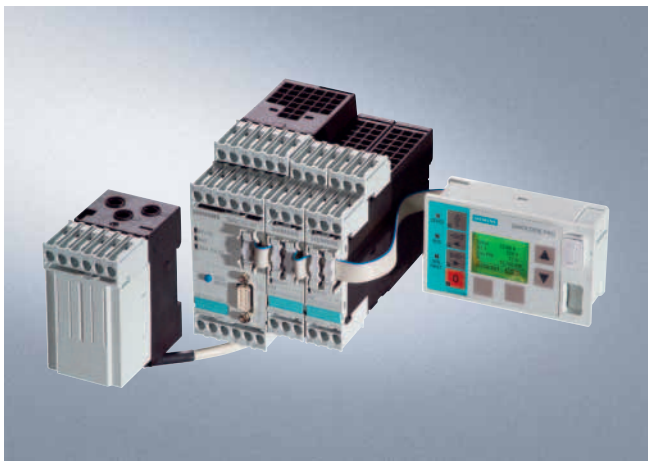
SIMOCODE pro 3UF7 motor management and control devices

Overview



SIMOCODE pro V with current/voltage measuring module, expansion modules and operator panel with display

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 operating, service and diagnostics data
- Open communication through PROFIBUS DP, the standard for fieldbus systems

SIMOCODE ES is the software package for SIMOCODEpro 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 • Decoupling module (optional) • Operator panel or operator panel with display (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 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
- For 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 versions 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)
- Positioner actuation
- 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 versions 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.

SIMOCODE pro 3UF7 motor management and control devices

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 ... 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. If the current/voltage measuring module is used in non-grounded networks or in networks with insulation measurement or monitoring, then a decoupling module must be used in addition.

Width				
45 mm	**55 mm**	**120 mm**	**145 mm**	
				**Current measuring modules**
				**Current/voltage measuring modules**
Set current				
0.3 ... 3 A; 2.4 ... 25 A	**10 ... 100 A**	**20 ... 200 A**	**63 ... 630 A**	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.
Straight-through transformers				
		Busbar connection		

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

Decoupling module for current/voltage measuring modules

Decoupling module

If the voltage and power measuring module from SIMOCODE pro is used in non-grounded networks, then a decoupling module must be installed on the system interface upstream from each current/voltage measuring module. If the voltage and power measuring module from SIMOCODE pro is used in networks with additional insulation measurement or insulation monitoring, then a decoupling module must be installed likewise upstream from each current/voltage measuring module. If 3UF7 10 current-only measuring modules are used in these networks, then additional decoupling modules must not be used under any circumstances.

Note:
When a decoupling module is used, restrictions on the number of connectable expansion modules must be observed (see page 7/13).

Operator panel

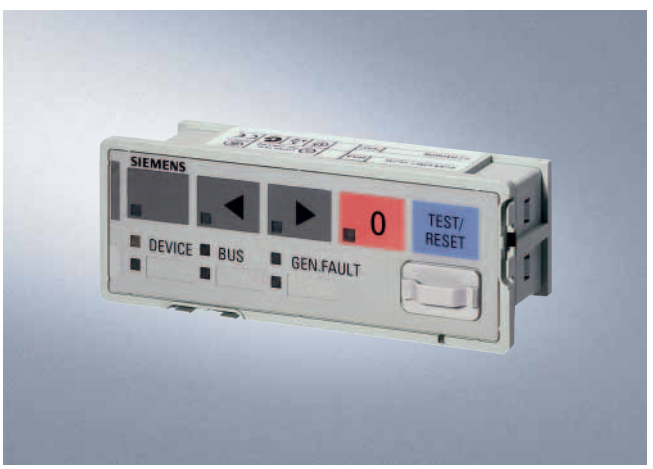
The operator panel is used to control the motor feeder and can replace all conventional pushbuttons and indicator lights to save space. This means that SIMOCODE pro or the feeder can be operated directly at the control cabinet and that the system interface is connected externally for easier parameterization 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 degree of protection IP54 with the system interface covered.



Operator panel for SIMOCODE pro

- 10 LEDs
- Test/reset button
- 4 control keys
- 2 system interfaces on the front with interface covers

SIMOCODE pro 3UF7 motor management and control devices

Operator panel with display

Operator panel with display for SIMOCODE pro V

As an alternative to the 3UF7 20 standard operator panel for SIMOCODE pro V there is also an operator panel with display: the 3UF7 21 is thus able in addition to indicate current measured values, operational and diagnostics data or status information of the motor feeder at the control cabinet. This operator panel can be used solely with basic unit 2 (SIMOCODE pro V), product version E03 and higher. It includes all the status LEDs also found on the basic unit and provides access to the system interface outside the control cabinet. The pushbuttons of the operator panel can be used to control the motor while at the same time the display indicates current measured values, status information, fault messages or the device-internal fault protocol. Overview of features:

- 7 LEDs, 4 of them user-assignable (4 green LEDs are integrated in the motor control pushbuttons, preferably for the feedback of switching states, e.g. On, Off, Left, Right, etc.)
- 4 user-assignable buttons for controlling the motor feeder
- 4 buttons for navigating in the display menu, 2 of them as softkeys with function options (e.g. Test/Reset)
- 2 system interfaces on the front with interface covers

Using the display settings each user can select for himself how the measured values are presented as standard and how the displayed unit is converted (e.g. °C -> °F). The menu language is also switchable. Following options are available:

- English
- German
- French
- Polish
- Spanish
- Portuguese
- Italian
- Finnish

Note:
The operator panel with display can be used solely with basic unit 2, product version E03 and higher. Furthermore, if the operator panel with display is used, restrictions on the number of connectable expansion modules must be observed *(see page 7/13).*

Inscription software for pushbuttons and LEDs on the operator panels

All operator panels come with prefabricated labeling strips. Using the latest version of the labeling software "SIRIUS Label Designer" it is also possible to produce user-specific inscription for the keys and LEDs of the operator panels from SIMOCODE pro.

Note:
The multilingual software is available free of charge from http://www.siemens.com/simocode.

Three different types of prepunched labeling strips are available for printing and can be ordered as an accessory part. With the help of a laser printer it is then easy to label the keys or LEDs of the 3UF7 20 operator panel or the keys of the 3UF7 21 operator panel with display.

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 versions 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 versions 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:
For the corresponding summation current transformers for rated fault currents of 0.3 A, 0.5 A or 1 A, see page 7/92.

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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 through Profibus. 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

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, passive, 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