SIEMENS

# Industrial Controls

# Motor management and control devices SIMOCODE pro

System Manual

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## Legal information

### Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

**⚠ DANGER**

indicates that death or severe personal injury **will** result if proper precautions are not taken.

**⚠ WARNING**

indicates that death or severe personal injury **may** result if proper precautions are not taken.

**⚠ CAUTION**

indicates that minor personal injury can result if proper precautions are not taken.

**NOTICE**

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

### Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

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### Disclaimer of Liability

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# Introduction

# 1

## 1.1 What is SIMOCODE pro?

SIMOCODE pro (SIRIUS Motor Management and Control Device) is a flexible motor management system for motors with constant speeds in low-voltage applications.

SIMOCODE pro optimizes the link between the control system and the motor feeder, increases plant availability and allows significant savings to be made during installation, commissioning, operation and maintenance.

SIMOCODE pro is installed in the motor control center or in the low-voltage switchgear system and links the higher-level automation system and the motor feeder intelligently. It comprises the following functions:

- Multifunctional and electronic full motor protection, independently of the automation system
- Integrated control functions for motor control instead of hardware
- Detailed operational data, service data, and diagnostic data
- Fail-safe shutdown up to SIL3
- Open communication through PROFINET, Modbus TCP, and EtherNet/IP
- Parameterization with the SIMOCODE ES (TIA Portal) software package

Only the switching and short-circuit protection mechanisms of the main circuit (contactors, circuit breakers, fuses) are additionally needed.

# 1.2 Important notes

## Purpose of this manual

The SIMOCODE pro System Manual describes in detail the motor management system and its functions. It contains information about configuring, commissioning, service and maintenance.

In addition to help on how to identify and rectify faults in the event of a malfunction, you will also find information specifically intended for service and maintenance personnel.

## Required basic knowledge

To understand this manual you will require basic knowledge of low-voltage controls and distribution, digital circuit engineering and automation technology.

## Scope of validity of the system manual

The system manual is applicable for the specified system components of SIMOCODE pro. It contains descriptions of the components that are valid at the time of publication.

## Manual Collection

A Manual Collection (https://support.industry.siemens.com/cs/ww/en/view/109743951), a collection of the following five SIMOCODE pro manuals, is available in Industry Online Support:

- SIMOCODE pro - 1 Getting Started
- SIMOCODE pro - 2 System Manual
- SIMOCODE pro - 3 Parameterization
- SIMOCODE pro - 4 Applications
- SIMOCODE pro - 5 Communication.

## SIMOCODE pro response tables

You can parameterize specific responses (deactivation, signaling, warning, tripping, delaying) for various SIMOCODE pro functions, such as overload. These responses are always displayed in tabular form:

- "X" = Applicable
- "—" = not applicable
- Factory settings are identified with a "d" for "default" in parentheses.

| Response | Function 1 | Function 2 | Function 3 |
|---|---|---|---|
| Tripping | — | X (d) | X |
| Warning | X (d) | X | — |
| Signaling | X | X | — |

| Response | Function 1 | Function 2 | Function 3 |
|---|---|---|---|
| Deactivated | X | X | X (d) |
| Delay | 0 to 25.5 s (default: 0) | — | — |

Brief description of the responses:

- Tripping: The QE* contactor controls are tripped. A fault message is generated which is available as diagnostics via the communication bus. The fault message and the device-internal signal remain on until the appropriate length of time has elapsed or the cause of the fault has been eliminated and acknowledged.
- Warning: In addition to the device-internal signal, a warning signal is generated that is available as diagnostics via the communication bus.
- Signaling: Only a device-internal signal is generated, which can be further processed as required.
- Deactivated: The appropriate function is switched off, no signals are generated.

A delay time can also be set for specific responses.

## Operating instructions and further information

- Please read the operating instructions of the respective components (Operating instructions (https://support.industry.siemens.com/cs/ww/en/ps/16027/man))
- In addition to the SIMOCODE pro manual collection, the following manuals are available to you:
  - The system manual "SIMATIC PROFINET System Description" (https://support.automation.siemens.com/WW/view/en/19292127)
  - The manual "Fault-tolerant S7-400H systems" (https://support.automation.siemens.com/WW/view/en/1186523)
  - Programming manual "PROFINET IO - from PROFIBUS DP to PROFINET IO" (https://support.automation.siemens.com/WW/view/en/19289930)
  - The application description "Saving Energy with SIMATIC S7 and ET200 S" (https://support.automation.siemens.com/WW/view/en/41986454)

## More information

You can find more information on the internet at:

- SIMOCODE pro (https://www.siemens.com/simocode)
- Information and Download Center (https://support.industry.siemens.com/cs/ww/en/ps/16027/cat)
- Siemens Industry Online Support (SIOS) (https://support.industry.siemens.com/cs/ww/en/ps)
- Certificates (https://support.industry.siemens.com/cs/ww/en/ps/16027/cert).

## Disclaimer of liability

The products described have been developed to implement safety-related functions as part of a complete plant or machine. In general, a complete safety system consists of sensors, evaluation units, signaling devices and methods for safe tripping. The manufacturer is responsible for ensuring safe functioning of the complete plant or machine. Siemens AG, its subsidiaries, and associated companies (hereinafter referred to as "Siemens") are not in a position to guarantee every characteristic of a complete plant or machine not designed by Siemens.

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# 1.3 Siemens Industry Online Support

## Information and service

At Siemens Industry Online Support you can obtain up-to-date information from our global support database:

- Product support
- Application examples
- Forum
- mySupport

**Link:** Siemens Industry Online Support (https://support.industry.siemens.com/cs/de/en)

## Product support

You can find information and comprehensive know-how covering all aspects of your product here:

- **FAQs**
  Answers to frequently asked questions
- **Manuals/operating instructions**
  Read online or download, available as PDF or individually configurable.
- **Certificates**
  Clearly sorted according to approving authority, type and country.
- **Characteristics**
  For support in planning and configuring your system.
- **Product announcements**
  The latest information and news concerning our products.
- **Downloads**
  Here you will find updates, service packs, HSPs and much more for your product.
- **Application examples**
  Function blocks, background and system descriptions, performance statements, demonstration systems, and application examples, clearly explained and represented.
- **Technical data**
  Technical product data for support in planning and implementing your project

**Link:** Product support (https://support.industry.siemens.com/cs/ww/en/ps)

## mySupport

The following functions are available in your personal work area "mySupport":

- **Support Request**
  Search for request number, product or subject
- **My filters**
  With filters, you limit the content of the online support to different focal points.

- **My favorites**
  With favorites you bookmark articles and products that you need frequently.
- **My notifications**
  Your personal mailbox for exchanging information and managing your contacts. You can compile your own individual newsletter in the "Notifications" section.
- **My products**
  With product lists you can virtually map your control cabinet, your system or your entire automation project.
- **My documentation**
  Configure your individual documentation from different manuals.
- **CAx data**
  Easy access to CAx data, e.g. 3D models, 2D dimension drawings, EPLAN macros, device circuit diagrams
- **My IBase registrations**
  Register your Siemens products, systems and software.

# 1.4 Siemens Industry Online Support app

### Siemens Industry Online Support app

The Siemens Industry Online Support app provides you access to all the device-specific information available on the Siemens Industry Online Support portal for a particular article number, such as operating instructions, manuals, data sheets, FAQs etc.

The Siemens Industry Online Support app is available for Android and iOS:

Android

iOS

## 1.5 Support Request

After you have registered, you can use the Support Request form in the online support to send your question directly to Technical Support:

| | |
|---|---|
| **Support Request:** | Internet (https://siemens.com/support-request) |

## 1.6 Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit
https://www.siemens.com/industrialsecurity.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under
https://www.siemens.com/cert.

# 1.7 Current information about operational safety

### Important note for maintaining operational safety of your system

**DANGER**

**Hazardous Voltage**

**Can Cause Death, Serious Injury or Risk of Property Damage**

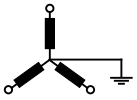
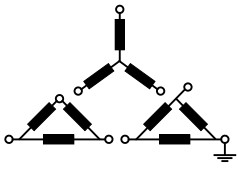
**Please take note of our latest information!**

Systems with safety-related characteristics are subject to special operational safety requirements on the part of the operator. The supplier is also obliged to comply with special product monitoring measures. We therefore also provide information in the newsletters Industrial controls (https://new.siemens.com/global/en/products/automation/industrial-controls/forms/newsletter.html) and Safety Integrated (https://new.siemens.com/global/en/products/automation/topic-areas/safety-integrated/factory-automation/newsletter.html) about new products, further technical developments as well as standards and guidelines.

# 1.8 Information for SIMOCODE pro regarding IEC60947-4-1:2018

## 1.8.1 Line system configurations

The voltage information regarding the SIMOCODE pro current and current/voltage measuring modules is valid for the following line system configurations according to IEC 60947-4-1:

| Three-phase four-wire systems | Three-phase three-wire systems |
|---|---|
|  |  |
| [V] | [V] |
| -- | 230 |
| 230 / 400 | 400 |
| 260 / 440 | 440 |
| -- | 500 |
| 400 / 690 | 600 |

The nameplates of the current/voltage measuring modules state a maximum line voltage of 400/690 V.

## 1.8.2 Protection of inputs and outputs

The specifications for short-circuit protection (fuses or miniature circuit breakers) are available for the device connections of the main circuit and the auxiliary circuit.

In order to ensure a holistic view for the protection of the device connections, the manufacturer is obliged to provide all relevant information for short-circuit protection and overcurrent protection.

If, for example, device connections for the control supply voltage, the supply voltage, or digital inputs/digital outputs are not connected to self-limiting current sources or energy sources, you can find the relevant information in the section "Mounting, wiring, connecting" of the System Manual and the technical data sheets in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

## 1.8.3 Touch current

A protective impedance is present in each of the 3UF711x-1xA01-0 / 3UF712x-1xA01-0 current/voltage measuring modules. This protective impedance is 7.2 MΩ per phase (product version E04 and higher).

**⚠ DANGER**

**Hazardous touch current**

When connecting multiple SIMOCODE systems in parallel, make sure that no hazardous touch current occurs.

The SIMOCODE basic units in the 110-240 V AC/DC version include galvanic isolation. This avoids the effect of parallel connection via a central supply voltage for multiple systems when these basic units are used.

The SIMOCODE basic units in the 24 V DC version do not include galvanic isolation.

**NOTICE**

**PELV power supply required**

When using numerous current/voltage measuring modules with these basic devices, deploy a PELV power supply, for example, to prevent a potential touch current.

**NOTICE**

**Ground leakage current**

Pay attention to any resulting ground leakage current that may occur.

# 1.9 Information about third-party software

## Third-party software components

This product, this solution or this service ("product") contains the third-party software components listed below. These consist either of open source software that is licensed under a license recognized by Open Source Initiative (http://www.opensource.org) or a license defined by Siemens as being comparable ("OSS") and/or commercial software or freeware. With regard to the OSS components, the relevant OSS terms and conditions take priority over all other terms and conditions applicable to this product.

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## 1.10 Recycling and disposal

For environmentally-friendly recycling and disposal of your old device, contact a company certified for the disposal of used electrical and electronic equipment, and dispose of the device as specified in the regulations for your particular country.

## 1.11 Device series

The following functionally graduated device series are available for SIMOCODE pro:

- Basic units:
  SIMOCODE pro C - the compact system for PROFIBUS DP communication with a direct-on-line and reversing starter function and/or for controlling a circuit breaker (MCCB).
- General Performance units:
  - SIMOCODE pro S - the smart system for PROFIBUS DP with direct-on-line, reversing, and star-delta starter function or for controlling a circuit breaker or soft starter. Its expandability with a multifunction module ensures there are always plenty of inputs and outputs. It enables precise ground-fault monitoring via the 3UL23 residual current transformer and temperature measurement.
  - SIMOCODE pro V PN GP - the smart system for PROFINET with direct-on-line, reversing, and star-delta starter function or for controlling a circuit breaker or soft starter. Its expandability with an expansion module ensures there are always plenty of inputs and outputs, precise ground-fault monitoring via the 3UL23 residual current transformer and temperature measurement.
- High Performance units:
  SIMOCODE pro V – the variable system that offers numerous functions, such as voltage measurement and fail-safe shutdown, in addition to all the SIMOCODE pro C/pro S functions. Devices are available for the following communication protocols:
  - PROFIBUS DP
  - Modbus RTU
  - PROFINET
  - EtherNet/IP.

See Check list for selecting a device series (Page 61).

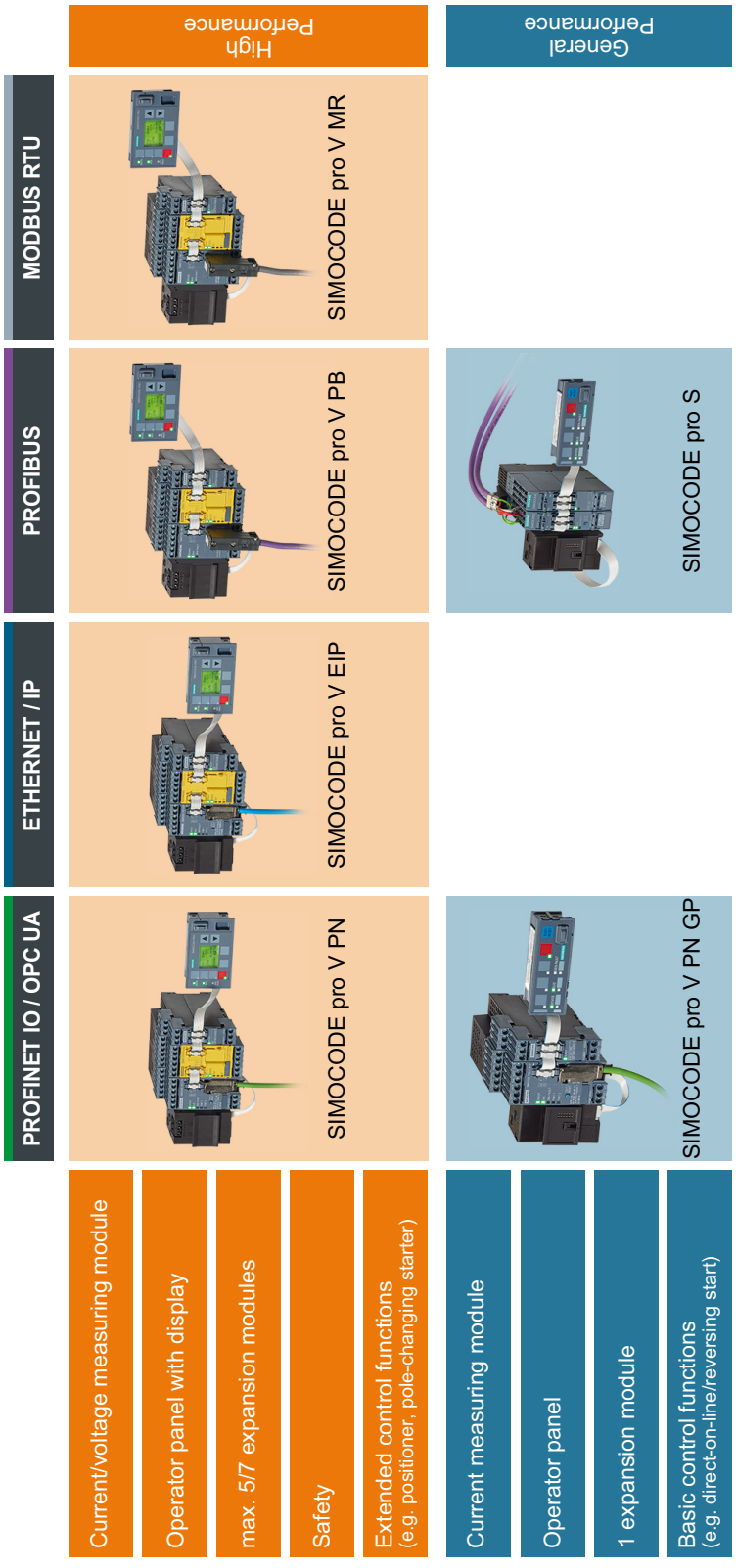



Figure 1-1 SIMOCODE pro device series

## 1.12 Modules, interfaces, configuration options

For each feeder, every system comprises a basic unit and a separate current measuring module. Both modules are connected to each other electronically via the system interface, by means of a connecting cable, and can be installed together as a unit (behind one another) or separately (side-by-side). An operator panel can also be connected optionally via the second system interface on the basic unit, and installed in the switchgear cabinet door. The current measuring module and the operator panel are connected to the basic unit via connecting cables, which also supply the power. More inputs, outputs and functions can be added to the SIMOCODE pro S, pro V PB, pro V MR, pro V EtherNet/IP and pro V PN /pro V PN GP basic units by means of optional expansion modules, thus supplementing the inputs and outputs already existing on the basic unit. All modules are connected by connecting cables. The connecting cables are available with different lengths (ribbon cable 0.025 m, 0.1 m, 0.15 m, 0.3 m, 0.5 m; round cable 0.5 m, 1.0 m, 2.5 m).

| NOTICE |
| --- |
| **Maximum length of the connecting cable**<br>The total length of all cables must not exceed 3 m on either of the system interfaces of the basic unit! |

| NOTICE |
| --- |
| **The maximum distance between modules**<br>The maximum distance between the modules (e. g. between the basic unit and the current measuring module) must not exceed 2.5 m. |

Additional control programs (star-delta starters, Dahlander starters, pole-changing starters, soft starters, each program also possible in combination with reversing starter, solenoid valve and positioner) are integrated in SIMOCODE pro V High Performance units. The SIMOCODE pro V device type is also particularly versatile. Its functionality can be expanded, if required, for example:

- The number and type of binary inputs and outputs can be increased in stages and adapted.
- A current/voltage measuring module can be used for additional voltage measurement and for monitoring power-related measured values (power management).
- A temperature module enables the evaluation of several analog temperature sensors.
- A ground-fault detection system can be integrated together with a residual-current transformer.
- An analog module extends the system by additional analog inputs and outputs, for example, for fill-level or flow-rate monitoring.
- An operator panel with display (OPD) is available as an alternative to the standard operator panel (OP) (restriction in the case of the SIMOCODE pro V PB: from version *E03*).

A special current/voltage measuring module for dry-running protection of centrifugal pumps in hazardous areas by monitoring the active power can be used in combination with the following high performance devices with PTB 18 ATEX 5003 X/ ITS21UKEX0455X:

- SIMOCODE pro V PB from version *E16*
- SIMOCODE pro V PN from version *E13*
- SIMOCODE pro V EIP from version *E04*

SIMOCODE pro C and SIMOCODE pro S are upwardly-compatible with SIMOCODE pro V. This means you can combine different series in your plant according to functional requirements.

Depending on functional requirements, the systems can be used simultaneously in a low-voltage switchboard without any problems and without any additional effort.

Parameterization of SIMOCODE pro C or SIMOCODE pro S can be transferred without a problem.

# Advantages/benefits/configuration with SIMOCODE pro

# 2

## 2.1 Advantages/benefits

- The quantity of cabling required between the motor feeder and the PLC is reduced significantly by connecting the entire motor feeder to the process control system via the fieldbus (see Figures "SIMOCODE pro, integrated in the main circuit, control circuit and at automation level (PLC)")
- Automated processes are decentralized by means of configurable control and monitoring functions in the feeder. This saves automation system resources and ensures that the feeder is fully functional and protected even if the control system or bus system fails.
- By recording and monitoring operating, service and diagnostics data in the feeder and process control system, plant availability is increased, and the feeder is easier to service and maintain.
- The user can implement plant-specific requirements for every motor feeder thanks to the high degree of modularity.
- SIMOCODE pro provides compact solutions and different levels of functions for every customer application.
- By replacing the control circuit hardware with an integrated control function, the quantity of required hardware components with wiring is reduced. This drives down storage costs and limits potential wiring errors.
- Using electronic full motor protection allows the motors to be used more efficiently and ensures that the tripping characteristic remains stable and the tripping response stays the same, even after many years.

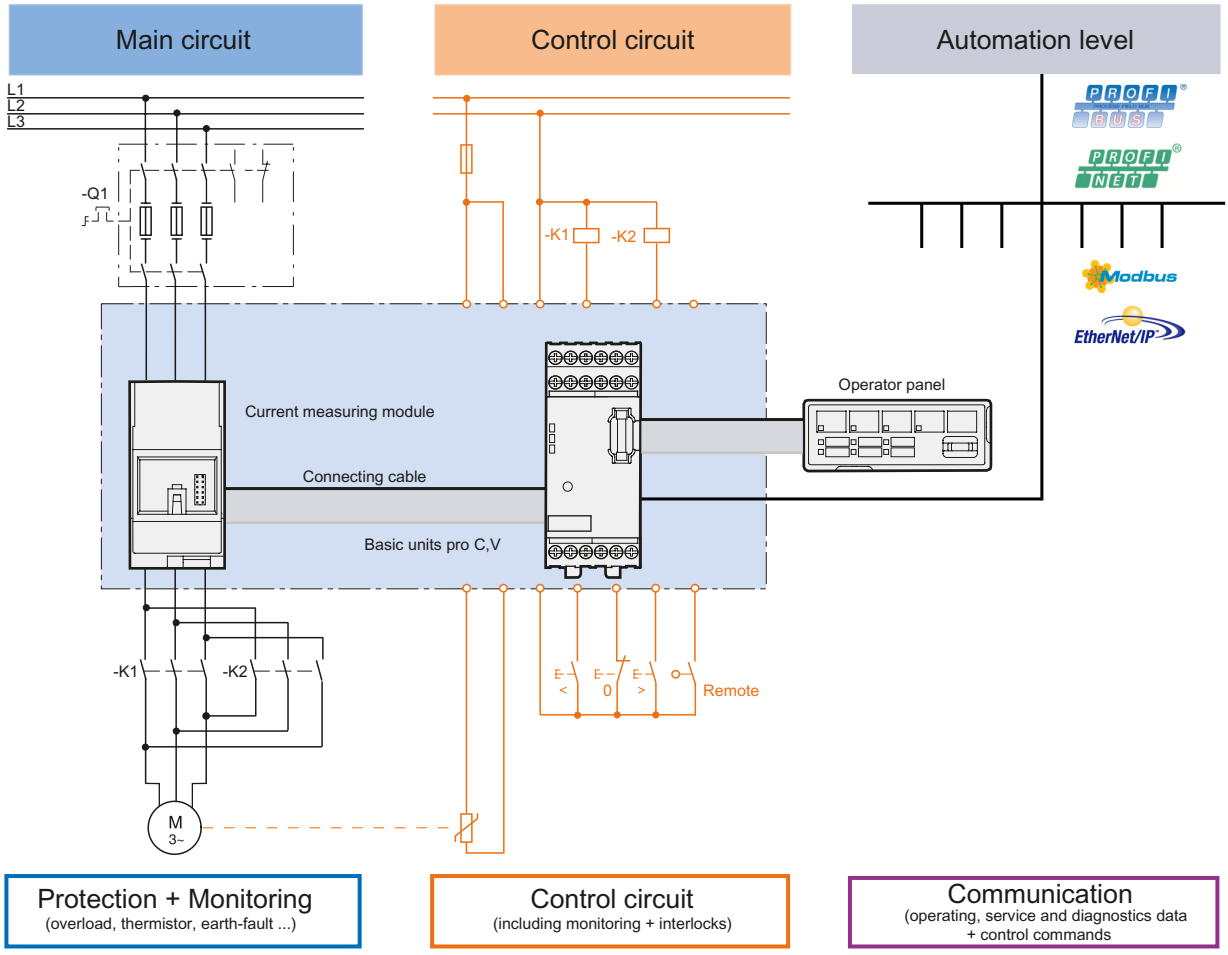



Figure 2-1 SIMOCODE pro C, pro V, integrated in the main circuit, control circuit and at automation level (PLC)

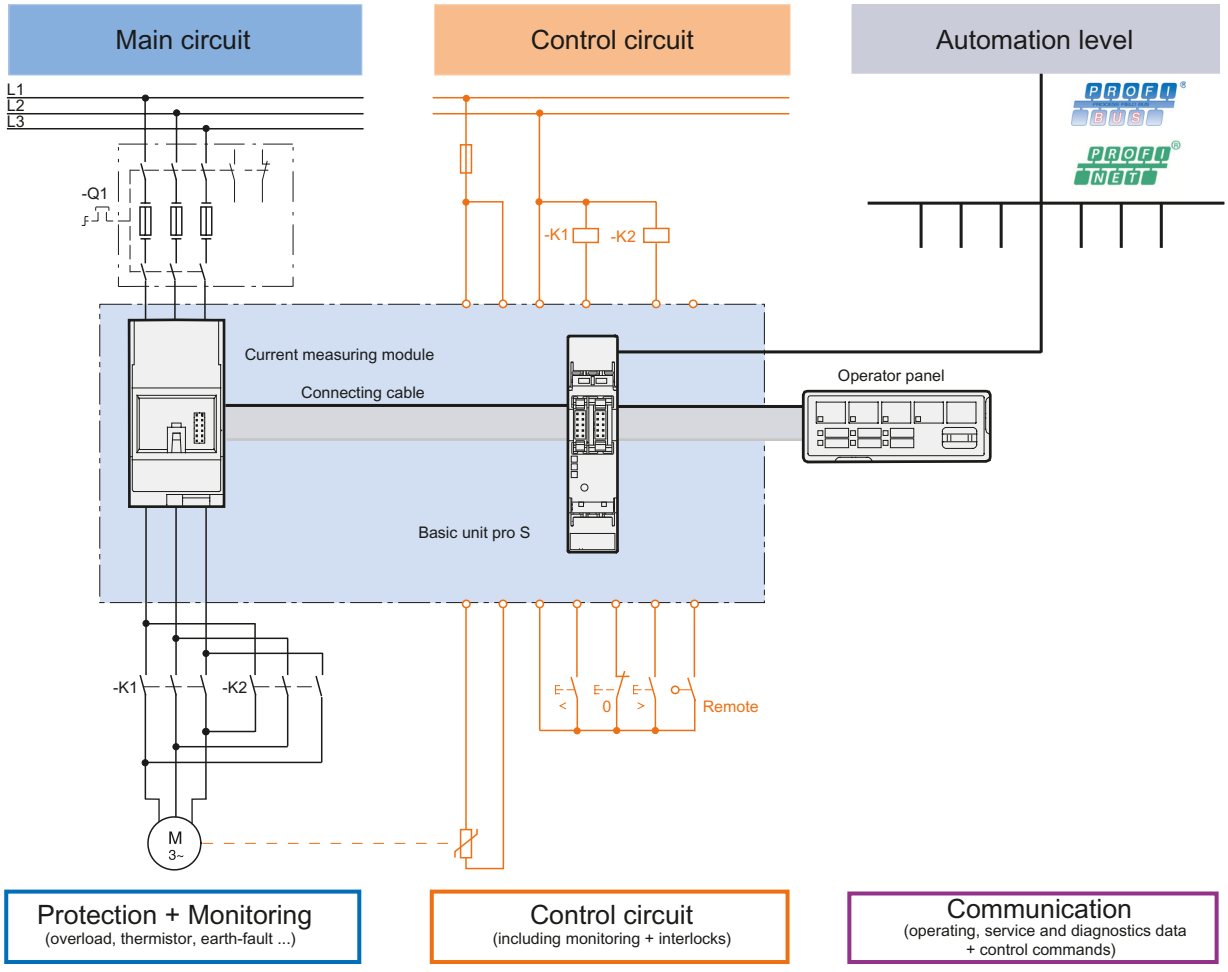



Figure 2-2 SIMOCODE pro S, integrated in the main circuit, control circuit and at automation level (PLC)

## 2.2 Independent operation

SIMOCODE pro protects and controls the motor feeder, independently of the automation system. Even if the automation system (PLC) fails, or if communication is disrupted, the motor feeder remains fully protected and controllable. SIMOCODE pro can be used without being connected to the fieldbus. This can easily be connected later, if required.

# 2.3 Simplifying configuration with SIMOCODE pro

### Conventional configuration without SIMOCODE pro

Individual components are used for control, monitoring and signal pre-processing. The component and wiring requirements for this type of configuration are as follows:

- Use and wiring of overload relays, thermistor evaluation devices, current transformers and analog/digital converters
- Wiring of the control circuit
- Connection of start / stop control devices
- The contactor must be brought into locking mode via the auxiliary switches
- Wiring of the interlocks

The following figure illustrates the conventional configuration of a direct starter:

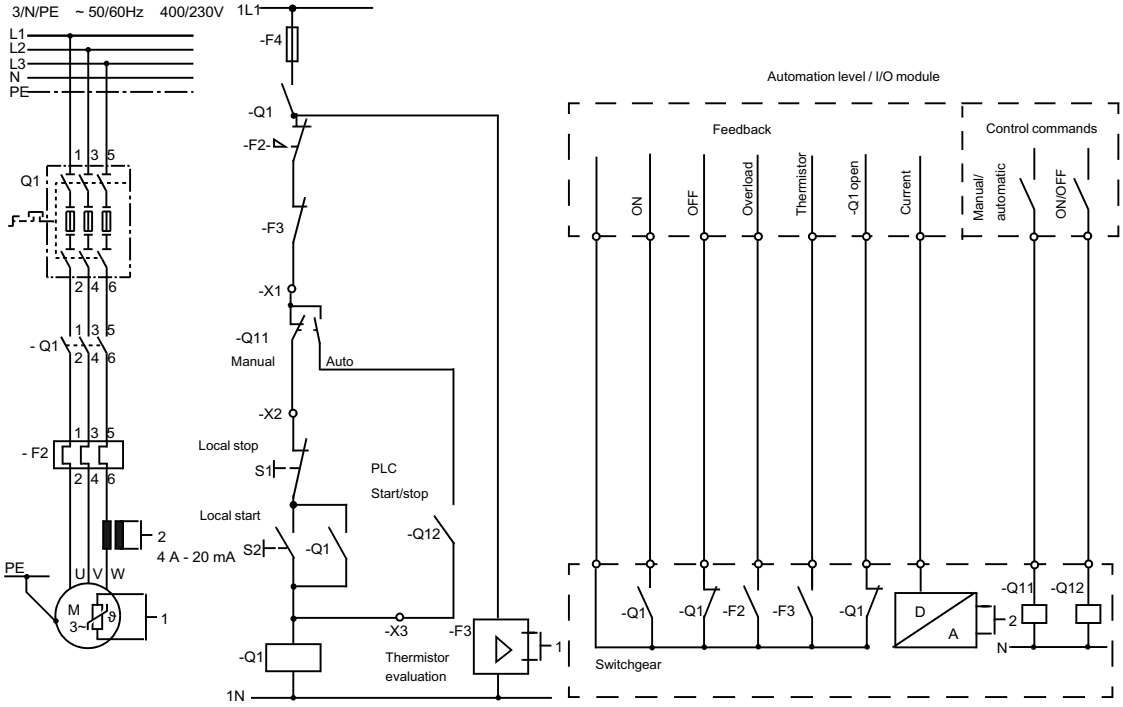



Figure 2-3 Conventional configuration of a motor feeder (direct starter)

### Configuration with SIMOCODE pro

SIMOCODE pro only is used to perform all control, monitoring and signal pre-processing functions.
The advantages of this configuration are as follows:

- Additional overload relays, thermistor evaluation devices, current transformers and analog/ digital converters are not necessary.
- The wiring of the control circuit (interlocking) is simplified.

- The start and stop switches are wired directly to the inputs of the basic unit.
- The contactor coil is energized via the output of the basic unit. An auxiliary contact for locking is not required.

The following figure illustrates a configuration with SIMOCODE pro connected to PROFIBUS:

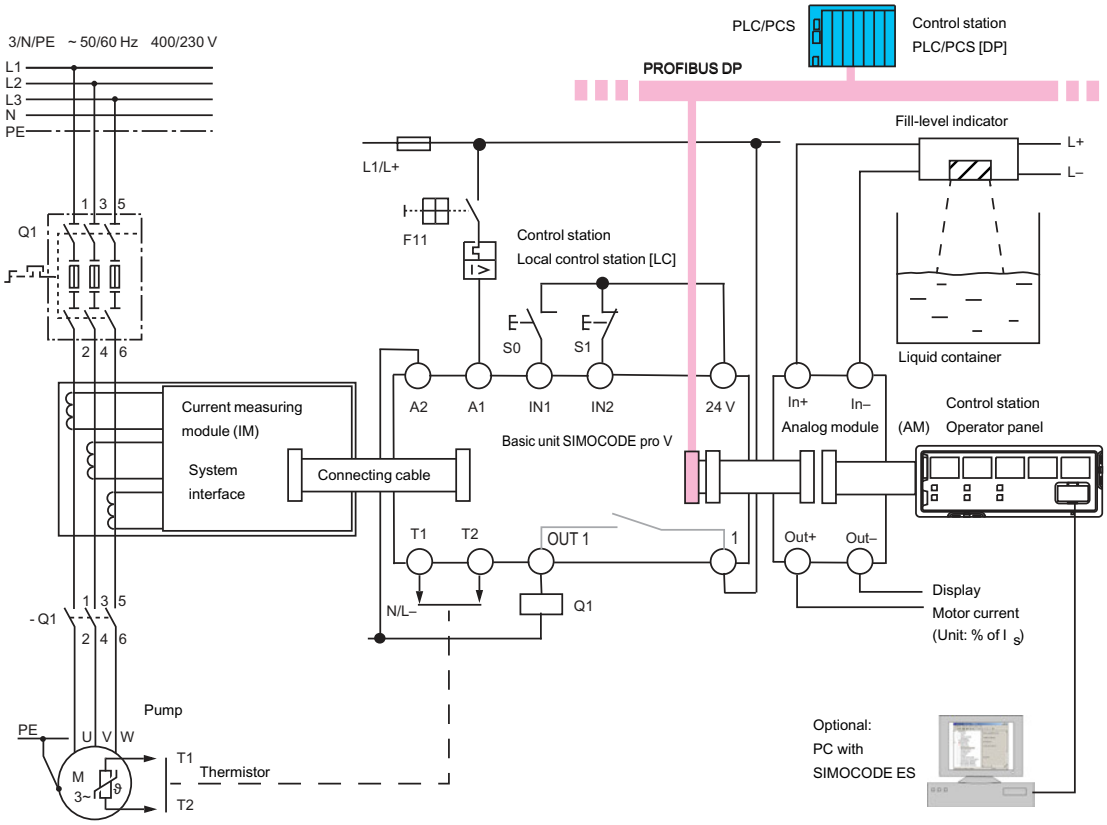



Figure 2-4 Configuration of a load feeder (direct-on-line starter) with SIMOCODE pro

## 2.4 Typical configuration

The following figures show typical hardware configurations:

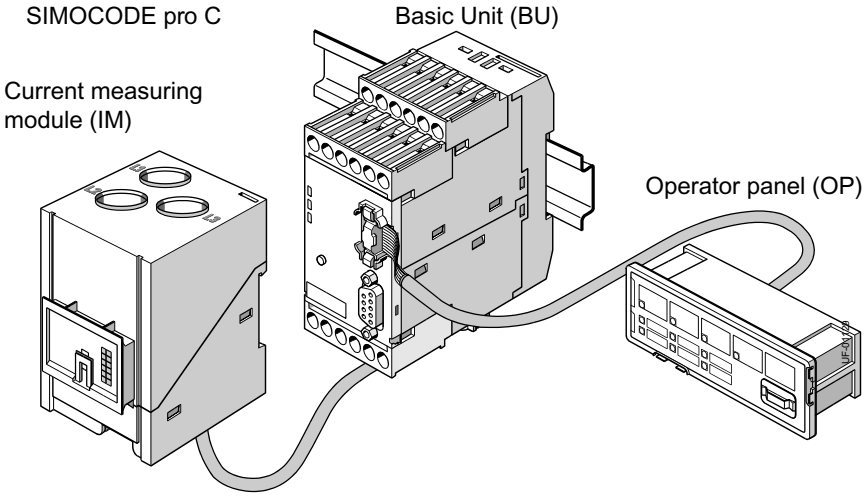



Figure 2-5 Typical SIMOCODE pro C hardware configuration

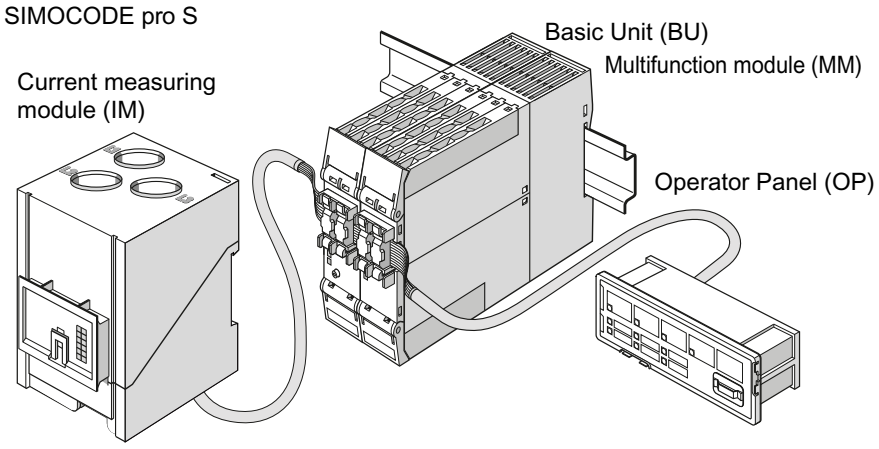



Figure 2-6 Typical SIMOCODE pro S hardware configuration

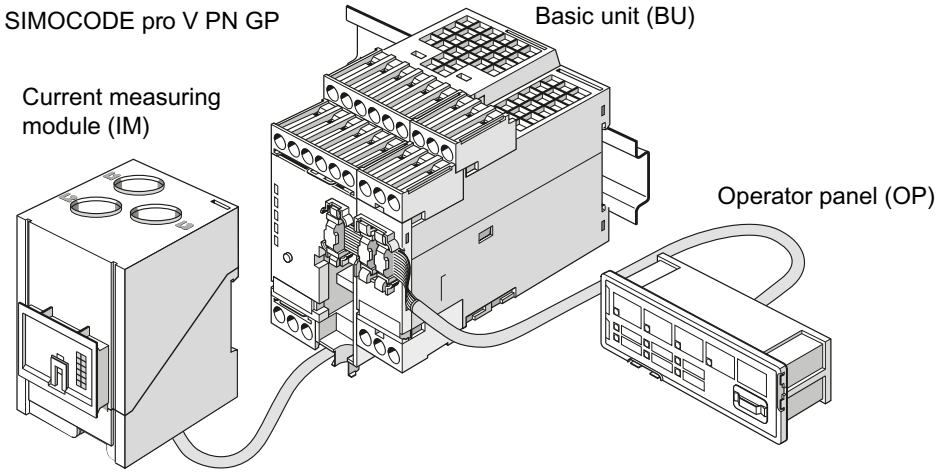



Figure 2-7 Typical SIMOCODE pro V PN GP hardware configuration

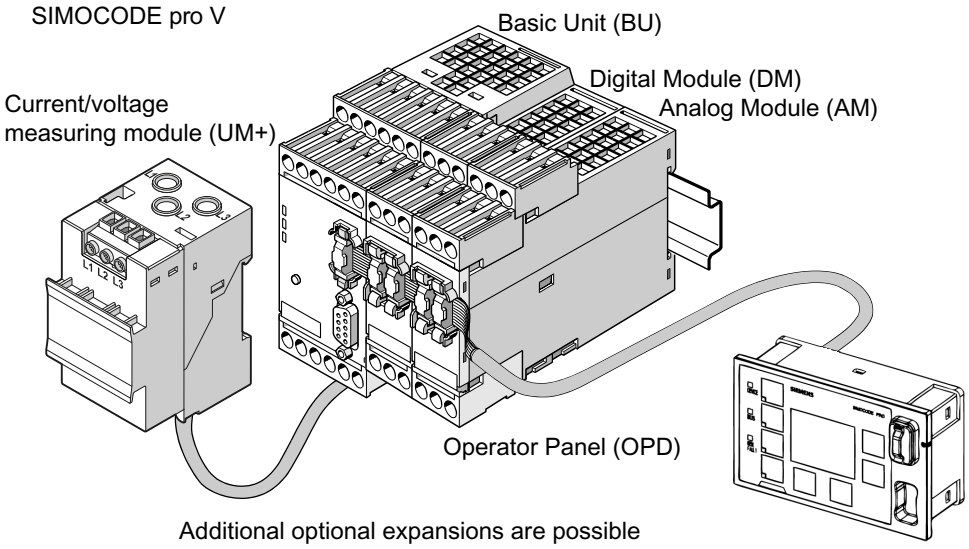



Figure 2-8 Typical SIMOCODE pro V PROFIBUS/Modbus RTU hardware configuration

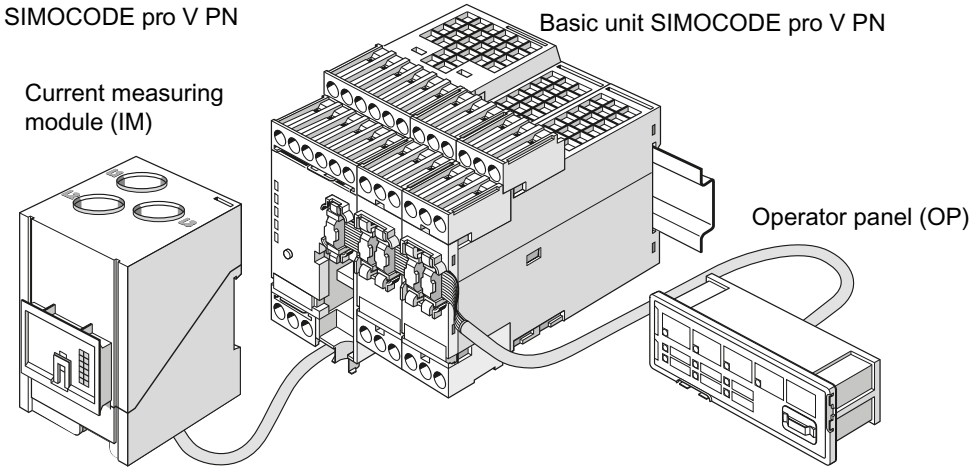



Figure 2-9 Typical SIMOCODE pro V PN/EtherNet/IP hardware configuration

For information about system components, see Chapter Description of system components (Page 81).

# Areas of application

# 3

SIMOCODE pro is often used for automated processes where plant downtimes are very expensive (e.g. steel or cement industry) and where it is important to prevent plant downtimes through detailed operating, service and diagnostics data or to localize the fault very quickly in the event of a fault.

SIMOCODE pro is modular and space-saving and suited especially for operation in motor control centers (MCC) in the process industry and in power plants.

Applications:

- Protection and control of motors:
  - in hazardous areas for different types of protection according to the ATEX Directive 2014/34/EU (see also Section Safety and commissioning information for Ex areas (Page 295))
  - in hazardous areas in accordance with the Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016 (S.I. 2016:1107), and associated amendments
  - Heavy-starting motors (paper, cement and metal industries; water management)
  - In high-availability plants (chemical, oil, and raw material processing industry, power plants)
- Dry-running protection of centrifugal pumps by active power monitoring of motors and shutdown if power consumption falls below a minimum value – especially also including hazardous areas
  - Type of ignition protection b "Control of ignition sources", ignition protection system b1, approval according to DIN EN ISO 80079-37
  - Approval according to ATEX Directive 2014/34/EU and IEC Ex
  - Approval in accordance with the Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016 (S.I. 2016:1107), and associated amendments

  See also Chapter Dry-running protection for centrifugal pumps by active power monitoring (Page 305) in the safety and commissioning information for Ex areas.

SIMOCODE pro is especially designed for the chemical industry (including oil and gas), the steel industry, water management, and the paper, pharmaceutical, cement and glass industries. Further applications include power plant engineering and diamond, gold and platinum mines. Based on the experience gained with the predecessor system SIMOCODE DP, SIMOCODE pro has been tailored even more specifically to the requirements of these industries. The availability of motors and thus the entire process plays an important role in these industries. Downtimes caused by faults often lead to high costs. This is why it is even more important to detect potential faults early on and to initiate targeted, preventative measures. SIMOCODE pro provides the user with a motor management system based on years of experience and the latest technology.

# Features

# 4

**Multifunction, electronic full motor protection for rated motor currents up to 820 A**

SIMOCODE pro provides comprehensive protection of the motor feeder by means of a combination of delayable, multi-level protection and monitoring functions:

- Current-dependent delayed electronic overload protection (CLASS 5E to 40E)
- Thermistor motor protection
- Phase failure/unbalance protection
- Stalled rotor protection
- Monitoring of adjustable limit values for the motor current
- Voltage monitoring
- Active power monitoring
- Dry-running protection for centrifugal pumps by means of active power monitoring
- Monitoring of cos phi (no-load operation/load shedding)
- Ground-fault monitoring
- Temperature monitoring, e.g. using Pt100/Pt1000
- Monitoring of operating hours
- Monitoring of downtimes
- Monitoring the number of starts within a specific period of time
- Safety-related tripping of motor feeders, e.g. fail-safe tripping in the process industry, locally or via fieldbus (see manual "SIMOCODE pro Safety fail-safe digital modules" (https://support.automation.siemens.com/WW/view/en/50564852))

**Recording of measured curves**

SIMOCODE pro is able to record measured curves and can, for example, illustrate the characteristic curve of the motor current during motor startup.

**Flexible motor control with integrated control functions (instead of extensive hardware interlocks):**

SIMOCODE pro has many pre-defined, integrated motor control functions, including all necessary connections and interlocks:

- Overload relay
- Direct starter (direct-on-line starter)
- Reversing starter
- Star-delta starter, also with direction reversal
- Two speeds, motors with separate windings (pole-changing starter), also with direction of rotation reversal

- Two speeds, motors with separate Dahlander windings, also with direction of rotation reversal
- Positioner control
- Solenoid valve control
- Actuation of a circuit breaker
- Soft starter control, possibly combined with reversing starter

These control functions are pre-defined in SIMOCODE pro and can be assigned freely to device inputs and outputs.

These pre-defined control functions can also be adjusted flexibly to meet customer requirements of the motor feeder, without requiring additional auxiliary relays in the control circuit. This is achieved by means of freely parameterizable logic modules (truth tables, counters, timers, pulse width modulators, etc.) and standard functions (power failure monitoring, emergency start, external fault monitoring, etc.).

**Detailed operating, service and diagnostics data:**

SIMOCODE pro provides a range of operating, service and diagnostics data and helps to detect impending faults in good time and stop these occurring with preventative measures. If a fault occurs, it can be diagnosed, traced and resolved within a short period of time. Plant downtime is thus reduced to a minimum or does not occur at all. See Chapter Overview of functions (Page 45).

**Communication:**

The SIMOCODE pro basic units have integrated communication bus interfaces and are thus able to replaces all individual wiring and distribution boxes normally required to exchange data with a higher-level automation system with a single bus cable.

**Communication through PROFIBUS:**

PROFIBUS stands for Process Field Bus. PROFIBUS is a multi-vendor standard for the networking of field devices (e.g. PLCs, drives, actuators, or sensors) in compliance with the European process and fieldbus standard (PROFIBUS standard EN 50170, Volume 2, -PROFIBUS). It specifies the functional, electrical and mechanical characteristics of a bit-serial fieldbus system.

PROFIBUS is a bus system that networks PROFIBUS-compatible automation systems and field devices at the cell and field level. PROFIBUS is available with the DP (= Distributed Peripherals), FMS (= Fieldbus Message Specification), PA (= Process Automation), or TF (= Technological Functions) protocol.

PROFIBUS DP is a bus system with the DP (distributed I/O) protocol. The main task of PROFIBUS DP is to manage the fast, cyclic data exchange between the central DP devices and the I/O devices.

PROFIBUS DPV1 is the extension of the DP protocol. It enables acyclic data exchange of parameter, diagnostic, receive and test data.

SIMOCODE pro C, pro S and pro V support, among others:

- Baud rates up to 1.5 Mbit / s or 12 Mbit / s
- Automatic baud rate detection
- Communication with one master (class 1) and up to two masters (class 2)

- Time stamp with high timing precision (SIMATIC S7) for SIMOCODE pro V
- Cyclic services (DPV0) and acyclic services (DPV1)
- DPV1 communication downstream from the Y-Link.

See Chapter "PROFIBUS communication" in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960).

**Communication via PROFINET:**

PROFINET (Process Field Network) is the open Industrial Ethernet Standard from Profibus & Profinet International (PI) for automation.

Within the context of Totally Integrated Automation (TIA), PROFINET is the systematic continuation of PROFIBUS DP, the established fieldbus, and Industrial Ethernet, the communication bus for the cell level. Experiences from both systems have been and are being integrated in PROFINET.

**SIMOCODE pro V PN** (High Performance unit) has two integrated PROFINET interfaces and provides communication functions via PROFINET IO with the following properties:

- Integrated switch with two ports
- Device replacement without removable medium/programming device
- Shared Device in combination with DM-F PROFIsafe modules
- Media redundancy
- System redundancy
- Dynamic reconfiguration (CiR)
- RT communication
- Support for PROFIenergy

**SIMOCODE pro V PN GP** (General Performance unit) has one/two integrated PROFINET interface(s) and provides communication functions via PROFINET IO with the following properties:

- Integrated switch with two ports (device with two ports)
- Device replacement without removable medium/programming device
- Media redundancy (device with two ports)
- System redundancy
- Dynamic reconfiguration (CiR)
- RT communication
- Support for PROFIenergy

See Chapter "PROFINET communication" in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960).

**Communication via Modbus:**

Modbus RTU (Remote Terminal Unit) is a standard protocol for network communication and uses the electrical RS485 connection for serial data transmission between Modbus devices in the network.

Modbus RTU uses a master/slave network in which the entire communication is triggered by only one master device while the slaves can only respond to the request of the master. The master sends a request to a slave address and only this slave address responds to the command (exception: broadcast frames to slave address 0 that are not acknowledged by the slaves).

SIMOCODE pro V Modbus devices have been developed in accordance with the "MODBUS over serial line specification and implementation guide" (available at www.modbus.org (http://www.modbus.org)). You can find the relevant information on establishing Modbus RTU communication in this specification. The key points for a Modbus RTU communication network ("Multipoint System requirements") listed in the specification apply equally for a communication network with SIMOCODE devices.

See Chapter "Modbus communication" in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960).

**Communication via EtherNet/IP:**

EtherNet/IP (EtherNet Industrial Protocol, often simply called EIP) is a real-time Ethernet that is used mainly in automation engineering. EtherNet/IP was developed by Allen-Bradley and was later handed over to the Open DeviceNet Vendor Association (ODVA) as an open standard. See Open DeviceNet Vendor Association (http://www.odva.org).

Besides PROFINET and Modbus/TCP, EtherNet/IP is an Ethernet-based fieldbus that is currently widely spread.

SIMOCODE pro V EtherNet/IP devices were developed in compliance with the EtherNet/IP standard and have the following properties:

- Integrated switch with two ports
- Media redundancy via Device Level Ring (DLR)
- System redundancy (as of E03).

See Chapter "EtherNet/IP communication" in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960).

# Overview of functions

# 5

## 5.1 Protection functions

Detailed description: See Chapter "Motor protection" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

### Overload protection

Current-dependent electronic protection of three-phase and AC motors with adjustable tripping characteristics (class times) according to IEC 60947-4-1 requirements.

### Unbalance protection

Protects motors from excessive temperatures caused by excessive phase unbalance.

### Phase failure protection

Protects motors from excessive temperatures caused by phase failure.

### Stalled rotor protection

Immediate trip after the motor current overshoots an adjustable threshold.

### Thermistor protection

SIMOCODE pro provides the option of connecting thermistor sensors (binary PTC) for monitoring the motor temperature.

### Dry-running protection for centrifugal pumps

The following high performance devices with PTB 18 ATEX 5003 X / ITS21UKEX0455X can be used to implement dry-running protection of centrifugal pumps (non-electrical devices) through active power monitoring and motor shutdown:

- SIMOCODE pro V PB from version *E16*
- SIMOCODE pro V PN from version *E13*
- SIMOCODE pro V EIP from version *E04*

This applies to centrifugal pumps with progressive flow characteristics, which are also suitable for pumping flammable media and are also installed in hazardous areas.

| **WARNING** |
| --- |
| **Installation in potentially explosive atmospheres** |
| SIMOCODE pro itself is not suitable for installation in potentially explosive atmospheres! |

If the active power, and thus the flow rate, falls below a minimum value, the motor - and thus the centrifugal pump - is switched off The devices support monitoring of the minimum flow rate for a freely selectable minimum value. A delay time (effective during operation including the pump's regular switch-off) can be specified to minimize the probability of incorrect tripping in addition to the parameter for the trip level of the minimum active power (which corresponds to a minimum flow rate). During the start-up procedure, operation with active power below the trip level can constitute a regular operating status of short duration (depending on the procedure used to open the pressure-side shut-off valve). For this reason, a start-up bridging time can be specified to prevent incorrect tripping during the start-up procedure.

The parameters can be entered using the "SIMOCODE ES" (TIA Portal) engineering software.

It is also possible to determine the trip level in a "teach-in" and to enter the further parameters with the aid of menu-guided input screens. Using this method, the operating point with optimum flow rate and the point with minimum flow rate are started up with real operating medium, as a result of which the trip level of the minimum active power is determined. The teach-in has to be repeated following any changes in the pump or system characteristics (e.g. as a result of changing the operating medium or of intervention in the plant configuration).

With regard to dry-running protection for centrifugal pumps, a current/voltage measuring module especially intended for this function is also required in addition to the basic unit.

See also:

- Chapter "Dry-running protection for centrifugal pumps by active power monitoring (Page 305)" in the safety and commissioning information for Ex areas
- Chapter "Dry-running protection for centrifugal pumps" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

## 5.2 Monitoring functions

Detailed description: See Chapters "Monitoring functions" and "Logic blocks" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

### Current limit monitoring

Current limit monitoring is used for process monitoring. This enables incipient anomalies in the system to be detected in good time. If a current limit is exceeded but still below the overload limit, it can, for example, indicate a dirty filter on a pump, or an increasingly sluggish motor bearing. If the current limit is undershot, it can be the first sign of a worn-out drive motor belt.

### Ground-fault monitoring

Residual current monitoring relays are used in industry to

- Protect systems from damage caused by residual currents
- Prevent production losses caused by unplanned downtime
- Perform maintenance to meet all demands.

Basic units have:

- An internal ground-fault monitoring system: For motors with a 3-wire connection, the basic unit calculates a possible fault current/ground-fault current from the total current via a current measuring module or a current / voltage measuring module. Internal ground-fault monitoring is only possible for motors with a 3-phase connection in networks that are either grounded directly or grounded with low impedance.
- External ground-fault monitoring in SIMOCODE pro S and SIMOCODE pro V [4)] : The external ground-fault monitoring using residual current transformer 3UL23 and ground-fault module is normally used in the following cases:
  - in cases in which power systems are grounded with high impedance
  - in cases, in which precise detection of the ground-fault current is necessary, for example, for condition monitoring.

  A ground-fault module can be used to create an additional input on the SIMOCODE pro V and SIMOCODE pro V PN GP basic units to connect a 3UL23 residual current transformer.
  A multifunction module can be used to create an additional input on the SIMOCODE pro S basic unit to connect a 3UL23 residual current transformer.
  With ground-fault detection using the 3UL23 residual current transformer, it is possible to determine the precise residual current as a measured value, and to define freely selectable warning and trip limits in a wide range from 30 mA - 40 A.
  See also Chapter "External ground-fault monitoring with 3UL23 residual current transformer" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

### Voltage monitoring [1)]

High Performance SIMOCODE pro V allows voltage monitoring of a three-phase current network or a single-phase network for undervoltage or further availability:

- Monitoring for undervoltage: Two-level monitoring for freely selectable limits. The response of SIMOCODE pro on reaching a prewarning level or trip level can be freely parameterized.
- Monitoring for further availability: Even when the motor is switched off, SIMOCODE pro can indicate the further availability of the feeder by measuring the voltage directly at the circuit breaker or fuses.

### Temperature monitoring [2)]

The SIMOCODE pro S, SIMOCODE pro V and SIMOCODE pro V PN GP devices offer the option of implementing analog temperature monitoring, e.g. of the motor windings or the bearings - SIMOCODE pro S with the multifunction module, SIMOCODE pro V/SIMOCODE pro V PN with the temperature module.

SIMOCODE pro S and SIMOCODE pro V support two-level monitoring for overtemperature for freely selectable limit values. The response of SIMOCODE pro on reaching a prewarning level or trip level can be freely parameterized and delayed. Temperature monitoring takes into account the highest temperature of all the sensor measuring circuits in use.

### Active power monitoring [1)]

The active power curve of a motor reflects its actual load. Excess load results in increased wear of the motor and, thus, may lead to premature motor failure. Excessively low active power can indicate no-load operation of the motor, for example.

High Performance SIMOCODE pro V offers the option of two-level active power monitoring for freely selectable upper and lower limits respectively. The response on reaching a prewarning level or trip level can be freely parameterized and delayed.

### Cos phi monitoring [1)]

The power factor fluctuates more than the motor current, particularly in the low-end performance range of a motor. For this reason, the monitoring of the power factor comes into consideration for the detection of faults. Examples: Breakage of a drive belt or drive shaft

High Performance SIMOCODE pro V enables two-level monitoring of the power factor cos phi for freely selectable minimum limits. The devices' response on reaching a prewarning level or trip level can be freely parameterized and delayed.

### Monitoring operating hours, stop time, and number of starts

SIMOCODE pro can monitor the operating hours and stop times of a motor to avoid plant downtimes due to failed motors caused by either running too long (wearing out) or being stopped for too long. For example, if an adjustable limit value is exceeded, a signal indicating that the relevant motor requires maintenance or replacement can be generated. After the motor has been replaced, the operating hours and stop times can be reset.

To avoid excessive thermal loads and premature aging of a motor, the number of motor starts in a selected time frame can be limited. The limited number of possible starts can be indicated by pre-warnings.

### Monitoring additional process variables via the analog module [3)]

High Performance SIMOCODE pro V allows measuring and monitoring of any other process variables via the analog module.

For example, the fill level can be monitored to protect a pump against dry operation, or a differential pressure transducer can be used to monitor the degree of pollution in a filter. If the fill level undershoots a specified level, the pump can be switched off and, if a specific differential pressure value is exceeded, the filter should be cleaned.

The devices support two-phase monitoring of the applicable process variable for freely selectable upper and lower current limits. The response of SIMOCODE pro on reaching a prewarning level or trip level can be freely parameterized and delayed.

### Phase sequence identification [1)]

SIMOCODE pro allows the direction of rotation of a motor to be determined by identification of the phase sequence. If the direction of rotation is wrong, a signal can be generated or the motor switched off. See Chapter Menu of the operator panel with display (Page 93).

### Monitoring any measured values using unrestricted limit monitors

SIMOCODE pro can monitor every measured value in the system for undershooting or overshooting a set threshold value by means of unrestricted limit monitors, e.g. the frequency [1)]. Further information can be found in Chapter "Limit monitors" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

1) For use with current / voltage measuring module

2) Temperature module or multifunction module additionally required

3) Analog module additionally required

4) SIMOCODE pro V and pro S device types: Ground-fault module or multifunction module and residual current transformer additionally required

## 5.3 Safety-oriented tripping

The SIMOCODE pro motor management system has two modules for the safety-related tripping of motors:

- Fail-safe digital module DM-F local: For applications requiring safety-related tripping of a motor feeder via a hardware signal that is acquired and evaluated by the module.
- DM-F PROFIsafe fail-safe digital module: For applications that require the safety-related tripping of a motor feeder by a fail-safe controller (F-CPU) via the communication bus with the fail-safe PROFIsafe profile.

These modules conform to the general requirements for EMERGENCY STOP devices or safety circuits described in EN 418 and EN 60204-1 (06.2006).

Depending on the external circuit, the following Performance Level / Safety Integrity Level can be achieved:

- PL e with Category 4 according to ISO 13849-1 or
- SIL 3 according to IEC 61508/62061

Safety technology and safety-related functions

- Are exclusively restricted to the fail-safe digital modules.
- Do not directly affect existing SIMOCODE pro components and concepts.

A more detailed description is provided in the documentation listed below

- Manual Fail-safe Digital Modules SIMOCODE pro, German (https://support.automation.siemens.com/WW/view/de/50564852)
- Manual Fail-safe Digital Modules SIMOCODE pro, English (https://support.automation.siemens.com/WW/view/de/50564852/0/en)
- Manual Fail-safe Digital Modules SIMOCODE pro, French (https://support.automation.siemens.com/WW/view/de/50564852/0/fr)
- Manual Fail-safe Digital Modules SIMOCODE pro, Spanish (https://support.automation.siemens.com/WW/view/de/50564852/0/es)
- Operating instructions "Fail-Safe Digital Module DM-F Local" (https://support.automation.siemens.com/WW/view/en/49222263)
- Operating instructions "Fail-Safe Digital Module DM-F PROFIsafe" (https://support.automation.siemens.com/WW/view/en/49222281).

You will find the System Manuals and Operating Instructions at Manuals/operating instructions (https://support.industry.siemens.com/cs/ww/en/ps/16027/man)

**CAUTION**

**Loss of safety function is possible**

For the 24 V DC power supply, always use an SELV or PELV power supply unit!

For capacitive and inductive loads, an adequate protective circuit is required!

## 5.4 Control functions

Depending on the device series, the following parameterizable control functions are available:

Table 5-1 Control functions

| Control function | SIMOCODE pro | | | |
|---|---|---|---|---|
| | BP | GP | | HP |
| | C | S | V PN GP | V PB, V MR, V PN, V EIP |
| Overload relay | ✓ | ✓ | ✓ | ✓ |
| Direct starter (direct-on-line starter) | ✓ | ✓ | ✓ | ✓ |
| Reversing starter | ✓ | ✓ | ✓ | ✓ |
| Molded case circuit breaker (MCCB) | ✓ | ✓ | ✓ | ✓ |
| Star-delta starter | — | ✓ | ✓ | ✓ |
| Star-delta reversing starter | — | — | — | ✓ |
| Dahlander starter, combinable with reversing starter | — | — | — | ✓ |
| Pole-changing starter, combinable with reversing starter | — | — | — | ✓ |
| Solenoid valve | — | — | — | ✓ |
| Positioner | — | — | — | ✓ |
| Soft starter | — | ✓ | ✓ | ✓ |
| Soft starter with reversing contactor | — | — | — | ✓ |

All the necessary protection functions and interlocks are already available and can be flexibly adapted and expanded.

For a detailed description of the individual control functions: See Chapter "Motor control" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

# 5.5 Communication

## PROFIBUS DP

SIMOCODE pro has an integrated PROFIBUS DP interface (SUB D socket or terminal connection on the basic units). SIMOCODE pro supports the following services, for example:

Table 5-2 PROFIBUS DP services

| Service | SIMOCODE pro | | |
|---|---|---|---|
| | C | S | V PB |
| Baud rates of up to 12 Mbit / s via Sub-D socket | ✓ | — | ✓ |
| Baud rates of up to 1.5 Mbit / s via terminal connection | ✓ | ✓ | ✓ |
| Automatic baud rate detection | ✓ | ✓ | ✓ |
| Cyclic services (DPV0) and acyclic services (DPV1) | ✓ | ✓ | ✓ |
| Operation as DPV1 slave downstream from the Y link | ✓ | ✓ | ✓ |
| Alarms according to DPV1 | ✓ | ✓ | ✓ |
| Time synchronization via PROFIBUS DP | — | — | ✓ |
| 3UF50 compatibility mode | — | — | ✓ |
| Safety-related tripping "PROFIsafe" | — | — | ✓ |

Detailed description: See Chapter "PROFIBUS DP communication" in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960).

## Modbus RTU

SIMOCODE pro V Modbus RTU possesses integrated Modbus RTU communication functions.

Detailed description: See Chapter "Modbus communication" in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960).

## PROFINET

### PROFINET IO

SIMOCODE pro V PN and pro V PN GP have integrated PROFINET IO device communication functions, such as:

- Integrated switch with two RJ45 ports
- Ethernet services: ping, arp, network diagnostics (SNMP) / MIB-2, LLDP, NTP
- Port diagnostics
- Deactivation of ports
- Media redundancy
- System redundancy

- Shared Device
- Device replacement without PG/PC
- I/O data
- Diagnostics and maintenance alarms
- Data records
- PROFIenergy
- PROFIsafe

**Note**

**Use of PORT connections with SIMOCODE pro V PN GP basic units**

Only PORT 1 can be used with SIMOCODE pro V PN GP 3UF7011-1A.00-2 basic units

**OPC UA**

In addition to the PROFINET IO device communication functions, SIMOCODE pro V PN also has OPC UA server functions. Using these functions, an OPC UA client can access SIMOCODE pro V PN data.

**Web server**

In addition to the PROFINET IO device communication functions, both the SIMOCODE pro V PN High Performance device and the SIMOCODE pro V PN General Performance device have an integrated web server function that permits access to the service and diagnostic data from a PC on which a web browser is installed.

Detailed descriptions: See Chapter "PROFINET communication" in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960).

## EtherNet/IP

SIMOCODE pro V EtherNet/IP has integrated EtherNet/IP communication functions:

- Integrated switch with two RJ45 ports
- Assembly objects for integration in cyclic communication with the controller
- CIP objects
- Application objects for access to SIMOCODE data such as measured values, statistics data, diagnostics and selected parameters
- Device Level Ring support
- Ethernet services: ping, arp, network diagnostics (SNMP) / MIB-2, LLDP, NTP
- Port diagnostics
- Deactivation of ports

Detailed description: See Chapter "EtherNet/IP communication" in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960).

**Web server**

In addition to the EtherNet/IP communication functions, SIMOCODE pro V EIP has an integrated web server function that permits access to the service and diagnostic data from a PC on which a web browser is installed.

Detailed descriptions: See Chapter "EtherNet/IP communication" in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960)"SIMOCODE pro - Communication".

## 5.6 Analog value recording

The "Analog Value Recording" function can be used to record any analog values (2 bytes / 1 word) in SIMOCODE pro over a set period of time, for example the development of the motor current on starting the motor.

Detailed description: See Chapter "Analog value recording" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

## 5.7 Standard functions

Standard functions are pre-defined functions that can be easily activated, e.g. time-staggered restart of the drives after a power failure. SIMOCODE pro has the following standard functions:

Table 5-3 Standard functions

| Standard function | SIMOCODE pro | | | | | | |
|---|---|---|---|---|---|---|---|
| | BP | GP | | HP | | | |
| | C Number | S Number | V PN GP Number | V PB Number | V MR Number | V PN Number | V EIP Number |
| Test | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Reset | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Test Position Feedback (TPF) | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| External fault | 4 | 4 | 4 | 6 | 6 | 6 | 6 |
| Operational Protection Off (OPO) | — | — | — | 1 | 1 | 1 | 1 |
| Power failure monitoring (UVO) | — | — | — | 1 | 1 | 1 | 1 |
| Emergency start | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Watchdog (PLC / PCS monitoring) | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Time stamping | — | — | — | 1 | — | — | — |
| Safety-related tripping "Local" | — | — | — | 1 | 1 | 1 | 1 |

Detailed description: See Chapter "Standard functions" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

## 5.8 Freely-programmable logic modules

If you need any other additional functions for your application, you can use the freely programmable logic modules. These can be used, for example, to implement logical operations, time relay functions and counter functions. Furthermore, limit monitors can monitor any value in SIMOCODE pro for undershooting or overshooting of a freely selected limit. Depending on the device series, the system provides several freely parameterizable logic modules:

Table 5-4 Freely-programmable logic modules

| **Logic module** | **SIMOCODE pro** | | | | | | |
|---|---|---|---|---|---|---|---|
| | **BP** | **GP** | | **HP** | | | |
| | **C Number** | **S Number** | **V PN GP Number** | **V PB Number** | **V MR Number** | **V PN Number** | **V EIP Number** |
| Truth table 3 inputs / 1 output | 3 | 4 | 4 | 6 | 6 | 8 | 8 |
| Truth table 2 inputs / 1 output | — | 2 | 2 | 2 | 2 | 2 | 2 |
| Truth tables 5 inputs/2 outputs | — | — | — | 1 | 1 | 1 | 1 |
| Timers | 2 | 2 | 2 | 4 | 4 | 6 | 6 |
| Counters | 2 | 2 | 2 | 4 | 4 | 6 | 6 |
| Signal conditioning | 2 | 4 | 4 | 4 | 4 | 6 | 6 |
| Non-volatile elements | 2 | 2 | 2 | 4 | 4 | 4 | 4 |
| Flashing | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Flicker | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Limit monitor | — | — | — | 4 | 4 | 6 | 6 |
| Calculation modules (calculators) | — | — | — | 2 [1)] | 2 | 4 | 4 |
| Analog multiplexer | — | — | — | — | — | 1 | 1 |
| Pulse width modulator | — | — | — | — | — | 1 | 1 |
| 1) from version *E03* | | | | | | | |

Detailed description: See Chapter "Logic blocks" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

## 5.9 Operating, service and diagnostics data

SIMOCODE pro supplies a large amount of detailed operating, service and diagnostics data.

### Operating data

- Motor switching state (ON, OFF, LEFT, RIGHT, SLOW, FAST), derived from the current flow in the main circuit: thus, feedback via auxiliary contacts of circuit breakers and contactors is not necessary.
- Current in phases 1, 2 and 3 and maximum current in % of current setting
- Voltage in phases 1, 2 and 3 in V [1)]
- Frequency [7)]
- Active power in W [1)]
- Apparent power in VA [1)]
- Power factor in % [1)]
- Phase unbalance in %
- Phase sequence [1)]
- Ground-fault current [6)]
- Temperature in the respective sensor measuring circuits, and maximum temperature in K [3)]
- Current analog signal values [4)]
- Time to trip in s
- Temperature rise for motor model in %
- Remaining cooling down period of the motor in s, etc.

It is possible to adapt the units via the device-internal conversion of individual measured values with the help of the logic modules (calculators) provided by SIMOCODE pro. For example, the temperature recorded by SIMOCODE pro can be calculated in either °F or °C and transmitted to the automation system via PROFIBUS DP.

### Service data

Among other things, SIMOCODE pro provides the following relevant data for maintenance:

- Number of motor operating hours, also resettable
- Motor stop times, also resettable
- Number of motor starts, also resettable
- Number of permissible starts remaining
- Number of overload trips, also resettable
- Feeder power consumption in kWh, also resettable [2)]
- Internal feeder-related comments stored in the device, e.g. information regarding maintenance events, etc.
- Safety-related tripping monitoring in h, also resettable [5)]

## Diagnostics data

- Numerous detailed early warning and fault messages, also for further processing in the device or in the control system
- Device-internal error logging with time stamp
- Value of the last trip current
- Feedback faults (e.g. no current flow in the main circuit after switch-on command), etc.
- "Local" and "PROFIsafe" diagnostic messages

1) When using SIMOCODE pro V High Performance basic units with current / voltage measuring module

2) When using SIMOCODE pro V PB basic units from version *E03* current / voltage measuring module

3) When using the SIMOCODE pro V basic units with the 3UF77 temperature module or the SIMOCODE pro S basic unit with multifunction module

4) When using SIMOCODE pro V High Performance basic units with analog module

5) When using SIMOCODE pro V High Performance basic units together with DM-F fail-safe digital module

6) When using the SIMOCODE pro V basic units with the 3UF7510 ground-fault module or the SIMOCODE pro S basic unit with a multifunction module and 3UL23 residual current transformer

7) 2nd generation current / voltage measuring module necessary

# Check list for selecting a device series

# 6

The following check list should help you decide upon the optimum device series for your requirements:

| Function/component | | SIMOCODE pro | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | BP | GP | | HP | | | |
| | | C | S | V PN GP | V PB | V MR | V PN | V EIP |
| **Control functions** | Intelligent overload relay | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Direct starter, reversing starter | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Star-delta starter | — | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Dahlander starter | — | — | — | ✓ | ✓ | ✓ | ✓ |
| | Pole-changing starter | — | — | — | ✓ | ✓ | ✓ | ✓ |
| | Soft starter | — | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Solenoid valve | — | — | — | ✓ | ✓ | ✓ | ✓ |
| | Positioner | — | — | — | ✓ | ✓ | ✓ | ✓ |
| | Can be combined with reversing function | — | — | — | ✓ | ✓ | ✓ | ✓ |
| **Protection functions** | Overload protection | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Thermistor motor protection with PTC (binary) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Stalled rotor | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Unbalance | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Phase failure | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| **Dry-running protection for centrifugal pumps by means of active power monitoring** | Minimum level; in combination with current/voltage measuring modules for dry-running protection | — | — | — | ✓ | — | ✓ | ✓ |
| **Measurement functions** | Current measurement | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Current/voltage/power measurement | — | — | — | ✓ | ✓ | ✓ | ✓ |

| Function/component | | SIMOCODE pro | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | BP | GP | | HP | | | |
| | | C | S | V PN GP | V PB | V MR | V PN | V EIP |
| **Monitoring functions** | Current limit monitoring | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Ground-fault monitoring (internal) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Ground-fault monitoring (residual current transformer) | — | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Voltage monitoring | — | — | — | ✓ | ✓ | ✓ | ✓ |
| | Temperature monitoring | — | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Active power monitoring | — | — | — | ✓ | ✓ | ✓ | ✓ |
| | Power factor (cos phi) monitoring | — | — | — | ✓ | ✓ | ✓ | ✓ |
| | Monitoring operating hours, stop time, and number of starts | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Monitoring additional process variables via the analog module | — | — | — | ✓ | ✓ | ✓ | ✓ |
| | Phase sequence detection | — | — | — | ✓ | ✓ | ✓ | ✓ |
| | Monitoring any measured values using unrestricted limit monitors | — | — | — | ✓ | ✓ | ✓ | ✓ |
| | Frequency measurement (with the 2nd generation current/voltage measuring modules) | — | — | — | ✓ | ✓ | ✓ | ✓ |
| **Safety functions** | Safety-related tripping | — | — | — | ✓ | ✓ | ✓ | ✓ |
| **Number of inputs/ outputs** | Number of digital inputs of basic unit | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| | Max. number of digital inputs with expansion modules | 4 | 8 | 8 | 12 | 12 | 12 | 12 |
| | Number of outputs of basic unit | 3 | 2 | 3 | 3 | 3 | 3 | 3 |
| | Max. number of digital outputs with expansion modules | 3 | 4 | 5 | 7 | 7 | 7 | 7 |

| Function/component | | SIMOCODE pro | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | BP | GP | | HP | | | |
| | | C | S | V PN GP | V PB | V MR | V PN | V EIP |
| **Expansion modules** | Multifunction module; monostable relay; 24 V DC inputs, temperature measurement, ground-fault monitoring | — | ✓ | — | — | — | — | — |
| | Multifunction module; monostable relay; 110 - 240 V AC/DC inputs, temperature measurement, ground-fault monitoring | — | ✓ | — | — | — | — | — |
| | Digital module; monostable relay; 24 V DC inputs | — | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Digital module; bistable relay; 24 V DC inputs | — | — | — | ✓ | ✓ | ✓ | ✓ |
| | Digital module; monostable relay; 110 to 240 V AC/DC inputs | — | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Digital module; bistable relay; 110 to 240 V AC/DC inputs | — | — | — | ✓ | ✓ | ✓ | ✓ |
| | DM-F LOCAL fail-safe digital module | — | — | — | ✓ | ✓ | ✓ | ✓ |
| | DM-F PROFIsafe fail-safe digital module | — | — | — | ✓ | — | ✓ | — |
| | Analog module:<br>Measuring, processing and outputting analog values | — | — | — | ✓ | ✓ | ✓ | ✓ |
| | Ground-fault module:<br>Residual current monitoring using a residual current transformer | — | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Temperature module:<br>Analog temperature monitoring of three measuring circuits with NTC, PT100, PT1000, and KTY | — | ✓ [1)] | ✓ | ✓ | ✓ | ✓ | ✓ |

1) only 1 sensor can be connected

# An overview of system components

# 7

## Modules

Selection and ordering data: See also Catalog IC10 (https://www.siemens.com/ic10).

For simple product selection, we recommend the TIA Selection Tool (https://www.siemens.com/TIA-Selection-Tool).

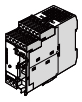
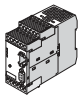
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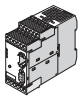
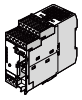
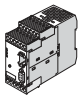
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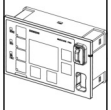
The product version data (*Exx*) refer to the device series (pro C, pro S, etc.).

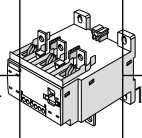
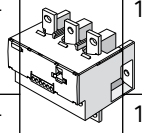
Table 7-1 Modules

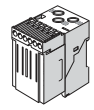
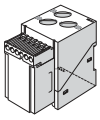
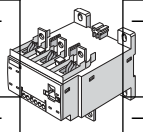
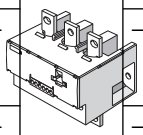
| Module | Control supply voltage | MLFB | Dia-gram | Number that can be connected to | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | pro C | pro S | pro V PN GP | pro V PB | pro V MR | pro V PN | pro V EIP |
| **Basic units (BU)** | | | | | | | | | | |
| **SIMOCODE pro C**<br>The compact Basic Performance system for PROFIBUS and direct-on-line and reversing starters and/or for controlling a circuit breaker.<br>4 inputs/3 outputs freely parameterizable, input for thermistor, monostable relay outputs | | |  | — | — | — | — | — | — | — |
| | 24 V DC | 3UF7000-1AB00-0 | | | | | | | | |
| | 110-240 V AC/DC | 3UF7000-1AU00-0 | | | | | | | | |
| **SIMOCODE pro S**<br>The smart General Performance system for PROFIBUS and for direct-on-line, reversing and star-delta starters or for controlling a circuit breaker or soft starter.<br>4 inputs/2 outputs freely parameterizable, input for thermistor, expandable with expansion modules | | |  | — | — | — | — | — | — | — |
| | 24 V DC | 3UF7020-1AB01-0 | | | | | | | | |
| | 110-240 V AC/DC | 3UF7020-1AU01-0 | | | | | | | | |

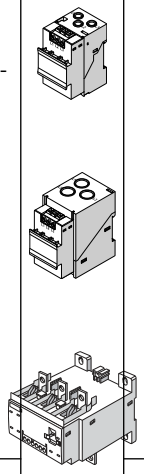
| Module | Control supply voltage | MLFB | Diagram | Number that can be connected to | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | pro C | pro S | pro V PN GP | pro V PB | pro V MR | pro V PN | pro V EIP |
| **SIMOCODE pro V PN GP**<br>The smart General Performance system for PROFINET and for direct-on-line, reversing and star-delta starters or for controlling a circuit breaker or soft starter.<br>4 inputs/3 outputs freely parameterizable, input for thermistor, expandable with 1 expansion module | | |  | — | — | — | — | — | — | — |
| | 24 V DC | 3UF7011-1AB00-1 ( 2 ports)<br>3UF7011-1AB00-2 ( 1 port) | | | | | | | | |
| | 110-240 V AC/DC | 3UF7011-1AU00-1 ( 2 ports)<br>3UF7011-1AU00-2 ( 1 port) | | | | | | | | |
| **SIMOCODE pro V PB**<br>The variable High Performance system for PROFIBUS, which offers numerous functions in addition to all of the SIMOCODE pro C/S functions.<br>4 inputs/3 outputs freely parameterizable, input for thermistor, monostable relay outputs, expandable with expansion modules<br>From product version *E16* with PTB 18 ATEX 5003 X / ITS21UKEX0455X: Suitable for dry-running protection for centrifugal pumps by means of active power monitoring | | |  | — | — | — | — | — | — | — |
| | 24 V DC | 3UF7010-1AB00-0 | | | | | | | | |
| | 110-240 V AC/DC | 3UF7010-1AU00-0 | | | | | | | | |

| Module | Control supply voltage | MLFB | Dia-gram | Number that can be connected to | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | pro C | pro S | pro V PN GP | pro V PB | pro V MR | pro V PN | pro V EIP |
| **SIMOCODE pro V MR**<br>The variable High Performance system for Modbus RTU that offers numerous functions in addition to all of the SIMOCODE pro C/S functions.<br>4 inputs/3 outputs freely parameterizable, input for thermistor, monostable relay outputs, expandable with expansion modules | | |  | — | — | — | — | — | — | — |
| | 24 V DC | 3UF7012-1AB00-0 | | | | | | | | |
| | 110-240 V AC/DC | 3UF7012-1AU00-0 | | | | | | | | |
| **SIMOCODE pro V PN**<br>The variable High Performance system for PROFINET with extensive functions.<br>4 inputs/3 outputs freely parameterizable, input for thermistor, monostable relay outputs, expandable with expansion modules<br>From product version *E13* with PTB 18 ATEX 5003 X / ITS21UKEX0455X: Suitable for dry-running protection for centrifugal pumps by means of active power monitoring | | |  | — | — | — | — | — | — | — |
| | 24 V DC | 3UF7011-1AB00-0 | | | | | | | | |
| | 110-240 V AC/DC | 3UF7011-1AU00-0 | | | | | | | | |
| **SIMOCODE pro V EIP**<br>The variable High Performance system for EtherNet/IP that offers numerous functions in addition to all of the SIMOCODE pro C/S functions.<br>4 inputs/3 outputs freely parameterizable, input for thermistor, monostable relay outputs, expandable with expansion modules<br>From product version *E04* with PTB 18 ATEX 5003 X / ITS21UKEX0455X: Suitable for dry-running protection for centrifugal pumps by means of active power monitoring | | |  | — | — | — | — | — | — | — |
| | 24 V DC | 3UF7013-1AB00-0 | | | | | | | | |
| | 110-240 V AC/DC | 3UF7013-1AU00-0 | | | | | | | | |

| Module | Control supply voltage | MLFB | Dia-gram | Number that can be connected to | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | pro C | pro S | pro V P N GP | pro V P B | pro V M R | pro V P N | pro V El P |
| **Operator panel (OP)**<br>Installation in control cabinet door or front plate, for connection to basic unit, system interface for connecting a PC, 10 LEDs for status indication and user-assignable buttons for controlling the motor. | | |  | | | | | | | |
| | — | 3UF7200-1AA00-0 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | — | 3UF7200-1AA01-0 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **Operator panel with display (OPD)** [4]<br>Installation in control cabinet door or front panel, for connection to a pro V basic unit, system interface for connecting a PC, 7 LEDs for status indication and user-assignable buttons for controlling the motor, multiple-language display, e.g. for indication of measured values, status information or fault messages. | | |  | | | | | | | |
| | — | 3UF7210-1AA00-0 | | — | — | — | 1 (from *E03*) | 1 | 1 | 1 |
| | — | 3UF7210-1BA00-0 | | — | — | — | 1 (from *E03*) | 1 | 1 | 1 |
| | — | 3UF7210-1AA01-0 ( titanium gray) | | — | — | — | 1 (from *E03*) | 1 | 1 | 1 |
| | — | 3UF7210-1BA01-0 (titanium gray) | | — | — | — | 1 (from *E03*) | 1 | 1 | 1 |

| Module | Control supply voltage | MLFB | Dia-gram | Number that can be connected to | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | pro C | pro S | pro V P N GP | pro V P B | pro V M R | pro V P N | pro V EI P |
| **Current measuring module (IM)**<br>Current measuring with through-hole or busbar connection system. | | |  | | | | | | | |
| 0.3 A to 3 A<br>(straight-through transformer) | — | 3UF7100-1AA00-0 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2.4 A to 25 A<br>(straight-through transformer) | | 3UF7101-1AA00-0 |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 10 A to 100 A<br>(straight-through transformer) | | 3UF7102-1AA00-0 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 20 A to 200 A<br>(straight-through transformer) | | 3UF7103-1AA00-0 |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 20 A to 200 A<br>(busbar connection) | | 3UF7103-1BA00-0 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 63 A to 630 A<br>(busbar connection) | | 3UF7104-1BA00-0 |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

| Module | Control supply voltage | MLFB | Dia-gram | Number that can be connected to | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | pro C | pro S | pro V P N GP | pro V P B | pro V M R | pro V P N | pro V El P |
| **Current/voltage measuring module (UM)**<br>Can only be mounted next to the basic unit, otherwise like current measuring modules.<br>Additionally:<br>• Voltage measurement<br>• Power measurement<br>• Power factor (cos phi) measurement<br>• Phase sequence | | | <br> | | | | | | | |
| 0.3 A to 3 A (straight-through transformer) | — | 3UF7110-1AA00-0 | | — | — | — | 1 (from *E02*) | 1 | 1 | 1 |
| 2.4 A to 25 A (straight-through transformer) | | 3UF7111-1AA00-0 |  | — | — | — | 1 (from *E02*) | 1 | 1 | 1 |
| 10 A to 100 A (straight-through transformer) | | 3UF7112-1AA00-0 | | — | — | — | 1 (from *E02*) | 1 | 1 | 1 |
| 20 A to 200 A (straight-through transformer) | | 3UF7113-1AA00-0 |  | — | — | — | 1 (from *E02*) | 1 | 1 | 1 |
| 20 A to 200 A (busbar connection) | | 3UF7113-1BA00-0 | | — | — | — | 1 (from *E02*) | 1 | 1 | 1 |
| 63 A to 630 A (busbar connection) | | 3UF7114-1BA00-0 | | — | — | — | 1 (from *E02*) | 1 | 1 | 1 |

| Module | Control supply voltage | MLFB | Dia-gram | Number that can be connected to | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | pro C | pro S | pro V P N GP | pro V P B | pro V M R | pro V P N | pro V EI P |
| **2nd generation current/voltage measuring modules (UM+)**<br>Can be mounted below / next to the basic unit, otherwise like current measuring modules.<br>In addition to current measurement:<br>• Voltage measurement<br>• Frequency measurement<br>• Power measurement<br>• Power factor (cos phi) measurement<br>• Phase sequence detection<br>• Dry-running protection for centrifugal pumps by means of active power monitoring (DRP device) | | |  | | | | | | | |
| 0.3 A to 4 A<br>(straight-through transformer) [1] | — | 3UF7110-1AA01-0, 3UF7120-1AA01-0 (DRP) | | — | — | — | 1 (from *E15*) | 1 (from *E03*) | 1 (from *E10*) | 1 |
| 3 A to 40 A<br>(straight-through transformer) [1] | | 3UF7111-1AA01-0, 3UF7121-1AA01-0 (DRP) | | — | — | — | 1 (from *E15*) | 1 (from *E03*) | 1 (from *E10*) | 1 |
| 10 A to 115 A<br>(straight-through transformer) | | 3UF7112-1AA01-0, 3UF7122-1AA01-0 (DRP) | | — | — | — | 1 (from *E15*) | 1 (from *E03*) | 1 (from *E10*) | 1 |
| 20 A to 200 A<br>(straight-through transformer) | | 3UF7113-1AA01-0, 3UF7123-1AA01-0 (DRP) | | — | — | — | 1 (from *E15*) | 1 (from *E03*) | 1 (from *E10*) | 1 |
| 20 A to 200 A<br>(busbar connection) | | 3UF7113-1BA01-0, 3UF7123-1BA01-0 (DRP) | | — | — | — | 1 (from *E15*) | 1 (from *E03*) | 1 (from *E10*) | 1 |
| 63 A to 630 A<br>(busbar connection) | | 3UF7114-1BA01-0, 3UF7124-1BA01-0 (DRP) | | — | — | — | 1 (from *E15*) | 1 (from *E03*) | 1 (from *E10*) | 1 |

| Module | Control supply voltage | MLFB | Dia-gram | Number that can be connected to | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | pro C | pro S | pro V P N GP | pro V P B | pro V M R | pro V P N | pro V El P |
| **Decoupling module (DCM)** [1]<br>For connecting on the line side of a current/ voltage measuring module of the 1st generation UM at the system interface for use of voltage measurement in isolated-neutral systems, systems with high-impedance resistive or asymmetrical grounding, and in single-phase systems. | | |  | | | | | | | |
| | — | 3UF7150-1AA00-0 | | — | — | 1 | 1 | 1 | 1 | 1 |
| **Digital modules (DM) 2)** | | | | | | | | | | |
| You add additional binary inputs and relay outputs to the basic unit with up to 2 digital modules. The input circuits of the digital modules are powered by an external source.<br>4 binary inputs and 2 relay outputs. | | |  | | | | | | | |
| Input voltage 24 V DC; monostable relay outputs<br>Input voltage 110 V-240 V AC/DC; monostable relay outputs | — | 3UF7300-1AB00-0<br>3UF7300-1AU00-0 | | —<br>— | 1<br>1 | 1<br>1 | 2<br>2 | 2<br>2 | 2<br>2 | 2<br>2 |
| Input voltage 24 V DC; bistable relay outputs<br>Input voltage 110 V-240 V AC/DC; bistable relay outputs | — | 3UF7310-1AB00-0<br>3UF7310-1AU00-0 | | —<br>— | —<br>— | —<br>— | 2<br>2 | 2<br>2 | 2<br>2 | 2<br>2 |
| **Fail-safe digital module (DM-F)** | | | | | | | | | | |

| Module | Control supply voltage | MLFB | Dia-gram | Number that can be connected to | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | pro C | pro S | pro V P N GP | pro V P B | pro V M R | pro V P N | pro V EI P |
| **DM-F Local fail-safe digital module** [2]<br>For fail-safe tripping via hardware signal.<br>2 relay enabling circuits, wired in parallel;<br>2 relay outputs, common ground, fail-safe tripping.<br>Inputs for sensor circuit, start signal, cascading and feedback circuit<br>Safety function via DIP switch | | |  | | | | | | | |
| | Rated control supply voltage Us: | | | | | | | | | |
| | 24 V DC<br>110 to 240 V AC/DC | 3UF7320-1AB00-0<br>3UF7320-1AU00-0 | | —<br>— | —<br>— | —<br>— | 1 (from *E07*)<br>1 (from *E07*) | 1<br>1 | 1<br>1 | 1<br>1 |
| **DM-F PROFIsafe fail-safe digital module** [2]<br>For fail-safe tripping via PROFIBUS/PROFIsafe:<br>2 relay enabling circuits, wired in parallel<br>2 relay outputs, common ground, fail-safe tripping<br>1 input for feedback circuit; 3 binary standard inputs. | | | | | | | | | | |
| | 24 V DC<br>110 to 240 V AC/DC | 3UF7330-1AB00-0<br>3UF7330-1AU00-0 | | —<br>— | —<br>— | —<br>— | 1 (from *E07*)<br>1 (from *E07*) | —<br>— | 1<br>1 | —<br>— |
| **Analog module (AM)** | | | | | | | | | | |
| By means of the analog module, the basic unit is optionally expanded by analog inputs and outputs (0 to 20 mA).<br>2 inputs (passive) for inputting and 1 output for outputting 0/4 to 20 mA signals. | | |  | | | | | | | |
| | — | 3UF7400-1AA00-0 | | — | — | — | 1 | 1 | 2 | 2 |
| **Ground-fault module (EM)** | | | | | | | | | | |

| Module | Control supply voltage | MLFB | Dia-gram | Number that can be connected to | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | pro C | pro S | pro V P N GP | pro V P B | pro V M R | pro V P N | pro V El P |
| The external ground-fault monitoring using residual current transformer and ground-fault module is used in the following cases:<br>• in cases in which power systems are grounded with high impedance<br>• in cases, in which precise detection of the ground-fault current is necessary, for example, for condition monitoring. | | |  | | | | | | | |
| | — | 3UF7500-1AA00-0 for connecting a 3UL22 residual-current transformer | | — | — | — | 1 (from *E02*) | 1 | 1 | 1 |
| | — | 3UF7510-1AA00-0 for connecting a 3UL23 residual-current transformer | | — | 1 | 1 | 1 (from *E10*) | 1 | 1 (from *E04*) | 1 |
| **Temperature module (TM)** | | | | | | | | | | |
| Irrespective of the thermistor protection of the basic units, an additional max. 3 analog temperature sensors can be evaluated using a temperature module.<br>Sensor types: PT100/PT1000, KTY83/KTY84 or NTC<br>3 inputs for connecting up to 3 analog temperature sensors. | | |  | | | | | | | |
| | — | 3UF7700-1AA00-0 | | — | 1 [3)] | 1 [3)] | 1 (from E*E02*) | 1 | 2 | 2 |
| **Multifunction module** | | | | | | | | | | |

| Module | Control supply voltage | MLFB | Dia-gram | Number that can be connected to | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | pro C | pro S | pro V P N GP | pro V P B | pro V M R | pro V P N | pro V EI P |
| To expand<br>• the number of inputs and outputs<br>• the functional scope<br>the SIMOCODE pro S basic units.<br>The following inputs and outputs are available:<br>• 4 digital inputs<br>• 2 relay outputs<br>• 1 input for connecting an analog temperature sensor (sensor types: PT100/ PT1000, KTY83/KTY84 or NTC)<br>• 1 input for connecting a 3UL23 residual current transformer | | |  | | | | | | | |
| Input voltage 24 V DC | | 3UF7600-1AB01-0 | | — | 1 | — | — | — | — | — |
| Input voltage 110-240 V AC/DC | | 3UF7600-1AU00-0 | | — | 1 | — | — | — | — | — |

1)

**Note**

When using the 2nd generation current / voltage acquisition modules (UM+), no decoupling module must be connected.

Detailed description: See Description of system components (Page 81)

Dimension drawings: See CAx data, dimension drawings (Page 359)

Mounting instructions See Mounting (Page 177)

Configuration information for SIMOCODE pro V PB when using an operator panel with display and/or a decoupling module: See Chapter Configuration information for SIMOCODE pro V when using an older basic unit (Page 148) and Configuration notes for use of a SIMOCODE pro V MR and SIMOCODE pro V EIP basic unit (Page 151).

2)

**Note**

**Use of a DM-F instead of a DM**

You use a fail-safe digital module (DM-FL or DM-FP) instead of a digital module (DM).

3) Only one temperature sensor can be connected

4)

**Note**

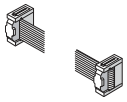
**Usage restrictions concerning the operator panel with display**

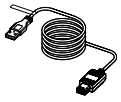
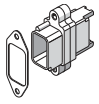
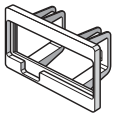
- SIMOCODE pro V PB basic unit: You only use the operator panel with display with SIMOCODE pro V PB basic unit from version *E03*.
- SIMOCODE pro V PN, pro V EIP basic unit: An operator panel with display from version *E07* is required for use with these basic units.
- In combination with the SIMOCODE pro PN basic unit, version *E09* or higher is required when using the operator panel with the 3UF7210-1AA00-0 display.
- In combination with the SIMOCODE pro MR basic unit, version *E09* or higher is required when using the operator panel with the 3UF7210-1AA00-0 display.
- When using the "Dry-running protection by means of active power monitoring" function, the following operator panels with display are permitted:
  - 3UF7210-1AA00-0: ≥ E12
  - 3UF7210-1AA01-0: ≥ E03
  - 3UF7210-1BA00-0: ≥ E04
  - 3UF7210-1BA01-0: ≥ E03

## Accessories

Selection and ordering data: See also Catalog IC10 (https://www.siemens.com/ic10).

Table 7-2 System components, accessories that can be connected

| System component, accessory | MLFB | Diagram | for pro C | for pro S | for V PN GP | for pro V PB | for pro V MB RTU | for pro V PN | for pro V EIP |
|---|---|---|---|---|---|---|---|---|---|
| **Connecting cable**<br>for connecting the basic unit, current measuring module, current/voltage measuring module, operator panel, and decoupling module | |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 0.025 m ribbon<br>0.1 m ribbon<br>0.15 m ribbon<br>0.3 m ribbon<br>0.5 m ribbon<br>0.5 m round<br>1.0 m round<br>1.5 m round<br>2.5 m round | 3UF7930-0AA00-0<br>3UF7931-0AA00-0<br>3UF7935-0AA00-0<br>3UF7932-0AA00-0<br>3UF7932-0BA00-0<br>3UF7937-0BA00-0<br>.....<br>3UF7933-0BA00-0 | | | | | | | | |
| **Interface covers**<br>For covering unused system interfaces | 3UF7950-0AA00-0 (light gray)<br>3RA6936-0B (titanium gray) |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| **Memory module**<br>Backup of the full set of parameters of a SIMOCODE pro system when the device is replaced. If a device is replaced, parameter transfer without PC. | 3UF7900-0AA00-0 (light gray) |  | ✓ | ✓ | — | ✓ | ✓ | — | — |
| | 3UF7900-0AA01-0 (titanium gray) | | ✓ | ✓ | — | ✓ | ✓ | — | — |
| | 3UF7901-0AA00-0 (light gray) | | — | ✓ | ✓ | ✓ [1] | ✓ | ✓ | ✓ |
| | 3UF7901-0AA01-0 (titanium gray) | | — | ✓ | ✓ | ✓ [1] | ✓ | ✓ | ✓ |
| **Initialization module**<br>Storage and initialization of device parameters and device addressing in motor control centers. | 3UF7902-0AA00-0 |  | — | ✓ | ✓ | ✓ [1] | ✓ | ✓ | ✓ |

| System component, accessory | | MLFB | Diagram | for pro C | for pro S | for V PN GP | for pro V PB | for pro V MB RTU | for pro V PN | for pro V EIP |
|---|---|---|---|---|---|---|---|---|---|---|
| **Y connecting cable**<br>Connection of the basic unit and current or current/voltage measuring module with the initialization module when using the initialization module | | |  | — | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Length of system interface | Length of open cable end | | | | | | | | | |
| 0.1 m | 1.0 m | 3UF7931-0CA00-0 | | | | | | | | |
| 0.5 m | 1.0 m | 3UF7932-0CA00-0 | | | | | | | | |
| 1.0 m | 1.0 m | 3UF7937-0CA00-0 | | | | | | | | |
| **Addressing plug**<br>Assigning the PROFIBUS/ Modbus RTU address without using a PC/PG to SIMOCODE pro through the system interface | | 3UF7910-0AA00-0 |  | ✓ | ✓ | ✓ | ✓ | ✓ | — | — |
| **USB PC cable**<br>for connecting SIMOCODE pro to the USB interface of a PC/PG | | 3UF7941-0AA0 0-A |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| **USB-to-serial adapter**<br>For connecting an RS 232 PC cable to the interface of a PC. | | 3UF7946-0AA0 -0 | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| **Door adapter**<br>For bringing out the system interface, e.g. out of a cabinet | | 3UF7920-0AA0 0-0 |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| **Adapter for operator panel**<br>Enables use of the smaller operator panel (OP) after system replacement in a front panel cutout in which, for example, a larger 3UF5 2 operator panel of SIMOCODE DP had previously been used.<br>Degree of protection: IP54. | | 3UF7922-0AA0 0-0 |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

| System component, accessory | MLFB | Diagram | for pro C | for pro S | for V PN GP | for pro V PB | for pro V MB RTU | for pro V PN | for pro V EIP |
|---|---|---|---|---|---|---|---|---|---|
| **Labeling strips**<br>for pushbuttons of the operator panel 3UF7 20<br>for pushbuttons of the operator panel with display 3UF7 21<br>for LEDs of the operator panel 3UF7 20 | 3UF7925-0AA00-0<br>3UF7925-0AA01-0<br>3UF7925-0AA02-0 | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| **Push-in lugs for screw mounting**<br>e.g. on mounting plate; 2 units required per device | | | | | | | | | |
| Can be used for the current measuring modules and current/voltage measuring modules<br>3UF7 1.0, 3UF7 1.1 and 3UF7 1.2 | 3RV2928-0B | | ✓ | ✓ | ✓ | — | ✓ | ✓ | ✓ |
| Can be<br>used for 3UF700, 3UF701, 3UF7 3, 3UF7 4, 3UF7 5 and 3UF7 7 | 3RP19 03 | | ✓ | — | — | ✓ | ✓ | ✓ | ✓ |
| Can be used for 3UF7020-1A.01-0 and 3UF7600-1A.01-0 | 3ZY1311-0AA00 | | — | ✓ | ✓ | — | — | — | — |
| **Terminal covers** | | | | | | | | | |
| **Covers for cable lug and busbar connections:**<br>Length 100 mm, can be used for 3UF7 1.3-1BA00-0<br>Length 120 mm, can be used for 3UF7 1.4-1BA00-0 | 3RT1956-4EA1<br>3RT1966-4EA1 | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| **Covers for box terminals:**<br>Length 25 mm, can be used for 3UF7 1.3-1BA00-0<br>Length 30 mm, can be used for 3UF7 1.4-1BA00-0 | 3RT1956-4EA2<br>3RT1966-4EA2 | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

| System component, accessory | MLFB | Diagram | for pro C | for pro S | for V PN GP | for pro V PB | for pro V MB RTU | for pro V PN | for pro V EIP |
|---|---|---|---|---|---|---|---|---|---|
| **Covers for screwed connection:**<br>between contactor and current measuring module or<br>between current/voltage measuring module with direct mounting<br>can be used for 3UF7 1.3-1BA00-0<br>can be used for 3UF7 1.4-1BA00-0 | 3RT1956-4EA3<br>3RT1966-4EA3 | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| **Box terminal blocks**<br>for round and ribbon cable conductors<br>up to 70 mm2, can be used for 3UF7 1.3-1BA00-0<br>up to 120 mm2, can be used for 3UF7 1.3-1BA00-0<br>up to 240 mm2, can be used for 3UF7 1.4-1BA00-0 | 3RT1955-4G<br>3RT1956-4G<br>3RT1966-4G | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| **Bus termination module**<br>with dedicated power supply;<br>for bus connection after the last device on the bus<br>Supply voltage:<br>115/230 V AC<br>24 V DC<br>**Note**<br>The use of bus connection modules is recommended, in particular, when using SIMOCODE pro S. | 3UF1900-1KA00<br>3UF1900-1KB00 | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| **Bus connecting terminal**<br>For securing the PROFIBUS cable on the SIMOCODE pro S basic unit. | 3UF7960-0AA00-0 | | — | ✓ | ✓ | — | — | — | — |

1) For basic unit SIMOCODE pro V PB from version *E09*

## Software, selection and ordering data:

Parameterization software, control, diagnostics and testing: See Manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

Selection and ordering data: See Catalog IC10 (https://www.siemens.com/ic10).

# Description of system components

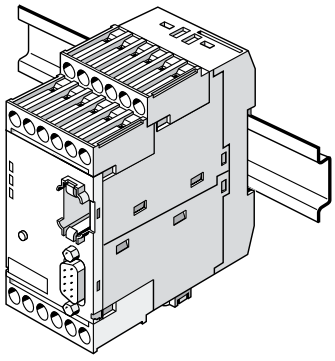
# 8

## 8.1 Basic units (BU)

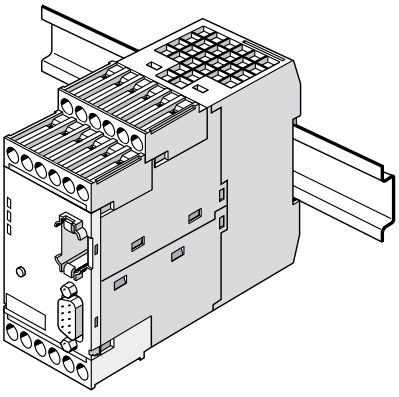
### Types of basic units

The basic units are the fundamental components of the SIMOCODE pro system. Basic units are always necessary when using SIMOCODE pro. They contain the processor in which all protection, control and monitoring functions of the SIMOCODE system are executed.

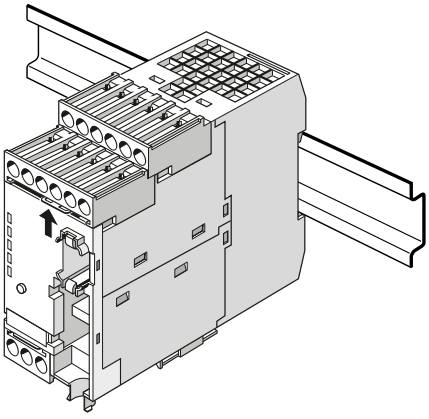
Basic Unit SIMOCODE pro C



Basic Unit SIMOCODE pro V PROFIBUS / Modbus RTU



Basic Units SIMOCODE pro V PN / pro V PN GP and SIMOCODE pro V EtherNet IP



Basic Unit SIMOCODE pro S

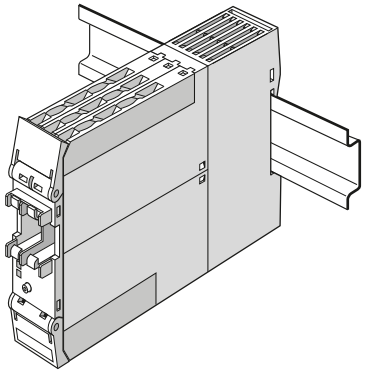


Figure 8-1 Basic units

The basic units are suitable for DIN rail mounting or with additional push-in lugs for mounting on a mounting plate. They are always equipped with removable terminals.

The basic units are available in different types for the following supply voltages:

- 24 V DC
- 110 to 240 V AC / DC

### SIMOCODE pro C basic unit

Basic unit pro C is the fundamental component of the SIMOCODE pro C device series and is used in conjunction with a current measuring module and optional operator panels.

The following motor control functions are supported:

- Overload relay
- Direct starter (direct-on-line starter) and reversing starter
- Circuit breaker control (MCCB).

### SIMOCODE pro S basic unit

Basic unit pro S is the fundamental component of the SIMOCODE pro S device series and is used in conjunction with a current measuring module and an optional operator panel. As compared with the basic unit, SIMOCODE pro C provides the following expansion options by means of connecting a multifunction / expansion module:

- Increased device functionality with additional inputs and outputs
- Connection of a residual current transformer
- Connection of a temperature sensor.

The following motor control functions are supported:

- Overload relay
- Direct starter (direct-on-line starter) and reversing starter
- Star-delta starter
- Circuit breaker control (MCCB)
- Control of a soft starter.

### SIMOCODE pro V PN GP basic unit

The SIMOCODE pro V PN GP General Performance basic unit for PROFINET is used in combination with a current measuring module and an optional operator panel. It provides the following expansion options by means of connecting an expansion module:

- Increased device functionality with additional inputs and outputs
- Connection of a residual current transformer
- Connection of a temperature sensor.

The following motor control functions are supported:

- Overload relay
- Direct starter (direct-on-line starter) and reversing starter
- Star-delta starter
- Circuit breaker control (MCCB)
- Control of a soft starter.

## SIMOCODE pro V High Performance basic unit

The SIMOCODE pro V High Performance basic units are the fundamental components of the SIMOCODE pro V device series and are used in combination with a current measuring module or current / voltage measuring module and optional operator panel.

The following motor control functions are supported:

- Overload relay
- Direct starter (direct-on-line starter) and reversing starter
- Star-delta starter, possibly combined with reversing starter
- 2 speeds, motors with separate windings (pole-changing starters), possibly combined with reversing starter
- 2 speeds, motors with separate Dahlander windings, possibly combined with reversing starter
- Positioner control
- Solenoid valve control
- Circuit breaker control (MCCB)
- Soft starter control, possibly combined with reversing starter

The SIMOCODE pro V High Performance basic units provide the following expansion options not offered by the SIMOCODE pro C, SIMOCODE pro S and SIMOCODE PRO V PN GP basic units:

- Increased device functionality via various expansion modules according to need
- Use of a current / voltage measuring module in place of a current measuring module
- Additional inputs and outputs, as required
- Larger number of inputs and outputs
- Use of an operator panel with display in place of a standard operator panel.

## Operator controls and display elements, system interfaces basic units

**LEDs for device diagnostics (DEVICE, BUS, GEN. FAULT)**

These LEDs on the front of the device are used for device and fault diagnostics, and indicate the basic status:

- Of the device itself via the "DEVICE" LED
- For bus communication via the "BUS" LED
- By displaying the activity at the two ports via the LEDs "PORT 1" and "PORT 2"
- Of any motor feeder faults via the "GEN. FAULT" FAULT" LED

For further information, refer to Chapters Diagnostics via LED display on the basic unit and on the operator panel (PROFIBUS) (Page 252) and Diagnostics via LED display on the basic unit and on the operator panel (PROFINET) (Page 257).

**"TEST/RESET" button**

Enables the device to be reset after tripping or after a fault has occurred and makes it possible to test the device/motor feeder with or without tripping the contactor control. If a memory module or addressing plug is plugged in, parameterization can be initiated via the TEST/RESET button or, for example, by accepting the PROFIBUS address.

You will find further information in Chapter "Test/Reset" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958), in Chapters Setting the PROFIBUS DP address (Page 250) and Setting IP parameters and PROFINET device name (Page 254) and in Chapter Backing up and saving parameters (Page 269).

**System interfaces**

2 system interfaces for connecting

- a current measuring module or a current / voltage measuring module and
- an operator panel or expansion modules

# 8.2 Operator panel (OP)

### Function of the operator panel

The operator panel controls the motor feeder from the switchgear cabinet. It has an external system interface on the front to allow easier parameterization or diagnostics via a PC / programming device. This system interface (with cover for IP54) can be used to connect (by means of the PC cable) a PC with the SIMOCODE ES (TIA Portal) software installed or the memory module or the addressing plug.

On the rear system interface, it is connected to the basic unit or to an expansion module via a connecting cable. It is supplied with power via the basic unit.

The operator panel is frequently installed in the front panels of motor control centers. It is used in all device series. It also contains all the status LEDs available on the basic unit and the "TEST/RESET" button, and facilitates access to the system interface from outside the control cabinet.

The following are available:

- 5 buttons, of which 4 are freely parameterizable
- 10 LEDs, of which 7 are freely parameterizable

The following figure shows an operator panel:

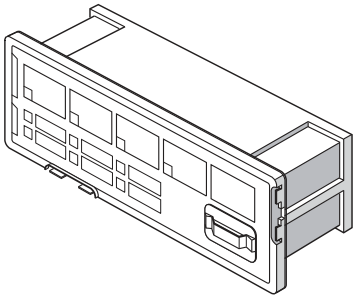


Figure 8-2 Operator panel

### Labeling strips:

Labeling strips are enclosed for designating buttons 1 to 4 and the yellow LEDs 1 to 3:

- Buttons 1 to 4: 6 pre-assigned labeling strips and 1 individually inscribable labeling strip
- LEDs 1 to 3: 1 individually inscribable labeling strip

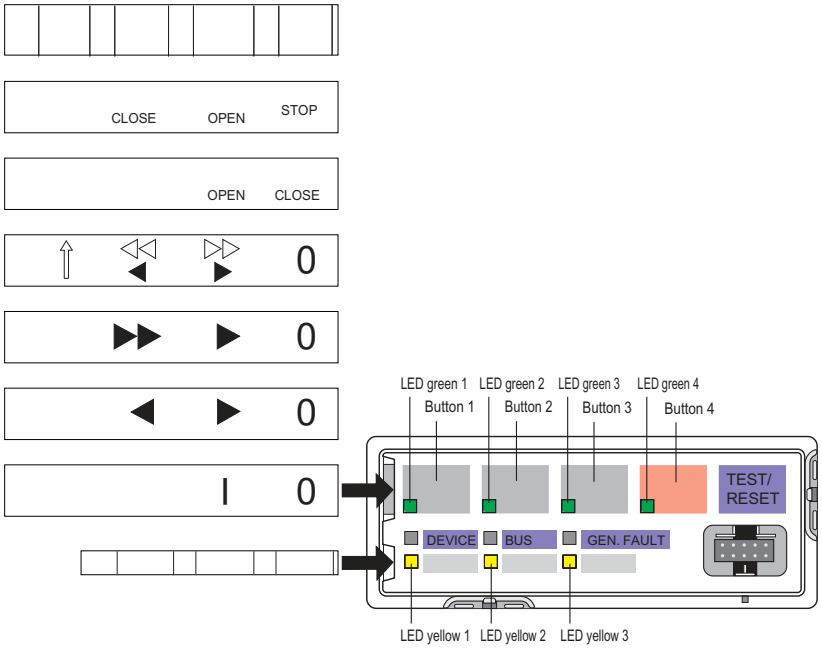



Figure 8-3 Labeling strips for operator panel buttons and LEDs

Unused labeling strips can be stored on the back of the operator panel:

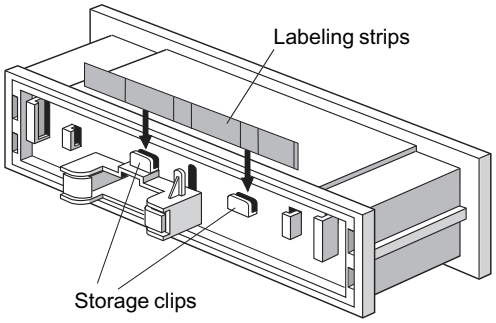



Figure 8-4 Storage clips for labeling strips for pushbuttons and LEDs of the operator panel

### "Park position" for memory module:

The memory module can be protected from unauthorized use by "parking" it on the rear of the operator panel inside the switchgear cabinet. In this case, the storage clips for the labeling strips cannot be used.

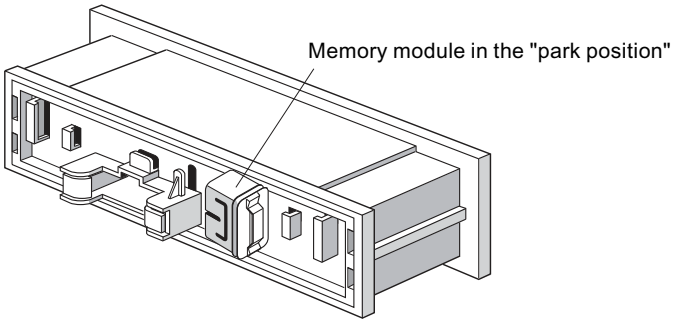



Figure 8-5 "Park position" for memory module

# 8.3 Operator panel with display

## 8.3.1 Functions and possible applications of the operator panel with display

Apart from the standard operator panel (OP), an optional operator panel with display (OPD) is also available for the SIMOCODE pro V High Performance device series. This operator panel can additionally display current measured values, operating data, diagnostics data or status information of the motor feeder on the cabinet. It also contains all the status LEDs that are present on the basic unit and facilitates access to the system interface from outside the cabinet. The motor can be controlled via the buttons on the operator panel. Current measured values, status information, fault messages or the device-internal error log are simultaneously shown on the display.

**Note**

**Usage restrictions concerning the operator panel with display**

- SIMOCODE pro V PB basic unit: The operator panel with display can only be used with SIMOCODE pro V PB basic unit from version *E03*.
- SIMOCODE pro V PN, pro V EIP basic unit: An operator panel with display from version *E07* is required for use with these basic units.
- In combination with the SIMOCODE pro PN basic unit, version *E09* or higher is required when using the operator panel with the 3UF7210-1AA00-0 display.
- In combination with the SIMOCODE pro MR basic unit, version *E09* or higher is required when using the operator panel with the 3UF7210-1AA00-0 display.
- When using the "Dry-running protection by means of active power monitoring" function, the following operator panels with display are necessary:
  - 3UF7210-1AA00-0: ≥ E12
  - 3UF7210-1AA01-0: ≥ E03
  - 3UF7210-1BA00-0: ≥ E04
  - 3UF7210-1BA01-0: ≥ E03

The following are available:

- 4 freely parameterizable buttons for controlling the motor feeder
- 4 keys for navigating the display menu, 2 of these are softkeys with different functions (e g. test / reset)
- 2 system interfaces (front and back)
- 7 LEDs, 4 of which are freely parameterizable (4 green LEDs integrated in the motor control buttons, primarily for feedback regarding the switching state, e.g. ON, OFF, CCW, CW, etc.)

**Note**

**Modification of selected device parameters via the operator panel with display**

Modification of selected device parameters is possible via the operator panel with display (see Parameters (Page 119))

The following figure shows an operator panel with display:

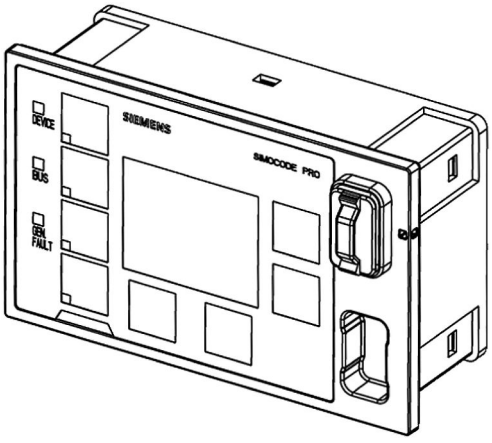



Figure 8-6 Operator panel with display

The operator panel with display can be connected directly to basic unit SIMOCODE pro V or an expansion module via the rear system interface. Voltage is supplied by the basic unit. This front system interface (with cover for IP54) can be used to connect (by means of the PC cable) a PC with the SIMOCODE ES (TIA Portal) software installed or the memory module and the addressing plug.

| **NOTICE** |
| --- |
| **Active operation**<br>You must not remove or plug in the operator panel with display during operation! |

**Note**

When using an operator panel with display, you may have to consider restrictions in the type and number of expansion modules that can be connected to a basic unit!

See Chapter Configuration information for SIMOCODE pro V when using an older basic unit (Page 148).

**Labeling strips:**

Labeling strips for labeling buttons 1 to 4 (6 pre-assigned and 1 that can be labeled individually) are included:

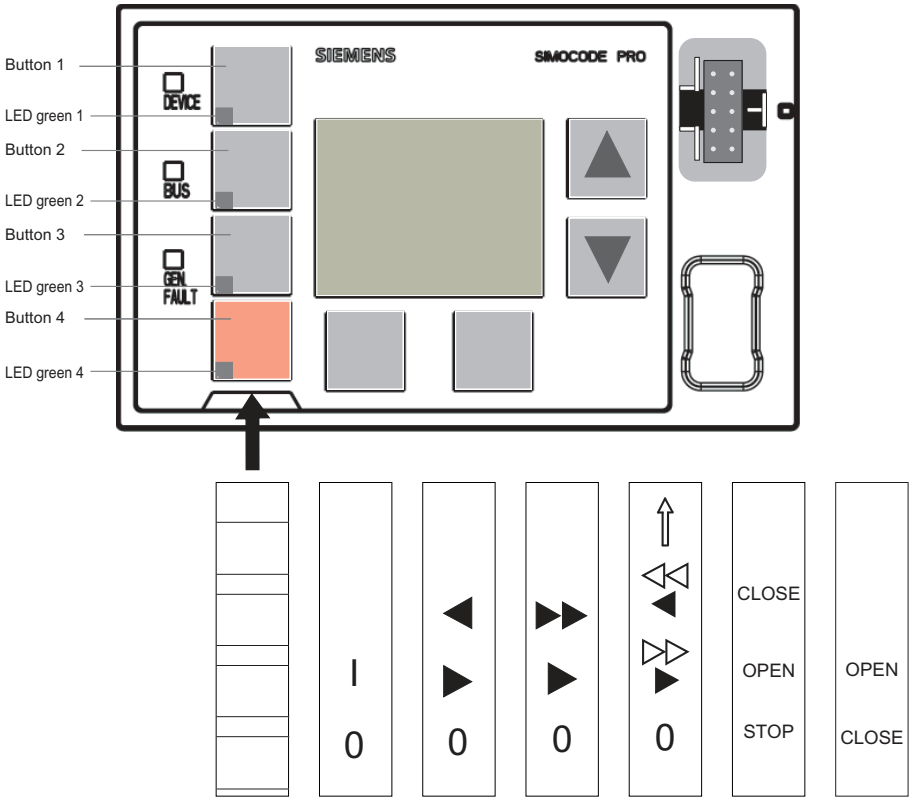



Figure 8-7 Labeling strips for the buttons of the operator panel with display

Unused labeling strips can be stored on the back of the operator panel with display:

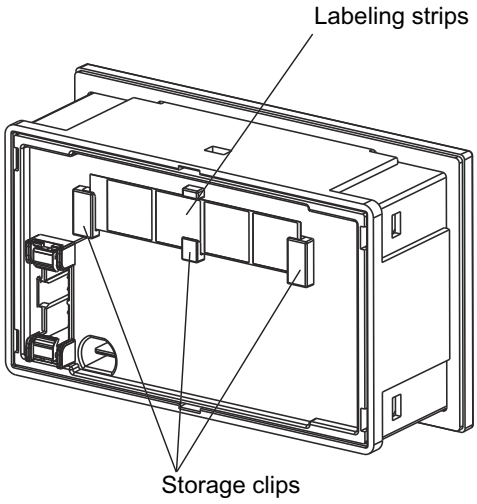



Figure 8-8 Storage clips for labeling strips

**"Park position" for memory module:**

The memory module can be "parked" on the front of the operator panel with display beneath the system interface:

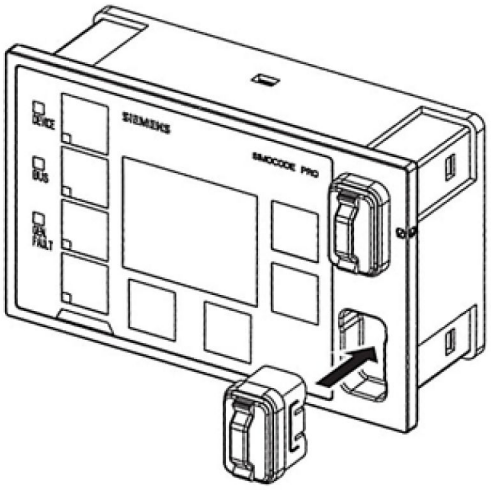


Figure 8-9 "Park position" for memory module

## 8.3.2 Operator controls and display elements of the operator panel with display

### Displays of the operator panel with display

The display shows current measured values, operating data and diagnostics data as well as the status information of the motor feeder in plain text or with the aid of symbols.

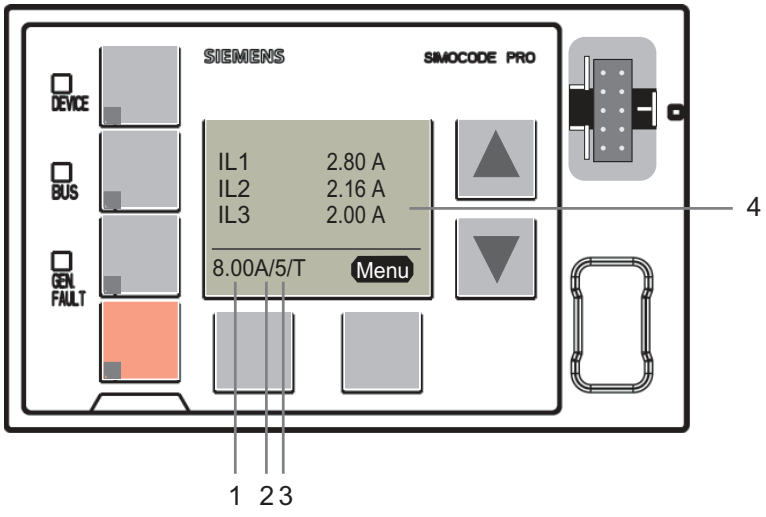



Figure 8-10 Display elements of the operator panel with display

**1**

Shows the **current setting Is** / rated motor current in A. For motors with two speeds, the relevant current setting Is1 or Is2 is always displayed depending on whether the current speed is slow or fast, e.g. **8 A.** For motors with two speeds, the left-hand softkey can be

used when the motor is stopped to alternate between the display of the two current settings. When running, the current setting for the active motor speed is always displayed.

**2**

Shows the set **class time** of the overload protection, e.g.: **10** = class 10E (class = trip class)

**3**

Indicates that temperature monitoring is active, e.g. the motor temperature is being monitored by thermistors or analog temperature sensors (Pt100, Pt1000, KTY, NTC). (**T**= temperature monitoring active.)

**4**

The **main display** enables customized depiction of different measured values when running. This is the standard display at the topmost menu level. Predefined profiles in the display settings can be selected for this purpose. By pressing the "Menu" softkey on the right, you can navigate through the submenus of the main display (see Chapter Read and adapt main display (Page 110)).

## Operator controls of the operator panel with display

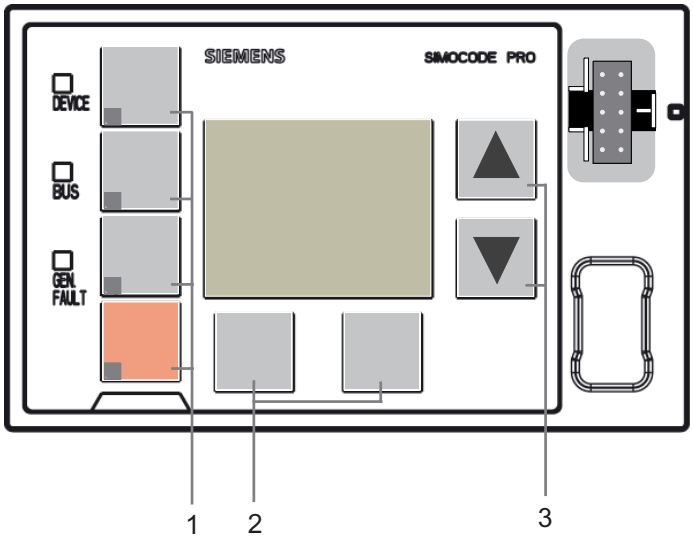



Figure 8-11 Operator controls of the operator panel with display

**1**

Four freely parameterizable **operator keys** with status LED**.** These operator keys are used to control the motor with integrated status LEDs for any status feedback. The functions can be user-defined. Labeling can be either freely chosen or achieved using the labeling strips supplied with the device (see also Chapter Operator panel with display (Page 88) and Chapters "Operator panel LED" and "Operator panel buttons" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958))

**2**

Two **softkeys.** They can have different functions depending on the menu displayed (e.g. open menu, exit menu, TEST/RESET). The currently assigned functions are shown on the lower left or right edge of the display.

**3**

Two **arrow keys** (one upwards arrow and one downwards arrow). They serve to navigate the menu or change the display settings, e.g. to adjust the contrast or to select a profile for the main display.

## 8.3.3 Menu of the operator panel with display

### 8.3.3.1 Timing charts

**Main menu, operator panel with display**

Details: See Displays of the operator panel with display (Page 108).

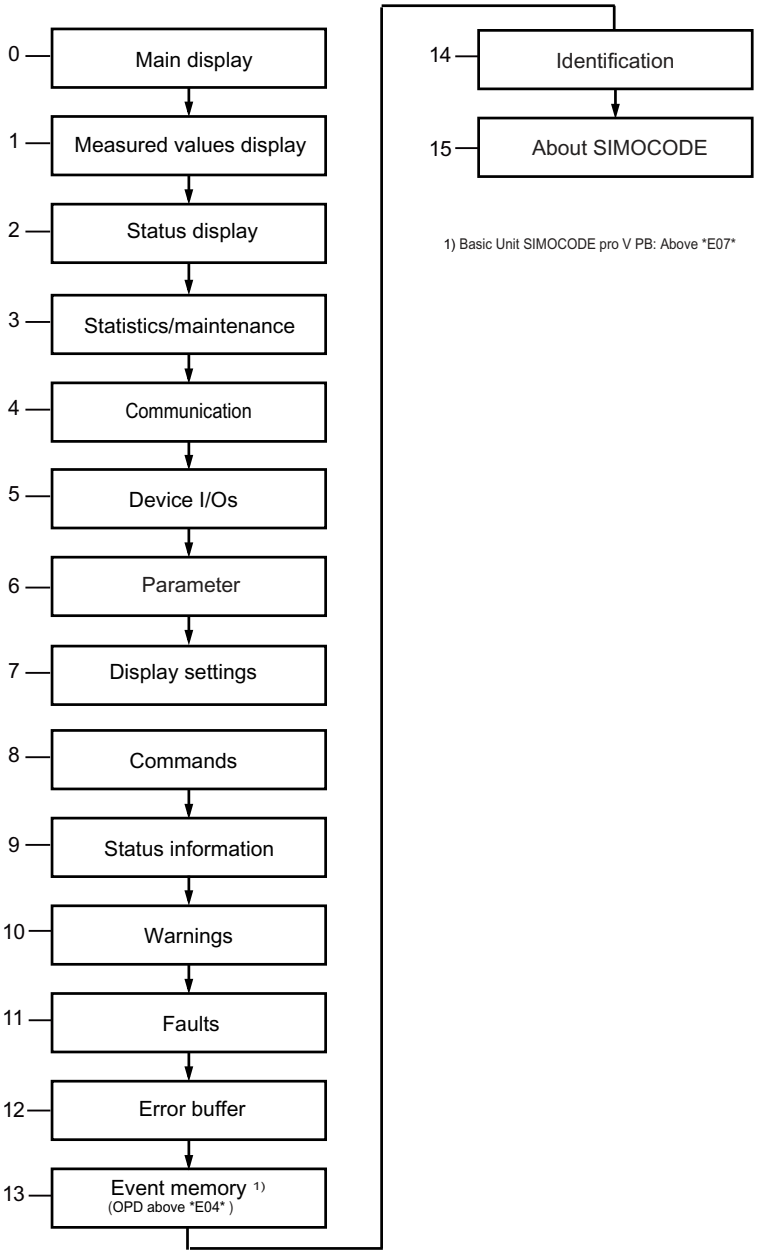



Figure 8-12 Main menu, operator panel with display

**Main display, operator panel with display**

Details: See Read and adapt main display (Page 110).

**1 Measured values, operator panel with display**

Details: See Display of measured values in the measured values display (Page 112).

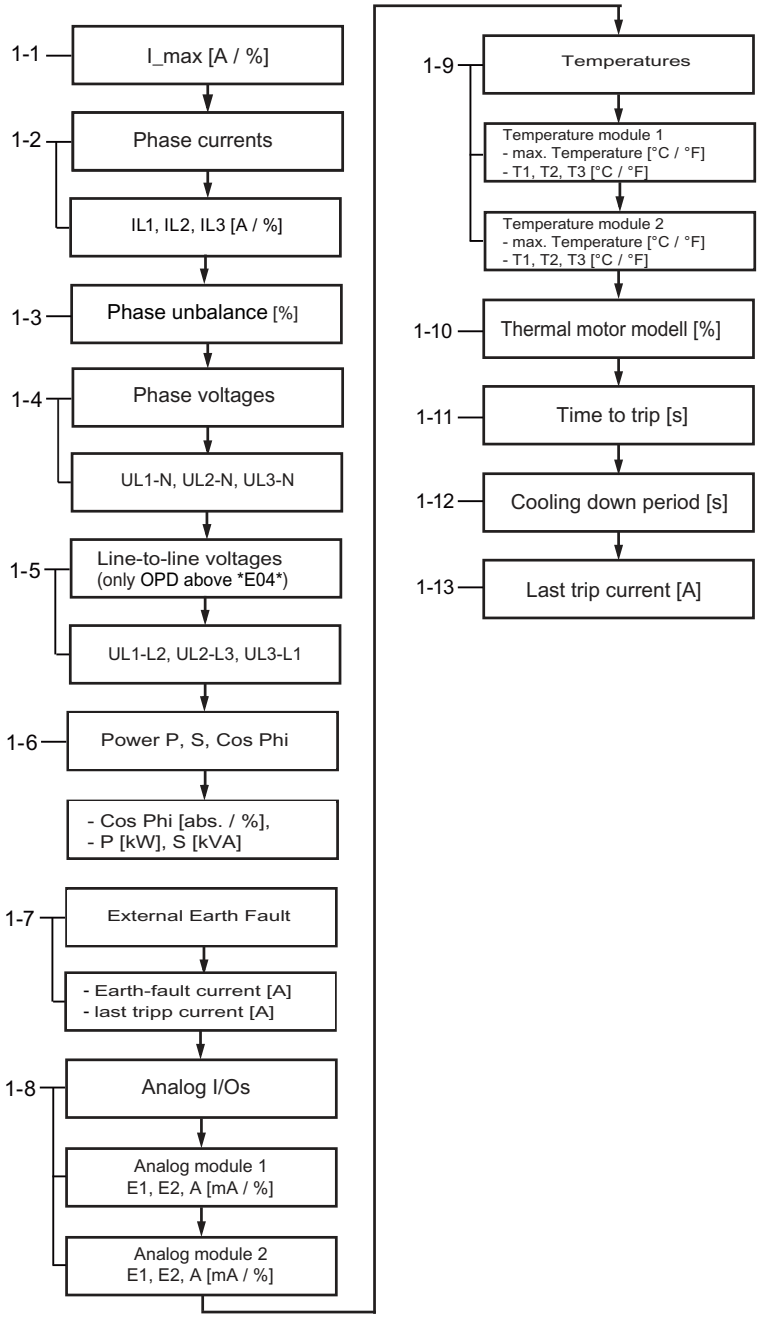



Figure 8-13 Measured values, operator panel with display

**Note**

**Numbering of the displays**

The numbering is valid with the maximum expansion.

**2 Status motor protection/motor control, operator panel with display**

Details: See Motor protection and motor control status (Page 114).

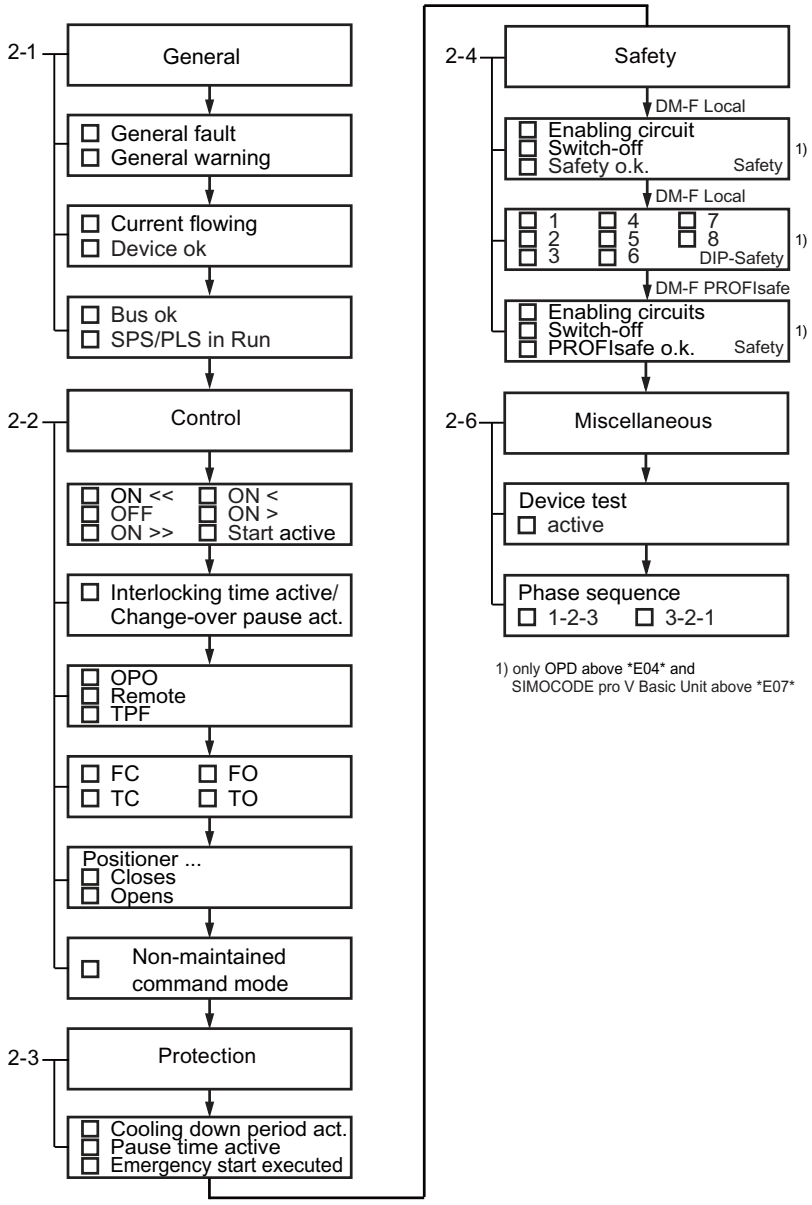



Figure 8-14 Status motor protection/motor control, operator panel with display - PROFIBUS / Modbus RTU

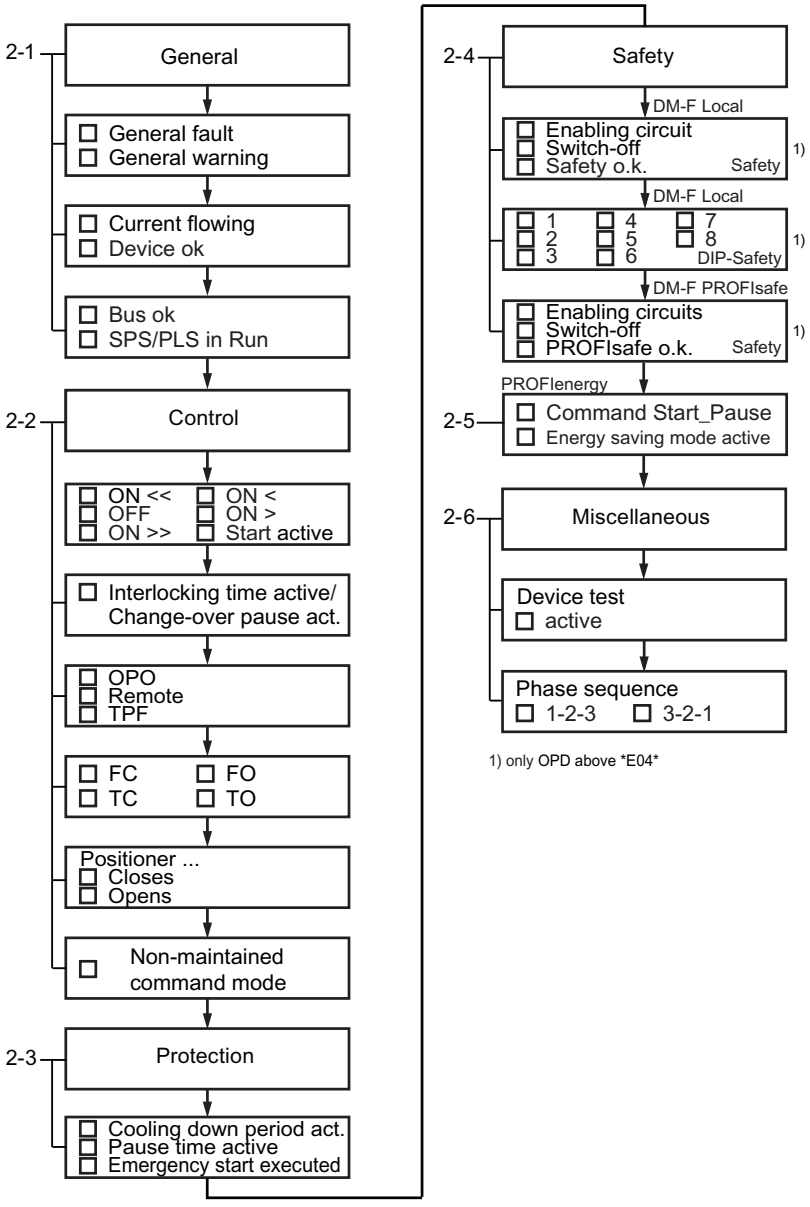



Figure 8-15 Status motor protection/motor control, operator panel with display - PROFINET / EtherNet/IP

**3 Statistics/maintenance, operator panel with display**

Details: See Display of statistical and maintenance-relevant information on the statistics/ maintenance display (Page 115).

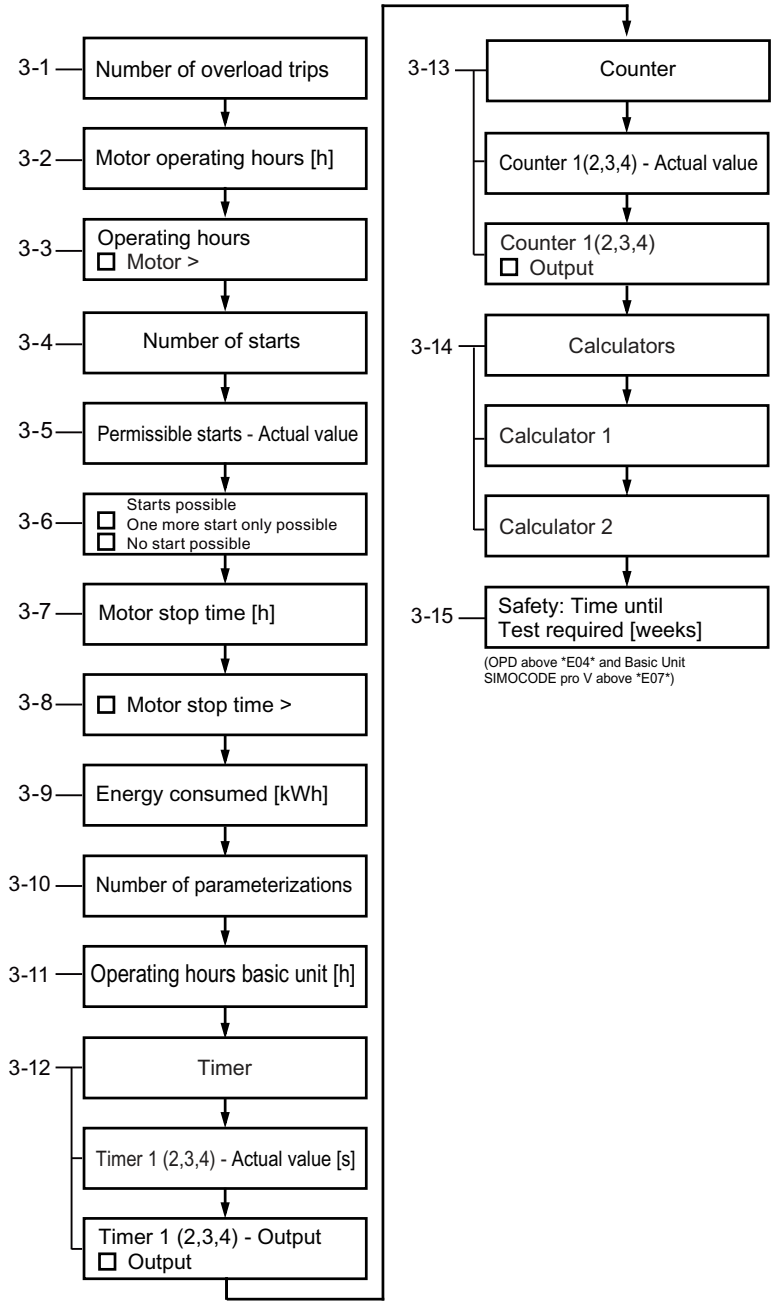



Figure 8-16 Statistics/maintenance, operator panel with display - PROFIBUS / Modbus

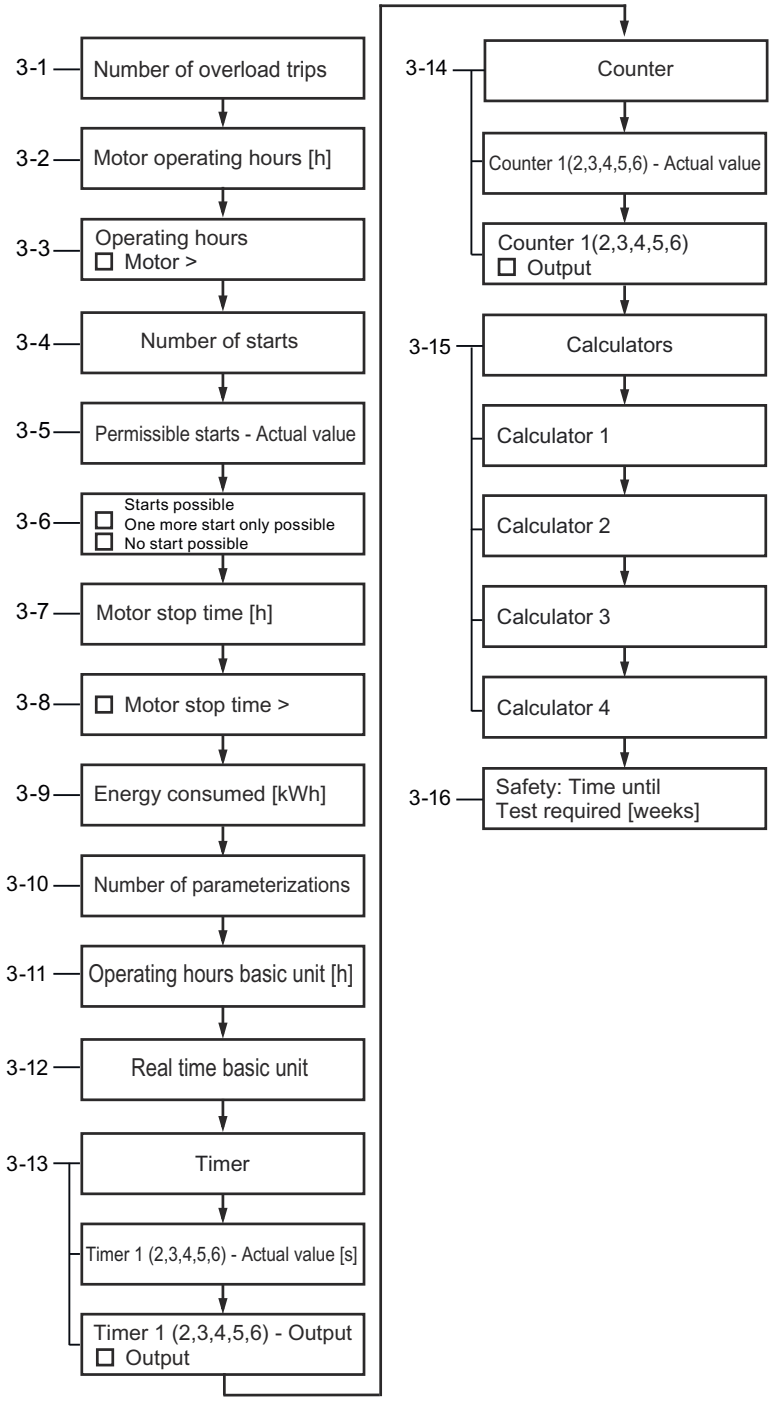



Figure 8-17 Statistics/maintenance, operator panel with display - PROFINET / EtherNet/IP

**4 Communication on the fieldbus, operator panel with display**

Details: See Status display for fieldbus communication (Page 116).

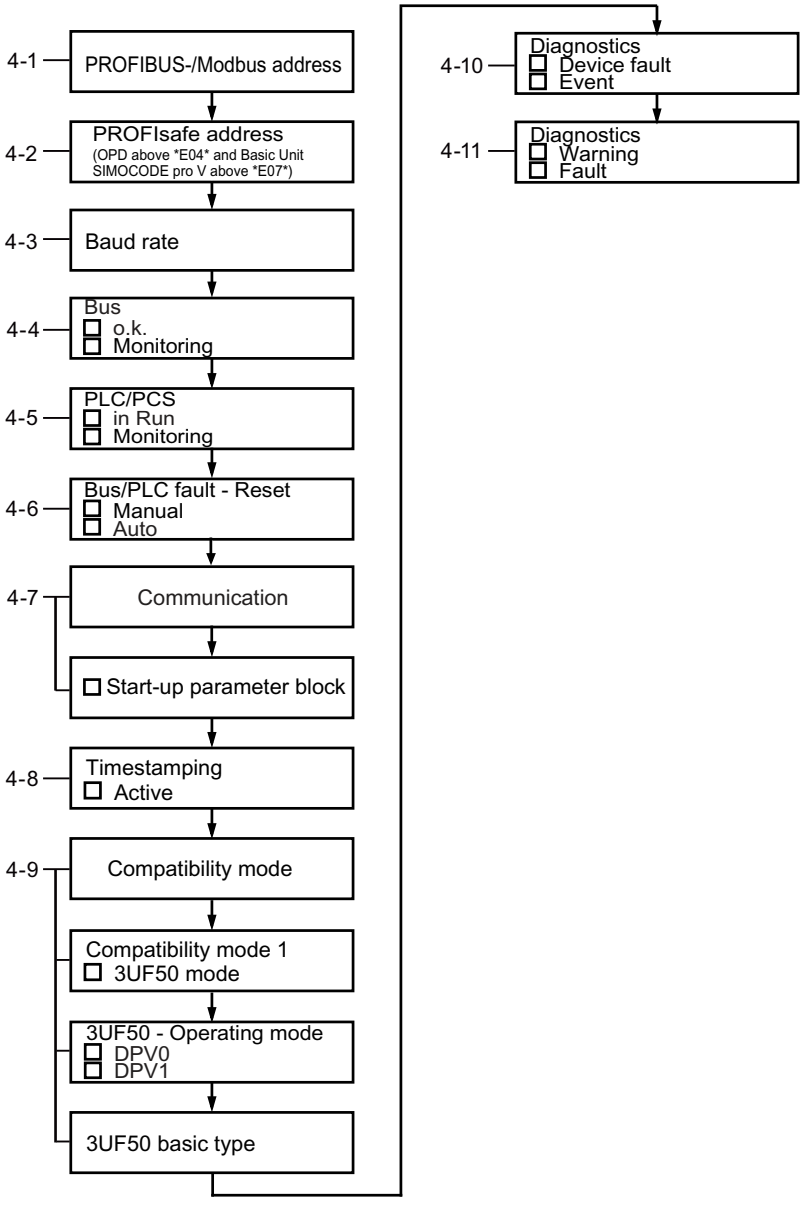



Figure 8-18 Communication on PROFIBUS / Modbus, operator panel with display

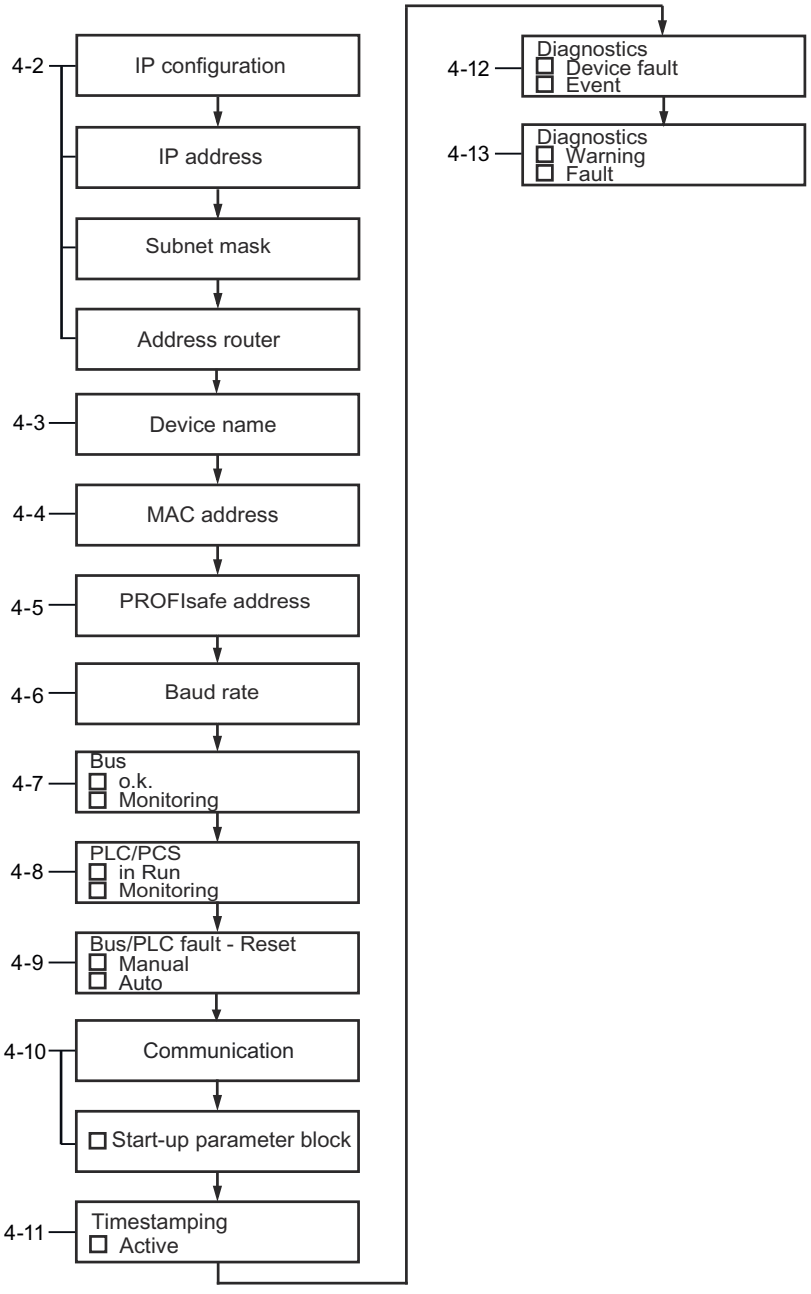



Figure 8-19 Communication on PROFINET/EtherNet/IP, operator panel with display

**5 Device I/Os, operator panel with display**

Details: See Displays the current status of all device I/Os (Page 117).

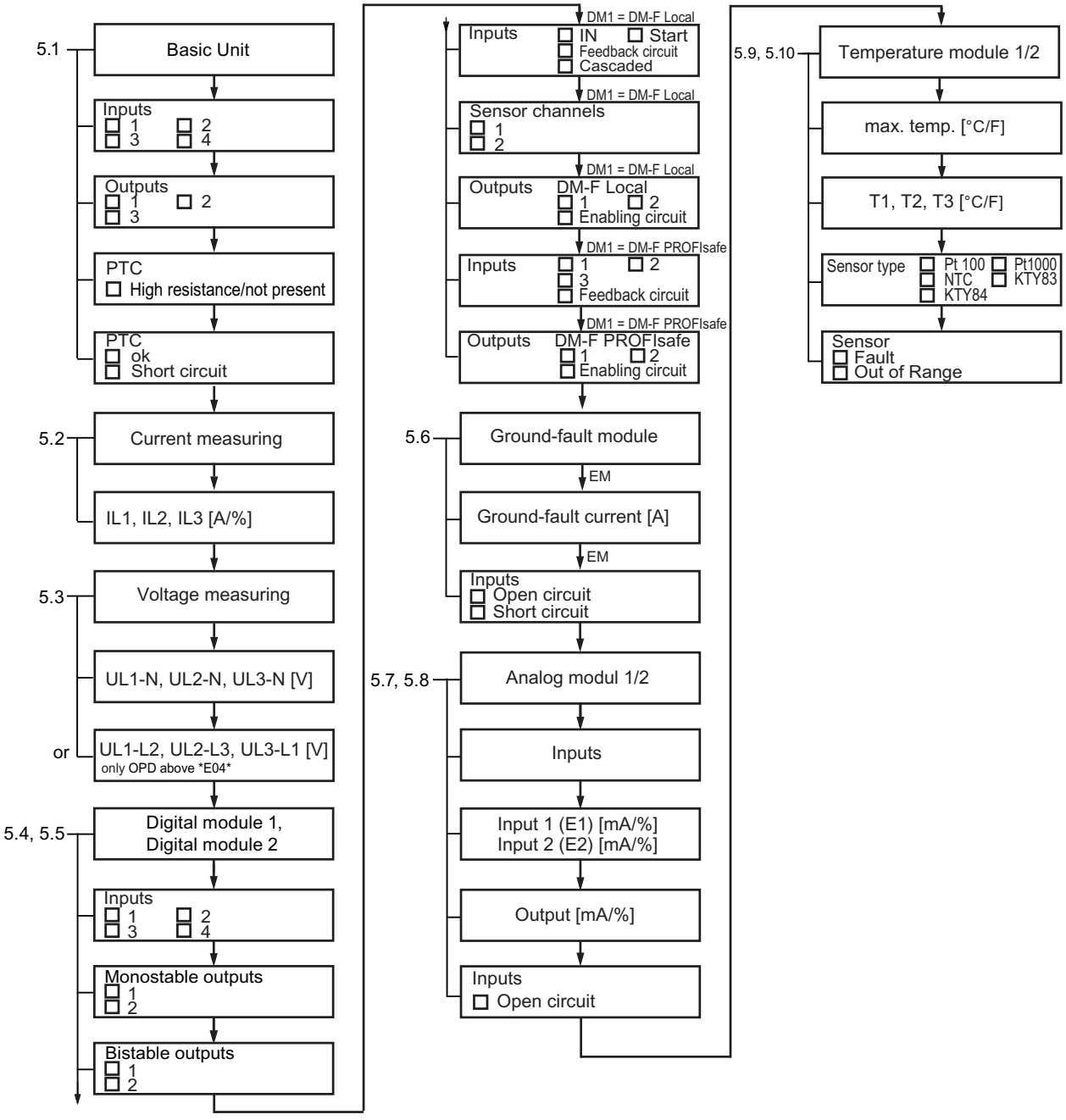



Figure 8-20 Device I/Os, operator panel with display

**6 Parameters, operator panel with display**

SIMOCODE pro V allows selected parameters to be set using the operator panel with display [1].

Details: See Parameters (Page 119)

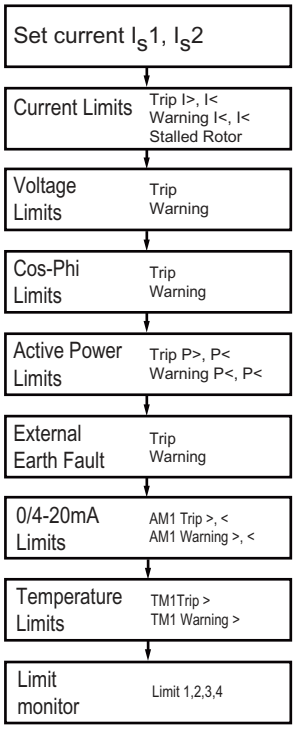



Figure 8-21 Parameter settings, operator panel with display

1)

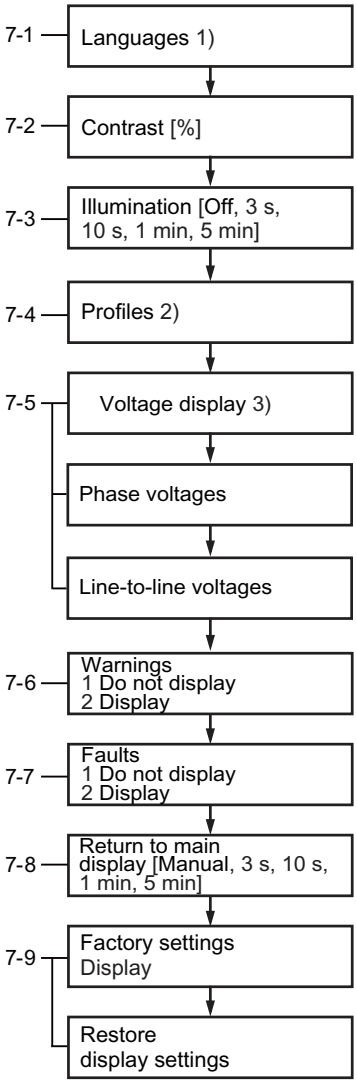
Overview of the basic units and operator panels and their product versions, which permit the setting of parameters via the operator panel with display:

| | | | Operator panel | | | |
|---|---|---|---|---|---|---|
| | | | 3UF7210-1AA00-0 | 3UF7210-1BA00-0 | 3UF7210-1AA01-0 | 3UF7210-1BA01-0 |
| SIMOCODE pro V PN | 3UF7011-1A.00-0 | E01 | E07 | E01 | E01 | E01 |
| SIMOCODE pro V EIP | 3UF7013-1A.00-0 | E01 | E07 | E01 | E01 | E01 |
| SIMO-CODE pro V PROFI-BUS | 3UF7010-1A.00-0 | E15 | E10 | E02 | E01 | E01 |
| SIMOCODE pro V MR | 3UF7012-1A.00-0 | E03 | E10 | E02 | E01 | E01 |

You will find usage restrictions concerning the operator panel with display in Chapter Functions and possible applications of the operator panel with display (Page 88).

**7 Display settings, operator panel with display**

Details: See Adapt display settings (Page 121).




1)

| 3UF7 210-1AA0.-0: | 3UF7 210-1BA0.-0: |
|---|---|
| English | English |
| Deutsch | 中国 |
| Français | Русский |
| Polski | 한국어 |
| Espanol | |
| Português | |
| Italiano | |
| Suomi | |

2)
IL1, II2, IL3 [A]
IL1, II2, IL3 [%]
I max [A]
I max [%]
I max, Cos
I max, U L1-N, Cos, S
I max, U L1-L2, Cos, S
I max, U L1-N, Cos, P
I max, U L1-L2, Cos, P
[mA] Input 1/ Output AM1
[mA] Input 2/ Output AM1
[mA] Input 1/ Input 2 AM1
[mA] Input 1/ Output AM2
[mA] Input 2/ Output AM2
[mA] Input 1/ Input 2 AM2
max. Temperature °C TM1
Temperature 1...3 °C TM1
max. Temperature °F TM1
Temperatur 1...3 °F TM1
max. Temperature °C TM2
Temperature 1...3 °C TM2
max. Temperature °F TM2
Temperature 1...3 °F TM2
U L1-N, U L2-N, U L3-N
U L1-L2, U L2-L3, U L3-L1
I max, U L1-N, Cos
I max, U L1-L2, Cos
I max, U L1-N, T max °C
I max, U L1-L2, T max °C
I max, U L1-N, T max °F
I max, U L1-L2, T max °F
Calculator 1
Calculator 2
Energy consumed [kWh]

3) only OPD above *E04*

Figure 8-22 Display settings, operator panel with display

**8 commands, operator panel with display (for pro V PB / pro V MR basic units)**

Details: See Resetting, testing and parameterizing via commands (Page 123).

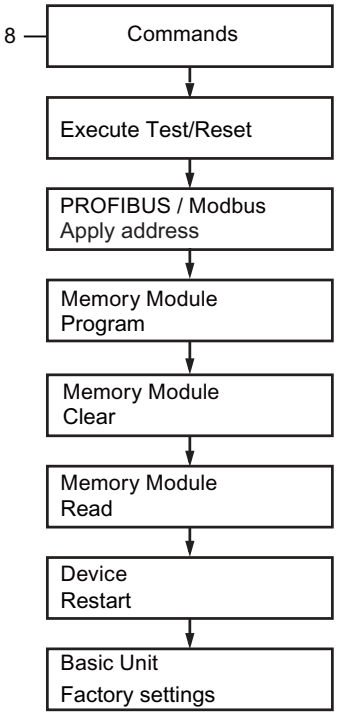



Figure 8-23 Commands, operator panel with display

**9 Messages, operator panel with display**

Details: See Display of all pending status information (Page 124).

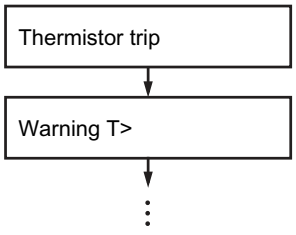



Figure 8-24 Messages, operator panel with display

**10 Warnings, operator panel with display**

Details: See Display of all pending warnings (Page 124).

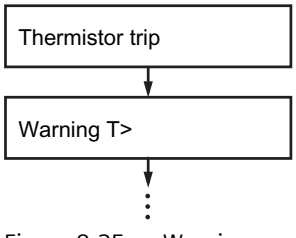



Figure 8-25 Warnings, operator panel with display

**11 Faults, operator panel with display**

Details: See Display of all pending faults (Page 125).

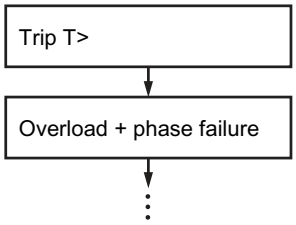



Figure 8-26 Faults, operator panel with display

**12 Fault memory, operator panel with display**

Details: See Reading the device's internal error buffer (Page 125)

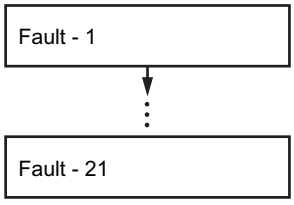



Figure 8-27 Fault memory, operator panel with display

**13 Event memory, operator panel with display** (only for OPD as from *E06* and BU2 as from *E07*)

Details: See Reading out the device-internal event memory (Page 125).

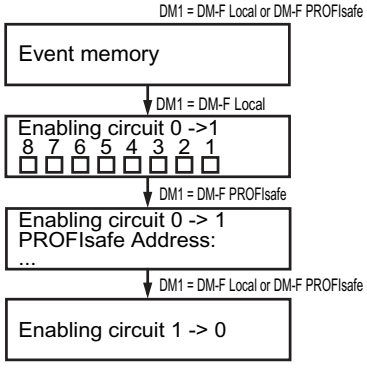



Figure 8-28 Event memory, operator panel with display

**14 Identification, operator panel with display**

Details: See Identification of the motor feeder and the SIMOCODE pro components (Page 126).

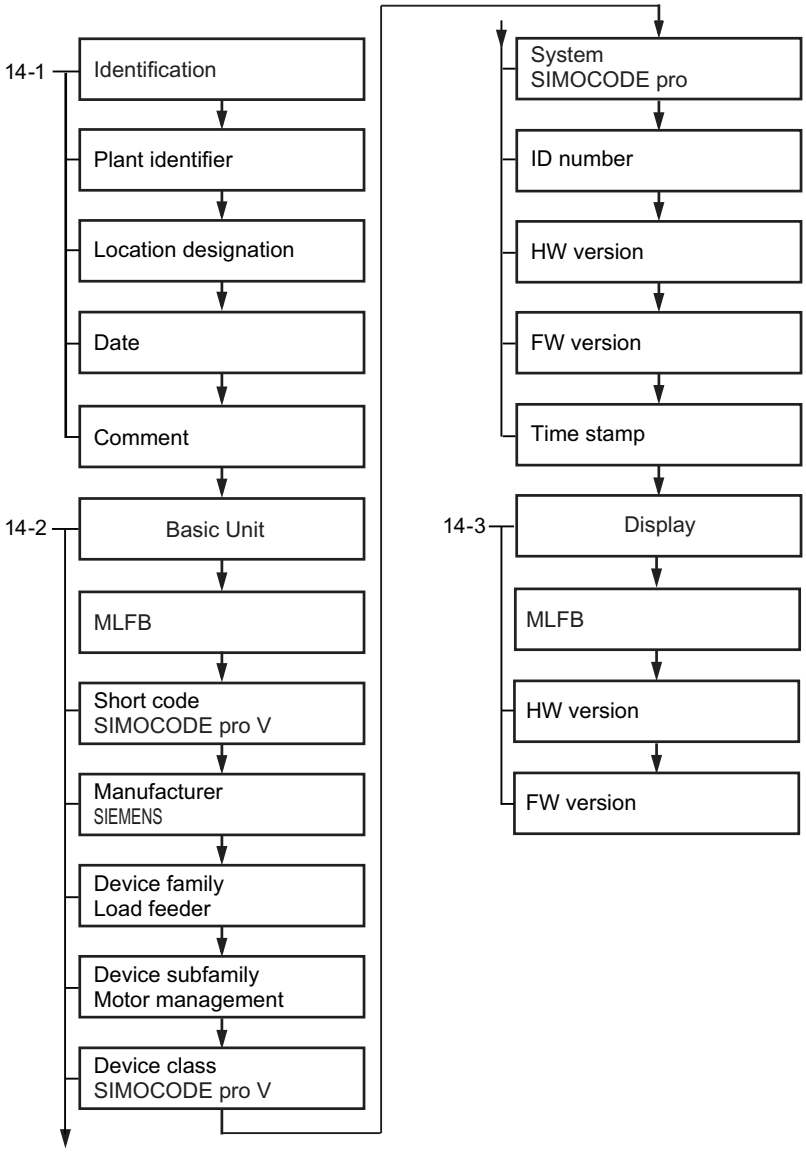



Figure 8-29 Identification, operator panel with display

### 8.3.3.2 Displays of the operator panel with display

You can navigate through the menu using the arrow keys and softkeys. Each menu item may have one or more submenus. The menu structure and display are, in part, directly dependent on the device parameterization (e. g. selected control function) and hardware configuration (e.g. type and number of expansion modules used).

- Main display
  The "main display" is the standard display of the SIMOCODE pro. It displays current measured values, which can be selected via profiles predefined to meet user-specific requirements. For detailed information: See "Read and adapt main display (Page 110)"
- Measured values display
  The "Measured values display" provides an overview of all values measured by SIMOCODE pro. For example, all phase currents, phase voltages, power-related measured values or temperatures. For detailed information: See "Display of measured values in the measured values display (Page 112)."
- Status display
  The "Status display" shows all higher-level status information, i.e. all status information relevant to the protection and control of the motor. For detailed information: See "Motor protection and motor control status (Page 114)."
- Statistics/Maintenance
  The "Statistics/Maintenance" menu item provides an overview of all SIMOCODE pro information that is primarily relevant to maintenance. For detailed information: See "Display of statistical and maintenance-relevant information on the statistics/maintenance display (Page 115)."
- Communication
  The "Communication" menu item displays all important information concerning fieldbus communication. For detailed information: See Status display for fieldbus communication (Page 116)
- Device I/Os
  The "Device I/Os" menu item provides a complete overview of the current status of all inputs and outputs of the basic unit as well as any connected expansion modules. For detailed information: See Displays the current status of all device I/Os (Page 117)
- Parameters
  SIMOCODE pro V allows selected parameters to be set using the operator panel with display: For detailed information: See Parameters (Page 119)

The parameterization is possible with the following combinations of basic unit/operator panel with display:

| | | | Operator panel | | | |
|---|---|---|---|---|---|---|
| | | | 3UF7210-1AA00-0 | 3UF7210-1BA00-0 | 3UF7210-1AA01-0 | 3UF7210-1BA01-0 |
| SIMOCODE pro V PN | 3UF7011-1A.00-0 | E01 | E07 | E01 | E01 | E01 |
| SIMOCODE pro V EIP | 3UF7013-1A.00-0 | E01 | E07 | E01 | E01 | E01 |

| | | | | | | |
|---|---|---|---|---|---|---|
| SIMOCODE pro V PROFIBUS | 3UF7010-1A.00-0 | E15 | E10 | E02 | E01 | E01 |
| SIMOCODE pro V Modbus RTU | 3UF7012-1A.00-0 | E03 | E10 | E02 | E01 | E01 |

You will find usage restrictions concerning the operator panel with display in Chapter Functions and possible applications of the operator panel with display (Page 88).

- Display settings
  All settings relevant to the operator panel with display can be carried out via "Display Settings". In addition to selecting the language and adjusting the contrast or illumination, it is also possible to select the profiles here that are relevant for adjusting the main display. For detailed information: See also "Adapt display settings (Page 121)."
- Commands
  The "Commands" menu item contains all commands relating to SIMOCODE pro, e.g. for testing the feeder, resetting after tripping and/or transferring parameters into the memory module or into SIMOCODE pro. For detailed information: See "Resetting, testing and parameterizing via commands (Page 123)."
- Messages
  The "Status Information" menu item provides an overview of all pending status information. For detailed information: See "Display of all pending status information (Page 124)."
- Warnings
  The "Warnings" menu item provides an overview of all pending warnings. For detailed information: See "Display of all pending warnings (Page 124)."
- Faults
  The "Faults" menu item provides an overview of all pending faults. For detailed information: See "Display of all pending faults (Page 125)."
- Error buffer
  The "Error buffer" menu item displays the SIMOCODE pro device-internal error buffer. For detailed information: See "Reading out the device-internal error buffer (Page 125)."
- Event memory
  The "Event Memory" menu item enables access to the SIMOCODE pro device-internal event memory. For detailed information: See "Reading out the device-internal event memory (Page 125)."

  **Note**

  **Precondition for event memory display**

  Is only displayed if DM-F present.

- Identification
  In the "Identification" menu item, you will find detailed information/labeling regarding SIMOCODE pro hardware components (basic unit, operator panel with display). For detailed information: See "Identification of the motor feeder and the SIMOCODE pro components (Page 126)."
- About SIMOCODE
  The "About SIMOCODE" menu item displays further information about SIMOCODE pro. See Timing charts (Page 93).

### 8.3.3.3 Read and adapt main display

To enable users speedy viewing of the measured values typically shown on their switchboard, various profiles are stored in the operator panel with display that enable user-specific adaptation of the standard measured values displayed in the SIMOCODE pro main display. The profile is selected in the menu "Display settings" → Profiles (see Section Adapt display settings (Page 121)).

The set current, the selected class time for the overload protection system and the use of temperature monitoring based on thermistors or analog temperature sensors are displayed (if programmed) at the bottom left of the main display. The submenus of the main display can be navigated with the right-hand softkey. For motors with two speeds, the left-hand softkey can be used to alternate between the display of the two set currents.

- **IL1, IL2, IL3 [A]** [1)]

Shows the currents in all three phases in A.

- **IL1, IL2, IL3 [%]** [1)]

Displays the currents in all three phases as a percentage of the set current.

- **Imax [A]** [1)]

Shows the maximum current of all three phases in A.

- **Imax [%]** [1)]

Displays the maximum current of all three phases as a percentage of the set current.

- **Imax, Cos phi** [2)]

Displays the maximum current of all three phases in amps and the power factor.

- **Imax, UL1-N, Cos phi, S** [3)]

Shows the maximum current of all three phases in amps, the phase voltage UL1 in V, the power factor, and the apparent power in kVA.

- **Imax, UL1-L2, Cos phi, S** [4)]

Shows the maximum current of all three phases in A, the line-to-line voltage UL1-L2 in V, the power factor, and the apparent power in kVA.

- **Imax, UL1-N, Cos phi, P** [3)]

Shows the maximum current of all three phases in amps, the phase voltage UL1 in V, the power factor, and the active power in kW.

- **Imax, UL1-L2, Cos phi, P** [4)]

Shows the maximum current of all three phases in A, the line-to-line voltage UL1-L2 in V, the power factor, and the active power in W.

- **In1/output AM1 / In1/output AM2** [5)] **[mA]**

Shows the current value at input 1 of analog module 1 / 2 and at the output of analog module 1 / 2 in mA.

- **In2/output AM1 / In2/output AM2** [5)] **[mA]**

Shows the current value at input 2 of analog module 1 / 2 and at the output of analog module 1 / 2 in mA.

- **Inputs AM 1 / inputs AM2** [5)] **[mA]**

Shows the current value at the two inputs of analog module 1 / 2 in mA.

- **Max. temp. °C TM 1 / TM2** [6)]

Shows the maximum temperature of all used sensor measuring circuits of the temperature module 1 / 2 in °C.

- **Temperatures °C TM 1 / TM2** [6)]

Shows the individual temperatures of all used sensor measuring circuits of the temperature module 1 / 2 in °C.

- **Max. temp. °F TM 1 / TM2** [6)]

Shows the maximum temperature of all used sensor measuring circuits of the temperature module 1 / 2 in °F.

- **Temperatures °F TM 1 / TM2** [6)]

Shows the individual temperatures of all used sensor measuring circuits of the temperature module 1 / 2 in °F.

- **UL1-N, UL2-N, UL3-N** [3)]

Shows all phase voltages in V.

- **UL1-L1, UL2-L3, UL3-L1** [4)]

Shows line-to-line voltages UL1-L2, UL2-L3, UL3-L1 in V.

- **Imax, UL1-N, Cos phi** [3)]

Shows the maximum current of all three phases in amps, the phase voltage UL1-N in V, and the power factor as absolute values.

- **Imax, UL1-L2, Cos phi** [4)]

Shows the maximum current of all three phases in A, the line-to-line voltage UL1-L2 in V and the power factor.

- **Imax, UL1-N, °C** [7)]

Shows the maximum current of all three phases in amps, the phase voltage UL1-N in V, and the maximum temperature of all used sensor measuring circuits of the temperature module in °C.

- **Imax, UL1-L2, °F** [7)]

Shows the maximum current of all three phases in A, the line-to-line voltage UL1-L2 in V, and the maximum temperature of all used sensor measuring circuits of the temperature module in °F.

- **Calculator 1**

Shows the calculated result that the function block Calculator 1 provides without units in the range 0 ... 65535.

Permits display, for example, of a 2-byte value sent directly from the automation system on the display of the switchboard or the display without units of each 2-byte value in SIMOCODE pro.

- **Calculator 2**

Shows the calculated result that the function block Calculator 2 provides without units in the range 0 ... 65535.

Permits display, for example, of a 2-byte or 4-byte value sent directly from the automation system on the display of the switchboard or the display without units of each 2-byte and 4-byte value in SIMOCODE pro.

- **Energy consumed** 2)

**Note**

**Modified system expansion or hardware configuration**

If the main display permanently fails to show measured values, this indicates that a profile has been selected in the display settings that is no longer supported, due, for example, to a changed system expansion or changed hardware configuration. The profile must be reselected.

1) Possible only if a current measuring module or current / voltage measuring module is used

2) Possible only if a current / voltage measuring module is used

3) Possible only if a current / voltage measuring module is used Values will only be displayed if phase voltage is set/configured

4) Possible only if a current / voltage measuring module is used and line-to-line voltage is set/configured

5) Possible only if the analog module is used

6) Possible only if the temperature module is used

7) Possible only if a current / voltage measuring module and temperature module are used Values will only be displayed if phase voltage is set/configured

### 8.3.3.4 Display of measured values in the measured values display

The "Measured Values" menu item displays all current SIMOCODE pro measured values. Depending upon the type of expansion modules used, all or only some of the values listed here will be available. These are the most important menus by way of example:

- Imax 1)
  Shows the maximum current of all three phases and can be switched between A or % of $I_s$
- IL1, IL2, IL3 1)
  Shows the currents of all three phases and can be switched between A or % of $I_s$.
- Phase unbalance 1)
  Shows the current phase unbalance as a percentage.
- UL1-N, UL2-N, UL3-N 2)
  Shows all phase voltages in V.
- U L1-L2, U L2-L3, U L3-L1 3)
  Shows all line-to-line voltages in V.
- Cos phi, P, S 4)
  Shows the power factor (0 to 100 % or absolute, switchable using the right softkey), the active power in kW, and the apparent power in kVA.
- Frequency [Hz] 7)

- Ground-fault current [mA]
  Shows the measured value of the residual current.
- Last trip current [mA]
  Shows the last measured value of the residual current.
- Analog input 1, analog input 2, analog output (for AM1) [5)]
  Shows the current values at both inputs and the actual value at the output of analog module 1 and can be switched over between mA and %.
- Analog input 1, analog input 2, analog output (for AM2) [5)]
  Shows the actual values at both inputs and the actual value at the output of analog module 2 and can be switched over between mA and %.
- Max. temperature [6)]
  Shows the maximum temperature of all used sensor measuring circuits of the temperature module 1 in °C (can be switched to °F).
- Max. temperature [6)]
  Shows the maximum temperature of all used sensor measuring circuits of the temperature module 2 in °C (can be switched to °F).
- T1, T2, T3 [6)]
  Shows the individual temperatures of all used sensor measuring circuits of the temperature module 1 in °C (can be switched to °F).
- T1, T2, T3 [6)]
  Shows the individual temperatures of all used sensor measuring circuits of the temperature module 2 in °C (can be switched to °F).
- Thermal motor model
  Shows the current temperature rise of the internal thermal motor model in %.
- Time to trip
  Shows the estimated time to trip.
- Cooling down period
  Displays the cooling down period remaining before the motor can be switched on again after an overload trip.
- Last trip current
  Shows the magnitude of the current that was measured at the moment of the overload trip, unit of measurement can be switched between A and % of $I_s$.

1) Possible only if a current measuring module or current / voltage measuring module is used

2) Possible only if a current / voltage measuring module is used Values will only be displayed if phase voltage is set/configured

3) Possible only if a current / voltage measuring module is used and line-to-line voltage is set/configured

4) Possible only if a current / voltage measuring module is used

5) Possible only if the analog module is used

6) Possible only if the temperature module is used

7) 2nd generation current / voltage measuring module necessary

### 8.3.3.5 Motor protection and motor control status

The status display shows all higher-level status information, i.e. all status information relevant to the protection and controlling of the motor. The type of status information depicted is, therefore, in part directly dependent upon the parameterized control function and the hardware configuration of SIMOCODE pro, and may vary.

These are the most important menus by way of example:

**General**

- General fault, general warning
- Current flowing, device ok
- Bus ok, PLC/PCS in Run

**Control**

---

**Note**

**Display status information**

The display of the status information can vary according to the control function.

---

- ON<<, ON<, OFF, ON>, ON>>, start active
- Interlocking time active, change-over pause active
- OPO, Remote, TPF
- FC, FO, TC, TO: Only for "Positioner" control functions.
- Positioner runs in CLOSED direction, positioner runs in OPEN direction: Only for "Positioner" control functions.
- Non-maintained command mode

**Protection**

- Cooling down period active, pause time active, emergency start executed

**Other**

- Device test active
- Phase sequence 1-2-3, phase sequence 3-2-1

Possible only if a current / voltage measuring module is used.

**Safety**

- Safety DM-F Local: Status of enabling circuit, shutdown "Safety," "Safety o.k." (only with an OPD as from product version *E04*, a SIMOCODE pro V MR / PN / EIP basic unit or a SIMOCODE pro V PB basic unit as from product version *E07* and a DM-F Local)
- DIP switches, DM-F Local: Status of DIP switches 1, 2, 3, 4, 5, 6, 7, 8 (only with an OPD as from product version *E04*, a SIMOCODE pro V MR/PN/EIP basic unit or a SIMOCODE pro V PB basic unit as from product version *E07* and a DM-F Local)
- Safety DM-F PROFIsafe: Status of enabling circuit, shutdown "Safety," "PROFIsafe active" (only with an OPD as from product version *E04*, a SIMOCODE pro V PN basic unit or a SIMOCODE pro V PB basic unit as from product version *E07* and a DM-F PROFIsafe).

### 8.3.3.6 Display of statistical and maintenance-relevant information on the statistics/ maintenance display

The "Statistics/Maintenance" menu item gives an overview of all SIMOCODE pro information that is primarily relevant to maintenance. The states of timers and counters, etc. are displayed, as well as operating hours, stop times and the number of starts.

These are the most important menus by way of example:

**General**

- Number of overload trips
- Motor operating hours
- Motor operating hours >: Displays overshooting of the set limit for operating hours monitoring.
- No. of starts - actual value
- Permissible starts - actual value
- One more start only, no start
- Stop time: Displays overshooting of the set limit for motor stop time monitoring.
- Energy consumed (possible only if a current / voltage measuring module is used)
- Number of parameterizations
- Motor operating hours basic unit
- Real time basic unit
- Timer
- Timer 1 (2, 3, 4, 5, 6) actual value
- Timer 1 (2, 3, 4, 5, 6) output
- Counter
- Counter 1 (2, 3, 4, 5, 6) actual value
- Counter 1 (2, 3, 4, 5, 6) output

**Calculators**

- Calculator 1
- Calculator 2
- Calculator 3
- Calculator 4

**Safety**

- Time until test requirement: Remaining time until next test requirement in weeks (displayed only when DM-F is installed).

### 8.3.3.7 Status display for fieldbus communication

The "Communication" menu item displays all important information concerning fieldbus communication.

**PROFIBUS/Modbus:**

In addition to the current PROFIBUS/Modbus device address, the baud rate or fieldbus-relevant settings concerning process and diagnostic alarms to the automation system.

These are the most important menus by way of example:

- PROFIBUS/Modbus address
- PROFIsafe address: Indicates the PROFIsafe address (only for OPD versions as from *E04*, SIMOCODE pro V PB basic unit as from *E07* and an available with a DM-F PROFIsafe)
- Baud rate
- Bus ok, Bus monitoring
- PLC/PCS in Run, PLC/PCS monitoring
- Bus/PLC fault - reset
- Startup parameter block
- Time stamping active
- Compatibility mode
- Compatibility mode 1, 3UF50 Mode
- 3UF50 mode DPV0, DPV1
- 3UF50 basic type
- Diagnostics device error, diagnostics message: Displays which diagnostic information of type "device error" and/or "message" is sent by SIMOCODE pro to a higher-level automation system via PROFIBUS.
- Diagnostics warning, diagnostics trip: Displays which diagnostic information of type "warning" and/or "trip" is sent by SIMOCODE pro to a higher-level automation system via PROFIBUS.

**PROFINET:**

Not only information about IP configuration, device name, MAC address, PROFIsafe address but also settings about the status of communication and the response of SIMOCODE pro if communication failures are displayed.

These are the most important menus by way of example:

- IP configuration
- Device name
- MAC address
- PROFIsafe address: Shows the PROFIsafe address (only when DM-F PROFIsafe is installed)
- Baud rate
- Bus OK, bus monitoring
- PLC/PCS in Run, PLC/PCS monitoring
- Bus/PLC fault - reset
- Startup parameter block
- Diagnostics device error, diagnostics message: Shows which type of diagnostic information is sent by SIMOCODE pro to a higher-level automation system via PROFINET.
- Diagnostics warning, diagnostics trip: Shows which type of diagnostic information is sent by SIMOCODE pro to a higher-level automation system via PROFINET.

#### 8.3.3.8 Displays the current status of all device I/Os

The "Device I/Os" menu item provides a complete overview of the current status of all inputs and outputs of the basic unit as well as any connected expansion modules. The type of status information displayed is directly dependent upon the SIMOCODE pro hardware configuration.

These are the most important menus by way of example:

**Basic unit**

- Inputs 1 (2, 3, 4)
- Outputs 1 (2, 3)
- PTC high resistance/not present
- PTC ok, PTC short circuit

**Current measurement**

IL1, Il2, IL3: Displays the currents (in A) in all three phases (possible only if a current measuring module or current / voltage measuring module is used).

**Voltage measurement**

- UL1-N, UL2-N, UL3-N: Displays all line-to-line voltages in V (possible only if a current / voltage measuring module is used and the OPD is version *E04* or higher and line-to-line voltage is set/configured).
- U L1-L2, U L2-L3, U L3-L1: Displays all line-to-line voltages in V (possible only if a current / voltage measuring module is used, line-to-line voltage is set/configured and the OPD used is version *E04* or higher).

**Digital module 1, digital module 2**

- Inputs 1 (2, 3, 4): Inputs 1, 2, 3, 4 "monostable" or "bistable."
- Outputs 1, 2 "monostable" (possible only if digital module 1 is used as "monostable").

---

**Note**

**Display**

For OPD up to product version *E03*, the display is different.

---

- Outputs 1, 2 "bistable" (possible only if digital module 1 is used as "monostable" or "bistable").

**Digital module 1 as DM-F Local**

Possible only if digital module 1 is "Local," an OPD as from version *E04* and a SIMOCODE pro V (PB basic unit as from product version *E07*) is used.

- Inputs DM-F Local: Inputs "IN," "Start," "Feedback circuit," "Cascaded."
- Sensor channels DM-F Local: Sensor channels 1, 2
- Outputs DM-F Local: Outputs 1, 2, "Enabling circuit."

**Digital module 1 is DM-F PROFIsafe**

Possible only if digital module 1 is "PROFIsafe", an OPD as from version *E04* and a SIMOCODE pro V PB / PN basic unit (PB as from product version *E07*) is used.

- Inputs DM-F PROFIsafe: Inputs 1, 2, 3, "Feedback circuit".
- Outputs DM-F PROFIsafe: Outputs 1, 2, "Enabling circuit."

**Ground-fault module**

Possible only if the ground-fault module is used.

- Ground-fault current [mA]
- Inputs
  - Open circuit
  - Short-circuit.

**Analog module**

Possible only if the analog module is used.

- Input 1, input 2
- Output
- Open circuit

**Temperature module**

Possible only if the temperature module is used.

- Max. temperature
- T1, T2, T3
- Sensor type Pt100, Pt1000, NTC, KTY83, KTY85
- Sensor fault sensor out of range

### 8.3.3.9 Parameters

You can set the following parameters using the operator panel with display:

| Parameters | Range | Note |
|---|---|---|
| **Overload protection → current settings** | | Possible only if a current measuring module is configured |
| Current setting Is1 | 0.00 - 9,999.00 A | - |
| Current setting Is2 | 0.00 - 9,999.00 A | Possible only in conjunction with the following control functions:<br>• Dahlander starter<br>• Dahlander reversing starter<br>• Pole-changing starter<br>• Pole-changing reversing starter |
| **Current limits** | | Possible only if a current measuring module is configured |
| Monitoring of current limits → trip level I > (upper limit) | 0 - 1020 % of Is | - |
| Monitoring of current limits → warning level I > (upper limit) | 0 - 1020 % of Is | - |
| Monitoring of current limits → trip level I < (lower limit) | 0 - 1020 % of Is | - |
| Monitoring of current limits → warning level I < (lower limit) | 0 - 1020 % of Is | - |
| Motor protection → stalled rotor protection level | 0 - 1020 % of Is | - |
| **Voltage monitoring → voltage limits** | | Possible only if a current / voltage measuring module is configured |
| Trip level U < (lower limit) | 0 - 2040 V | - |
| Warning level U < (lower limit) | 0 - 2040 V | - |

| Parameters | Range | Note |
|---|---|---|
| **Cos phi monitoring → Cos phi limits** | | Possible only if a current / voltage measuring module is configured |
| Trip level cos phi < (lower limit) | 0 - 100 % | - |
| Warning level cos phi < (lower limit) | 0 - 100 % | - |
| **Active power monitoring → Active power limits** | | Possible only if a current / voltage measuring module is configured |
| Trip level P > (upper limit) | 0.000 - 9999.000 kW | - |
| Warning level P > (upper limit) | 0.000 - 9999.000 kW | - |
| Trip level P < (lower limit) | 0.000 - 9999.000 kW | - |
| Warning level P < (lower limit) | 0.000 - 9999.000 kW | - |
| **Ground fault monitoring → Ground fault limits** | | Possible only if a 3UF7510 ground-fault module is configured |
| Trip level | 0.00 - 40.00 A | - |
| Warning level | 0.00 - 40.00 A | - |
| **0/4-20 mA monitoring → 0/4-20 mA limits** | | Possible only if analog module 1 and/or 2 is configured |
| Analog module 1 - trip level 0/4-20 mA > (upper limit) | 0 - 255 | Represented in 0/4 - 20 mA similar to "Measured values" menu |
| Analog module 1 - warning level 0/4-20 mA > (upper limit) | 0 - 255 | Represented in 0/4 - 20 mA similar to "Measured values" menu |
| Analog module 1 - trip level 0/4-20 mA < (lower limit) | 0 - 255 | Represented in 0/4 - 20 mA similar to "Measured values" menu |
| Analog module 1 - warning level 0/4-20 mA < (lower limit) | 0 - 255 | Represented in 0/4 - 20 mA similar to "Measured values" menu |
| Analog module 2 - trip level 0/4-20 mA > (upper limit) | 0 - 255 | Represented in 0/4 - 20 mA similar to "Measured values" menu |
| Analog module 2 - warning level 0/4-20 mA > (upper limit) | 0 - 255 | Represented in 0/4 - 20 mA similar to "Measured values" menu |
| Analog module 2 - trip level 0/4-20 mA < (lower limit) | 0 - 255 | Represented in 0/4 - 20 mA similar to "Measured values" menu |
| Analog module 2 - warning level 0/4-20 mA < (lower limit) | 0 - 255 | Represented in 0/4 - 20 mA similar to "Measured values" menu |
| **Temperature monitoring → temperature limits** | | Possible only if temperature module 1 and/or 2 is configured |
| Temperature module 1 - trip level > (upper limit) | 0 - 65,535 K | Represented in °C/F similar to "Measured values" menu |
| Temperature module 1 - warning level > (upper limit) | 0 - 65,535 K | Represented in °C/F similar to "Measured values" menu |
| Temperature module 2 - trip level > (upper limit) | 0 - 65,535 K | Represented in °C/F similar to "Measured values" menu |
| Temperature module 2 - warning level > (upper limit) | 0 - 65,535 K | Represented in °C/F similar to "Measured values" menu |
| Limit monitor - limit monitor limit | 0 - 65535 | - |
| Limit 1 | 0 - 65535 | - |
| Limit 2 | 0 - 65535 | - |
| Limit 3 | 0 - 65535 | - |

| Parameters | Range | Note |
|---|---|---|
| Limit 4 | 0 - 65535 | - |
| Limit 5 | 0 - 65535 | - |
| Limit 6 | 0 - 65535 | - |

**Note**

**Password protection**

It is only possible to change these parameters if password protection is not active. Only then can you choose the parameter to be modified with the "OK" button.

Proceed as follows to change a parameter:

- Choose menu item "Parameters" from the main menu
- Then choose the parameter to be changed in the relevant submenu
- Click OK to confirm the selection

You can now change the value with the ▲ and ▼ buttons. The longer you hold these buttons for, the larger the step by which the value changes.

### 8.3.3.10 Adapt display settings

The default settings configured in the basic unit can be modified via the display settings. However, changes made in this way do not result in a change to the configured defaults. In addition to selecting the language and adjusting the contrast or illumination, it is also possible to select the profiles here that are relevant for adjusting the main display. In the factory settings menu item, the changes made to the display settings can be reset to the values configured in the basic unit.

These are the most important menus by way of example:

**Languages**

English (default), German, French, Polish, Spanish, Portuguese, Italian, Finnish

or alternatively

English, Chinese, Russian, Korean.

**Contrast**

0 % to 100 % (default: 50 %)

**Illumination**

Specifies how long the backlit display will remain on on the operator panel with display after the last keystroke and enables permanent activation or deactivation of the backlit display.
Off, 3 s, 10 s (default), 1 min, 5 min

**Profiles**

Enables selection of the display profiles for the main display. If a defined profile is no longer supported by SIMOCODE pro, for example, due to a changed hardware configuration, the start display will be shown instead of the default main display:

- IL1, IL2, IL3 [A] (default)
- Imax [A]
- IL1, IL2, IL3 [%]
- Imax [%]
- Imax, Cos phi
- Imax, UL1-N, Cos phi, S
- Imax, UL1-L2, Cos phi, S
- Imax, UL1-N, Cos phi, P
- Imax, UL1-L2, Cos phi, P
- In1/output AM1 [mA] (only if analog module 1 is present and configured)
- In2/output AM1 [mA] (only if analog module 1 is present and configured)
- In1/output AM2 [mA] (only if analog module 2 is present and configured)
- In2/output AM2 [mA] (only if analog module 2 is present and configured)
- Inputs AM 1 / inputs AM2 [mA]
- Max. temp. °C/°F TM1 (only if temperature module 1 is present and configured)
- Temperatures °C/°F TM1 (only if temperature module 1 is present and configured)
- Max. temp. °C/°F TM2 (only if temperature module 2 is present and configured)
- Temperatures °C/°F TM2 (only if temperature module 2 is present and configured)
- UL1-N, UL2-N, UL3-N
- UL1-L2, UL2-L3, UL3-L1
- Imax, UL1-N, Cos phi
- Imax, UL1-L2, Cos phi
- Imax, UL1-N °C/°F (temperature display TM1! [1])
- Imax, UL1-L2, °C/°F [1] (temperature display TM1! [1])
- Calculator 1
- Calculator 2
- Energy consumed [kWh] (only if a current / voltage measuring module is configured).

See Section Read and adapt main display (Page 110).

| NOTICE |
| --- |
| **1) Temperatures** |
| The temperature from temperature module 1 is always shown in this display profile. |
| The temperature from temperature module 2 is not shown in this profile. |

**Voltage display**

Switch voltage display: Defines whether "phase voltages" or "line-to-line voltages" will be displayed (available only with an OPD as from product version *E04* and a SIMOCODE pro V PB basic unit up to product version *E06*). Configuration is performed in the basic unit as from SIMOCODE pro V PB basic unit, product version *E07*.

**Warnings**

Determines whether, in the case of a pending general warning, the display is switched over to the menu item "Warnings" so that details are displayed (not activated per default): Do not display (default) - Display

**Faults**

Determines whether, in the case of a pending general fault, the display is switched over to the menu item "Faults" so that details are displayed (switched on per default, higher priority than pending warnings): Do not display - Display (default)

**Return to main display**

Determines whether and when to return from the current menu to the main display:

Manual, 3 s, 10 s (default), 1 min, 5 min

### 8.3.3.11 Resetting, testing and parameterizing via commands

The "Commands" menu item contains all commands relating to SIMOCODE pro, e.g. for testing the feeder, resetting after tripping and/or transferring parameters into the memory module or into SIMOCODE pro.

**Program memory module**

Parameters are transferred to memory module The memory module must be plugged into the system interface for this purpose.

**Clear memory module**

Parameters in memory module are reset. The memory module must be plugged into the system interface for this purpose.

**Read memory module**

Acceptance of the parameters from the memory module into the basic unit. The memory module must be plugged into the system interface for this purpose.

**Memory module write protection on**

All contents of the memory module are write-protected. This prevents any inadvertent changes to the contents of the memory module and any parameter changes to the connected SIMOCODE pro V basic unit.

An inadvertent change of parameters for a motor feeder is prevented.

SIMOCODE pro signals the successful execution of the command with the event "Memory module write-protected".

**Memory module write protection off**

With this command you can cancel the write protection of the memory module.

**Restart**

Initialization of SIMOCODE pro. New start.

**Factory settings**

All parameters assume their factory settings again.

**Set time (= PC time)**

If no NTP server address has been configured or no server has been found in the network, you can set the time of day here, that is, the real-time clock of SIMOCODE pro is set to the system time of the computer.

**Test**

Execute the test function. Same function as "TEST/RESET" button on the basic unit and operator panel

**Reset**

Execute a reset operation. Same function at "TEST/RESET" button on the basic unit and operator panel.

### 8.3.3.12 Displaying all pending messages

This menu item provides an overview of all pending status information. A precise description of the pending status information messages can be found in Chapter Alarms, faults, and system events - error handling (Page 284).

### 8.3.3.13 Displaying all pending warnings

This menu item provides an overview of all pending warnings. In the displays settings, it is possible to set that the display will automatically switch to this menu item when a new general warning occurs so that the exact cause of the general warning can be displayed. A precise description of the pending warnings can be found in Chapter Alarms, faults, and system events - error handling (Page 284).

### 8.3.3.14 Displaying all pending faults

This menu item provides an overview of all pending faults. In the display settings, it is possible to set that the display will automatically switch to this menu item when a new general fault occurs so that the exact cause of the general fault can be displayed. A precise description of the pending faults can be found in Chapter Alarms, faults, and system events - error handling (Page 284).

### 8.3.3.15 Reading the device's internal error buffer

The "Error buffer" menu item enables access to the SIMOCODE pro's internal error buffer. The time and cause of the last 21 faults are displayed here. See also Chapter Error buffer (Page 281). A precise description of the faults can be found in Chapter Alarms, faults, and system events - error handling (Page 284).

### 8.3.3.16 Reading the device's internal event memory

The "Event memory" menu item enables access to the SIMOCODE pro's internal event memory. The two most recent events "DM-F enabling circuit closed" and "DM-F enabling circuit open" are displayed, together with the time, for both digital modules "DM-F Local" and "DM-F PROFIsafe".

**Event memory**

The event memory is displayed.

**Last event "Enabling circuit closed," DM-F Local**

The entry contains the last event "DM-F enabling circuit closed," the time and the related DIP switch configuration.

---

**Note**

**Requirements**

Possible only if digital module 1 is used as a DM-F Local module.

---

**Last event "Enabling circuit closed," DM-F PROFIsafe**

The entry contains the last event "DM-F enabling circuit closed," the time and the related PROFIsafe address.

---

**Note**

**Requirements**

Possible only if digital module 1 is used as a DM-F PROFIsafe module.

---

**Last event "Enabling circuit open"**

The entry contains the last event "DM-F enabling circuit open" and the corresponding time.

**Note**

**Requirements**

Possible only if digital module 1 is used as a DM-F Local or DM-F PROFIsafe module.

### 8.3.3.17 Identification of the motor feeder and the SIMOCODE pro components

In the "Identification" menu item, you will find detailed information about the used SIMOCODE pro hardware components, e.g. hardware and firmware versions. This dialog box also enables identification of the motor feeder via a plant identifier stored in SIMOCODE pro, as well as a request for the location designation and display of the device's internal comment.
The essential menus are described by way of an example below:

**Identification**

- Plant identifier
- Location designation
- Date installed
- Description

**Basic unit**

- Order number
- Short code
- Vendor
- Device subfamily
- Device class
- System
- Ident. no.
- Hardware version
- Firmware version
- Time stamp

**Display**

- Order number
- Hardware version
- Firmware version

## 8.4 Current measuring modules (IM) for the SIMOCODE pro C, SIMOCODE pro S, and SIMOCODE pro V device series

Current measuring modules can be used together with all device series.
The current measuring module must be selected according to the current setting to be monitored for each feeder (rated operating current of the motor). The current measuring modules cover current ranges between 0.3 A and 630 A, with interposing transformers up to 820 A.
Current measuring modules are available for the following current ranges (see figure below):

- 0.3 to 3 A with through-hole connection
- 2.4 to 25 A with through-hole connection
- 10 to 100 A with through-hole connection
- 20 to 200 A with through-hole technology or bus connection system
- 63 to 630 A with bus connection system

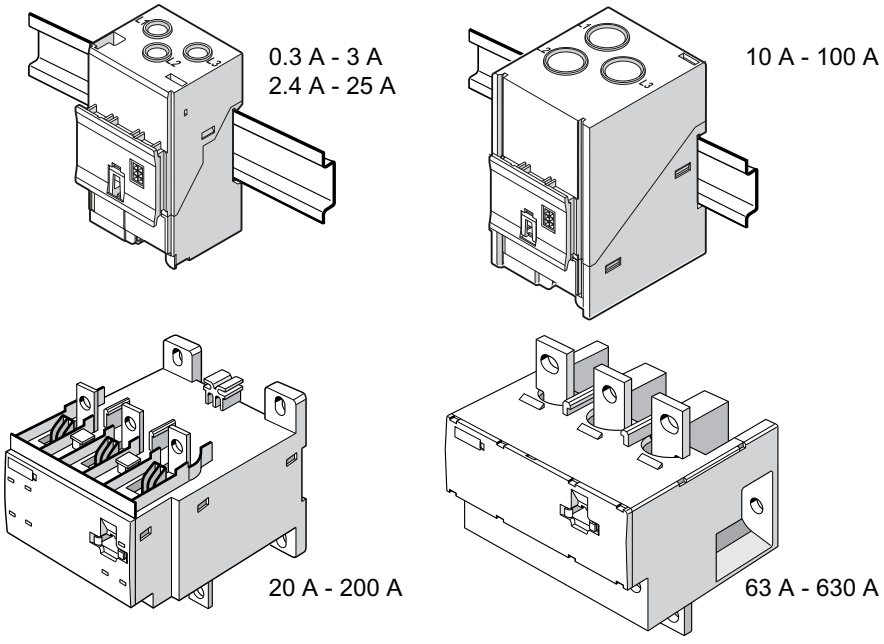



Figure 8-30 Types of current measuring modules

The current measuring module is connected to the basic unit via a connecting cable, which also supplies the power. Current measuring modules up to 100 A are suitable for standard rail mounting or can be fixed directly to the mounting plate using additional push-in lugs. Basic units can be snapped directly onto the current measuring modules. Current measuring modules up to 200 A can also be mounted on the standard mounting rail or, optionally, they can be fixed directly to the mounting plate with the screw attachments that are integrated in

the enclosure. The current measuring module up to 630 A can only be mounted using the integrated screw attachments.

**Note**

Current measuring modules with a current setting of up to 100 A can be connected to the basic unit mechanically and be installed as a unit (behind one another). Larger current measuring modules can only be mounted separately.

# 8.5 Current / voltage measuring modules (UM, UM+) for the SIMOCODE pro V High Performance device series

## Variants

Two device generations of the current / voltage measuring modules are available:

**1st generation: UM, MLFB ending in 000 (e.g. 3UF7110-1AA00-0).**

A decoupling module may be required when using these current / voltage measuring modules. See Chapter Decoupling module (DCM) for 1st generation current/voltage measuring modules (e.g. 3UF711.1AA00-0) (Page 136).

**2nd generation: UM+, MLFB ending in 010 (e.g. 3UF7110-1AA01-0).**

**Note**

When using the 2nd generation current / voltage acquisition modules (UM+), no decoupling module must be connected.

## Function

The SIMOCODE pro V High Performance device series allows use of a current / voltage measuring module instead of a current measuring module. In addition to measuring the motor current, current / voltage measuring modules also enable:

- Monitoring voltages up to 690 V (UM, UM+)
- Calculation and monitoring of power and cos phi (UM, UM+)
- Determining the frequency (UM+)
- Monitoring the phase sequence (UM, UM+)

With SIMOCODE ES (TIA Portal), you can define under "Parameters → Device configuration → Display voltage" whether the phase voltage or line-to-line voltage is to be used system-wide (when using a SIMOCODE pro V High Performance basic unit from firmware version V3.0).

Current / voltage measuring modules are available for the following current ranges:

| | Current range | Through-hole connection | Through-hole technology or bus connection system | Bus connection system |
|---|---|---|---|---|
| UM | 0.3 to 3 A | ✓ | — | — |
| | 2.4 to 25 A | ✓ | — | — |
| | 10 to 100 A | ✓ | — | — |
| | 20 to 200 A | — | ✓ | — |
| | 63 to 630 A | — | — | ✓ |

| | Current range | Through-hole connection | Through-hole technology or bus connection system | Bus connection system |
|---|---|---|---|---|
| UM+ | 0.3 to 4 A | ✓ | — | — |
| | 3 to 40 A | ✓ | — | — |
| | 10 to 115 A | ✓ | — | — |
| | 20 to 200 A | — | ✓ | — |
| | 63 to 630 A | — | — | ✓ |

The diagram below shows the various current / voltage measuring modules:

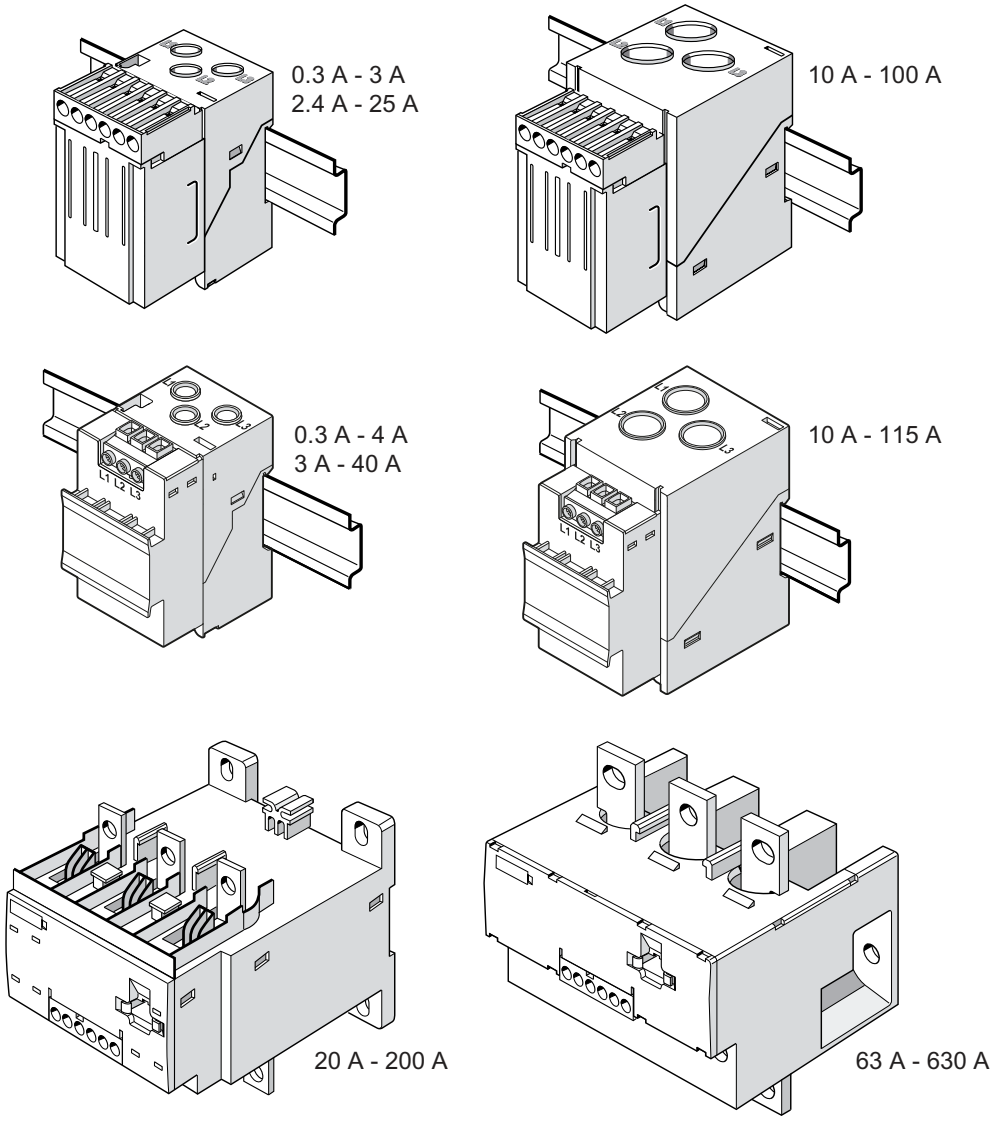



Figure 8-31 Variants of current / voltage measuring modules

**Wiring:**

The current / voltage measuring modules are connected to the basic unit via a connecting cable, which also supplies the power.

For the purpose of calculating or monitoring power-related measured values, current / voltage measuring modules are equipped with additional, removable terminals to which the voltages of all three phases of the main circuit are connected. An additional 3-core cable can be used, for example, to connect the main circuit directly from the bus connections of the current / voltage measuring module with the connection terminals of the voltage measuring module.

**Mounting:**

The current / voltage measuring modules UM / UM+ with a current setting of up to 115 A are suitable for standard rail mounting or can be fixed directly to the mounting plate using additional push-in lugs. These can be connected to the basic unit mechanically and installed as a unit (behind one another). For current / voltage measuring modules UM+ with a current setting of up to 115 A it is possible to mount the basic unit on the current / voltage measuring module.

Current / voltage measuring modules with a setting current up to 200 A can also be mounted on the standard mounting rail or, optionally, they can be fixed directly to the mounting plate with the screw attachments that are integrated in the enclosure.

The current / voltage measuring module with a current setting of up to 630 A can only be mounted using the integrated screw attachments. In this case, basic units can only be installed separately next to the current / voltage measuring modules.

## Application notes when using a 2nd generation current / voltage measuring module

**Note**

**MLFB**

The MLFBs of 2nd generation current / voltage measuring modules end in 010 (e.g. 3UF71101AA010)

**Measured variables and measurement accuracies**

The following new measured quantities are available:

- Frequency f of the supply voltage [1)]
- Average phase current - mean value (I1/I2/I3) I_avg:

Thanks to the internally determined ground-fault current, it is possible to monitor it by means of a warning and tripping threshold (up to max. 6x $I_o$). The relevant settings are made via the "Internal ground fault" function block. See Chapter "Ground fault monitoring" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

The accuracy of measured values has been improved. The following measuring accuracies are possible in the rated ranges:

- Current I: 1.5%
- Voltage U: 1.5%
- Power factor cos phi: 1.5%
- Active power P: 5%
- Active energy E: 5%
- Frequency f of the supply voltage: 1.5%
- Average phase current - mean value (I1/I2/I3) I_avg: 1.5%
- Ground-fault detection according to IEC 60947-1:
  - in the range 30% - 120% $I_s$: ± 10% (Class CI-A)
  - in the range 15% - 30% $I_s$: ± 25% (Class CI-B)

The measurement ranges of the current / voltage measuring modules have been adjusted to the current ranges of SIRIUS Innovations contactors and load feeders. This results in increases to the following measuring ranges: 0.3 to 4 A; 3 to 40 A and 10 to 115 A.

The measured values with the accuracy figures mentioned can be found in data record 94 - Measured values (from byte position 132) and in data record 95 - Statistics data in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960).

1)

**Note**

**Frequency measurement**

For a correct frequency measurement, the voltage measurement must be connected.

**Measurement performance**

The rate of measured value acquisition has been improved, and so updating of all measured values within 200 ms can be assumed.

**Tripping characteristic**

The overload tripping characteristic, which is calculated in the measuring modules, has been revised in the 2nd generation current / voltage measuring modules. By means of diverse analyses, the characteristic curve has been adjusted further to the actual requirements for overload release.

The tripping characteristic fulfills all basic points defined for overload protection in IEC 60947-4-1. In particular in the range of the 2-fold motor rated current, the characteristic curve was approximated to the practical conditions. Thus, the characteristic curve has steepened slightly, which produces slower tripping in the range between 1.15-fold and 6-fold motor rated current, and faster tripping in the range above 6-fold motor rated current.

The tripping characteristics can be found in Chapter "Overload protection" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

The trip classes have been extended with trip class 7. Thus, if required, finer coordination of the trip classes can be chosen in the lower range (if, for example, there is a wish to approximate to the characteristic curve of the class 10E current measuring modules).

**Interaction with the SIMOCODE basic units**

The 2nd generation current / voltage measuring modules operate with the new functions together with the basic units as from the following product versions:

- SIMOCODE pro V PB: From E15
- SIMOCODE pro V MR: From E03
- SIMOCODE pro V PN: From E10
- SIMOCODE pro V EIP: From E01.

| NOTICE |
| --- |
| **Connecting current / voltage measuring modules to the basic unit**<br>The 2nd generation current / voltage measuring modules must be connected directly to the basic unit in order to achieve the full performance capability. |

**NOTICE**

**Compatibility/compatibility mode**

- The 2nd generation current / voltage measuring modules also function with older SIMOCODE basic units. In this case, they behave compatibly with the 1st generation current / voltage measuring modules and can replace them in an application (compatibility mode). The prerequisite is that the current setting must lie within the permitted range of the 2nd generation current/voltage measuring module. Example: A 1st generation current / voltage measuring module 3UF7111-1AA00-0 (2.4 - 25 A) is to be replaced. If the current setting lies within the range of 2.4 to 3.0 A, a 2nd generation current / voltage measuring module 3UF7110-1AA01-0 (0.3 - 4 A) must be used.
- If both the SIMOCODE pro basic unit and also the current / voltage measuring module are replaced and the hardware parameterization is unchanged (the SIMOCODE ES parameterization still contains a 1st generation current / voltage measuring module), the compatibility mode of the current / voltage measuring module is also active.
- In the event that a 1st generation current / voltage measuring module is replaced by a 2nd generation current / voltage measuring module, an existing decoupling module must be removed to ensure fault-free operation.

Specifically, this means:

- The tripping characteristic remains as in the 1st generation current / voltage measuring modules.
- The measurement accuracy figures and measured values correspond to those of the 1st generation current / voltage measuring modules.
- The new measured values stored as float in the data records are not entered (see manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960) → Tables, data records - definitions").

The following restrictions still have to be observed:

**NOTICE**

**Maximum configuration of the SIMOCODE system with older basic units SIMOCODE pro V PB (≤ E14) or pro V MR (E01) and a 2nd generation current / voltage measuring module**

- When using BU / UM+: max. 4 expansion modules
- When using BU / UM+ / OP:
  - max. 4 expansion modules
  - max. 3 expansion modules when using AM, TM and EM
- when using BU / UM+ / OPD: Max. 3 expansion modules, of which one AM, TM or EM or max. 2 expansion modules from AM, TM and EM when using a BU 24 V DC
- when using BU / UM+ / OPD: Max. 2 expansion modules, of which one AM, TM or EM when using a BU 110-240 V AC/DC

In this case, the installation guidelines for configuration with the 2nd generation current / voltage measuring modules must be observed.

See also Configuration information for SIMOCODE pro V when using an older basic unit (Page 148) for more information.

| **NOTICE** |
| --- |
| **Rated motor current is in the range from 2.4 - 2.99 A and a 1st generation current / voltage measuring module with the 2.4 - 25 A measuring range is used**<br>In this case, the 0.3 - 4 A measuring range must be used for the 2nd generation current / voltage measuring modules.<br>This requires a change of the parameterization to the smaller measuring range (0.3 - 4 A). Attention must be paid to this with regard to code conversion of the MLFB numbers.<br>The installation width of the two measuring ranges is identical. |

# 8.6 Decoupling module (DCM) for 1st generation current/voltage measuring modules (e.g. 3UF711.1AA00-0)

### Function of the decoupling module

When measuring voltage and power with SIMOCODE pro in ungrounded networks, each current / voltage measuring module must have a decoupling module connected upstream in series at the system interface. Where voltage or power is measured with SIMOCODE pro in systems with additional insulation measurement or insulation monitoring, a decoupling module must be connected between the basic unit and each current / voltage measuring module. If using the 3UF710 current measuring module in these networks, it is imperative that an additional decoupling module is not used.

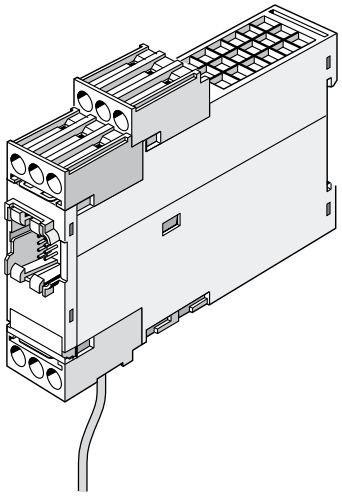


Figure 8-32 Decoupling module, SIMOCODE pro V device series

**Note**

**Connectable expansion modules**

When using a decoupling module, note that the type and number of expansion modules that can be connected to a basic unit are limited! See Chapter Configuration information for SIMOCODE pro V when using an older basic unit (Page 148).

**Note**

**Using the decoupling module**

Do not use the decoupling module with the 2nd generation current / voltage measuring modules.

In the event that a 1st generation current / voltage measuring module is replaced by a 2nd generation current / voltage measuring module, remove the decoupling module.

## Using the decoupling module in different networks

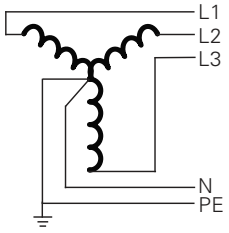
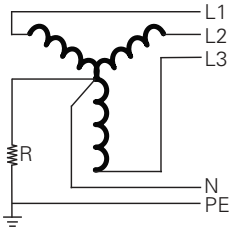
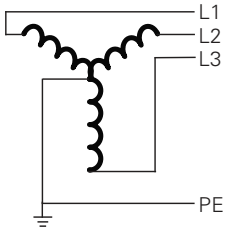
A decoupling module may be required when using a voltage measuring module, especially for the following networks:

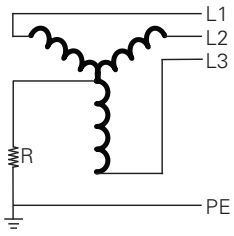
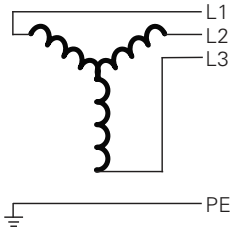
- Isolated systems
- High-impedance grounded systems
- Asymmetrically grounded systems
- Single-phase systems

The tables below show decoupling module requirements for different grounding systems and system configurations (star systems, delta systems, and single-phase systems):

**Star networks:**

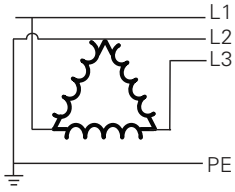
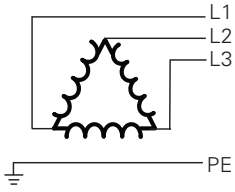
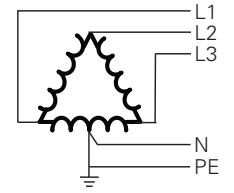
Table 8-1 Decoupling module requirements for star networks

| Star configuration | Network configuration | Decoupling module required? | Note |
|---|---|---|---|
| 4-wire, star, grounded with low impedance |  | No | "TN-S system" according to IEC 60364 |
| 4-wire, star, grounded with high impedance |  | Yes | — |
| 3-wire, star, grounded with low impedance |  | No | "TN-C system" according to IEC 60364 |

| Star configuration | Network configuration | Decoupling module required? | Note |
|---|---|---|---|
| 3-wire, star, grounded with high impedance |  | Yes | — |
| 3-wire, star, with isolated neutral |  | Yes | "IT system" according to IEC 60364 |

### Delta configurations

Table 8-2 Decoupling module requirements for delta networks

| Delta network[1)] | Network configuration | Decoupling module required? | Note |
|---|---|---|---|
| 3-wire, delta, one phase grounded |  | Yes | Parameter "Voltage display → phase voltages" must be active. |
| 3-wire, delta,<br>with isolated ground |  | Yes | Parameter "Voltage display → phase voltages" must be active. |
| Center tap grounded |  | Yes | Parameter "Voltage display → phase voltages" must be active. |
| 1) Mainly encountered in North America | | | |

### Single-phase systems

Table 8-3 Decoupling module requirements for single-phase networks

| Single-phase network | Network configuration | Decoupling module required? | Note |
|---|---|---|---|
| |  | Yes | Parameter "Voltage display → Phase voltages" must be active. The voltage applied is calculated from U_L1N + U_l2N |

## 8.7 Spectrum of the expansion modules

Expansion modules are provided as optional additions for the SIMOCODE pro S and pro V device series. The following expansion modules are available:

- Digital modules (DM) (Page 141)
- Fail-safe digital module Local (DM-F Local) (Page 142)
- PROFIsafe fail-safe digital module (DM-F PROFIsafe) (Page 142)
- Analog module (AM) (Page 144)
- Ground-fault module (EM) (Page 145)
- Temperature module (TM) (Page 146)
- Multifunction module (Page 147) (for the SIMOCODE pro S device series)

All expansion modules have an enclosure width of 22.5 mm or 45 mm. They are equipped with 2 system interfaces (incoming/outgoing) and removable terminals on the front panel. The expansion module is connected, for example, to the system interface of the basic unit via the first system interface using a connecting cable. For example, further expansion modules can be connected via the second system interface or the operator panel.

All expansion modules are suitable for DIN rail mounting or can be fastened directly to a mounting plate using additional push-in lugs.

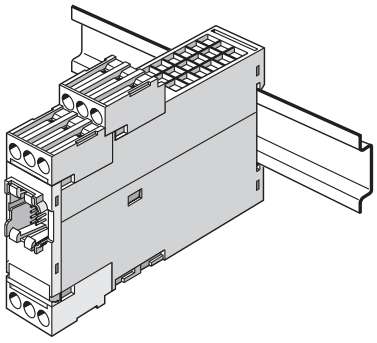


Figure 8-33 Expansion module

**Note**

When an operator panel with display and/or a decoupling module is used, you may have to take further restrictions into consideration concerning the number of expansion modules connectable per basic unit.

See Chapters Configuration information for SIMOCODE pro V when using an older basic unit (Page 148) and Configuration notes for use of a SIMOCODE pro V MR and SIMOCODE pro V EIP basic unit (Page 151)

## 8.8 Digital module (DM)

Digital modules offer the option of further increasing the types and number of binary inputs and relay outputs available at the SIMOCODE pro basic unit.

The following digital modules are available:

Table 8-4 Versions of digital modules

| Inputs | Power supply | Outputs |
|---|---|---|
| 4 inputs | External 24 V DC | 2 monostable relay outputs |
| 4 inputs | External 110 V to 240 V AC/DC | 2 monostable relay outputs |
| 4 inputs | External 24 V DC | 2 bistable relay outputs |
| 4 inputs | External 110 V to 240 V AC/DC | 2 bistable relay outputs |

Up to 2 digital modules can be connected to one SIMOCODE pro basic unit. 4 additional binary inputs and 2 additional binary outputs are thus provided by each module. All types can be combined with each other. SIMOCODE pro can therefore be expanded to provide a maximum of 12 binary inputs and 7 relay outputs.

With the monostable version, the relay outputs open after disconnection/failure/interruption of the supply voltage. With the bistable version, the switching state of the relay outputs is maintained even after disconnection/failure/interruption of the supply voltage.

You can set a debouncing time for the digital module inputs if required (see Chapter "Digital module inputs" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958)).

Power supply to the inputs: See Chapter Wiring basic units, expansion modules and the decoupling module (Page 186).

**Note**

To implement some motor control functions, a further digital module is required in addition to the relay outputs on the basic unit.

**Note**

If 2 digital modules are being used, the digital module connected the closest to the basic unit via the system interface will be identified as digital module 1. The digital module connected next in line will be identified as digital module 2. If one digital module is connected to the front and another to the lower system interface of the basic unit, the digital module on the front system interface of the basic unit will always be identified as digital module 1.

# 8.9 Fail-safe digital module (DM-F)

### Requirements and safety-related functions of the DM-F fail-safe digital modules

The fail-safe digital module DM-F extends the SIMOCODE pro motor management system with fail-safe functions for switching off motors:

- DM-F Local fail-safe digital module
- DM-F PROFIsafe fail-safe digital module

These modules conform to the general requirements for emergency stop devices or safety circuits described in EN 418 and EN 60204-1 (06.2006).

With appropriate external circuitry, the following performance levels / safety integrity levels can be achieved:

- PL e with Category 4 according to ISO 13849-1 or
- SIL 3 according to IEC 61508 / 62061.

Safety engineering and safety-related functions:

- These are exclusively restricted to the fail-safe digital modules.
- They therefore have no direct impact on existing SIMOCODE pro components and concepts.

LEDs for DM-F device diagnostics: See Chapter Technical specifications (Page 319) and / or Manual SIMOCODE pro fail-safe digital modules (https://support.automation.siemens.com/WW/view/en/50564852).

"TEST/RESET" DM-F button, setting the DM-F DIP switches, DM-F system interfaces**:** See Manual SIMOCODE pro fail-safe digital modules (https://support.automation.siemens.com/WW/view/en/50564852).

### Documentation for safety-related functions and fail-safe digital modules

Safety-related functions and additional information on fail-safe digital modules can be found in the following documentation:

- Manual SIMOCODE pro fail-safe digital modules (https://support.automation.siemens.com/WW/view/en/50564852)
- Operating Instructions "Fail-safe Digital Module DM-F Local"
- Operating Instructions "Fail-safe Digital Module DM-F PROFIsafe"

You can find the manual and operating instructions under Manuals/operating instructions (https://support.industry.siemens.com/cs/ww/en/ps/16027/man)

The fail-safe **DM-F Local digital module** facilitates safety-related tripping of a motor feeder by means of a hardware signal that is detected and evaluated by the module.

From a non-safety-related perspective, the DM-F module comprises:

Table 8-5 Inputs, outputs and voltage supply to the digital module Fail-safe Local (DM-F Local)

| Inputs | Power supply | Outputs |
|---|---|---|
| 4 non-safety-related digital inputs:<br>• Input 1: Sensor circuit<br>• Input 2: Start input<br>• Input 3: Feedback circuit<br>• Input 4: Cascading input | 24 V DC | 2 non-safety-related monostable relay outputs |

The fail-safe **DM-F PROFIsafe digital module** provides safety-related tripping of a motor feeder by a fail-safe control (F-CPU) via PROFIBUS with the fail-safe PROFIsafe profile.

From a non-safety-related perspective, the DM-PROFIsafe module comprises:

Table 8-6 Inputs, outputs and voltage supply to the digital module Fail-safe PROFIsafe (DM-F PROFIsafe)

| Inputs | Power supply | Outputs |
|---|---|---|
| 4 non-safety-related digital inputs | 24 V DC | 2 non-safety-related monostable relay outputs |

**⚠ WARNING**

**Hazardous voltage**

For the 24 V DC power supply, always use an SELV or PELV power supply unit!

Surge suppressors are required for inductive loads!

## 8.10 Analog module (AM)

By means of the analog module, the SIMOCODE pro V High Performance basic units can be optionally expanded by analog inputs and outputs (0/4 mA to 20 mA). This makes it possible to detect and monitor any process variables that can be mapped onto a 0/4 to 20 mA signal.

Typical applications are, for example, fill-level monitoring for protecting pumps from dry operation, or the monitoring of pollution in a filter using a differential pressure transducer. The automation system has free access to the measured process variables. The analog output can, for example, be used for the visualization of any process variables on a pointer instrument. The automation system can also freely access the output via the communication bus.

- 1 analog module can be connected to the SIMOCODE pro V PB and pro V MR basic units
- 2 analog modules can be connected to the SIMOCODE pro V PN and pro V EIP basic units
- For each analog module, 2 analog inputs (passive) for detecting 0/4 mA to 20 mA signals. Both inputs are set either to 0 mA to 20 mA or to 4 mA to 20 mA.
- For each analog module, 1 output for issuing a 0/4 mA to 20 mA signal.

**Note**

The inputs of the analog module are passive inputs that have to be supplied in each case by an external, isolated current source (e.g. isolating transformer). If the output of the analog module is not being utilized, it can be used as current source for an input.

**Note**

**Requirements for using an analog module with SIMOCODE pro V PB**

Use of an analog module requires a SIMOCODE pro V PB basic unit, at least version *E02* or later (from 04/2005).

## 8.11 Ground-fault module (EM)

The 3UF7 500-1AA00-0 and 3UF7 510-1AA00-0 ground-fault modules are suitable for use with the SIMOCODE pro V/pro S basic units. 1 ground-fault module can be connected to 1 basic unit.

| NOTICE |
| --- |
| **Use of residual current transformers** |
| The 3UF7 500-1AA00-0 ground-fault module requires the 3UL22 residual current transformer. |
| The 3UF7 510-1AA00-0 ground-fault module requires the 3UL23 residual current transformer. |

**Requirements for use of ground-fault modules in combination with SIMOCODE pro V basic unit:**

**Note**

**Requirements for use of a 3UF7 500-1AA00-0 ground-fault module with SIMOCODE pro V PB**

Use of a ground-fault module requires a SIMOCODE pro V PB basic unit, at least version *E02* or later (from 04/2005).

**Note**

**Requirements for use of a 3UF7 510-1AA00-0 ground-fault module with SIMOCODE pro V PB**

Use of this ground-fault module requires a SIMOCODE pro V PB basic unit, with at least product version *E10* (from 09/2013).

Detailed information on ground-fault monitoring: See Chapter "Monitoring functions" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

## 8.12 Temperature module (TM)

The temperature module offers the option of expanding the SIMOCODE pro V/pro S device series by an analog temperature monitoring system. In addition to the thermistor monitoring system for the basic units, up to 3 analog sensor measuring circuits (in two or three-wire systems) can be connected, the temperatures in the 3 sensor measuring circuits can be measured, and the highest temperature in all sensor measuring circuits can be determined. The temperatures recorded can be fully integrated and monitored in the process and can also be transferred to a higher-level automation system via the communication bus.

You can, for example, implement analog temperature monitoring of the motor windings, bearings, coolant or gearbox oil.

Various sensor types (NTC, KTY83/84, PT100/PT1000) for use with solid, liquid, or gaseous media are supported.

**Note**

The same sensor type must be used in all sensor measuring circuits.

- 1 temperature module can be connected to the SIMOCODE pro V PB and pro V MR basic units
- 1 temperature module with 1 sensor to the SIMOCODE pro S basic unit
- 2 temperature modules can be connected to the SIMOCODE pro V PN and pro V EIP basic units
- 1 temperature module to the SIMOCODE pro V PN GP basic unit
- 3 sensor measuring circuits in 2 or 3-wire systems.

**Note**

**Requirements for using a temperature module with SIMOCODE pro V PB**

Use of a temperature module requires a SIMOCODE pro V PB basic unit, at least version *E02* or later (from 04/2005).

## 8.13 Multifunction module

The multifunction module is the expansion module of the SIMOCODE pro S device series with the following functions:

- Digital module function with four digital inputs and two monostable relay outputs
- Ground-fault module function with one input for connecting a 3UL23 residual current transformer
- Temperature module function with an input for connecting a PT100, PT1000, KTY83, KTY84, or NTC analog temperature sensor

No more than one multifunction module can be connected to one SIMOCODE pro S basic unit.

**Note**

**Use of expansion modules of SIMOCODE pro V with the SIMOCODE pro S basic unit**

One of the following expansion modules of SIMOCODE pro V can be used with the SIMOCODE pro S basic unit (3UF7020-1AB01-0 or 3UF7020-1AU01-0) instead of the 3UF76* multifunction module:

- 24 V DC digital module with monostable relay outputs (3UF7300-1AB00-0) or 110 ... 240 V AC/DC digital module (3UF7300-1AU00-0)
- Ground-fault module (3UF7510-1AA0-0)
- Temperature module (3UF7700-1AA00-0), limited to use of one sensor input only

# 8.14 Configuration information for SIMOCODE pro V when using an older basic unit

**Note**

**Restrictions for the SIMOCODE pro V device series**

The restrictions mentioned here apply to the SIMOCODE pro V High Performance device series with the following product versions:

- SIMOCODE pro V PB: Before E15
- SIMOCODE pro V PN: Before E10
- SIMOCODE pro V MR: Before E03

Devices with the stated product versions or later can be used without restriction with an operator panel with display and 2nd generation current/voltage measuring modules.

You will find usage restrictions concerning the operator panel with display in Chapter Functions and possible applications of the operator panel with display (Page 88).

## Use of a decoupling module and/or an operator panel with display

If you want to use an operator panel with display and/or a decoupling module in the SIMOCODE pro V system, then the following configuration instructions concerning the type and number of connectable expansion modules must be observed.

The following table shows the maximum possible configuration with expansion modules for the various combinations (✓ = possible, - = not possible):

## Maximum configuration with expansion modules

Table 8-7 Maximum configuration with expansion modules when using an operator panel/operator panel with display, a 1st generation current/voltage measuring module and a decoupling module for SIMOCODE pro V PB basic units (3UF7010-1A.00-0) with a 24 V DC or 110 V - 240 V AC/DC supply

| | | | **SIMOCODE pro basic unit $U_s$ = 24 V DC** | | | | | **SIMOCODE pro basic unit $U_s$ = 110-240 V AC/DC** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OP | Meas-ure-ment | Decou-pling module | DM-F/DM | DM | AM | TM | EM | DM-F/DM | DM | AM | TM | EM |
| None/OP | I | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | U/I | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | U/I [4] | ✓ | ✓ [1] | ✓ [1] | ✓ | ✓ | ✓ | ✓ | ✓ | - | ✓ | ✓ |
| | | | | | | | | ✓ [1] | ✓ [1] | ✓ | ✓ | - |
| | | | | | | | | ✓ | - | ✓ | ✓ | - |
| | | | | | | | | ✓ | - | ✓ | - | ✓ |

| | | | **SIMOCODE pro basic unit $U_s$ = 24 V DC** | | | | | **SIMOCODE pro basic unit $U_s$ = 110-240 V AC/DC** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OPD | I | - | Max. 4 modules | | | | | Max. 4 modules | | | | |
| | U/I | - | Max. 4 modules | | | | | Max. 3 modules [5] | | | | |
| | | | | | | | | - | - | ✓ | ✓ | - |
| | U/I [4] | ✓ | ✓ | - | ✓ | ✓ | ✓ | ✓ [2] | - | ✓ | ✓ | ✓ |
| | | | ✓ | ✓ | - | ✓ | ✓ | ✓ | ✓ | - | - | - |
| | | | | | | | | ✓ [1] | ✓ [1] | ✓ [3] | - | - |
| | | | | | | | | ✓ | - | - | ✓ | ✓ |

1) No bistable relay outputs and no more than 5 of 7 relay outputs active simultaneously (> 3 s)

2) No bistable relay outputs and no more than 3 of 5 relay outputs active simultaneously (> 3 s)

3) Analog module output is not used.

4) 1st generation current/voltage measuring modules; MLFB ending in 000 (e.g. 3UF7110-1AA00-0)

5) AM and TM cannot be used at the same time

Table 8-8 Maximum configuration with expansion modules when using an operator panel/operator panel with display, a 2nd generation current/voltage measuring module and a SIMOCODE pro V-PB basic unit with a product version earlier than E15 / SIMOCODE pro V Modbus basic unit with product version E01

| | | **SIMOCODE pro basic unit $U_s$ = 24 V DC** | | | | | **SIMOCODE pro basic unit $U_s$ = 110-240 V AC/DC** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| OP | Meas-urement | DM-F/DM | DM | AM | TM | EM | DM-F/DM | DM | AM | TM | EM |
| None/UI | | Max. 4 modules | | | | | | | | | |
| OP | U/I | Max. 4 modules [1] | | | | | | | | | |
| | | - | - | ✓ | ✓ | ✓ | - | - | ✓ | ✓ | ✓ |
| OPD | U/I | Max. 3 modules [1] | | | | | Max. 2 modules [1] | | | | |
| | | - | - | ✓ | ✓ | - | | | | | |
| | | - | - | ✓ | - | ✓ | | | | | |
| | | - | - | - | ✓ | ✓ | | | | | |

1) Max. 1 AM, TM, EM module

**Note**

**Decoupling module**

A decoupling module is **not** necessary for 2nd generation current/voltage measuring modules.

## Configuration instructions for the use of fail-safe expansion modules

In conjunction with DM-F Local and DM-F PROFIsafe fail-safe digital modules, the expansion modules can be used as follows:

| Fail-safe digital module | Number of expansion modules | Digital module 2 | Analog module | Temperature module | Ground-fault module |
|---|---|---|---|---|---|
| DM-F Local | max. 4 | ✓ | ✓ | ✓ | ✓ |
| DM-F PROFIsafe | max. 3 | ✓ | ✓ | ✓ | — |

**Note**

**Restrictions for the SIMOCODE pro V device series**

The restrictions mentioned here apply to the SIMOCODE pro V High Performance device series with the following product versions:

- SIMOCODE pro V PB: Before E15
- SIMOCODE pro V PN: Before E10
- SIMOCODE pro V MR: Before E03

Devices with the stated product versions or later can be used without restriction with an operator panel with display and 2nd generation current/voltage measuring modules.

## 8.15 Configuration notes for use of a SIMOCODE pro V MR and SIMOCODE pro V EIP basic unit

The following expansion modules are not supported:

- DM-F PROFIsafe fail-safe digital module (3UF7330-..)
- Ground-fault module (3UF7500-..).

You will find usage restrictions concerning the operator panel with display in Chapter Functions and possible applications of the operator panel with display (Page 88).

# Compartment identification

# 9

## 9.1 Applications and advantages of compartment identification

The compartment identification described in this chapter is mainly used in application in which SIMOCODE pro is used in a withdrawable motor control center (MCC).

In withdrawable motor control centers, all components belonging to the motor feeder are grouped together as one unit in a switchboard-specific enclosure. In this way, a complete withdrawable module can be replaced very quickly and without isolating the MCC if a component is defective.

This principle is very often used in the various branches of the process industry. That is why a SIMOCODE pro with such a design is used in very many of its applications.

With the compartment identification mechanism, programming a SIMOCODE pro S/pro V device when a withdrawable module is replaced is completely automated.

The initialization module (3UF7 902-0AA00-0) permanently installed in the switchboard contains a copy of the SIMOCODE device parameters and the device addressing, which are taken over completely automatically by the new SIMOCODE pro device after replacement of the withdrawable module.

No special knowledge of SIMOCODE is necessary any longer to replace withdrawable modules and at the same time the risk of incorrect parameterization in the SIMOCODE device is reduced.

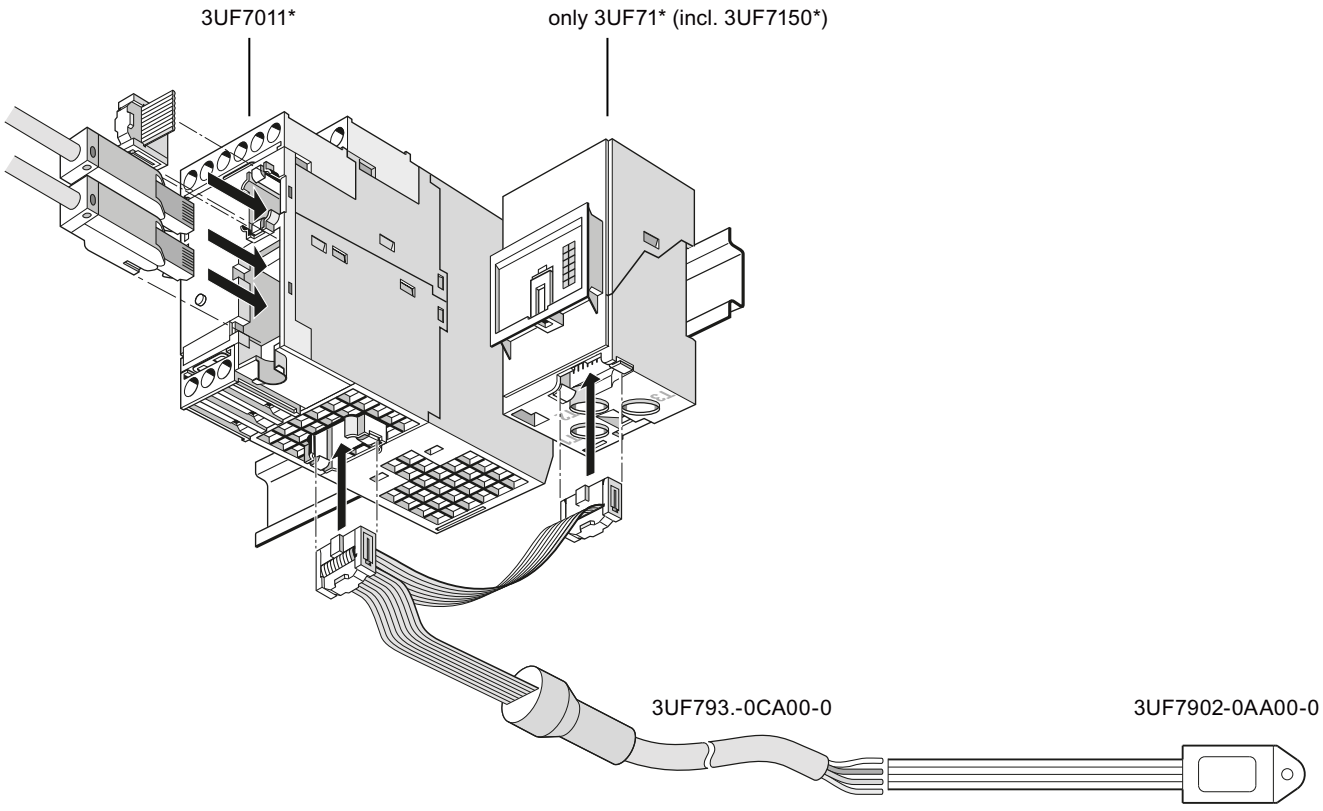



Figure 9-1 Compartment identification

**CAUTION**

**Basic units SIMOCODE pro C (3UF7000*) and basic units SIMOCODE pro V (3UF7010*) to E08, V3.0**

These basic units do not support the initialization module and start with the internal parameters.

A configuration such as the one shown above ensures

- that the parameters, device addressing, and I&M data of the initialization module are downloaded to the SIMOCODE basic unit during device start-up of SIMOCODE pro
- the parameters, device addressing, and I&M data are additionally written to the initialization module when parameterizing SIMOCODE pro

This makes it simple for a user to change a withdrawable module without having to deal with further details of parameterization or address assignment.

**The advantages of operation with a permanently installed initialization module in the switchboard:**

- Device parameters and device addressing are automatically stored in the initialization module in the motor control center and loaded form this initialization module (initialized).
- It is possible to replace an MCC motor feeder without special knowledge of SIMOCODE pro.
- Manual addressing and parameterization are no longer necessary. The simplifies operation of the switchboard.

## 9.2 Hardware and software requirements for compartment identification

### Basic unit versions

The compartment identification function is supported by the following basic units:

- SIMOCODE pro S basic units
- SIMOCODE pro V PB basic units as from product version E09, firmware version V3.1
- SIMOCODE pro V MR basic units
- SIMOCODE pro V PN basic units
- SIMOCODE pro V EIP basic units.

| NOTICE |
| --- |
| **Basic units SIMOCODE pro C (3UF7000*) and basic units SIMOCODE pro V (3UF7010*) to E08, V3.0**<br>These basic units do not support the initialization module and start with the internal parameters. |

| NOTICE |
| --- |
| **Current measuring module required**<br>To operate SIMOCODE pro with an initialization module, a current measuring module or a current / voltage measuring module must be connected to the basic unit. |

### Version of the operator panel with display

The compartment identification function is supported by operator panels with display as from product version *E07*.

When using the "Dry-running protection by means of active power monitoring" function, one of the following operator panels with display is necessary:

- 3UF7210-1AA00-0: ≥ E12
- 3UF7210-1AA01-0: ≥ E03
- 3UF7210-1BA00-0: ≥ E04
- 3UF7210-1BA01-0: ≥ E03

## 9.3 Operating compartment identification

### Safety guidelines

**Note**

**Startup with an initialization module**

During device startup with an initialization module, there must be no memory module in the system interface of the SIMOCODE basic unit.

If there is a memory module in the system interface of the SIMOCODE pro basic unit,

- the "Fault - parameterization" fault message will be output
- the "Gen.Fault" LED will flash red.

**Note**

**Contacting of the initialization module**

The initialization module must be contacted before or together with the voltage supply of the basic unit.

### Loading parameters from the initialization module

As soon as contact has been established with the initialization module and the voltage has been switched on, the parameters of the initialization module are loaded into the basic unit. The previous parameterization is overwritten and the compartment identification is activated (see the following topic "Autoactivation of compartment identification").

You can also track successful read-in of the parameters from the initialization module with the "initialization module read in" event in the SIMOCODE ES (TIA Portal) online functions.

**Note**

**Loading parameters from the initialization module into the SIMOCODE pro V basic units with an earlier product version**

Basic units SIMOCODE pro C (3UF7000*) and SIMOCODE pro V (3UF7010*) to E08, V3.0 do not detect the initialization module and ignore its parameters!

**Note**

**Connecting a SIMOCODE pro S basic unit or a SIMOCODE pro V basic unit**

Because a basic unit in these device series does not find any valid parameters on start-up with an empty initialization module, "Trip - Parameterization" is signaled. The "general fault" LED of the basic unit flashes red.

Reparameterization of the device, e.g. with SIMOCODE ES (TIA Portal), writes valid parameters to the basic unit and the initialization module again.

You can then acknowledge the fault message.

### Saving parameters onto the initialization module

If an initialization module is connected to a SIMOCODE pro basic unit, all parameters that are saved to the SIMOCODE basic unit, e.g. SIMOCODE ES (TIA Portal), are automatically copied into the initialization module.

You can also track successful writing of the parameters into the initialization module with the "initialization module programmed" event in the SIMOCODE ES online functions.

### Parameter settings in the "SIMOCODE ES (TIA Portal)" software

From a technical point of view, the initialization module is treated like an expansion module of SIMOCODE pro.

To use the mechanism of compartment identification, choose the "initialization module" option in the "Parameter → Device configuration" dialog box in the "SIMOCODE ES" software.

### Autoactivation of compartment identification

If a SIMOCODE pro S or SIMOCODE pro V basic unit detects a connected initialization module during device startup, it will automatically load the parameters stored in it and will start with these parameters.

At the same time, the "Initialization module" parameter of the device configuration in the SIMOCODE pro basic unit is activated so that, on each new device startup, an initialization module is expected.

**Note**

**Device startup when the "initialization module" parameter is activated**

If no initialization module is detected during device start-up, SIMOCODE pro will signal "Trip - Configuration fault." The "General Fault" LED of the basic unit flashes.

The basic unit can only be reset when the configuration error has been remedied by connecting an initialization module or when a configuration has been loaded into the device without the "initialization module" option.

### Deactivation of the compartment identification

To prevent SIMOCODE pro V from expecting an initialization module during device startup, you clear the "Initialization module" check mark in the "Parameter → Device configuration" dialog box. In this case, no initialization module must be connected to the SIMOCODE basic unit while this configuration is being downloaded.

A further way of deactivating the compartment identification is to reset the SIMOCODE pro basic unit to the factory settings. Resetting is performed in the "Commands" dialog box. In this case, too, no initialization module must be connected to the SIMOCODE pro basic unit. The parameter settings can then also be reloaded into the SIMOCODE pro basic unit.

## Commands

**"Initialization module write protection on" command**

All contents of the initialization module are write-protected. This prevents any inadvertent changes to the contents of the initialization module and any parameter changes to the connected SIMOCODE pro basic unit. An inadvertent change of parameters for a motor feeder is prevented. SIMOCODE pro signals successful execution of the command with the "initialization module write-protected" event.

**"Initialization module write protection off" command**

With this command, you can remove the write protection of the initialization module.

**"Initialization module write protection identification data on" command**

The device addressing stored in the initialization module and the I&M data (identification & maintenance) are write-protected. With this command, you can

- prevent inadvertent changes to the addressing and I&M data for the motor feeder.
- continue to make parameter changes in the initialization module as well as in the SIMOCODE pro basic unit if the address data and I&M data are identical to the data already contained in the device when parameters are downloaded.

SIMOCODE pro signals the successful execution of the command with the "initialization module identification data write-protected" event.

**"Initialization module write protection identification data off" command**

With this command, you can remove the write protection of the identification data of the initialization module.

**"Clear initialization module data" command:**

With this command

- all contents of the initialization module are erased
- The initialization module is reset to the as-delivered state.

SIMOCODE pro signals the successful deletion with the "Initialization module cleared" event.

On startup with an empty initialization module, the basic unit signals "Fault - parameterization." The "general fault" LED of the basic unit flashes red.

Reparameterization of the device, e.g. with SIMOCODE ES (TIA Portal), writes valid parameters to the basic unit and the initialization module again. You can then acknowledge the fault message

## Messages

You can check the states of the initialization module by the following events (in the ""Commissioning → Faults, warnings, event" dialog box of the "SIMOCODE ES (TIA Portal)" software:

- Initialization module write-protected
- Initialization module write-protected, parameter changes not allowed
- Initialization module identification data write-protected

- Initialization module read in
- Initialization module programmed
- Initialization module cleared.

See Alarm, fault, and system events for compartment identification (Page 164).

# 9.4 Mounting, wiring, interfaces, compartment identification

### Mounting the initialization module in the switchboard

Mounting the initialization module with the mounting lugs in the switchboard

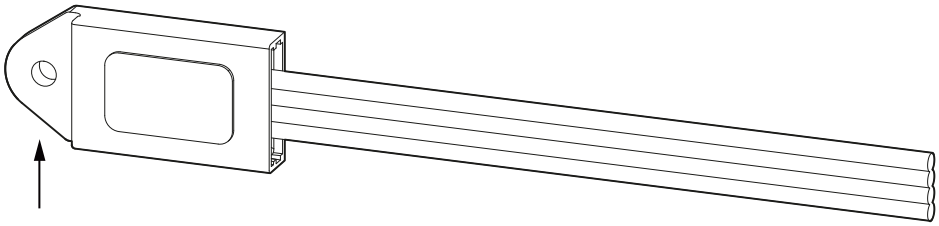



Figure 9-2 Mounting the initialization module

### Wiring the initialization module

Unlike the other expansion components of the system, the initialization module does not have a connector. It is intended for installation in the fixed part of the switchboard. Connect the initialization module to a motor control center's control connector toward the switchboard using the four connecting wires.

On the mating side, there is a withdrawable module to whose control connectors the corresponding four connecting wires of the Y connecting cable are connected (see figure).

Connect each of the wires that are of the same color on the initialization module and the Y connecting cable.

| **NOTICE** |
| --- |
| **Note the correct colors!**<br>Incorrect wiring can destroy the initialization module. |

**Note**

**Cable routing**

When wiring the initialization module make sure the individual conductors are routed as close together as possible (ribbon cable).

| **NOTICE** |
| --- |
| **Maximum length of the connecting cable**<br>The total length of all cables must not exceed 3 m on either of the system interfaces of the basic unit! |

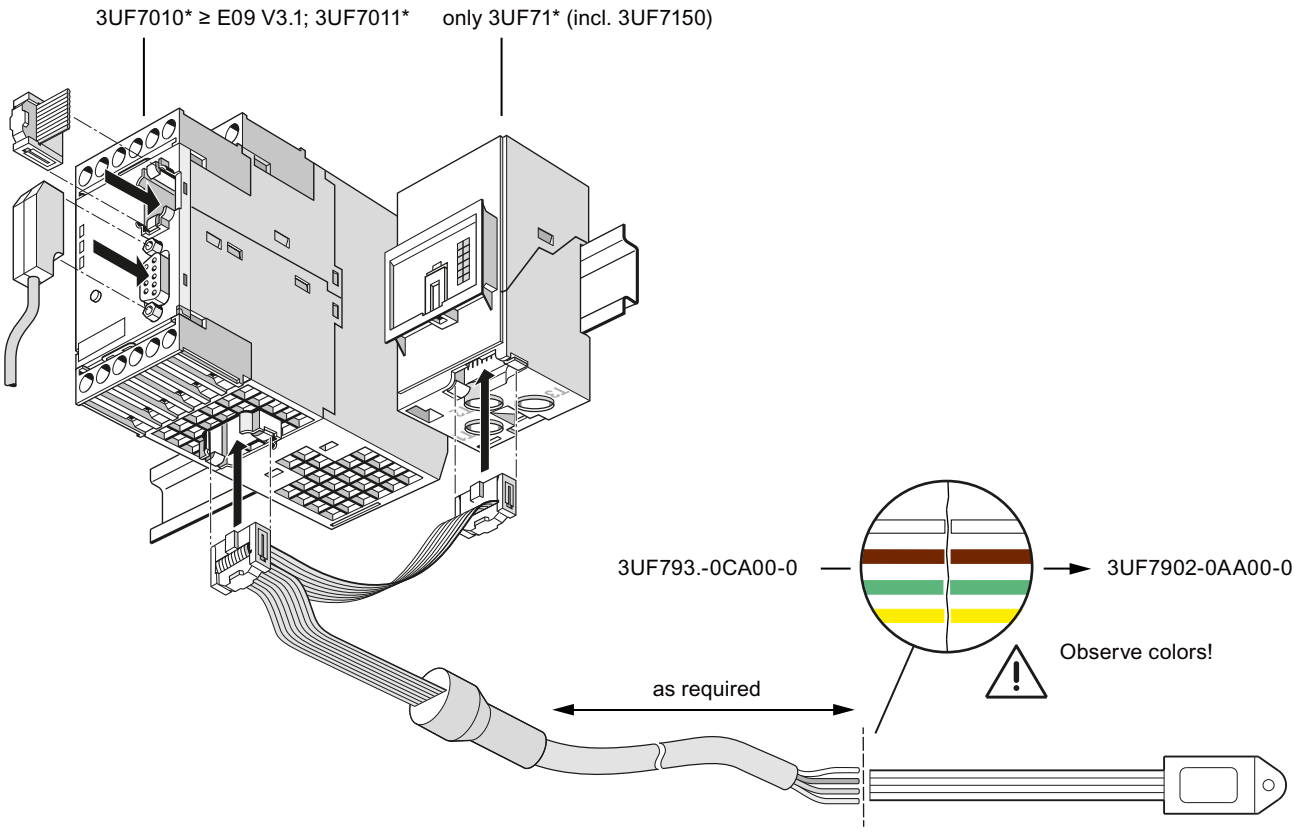



Figure 9-3 Wiring the initialization module

**CAUTION**

**SIMOCODE pro basic units with an earlier product version**

SIMOCODE pro C basic units (3UF7000*) and SIMOCODE pro V PB basic units (3UF7010*) up to E08, V3.0 do not support the initialization module and start with the internal parameters.

**Connecting the Y connecting cable to the basic unit and to the current measuring module or to the current / voltage measuring module**

- Connect the connector in the middle of the Y connecting cable (1) on the basic unit
- Connect the connector at the end of the Y connecting cable (2) to a current measuring module or current / voltage measuring module
- If you are using a decoupling module:
  - Connect the connector at the end of the initialization cable (2) on the decoupling module.
  - Connect the decoupling module with a system interface connecting cable to the current / voltage measuring module.

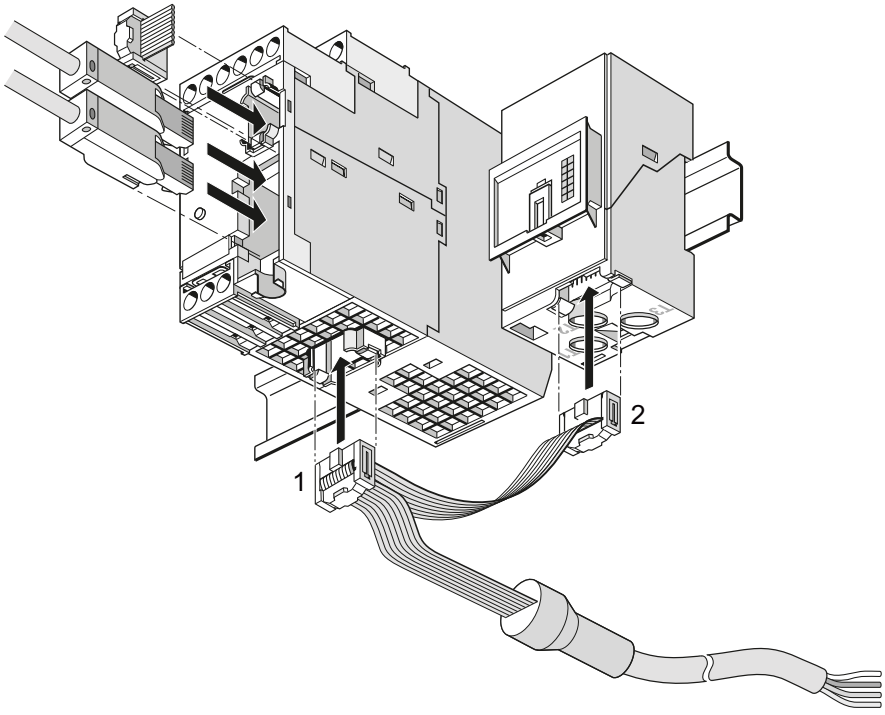



Figure 9-4 Connecting the Y connecting cable to the basic unit and to the current measuring module or to the current / voltage measuring module

# 9.5 Commissioning and service compartment identification

## General safety information

**Note**

**Operating Instructions**

During commissioning and service work, also heed the relevant "Initialization Module" Operating Instructions!

You will find the operating instructions for SIMOCODE pro at Manuals/operating instructions (https://support.industry.siemens.com/cs/ww/en/ps/16027/man).

## Commissioning the initialization module

**Sequence for initial startup of a new SIMOCODE pro basic unit and a new initialization module**

| Step | Description |
|---|---|
| 1 | Connect the SIMOCODE pro basic unit to the planned expansion modules and to the initialization module. |
| 2 | Switch on the power supply. The following LED states result:<br>• The "DEVICE" LED lights up green<br>• The "BUS" LED lights up or flashes green when the bus is connected<br>• The "GEN.FAULT" LED flashes red<br>At the same time, the "Fault - parameterization" fault message is output. |
| 3 | Parameterize SIMOCODE pro with a PC with the SIMOCODE ES (TIA Portal) software installed. For this, connect the PC/PG to the system interface with the PC cable (see the figure below) or to the basic unit via the communication bus. |
| 4 | Acknowledge the pending fault either locally on the device or via the SIMOCODE ES software by means of the "TEST/RESET button". |

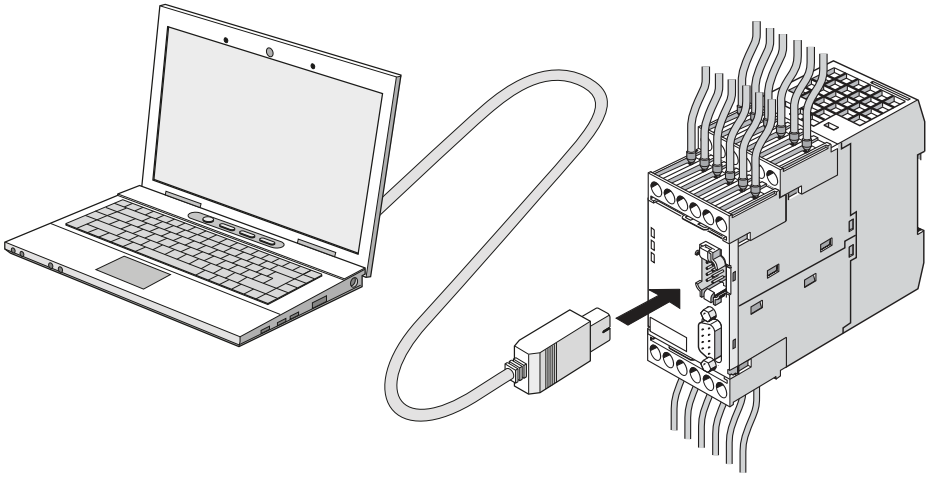


Figure 9-5 Connecting a PC to a SIMOCODE pro basic unit

# 9.6 Alarm, fault, and system events for compartment identification

## Messages

Table 9-1 Alarm, fault, and system events

| Message | Description | Troubleshooting |
|---|---|---|
| Initialization module write-protected | The initialization module is completely write-protected. | Deactivate write protection of the initialization module. |
| Initialization module write-protected, parameter changes not allowed | The initialization module is completely or partially write-protected. Reparameterization of SIMOCODE pro is denied because the initialization module is write-protected. | Deactivate write protection of the initialization module. |
| Initialization module identification data write-protected | The device addressing and the I&M data in the initialization module are write-protected. Parameterization will only be accepted by SIMOCODE if the new parameter set is identical to the data stored in the initialization module at that time. | • Select a parameterization with identical addressing and I&M data<br>• Deactivate the partial write protection of the initialization module. |
| Initialization module read in | The parameters of the initialization module were read into SIMOCODE. | - |
| Initialization module programmed | The reparameterization was accepted in the initialization module. | - |
| Initialization module cleared | The initialization module has been cleared and is now back in the as-delivered condition. | - |

## 9.7 Compartment identification dimension drawings

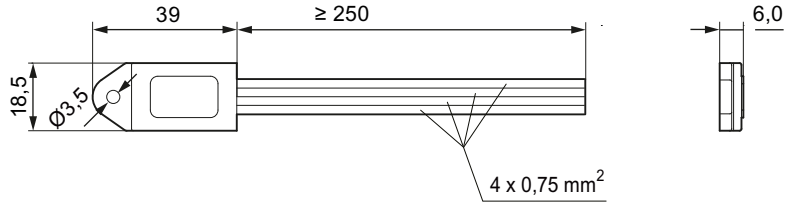



Figure 9-6 Dimension drawing initialization module

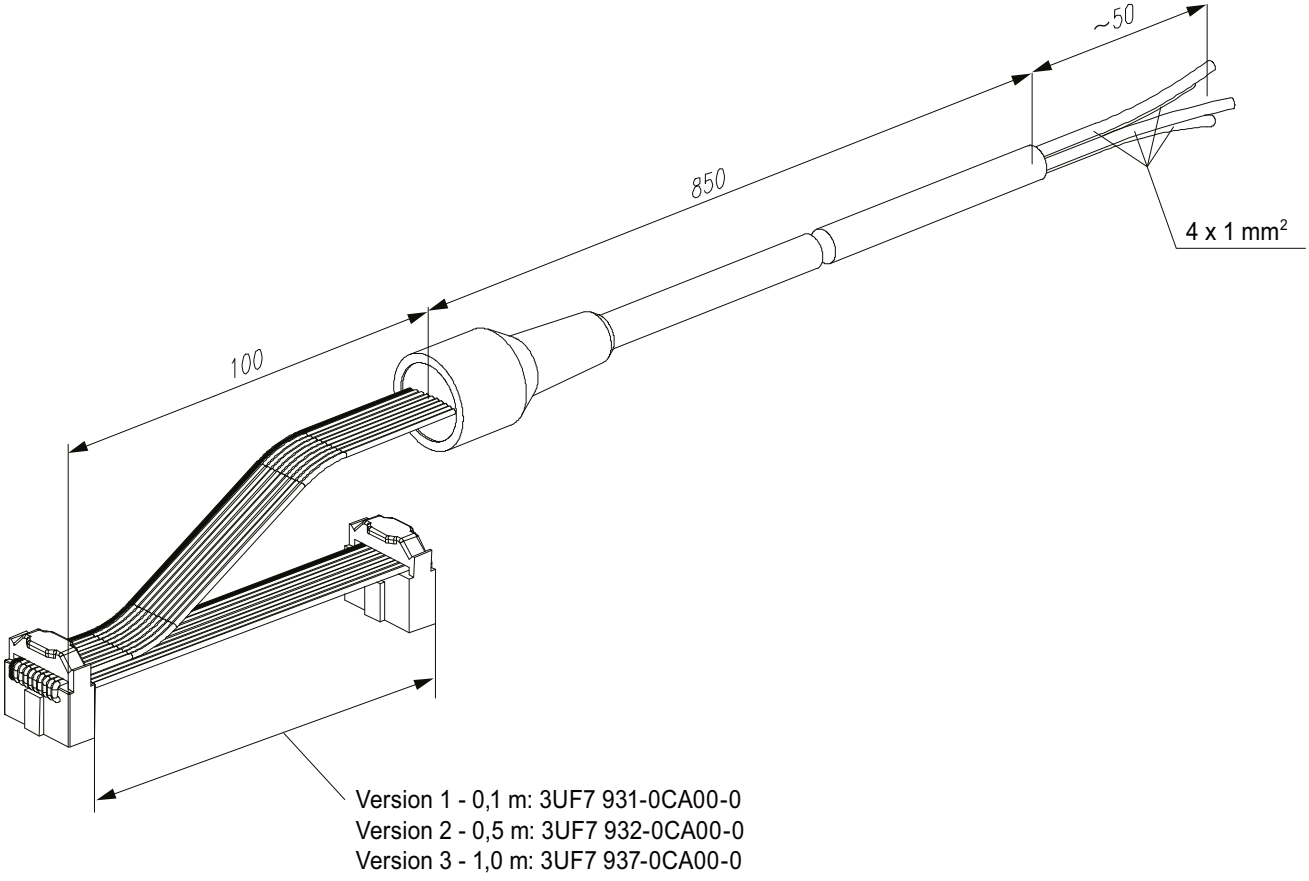



Figure 9-7 Dimension drawing Y connecting cable

## 9.8 Technical data compartment identification

### Technical data initialization module

- Order number (MLFB): 3UF7 902-0AA00-0
- Ambient temperature: -25 ... +80 °C
- Rated insulation voltage: 300 V
- Rated operating voltage: 24 V.

### Technical data Y connecting cable

- Order numbers (MLFB):
  - Version 1 - 0.1 m: 3UF7 931-0CA00-0
  - Version 2 - 0.5 m: 3UF7 932-0CA00-0
  - Version 3 - 1.0 m: 3UF7 937-0CA00-0.
- Ambient temperature: -25 ... +60 °C
- Rated insulation voltage: 300 V
- Rated operating voltage: 24 V.

# Accessories

# 10

## Accessories overview

The following figure shows selected accessories:

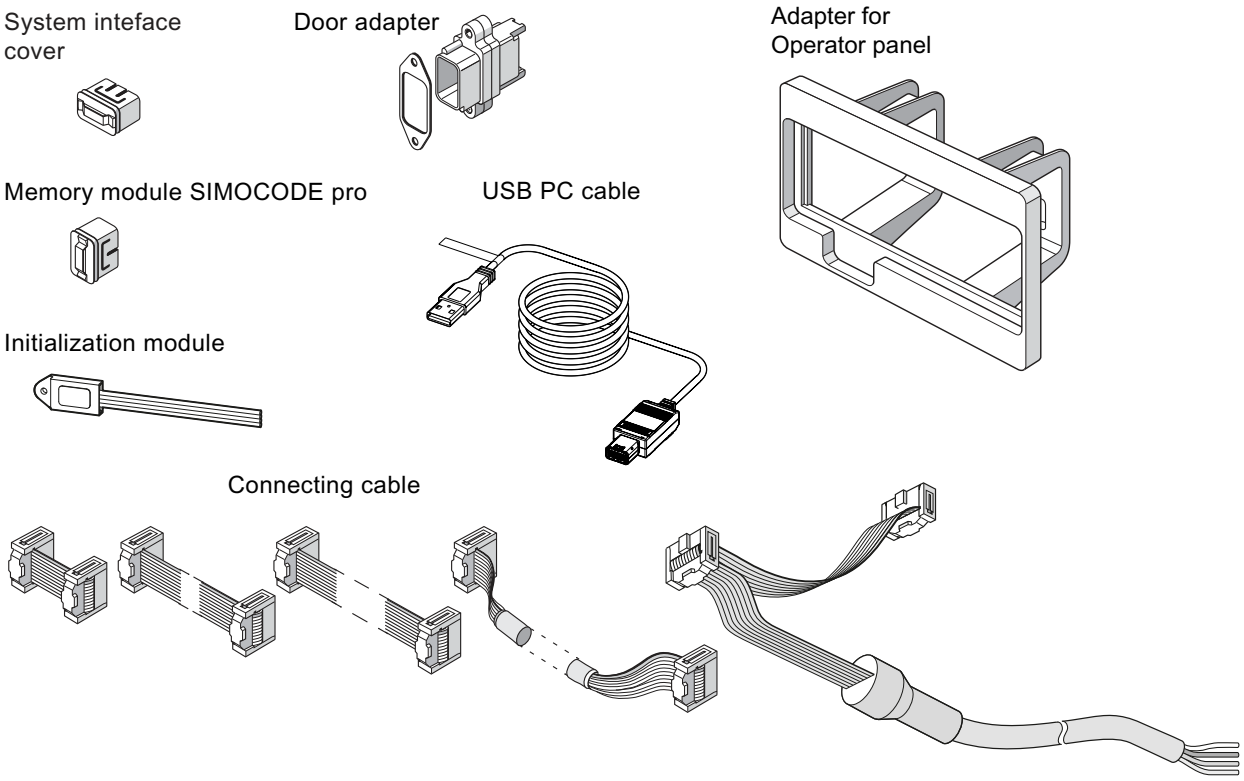



Figure 10-1 Accessories

## USB PC cable

For device parameterization, for connecting a PC via its USB interface or serial interface to the system interface of a basic unit.

**Note**

**PC cable variant**

For SIMOCODE pro V PN / EIP, a serial PC cable 3UF7940-0AA00-0 as from product version *E02* or a USB PC cable USB 3UF7941-0AA00-0 can be used.

## USB-to-serial adapter

For connecting an RS -232 PC cable to the USB interface of a PC.

## Memory module

Enable all system parameter settings to be backed up and transferred to a new system without the need for additional resources or specialist expertise, for example, if the device is replaced (see also Chapter Replacing SIMOCODE pro components (Page 271)).

**Note**

**Memory module type**

- The SIMOCODE pro C and SIMOCODE pro V PB basic units up to product version *E08* only support the 3UF7900* memory module.
- The SIMOCODE pro S, SIMOCODE pro V MR and SIMOCODE pro V PB basic units support all memory modules as from product version *E09*.
- A 3UF7901* memory module is required for the SIMOCODE pro V PN and SIMOCODE pro V EIP basic units. The 3UF7900* memory module is not supported.

## Initialization module

The initialization module enables all system parameter settings to be backed up and transferred to a new system without the need for additional resources or specialist expertise, for example, if the device is replaced. It can be installed permanently in the switchboard.

**Note**

**Basic unit support**

The SIMOCODE pro S and SIMOCODE pro V PB basic units (as from product version *E09*) support the initialization module.

Further information: See Chapter Compartment identification (Page 153).

## Addressing plug

For "hardware" assignment of the PROFIBUS DP address without PC/PG on SIMOCODE pro via the system interface. Setting the PROFIBUS DP address with the addressing plug: See Chapter Setting the PROFIBUS DP address (Page 250).

## Connecting cable

Different types and lengths of connecting cable are available. It is required to connect the basic unit to its current measuring module and, if applicable, to its expansion modules or the operator panel.

**Note**

The total length of all cables must not exceed 3 m on either of the system interfaces of the basic unit!

### Door adapter

The door adapter is used to facilitate access to the SIMOCODE pro system interface, for example via the front panel, to ensure fast parameterization.

### System interface cover

The system interface cover helps to protect and/or seal the system interfaces against the ingress of dirt. In normal operation, unused system interfaces must be closed.

### Operator panel adapter

The operator panel adapter enables use of the 3UF720 operator panel of SIMOCODE pro in a front panel cutout, in which a 3UF52 operator panel of SIMOCODE-DP (IP54 degree of protection) has previously been used, e.g. after system replacement.

# 3UF50 compatibility mode 11

## 11.1 Application, Win-SIMOCODE-DP converter

### Application of 3UF50 compatibility mode

3UF50 compatibility mode is used whenever a SIMOCODE-DP device is to be replaced with a SIMOCODE pro V PB device without modification of the configuration.

In 3UF50 compatibility mode, you can operate a SIMOCODE pro V PB basic unit with a 3UF50 configuration. In this case, from the point of view of the PLC (master class 1) communication with SIMOCODE pro is the same as communication with SIMOCODE-DP.

SIMOCODE-DP supports cyclic communication (basic types 1-3), diagnosis, as well as DPV1 data sets (DS 130, DS 131, DS 133).

### Win SIMOCODE-DP converter

In order for the technical functions (parameterization) of SIMOCODE-DP to be integrated into the technical functions of SIMOCODE pro V PB, the device parameters must be adjusted accordingly. The "Win SIMOCODE-DP Converter" software supports you in this process. This software enables you to convert the parameter files (smc files) created with Win SIMOCODE-DP into SIMOCODE ES parameter files (sdp files).

### Safety guidelines

**Note**

Communication with a DP master (class 2 master), e.g. with the Win-SIMOCODE-DP Professional software via PROFIBUS DP, is not covered by the 3UF50 compatibility mode.

**Note**

In the 3UF50 compatibility mode, the startup parameter block is always set, i.e. the transmission of the device parameters created using the SIMOCODE-DP GSD or the SIMOCODE-DP Object Manager cannot be integrated into SIMOCODE pro V PB.

**Note**

The 3UF50 compatibility mode supports SIMOCODE-DP projects in which SIMOCODE-DP is integrated via GSD SIEM8031.gs?, SIEM8069.gs? or via the SIMOCODE-DP Object Manager (OM).

## 11.2 Diagram of send and receive data

The following table shows the send and receive data in compatibility mode:

Table 11-1 "Receive" configuration

| **Receive** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Basic type 1, SIMOCODE DP | Basic type 1, SIMOCODE pro V | | Basic type 2, SIMOCODE DP | Basic type 2, SIMOCODE pro V | | Basic type 3, SIMOCODE DP | Basic type 3, SIMOCODE pro V |
| 0 | Receive data | Cyclic receive bit 0 to 1.7 | 0 | Receive data | Cyclic receive bit 0 to 1.7 | 0 | Receive data | Cyclic receive bit 0 to 1.7 |
| 1 | | | 1 | | | 1 | | |
| 2 | | Not supported | 2 | | Not supported | 2 | | Not supported |
| 3 | | | 3 | | | 3 | | |

Table 11-2 "Send" configuration

| **Send** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Basic type 1, SIMOCODE DP | Basic type 1, SIMOCODE pro V | | Basic type 2, SIMOCODE DP | Basic type 2, SIMOCODE pro V | | Basic type 3, SIMOCODE DP | Basic type 3, SIMOCODE pro V |
| 0 | Send data | Cyclic send bit 0 to 1.7 | 0 | Send data | Cyclic send bit 0 to 1.7 | 0 | Send data | Cyclic send bit 0 to 1.7 |
| 1 | | | 1 | | | 1 | | |
| 2 | Motor current | Specified: max. current $I_{max}$ | 2 | Motor current | Specified: max. current $I_{max}$ | 2 | | Acycl. Send Bit 0 to 1.7 |
| 3 | | | 3 | | | 3 | | |
| 4 | Number of starts | Specified: Number of starts (Byte 0) | | | | | | |
| 5 | | | | | | | | |
| 6 | | | | | | | | |
| 7 | Counter 1 value | Specified: Counter 1 - Actual value | | | | | | |
| 8 | | | | | | | | |
| 9 | Counter 2 value | Specified: Counter 2 - Actual value | | | | | | |
| 10 | | | | | | | | |
| 11 | Sensor value | Specified: TM - Max. temperature | | | | | | |

**Note**

The send data bytes 2 - 11 are always permanently assigned in compatibility mode (see Table "'Send' configuration").

## 11.3 Diagram of diagnostics data

The following table shows the diagnostics data in the 3UF50 compatibility mode:

Table 11-3 Diagram of the diagnostics data in the 3UF50 compatibility mode

| Byte.Bit | Setup 3UF50 - Device-specific diagnostics according to DP standard SIMOCODE DP | Byte.Bit | Setup 3UF50 - Device-specific diagnostics according to DPV1 SIMOCODE DP | Equivalent in SIMOCODE pro V |
|---|---|---|---|---|
| | | 6 | 0x0B | Same as 3UF-50 diagnostics |
| | | 7 | 0x81 | |
| | | 8 | 0x04 | |
| 6 | 0x0E | 9 | 0x00 | |
| 7.0 | Free | 10.0 | Free | |
| 7.1 | Event: DP block | 10.1 | Event: DP block | Event - Startup parameter block active |
| 7.2 | Event: Emergency start | 10.2 | Event: Emergency start | Status - Emergency start executed |
| 7.3 | Event: HW test OK | 10.3 | Event: HW test OK | • No fault - HW fault basic unit<br>• No fault - Module fault<br>• No fault - temporary components |
| 7.4 | Free | 10.4 | Free | — |
| 7.5 | Event: Ext. message 1 | 10.5 | Event: Ext. message 1 | Event - ext. fault 5 |
| 7.6 | Event: Ext. message 2 | 10.6 | Event: Ext. message 2 | Event - ext. fault 6 |
| 7.7 | Event: Ext. message 3 | 10.7 | Event: Ext. message 3 | — |
| 8.0 | Warning: Ext. warning | 11.0 | Warning: Ext. warning | Warning: Ext. fault 3 |
| 8.1 | Warning: Unbalance > 40 % | 11.1 | Warning: Unbalance > 40 % | Warning - Unbalance |
| 8.2 | Event: Failure PLC-CPU | 11.2 | Event: Failure PLC-CPU | Status - PLC / PCS (intervened) |
| 8.3 | Warning: Sensor short circuit | 11.3 | Warning: Sensor short circuit | Warning - Thermistor short circuit |
| 8.4 | Event: Cooling down period active | 11.4 | Event: Cooling down period active | Status - Cooling down period active |
| 8.5 | Status: TPF | 11.5 | Status: TPF | Status - Test position (TPF) |
| 8.6 | Free | 11.6 | Free | — |
| 8.7 | Free | 11.7 | Free | — |
| 9.0 | Warning: Ground fault | 12.0 | Warning: Ground fault | • Warning internal ground fault or<br>• Warning external ground fault |
| 9.1 | Warning: Overload | 12.1 | Warning: Overload | Warning - Overload |

| Byte.Bit | Setup 3UF50 - Device-specific diagnostics according to DP standard SIMOCODE DP | Byte.Bit | Setup 3UF50 - Device-specific diagnostics according to DPV1 SIMOCODE DP | Equivalent in SIMOCODE pro V |
|---|---|---|---|---|
| 9.2 | Warning: Overload + unbalance | 12.2 | Warning: Overload + unbalance | Warning - Overload + unbalance |
| 9.3 | Warning: I1 response level overshot | 12.3 | Warning: I1 response level overshot | Warning - Warning level I > |
| 9.4 | Warning: I1 response level undershot | 12.4 | Warning: I1 response level undershot | Warning - Warning level I < |
| 9.5 | Warning: I2 response level overshot | 12.5 | Warning: I2 response level overshot | — |
| 9.6 | Warning: I2 response level undershot | 12.6 | Warning: I2 response level undershot | — |
| 9.7 | Warning: Thermistor | 12.7 | Warning: Thermistor | • Warning - Thermistor overload<br>• Warning - Thermistor open circuit<br>• Warning - TM warning T ><br>• Warning - TM sensor fault<br>• Warning - TM out of range |
| 10.0 | Trip: Ground fault | 13.0 | Trip: Ground fault | • Fault - internal ground fault or<br>• Fault - ext. ground fault |
| 10.1 | Trip: Overload | 13.1 | Trip: Overload | Fault - overload |
| 10.2 | Trip: Overload + unbalance | 13.2 | Trip: Overload + unbalance | Fault - overload + phase failure |
| 10.3 | Trip: I1 response level overshot | 13.3 | Trip: I1 response level overshot | Fault - trip level I > |
| 10.4 | Trip: I1 response level undershot | 13.4 | Trip: I1 response level undershot | Fault - trip level I < |
| 10.5 | Trip: I2 response level overshot | 13.5 | Trip: I2 response level overshot | — |
| 10.6 | Trip: I2 response level undershot | 13.6 | Trip: I2 response level undershot | — |

| Byte.Bit | Setup 3UF50 - Device-specific diagnostics according to DP standard SIMOCODE DP | Byte.Bit | Setup 3UF50 - Device-specific diagnostics according to DPV1 SIMOCODE DP | Equivalent in SIMOCODE pro V |
|---|---|---|---|---|
| 10.7 | Trip: Thermistor | 13.7 | Trip: Thermistor | • Fault - thermistor overload<br>• Fault - thermistor short circuit<br>• Fault - thermistor open circuit<br>• Fault - TM trip T ><br>• Fault - TM sensor fault<br>• Fault - TM out of range |
| 11.0 | Trip: FB ON | 14.0 | Trip: FB ON | Fault - feedback (FB) ON |
| 11.1 | Trip: FB OFF | 14.1 | Trip: FB OFF | Fault - feedback (FB) OFF |
| 11.2 | Trip: Stalled rotor | 14.2 | Trip: Stalled rotor | Fault - stalled rotor |
| 11.3 | Trip: Stalled positioner | 14.3 | Trip: Stalled positioner | Fault - stalled positioner |
| 11.4 | Trip: Double 0 | 14.4 | Trip: Double 0 | Fault - double 0 |
| 11.5 | Trip: Double 1 | 14.5 | Trip: Double 1 | Fault - double 1 |
| 11.6 | Trip: End position | 14.6 | Trip: End position | Fault - end position |
| 11.7 | Trip: Antivalence | 14.7 | Trip: Antivalence | Fault - antivalence |
| 12.0 | Trip: ESB | 15.0 | Trip: ESB | Fault - ext. fault 4 |
| 12.1 | Trip: OPO | 15.1 | Trip: OPO | Fault - Operational Protection Off (OPO) |
| 12.2 | Trip: UVO | 15.2 | Trip: UVO | Fault - power failure (UVO) |
| 12.3 | Trip: Ext. fault 1 | 15.3 | Trip: Ext. fault 1 | Fault - ext. fault 1 |
| 12.4 | Trip: Ext. fault 2 | 15.4 | Trip: Ext. fault 2 | Fault - ext. fault 2 |
| 12.5 | Trip: TPF fault | 15.5 | Trip: TPF fault | Fault - Test Position Feedback (TPF) |
| 12.6 | Trip: Runtime ON | 15.6 | Trip: Runtime ON | Fault - execution ON command |
| 12.7 | Trip: Runtime OFF | 15.7 | Trip: Runtime OFF | Fault - execution STOP command |
| 13.0 | Trip: Parameter fault 0 | 16.0 | Trip: Parameter fault 0 | Fault - parameterization |
| 13.1 | Trip: Parameter fault 1 | 16.1 | Trip: Parameter fault 1 | — |
| 13.2 | Trip: Parameter fault 2 | 16.2 | Trip: Parameter fault 2 | — |
| 13.3 | Trip: Parameter fault 3 | 16.3 | Trip: Parameter fault 3 | — |
| 13.4 | Trip: Parameter fault 4 | 16.4 | Trip: Parameter fault 4 | Fault - configuration error |

| **Byte.Bit** | **Setup 3UF50 - Device-specific diagnostics according to DP standard SIMOCODE DP** | **Byte.Bit** | **Setup 3UF50 - Device-specific diagnostics according to DPV1 SIMOCODE DP** | **Equivalent in SIMOCODE pro V** |
|---|---|---|---|---|
| 13.5 | Trip: Parameter fault 5 | 16.5 | Trip: Parameter fault 5 | |
| 13.6 | Trip: Parameter fault 6 | 16.6 | Trip: Parameter fault 6 | |
| 13.7 | Trip: Parameter fault 7 | 16.7 | Trip: Parameter fault 7 | Fault - hardware fault basic unit |
| 14 - 15 | Number of overload trips | | | Number of overload trips |
| 16 - 17 | I of the overload trip [% / IE)] | | | Last trip current |
| 18 - 19 | Operating hours [10 h] | | | Motor operating hours |

# Mounting, wiring, connecting 12

## 12.1 Mounting

### 12.1.1 Mounting basic units, expansion modules, and the decoupling module

You can attach these system components as follows:

- Snap-on mounting onto a 35 mm standard mounting rail, without tools
- Snap-on mounting of basic units (no tools required) onto current measuring modules of 45 mm and 55 mm in width (up to 100 A or 115 A (UM+))) with integrated standard mounting rail
- Screw fixing with fixing lugs (article number: 3RP1903 or 3ZY1311-0AA00 for SIMOCODE pro S) and screws on a flat surface. These fixing lugs are only suitable for basic units, expansion modules and the decoupling module!

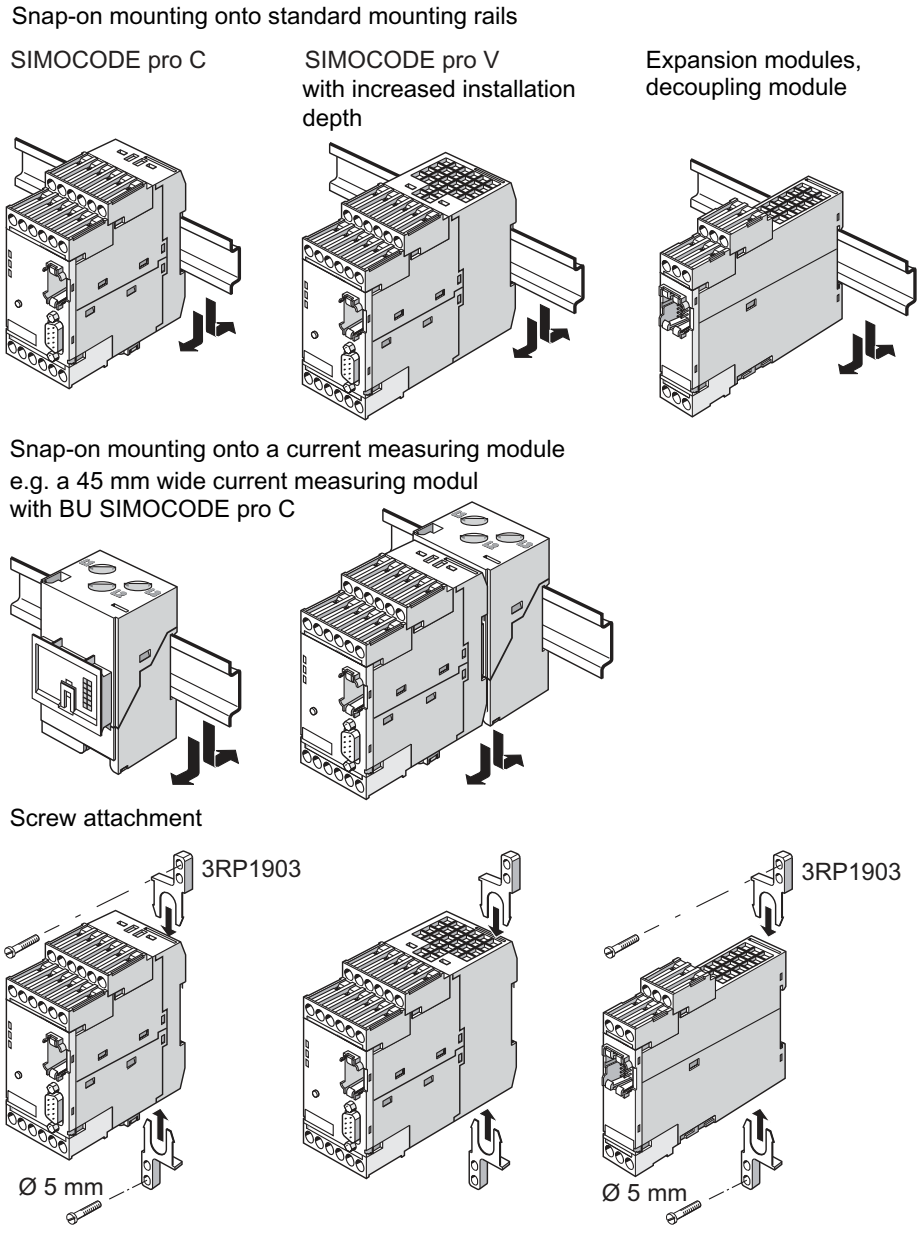



Figure 12-1 Mounting basic unit, expansion modules or the decoupling module, SIMOCODE pro C/V

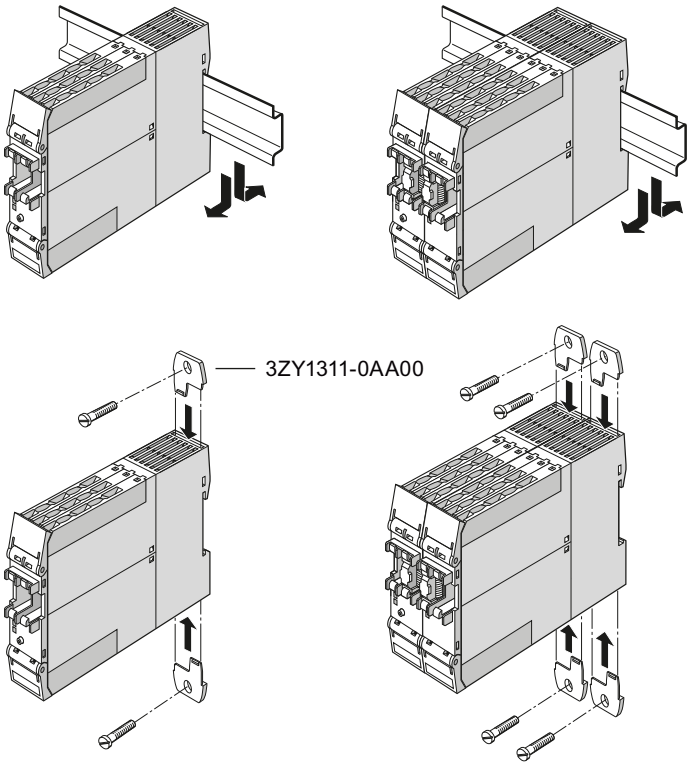



Figure 12-2 Mounting of basic unit and multifunction module, SIMOCODE pro S

## 12.1.2 Mounting the bus terminal

### Sequence for mounting the bus terminal on the SIMOCODE pro S basic unit

Proceed as follows:

Table 12-1 Mounting the bus terminal on the SIMOCODE pro S basic unit

| Step | Description |
|---|---|
| 1 | Screw the two PROFIBUS cables to the bus terminal as shown |
| 2 | Attach the bus terminal to the SIMOCODE pro S basic unit as shown. |

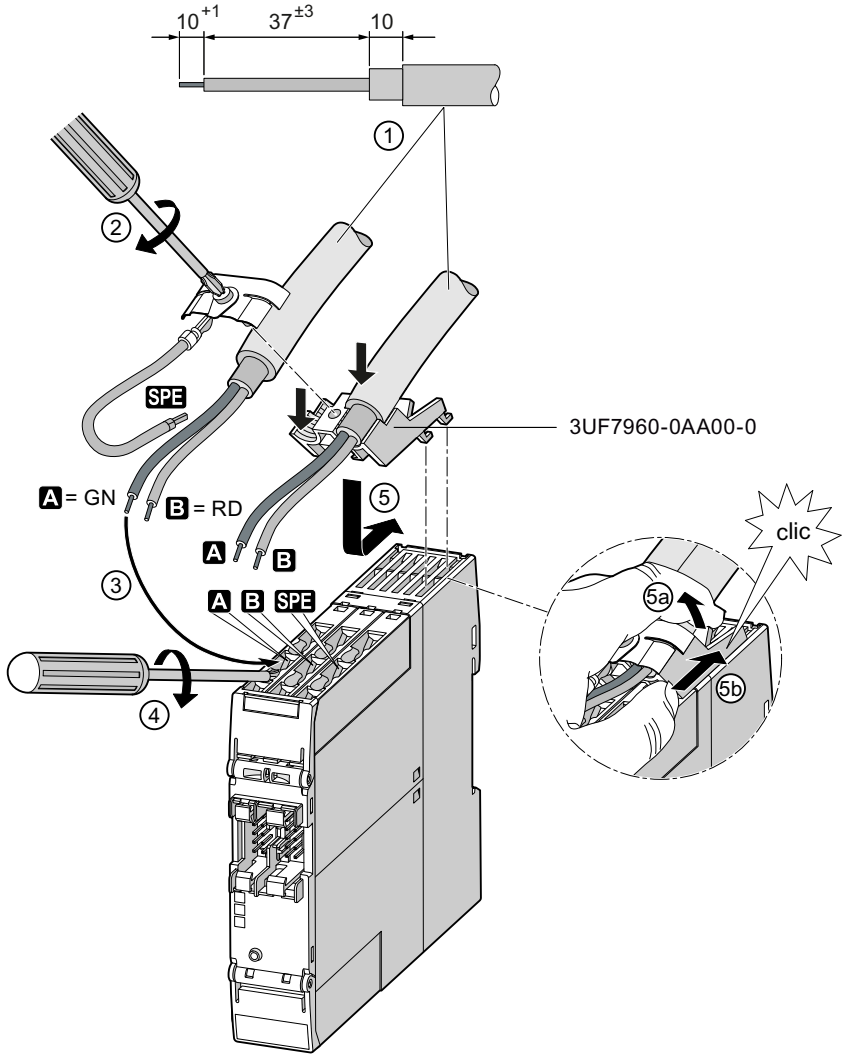



Figure 12-3 Mounting the bus terminal on the SIMOCODE pro S basic unit

## 12.1.3 Mounting of digital modules DM-F Local and DM-F PROFIsafe

See Manual SIMOCODE pro fail-safe digital modules (https://support.automation.siemens.com/WW/view/en/50564852), Chapter "Mounting and connection."

## 12.1.4 Mounting of current measuring modules

You can attach these system components as follows:

- Current measuring modules up to 100 A: Standard mounting rail mounting or screw attachment with mounting lugs (Order No: 3RV2928-0B) and screws for mounting on a level surface. These mounting lugs are suitable only for current measuring modules and current / voltage measuring modules! For current measuring modules up to 25 A you will require an additional 25 mm spacer.
- Current measuring modules up to 200 A: Rail-mounting or screw attachment
- Current measuring modules up to 630 A: Screw mounting.

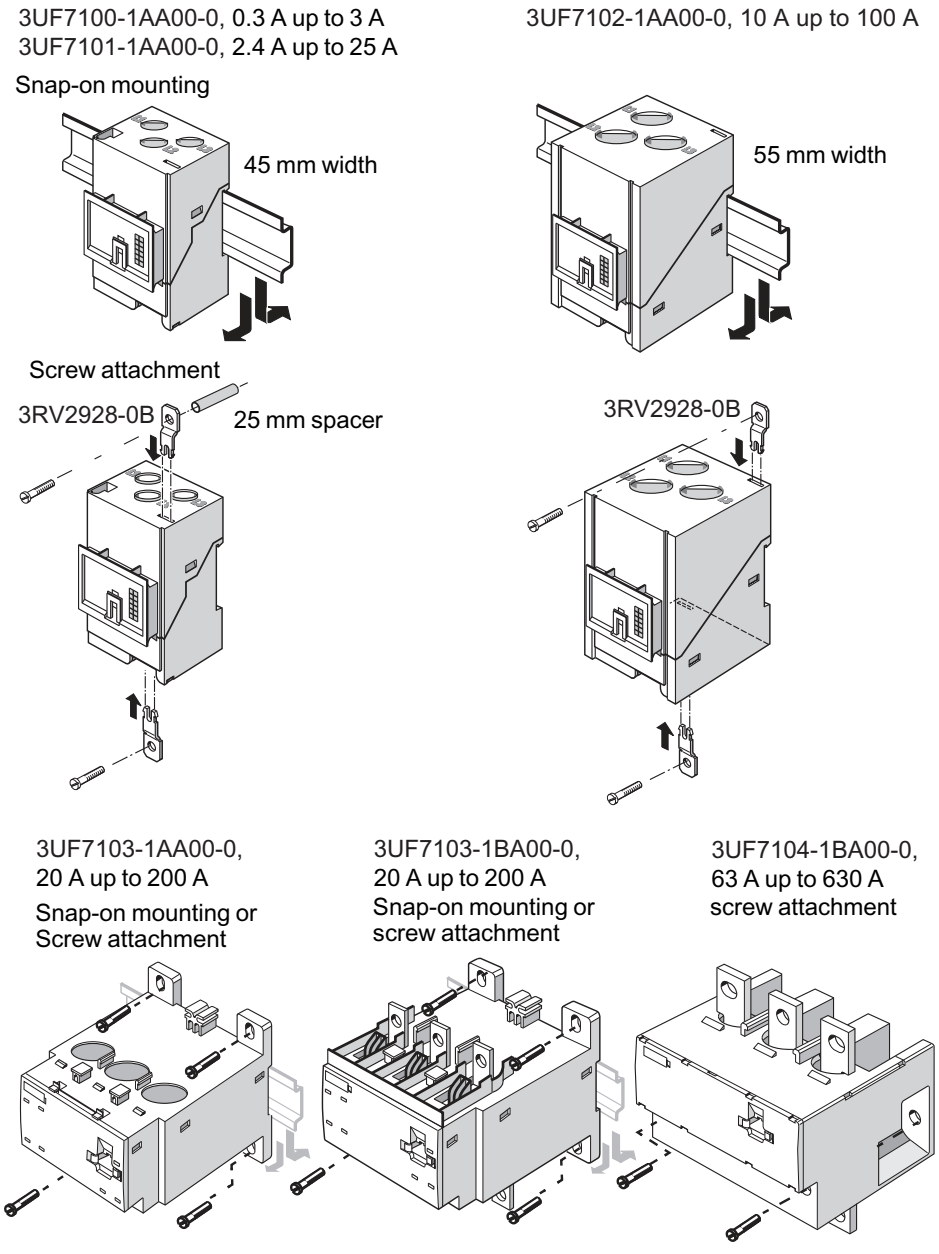



Figure 12-4 Mounting the current measuring modules

## 12.1.5 Mounting the current / voltage measuring modules

You can attach these system components as follows:

- Current / voltage measuring modules up to 115 A: Standard mounting rail mounting or screw attachment with mounting lugs (article number: 3RV2928-0B) and screws for mounting on a level surface. These mounting lugs are suitable only for current / voltage measuring modules (and current measuring modules)! For current / voltage measuring modules up to 25 A you will require an additional spacer, 25 mm in length.
- Current / voltage measuring modules up to 200 A: Standard mounting rail or screw attachment.
- Current / voltage measuring modules up to 630 A: Screw mounting

**Note**

Current / voltage measuring modules with a current setting of up to 115 A can be connected to the basic unit mechanically and installed as a unit (behind one another).

Larger current / voltage measuring modules can only be mounted separately.

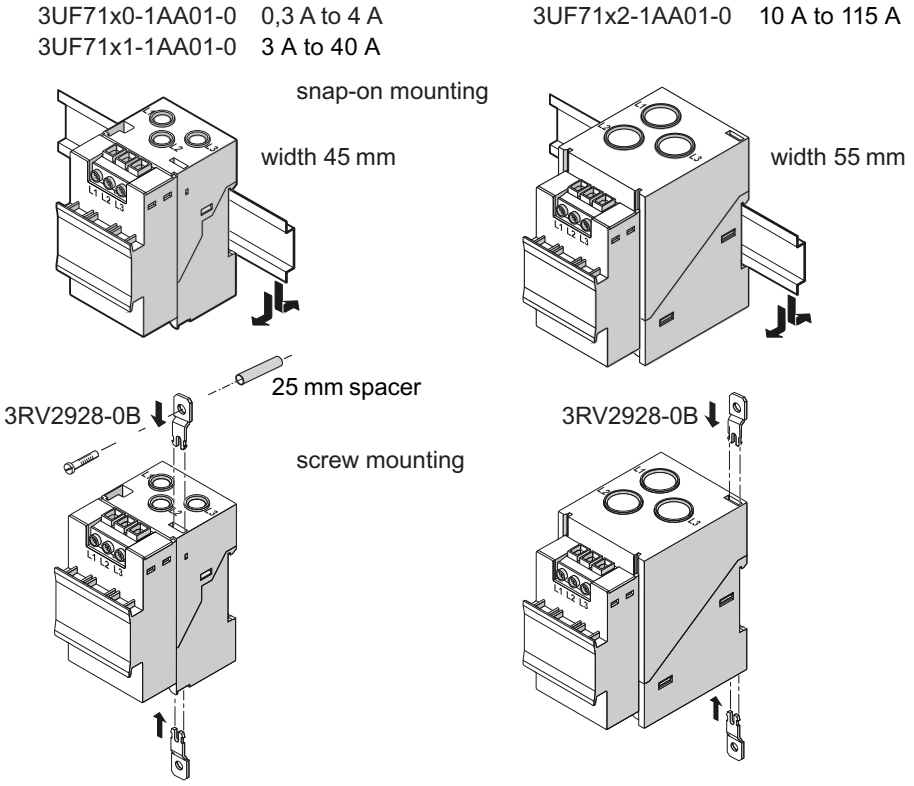



Figure 12-5 Mounting the current / voltage measuring modules UM+ with through-hole technology

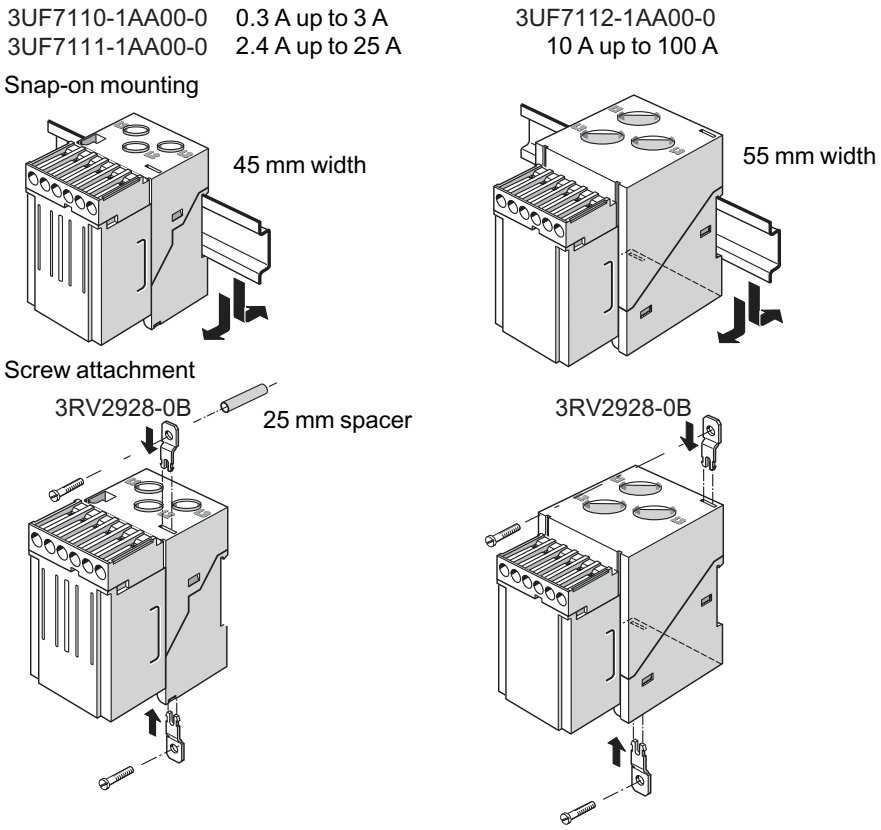



Figure 12-6 Mounting the current / voltage measuring modules UM with through-hole technology

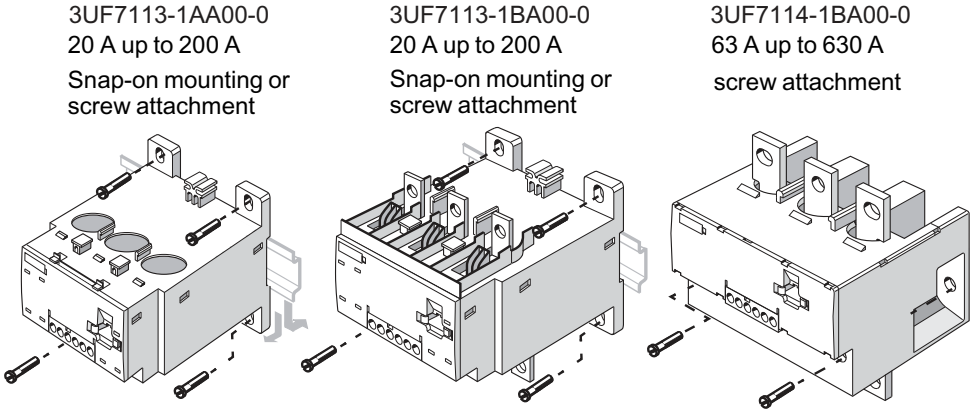



Figure 12-7 Mounting the current / voltage measuring modules UM with bus connection system

## 12.1.6 Mounting of the operator panel and operator panel with display

The operator panels are designed for installation in the front panels of motor control centers, for example, or in control cabinet doors.

To install, proceed as follows:

Table 12-2 Sequence for installing the operator panel / operator panel with display

| Step | Description |
|---|---|
| 1 | Make a cutout, e.g. in the front panel or switchgear cabinet door. Dimensions (see figure "Mounting the operator panel" or figure "Mounting the operator panel with display"). |
| 2 | Position the operator panel or the operator panel with display in the cutout. |
| 3 | Snap the four mounting brackets onto the operator panel. |
| 4 | Lock the operator panel in position by tightening the four screws on the securing brackets. |

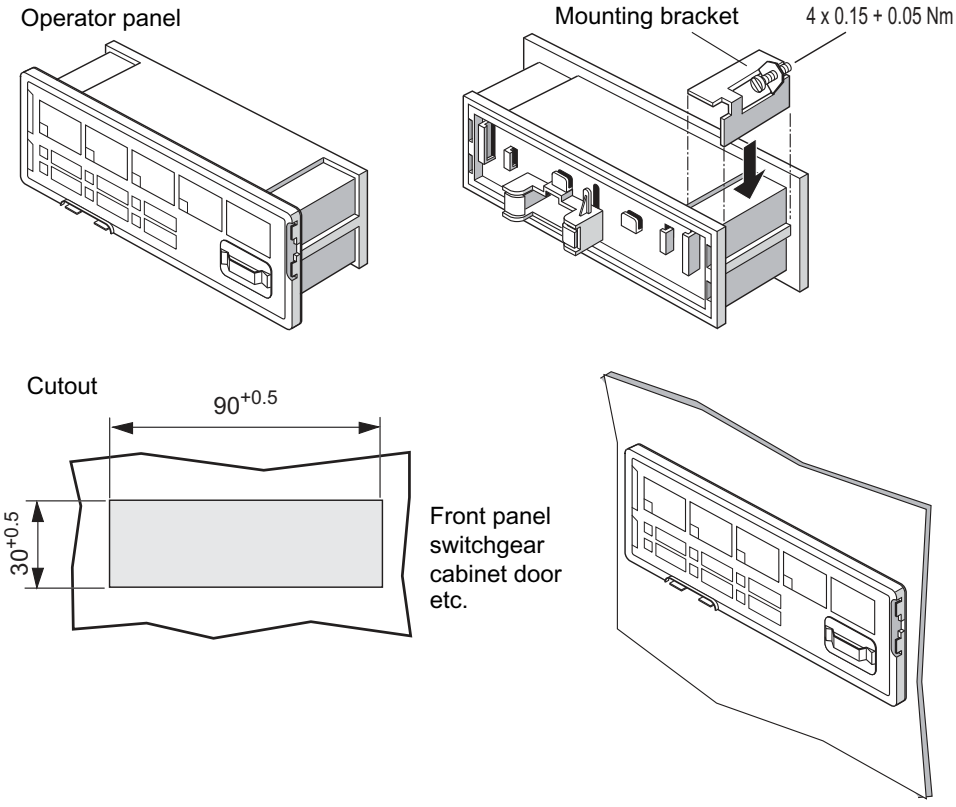



Figure 12-8 Mounting the operator panel

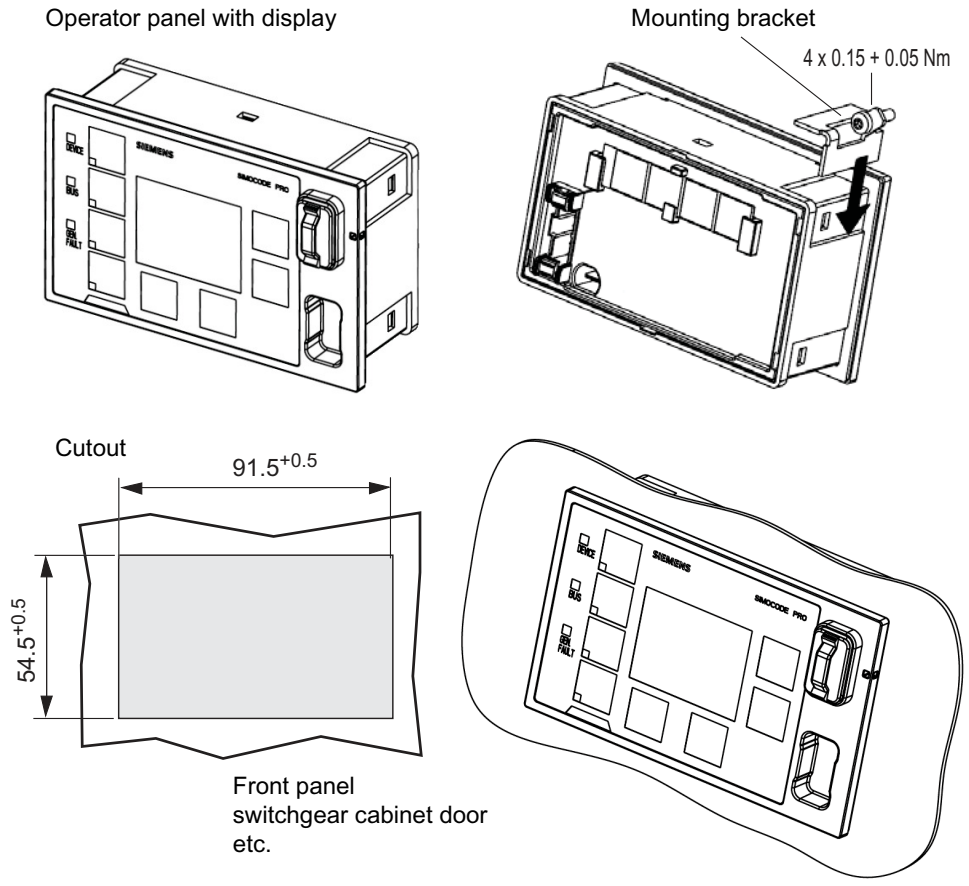



Figure 12-9 Mounting the operator panel with display

**WARNING**

**Tightening torque of the screws**

To ensure that the panel will function correctly and is sealed to comply with IP54, the tightening torque of the screws provided must not be set too high when mounting and the seal must be properly fitted.

**Note**

Only one connecting cable is required for connecting the operator panel with display to SIMOCODE pro (see Chapter An overview of system components (Page 65)). Additional wiring for the power supply or ground is not required.

# 12.2 Wiring, connecting

## 12.2.1 Wiring basic units, expansion modules and the decoupling module

### Removable terminals

Basic units, expansion modules and the decoupling module have removable terminals. You do not have to detach the wiring to exchange these devices!

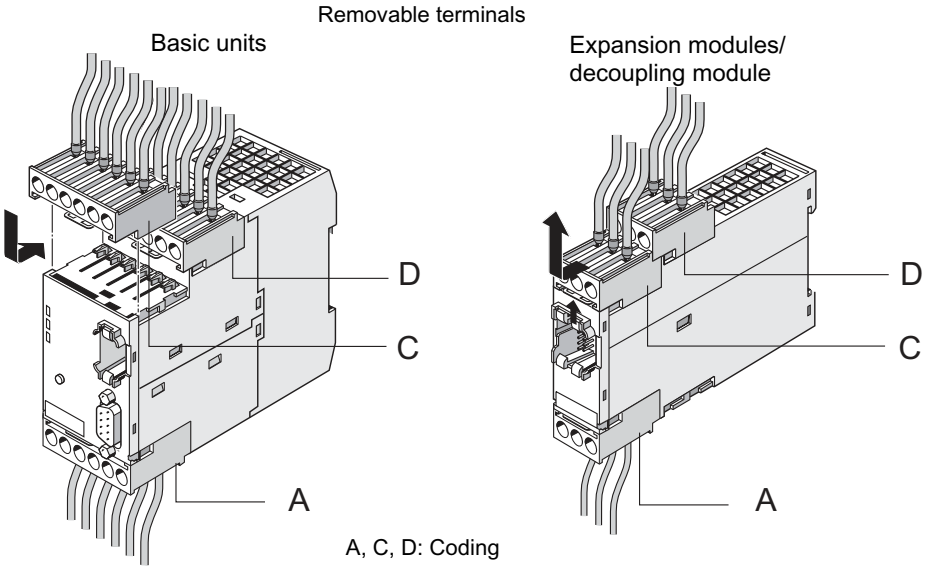



Figure 12-10 Removable terminals for basic units, expansion modules, or the decoupling module, SIMOCODE pro C/V

**Note**

The removable terminals are mechanically coded and will only fit in a certain position!

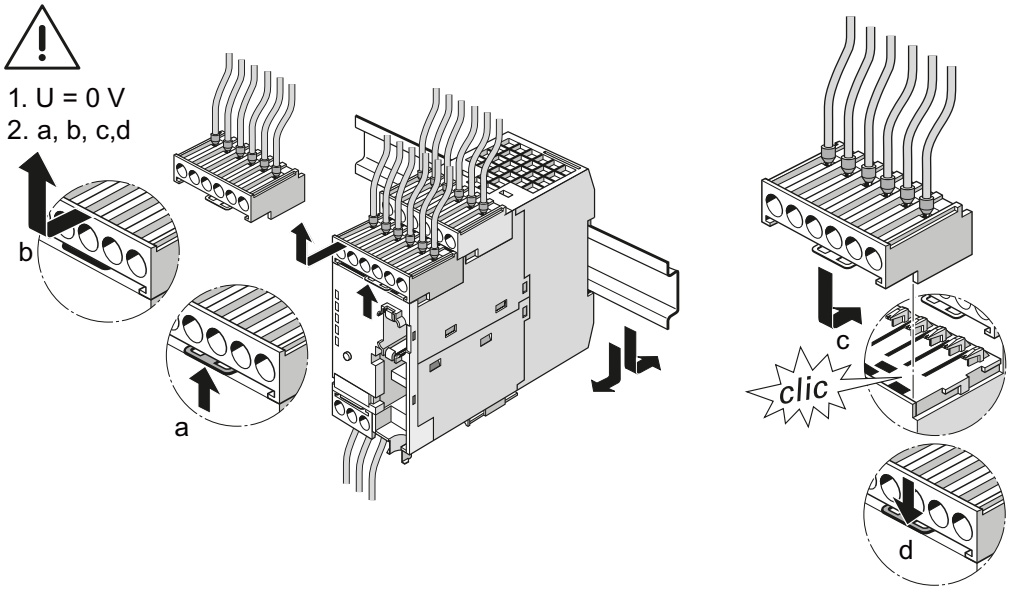



Figure 12-11 Removable terminals for SIMOCODE pro C and pro V basic units

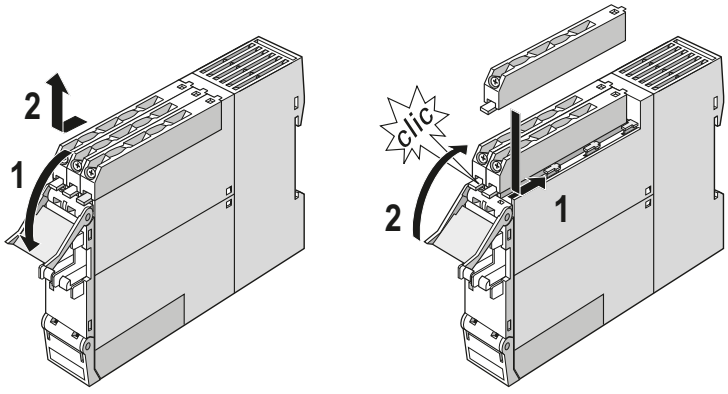



Figure 12-12 Removable terminals for basic unit and multifunction module, SIMOCODE pro S

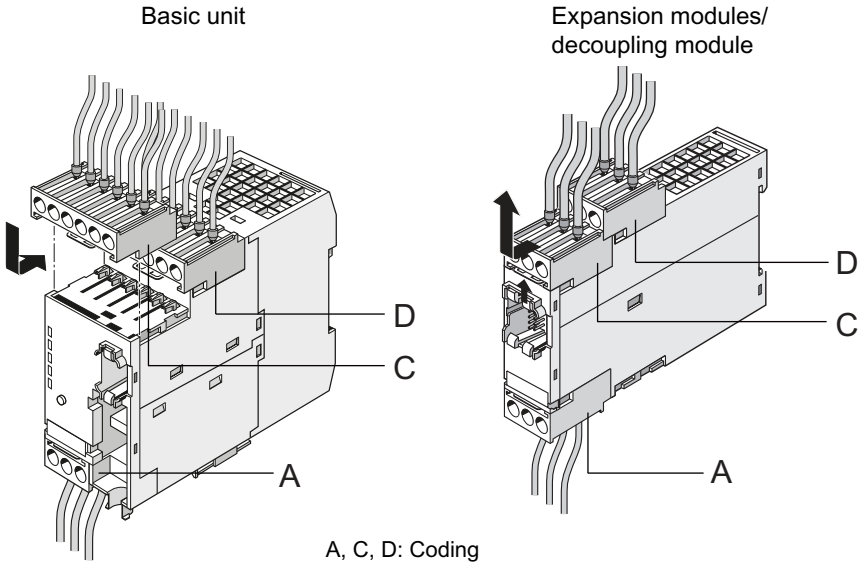



Figure 12-13 Removable terminals for SIMOCODE pro V PN / pro V EIP basic units, expansion modules and decoupling module

## Cables

The conductor cross sections are the same for all devices. The following table shows conductor cross sections, stripped lengths, and tightening torques of the cables for the removable terminals:

Table 12-3 Conductor cross sections, stripped lengths, and tightening torques of the cables for the basic units SIMOCODE pro C and pro V

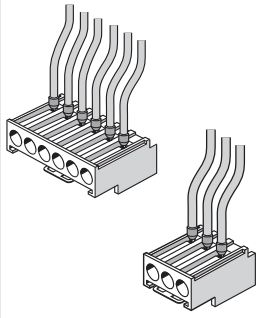
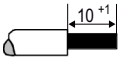
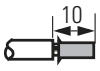
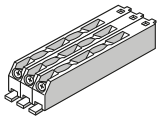
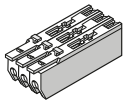
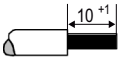
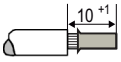
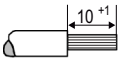
| **Removable terminals** | **Screwdriver** | | **Tightening torque** |
|---|---|---|---|
|  |  | PZ2 / Ø 5 to 6 mm | TORQUE:<br>7 to 10.3 lb.in<br>0.8 to 1.2 Nm |
| | **Stripped lengths** | | **Conductor cross section** |
| |  | Solid | 2x 0.5 to 2.5 $mm^2$ / 1x 0.5 to 4 $mm^2$<br>2x AWG 20 to 14 / 1x AWG 20 to 12 |
| |  | Finely stranded with / without end sleeve | 2x 0.5 to 1.5 $mm^2$ / 1x 0.5 to 2.5 $mm^2$<br>2x AWG 20 to 16 / 1x AWG 20 to 14 |

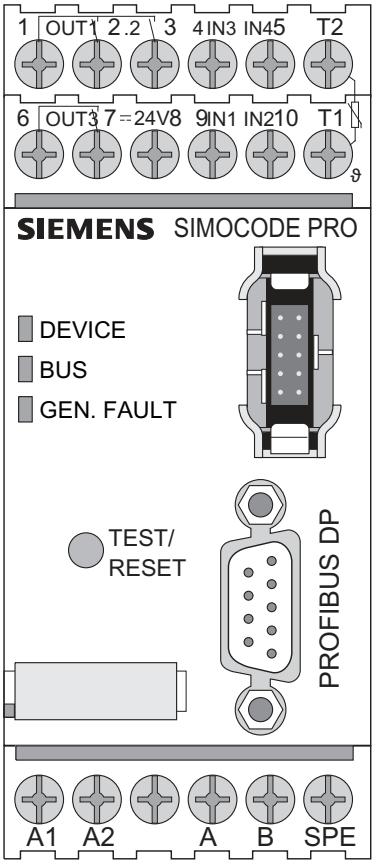
Table 12-4 Conductor cross sections, stripped lengths, and tightening torques of the cables for the basic unit SIMOCODE pro S

| Removable terminals | Screwdriver | | Tightening torque |
|---|---|---|---|
|   |  | PZ1 / Ø 4.5 mm | TORQUE:<br>5.2 to 7.0 lb.in<br>0.6 to 0.8 Nm |
| | **Stripped lengths** | | **Conductor cross section** |
| |  | Solid | 2x 0.5 to 1.5 mm² / 1x 0.5 to 2.5 mm²<br>2x AWG 20 to 16 / 1x AWG 20 to 14 |
| |  | Finely stranded with end sleeve | 2x 0.5 to 1.0 mm² / 1x 0.5 to 2.5 mm² |
| |  | Finely stranded without end sleeve | - |
| | PROFIBUS | | 2x 0.34 mm² / 1x 0.34 mm² |

## Pin assignment of SIMOCODE pro C / pro V PB / pro V MR basic units

The following table show the assignment of the removable terminals of the SIMOCODE pro C/ pro V PB basic units:

| Terminal | Assignment |
|---|---|
| Upper terminals | |
| 1 | Common potential for relay outputs 1 and 2 |
| 2 | Relay output OUT1 |
| 3 | Relay output OUT2 |
| 4 | Digital input IN3 |
| 5 | Digital input IN4 |
| T2 | Thermistor connection (binary PTC) |
| 6 | Relay output OUT3 |
| 7 | Relay output OUT3 |
| 8 | 24 V DC only for IN1 to IN4 |
| 9 | Digital input IN1 |
| 10 | Digital input IN2 |
| T1 | Thermistor connection (binary PTC) |
| Lower terminals | |
| A1 | Supply voltage terminal 1 |
| A2 | Supply voltage terminal 2 |
| A | Bus-type connection A |
| B | Bus-type connection B |
| SPE [1)] | System shielding |



1)

**Note**

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

**Notes on the protection of device connections**

A1 / A2: Supply voltage:

The technical data for protection can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

IN1 / IN2 / IN3 / IN4 / 24 V=: Digital inputs:

No additional measures are required for short-circuit protection when using the internal 24 V=.

The technical data for protection when using an external power supply can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

T1 / T2: Thermistor input:

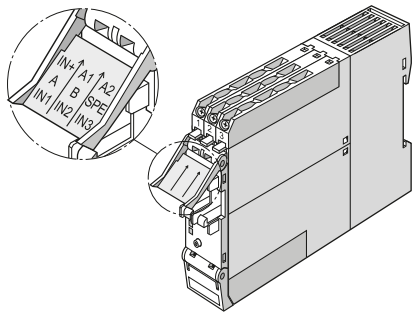
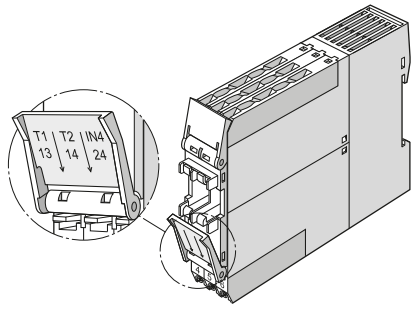
No additional measures are required for short-circuit protection.

Out1 / Out2 / Out3: Relay outputs:

The technical data for protection can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

## Assignment of the removable terminals, SIMOCODE pro S basic units

The following table shows the assignment of the removable terminals of the SIMOCODE pro S basic unit:

| Terminal | Assignment | |
|---|---|---|
| Upper terminals | |   |
| IN+ | 24 V DC only for IN1 to IN4 | |
| A1 | Supply voltage terminal 1 | |
| A2 | Supply voltage terminal 2 | |
| A | PROFIBUS DP terminal A | |
| B | PROFIBUS DP terminal B | |
| SPE [1)] | System shielding | |
| IN1 | Digital input IN1 | |
| IN2 | Digital input IN2 | |
| IN3 | Digital input IN3 | |
| Lower terminals | |   |
| T1 | Thermistor connection 1 (binary PTC) | |
| T2 | Thermistor connection 2 (binary PTC) | |
| IN4 | Digital input IN4 | |
| 13 | Common potential for relay outputs 1 and 2 | |
| 14 | Relay output OUT1 | |
| 24 | Relay output OUT2 | |

1)

**Note**

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

**Notes on the protection of device connections**

A1 / A2: Supply voltage:

The technical data for protection can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

IN1 / IN2 / IN3 / IN4 / 24 V=: Digital inputs:

No additional measures are required for short-circuit protection when using the internal 24 V=.

The technical data for protection when using an external power supply can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

T1 / T2: Thermistor input:

No additional measures are required for short-circuit protection.

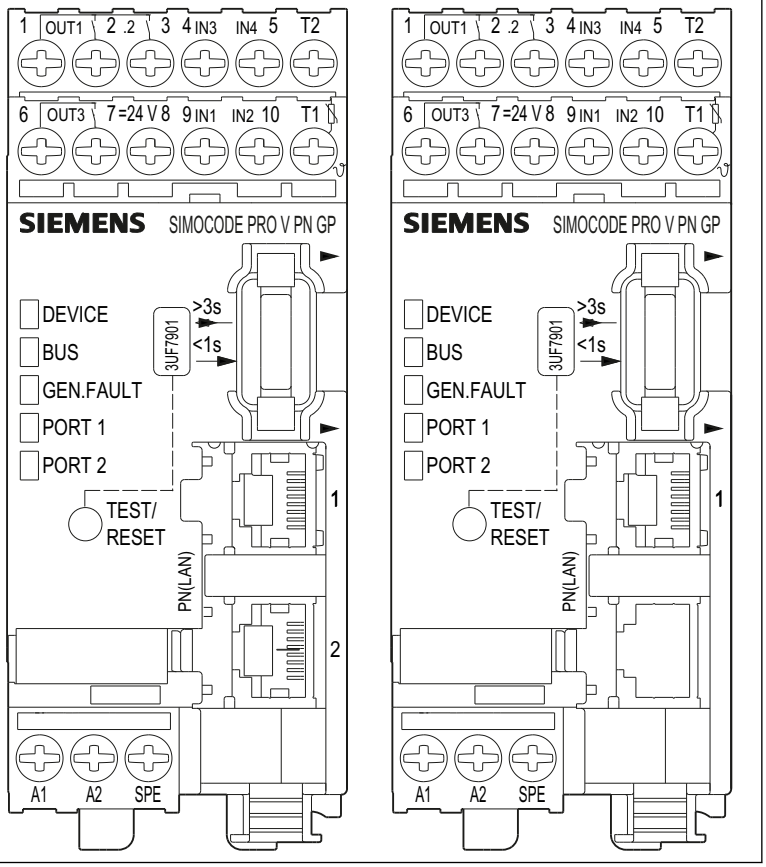
Out1 / Out2 / Out3: Relay outputs:

The technical data for protection can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

### Pin assignment for SIMOCODE pro V PN GP basic unit

The following table shows the pin assignment of the removable terminals:

| Terminal | Assignment |
|---|---|
| Upper terminals | |
| 1 | Common potential for relay outputs 1 and 2 |
| 2 | Relay output OUT1 |
| 3 | Relay output OUT2 |
| 4 | Digital input IN3 |
| 5 | Digital input IN4 |
| T2 | Thermistor connection (binary PTC) |
| 6 | Relay output OUT3 |
| 7 | Relay output OUT3 |
| 8 | 24 V DC only for IN1 to IN4 |
| 9 | Digital input IN1 |
| 10 | Digital input IN2 |
| T1 | Thermistor connection (binary PTC) |
| Lower terminals | |
| A1 | Supply voltage terminal 1 |
| A2 | Supply voltage terminal 2 |
| PORT 1 | PROFINET connection 1 |
| PORT 2 [1)] | PROFINET connection 2 |
| SPE [2)] | System shielding |




1) Not available for SIMOCODE pro V PN GP 3UF7011-1AB00-2 and 3UF7011-1AU00-2 basic units

2)

**Note**

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

**Notes on the protection of device connections**

A1 / A2 supply voltage:

The technical data for protection can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

IN1 / IN2 / IN3 / IN4 / 24 V=: Digital inputs:

No additional measures are required for short-circuit protection when using the internal 24 V=.

The technical data for protection when using an external power supply can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

T1 / T2: Thermistor input:

No additional measures are required for short-circuit protection.

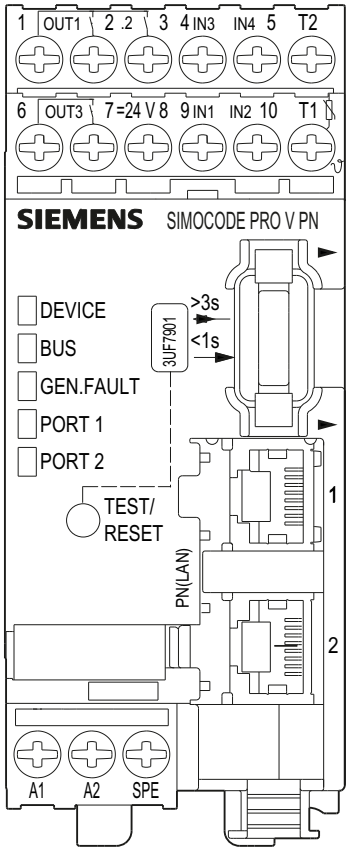
Out1 / Out2 / Out3: Relay outputs:

The technical data for protection can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

## Pin assignment for SIMOCODE pro V PN / EIP basic units

The following table shows the pin assignment of the removable terminals:

| Terminal | Assignment |
|---|---|
| Upper terminals | |
| 1 | Common potential for relay outputs 1 and 2 |
| 2 | Relay output OUT1 |
| 3 | Relay output OUT2 |
| 4 | Digital input IN3 |
| 5 | Digital input IN4 |
| T2 | Thermistor connection (binary PTC) |
| 6 | Relay output OUT3 |
| 7 | Relay output OUT3 |
| 8 | 24 V DC only for IN1 to IN4 |
| 9 | Digital input IN1 |
| 10 | Digital input IN2 |
| T1 | Thermistor connection (binary PTC) |
| Lower terminals | |
| A1 | Supply voltage terminal 1 |
| A2 | Supply voltage terminal 2 |
| PORT 1 | PROFINET / EIP connection 1 |
| PORT 2 | PROFINET / EIP connection 2 |
| SPE [1)] | System shielding |




1)

**Note**

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

### Notes on the protection of device connections

A1 / A2: Supply voltage:

The technical data for protection can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

IN1 / IN2 / IN3 / IN4 / 24 V=: Digital inputs:

No additional measures are required for short-circuit protection when using the internal 24 V=.

The technical data for protection when using an external power supply can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

T1 / T2: Thermistor input:

No additional measures are required for short-circuit protection.

Out1 / Out2 / Out3: Relay outputs:

The technical data for protection can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

## Power supply to the inputs of the basic unit

There are three possibilities for powering the inputs:

**a)**: 24 V DC internal

**b)**: 24 V DC external. Input 1 or 3 is the reference potential, i.e. three inputs are available.

**c)**: 24 V DC external. **Only possible for a basic unit with 24 V DC supply voltage!**

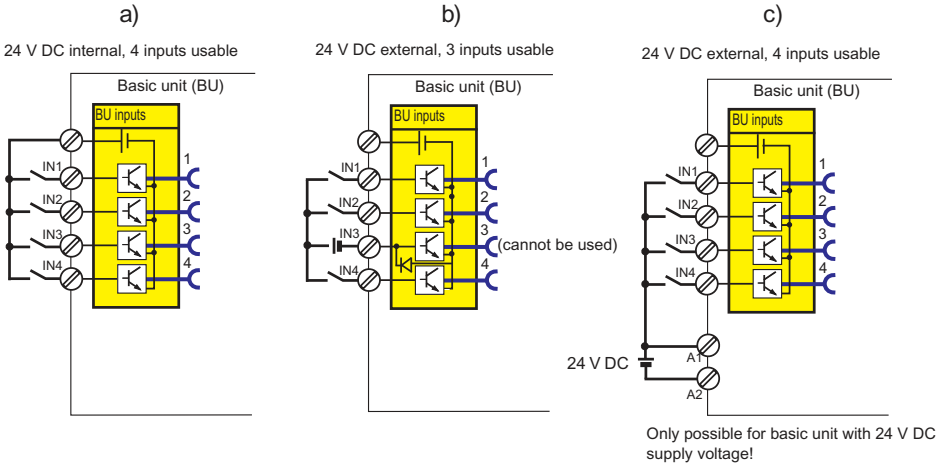



Figure 12-14 24 V DC to supply the inputs and SIMOCODE pro C / pro V PB / pro V MB RTU / pro S basic units

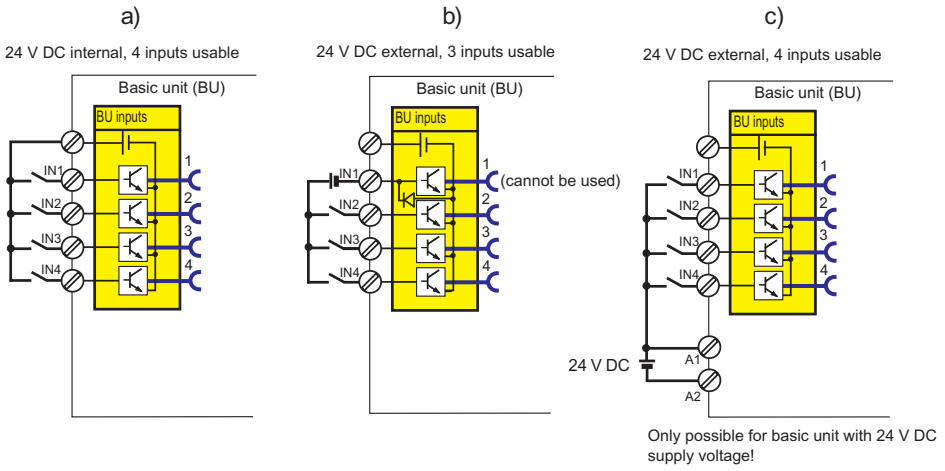



Figure 12-15 24 V DC to supply the inputs, SIMOCODE pro V PN / pro V EIP / pro V PN GP basic units

All inputs work reaction-free, i.e. the signal statuses on neighboring inputs do not influence each other.

## Wiring sequence of the removable terminal of the SIMOCODE pro C/V basic units

Proceed as follows:

| Step | Description |
|---|---|
| 1 | Connect the cables to the upper and lower terminals. |
| 2 | If you wish to use the A/B terminals for PROFIBUS DP, connect the PROFIBUS DP cable shield to the SPE / PE terminal. |
| 3 | Connect the equipment shield to the SPE [1] terminal. |

1)

**Note**

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

**Note**

The A / B terminals are an alternative to the 9-way SUB-D connection! Baud rates of up to 1.5 Mbit / s [1] are possible.

**Note**

**1) Baud rates > 1.5 Mbit / s**

At baud rates > 1.5 Mbit / s, the "Bus" fault is generated and the "Bus" LED lights up.

## Wiring sequence of the PROFIBUS cable for SIMOCODE pro S basic units

Proceed as follows:

| Step | Description |
|---|---|
| 1 | Insulate the PROFIBUS cable as shown below. |
| 2 | Screw the SPE cable to the bus terminal as shown below. |
| 3 | Connect the PROFIBUS cables A and B and the SPE cable to terminals A, B, and SPE [1] as shown below. |

**Note**

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

**CAUTION**

**SPE connection**

Connect the SPE cable to the SPE terminal or alternatively to the bus connection terminal with a ring cable lug.

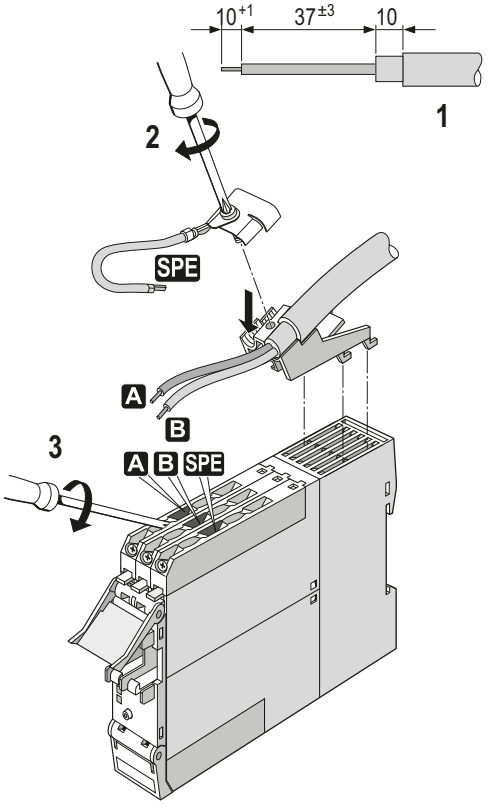



Figure 12-16 Wiring sequence of the PROFIBUS cable for SIMOCODE pro S basic units

### Sequence for wiring the removable terminals for SIMOCODE pro V PN / pro V EIP / pro V PN GP basic units

Proceed as follows:

| Step | Description |
|---|---|
| 1 | Connect the cables to the upper and lower terminals. |
| 2 | Connect the equipment shield to the SPE [1] terminal. |

**DANGER**

**Hazardous voltage. Can cause death or serious injury**

To ensure touch protection and degree of protection IP20 for SIMOCODE pro S, screw in all screws which are not used for conductor clamping and close the terminal covers.

1)

**Note**

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

## Connection examples SIMOCODE pro C / pro V PB / pro V MR / pro S basic unit

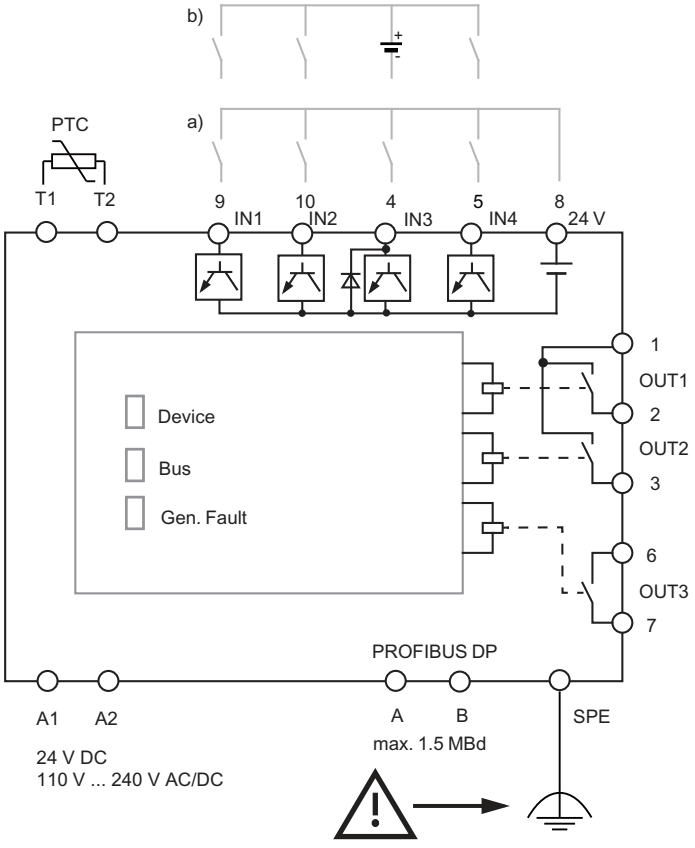



Figure 12-17 Connection example SIMOCODE pro C / pro V PB / pro V MR basic units

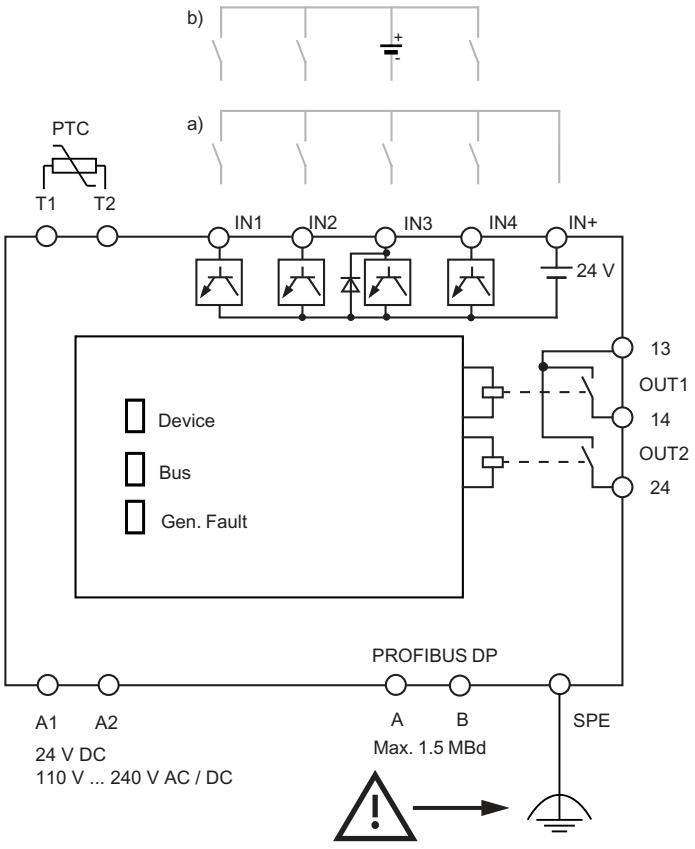



Figure 12-18 Connection example SIMOCODE pro S basic unit

**Note**

**Only three inputs can be used**

With an external 24 V DC supply, only three inputs can be used (see section "Power supply to the inputs of the basic unit" above).

**Note**

**Baud rates PROFIBUS DP**

Baud rates up to 1.5 Mbits are possible via bus terminals A/B.

## Connection examples for SIMOCODE pro V PN / pro V EIP basic units

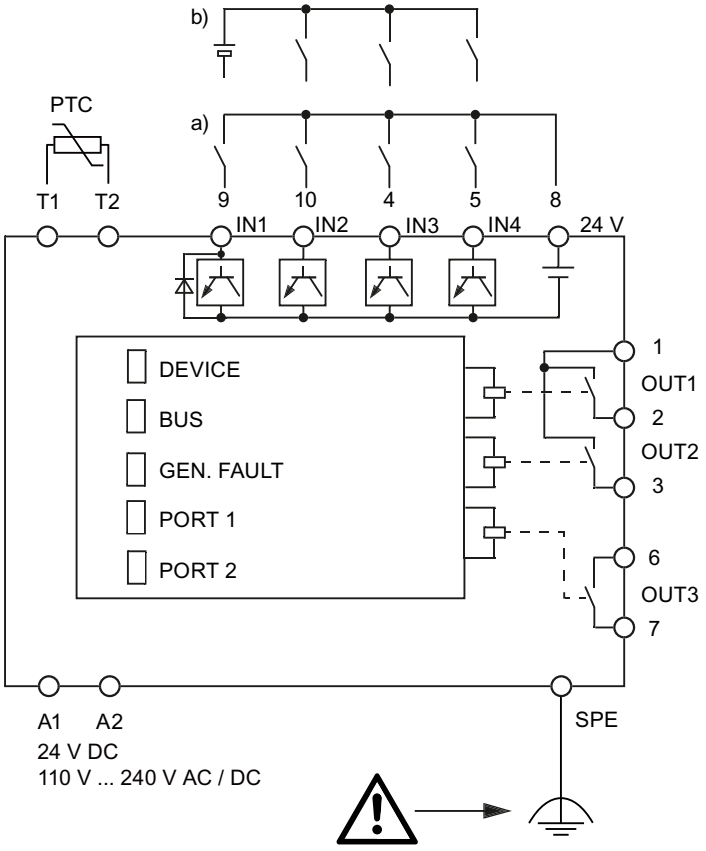
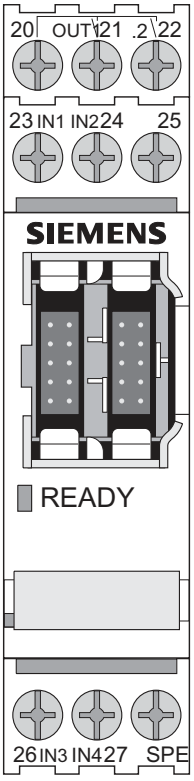



Figure 12-19 Connection examples for SIMOCODE pro V PN / pro V EIP basic units

### Terminal assignment of the digital module

The following table shows the assignment of the removable terminals:

| Terminal | Assignment | |
|---|---|---|
| Upper terminals | |  |
| 20 | Common potential for relay outputs 1 and 2 | |
| 21 | Relay output OUT1 | |
| 22 | Relay output OUT2 | |
| 23 | Digital input IN1 | |
| 24 | Digital input IN2 | |
| 25 | N/M for IN1 to IN4 | |
| Lower terminals | | |
| 26 | Digital input IN3 | |
| 27 | Digital input IN4 | |
| SPE [1)] | System shielding | |



1)

**Note**

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

**Notes on the protection of device connections**

IN1 / IN2 / IN3 / IN4 / N/M: Digital inputs:

No additional measures are required for short-circuit protection when using the internal 24 V.

The technical data for protection when using an external power supply can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

Out1 / Out2 / Out3: Relay outputs:

The technical data for protection can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

## Power supply to the digital module inputs

There are two possibilities for powering the inputs:

a) Digital module with 24 V DC input supply

b) Digital module with 110 to 240 V AC/DC input supply

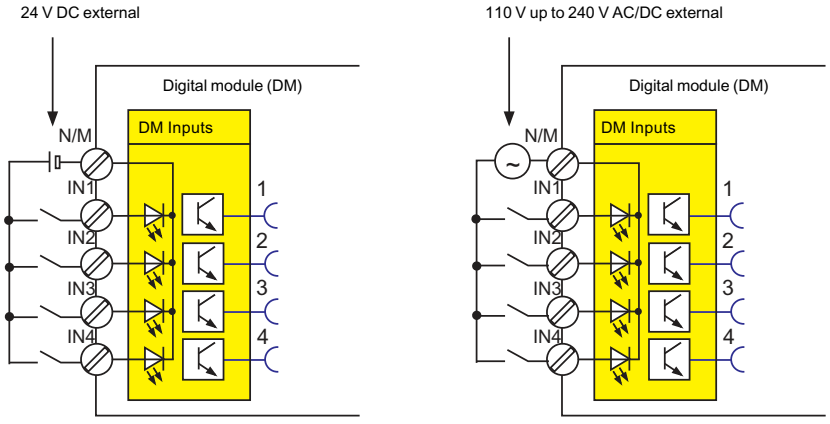



Figure 12-20 Power supply to the digital module inputs

## Digital module connection example

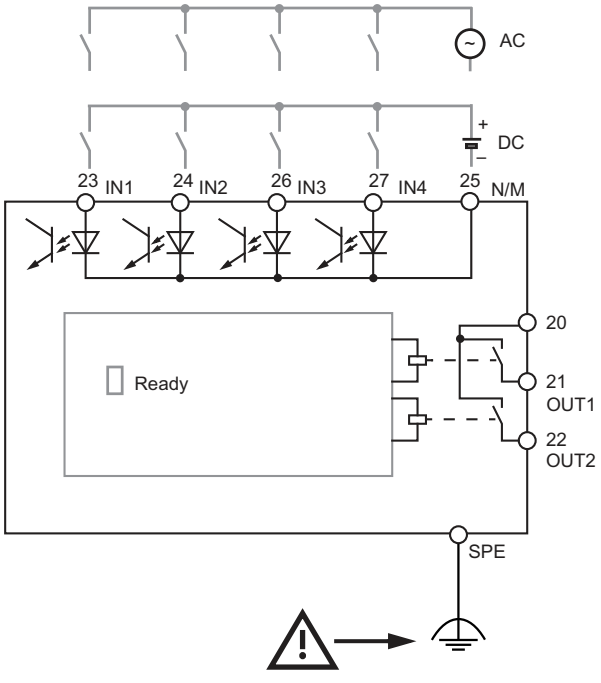
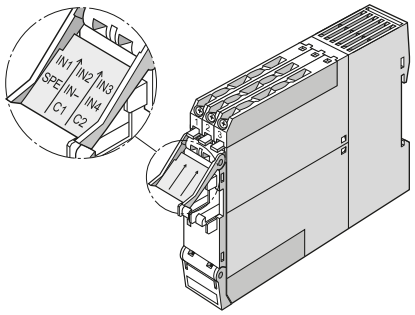
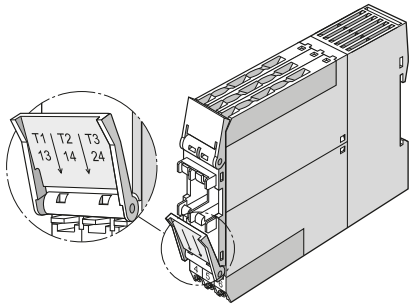



Figure 12-21 Digital module connection example

## Terminal assignment of the multifunction module

| Terminal | Assignment | |
|---|---|---|
| Upper terminals | |   |
| IN1 | Digital input IN1 | |
| IN2 | Digital input IN2 | |
| IN3 | Digital input IN3 | |
| SPE [1)] | System shielding | |
| IN- | Ground for IN1 to IN4 | |
| IN4 | Digital input IN4 | |
| C1 | Terminal 1, 3UL23 residual current transformer | |
| C2 | Terminal 2, 3UL23 residual current transformer | |
| Lower terminals | |   |
| T1 | Input T1, temperature sensor | |
| T2 | Input T2, temperature sensor | |
| T3 | Input T3, temperature sensor | |
| 13 | Common potential for relay outputs 1 and 2 | |
| 14 | Relay output OUT1 | |
| 24 | Relay output OUT2 | |

**DANGER**

**Hazardous voltage. Can cause death or serious injury**

To ensure touch protection and degree of protection IP20 for SIMOCODE pro S, screw in all screws which are not used for conductor clamping and close the terminal covers.

1)

**Note**

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

**Notes on the protection of device connections**

IN1 / IN2 / IN3 / IN4 / N/M: Digital inputs:

The technical data for protection when using an external power supply can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

T1 / 1T2  1T3: Temperature inputs:

No additional measures are required for short-circuit protection.

Out1 / Out2 / Out3: Relay outputs:

The technical data for protection can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

## Connection example for multifunction module

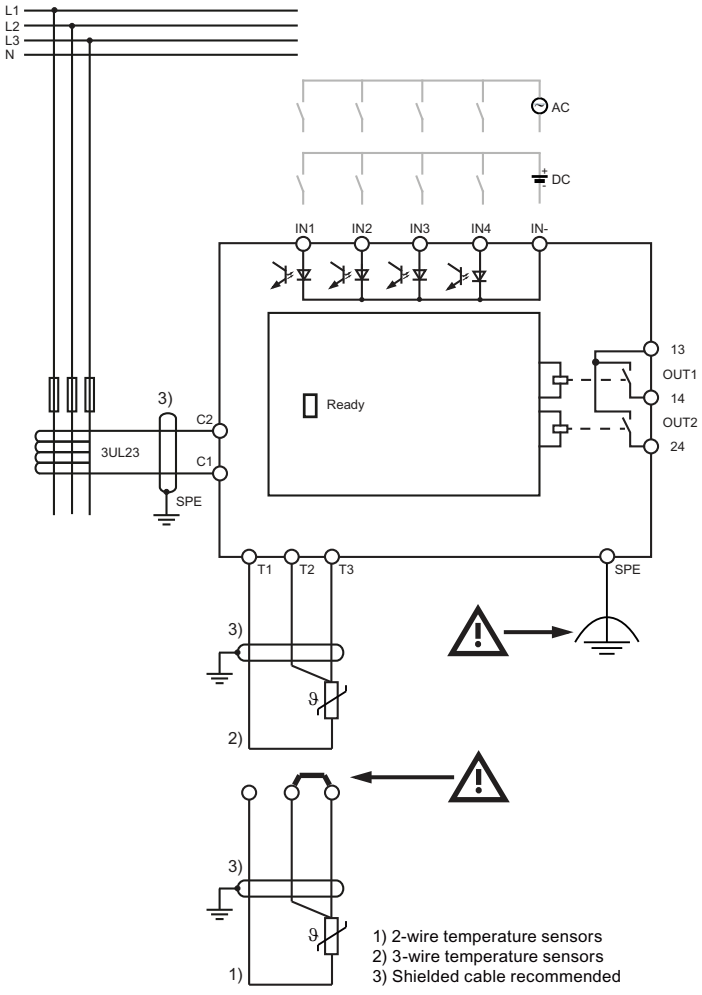



Figure 12-22 Connection example for multifunction module

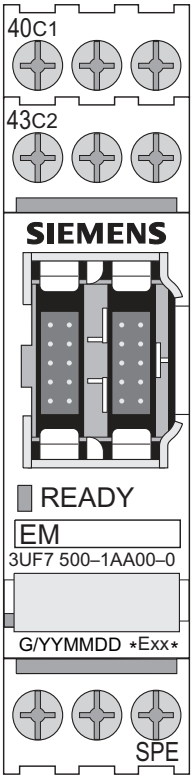
Safety information on installing the 3UL23 residual current transformer:

See Chapter 14.2.5 in the Manual 3UG4/3RR2 Monitoring Relay (https://support.industry.siemens.com/cs/ww/en/view/54397927).

| NOTICE |
|---|
| **Routing the connecting cables / using shielded cables** |
| To avoid interference injection, which could result in incorrect measurements, route these connecting lines parallel and twisted, if possible, or use shielded cables. |

### Terminal assignment of the ground-fault module

The following table shows the assignment of the removable terminals:

| Terminal | Assignment | |
|---|---|---|
| Upper terminals | |  |
| 40 | Input C1 residual current transformer | |
| 43 | Input C2 residual current transformer | |
| Lower terminals | | |
| SPE [1)] | System shielding | |



1)

**Note**

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

**Notes on the protection of device connections**

C1 / C2: Temperature inputs, residual current transformer:

No additional measures are required for short-circuit protection.

| **NOTICE** |
| --- |
| **Types of ground-fault module** |
| The 3UF7 500-1AA00-0 ground-fault module requires the 3UL22 residual current transformer. |
| The 3UF7 510-1AA00-0 ground-fault module requires the 3UL23 residual current transformer. |

## Ground-fault module connection example

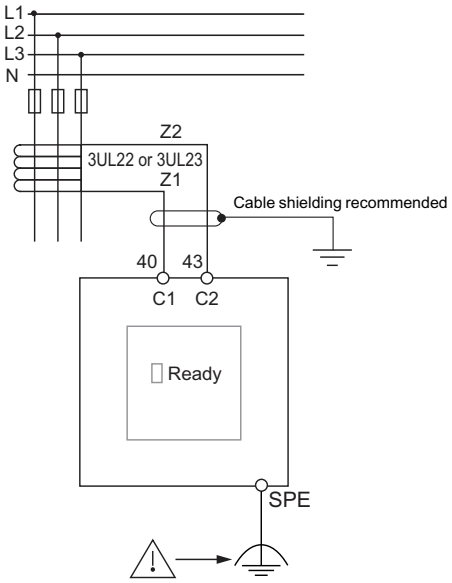



Figure 12-23 Ground-fault module connection example

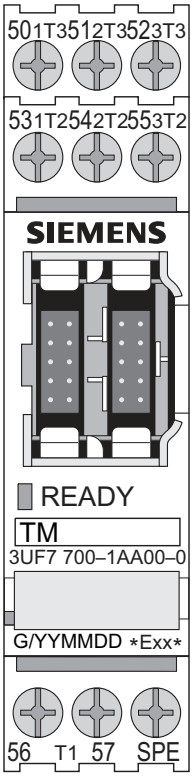
The output signal of the transformers 3UL22/3UL23 is connected to terminals C1 and C2 of the corresponding ground-fault module.

Information on installing the residual current transformer 3UL23: See Manual 3UG4/3RR2 Monitoring Relay (https://support.industry.siemens.com/cs/ww/en/view/54397927), Chapter 13.2.5.

| NOTICE |
| --- |
| **Routing the connecting cables / using shielded cables**<br>To avoid interference injection, which could result in incorrect measurements, route these connecting lines parallel and twisted, if possible, or use shielded cables. |

### Terminal assignment of the temperature module

The following table shows the assignment of the removable terminals:

| Terminal | Assignment | |
| --- | --- | --- |
| Upper terminals | |  |
| 50 | Input T3, temperature sensor 1 | |
| 51 | Input T3, temperature sensor 2 | |
| 52 | Input T3, temperature sensor 3 | |
| 53 | Input T2, temperature sensor 1 | |
| 54 | Input T2, temperature sensor 2 | |
| 55 | Input T2, temperature sensor 3 | |
| Lower terminals | | |
| 56 | Input T1, temperature sensor 1 to 3 | |
| 57 | Input T1, temperature sensor 1 to 3 | |
| SPE [1)] | System shielding | |

1)

**Note**

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

You can connect up to three 2-wire or 3-wire temperature sensors.

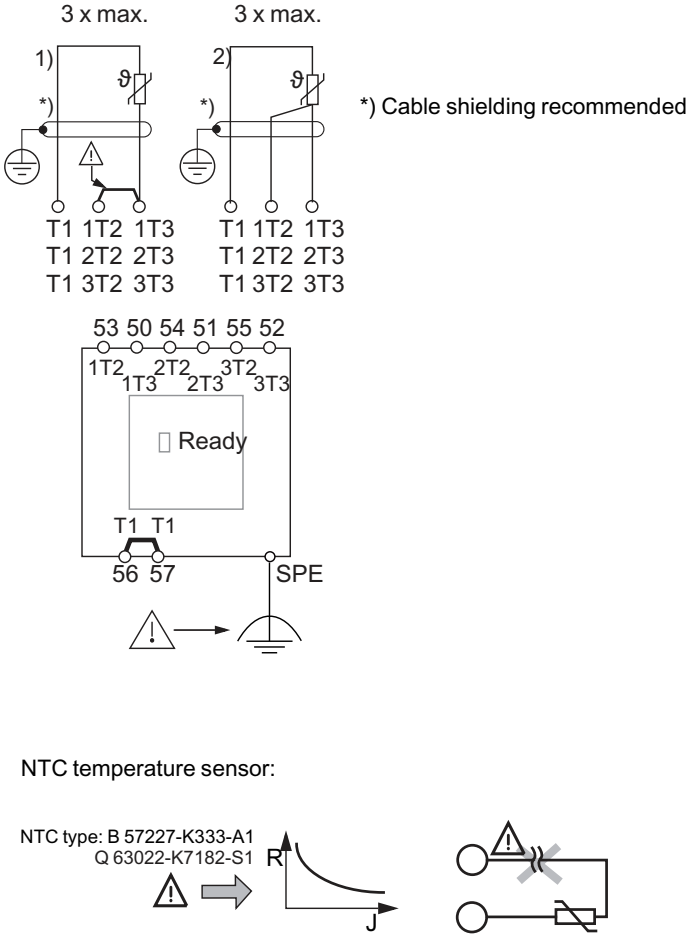
- 2-wire temperature sensors: Connect a jumper between the T2 terminals and T3 terminals.
- 3-wire temperature sensors: Assign terminals 56 and 57 twice when three sensors are used.

**Notes on the protection of device connections**

T1 / 1T2 / 2T2 / 3T2 / 1T3 / 2T3 / 3T3: Temperature inputs:

No additional measures are required for short-circuit protection.

## Temperature module connection example



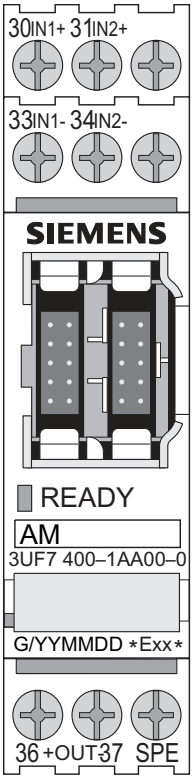

NTC temperature sensor:




Figure 12-24 Temperature module connection example

### Terminal assignment of the analog module

The following table shows the assignment of the removable terminals:

| Terminal | Assignment | |
|---|---|---|
| Upper terminals | |  |
| 30 | Analog input IN1+ | |
| 31 | Analog input IN2+ | |
| 33 | Analog input IN1+ | |
| 34 | Analog input IN2+ | |
| Lower terminals | | |
| 36 | Analog output OUT+ | |
| 37 | Analog output OUT+ | |
| SPE [1)] | System shielding | |



1)

**Note**

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

**Notes on the protection of device connections**

IN1+ / IN1- / IN2+ / IN2-: Analog inputs:

No additional measures are required for short-circuit protection.

OUT+ / OUT-: Analog outputs:

No additional measures are required for short-circuit protection.

## Analog module connection example

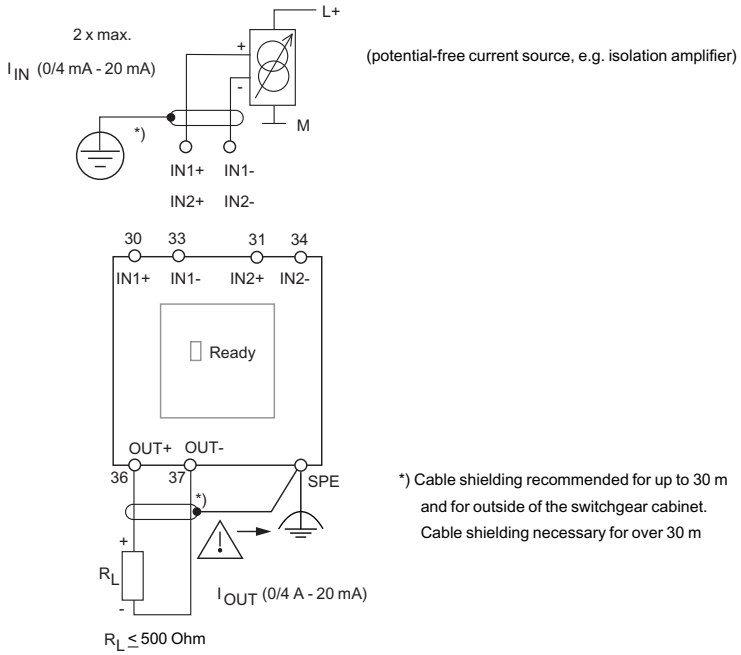
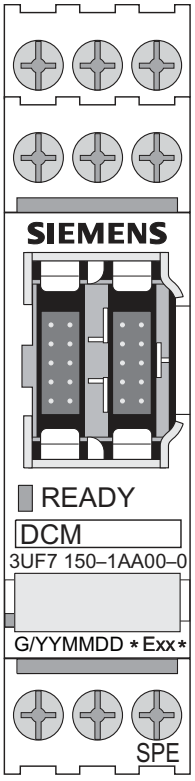



Figure 12-25 Analog module connection example

### Terminal assignment of the decoupling module

The following table shows the assignment of the removable terminals:

| Terminal | Assignment | |
|---|---|---|
| Upper terminals | |  |
| — | | |
| Lower terminals | | |
| SPE [1] | System shielding | |

1)

**Note**

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

### Decoupling module connection example

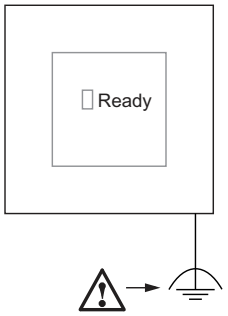



Figure 12-26 Decoupling module connection example

### Wiring the removable terminals of the expansion modules and the decoupling module

Connect the equipment shield to the SPE terminal.

## 12.2.2 Wiring digital modules DM-F Local and DM-F PROFIsafe

### Safety guidelines

See Manual Fail-safe Digital Modules SIMOCODE pro (https://support.automation.siemens.com/WW/view/en/50564852), Chapter "Mounting and connection."

**WARNING**

**Loss of safety function is possible**

For the 24 V DC power supply, always use an SELV or PELV power supply unit!

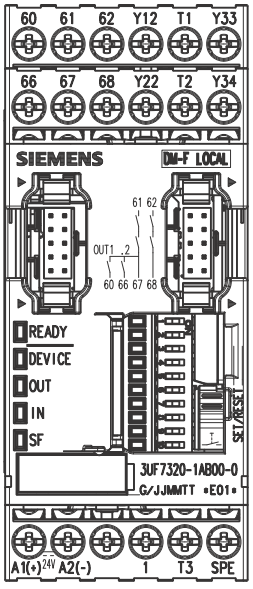
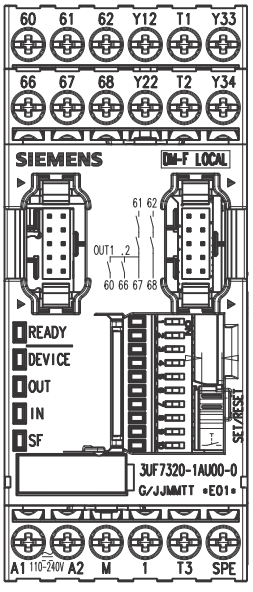
**Note**

Surge suppressors are required for inductive loads.

## Terminal assignment for digital module DM-F Local

The following table shows the pin assignment of the removable terminals:

Table 12-5 Terminal assignment of the removable terminals of the digital module DM-F Local, 24 V DC version and 110 to 240 V UC version.

| Terminal | Assignment | |
|---|---|---|
| Upper terminals | |  |
| 60, 66 | Digital module, relay outputs 1 (60) and 2 (66) | |
| 61, 67 | Relay enabling circuit 1, NO | |
| 62, 68 | Relay enabling circuit 2, NO | |
| Y12, Y22 | Sensor input channel 1, channel 2 | |
| T1, T2 | Supply for sensor inputs (24 V DC, pulsed) | |
| Y33 | Start button (start after rising and falling edge) | |
| Y34 | Feedback circuit | |
| Lower terminals | | |
| A1 (+) | Power supply connection 110 to 240 V AC/DC or +24 V DC | |
| A2 (-) | N or -24 V | |
| M | Ground (reference potential for sensor inputs, 3UF7320-1AU00-0 only) | |
| 1 | Cascading input | |
| T3 | Supply for sensor inputs (24 V DC, static) | |
| SPE [1)] | System shielding |  |

1)

**Note**

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

**Notes on the protection of device connections**

A1 / A2: Supply voltage:

The technical data for protection can be found in the Siemens Industry Online Support: https://support.industry.siemens.com/cs/ww/en/ps/16337/td (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

Y12 / Y22 / Y33 / Y34: Sensor inputs:

Start, feedback circuit: No additional measures are required for short-circuit protection.

1: Cascading input:

No additional measures are required for short-circuit protection.

61 / 62 / 67 / 68: Enabling circuits

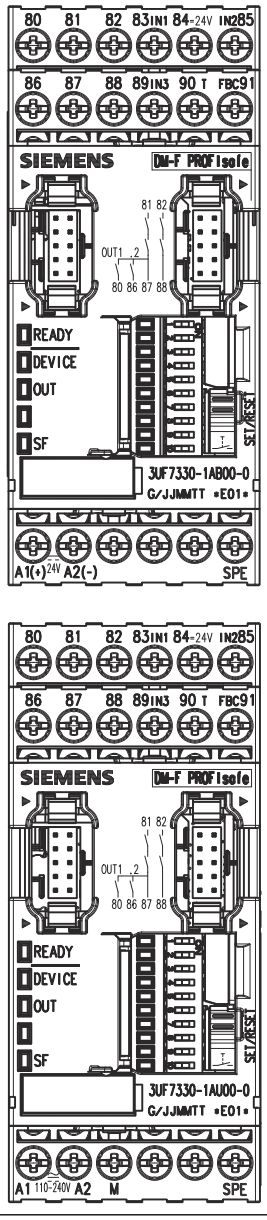
The technical data for protection can be found in the Siemens Industry Online Support: https://support.industry.siemens.com/cs/ww/en/ps/16337/td (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

60 / 66: Relay outputs:

The technical data for protection can be found in the Siemens Industry Online Support: https://support.industry.siemens.com/cs/ww/en/ps/16337/td (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

## Terminal assignment for digital module DM-F PROFIsafe

Table 12-6 Terminal assignment of the removable terminals of the digital module DM-F PROFIsafe, 24 V DC version and 110 to 240 V UC version.

| Terminal | Assignment | |
|---|---|---|
| Upper terminals | |  |
| 80, 86 | Digital module, relay outputs 1 (80) and 2 (86) | |
| 81, 87 | Relay enabling circuit 1, NO | |
| 82, 88 | Relay enabling circuit 2, NO | |
| 83 (IN1)<br>85 (IN2)<br>89 (IN3) | Digital module, inputs 1, 2, 3 | |
| 84 | Power supply, diigital module, inputs 1 to 3, 24 V DC | |
| 90 (T) | Feedback circuit supply (FBC) 24 V DC | |
| 91 (FBC) | Feedback circuit | |
| Lower terminals | | |
| A1 (+) | Power supply connection 110 to 240 V AC/DC or +24 V DC | |
| A2 (-) | N or -24 V | |
| M | Ground (reference potential inputs, only 3UF7320-1AU00-0) | |
| 1 | Cascading input | |
| T3 | Supply for sensor inputs (24 V DC, static) | |
| SPE [1)] | System shielding | |



1)

**Note**

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

**Notes on the protection of device connections**

A1 / A2: Supply voltage:

The technical data for protection can be found in the Siemens Industry Online Support: https://support.industry.siemens.com/cs/ww/en/ps/16337/td (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

FBC: Feedback circuit:

No additional measures are required for short-circuit protection.

IN1 / IN2 / IN3: Digital inputs

No additional measures are required for short-circuit protection.

1: Cascading input:

No additional measures are required for short-circuit protection.

81 / 82 / 87 / 88: Enabling circuits

The technical data for protection can be found in the Siemens Industry Online Support: https://support.industry.siemens.com/cs/ww/en/ps/16337/td (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

80 / 86: Relay outputs:

The technical data for protection can be found in the Siemens Industry Online Support: https://support.industry.siemens.com/cs/ww/en/ps/16337/td (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

## Digital module DM-F Local connection example

DM-F Local with cross-circuit detection, 2 NCs, 2 channels, monitored start

| **WARNING** |
| --- |
| **Fuse protection required!** |
| Always install the prescribed fuse protection. |
| This ensures safe tripping in the event of a fault. |

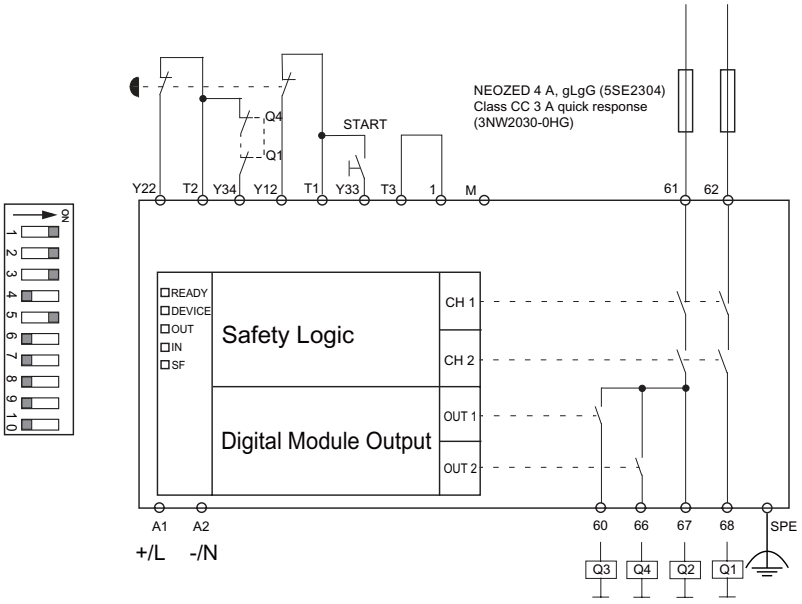



Figure 12-27 Connection example for "DM-F Local with cross-circuit detection, 2 NCs, 2 channels, monitored start"

For further connection examples: See Manual Fail-safe Digital Modules SIMOCODE pro (https://support.automation.siemens.com/WW/view/en/50564852).

## Digital module DM-F PROFIsafe connection example

**WARNING**

**Fuse protection required!**

Always install the prescribed fuse protection.

This ensures safe tripping in the event of a fault.

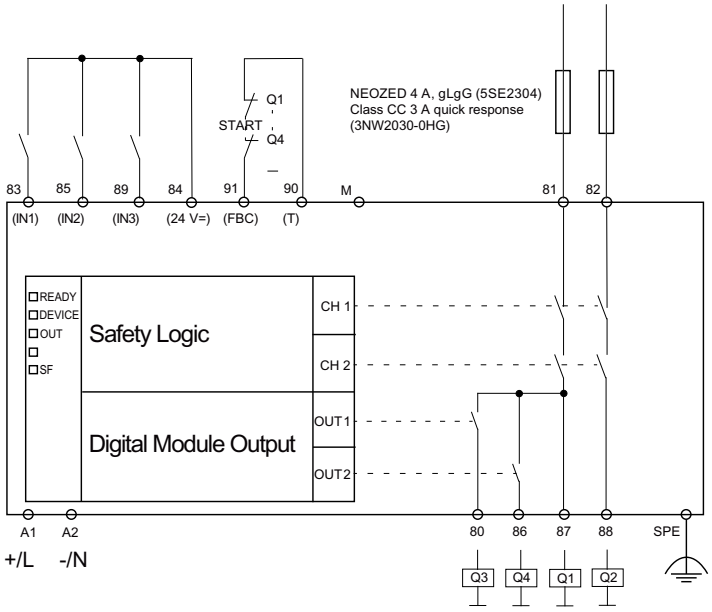



Figure 12-28 Block diagram of DM-F PROFIsafe

### Connection examples fail-safe digital module DM-F

See Manual Fail-safe Digital Modules SIMOCODE pro (https://support.automation.siemens.com/WW/view/en/50564852).

## 12.2.3 Wiring of current measuring modules

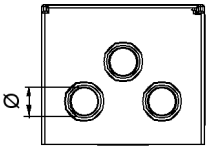
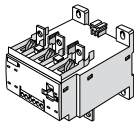
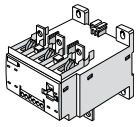
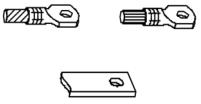
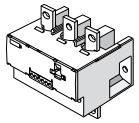
### Selection

Select the appropriate current measuring module according to the motor current:

- Through-hole connection up to 200 A: The cables of the three phases are passed through the feed-through openings.
- Bus connection system from 20 A to 630 A, also for direct connection to Siemens contactors.

The following table shows the various current measuring modules:

Table 12-7 Current measuring modules

| Current measuring module | | Version |
|---|---|---|
| 3UF7100-1AA00-0; 0.3 to 3 A<br>Ø feed-through openings: 7.5 mm |  | Through-hole connection<br> |
| 3UF7101-1AA00-0; 2.4 to 25 A<br>Ø feed-through openings: 7.5 mm | | |
| 3UF7102-1AA00-0; 10 - 100 A<br>Ø feed-through openings: 14 mm |  | |
| 3UF7103-1AA00-0; 20 to- 200 A<br>Ø feed-through openings: 25 mm |  | |
| 3UF7103-1BA00-0; 20 to 200 A<br>Conductor cross section: 16 to 95 mm², AWG 5 to 3/0 |  | Bus connection system<br> |
| 3UF7104-1BA00-0; 63 to 630 A<br>Conductor cross section: 50 to 240 mm², AWG 1/0 to 500 kcmil |  | |

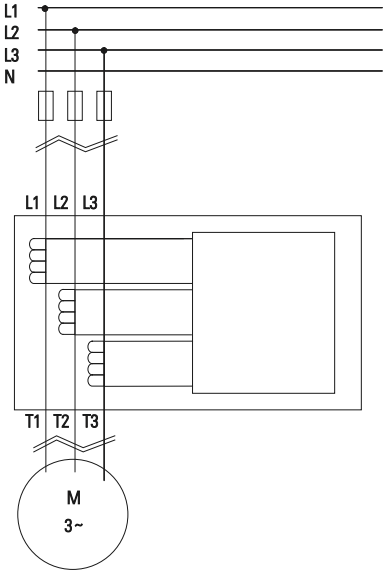



Figure 12-29 Main circuit connection

**Note**

When connecting or routing the cables of the individual phases of the main circuit, ensure correct assignment of the phases on the current measuring module and correct routing direction!

Please note the information in the Operating Instructions. You will also find the Operating Instructions for SIMOCODE pro at Operating instructions (https://support.industry.siemens.com/cs/ww/en/ps/16027/man)

### 12.2.4 Wiring of current / voltage measuring modules

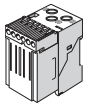
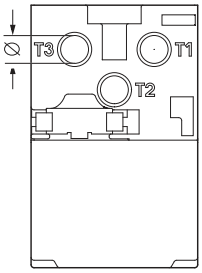
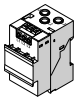
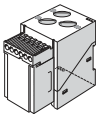
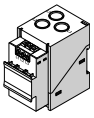
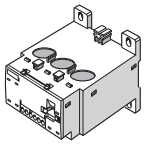
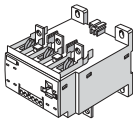
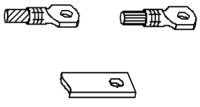
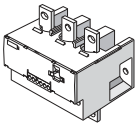
#### Selection

Select the appropriate current / voltage measuring module according to the motor current.

- Through-hole connection up to 200 A: The cables of the three phases are passed through the feed-through openings.
- Bus connection system from 20 A to 630 A, also for direct connection to Siemens contactors.

The following table shows the various current / voltage measuring modules:

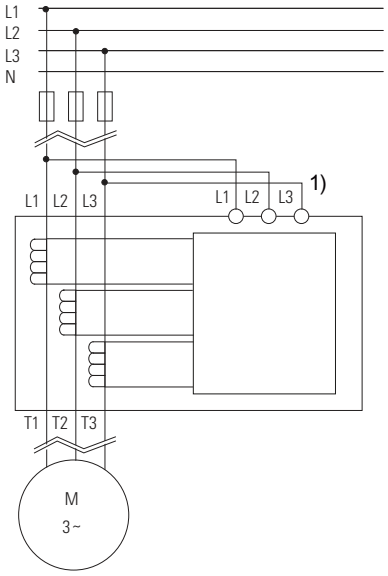
Table 12-8 Current / voltage measuring modules

| **1) Current / voltage measuring module UM**<br>**2) 2nd generation current / voltage measuring module UM+**<br>**3) 2nd generation current / voltage measuring module UM+ for ATEX dry-running protection** | | **Version** |
|---|---|---|
| 1) 3UF7110-1AA00-0; 0.3 - 3 A<br>2) 3UF7110-1AA01-0; 0.3 - 4 A<br>3) 3UF7120-1AA01-0; 0.3 - 4 A<br>Ø feed-through openings: 7.5 mm |  | Through-hole connection<br> |
| 1) 3UF7111-1AA00-0; 2.4 - 25 A<br>2) 3UF7111-1AA01-0; 3 - 40 A<br>3) 3UF7121-1AA01-0; 3 - 40 A<br>Ø feed-through openings: 7.5 mm |  | |
| 1) 3UF7112-1AA00-0; 10 - 100 A<br>2) 3UF7112-1AA01-0; 10 - 115 A<br>3) 3UF7122-1AA01-0; 10 - 115 A<br>Ø feed-through openings: 14 mm | <br> | |
| 1) 3UF7113-1AA00-0; 20 - 200 A<br>2) 3UF7113-1AA01-0; 20 - 200 A<br>3) 3UF7123-1AA01-0; 20 - 200 A<br>Ø feed-through openings: 25 mm |  | |
| 1) 3UF7113-1BA00-0; 20 - 200 A<br>2) 3UF7113-1BA01-0; 20 - 200 A<br>3) 3UF7123-1BA01-0; 20 - 200 A<br>Conductor cross section: 16 to 95 mm², AWG 5 to 3/0 |  | Bus connection system<br> |
| 1) 3UF7114-1BA00-0; 63 - 630 A<br>2) 3UF7114-1BA01-0; 63 - 630 A<br>3) 3UF7124-1BA01-0; 63 - 630 A<br>Conductor cross section: 50 to 240 mm², AWG 1/0 to 500 kcmil |  | |

**Notes on the protection of device connections**

L1 / L2 / L3: Voltage measurement:

Short-circuit proof wiring is recommended.




## Safety guidelines

**⚠ WARNING**

**1) Short-circuit proof wiring or line protection recommended**

**Note**

**Acquisition of the line supply voltage**

A voltage tap between the circuit breaker or fuse and the contactor is recommended for acquisition of the line supply voltage.

Thus, when the motor is shut down, its operable state can be derived from the presence of the supply voltage.

**Note**

**Measurement of voltage or power-related variables**

Connect the main circuit L1, L2, L3 of a current / voltage measuring module to the clamps (L1, L2, L3) of the removable terminal with a 3-core cable. The supply cables may require additional cable protection, for example via short-circuit proof cable or fuses.

**Note**

When connecting or routing the cables of the individual phases of the main circuit, ensure correct assignment of the phases on the current / voltage measuring module and correct routing direction!

Please note the information in the Operating Instructions. You will also find the Operating Instructions for SIMOCODE pro at Operating instructions (https://support.industry.siemens.com/cs/ww/en/ps/16027/man)

## Removable terminals

The following tables show conductor cross-sections, stripped lengths, tightening torques of conductors and pin assignments of the removable terminals of the current / voltage measuring modules:

Table 12-9 Conductor cross-sections, stripped lengths, tightening torques of conductors of the 2nd generation 45 mm and 55 mm current / voltage measuring modules

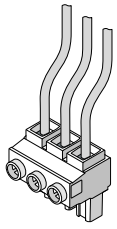
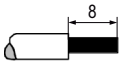
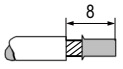
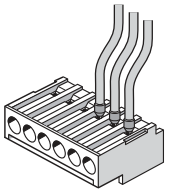
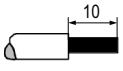
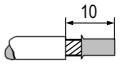
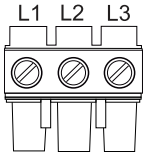
| **Removable terminals** | **Screwdriver** | | **Tightening torque** |
|---|---|---|---|
|  |  | ISO 2380-<br>A 0.6 x 3.5 (8WA2803) | TORQUE:<br>4.4 to 5.3 lb.in<br>0.5 to 0.6 Nm |
| | **Stripped lengths** | | **Conductor cross section** |
| |  | Solid | 1x 0.25 - 2.5 mm² / 1x AWG 24 to 14<br>2x 0.25 - 1 mm² / 2x AWG 24 to 18 |
| |  | Finely stranded with end sleeve | |

Table 12-10 Conductor cross-sections, stripped lengths, tightening torques of conductors of the 2nd generation 120 mm and 145 mm current / voltage measuring modules

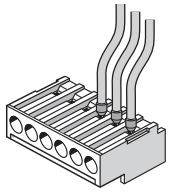
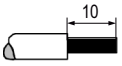
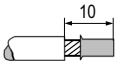
| **Removable terminals** | **Screwdriver** | | **Tightening torque** |
|---|---|---|---|
|  |  | PZ 2 / ∅ 5 ... 6 mm | TORQUE:<br>7 to 10.3 lb.in<br>0.8 ... 1.2 Nm |
| | **Stripped lengths** | | **Conductor cross section** |
| |  | Solid | 1x 0.5 - 4 mm² / 1x AWG 20 to 12<br>2x 0.5 - 2.5 mm² / 2x AWG 20 to 14 |
| |  | Finely stranded with end sleeve | 1x 0.5 - 2.5 mm² / 1x AWG 20 to 14<br>2x 0.5 - 1.5 mm² / 2x AWG 20 to 16 |

**Pin assignments of the removable terminals of the 2nd generation current / voltage measuring modules**

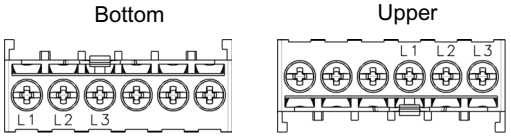



L1, L2, L3: Terminals for connecting the 3-wire cable of the main circuit

Table 12-11 Conductor cross-sections, stripped lengths, tightening torques of conductors of the 1st generation current / voltage measuring modules

| **Removable terminals** | **Screwdriver** | | **Tightening torque** |
|---|---|---|---|
|  |  | PZ2 / Ø 5 to 6 mm | TORQUE:<br>7 to 10.3 lb.in<br>0.8 to 1.2 Nm |
| | **Stripped lengths** | | **Conductor cross section** |
| |  | Solid | 1x 0.5 - 4 mm² / 1x AWG 20 to 12<br>2x 0.5 - 2.5 mm² / 2x AWG 20 to 14 |
| |  | Finely stranded with / without end sleeve | 1x 0.5 - 2.5 mm² / 1x AWG 20 to 14<br>2x 0.5 - 1.5 mm² / 2x AWG 20 to 16 |

**Pin assignments of the removable terminals of the 1st generation current / voltage measuring modules**




L1, L2, L3: Terminals for connecting the 3-wire cable of the main circuit

## 12.2.5 Measuring current with an external current transformer (interposing transformer)

### Functional principle

SIMOCODE pro can be operated with external current transformers. The secondary cables of the current transformer are looped through the three feed-through openings of the current measuring module, and short-circuited. The secondary current of the external current transformer is the primary current of the SIMOCODE pro current measuring module.

**Note**

If the main circuit is using rated current, the secondary current of the current transformer must be within the setting range of the current measuring module used!

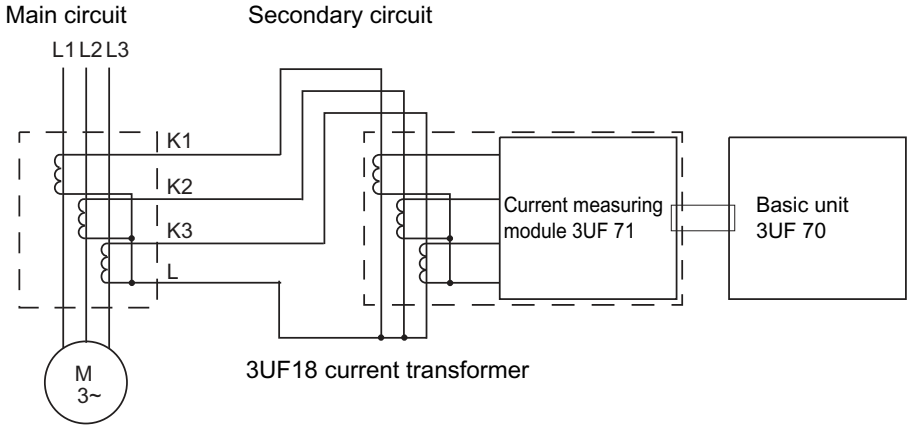



Figure 12-30 Measuring current with an external 3UF18 current transformer

### Transformation ratio

The transformation ratio is calculated using the following formula:

$$\text{Transformation ratio} = \frac{\text{Primary current (external current transformer)}}{\underset{\text{(ext. current transformer)}}{\text{Secondary current}} \times \underset{\text{(current measuring module)}}{\text{number of loops n}}}$$

In the following examples, the displayed actual current flowing does not need to be converted, even when an interposing transformer is used, since SIMOCODE pro only outputs the proportional value, based upon the parameterized current setting $I_s$.

### Requirements for an interposing current transformer

- Secondary current: 1 A
- Frequency: 50 Hz/60 Hz

- Transformer rating: Recommended ≥ 2.5 VA, depending on the secondary current and cable length
- Overcurrent factor: 5P10 or 10P10
- Accuracy class: 1

## Example 1

- 3UF1868-3GA00 current transformer:
  - Primary current: 820 A at nominal load
  - Secondary current: 1 A
- SIMOCODE pro with 3UF7100-1AA00-0 current measuring module, current setting 0.3 A to 3 A. This means:
  - The secondary current of the current transformer is 1 A at rated load and is, therefore, within the 0.3 to 3 A setting range of the current measuring module used
  - The current setting $I_s$ to be parameterized in SIMOCODE pro is 1 A.

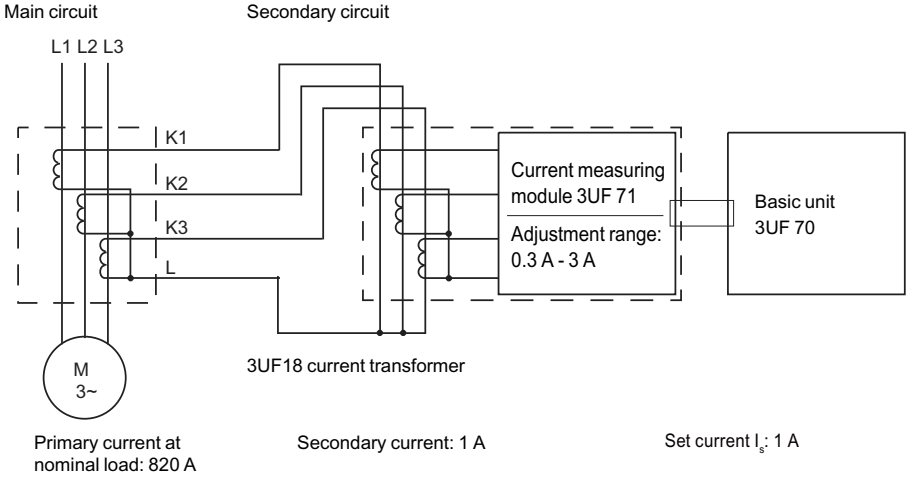



Figure 12-31 Example (1 of 2) for measuring current with an 3UF18 external current transformer

### Example 2

- 3UF1868-3GA00 current transformer:
  - Primary current: 205 A at nominal load
  - Secondary current: 0.25 A
- SIMOCODE pro with 3UF7100-1AA00-0 current measuring module, current setting 0.3 to 3 A. This means:
  - The secondary current of the current transformer is 0.25 A at rated load and is, therefore, **not** within the 0.3 to 3 A setting range of the current measuring module used.
  - The secondary current must be boosted by multiple looping of the secondary cables through the feed-through openings of the current measuring module. Double-looping results in 2 x 0.25 A = 0.5 A.
  - The current setting $I_s$ to be parameterized in SIMOCODE pro is 0.5 A.

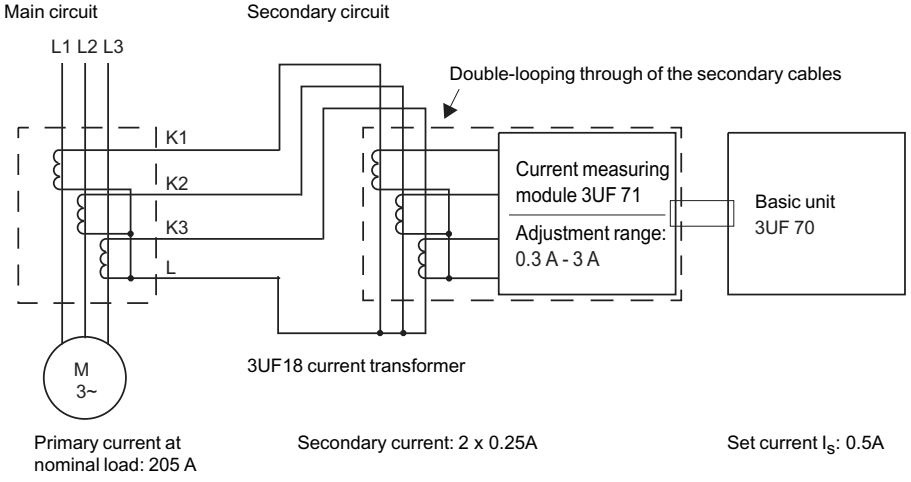



Figure 12-32 Example (2 of 2) for measuring current with an external 3UF18 current transformer

**Note**

If the SIMOCODE pro V PB basic unit as from version *E03* is used, the current setting does not have to be converted but is the same as the nominal primary current.

By additionally entering the transformation ratio of the current transformer (interposing transformer), conversion will be performed automatically in the device.

# 12.3 System interfaces

## 12.3.1 Information about the system interfaces

### Information about the system interfaces

- SIMOCODE pro system components are connected to each other via the system interfaces. The system interfaces are provided on the front and bottom of the devices.
- Connecting cables of different lengths are available for connecting the system components.
- The PC cables, addressing plugs, and memory modules can be plugged directly into the system interface.
- The system is always configured according to the basic unit. Basic units have two system interfaces:
  - Bottom/left: For outgoing connecting cable to the current or current / voltage measuring module.
  - Front side: For outgoing connecting cables leading to an expansion module or operator panel, or for PC cables, memory modules or addressing plugs.
- Current measuring modules and current / voltage measuring modules have one system interface:
  - Bottom or front: For incoming connecting cable from the basic unit.
- Expansion modules have two interfaces on the front:
  - Left: For incoming connecting cables from the upstream expansion module or SIMOCODE pro S/SIMOCODE pro V basic unit.
  - Right: For outgoing connecting cables leading to an expansion module or operator panel, and for PC cables, memory modules or addressing plugs.
- Decoupling modules have 2 interfaces on the front:
  - Left: For incoming connecting cable from the upstream expansion module or basic unit.
  - Right: Exclusively for the outgoing connecting cable to the current / voltage measuring module.
- Operator panels have two system interfaces:
  - Front side: For PC cables, memory modules and addressing plugs.
  - Rear side: For incoming connecting cable from the upstream expansion module or basic unit.

| **WARNING** |
| --- |
| **Hazardous voltage** |
| Connect the system interfaces only when they are fully de-energized! |

**See also**

Closing the system interfaces with the system interface cover (Page 239)

## 12.3.2 System interfaces on basic units, expansion modules, decoupling module, current measuring modules and current / voltage measuring modules

### Examples of connection of system components to the system interface and system structure

Close system interfaces not in use with the system interface cover (see Closing the system interfaces with the system interface cover (Page 239).

**⚠ WARNING**

**System interface on the operator panels (degree of protection IP54):**

To ensure degree of protection IP 54

- press the cover into the socket as far as it will go when it is used for the first time!
- When fastening the operator panel with the screws supplied, do not apply an excessive tightening torque.

The following figure shows an example for SIMOCODE pro C/V of connecting system components to the

system interfaces:

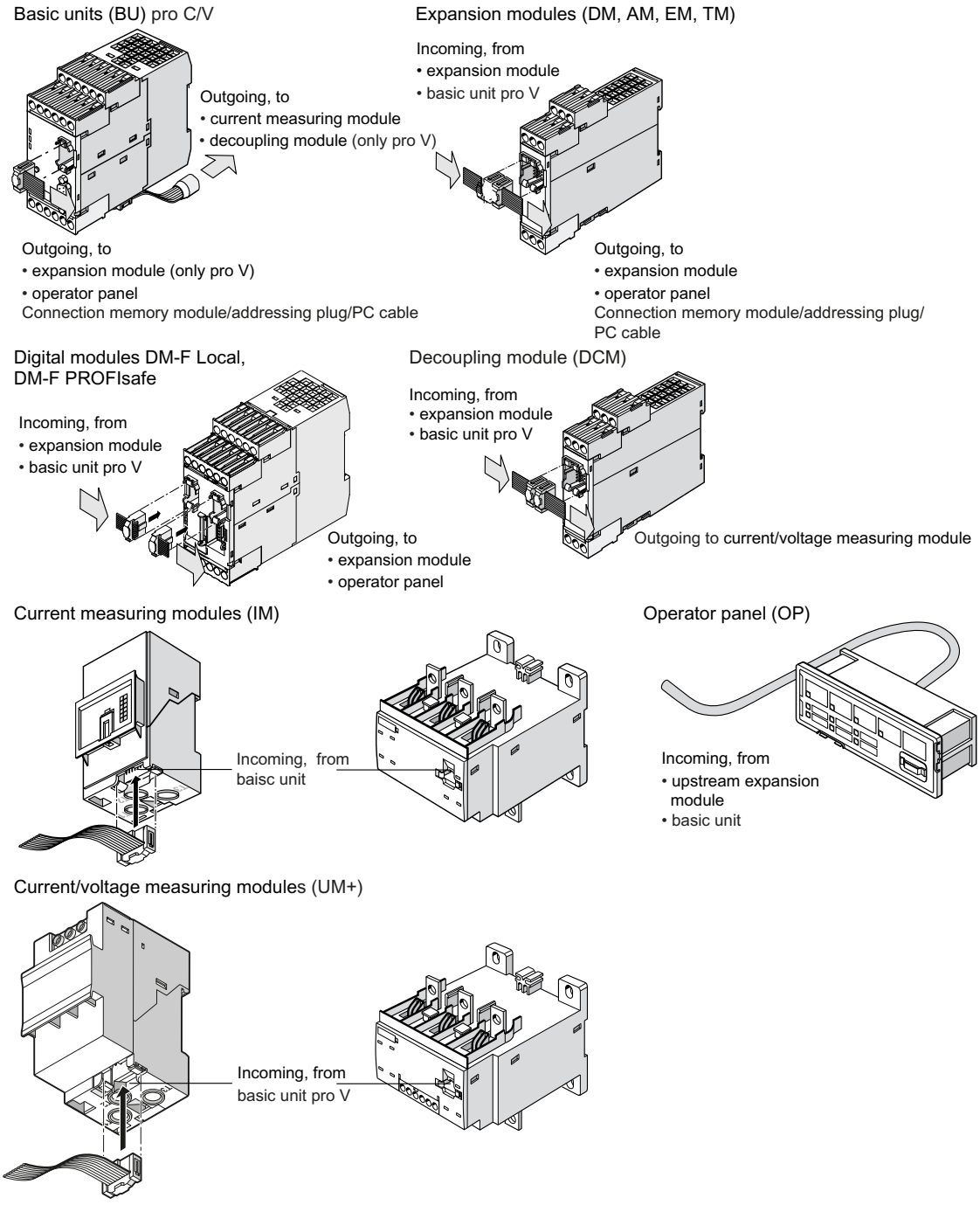



Figure 12-33 Example of system interfaces - SIMOCODE pro C/V with system component IM, UM+

The following figure shows an example for SIMOCODE pro S of connecting system components to the system interfaces:

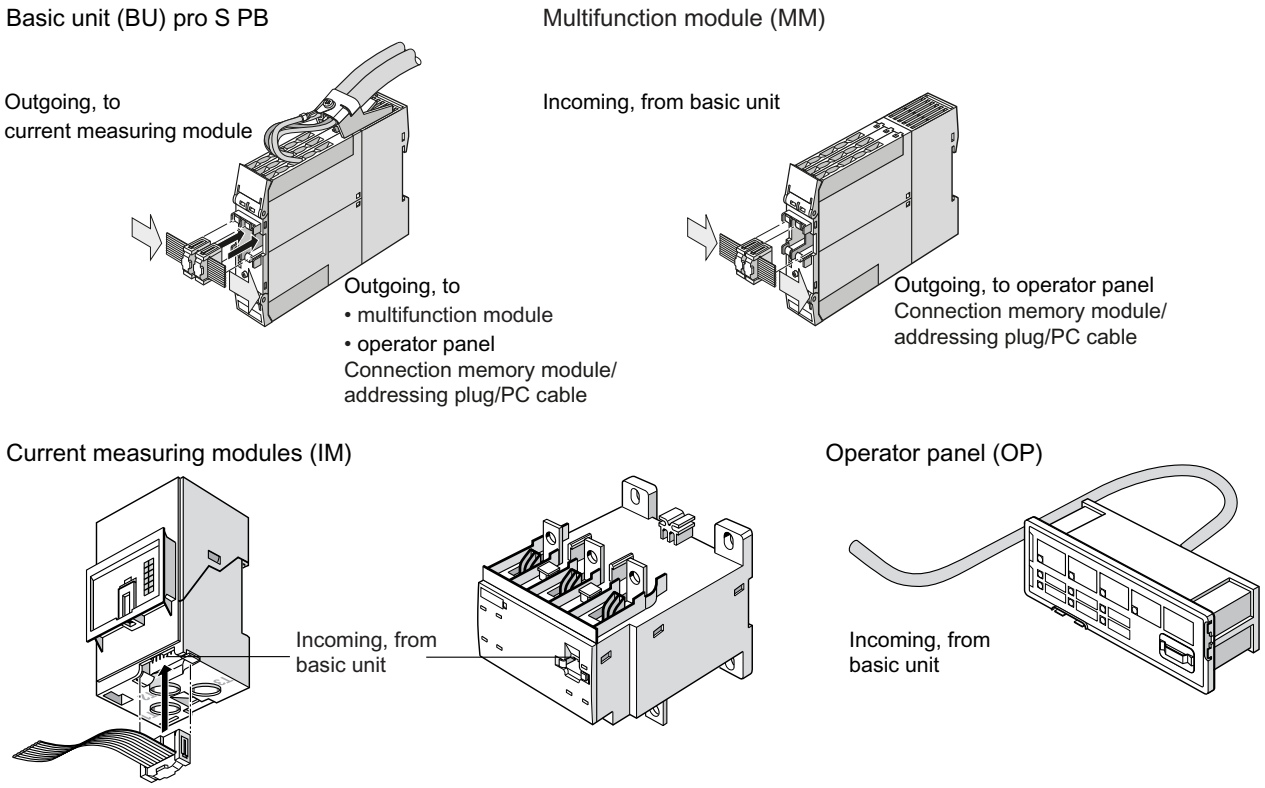



Figure 12-34 Example of system interface - SIMOCODE pro S

The following figure shows an example of a SIMOCODE pro V system installation:

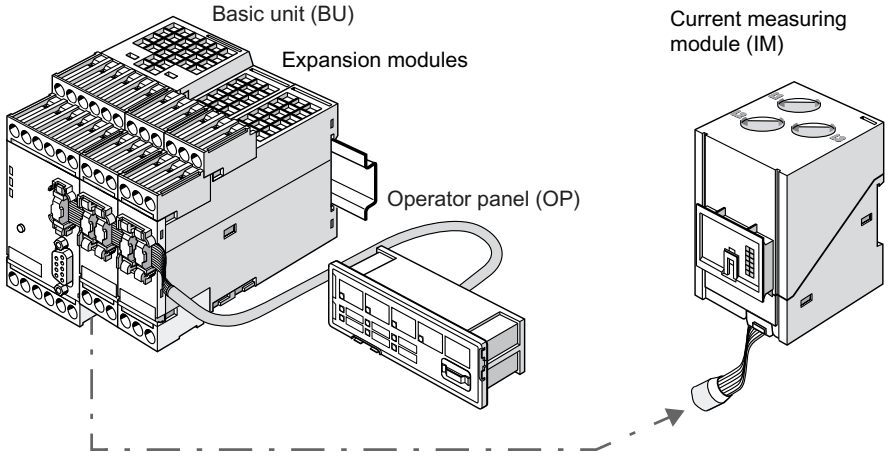



Figure 12-35 Example of SIMOCODE pro V installation

The following figure shows an example of a SIMOCODE pro S system installation:

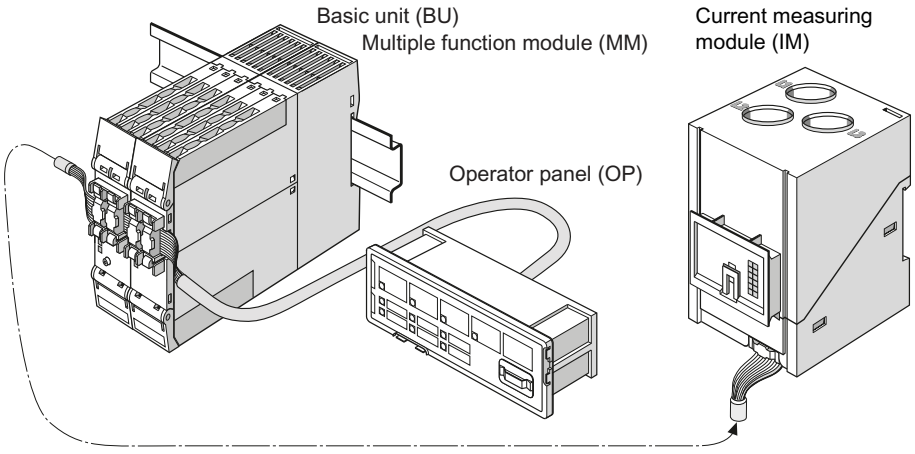



Figure 12-36 Example of SIMOCODE pro S installation

## Sequence for connecting cables to the system interface

Proceed as follows:

Table 12-12 Connecting to the system interface

| Step | Description |
|---|---|
| 1 | Place the plug in the plug shaft, keeping it is as straight as possible. Ensure the locking mechanisms of the connector slot audibly snap onto the connector enclosure. |
| 2 | System interfaces not in use can be closed using the system interface cover. |

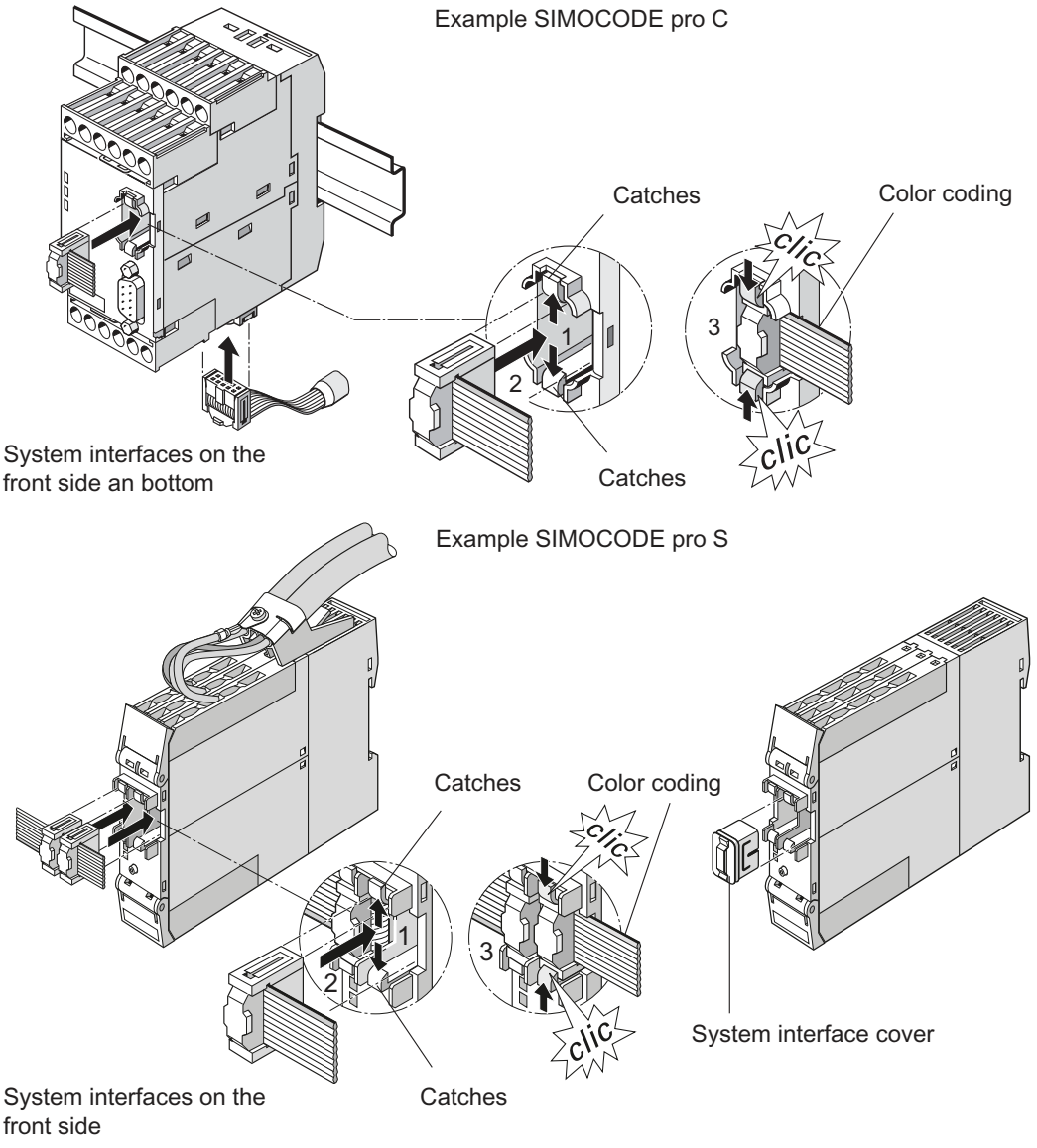



Figure 12-37 Sequence for connecting cables to the system interfaces

## Safety guidelines

**Note**

Only a current / voltage measuring module may be connected to the right-hand system interface of the decoupling module. Memory modules, addressing plugs or PC cables will not be recognized there.

**Note**

Observe the color coding of the connecting cable (see diagram)!

### 12.3.3 System interfaces on the digital modules DM-F Local and DM-F PROFIsafe

See System Manual SIMOCODE pro fail-safe digital modules (https://support.automation.siemens.com/WW/view/en/50564852), Chapter "Mounting and connection."

### 12.3.4 System interfaces on the operator panel and the operator panel with display

#### Versions and safety notices

The operator panel has two system interfaces:

- Rear side system interface. This is not normally accessible on an integrated operator panel. The incoming cable from the basic unit or expansion module is always connected here.
- Front system interface. This is normally accessible on an integrated operator panel. Components are only connected directly when needed, and removed again after use. These can be:
  - Memory module
  - Addressing plug
  - PC cable for connecting a PC / PG
  - Cover (if the system interface is not in use).

**⚠ WARNING**

**Hazardous voltage**

Connect the system interfaces only when they are fully de-energized!

**⚠ WARNING**

**System interface on the operator panels (degree of protection IP54):**

To ensure degree of protection IP 54

- press the cover into the socket as far as it will go when it is used for the first time!
- When fastening the operator panel with the screws supplied, do not apply an excessive tightening torque.

### Sequence for connecting cables to the system interface of the operator panel and the operator panel with display

Proceed as follows:

Table 12-13 Connecting system components to the system interface

| Step | Description |
|---|---|
| 1 | Place the plug in the plug shaft, keeping it is as straight as possible. Ensure the locking mechanisms of the connector slot audibly snap onto the connector enclosure.<br>The incoming connecting cable is connected on the rear. |
| 2 | System interfaces not in use can be closed using the system interface cover. |

**Note**

Throughout connection, you can place the cover on one of the two "park positions" (see figure below).

**Note**

Observe the color coding of the connecting cable (see diagram)!

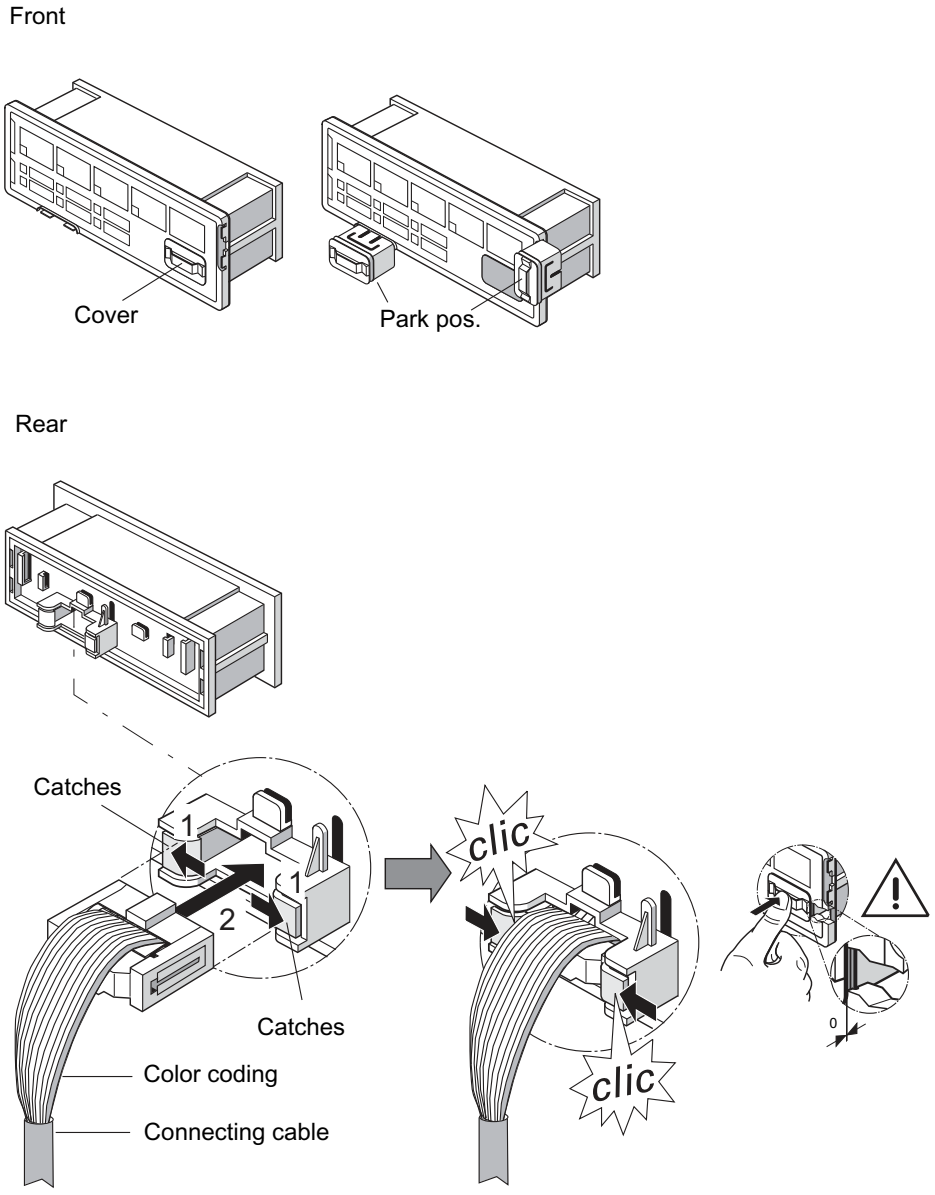



Figure 12-38 Sequence for connecting cables to the system interface of the operator panel

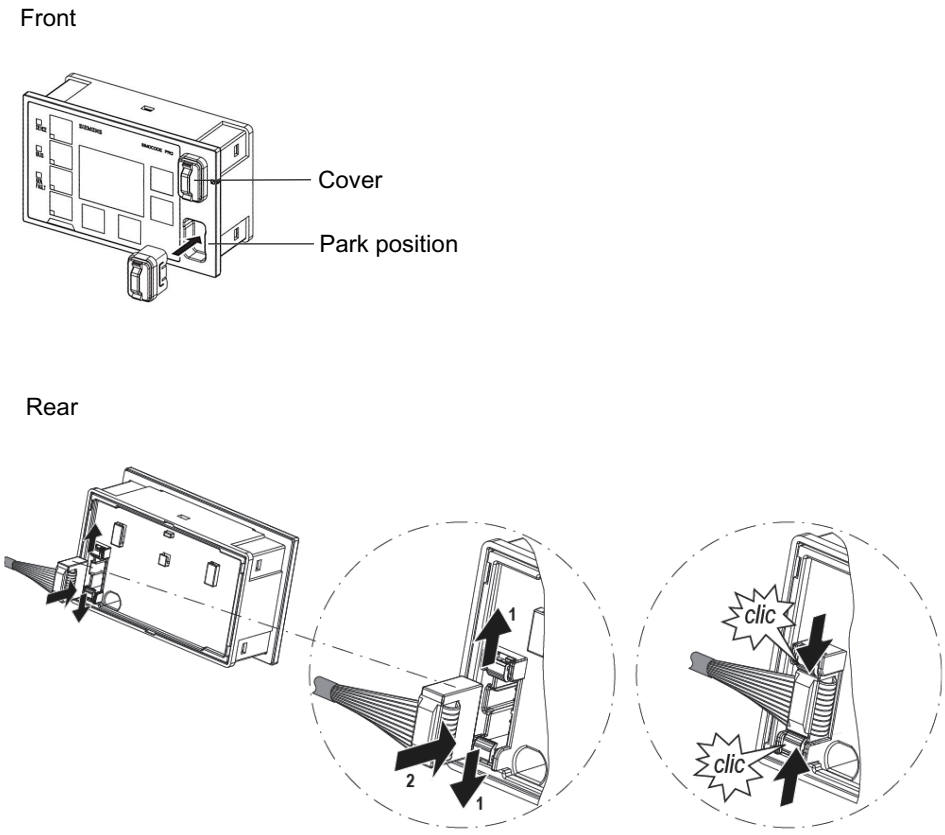



Figure 12-39 Sequence for connecting cables to the system interface of the operator panel with display

### 12.3.5 Closing the system interfaces with the system interface cover

**Examples of closing the system interface with the system interface cover**

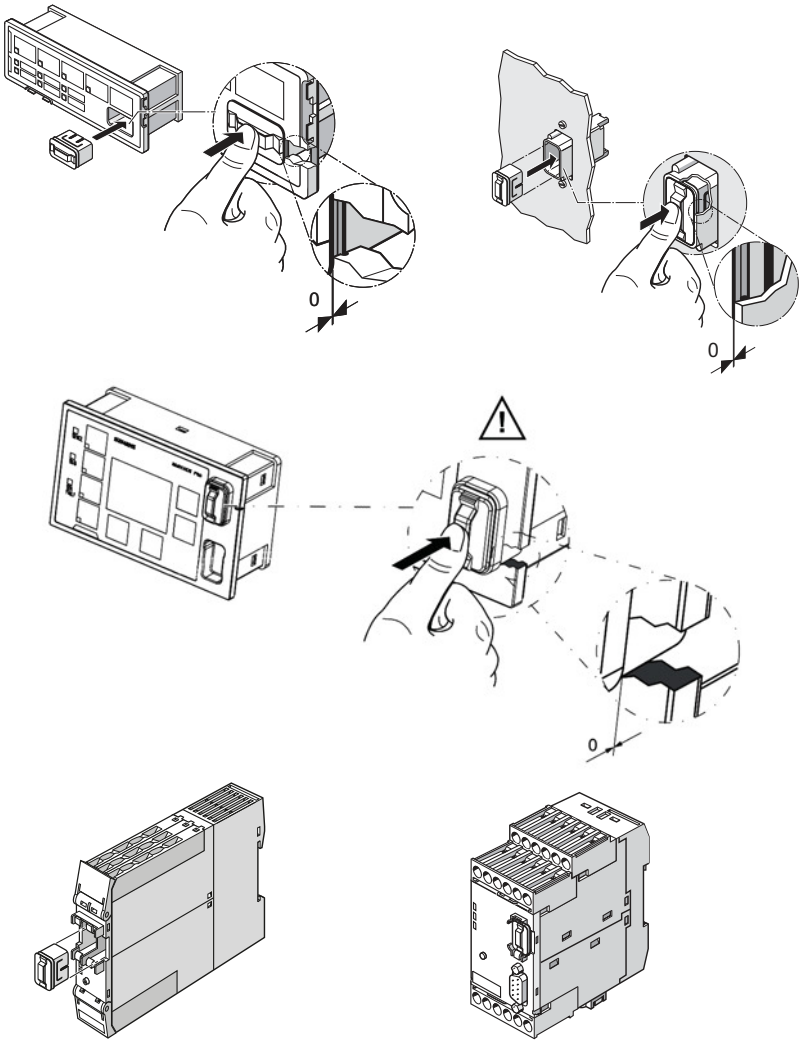



Figure 12-40 Examples of closing the system interface with the system interface cover

**WARNING**

**System interface on the operator panels (degree of protection IP54):**

To ensure degree of protection IP 54

- press the cover into the socket as far as it will go when it is used for the first time!
- When fastening the operator panel with the screws supplied, do not apply an excessive tightening torque.

## 12.3.6 PROFIBUS DP to a 9-pole SUB-D socket

### PROFIBUS DP connection

The PROFIBUS DP can be connected to the basic unit.

| System | PROFIBUS DP via Sub-D | PROFIBUS DP via terminals A/B |
|---|---|---|
| SIMOCODE pro C | 12 Mbaud | 1.5 Mbaud |
| SIMOCODE pro S | - | 1.5 Mbaud |
| SIMOCODE pro V | 12 Mbaud | 1.5 Mbaud |

**Note**

The 9-way SUB-D connection is an alternative to the A / B terminals!

### Sequence for connecting PROFIBUS DP to the SIMOCODE pro C and SIMOCODE pro V basic units

Proceed as follows:

Table 12-14 Sequence for connecting PROFIBUS DP to the basic unit

| Step | Description |
|---|---|
| 1 | Connect the PROFIBUS DP cable with the 9-pole SUB-D plug to the PROFIBUS DP interface. |

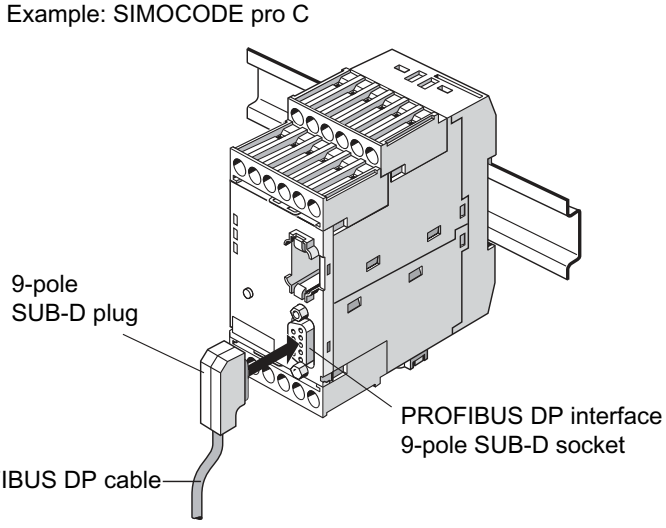



Figure 12-41 Connecting the PROFIBUS DP to the 9-way SUB-D socket

## 12.3.7 Ethernet cable to RJ45 socket (PROFINET and EtherNet/IP)

The ETHERNET cable is connected to the basic unit.

| **NOTICE** |
|---|
| **Ethernet connector**<br>Connect using only Industrial Ethernet connectors, e.g.<br>• Siemens IE FC RJ45 PLUG 180 2x2, RJ45 connector (10/100MBIT/S) with robust metal housing and Fast Connect connection method, for IE FC Cable 2x2 180° cable outlet, order number 6GK1901-1BB10-2AA0 or<br>• Siemens IE FC RJ45 PLUG 90 2x2, RJ45 connector (10/100MBIT/S) with robust metal housing and Fast Connect connection method, for IE FC Cable 2x2 90° cable outlet, order number 6GK1901-1BB20-2AA0. |

### Sequence for connecting ETHERNET to the basic unit

Table 12-15 Connecting the ETHERNET cable to the basic unit pro V

| Step | Description |
|---|---|
| 1 | Connect the Ethernet cable to the Ethernet interface 1 and/or Ethernet interface 2 |

The following connection options are available:

- with connector IE FC RJ45 Plug 180 on interface 1 and/or interface 2 (left)
- with connector IE FC RJ45 Plug 90 on interface 1 (right).

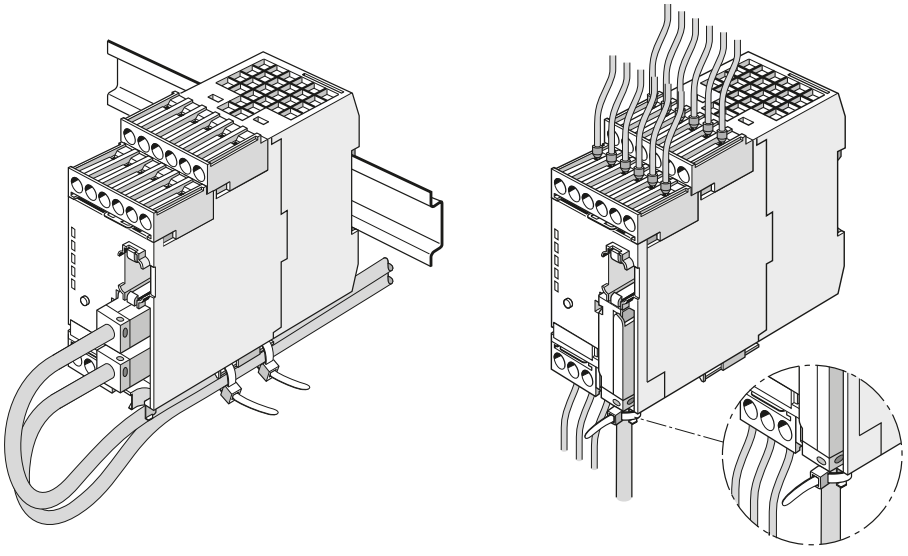


Figure 12-42 Connecting the Ethernet cable to the basic unit pro V

## 12.3.8 Modbus RTU connection to the SIMOCODE pro device

### Connecting Modbus RTU to the SIMOCODE pro V Modbus basic unit

Modbus RTU can be connected to the SIMOCODE pro V basic unit both via the connecting terminals as well as via the sub-D connector. The maximum data transfer rate for both connection methods is 57,600 bps.

| **NOTICE** |
| --- |
| **9-pin sub-D connection**<br>The 9-way sub-D connection is an alternative to the A/B terminals! |

### Connecting Modbus RTU to the SIMOCODE pro V Modbus basic unit via the device terminals

Terminal assignment:

| Terminal | Modbus signal |
| --- | --- |
| A | D0 or DA |
| B | D1 or DB |
| SPE | Cable shielding |

### Connecting Modbus RTU to the SIMOCODE pro V Modbus basic unit via the sub-D connector

The pin assignments of the 9-pin sub-D socket for SIMOCODE pro correspond to the assignments defined for PROFIBUS DP. The sub-D connector has the following assignments:

| Pin | Modbus signal |
| --- | --- |
| 8 | D0 or DA |
| 3 | D1 or DB |
| 5 | GND |

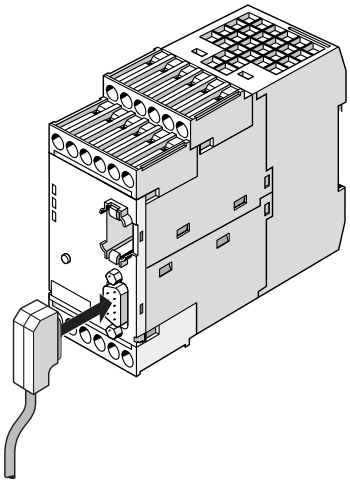


Figure 12-43 Connecting the 9-pin sub-D connector to the SIMOCODE pro V Modbus RTU basic unit

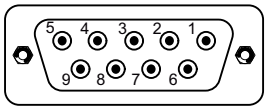



Figure 12-44 PIN assignments 9-pin sub-D socket

SIMATIC Industrial Communication 6ES7972* RS485 connectors can be used to connect Modbus RTU to the sub-D interface thanks to the identical pin assignments to PROFIBUS DP (see RS485 bus connector (https://mall.industry.siemens.com/mall/en/WW/Catalog/Products/9300041?tree=CatalogTree) in the Industry Mall).

| **NOTICE** |
| --- |
| **Using the PROFIBUS DP connector**<br>When the PROFIBUS DP connector is used, the bus terminator does not conform to the Modbus specification.<br>Possible functional constraints resulting from the use of the PROFIBUS DP bus terminator with a MODBUS TCP are the user's responsibility. |

You can find recommendations for a suitable layout of the serial communication bus in the document MODBUS over Serial Line - Specification and Implementation Guide - V1.02 (http://www.modbus.org/docs/Modbus_over_serial_line_V1_02.pdf) on the Internet.

# 12.4 Configuration guidelines

## 12.4.1 Configuration guidelines on PROFIBUS DP

### Definition

The key data contained in this chapter is valid for Siemens products and cables.

### PROFIBUS User Organization (PNO) installation guidelines

In the case of electric PROFIBUS networks, note also the PROFIBUS DP / FMS installation guidelines defined by the PROFIBUS user organization. These contain important information about cable routing and the commissioning of PROFIBUS networks.

Publisher:

PROFIBUS-Nutzerorganisation e. V.

Haid-und-Neu-Strasse 7

76131 Karlsruhe / Germany

Phone: ++49 721 965 85 90

Fax: ++49 721 965 85 89

Internet: PROFIBUS user organization (http://www.profibus.com)

Guideline: Order no. 2.111

See also Manual "SIMATIC NET PROFIBUS Networks (https://support.automation.siemens.com/WW/view/en/1971286)."

### Application of bus termination modules

The 3UF1900-1K.00 bus termination module is primarily intended for use in MCC motor feeders. It provides correct bus termination, even when MCC plug-in units have been removed. The bus termination module can also be utilized when a standard SUB-D plug cannot be used for the last device on a bus line.

The 3UF1900-1KA00 bus termination module can be connected to either a 220 / 230 V, 380 / 400 V, 115 / 120 V or 24 V AC supply. The 3UF1900-1KB00 type can be used for a 24 V DC supply.

**Note**

**Use of SIMOCODE pro S basic units**

In particular, when using SIMOCODE pro S basic units, use the bus termination module for connecting a PROFIBUS segments.

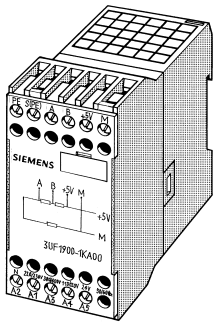



Figure 12-45 Bus termination module

## 12.4.2 Configuration guidelines on PROFINET

### PROFINET installation guidelines

Please also note the PROFINET installation guidelines of the PROFIBUS user organization. These contain important information about planning, installing, and commissioning PROFINET networks.

**Publisher:**

PROFIBUS-Nutzerorganisation e. V.

Haid-und-Neu-Strasse 7

76131 Karlsruhe / Germany

Phone: +49 (721) 965-8590

Fax: +49 (721) 965-8589

Internet: PI - PROFIBUS & PROFINET International Home (http://www.profibus.com)

**PROFINET installation guidelines:**

- PROFINET planning
  Version: 1.04
  Order No.: 8.061
  Language: German
- PROFINET installation
  Version: 1.0
  Order No.: 8.071
  Language: German

- PROFINET commissioning
  Version: 1.01
  Order No.: 8.081
  Language: German
- PROFINET commissioning
  Checklist version: 1.01
  Order No.: 8.091
  Language: German

For an overview of the structure and configuration of Industrial Ethernet networks with SIMATIC NET: See also "Industrial Ethernet Networking Manual" system manual (https://support.automation.siemens.com/WW/view/en/27069465)

# Commissioning, service, troubleshooting 13

## 13.1 General information about commissioning and service

### Safety guidelines

**⚠ WARNING**

**Hazardous voltage!**

Can cause electric shock and burns.

Before starting work, disconnect the system and the device from the power supply.

**Note**

Please also observe the following SIMOCODE pro Operating Instructions (supplied with the devices):

Table 13-1 SIMOCODE pro operating instructions

| Device | Article No. Operating instructions |
|---|---|
| Basic unit | 3ZX1012-0UF70-3BA1 |
| SIMOCODE pro S basic unit | 3ZX1012-0UF70-2BA1 |
| Operator panel | 3ZX1012-0UF72-1AA1 |
| Operator panel adapter | 3ZX1012-0UF78-2BA1 |
| Operator panel with display | 3ZX3012-0UF72-2AA1 |
| Digital module | 3ZX1012-0UF73-1AA1 |
| DM-F Local fail-safe digital module | 3ZX1012-0UF73-1BA1 |
| DM-F PROFIsafe fail-safe digital module | 3ZX1012-0UF73-3BA1 |
| Expansion modules | 3ZX1012-0UF75-1BA1 |
| Multifunction module | 3ZX1012-0UF76-1AA1 |
| Current measuring module | 3ZX1012-0UF71-1AA1 |
| Current / voltage measuring module | 3ZX1012-0UF71-1BA1 |
| Door adapter | 3ZX1012-0UF78-1AA1 |
| Decoupling module | 3ZX1012-0UF71-5BA1 |
| Initialization module | 3ZX1012-0UF70-2AA1 |
| You will also find the Operating Instructions for SIMOCODE pro at Operating Instructions (https://support.industry.siemens.com/cs/ww/en/ps/16027/man) | |

### Prerequisites

The following prerequisites must be fulfilled for commissioning and servicing:

- SIMOCODE pro is already installed and wired
- The motor is switched off.

### Parameterization methods

You can parameterize SIMOCODE pro as follows:

- With the memory module in which the parameters have already been saved from a basic unit. The memory module is plugged into the system interface. If the memory module is connected to the system interface and the supply voltage returns to the basic unit, the basic unit will be automatically parameterized by the memory module. The parameters can also be downloaded to the basic unit from the memory module by pressing the TEST / RESET button briefly.
- With the SIMOCODE ES software via serial or USB interface: The PC / PG is connected to the system interface with a PC cable.
- With an automation system and/or SIMOCODE ES software via PROFIBUS DP. For this purpose, the PROFIBUS DP cable is connected to the PROFIBUS DP interface of the basic unit.
- With the initialization module in which the parameters have already been saved from a basic unit. The initialization module is permanently installed in the switchboard in a Motor Control Center (MCC). If a withdrawable unit with a SIMOCODE pro S or SIMOCODE pro V basic unit into the MCC and the power supply returns to the basic unit, it will automatically be parameterized by the initialization module.

### Commissioning options

There are two commissioning options:

1. Standard case: SIMOCODE pro has not yet been parameterized and has the factory setting
2. SIMOCODE pro has already been parameterized:
   - The parameters have already been loaded into the basic unit.
   - The parameters from a previous application still exist. Check whether the parameters (e.g. the set current) are correct for the new application. Change these accordingly, if necessary.

# 13.2 Commissioning

## 13.2.1 Commissioning with PROFIBUS

### 13.2.1.1 PROFIBUS commissioning steps

Please observe the information in Chapter General information about commissioning and service (Page 247).

To commission SIMOCODE pro, proceed as follows:

Table 13-2 Commissioning the basic unit

| Step | Description |
|---|---|
| 1 | Switch on the power supply. In a fault-free state, the following LEDS should light up or flash green:<br>• "Device" (lights up)<br>• "Bus" if PROFIBUS DP is connected (lights up or flashes).<br>Proceed to Step 2.<br>Otherwise, carry out diagnostics according to the LED display. For more information, see Chapter Diagnostics via LED display on the basic unit and on the operator panel (PROFIBUS) (Page 252). Try to rectify the fault. |
| 2 | If you wish to make SIMOCODE pro available on the PROFIBUS DP, set the PROFIBUS DP address. For more information, see Chapter Setting the PROFIBUS DP address (Page 250). |
| 3 | Parameterize SIMOCODE pro or check the existing parameterization, e.g. with a PC on which SIMOCODE ES (TIA Portal) software is installed. For this, connect the PC / PG to the system interface with the PC cable (see the figure below).<br>**Notice**<br>With SIMOCODE pro C use the system interface on the front and with SIMOCODE pro S use the right-hand system interface. |
| 4 | Start SIMOCODE ES. |

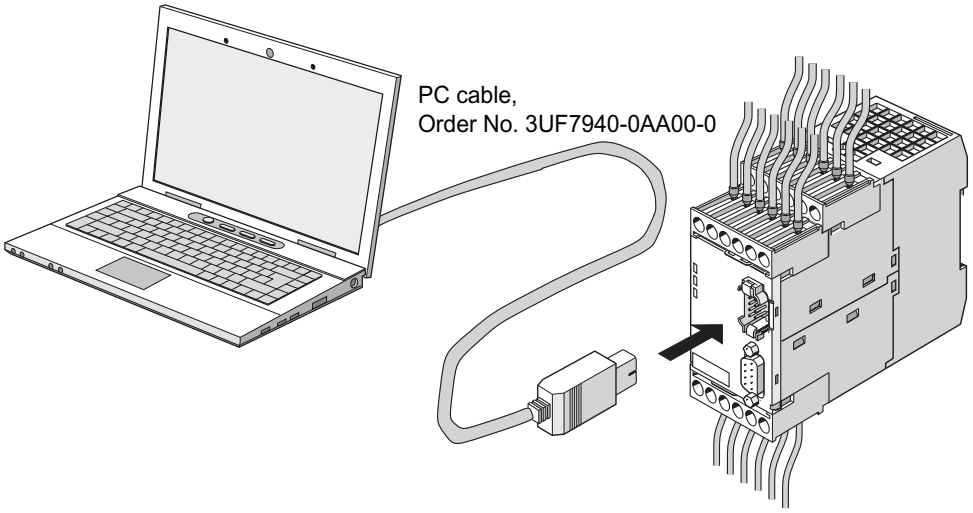



Figure 13-1 Connecting a PC to the basic unit

### 13.2.1.2 Setting the PROFIBUS DP address

#### Setting the PROFIBUS DP address via the addressing plug

**Note**

This setting cannot be made if the TEST / RESET button has been blocked.

Proceed as follows:

Table 13-3 Setting the PROFIBUS DP address via the addressing plug

| Step | Description |
|---|---|
| 1 | Set the desired valid address on the DIP switch.<br>The switches are numbered.<br>For example, address 21: Put the "16"+"4"+"1" switches in the "ON" position. |
| 2 | Plug the addressing plug into the system interface. The "Device" LED lights up yellow. |
| 3 | Briefly press the TEST / RESET button. The address you set is now stored. The "Device" LED flashes yellow for approx. 3 seconds. |
| 4 | Remove the addressing plug from the system interface. |

## Setting the PROFIBUS DP address via SIMOCODE ES (TIA Portal)

Proceed as follows:

Table 13-4 Setting the PROFIBUS DP address via SIMOCODE ES (TIA Portal)

| Step | Description |
|---|---|
| 1 | Switch on the power supply of the basic unit. |
| 2 | Connect the USB interface of the PC/PG and the system interface of the basic unit to the Sirius USB PC cable. It may be necessary to install a device driver for the parameterization cable when using the USB PC cable for the first time. |
| 3 | Observe the status LED on the basic unit. The "Device" LED should light up green.<br>SIMOCODE pro can be started up. |
| 4a | Setting the address of a device configured in SIMOCODE ES (TIA Portal) (as started in steps 2 and 3):<br>Under "Parameters → Fieldbus interface", set the "Station address" to the required address and then download the parameterization to the device. |
| 4b | Setting the address of a SIMOCODE device without integration in the current project:<br>In the project navigator, open "Online access" via "Online & Diagnostics". Here, the device currently connected to the serial interface can be accessed using "COM<x> [SIRIUS PtP] → Update accessible devices". If the serial interface COM<x> should indicate a protocol other than SIRIUS PtP, you can change this via the context menu (right mouse button) → Properties. There, under "Parameters → Fieldbus interface", set the "Station address" to the required address and then download the change into the device again. |
| 5 | After the parameters have been transferred to the basic unit, the message confirming successful downloading appears under "Info → General" in the status window. |

## Setting the PROFIsafe address on DM-F PROFIsafe

See Chapter "Safety-related tripping" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

### 13.2.1.3 Diagnostics via LED display on the basic unit and on the operator panel (PROFIBUS)

The basic units and the operating panel have three LEDs for displaying specific device states:

Table 13-5 Diagnostics via LED display on the basic unit and on the operator panel

| LED | Status | Display | Description | Corrective measures for faults |
|---|---|---|---|---|
| Device | Device status | Green | Device ON | - |
| | | Green – flickering | Internal fault | Send the basic unit in for repair |
| | | Yellow | Memory module or addressing plug recognized, TEST/RESET buttons control the memory module or addressing plug | - |
| | | Yellow – flashing | Memory module / addressing plug read in; factory settings restored (duration: 3 s) | _ |
| | | Yellow – flickering | Memory module programmed (duration: 3 s) | - |
| | | Red | Incorrect parameterization (also GEN. FAULT on) | Parameterize again, then switch the control voltage off and on again |
| | | | Basic unit defective (also GEN. FAULT on) | Replace the basic unit! |
| | | Red – flashing | Memory module, addressing plug or expansion modules defective (also GEN. FAULT on - flashing) | Reprogram/replace the memory module, replace the expansion modules |
| | | Off | Supply voltage too low | Check whether the supply voltage is connected/switched on |
| Bus | Bus status | Off | Bus not connected or bus fault | Connect the bus or check the bus parameters |
| | | Green – flashing | Baud rate recognized / communication with PC / programming device | - |
| | | Green | Communication with PLC/PCS | - |
| GEN. FAULT | Fault status | Red | Fault pending; reset has been saved | Rectify fault, e.g., overload |
| | | Red – flashing | Fault pending; reset has not been saved | Clear the error and press Reset;<br>Configuration error: Parameterize again and reset, or switch the control voltage off and on again |
| | | Off | No fault | - |

### 13.2.1.4 Diagnostics via LED display on the modules DM-F Local or DM-F PROFIsafe

See Manual Fail-safe Digital Modules SIMOCODE pro (https://support.automation.siemens.com/WW/view/en/50564852).

## 13.2.2 Commissioning with PROFINET

### 13.2.2.1 PROFINET commissioning steps

Please observe the information in Chapter General information about commissioning and service (Page 247).

To commission SIMOCODE pro, proceed as follows:

Table 13-6 Commissioning the basic unit

| Step | Description |
|---|---|
| 1 | Switch on the power supply. In a fault-free state, the following LEDS should light up green:<br>• "Device" (lights up)<br>• "PORT 1 / PORT 2" when the PROFINET cable is connected (lighted or flashing).<br>Continue with step 2.<br>Otherwise, carry out diagnostics according to the LED display. For more information, see Chapter Diagnostics via LED display on the basic unit and on the operator panel (PROFINET) (Page 257). Try to rectify the fault. |
| 2 | If you want to make SIMOCODE pro available to PROFINET, you must set the IP parameters and the PROFINET device names. For more information, see Chapter Setting IP parameters and PROFINET device name (Page 254). |
| 3 | Parameterize SIMOCODE pro or check the existing parameterization, e.g. with a PC on which SIMOCODE ES (TIA Portal) software is installed. For this, connect the PC / PG to the system interface with the PC cable (see the figure below). |
| 4 | Start SIMOCODE ES. |

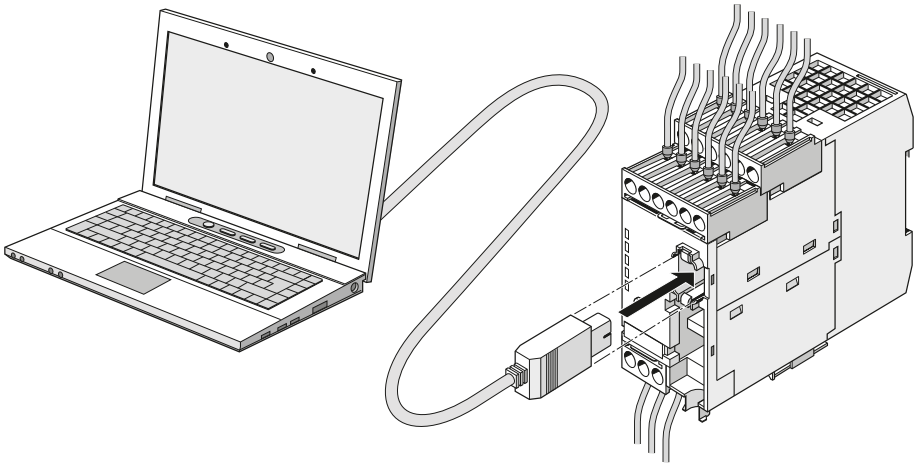


Figure 13-2 Connecting a PC to the basic unit

### 13.2.2.2 Setting IP parameters and PROFINET device name

#### Setting IP parameters and PROFINET device name on a plant-specific basis

The setting of IP parameters and the PROFINET device name is a mandatory step for communication via PROFINET.

These parameters can be set in different ways, depending on the needs of the plant configuration.

A detailed description of these possible approaches can be found in the Chapter "Configuration of further properties of SIMOCODE pro V PN as IO Device" in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960).

#### Setting IP parameters and PROFINET device name with SIMOCODE ES (TIA Portal) via PC cable

Proceed as follows:

Table 13-7 Setting IP parameters and PROFINET device name with SIMOCODE ES (TIA Portal) via PC cable

| Step | Description |
|---|---|
| 1 | Plug the PC cable into the system interface. |
| 2 | Start SIMOCODE ES (TIA Portal). |

| Step | Description | |
|---|---|---|
| 3 | 1st option: Create new project<br>• In the Project view, create a new project via "Project → New"<br>• Add a new device by double-clicking the button "Add new device" in the project navigator and select the application in the device wizard. The selected application corresponds to the description in the manual SIMOCODE pro - Application examples (https://support.industry.siemens.com/cs/ww/en/view/109743959).<br>• Check the device configuration and adapt it to the actual configuration, if applicable<br>• Select the communication settings under "Parameters → PROFINET parameters" and set the IP parameters and the device name<br>• Under "Parameters → Motor protection", set the current setting and, if applicable, other parameters<br>• Adapt other parameters in the parameter editor if necessary<br>• Save the project and transfer the device parameters to the device | 2nd option: Do not create a new project<br>• In the portal view, click on the button "Online & Diagnostics"<br>• Click "Accessible devices". The "Accessible devices" window opens<br>• Click the "Start search" button<br>• Select a station |
| 4 | Select the type of the PG/PC interface (SIRIUS PtP in this case) | |
| 5 | Select the PG/PC interface via which the USB PC cable is connected to the computer. | |
| 6 | Click on the "Start search" button and load the parameterization into the device.<br>After successfully transferring the parameters into the device (see message in inspector window), the device is ready to operate. | |
| 7 | Select a suitable station. You can show the following devices/stations:<br>• devices with the same addresses<br>• all compatible stations<br>• accessible stations | |
| 8 | Click the "Connect..." button. | |
| 9 | Open the "PROFINET parameters" dialog box in the parameter editor | |
| 10 | Activate/deactivate "Overwrite IP parameters in device" and set the IP address, subnet mask, and router as appropriate.<br>The IP parameters are configured with SIMOCODE ES and transferred to the device. In this case, the "Overwrite IP parameters in device" checkbox must be selected. Choose the IP parameters to match the configuration in the automation system. If the IP parameters are assigned by the IO controller in the automation system, no setting is necessary here and the "Overwrite IP parameters in device" checkbox must not be selected [1)] | |
| 11 | Enter the IP address. | |
| 12 | Activate the checkbox "Use router" if you want to use a router | |
| 13 | Enter the IP address (gateway) of the router | |
| 14 | Select the device name to match the configuration in the automation system | |
| 15 | Activate the "Overwrite device name in device" checkbox if you want to transfer the device name to the device. | |

| Step | Description |
|---|---|
| 16 | If necessary, select the "Web server activated" checkbox |
| 17 | If necessary, select the "OPC-UA server activated" checkbox |
| 18 | Select the "Activate NTP synchronization" checkbox if you want to synchronize the unbuffered real-time clock of SIMOCODE pro V PN using the NTP procedure. |
| 19 | Enter the NTP server address when the "Activate NTP synchronization" checkbox is selected. |
| 20 | Enter a value for the time shift: -1440 min to +1440 min (default value: 0 min) |
| 21 | Enter a value for the cyclic update interval when the "Activate NTP synchronization" checkbox is selected: 10 to 86400 s (default value: 10 s) |
| 22 | Load the data to the basic unit via "Online → Load to device" or click the corresponding button in the menu bar |

1)

**Note**

**Initial transfer of device name**

The initial transfer of the device name must take place via the SIMOCODE pro system interface, since the device cannot be reached via PROFINET as address settings are missing.

### Setting the PROFIsafe address on DM-F PROFIsafe

See Chapter "Safety-related tripping" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

## 13.2.2.3 Setting the time manually after switch-on or recovery of the supply voltage

### Setting the time with SIMOCODE ES (TIA Portal)

If the internal realtime clock of the devices is not automatically synchronized via NTP, you can make the setting manually with SIMOCODE ES.

To do so, follow these steps:

Set the time manually after switch-on or recovery of the supply voltage

| Step | Description |
|---|---|
| 1 | Go online, e.g. via "Online & Diagnostics" → Accessible devices |
| 2 | • In the project navigator, double-click "Commissioning".<br>• Click on "Command"<br>• Choose "Set time (=PC time in UTC) |

### 13.2.2.4 Diagnostics via LED display on the basic unit and on the operator panel (PROFINET)

The basic unit and the operating panel have LEDs for displaying specific device states:

Table 13-8 Diagnostics via LED display

| LED | Status | Display | Description | Corrective measures for faults |
|---|---|---|---|---|
| Device | Device status | Green | Device ON | _ |
| | | Green – flickering | Internal fault | Send the basic unit in for repair |
| | | Yellow | Memory module recognized, TEST/RESET buttons control the memory module | _ |
| | | Yellow – flashing | Memory module read in; factory settings configured (duration: 3 s) | _ |
| | | Yellow – flickering | Memory module programmed (duration: 3 s) | _ |
| | | Red | Device defective (also GEN. FAULT on) | Replace the basic unit! |
| | | Red – flashing | Memory module or expansion modules defective (also GEN. FAULT on - flashing) | Reprogram/replace the memory module, replace the expansion modules |
| | | Off | Supply voltage too low | Check whether the supply voltage is connected/switched on |
| | | Green - flashing | PE energy saving mode active | _ |
| Bus | Bus status | Off | No communication with the IO Controller of the PLC/PCS via PROFINET | Connect the bus or check PROFINET parameters (IP parameters, device name) |
| | | Green | Communication with the IO Controller of the PLC/PCS via PROFINET is active | _ |
| GEN. FAULT | Fault status | Red | Fault pending; reset has been saved | Rectify fault, e.g., overload |
| | | Red – flashing | Fault pending; reset has not been saved | Clear the error and reset.<br>Configuration error: Parameterize again and reset, or switch the control voltage off and on again |
| | | Off | No fault | _ |
| PORT1 (only on basic unit) | Bus status | Green | Ethernet connection available | _ |
| | | Off | No Ethernet connection available | Check the Ethernet connection and the wiring |
| | | Flashing | Station flash test for device location active | _ |
| PORT2 (only on basic unit) | Bus status | Green | Ethernet connection available | _ |
| | | Off | No Ethernet connection available | Check the Ethernet connection and the wiring |
| | | Flashing | Station flash test for device location active | _ |

## 13.2.3 Commissioning with Modbus

### 13.2.3.1 Commissioning with Modbus RTU

#### Commissioning sequence of the SIMOCODE pro V Modbus basic unit

Table 13-9 Commissioning sequence of the SIMOCODE pro V Modbus basic unit

| Step | Description |
|---|---|
| 1 | Switch on the power supply. In a fault-free state, the "Device" LED should light up green. |
| 2 | Connect the PC / PG to the system interface with the PC cable (see the figure below) |
| 3 | Parameterize SIMOCODE pro or check the existing parameterization with a PC on which SIMOCODE ES (TIA Portal) is installed |
| 4 | If automatic baud rate detection is activated, the "Bus" LED flashes green as soon as the setting selected by the controller is found.<br>When the controller exchanges data with the device, the "Bus" LED lights up green. |

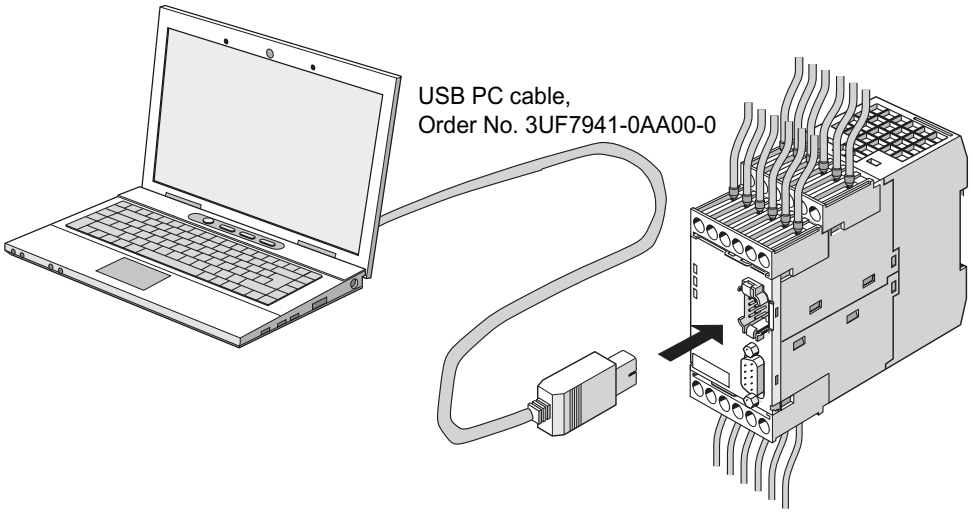



Figure 13-3 Connecting a PC to the SIMOCODE pro V Modbus RTU basic unit

#### Software for configuring and commissioning

SIMOCODE ES V14 + SP1 (or a later version) is required for full configuring and commissioning. Here, you can choose between:

- SIMOCODE ES Basic: text-oriented configuration of SIMOCODE
- SIMOCODE ES Standard: configuration of SIMOCODE using graphically interconnectable function blocks.

**Note**

SIMOCODE ES Professional software does not have more functionality than SIMOCODE ES Standard for SIMOCODE pro Modbus devices, but it can nevertheless be used for commissioning.

The functional principle of SIMOCODE ES software is described in the online help. A "Getting Started" is available on the internet in a multimedia format to help you become more familiar with the software in the initial fundamental steps: Guided Tour (https://www.industry.siemens.com/topics/global/en/tia-portal/tia-portal-framework/tabcardpages/Pages/guided-tour.aspx)

## Device addressing

As supplied, the default setting for the device address 126. This must be reassigned when commissioning the devices.

## Setting the Modbus RTU address via addressing plug

Proceed as follows:

Table 13-10 Setting the Modbus RTU address via addressing plug

| Step | Description |
|---|---|
| 1 | Set the desired valid address on the DIP switch.<br>The switches are numbered. Addresses from 1 to 247 can be assigned.<br>For example, address 21: Put the "16"+"4"+"1" switches in the "ON" position. [1)] |
| 2 | Plug the addressing plug into the system interface. The "Device" LED lights up yellow. |
| 3 | Briefly press the "TEST/RESET" button. The address you set is now stored. The "Device" LED flashes yellow for approx. 3 seconds. |
| 4 | Remove the addressing plug from the system interface. |

1)

**Note**

**Labeling for the address "128"**

Labeling for the address "128" is not available on the addressing plug, that is, the unlabeled switch corresponds to the address "128".

## Setting the Modbus RTU address with SIMOCODE ES (TIA Portal)

Proceed as follows:

Table 13-11 Setting the Modbus RTU address with SIMOCODE ES (TIA Portal)

| Step | Description |
|---|---|
| 1 | Plug the PC cable into the system interface. |
| 2 | Start SIMOCODE ES |
| 3 | Select "Online → Go online" or click the "Go online" button |

## Communication parameters

The following Modbus communication parameters can be set in the SIMOCODE ES (TIA Portal) software under "Parameters → Modbus":

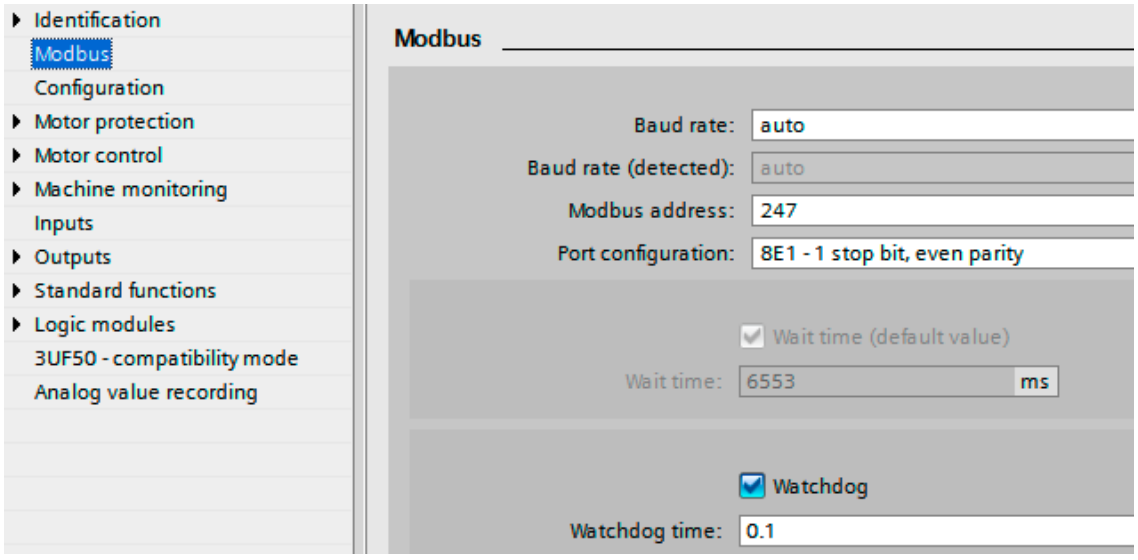



Figure 13-4 Modbus settings

- Baud rate: The baud rate of SIMOCODE pro V Modbus can be set in the range from 0.3 - 57.6 kbps. The parameter setting "auto" activates automatic baud rate detection with which the device autonomously determines the setting selected by the controller. Automatic baud rate search encompasses baud rates in the range from 4.8 ... 57.6 kbps.

  **Note**

  **Automatic baud rate detection**

  Use of this function is only possible when the "Watchdog" function is activated.

  Idle time:
  Messages begin and end with a transmission break of at least 3.5 characters. The shortest idle time depends on the baud rate. The following table shows the default values:

| Bits per second (bps) | Shortest idle time (ms) |
|---|---|
| 300 | 128 |
| 600 | 64 |
| 1200 | 32 |
| 2400 | 16 |
| 4800 | 8 |
| 9600 | 4 |
| 19200 | 2 |
| 57600 | 2 |

- Baud rate (detected): Information about the detected baud rate, if automatic baud rate detection (baud rate = auto) is set.
- Modbus address: Setting the Modbus address for the SIMOCODE device. The address can be set in the range from 1 - 247. As supplied, the address for SIMOCODE pro V devices is set to the default value of 126
- Port configuration: The number of stop bits and the selected parity of the Modbus interface can be set here. The following settings are possible:
  - 8E1 - 1 stop bit, even parity
  - 8O1 - 1 stop bit, odd parity
  - 8N2 - 2 stop bits, no parity
  - 8N1 - 1 stop bit, no parity

- Wait time / wait time (default value): The time duration of the pause between a received request and the reply from SIMOCODE pro can be set with the "Wait time" and "Wait time (default value)" parameters. If the default value of the Modbus specification is to be used, selection of the "Wait time (default value)" parameter is recommended. The "Wait time" parameter is available for free setting. The setting is made in ms. The smallest settable value corresponds to the default value of the Modbus specification. If longer wait times are required, these can be defined using the "Wait time" parameter.
- Watchdog / Watchdog time: Monitoring of the bus communication can be activated with these parameters. This is necessary when automatic baud rate detection is selected, or if the SIMOCODE device were to experience a fault if the bus communication fails. If the watchdog is activated, SIMOCODE monitors whether a valid read or write access to the device occurs within the set watchdog time. If this is not the case, SIMOCODE begins a new search for a valid baud rate if automatic rate detection is set. In addition, a "Fault - bus" is generated if the "Watchdog → Bus monitoring" parameter is also activated.

### Bus and controller monitoring on Modbus

With the SIMOCODE pro V Modbus basic unit, both the bus communication and the controller function can be monitored. The functions "Bus monitoring" and "PLC / PCS monitoring" are available for this purpose.

The functionality differs slightly from that described for SIMOCODE pro PROFIBUS.

- Bus monitoring: With this type of monitoring, the "Fault - bus" fault is generated if
  - "Bus monitoring" is active
  - In the "Remote" operating mode (mode selector S1 = 1 and S2 = 1), cyclic data access to Modbus registers between the PLC and SIMOCODE pro is interrupted for longer than the set bus monitoring time, e.g. as the result of an interruption of the Modbus connection.
  - The "Status - bus o. k." can always be evaluated. If SIMOCODE pro is cyclically exchanging data with the PLC, "Status - Bus o. k." is set to "1".
- PLC / PCS monitoring: With this type of monitoring, the "Fault - PLC/PCS" message is generated if
  - "PLC/PCS monitoring" is active
  - The input "PLC/PCS monitoring - input" switches to logic zero when in the "Remote" operating mode (mode selector S1=1 and S2=1). "PLC/PCS monitoring - input" is connected preferably with the bit "Cyclic receive - bit 0.7".
  - The status "PLC/PCS in Run" can always be evaluated. If SIMOCODE pro is in cyclic data exchange with the PLC, and the input "PLC/PCS monitoring" is set, "PLC/PCS in Run" is set to "1".

You can find the further description of the "Watchdog" function block (PLC/PCS monitoring) in Chapter "Watchdog" (PLC/PCS monitoring) in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

## 13.2.4 Commissioning with EtherNet/IP

### 13.2.4.1 EtherNet/IP commissioning steps

Please observe the information in Chapter General information about commissioning and service (Page 247).

To commission SIMOCODE pro, proceed as follows:

Table 13-12 Commissioning the basic unit

| Step | Description |
|---|---|
| 1 | Switch on the power supply. In a fault-free state, the following LEDS should light up green:<br>• "Device" (lights up)<br>• "PORT 1 / PORT 2" when the Ethernet cable is connected (lighted or flashing).<br>Continue with step 2.<br>Otherwise, carry out diagnostics according to the LED display. For more information, see Chapter Diagnostics via LED display on the basic unit and on the operator panel with EtherNet/IP (Page 266). Try to rectify the fault. |
| 2 | If you want to make SIMOCODE pro available to EtherNet/IP, you must set the IP parameters and the device name. For more information, see Chapter Setting IP parameters and EIP device name (Page 263). |
| 3 | Parameterize SIMOCODE pro or check the existing parameterization, e.g. with a PC on which SIMOCODE ES software is installed. For this, connect the PC / PG to the system interface with the PC cable (see the figure below). |
| 4 | Start SIMOCODE ES. |

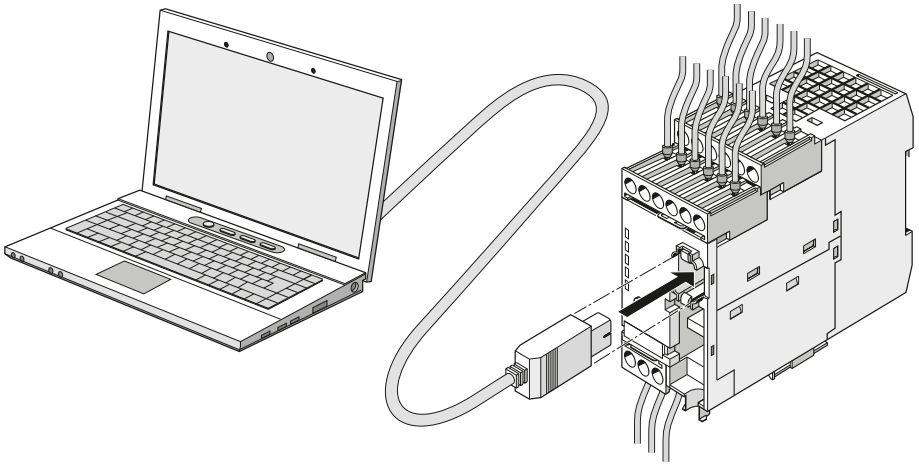


Figure 13-5 Connecting a PC to the basic unit

### 13.2.4.2 Setting IP parameters and EIP device name

#### Setting IP parameters and device name on a plant-specific basis

For communication via EtherNet/IP it is mandatory to set the IP parameters and the device name.

These parameters can be set in different ways, depending on the needs of the plant configuration.

### Setting IP parameters and EtherNet/IP device name with SIMOCODE ES via PC cable

Proceed as follows:

Table 13-13 Setting IP parameters and EtherNet/IP device name with SIMOCODE ES via PC cable

| Step | Description | |
|---|---|---|
| 1 | Plug the PC cable into the system interface | |
| 2 | Start SIMOCODE ES (TIA Portal) | |
| 3 | 1st option: Create new project<br>• In the Project view, create a new project via "Project → New"<br>• Add a new device by double-clicking the button "Add new device" in the project navigator and select the application in the device wizard. The selected application corresponds to the description in the manual SIMOCODE pro - Application examples (https://support.industry.siemens.com/cs/ww/en/view/109743959).<br>• Check the device configuration and adapt it to the actual configuration, if applicable<br>• Select the communication settings under "Parameters → Ethernet parameters" and set the IP parameters and the device name<br>• Under "Parameters → Motor protection", set the current setting and, if applicable, other parameters<br>• Adapt other parameters in the parameter editor if necessary<br>• Save the project and transfer the device parameters to the device | 2nd option: Do not create a new project<br>• In the portal view, click on the button "Online & Diagnostics"<br>• Click "Accessible devices". The "Accessible devices" window opens<br>• Click the "Start search" button<br>• Select a station |
| 4 | Select the type of the PG/PC interface (SIRIUS PtP in this case) | |
| 5 | Select the PG/PC interface via which the USB PC cable is connected to the computer. | |
| 6 | Click on the "Start search" button and load the parameterization into the device.<br>After successfully transferring the parameters into the device (see message in inspector window), the device is ready to operate. | |
| 7 | Select a suitable station. You can show the following devices/ stations:<br>• devices with the same addresses<br>• all compatible stations<br>• accessible stations | |
| 8 | Click the "Connect..." button. | |
| 9 | Open the "Ethernet parameters" dialog box in the parameter editor | |

| Step | Description |
|---|---|
| 10 | Select "Use BOOTP/DHCP" if the IP parameters are obtained from a DHCP server and assigned to the IO Device.<br>If the DHCP mode is selected, SIMOCODE pro immediately receives an IP address if the DHCP server is available in the same network. Otherwise the device searches for an IP address. If SIMOCODE pro finds no IP address when setting up an online connection or during a loading operation, because no DHCP server is available in the network, SIMOCODE ES assigns the device a temporary IP address. If the DHCP mode is selected, SIMOCODE pro accepts this temporary address as if it came from a DHCP server. There are two options for deactivating a temporary IP address again:<br>• Restart the device by means of "Commissioning → Command → Restart/Cold start"<br>• Switch the device off and on again. After the restart, the device runs in the DHCP mode and looks for an IP address again. |
| 11 | Activate/deactivate "Overwrite IP parameters in device" and set the IP address, subnet mask, and router as appropriate.<br>The IP parameters are configured with SIMOCODE ES and transferred to the device. In this case, the "Overwrite IP parameters in device" checkbox must be selected. Choose the IP parameters to match the configuration in the automation system. If the IP parameters are assigned by the IO controller in the automation system, no setting is necessary here and the "Overwrite IP parameters in device" checkbox must not be selected [1)] |
| 12 | Enter the IP address. |
| 13 | Activate the checkbox "Use router" if you want to use a router |
| 14 | Enter the IP address (gateway) of the router |
| 15 | Select the EtherNet/IP device name to match the configuration in the automation system. |
| 16 | Activate the "Overwrite device name in device" checkbox if you want to transfer the device name to the device. |
| 17 | If necessary, select the "Web server activated" checkbox |
| 18 | Select the "Activate NTP synchronization" checkbox if you want to synchronize the unbuffered real-time clock of SIMOCODE pro V EIP using the NTP procedure. |
| 19 | Enter the NTP server address when the "Activate NTP synchronization" checkbox is selected. |
| 20 | Enter a value for the time shift: -1440 min to +1440 min (default value: 0 min) |
| 21 | Enter a value for the cyclic update interval when the "Activate NTP synchronization" checkbox is selected: 10 to 86400 s (default value: 10 s) |
| 22 | Load the data to the basic unit via "Online → Load to device" or click the corresponding button in the menu bar |

1)

**Note**

**Initial transfer of device name**

The initial transfer of the device name must occur via the SIMOCODE pro system interface, since the device is not yet accessible via EtherNet/IP due to the missing address settings.

### 13.2.4.3 Set the time manually after switch-on or recovery of the supply voltage

#### Setting the timer with SIMOCODE ES

If the internal realtime clock of the devices is not automatically synchronized via NTP, you can make the setting manually with SIMOCODE ES.

To do so, follow these steps:

Set the time manually after switch-on or recovery of the supply voltage

| Step | Description |
|---|---|
| 1 | Start SIMOCODE ES |
| 2 | Establish an online connection. |
| 3 | Set the device-internal real time clock via "Commissioning → Command → Set time (= PC time in UTC)" |

### 13.2.4.4 Diagnostics via LED display on the basic unit and on the operator panel with EtherNet/IP

The basic unit and the operating panel have LEDs for displaying specific device states:

Table 13-14 Diagnostics via LED display

| LED | Status | Display | Description | Corrective measures for faults |
|---|---|---|---|---|
| Device | Device status | Green | Device ON | _ |
| | | Green flickering | Internal fault | Send back the basic unit! |
| | | Yellow | Memory module recognized, TEST/RESET buttons control the memory module | _ |
| | | Yellow flashing | Memory module read in; factory settings configured (duration: 3 s) | _ |
| | | Yellow flickering | Memory module programmed (duration: 3 s) | _ |
| | | Red | Device defective (also GEN. FAULT on) | Replace the basic unit! |
| | | Red – flashing | Memory module or expansion modules defective (also GEN. FAULT on - flashing) | Reprogram/replace the memory module, replace the expansion modules |
| | | Off | Supply voltage too low | Check whether the supply voltage is connected/switched on |
| | | Green flashing | PE energy saving mode active | _ |
| Bus | Bus status | Off | No communication with a controller active | Connect the bus or check Ethernet parameters (IP parameters, device name) |
| | | Green flashing | Communication with a controller active (e.g. Rockwell Automation controller) | _ |
| GEN. FAULT | Fault status | Red | Fault pending; reset has been saved | Rectify fault, e.g., overload |
| | | Flashing red | Fault pending; reset has not been saved | _ |
| | | Off | No fault | _ |
| PORT1 (only on basic unit) | Bus status | Green | Ethernet connection available | _ |
| | | Off | No Ethernet connection available | Check the Ethernet connection and the wiring |
| | | Flashing | Station flash test for device location active | _ |
| PORT2 (only on basic unit) | Bus status | Green | Ethernet connection available | _ |
| | | Off | No Ethernet connection available | Check the Ethernet connection and the wiring |
| | | Flashing | Station flash test for device location active | _ |

# 13.3 Service

## 13.3.1 Preventive maintenance

### Preventive maintenance - general information

Preventive maintenance is an important step towards avoiding faults and unforeseen costs. Industrial plants require regular professional maintenance, for example, to avoid production losses due to plant downtimes. Preventive maintenance ensures that all components are always kept in perfect working order.

### Reading out statistical data

SIMOCODE pro makes statistical data available that can, for example, be read out with SIMOCODE ES (TIA Portal) under **Commissioning → Service Data / Statistical Data**. For example, based on "Motor operating hours" and "Number of starts," you can decide whether motor and / or motor contactors should be replaced.

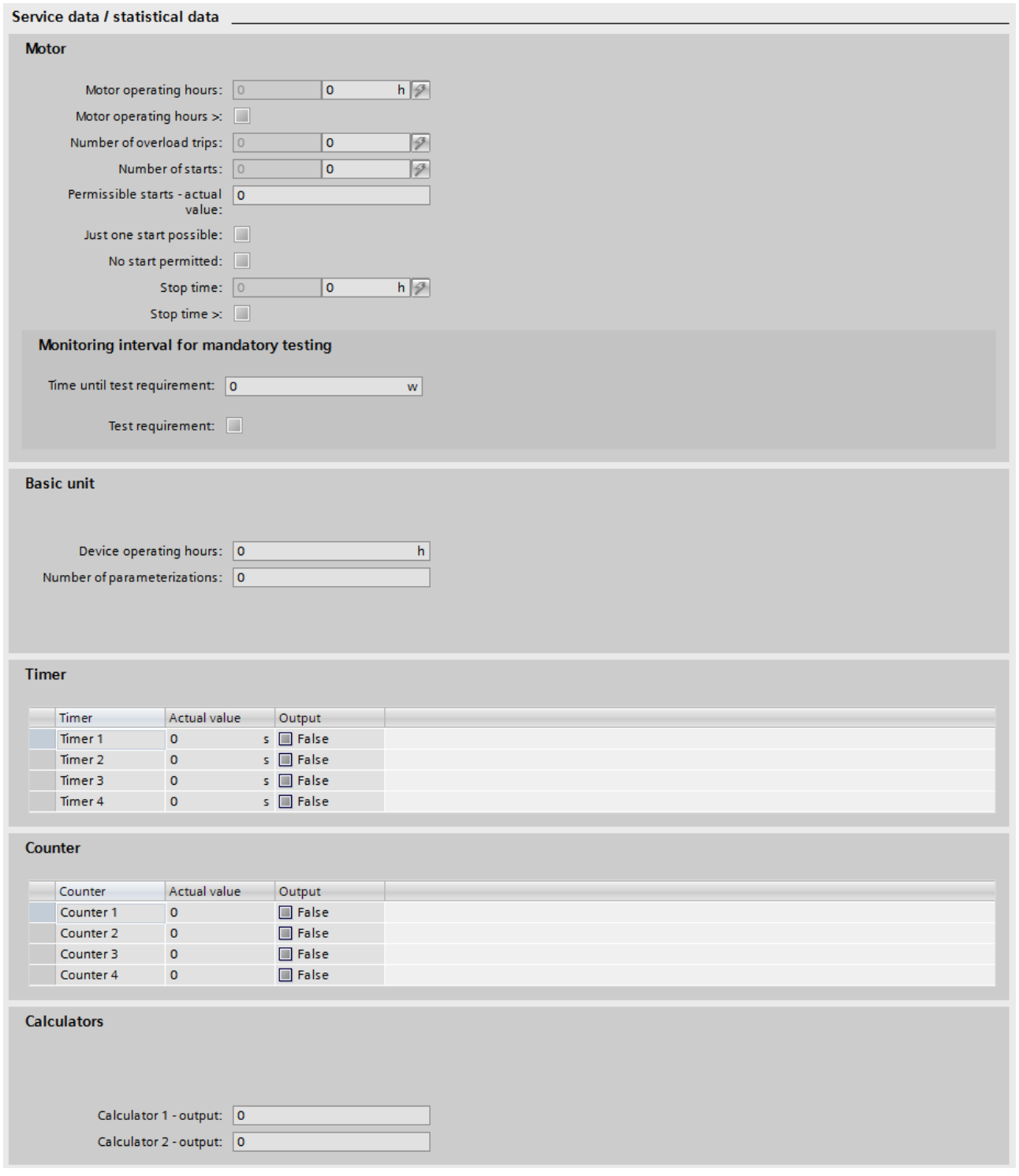



Figure 13-6 Reading out statistical data

## 13.3.2 Backing up and saving parameters

Always save the parameters in the memory module or in a SIMOCODE ES file. This particularly applies if you replace a basic unit, or if you wish to transfer data from one basic unit to another.

### Saving parameters from the basic unit into the memory module

**Note**

This function will not be available if the TEST / RESET button has been disabled.

Proceed as follows:

Table 13-15 Saving the parameters into the memory module

| Step | Description |
|---|---|
| 1. | Plug the memory module into the system interface. The "Device" LED lights up yellow for approx. 10 seconds. During this time, press the "TEST / RESET" button for approx. 3 seconds. The parameters will be saved in the memory module. After successful data transfer, the "Device" LED flickers yellow for approx. 3 seconds. |
| 2. | If necessary, unplug the memory module from the system interface. |

### Saving parameters from the memory module into the basic unit

**Note**

This function will not be available if the TEST / RESET button has been disabled.

Proceed as follows:

Table 13-16 Saving parameters from the memory module into the basic unit

| Step | Description |
|---|---|
| 1. | Plug the memory module into the system interface. The "Device" LED lights up yellow for approx. 10 seconds. During this time, briefly press the "TEST / RESET" button. The parameters will be transferred to the basic unit. After successful data transfer, the "Device" LED flashes yellow for approx. 3 seconds. |
| 2. | If necessary, unplug the memory module from the system interface. |

**Note**

If the memory module is plugged in, the parameters will be transferred from the memory module to the basic unit when the supply voltage is switched on.

### Saving parameters from the basic unit to a SIMOCODE ES file

Proceed as follows:

Table 13-17 Saving parameters to a SIMOCODE ES file

| Step | Description |
|---|---|
| 1. | Plug the PC cable into the system interface. |
| 2. | Start SIMOCODE ES. |
| 3. | Create a new project via "Create new project". |
| 4. | Switch to the project view. |
| 5. | Go online, e.g. via "Online & Diagnostics" in the project navigator |
| 6. | Open the "Online access" menu in the project navigator and select the suitable interface by double-clicking it. |
| 7. | Double-click on "Update accessible devices". |
| 8. | Select "Online → Upload device as new station (hardware and software) ...". |
| 9. | Save the project. |

**Note**

This function will not be available if the TEST / RESET button has been disabled.

### Saving parameters from a SIMOCODE ES file into the basic unit

Proceed as follows:

Table 13-18 Saving parameters from a SIMOCODE ES file into the basic unit

| Step | Description |
|---|---|
| 1. | Plug the PC cable into the system interface. |
| 2. | Start SIMOCODE ES. |
| 3. | Open a project. |
| 4. | Select Online → Extended online connection. |
| 5. | Select the type of the PG/PC interface (SIRIUS PtP or PN/IE). |
| 6. | Select the PG/PC interface. |
| 7. | Click the "Start search" button. A search is made for compatible stations. |
| 8. | Select a station. |
| 9. | Load the parameters to the device via "Online → Load to device". |

## 13.3.3 Replacing SIMOCODE pro components

### Safety guidelines

**⚠ WARNING**

**Replacing current measuring modules and current/voltage measuring modules**

The main power for the feeder and the supply voltage for the basic unit must be switched off before replacing current measuring modules and current/voltage measuring modules.

**Note**

Please observe the information contained in the Operating Instructions!

You will also find the Operating Instructions for SIMOCODE pro at Operating Instructions (https://support.industry.siemens.com/cs/ww/en/ps/16027/man)

**Note**

It is not necessary to detach the wiring from the removable terminals to replace the components!

### Replacing the basic unit

Proceed as follows:

Table 13-19 Replacing the basic unit

| Step | Description |
|---|---|
| 1. | Save the parameters. For information on this, see Chapter Backing up and saving parameters (Page 269). |
| 2. | Switch off the main power for the unit feeder and the power supply for the basic unit. |
| 3. | Withdraw the PC cable if necessary, then remove the cover or the connecting cable from the system interface. |
| 4. | Withdraw the removable terminals. You do not need to detach the wiring. |
| 5. | Dismantle the basic unit. |
| 6. | Withdraw the removable terminals from the new basic unit. |
| 7. | Mount the new basic unit. |
| 8. | Connect the wired, removable terminals. |
| 9. | Connect the cables to the system interfaces. |
| 10. | Switch on the supply voltage for the basic unit. |
| 11. | Save the parameters into the basic unit. For information on this, see Chapter Backing up and saving parameters (Page 269). |
| 12. | Switch on the main power for the unit feeder. |

## Replacing an expansion module or a decoupling module

Proceed as follows:

Table 13-20 Replacing an expansion module or a decoupling module

| Step | Description |
|---|---|
| 1. | Switch off the main power for the feeder and switch off the power supply for the basic unit and the DM-F. |
| 2. | Withdraw the PC cable if necessary, then remove the cover or the connecting cable from the system interface. |
| 3. | Withdraw the removable terminals. You do not need to detach the wiring. |
| 4. | Remove the expansion module or decoupling module. |
| 5. | Withdraw the removable terminals from the new expansion module or decoupling module. |
| 6. | Install the new expansion module or decoupling module. |
| 7. | Connect the wired, removable terminals. |
| 8. | Connect the cables to the system interfaces. |
| 9. | Switch on the supply voltage for the basic unit. |
| 10. | Switch on the main power for the unit feeder. |

## Replacing a DM-F

Proceed as follows:

Table 13-21 Replacing a DM-F

| Step | Description |
|---|---|
| 1 | First, switch off the main power for the feeder and then the supply voltage for the basic unit and the DM-F. |
| 2 | Withdraw the PC cable if necessary, then remove the cover or the connecting cable from the system interface. |
| 3 | Withdraw the removable terminals. You do not need to detach the wiring. |
| 4 | Dismantle the DM-F. |
| 5 | Withdraw the removable terminals from the new DM-F. |
| 6 | Mount the new DM-F. |
| 7 | Connect the wired, removable terminals. |
| 8 | Connect the cables to the system interfaces. |
| 9 | DM-F PROFIsafe only:<br>Set the DIP switches for the PROFIsafe address according to the configuration in the F-controller (see Chapter "Configuring the DM-F PROFIsafe and integrating it into the fail-safe automation system" in the manual Manual Fail-safe Digital Modules SIMOCODE pro (https://support.automation.siemens.com/WW/view/en/50564852)). |
| 10 | Switch on the power supply for the DM-F and the basic unit. |
| 11 | DM-F Local only<br>Configure the DM-F Local accordingly (see Chapter "Configuring the DM-F Local" in manual Manual Fail-safe Digital Modules SIMOCODE pro (https://support.automation.siemens.com/WW/view/en/50564852)). |
| 12 | Switch on the main power for the unit feeder. |

## Replacing the current measuring module and the current/voltage measuring module

**⚠ WARNING**

**Replacing current measuring modules and current/voltage measuring modules**

The main power for the feeder and the supply voltage for the basic unit must be switched off before replacing current measuring modules and current/voltage measuring modules.

Proceed as follows:

Table 13-22 Replacing the current measuring module and the current/voltage measuring module

| Step | Description |
|---|---|
| 1 | Switch off the main power for the unit feeder and the power supply for the basic unit. |
| 2 | Pull out the connecting cable from the system interface. |
| 3 | Remove the removable terminal from the module as illustrated below (current / voltage measuring modules only) |
| 4 | Disconnect the three cables of the three phases of the main circuit. |
| 5 | Replace the module (see Chapter Mounting of current measuring modules (Page 181) and Chapter Mounting the current / voltage measuring modules (Page 182)). |
| 6 | Connect the three cables of the main circuit, leading them through the feed-hole openings. |
| 7 | Plug the removable terminals onto the module (current / voltage measuring modules only). |
| 8 | Connect the cable to the system interface. |
| 9 | Switch on the supply voltage for the basic unit. |
| 10 | Switch on the main power for the unit feeder. |

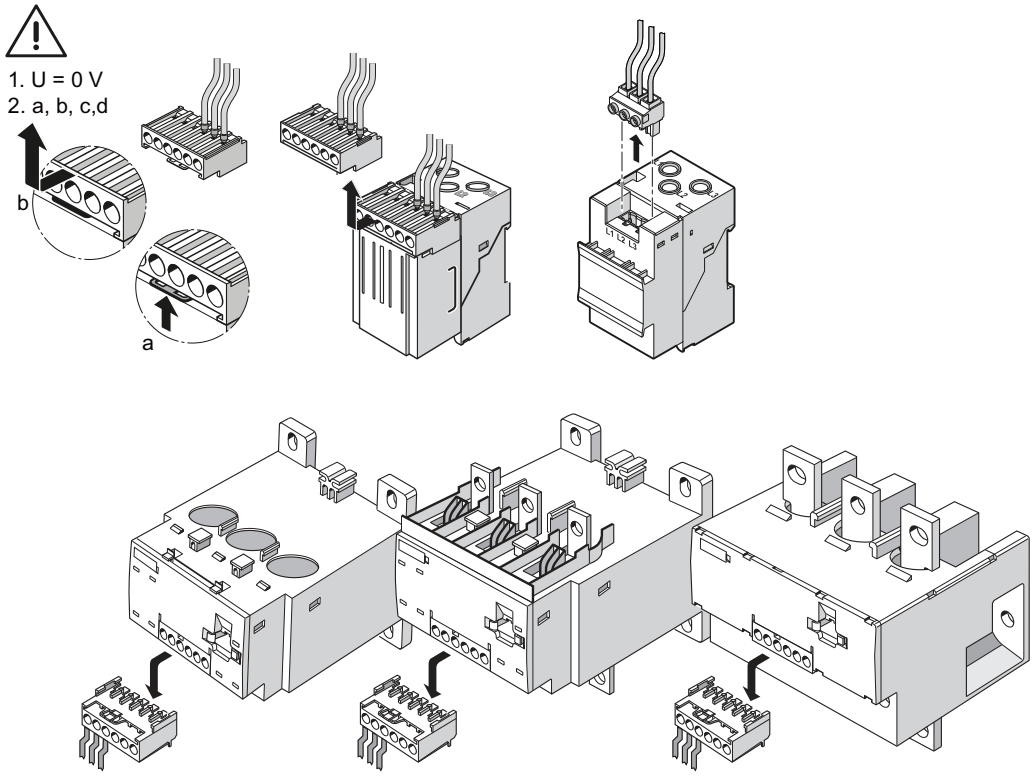



Figure 13-7 Replacing current/voltage measuring modules

### Replacing a 1st generation current/voltage measuring module (UM) with a 2nd generation current/voltage measuring module (UM+)

**⚠ WARNING**

**Replacing current measuring modules and current/voltage measuring modules**

The main power for the feeder and the supply voltage for the basic unit must be switched off before replacing current measuring modules and current/voltage measuring modules.

The following table shows which 2nd generation current/voltage measuring module replaces a 1st generation current/voltage measuring module:

| 1st generation current/voltage measuring module | | 2nd generation current/voltage measuring module |
|---|---|---|
| ⚠ | | |
| 3UF7110-1AA00-0, $I_s$ = 0.3 to 3 A | → | 3UF7110-1AA01-0, $I_s$ = 0.3 to 4 A |
| 3UF7111-1AA00-0, $I_s$ = 2.4 to 3 A | → | 3UF7110-1AA01-0, $I_s$ = 0.3 to 4 A |
| 3UF7111-1AA00-0, $I_s$ = 3.0 to 25 A | → | 3UF7111-1AA01-0, $I_s$ = 3 to 40 A |
| 3UF7112-1AA00-0, $I_s$ = 10 to 100 A | → | 3UF7112-1AA01-0, $I_s$ = 10 to 115 A |
| 3UF7113-1AA01-0, $I_s$ = 20 to 200 A | → | 3UF7113-1AA00-0, $I_s$ = 20 to 200 A |
| 3UF7113-1BA01-0, $I_s$ = 20 to 200 A | → | 3UF7113-1BA00-0, $I_s$ = 20 to 200 A |
| 3UF7114-1BA01-0, $I_s$ = 20 to 200 A | → | 3UF7114-1BA00-0, $I_s$ = 20 to 200 A |

**Note**

**Conversion to a 2nd generation current/voltage measuring module**

Depending on the previous parameterization of the SIMOCODE basic unit, the Device LED and the General Fault LED may flash red when downloading a parameterization with a 2nd generation current / voltage measuring module.

This behavior can be corrected with a reset. The device LED changes to green; the Gen. Fault LED goes out.

After a reset, the basic unit is in the UM+ mode. The device LED changes to green; the Gen. Fault LED goes out.

### 13.3.4 Exchanging a 3UF52 operator panel for a 3UF720 operator panel

To exchange a 3UF52 operator panel for the smaller 3UF720 operator panel, proceed as follows:

Table 13-23 Exchanging a 3UF52 operator panel for a 3UF720 operator panel

| Step | Description |
|---|---|
| 1 | Unscrew the four mounting bracket screws and remove the 3UF52 operator panel from the front panel or switchgear cabinet door. |
| 2 | Ensure that the dimensions of the cutout in the front panel or cabinet door measure 91.5 + 0.5 mm (width) and 54.5 + 0.5 mm (height) (see figure). |
| 3 | Slide the seal provided onto the operator panel adapter (see figure). |
| 4 | Position the operator panel adapter in the cutout. |
| 5 | Position the operator panel in the adapter. |
| 6 | Snap the four mounting brackets onto the operator panel. |
| 7 | Lock the operator panel in position by tightening the four mounting bracket screws (see figure and safety information!). |

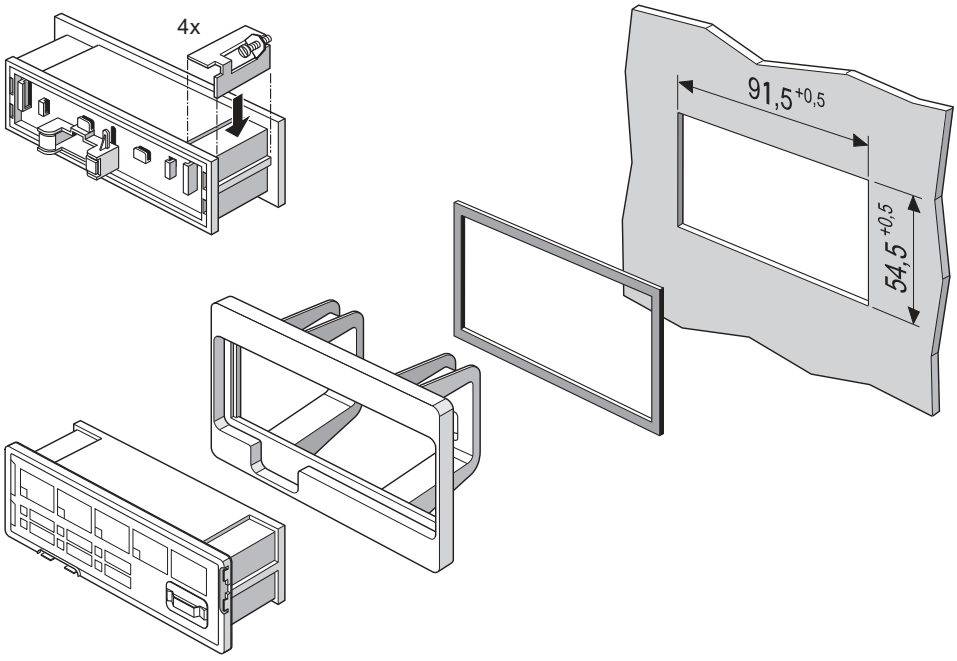



Figure 13-8 Mounting the operator panel adapter (1)

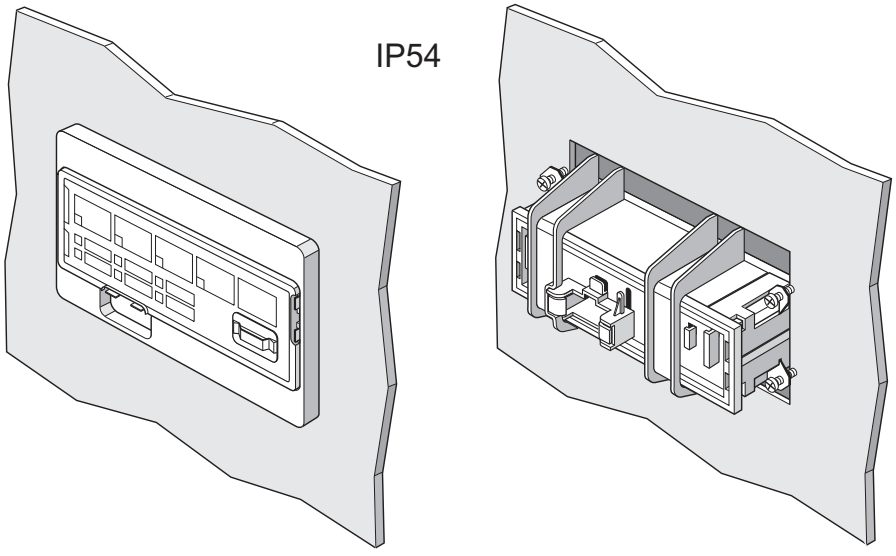



Figure 13-9 Mounting the operator panel adapter (2)

**⚠ WARNING**

**Tightening torque of the screws**

To ensure that the panel will function correctly and is sealed to comply with IP54, the tightening torque of the screws provided must not be set too high when mounting and the seal must be properly fitted.

**Note**

A SIMOCODE pro 3UF7 system operator panel is not compatible with SIMOCODE DP 3UF5, and vice versa.

## 13.3.5 Restoring factory settings

With the factory settings, all parameters are reset to the factory values.

### Restoring the factory settings with the TEST / RESET button on the basic unit

Proceed as follows (also deletes any previous password setting!):

Table 13-24 Restoring the factory settings with the TEST / RESET button

| Step | Description |
|---|---|
| 1 | Switch off the supply voltage for the basic unit. |
| 2 | Press the TEST / RESET button on the basic unit and keep it pressed. |
| 3 | Switch on the supply voltage for the basic unit. The "Device" LED lights up yellow. |
| 4 | Release the TEST / RESET button after approx. two seconds. |
| 5 | Press the TEST / RESET button again after approx. two seconds. |
| 6 | Release the TEST / RESET button after approx. two seconds. |
| 7 | Press the TEST / RESET button again after approx. two seconds. |
| 8 | The factory setting is restored. |

**Note**

If any of the steps stated above are not carried out correctly, the basic unit will revert to normal operation.

**Note**

This function is always active, irrespective of the "TEST / RESET keys disabled" parameter.

### Restoring the factory settings with the software SIMOCODE ES (TIA Portal)

Prerequisite: SIMOCODE pro is connected to the PC / PG via PROFIBUS DP or via the system interface and SIMOCODE ES is started.

Proceed as follows (resets to factory settings, including the password):

Table 13-25 Restoring the factory settings with the software SIMOCODE ES (TIA Portal)

| Step | Description |
|---|---|
| 1 | Go online, e.g. via "Online → Connect online". |
| 2 | In the Project navigation view, select "Online accesses → COM [Sirius PtP] → Update accessible stations → SIMOCODE → Commissioning → Command". |
| 3 | Click on the "Factory settings" button. The factory default setting is made after entering the password. |
| 4 | "Factory settings OK" is displayed in the inspector window. |

### 13.3.6 Firmware update of device components

You can use this function to update the firmware of the following SIMOCODE pro basic units. You can download the firmware versions on the Support page:

- Firmware update for SIMOCODE pro V PB basic units from product version *E15* (https://support.industry.siemens.com/cs/ww/en/view/109767656)
- Firmware update for SIMOCODE pro V MR basic units from product version *E03* (https://support.industry.siemens.com/cs/ww/en/view/109771740)
- Firmware update for SIMOCODE pro V PN basic units from product version *E08* (https://support.industry.siemens.com/cs/de/en/view/109749989)
- Firmware update for SIMOCODE pro V EIP basic units (https://support.industry.siemens.com/cs/de/en/view/109756912)

**Note**

The parameterization of the device is retained after the firmware has been updated.

**NOTICE**

**Connection to the device**

The connection by USB PC cable or Ethernet must not be interrupted during the update procedure.

**Requirements:**

- The basic unit must be connected to SIMOCODE ES via online connection, USB PC cable (PtP) or Ethernet.
- The supply voltage must be present at the basic unit at the start of and during the firmware update.
- A firmware update is only possible if
  - The motor is in the "off" state and there is no motor current
  - The control station is in "Local manual" status
  - The device is not protected by a password

**Firmware update**

You can perform the firmware update as follows:

- for the SIMOCODE pro V PB and pro V MR basic units, via the SIRIUS PC USB cable (SIRIUS PtP) with the assistance of the SIMOCODE ES (TIA Portal) software, all versions Basic / Standard / Premium V15 or higher or Professional V16 or higher.
- for the SIMOCODE pro V PN and pro V EIP basic units: via Ethernet with the assistance of the SIMOCODE ES (TIA Portal) software, all versions Basic / Standard / Premium V13 or higher or Professional V16 or higher.

**⚠ WARNING**

**Risk of impermissible system states.**

The installation of the firmware update switches the basic unit into "station failure" state. This state can affect the operation of an online process or a machine.

Unexpected operation of a process or a machine can lead to fatal or severe injuries and/or to property damage.

Before installing the firmware update, ensure that the basic unit is not involved in an active process.

**Update procedure:**

1. Select the module in the device configuration
2. Select the "Online & diagnostics" command from the shortcut menu
3. Select the "Firmware update" group from the "Functions" folder.
4. Click the "Browse" button to select the path to the firmware update files.
5. Select the firmware file from the folder into which you previously unpacked the download file. The table in the "Firmware update" area lists those modules under "Suitable for modules with" for which an update is possible with the selected firmware file.
6. Click the "Run update" button. If the module can interpret the selected file, the file is downloaded to the module

**Updating the firmware**

The "Run firmware after update" check box is always selected. When the loading process is complete, the module works with the new firmware.

**Note**

**Avoid interrupting the firmware update**

If you interrupt a firmware update, the device is not ready for use. In this case, the "BUS" and "GEN FAULT" LED indicators flash alternately and the "DEVICE" LED lights up red.

Note the following behavior during the firmware update:

The "BUS" and "GEN FAULT" LED indicators flash alternately and the "DEVICE" LED lights up red.

**Checking the behavior following the firmware update**

After the firmware update, check the firmware version of the basic unit that has had the firmware updated.

### 13.3.7 Support Request

After you have registered, you can use the Support Request form in the online support to send your question directly to Technical Support:

| | |
|---|---|
| **Support Request:** | Internet (https://siemens.com/support-request) |

# 13.4 Troubleshooting

## 13.4.1 Error buffer

SIMOCODE pro has an error buffer in which the 21 most recent errors / faults and "Power - On" events are recorded with a time stamp. Time stamps are based upon the operating hours of the device (resolution 1 s), i.e. the length of time for which the device is supplied with control supply voltage.

The "Error/Fault" and "Power - On" events are logged. Each of these events is given a time stamp.

- Error/Fault: The last 21 errors are stored in a ring buffer; the incoming error (rising edge) is always logged. An outgoing error (falling edge) will not be logged.
- Power on: If the most recent entry is "Power - On," this is not logged multiple times. Instead, the error number is used as a power-on counter. Thus, the error buffer cannot be deleted by frequent on/off operations.

Entry 1 is the most recent entry and entry 21 the oldest.

This data is displayed via the "SIMOCODE ES (TIA Portal)".

**Example:**

**Error buffer/error protocol**

**Time and reason for the last 21 trips since the last power ON**

| Time (d.hh:mm:ss) | Error | Number | Text |
|---|---|---|---|
| 57.19:36:57 | Error | 31 | Thermistor trip level |
| 57.19:36:57 | Error | 3 | Configuration error |
| 57.19:36:57 | Power - On | | Number of Power - On: 1 |
| 57.13:15:59 | Error | 31 | Thermistor trip level |
| 57.13:15:59 | Error | 3 | Configuration error |
| 57.13:15:59 | Power - On | | Number of Power - On: 1 |
| 57.10:28:01 | Error | 31 | Thermistor trip level |
| 57.10:28:01 | Error | 3 | Configuration error |
| 57.10:28:01 | Power - On | | Number of Power - On: 1 |
| 57.07:23:15 | Error | 31 | Thermistor trip level |
| 57.07:23:15 | Error | 3 | Configuration error |
| 57.07:23:15 | Power - On | | Number of Power - On: 1 |
| 57.03:42:30 | Error | 31 | Thermistor trip level |
| 57.03:42:30 | Error | 3 | Configuration error |
| 57.03:42:30 | Power - On | | Number of Power - On: 1 |
| 56.21:41:01 | Error | 31 | Thermistor trip level |
| 56.21:41:01 | Error | 3 | Configuration error |
| 56.21:41:01 | Power - On | | Number of Power - On: 1 |

**Time of the last events, "Enabling circuit closed" and "Enabling circuit open":**

| Time (d.hh:mm:ss) | Event | Number | Text |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**DIP switch position DM-F during the last event:**

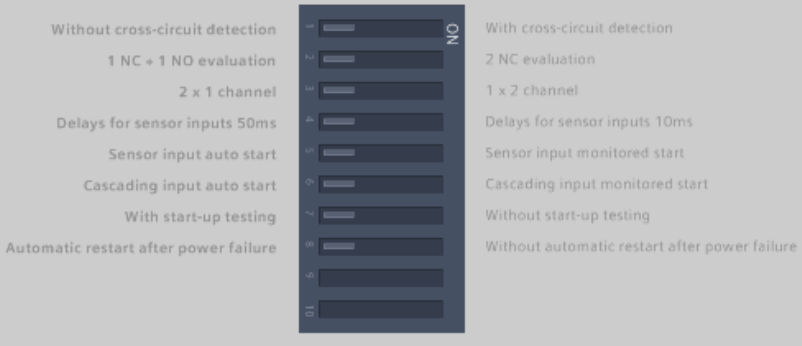



Figure 13-10 Example of event logging using the SIMOCODE ES (TIA Portal)

**Example:**

The most recent "power-on" event was logged at a device operating time of 17 days, 21 hours and 31 minutes. Therefore, at the moment of "Power - On", the device was operating

(supplied with voltage) for 17d 21h 31min. The "Number of starts >" fault was logged at a device operating time of 18 days, 22 hours, 17 minutes, i.e. 24h 46min after the most recent "Power - On."

When **using a DM-F**, the events "Enabling circuit closed" and "Enabling circuit open" are logged for the DM-F Local and/or the DM-F PROFIsafe in a separate window:

- Time
- Event: "Enabling circuit closed" or "Enabling circuit open"
  - Number:
    Line 1 200 or 202
    Line 2 201 or 203
  - Text:
    Line 1 "DM-F Local enabling circuit 0 -> 1" or "DM-F PROFIsafe enabling circuit 0 -> 1"
    Line 2 "DM-F Local enabling circuit 1 -> 0" or "DM-F PROFIsafe enabling circuit 1 -> 0."

The current DIP switch position of the "DM-F Local" and/or the "DM-F PROFIsafe" is displayed under "DIP switch position DM-F during the last event".

See also Chapter "Data record 72 - Error buffer" in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960).

### 13.4.2 Event memory

In addition to the error buffer, various events can be stored in the event buffer

**Note**

This event memory is supported by the SIMOCODE pro V basic unit as from firmware version V3.0.

The following events are stored:

- last event "DM-F enabling circuit closed"
- last event "DM-F enabling circuit open"
- Initialization module read in
- Initialization module written.

See also Chapter "Data record 73 - Event buffer" in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960).

## 13.4.3 Alarms, faults, and system events - error handling

Table 13-26 Alarm, fault, and system events

| Event (alphabetical) | Description | Troubleshooting | Acknowledgment / fault rectification | Contactor control | Error No. [1] |
|---|---|---|---|---|---|
| Analog module 1/2 open circuit | An open circuit has occurred in the analog value measuring circuit. | Check the measured value sensor and the measuring circuit. | Reset | | 64 |
| Startup parameter block active | The startup parameter block prevents transfer of SIMOCODE pro parameters that can be transferred from the IO controller during startup.<br>The block may not be set if<br>SIMOCODE pro is integrated in STEP7 via the SIMOCODE pro object manager (OM). [2] | | | | |
| Antivalence | Only for positioner control function: The change-over contacts of the limit switch do not issue an antivalent signal. | Limit switch defective, open circuit limit switch | | Tripped | |
| Configuration error | The configured unit configuration does not match the actual configuration. | • Check whether all the configured components are available<br>• Check the actual configuration with "Configuration". | Clear the fault; reset | Tripped | 3 |
| Execution STOP command | The motor feeder could not be turned off after a STOP command was issued. | • The contactor contact is welded<br>• Parameter execution time is too short<br>• The "open" end position has not been reached during the parameterized runtime (only for the "Positioner" and "Solenoid valve" control functions). | Clear the fault; reset | Tripped | 9 |
| Execution ON command | The motor feeder could not be turned on after an ON command is issued. | • Main circuit is interrupted (fuse, circuit breaker)<br>• The motor contactor or contactor control is defective<br>• Parameter execution time is too short. | Reset | Tripped | 8 |
| Trip level cos phi < | The power factor cos phi has undershot the trip level. Possible cause: The motor is being operated without a load. | Please check the application that is being driven by the motor. | | Tripped | 44 |
| Trip level I < undershot | The maximum current has undershot the trip level. | Please check the application that is being driven by the motor. | | Tripped | 41 |

| Event (alphabetical) | Description | Troubleshooting | Acknowledgment / fault rectification | Contactor control | Error No. [1] |
|---|---|---|---|---|---|
| Trip level I > overshot | The maximum current has overshot the trip level. | Please check the application that is being driven by the motor. | | Tripped | 40 |
| Trip level P < undershot | The active power of the motor has undershot the trip level. | Please check the application that is being driven by the motor. | | Tripped | 43 |
| Trip level P > overshot | The active power of the motor has overshot the trip level. | Please check the application that is being driven by the motor. | | Tripped | 42 |
| Trip level U < undershot | The voltage in the motor feeder has undershot the trip level.<br>Possible causes:<br>• Undervoltage in the network<br>• Fuse has tripped | Check the motor feeder. | | Tripped | 45 |
| Trip level 0/4 - 20 mA < undershot | The measured value at the analog input has undershot the trip level. | Check the measuring station. | | Tripped | 47 |
| Trip level 0/4 - 20 mA > overshot | The measured value at the analog input has overshot the trip level. | Check the measuring station. | | Tripped | 46 |
| Operational Protection Off (OPO) | An "Operational Protection Off (OPO)" signal is pending. A switched-on motor feeder has been switched off. The feeder cannot be switched on while the OPO signal is active. | | Reset | Tripped; for positioners QE1 or QE2 switched on until end position is reached - depending upon configuration | 19 |
| Motor operating hours > | The configured limit value for motor operating hours monitoring has been exceeded. | Please adopt the maintenance measures intended for the feeder. | | | |
| Stalled rotor | The maximum motor current has exceeded the threshold for stalled rotor protection. Possible cause: The motor is blocked. | Please check the application that is being driven by the motor. | Reset | Tripped | 48 |
| Stalled positioner | The torque switch has activated before or without the respective limit switch. | • The positioner may be blocked.<br>• Acknowledge the fault by releasing with the "OPEN/ CLOSED" counter command.<br>• Please check the positioner application and the limit switches. | Counter command "OPEN / CLOSED!" | Tripped | 12 |

| Event (alphabetical) | Description | Troubleshooting | Acknowledgment / fault rectification | Contactor control | Error No. [1] |
|---|---|---|---|---|---|
| DM-F feedback circuit | The DM-F Local or DM-F PROFIsafe has detected a fault in the feedback circuit (the feedback circuit must be closed as the enabling circuit is switched on); the "SF" (general fault) LED on the front of the DM-F Local or DM-F PROFIsafe is flashing red. | • Check the wiring of the feedback circuit<br>• Check the contact blocks in the feedback circuit. | Rectify the fault such that the feedback circuit is closed. | Tripped | |
| DM-F safety-related tripping | The DM-F has tripped the enabling circuit for safety reasons. | The motor cannot be switched on again until the enabling circuits of the DM-F are closed again. | Acknowledge with "Reset", if auto-reset is not active. | Tripped | 66 |
| DM-F test requirement | The enabling circuits of the DM-F Local or DM-F PROFIsafe have not been opened and closed again within the configured time period. | The function of the enabling circuit relay contacts can only be tested when they are switched. Perform a function test. | Please apply the maintenance measures prescribed for this scenario. | | |
| DM-F wiring | DM-F module wiring fault (short-circuit to ground in the sensor circuit/feedback circuit); the "SF" (general fault) LED on the front of the DM-F Local is illuminated red. | • Check the wiring of the sensor circuits / feedback circuit<br>• Rectify the fault. | Reset | Tripped | 67 |
| DM-FL actual and set configuration different | The actual configuration of the DM-F Local does not correspond to the parameterized set configuration. | Check whether the effective configuration of the DM-F Local corresponds to the parameterized set configuration. Correct the effective configuration by changing the DIP switch settings or adjusting the set configuration by means of parameterization if required. | | | |
| DM-FL simultaneity | The DM-F Local has detected a discrepancy error in the two-channel sensor circuit. | Check the switching elements in the sensor circuit. | Rectify the fault by opening or closing the sensor inputs. | Tripped | |
| DM-FL configuration mode | The DM-F Local is in "configuration mode"; the "DEVICE" LED on the front of the DM-F Local is illuminated yellow. | Complete the configuration (see manual "Fail-safe Digital Modules SIMOCODE pro Safety", Chapter 7.4) [3]. | | | |

| Event (alphabetical) | Description | Troubleshooting | Acknowledgment / fault rectification | Contactor control | Error No. [1] |
|---|---|---|---|---|---|
| DM-FL cross circuit | Cross circuit in sensor circuit of DM-F Local; the "SF" (general fault) LED on the front of the DM-F Local is illuminated red. | • Check the wiring of both sensor circuits for cross circuiting<br>• Rectify the fault. | Reset | Tripped | 68 |
| DM-FL waiting for start-up test | The DM-F LOCAL is in the "Waiting for start-up test" status. | Perform the startup test by actuating the sensor in the sensor circuit. | | | |
| DM-FP Prm error | The parameter settings of the PROFIsafe profile are incorrect or the set PROFIsafe address is not identical to the configured address. | Check the communication / PROFIsafe parameters of SIMOCODE pro that were set on the IO controller. | | | |
| Double 0 | Both torque switches have activated simultaneously. The motor feeder has been turned off. | • Open circuit torque switch.<br>• Torque switch is defective. | | Tripped | 13 |
| Double 1 | Both limit switches have activated simultaneously. | Limit switch defective | | Tripped | 14 |
| End position | Except positioner 5 control function: The state of the limit switches has changed without a command (positioner has left the end position without a command). | | Counter command "OPEN / CLOSED!" | Tripped | 15 |
| External ground fault | External ground-fault monitoring has responded. An impermissibly high residual current is flowing. | Please check the motor connection cable for damage. | Reset | Tripped | 29 |
| External fault 1, 2, 3, 4, 5 or 6 | A signal is pending at the input (socket) of the "External fault 1, 2, 3, 4, 5 or 6" standard function. | Check the motor feeder. | | Tripped | 56, 57, 58, 59, 60, 61 |
| Required function is not supported | At least one parameterized function is not supported by the version of the basic unit. | Activate only the functions that are supported by the version of the basic unit. | | | |
| Hardware fault [6] | The SIMOCODE pro basic unit hardware is defective. | Replace the basic unit. See Chapter Replacing SIMOCODE pro components (Page 271). | Clear the fault. | Tripped | 0 |
| Initialization module write-protected | The initialization module is completely write-protected. | Deactivate write protection of the initialization module | | | |
| Initialization module write-protected, parameter changes not allowed | The initialization module is completely or partially write-protected.<br>Reparameterization of SIMOCODE pro is denied because the initialization module is write-protected. | Deactivate write protection of the initialization module | | | |

| Event (alphabetical) | Description | Troubleshooting | Acknowledgment / fault rectification | Contactor control | Error No. [1] |
|---|---|---|---|---|---|
| Initialization module - identification data write-protected | Reparameterization has been rejected because the initialization module is write-protected. | • Select a parameterization with identical addressing and I&M data<br>• Deactivate the partial write protection of the initialization module | | | |
| Initialization module read in | The parameters of the initialization module were read into SIMOCODE. | | | | |
| Initialization module programmed | The reparameterization was accepted in the initialization module. | | | | |
| Initialization module cleared | The initialization module has been cleared and is now back in the as-delivered condition. | | | | |
| Internal ground fault | Internal ground-fault monitoring has responded. An impermissibly high residual current is flowing. | Please check the motor connection cable for damage. | Reset | Tripped | 28 |
| No start permitted | The permissible number of starts in the monitoring timeframe has been attained. The next start should not be carried out until the interlocking time has expired. | | Reset | Tripped | |
| Module fault | At least 1 SIMOCODE pro module is not ready for use. | • Connecting cable defective or incorrectly connected<br>• Module defective. Replace the module. See Chapter Replacing SIMOCODE pro components (Page 271). | Clear the fault; reset | Tripped | 1 |
| Module supply voltage is not present | Supply voltage on the DM-F Local is too low or not present. | • The terminals are not wired properly<br>• Module defective. Replace the module. See Chapter Replacing SIMOCODE pro components (Page 271). | Clear the fault; reset | Tripped | |
| Power failure (UVO) | The power failure lasted longer than the set power failure time. | | Clear the fault; reset | Tripped | 18 |
| Just one start possible | The start after the next one should not be carried out until the interlocking time has expired. | | | | |
| Parameter is incorrect ("General fault" category) | The parameter data is incorrect. | The designation of the incorrect parameter can be found via the number (byte No.) in Chapter "Tables" in the manual "Parameterizing SIMOCODE pro" [4]. | Clear the fault; reset | Tripped | 4 |

| Event (alphabetical) | Description | Troubleshooting | Acknowledgment / fault rectification | Contactor control | Error No. [1] |
|---|---|---|---|---|---|
| Parameter is incorrect ("Event" category) | The parameter data transferred to the unit is incorrect. Errors in the parameter data can occur, for example, if the device has not been parameterized with SIMOCODE ES (TIA Portal). | Check the parameter data (data records 130 - 135) that has been transmitted to the device for correct content.<br>See Chapter "Data formats and data records" in the manual "SIMOCODE pro - Communication" [5]. | | | |
| Parameter changes not allowed in the current operating state | You attempted to change at least one parameter that cannot be changed in the current operating state. | Many parameters can only be changed if the motor feeder is switched off and not in "Remote" mode. The following parameters can always be changed: See Chapter "Data formats and data records" in the manual "SIMOCODE pro - Communication" [5]. | | | |
| Wrong password | SIMOCODE pro parameters are protected by a password. An attempt has been made to change the parameters without entering the password. | Please use the correct password for changing the parameters. If you do not know the password, new parameters can only be entered after the factory settings have been restored. For a description of how to restore the factory settings, see Chapter Restoring factory settings (Page 277). | | | |
| Phase unbalance | The limit value for phase unbalance has been exceeded. Phase unbalance can cause an overload. Possible causes:<br>• Phase failure<br>• Fault in the motor windings. | Check the motor feeder and the motor. | Reset | Tripped | 25 |
| Feedback (FB) OFF | The current flow in the motor feeder has been interrupted without the motor feeder being turned off. | • The main circuit has been interrupted (fuse, circuit breaker, main switch).<br>• The motor contactor or contactor control is defective | Reset | Tripped | 11 |
| Feedback (FB) ON | Current is flowing in the motor feeder without the motor feeder being switched on | • Contactor contacts have been manually activated<br>• Contactor has not been switched on via SIMOCODE | Clear the fault; reset | Tripped | 10 |
| Test Position Feedback (TPF) | Current is flowing in the motor feeder although the motor feeder is in the test position (TPF). | The main circuit is not interrupted in test operation. | Reset | Tripped | 17 |
| Memory module read in | The parameters of the memory module were read into SIMOCODE. | | | | |
| Memory module cleared | The memory module was cleared and is now back in as-delivered state. | | | | |

| Event (alphabetical) | Description | Troubleshooting | Acknowledgment / fault rectification | Contactor control | Error No. [1] |
|---|---|---|---|---|---|
| Memory module programmed | The reparameterization was accepted in the memory module. | | | | |
| Memory module write-protected | The memory module is completely write-protected. | Deactivate write protection of the memory module. | | | |
| Status - cooling down period active | The motor feeder has been switched off due to overload. | The motor can only be switched on again after the cooling down period has expired. | | | |
| Status - DM-F enabling circuit | Shows the status of the enabling circuit:<br>• closed or<br>• tripped | | | | |
| Status - emergency start executed | The thermal memory has been cleared with the function "Emergency start". | The motor can be switched on again immediately after an overload trip. | | | |
| Status - test position (TPF) | The motor feeder is in the test position (TPF). The main circuit has been interrupted and the feeder can be "cold started". | | | | 17 |
| Stop time > | The configured limit value for motor stop time monitoring has been exceeded. | Please adopt the maintenance measures intended for the feeder. If possible, switch on the feeder. | | | |
| Fault - bus | Bus communication has been or is being interrupted. | Check the bus connection (plugs, cables, etc.). | Reset, auto-reset | Tripped | 5 |
| Fault - PLC/PCS | The PLC that controls the feeder was or is in STOP mode. | Check the operating state of the PLC. | Reset, auto-reset | Tripped | 6 |
| Fault antivalence | The limit switches are not reporting any antivalent signals. | • Limit switch open circuit<br>• Please check the positioner application and the limit switches. | Counter command "OPEN/ CLOSED" | Tripped | 16 |
| Fault - EM open circuit | A short circuit has occurred in the wiring to the 3UL23 residual current transformer. | Check the wiring to the 3UL23 residual current transformer | Reset | Tripped | 38 |
| Fault - EM short-circuit | A short-circuit has occurred in the wiring to the 3UL23 residual current transformer. | Check the wiring to the 3UL23 residual current transformer | Reset | | 39 |
| Fault end position | Positioner/solenoid valve has left the end position without a command being issued. The motor feeder has been turned off. | Acknowledge the fault by releasing with the counter command "OPEN/ CLOSED". | Reset; counter command | Tripped | 15 |
| Fault - temporary components (e.g. memory module) | One of the following components is defective:<br>• Memory module<br>• PC cable. | Replace the defective components. See Chapter Replacing SIMOCODE pro components (Page 271). | Clear the fault; reset | Tripped | 2 |

| Event (alphabetical) | Description | Troubleshooting | Acknowledgment / fault rectification | Contactor control | Error No. [1] |
|---|---|---|---|---|---|
| Temperature module 1/2 - trip level exceeded | The temperature trip level has been overshot. | Check the temperature measuring station. | Tripped | | 35 |
| Temperature module 1/2 - warning level exceeded | The temperature warning level has been exceeded. | Check the temperature measuring station. | | | |
| Temperature module 1/2 out of range | Temperature sensor is delivering impermissible values. | Check the temperature sensor. | Reset | Tripped | 37 |
| Temperature module 1/2 sensor fault | Either a short circuit or an open circuit has occurred in the temperature sensor circuit. | Check the temperature sensor and the sensor cable. | Clear the fault; reset | Tripped | 36 |
| Test trip | The motor feeder has been checked and switched off by a test trip. | | Reset | Tripped | 65 |
| Thermistor trip level | Thermistor protection response. The temperature of the motor is too high. | Please check the motor and the application that is being driven by the motor. The motor cannot be switched on again until the temperature has reached the reset point of the thermistor. | Reset, auto-reset | Tripped | 31 |
| Thermistor open circuit | An open circuit has occurred in the thermistor sensor cable. | Check the thermistor sensor cable and the thermistor. | Clear the fault; reset | Tripped | 33 |
| Thermistor short circuit | A short circuit has occurred in the thermistor sensor cable. | Check the thermistor sensor cable and the thermistor. | Clear the fault; reset | Tripped | 32 |
| Dry-running – pump | Dry-running of the pump was prevented by switching off the pump motor. Possible causes:<br>• The permissible limit value of the minimum flow rate $Q_{min}$ of the pump was undershot or<br>• The set limit value of the active power $P_{min}$ of the pump motor is not correct. | Make sure that the minimum flow rate specified for the pump is not undershot and that the monitored limit value of the active power $P_{min}$ has been set correctly. | | | |

| Event (alphabetical) | Description | Troubleshooting | Acknowledgment / fault rectification | Contactor control | Error No. [1] |
|---|---|---|---|---|---|
| Dry-running protection – error | An error was detected in the measured value acquisition of the active power of the pump motor or the teach-in process was interrupted with a timeout. The pump motor was switched off.<br>Possible causes:<br>• Timeout during teach-in process<br>• Unbalance in voltage or current of at least 30%<br>• Fault in current/voltage measuring module | 1. Repeat the teach-in process.<br>2. Check the power supply.<br>3. Check the current/voltage measuring module; replace the defective component. | | | |
| Overload | The motor feeder has been overloaded. | Please check the motor and the application that is being driven by the motor. The motor can be switched on again after the cooling down period has expired or after an emergency start. | Reset, auto-reset | Tripped | 26 |
| Overload and unbalance | There is a load unbalance on the motor feeder phases. Possible causes:<br>• Phase failure<br>• Fault in the motor windings. | Check the motor feeder and the motor. The motor can be switched on again after the cooling down period has expired or after an emergency start. | Reset, auto-reset | Tripped | 27 |
| Prewarning overload (I > 115 %) | The motor feeder is in overload operation. If this condition continues to persist, the motor feeder will trip within a short period of time due to overload. | Please check the motor and the application that is being driven by the motor. | | | |
| Warning level cos phi < | The power factor cos phi has undershot the warning level.<br>Possible cause: The motor is being operated without a load. | Please check the application that is being driven by the motor. | | | |
| Warning level I< undershot | The maximum current has undershot the warning level. | Please check the application that is being driven by the motor. | | | |
| Warning level I> overshot | The maximum current has overshot the warning level. | Please check the application that is being driven by the motor. | | | |
| Warning level P< undershot | The active power of the motor has undershot the warning level. | Please check the application that is being driven by the motor. | | | |
| Warning level P> overshot | The active power of the motor has overshot the warning level. | Please check the application that is being driven by the motor. | | | |
| Warning level U< undershot | The voltage in the motor feeder has undershot the warning level. Possible causes:<br>• Undervoltage in the network<br>• Fuse has tripped. | Check the motor feeder. | | | |

| Event (alphabetical) | Description | Troubleshooting | Acknowledgment / fault rectification | Contactor control | Error No. [1] |
|---|---|---|---|---|---|
| Warning level 0/4 - 20 mA < undershot | The measured value at the analog input has undershot the warning level. | Check the measuring station. | | | |
| Warning level 0/4 - 20 mA > overshot | The measured value at the analog input has overshot the warning level. | Check the measuring station. | | | |
| Permissible number of starts exceeded | The permissible number of starts in the monitoring timeframe has already been exceeded. The next start should not be carried out until the interlocking time has expired. | | Reset | Tripped | 52 |

1) See also "Error number" in Chapter "Data record 72 - Error buffer" in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960).

**Note**

**2) Parameter block**

On devices in the as-delivered condition or after the factory settings have been restored, the parameter block is not active!

3) SIMOCODE pro fail-safe digital modules (https://support.automation.siemens.com/WW/view/en/50564852)

4) Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958)

5) SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960)

6) If SIMOCODE pro restarts the basic unit after a hardware fault into the normal operating mode (device LED lights up green) by means of a power cycle, no hardware replacement is necessary.

# Safety and commissioning information for Ex areas 14

## 14.1 Motor protection functions (overload protection, thermistor protection)

### 14.1.1 Module integration

The motor protection functions (overload protection, thermistor protection) are implemented in the following modules:

- 3UF70 basic units
- 3UF71 current / voltage measuring modules
- 3UF73 digital modules
- 3UF76 multifunction modules.

### 14.1.2 Information and standards

#### Information and standards

**Motor protection functions (overload protection, thermistor protection)**

The overload protection and the thermistor motor protection of the SIMOCODE pro system comply with the requirements for overload protection of explosion-proof motors of the following types of protection:

- **Ex d "flameproof enclosure" according to DIN EN 60079-1**
- **Ex e "increased safety" according to DIN EN 60079-7**
- **Ex p "pressurization" according to DIN EN 60079-2**
- **Ex t "dust ignition protection by enclosure" according to DIN EN 60079-31**

Increased danger in hazardous areas means it is necessary to carefully observe the following notes and standards:

- **IEC 60079-14 / EN 60079-14 / DIN VDE 0165-1** Electrical equipment for locations with explosive gas atmosphere - Electrical installations in hazardous areas (except mines)
- **IEC 60079-17 / EN 60079-17 / DIN VDE 0165-10-1** Electrical equipment for locations with explosive gas atmosphere - Testing and maintenance of electrical installations in hazardous areas (except mines)
- **DIN EN 50495** Safety devices required for the safe functioning of equipment with respect to explosion risks

- **VDE 0118** Erection of electrical installations in mines
- **National implementation of Directive 1999/92/EC**

All 3UF7 devices are approved under Equipment Group I, Category "M2" (mining) and Equipment Group II, Category 2 in the area "G and D" (areas in which explosive gas, vapor, mist and air mixtures as well as flammable dust are present):

Marking:

- BVS 06 ATEX F 001 *) / ITS21UKEX0464
- II (2) G [Ex eb Gb][Ex db Gb][Ex pxb Gb]
- II (2) D [Ex tb Db][Ex pxb Db]
- I (M2) [Ex db Mb]

*)

**Note**

This safety and commissioning information is also valid for devices with certificate numbers BVS 04 ATEX F 003.

The devices are suitable for protecting motors in potentially explosive areas in accordance with the above standards.

**WARNING**

**Use in hazardous locations**

The components of SIMOCODE pro are **not** suitable for installation in hazardous areas.

The device is only allowed to be installed in a control cabinet with the minimum degree of protection of IP 4x.

If you have any questions, ask your explosion protection specialist.

**WARNING**

**Qualified personnel required**

All work involved in connecting, commissioning and maintenance must be carried out by **qualified, responsible** personnel.

Failure to follow proper procedures may result in **personal injury and damage to property**.

## 14.1.3 Installation and commissioning – motor protection functions (overload protection, thermistor protection)

### 14.1.3.1 Operating Instructions

| NOTICE |
| --- |
| **SIMOCODE pro Operating Instructions**<br>Please observe the SIMOCODE pro Operating Instructions (enclosed with the devices).<br>You can find the Operating Instructions for SIMOCODE pro listed in Chapter General information about commissioning and service (Page 247) or at Operating Instructions (https://support.industry.siemens.com/cs/ww/en/ps/16027/man) in the Industry Online Support. |

### 14.1.3.2 Setting the rated motor current

**Notes/example**

Set the 3UF7 to the rated motor current (according to the type plate or design test certificate of the motor).

| NOTICE |
| --- |
| **Trip class / tripping characteristic**<br>Pay attention to the trip class or the tripping characteristic of the 3UF7.<br>Choose the trip class so that the motor is thermally protected even with a blocked rotor.<br>The motor, cables, and contactor must be dimensioned for the selected trip class. |

| NOTICE |
| --- |
| **Setting the "response" of the overload protection**<br>Set the response of the overload protection to "Trip"! |

## Example of a tripping characteristic with 3UF710* current/voltage measuring modules and 3UF711*-1AA00-0 1st generation current/voltage measuring modules

Motor 500 V, 50 / 60 Hz, 110 kW, 156 A, temperature class T3, time $T_E$ = 11 s, $I_A$ / $I_s$ = 5.5:

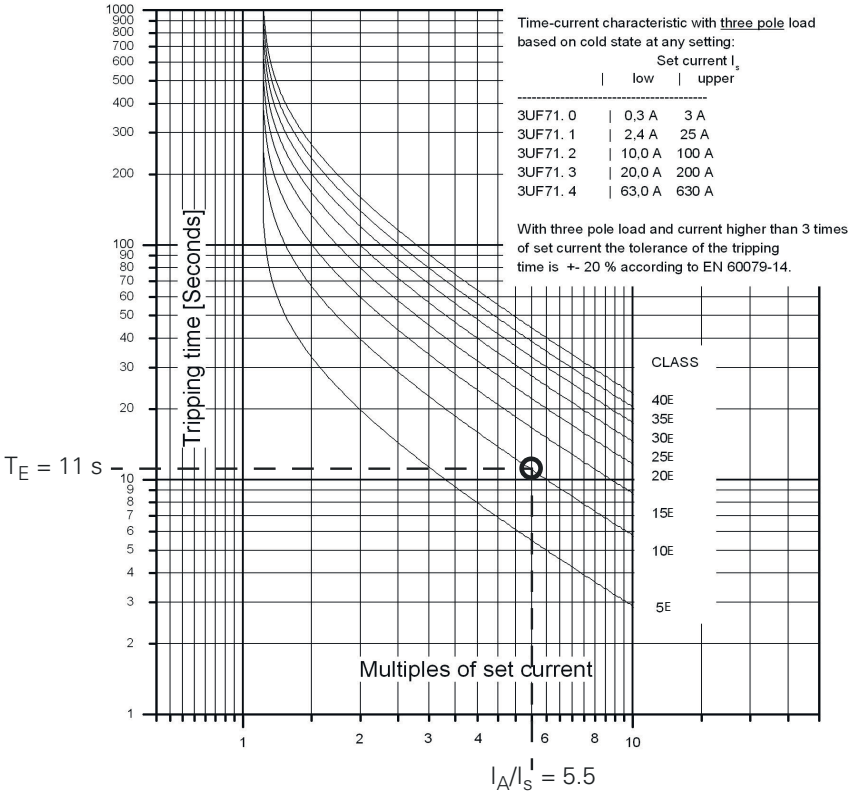



Figure 14-1 Tripping conditions of the Ex e motor, selected: CLASS 10E when using a 3UF710* current measuring module

The latest tripping characteristics for SIMOCODE pro can be found in the Industry Online Support (Tripping characteristics 3UF7 (https://support.industry.siemens.com/cs/search?search=3UF7&type=Characteristic&lc=en-WW)).

| **NOTICE** |
| --- |
| **Tripping characteristic**<br>The type of tripping characteristic is dependent on the configured measuring module.<br>If a 3UF711*-1AA00-0 1st generation current / voltage measuring module is configured in a parameter assignment, although a 3UF711*-1AA01-0 2nd generation current / voltage measuring module is used, then the tripping characteristic remains that of the 1st generation current / voltage measuring module.<br>If only the hardware of the measuring module is replaced, this does not result in any change to the tripping behavior. |

### 14.1.3.3 SIMOCODE pro with thermistor input

On the 3UF70, you can use temperature sensor type A with a characteristic according to IEC 60947-8 (DIN VDE 0660, part 303) and DIN VDE V 0898-1-401.

Depending on the number of sensors, the following tripping and restart temperatures apply.

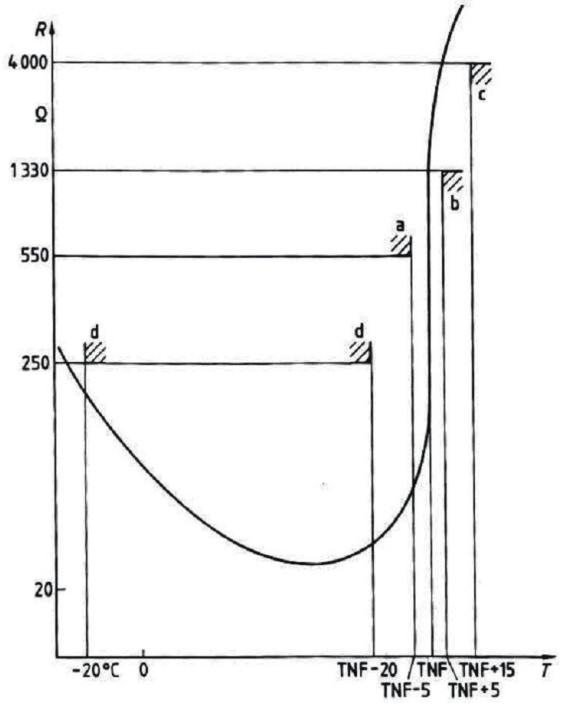



Figure 14-2 Typical characteristic curve of a type A sensor (logarithmic scale)

Depending on the number of sensors, the following tripping and restart temperatures will result based on the TNF (rated response temperature of the sensor):

Table 14-1 Tripping and restart temperatures

| | **Tripping temperature** | **Restart temperature** |
|---|---|---|
| 3 sensors | TNF +4 K | TNF -7 K |
| 6 sensors | TNF -5 K | TNF -20 K |

The temperatures listed are limit values.

**⚠ CAUTION**

**Response setting**

Set the response for the activated thermistor to "Trip"!

### 14.1.3.4 Sensor circuit wiring

| NOTICE |
| --- |
| **Installing the measuring circuit cables**<br>Lay the measuring circuit cables as separate control cables. It is not permissible to use the cores of the motor supply cable or other main supply cables.<br>Shielded control cables should be used if extremely inductive or capacitive interference is expected as a result of power cables routed in parallel. |

Maximum cable lengths of the sensor circuit cables:

Table 14-2 Maximum cable length of the sensor circuit cables

| Cable cross section | Cable lengths (single) at the thermistor input | |
| --- | --- | --- |
| | Without short-circuit detection | With short-circuit detection[1)] |
| 2.5 $mm^2$ | 2800 m | 250 m |
| 1.5 $mm^2$ | 1500 m | 150 m |
| 0.5 $mm^2$ | 500 m | 50 m |
| 1) A short circuit in the sensor circuit will be detected up to these maximum cable lengths. | | |

| NOTICE |
| --- |
| **Evaluation of the short-circuit detection of the sensor cable**<br>Evaluating the short-circuit detection of the sensor cable is recommended.<br>If the short-circuit detection of the sensor cable is not evaluated, when commissioning or after modifications / maintenance work (assembly, disassembly) of the system, the sensor resistor must be measured using a suitable measuring instrument. |

### 14.1.3.5 Short-circuit protection for type of coordination 2 according to IEC 60947-4-1

Short-circuit protection must be carried out by separately arranged overcurrent protection devices.

| NOTICE |
| --- |
| **Fuse protection of the contactor for type of coordination 2**<br>When combining with other contactors, observe the respective maximum fuse protection of the contactor for type of coordination 2. |

### 14.1.3.6 Cable protection

| NOTICE |
| --- |
| **Cable cross sections**<br>Avoid impermissibly high cable surface temperatures by correctly dimensioning the cross sections!<br>Choose a sufficient cable cross section, especially for heavy-starting motors CLASS 20E to CLASS 40E (see Chapter Short-circuit protection with fuses for motor feeders for short-circuit currents up to 100 kA and 690 V for 1st generation current / voltage measuring module (Page 353)) |

### 14.1.3.7 Test

#### Testing - general information

SIMOCODE pro offers users a convenient method of checking the complete motor protection chain (incl. actuators and sensors such as contactors, circuit breakers, thermistors). This can be used, for example, for testing according to IEC 60079-17 or VDE 0118 The test encompasses a full function test. For this purpose, all three test phases are to be carried out (hardware test, current feedback, motor protection tripping, see below). The test can be carried out using the "TEST / RESET" buttons provided, or automatically via the bus. Tripping currents do not need to be injected in order to carry out testing.

#### Test phases

- Phase 1: Hardware test / lamp test (0 to 2 s):
  The hardware (e.g. the thermistor electronics) is tested, all LEDs and displays are activated, including the lamp control. Contactor controls remain unchanged.
- Phase 2: Hardware test results (2 s to 5 s):
  If there is a fault, the "HW fault basic unit" fault is triggered.
  If there is no fault:
  - the "GEN. FAULT" LED flashes if no main current is flowing
  - the "GEN. FAULT" LED flickers; if main current is flowing in all three phases (exception: with a "1-phase load" in one phase).
- Phase 3: Relay test (> 5 s):
  If testing is carried out with tripping, the contactor controls are deactivated.

The contactor control can only be shut down by means of the "Test 1" function block and in the "Local 1-3" operating mode, using the "TEST / RESET" button on the basic device / operator panel.

The following table shows the test phases performed when the "TEST / RESET" button is pressed for the required length of time:

Table 14-3 States of the status LEDs / contactor controls during testing

| Test phase | Status | Without main current | | With main current | |
|---|---|---|---|---|---|
| | | OK | Fault *) | OK | Fault |
| Hardware test / lamp test | | | | | |
| < 2 s | "DEVICE" LED | ◯ orange | ◯ green | ◯ orange | ◯ green |
| | "GEN.FAULT" LED | ◯ | ◯ | ◯ | ◯ |
| | Contactor control | Unchanged | Unchanged | Unchanged | Unchanged |
| | Show QL *) | ◯ | ◯ | ◯ | ◯ |
| Results of the hardware test / lamp test | | | | | |
| 2 to 5 s | "DEVICE" LED | ◯ green | ◯ red | ◯ green | ◯ red |
| | "GEN.FAULT" LED | ◑ | ◯ | ⊗ | ◯ |
| | Contactor control | Unchanged | Deactivated | Unchanged | Deactivated |
| Relay test | | | | | |
| > 5 s | "DEVICE" LED | ◯ green | ◯ red | ◯ green | ◯ red |
| | "GEN.FAULT" LED | ◯ | ◯ | ◯ | ◯ |
| | Contactor control | Deactivated | Deactivated | Deactivated | Deactivated |

◯ LED lighted / switched on
◑ LED flashing
⊗ LED flickering
○ LED off
*) "Fault" only displayed after 2 s

### 14.1.3.8 Further safety guidelines

**⚠ WARNING**

**Safety information for DM-F Local and DM-F PROFIsafe fail-safe digital modules**

Pay attention to the safety notes in the Manual Fail-safe Digital Modules SIMOCODE pro (http://support.automation.siemens.com/WW/view/en/50564852).

**⚠ CAUTION**

**Using relay outputs for the protection function**

For the protection function, only the relay outputs of the 3UF70 basic unit, of a monostable digital module 3UF730, of a multifunction module 3UF76, or of a fail-safe expansion module 3UF732/3UF733 may be used, and only if connected to the corresponding contactor controls "QE" of the control function!

**⚠ WARNING**

**The 3UF7 is not suitable for installation in hazardous areas.**

The device is only allowed to be installed in a control cabinet with the minimum degree of protection of IP 4x.

If installed in hazardous areas, there must be no ignition hazard from the 3UF7. Appropriate measures must be taken (e.g. encapsulation).

**⚠ WARNING**

**Electrical isolation required**

For SIMOCODE pro devices with a 24 V DC control supply, galvanic isolation must be ensured with a battery or a safety isolating transformer according to DIN EN 61558-2-6.

**Note**

The 3UF7 is not suitable for load-side operation on frequency converters.

### 14.1.3.9 Ambient conditions

Permissible ambient temperature range:

- Storage / transport: -40 °C to +80 °C
- Operation: -25 °C to +60 °C; OPD: 0 °C to +60 °C.

### 14.1.3.10 Safety values

In a system with SIMOCODE pro basic units and current measuring modules, the functionality of the SIMOCODE pro motor protection and control device is suitable for use in safety functions up to safety integrity level SIL1.

This applies to the "low demand mode of operation" with a three-year test cycle for safety functions as well as for the "high demand mode of operation".

- $SFF_{SIMOCODE} \geq 60\ \%$
- $PFH_{Max,\ SIMOCODE} \leq 3 * 10^{-6}$ 1/h
- $PFD_{3a} \leq 3*10^{-2}$
- HFT = 0 (single-channel system)
- $T_{UL}$ = 20 years

The failure rate was specified for a maximum ambient temperature of 60 °C.

The requirements demanded of SIL 1 are fulfilled with a reserve of 70% for sensors and actuators.

### 14.1.4 Maintenance and repairs

These devices are maintenance-free.

**WARNING**

**Repairs**

Repairs to the device may only be carried out by the manufacturer.

### 14.1.5 Warranty

**Note**

To meet the conditions of the warranty, you must observe the safety and commissioning instructions from the operating instructions.

You can find the Operating Instructions for SIMOCODE pro listed in Chapter General information about commissioning and service (Page 247) or at Operating Instructions (https://support.industry.siemens.com/cs/ww/en/ps/16027/man) in the Industry Online Support.

### 14.1.6 Further information

You will find further information on the Internet:

- Internet (https://www.siemens.com/simocode)
- Information and Download Center (https://support.industry.siemens.com/cs/ww/en/ps/16027/cat)
- Product Information System (ProdIS) (https://support.industry.siemens.com/cs/ww/en/ps)
- Service and support (https://siemens.com/support-request)
- ATEX (https://www.siemens.com/sirius/atex)
- Certificates (https://support.industry.siemens.com/cs/ww/en/ps/16027/cert)

# 14.2 Dry-running protection for centrifugal pumps by active power monitoring

## 14.2.1 Module integration

The function "dry-running protection for centrifugal pumps by means of active power monitoring" is implemented in the following modules:

- Basic units with PTB 18 ATEX 5003 X / ITS21UKEX0455X:
  - 3UF7010-1A.00-0 from *E16*
  - 3UF7011-1A.00-0 from *E13*
  - 3UF7013-1A.00-0 from *E04*
- 3UF712 current/voltage measuring modules

You must to use a combination of both modules to realize this function.

**Note**

At the start of delivery, SIMOCODE pro V PN 3UF7011-1A.00-0 from V3.0.0 and SIMOCODE pro V EIP 3UF7013-1A.00-0 from V2.0.0 do not yet feature an ATEX dry-running protection function: It is therefore not possible to activate this feature in the affected devices.

## 14.2.2 Information and standards

### Information and standards

**Dry-running protection for centrifugal pumps by active power monitoring – type of ignition protection b**

Monitoring systems against dry running are one of the elements required to ensure the safe operation of centrifugal pumps in hazardous areas.

SIMOCODE pro is a safety, controlling or regulating device intended to work autonomously. SIMOCODE pro corresponds to the requirement level for a b1 ignition protection system for centrifugal pumps that are suitable for pumping flammable media and are installed in hazardous areas.

**⚠ WARNING**

**Use in hazardous locations**

The components of SIMOCODE pro are **not** suitable for installation in hazardous areas.

The device is only allowed to be installed in a control cabinet with the minimum degree of protection of IP 4x.

If you have any questions, ask your explosion protection specialist.

**NOTICE**

**Overall ignition protection concept**

According to the overall ignition protection concept for the centrifugal pump, further independent monitoring devices may be necessary, depending on the requirement level, to avoid ignition sources in the event of expected and/or rare malfunctions. Failure of this "dry-running protection for centrifugal pumps by active power monitoring" device for control of ignition sources is regarded as a rare malfunction.

**⚠ WARNING**

**Qualified personnel required**

All work involved in connecting, commissioning and maintenance must be carried out by **qualified, responsible** personnel.

Failure to follow proper procedures may result in **personal injury and damage to property**.

With SIMOCODE pro the dry-running protection for centrifugal pumps (non-electrical device) works by active power monitoring and shutdown of the motor if a minimum flow rate is undershot. This corresponds to the following type of ignition protection: **Control of ignition sources b, ignition protection system b1, e.g. according to DIN EN 80079-37**

SIMOCODE pro is registered for dry-running protection for centrifugal pumps by active power monitoring according to both ATEX and IEC Ex.

Increased danger in hazardous areas means it is necessary to carefully observe the following notes and standards:

- **IEC 60079-14 / EN 60079-14 / DIN VDE 0165-1** Electrical apparatus for explosive gas atmospheres - Electrical installations in hazardous areas (other than mines)
- **IEC 60079-17 / EN 60079-17 / DIN VDE 0165-10-1** Electrical apparatus for explosive gas atmospheres - Explosive atmospheres. Electrical installations inspection and maintenance (other than mines)

- **DIN EN 50495** Safety devices required for the safe functioning of equipment with respect to explosion risks
- **VDE 0118** Erection of electrical installations in mines
- **DIN EN ISO 80079-36** Explosive atmospheres - Part 36: Non-electric equipment for use in explosive atmospheres - Basic method and requirements
- **DIN EN ISO 80079-37** Explosive atmospheres - Part 37: Non-electrical equipment for explosive atmospheres - Non-electrical type of protection constructional safety "c", control of ignition sources "b", liquid immersion "k"
- **DIN EN 1127-1** Explosive atmospheres - Explosion prevention and protection - Part 1: Basic concepts and methodology
- **DIN EN 13237** Potentially explosive atmospheres – Terms and definitions for equipment and protective systems intended for use in potentially explosive atmospheres
- **DIN EN 15198** Methodology for the risk assessment of non-electrical equipment and components for intended use in potentially explosive atmospheres
- **National implementation of Directive 1999/92/EC**

Marking on the nameplate of the SIMOCODE pro device with meaning with regard to the possible applications of the centrifugal pumps to be protected in hazardous areas:

- PTB 18 ATEX 5003 X / ITS21UKEX0455X
- IECEx PTB 18.0004 X
- I (1G/M2) [Ex h Ga/Mb]
- II (1/2) G [Ex h Ga/Gb]
- II (1G/2D) [Ex h Ga/Db]

**Explanation of marking:**

Notes regarding the term "device":

- The electrical device to be marked (SIMOCODE pro) is installed in the non-hazardous area.
- The marking refers to the requirements for the non-electrical device (centrifugal pump) to be protected, which is installed in the hazardous area or in which a hazardous area may be present.
- The protection function of the SIMOCODE pro device is achieved by monitoring/avoiding ignition sources on the device to be protected (centrifugal pump) by preventing dry running.

All valid device combinations (see Module integration (Page 305)) are permitted:

- For explosion protection outside of the equipment (centrifugal pump)
  - Under Equipment Group I, Equipment category M2 (mining) for mines endangered by firedamp
  - Under Equipment Group II, Equipment category 2G (potentially explosive gas atmospheres, zone 1)
  - Under Equipment Group II, Equipment category 2D (potentially explosive dust atmospheres, zone 21)
- For explosion protection within the equipment (centrifugal pump). In this case, approval relates to both stated Equipment Groups and Equipment category 1G (potentially explosive gas atmospheres, zone 0).

**Explanation of approval for explosion protection within the equipment (centrifugal pump):**

In practice, very rarely zone 0 (gas/vapor/mist) will be present inside the pump, but possibly zone 2, sometimes also zone 1. These use cases are covered by the approval for zone 0. For requirements according to zone 2 and zone 1, SIMOCODE pro can be used as the sole safety device to protect against dry running - depending on the overall protection concept of the operator. For requirements according to zone 0, SIMOCODE pro can be used as a building block in addition to other independent safety devices - here too, depending on the overall protection concept of the operator.

The devices/modules are also marked with the following warning:

**"WARNING – this enclosure contains equipment forming part of an ignition protection system in accordance with ISO 80079-37."**

| **NOTICE** |
| --- |
| **Monitoring equipment required**<br>Take steps to ensure that the system cannot operate without any additional monitoring equipment required by the overall ignition protection concept. |

| **NOTICE** |
| --- |
| **Points to observe**<br>To ensure that SIMOCODE pro is used as intended for dry-running protection for centrifugal pumps by active power monitoring in hazardous areas, observe the stipulations from this manual as well as the stipulations from the manuals provided by the manufacturers of the centrifugal pump and the motor. |

The devices are suitable for dry-running protection of centrifugal pumps by active power monitoring in hazardous areas in accordance with the above standards.

**Tests other than those legally stipulated (Ordinance on Industrial Safety and Health) are not required.**

## 14.2.3 Installation and commissioning – dry-running protection for centrifugal pumps by means of active power monitoring

### 14.2.3.1 Operating Instructions

| NOTICE |
| --- |
| **SIMOCODE pro Operating Instructions**<br>Please observe the SIMOCODE pro Operating Instructions (enclosed with the devices).<br>You can find the Operating Instructions for SIMOCODE pro listed in Chapter General information about commissioning and service (Page 247) or at Operating Instructions (https://support.industry.siemens.com/cs/ww/en/ps/16027/man) in the Industry Online Support. |

| NOTICE |
| --- |
| **Operating instructions from the manufacturer of the centrifugal pump and the manufacturer of the motor used to drive the pump**<br>Observe the operating instructions from the manufacturer of the centrifugal pump that is to be protected against dry running as well as those from the manufacturer of the motor used to drive the pump |

### 14.2.3.2 General information on installation and commissioning

| ⚠ WARNING |
| --- |
| **Qualified personnel required**<br>All work involved in connecting, commissioning and maintenance must be carried out by **qualified, responsible** personnel.<br>Failure to follow proper procedures results in **personal injury and damage to property**. |

| NOTICE |
| --- |
| **Information provided by the pump manufacturer**<br>Observe all information provided by the pump manufacturer concerning installation / mounting / preconditions for commissioning. |

**NOTICE**

**Setting the motor's rated current**

Set the motor's rated current $I_E$ (see nameplate) correctly in SIMOCODE pro.

The automatic zero point measurement at $I < 0.1 * I_E$ can lead to unintended shutdowns if $I_E$ is set too high.

### 14.2.3.3 Special conditions for commissioning and operation

**NOTICE**

**Commissioning and operation of the centrifugal pumps to be protected**

You must commission and operate the centrifugal pumps that are to be protected in accordance with the pump manufacturer's stipulations.

**NOTICE**

**Suitability of the device for control of ignition sources**

The device for control of ignition sources is suitable for centrifugal pumps with progressive flow characteristics with sufficient distance between the active powers $P_{MIN}$ at the minimum flow rate $Q_{MIN}$ and $P_{OPT}$ at the operating point $Q_{OPT}$ with $P_{MIN} / P_{OPT} < 0.80$.

**⚠ CAUTION**

**Setting the required switching levels**

Set the dry-running protection by active power monitoring to the required switching level and check that it is working correctly.

The equipment may not be used as a device for control of ignition sources for monitoring the liquid filling of a centrifugal pump installed in a potentially explosive atmosphere until the combination pump/motor/shutdown has been successfully tested.

**NOTICE**

**Checking the set parameter values**

Check the parameter values that have been set with respect to their suitability for the protection function in terms of avoiding dry running when required (following any changes in the pump or system characteristics, e.g. as a result of changing the operating medium or of intervention in the plant configuration). Correct the parameter values where necessary.

To determine the active power from which the trip level is derived, you must either use the same 3UF7 system, with which the shutdown function is realized, or an identical system with the same functionality. External measuring equipment is not permitted for determining the active power.

| **NOTICE** |
| --- |
| **Monitoring limit values**<br>Make sure that the pump is shut down when the limit values for monitoring are reached. |

| **⚠ CAUTION** |
| --- |
| **No automatic restart**<br>Take steps to ensure that the drive motor cannot automatically restart.<br>Acknowledge any fault manually once it has been remedied. |

| **NOTICE** |
| --- |
| **Periodic function tests**<br>Test the device for control of ignition sources in accordance with the operating instructions on a periodic basis to make sure it is working correctly (see sections Test (Page 313) and Periodic tests (Page 317)). |

### 14.2.3.4 Setting the parameters

#### Example

Set the following parameters in SIMOCODE pro:

- Trip level: $P_{TRIP}$ threshold value for active power monitoring to prevent dry running: $P_{TRIP}$ < (lower limit): 0 - 750000 W (default setting: 0)
- Delay time for preventing incorrect tripping caused by short undershooting of the $P_{TRIP}$ threshold value during operation: $t_{V,TRIP}$: 0 - 10 s (default setting: 0.5 s, incrementally: 0.1 s)
- Start-up bridging time for preventing incorrect tripping caused by short undershooting of the $P_{TRIP}$ threshold value during start-up of the centrifugal pump (depending on the procedure used to open the pressure-side shut-off valve): $t_{BRIDGE}$: 0 - 60 s (default setting: 0 s, incrementally: 0.5 s). During the start-up bridging time, the dry-running protection function is suppressed. If the trip level is still undershot after expiry of $t_{BRIDGE}$, then the delay time $t_{V,TRIP}$ starts to run from this instant.

Parameters can be entered directly in SIMOCODE ES.

To determine the trip level, you must perform an active power measurement with a corresponding 3UF7 system beforehand (either with the same system, which is also used for monitoring, or with an identical system with the same functionality). You will find the parameters in the project for the respective SIMOCODE pro device in the parameter editor under "Dry-running protection". You must upload the parameters manually to the device.

However, we recommend a "teach-in" to determine and enter the parameters. This must be carried out with the medium being pumped. You can initially carry out the teach-in with water during the cold commissioning of the production plant. However, it is essential that you repeat the procedure with operating medium under operational conditions.

SIMOCODE ES engineering software will support you when carrying out the teach-in by providing a dry-running wizard.

To start the wizard, go to the online view and open the commissioning editor for the respective SIMOCODE device in the project. You will find the wizard there under "Dry running wizard".

**Note**

**Teach-in procedure**

The teach-in procedure as well as that for direct entry of the parameters is described in the chapter "Dry-running protection for centrifugal pumps" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

**Note**

**Log file**

For verification purposes, we recommend generating a log file (see Chapter "Dry-running protection of centrifugal pumps" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958)) after setting the parameters (whether done as a teach-in or by means of direct entry using SIMOCODE ES).

**Note**

**Activating the dry-running protection function**

This function is deactivated in the as-delivered state.

The function is activated following a successful run-through with the wizard. The response of the dry-running protection at $P_{TRIP}$ < (lower threshold) is set to "Trip".

**Note**

**Default setting for response**

The response of the dry-running protection at $P_{TRIP}$ < (lower threshold) is preset to "Trip".

**Note**

**Setting the warning level**

You have the option of configuring an additional warning level for undershooting of active power using the "Active power monitoring" function (see Chapter "Active power monitoring" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958)). This becomes effective before the trip level $P_{TRIP}$ is undershot.

However, this warning level is of no relevance with respect to approval for use in hazardous areas.

| NOTICE |
| --- |
| **Manufacturer's instructions on the centrifugal pump**<br>Observe the manufacturer's instructions for the centrifugal pump, which must be protected against dry running, in particular the characteristic curve which supplies the information on the minimum flow rate and possible information for the procedure during startup and shutdown of the pump / motor. |

#### 14.2.3.5 Line protection

| NOTICE |
| --- |
| **Cable / conductor cross sections**<br>Avoid impermissible maximum cable surface temperatures by correctly dimensioning the cross sections!<br>Choose a sufficient cable cross section, especially for heavy-starting motors CLASS 20E to CLASS 40E (see Chapter Short-circuit protection with fuses for motor feeders for short-circuit currents up to 100 kA and 690 V for 1st generation current / voltage measuring module (Page 353)) |

#### 14.2.3.6 Test

**General system tests**

SIMOCODE pro offers you a method of checking the dry-running protection chain (incl. actuators such as contactors, circuit breakers). Use this, for example, to carry out the test according to IEC 60079-17 or VDE 0118.

The test encompasses a full function test. For this purpose, all 3 test phases are to be carried out (hardware test, current feedback, motor protection tripping, see below). The test can be carried out using the "TEST / RESET" buttons provided, or automatically via the bus. It is not necessary to load the test variable (active power) to check if the measured values are correct.

**Note**

**Must be carried out periodically**

You must repeat the general system tests at least every 3 years (cf. IEC 60079-17, Section 4.4.2).

**Test phases of the general system test**

The hardware is tested, all LEDs and displays are activated, including the lamp control. Contactor controls remain unchanged.

- Phase 1: Hardware test / lamp test (0 s to 2 s)
- Phase 2: Hardware test results (2 s to 5 s): If there is a fault, the "HW fault basic unit" fault is triggered. If there is no fault:
  - The "GEN. FAULT" LED flashes if no main current is flowing
  - The "GEN. FAULT" LED flickers if main current is flowing in all 3 phases (exception: with a "1-phase load" in one phase).
- Phase 3: Relay test (> 5 s): If testing is carried out with tripping, the contactor controls are deactivated. The contactor control can only be shut down by means of the "Test 1" function block and in the "Local 1-3" operating mode, using the "TEST / RESET" button on the basic unit / operator panel.

The following table shows the test phases performed when the "TEST / RESET" button is pressed for the required length of time:

| **Test phase** | **Status** | **Without main current** | | **With main current** | |
|---|---|---|---|---|---|
| | | **OK** | **Fault** *) | **OK** | **Fault** |
| Hardware test / lamp test | | | | | |
| < 2 s | "DEVICE" LED | ◯ orange | ◯ green | ◯ orange | ◯ green |
| | "GEN.FAULT" LED | ◯ | ◯ | ◯ | ◯ |
| | Contactor control | Unchanged | Unchanged | Unchanged | Unchanged |
| | Show QL *) | ◯ | ◯ | ◯ | ◯ |
| Results of the hardware test / lamp test | | | | | |
| 2 - 5 s | "DEVICE" LED | ◯ green | ◯ red | ◯ green | ◯ red |
| | "GEN.FAULT" LED | ◑ | ◯ | ⊗ | ◯ |
| | Contactor control | Unchanged | Deactivated | Unchanged | Deactivated |
| Relay test | | | | | |
| > 5 s | "DEVICE" LED | ◯ green | ◯ red | ◯ green | ◯ red |
| | "GEN.FAULT" LED | ◯ | ◯ | ◯ | ◯ |
| | Contactor control | Deactivated | Deactivated | Deactivated | Deactivated |

◯ LED lights up / activated
◑ LED flashing
⊗ LED flickering
◯ LED off
*) "Fault" only displayed after 2 s

**System test with operating medium**

A system test with operating medium is an integral part of any commissioning procedure (e.g. after changes to parameter settings) and of the "General system test". It might also be required at shorter intervals if demanded by statutory regulations.

**Note**

**Automation**

If you wish to reduce the amount of manual intervention, you can store appropriate sequences in your process control system for (partially) automated running of the system test with operating medium.

- Checking a potential drift:
  - Set the same operating conditions (medium, flow rate, temperature, pressures, etc.) as for the previous test.
  - Measure the active power (at least two measured values, e.g. $P_{OPT}$ and $P_{MIN}$).
  - Compare the measured values with those from the previous test.
  - Eliminate any causes of deviation.
- Checking the effectiveness of shutdown:
  - If not yet done: First enter the relevant values for plant configuration for the trip level of the active power monitoring $P_{TRIP}$ and for the delay time for ongoing operation $t_{V,TRIP}$.
  - If necessary, carry out a teach-in to determine the trip level (see Chapter "Dry-running protection for centrifugal pumps" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958)).
  - Set the start-up bridging time $t_{BRIDGE}$ to 0 s.
  - Start the centrifugal pump filled with operating medium; the pressure-side shut-off valve must be closed. The "dry-running protection" function must shut down the pump immediately.
  - Set a sufficiently large value for the start-up bridging time $t_{BRIDGE}$ – coordinated with the procedure used when starting up the centrifugal pump.
  - Start the centrifugal pump filled with operating medium.
  - Begin by setting a sufficiently high flow rate for ongoing operation.
  - Reduce the pump's flow rate incrementally until the active power value detected by SIMOCODE pro falls below the trip level. The time span during which the flow-rate remains at a certain value for the active power at each step must be longer than the delay time $t_{V,TRIP}$ that has been set. After undershooting the trip level $P_{TRIP}$, the pump must shut down once the delay time $t_{V,TRIP}$ has expired. The system's response (shutdown and delay time) must correspond to the preset parameter values.

### 14.2.3.7 Further safety information

**WARNING**

**Safety information for DM-F Local and DM-F PROFIsafe fail-safe digital modules**

Pay attention to the safety notes in the Manual Fail-safe Digital Modules SIMOCODE pro (http://support.automation.siemens.com/WW/view/en/50564852).

**CAUTION**

**Using relay outputs for the protection function**

For the protection function, only the relay outputs of the 3UF70 basic unit, of a monostable digital module 3UF730, of a multifunction module 3UF76, or of a fail-safe expansion module 3UF732/3UF733 may be used, and only if connected to the corresponding contactor controls "QE" of the control function!

**WARNING**

**Electrical isolation required**

For SIMOCODE pro devices with a 24 V DC control supply, you must ensure galvanic isolation with a battery or a safety isolating transformer according to DIN EN 61558-2-6.

**Note**

SIMOCODE pro is not suitable for load-side operation on frequency converters.

### 14.2.3.8 Environmental conditions

Permissible ambient temperature range:

- Storage / transport: -40 °C to +80 °C
- Operation: -25 °C to +60 °C; OPD: 0 °C to +60 °C.

### 14.2.3.9 Safety values

In a system with SIMOCODE pro basic units and current measuring modules, the functionality of the SIMOCODE pro motor protection and control device is suitable for use in safety functions up to safety integrity level SIL1.

This applies to the "low demand mode of operation" with a three-year test cycle for safety functions as well as for the "high demand mode of operation".

- $SFF_{SIMOCODE} \geq 60\ \%$
- $PFH_{Max,\ SIMOCODE} \leq 3 * 10^{-6}\ 1/h$
- $PFD_{3a} \leq 3*10^{-2}$
- HFT = 0 (single-channel system)
- $T_{UL}$ = 20 years

The failure rate was specified for a maximum ambient temperature of 60 °C.

The requirements demanded of SIL 1 are fulfilled with a reserve of 70% for sensors and actuators.

### 14.2.4 Periodic tests

You must regularly test the functional safety of the device for control of ignition sources using the "Dry-running protection for centrifugal pumps by means of active power monitoring" function. The procedure corresponds to that for commissioning and is described in section Test (Page 313).

**Note**

**Calibration of active power measurement**

Active power measurement is calibrated just once prior to shipment of the equipment.

It is not necessary to repeat calibration during the equipment's lifetime when used in hazardous areas for dry-running protection for centrifugal pumps by means of active power monitoring.

### 14.2.5 Maintenance and repair

These devices are maintenance-free.

**⚠ WARNING**

**Repairs**

Repairs to the device may only be carried out by the manufacturer.

### 14.2.6 Warranty

**Note**

To meet the conditions of the warranty, you must observe the safety and commissioning information from the operating instructions.

You can find the Operating Instructions for SIMOCODE pro listed in Chapter General information on installation and commissioning (Page 309) or at Operating Instructions (https://support.industry.siemens.com/cs/ww/en/ps/16027/man) in the Industry Online Support.

### 14.2.7 More information

You will find further information on the Internet:

- Internet (https://www.siemens.com/simocode)
- Information and Download Center (https://support.industry.siemens.com/cs/ww/en/ps/16027/cat)
- Product Information System (ProdIS) (https://siemens.com/support-request)
- Service and Support (https://support.industry.siemens.com/cs/ww/en/ps)
- ATEX (https://www.siemens.com/sirius/atex)
- Certificates (https://support.industry.siemens.com/cs/ww/en/ps/16027/cert)

# Technical specifications

# 15

## 15.1 Common technical data

| Common technical data | |
|---|---|
| **Standards** | EN 60204-1, EN 1760-1, ISO 13849-1, IEC 61508, IEC/EN 60947-4-1, IEC/ EN 60947-5-1, ISO EN 80079-36, ISO EN 80079-37 |
| **Test verification documents** | See Certificates (https://support.industry.siemens.com/cs/ww/en/ps/16027/cert) |
| **Certificate of suitability** | |
| IECEx | Yes; IECEx PTB 18.0004 X |
| According to ATEX Product Directive 2014/34/EU | BVS 06 ATEX F 001, PTB 18 ATEX 5003 X |
| According to Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016 (S.I. 2016 No.1107) | ITS21UKEX0464, ITS21UKEX0455X |
| **Permiss. ambient temperature** | |
| In operation | -25 ... +60 °C [1] |
| For storage and transport | -40 ... +80 °C [2] |
| at installation altitude above MSL | |
| ≤ 2000 m | |
| ≤ 3000 m | Max. +50 °C (no protective separation) |
| ≤ 4000 m | Max. +40 °C (no protective separation) |
| **Degree of protection (according to IEC 60529)** | |
| All components (except current measuring modules with bus connection, operator panel and door adapter) | IP20 [5] |
| Current measuring modules with bus connection | IP00 |
| Operator panel (front) and door adapter (front) with cover | IP54 |
| **Vibration resistance** acc. to IEC 60068-2-6 | |
| • General<br>• SIMOCODE pro S basic unit and SIMOCODE pro S multifunction module assembled on a current measuring module<br>• SIMOCODE pro V basic unit assembled on a current / voltage measuring module | • 1-6 Hz / 15 mm; 6-500 Hz / 2 g<br>• 1-6 Hz / 15 mm; 6-500 Hz / 1 g<br>• 1-6 Hz / 15 mm; 6-500 Hz / 1 g |
| **Shock resistance (sine pulse)** acc. to IEC 60068-2-27 | |

| **Common technical data** | |
|---|---|
| • General<br>• SIMOCODE pro S basic unit and SIMOCODE pro S multifunction module assembled on a current measuring module<br>• SIMOCODE pro V basic unit assembled on a current / voltage measuring module | • 15 g / 11 ms<br>• 15 g / 11 ms<br>• 15 g / 11 ms |
| **Mounting position** | • Any (except operator panel, operator panel with display and door adapter)<br>• Operator panel, operator panel with display and door adapter: Vertical |
| **Frequencies** | 50/60 Hz ± 5 % |
| **EMC stability according to IEC 60947-1**<br>• IEC 60947-1, IEC 60947-5-1, SN 27095, NE21<br>• DM-F: IEC 61326-3-1 | Corresponds to degree of severity 3 |
| Conducted interference, burst according to IEC C 61000-4-4 | 2 kV (power ports)<br>**Surge suppressor is required for inductive loads.**<br>1 kV (signal ports) |
| Conducted interference, high-frequency according to IEC 61000-4-6 | 10 V |
| Conducted interference, surge according to IEC 61000-4-5 | 2 kV (line to earth)<br>1 kV (line to line) |
| Electrostatic discharge, ESD according to IEC 61000-4-2 [4] | 8 kV (air discharge)<br>6 kV (contact discharge) [3] |
| Radiated interference immission according to IEC 61000-4-3 | 10 V/m |
| **SIMOCODE pro is a Class A product. This product can cause radio interference if used in a domestic environment. In this case the user must implement suitable countermeasures.**<br>Conducted and radiated interference emission | DIN EN 55011/DIN EN 55022 (CISPR11/CISPR22)<br>(corresponds to Degree of Severity A) |
| **Protective separation according to IEC 60947-1** | All SIMOCODE pro circuits are isolated from each other according to IEC 60947-1, i.e. dimensioned with double creepage distance and air clearance. |
| | **Notice**<br>Observe the notes of the test report, No. A0258 "Protective separation". |
| 3UF793 connecting cable: | |
| Rated voltage | 300 V |
| Rated operating voltage | 24 V |

1) for operator panel with display 3UF721 0 - 60 °C

2) for operator panel with display 3UF721 20 - 70 °C

3) for operator panel with display 3UF721 4kV

4) 3UF7020: Operator input during operation only on the front

5) ⚠ **Danger**

**Hazardous voltage. Will cause death or serious injury.**

To ensure touch protection and degree of protection IP20 for SIMOCODE pro S, screw in all screws that are not used for conductor clamping and close the terminal covers.

## 15.2 Protection of inputs and outputs

The specifications for short-circuit protection (fuses or miniature circuit breakers) are available for the device connections of the main circuit and the auxiliary circuit.

In order to ensure a holistic view for the protection of the device connections, the manufacturer is obliged to provide all relevant information for short-circuit protection and overcurrent protection.

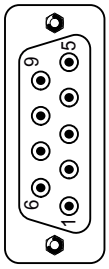
If, for example, device connections for the control supply voltage, the supply voltage, or digital inputs/digital outputs are not connected to self-limiting current sources or energy sources, you can find the relevant information in the section "Mounting, wiring, connecting" of the System Manual and the technical data sheets in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

**See also**

Wiring, connecting (Page 186)

## 15.3 Technical specifications of the SIMOCODE pro C / pro S / pro V PB / pro V MR basic units

| Technical specifications of the SIMOCODE pro C / pro S / pro V PB / pro V MR basic units | |
|---|---|
| **Mounting** | Snap-mounted onto 35-mm standard mounting rail or screw-mounted using additional push-in lugs |
| **Cabinet mounting basic unit SIMOCODE pro S (3UF7020)** | Minimum distance to be maintained<br>• from cabinet rear wall for series mounting at side: 0 mm<br>• from grounded parts at side: 2 mm |
| **Display** | |
| Red / green / yellow "DEVICE" LED | • Red: "Function test negative, device disabled"<br>• Green: "Ready for operation"<br>• Yellow: "Memory module or addressing plug detected"<br>• OFF: "No control supply voltage" |
| Green "BUS" LED | • Continuous light: "Communication with PLC/PCS"<br>• Flashing: "Baud rate recognized/communication with PC/PG"<br>• Flickering: "Communication interrupted" |
| Red "GEN. FAULT" LED | Continuous light/flashing: "Feeder fault," e.g. overload tripping |
| **"TEST/RESET" button** | • Resets the device after tripping<br>• Function test (system self-test)<br>• Operation of memory module or addressing plug |
| **System interfaces** | |
| Front, right-hand side (pro S) | For connecting an operator panel or expansion modules. The memory module, addressing plug or a PC cable can also be connected to the system interface for parameterization purposes. |
| Bottom, front (pro C, pro V) | Connection of a current measuring module or a current/voltage measuring module |
| Front, left-hand side (pro S) | Connection of a current measuring module |
| **PROFIBUS DP interface** | |
| Interface (physical) | RS485 |

| **Technical specifications of the SIMOCODE pro C / pro S / pro V PB / pro V MR basic units** | | |
|---|---|---|
| Connection technology [1] | 9-way sub D socket (12 Mbit)<br>Pin assignment acc. to DIN EN 61158-2<br>Terminals (1.5 Mbit)<br>Connection of a PROFIBUS DP cable via terminal connection or a 9-pole sub D socket.<br><br><br>Pin assignment:<br>1: n. c.: Reserved<br>2: n. c.: Reserved<br>3: BUS B: Data line B<br>4: RTS: Transmission request<br>5: P-: Ground<br>6: P+: Supply voltage<br>7: n. c.: Reserved<br>8: BUS A: Data line A<br>9: n. c.: Reserved<br>-: SHIELD: Shield over connector housing<br>Load rating 5 V DC on PROFIBUS DP: Max. 100 mA<br>Support for the transfer rates defined by the PROFIBUS DP standard: 9.6 Kbit / s, 19.2 Kbit / s, 45.45 Kbit / s, 93.75 Kbit / s, 187.5 Kbit / s, 500 Kbit / s, 1500 Kbit / s, 3000 Kbit / s, 6000 Kbit / s, 12000 Kbit / s.<br>**Note**<br>The 5 V power supply is only sufficient to power the bus termination module, not any other loads.<br>Supported data transfer rates for Modbus RTU:<br>300 baud, 600 baud, 1,200 baud, 2,400 baud, 4,800 baud, 9,600 baud, 19,200 baud (default), 57,600 baud | |
| **Rated control supply voltage $U_s$** (according to DIN EN 61131-2)<br>**⚠ Warning**<br>For the 24 V DC power supply, always use an SELV or PELV power supply unit! | 110 V to 240 V AC/DC, 50/60 Hz | 24 V DC |
| **Operating range** | 0.85 x Us to 1.1 x Us | 0.8 x Us to 1.2 x Us |
| **Power consumption** | | |

| Technical specifications of the SIMOCODE pro C / pro S / pro V PB / pro V MR basic units | | |
|---|---|---|
| SIMOCODE pro C (3UF7000) / pro S (3UF7020).<br>Measurement conditions: Room temperature, combination of basic unit, current acquisition module and operator panel, each with 2 LEDs switched on and active inputs and outputs, active thermistor, and 1.5 MBd bus transmission rate | SIMOCODE pro C basic unit: | |
| | 5.3 VA / 2.9 W | 2.3 W |
| | SIMOCODE pro S basic unit: | |
| | 4.7 VA / 2.5 W | 2.1 W |
| SIMO-<br>CODE pro V PB (3UF7010) / pro V MR (3UF7012):<br>Measurement conditions: Room temperature, combination of basic unit, current/voltage acquisition modules and operator panel with display, each with 2 LEDs switched on and active inputs and outputs, active thermistor, and 1.5 MBd bus transmission rate | SIMOCODE pro V PB basic unit: | |
| | 8.3 VA / 3.6 W | 2.6 W |
| | SIMOCODE pro V MR basic unit: | |
| | 8.3 VA / 3.6 W | 2.6 W |
| **Rated insulation voltage $U_i$** | 300 V (at pollution degree 3) | |
| **Rated impulse withstand voltage $U_{imp}$** | 4 kV | |
| **Power failure backup time** (longer power failures lead to shutdown of the relay outputs (monostable)) | SIMOCODE pro C<br>24 V DC<br>110 V to 240 V AC/DC | Typ. 50 ms |
| | SIMOCODE pro S | Typ. 50 ms |
| | SIMOCODE pro V - 24 V DC | Typ. 50 ms |
| | SIMOCODE pro V - 110 V - 240 V AC/DC | Typ. 200 ms |
| **Relay outputs** | | |
| Number | Monostable relay outputs:<br>3 (SIMOCODE pro C, pro V)<br>2 (SIMOCODE pro S) | |
| Function | Isolated NO contacts (NO contact response parameterizable via internal signal conditioning), 2 relay outputs connected to common potential, one separate relay output, freely-assignable to control functions (e.g. line, star or delta contactor or operating state status information.) | |
| Stipulated short-circuit protection for auxiliary contacts (relay outputs) | • 6 A fuse inserts, operational class gG; 10 A quick-response (IEC 60947-5-1)<br>• Miniature circuit breaker 1.6 A, C characteristic (IEC 60947-5-1)<br>• Miniature circuit breaker 6 A, C characteristic (Ik < 500 A) | |
| Rated uninterrupted current | 5 A<br>6 A at max. +50 °C | |
| Rated switching capacity | • AC-15:<br>6 A / 24 V AC;<br>6 A / 120 V AC;<br>3 A / 230 V AC<br>• DC-13:<br>2 A / 24 V DC;<br>0.55 A / 60 V DC;<br>0.25 A / 125 V DC | |

| **Technical specifications of the SIMOCODE pro C / pro S / pro V PB / pro V MR basic units** | |
|---|---|
| **Inputs (binary)** | 4 inputs connected to common potential that are supplied via the device electronics (24 V DC) for measuring process signals (e.g. local control station, key-operated switch, limit switch, etc.), freely-assignable to control functions. |
| 24 V DC | |
| Cable lengths (single) | 300 m |
| Input characteristic | Type 1 according to EN 61131-2 |
| **Thermistor motor protection (PTC binary)** | |
| Total cold resistance | ≤ 1.5 kOhm |
| Response value | 3.4 kOhm to 3.8 kOhm |
| Return value | 1.5 kOhm to 1.65 kOhm |
| Sensor short-circuit response value | < 9 ohm |
| Cable lengths (single), conductor cross sections: | 250 m: 2.5 $mm^2$<br>150 m: 1.5 $mm^2$<br>50 m: 0.5 $mm^2$ |
| **Dry-running protection for centrifugal pumps by active power monitoring** (for 3UF7010-1A.00-0 basic unit) | |
| Trip level – active power | 0 - 750000 W (default setting: 0) |
| Delay time during pump operation | 0 s ... 10 s |
| Start-up bridging time when starting pump | 0 s ... 60 s |
| **Connection of SIMOCODE pro C / pro V basic units** | |
| • Tightening torque | TORQUE: 7 lb.in to 10.3 lb.in 0.8 Nm to 1.2 Nm |
| • Connection cross sections | |
| - Solid | 2 x0.5 $mm^2$ ... 2.5 $mm^2$; 1 x 0.5 $mm^2$ ... 4 $mm^2$<br>2 x AWG 20 to 14 / 1 x AWG 20 to 12 |
| - Finely stranded with end sleeve | 2 x 0.5 $mm^2$ ... 1.5 $mm^2$; 1 x 0.5 $mm^2$ ... 2.5 $mm^2$<br>2 x AWG 20 to 16 / 1 x AWG 20 to 14 |
| - PROFIBUS cable | 2 x 0.34 $mm^2$ AWG 22 |
| **Connection of SIMOCODE pro S basic unit** | |
| • Tightening torque | TORQUE: 5.2 lb.in to 7.0 lb.in<br>0.6 Nm to 0.8 Nm |
| • Connection cross sections | |
| - Solid | 2 x 0.5 $mm^2$ ... 1.5 $mm^2$; 1 x 0.5 $mm^2$ ... 2.5 $mm^2$<br>2 x AWG 20 to 16 / 1 x AWG 20 to 14 |
| - Finely stranded with end sleeve | 2 x 0.5 $mm^2$ ... 1.0 $mm^2$; 1 x 0.5 $mm^2$ ... 2.5 $mm^2$ |
| - PROFIBUS cable | 2 x 0.34 $mm^2$ / 1 x 0.34 $mm^2$<br>AWG 22 |

1)

**Note**

**Bus termination module**

The bus termination module is powered by a voltage of max. 5 V.

The current drawn for the bus termination module is limited.

## 15.4 Technical specifications of the SIMOCODE pro V PN / pro V PN GP / pro V EIP basic units

| **Technical specifications of the SIMOCODE pro V PN / pro V PN GP / pro V EIP basic units** | |
|---|---|
| Mounting | Snap-mounted onto 35-mm standard mounting rail or screw-mounted using additional push-in lugs |
| **Mounting position** | Any |
| **Display** | |
| Red/green/yellow "DEVICE" LED | • Red: "Function test negative, device disabled"<br>• Green: "Ready for operation"<br>• Yellow: "Memory module detected"<br>• OFF: "No control supply voltage" |
| Green "BUS" LED | • Continuous light: "Communication with PLC/PCS"<br>• Flashing: "Baud rate recognized/communication with PC/PG" |
| Red "GEN. FAULT" LED | Continuous light/flashing: "Feeder fault", e.g. overload tripping |
| Green "PORT1" LED | • Continuous light: Ethernet connection available<br>• Flashing: Station flash test |
| Green "PORT2" LED | • Continuous light: Ethernet connection available<br>• Flashing: Station flash test |
| **"TEST/RESET" button** | • Resets the device after tripping<br>• Function test (system self-test)<br>• Operation of memory module |
| **System interfaces** | |
| Front | For connecting an operator panel or expansion modules. The memory module or a PC cable can also be connected to the system interface for parameterization purposes. |
| Bottom | Connection of a current measuring module or a current/voltage measuring module |
| **ETHERNET interface** | |
| Connection system | 2 x RJ45 (LAN) |
| Transmission rate | 100 Mbps |
| Number of interfaces according to PROFINET | 2<br>1 (SIMOCODE pro V PN GP 3UF7011-1A.00-2 basic units) |
| PROFINET conformity class | C |
| Protocols supported | PROFINET IO, PROFIsafe, LLDP, SNMP, Address Resolution Protocol (ARP), HTTP, HTTPS, OPC UA Server, NTP |
| Autonegation | Yes |
| Autosensing | Yes |
| MRP redundancy procedure | Yes<br>No (SIMOCODE pro V PN GP 3UF7011-1A.00-2 basic units) |
| MRPD redundancy procedure | yes (pro V PN / pro V PN GP (3UF7011-1A.00-1)<br>from firmware version V.3.0.0 |
| PROFINET IO system redundancy | Yes |

| Technical specifications of the SIMOCODE pro V PN / pro V PN GP / pro V EIP basic units | | |
|---|---|---|
| PROFIenergy measured values | Yes | |
| PROFIenergy shutdown | Yes | |
| **Rated control supply voltage Us** (according to DIN EN 61131-2)<br>**⚠ Warning**<br>For the 24 V DC power supply, always use an SELV or PELV power supply unit! | 110 V to 240 V AC/DC, 50/60 Hz | 24 V DC |
| **Operating range** | 0.85 x Us to 1.1 x Us (startup)<br>0.85 x Us to 1.1 x Us (operation) | 0.85 x Us to 1.2 x Us (startup)<br>0.80 x Us to 1.2 x Us (operation) |
| **Power consumption** | | |
| SIMOCODE pro V PN (3UF7011) and SIMOCODE pro V EIP (3UF7013):<br>Measurement conditions: Room temperature, combination of basic unit, current/voltage acquisition module and operator panel with display, each with 2 LEDs switched on and active inputs and outputs, active thermistor, and 100 MBd bus transmission rate | Basic unit SIMOCODE pro V PN (GP) (< V3.0.0) and pro V EIP (< V2.0.0) | |
| | 8.3 VA / 4.8 W | 3.9 W |
| | Basic unit SIMOCODE pro V PN (GP) (from V3.0.0) and pro V EIP (from V2.0.0) | |
| | 8.3 VA / 4.5 W | 3.6 W |
| **Rated insulation voltage $U_i$** | 300 V (at pollution degree 3) | |
| **Rated impulse withstand voltage $U_{imp}$** | 4 kV | |
| **Power failure backup time** (longer power failures lead to shutdown of the relay outputs (monostable)) | • 24 V DC<br>• 110 V to 240 V AC/DC | Typ. 20 ms<br>Typ. 20 ms |
| **Relay outputs** | | |
| Number | 3 monostable relay outputs | |
| Function | Isolated NO contacts (NO contact response parameterizable via internal signal conditioning), 2 relay outputs connected to common potential, one separate relay output, freely-assignable to control functions (e.g. line, star or delta contactor or operating state status information.) | |
| Stipulated short-circuit protection for auxiliary contacts (relay outputs) | • 6 A fuse inserts, operational class gG; 10 A quick-response (IEC 60947-5-1)<br>• Miniature circuit breaker 1.6 A, C characteristic (IEC 60947-5-1)<br>• Miniature circuit breaker 6 A, C characteristic (Ik < 500 A) | |
| Rated uninterrupted current | • 5 A<br>• 6 A at max. +50 °C | |
| Rated switching capacity | • AC-15:<br>6 A / 24 V AC;<br>6 A / 120 V AC;<br>3 A / 230 V AC<br>• DC-13:<br>2 A/24 V DC;<br>0.55 A / 60 V DC;<br>0.25 A / 125 V DC | |
| Contact rating of the auxiliary contacts according to UL | B300/R300 | |
| Electrical durability (operating cycles) | Typical: 100 000 | |

| **Technical specifications of the SIMOCODE pro V PN / pro V PN GP / pro V EIP basic units** | |
|---|---|
| Mechanical durability (operating cycles) | Typical: 10 000 000 |
| **Inputs (binary)** | 4 inputs connected to common potential that are supplied via the device electronics (24 V DC) for measuring process signals (e.g. local control station, key-operated switch, limit switch, etc.), freely-assignable to control functions. |
| 24 V DC | |
| Cable lengths (single) | 300 m |
| Input characteristic | Type 1 according to EN 61131-2 |
| **Thermistor motor protection (PTC binary)** | |
| Total cold resistance | ≤ 1.5 kOhm |
| Response value | 3.4 kOhm to 3.8 kOhm |
| Return value | 1.5 kOhm to 1.65 kOhm |
| Sensor short-circuit response value | < 9 ohm |
| Cable lengths (single), conductor cross sections: | 250 m: 2.5 $mm^2$<br>150 m: 1.5 $mm^2$<br>50 m: 0.5 $mm^2$ |
| **Dry-running protection of centrifugal pumps by active power monitoring** (for 3UF7011-1A.00-0 (< V3.0.0) and 3UF7013-1A.00-0 (< V2.0.0) basic units) | |
| Trip level – active power | 0 - 750000 W (default setting: 0) |
| Delay time during pump operation | 0 s ... 10 s |
| Start-up bridging time when starting pump | 0 s ... 60 s |
| **Connection** | |
| Tightening torque | TORQUE: 7 lb.in - 10.3 lb.in; 0.8 Nm - 1.2 Nm |
| Connection cross sections | |
| • Solid | 2 x 0.5 $mm^2$ - 2.5 $mm^2$; 1 x 0.5 $mm^2$ - 4 $mm^2$;<br>2 x AWG 20 to 14 / 1 x AWG 20 to 12 |
| • Finely stranded with end sleeve | 2 x 0.5 $mm^2$ - 1.5 $mm^2$; 1 x 0.5 $mm^2$ - 2.5 $mm^2$;<br>2 x AWG 20 to 16 / 1 x AWG 20 to 14 |

# 15.5 Technical data of the current measuring modules and the current / voltage measuring modules

| **Technical data of the 2nd generation current / voltage measuring modules** | | |
|---|---|---|
| **Mounting** | | |
| Current setting $I_s$ = 0.3 A - 4 A; 3 A - 40 A; 10 A - 115 A<br>(3UF71..-1AA0.-0) | Snap-mounted onto 35-mm standard mounting rail or screw-mounted using additional push-in lugs | |
| Current setting $I_s$ = 20 A to 200 A<br>(3UF71.3-1.A01-0) | Snap-on mounting onto 35-mm standard mounting rails, screw attachment onto the mounting plate or direct mounting onto the contactor | |
| Current setting $I_s$ = 63 A to 630 A<br>(3UF71.4-1BA01-0) | Screw attachment to the mounting plate or direct mounting onto the contactor | |
| **System interface for main circuit** | For connection to a basic unit | |
| Current setting $I_s$ | 3UF7110-1AA01-0: 0.3 A - 4 A<br>3UF7111-1AA01-0: 3 A - 40 A<br>3UF7112-1AA01-0: 10 A - 115 A | 3UF7113-1AA01-0: 20 A to 200 A<br>3UF7113-1BA01-0: 20 A to 200 A<br>3UF7114-1BA01-0: 63 A to 630 A |
| Rated insulation voltage $U_i$ (at pollution degree 3) | 690 V | |
| Rated operating voltage $U_e$ | 690 V | |
| Rated impulse withstand voltage $U_{imp}$ | 6 kV | |
| Rated frequency | 50/60 Hz | |
| Type of current | Three-phase | |
| Short circuit | Additional short-circuit protection is required in the main circuit [1] | |
| Typical voltage measuring range | | |
| Line-to-line voltage / voltage between lines (e.g.: $U_{L1L2}$) | 110 V - 690 V | |
| Phase voltage (e.g.: $U_{L1}$) | 65 V to 400 V | |
| Operating range | 0.12 x $I_u \leq Is \leq 10 \times I_o$ | |
| **Accuracy [7] at 25°C, 50/60 Hz for the following voltage ranges and limited current ranges** | | |
| of the voltage measurement | ± 1.5% | |
| Valid for voltage range:<br>• Line-to-line voltage $U_L$ in the range 0.85 x 110 V - 1.1 x 690 V<br>• Phase voltage $U_L$ in the range 0.85 x 65 V - 1.1 x 400 V | | |
| of the current measurement | ± 1.5% | |
| Valid for limited current range: | 3UF7110-1AA01-0: 0.25 A - 8 A<br>3UF7111-1AA01-0: 2.25 A - 80 A<br>3UF7112-1AA01-0: 7.5 A - 230 A | 3UF7113-1AA01-0: 15 A - 400 A<br>3UF7113-1BA01-0: 15 A - 400 A<br>3UF7114-1BA01-0: 47 A - 1260 A |
| Temperature drift of current measurement | 3UF7110-1AA01-0: 0.02% / K<br>3UF7111-1AA01-0: 0.01% / K<br>3UF7112-1AA01-0: 0.01% / K | 3UF7113-1AA01-0: 0.01% / K<br>3UF7113-1BA01-0: 0.01% / K<br>3UF7114-1BA01-0: 0.01% / K |
| of the cos phi measurement (cos phi ≥ 0.5) | ± 1.5% [8] | |

| **Technical data of the 2nd generation current / voltage measuring modules** | | |
|---|---|---|
| of the apparent power measurement (cos phi ≥ 0.5) | ± 3% | |
| of the active power measurement (cos phi ≥ 0.5) | ± 5% | |
| of the energy measurement (cos phi ≥ 0.5) | ± 5% | |
| of the frequency measurement (cos phi ≥ 0.5) | ± 1.5% | |
| of the ground-fault detection acc. to IEC 60947-1, Annex T | | |
| • in the range 30% - 120% $I_s$ | • ± 10% (Class CI-A) | |
| • in the range 15% - 30% $I_s$ | • ± 25% (Class CI-B) | |
| **Accuracy at 25°C, 50/60 Hz for extended current ranges 2 x $I_o$ < Is < 8x $I_o$** | | |
| Temperature drift of current measurement | | |
| • 3UF7110-1AA01-0 | | 0.02% / K |
| • 3UF7111-1AA01-0, 3UF7112-1AA01-0, 3UF7113-1AA01-0, 3UF7113-1BA01-0, 3UF7114-1BA01-0 | | 0.01% / K |
| Current measuring accuracy | | ± 3% (typically) |
| Accuracy of the cos phi measurement (cos phi ≥ 0.5) | | ± 5% (typically) |
| Accuracy of the apparent power measurement (cos phi ≥ 0.5) | | ± 5% (typically) |
| Accuracy of the active power measurement (cos phi ≥ 0.5) | | ± 10% (typically) |
| Accuracy of the energy measurement (cos phi ≥ 0.5) | | ± 10% (typically) |
| **Note on voltage measurement** | | |
| **Caution**<br>Note that the supply cables for voltage measurement may require additional cable protection. | | |
| **Feed-through opening** | Diameter | Design of cable insulation |
| Current setting 0.3 A - 4 A; 3 A - 40 A | 7.5 mm | 6 kV according to IEC 60947-1 |
| Current setting 10 A - 115 A: | 14.0 mm | 6 kV according to IEC 60947-1 |
| Current setting 20 A to 200 A: | 25.0 mm | 6 kV according to IEC 60947-1 |
| **Bus connection** | | |
| Current setting $I_s$ | 20 A to 200 A | 63 A to 630 A |
| Connection screw | M8x25 | M10x30 |
| Tightening torque | 10 Nm to 14 Nm | 14 Nm to 24 Nm |
| Solid with cable lug | 16 $mm^2$ - 95 $mm^2$ [2) 3)] | 50 $mm^2$ - 240 $mm^2$ [2) 4)] |
| Stranded with cable lug | 25 $mm^2$ - 120 $mm^2$ [2) 3)] | 70 $mm^2$ - 240 $mm^2$ [2) 4)] |
| AWG cable | 4 kcmil - 250 kcmil | 1/0 kcmil to 500 kcmil |
| **Connection for voltage measurement** | | |
| | **45 mm / 55 mm modules** | **120 mm / 145 mm modules** |
| • Tightening torque | TORQUE: 4.4 lb.in - 5.3 lb.in<br>0.5 Nm to 0.6 Nm | TORQUE: 7 lb.in - 10.3 lb.in<br>0.8 Nm to 1.2 Nm |
| • Connection cross sections | | |

| **Technical data of the 2nd generation current / voltage measuring modules** | | |
|---|---|---|
| - Solid | 1 x 0.25 mm² - 2.5 mm² / 1 x AWG 24 to 14<br>2 x 0.25 mm² - 1 mm² / 2 x AWG 24 to 18 | 1 x 0.5 mm² - 4 mm² / 1 x AWG 20 to 12<br>2 x 0.5 mm² - 2.5 mm² / 2 x AWG 20 to 14 |
| - Finely stranded with end sleeve | | 1 x 0.5 mm² - 2.5 mm² / 1 x AWG 20 to 14<br>2 x 0.5 mm² - 1.5 mm² / 2 x AWG 20 to 16 |

1) You will find more information at SIMOCODE pro (https://www.siemens.com/simocode).

2) Screw connection is possible with an appropriate 3RT19 box terminal.

3) When connecting cable lugs complying with DIN 46235 to cables with a cross section larger than 95 mm², the 3RT19 56-4EA1 terminal cover is required to maintain phase separation.

4) When connecting cable lugs complying with DIN 46234 to cables with a cross section larger than 240 mm² and when connecting cable lugs complying with DIN 46235 to cables with a cross section larger than 185 mm², the 3RT19 56-4EA1 terminal cover is required to maintain phase separation.

| **Technical data of the current measuring modules or the 1st generation current / voltage measuring modules** | | |
|---|---|---|
| **Mounting** | | |
| Current setting $I_s$ = 0.3 A to 3 A; 2.4 A to 25 A; 10 A to 100 A<br>(3UF7100*, 3UF7101*, 3UF7102*, 3UF7110.0-0, 3UF7111.0-0, 3UF7112.0-0) | Snap-mounted onto 35-mm standard mounting rail or screw-mounted using additional push-in lugs | |
| Current setting $I_s$ = 20 A to 200 A<br>(3UF7103*, 3UF7113.0-0) | Snap-on mounting onto 35-mm standard mounting rails, screw attachment onto the mounting plate or direct mounting onto the contactor | |
| Current setting $I_s$ = 63 A to 630 A<br>(3UF7104*, 3UF7114.0-0) | Screw attachment to the mounting plate or direct mounting onto the contactor | |
| **System interface for main circuit** | For connection to a basic unit or decoupling module | |
| Current setting $I_s$ | 3UF7100*0-0, 3UF7110*0-0: 0.3 A - ´3 A<br>3UF7101*0-0, 3UF7111*0-0: 2.4 A - 25 A<br>3UF7102*0-0, 3UF7112*0-0: 10 A - 100 A | 3UF7103*0-0, 3UF7113*0-0: 20 A to 200 A<br>3UF7104*0-0, 3UF7114*0-0: 63 A to 630 A |
| Rated insulation voltage $U_i$ (at pollution degree 3) | 690 V [1] | |
| Rated operating voltage $U_e$ | 690 V | |
| Rated impulse withstand voltage $U_{imp}$ | 6 kV [2] | |
| Rated frequency | 50/60 Hz | |
| Type of current | Three-phase | |
| Short circuit | Additional short-circuit protection is required in the main circuit [3] | |
| Operating range | $0.1 \times I_u \leq I_s \leq 10 \times I_o$ | |
| Accuracy of current measuring (ranging from 1 x minimum current setting $I_u$ to 8 x maximum current setting $I_o$) | ± 3% (typically) | |
| Typical voltage measuring range | | |

| **Technical data of the current measuring modules or the 1st generation current / voltage measuring modules** | | |
|---|---|---|
| Line-to-line voltage / voltage between lines (e.g.: $U_{L1L2}$) | 110 V - 690 V (depending on the setting, either the line-to-line voltage/phase-to-ground voltage or the phase voltage is displayed) | |
| Phase voltage (e.g.: $U_{L1}$) | 65 V to 400 V | |
| Voltage measuring accuracy in the range from 230 V to 400 V | ± 3% (typically) | |
| Accuracy of cos phi measurement (in the nominal load range cos phi = 0.4 to 0.8) | ± 5% (typically) | |
| Accuracy of apparent power measurement (in the nominal load range) | ± 5% (typically) | |
| **Notes on voltage measurement** | | |
| Current / voltage measuring modules must be used with a decoupling module in certain types of power system. See the table in Chapter Decoupling module (DCM) for 1st generation current/voltage measuring modules (e.g. 3UF711.1AA00-0) (Page 136). | **Caution**<br>Note that the supply cables for voltage measurement may require additional cable protection. | |
| **Feed-through opening** | Diameter | Design of cable insulation |
| Current setting 0.3 A to 3 A; 2.4 A to 25 A | 7.5 mm | 6 kV according to IEC 60947-1 |
| Current setting 10 A to 100 A: | 14.0 mm | 6 kV according to IEC 60947-1 |
| Current setting 20 A to 200 A: | 25.0 mm | UM: 6 kV, IM: 8 kV according to IEC 60947-1 |
| **Bus connection** | | |
| Current setting $I_s$ | 20 A to 200 A | 63 A to 630 A |
| Connection screw | M8x25 | M10x30 |
| Tightening torque | 10 Nm to 14 Nm | 14 Nm to 24 Nm |
| Solid with cable lug | 16 $mm^2$ - 95 $mm^2$ [2) 4) 5)] | 50 $mm^2$ - 240 $mm^2$ [2) 4) 6)] |
| Stranded with cable lug | 25 $mm^2$ - 120 $mm^2$ [2) 4) 5)] | 70 $mm^2$ - 240 $mm^2$ [2) 4) 6)] |
| AWG cable | 6 kcmil to 300 kcmil | 1/0 kcmil to 500 kcmil |
| **Connection for voltage measurement** | | |
| • Tightening torque | TORQUE: 7 lb.in - 10.3 lb.in<br>0.8 Nm to 1.2 Nm | |
| • Connection cross sections | | |
| - Solid | 1 x 0.5 $mm^2$ - 4 $mm^2$ / 1 x AWG 20 to 12<br>2 x 0.5 $mm^2$ - 2.5 $mm^2$ / 2 x AWG 20 to 14 | |

| Technical data of the current measuring modules or the 1st generation current / voltage measuring modules | |
|---|---|
| - Finely stranded with end sleeve | 1 x 0.5 $mm^2$ - 2.5 $mm^2$ / 1 x AWG 20 to 14 |
| | 2 x 0.5 $mm^2$ - 1.5 $mm^2$ / 2 x AWG 20 to 16 |

1) for 3UF7103 or 3UF7104 to 1000 V

2) for 3UF7103 or 3UF7104 to 8 kV

3) You will find more information at SIMOCODE pro (https://www.siemens.com/simocode) and in Chapter Short-circuit protection with fuses for motor feeders for short-circuit currents up to 100 kA and 690 V for 1st generation current / voltage measuring module (Page 353)

4) Screw connection is possible with an appropriate 3RT19 box terminal.

5) When connecting cable lugs complying with DIN 46235 to cables with a cross section larger than 95 $mm^2$, the 3RT19 56-4EA1 terminal cover is required to maintain phase separation.

6) When connecting cable lugs complying with DIN 46234 to cables with a cross section larger than 240 $mm^2$ and when connecting cable lugs complying with DIN 46235 to cables with a cross section larger than 185 $mm^2$, the 3RT19 56-4EA1 terminal cover is required to maintain phase separation.

7) Valid for float values

8) A current range of 0.4 - 8 A is necessary for the 3UF7110-1AA01-0 version

## 15.6 Technical data of the decoupling module

| **Technical data of the decoupling module** | |
|---|---|
| **Mounting** | Snap-mounted onto 35-mm standard mounting rail or screw-mounted using additional push-in lugs. |
| **Display** | |
| • Green "READY" LED | |
| **System interfaces** | The left interface is for connection to a basic unit or an expansion module, the right interface is exclusively for connection to a current / voltage measuring module. |
| **Connection cross sections** | |
| • Tightening torque | TORQUE: 7 LB.IN to 10.3 LB.IN 0.8 Nm to 1.2 Nm |
| • Connection cross sections | |
| - Solid | 2 x 0.5 $mm^2$ to 2.5 $mm^2$ / 1 x 0.5 $mm^2$ to 4 $mm^2$<br>2 x AWG 20 to 14 / 1 x AWG 20 to 12 |
| - Finely stranded with end sleeve | 2 x 0.5 $mm^2$ to 1.5 $mm^2$ / 1 x 0.5 $mm^2$ to 2.5 $mm^2$<br>2 x AWG 20 to 16 / 1 x AWG 20 to 14 |

# 15.7 Technical data of the expansion modules

## 15.7.1 Technical data of the digital modules

| Technical data of the digital modules | |
|---|---|
| **Mounting** | Snap-mounted onto 35-mm standard mounting rail or screw-mounted using additional push-in lugs |
| **Display** | |
| • Green "READY" LED | • Continuous light: "Ready for operation"<br>• Flashing: "No connection to basic unit" |
| **System interfaces** | For connecting to a basic unit, an additional expansion module, a current measuring module or a current / voltage measuring module or the operator panel |
| **Control circuit** | |
| Rated insulation voltage $U_i$ | 300 V (at pollution degree 3) |
| Rated impulse withstand voltage $U_{imp}$ | 4 kV |
| **Relay outputs** | |
| • Number | 2 monostable or bistable relay outputs (depending on the type) |
| • Function | Isolated NO contacts (NC contact response parameterizable via internal signal conditioning), relay outputs all with connection to common potential, freely-assignable to control functions (e.g. line, star or delta contactor or operating state status information). |
| • Stipulated short-circuit protection for auxiliary contacts (relay outputs) | • Fuse links, operating class gL/gG 6 A, quick-response 10 A (IEC 60947-5-1)<br>• Miniature circuit breaker 1.6 A, C characteristic (IEC 60947-5-1)<br>• Miniature circuit breaker 6 A, C characteristic ($I_k$ < 500 A) |
| • Rated uninterrupted current | • 5 A<br>• 6 A at max. +50 °C |
| • Rated switching capacity | |
| AC-15 | 6 A / 24 V AC;<br>6 A / 120 V AC;<br>3 A / 230 V AC |
| DC-13 | 2 A / 24 V DC;<br>0.55 A / 60 V DC;<br>0.25 A / 125 V DC |
| **Inputs (binary)** | 4 externally supplied, isolated inputs (24 V DC or 110 V to 240 V AC / DC, depending on the type), connected to common potential for measuring process signals (e.g. local control station, key-operated switches, limit switches, ...), freely-assignable to control functions. |
| • 24 V DC:<br>Cable lengths (single)<br>Input characteristic | <br>300 m<br>Type 2 according to EN 61131-2 |

| **Technical data of the digital modules** | |
|---|---|
| • 110 V to 240 V AC/DC:<br>Cable lengths (single)<br>Input characteristic | <br>200 m (cable capacitance 300 nF / km)<br>— |
| **Connection** | Removable terminal block with screw connection |
| • Tightening torque | TORQUE: 7 LB.IN to 10.3 LB.IN 0.8 Nm - 1.2 Nm |
| • Connection cross sections | |
| - Solid | 2 x 0.5 $mm^2$ to 2.5 $mm^2$ / 1 x 0.5 $mm^2$ to 4 $mm^2$<br>2 AWG 20 to 14 / 1 x AWG 20 to 12 |
| - Finely stranded with end sleeve | 2 x 0.5 $mm^2$ - 1.5 $mm^2$ / 1 x 0.5 $mm^2$ - 2.5 $mm^2$<br>2 x AWG 20 to 16 / 1 x AWG 20 to 14 |

## 15.7.2 Technical data, digital modules DM-F Local and DM-F PROFIsafe

| **Technical data of the DM-F Local and DM-F PROFIsafe digital modules** | |
|---|---|
| **Mounting** | Snap-mounted onto 35-mm standard mounting rail or screw-mounted using additional push-in lugs |
| **Enclosure width** | 45 mm |
| **System interfaces** | For connecting to a basic unit, an additional expansion module, a current measuring module or a current / voltage measuring module or the operator panel |
| **Rated control supply voltage $U_s$** (according to DIN EN 61131-2) | • 24 V DC<br>• 110 V to 240 V AC/DC, 50/60 Hz |
| **Operating range** | • 24 V DC: 0.8 to 1.2 x $U_s$<br>• 110 V to 240 V AC/DC: 0.85 to 1.1 x $U_s$ |
| **Power consumption** | DM-F LOCAL:<br>• 24 V DC: 3 W<br>• 110 V to 240 V AC/DC: 9.5 VA/4.5 W<br>DM-F PROFIsafe:<br>• 24 V DC: 4 W<br>• 110 V to 240 V AC/DC: 11.0 VA/5.5 W |
| **Protective separation according to IEC 60947-1** | Between relay enabling circuits / relay outputs and electronics |
| **Rated insulation voltage $U_i$** | 300 V (at pollution degree 3) |
| **Rated impulse withstand voltage $U_{imp}$** | 4 kV |
| **Mains buffering time** | • 24 V DC: typically 20 ms at 0.8 x Us<br>• 110 V to 240 V AC/DC: typically 20 ms at 0.85 x Us, typically 200 ms at 230 V |
| **Relay outputs** | 2 monostable relay outputs |
| • Number | • Common potential connection is internally disconnected in a fail-safe manner by a relay enabling circuit |
| • Function | • Normally open contact, freely assignable to the control functions |

| Technical data of the DM-F Local and DM-F PROFIsafe digital modules | |
|---|---|
| **Electrical service life of relay outputs** | 0.1 million switching cycles (AC-15, 230 V/3 A) |
| **Relay enabling circuits** | |
| • Number | 2 common switching-type, fail-safe relay enabling circuits |
| • Function | Fail-safe normally open contacts |
| • Stipulated short-circuit protection for relay enabling circuits / relay outputs | Fuse links operating class gL/gG 4 A (IEC 60947-5-1), separate for each relay enabling circuit |
| • Rated uninterrupted current of relay enabling circuits | 5 A |
| • Rated switching capacity of relay enabling circuits | AC-15: 3 A / AC 24 V; 3 A / AC 120 V; 1.5 A / AC 230 V<br>DC-13: 4 A / DC 24 V; 0.55 A / DC 60 V; 0.22 A / DC 125 V; 0.11 A / DC 250 V |
| • Electrical service life of relay enabling circuits | 0.1 million switching cycles (AC-15, 240 V/ 2 A) |
| • Switching rate of the relay enabling circuits | 2000/h |
| **Connection** | Removable terminals with screw connection |
| • Tightening torque | TORQUE: 7 LB.IN to 10.3 LB.IN 0.8 Nm - 1.2 Nm |
| • Connection cross sections | |
| - Solid | 2x 0.5 $mm^2$ to 2.5 $mm^2$ / 1x 0.5 $mm^2$ to 4 $mm^2$<br>2x AWG 20 to 14 / 1x AWG 20 to 12 |
| - Finely stranded with end sleeve | 2x 0.5 $mm^2$ to 1.5 $mm^2$ / 1x 0.5 mm2 to 2.5 $mm^2$<br>2x AWG 20 to 16 / 1x AWG 20 to 14 |

## 15.7.3 Technical data of the DM-F Local digital module

| Technical data of the DM-F Local digital module | | | |
|---|---|---|---|
| **LEDs on DM-F LOCAL** | | **Color** | **Meaning** |
| "READY" | | OFF | System interface not connected / supply voltage too low / device defective |
| | | Green | Device ON/system interface OK |
| | | Flashing green | Device ON / system interface not active or not OK |
| "DEVICE" | | OFF | Supply voltage too low |
| | | Green | Device ON |
| | | Flashing green | Self-test |
| | | Yellow | Configuration mode |
| | | Flashing yellow | Configuration error |
| | | Red | Device defective or faulty |
| "OUT" | | OFF | Safety-related output not active |
| | | Green | Safety-related output active |
| | | Flashing green | Feedback circuit not closed although start condition satisfied |

| **Technical data of the DM-F Local digital module** | | | |
|---|---|---|---|
| "IN" | | OFF | Input not active |
| | | Green | Input active |
| | | Flashing green | Fault detected (e.g., cross circuit at input, sensor simultaneity not fulfilled) |
| "GF" | | OFF | No general fault |
| | | Red | Group fault (wiring error, cross-circuit, configuration error) |
| | | Flashing red | Group fault (feedback circuit fault, simultaneity condition not satisfied) |
| "1" | | OFF | Cross-circuit detection Off |
| | | Yellow | Cross-circuit detection On |
| | | Flashing yellow | Configuration mode waiting for confirmation |
| | | Flickering yellow | Configuration error |
| "2" | | OFF | NC contact/NO contact |
| | | Yellow | NC contact/NC contact |
| | | Flashing yellow | Configuration mode waiting for confirmation |
| | | Flickering yellow | Configuration error |
| "3" | | OFF | 2 x 1-channel |
| | | Yellow | 1 x 2-channel |
| | | Flashing yellow | Configuration mode waiting for confirmation |
| | | Flickering yellow | Configuration error |
| "4" | | OFF | Debounce time Y12, Y22, Y34 ~ 50 ms |
| | | Yellow | Debounce time Y12, Y22, Y34 ~ 10 ms |
| | | Flashing yellow | Configuration mode waiting for confirmation |
| | | Flickering yellow | Configuration error |
| "5" | | OFF | Sensor circuit, automatic start |
| | | Yellow | Sensor circuit, monitored start |
| | | Flashing yellow | Configuration mode waiting for confirmation |
| | | Flickering yellow | Configuration error |
| "6" | | OFF | Cascading input 1, automatic start |
| | | Yellow | Cascading input 1, monitored start |
| | | Flashing yellow | Configuration mode waiting for confirmation |
| | | Flickering yellow | Configuration error |
| "7" | | OFF | With startup testing |
| | | Yellow | Without startup testing |
| | | Flashing yellow | Configuration mode waiting for confirmation |
| | | Flickering yellow | Configuration error |
| "8" | | OFF | Automatic starting after power failure |
| | | Yellow | No automatic starting after power failure |
| | | Flashing yellow | Configuration mode waiting for confirmation |
| | | Flickering yellow | Configuration error |
| **DIP switch** | | for setting safety functions | |
| **"SET / RESET" button** | | • Application of parameters set via DIP switch<br>• Resetting of faults (also possible via "TEST/RESET" button on basic unit) | |

| Technical data of the DM-F Local digital module | |
|---|---|
| **Inputs with safety relay function** | 2 sensor inputs 24 V DC (Y12, Y22)<br>• Supply via terminal T1 and T2 with cross-circuit detection or external supply (static +24 V DC) without cross-circuit detection<br>• Functions parameterizable via DIP switch |
| | 1 start signal input 24 V DC (Y33)<br>• For monitored reconnection of the relay enabling circuits after a safety-related trip<br>• Supply via terminal T1 with/without T3 (static +24 V DC) without cross-circuit detection |
| | 1 cascading input 24 V DC (1)<br>• For use in connection with a higher-level safety relay<br>• Supply via terminal T3 (static +24 V DC) |
| | 1 feedback circuit input 24 V DC (Y34)<br>• For contactor monitoring of the motor and incoming supply contactors via series-connected auxiliary switch normally-closed contacts<br>• Supply via terminal T2 with/without T3 (static +24 V DC) without cross-circuit detection |
| **Cable length (single)** | 1500 m |
| **Input characteristic** | Type 2 according to EN 61131-2 |

## 15.7.4 Technical data of the DM-F-PROFIsafe digital module

| Technical data of the DM-F PROFIsafe digital module | | | |
|---|---|---|---|
| **LED display DM-F PROFI-safe** | | **Color** | **Meaning** |
| "READY" | | OFF | System interface not connected / supply voltage too low / device defective |
| | | Green | Device ON/system interface OK |
| | | Flashing green | Device ON / system interface not active or not OK |
| "DEVICE" | | OFF | Supply voltage too low |
| | | Green | Device ON |
| | | Red | Device defective or faulty |
| "OUT" | | OFF | Safety-related output not active |
| | | Green | Safety-related output active |
| | | Flashing green | Feedback circuit not closed although start condition satisfied |
| "GF" | | OFF | No general fault |
| | | Red | Group fault (PROFIsafe not active, incorrect PROFIsafe address, wiring error, device defective) |
| "1" | | Yellow | PROFIsafe address 1 |
| "2" | | Yellow | PROFIsafe address 2 |
| "3" | | Yellow | PROFIsafe address 4 |
| "4" | | Yellow | PROFIsafe address 8 |
| "5" | | Yellow | PROFIsafe address 16 |
| "6" | | Yellow | PROFIsafe address 32 |

| Technical data of the DM-F PROFIsafe digital module | | | |
|---|---|---|---|
| "7" | | Yellow | PROFIsafe address 64 |
| "8" | | Yellow | PROFIsafe address 128 |
| "9" | | Yellow | PROFIsafe address 256 |
| "10" | | Yellow | PROFIsafe address 512 |
| **DIP switch** | for setting the PROFIsafe address | | |
| **"SET / RESET" button** | • Displays the set PROFIsafe address<br>• Application of the set PROFIsafe address (restart of the module)<br>• Resetting of faults (also possible via "TEST/RESET" button on basic unit) | | |
| **Inputs binary** | • 3 inputs (83, 85, 89) 24 V DC<br>• Supply via terminal 84 or external supply (static +24 V)<br>• Common connected, electrically isolated inputs for acquiring process signals (e.g., local control station, keyswitch, limit switch, etc.), freely assignable to control functions | | |
| **Input with safety relay function** | • 1 feedback circuit input (91/FBC) 24 V DC<br>• For contactor monitoring of the motor and incoming supply contactors via series-connected auxiliary switch contacts<br>• Supply via terminal 90/T | | |
| **Cable length (single)** | 300 m | | |
| **Input characteristic** | Type 2 according to EN 61131-2 | | |

## 15.7.5 Safety-related technical data of the digital modules DM-F Local and DM-F PROFIsafe

See "Technical Data" in the Manual "SIMOCODE pro Safety" fail-safe digital modules (https://support.automation.siemens.com/WW/view/en/50564852).

## 15.7.6 Technical data of the analog module

| Technical data of the analog module | |
|---|---|
| **Mounting** | Snap-mounted onto 35-mm standard mounting rail or screw-mounted using additional push-in lugs |
| **Display** | |
| • Green "READY" LED | • Continuous light: "Ready for operation"<br>• Flashing: "No connection to basic unit" |
| **System interfaces** | For connecting to a basic unit, an additional expansion module, a current measuring module or a current / voltage measuring module or the operator panel. |
| **Control circuit** | |
| Connection type: | 2-wire connection |
| **Inputs:** | |
| • Channels | 2 (passive) |

| **Technical data of the analog module** | |
|---|---|
| • Parameterizable measuring ranges | 0/4 mA to 20 mA |
| • Cable shielding | Recommended for up to 30 m and outside the cabinet; shielding mandatory for cables of 30 m or longer |
| • Max. input current (destruction limit) | 40 mA |
| • Accuracy | ±1 % |
| • Input resistance | 50 ohms |
| • Conversion time | 150 ms |
| • Resolution | 12 bits |
| • Open-circuit detection | For measuring range 4 mA to 20 mA |
| • Isolation of the inputs from the device electronics | No |
| **Outputs:** | |
| • Channels | 1 |
| • Parameterizable output range | 0/4 mA to 20 mA |
| • Cable shielding | Recommended for up to 30 m and outside the cabinet; shielding mandatory for cables of 30 m or longer |
| • Max. output voltage | 30 V DC |
| • Accuracy | ±1 % |
| • Max. output load | 500 ohms |
| • Conversion time | 25 ms |
| • Resolution | 12 bits |
| • Short-circuit proof | Yes |
| • Isolation of the outputs from the device electronics | No |
| **Connection:** | |
| • Tightening torque | TORQUE: 7 LB.IN to 10.3 LB.IN 0.8 Nm to 1.2 Nm |
| • Connection cross sections | |
| - Solid | 2x 0.5 $mm^2$ to 2.5 $mm^2$ / 1x 0.5 $mm^2$ to 4 $mm^2$<br>2x AWG 20 to 14 / 1x AWG 20 to 12 |
| - Finely stranded with end sleeve | 2x 0.5 $mm^2$ to 1.5 $mm^2$ / 1x 0.5 $mm^2$ to 2.5 $mm^2$<br>2x AWG 20 to 16 / 1x AWG 20 to 14 |

## 15.7.7 Technical data of the ground-fault module 3UF7500-1AA00-0

| **Technical data of the ground-fault module 3UF7500-1AA00-0** | |
|---|---|
| **Mounting** | Snap-mounted onto 35 mm standard mounting rail or screw-mounted using additional push-in lugs |
| **Display** | |
| • Green "READY" LED | • Continuous light: "Ready for operation"<br>• Flashing: "No connection to basic unit" |
| **System interface** | For connecting to a basic unit, an additional expansion module, a current measuring module or a current / voltage measuring module or the operator panel. |
| **Control circuit** | |
| Connectable 3UL22 residual current transformer with rated fault currents $I_N$ | 0.3 / 0.5 / 1 A |
| • $I_{ground\ fault} \leq 50\ \% I_N$ | No tripping |
| • $I_{ground\ fault} \geq 100\ \% I_N$ | Tripping |
| Response delay (conversion time) | 300 ms to 500 ms, additional delay possible |
| **Connection** | |
| • Tightening torque | TORQUE: 7 LB.IN to 10.3 LB.IN 0.8 Nm to 1.2 Nm |
| • Connection cross sections | |
| - Connection cross sections, solid: | 2x 0.5 $mm^2$ to 2.5 $mm^2$ / 1x 0.5 $mm^2$ to 4 $mm^2$<br>2x AWG 20 to 14 / 1x AWG 20 to 12 |
| - Connection cross sections, finely stranded with ferrule: | 2x 0.5 $mm^2$ to 1.5 $mm^2$ / 1x 0.5 $mm^2$ to 2.5 $mm^2$<br>2x AWG 20 to 16 / 1x AWG 20 to 14 |

## 15.7.8 Technical data of the ground-fault module 3UF7510-1AA00-0

| **Technical data of the ground-fault module 3UF7510-1AA00-0** | | | | | |
|---|---|---|---|---|---|
| **Mounting** | Snap-mounted onto 35 mm standard mounting rail or screw-mounted using additional push-in lugs | | | | |
| **Display** | | | | | |
| • Green "READY" LED | • Continuous light: "Ready for operation"<br>• Flashing: "No connection to basic unit" | | | | |
| **System interface** | For connecting to a basic unit, an additional expansion module, a current measuring module or a current / voltage measuring module or the operator panel. | | | | |
| **Control circuit** | | | | | |
| Cable to the residual current transformer<br>**Notice**<br>• We recommend using twisted cables.<br>• Cables of lengths > 10 m must additionally be shielded and grounded. | | | | | |
| Conductor cross section | 0.5 $mm^2$ | 1.0 $mm^2$ | 1.5 $mm^2$ | 2.5 $mm^2$ | 4.0 $mm^2$ |
| AWG | 20 kcmil | 18 kcmil | 16 kcmil | 14 / 12 kcmil | 10 kcmil |

| Technical data of the ground-fault module 3UF7510-1AA00-0 | | | | | |
|---|---|---|---|---|---|
| Max. cable length | 70 m | 140 m | 210 m | 300 m | 550 m |
| Connectable residual current transformer 3UL23 [1] - feed-through diameter | 35 mm to 210 mm | | | | |
| Type of current to be monitored | AC and pulsating DC (type A) | | | | |
| Measurable line frequency | 16 Hz to 400 Hz | | | | |
| Response value current (settable) | 0.03 A to 40 A | | | | |
| Measuring accuracy (relative) ground-fault module | ±5 % | | | | |
| Measuring accuracy (relative) transformer 3UL23 | ±2.5 % | | | | |
| Reaction time (maximal) | 100 ms | | | | |

| Connection | |
|---|---|
| Tightening torque | TORQUE: 7 LB.IN to 10.3 LB.IN 0.8 Nm to 1.2 Nm |
| Connection cross sections | |
| • Solid | 2x 0.5 $mm^2$ to 2.5 $mm^2$ / 1x 0.5 $mm^2$ to 4 $mm^2$<br>2x AWG 20 to 14 / 1x AWG 20 to 12 |
| • Finely stranded with end sleeve | 2x 0.5 $mm^2$ to 1.5 $mm^2$ / 1x 0.5 $mm^2$ to 2.5 $mm^2$<br>2x AWG 20 to 16 / 1x AWG 20 to 14 |

1) Technical data residual current transformer 3UL23: See Manual 3UG4/3RR2 Monitoring Relay (https://support.industry.siemens.com/cs/ww/en/view/54397927).

## 15.7.9 Technical data of the temperature module

| Technical data of the temperature module | |
|---|---|
| **Mounting** | Snap-mounted onto 35-mm standard mounting rail or screw-mounted using additional push-in lugs |
| **Display** | |
| • Green "READY" LED | • Continuous light: "Ready for operation"<br>• Flashing: "No connection to basic unit" |
| **System interface** | For connecting to a basic unit, an additional expansion module, a current measuring module or a current / voltage measuring module or the operator panel. |
| **Sensor circuit** | |
| Conversion time | 500 ms |
| Type of connection | 2-wire or 3-wire connection |
| Typical sensor current: | |

| **Technical data of the temperature module** | |
|---|---|
| • PT100 | 1 mA (typical) |
| • PT1000 / KTY83 / KTY84 / NTC | 0.2 mA (typical) |
| Open circuit detection / short-circuit detection / measuring range: | |
| • PT100 / PT1000 | Open circuit, short-circuit; measuring range: -50 °C to +500 °C |
| • KTY83-110 | Open circuit, short-circuit; measuring range: -50 °C to +175 °C |
| • KTY84 | Open circuit, short-circuit; measuring range: -40 °C to +300 °C |
| • NTC | Short-circuit; measuring range: +80 °C to +160 °C |
| Measuring accuracy at an ambient temperature of 20 °C (T20) | < ±2 K, ±1 digit |
| Deviation due to ambient temperature (as % of measured value) | 0.05 per K deviation from T20 |
| Isolation of the inputs from the device electronics | No |
| **Connection** | |
| Tightening torque | TORQUE: 7 LB.IN - 10.3 LB.IN 0.8 Nm - 1.2 Nm |
| Connection cross sections | |
| • Solid: | 2x 0.5 $mm^2$ to 2.5 $mm^2$ / 1x 0.5 $mm^2$ to 4 $mm^2$<br>2x AWG 20 to 14 / 1x AWG 20 to 12 |
| • Finely stranded with end sleeve: | 2x 0.5 $mm^2$ to 1.5 $mm^2$ / 1x 0.5 $mm^2$ to 2.5 $mm^2$<br>2x AWG 20 to 16 / 1x AWG 20 to 14 |

# 15.8 Technical data of the multifunction module

| **Technical data of the multifunction module** | |
|---|---|
| **Mounting** | Snap-mounted onto 35-mm standard mounting rail or screw-mounted using additional push-in lugs |
| **Cabinet mounting** | Minimum distance to be maintained<br>• from cabinet rear wall for series mounting at side: 0 mm<br>• from grounded parts at side: 2 mm |
| **Display** | |
| Green "READY" LED | • Continuous light: "Ready for operation"<br>• Flashing: "No connection to basic unit" |
| **System interfaces** | For connection to a SIMOCODE pro S basic unit or an operator panel |
| **Digital module function** | |
| Control circuit | |
| Rated insulation voltage $U_i$ | 300 V (at pollution degree 3) |
| Rated impulse withstand voltage $U_{imp}$ | 4 kV |
| Inputs (binary) | 4 externally supplied, isolated inputs (24 V DC or 110 V to 240 V AC / DC, depending on the type), connected to common potential for measuring process signals (e.g. local control station, key-operated switches, limit switches, ...), freely-assignable to control functions. |
| • 24 V DC:<br>Cable lengths (single)<br>Input characteristic | <br>300 m<br>Type 2 according to EN 61131-2 |
| • 110 V to 240 V AC/DC:<br>Cable lengths (single)<br>Input characteristic | <br>200 m (cable capacitance 300 nF / km)<br>— |
| Relay outputs | |
| • Number | 2 monostable relay outputs (depending on the type) |
| • Function | Isolated NO contacts (NC contact response parameterizable via internal signal conditioning), relay outputs all with connection to common potential, freely-assignable to control functions (e.g. line, star or delta contactor or operating state status information). |
| • Stipulated short-circuit protection for auxiliary contacts (relay outputs) | • Fuse links, operating class gL/gG 6 A, quick-response 10 A (IEC 60947-5-1)<br>• Miniature circuit breaker 1.6 A, C characteristic (IEC 60947-5-1)<br>• Miniature circuit breaker 6 A, C characteristic ($I_k$ < 500 A) |
| • Rated uninterrupted current | • 5 A<br>• 6 A at max. +50 °C |
| • Rated switching capacity | |
| AC-15 | 6 A / 24 V AC;<br>6 A / 120 V AC;<br>3 A / 230 V AC |
| DC-13 | 2 A / 24 V DC;<br>0.55 A / 60 V DC;<br>0.25 A / 125 V DC |
| **Ground-fault module function** | |

| **Technical data of the multifunction module** | |
|---|---|
| Connectable 3UL23 residual current transformer - feed-through diameter | 35 mm to 210 mm |
| Type of current to be monitored | AC and pulsating DC (type A) |
| Measurable line frequency | 16 Hz to 400 Hz |
| Response value current (settable) | 0.03 A to 40 A |
| Measuring accuracy (relative) ground-fault module | ±5 % |
| Measuring accuracy (relative) transformer 3UL23 | ±2.5 % |
| Reaction time (maximal) | 100 ms |
| **Temperature module function** | |
| Sensor circuit | |
| Versions of the cable shielding for the sensor circuit | • Up to 30 m, cable shielding recommended<br>• From 30 m, cable shielding necessary |
| Versions of the cable shielding for the sensor circuit | |
| Conversion time | 500 ms |
| Type of connection | 2-wire or 3-wire connection |
| Typical sensor circuit | |
| • PT100 | 1 mA (typical) |
| • PT1000 / KTY83 / KTY84 / NTC | 0.2 mA (typical) |
| Measuring range open circuit detection / short-circuit detection | |
| • PT100 / PT1000 | -50 °C ... +500 °C (open circuit, short circuit) |
| • KTY83-110 | -50 °C to +175 °C (open circuit, short circuit) |
| • KTY84 | -40 °C to +300 °C (open circuit, short circuit) |
| • NTC | +80 °C to +160 °C (short circuit) |
| Measuring accuracy at an ambient temperature of 20 °C (T20) | < ±2 K, ±1 digit |
| Deviation due to ambient temperature (as % of measured value) | 0.05 per K deviation from T20 |
| Isolation of the inputs from the device electronics | No |
| **Connection** | |
| • Tightening torque | TORQUE: 5.2 LB.IN to 7.0 LB.IN<br>0.6 Nm to 0.8 Nm |
| • Connection cross sections | |

| **Technical data of the multifunction module** | |
|---|---|
| - Solid | 2 x0.5 $mm^2$ to 1.5 $mm^2$; 1 x 0.5 $mm^2$ to 2.5 $mm^2$<br>2 x AWG 20 to 16 / 1 x AWG 20 to 14 |
| - Finely stranded with end sleeve | 2 x 0.5 $mm^2$ ... 1.0 $mm^2$; 1 x 0.5 $mm^2$ ... 2.5 $mm^2$ |

# 15.9 Technical data of the operator panels

## 15.9.1 Technical data of the operator panel

| **Technical data of the operator panel** | |
|---|---|
| **Mounting** | Installation in a cabinet door or in a front panel, with IP54 system interface cover. |
| **LED displays** | |
| • Red / green / yellow "DEVICE" LED | • Red blocked: "Function test negative, device disabled"<br>• Green: "Ready for operation"<br>• Flashing green: "No connection to basic unit"<br>• Yellow: "Memory module or addressing plug detected"<br>• OFF: "No control supply voltage" |
| • Green "BUS" LED | • Continuous light: "Communication with PLC/PCS"<br>• Flashing: "Baud rate recognized/communication with PC/PG" |
| • Red "GEN. FAULT" LED | • Continuous light /<br>• Flashing: "Feeder fault," e.g. overload tripping |
| • 3 yellow LEDs / 4 green LEDs | For freely assigning any status signals |
| **Buttons** | |
| • Test / Reset | • Resets the device after tripping<br>• Function test (system self-test)<br>• Operation of memory module or addressing plug |
| • Control buttons | • For controlling the motor feeder, freely assignable |
| **System interfaces** | |
| • Front | For connecting a memory module, an addressing plug, or a PC cable for parameterization purposes |
| • Rear face | For connecting a cable to the basic unit or the expansion module |

## 15.9.2 Technical data of the operator panel with display

| **Technical data of the operator panel with display** | |
|---|---|
| **Mounting** | Installation in a cabinet door or in a front panel, with IP54 system interface cover. |
| **LED displays** | |
| • Red / green / yellow "DEVICE" LED | • Red blocked: "Function test negative, device disabled"<br>• Green: "Ready for operation"<br>• Flashing green: "No connection to basic unit"<br>• Yellow: "Memory module or addressing plug detected"<br>• OFF: "No control supply voltage" |

| **Technical data of the operator panel with display** | |
|---|---|
| • Green "BUS" LED | • Continuous light: "Communication with PLC/PCS"<br>• Flashing: "Baud rate recognized/communication with PC/PG" |
| • Red "GEN. FAULT" LED | • Continuous light/flashing: "Feeder fault," e.g. overload tripping |
| • 4 green LEDs | For freely assigning any status signals (preferably for feedback on the switching state, e.g. ON, OFF, CCW, CW) |
| **Display** | Graphic display of current measured values, operating and diagnostics data or status information. |
| **Buttons** | |
| • Control buttons | • Control of the motor feeder, freely assignable |
| • Arrow keys | • Navigation in the display menu |
| • Softkeys | • Various functions, depending upon the menu, e.g. test, reset, operation of memory module and addressing plug |
| **System interfaces** | |
| • Front | For connecting a memory module, an addressing plug, or a PC cable for parameterization purposes |
| • Rear face | Connection to the basic unit or to an expansion module |

**Note**

**Product version of the operator panel with display**

- For use with the SIMOCODE pro V PN/pro V EIP basic units, an operator panel with display version *E07* or higher is required
- For use with the SIMOCODE pro V MB basic unit, an operator panel with display version *E09* or higher is required.

**Note**

**Usage restrictions concerning the operator panel with display**

- SIMOCODE pro V PB basic unit: The operator panel with display can only be used with SIMOCODE pro V PB basic unit from version *E03*.
- SIMOCODE pro V PN, pro V EIP basic unit: An operator panel with display from version *E07* is required for use with these basic units.
- In combination with the SIMOCODE pro PN basic unit, version *E09* or higher is required when using the operator panel with the 3UF7210-1AA00-0 display.
- In combination with the SIMOCODE pro MR basic unit, version *E09* or higher is required when using the operator panel with the 3UF7210-1AA00-0 display.
- When using the "Dry-running protection" function, the following operator panels with display are necessary:
  - 3UF7210-1AA00-0: ≥ E12
  - 3UF7210-1AA01-0: ≥ E03
  - 3UF7210-1BA00-0: ≥ E04
  - 3UF7210-1BA01-0: ≥ E03

# 15.10 Technical data of the compartment identification

## Technical data of the initialization module

| Technical data of the initialization module | |
|---|---|
| Order No. (MLFB) | 3UF7 902-0AA00-0 |
| Ambient temperature | -25 to +80 °C |
| Rated voltage | 300 V |
| Rated operating voltage | 24 V |

## Technical data of the Y connecting cable

| Technical data of the Y connecting cable | |
|---|---|
| Order No. (MLFB) | 3UF7 931-0CA00-0, 3UF7 932-0CA00-0, 3UF7 937-0CA00-0 |
| Lengths of system cable / open end of cable | |
| 3UF7 931-0CA00-0 | 0.1 m / 1.0 m |
| 3UF7 932-0CA00-0 | 0.5 m / 1.0 m |
| 3UF7 937-0CA00-0 | 1.0 m / 1.0 m |

# 15.11 Short-circuit protection with fuses for motor feeders for short-circuit currents up to 100 kA and 690 V for 1st generation current / voltage measuring module

## Short-circuit protection with fuses for motor feeders for short-circuit currents up to 100 kA and 690 V

You will find selection tables for fuseless and fused motor feeders in the following manuals:

- Configuration Manual Load Feeders – Configuring the SIRIUS Modular System (https://support.automation.siemens.com/WW/view/en/39714188)
- Configuration Manual Configuring SIRIUS Innovations UL - Selection Data for Fuseless and Fused Load Feeders (https://support.automation.siemens.com/WW/view/en/53433538)

The manufacturer's declarations can be found in the Industry Online Support:

Declarations, manufacturer (https://support.industry.siemens.com/cs/ww/en/view/109741638)

# 15.12 Typical reaction times

## 15.12.1 Typical reaction times of the SIMOCODE pro C/V device series

Table 15-1 Typical reaction times of SIMOCODE pro C device series

| Component | Time inputs | Time processing | Time outputs |
|---|---|---|---|
| Basic unit: | Set delay time | 30 ms | 10 ms |
| Thermistor: | 400 ms | | - |
| PROFIBUS: | 30 ms | | 30 ms |
| Current measurement: | 200 ms | | - |
| Internal ground fault: | 300 ms ... 600 ms + set delay | | - |

Table 15-2 Typical reaction times of SIMOCODE pro V device series [1)]

| Component | Time: Inputs | | Time: Processing | Time: Outputs |
|---|---|---|---|---|
| Basic unit: | Set delay time | | 5 ms | 10 ms |
| Thermistor: | 400 ms | | | - |
| PROFIBUS, PROFINET: | 5 ms | | | 5 ms |
| | when using UM | when using UM+ [2), 4)] | | |
| Current measurement: | 300 ms | 200 ms | | - |
| Voltage measurement: | 300 ms | 200 ms | | - |
| Active power / cos phi: | 1000 ms | 200 ms | | - |
| Internal ground fault: | 300 ms ... 600 ms [3)] | 200 ms ... 600 ms [3)] | | - |
| Ground-fault module / external ground fault | 100 ms [3)] | | | - |
| Digital modules: | | | | |
| • 24 V DC version | 15 ms + delay time | | | 25 ms |
| • 110 V - 240 V AC/DC version | 50 ms + delay time | | | 25 ms |
| Analog module | 150 ms | | | 25 ms |
| Temperature module | 500 ms | | | - |
| DM-F Local | ≤ 75 ms + delay time | | | 30 ms |
| DM-F PROFIsafe | 15 ms + delay time | | | 30 ms |

1) Based upon a typical hardware set-up: Basic unit + current measuring module + 2 expansion modules

Reaction time = inputs conversion time + internal processing time + outputs conversion time

Example:

You wish to switch a relay output of the basic unit via PROFIBUS when the "remote" bit is set:

- SIMOCODE pro C: Reaction time = 30 ms + 30 ms + 10 ms = 70 ms
- SIMOCODE pro V: Reaction time = 5 ms + 5 ms + 10 ms = 20 ms.

For the data from and to the PLC, you must also add the times for bus execution time, IM/CP cycles, and PLC-CPU cycle.

You will find the corresponding information in the device descriptions.

2) 2nd generation current / voltage measuring modules

3) + set delay

4) Existing values are valid in compatibility mode

## 15.12.2 Typical response times of SIMOCODE pro S device series

Table 15-3 Typical reaction times of the SIMOCODE pro device series

| Component/control function | Time inputs | Time: Processing | Time: Outputs |
|---|---|---|---|
| Basic unit:<br>Thermistor:<br>PROFIBUS: | Set delay time<br>400 ms<br>30 ms | 30 ms | 10 ms<br>-<br>30 ms |
| Current measurement<br>Internal ground fault | 300 ms<br>300 ms ... 600 ms + set delay | | -<br>- |
| Multifunction module<br>• 24 V-DC version<br>• 110 V - 240 V AC/DC version | <br>30 ms + delay time<br>65 ms + delay time | | <br>40 ms<br>40 ms |
| Ground-fault module function | 100 ms + set delay | | - |
| Temperature module function | 500 ms | | - |
| Star-delta starter - typical switchover time from star to delta | 100 to 150 ms [1)] | | - |

1) QE2 and QE3 must be parameterized to the outputs of the basic unit.

Example:

You wish to switch a relay output of the basic unit via PROFIBUS when the "remote" bit is set:

Reaction time = 30 ms + 30 ms + 10 ms = 70 ms

In the case of the data from and to the PLC, you must also add the times for bus runtime, IM/CP cycles, and PLC-CPU cycle.

You will find the corresponding information in the device descriptions.

### 15.12.3 Typical reaction times of the Modbus RTU device series

| Component | Time: Inputs | Time: Processing | Time: Outputs |
|---|---|---|---|
| Basic unit:<br>Thermistor:<br>Modbus RTU: | Set delay time<br>400 ms<br>5 ms | 5 ms | 10 ms<br>-<br>5 ms |
| Current measurement:<br>Voltage measurement:<br>Active power / cos phi:<br>Internal ground fault: | 300 ms<br>300 ms<br>1000 ms<br>300 ms ... 600 ms + set delay | | -<br>-<br>-<br>- |
| Ground-fault module / external ground fault | 100 ms + set delay | | - |
| Digital modules:<br>• 24 V DC version<br>• 110 V - 240 V AC/DC version | <br>15 ms + delay time<br>50 ms + delay time | | <br>25 ms<br>25 ms |
| Analog module | 150 ms | | 25 ms |
| Temperature module | 500 ms | | - |
| DM-F Local | ≤ 75 ms + delay time | | 30 ms |
| DM-F PROFIsafe | 15 ms + delay time | | 30 ms |

1) Based upon a typical hardware set-up: Basic unit + current measuring module + 2 expansion modules

Reaction time = inputs conversion time + internal processing time + outputs conversion time

Example:

You wish to switch a relay output of the basic unit via PROFIBUS when the "remote" bit is set:

Reaction time = 5 ms + 5 ms + 10 ms = 20 ms.

For the data from and to the PLC, you must also add the times for bus execution time, IM/CP cycles, and PLC-CPU cycle.

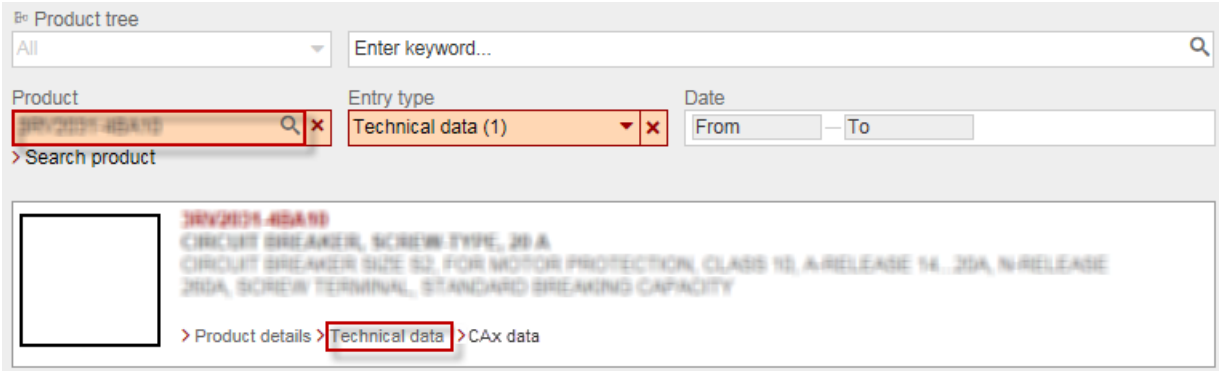
You will find the corresponding information in the device descriptions.

# 15.13 Technical data in Siemens Industry Online Support

## Technical data sheet

You can also find the technical data of the product at Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/).

1. Enter the full article number of the desired device in the "Product" field, and confirm with the Enter key.
2. Click the "Technical data" link.



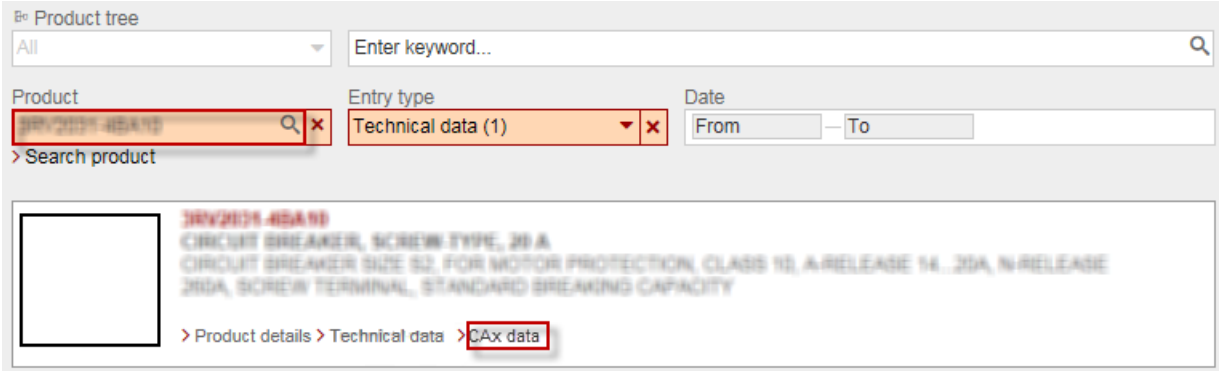
# CAx data, dimension drawings

# 16

## 16.1 CAx data

You can find the CAx data in the Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/).

1. Enter the full article number of the desired device in the "Product" field, and confirm with the Enter key.
2. Click the "CAx data link.



# List of abbreviations

# 17

Table 17-1 Guide to the abbreviations

| Abbreviation | Term |
|---|---|
| AM | Analog module |
| AS | Alarm switch |
| ATEX | "Atmosphère explosible" according to ATEX Directive 2014/34/EU |
| AWG | American Wire Gauge |
| Acycl. | Acyclic |
| OP | Operator panel |
| OPD | Operator Panel with Display for SIMOCODE pro |
| BP | Basic Performance |
| OPO | Operational Protection Off |
| CPU | Central Processing Unit |
| DCM | Decoupling module |
| DHCP | Dynamic Host Configuration Protocol |
| DIP | Dual In-Line Package |
| DM | Digital module |
| DM-F | Fail-safe digital module (DM-FL or DM-FP) |
| DM-FL | Digital Module Failsafe Local |
| DM-FP | Digital Module Failsafe PROFIsafe |
| TO | Torque open |
| TC | Torque closed |
| DP | Distributed peripherals |
| DRP | Dry-running protection |
| DS | Data record |
| DTM | Device Type Manager |
| EEx | European Norm EXplosion-proof: Specifies the protection classes for categorizing motors for use in hazardous areas. |
| EIP | EtherNet/IP |
| ex | Explosion-proof |
| EM | Ground-fault module |
| EMF | Electromotive force |
| EMC | Electromagnetic compatibility |
| F-CPU | Fail-safe CPU (controller) |
| FMS | Fieldbus Message Specification |
| BU | Basic unit |
| BU0 | SIMOCODE pro S basic unit |
| BU1 | SIMOCODE pro C basic unit |
| BU2 | 1st generation SIMOCODE pro V PB (PROFIBUS) basic unit (for UM) |
| BU2+ | 2nd generation SIMOCODE pro V PB (PROFIBUS) basic unit (for UM+) |

| Abbreviation | Term |
|---|---|
| BU2_MR | 1st generation SIMOCODE pro V Modbus RTU basic unit (for UM) |
| BU2_MR+ | 2nd generation SIMOCODE pro V Modbus RTU basic unit (for UM+) |
| BU3 | SIMOCODE pro V PN (PROFINET) basic unit |
| BU3 GP | SIMOCODE pro V PN GP (PROFINET General Performance) basic unit |
| GP | General Performance |
| GSD | Device master data |
| HFT | Hardware failure tolerance |
| HP | High Performance |
| AUXS | Auxiliary switch |
| I&M | Identification and Maintenance |
| InM | Initialization module |
| IT | Isolation-Terre (isolation ground) |
| IM | Current measuring module |
| MM | Multifunction module |
| MR | Modbus RTU |
| NTC | Negative temperature coefficient (resistance dependent on temperature) |
| OB | Organization block |
| OM | Object Manager for PROFIBUS DP slaves for integration into STEP 7 |
| OSSD | Part of the electro-sensitive protective equipment (ESPE) that is connected to the machine control system and that switches to the OFF state if the sensor part is tripped during operation for the intended purpose. |
| PB | PROFIBUS |
| PCS | Process Control System |
| PDM | Process Device Manager |
| PELV | Protective Extra Low Voltage |
| PFD | Probability of failure of demand: Probability of dangerous failure of a safety function on demand |
| $PFD_{avg}$ | Average probability of failure of demand: Average probability of dangerous failure of a safety function on demand |
| PFHD | Probability of dangerous failure per hour: Average probability of hazardous failure occurring each hour |
| PG | Programming device |
| PL | Performance Level |
| PCS | Process Control System |
| PN | PROFINET |
| PROFIBUS | Process fieldbus |
| PTC | Positive temperature coefficient (resistance dependent on temperature) |
| PZ | Pozidriv |
| FB | Feedback |
| FO | Feedback open |
| TPF | Test position feedback |
| FC | Feedback closed |
| SELV | Safety Extra Low Voltage |
| GF, CF | Group fault or control function |
| SIL | Safety Integrity Level |

| Abbreviation | Term |
|---|---|
| SFB | System function block |
| SFC | System function |
| SFF | Safe failure fraction |
| PLC | Programmable logic controller |
| Th | Thermistor |
| TM | Temperature module |
| DRP | Dry-running protection |
| $T_{OFDT}$ | Total one fault delay time (maximum response time when error is present) |
| $T_{WCDT}$ | Total worst case delay time (maximum response time in error-free state) |
| UKCA | UK Conformity Assessed: British product designation, required for certain products that are placed on the market in Great Britain (England, Wales and Scotland) |
| UKEX | UK Type Examination certificate for products in potentially explosive atmospheres, issued by a British notified body - British equivalent for ATEX, of the regulation governing equipment and protective systems for intended for use in potentially explosive atmospheres from 2016 ("The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016" (SI 2016:1107)) |
| UM | 1st generation current / voltage measuring module (identified in SIMOCODE ES (TIA Portal) as IUM) |
| UM+ | 2nd generation current / voltage measuring module (identified in SIMOCODE ES (TIA Portal) as IUM V2) |
| $T_{UL}$ | Useful lifetime |
| UM+_TL | 2nd generation current / voltage measuring module for dry-running protection (identified in SIMOCODE ES (TIA Portal) as IUM V2 DRP) |
| UVO | Undervoltage off |
| LC | Local control |
| Cycl. | Cyclic |

# Glossary

### 0/4 to 20 mA monitoring

SIMOCODE pro supports two-phase monitoring of the analog signals of a transducer (standardized 0/4 - 20 mA output signal). The analog signals are fed to the "0/4 to 20 mA monitoring" function block via the analog module.

### Addressing plug

The addressing plug is necessary to enable the hardware-based allocation of the PROFIBUS DP address to a basic unit without a PC / PG.

### Analog module (AM)

The analog module provides a way of optionally extending the basic unit with analog inputs and outputs (0/4 - 20 mA). This makes it possible to measure and monitor any process variables that can be mapped onto a 0/4 to 20 mA signal. The automation system has free access to the measured process variables.

### Application data unit (ADU)

Modbus application data unit.

### ATEX

French abbreviation for "atmosphère explosible" (explosive atmosphere).

Synonym for the ATEX Directive 2014/34/EU.

### Basic unit (BU)

The basic units are the fundamental components of the SIMOCODE pro system. Basic units are always necessary when using SIMOCODE pro.

Versions:

- SIMOCODE pro C basic unit**:** Basic component of the SIMOCODE pro C device series for PROFIBUS DP. It contains the essential motor control and motor protection functions.
- Basic unit pro S: Basic component of the SIMOCODE pro S device series for PROFIBUS DP. It is used in combination with a current measuring module and an optional operator panel.
- SIMOCODE pro V PN GP basic unit: Basic component for PROFINET. It is used in combination with a current measuring module and an optional operator panel.
- SIMOCODE pro V PB basic unit: Basic component of the SIMOCODE pro V device series for PROFIBUS DP. It contains all functions and requirements regarding motor protection, motor control, diagnostics, and monitoring.

- SIMOCODE pro V basic unit Modbus RTU: Basic component of the SIMOCODE pro V Modbus RTU device series for Modbus RTU. It contains all functions and requirements regarding motor protection, motor control, diagnostics, and monitoring.
- SIMOCODE pro V PN basic unit: Basic component of the SIMOCODE pro V PN device series for PROFINET. It contains all functions and requirements regarding motor protection, motor control, diagnostics, and monitoring.
- SIMOCODE pro V EtherNet/IP basic unit: Basic component of the SIMOCODE pro V EtherNet/IP device series. It contains all functions and requirements regarding motor protection, motor control, diagnostics, and monitoring.

### Baud rate

The baud rate is the speed at which data is transferred and indicates the number of transmitted bits per second (baud rate = bit rate). For example, with PROFIBUS DP, baud rates between 9.6 kbaud and 12 Mbaud are possible.

### Bus

A common transmission path with which all stations are connected. It has two defined ends. With PROFIBUS, the bus is a two-wire cable (copper cable) or a fiber optic cable.

### Bus segment

PROFIBUS DP consists of at least one bus segment. A bus segment has at least two stations, one of which must be a DP master. A maximum of 32 stations can be connected to a bus segment.

### Cascading input

Safe, 1-channel input of a safety relay, e.g. DM-F LOCAL and DM-F PROFIsafe. Internally, this input is evaluated like a sensor signal. If no voltage is present, the safety relay trips the enabling circuits (outputs) in a safety-related way.

### Class

Unit for the trip class. Indicates the maximum tripping time in which SIMOCODE must trip at a current that is 7.2 times the value of the current setting $I_s$ in a cold state (motor protection according to IEC 60947). If Class 10E is set for SIMOCODE pro, for example, it is ensured that the (cold) motor will switch off after 10 seconds if a current occurs that is 7.2 times the current setting. The trip class can be set to eight different settings ranging from Class 5E to Class 40E.

### Class 1 master

Active station on PROFIBUS DP. It is characteristically used for cyclic data exchange with other stations. Typical Class 1 masters include PLCs with a PROFIBUS DP connection.

### Class 2 master

Optional station on PROFIBUS DP. Typical class 2 masters include:

- PC/PG with SIMOCODE ES (TIA Portal)
- PDM (PCS7)
- PC with "SIMARIS manager" software (power management).

### Connecting cable

Connecting cables are necessary for connecting the individual basic units with their current measuring modules and, if required, with their expansion modules or operator panels. They are available in various versions and lengths (ribbon cable 0.025 m, 0.1 m, 0.15 m, 0.3 m, 0.5 m; round cable 0.5 m, 1.0 m, 2.5 m).

**Notice**

**Maximum length of connecting cables:**

The total length of all cables must not exceed 3 m on either of the system interfaces of the basic unit!

### Contactor

Electromagnetically operated low-voltage switch with only one position of rest; it cannot be manually operated. Contactors can energize, carry, and deenergize currents in a circuit under normal operating conditions, including operational overload. The contact system consists of main and auxiliary contacts (NC, NO). Depending on the size of the contactor, the main contacts can switch several hundred amps while the auxiliary contacts are only rated for control currents of a few amps.

### Control functions

Control functions (e.g. direct-on-line starters, reversing starters) are used for controlling load feeders. They are characterized by the following important features:

- Monitoring the switch-on / switch-off process (no current flows in the main circuit without the ON command)
- Monitoring the OFF state (no current flows in the main circuit without the ON command)
- Monitoring the ON status
- Tripping if a fault occurs.

### Control stations

Control stations are places from which control commands are issued to the motor. The "Control Stations" function block is used for administration, switching and prioritization of these different control stations. SIMOCODE pro allows parallel administration of up to

four different control stations. Dependent on the control function, up to 5 different control commands can be transmitted from every control station to SIMOCODE pro.

- Local control, in the direct vicinity of the motor. Control commands via pushbuttons.
- PLC/PCS, switching commands are issued by the automation system (remote).
- PC, control commands are issued via an operator control and monitoring station or via PROFIBUS DPV1 with SIMOCODE ES (TIA Portal).
- Operator panel / operator panel with display, control commands are issued via the buttons of the operator panel / operator panel with display in the switchgear cabinet door.

### Cooling down period

The cooling down period is the amount of time that must elapse before an overload trip can be reset. This is usually 5 minutes. Supply voltage failures of SIMOCODE pro during this time extend the specified time correspondingly.

### Cos phi monitoring

Cos phi monitoring monitors the load condition of inductive loads. The main field of application is for asynchronous motors in 1-phase or 3-phase networks with loads that fluctuate significantly. The power factor (cos phi) is measured by evaluating the phase displacement between the voltage and current in a phase.

### Current measuring module (IM)

Current measuring modules are used together with the basic units. The current measuring module must be selected according to the current setting to be monitored (rated operating current of the motor). The current measuring modules cover current ranges between 0.3 A and 630 A, with intermediate transformers up to 820 A.

### Current limit monitoring

Current limit monitoring is used for process monitoring. This enables incipient anomalies in the system to be detected in good time. If a current limit is exceeded but still below the overload limit, it can, for example, indicate a dirty filter on a pump, or an increasingly sluggish motor bearing. If the current limit is undershot, it can be the first sign of a worn-out drive motor belt.

### Current/voltage measuring module (UM, UM+)

The SIMOCODE pro V device series allows use of a current/voltage measuring module instead of a current measuring module. In addition to measuring the motor current, current/voltage measuring modules also enable:

- Monitoring of voltages up to 690 V
- Calculation and monitoring of power and power factor (cos phi)
- Monitoring of the phase sequence.

Special current/voltage measuring modules (DRP) are available for dry-running protection for centrifugal pumps by means of active power monitoring.

### Cyclic redundancy check (CRC)

Cyclic redundancy check for checking Modbus RTU transmission errors

### Decoupling module

A module for connection between a current/voltage measuring module and the basic unit at the system interface when voltage and power measurements are implemented in non-grounded networks.

### Device master data (GSD file)

Information on the input and output range, as well as the consistency of the cyclically transmitted data is defined in the device data file (GSD file), tested with the configuration telegram from the device and, if appropriate, declared to be valid. The GSD file is used for integrating the device into SIMATIC S7 or any DP standard master system (automation system).

### Device name

Before an IO device can be addressed by an IO controller, it must have a device name because the IP address is permanently assigned to the device name. In the case of PROFINET, this method was chosen because names are easier to handle than complex IP addresses.

Assignment of a device name for a specific IO device is comparable to setting the PROFIBUS address on a DP slave.

An IO device does not have a device name when it is delivered. It can only be addressed by an IO controller once a device name has been assigned to it, e.g. for transmission of the configuration data (including the IP address) during startup or for exchanging useful data in cyclic operation.

### Digital module (DM)

Digital modules offer the option of further increasing the types and number of binary inputs and outputs on SIMOCODE pro V as required. Up to two digital modules can be connected to one SIMOCODE pro V basic unit. All types can be combined with each other. SIMOCODE pro V can thus be extended to a maximum of twelve binary inputs and seven binary outputs.

### DIP switch

Small switch used to make certain basic settings. The abbreviation stands for Dual In-line Package, a device package with two parallel rows of electrical connection pins.

### DM-F Local and DM-F PROFIsafe digital modules

The DM-F Local and DM-F PROFIsafe fail-safe digital modules are used as safety relays in EMERGENCY STOP devices in accordance with EN 418 and in safety circuits in accordance with EN 60204 (11.98):

DM-F Local digital module:

For applications that require local safety-related tripping with EMERGENCY OFF buttons.

DM-F PROFIsafe digital module:

For applications that require decentralized safety-related tripping with EMERGENCY OFF buttons. A fail-safe SIMATIC controller applies the logical connection between the EMERGENCY OFF button and DM-F PROFIsafe digital module.

See manual "Fail-safe Digital Modules SIMOCODE pro Safety".

### Door adapter

The door adaptor is necessary for making the system interface of a basic unit available at an easily accessible location (e.g. front panel), thus enabling fast parameterization.

### DP master

A master that works with the DP protocol according to the EN 50170 standard, Volume 2, PROFIBUS. Cyclic send data is exchanged between the DP master and the DP slave once in every DP cycle. The DP master sends the cyclic receive data to SIMOCODE pro. In response, SIMOCODE pro sends the cyclic send data to the DP master.

### DP slave/DP standard slave

A slave that is operated on PROFIBUS with the PROFIBUS DP protocol and works according to the EN 50170 standard, Volume 2, PROFIBUS.

### Dynamic Host Configuration Protocol

The Dynamic Host Configuration Protocol (DHCP) is an information technology communication protocol. It enables assignment of the network configuration to clients by a server. DHCP was defined in RFC 2131 and was assigned the UPD ports 67 and 68 by the Internet Assigned Numbers Authority.

### Emergency start

Emergency start deletes the thermal memory from SIMOCODE pro each time it is activated. This allows the motor to be immediately restarted after an overload trip. This function can be used to:

- Enable an immediate restart/reset after an overload trip
- Influence the thermal memory (motor model) during operation, if required.

Since the emergency start is edge-triggered, this function cannot permanently affect the thermal motor model.

### EMERGENCY STOP

Shutdown in case of an emergency according to EN 418 (ISO 13850).

An action in an emergency that is intended to stop a process or motion that would result in a hazard.

### EMERGENCY STOP command device

Contact block ("EMERGENCY STOP" mushroom pushbutton according to EN EN 418 (ISO 13850), cable-operated switch with positive opening contacts according to EN 60204-1) that causes the process, machine or plant to be stopped when actuated in hazardous situations. This must have positive-opening contacts, be easy to reach and be tamper-proof.

### EMERGENCY STOP device

Protective device that is operated in response to an emergency according to EN 418 (ISO 13850), EN 60204-1.

### Enabling circuit

An enabling circuit is used to generate a safety-related output signal. From an external viewpoint, enabling circuits act as NO contacts (however, in terms of functionality, safety-related opening is always the most important aspect). A single enabling circuit, that is internally redundantly configured in the safety relay (two-channel) can be used for Category 3/4 according to EN 954-1 (ISO 13849-1).

### EtherNet/IP

EtherNet/IP (EtherNet Industrial Protocol, often simply called EIP) is a real-time Ethernet that is used mainly in automation engineering. EtherNet/IP was developed by Allen-Bradley (belongs to Rockwell Automation) and was later handed over to the Open DeviceNet Vendor Association (ODVA) as an open standard. In 1998, a working group of ControlNet International designed a process for basing the already-published application protocol, Common Industrial Protocol, on Ethernet. Based on this process, EtherNet/IP was published as an open industrial standard in March 2000. ControlNet International (CI), the Open DeviceNet Vendor Association (ODVA) and the Industrial Ethernet Association (IEA) were involved.

Besides PROFINET and Modbus/TCP, EtherNet/IP is an Ethernet-based fieldbus that is currently widely spread.

### Expansion modules

Expansion modules are intended as optional additions for the basic units. The following expansion modules are available:

- Digital module (DM)
- Analog module (AM)
- Ground-fault module (EM, EM+)

- Temperature module (TM)
- Multifunction module (MM).

All expansion modules are equipped with 2 system interfaces (incoming/outgoing) and removable terminals.

### F_WD_Time

Monitoring time in the fail-safe PROFIsafe option. A valid, current safety message frame must be received from the F-CPU within this monitoring time. Otherwise, the PROFIsafe option goes to the safe state.

### Factory settings

The factory settings are used to reset all parameters of a device to the default settings to which they were set at the factory. The factory settings can be restored using either the "TEST / RESET" button on the basic unit or via SIMOCODE ES (TIA Portal).

### Feedback circuit

A feedback circuit is used to monitor controlled actuators (e.g., relays or contactors with positively driven contacts). The evaluation unit can only be activated if the feedback circuit is closed.

**Note:**

The NC contacts of the relays to be monitored are connected in series and integrated into the feedback circuit of the safety relay. If a contact in the enabling current path is welded, the safety relay can no longer be activated because the feedback circuit remains in the open position.

### Field/field level

The field or field level of an automation system contains the individual sensors and actuators, as opposed to the control level, which is located above it in the hierarchy.

### Fieldbus

Industrial communication system that connects a large number of field devices such as probes (sensors), actuators and drives to a control device.

### Function block

Defined group of functions that can be freely parameterized by the user and connected to other function blocks to create a complete feeder-specific logic system. This means conventional wired control circuits containing auxiliary relays, time relays, etc. can be completely replaced.

### Function code (FC)

Identification of a function

### Ground-fault module (EM, EM+)

The ground-fault module and the multifunction module enable implementation of a powerful external ground fault monitoring system in conjunction with the 3UL22 (3UF7 500-1AA00-0) and 3UL23 (3UF7 510-1AA00-0) residual current transformers. In addition to the internal ground-fault monitoring function which is supported by both device series, SIMOCODE pro can be extended by an additional and more precise external ground-fault monitoring system.

### Ground-fault monitoring

SIMOCODE pro acquires and monitors all three phase currents. By evaluating the summation current of the three current values, the motor feeder can be monitored for a possible residual current or ground fault. There is a difference between internal and external ground-fault monitoring:

**Internal** ground-fault monitoring:

Internal ground-fault monitoring via current measuring modules or current/voltage measuring modules is only possible for motors with a 3-phase connection in power systems that are either grounded solidly or with low impedance. The basic unit uses the total current to detect a possible residual current / ground-fault current.

**External** ground-fault monitoring:

The external ground-fault monitoring using residual current transformer and ground-fault module is normally used for power systems that are grounded with high impedance, or in cases, in which precise detection of the ground-fault current is necessary, for example, for condition monitoring. The ground-fault module (EM) or the multifunction module (MM) evaluates rated fault currents using an externally connected summation current transformer (e.g. 3UL23).

### GSD file

The properties of a PROFINET device are described in a GSD (General Station Description) file that contains all the necessary information for configuration. You can use a GSD file to integrate a PROFINET device in exactly the same way as a PROFIBUS device into an automation system (SIMATIC S7 environment or any DP standard master system).

In the case of PROFINET IO, the GSD file is in XML format. The structure of the GSD file conforms to ISO 15734, the worldwide standard for device descriptions.

### I&M data

Identification and maintenance data.

Information stored in a module that helps you to check the plant configuration, to locate hardware modifications in a plant, or to remedy faults in a plant. I&M data can be used to identify modules uniquely on the network.

### I/O

The term I/O devices is used in automation engineering to refer to peripheral devices, for example, devices that are connected to centralized controls.

### Independent operation

SIMOCODE pro protects and controls the motor feeder, independently of the automation system. Even if the automation system (PLC) fails, or if communication is disrupted, the motor feeder remains fully protected and controllable. SIMOCODE pro can be used without being connected to the communication bus. This can easily be connected later, if required.

### Initialization module

Memory module permanently installed in the switchboard or the motor control center in which the device parameters of intelligent switching devices are stored.

The initialization module is used in motor control centers with a withdrawable design in which all functions concerning the motor feeder are fitted in an exchangeable withdrawable module.

The initialization module can be permanently installed in the switchboard and enables backup of all parameters of a system and completely automatic transmission to a new system, e.g. device replacement.

### IP address

To enable a PROFINET device to be addressed as a node on Industrial Ethernet, this device also requires an IP address that is unique within the network. The IP address is made up of 4 decimal numbers with a range of values from 0 through 255. The decimal numbers are separated by a decimal point.

The IP address is made up of

- The address of the (sub)net and
- The address of the node (generally called the host or network node)

### IT system

The IT system (FR Isolé Terre) is a specific type of ground connection for increased fail-safe protection in case of insulation faults.

### Local Human Machine Interface (HMI) for SIRIUS devices

Human Machine Interface for a SIRIUS device or for several SIRIUS devices

### Logic modules

Logical operations, time relay functions and counter functions are implemented using logic modules.

### Low voltage

All voltage levels used for the distribution of electricity that are within a range whose upper limit in AC systems is generally 1000 V.

### MAC address

Each PROFINET device is assigned a globally unique device identification at the factory. This 6-byte-long device identifier is the MAC address.

The MAC address is divided up as follows:

- 3 bytes for the manufacturer ID and
- 3 bytes device identifier (consecutive number).

The MAC address can generally be read from the front on the device, e.g.: 08-00-06-6B-80-C0.

### Master

PROFIBUS DP is based on a master-slave architecture. Telegrams are sent by the master to the addressed station (slave) and responded to by the slave.

### Media redundancy

SIMOCODE pro V PN supports media redundancy according to the Media Redundancy Protocol (MRP). This function is configured using the configuration tool of the automation system, e.g. HW Config with STEP 7.

### Memory module

The memory module is plugged into the system interface and is used for fast reading in or out of the entire SIMOCODE pro parameterization, e.g. if a unit is exchanged.

**Note**

The SIMOCODE pro C and SIMOCODE pro V PB basic units up to product version *E08* only support the 3UF7900-0AA00-0 memory module. The basic units SIMOCODE pro S and SIMOCODE pro V (PB as from product version *E09*) also support the memory module 3UF7910-0AA00-0.

### Modbus address table

Data with similar properties are combined in one of four address tables: Discrete inputs, coils, input register, holding register

### Modbus RTU

Modbus RTU (Remote Terminal Unit) is a standard protocol for network communication and uses the electrical RS485 connection for serial data transmission between Modbus devices in the network.

Modbus RTU uses a master/slave network in which the entire communication is triggered by only one master device while the slaves can only respond to the request of the master. The master sends a request to a slave address and only this slave address responds to the command (exception: broadcast frames to slave address 0 which are not acknowledged by the slaves).

### Monitoring functions

The following monitoring functions

- Ground-fault monitoring
- Current limit monitoring
- Voltage monitoring
- Cos phi monitoring
- Active power monitoring
- 0/4 to 20 mA monitoring
- Operation monitoring
- Temperature monitoring (analog)

Operate "in the background" in the same way as motor protection and motor control. They can be active or not, according to the control function selected.

### Monitoring the number of starts

Monitoring the number of starts can protect system parts (motors and switching devices such as soft starters and converters) from too many start processes within a parameterizable time frame and thus prevent damage. This is particularly useful for commissioning or manual control.

### Motor protection

The basic unit has several protection mechanisms for current-dependent motor protection:

- Overload protection
- Unbalance protection
- Stalled rotor protection
- Thermistor protection.

### Motor stop time monitoring

SIMOCODE pro can monitor the stop times of a motor to avoid plant downtimes due to failed motors caused by either running too long (wearing out) or being stopped for too long.

### Multifunction module

Universal module of the SIMOCODE pro S device series with the following functions:

- Digital module function with four digital inputs and two monostable relay outputs
- Ground fault module function with the possibility of implementing powerful external ground-fault monitoring in conjunction with the 3UL23 residual-current transformer
- Temperature module function with one input for connecting an analog PT100, PT1000, KTY83, KTY84 or NTC temperature sensor.

### Network Time Protocol

Implementation of a TCP/IP protocol for time synchronization in networks. The NTP procedure uses hierarchical time synchronization, that is, an external clock (e.g. SICLOCK TM or a PC in the network) is used for synchronization.

### Octet

Sequence of bytes. Octet n: string of n bytes.

### Offset

A reference within an address table.

### OPC Unified Architecture (UA)

OPC Unified Architecture (UA) is the next generation technology of the OPC Foundation for secure and reliable data transfer and defines access to industrial communication networks.

### OPC UA client

An OPC UA client is a user program that accesses process data via the OPC UA interface. Access to the process data is made possible by the OPC UA server.

### OPC UA server

The OPC server provides the OPC client with a wide range of functions with which it can communicate via industrial networks. SIMOCODE pro V PN provides extensive process data via OPC UA.

### Operating hours monitoring

The motor operating hours monitoring function enables the operating hours (service life) of a motor to be recorded so that motor maintenance prompts can be generated in good time as applicable.

### Operation monitoring

SIMOCODE pro can monitor the operating hours and stop times of a motor and restrict the number of startups in a defined time frame in order to avoid plant downtimes due to failed motors caused by running or being stopped for too long.

### Operational Protection Off (OPO)

The "Operational Protection Off (OPO)" function block puts the positioner into a safe position and switches the motor off.

### Operator panel with display (OPD)

The operator panel with display can be used as an alternative to the standard operator panel (OP). It displays the current measured values, operating and diagnostic data, status information for the motor feeder at the switchgear cabinet and the device-internal error log. It also contains all the status LEDs that are present on the basic unit and facilitates access to the system interface from outside the cabinet. Its keys can be used to control the motor and to navigate the display menu.

### Operator panel (OP)

The operator panel controls the motor feeder from the switchgear cabinet. It contains all the status LEDs that are on the basic units, the "TEST/RESET" button and the external system interface.

### Organization block

Organization blocks form the interface between the CPU operating system and the user program. The order in which the user program is processed is specified in the organization blocks.

### Overload protection

SIMOCODE pro protects three-phase or AC motors in accordance with IEC 60947-4-1 requirements. The trip class can be set to eight different settings ranging from CLASS 5E to CLASS 40E.

### Pause time

The pause time is the specified time for the cooling down response of the motor when tripped under normal operating conditions (not in the case of an overload trip). After this interval, the thermal memory in SIMOCODE pro is erased and a new cold start is possible. This means that many startups can be performed in a short space of time.

### PC cable

The PC cable is used to connect the serial interface of the PC to the system interface of a basic unit for device parameterization.

**Note**

**PC cable variant**

For SIMOCODE pro V PN, a serial PC cable 3UF7940-0AA00-0 as from product version *E02* or a USB PC cable 3UF7941-0AA00-0 can be used.

### PELV

Protective Extra-Low Voltage. Protective measure against electric shock (formerly referred to as "protective extra low voltage with safe isolation").

In contrast to an SELV circuit, live parts and exposed conductive parts of the equipment may be grounded and connected to the protective conductor. Safe isolation means that the primary circuit of the transformer must be separated from the secondary circuit by double or reinforced insulation. PELV is used whenever operational reasons dictate that live conductors of the low voltage or bodies of the equipment must be grounded. This is the case, for instance, if equipotential bonding is necessary to prevent sparking in containers or hazardous areas. However, owing to the chassis ground, dangerous leakage currents can flow through the body regardless of the low voltage if a fault occurs in the higher-level power system.

Use of power supply units according to IEC 60536, protection class III (SELV or PELV):

See Chapters "Safety-related tripping", "Fail-safe digital modules (DM-F)", and "DM-F Local and DM-F PROFIsafe digital modules".

### Performance Level (PL)

Defined by standard EN ISO 13849-1 as "a discrete level specifying the ability of safety-related control parts to execute a safety function under anticipated conditions." Five performance levels are specified (a to e) with defined ranges of the probability of a dangerous failure per hour. PL "e" corresponds to SIL 3 and is specified as the highest level.

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### Pozidriv (PZ)

Type of fixing screws and cross-tip screwdrivers.

### Process Automation (PA)

Automation of continuous production processes. For instance, it controls production processes in the chemical industry or in water supply systems.

**PROFIBUS**

Process Fieldbus, a European process and fieldbus standard defined in the PROFIBUS standard (EN 50170, Volume 2, PROFIBUS). It specifies the functional, electrical and mechanical characteristics of a bit-serial fieldbus system.

PROFIBUS is a bus system that networks PROFIBUS-compatible automation systems and field devices at the cell and field level. PROFIBUS is available with the DP (= Distributed Peripherals), FMS (= Fieldbus Message Specification), PA (= Process Automation), or TF (= Technological Functions) protocol.

**PROFIBUS User Organization (PNO) installation guidelines**

The PROFIBUS DP / FMS installation guidelines published by the PROFIBUS User Organization must be complied with when installing PROFIBUS networks. These contain important information about cable routing and the commissioning of PROFIBUS networks.

**PROFIBUS DP**

PROFIBUS bus system with the DP (distributed I/Os - decentralized peripherals) protocol. The main task of PROFIBUS DP is to manage the fast, cyclic data exchange between the central DP devices and the I/O devices.

**PROFIBUS DP interface**

SIMOCODE pro has an integrated PROFIBUS DP interface (SUB-D socket or terminal connection on the basic units).

**PROFIBUS DPV1**

Extension of the DP protocol. It enables acyclic data exchange of parameter, diagnostic, receive and test data.

**PROFIenergy**

Profile for power management in production plants.

PROFIenergy uses the PROFINET communication protocol. It controls the power consumption of automation equipment in production via a PROFINET network.

**PROFINET**

PROFINET (Process Field Network) is the open Industrial Ethernet Standard from Profibus & Profinet International (PI) for automation.

Within the context of Totally Integrated Automation (TIA), PROFINET is the systematic development of the following systems:

- PROFIBUS DP, the established fieldbus
- Industrial Ethernet, the communications bus for the cell level.

Experiences from both systems have been and are being integrated in PROFINET.

**PROFINET IO controller**

Device via which the connected IO devices are addressed. This means the IO controller exchanges input and output signals with assigned field devices. The IO controller is often the controller on which the automation program runs.

**PROFINET IO device**

Distributed field device assigned to one of the IO controllers.

**PROFINET IO Supervisor**

PG/PC for commissioning and diagnostics.

**PROFIsafe**

The PROFIBUS safety profile specifies communication between fail-safe I/O devices and fail-safe controllers. It is based on the standards for safety-related applications as well as on the experience of PLC users and manufacturers who are members of PROFIBUS International (PI). The PROFIBUS safety profile has TÜV and BIA (Institute for Occupational Safety and Health of the German Social Accident Insurance) certification. The newest version of the PROFIsafe specification is the Profile for Safety Technology V1.11 specification, published in 07/2001.

**Programmable logic controller (PLC)**

Controller whose functionality is stored in the control equipment as a software program. The PLC comprises a CPU, memory, input/output modules, and an internal bus system. The I/O and the programming language are oriented toward control engineering needs.

**Programming device**

A compact and transportable PC, suitable for industrial purposes. Its distinguishing feature is the special hardware and software for SIMATIC programmable logic controllers.

**Protection functions**

The protection functions

- Overload protection
- Unbalance protection
- Stalled rotor protection
- Thermistor protection
- Dry-running protection

operate alongside motor control "at a higher level in the background." They can be active or not, according to the control function selected.

### Protective Extra Low Voltage (PELV)

Protective measure against electric shock (formerly referred to as "protective extra low voltage with safe isolation").

In contrast to an SELV circuit, live parts and exposed conductive parts of the equipment may be grounded and connected to the protective conductor. Safe isolation means that the primary circuit of the transformer must be separated from the secondary circuit by double or reinforced insulation. PELV is used whenever operational reasons dictate that live conductors of the low voltage or bodies of the equipment must be grounded. This is the case, for instance, if equipotential bonding is necessary to prevent sparking in containers or hazardous areas. However, owing to the chassis ground, dangerous leakage currents can flow through the body regardless of the low voltage if a fault occurs in the higher-level power system.

### Protocol data unit (PDU)

Consists of function code and the data

### Record

Record.

### RT communication

As a motor management system, SIMOCODE pro V PN does not have any time-critical communication functions itself but it does support the PROFINET hardware RT used. The integrated 2-port switch is therefore used to forward RT data.

### SELV

Safety extra low voltage Low electric voltage that offers significant protection against electric shock due to its low value and insulation. For certain requirements, the highest voltage must be defined below 50 V AC or 120 V smoothed DC, especially if direct contact with live parts is permissible. At a nominal voltage of 120 V, the greatest peak value in a smoothed DC system is 140 V, and at a nominal voltage of 60 V it is 70 C.

Use of power supply units according to IEC 60536, protection class III (SELV or PELV):

### SFB

System function block A block integrated in the S7 CPU operating system that can be called like a function block (FB) in the user program if required.

### SFC

System function:

A function integrated in the S7 CPU operating system that can be called like a function (FC) in the user program if required.

### Shared device

Shared device is the function with which an IO device is used simultaneously by two or more IO controllers.

Use of this function depends on whether the automation system supports the function. It is configured using the configuration tool of the automation system, e.g. with STEP 7 HW Config.

### SIL (Safety Integrity Level)

Measure, defined in IEC 61508, for the safety-related performance of an electrical or electronic control device.

The IEC standard defines four SIL levels SIL1 to SIL4, which are defined as the safety implementations of electrical and electronic equipment. The SIL value describes the specified safety function in the event of a fault.

### SIMATIC

Name of products and systems for industrial automation from Siemens AG.

### SIMATIC PDM

You can also configure SIMOCODE pro using the SIMATIC PDM (Process Device Manager) software. The following options exist:

- SIMATIC PDM as a standalone program
- PDM integrated in STEP 7

### SIMOCODE ES (TIA Portal)

Standard parameterization software for SIMOCODE pro.

### SIMOCODE pro S7 slave

The SIMOCODE pro S7 slave is a special slave with the following characteristics:

- It supports the S7 model (diagnostic interrupts, process interrupts)
- It can be parameterized

### SIMOCODE pro object manager (OM)

Part of SIMOCODE ES. When SIMOCODE ES and SIMOCODE pro object manager are installed on a PC/PG, SIMOCODE ES can be called directly from STEP 7 HW Config. This enables simple and universal SIMATIC S7 configuration.

### SIMOCODE pro PCS-7 library

The SIMOCODE pro PCS 7 library is used to connect SIMOCODE pro to the SIMATIC PCS 7 process control system. It contains:

- The diagnostics and driver modules corresponding to the diagnostics and driver concept of SIMATIC PCS 7
- The elements (symbols and faceplates) necessary for operating and monitoring.

Service packs and hot fixes:

The PCS 7 libraries are subject to continual updating and improvement. You can download the current service packs and hot fixes in the Industry Online Support.

### Simple Network Management Protocol (SNMP)

Network protocol for monitoring and controlling network elements (e.g. switches).

### Slave

PROFIBUS DP is based on a master-slave architecture. Telegrams are sent by the master to the addressed station (slave) and responded to by the slave.

### Stalled rotor protection

If the motor current rises above an adjustable stalled rotor protection level (current threshold), a defined and delayable response can be configured for SIMOCODE pro. In this case, for example, the motor can be shut down independently of the overload protection. The stalled rotor protection is only active after the parameterized class time has elapsed, e.g. for Class 10E after 10 seconds, and prevents unnecessarily high thermal and mechanical loads as well as premature aging of the motor.

### Standard function

Standard functions are typical motor functions that can be activated according to need and, as applicable, individually set for each motor feeder. They are already available, work independently of the selected control function and can be used/activated as optional additions.

### Station

A device that can send, receive or amplify data via the bus, e.g. master, slave.

### Statistical data

SIMOCODE pro makes statistical data available, which can be read out, for example, with SIMOCODE ES (TIA Portal) under Commissioning → Service Data / Statistical Data.

### STEP7

The basic STEP 7 software is the standard tool for the SIMATIC S7, SIMATIC C7, and SIMATIC WinAC automation systems.

### Stop category 0

Non-controlled shutdown by immediately switching off the power to the machine's drive elements.

### System interface cover IP54

Cover to protect the system interface on the door adaptor or on the operator panel/operator panel with display from soiling or to seal it.

### Temperature module (TM)

The temperature module offers the option of expanding the SIMOCODE pro V device series by an analog temperature monitoring system. With this, up to three analog sensor measuring circuits (two-wire or three-wire systems) can be connected. The temperatures recorded can be fully integrated into the process, can be monitored and are also available for a higher-level automation system. You can, for example, implement analog temperature monitoring of the motor windings, bearings, coolant or gearbox oil. SIMOCODE pro V supports various sensor types (NTC, KTY83/84, PT100 and PT1000) for use with solid, liquid, or gaseous media.

### Temperature monitoring

See temperature module (TM).

### Terminal block

Insulating part comprised of one or more terminals, insulated from one another, for mounting on a strip.

### Test Position Feedback (TPF)

If the motor feeder is in the test position, its main circuit is isolated from the network. However, the control voltage is connected.

The "cold run" function test is performed with the feeder in this state. This means the motor feeder is tested without a current in the main circuit.

### Thermistor protection

SIMOCODE pro V provides the option of connecting thermistor sensors (binary PTC) for monitoring the motor temperature.

### TN-C system

In a TN-C system (FR Terre Neutre Combiné) 1 wire is used simultaneously as a protective earth (PE) and neutral wire (N).

### TN-S system

In a TN-S system (FR Terre Neutre Séparé) the neutral wire and the protective earth are led separately from the transformer up to the appliance.

### Trip class

See "Class".

### UKCA marking

UK Conformity Assessed: Product marking required in the United Kingdom for all Ex products that are placed on the market in Great Britain (England, Wales and Scotland). It replaces the CE marking. The CE marking is still required in Northern Ireland in addition to the UKCA marking.

### UKEX approval

UK Type Examination approval for products in potentially explosive atmospheres, issued by a British notified body - British equivalent for ATEX, of the regulation governing equipment and protective systems for intended for use in potentially explosive atmospheres from 2016 ("The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016" (SI 2016:1107))

### Unbalance protection

The extent of the phase unbalance can be monitored and transmitted to the control system. A definable and delayable response can be triggered when an adjustable limit has been overshot. If the phase unbalance is more than 50 %, the tripping time is also automatically reduced in accordance with the overload characteristic since the heat generation of the motors increases in asymmetrical conditions.

### Universal Current (UC)

Universal current. Property of devices that can be operated with both AC and DC.

### USB PC cable

The USB-PC cable is used to connect the USB interface of the PC to the system interface of a basic unit for device parameterization.

### Voltage monitoring

See monitoring voltage

### Voltage monitoring

SIMOCODE pro supports two-phase undervoltage monitoring of either a three-phase network or a one-phase network for freely selectable limits, direction of rotation (for AC) or readiness to start. The response of SIMOCODE pro on reaching a prewarning level or trip level can be freely parameterized and delayed. Voltage measurement is performed using current/voltage measuring modules.

### Win SIMOCODE-DP converter

Software tool for converting "old" Win SIMOCODE-DP parameter files (3UF5 device series) into SIMOCODE ES parameter files for SIMOCODE pro.

### Y connecting cable

Connecting cable with which a connection can be made via the system interface from a SIMOCODE pro basic unit to both an initialization module and a current measuring module.

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