SIMOCODE pro 3UF7 motor management and control devices

Overview

SIMOCODE pro basic unit, expansion module and operator panel

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 interface 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 through PROFIBUS DP, the standard for fieldbus systems

SIMOCODE ES is the software package for SIMOCODE pro parameterization, start-up and diagnostics.

Design

General

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

- SIMOCODE pro C and
- SIMOCODE pro V.

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

System	SIMOCODE pro C	SIMOCODE pro V
Modules	• Basic unit 1 • Current measuring module • Operator panel (optional)	• Basic unit 2 • Current measuring module or current/voltage measuring module • Operator panel (optional) • Expansion modules (optional)

Per feeder each system always comprises one basic unit and one separate current measuring module. 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 motor current to be monitored is decisive only for the choice of current measuring module.

An operator panel for mounting in the control cabinet door is optionally connectable through a second system interface on the basic unit. Both the current measuring module and the operator panel are electrically supplied by the basic unit through the connection cable. More inputs, outputs and functions can be added to basic unit 2 (SIMOCODE pro V) by means of optional expansion modules, thus supplementing the inputs and outputs already existing on the basic unit.

All modules are connected together by connection cables. The connection cables are available in various lengths. The maximum distance between the modules (e.g. between the basic unit and the current measuring module) must not exceed 2.5 m. The total length of all the connection cables in a single system must not be more than 3 m.

SIMOCODE pro designed for mixed operation

Depending on functional requirements, the two 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. Both systems have the same removable terminals and the same terminal designations.

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SIMOCODE pro C, basic unit 1

The compact system for

- Direct-on-line and reversing starters
- Actuation of a circuit breaker (MCCB)

with up to 4 binary inputs, up to 3 monostable relay outputs and one thermistor connection (binary PTC)

The basic unit 1 is available in two different variants for the following supply voltages:

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

SIMOCODE pro C, basic unit 1

Inputs:
- 4 binary inputs, with internal supply from 24 V DC

Outputs:
- 3 (2+1) monostable relay outputs

Thermistor connection for binary PTC

PROFIBUS interface:
- 9-pole SUB-D or
- Terminal connection

Connection of the supply voltage:
- 24 V DC or
- 110 ... 240 V AC/DC

Test/Reset button

3 LEDs

2 system interfaces for connection
- A current measuring module and
- Of an operator panel

Basic unit 1 is suitable for standard rail mounting or, with additional push-in lugs, for fixing to a mounting plate.

SIMOCODE pro V, basic unit 2

The variable system which offers all SIMOCODE pro C functions plus many additional functions. Basic unit 2 supports the following control functions:

- Direct-on-line and reversing starters
- Wye/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)
- Slide control
- Solenoid valve actuation
- Actuation of a circuit breaker (MCCB)
- Soft starter actuation (also with direction reversal)

Basic unit 2 has 4 binary inputs, 3 monostable relay outputs and one thermistor connection (binary PTC). The type and number of inputs and outputs can be increased by means of additional expansion modules.

Basic unit 2 is available in two different variants for the following supply voltages:
- 24 V DC
- 110 ... 240 V AC/DC

SIMOCODE pro V, basic unit 2

Inputs:
- 4 binary inputs, with internal supply from 24 V DC

Outputs:
- 3 (2+1) monostable relay outputs

Thermistor connection for binary PTC

PROFIBUS interface:
- 9-pole SUB-D or
- Terminal connection

Connection of the supply voltage:
- 24 V DC or
- 110 ... 240 V AC/DC

Test/Reset button

3 LEDs

2 system interfaces for connection
- A current measuring module or current/voltage measuring module
- Expansion modules and
- of an operator panel

Basic unit 2 is suitable for standard rail mounting or, with additional push-in lugs, for fixing to a mounting plate.

Current measuring modules (current ranges)

The current measuring module is selected for each feeder according to the rated motor current to be monitored. Various current measuring modules for current ranges from 0.3 to 630 A are available for this purpose. The current measuring module is connected to the basic unit by a connection cable and is supplied with electricity by the basic unit through this connection cable. Current measuring modules up to 100 A are suitable for standard rail mounting or can be fixed directly to the mounting plate by means of additional push-in lugs. Similarly, current measuring modules up to 200 A can also be mounted on standard mounting rails or be fixed directly to mounting plates by means of fixtures integrated in the enclosure. Finally, current measuring modules up to 630 A can only be mounted with the integrated screw fixtures.

Note:
Current measuring modules for up to 100 A set current can be mechanically connected to the corresponding basic unit and mounted with it as a unit (one behind the other). For larger current measuring modules, only separate mounting is possible.

Current measuring modules for the following current ranges are offered:
- 0.3 ... 3 A with straight-through current transformer
- 2.4 ... 25 A with straight-through current transformer
- 10 ... 100 A with straight-through current transformer
- 20 ... 200 A with straight-through current transformer or busbar connection
- 63 ... 630 A with busbar connection

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

Current/voltage measuring modules (voltage range)

Current/voltage measuring modules have the same functions as the current measuring modules. However, they can only be used in combination with basic unit 2. They offer the same current ranges for the rated motor current. Mounting on standard mounting rails, on mounting plates or directly on the contactor is also the same as with the current measuring modules. They can also measure voltages up to 690 V in the main circuit, which is necessary for calculating or monitoring power-related measured variables. Current/voltage measuring modules have additional removable terminals, to which the voltages of all three phases of the main circuit are connected (3-pole). An additional 3-core cable can be used, for example, to directly connect the main circuit from the busbar terminals of the current/voltage measuring modules to the voltage measuring terminals.

Note:
Current/voltage measuring modules can only be mounted separately from the associated basic unit 2. A current/voltage measuring module can only be used with a basic unit 2, product version E02 and later (from April 2005).

Width				
45 mm	**55 mm**	**120 mm**	**145 mm**	
				**Current measuring modules**
				**Current/voltage measuring modules**
Set current				To measure and monitor motor currents up to 820 A, matching 3UF18 interposing current transformers are available for the current measuring modules and current/voltage measuring modules.
0.3 ... 3 A; 2.4 ... 25 A	**10 ... 100 A**	**20 ... 200 A**	**63 ... 630 A**	
Straight-through transformers				
		Busbar connection		

Sizes and set current of the current measuring modules and the current/voltage measuring modules

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Operator panel

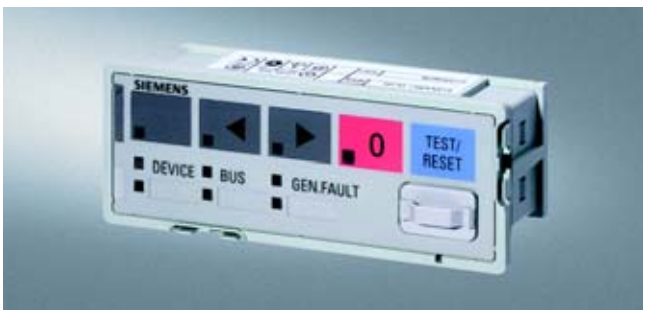
The operator panel is used to control the motor feeder and can replace all conventional pushbuttons and indicator lights to save space. This means that SIMOCODE pro or the feeder can be operated directly at the control cabinet and that the system interface is connected externally for easier parameterization or diagnostics 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
- 2 system interfaces on the front with interface covers

Expansion modules for additional I/Os and functions

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. Through the one system interface the expansion module is connected to the system interface of basic unit 2 using a connection cable, for example; through 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.

All expansion modules are suitable for standard rail mounting or can be directly fixed to a mounting plate using additional push-in lugs. Basic unit 2 can be extended on the whole with up to 5 expansion modules.

Expansion with additional binary I/Os through digital modules

Up to two digital modules can be used to add additional binary inputs and relay outputs to basic unit 2. The input circuits of the digital modules are supplied from an external power supply. The following variants are available:

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

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

4 binary inputs, externally supplied with
- 24 V DC or
- 110 ... 240 V AC/DC

2 relay outputs,
- Monostable or
- Bistable (the switching state 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 or current/voltage measuring module
- Of an operator panel

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.

Expansion with a ground-fault monitoring module with an external summation current transformer

Instead of ground-fault monitoring using the current measuring modules or current/voltage measuring modules, it may be necessary, especially in high-impedance grounded networks, to implement ground-fault monitoring for smaller ground fault currents using a summation current transformer. A ground-fault module can be used to add an additional input to basic unit 2 for connection of a summation current transformer (3UL2 20.-.A).

Maximum one ground-fault module can be connected to one basic unit 2.

3UF7 500-1AA00-0 ground-fault module

1 input for connecting a summation current transformer (3UL2 20.-.A)

1 Ready LED

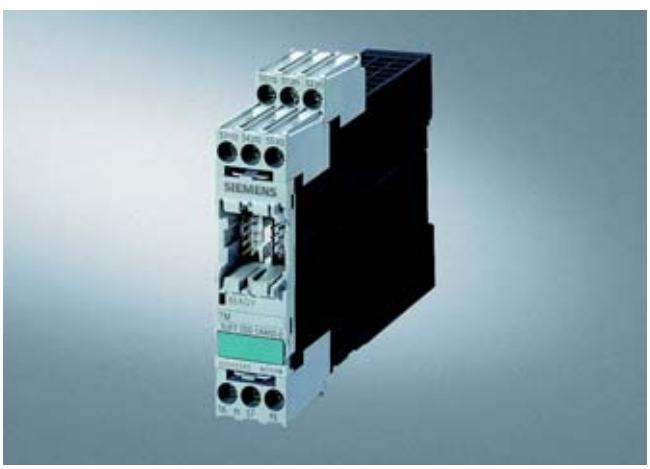
2 system interfaces for connection
- To basic unit 2
- Of expansion modules
- Of a current measuring module or current/voltage measuring module
- Of an operator panel

Note:
A ground-fault module can only be used with a basic unit 2, product version E02 and later (from April 2005).

Expansion of analog temperature monitoring with a temperature module

Independently of the thermistor motor protection of the basic units, up to 3 analog temperature sensors can be evaluated using a temperature module.
The temperatures measured here can be completely integrated in the process, monitored and supplied to a higher-level automation system. The temperature module can be used, for example, for analog monitoring of the temperature of the motor windings or bearings or for monitoring the coolant or gear oil temperature. Various sensor types are supported (resistance sensors) for use in solid, liquid or gaseous media:
- PT100/PT1000
- KTY83/KTY84
- NTC

Maximum one temperature module can be connected to one basic unit 2. The same sensor type must be used in all sensor measuring circuits.



3UF7 700-1AA00-0 temperature module

3 inputs for connecting up to 3 resistance sensors in 2-wire or 3-wire circuits

1 Ready LED

2 system interfaces for connection
- To basic unit 2
- Of expansion modules
- Of a current measuring module or current/voltage measuring module
- Of an operator panel

Note:
A temperature module can only be used with a basic unit 2, product version E02 and later (from April 2005).

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Expansion with additional inputs/outputs by means of an analog module

Basic unit 2 can be optionally expanded with analog inputs and outputs (0/4 ... 20 mA) by means of the analog module. It is then possible to measure and monitor any process variable that can be mapped on a 0/4 ... 20 mA signal. Typical applications are, for example, level monitoring for the implementation of dry running protection for pumps or monitoring the degree of pollution of a filter using a differential pressure transducer. In this case the automation system has free access to the measured process variables. The analog output can be used, for example, to visualize process variables on a pointer instrument. The automation system also has free access to the output through PROFIBUS.

Maximum one analog module can be connected to one basic unit 2. Both inputs are set to a measuring range of either 0 ... 20 mA or 4 ... 20 mA.

3UF7 400-1AA00-0 analog module

Inputs:

- 2 inputs (potential applied) for measuring 0/4 ... 20 mA signals

Outputs:

- 1 output to output a 0/4 ... 20 mA signal

1 Ready LED

2 system interfaces for connection
- To basic unit 2
- Of expansion modules
- Of a current measuring module or current/voltage measuring module
- Of an operator panel

Note:
An analog module can only be used with a basic unit 2, product version E02 and later (from April 2005).

Safe isolation

All circuits in SIMOCODE pro are safely isolated from each other in according to IEC 60947-1. That is, they are designed with double creepages and clearances. 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.

EEx e and EEx d types of protection

The overload protection and the thermistor motor protection of the SIMOCODE pro system comply with the requirements for overload protection of explosion-protected motors to the degree of protection:
- EEx d "flameproof enclosure" e.g. according to EN 50018 or EN 60079-1
- EEx e "increased safety" e.g. according to EN 50019 or EN 60079-7.

When using SIMOCODE pro devices with a 24 V DC control voltage, electrical isolation must be ensured using a battery or a safety transformer according to EN 61558-2-6.

EC type test certificate: BVS 06 ATEX F 001
Test log: BVS PP 05.2029 EG.