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MOTOR MANAGEMENT



SIMOCODE pro
3UF7



SIEMENS

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CA 01



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Contents

Contactors and contactor assemblies • Semiconductor controlgear, soft starters, controllers • Circuit-breakers • Overload relays • Load feeders • Switch disconnectors and fuses • SIMIREL time, monitoring, coupling relays and converters • Control and signaling devices • BETA electrical installation technology: Selected products • SIGUARD safety systems • SIDAC-T transformers • SIDAC-S power supplies • ALPHA FIX terminal blocks

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Further information about low-voltage controlgear is available on the Internet at:
<http://www.siemens.de/lowvoltage>

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Controlgear for Industry

Catalog LV 10 News Motor Management · 11/2004

The products described in this catalog are also included in the CD-ROM catalog CA 01
Order No.:
E86060-D4001-A110-C3-7600

Contact your local Siemens representative for further information

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Introduction

1

Switching devices:
Contactors and contactor assemblies

2

Switching devices:
Soft starters, semiconductor switching devices, control devices, AS-Interface

3

Protective devices:
Circuit-breakers

4

Protective devices:
Overload relays

5

Load feeders

6

Switch disconnectors and fuses

7

SIMIREL time, monitoring, coupling relays and converters

8

Control and signaling devices

9

BETA modular installation devices:
Selected products

10

SIGUARD safety systems

11

SIDAC-T
transformers

12

SIDAC-S
power supplies

13

ALPHA FIX terminal blocks

14

Appendix

15

Explanations

Delivery times (DT)

▶ Preferred type	Preferred types are available immediately from stock, i.e. are dispatched within 24 hours.
A 2 working days	
B 1 week	Normal quantities of the products are usually delivered within the specified time following receipt of your order at our branch.
C 3 weeks	
D 6 weeks	In exceptional cases, the actual delivery period may differ from that specified.
X On request	

The delivery periods apply up to the ramp at Siemens AG (products ready for dispatch). The transport times depend on the destination and type of shipping. The standard transport time for Germany is 1 day.

The delivery times specified here represent the situation in October 2004. They are continuously optimized. Up-to-date information can be found at <http://www.siemens.de/automation/mail>.

Price units (PU)

The price unit defines the number of units, sets or meters to which the specified price and weight apply.

Packaging size (PS)

The packaging size defines the number, e.g. of units, sets or meters, for outer packaging. Only the quantity defined by the packaging size or a multiple thereof can be ordered!

For multi-unit packaging and recyclable packaging, see [Catalog LV 10 · 2004, Appendix](#).

Price group (PG)

Each product is assigned to a price group.

Weight

The defined weight in kg refers to the price unit (PU).

Dimensions

All dimensions in mm.

Switching Devices: Soft Starters, Semiconductor Switching Devices, Control Devices, AS-I

3



Catalog

SIRIUS Motor Management and Control Devices

[SIMOCODE pro motor management and control devices](#)

- 3/2 Overview
- 3/2 Benefits
- 3/3 Area of application
- 3/4 Selection and ordering data

Technical information

SIRIUS Motor Management and Control Devices

[SIMOCODE pro motor management and control devices](#)

- 3/7 Design
- 3/10 Function
- 3/12 Integration
- 3/13 Technical data
- 3/16 Dimension drawings
- 3/18 Circuit diagrams
- 3/18 Further information



Motor management and control devices SIMOCODE pro

Overview

SIMOCODE pro is a flexible, modular motor management system for motors with constant speeds in the low-voltage performance range. It optimizes the connection between I&C and motor feeder, increases plant availability and allows significant savings to be made for startup, operation and maintenance of a system.

When SIMOCODE pro is installed in the low-voltage switchboard, it is the intelligent connection between the higher-level automation system and the motor feeder and includes the following:

- Multifunctional, solid-state full motor protection which is independent of the automation system
- Flexible software instead of hardware for the motor control
- Detailed operational, service and diagnostics data
- Open communication via PROFIBUS DP, the standard for field-bus systems.

Benefits

General customer benefits

- Integrating the whole motor feeder into the process control via a bus significantly reduces the wiring outlay between the motor feeder and PLC.
- Distribution of the automated processes by means of configurable control and monitoring functions in the feeder saves resources in the automation system and ensures full functionality and protection of the feeder even if the I&C or bus system fails.
- The acquisition and monitoring of operational, service and diagnostics data in the feeder and process control system increases system availability as well as maintenance and service-friendliness.
- The high degree of modularity allows users to perfectly implement their plant-specific requirements for each motor feeder.
- The SIMOCODE pro system offers functionally graded and space-saving solutions for each customer application.
- The replacement of the control circuit hardware with software decreases the number of hardware components and wiring required and in this way limits stock keeping costs and potential wiring errors.
- The use of solid-state full motor protection permits better utilization of the motors and ensures long-term stability of the tripping characteristic and reliable tripping even after years of service.

Multifunctional, solid-state full motor protection for rated motor currents up to 820 A

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

- Inverse-time delayed solid-state overload protection (Class 5 ... 40)
- Phase failure / unbalance protection
- Stall protection
- Thermistor motor protection
- Earth-fault monitoring
- Monitoring of adjustable limit values for the motor current as well as
- Monitoring of operating hours, downtime and number of starts etc.

Flexible motor control on software basis (instead of comprehensive hardware interlocks)

Many predefined motor control functions have already been integrated into SIMOCODE pro, including all necessary logic operations and interlocks.

- Direct-on-line and reversing starters
- Star-delta starters (also with direction reversal) ¹⁾
- Two speeds, motors with separate windings (pole-changing switch); also with direction reversal ¹⁾
- Two speeds, motors with separate Dahlander windings (also with direction reversal) ¹⁾
- Solenoid valve actuation ¹⁾
- Positioner actuation ¹⁾
- Soft starter actuation (also with direction reversal) ¹⁾

These control functions have been implemented by means of software and can be freely assigned to the inputs and outputs (including PROFIBUS DP).

These predefined control functions can also be flexibly adapted to each customer-specific configuration of a motor feeder by means of freely configurable logic modules (truth tables, counters, timers, edge evaluation ...) and with the help of standard functions (power failure monitoring, emergency start, external faults ...).

SIMOCODE pro makes a lot of additional hardware and wiring in the control circuit unnecessary which results in a high level of standardization of the motor feeder in terms of its design and circuit diagrams.

Detailed operational, service and diagnostics data

SIMOCODE pro makes different operational, service and diagnostics data available and helps to detect potential faults in time and to prevent them by means of preventative measures. In the event of a malfunction, a fault can be diagnosed, localized and rectified very quickly - there are no or very short downtimes.

Operational data

- Motor switching status derived from the current flow in the main circuit.
- All phase currents
- Phase unbalance
- Time to trip
- Remaining cooling time etc.

Service data

- Motor operating hours
- Motor stop times
- Number of motor starts
- Number of overload trips
- Internal comments stored in the device etc.

Diagnostic data

- Numerous detailed early warning and fault messages
- Internal device fault logging with time stamp etc.

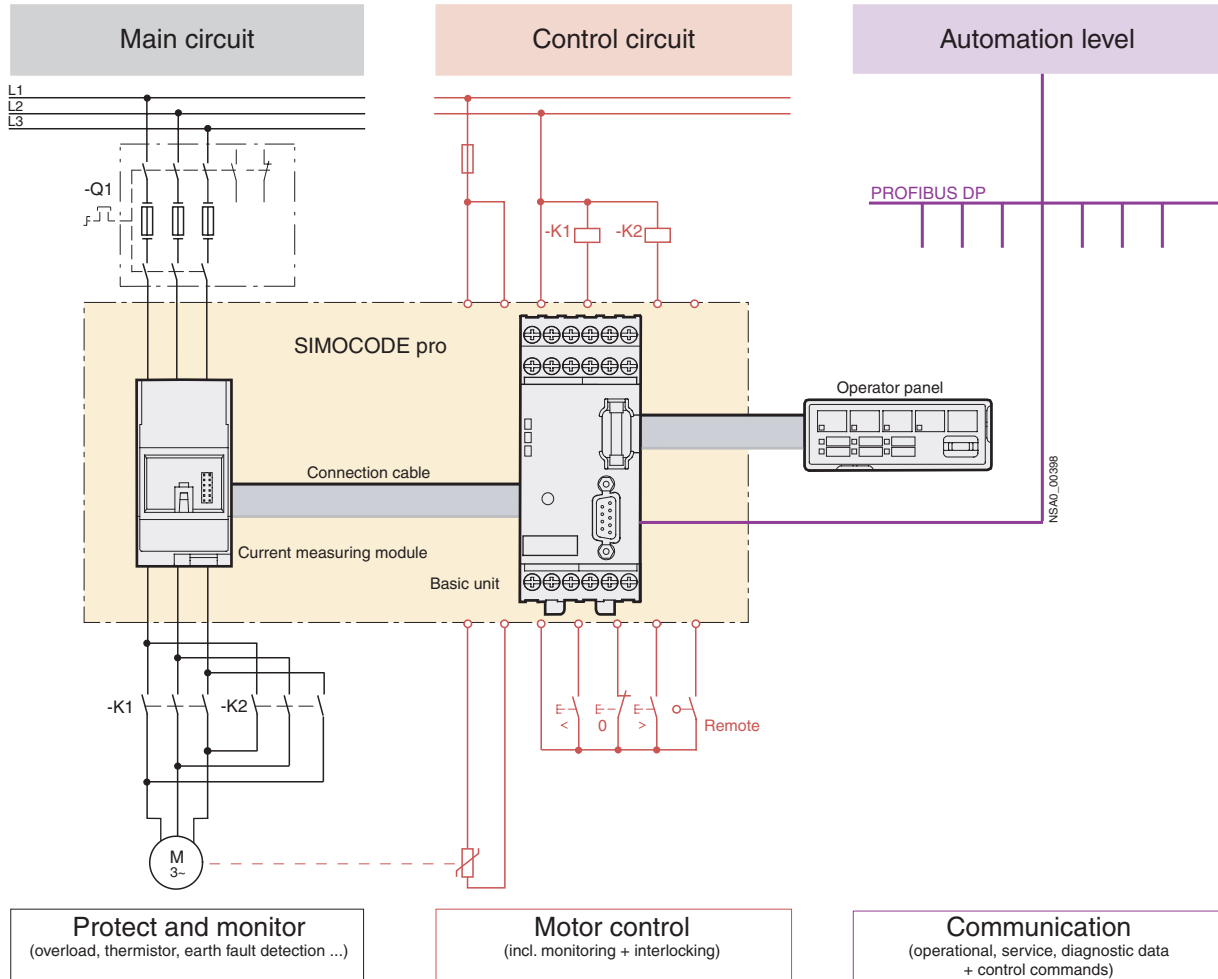
Communication

SIMOCODE pro is equipped with an integrated PROFIBUS DP interface (SUB-D or terminal connection) and can therefore replace all individual wiring (including terminal blocks), which would usually be required for exchanging data with the higher-level automation system, with a single 2-wire cable.

SIMOCODE pro supports among other things:

- Baud rates up to 12 Mbit/s
- Automatic baud rate detection
- Cyclic services (DPV0)
- Acyclic services (DPV1) etc.

1) For use with SIMOCODE pro V, basic unit 2.



SIMOCODE pro combines all the necessary functions for the motor feeder in a compact system

Area of application

SIMOCODE pro is often used for automated processes where plant downtimes would be very expensive (e. g. steel or cement industry) and where it is important to prevent plant downtimes through detailed operational, service and diagnostics data or to localize the fault very quickly in the event of a malfunction. SIMOCODE pro is modular and space-saving and suited especially for use in motor control centers in the process industry and for power plant technology.

Applications

Protection and control of motors

- In hazardous areas (chemical, oil and gas industry)
- With heavy-duty starting (paper, cement and metal industry)
- In high-availability plants (chemical, oil, raw material processing industry, power plants)

Industries

Today, SIMOCODE pro is mainly used in the chemical (incl. oil and gas), steel, water, pharmaceutical, cement, and glass industry. It is also used for applications in power plants and large diamond, gold and platinum mines. Based on the experience made with the predecessor system SIMOCODE DP, SIMOCODE pro has been tailored even more specifically to the requirements of these industries. An essential requirement in these industries is the availability of the motors and thus the availability of the whole process. Plant downtimes caused by faults frequently result in high costs. For this reason, it is very important to detect potential faults early on and to initiate targeted countermeasures. SIMOCODE pro offers users an up-to-date motor management system based on years of experience.

SIRIUS Motor Management and Control Devices

Motor management and control devices SIMOCODE pro

Selection and ordering data

3

Version	Current setting range	Overall width	DT	Order No.	Price € per PU	PU (unit, set, m)	PS*	PG	Weight per PU approx. kg
	A	mm							

SIMOCODE pro (available from 12/2004)



3UF7 000-1A.00-0

SIMOCODE pro C, Basic Unit 1,
PROFIBUS DP interface, 12 Mbit/s, RS 485
4 I/3 O freely assignable, input for thermistor connection,
monostable relay outputs,
rated control supply voltage U_s :

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

A	3UF7 000-1AB00-0	1	1 unit	131	0.350
A	3UF7 000-1AU00-0	1	1 unit	131	0.350



3UF7 010-1A.00-0

SIMOCODE pro V, Basic Unit 2,
PROFIBUS DP interface, 12 Mbit/s, RS 485
4 I/3 O freely assignable, input for thermistor connection,
monostable relay outputs,
rated control supply voltage U_s :

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

A	3UF7 010-1AB00-0	1	1 unit	131	0.350
A	3UF7 010-1AU00-0	1	1 unit	131	0.350



3UF7 100-1AA00-0

Current measuring module

Straight-through transformers

0.3 ... 3	45	A	3UF7 100-1AA00-0	1	1 unit	131	0.100
2.4 ... 25	45	A	3UF7 101-1AA00-0	1	1 unit	131	0.150
10 ... 100	55	A	3UF7 102-1AA00-0	1	1 unit	131	0.350
20 ... 200	120	X	3UF7 103-1AA00-0	1	1 unit	131	0.600

Busbar connection

20 ... 200	120	X	3UF7 103-1BA00-0	1	1 unit	131	1.000
63 ... 630	145	X	3UF7 104-1BA00-0	1	1 unit	131	1.750



Operator panel

Installation in control cabinet door or front plate,
for plugging into basic unit
10 LED for status indication and
user-assignable buttons for manual control

A	3UF7 200-1AA00-0	1	1 unit	131	0.100
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3UF7 300-1AU00-0

Digital module

4 binary inputs and 2 relay outputs,
up to 2 digital modules can be connected per Basic Unit 2 A
Attention:
Digital modules can only be used in combination with
Basic Unit 2!

Relay outputs

- monostable
- bistable

Input voltage

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

A	3UF7 3□□-1A□□00-0	1	1 unit	131	0.150
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Accessories

Version	DT	Order No.	Price € per PU	PU (unit, set, m)	PS*	PG	Weight per PU approx. kg	
Connection cable (available from 12/2004)								
 <p>3UF7 932-0AA00-0</p>		Connection cable In different lengths for connecting basic unit, current measuring module, operator panel or expansion modules:						
		• Side by side (0.025 m) Important: Only suitable for connecting Basic Unit 2 to its expansion modules or for connecting expansion modules to each other; only when the front plates finish at the same height	A	3UF7 930-0AA00-0	1	1 unit	131	0.010
		• Length 0.1 m	A	3UF7 931-0AA00-0	1	1 unit	131	0.010
		• Length 0.5 m	A	3UF7 932-0AA00-0	1	1 unit	131	0.020
		• Length 2.0 m	A	3UF7 933-0AA00-0	1	1 unit	131	0.100
PC cable (available from 12/2004)								
		For PC/PG communication with SIMOCODE pro via system interface	A	3UF7 940-0AA00-0	1	1 unit	131	0.150
Memory module (available from 12/2004)								
		For parameterizing SIMOCODE pro without a PC/PG via system interface	A	3UF7 900-0AA00-0	1	1 unit	131	0.030
Addressing plug (available from 12/2004)								
		For assigning the PROFIBUS addresses without using a PC/PG on a basic unit	A	3UF7 910-0AA00-0	1	1 unit	131	0.030
Door adapter (available from 12/2004)								
		For external connection of the system interface outside, for example, a control cabinet	A	3UF7 920-0AA00-0	1	1 unit	131	0.030
System manual (available from 12/2004)								
		SIMOCODE pro Token fee Languages:						
		• German	A	3UF7 970-0AA01-0	1	1 unit	131	0.850
		• English	A	3UF7 970-0AA00-0	1	1 unit	131	0.850
PCS 7 function block library for SIMOCODE pro (available from 01/2005)								
		For integrating SIMOCODE pro into the PCS 7 process control system PCS 7 function block library for SIMOCODE pro, V6, comprising:						
		AS modules and faceplates for integrating SIMOCODE pro into the PCS 7 process control system, for PCS 7 Version V6.x, engineering software for one engineering station (single license) including runtime software for execution of the AS module in an automation system (single license), English/German, delivery format: on CD	A	3UF7 982-0AA00-0	1	1 unit	131	0.240
		AS modules for integrating SIMOCODE pro into the PCS 7 process control system, for PCS 7 Version V6.x, runtime software for execution of the AS module in an automation system (single license), license without software and documentation	A	3UF7 982-0AA01-0	1	1 unit	131	0.001

* This quantity of a multiple thereof can be ordered.

SIRIUS Motor Management and Control Devices

Motor management and control devices SIMOCODE pro

3

Version	DT	Order No.	Price € per PU	PU (unit, set, m)	PS*	PG	Weight per PU approx. kg
SIMOCODE ES (available from 12/2004)							
Parameterization and service software for SIMOCODE pro							
Executes on PC/PG under Windows 2000/XP, without PC cable Type of delivery: CD, single license, variants:							
• SIMOCODE ES Smart, for parameterizing via system interface	A	3ZS1 312-1CC10-0YA0		1	1 unit	131	0.230
• SIMOCODE ES Professional, for parameterizing over DPV 1 and system interface, incl. STEP 7 object manager	A	3ZS1 312-2CC10-0YA0		1	1 unit	131	0.230
Push-in lugs (available from 12/2004)							
For screw fixing							
e.g. on mounting plate, 2 units required per device							
Can be used with 3UF7 100, 3UF7 101 and 3UF7 102		▶ 3RB1 900-0B		100	10 units	101	0.100
Can be used for 3UF7 0 and 3UF7 3		▶ 3RP1 903		1	10 units	101	0.002

Configuration

General

SIMOCODE pro is a modularly constructed motor management system which can be subdivided into two device series with different functional scopes:

- SIMOCODE pro C and
- SIMOCODE pro V.

Both device series (systems) are made up of different hardware components (modules):

System	SIMOCODE pro C	SIMOCODE pro V
Modules	<ul style="list-style-type: none"> • Basic Unit 1 • Current measuring module • Operator panel (optional) 	<ul style="list-style-type: none"> • Basic Unit 2 • Current measuring module • Operator panel (optional) • Expansion modules (optional)

Each system comprises one basic unit as the main component and a separate current measuring module for each feeder. The two modules are connected together electrically through the system interface with a connection cable and can be mounted mechanically connected as a unit (one behind the other) or separately (side by side). The current measuring module must be selected in accordance with the motor current to be monitored.

As an option, an operator panel can be connected through a second system interface to the basic unit for mounting in the door of the control cabinet. The electrical supply for both the Current measuring module and the operator panel is provided by the basic unit over the connection cable. Apart from the inputs and outputs available on the basic unit, additional inputs/outputs and functions can be added to Basic Unit 2 (SIMOCODE pro V) using optional expansion modules.

All modules are interconnected using connection cables. The connection cables are available in a choice of lengths. The maximum distance between the modules (e.g. between the basic unit and the Current measuring module) is 2 m. The overall length of the connection cables in a system is not permitted to exceed 3 m.

SIMOCODE pro is designed for mixed operation

In accordance with functional requirements, the two different systems can be used simultaneously without any problems and without any additional outlay in a low-voltage system. SIMOCODE pro C is fully upward compatible to SIMOCODE pro V. The same components are used. The parameterization of SIMOCODE pro C can be transferred without any problems. Removable terminals and the terminal designations are identical in both systems.

SIMOCODE pro C, Basic Unit 1

The compact system for

- direct-on-line and reversing starters

With up to 4 binary inputs, up to 3 monostable relay outputs and a thermistor connection (binary PTC).

Basic Unit 1 is available in two different variants for the following supply voltages:

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



SIMOCODE pro C, Basic Unit 1

Inputs:

- 4 binary inputs, supplied internally with DC 24 V

Outputs:

- 3 (2+1) monostable relay outputs

Thermistor connection for binary PTC

PROFIBUS interface:

- 9-pin sub D or
- terminal connection

Connection of supply voltage:

- DC 24 V or
- AC/DC 110 ... 240 V

Test/Reset button

3 LEDs

2 system interfaces for connection

- of a current measuring module and
- an operator panel

Basic Unit 1 is suitable for mounting on standard rails or, with additional plug-in lugs, for fixing to a mounting plate.

SIRIUS Motor Management and Control Devices

Motor management and control devices SIMOCODE pro

SIMOCODE pro V, Basic Unit 2

The variable system, that offers numerous additional functions in addition to the SIMOCODE pro C functions. Basic Unit 2 supports the following control functions:

- Direct-on-line and reversing starters
- Star-delta starters (also with direction reversal)
- Two speeds, motors with separate windings (pole-changing switch); also with direction reversal
- Two speeds, motors with separate Dahlander windings (also with direction reversal)
- Solenoid valve actuation
- Positioner actuation
- Soft starter actuation (also with direction reversal)

Basic Unit 2 is equipped with 4 binary inputs, 3 monostable relay outputs and a thermistor connection (binary PTC). The number and type of inputs and outputs can be increased with additional expansion modules.

Basic Unit 2 is available in two different variants for the following supply voltages:

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



SIMOCODE pro V, Basic Unit 2

Inputs:

- 4 binary inputs, supplied internally with DC 24 V

Outputs:

- 3 (2+1) monostable relay outputs

Thermistor connection for binary PTC

PROFIBUS interface:

- 9-pin sub D or
- terminal connection

Connection of supply voltage:

- DC 24 V or
- AC/DC 110 ... 240 V

Test/Reset button

3 LEDs

2 system interfaces for connection

- of a current measuring module,
- expansion modules and
- an operator panel.

Basic Unit 2 is suitable for mounting on standard mounting rails or, with additional plug-in lugs, for fixing to a mounting plate.

Current measuring modules/current ranges

The current measuring module is selected for each feeder in accordance with the rated motor current to be monitored. Different current measuring modules are therefore available for current ranges from 0.3 to 630 A. The current measuring module is connected to the basic unit over a connection cable which also provides the power supply. Current measuring modules up to 100 A are suitable for rail mounting or can be directly fixed to the mounting plate using additional plug-in lugs. The current measuring modules up to 200 A can also be mounted on standard rails or they can be directly fixed to the mounting plate using the screws integrated into the housing. For the current measuring module up to 630 A, mounting is only possible using the integrated screw mechanisms.

Note:

Current measuring modules with current settings of up to 100 A can be mechanically connected to the basic unit and mounted as a combined unit (one behind the other). Current measuring modules with higher current settings can only be mounted separately.

Current measuring modules for the following current ranges can be offered:

- 0.3 ... 3 A, straight-through transformer
- 2.4 ... 25 A, straight-through transformer
- 10 ... 100 A, straight-through transformer
- 20 ... 200 A, straight-through transformer or busbar connection
- 63 ... 630 A, busbar connection

For motor currents up to 820 A, a current measuring module, e.g. 0.3 ... 3 A, can be used in combination with a 3UF1 8 interposing current transformer.

Operator panel

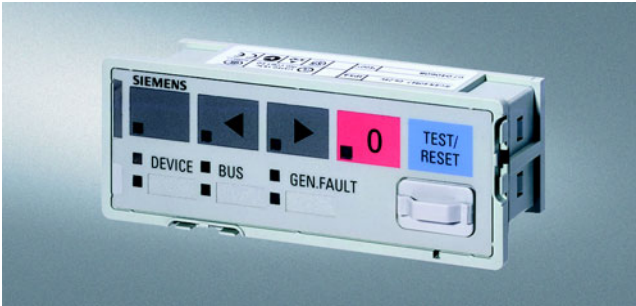
The operator panel is used to control the motor feeder and can replace all conventional pushbuttons and indicator lamps to save space. This means that SIMOCODE pro or the feeder can be operated directly at the control cabinet and that the system interface is connected externally for easier parameterization or diagnosis using a PC/PG, for example.

The operator panel is connected to the basic unit over a connection cable from its rear system interface and is supplied electrically from the basic unit.

The operator panel has 5 freely assignable buttons and a total of 10 LEDs, of which 7 LEDs can be used as required and assigned to any status signal.

A PC/PG can be connected to the front system interface over the PC cable.

The operator panel is mounted in the control cabinet door or the front plate of, for example, a withdrawable unit and satisfies IP54 degree of protection with the system interface covered.



Operator panel for SIMOCODE pro

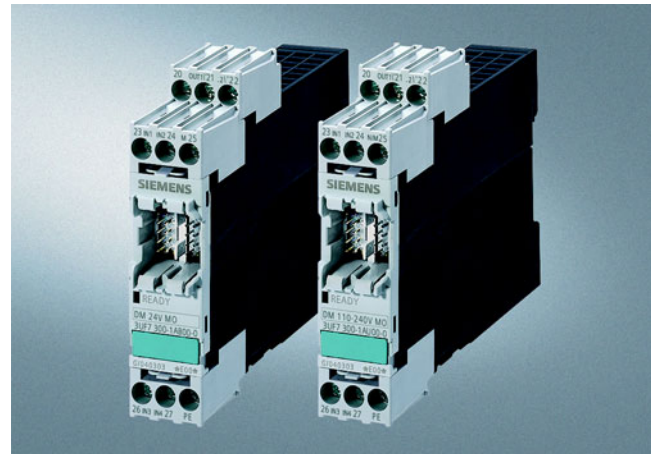
- 10 LEDs
- Labeling strips
- Test/Reset button
- 4 Control keys
- System interface with cover

Expansion module for additional binary I/Os

With Basic Unit 2 (SIMOCODE pro V), it is possible to expand the number and type of inputs and outputs in order to implement additional functions, for example. Each expansion module has two system interfaces on the front. The expansion module is connected through one system interface using a connection cable, for example, on the system interface of Basic Unit 2 and over the second system interface, further expansion modules or the operator panel can be connected. The power supply for the expansion modules is provided by the connection cable through Basic Unit 2. The input circuits of the digital modules are supplied from an external power supply. The following digital modules are available for Basic Unit 2:

- 4 inputs, supplied externally with **DC 24 V** and 2 **monostable** relay outputs
- 4 inputs, supplied externally with **AC/DC 110 ... 240 V** and 2 **monostable** relay outputs
- 4 inputs, supplied externally with **DC 24 V** and 2 **bistable** relay outputs
- 4 inputs, supplied externally with **AC/DC 110 ... 240 V** and 2 **bistable** relay outputs

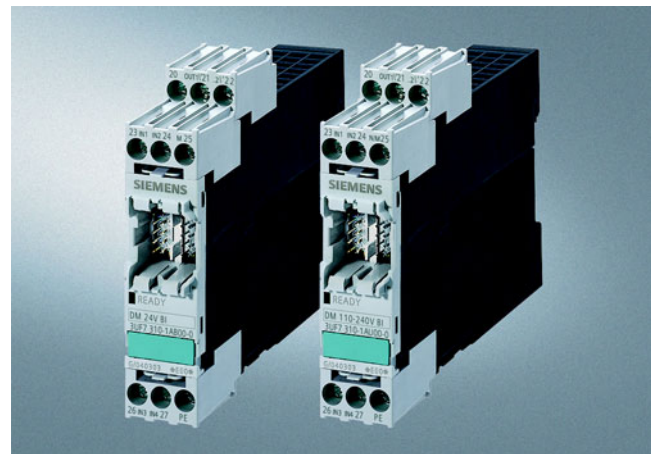
Up to two digital modules can be connected to one Basic Unit 2. All variants can be combined with each other.



Digital modules 3UF7 300-1AB00-0 (left) and 3UF7 300-1AU00-0 (right)

Note:

For the implementation of some motor control functions, in addition to the relay outputs on Basic Unit 2, at least one further digital module is required.



Digital modules 3UF7 310-1AB00-0 (left) and 3UF7 310-1AU00-0 (right)

4 binary inputs, externally supplied with

- DC 24 V or
- AC/DC 110 ... 240 V

2 relay outputs,

- monostable or
- bistable (the switching status of the relay outputs is also maintained following failure of the supply voltage on Basic Unit 2)

1 Ready LED

2 system interfaces for connection

- to Basic Unit 2
- of expansion modules
- of a current measuring module
- of an operator panel

Safe isolation

All circuits in SIMOCODE pro are safely isolated from each other in accordance with IEC 60947-1. That is, they are designed with double creepage and air distances. In the event of a fault, therefore, no parasitic voltages can be formed in neighboring circuits. The instructions of Test Report No. 2668 must be complied with.

Function

Multifunctional, solid-state full motor protection

Inverse-time delayed, solid-state overload protection with adjustable tripping characteristics (Class 5 –40)

•SIMOCODE pro protects three-phase or AC motors in accordance with IEC 60947-4-1 requirements. The tripping class can be adjusted in eight steps from Class 5 to Class 40. In this way, the disconnecting time can be adapted very accurately to the load torque which allows the motor to be utilized more effectively. SIMOCODE pro is equipped with a two-step overload protection with an adjustable and delayable response in the event of an overload alarm or overload tripping operation. In addition, the time until the overload tripping operation is performed is calculated and can be made available to the I&C system. After an overload tripping operation, the remaining cooling time can be displayed (characteristics in SIMOCODE pro system manual).

Phase failure / unbalance protection

•The level of the phase unbalance can be monitored and transmitted to the I&C system. If a specified limit value is violated, a defined and delayable response can be initiated. If the phase unbalance is larger 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.

Stall protection

•If the motor current rises above an adjustable blocking threshold (current threshold), a defined and delayable response can be configured for SIMOCODE pro. In this case, for example, the motor can be shut down independent of the overload protection. The blocking protection is only enabled after the configured class time has elapsed and avoids unnecessarily high thermal and mechanical loads as well as wear of the motor.

Thermistor motor protection

•This protection function is based on direct temperature measurements by means of temperature sensors in the stator windings or in the housing of the motor. These protective functions should be used, in particular, in motors with high operating frequencies, heavy-duty starting, intermittent and/or braking operation, but also in the case of speeds lower than the rated speed. SIMOCODE pro supports connection and evaluation of several binary PTC sensors connected in series on the basic unit. In addition, the sensor measuring circuit can be monitored for short-circuits and wire breakages. If the temperature of the motor increases beyond a defined limit or if there is a fault in the sensor measuring circuit, a defined response can be configured.

Earth fault monitoring by means of current measuring module

•SIMOCODE pro acquires and monitors all three phase currents. In this way, the motor feeder can be monitored for possible fault currents or ground faults with the help of internal calculations. Internal earth fault monitoring is only available for motors with three-phase connections in directly grounded networks or in networks grounded with low impedance. A defined and delayable response can be configured if a ground fault is detected.

Monitoring of adjustable limit values for the motor current

•Current limit value monitoring is used for process monitoring independent of overload protection. Violation of a current limit value below the overload threshold can be an indication for a dirty filter in a pump or for an increasingly sluggish motor bearing, for example. Violation of the lower current limit value can be a first indication of a worn drive belt. SIMOCODE pro supports two-step monitoring of the motor current for freely selectable upper and lower current limit values. The response of SIMOCODE pro can be freely configured and delayed if it reaches an alarm or tripping threshold.

Monitoring of operating hours, downtime and number of starts

•In order to prevent plant downtime caused by motor failure due to excessive motor operating times (wear) or excessive motor downtimes, SIMOCODE pro can monitor the service hours and downtime of a motor. When an adjustable limit value is violated, a message or alarm can be generated which can indicate that the corresponding motor must be serviced or replaced. After the motor has been replaced, the operating hours and downtimes can be reset, for example.

•To avoid excessive thermal loads and early wear of the motor, it is possible to limit the number of motor startups for a specific period. Alarms can indicate that only a small number of possible starts remain.

1) For use with SIMOCODE pro V, basic unit 2.

Flexible motor control implemented with software

Many typical motor control functions have been predefined in SIMOCODE pro and are available for use:

- Direct-on-line and reversing starters
- Star-delta starters (also with direction reversal) ¹⁾
- Two speeds, motors with separate windings (pole-changing switch); also with direction reversal ¹⁾
- Two speeds, motors with separate Dahlander windings (also with direction reversal) ¹⁾
- Solenoid valve actuation ¹⁾
- Positioner actuation ¹⁾
- Soft starter actuation (also with direction reversal) ¹⁾

These control programs already include all the software interlocks and logic operations required for operation of the required motor functions.

It is also monitored whether the current checkback of the motor feeder corresponds with the control command. If not, SIMOCODE pro opens the motor contactor and generates an alarm indication.

Motor control can be switched over or carried out simultaneously from several control stations, e.g.:

- From the I&C system via PROFIBUS DP
- From a PC/PG via PROFIBUS DP
- From the control cabinet door via the operator panel
- From a PC/PG on the system interface via SIMOCODE pro
- From a local control station on the motor. In this case, the buttons, switches and indicator lights are connected to the inputs and outputs of SIMOCODE pro.

Regardless of whether a control command is sent to SIMOCODE pro via PROFIBUS DP using the operator panel or via the buttons connected to the binary SIMOCODE pro inputs, SIMOCODE pro can execute these control commands simultaneously or in accordance with the enabled commands defined on configuration.

These predefined control functions can also be flexibly adapted to each customer-specific configuration of a motor feeder by means of freely configurable logic modules (truth tables, counters, timers, edge evaluation ...).

In addition, special standard functions are stored in SIMOCODE pro which can also be used to extend the protection and control functions, e. g.:

- Power failure monitoring ¹⁾ for automatic, time-staggered restart of motors following a network failure e.g. with the help of a separate voltage relay (voltage controller).
- Fault signaling modules for external faults with or without manual or automatic acknowledgement for generating internal messages or for tripping SIMOCODE pro in response to freely definable events (e. g. speed controller has been activated). Designations/names can also be assigned to the external faults which are stored in the device and which are therefore also available to the I&C system.
- Emergency start function and reset of the thermal memory of SIMOCODE pro after tripping i.e. immediate restart is possible (important, for example, for pumps used to extinguish fires).
- Test function for the load feeder circuit when the main circuit-breaker is open to test the control circuit when the main circuit is de-energized.

Detailed operational, service and diagnostics data

SIMOCODE pro provides a variety of operating, service and diagnostic data, such as

Operating data

- The switching state of the motor (On, Off, clockwise, counter-clockwise, fast, slow) derived from the current flow in main circuit
- Current in phase 1, 2, 3 and maximum current in % of the current setting
- Phase unbalance in %
- Time to trip in s
- Temperature rise for motor model in %
- Remaining cooling time of the motor in s etc.

Service data

- Motor operating hours (can be reset)
- Motor stop times (can be reset)
- Number of motor starts (can be reset)
- Number of remaining permissible motor starts
- Number of overload trips (can be reset)
- Internal comments (stored in the device for each feeder e. g. notes for maintenance events etc.)

Diagnostic data

- Numerous detailed early warning and fault messages (can also be used for further processing in the device or I&C system)
- Internal device fault logging with time stamp
- Value of the previous tripping current
- Checkback error (e. g. no current flow in the main circuit following ON control command) etc.

Autonomous operation

An essential feature of SIMOCODE pro is independent execution of all protection and control functions even if communication with the I&C system breaks down. If the bus or automation system fails, the full functionality of the feeder is ensured or a predefined response can be initiated e.g. the feeder can be shut down in a controlled manner or certain configured control mechanisms can be performed (e. g. the direction of rotation can be reversed).

1) For use with SIMOCODE pro V, basic unit 2.

Integration

General

In addition to device function and hardware design, a great deal of emphasis is placed on the ease of communication-capable controlgear on the user-friendliness of the configuration software and the ability of the system to be integrated easily into various different system configurations and process automation systems. For this reason, the SIMOCODE pro system provides suitable software tools for consistent, time-saving parameterization, configuring and diagnostics:

- SIMOCODE ES for "totally integrated" commissioning and service
- OM SIMOCODE pro object manager for "totally integrated" into SIMATIC S7
- PCS 7 function block library SIMOCODE pro for "totally integrated" into PCS 7

SIMOCODE ES

The parameterization software for SIMOCODE pro can be run on a PC/PG under Windows 2000 or Windows XP. It is available in two functionally graded versions:

- **SIMOCODE ES Smart**, for direct connection to SIMOCODE pro via the system interface on the device (point-to-point)
- **SIMOCODE ES Professional**, for connection to one or several devices via PROFIBUS DP or point-to-point via the system interface

With SIMOCODE ES, the motor management system SIMOCODE pro provides a user-friendly and clear user interface with which to configure, operate, monitor and test SIMOCODE pro in the field or from a central location. By displaying all operating, service and diagnostics data, SIMOCODE ES supplies important information on whether maintenance work is required or, in the event of a fault, helps to prevent faults or to localize and rectify them quickly once they have occurred.

Unnecessary plant downtimes can be prevented by changing parameters online (even during operation). The flexible printing function integrated into SIMOCODE ES allows comprehensive documentation of all parameters or partial documentation of selected or changed parameters.

OM SIMOCODE pro object manager (as part of SIMOCODE ES Professional)

The object manager **OM SIMOCODE pro** is a standard component of **SIMOCODE ES Professional**. In contrast to a conventional GSD file, it enables SIMOCODE ES to be integrated into STEP 7 for convenient device parameterization. By installing SIMOCODE ES Professional and OM SIMOCODE pro on a PC/PG, which is used to configure the hardware of the SIMATIC S7, SIMOCODE ES Professional can be called directly from the hardware configuration. This allows easy and consistent S7 configuration.

PCS 7 function block library for SIMOCODE pro

The SIMOCODE pro PCS 7 function block library can be used for simple and easy integration of SIMOCODE pro into the SIMATIC PCS 7 V6 process control system. The SIMOCODE pro PCS 7 function block library contains the diagnostic and driver blocks corresponding with the diagnostic and driver concept of SIMATIC PCS 7 as well as the elements (symbols and faceplate) required for operator control and process monitoring. The application is integrated by graphic interconnection using the CFC Editor.

The technological and signal processing functions of the SIMOCODE pro PCS 7 function block library are based on the SIMATIC PCS 7 standard libraries (driver blocks, technological blocks) and are optimally tailored to SIMOCODE pro. Users who previously configured motor feeder circuits using conventional technology by means of signal blocks and motor or valve blocks, can now easily switch to the SIMOCODE pro PCS 7 function block library.

The SIMOCODE pro PCS 7 function block library supplied on CD-ROM allows the user to run the required engineering software on the engineering station (single license) including the runtime software for executing the AS blocks in an automation system (single license). If the AS blocks are to be used in additional automation systems, the corresponding number of runtime licenses are required which are supplied without a data carrier.

System manual for SIMOCODE pro

The SIMOCODE pro system manual describes the motor management system and its functions in detail. It contains information about configuration and commissioning as well as servicing and maintenance. A typical example of a reversing starter application is used to teach the user quickly and practically how to use the system. In addition to help on how to identify and rectify faults in the event of a malfunction, the manual also contains special information for servicing and maintenance.

Furthermore, the manual contains circuit diagrams, dimension drawings and technical data of the system components as configuring aids.

Technical data

General data applicable to the basic units, current measuring modules, expansion modules and operator panel		
Permissible ambient temperature		
• During operation	°C	-25 ... +60
• Storage and transport	°C	-40 ... +80
Installation altitude above sea level		
• Permissible ambient temperature max. +50 °C (no safe isolation)	m	≤2000
• Permissible ambient temperature max. +40 °C (no safe isolation)	m	≤3000
• Permissible ambient temperature max. +40 °C (no safe isolation)	m	≤4000
Degree of protection (to IEC 60529)		
• All components, (except for current measuring modules for rail mounting, operator panel and door adapter)		IP20
• Current measuring module for rail mounting		IP00
• Operator panel (front) and door adapter (front) with cover		IP54
Shock resistance (sine pulse)	g/ms	15/11
Mounting position		As required
Frequency	Hz	50/60 ±5 %
Electromagnetic compatibility acc. to IEC 60947-1		
• Line-induced interference, burst to IEC 61000-4-4		(corresponds to degree of severity 3) 2 kV (power ports) 1 kV (signal ports) 2 kV (line to ground) 1 kV (line to line)
• Line-induced interference, surge to IEC 61000-4-5		8 kV (air discharge) 6 kV (contact discharge) 10 V/m
• Electrostatic discharge, ESD to IEC 61000-4-2		
• Field-related interference to IEC 61000-4-3		
EMC/emission acc. to IEC 60947-1		
• Line-conducted and radiated interference emission		EN 55011/ EN 55022 (CISPR 11/CISPR 22) (corresp. to degree of severity A)
Safe isolation to IEC 60947-1		
		All circuits in SIMOCODE pro are safely isolated from each other in accordance with IEC 60947-1, they are designed with doubled creepage paths and clearances The instructions of Test Report No. 2668 "Safe isolation" must be complied with.
Basic units		
Fixing		
		Snap-on mounting onto 35 mm standard mounting rail or screw mounting with additional plug-in lugs
Display		
• Red/green "DEVICE" LED		Green: "Ready" Red: "Function test not OK; device is disabled" Off: "No control supply voltage"
• Green "BUS" LED		Continuous light: "Communication with PLC/PCS"
• Red LED "GEN. FAULT"		Flashing: "Baud rate recognized/communicating with PC/PG" Continuous light/flashing: "Feeder fault", e. g. overload tripping
Test/Reset button		
		• Resets the device after tripping • Function test • Operation of a memory module or addressing plug
System interface		
• Front		Connection of an operator panel or expansion modules; the memory module, addressing plug or a PC cable can also be connected to the system interface for parameterizing
• Bottom		Connection of a current measuring module
PROFIBUS DP interface		
		Connection of the PROFIBUS DP cable over terminals or over a 9-pin sub D female connector

SIRIUS Motor Management and Control Devices

Motor management and control devices SIMOCODE pro

3

Control circuit

Rated control supply voltage U_s (acc. to EN 61131-2)		AC/DC 110 ... 240 V; 50/60 Hz	DC 24 V
Operating range		0.85 ... 1.1 x U_s	0.8 ... 1.2 x U_s
Power consumption			
• Basic Unit 1 (3UF7 000)		7 VA	5 W
• Basic Unit 2 (3UF7 010)		10 VA	7 W
incl. two expansion modules connected to Basic Unit 2			
Rated insulation voltage U_i	V	300 (at pollution degree 3)	
Rated impulse withstand voltage U_{imp}	kV	4	
Relay outputs		3 monostable relay outputs	
• Number		Floating NO contact (NC contact response can be parameterized with internal signal conditioning), 2 relay outputs are jointly and 1 relay output is separately connected to a common potential; they can be freely assigned to the control functions (e. g. for line, star and delta contactors and for signaling the operating status)	
• Auxiliary contacts of the 3 relay outputs		• Fuse links, Class gL/gA 6 A, quick-acting 10 A (IEC 60947-5-1)	
		• Miniature circuit-breaker 1.6 A, C characteristic (IEC 60947-5-1)	
		• Miniature circuit-breaker 6 A, C characteristic ($I_k < 500$ A)	
• Specified short-circuit protection for auxiliary contacts (relay outputs)		6	
• Rated uninterrupted current	A	AC-15 6 A/AC 24 V	6 A/AC 120 V
• Rated short-circuit capacity		DC-13 2 A/DC 24 V	0.55 A/DC 60 V
			3 A/AC 230 V
			0.25 A/DC 125 V
Inputs (binary)		4 inputs supplied internally by the device electronics with DC 24 V and connected to a common potential for acquiring process signals (e. g. local control station, key switch, limit switch), freely assignable to control functions	
Thermistor motor protection (binary PTC)			
• Summation cold resistance	k Ω	≤ 1.5	
• Response value	k Ω	3.4 ... 3.8	
• Return value	k Ω	1.5 ... 1.65	
Conductor cross-sections			
• Tightening torque	nm	0.8 ... 1.2	
• Solid	mm ²	1 x(0.5 ... 4.0); 2 x(0.5 ... 2.5)	
• Finely stranded with end sleeve	mm ²	1 x(0.5 ... 2.5); 2 x(0.5 ... 1.5)	
• AWG cable	AWG	2 x 20 ... 14	

Current measuring module

Fixing		Snap-on mounting onto 35 mm standard mounting rail or screw mounting with additional plug-in lugs	
• Current setting $I_e = 0.3 \dots 3$ A; 2.4 ... 25 A; 10 ... 100 A (3UF7 100, 3UF7 101, 3UF7 102)		For snapping on to 35 mm standard mounting rail, screwing on to mounting plate or direct attachment to the contactor	
• Current setting $I_e = 20 \dots 200$ A (3UF7 103)		Screw fixing on to mounting plate or direct fixing on contactor	
• Current setting $I_e = 63 \dots 630$ A (3UF7 104)			
System interface		For connection to a basic unit	

Main circuit

Current setting I_e		3UF7 100, 3UF7 101, 3UF7 102	3UF7 103, 3UF7 104
• Rated insulation voltage U_i (pollution degree 3)	A	0.3 ... 3; 2.4 ... 25; 10 ... 100	20 ... 200, 63 ... 630
• Rated impulse withstand voltage U_{imp}	V	690	1000
• Rated frequency	kV	6	8
• Type of current	Hz	50/60	
• Short-circuit		Three-phase current	
• Accuracy of current sensing (in the range of 1 x minimum current setting I_u to 8 x max. current setting I_o)		Additional short-circuit protection is required in main circuit ¹⁾	
		± 3 %	

Connection for main circuit

Push-through opening (diameter)			
• Current setting $I_e = 0.3 \dots 3$ A; 2.4 ... 25 A	mm	7.5	
• Current setting $I_e = 10 \dots 100$ A	mm	14.0	
• Current setting $I_e = 20 \dots 200$ A	mm	25.0	
Busbar connection²⁾			
• Current setting I_e	A	20 ... 200	63 ... 630
• Terminal screw		M8 x 25	M10 x 30
• Tightening torque	nm	10 ... 14	14 ... 24
• Solid with cable lug	mm ²	16 ... 95 ³⁾	50 ... 240 ⁴⁾
• Stranded with cable lug	mm ²	25 ... 120 ³⁾	70 ... 240 ⁴⁾
• AWG cable	AWG	6 ... 3/0 kcmil	1/0 ... 500 kcmil

1) For further details, visit <http://www.siemens.com/simocode>.

2) Screw connection is possible using a suitable 3RT19 ... box terminal.

3) When connection cable lugs to DIN 46235, use 3RT19 56-4EA1 terminal cover for conductor cross-sections from 95 mm² to ensure phase spacing.

4) When connection cable lugs to DIN 46234 for conductor cross-sections from 240 mm² as well as DIN 46235 for conductor cross-sections from 185 mm², use 3RT19 66-4EA1 terminal cover to ensure phase spacing.

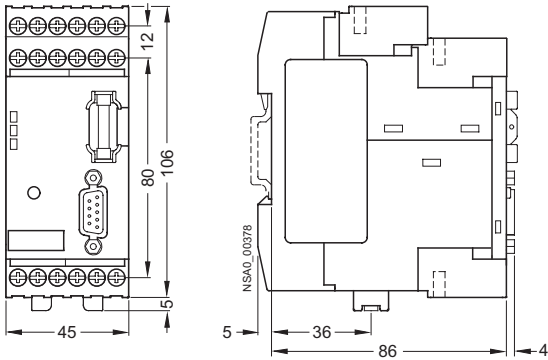
Expansion module (digital module)		
Fixing		Snap-on mounting onto 35 mm standard mounting rail or screw mounting with additional plug-in lugs
Display •Green LED "READY"		Continuous light: "Ready" Flashing: "No connection to the PC"
System interfaces		For connecting to a basic unit, another expansion module or an operator panel
Control circuit		
Rated insulation voltage U_i	V	300 (at pollution degree 3)
Rated impulse withstand voltage U_{imp}	kV	4
Relay outputs •Number •Auxiliary contacts of the 2 relay outputs •Specified short-circuit protection for auxiliary contacts (relay outputs) •Rated uninterrupted current •Rated short-circuit capacity	A	2 monostable or bistable relay outputs (depending on the variant) Floating NO contact (NC contact response can be parameterized with internal signal conditioning), all relay outputs are jointly connected to a common potential; they can be freely assigned to the control functions (e. g. for line, star and delta contactors and for signaling the operating status) •Fuse links, Class gL/gA 6 A, quick-acting 10 A (IEC 60947-5-1) •Miniature circuit-breaker 1.6 A, C characteristic (IEC 60947-5-1) •Miniature circuit-breaker 6 A, C characteristic ($I_k < 500$ A) AC-15 6 A/AC 24 V 6 A/AC 120 V 3 A/AC 230 V DC-13 2 A/DC 24 V 0.55 A/DC 60 V 0.25 A/DC 125 V
Inputs (binary)		4 externally supplied floating inputs, DC 24 V or AC/DC 110 ... 240 V depending on the variant; inputs jointly connected to common potential for sensing process signals (e. g.: local control station, key switch, limit switch), freely assignable to the control functions
Conductor cross-sections •Tightening torque •Solid •Finely stranded with end sleeve •AWG cable	nm mm ² mm ² AWG	0.8 ... 1.2 1 x(0.5 ... 4.0); 2 x(0.5 ... 2.5) 1 x(0.5 ... 2.5); 2 x(0.5 ... 1.5) 2 x 20 ... 14
Operator panel		
Fixing		Mounted in a control cabinet door or in a front panel, IP54 with system interface cover
Display •Red/green "DEVICE" LED •Green "BUS" LED •Red LED "GEN. FAULT" •Green and yellow LEDs		Green: "Ready" Green flashing: "No connection to the basic unit" Red: "Function test not OK; device is disabled" Off: "No control supply voltage" Continuous light: "Communication with PLC/PCS" Flashing: "Baud rate recognized/communicating with PC/PG" Continuous light/flashing: "Feeder fault", e. g. overload tripping For assigning to any status signals, as required
Keys •Test/Reset •Control keys		•Resets the device after tripping •Function test •Operation of a memory module or addressing plug For controlling the motor feeder, user-assignable
System interface •Front •Rear		For plugging in a memory module, an addressing plug or a PC cable for parameterization Connection to the basic unit or to an expansion module

SIRIUS Motor Management and Control Devices

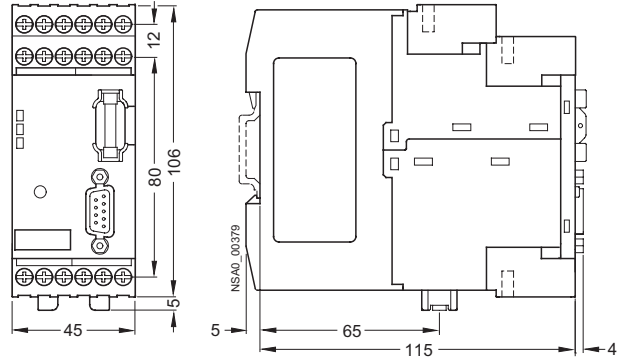
Motor management and control devices SIMOCODE pro

Dimension drawings

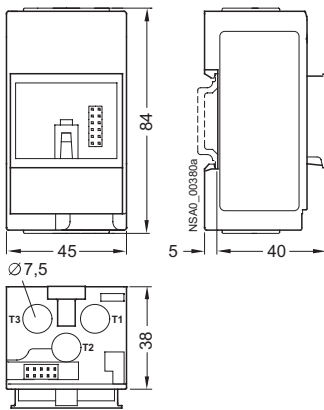
Basic Unit 1, SIMOCODE pro C, 3UF7 000



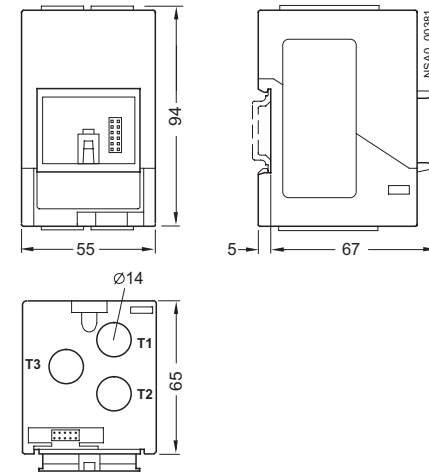
Basic Unit 2, SIMOCODE pro V, 3UF7 010



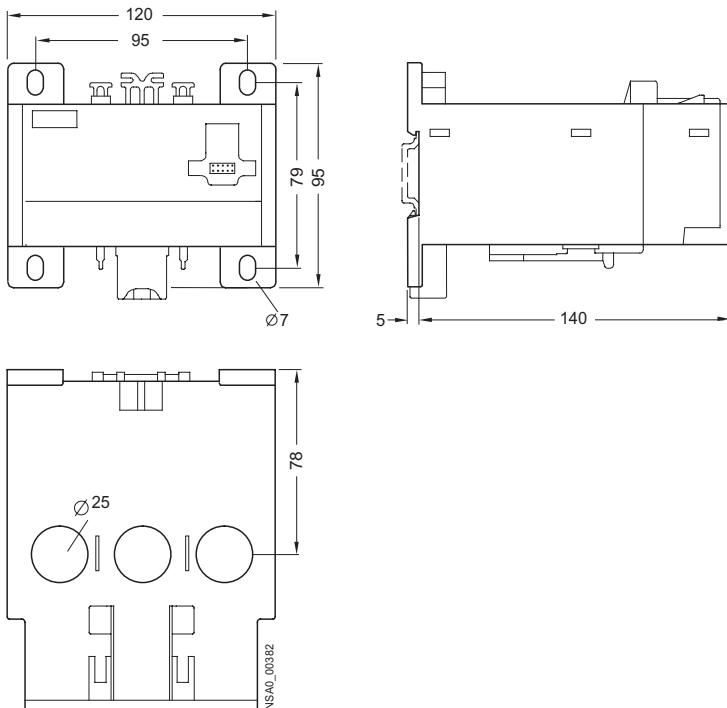
3UF7 100, 3UF7 101 current measuring module (straight-through transformer)



3UF7 102 current measuring module (straight-through transformer)

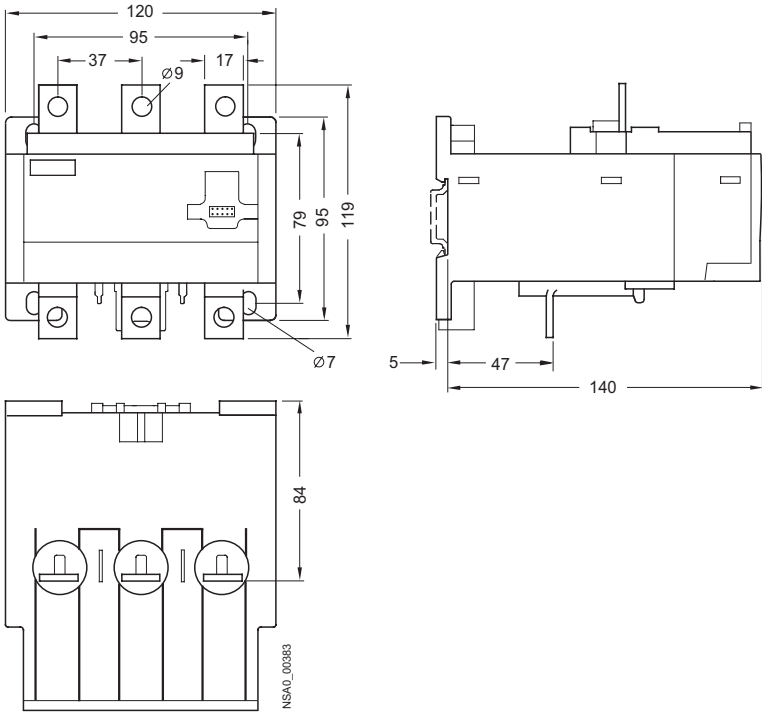


3UF7 103 current measuring module (straight-through transformer)

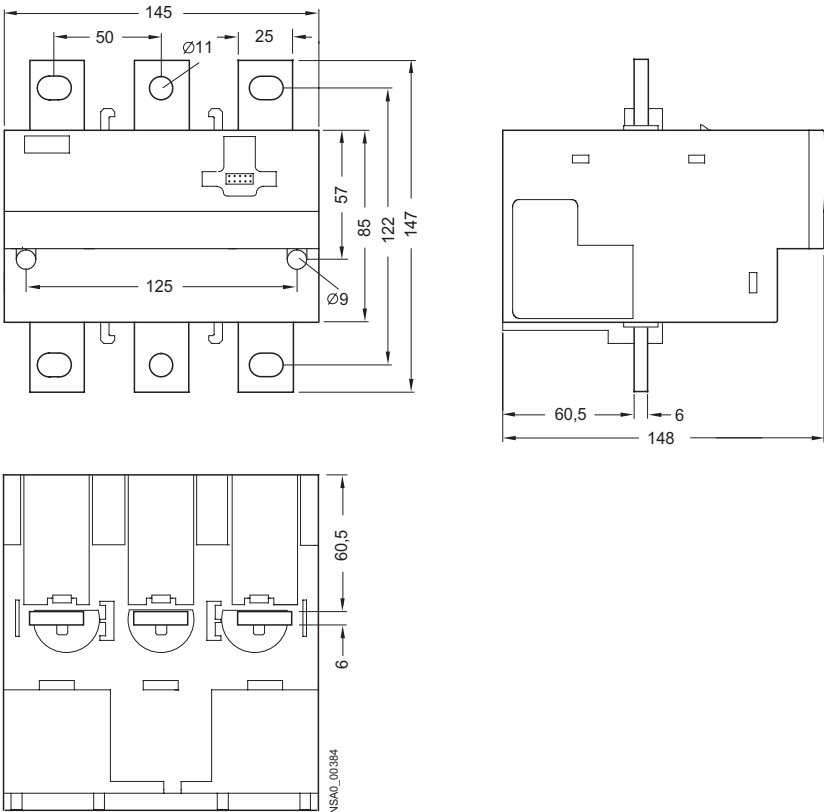


3

3UF7 103 current measuring module (busbar connection)



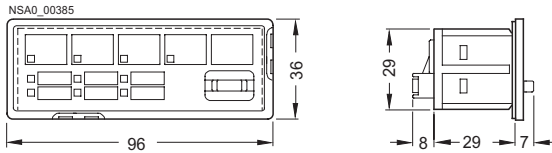
3UF7 104 current measuring module (busbar connection)



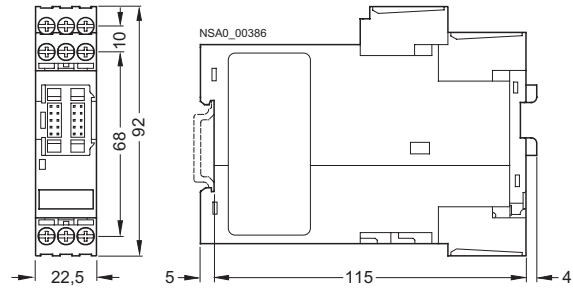
SIRIUS Motor Management and Control Devices

Motor management and control devices SIMOCODE pro

3UF7 200 operator panel

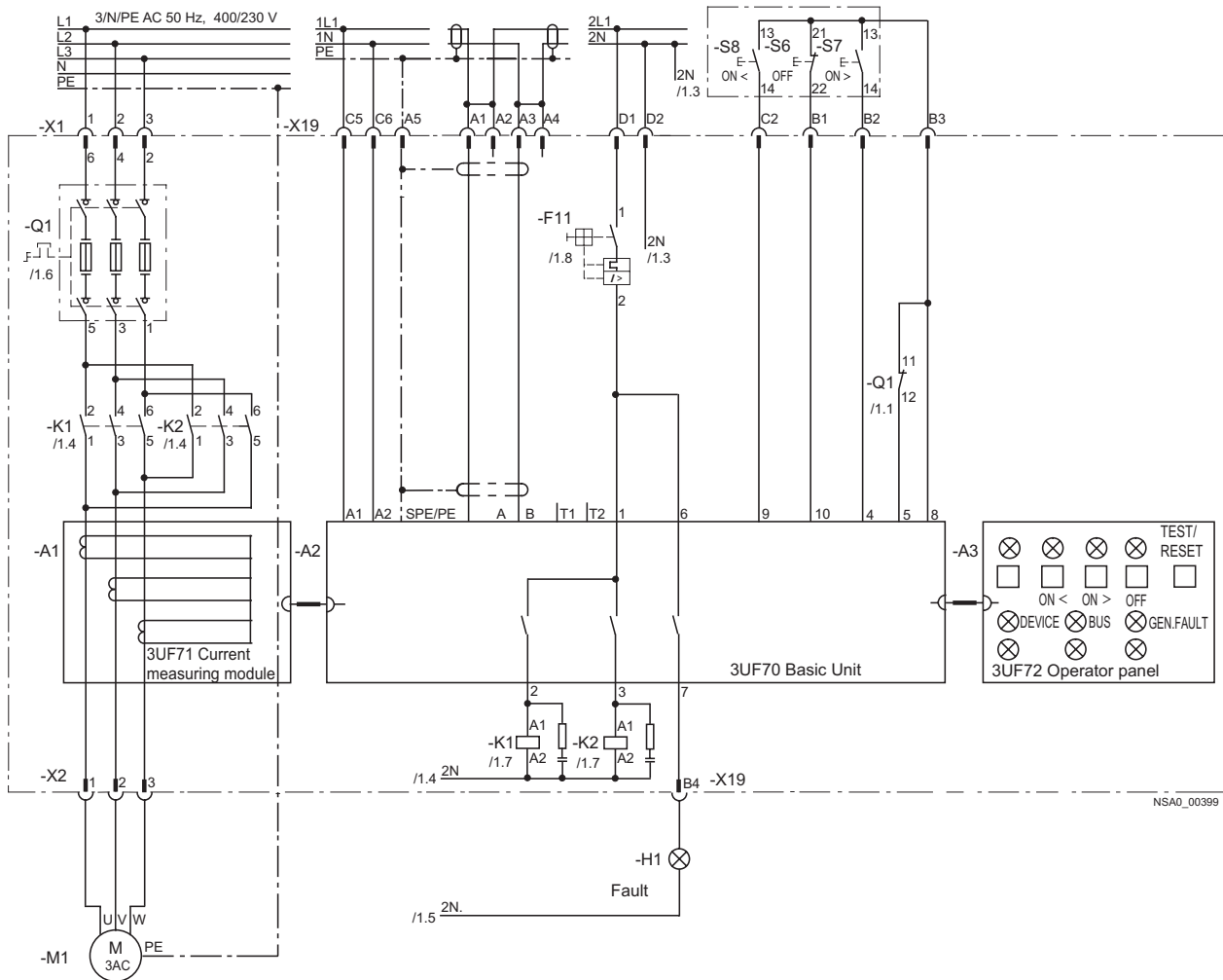


3UF7 3 digital module



Circuit diagrams

Reversing starter with SIMOCODE pro



Circuit diagrams for additional control functions can be referred to in the SIMOCODE pro system manual

Further information

System manual

For selection of equipment and for planning, it is recommended that the 3UF7 970-0AA0.-0 system manual is consulted.

Internet

You can find further information on the Internet at: <http://www.siemens.com/simocode>.

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