

Industrial Controls

Motor Management and Control Devices SIMOCODE 3UF SIMOCODE PRO V PN FDI

Programming and Operating 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.

Proper use of Siemens products

Note the following:

WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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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

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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/industrialsecurity>.

Information on data protection

Siemens observes standard data protection principles, in particular the principle of privacy by design.

For this product this means:

This product does not process or store any personal data, only technical function data (e.g. time stamps). If you link this data with other data (e.g. shift schedules) or store personal data on the same storage medium (e.g. hard disk), and thus establish a link to a person or persons, then you are responsible for ensuring compliance with the relevant data protection regulations.

SIMOCODE pro - General

General

There is a help topic for every SIMOCODE pro V PN FDI package dialog in the online help. The topics are to some extent very comprehensive.

Depiction of preset values:

Preset values are underlined or have an additional line: "Defaults".

Note

Observe the operating instructions/manuals of the components used.

Identification

4.1 Identification

Identification

The dialog box **Identification > Device** provides you with an overview of device-specific information.

You can use the overview for plant documentation, for example.

4.2 Marking

Marking

- Plant identifier: Synonymous with a device that you can insert
- Location designation: Designation of the installation location
- Description: User-specific details about the operating unit
- Installation date: User-specific information about when the device was installed.

4.3 Device

Device

Overview of the device-specific information. This overview can, for example, be used for system documentation.

Information	Meaning
Manufacturer	Name of the manufacturer (SIEMENS)
Order number	Order number (MLFB) of the device (MLFB = Maschinen Lesbare Fabrikate-Bezeichnung; corresponds to the order number)
Short code	Short code of the device (SIMOCODE pro V PN)
PNO profile	Profile within PNO (PROFINET International)
Device family	Designation of the higher-level device family, e.g. devices
Device subfamily	Designation of the device subfamily below the device family, e.g. Motor Management System
Device class	Designation of the device class below the sub family
Identification number	Provided by the manufacturer
Fieldbus interface	e. g. PROFINET

Information	Meaning
HW Release	Corresponds to the I & M value: Hardware Revision (provided by the manufacturer)
FW Release	Corresponds to the I & M value: Software Revision (provided by the manufacturer)
Revision counter	Corresponds to the I & M value: Rev Counter
IaM version	Corresponds to the I & M value: IM Version
Supported IaM data	Corresponds to the I & M value: IM Supported
Timestamp	Provided by the manufacturer

Device Configuration

5.1 Device Configuration

This dialog provides an overview of the device configuration. It can, for example, be used for system documentation.

Basic unit

SIMOCODE pro V PN as the basic unit.

Version

Firmware revision level for the selected basic unit:

- SIMOCODE pro V PN basic unit: Select V1.0, V1, V1.2 or V2.0

Thermistor

The basic units provide the option of connecting thermistor sensors (binary PTC) for monitoring the motor temperature. See Thermistor parameters.

5.2 Module Configuration

For Pro V PN

- Current Measurement: If necessary, select the current measurement module with the appropriate current range (depending on the Current module availability and Support IUM/IUM V2), see Current range details in section 5.1, overload protection- Set current (Page 23).
- Voltage measurement: Select here whether to use a current-voltage measurement module for voltage, power factor (cos-phi) or real power monitoring.
- Voltage display: Please select either "Phase voltage" or "Line-to-line voltage" here (default: phase voltage). This can only be activated if a current measuring module has been selected.
- Digital module 1: Please select here, if a digital module with monostable, bistable or safety outputs (DM-F Local and/or DM-F PROFI-safe) is to be used.
- Digital module 2: Select here whether to use digital modules with monostable or bistable outputs.
- Operator panel: Select here whether to use an operator panel or not.

- Temperature module 1/2. Choose here whether or not a temperature module is to be used for temperature monitoring (e.g., for monitoring the motor windings, motor bearings, coolant temperature, or gearbox temperature). Temperature module 2 can only be activated if temperature module 1 has been configured.
- Analog module 1/2. Choose here whether or not the analog signals of a transducer (standard output signal 0/4-20 mA) are to be monitored. Analog module 2 can only be activated if analog module 1 has been configured.
- Earth fault module: Select here whether the external earth-fault monitoring is to be used via a residual current transformer and earth-fault module.
- If yes, select
 - The 3UF7500 earth-fault module (in conjunction with the 3UL22 residual current transformer)
 - The 3UF7510 earth-fault module (in conjunction with the 3UL23 residual current transformer).
- Initialization module: This can be permanently installed in the switchgear and enable backup of all parameters of a system and completely automatic transmission to a new system, e.g. device replacement.

Note

The DM-F Local and DM-F PROFIsafe failsafe digital modules can be activated from the following firmware versions onwards:

- Pro V PN: V1.0.
-

Note

The earth fault module 3UF7510 can be activated from the following firmware versions onwards:

- Pro V PN: V1.1.
-

Device Parameters

6.1 Device Parameters

PROFINET Parameters

MAC address

Each PROFINET device is assigned a globally unique device identifier at the factory. This 6-byte long device identifier is the MAC address.

The MAC address is divided up as follows:

- 3 bytes manufacturer's 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.

The device can be reached via LAN using this address.

IP parameter

The IP parameters, consisting of IP address, subnet mask, and router can also be assigned in various ways and transferred to the IO Device.

Possibilities for this are:

- The IO Controller assigns the IP parameters to the IO Device. In this case, the "Overwrite IP parameters in device" check box must not be selected.
- The IP parameters are obtained from a DHCP server and assigned to the IO Device. In this case, the "Overwrite IP parameters in device" check box must not be selected.
- The IP parameters are configured with Device Integration Manager and transferred to the device. In this case, the "Overwrite IP parameters in device" check box 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" check box must not be selected.

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 reachable via PROFINET due to the missing address settings.

- IP address, subnet screen
To allow 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 period. The IP address is composed of the address of the (sub) net and the address of the node (generally also called a host or network node).
- Router:
 - Do not use router/Use router
 - Address (gateway).

Station

- To Overwrite device name in device: Select the "Overwrite device name in device" parameter.
- Device name: Select the PROFINET device name to match the configuration in the automation system.
- Station type: Displays the station type.
- Baud rate: The baud rate is initially set to "automatic". The actual baud rate is displayed with "Open Online".
- PROFIsafe address: Displays the PROFIsafe address.

Note

The PROFIsafe address must be set directly using the DIP switch of the DM-F PROFIsafe digital module!

OPC-UA server - web server

- OPC-UA server activated: The default setting the OPC-UA server is "not active". To activate the OPC-UA server, the "PROFINET parameters → OPC-UA server activated" check box must not be selected.
- Web server activated: The default setting of the web server is "not active".
- Web server user name: Enter a user name when web server is activated.
- Web server password: Enter a password when web server is activated.
- Web server password confirmation: Confirm the password.

NTP procedure - Synchronization

- Activate NTP synchronization: Select this check box if you want to synchronize the unbuffered real time clock of SIMOCODE pro V PN using the NTP procedure.
- NTP server address: Enter the NTP server address when "Activate NTP synchronization" check box is selected.

- Cyclic update interval: Enter a value for the cyclic update interval when "Activate NTP synchronization" check box is selected: 1... 86400 s (default value: 10 s).
- Time shift: Enter a value for the time shift: -1440 min ... +1440 min (default value: 0 min). If you would like to set up the time in device to UTC time (recommended) please set first +/- offset in NTP Time shift parameter in minutes respective to current time zone and then upload the data to the device.

Start-up parameter block

With this parameter you instruct SIMOCODE pro to ignore all parameter data that are sent to the individual devices at startup of the controller. The current parameter data that SIMOCODE pro has saved are not overwritten by the DP master in this case. When "Startup parameter block" is activated, you can only change the parameter data by entering new parameters with Device Integration Manager.

Preset:

- Activated, directly in Device Integration Manager when parameterizing
- Not activated
 - after factory setting
 - if integrated via OM SIMOCODE.

6.2 Diagnosis

Diagnosis

It is possible to stipulate which diagnosis data can be reported via PROFINET by activating the corresponding checkbox:

- Diagnosis for device faults
- Diagnosis for process errors
- Diagnosis for process warnings
- Diagnosis for process messages.

Motor Protection

7.1 Overload Protection

Overload Protection

SIMOCODE pro protects 3-phase and AC motors in compliance with IEC 60947-4-1. The tripping class can be set to 8 different settings ranging from class 5 to class 40. Therefore, the switch-off time can be adjusted very precisely to the power-up time of the motor which allows the motor to be better used to capacity. The "Heating up the motor model" value and the interval up to the overload tripping are also calculated and can be put at the disposal of the control system. After an overload tripping, the remaining cooling down time is displayed. The motor current at the point of overload tripping is stored.

Depending on the control function, the set current is separately parameterizable for one or two speeds (I_{s1} and I_{s2}).

Set current I_{s1} (CiR)

The motor rated current is normally set with the Iset current I_{s1} . This value is listed on the type plate of the motor. It is the basis for calculating the overload tripping characteristic curve.

Range: depends on the desired current measuring module or current/voltage measuring module.

When a current measuring module or 1st generation current / voltage measuring modules are used:

Set current I_{s1} :	0.3 A to 3 A
	2.4 A to 25 A
	10 A to 100 A
	20 A to 200 A
	63 A to 630 A

When 2nd generation current / voltage measuring modules are used:

Set current I_{s1} :	0.3 A to 4 A
	3 A to 40 A
	10 A to 115 A
	20 A to 200 A
	63 A to 630 A

Transformation Ratio - Active

When using an interposing transformer, of if there is multiple looping of the main current cables through the current/voltage measuring module, you can enter the transformation ratio of the interposing transformer.

Activate the checkbox if you wish to use this option. The parameterized set current thus continues to correspond the actual nominal motor current and does not have to be converted. The transformation ratio is calculated from the ratio between nominal motor current [A] and measuring current [A] or any multiple of this ratio.

Transformation Ratio - Primary

Enter the primary current here, with the "Transformation ratio - active" checkbox activated.
Range: 0 - 8191,875.

Transformation Ratio - Secondary

Enter the secondary current here, with the "Transformation ratio - active" checkbox activated.
Range: 0 - 15.

Set current I_{s2} (CiR)

Range: depends on the selected current measuring module or current/voltage measuring module.

When a current measuring module or 1st generation current / voltage measuring modules are used:

Set current I_{s2} :

- 0.3 A to 3 A
- 2.4 A to 25 A
- 10 A to 100 A
- 20 A to 200 A
- 63 A to 630 A

When 2nd generation current / voltage measuring modules are used:

Set current I_{s2} :

- 0.3 A to 4 A
- 3 A to 40 A
- 10 A to 115 A
- 20 A to 200 A
- 63 A to 630 A

Transformation Ratio - Active

When using an interposing transformer, or if there is multiple looping of the main current cables through the current/voltage measuring module, you can enter the transformation ratio of the interposing transformer.

Activate the checkbox if you wish to use this option. The parameterized set current thus continues to correspond the actual nominal motor current and does not have to be converted. The Transformation ratio is calculated from the ratio between nominal motor current [A] and measuring current [A] or any multiple of this ratio.

Note

This parameter is only available when using Basic Unit 2 from product version *E03*.

Transformation Ratio - >Primary

Enter the primary current here, with the "Transformation ratio - active" checkbox activated.
Range: 0 - 8191,875.

Transformation Ratio - Secondary

Enter the secondary current here, with the "Transformation ratio - active" checkbox activated.
Range: 0 - 15.

Class (CiR)

The class (tripping class) indicates the maximum tripping time in which SIMOCODE pro must trip cold with the 7.2-fold set current I_s (motor protection according to IEC 60947). Please take into account that with start-ups > "Class 10", the admissible AC3 current of the contactor must be reduced (derating), which means that a larger contactor must be used.

Note

In the case of motors with two speeds, the same or different transformation ratios can be set for each speed, depending upon whether the same or two different interposing transformers is/are used for each speed.

Class: 5, 10, 15, 20, 25, 30, 35, 40

Response in case of overload

The response of SIMOCODE pro can be additionally adjusted in case of overload.

Note

With motors for EEx e applications the response must remain set to "tripping"!

Cooling down period (CiR)

The cooling down period is the specified time after which an overload tripping can be reset. It is usually five minutes. The thermal memory is deleted after the cooling down period expires. Supply voltage failures of SIMOCODE pro during this time correspondingly extend the specified time.

Cooling down period: 60 up to 6553.5 s

Preset: 300 s

Pause time (CiR)

The pause time is the specified time for the cooling response of the motor when switching off under normal operating conditions (not in the case of overload tripping!). After this interval, the thermal memory in SIMOCODE pro is deleted and a new cold start is possible. Due to this, frequent start-ups within a short period of time are possible.

Note

The motor and the switchgear must be dimensioned specifically for this load!

Pause time: 0 up to 6553.5 s

Type of load

The phase failure monitoring is deactivated automatically.

You can choose whether SIMOCODE pro is to protect a 1-phase or a 3-phase load.

With a 1-phase load, the following measures should be carried out:

- The internal earth-fault monitoring and the unbalance protection must be deactivated.
- Only one of the two cables should be feed through a push-through system opening in the current measuring module.

Type of load: 1-phase, 3-phase

Response at Pre-Warning Level ($I > 115\% I_s$)

The response of SIMOCODE pro can be additionally adjusted in case of overload (disabled, signaling, warning).

Delay pre-warning (CiR)

The "delay" parameter (default: 0.5 s) is used to determine the interval during which the pre-warning level ($1.15 \times I_s$) must be constantly exceeded before SIMOCODE pro executes the desired response. Otherwise, there is no reaction.

In case of phase failure or unbalance $> 50\%$, this pre-warning is already issued at approx. $0.85 \times I_e$.

Reset

If the "Reset" parameter is set to "Auto", the "Overload", "Overload + unbalance" and "Thermistor" faults are acknowledged automatically

- if the cooling down period has expired
- if the thermistor value has decreased to the resetting value according to specification.

If the "Reset" parameter is set to "Manual", the errors must be acknowledged by a reset signal:

- "Reset" button on the basic unit
- "Reset" button on the operator panel
- "Reset" standard functions. For this reason, the "Reset - input" inputs (plugs) must be connected to the corresponding sockets, e.g. using reset via the bus.

Reset: Manual, Auto

Note

The "Auto reset" mode of operation may not be used in applications in which an unexpected restart of the motor can lead to damage to persons or objects.

7.2 Unbalance Protection

Unbalance Protection

The extent of the phase unbalance can be monitored and transmitted to the control system. A definable and delayable response can be tripped when an adjustable level is exceeded. If the phase unbalance is greater than 50 %, a reduction of the tripping time according to the overload characteristic curve takes place automatically since the heat development in motors increases with asymmetric conditions.

Level (CiR)

The limit of the unbalance to which SIMOCODE pro is to react when overshoot is set here.

Level: 0 to 100 %
Preset: 40 %

Response

Here you can choose the response of SIMOCODE pro in case of phase unbalance:

Response	Unbalance
Disabled	X
Signaling	X
Warning	X
Tripping	X

Delay (CiR)

The unbalance limit must be exceeded for the period of the set delay time before SIMOCODE pro executes the desired response. Otherwise, there is no reaction.

Delay: 0 up to 25.5 s
Preset: 0.5 s

7.3 Stalled Rotor

Stalled Rotor

After the motor current exceeds an adjustable stall limit (current limit), a definable and delayable response can be parameterized in SIMOCODE pro. For example, the motor can be set to be tripped quickly independently of the overload protection. The stall protection is only active after the parameterized class interval has elapsed, e.g. for class 10 after 10 seconds. The stall protection prevents the motor from unnecessary high thermal and mechanical load as well as premature deterioration.

Level (CiR)

After exceeding the stall limit, SIMOCODE pro reacts according to the specified response.

Level: 0 – up to 1020 % of I_s

Response

Here you can determine the response to be executed when the blocking limit is exceeded:

Response	Overload
Disabled	X
Signaling	X
Warning	X
Tripping	X

Delay (CiR)

The "Delay" parameter is used to specify the time interval. The stall level must be constantly exceeded before SIMOCODE pro executes the desired response. Otherwise there is no reaction.

Delay: 0 to 25.5 s
Preset: 0.5 s

7.4 Thermistor

Thermistor

Thermistor protection is based on a direct temperature measurement in the motor via binary PTC thermistors which can be connected to either Basic Unit 1 (BU1) or Basic Unit 2 (BU2). Thermistor protection is used for:

- motors with high switching frequencies
- converter operation
- Motors with heavy starting
- intermittent operation and/or during braking
- a restricted air supply
- speeds that are lower than the rated speed.

In this case, the sensors are mounted in the winding slot or in the bearings of the motor.

Response at tripping level

Here you can choose the SIMOCODE pro response to be executed if the temperature exceeds the trip level.

Response	Tripping threshold
Disabled	–
Signaling	X
Warning	X
Tripping	X

Note

With motors for EEx e applications, the response must remain set to "tripping".

Sensor fault sensor circuit error

Here you can choose the SIMOCODE pro response to be executed if there is a short circuit or a wire break in the thermistor sensor cable.

Response	Sensor fault
Disabled	X
Signaling	X
Warning	X
Tripping	X

Motor Control

8.1 Motor Control

Motor Control

You can select and enable control stations according to requirements here.

8.2 Control Station

8.2.1 Control Station

Control Station

Control stations are places from which control commands can be given to the motor. The Control Stations function block is used for the management, switching and prioritization of these different control stations.

With this, SIMOCODE pro allows the parallel administration of up to four different control stations. Dependent on the specified 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 are issued via push button.
- **PLC/DCS**: Switching commands are issued by the automation system (remote).
- **PC**: Control commands are issued via an operator control station or via PROFINET with the Device Integration Manager.
- **Operator Panel**: Control commands are issued via the buttons of the Operator Panel in the switchgear cabinet door.

Control commands can be e.g.:

- Motor ON (ON>), Motor OFF (OFF) for a direct starter
- Motor LEFT (ON<), Motor OFF (OFF), Motor RIGHT (ON>) for a reversing starter
- Motor SLOW (ON>), Motor FAST (ON>>), Motor OFF (OFF) for a Dahlander circuit.

The plugs of the Control Stations function block must be connected to arbitrary sockets (e.g. binary inputs on the Basic Unit, control bits from PROFINET) for the control commands to take effect.

Up to 5 different control commands can be sent from each control station. There are up to 5 plugs (plug ON<<, ON<, OFF, ON>, ON>>) available on the function block per control station. The number of active plugs depends on the chosen control function. With a direct starter, for example, only the plugs "ON>" and "OFF" are active.

8.2.2 Operation Mode Selector

Operation Mode Selector

You can use the control stations either individually or in combination. There are four different operating modes you can switch between:

- Local 1
- Local 2
- Local 3
- Remote/Automatic: In this mode of operation, the communication must be carried out via PLC.

Not all control stations are usually connected. If more than one control station (e.g. local and PLC/PCS) is connected, it makes sense and is also mandatory to operate the control stations selectively. 4 operating modes are provided for this purpose which can be selected via 2 control signals (mode selectors). For each individual control station in every operating mode, it can be stipulated if "ON commands" and/or "OFF commands" are to be used. The operating modes are so controlled that only one operating mode is active at any one time.

Example: There are 3 modes of operation in a system:

Mode of operation	Description
Key-operated switch operation, e.g. local 1	Only local control entries are admissible! All other control stations are locked
Manual operation, e.g. local 3	Only operator panel control commands and local control commands can be issued.
Remote operation, e.g. remote/automatic	Only PLC/DCS control commands are permitted; locally, only OFF commands are permitted

The key-operated Switch must be read in via an input to select these operating modes. The Remote Switching operation should be controlled via the bus. The Key-operated Switching operation has priority over all other operating modes.

The S1/S2 mode selectors are used to switch between the operating modes "Local 1", "Local 2", "Local 3" and "Remote/Automatic".

The S1 and S2 plugs must be connected to arbitrary sockets (e.g. device inputs, control bits from PROFINET, etc.) for this.

The following table shows the operating modes, depending on the signal status of the S1 and S2 mode selectors:

Input	Mode of operation			
	Local 1	Local 2	Local 3	Remote/automatic
S1	0	0	1	1
S2	0	1	0	1

The different operating modes for enabling the control stations can be used to specify the switch authorizations for the individual control stations:

- Local Control [LC]
- PLC/DCS[PN]
- PC/OPC-UA
- Operator Panel [OP].

Only the following are active:

- The operating mode set by the plugs S1 and S2 of the "Control Stations" function blocks and
- the releases selected there.

8.2.3 Local Control [LC]

Local Control [LC]

In this case, the control devices are usually in the direct vicinity of the motor and wired to the inputs of SIMOCODE pro. The plugs of the Control Stations function block must be connected to arbitrary sockets (normally the function blocks for the Basic Units or the Digital Module Inputs, Basic Unit Inputs, DM Inputs) for the control commands to take effect.

Note

The OFF command "LC OFF" is 0-active. This ensures that SIMOCODE pro switches off the motor safely e.g. if a wire break occurs in the supply cable. The precondition is that the control station is active.

8.2.4 PLC - PCS [PN]

PLC - PCS [PN]

This control station is primarily intended for control commands from the automation system (PLC/PCS) via the cyclic control telegram of PROFINET.

The plugs of the Control Stations function block must be connected to arbitrary sockets, normally cyclic control for the control commands to take effect.

8.2.5 PC - OPC-UA [HMI]

PC - OPC-UA [HMI]

This control station is primarily intended for switching commands on an arbitrary PC that, along with the automation system, is used as a second master on PROFINET or that, as a client, accesses the data made available by SIMOCODE pro, as server, via OPC-UA. The control commands are transferred using a client-server connection via OPC-UA.

Note

If the SIMOCODE ES Professional or Device Integration Manager is connected to SIMOCODE pro via PROFINET, its control commands automatically take effect via the "PC/OPC-UA" control station.

At the same time, the enabled commands for this control station also take effect for SIMOCODE ES.

8.2.6 Operator Panel [OP]

Operator Panel [OP]

This control station is primarily intended for control commands issued via the buttons of the 3UF72 Operator Panel which is e.g. mounted in a switchgear cabinet door. The plugs of the Control Stations function block must be connected to arbitrary sockets (normally with the function block for the buttons of the Operator Panel - OP Buttons) for the control commands to take effect.

Note

Since the operator panel only has four buttons for controlling the motor feeder, one button must be used as a speed switch button for control functions with two rotational speeds and two directions for rotation.

For this purpose, the button must be assigned to the internal control command "[OP] <>/<<>>".

8.2.7 Releases

8.2.7.1 Releases

Releases

Releases for the control commands "ON" and "OFF", which must be activated, are assigned to each mode of operation for every single control station. This means that depending on the operating mode, it can be specified for each control station whether the motor may only be switched on, off or both on and off.

8.2.7.2 Operating Mode Local 1 - S1=0 and S2=0

Operating Mode Local 1

Operating Mode Selector S1=0 and S2=0 (Operating Mode Local 1).

8.2.7.3 Operating Mode Local 2 - S1=0 and S2=1

Operating Mode Local 2

Operating Mode Selector S1=0 and S2=1 (Operating Mode Local 2).

8.2.7.4 Operating Mode Local 3 - S1=1 and S2=0

Operating Mode Local 3

Operating Mode Selector S1=1 and S2=0 (Operating Mode Local 3).

8.2.7.5 Operating Mode Remote-Auto - S1=1 and S2=1

Operating Mode Remote/Auto

Operating Mode Selector S1=1 and S2=1 (Operating Mode Remote/Auto).

8.3 Control Function

8.3.1 Control Functions

Control functions (e.g. direct starters, reversing starters) are used for controlling load feeders. They have the following important features:

- Monitoring the switch-on/switch-off sequence
- Monitoring the ON/OFF status
- Switching off in case of a fault.

For monitoring these statuses, SIMOCODE pro uses the auxiliary control input "Feedback ON", which is usually derived directly from the current flow in the main circuit via the current measurement modules.

All necessary interlocks and connections for the corresponding applications are already implemented in the control functions.

Control functions contain:

- Plugs for control commands (ON <<, ON <, OFF, ON >, ON >>) that are usually connected with the "Enabled Control Command" sockets.
- Auxiliary control inputs (plug), e.g. Feedback ON
- Sockets for
 - contactor controls QE1 to QE5
 - displays (lamp controls) QL*, QLS
 - statuses, e.g. "Status - ON <<, Status - ON >>"
 - faults, e.g. "Trip - Feedback (FB) ON", "Trip - Antivalence"
- Settings, e.g. interlocking time
- A logic component with all necessary interlocking and connections for the control function
- Like control functions, the motor protection with its parameters and signals is active "at a higher level in the background". Motor protection and thermistor protection are independent functions that switch off the motor when activated via the control functions.

8.3.2 Operating Mode

Operating Mode

Parameter	Description
Non-maintained command mode	<ul style="list-style-type: none"> • Deactivated: The control command on the corresponding input of the control stations "ON <, ON <<, ON >, ON >>" is saved. It can only be revoked by an "OFF" control command from the corresponding control station. The auxiliary contact for locking the contactor is no longer necessary. Motor feeders are usually operated in locking mode. Locking is preset. • Activated: Depending on the control function chosen, the Non-maintained command mode affects the plugs of all control stations "ON <, ON <<, ON >, ON >>". A control command is only effective as long as there is a "high signal".
Saving change-over Command	<ul style="list-style-type: none"> • Deactivated: Commands for switching from one direction of rotation/rotational speed to the other are implemented with a previous "OFF" and after the interlocking time/change-over pause has elapsed. This setting is usually used and is preset. • Activated: Commands for switching from one direction of rotation/rotational speed to the other are implemented without a previous "OFF" and after the interlocking time/change-over pause has elapsed. If the selected direction/speed cannot be executed immediately due to a parameterized interlocking time/change-over pause, the selection is signalized by flickering QLE displays. Your selection can be cancelled at any time with "OFF".

Parameter	Description
DM-F LOCAL/DM-F PROFIsafe - separate function from the control function	<ul style="list-style-type: none"> • Deactivated: A safety-oriented tripping via the DM-F module also affects the SIMOCODE pro control function, so that the contactor control is always tripped, too. This setting is selected for applications where a safety-oriented tripping directly affects the motor controlled by SIMOCODE pro. • Activated: A safety-oriented tripping via the DM-F module does not affect the SIMOCODE pro control function, so that the contactor control is not tripped. This setting is selected for applications where a safety-oriented tripping does not affect the motor controlled by SIMOCODE pro.
Type of consumer load	<p>You can choose between:</p> <ul style="list-style-type: none"> • Motor and • Resistive load (e.g. heating) <p>Because generally no overcurrent flows in a resistive load during switching, the "Start Active" status is not signaled. In this case, the start-up override does not occur for the "signaling", "warning" and "tripping" functions.</p>

8.3.3 Auxiliary Control Inputs

Auxiliary Control Inputs

The auxiliary control input "Feedback ON" is used for monitoring the following operations:

- Switch-on/switch-off sequence
- ON/OFF status
- Switching off in case of a fault
- Additional (advanced) status information for the "Positioner" or "Solenoid Valve" control function:
 - Feedback CLOSED (FC)
 - Feedback OPEN (FO)
 - Torque CLOSED (TC)
 - Torque OPEN (TO).

These feedback signals specify the present status of the corresponding limit switch and/or torque switch. The amount of usable status information is directly dependent on the selected control function.

Control is possible with any signal.

8.3.4 Timings

Timings

Parameter	Description
Feedback time (CiR)	SIMOCODE pro monitors the status of the feeder (ON or OFF) via FB ON. If the status of FB ON changes - without a corresponding switching command - the trip feedback (FB) switches off the feeder. Default: 0.5 s. The feedback time can be used to suppress such "feedback faults" for a defined period of time, e.g. in the case of network switches. SIMOCODE pro continuously controls if FB ON = 0. If the current flows longer than the set feedback time without the "ON" control command being issued, fault message "Trip - Feedback (FB) ON" is issued. The contactor controls can only be connected after the fault has been rectified. When the motor is switched on, SIMOCODE pro continuously controls if FB ON = 1. If the current flows longer than the set feedback time without the "OFF" control command being issued, a fault message "trip - feedback (FB) OFF" is issued. The contactor controls are deactivated.
Execution time (CiR)	SIMOCODE pro monitors switching on/switching off. Switching on/switching off must be completed within this time period. Default: 1.0 s. After the "ON" control command is issued, SIMOCODE pro must be able to detect current in the main circuit within the execution time. Otherwise, the fault message "trip - execution ON command" will be issued. SIMOCODE pro deactivates the contactor controls. After the "OFF" control command is issued, SIMOCODE pro must not be able to detect any current in the main circuit after the execution time has elapsed. Otherwise, the fault message "trip - execution STOP command" will be issued. The contactor controls can only be connected after the fault has been rectified.
Interlocking time (CiR)	SIMOCODE pro prevents, e.g. in the case of reversing starters, both contactors from switching on at the same time. Switching from one direction of rotation to the other can be delayed via the interlocking time. Default: 0 s.

Parameter	Description
Change-over pause (CiR)	In the "Dahlander" and "Pole-changing starter" control functions, switching from the fast speed to the slow one can be delayed with the time configured. In the "Star-Delta" control function, the change-over pause time extends the time between switching off the star contactor and switching on the delta contactor by the time configured. Default: 0.00 s.
Max. star time (CiR)	For the "Star-delta Starter" or the "Star-delta Reversing Starter" control function: Time-dependent switching from star to delta. Max. star time: 0 - 255 s (default: 20 s).

Note

(CiR): Change in Running

The parameters followed by (CiR) can be changed when the motor is in operation.

Monitoring Functions

9.1 Earth Fault

9.1.1 Internal earth-fault monitoring when using a current measuring module or a 1st generation current / voltage measuring module

Internal earth-fault monitoring via current measuring modules or current / voltage measuring modules is only possible for motors with a 3-phase connection in networks that are either grounded directly or with low impedance. You can activate internal ground-fault monitoring by parameterization.

It covers two different operating conditions:

- Normal operation to $2 \times I_s$. The actual operating current must be less than twice the set current I_s . Fault currents of $> 30 \%$ of the set current I_s will be detected.
- Start-up or overload operation to $2 \times I_s$. The actual operating current is greater than twice the set current I_s . Residual currents of $> 15 \%$ of the effective motor current will be detected.

NOTICE
False tripping in the case of internal ground-fault monitoring False tripping can occur if you use internal earth-fault monitoring for star-delta circuits. During delta operation, the residual current is non-zero due to harmonics.

Response to internal earth-fault monitoring

Deactivated, signaling, warning, tripping

Delay

Setting range: 0 - 25.5 s (**0.5 s**)

Activity

Unless deactivated, this function is always active, regardless of whether the motor is running or not (operating state "ON").

9.1.2 Internal earth-fault monitoring when using a current measuring module or a 2nd generation current / voltage measuring module

Internal earth-fault monitoring via current measuring modules or current / voltage measuring modules is only possible for motors with a 3-phase connection in networks that are either grounded directly or with low impedance. You can activate internal ground-fault monitoring by parameterization.

It covers two different operating conditions:

- Normal stationary use case up to 2x rated motor current I_s :
 - Residual currents greater than the value of the set trip / warning levels are detected.
 - Ground-fault monitoring fulfills the accuracy requirements of IEC 60947-1 Class II-B.
- Temporary starting or overload operation greater than 2x rated motor current I_s :
 - Responsiveness in the overload range of $> 2x$ rated motor current is reduced to reduce false tripping.
 - Residual currents of $> 1/2 * I_{trip\ level} / I_s * I_{max}$ (of the effective motor current) are detected.

NOTICE

False tripping in the case of internal ground-fault monitoring

False tripping can occur if you use internal earth-fault monitoring for star-delta circuits. During delta operation, the residual current is non-zero due to harmonics.

Trip level activity, warning level

Unless deactivated, this function is always active, independent of whether the motor is running or not (operating state "ON").

Here you can specify in which motor operating states the trip level / warning level will be active:

- Always (on): Trip level / warning level is always active, regardless of whether the motor is running or at a standstill
- If motor is running, except TPF (run): Trip level / warning level is only active when the motor is running
- If motor is running, except with TPF, with startup override (run+): Trip level / warning level is only active when the motor is running and starting has been completed

Response to trip level

Signaling, tripping

Delay

Setting range: 0 - 25.5 s (**0.5 s**)

Response to warning level

Disabled, signaling, warning

Delay

Setting range: 0 - 25.5 s (**0.1 s**)

9.1.3 External Earth Fault Monitoring

External Earth Fault Monitoring

External Earth-fault Monitoring via a residual current transformer and an Earth-fault Module is normally used in the following cases:

- Where networks with high impedance are grounded
- Where precise measurement of the earth-fault current is necessary, e.g. for the purpose of condition monitoring.

Rated Fault Currents of 0.3 A / 0.5 A / 1 A are evaluated by the 3UL22 residual current transformer. The response delay of the residual current transformer is 300 ms - 500 ms. This response delay can be further delayed by parameterizing SIMOCODE pro accordingly.

With 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 mA.

Principle of operation:

The main conductors and, if present, the neutral conductor to which the load is connected, are routed through the opening of the 3UL23 residual current transformer. Its secondary winding is connected to the earth-fault module. If an insulation fault occurs, for example, a residual current is created between the inflowing and outflowing currents, and this is evaluated by the earth-fault module.

Settings in the device configuration:

Select here whether the external earth-fault monitoring is to be used via a residual current transformer and earth-fault module.

9.1 Earth Fault

If yes, select:

- The 3UF7500 earth-fault module (in conjunction with the 3UL22 residual current transformer) or
- The 3UF7510 earth-fault module (in conjunction with the 3UL23 residual current transformer)
- The multifunction module (only with SIMOCODE pro S basic unit in conjunction with the 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.

Note

- The 3UL23 residual current transformer is suitable for detecting pure AC fault currents and AC fault currents with a pulsating direct-current component.
 - Requirement for the use of a 3UF7510 earth-fault module:
Use of this earth-fault module requires a SIMOCODE pro V basic unit with at least product version *E10* (from 09/2013).
 - Requirement for the use of a 3UF7500 earth-fault module:
Use of this earth-fault module requires a SIMOCODE pro V basic unit with at least product version *E02* (from 04/2005).
-

Note

Open-circuit voltage may result in death, serious injury or material damage!

The current transformer output is a constant current power supply. In accordance with $U = R \cdot I$, the output voltage increases with an increasing resistance. If the connecting terminals of the current transformer are open, the output voltage may become high enough for you to put your life at risk or permanently damage the current transformer.

Avoid operating the unit when open. Operating a network for monitoring safely and without faults requires that the monitoring relay and the 3UL23 residual current transformer have been installed completely. It is absolutely necessary to short-circuit previously installed 3UL23 residual current transformers when the units are not connected to a monitoring relay.

Note

No personnel protection or fire protection!

The 3UF75* earth-fault modules monitor devices and systems for correct functioning. They are not suitable for personnel protection or protection against fire.

A definable and delayable response can be parameterized when an earth fault is detected. An event is generated if the Earth-fault limit is exceeded. You can set additional trippings via parameterization. If the rated fault currents are exceeded, SIMOCODE pro reacts by either:

- Turning off the contactor controls QE*
- By issuing a warning.

depending upon the configuration you have set.

Trip level (CiR), warning level (CiR)

You can parameterize two different response levels (trip level, warning level) for earth-fault current monitoring.

If the earth-fault current exceeds the set response level, the earth-fault monitoring function responds.

Trip level:	30 mA ... 40 A in 10 mA increments (default setting: 1000 mA)
Warning level:	20 mA ... 40 A in 10 mA increments (default setting: 500 mA)

Note

(CiR): Change in Running

The parameters followed by (CiR) can be changed when the motor is in operation.

Active status trip level, warning level

Unless deactivated, this function is always active, independent of whether the motor is running or not (operating state "ON").

Here you can specify in which motor operating states the trip level/warning level is to be active.

always (on)	trip level/warning level always active, regardless of whether the motor is running or at a standstill
if motor is running, except TPF (run)	trip level/warning level only active if motor running.
if motor is running, except TPF, with startup override (run+)	trip level/warning level only active if motor running and start procedure completed.

Response at trip level

Here you can set how SIMOCODE pro should respond if the trip level is undershot.

Response	Trip level
Signaling	X
Warning	-
Tripping	X
Delay	0 - 25.5 s ¹⁾
Preset	0.5 s

¹⁾ Additional delay of the residual current transformer delay.

Response at warning level

Here you can set how SIMOCODE pro should respond if the warning level is undershot.

Response	Warning level
Disabled	X
Signaling	X
Warning	X
Tripping	-
Delay	0 - 25.5 s ¹⁾
Preset	0.1 s

¹⁾ Additional delay of the residual current transformer delay

Hysteresis

Here you can set the hysteresis for the earth-fault current:

Hysteresis earth-fault current	0 - 15% of the level value in 1% increments
Preset	5 %

Response at sensor fault

Here you can set how SIMOCODE pro should respond to a sensor fault:

Response	Sensor fault
Disabled	X
Signaling	X
Warning	X
Tripping	-

9.2 Current Limits

9.2.1 Current Limits

Current Limits

Current limit monitoring is used for process monitoring, independent of overload.

SIMOCODE pro supports two-phase monitoring of the motor current for freely-selectable upper and lower current limits.

The response of SIMOCODE pro when an pre-warning or trip level has been reached can be freely parameterized and delayed.

Motor current measurement is carried out via current measuring modules or current/voltage measuring modules.

Hysteresis

Here you can set the hysteresis for the current limits:

Range	0 to 15 % of the threshold value in 1% increments
Preset	5 %

9.2.2 I> (upper limit)

Trip level (CiR), warning level (CiR)

When monitoring Current Limits I> (upper limit), 2 different response levels, I> (upper limit) trip level and I> (upper limit) warning level, can be parameterized and monitored. If the current of one or more phases exceeds the response level, Current Limits monitoring is activated.

Trip level	0 to 1020 % of I _s in 4 % increments
Warning level	0 to 1020 % of I _s in 4 % increments

Response, Delay (CiR) at trip level

Here you can set:

- how SIMOCODE pro should respond when the trip level is overshoot
- the delay time.

Response	Trip level
Disabled	X
Signaling	X
Warning	-
Tripping	X
Delay	0 to 25.5 s
Preset	0.5 s

Response, Delay (CiR) at warning level

Here you can set:

- how SIMOCODE pro should respond when the warning level is overshoot
- the delay time.

Response	Warning level
Disabled	X
Signaling	X
Warning	X
Tripping	-
Delay	0 to 25.5 s
Preset	0.5 s

9.2.3 $I <$ (lower limit)

Trip level (CiR), warning level (CiR)

When monitoring Current Limits $I <$ (lower limit), two different response levels (trip level/warning level) can be parameterized and monitored. Current Limit monitoring is activated if the current of the phases (I_{\max}) drops below the response level.

Trip level	0 to 1020 % of I_s in 4 % increments
Warning level	0 to 1020 % of I_s in 4 % increments

Response, Delay (CiR) at trip level

Here you can set:

- how SIMOCODE pro should respond when the trip level is undershot
- the delay time.

Response	Trip level
Disabled	X
Signaling	X
Warning	-
Tripping	X
Delay	0 to 25.5 s
Preset	0.5 s

Response, Delay (CiR) at warning level

Here you can set:

- how SIMOCODE pro should respond when the warning level is undershot
- the delay time.

Response	Warning level
Disabled	X
Signaling	X
Warning	X
Tripping	-
Delay	0 to 25.5 s
Preset	0.5 s

9.3 Voltage $U_{<}$ (lower limit)

Monitoring voltage $U_{<}$ (lower limit)

SIMOCODE pro supports two-phase undervoltage monitoring of either a three-phase network or a one-phase network for freely selectable limits. The response of SIMOCODE on reaching a pre-warning level or trip level can be freely parameterized and delayed. Voltage is measured by current/Voltage measuring modules. This is based on the minimal voltage of all voltages U_{\min} .

Note

Please note that only phase voltage is available with SIMOCODE pro V basic units up to version *E06*. If required, the line-to-line voltage can be calculated from the phase voltage with the aid of the logic module "Calculator 1/2" as follows: Line-to-line voltage = phase voltage * 1.73.

From version *E07* onwards, either phase voltage or line-to-line voltage can be used.

Furthermore, even when the motor is switched off, SIMOCODE pro can determine and signal the further availability of the feeder by measuring the voltage directly at the circuit breaker or at the fuses in the main circuit.

Trip level (CiR), Warning level (CiR)

You can parameterize two different response levels (trip level/warning level). Voltage monitoring will be activated if the voltage of one or more phases falls below the response level or warning level.

Trip level	0 to 2040 V in 8 V increments
Warning level	0 to 2040 V in 8 V increments

Trip level and warning level activity

Here you can specify in which motor operating states the trip level/warning level is to take effect:

Always, except in the case of TPF (on+)	Trip level/warning level always takes effect, regardless of whether the motor is running or stationary; Exception: "TPF", i.e. motor feeder is in test position.
When the motor is on, except in the case of TPF (run)	Trip level/warning level only takes effect if the motor is on and not in the test position
Always (on) ¹⁾	Trip Level/warning level always takes effect, regardless of whether the motor is running or at a standstill

¹⁾ When using Basic Unit 2 (from product version *E03*) with a current/voltage measuring module

Response, Delay (CiR) at trip level

Here you can set:

- how SIMOCODE pro should respond when the trip level is undershot
- the delay time.

Response	Trip level
Disabled	X
Signaling	X
Warning	-
Tripping	X
Delay	0 to 25.5 s
Preset	0.5 s

Response, Delay (CiR) at warning level

Here you can set:

- how SIMOCODE pro should respond when the trip level is undershot
- the delay time.

Response	Warning level
Disabled	X
Signaling	X
Warning	X
Tripping	-
Delay	0 to 25.5 s
Preset	0.5 s

Hysteresis for voltage, cos-phi, power

The hysteresis for voltage, cos phi and power can be set here:

Range 0 to 15 % of the threshold value in 1 % increments (5 %)

9.4 Cos-Phi< (lower limit)

Cos-Phi< (lower limit)

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 fluctuates more than either the motor current or the active power does, particularly in the low-end performance area of a motor. Therefore, power factor monitoring is particularly suitable for distinguishing between non-load operation and faults, e.g. a broken drive belt or a drive shaft. If the set Trip Level or Warning Level is undershot, a signal is generated of the motor is switched off, depending upon the setting.

Trip Level (CiR), Warning Level (CiR)

You can parameterize 2 different response levels (Trip Level/Warning Level) for power factor (cos phi) monitoring.

Trip Level:	0 to 100 % of I_s
Warning Level:	0 to 100 % of I_s

Trip Level and Warning Level activity

The Trip Level/Warning Level is only effective when the motor is running, the start-up procedure has been completed and there is no Test Position Feedback (TPF) (run+).

Response at Trip Level

Here you can set how SIMOCODE pro should respond if the set Trip Level is undershot:

Response	Trip level
Disabled	X
Signaling	X
Warning	-
Tripping	X
Range	0 to 25.5 s
Preset	0.5 s

Response at Warning Level

Here you can set how SIMOCODE pro should respond if the set Warning Level is undershot:

Response	Warning level
Disabled	X
Signaling	X
Warning	X
Tripping	-
Range	0 to 25.5 s
Preset	0.5 s

9.5 Active Power

9.5.1 Active Power

Active Power

SIMOCODE pro can indirectly monitor the state of a device or system via the Active Power. For example, by monitoring the Active Power of a pump motor, conclusions can be drawn from the Active Power level about the flow rate or fluid fill levels. The active power curve of a motor is a precise reflection of its actual load across the entire range. Excess load results in increased wear of the motor and, thus, may lead to premature motor failure. Insufficient active power can, for example, be a sign of non-load motor operation.

SIMOCODE pro supports 2-phase monitoring of the Active Power for freely-selectable upper and lower current limits. The response of SIMOCODE pro when a pre-warning or trip Level has been reached can be freely parameterized and delayed.

Active Power is measured via current/voltage measuring modules.

Trip level (CiR), Warning level (CiR)

With Active Power Monitoring, you can parameterize two different Response Levels (trip level/warning level) for the upper and lower limit.

Trip level:

- $P >$ (upper limit) 0 to 4294967.295 kW
- $P <$ (lower limit)

Warning Level

- P> (upper limit) 0 to 4294967.295 kW
- P< (lower limit)

Trip level and warning level activity

The trip level/warning level is only effective when the motor is running, the start-up procedure has been completed and there is no Test Position Feedback (TPF) (run+).

Response, Delay (CiR) at trip level:

Here you can set:

- how SIMOCODE pro should respond if the set Trip Level is either undershot or overshoot
- the delay time.

Response	Trip level
Disabled	X
Signaling	X
Warning	-
Tripping	X
Delay	0 to 25.5 s
Preset	0.5 s

Response, Delay (CiR) at warning level

Here you can set:

- how SIMOCODE pro should respond if the set warning level is overshoot
- the delay time.

Response	Warning level
Disabled	X
Signaling	X
Warning	-
Tripping	-
Delay	0 to 25.5 s
Preset	0.5 s

9.5.2 P> (upper limit)

Monitoring Active Power P> (upper limit)

SIMOCODE pro can indirectly monitor the state of a device or system via the Active Power. For example, by monitoring the Active Power of a pump motor, conclusions can be drawn from the Active Power level about the flow rate or fluid fill levels. The active power curve of a motor is a precise reflection of its actual load across the entire range. Excess load results in increased wear of the motor and, thus, may lead to premature motor failure.

SIMOCODE pro supports 2-phase monitoring of the Active Power for freely-selectable upper current limits. The response of SIMOCODE pro when a pre-warning or trip Level has been reached can be freely parameterized and delayed.

Active Power is measured via current/voltage measuring modules.

Trip level (CiR), warning level (CiR)

With Active Power Monitoring, you can parameterize two different response levels (trip level/warning level) for the upper limit:

- Trip level: 0 to 4294967.295 kW
- Warning level: 0 to 4294967.295 kW.

Trip level and warning level activity

The trip level/warning level is only effective when the motor is running, the start-up procedure has been completed and there is no Test Position Feedback (TPF) (run+).

Response, Delay (CiR) at trip level

Here you can set:

- how SIMOCODE pro should respond if the set trip level is overshoot
- the delay time.

Response	Trip level
Disabled	X
Signaling	X
Warning	-
Tripping	X
Delay	0 to 25.5 s
Preset	0.5 s

Response, Delay (CiR) at warning level

Here you can set:

- how SIMOCODE pro should respond if the set warning level is overshoot
- the delay time.

Response	Warning level
Disabled	X
Signaling	X
Warning	—
Tripping	-
Delay	0 to 25.5 s
Preset	0.5 s

9.5.3 P< (lower limit)**Monitoring Active Power P< (lower limit)**

SIMOCODE pro can indirectly monitor the state of a device or system via the Active Power. For example, by monitoring the Active Power of a pump motor, conclusions can be drawn from the Active Power level about the flow rate or fluid fill levels. The active power curve of a motor is a precise reflection of its actual load across the entire range. Insufficient active power can, for example, be a sign of non-load motor operation.

SIMOCODE pro supports 2-phase monitoring of the Active Power for freely-selectable lower current limits. The response of SIMOCODE pro when a pre-warning or trip level has been reached can be freely parameterized and delayed.

Active Power is measured via current/voltage measuring modules.

Trip level (CiR), warning level (CiR)

With Active Power Monitoring, you can parameterize two different Response Levels (trip level/warning level) for the lower limit.

- Trip level: 0 - 4294967.295 kW
- Warning level: 0 - 4294967.295 kW.

Trip level and warning level activity

The trip level/warning level is only effective when the motor is running, the start-up procedure has been completed and there is no Test Position Feedback (TPF) (run+).

Response, Delay (CiR) at trip level

Here you can set:

- how SIMOCODE pro should respond if the set trip level is undershot
- the delay time.

Response	Trip level
Disabled	X
Signaling	X
Warning	-
Tripping	X
Delay	0 to 25.5 s
Preset	0.5 s

Response, Delay (CiR) at warning level

Here you can set:

- how SIMOCODE pro should respond if the set warning level is undershot
- the delay time.

Response	Warning level
Disabled	X
Signaling	X
Warning	X
Tripping	-
Delay	0 to 25.5 s
Preset	0.5 s

9.6 0-20 mA - 4-20 mA

9.6.1 0-20 mA - 4-20 mA

Monitoring 0/4-20 mA

SIMOCODE pro supports two-phase monitoring of the analog signals of a transducer standard 0/4-20 mA output signal. The analog signals are fed to the "0/4-20mA" function block via the Analog Module:

Trip Level (CiR), Warning Level (CiR)

With 0/4-20 mA Monitoring, you can parameterize two different response levels (Trip Level/Warning Level) for the upper and lower limit:

Trip level: 0 - 23,6 mA

- 0/4-20> (upper limit)
- 0/4-20< (lower limit)

Warning level: 0 - 23,6 mA

- 0/4-20> (upper limit)
- 0/4-20< (lower limit)

Activity Trip Level, Warning Level

Here you can specify in which motor operating states the Trip Level/Warning Level is to take effect:

- **Always (on)** Trip Level/Warning Level always takes effect, regardless of whether the motor is running or stationary
- **Always, except in the case of TPF (on+)** Trip Level/Warning Level always takes effect, regardless of whether the motor is running or stationary with the exception of "TPF", i.e. motor feeder is in test position
- **When the motor is on, except in the case of TPF (run)** Trip Level/Warning Level only takes effect if the motor is on and not in the test position
- **When the motor is on, except in the case of TPF, with start hiding (run+)** The Trip Level/Warning Level only takes effect if the motor is running and the start-up procedure is finished, and there is no test position feedback (TPF)

Response, Delay (CiR) at Trip Level

Here you can set:

- how SIMOCODE pro should respond if the set Trip Level is either undershot or overshoot
- the delay time.

Response	Trip level
Disabled	X
Signaling	X
Warning	-
Tripping	X
Delay	0 to 25.5 s
Preset	0.5 s

Response, Delay (CiR) at Warning Level

Here you can set:

- how SIMOCODE pro should respond if the set Warning Level is either undershot or overshoot
- the delay time.

Response	Warning level
Disabled	X
Signaling	X
Warning	X
Tripping	-
Delay	0 to 25.5 s
Preset	0.5 s

Marking

The marking is stored in the device and allocated and displayed in the Faults/Warnings online dialog. Optional marking for designating the signal, e.g. "0/4-20>"; range: up to 10 characters.

Hysteresis for 0/4-20 mA

Here you can set the fluctuation range for the analog signal:

Hysteresis for the analog signal	0 to 15 % in 1% increments
Preset	5 %

Note

Monitoring of a second process variable via Input 2 of the Analog Module can be done, for example, by free limit monitors.

9.7 Operating Hours Monitoring

9.7.1 Operating Hours Monitoring

Operating Hours Monitoring

To avoid plant downtimes due to failed motors caused by excessive run or stop times, SIMOCODE pro can monitor the operating hours and stop times of a motor and limit the number of motor starts in a defined time frame.

If an adjustable limit value is exceeded, a signal of warning can be generated that indicates maintenance or replacement of the motor in question is required. After replacing the motor, the operating hours and motor stop times can be reset.

To avoid excessive thermal strain and premature aging of a motor, the number of motor starts in a selectable time frame can be limited. The number of starts still possible will be available for further processing in SIMOCODE pro.

A low number of possible starts can be indicated by pre-warnings.

Note

Operating hours, plant downtimes and the number of motor starts can be monitored completely in the device and/or transmitted to the automation system via PROFINET.

9.7.2 Motor Operating Hours Monitoring

Motor 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.

Level (CiR)

If the operating hours exceed the set Response Level, the Monitoring function will be activated.

Level 0 to 1193046 hours

Response

You can set the response for overshoot here:

Response	Level
Disabled	X
Signaling	X
Warning	X
Tripping	-

9.7.3 Motor Stop Time Monitoring

Motor Stop Time Monitoring

System parts for important processes often have dual drives (A and B drives). Ensure that these are always operated alternately. This prevents long Motor Stop Times and reduces the risk of non-availability. The motor stop time monitoring function can be used, for example, to generate an alarm, thus initiating connection of the motor.

Level (CiR)

The length of the permissible motor stop time is stipulated here, if exceeded, monitoring will begin.

Level 0 to 65535 hours

Activity

Unless deactivated, this function is always active, independent of whether the motor is running or not (operating state "on").

Response

Here you can determine the response for when the Permissible Motor Stop Time is exceeded:

Response	Level
Disabled	X
Signaling	X
Warning	X
Tripping	-

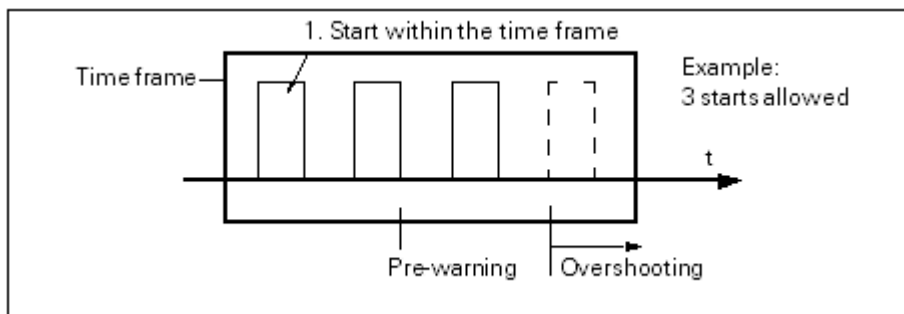
9.7.4 Motor Start Limitation

Motor Start Limitation

Motor Start Limitation can protect system parts (motor, 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.

Schematic

The following schematic illustrates the principle of Motor Start Limitation:



Permissible Starts (CiR)

The maximum Number of Starts is set here. The time interval "Time Range for starts" commences to run after the first start. After the second to last permissible start has been executed, the "Just One Start Possible" prewarning is generated.

Permissible Starts: 1 - 255

Time Range for Starts (CiR)

The time range for permissible start processes is set here. The maximum number of starts is only available again after the parameterized time range for starts has expired. The number of available starts is shown by the analog value "Permissible Starts - Actual Value".

Time Range for Starts: 00:00:00 - 18:12:15 hh:mm:ss

Response at Overshoot

Here you can set the response for when the Number of Starts within the Time Range for Starts has been overshoot.

Response	Level
Disabled	X
Signaling	X
Warning	X
Tripping	X

Interlocking Time (CiR)

Interlocking Time: **0** - 65535

If a new start command is issued within the time range for starts after the last permissible start, this new start command will no longer be executed if the setting "Response at Overshoot Tripping" has been set. "Trip - No. of Starts>" will be displayed and the set Interlocking Time activated.

9.8 Temperature

Temperature T> (Upper limit)

Temperature monitoring of, for example, motor windings, motor bearings, coolant and gearbox temperature, can be carried out via up to 3 analog temperature sensors such as NTC, KTY 83/84, Pt100, Pt1000. SIMOCODE pro supports 2-phase monitoring for overtemperature: Separate levels can be set for the warning temperature and the switch-off temperature.

Temperature Monitoring is based upon the highest temperature in all sensor measuring circuits of the Temperature Module.

Settings

Temperature	Description
Trip Level T> (CiR)	-273°C to 65262°C (Preset: -273°C)
Response at Trip level T>	Set response when the temperature is overshoot (see the following table "response")
Marking: Trip Level T>	No parameters. Optional marking for designation of the signal, e.g. "Temperature>". Range: up to 10 characters
Warning Level T> (CiR)	-273°C to 65262°C (Preset: -273°C)

Temperature	Description
Response Warning Level T>	Set response when the temperature is overshoot (see the following table "response")
Marking Warning Level T>	No parameters. Optional marking for designating the signal, e.g. "Temperature >". Range: up to 10 characters
Hysteresis	0 to 255°C in 1°C increments (preset: 5°C)

Trip level and warning level activity

The trip level/warning level always takes effect, independent of whether the motor is running or not (operating status "ON").

Response

Overtemperature: Here you can select how SIMOCODE pro should respond when the temperature has overshoot the warning level/trip level.

Response	Trip level T>	Warning level T>
Disabled	-	X
Signaling	X	X
Warning	-	X
Tripping	X	-

Note

With motors for EEx e applications, the response must remain set to "Tripping"!

Note

The sensor type, the number of measuring circuits in use and the response to a sensor fault must be set in the Temperature Module Inputs (TM Inputs) function block if temperature monitoring is being used.

Note

To monitor several sensor measuring circuits individually and independently, a suitable number of free Limit Monitors can be linked to the Temperature Module Inputs function block and differing limits set for the individual temperature sensors.

9.9 Monitoring - Interval for Mandatory Testing

Monitoring - Interval for Mandatory Testing

Function for monitoring the interval between the connection and the tripping of the enabling circuit (actuator tripping). The monitoring time starts anew, every time the enabling circuit closes.

This function supports you in complying with test intervals that require verification.

In the enabling circuit of the DM-F Local and the DM-F PROFIsafe, relay contacts carry out safety-oriented tripping. Whether the relay contacts of the enabling circuit really open or not, can only be established via a change in the switching state of the contacts.

The "Monitoring - interval for mandatory testing" function supports the system operator in the monitoring of the time that has elapsed since the last connection of the enabling circuit.

When the adjustable limit has been reached, the set reaction follows (deactivated, send, warning; see response). This is logged in the event memory.

This monitoring function is an organizational measure that supports the system operator in detecting faults by carrying out regular testing. It is comparable with the notes in the operating instructions for regularly testing of the function of a safety device. Die The monitoring function itself need not be safety-oriented.

Response "Monitoring - interval for mandatory testing"

Here you can determine the response when the set limit value is reached:

Response	Monitoring - interval for mandatory testing
Disabled	X
Signaling	X
Warning	X
Tripping	-

Test interval (CiR)

Adjustable limit value for interval for mandatory testing: **0** - 255 weeks.

Inputs

10.1 Digital Inputs

Digital Inputs

Basic Unit - Inputs

SIMOCODE pro has a BU Inputs function block with four binary inputs with common potential. You can connect e.g. the buttons for a Local Control Station to the Inputs. These signals can be used for further processing in SIMOCODE pro by internally connecting the sockets of the BU Inputs function block.

The BU Inputs function block consists of:

- Input Terminals located on the outside of the Basic Unit, corresponding to the sockets "BU Input 1" to "BU Input 4".
- Sockets in SIMOCODE pro that can be connected to any plugs, e.g. to the Control Stations function block.
- A socket for the "TEST/RESET" button: The function of the "TEST/RESET" button is generally dependent upon the operating status of the device.
- Reset function for the acknowledgement of any pending faults.
- Test function for carrying out device tests.

In addition, other functions can be assigned to the "TEST/RESET" button (e.g. operation of the memory module and the addressing plug).

Application examples

The inputs can be used, for example, for connecting the start and stop buttons of the Local Control Station, which can then be assigned to the Local-Control Station function block. If assigned accordingly, the input signals can also be used to activate function blocks such as "RESET" or "External Fault".

Basic Unit - delay time inputs

You can set a delay time for the inputs, if required.

Digital Module Inputs

SIMOCODE pro has two DM Inputs function blocks, each with four grouped binary inputs with common potential. You can connect e.g. the buttons for a Local Control Station to the inputs. These signals can be further processed in SIMOCODE pro by internally wiring the sockets of the DM Inputs function blocks.

Note

The DM Inputs function blocks can only be used if the respective Digital Module (DM) is connected and configured in the device configuration!

Note

When using the DM-F Local and DM-F PROFIsafe failsafe digital modules, the input signals can be used as non-safety-oriented information.

Each DM Inputs function block consists of:

- Input terminals located on the outside of the Digital Module, corresponding to the sockets DM Input 1 to DM Input 4.
- Sockets in SIMOCODE pro that can be connected to any plugs, e.g. to the Control Stations function block.

1 DM1 inputs function block and 1 DM2 inputs function block are available for the SIMOCODE pro V PN basic units.

Application examples

Digital Modules allow the number of binary inputs and outputs on Basic Unit 2 to be increased in increments. SIMOCODE pro V can thus be extended to a maximum of twelve Binary Inputs and seven Binary Outputs. By allocating accordingly, input signals can be used to activate, for example, function blocks such as "Reset" or "External Fault".

Digital Module - delay time inputs

If necessary, you can set a delay time for the inputs. Range: 6, 16, 26, 36 ms.
These values are valid for digital modules with a 24 V DC input supply.
For digital modules with a 110 to 240 V AC/DC input supply, the values are about 40 ms higher.

Note

The delay times of the digital module inputs can only be set and/or are only relevant when "monostable" or "bistable" is set for digital module 1.

The delay time cannot be set if digital module 1 is a DM-F PROFIsafe.

If digital module 1 is a DM-F Local, the delay times can be set using the DIP switches on the front of the DM-F Local.

10.2 Analog Module Inputs

Analog Module Inputs

SIMOCODE pro has 2 AM Inputs function blocks (AM1 Inputs and AM2 Inputs) (AM2 inputs only in connection with SIMOCODE pro V PN basic unit) with two analog sockets, corresponding to the 2 analog inputs of the Analog Module. The effective analog value of each input can be read from these sockets and processed internally.

An additional binary socket of the function block represents the status of the sensor measuring circuits. The analog values can be processed internally and/or transmitted cyclically to the automation system via the Cyclic Send function blocks.

Note

The AM1/AM2 Inputs function blocks can only be used if the corresponding analog modules (AM1 and/or AM2) have been connected and configured in the device configuration!

Application examples

Typical applications are e.g.:

- Fill-level monitoring for implementing dry running protection for pumps.
- Monitoring of pollution in a filter using a differential pressure transducer.

Settings Analog Module - Inputs**Settings Analog Module - Inputs**

Input Signal	0-20 mA, 4-20 mA
Response at Open Circuit	Signaling, Warning , Tripping
Active Inputs	1 Input, 2 Inputs

Note

The value of the Analog Module Inputs is in S7 format.

Note

The Inputs of the Analog Module are passive inputs i.e. to configure an Analog Input Circuit, each Input will require an additional potential-free external current source connected in series. If the Output of the Analog Module is not being used by another application, it can be used as current source for an Input Circuit of the Analog Module. The "Start Value of Value Range" and the "End Value of Value Range" of the Analog Module Output have to be set to 65535 for this. Thus, the maximum possible current will always be available via the Analog Module Output.

10.3 Temperature Module Inputs

Temperature Module Inputs

SIMOCODE pro has two TM Inputs function blocks (TM1 Inputs and TM2 Inputs) (TM2 inputs only in connection with SIMOCODE pro V PN basic unit) with three analog sockets corresponding to the three sensor measuring circuits of the Temperature Module. The temperature (in K) of the three measuring circuits can be read from these sockets and processed internally. An additional analog socket always supplies the maximum temperature of all three measured temperatures. Furthermore, the two binary sockets of the function block represent the status of the sensor measuring circuits. The temperatures can be processed internally and/or transmitted to the automation system via the Cyclic Send function block.

Note

The TM1/TM2 Inputs function blocks can only be used if the corresponding temperature modules (TM1 and/or TM2) have been connected and configured in the device configuration!

Notes on wiring:

You can connect up to three 2-wire or 3-wire temperature sensors.

Application examples

Among other things, you can monitor the following motor components:

- Motor windings
- Motor bearings
- Motor coolant temperature
- Motor gearbox oil temperature.

The individual temperatures of the three sensor measuring circuits can be monitored independently of each other by connecting free Limit Monitors.

Settings Temperature Module Inputs

Sensor Type	PT100, PT1000, KTY83, KTY84, NTC
Response at sensor fault/out of range	Disabled, Signaling, Warning , Tripping
Number of active sensors	1 sensor, 2 sensors, 3 sensors

10.4 Cyclic Receive**Cyclic Receive**

With the Cyclic Receive function block, you can specify which cyclic data from the automation system will be further processed via PROFINET in SIMOCODE pro. These will normally be PLC/PCS binary control commands. Connection with the Control Stations function block in SIMOCODE pro will allow the motor to be controllable via PROFINET. Direct connection of the analog value with the AM Output function block will result in, for example, the cyclic output of the value sent via PROFINET at the output of the Analog Module.

The "Cyclic receive" function blocks consist of:

- Eight bits each (byte 0 and byte 1 for binary information)
- One word (= two bytes, byte 2 to 3 for an analog value, freely programmable) for basic type 1.

A total of three "Cyclic receive" function blocks (0, 1, 2/3) are provided.

PROFINET:

The Cyclic Send data are exchanged between the IO Device (SIMOCODE pro) and the IO Controller (automation system). The IO Controller sends the Cyclic Receive data to SIMOCODE pro in each case. In response, SIMOCODE pro returns the Cyclic Send data.

10.5 Ethernet - OPC-UA Receive

Ethernet - OPC-UA Receive

In addition to "Cyclic Receive" it is possible to transfer further data to SIMOCODE pro via OPC UA.

With the "OPC UA Receive" function blocks (only in connection with SIMOCODE pro V PN basic unit), you can specify which information will be further processed in SIMOCODE pro. For this, you only have to connect the sockets of the "OPC-UA Receive" function blocks to any other function blocks in SIMOCODE pro.

Outputs

11.1 Basis Unit Outputs

Basis Unit Outputs

SIMOCODE pro has a BU Outputs function block with there relay outputs. You can e.g. switch, contactors or lamps via these Relay Outputs. For this, the inputs (plugs) of the function block must be connected to the respective sockets (usually the QE. Contactor controls of the control function).

The BU Outputs function block consists of:

- 3 plugs, corresponding to the Basic Unit outputs 1 to 3
- 3 relays
- Output terminals.

Application examples

- Control of the main Contactor in the motor feeder:
You can e.g. define which relay output is used for controlling the motor contactor in the motor feeder. For this connect the desired relay output to the respective "QE" contactor control of the control function.
- Lamp control for displaying operating states:
You can e.g. define which relay outputs are to be used for controlling the lamps/LEDs displaying operating states of the motor (FAULT, ON, OFF, FAST, SLOW...).
For this, connect the desired relay output to the respective "QE..." contactor control of the control function. The following are specially intended for controlling lamps and LED.

In addition to the status displays, the "QL..." lamp controls automatically signal via a 2 Hz flash frequency.

- Test mode (QLE.../QLA lamp outputs are flashing)
- Unacknowledged fault (lamp output general fault QLS is flashing)
- Transfer of any other information, status information, warnings, faults etc. to the relay outputs
- Lamp test: all QL outputs are activated for approx. 2 s.

In most cases, the outputs of the Basic Unit will be connected to the QE or QL outputs.

Settings Basic Unit Outputs 1 to 3

Control of the BU Outputs function block via any signal (any sockets, e.g. device inputs, control bits from PROFINET, etc. usually from the QE contactor controls).

11.2 Operator Panel LEDs

Operator Panel LEDs

SIMOCODE pro has an OP - LED function block for controlling the seven freely-assignable LEDs. The LEDs are in the Operator Panel and can be used to display any status. For this, the inputs (plugs) of the OP - LED function block must be connected to the respective sockets (e.g. to the sockets for the status information of the control function).

Note

The OP - LED function block can only be used if the Operator Panel (OP) is connected and configured in the device configuration!

The OP-LED function block consists of:

- 4 plugs, "OP LED Green 1" to "OP LED Green 4", corresponding to the green LEDs. The green LEDs are optically/constructionally allocated to the buttons on the Operator Panel. They will normally display feedback concerning the motor operating state.
- 3 plugs, "OP LED Yellow 1" to "OP LED Yellow 3", corresponding to the yellow LEDs.
- 4 green LEDs.
- 3 yellow LEDs (not for Operator Panel with Display (OPD)).

Overall, there is 1 OP LED function block for BU1 and BU2.

Note

The three yellow LEDs mentioned in this section are not available for the operator panel with display. Status information can be read out here directly via the display. While it is still possible to connect the corresponding three plugs via the software, they remain nonfunctional.

Application examples

- Display of operating states:
You can e.g. define which LEDs are to be used for displaying the operating states (FAULT, ON, OFF, FAST, SLOW).
For this, connect the desired LED to the respective "QL" Lamp Control of the control function.
In many cases, the LEDs are connected to the QL Outputs.
- Transfer of any other information, status information, warnings, faults, etc. to the yellow LEDs.

Settings Operator Panel LED

- Green 1 to Green 4: Control of the OP LED function block with any signal (any sockets, e.g. feedback concerning the "Motor" operating state).
- Yellow 1 to Yellow 3: Control of the OP LED function block with any signal (any sockets, e.g. displays for status, events, faults).

11.3 Digital Module 1 Outputs

Digital Module 1 Outputs

SIMOCODE pro has a DM1 Outputs function block, which is equipped with two Relay Outputs. You can e.g. switch contactors or lamps via these Relay Outputs. For this, the inputs (plugs of the DM1 Outputs function block) must be connected to the respective sockets (e.g. of the control function).

The DM1 Outputs function block has:

- 2 plugs, corresponding to the relay outputs Out1, Out2.
- 2 relays.
- Output terminals.

Note

In addition to the two jointly-switched failsafe enabling circuits, the failsafe DM-F Local and DM-F PROFIsafe digital modules are equipped with two standard relay outputs, the common root of which is switched off for safety reasons via an enabling circuit.

For the logical wiring, the standard relay outputs are always switched. The state of the failsafe enabling circuits is not affected by the logical wiring.

Application examples

- Controlling the motor contactor in the motor feeder:
You can e.g. define which relay output is used for controlling the motor contactor in the motor feeder. For this, connect the desired relay output to the respective "QE" contactor control of the control function.
- Lamp control for displaying operating states:
You can e.g. define which relay outputs are to be used for controlling the lamps/LEDs displaying operating states of the motor (FAULT, ON, OFF, FAST, SLOW...).
For this, connect the desired relay output to the respective "QE..." Lamp Control of the control function.
- Transfer of any other information, status information, warnings, faults, etc. to the relay outputs.

Settings Digital Module 1 Outputs

Control of the DM1 outputs function block with any signal (any sockets, e.g. device inputs, control bits from PROFINET, etc. usually from the QE contactor controls).

11.4 Digital Module 2 Outputs

Digital Module 2 Outputs

SIMOCODE pro has a DM2 Outputs function block, which is equipped with two Relay Outputs. You can e.g. switch contactors or lamps via these Relay Outputs. For this, the inputs (plugs of the DM2 Outputs function block) must be connected to the respective sockets (e.g. of the control function).

The DM2 Outputs function block has:

- 2 plugs, corresponding to the relay outputs Out1, Out2.
- 2 relays.
- Output terminals.

Note

In addition to the two jointly-switched failsafe enabling circuits, the failsafe DM-F Local and DM-F PROFIsafe digital modules are equipped with two standard relay outputs, the common root of which is switched off for safety reasons via an enabling circuit.

For the logical wiring, the standard relay outputs are always switched. The state of the failsafe enabling circuits is not affected by the logical wiring.

Application examples

- Controlling the motor contactor in the motor feeder:
You can e.g. define which relay output is used for controlling the motor contactor in the motor feeder. For this, connect the desired relay output to the respective "QE" contactor control of the control function.
- Lamp control for displaying operating states:
You can e.g. define which relay outputs are to be used for controlling the lamps/LEDs displaying operating states of the motor (FAULT, ON, OFF, FAST, SLOW...).
For this, connect the desired relay output to the respective "QE..." Lamp Control of the control function.
- Transfer of any other information, status information, warnings, faults, etc. to the relay outputs.

Settings Digital Module 2 Outputs

Control of the DM2 outputs function block with any signal (any sockets, e.g. device inputs, control bits from PROFINET, etc. usually from the QE contactor controls).

11.5 Analog Module Outputs

Analog Module Outputs

You can use analog modules 1 and 2 to expand basic unit 3 with one analog input each. The corresponding function blocks "AM1 Output" and "AM2 Output" (in conjunction with SIMOCODE pro V PN basic unit only) allow every analog value (2 bytes/1 word) in SIMOCODE pro to be output as a 0/4 A - 20 mA signal, for example, on a connected pointer instrument. By activating the function block via the "assigned analog output value" plug with any integer value between 0 and 65535, an equivalent analog signal of 0 to 20 mA or 4 to 20 mA will be sent to the output terminals of the Analog Module.

Note

The AM1 Output and AM2 Output function blocks can only be used if the respective analog module (AM) is connected and configured in the device configuration!

Settings Analog Module Outputs

Assigned analog output value	Any value (1 word/2 byte) in SIMOCODE pro
Output signal	0 - 20 mA , 4 - 20 mA
Start value of value range	0 - 65535
End value of value range	0 - 65535

Note

The outputs of the Analog Module are passive outputs. Thus, to configure an analog output circuit, each output will also require an isolated current source connected in series. If the output of the Analog Module is not being used by another application, it can also be used as current source for an Analog Module output circuit. The "start value of value range" and the "end value of value range" of the Analog Module output have to be set to 65535 for this. Thus, the maximum possible current will be available via the Analog Module output.

Application examples

- Output of the effective motor current - across the entire motor current range.
 The motor current of a motor ranges from 0 to 8 A.
 The rated current I_N of the motor at nominal load is 2 A.
 The parameterized set current I_s in Device Integration Manager corresponds to the rated current I_N (2 A). In SIMOCODE pro, representation of the effective phase currents or the maximum current (current IL_1 , IL_2 , IL_3 , max. current I_{max}) corresponds to the selected range as a percentage of the parameterized Set Current I_s :

- 0 A motor current corresponds to 0 % of I_s
- 8 A motor current corresponds to 400 % of I_s
- The smallest unit for the effective motor current in SIMOCODE pro is 1 %.

As a result,

- the "start value of value range (CiR)" to be selected is: 0
- the "end value of value range (CiR)" to be selected is: 400.

When the parameterized "output signal" = 0 - 20 mA:

- 0 % Motor Current corresponds to: 0 mA at the Analog Module Output
- 400 % Motor Current corresponds to: 20 mA at the Analog Module Output.

When the parameterized "Output Signal" = 4 - 20 mA:

- 0 % Motor Current corresponds to: 4 mA at the Analog Module Output
- 400 % Motor Current corresponds to: 20 mA at the Analog Module Output.

2. Output of the Effective Motor Current - only part of the motor current range (overload range).

The Motor Current of a motor ranges from 0 to 8 A.

The Rated Current I_N of the motor at nominal load is 2 A.

The parameterized Set Current I_s in Device Integration Manager corresponds to the Rated Current I_N (2 A). However, only the overload range (2 A - 8 A) is to be displayed on a pointer instrument via the Analog Module Output.

In SIMOCODE pro, representation of the effective phase currents or the maximum current (current IL_1 , IL_2 , IL_3 , max. current I_{max}) corresponds to the selected range as a percentage of the parameterized Set Current I_s :

- 0 A motor current corresponds to 0 % of I_s
- 8 A motor current corresponds to 400 % of I_s
- The smallest unit for the effective motor current in SIMOCODE pro is 1 %.

As a result,

- the "start value of value range (CiR)" to be selected is: 100
- the "end value of value range (CiR)" to be selected is: 400.

When the parameterized "output signal" = 0 - 20 mA:

- 100 % Motor Current corresponds to: 0 mA at the Analog Module Output
- 400 % Motor Current corresponds to: 20 mA at the Analog Module Output.

When the parameterized "Output Signal" = 4 - 20 mA:

- 100 % Motor Current corresponds to: 4 mA at the Analog Module Output
- 400 % Motor Current corresponds to: 20 mA at the Analog Module Output.

3. Output of any analog value from the automation system, cyclically via PROFINET.
1 word (2 byte) can be cyclically transmitted from the automation system to SIMOCODE pro via PROFINET. Any value can be output as a 0/4 to 20 mA signal by directly connecting this cyclic control word from PROFINET to the Analog Module Output. If the transmitted value is in S7 Format (0 to 27648) it must be taken into consideration when parameterizing:

As a result,

- the "start value of value range (CiR)" to be selected is: 0
- the "end value of value range (CiR)" to be selected is: 27648.

When the parameterized "output signal" = 0 - 20 mA:

- 0: 0 mA at the analog module output
- 27648: 20 mA at the analog module output.

When the parameterized "output signal" = 4 - 20 mA:

- 0: 4 mA at the Analog Module Output
- 27648: 20 mA at the Analog Module Output.

11.6 OPC-UA Send Data

11.6.1 OPC-UA Send Data

In this dialog you can connect each of the inputs (plugs) to a socket. To do so, choose the appropriate socket in the scroll boxes.

In addition to "Cyclic Send" it is possible to transfer a further 16 bits of binary information via OPC UA.

With the "OPC UA Send" function block, you can specify which information is to be transferred. The inputs (plugs) of the function blocks must be connected to the respective sockets

The OPC-UA Send function blocks consist of:

- 8 bits each (2 bytes, byte 0 and byte 1 for binary information).

Settings

OPC-UA Send Data	Description
Byte 0 - 1	Control of bits with any signals (any sockets, e.g., device inputs, Send Data, status information, events, etc.)
Bit 0 - Bit 7	

11.7 Cyclic Send Data

11.7.1 Cyclic Send Data

Cyclic Send Data

The Cyclic Send function blocks allow you to specify the information to be transferred to the automation system via PROFINET.

Cyclic Send function blocks consist of:

- 8 bits each (2 bytes, byte 0 and byte 1 for binary information).
- 9 words (= 18 bytes, byte 2 to 19 for nine analog values, freely parameterizable).

In total, there are available 5 Cyclic Send function blocks (0, 1, 2/3, 4/9, 10/19).

Settings

Byte 0 to 1	Bit 0 to bit 7	Basic types 1*, 2	Controls of the bits with any signals (any sockets, e.g. Device Inputs, Send Data, etc.).
Byte 2/3		Basic types 1*, 2	Control of 1 word (2 bytes) with any analog values (any sockets e.g. maximum current I _{max} , remaining cooling time, actual value of timers, etc.)
Byte 4/5, 6/7, 8/9		Basic type 1*	Control of 3 words (6 bytes) with any analog values (any sockets)

*) For Basic Unit SIMOCODE pro V only

Byte 0 of the signaling data is already preset. Byte 2/3 is preset with the max. current I_{max}!

Cyclic Services PROFINET

The Cyclic Send data are exchanged between the IO Device (SIMOCODE pro) and the IO Controller (automation system). The IO Controller sends the Cyclic Receive data to SIMOCODE pro in each case. In response, SIMOCODE pro returns the Cyclic Send data.

Cyclic Send Data	Description
Byte 0 to 1	Control of bits with any signals (any sockets, e.g. device inputs, Send Data, etc.).
Bit 0 to Bit 7	
Basic types 1*, 2, 3**	
Byte 2/3	Control of 1 word (2 bytes) with any analog value (any sockets, e.g., maximum current I _{max} , remaining cooling down period, actual value of timers, etc.)
Basic types 1*, 2, 3**	
Byte 4/5, 6/7, 8/9	Control of 3 words (6 bytes) with any analog values (any sockets)
Basic type 1*	
Byte 10/11, 12/13, 14/15, 16/17, 18/19	Control of 5 words (10 bytes) with any analog values (any sockets)
Basic type 3**	

*) For basic unit SIMOCODE pro V only

**) For basic unit SIMOCODE pro V PN only

Byte 0 of the send data is already preset. Byte 2/3 is preset with the max. current I_{max}!

11.7.2 Cyclic Send Data Byte 0

Cyclic Send Data Byte 0

Byte 0, Bit 0 to Bit 7, Basic types 1*, 2: Controls of the bits with any signals (any sockets, e.g. Device Inputs, Send Data, etc.).

*) For Basic Unit 2 only

11.7.3 Cyclic Send Data Byte 1

Cyclic Send Data Byte 1

Byte 1, Bit 0 to Bit 7, Basic types 1*, 2: Controls of the bits with any signals (any sockets, e.g. Device Inputs, Send Data, etc.).

*) For Basic Unit 2 only.

11.7.4 Cyclic Send Data Byte 2-3 (4-9)

Cyclic Send Data Byte 2-3 (4-9)

Byte 2/3 Basic types 1 *), 2: Control of 1 word (2 bytes) with any analog values (any sockets e.g. maximum current I_max, remaining cooling time, actual value of timers, etc.).

Byte 4/5, 6/7, 8/9 Basic type 1 *): Control of 3 words (6 bytes) with any analog values (any sockets).

*) For Basic Unit 2 only.

Note

Active power Pa signed and active power Pb signed (Inverted) for cyclic bytes (6-13) with float values is not supported with current / voltage measuring module V2 configured with SIMOCODE pro V PB 4.1.

Standard Functions

12.1 Test - Reset

12.1.1 Test - Reset

Test - Reset

The function of the "TEST/RESET" button on the Basic Unit is generally dependent upon the operating status of the device:

- Reset function: if a fault occurs
- Test function: in other operating states.

In addition to the TEST/RESET buttons, SIMOCODE pro allows internal Test/Reset tripping via the Test function block. The Test function block consists of 1 plug.

Overall, there are 2 Test 1 and Test 2 function blocks for BU1 and BU2, whereby each function block has a slightly different function:

- Test 1: When testing/tripping the output relays
- Test 2: Without tripping the output relays (normally for testing via the bus).

12.1.2 Test

Test

Carrying out testing

Testing can be carried out as following:

- Via the "TEST/RESET" button on the Basic Unit and on the Operator Panel (can be deactivated) as well as via PC with the Device Integration Manager.
- Via the plugs of the internal Test 1 or Test 2 function blocks.
- Via the menu of the Operator Panel with Display (e.g. the "commands" menu item).

Testing can be terminated at any time - it does not influence the thermal motor model/overload function, i.e. after switching off via TEST, the system can be reset immediately. Tripping only occurs for Test 1 when the operating mode is set to "Remote".

Test Function

A SIMOCODE pro function test can also be initialized via the test function. The test function comprises the following steps:

- Lamp/LED test (test function) < 2 s activated
- Testing the device functionality (Test Function activated for 2 s - 5 s)
- For the Test 1 function block only: switching off the QE (Test Function activated for > 5 s).

Test 1-2 - Input

Generally, the following applies to the acknowledgement of faults:

- Faults can be acknowledged
 - If the cause of the fault has been eliminated.
 - If there is no "ON" control command pending.
- A reset will not be possible if the cause of the fault has not been eliminated or if an "ON" control command is pending. The reset will be saved depending on the type of fault. Saving a reset is indicated by the "GEN. FAULT" LED on the Basic Unit and on the Operator Panel. The LEDs change from flashing to continuous signal.

Automatic acknowledgement of faults

Faults are automatically acknowledged in the following cases:

- A reset has been saved and the cause of the fault is no longer present (user has previously acknowledged the fault).
- Auto-reset of overload tripping or thermistor tripping if motor protection reset = Auto (acknowledgement is automatic following expiration of the cooling down period). The motor cannot start immediately since resetting is not possible if an ON command is pending.
- If a configured module fails, all related faults will be acknowledged automatically. However, a configuration fault will be generated (exception: Operator Panel, if parameterized accordingly). This ensures that a module fault does not cause the general fault to be acknowledged automatically.
- If a function or module is deactivated in the device configuration (via parameterization), all related faults are acknowledged automatically the motor cannot start immediately since parameters cannot be entered if an ON command is pending).
- If a function's parameter is changed from "Tripping" to "Warning", "Signaling" or "Deactivated", all related faults will be acknowledged automatically.
- For an external fault: with its own parameter: "Auto-Reset".

12.1.3 Reset

Reset

Carrying out Reset

Resetting can be carried out as follows:

- Via the "TEST/RESET" button on the Basic Unit and on the Operator Panel (can be deactivated) as well as via PC with the Device Integration Manager.
- Via the "Reset Input" plug of the internal function blocks via the plugs of the internal function blocks Reset 1, Reset 2 and Reset 3.
- Via the menu of the Operator Panel with Display (e.g. the "commands" menu item).

Reset 1-3 - Input

Control of the Reset function block from any signal (any sockets, e.g. device inputs, control bits from PROFINET, etc.)

Reset 1-3 - TEST/RESET button blocked

The blue TEST/RESET buttons on the Basic Unit and on the Operator Panel are intended for acknowledging faults and carrying out device tests.

The buttons can be locked via "TEST/RESET buttons blocked". These can then be used for other purposes. On the Operator Panel with Display, blocking is carried out via the menu (default: unblocked).

Acknowledgement of faults

Generally, the following applies to the acknowledgement of faults:

- Faults can be acknowledged:
 - If the cause of the fault has been eliminated.
 - If there is no "ON" control command pending.
- A reset will not be possible if the cause of the fault has not been eliminated or if an "ON" control command is pending. The reset will be saved depending on the type of fault. Saving a reset is indicated by the "GEN. FAULT" LED on the Basic Unit and on the Operator Panel. The LEDs change from flashing to continuous signal.

Automatic acknowledgement of faults

Faults are automatically acknowledged in the following cases:

- A reset has been saved and the cause of the fault is no longer present (user has previously acknowledged the fault).
- Auto-reset of overload tripping or thermistor tripping if motor protection reset = Auto (acknowledgement is automatic following expiration of the cooling down period). The motor cannot start immediately since resetting is not possible if an ON command is pending.

- If a configured module fails, all related faults will be acknowledged automatically. However, a configuration fault will be generated (exception: Operator Panel, if parameterized accordingly). This ensures that a module fault does not cause the general fault to be acknowledged automatically.
- If a function or module is deactivated in the device configuration (via parameterization), all related faults are acknowledged automatically the motor cannot start immediately since parameters cannot be entered if an ON command is pending).
- If a function's parameter is changed from "Tripping" to "Warning", "Signaling" or "Deactivated", all related faults will be acknowledged automatically.
- For an external fault: with its own parameter: "Auto-Reset".

12.2 Test Position Feedback

Test Position Feedback

You can carry out the "cold starting" function test using the Test Position Feedback (TPF) function block. For this purpose, the Input (plug) of the function block must be connected to the respective socket. The activated test position will be indicated by the flashing QL of the control function.

The Test Position Feedback (TPF) function block consists of:

- 1 plug.
- 1 "Status - Test Position" socket. This is set when a signal is issued at the Input.
- 1 "Test Position Feedback" socket. This is set when:
 - "TPF" is activated although current is flowing in the main circuit.
 - "TPF" is activated and current is flowing in the main circuit.

Overall, there is 1 Test Position Feedback function block for BU1 and BU2.

In this dialog you can:

- Connect the input (plug) with a socket. For this purpose, select the corresponding socket in the scroll boxes.
- Select the input logic (normally open contact / normally closed contact) in the "Type" scroll box.

Note

When the Test Position is enabled, the QLE/QLA sockets of the control function are controlled through blinking, e.g. to indicate test operation of the motor feeder via a blinking LED button.

Cold starting

If the motor feeder is in the test position, its main circuit will be isolated from the network. However, the control voltage will be connected.

The "cold starting" function test is carried out in this status. Cold starting means the motor feeder is tested without a current in the main circuit.

To differentiate this function from normal operation, it must be enabled via the socket on the function block.

Feedback stating that the motor feeder is isolated from the mains voltage can result, for example, via an auxiliary contact of the main switch in the motor feeder that is connected to any device input (terminal). This is then internally connected to the "Test Position Feedback (TPF) - Input" plug of the function block.

When using current/voltage measurement modules, this type of auxiliary contact is entirely unnecessary. The TPF function block can be activated by monitoring for undervoltage (voltage monitoring function block). If the current flows erroneously during test operation, the contactor outputs are switched off by "Fault - Test Position Feedback (TPF)".

"Trip - Test Position Feedback (TPF)" fault message and acknowledgement

Note

"Trip - Test Position Feedback (TPF)" will be generated if:

- "TPF" is activated, although current is flowing in the motor feeder
 - "TPF" is activated, and current is flowing in the motor feeder.
-

Settings Test Position Feedback

Input	Control of the "Test Position Feedback (TPF)" function block with any signal (any sockets, e.g. device input)
Type	Specification of the input logic: <ul style="list-style-type: none">• NO contact (1-active)• NC contact (0-active)

12.3 External Fault

12.3.1 External Faults

External Faults

The External Fault 1 - 6 function blocks can be used to monitor any statuses and/or external devices, to generate fault messages and, if necessary, to switch off the motor. To do this, the Inputs (plugs) of the External Fault function blocks must be connected to any sockets (e.g. device inputs, control bits from PROFINET, etc.). External faults can also be "marked" in SIMOCODE pro. This facilitates their allocation to the actual malfunction.

Example: Monitoring the rotational speed of the motor using an external rotational-speed monitor.

The External Fault function block consists of:

- 2 plugs (1 plug for setting, 1 plug for resetting)
- 1 "Event - External Fault" socket. This is set when a signal is pending at the Input.

Overall, there are:

- 4 External Faults 1 to 4 function blocks for BU1 (For SIMOCODE pro C and pro S.)
- 6 External Faults 1 to 6 function blocks for BU2 (For SIMOCODE pro V PN).

Settings External Fault

Type	Specification the input logic: <ul style="list-style-type: none"> • NO contact (1-active) • NC contact (0-active)
ctivity	To specify in which motor operating state the External Fault to be evaluated: <ul style="list-style-type: none"> • Always: Always evaluate, regardless of whether the motor is running at a standstill. • Only when the motor is ON: Evaluation only when the motor is switched ON
Marking	No parameters. Optional marking to designate the signal, e.g. "rotational speed >", e.g. using Device Integration Manager. Range: up to a maximum of 10 characters
Input	Control of the External Fault function block using the monitored signal (any sockets, e.g. device inputs, control bits from PROFINET, etc.)

Reset	Acknowledgment the "External Fault" using any signal (any socket , e.g. device inputs, control bits from PROFINET, etc.)
Response	Specification of the response to an External Fault when activated via the Input (see table response)
Reset also by	<p>Specification of further (common) acknowledgement options using additional reset types:</p> <ul style="list-style-type: none"> • TEST/RESET buttons on the Basic Unit and the Operator Panel (panel reset) • Remote reset: Acknowledgement via Reset 1-3, control bit "Reset" command • Auto reset: The trip resets itself after the cause has been eliminated (after removal of the activation signal) • OFF command reset: "OFF" control command resets the fault.

12.3.2 External Faults 1-6

12.3.2.1 External Faults 1-6

External Faults 1-6

The External Fault 1 function block can be used to monitor any statuses and/or external devices, to generate fault messages and, if necessary, to switch off the motor. To do this, the Inputs (plugs) of the External Fault function blocks must be connected to any sockets (e.g. device inputs, control bits from PROFINET, etc.). External faults can also be "marked" in SIMOCODE pro. This facilitates their allocation to the actual malfunction.

Example: Monitoring the rotational speed of the motor using an external rotational-speed monitor.

The External Fault function block consists of:

- 2 plugs (1 plug for setting, 1 plug for resetting)
- 1 "Event - External Fault" socket. This is set when a signal is pending at the Input.

Settings Type, Activity, Marking

Type	Specification the input logic: <ul style="list-style-type: none"> • NO contact (1-active) • NC contact (0-active)
Activity	To specify in which motor operating state the External Fault to be evaluated: <ul style="list-style-type: none"> • Always: Always evaluate, regardless of whether the motor is running at a standstill. • Only when the motor is ON: Evaluation only when the motor is switched ON
Marking	No parameters. Optional marking to designate the signal, e.g. "rotational speed >", e.g. using Device Integration Manager. Range: up to a maximum of 10 characters.

12.3.2.2 External Faults 1-6 Inputs

External Faults 1-6 Inputs

Settings:

Input	Control of the External Fault function block using the monitored signal (any sockets, e.g. device inputs, control bits from PROFINET, etc.)
Reset	Acknowledgment the "External Fault" using any signal (any socket , e.g. device inputs, control bits from PROFINET, etc.).
Response	Specification of the response to an External Fault when activated via the Input (see the following table)

Response:

Response	External fault
Fault/Tripping	X
Warning	X
Signaling	X
Disabled	-

12.3.2.3 External Fault 1-6 Reset

External Fault 1-6 Reset

Specification of further (common) acknowledgement options using additional reset types:

- **TEST/RESET buttons on the Basic Unit and the Operator Panel (panel reset)**
- **Remote reset: Acknowledgement via Reset 1-3, control bit "Reset" command**
- **Auto reset:** The trip resets itself after the cause has been eliminated (after removal of the activation signal)
- **OFF command reset:** "OFF" control command resets the fault.

12.4 Operational Protection OFF (OPO)

Operational Protection OFF (OPO)

The Operational Protection Off (OPO) function block returns the Positioner to a safe position. In order to do this, the input (plug) must be connected to the respective socket (e.g. device inputs, control bits from PROFINET, etc.).

The Operational Protection Off function block consists of:

- 1 plug
- 1 "Status - OPO" socket. This is set when a signal is pending at the Input.
- 1 "Trip - OPO Fault" socket. This is set when the respective, safe end position has been reached.

Overall, there is 1 "Operational Protection Off (OPO)" function block for BU2.

Settings Operational Protection OFF (OPO)

Input	Control of the Operational Protection function block using the monitored signal (any sockets, e.g. device inputs, etc.)
Positioner response	Specification of the response for the Positioner control function and accordingly Solenoid Valve control function when activated via the Input: <ul style="list-style-type: none"> • CLOSED: Positioner moves to the "Closed" end position • OPEN: Positioner runs in the "Open" end position
Type	Specification of the input logic: <ul style="list-style-type: none"> • NO contact (1-active) • NC contact (0-active).

Safety information

Note

A "Trip - Operational Protection Off (OPO)" fault message is not generated if the "OPO" command attempts to run the Positioner to the end position in which it is already in, or to which it is heading.

Note

No other control command (counter command or stop command) is carried out while "Operational Protection Off (OPO)" is active.

Note

The "Trip - Operation Protection Off (OPO)" fault message must be acknowledged using the open or closed control command, depending on the present "OPO" end position.

Note

Acknowledgement is carried out even if the desired end position has not yet been reached.

Note

The fault message is available as diagnosis via PROFINET.

Response to other Control Functions:

For other control functions, the following scenarios can be differentiated between for OPO:

- Motor in operation: The motor is switched off with a "Trip - Operational Protection Off (OPO)" fault.
- The motor is off. Initially no fault. The "Trip - Operational Protection Off (OPO)" fault only occurs when an "ON Command" is issued.

12.5 Power Failure Monitoring (UVO)

Power Failure Monitoring (UVO)

The Power Failure Monitoring (UVO) function block is activated via the plug. This is carried out via an external voltage relay that is connected to the function block via the binary inputs of SIMOCODE pro.

Overall, there is 1 Power Failure Monitoring (UVO) function block for BU2.

Settings Power Failure Monitoring (UVO)

Type	<p>Specification of the type of power failure monitoring:</p> <ul style="list-style-type: none"> • Disabled • Service supply is not interrupted. The control voltage from SIMOCODE pro remains constant. The interruption of the mains voltage must be measured, for example, by a separate voltage relay.
Power Failure Time (CiR)	<p>Start time after power failure. If the mains voltage returns within the power failure time, all the drives that were connected before the power failure are automatically reconnected. If the mains voltage does not return within this time period, the drives remain disconnected and the "Trip - Power Failure (UVO)" fault message is generated. Once the mains voltage has returned, the fault message can be acknowledged using "Reset".</p> <p>Range:</p> <ul style="list-style-type: none"> • 0 to 25.5 s in 0.1 second increments • 26 to 255 s in 1 second increments • 256 to 2550 s in 10 second increments.
Restart Time Delay (CiR) (staggered)	<p>The restart time delay can be set so that not all motors restart simultaneously (the mains voltage would otherwise breakdown again).</p> <p>Range:</p> <p>0 to 255 s.</p>
Input	<p>Control of the Power Failure Monitoring function block using the monitored signal (any sockets, e.g. device inputs, control bits from PROFINET, etc.)</p>

12.6 Emergency Start

Emergency Start

The emergency start deletes the thermal memory from SIMOCODE pro each time it is activated. This enables immediate restarting of the motor after an overload trip. This function can be used to:

- Enable a reset and start up the motor again immediately after an overload trip.
- Delete the thermal memory (motor model) during operation, if required.

Note

Frequent emergency starts may result in thermal overloading of the motor.

An emergency start is carried out via the plug of the function block. To do this, the input (plug) of the function block must be connected to any socket (e.g. device inputs, control bits from PROFINET, etc.).

The Emergency Start function block consists of:

- 1 plug
- 1 "Status - Emergency Start Executed" socket. This is set when the emergency start is carried out.

Overall, there is 1 Emergency Start function block for BU1 and BU2.

Settings Emergency Start

Control of the Emergency Start function block from any signal (any sockets, e.g. device inputs, control bits from PROFINET, etc.).

12.7 Safety Oriented Tripping

12.7.1 Safety-oriented Tripping

Safety-oriented Tripping

Note

Please note that the information made available for further processing is in the form of non-safety-oriented signals.

Note

Please note that the "Safe tripping" function block is not a safety-oriented tripping function. The DM-F Local safety function is determined by the DIP switch setting on the module only. The DM-F PROFIsafe safety function is performed by the failsafe program in the F-CPU.

Further information: See System Manual.

A total of 1 "Safe tripping" function block is available for SAFETY (Local) or PROFIsafe.

The "DM-F Local safe tripping" function block consists of 3 sockets:

- Event - DM-F LOCAL ok: The DM-F Local is ready for operation.
- Event - Safe tripping: A safety-oriented tripping has been carried out.
- Status - Enabling circuit closed: The enabling circuit is closed.

Settings of the DIP switches, DM-F Local

Note

The set DIP-switch position in the Device Integration Manager user interface (which can be done using the mouse pointer) is transferred to the basic unit as part of the standard download. However, it does not affect the function of the DM-F Local. This way, the desired function is already set during parameterization.

The effective parameterization must be set using the DIP switches on the front of the DM-F Local (see table below and/or "Failsafe Digital Modules SIMOCODE pro Safety Solutions" manual).

The basic unit compares the set position (from the download) with the actual position at the DM-F Local. If these differ "Configuration deviation" is output!

DM-F Local

Without / with cross-circuit detection

Description

Without / with cross-circuit detection Cross-circuit detection is only possible with potential-free sensors. In this case, the sensors must be connected between T1 - Y12, Y33 and T2 - Y22. The device anticipates the T1 terminal test signal on terminals Y12 and Y33. Likewise, the T2 terminal test signal is anticipated on terminals Y22 and Y34. In the event of the signals on Y12, Y33 and Y22, Y34 not corresponding to the T1 and T2 test signals, the device detects a sensor fault. When electronic sensors such as light arrays or laser scanners are connected, cross-circuit detection must be disabled. The DM-F Local no longer monitors the sensor inputs for cross circuiting. Usually, the outputs of safety sensors (OSSD) are monitored for cross circuiting in the sensor itself. When the device has been parameterized as "without cross-circuit detection", the T1 and T2 test outputs are switched off and must not be reconnected. The DM-F Local anticipates a +24 V DC signal from the same current source from which the device is powered on inputs Y12, Y22, Y33 and Y34 (DM-F Local-*1AB00 only) or from T3 (static +24 V DC). With the DM-F Local-*1AU00 device version, terminal T3 must be connected to the potential-free sensor contacts, due to the galvanic isolation of the input circuit and the sensor supply.

DM-F Local	Description
1NC contact + 1NO contact evaluation / 2NC contact evaluation	In addition to the 2-channel connection of aligned sensor contacts (NC/NC), sensors with opposing contacts (NC/NO) often used for magnetically-operated switches) can also be evaluated. In this case, please ensure that the NC contact is connected to Y12 and the NO contact is connected to Y22.
2x 1-channel / 1x 2-channel	<ul style="list-style-type: none"> • 2 sensors, each with one contact (2x 1-channel) (NC/NC). Here, the sensors are "AND"- connected with one another. Simultaneity is not monitored. • 1 sensor with 2 contacts (1x 2-channel) (NC/NC). Here, it is expected that both contacts open simultaneously.
Delay time for sensor inputs 50 ms / 10 ms	<p>During the delay time, sensor signal changes are not evaluated.</p> <ul style="list-style-type: none"> • Delay time 50 ms: Changes in the switching position of strongly bouncing contacts are hidden (e.g. position switch on heavy protective doors). • Delay time 10 ms: The shorter delay time allows for a quicker tripping of bounce-free sensors (e.g. light arrays).
Sensor input automatic start / monitored start	<ul style="list-style-type: none"> • Automatic start: The enabling circuits are switched to the operative position, as soon as the starting condition on sensor inputs Y12, Y22, Y34 and 1 have been fulfilled. The start button connection terminal Y33 is not queried. • Monitored start: The enabling circuits are switched to the operative position, as soon as the starting condition on sensor inputs Y12, Y22, Y34 and 1 have been fulfilled and the start button on terminal Y33 has subsequently been actuated (start with the falling edge).

DM-F Local

Cascade input automatic start / monitored start

Description

- **Automatic start:**
The enabling circuits are switched to the operative position, as soon as the starting condition on cascade input 1 has been fulfilled, i.e. as soon as a static +24 V DC signal is present (e.g. from T3).
- **Monitored start:**
The enabling circuits are switched to the operative position, as soon as the starting condition on cascade input 1 has been fulfilled, i.e. as soon as a static +24 V DC signal is present (e.g. from T3) and the start button on terminal Y33 has subsequently been actuated (start with the falling edge).

With / without start-up testing

After a voltage failure, start-up testing requires that the sensors at Y12 and Y22 be actuated once by the system operator.

With automatic starting / without automatic starting after power failure

The DM-F Local can be parameterized, so that the enabling circuits automatically switch to the operative position after a power failure i.e. without pressing the start button Y33.

Prerequisites:

- Y12, Y22 or cascade input 1 are parameterized for "monitored start".
- The starting condition on the sensor inputs and on the cascade input has been fulfilled.
- Valid actuation of the start button prior to the power failure i.e. the enabling circuits were in the operative position.

DM-F PROFIsafe







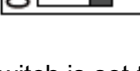
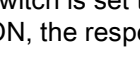

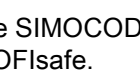
The "DM-F PROFIsafe safe tripping" function block consists of 3 sockets:

- **Event - PROFIsafe active:** Failsafe communication between the F-CPU and the DM-F PROFIsafe is active.
- **Event - Safe tripping:** A safety-oriented tripping has been carried out.
- **Status - Enabling circuit closed:** The enabling circuit is closed.

The following schematic shows the "Safe tripping" function block, DM-F PROFIsafe:

Settings of the DIP switches, DM-F PROFIsafe

Set the PROFIsafe address using the DIP switches on the DM-F PROFIsafe as follows:

1 = 2^0		1
2 = 2^1		2
3 = 2^2		4
4 = 2^3		8
5 = 2^4		16
6 = 2^5		32
7 = 2^6		64
8 = 2^7		128
9 = 2^8		256
10 = 2^9		512

When one DIP switch is set to ON, the respective value is active. When more than one DIP switch is set to ON, the respective values must be added up.

"Safe tripping" response 1)

Here, you set the SIMOCODE pro reaction to a safety-oriented tripping via the DM-F Local or the DM-F PROFIsafe.

Note

The module response is not affected by this setting. In the event of the conditions for safety-oriented tripping being fulfilled, the enabling circuits are always opened!

Response	Safe tripping
Tripping	X
Disabled	X
Send	X
Warning	X

Note

In the event that the option "DM-F LOCAL/PROFIsafe - separate function from control function" has been activated under "Motor control > Control function > Operating mode", "Safe Tripping" can no longer be set as response; "Deactivated", "Send" or "Warning" are the only remaining options.

Reset "Safe tripping"

Here, you can select manual or automatic acknowledging of SIMOCODE pro faults caused by safety-oriented tripping (default: manual).

12.7.2 DM-F LOCAL Digital Module

DM-F LOCAL Digital Module

The "DM-F Local safe tripping" function block consists of 3 sockets:

- Event - DM-F LOCAL ok: The DM-F Local is ready for operation.
- Event - Safe tripping: A safety-oriented tripping has been carried out.
- Status - Enabling circuit closed: The enabling circuit is closed.

Settings of the DIP switches, DM-F Local

Note

The set DIP-switch position in the Device Integration Manager user interface (which can be done using the mouse pointer) is transferred to the basic unit as part of the standard download. However, it does not affect the function of the DM-F Local. This way, the desired function is already set during parameterization.

The effective parameterization must be set using the DIP switches on the front of the DM-F Local (see table below and/or "Failsafe Digital Modules SIMOCODE pro Safety Solutions" manual).

The basic unit compares the set position (from the download) with the actual position at the DM-F Local. If these differ "Configuration deviation" is output!

DM-F Local

Without / with cross-circuit detection

Description

Without / with cross-circuit detection Cross-circuit detection is only possible with potential-free sensors. In this case, the sensors must be connected between T1 - Y12, Y33 and T2 - Y22. The device anticipates the T1 terminal test signal on terminals Y12 and Y33. Likewise, the T2 terminal test signal is anticipated on terminals Y22 and Y34. In the event of the signals on Y12, Y33 and Y22, Y34 not corresponding to the T1 and T2 test signals, the device detects a sensor fault. When electronic sensors such as light arrays or laser scanners are connected, cross-circuit detection must be disabled. The DM-F Local no longer monitors the sensor inputs for cross circuiting. Usually, the outputs of safety sensors (OSSD) are monitored for cross circuiting in the sensor itself. When the device has been parameterized as "without cross-circuit detection", the T1 and T2 test outputs are switched off and must not be reconnected. The DM-F Local anticipates a +24 V DC signal from the same current source from which the device is powered on inputs Y12, Y22, Y33 and Y34 (DM-F Local-*1AB00 only) or from T3 (static +24 V DC). With the DM-F Local-*1AU00 device version, terminal T3 must be connected to the potential-free sensor contacts, due to the galvanic isolation of the input circuit and the sensor supply.

1NC contact + 1NO contact evaluation / 2NC contact evaluation

In addition to the 2-channel connection of aligned sensor contacts (NC/NC), sensors with opposing contacts (NC/NO) often used for magnetically-operated switches) can also be evaluated. In this case, please ensure that the NC contact is connected to Y12 and the NO contact is connected to Y22.

2x 1-channel / 1x 2-channel

- 2 sensors, each with one contact (2x 1-channel) (NC/NC). Here, the sensors are "AND"-connected with one another. Simultaneity is not monitored.
- 1 sensor with 2 contacts (1x 2-channel) (NC/NC). Here, it is expected that both contacts open simultaneously.

Delay time for sensor inputs
50 ms / 10 ms

During the delay time, sensor signal changes are not evaluated.

- Delay time 50 ms: Changes in the switching position of strongly bouncing contacts are hidden (e.g. position switch on heavy protective doors).
- Delay time 10 ms: The shorter delay time allows for a quicker tripping of bounce-free sensors (e.g. light arrays).

DM-F Local

Sensor input automatic start /
monitored start

Description

- **Automatic start:**
The enabling circuits are switched to the operative position, as soon as the starting condition on sensor inputs Y12, Y22, Y34 and 1 have been fulfilled. The start button connection terminal Y33 is not queried.
- **Monitored start:**
The enabling circuits are switched to the operative position, as soon as the starting condition on sensor inputs Y12, Y22, Y34 and 1 have been fulfilled and the start button on terminal Y33 has subsequently been actuated (start with the falling edge).

Cascade input automatic start /
monitored start

- **Automatic start:**
The enabling circuits are switched to the operative position, as soon as the starting condition on cascade input 1 has been fulfilled, i.e. as soon as a static +24 V DC signal is present (e.g. from T3).
- **Monitored start:**
The enabling circuits are switched to the operative position, as soon as the starting condition on cascade input 1 has been fulfilled, i.e. as soon as a static +24 V DC signal is present (e.g. from T3) and the start button on terminal Y33 has subsequently been actuated (start with the falling edge).

With / without start-up testing

After a voltage failure, start-up testing requires that the sensors at Y12 and Y22 be actuated once by the system operator.

With automatic starting / without
automatic starting after power
failure

The DM-F Local can be parameterized, so that the enabling circuits automatically switch to the operative position after a power failure i.e. without pressing the start button Y33.

Prerequisites:

- Y12, Y22 or cascade input 1 are parameterized for "monitored start".
- The starting condition on the sensor inputs and on the cascade input has been fulfilled.
- Valid actuation of the start button prior to the power failure i.e. the enabling circuits were in the operative position.

"Safe tripping" response 1)

Here, you set the SIMOCODE pro reaction to a safety-oriented tripping via the DM-F Local or the DM-F PROFIsafe.

Note

The module response is not affected by this setting. In the event of the conditions for safety-oriented tripping being fulfilled, the enabling circuits are always opened!

Response	Safe tripping
Tripping	X
Disabled	X
Send	X
Warning	X

Note

In the event that the option "DM-F LOCAL/PROFIsafe - separate function from control function" has been activated under "Motor control > Control function > Operating mode", "Tripping" can no longer be set as response; "Deactivated", "Send" or "Warning" are the only remaining options.

Reset "Safe tripping"

Here, you can select manual or automatic acknowledging of SIMOCODE pro faults caused by safety-oriented tripping (default: manual).

12.8 Watchdog (PLC/DCS monitoring)

Watchdog (PLC/DCS monitoring)

The Watchdog function block monitors communication with the PLC via PROFINET, as well as the operating state of the PLC in the "Remote" operating mode.

Bus monitoring

With this type of monitoring, the "Trip - Bus" fault is generated if:

- "Bus Monitoring" is active.
- When, in the "Remote" operating mode (mode selector S1=1 and S2=1), the cyclic data transfer between the PLC and SIMOCODE pro is interrupted, e.g. by the PROFINET connection being interrupted.
- "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, "Trip - PLC/DCS" is generated if:

- "PLC/DCS Monitoring" is activated.
- The PROFINET switches to "CLEAR or Hold/Stop" status when in the "Remote" operating mode (mode selector S1=1 and S2=1).
- The "Status - PLC/PCS in Run" can always be evaluated. If the PROFINET is in the "CLEAR" status, the "Status - PLC/DCS in Run" is set to "0".

If the "PLC/DCS Monitoring - Input" is connected primarily to the "Cyclic Receive - Bit 0.7" bit, the status of the PLC is deduced from this bit only.

Settings PLC/PCS monitoring

Bus Monitoring	<ul style="list-style-type: none"> • Activated: If a bus fault occurs, the "Trip - Bus" fault message is generated and must be acknowledged. • Deactivated: No fault message; however, the "Status - Bus o.k." information can be evaluated at anytime.
PLC/PCS monitoring - Input	Control of the Watchdog function block using the monitored signal (any sockets, e.g. control bits from PROFINET, etc.
PLC/PCS monitoring	<ul style="list-style-type: none"> • Activated: If an SPS fault occurs, the "Trip - PLC/DCS" fault message is generated and must be acknowledged. • Deactivated: No fault message; however, the "Status - PLC/DCS in Run" information can be evaluated at anytime.
Bus/PLC-Fault - Reset	<p>You can select whether faults are to be acknowledged automatically or manually.</p> <p>Range: Manual/Automatic.</p>

Logic Modules

13.1 Truth Tables

13.1.1 Truth Tables

Truth Tables

You can make the following settings here:

- Truth Tables 1-6 (3I - 1O)
- Truth Tables 10, 11 (3I - 1O)
- Truth Tables 7-8 (2I - 1O)
- Truth Tables 9 (5I - 2O).

13.1.2 Table 1 (3I - 1O)

13.1.2.1 Table 1 (3I - 1O)

Table 1 (3I - 1O)

The Truth Table for 3I/1O consists of:

- 3 plugs
- 1 logic component
- 1 socket (Truth Table Output).

You can choose from the 8 possible input conditions the one with which to generate an output signal.

8 Truth Tables (1 to 6, 10, 11) are available for SIMOCODE pro V PN Basic Unit.

13.1.2.2 Input Table 1 (3I - 1O)

Input Table 1 (3I - 1O)

Activate the Truth Table with any signal (any sockets, e.g. device inputs, control bits from PROFINET, etc.

13.1.2.3 Logic Table 1 (3I - 1O)

Logic Table 1 (3I - 1O)

You can choose from the 8 possible input conditions the one with which to generate an output signal.

13.1.3 Table 2 (3I - 1O)

13.1.3.1 Table 2 (3I - 1O)

Table 2 (3I - 1O)

The Truth Table for 3I/1O consists of:

- 3 plugs
- 1 logic component
- 1 socket (Truth Table Output).

You can choose from the 8 possible input conditions the one with which to generate an output signal.

8 Truth Tables (1 to 6, 10, 11) are available for SIMOCODE pro V PN Basic Unit.

13.1.3.2 Input Table 2 (3I - 1O)

Input Table 2 (3I - 1O)

Activate the Truth Table with any signal (any sockets, e.g. device inputs, control bits from PROFINET, etc).

13.1.3.3 Logic Table 2 (3I - 1O)

Logic Table 2 (3I - 1O)

You can choose from the 8 possible input conditions the one with which to generate an output signal.

13.1.4 Table 3 (3I - 1O)

13.1.4.1 Table 3 (3I - 1O)

Table 3 (3I - 1O)

The Truth Table for 3I/1O consists of:

- 3 plugs
- 1 logic component
- 1 socket (Truth Table Output).

You can choose from the 8 possible input conditions the one with which to generate an output signal.

8 Truth Tables (1 to 6, 10, 11) are available for SIMOCODE pro V PN Basic Unit.

13.1.4.2 Input Table 3 (3I - 1O)

Input Table 3 (3I - 1O)

Activate the Truth Table with any signal (any sockets, e.g. device inputs, control bits from PROFINET, etc).

13.1.4.3 Logic Table 3 (3I - 1O)

Logic Table 3 (3I - 1O)

You can choose from the 8 possible input conditions the one with which to generate an output signal.

13.1.5 Table 4 (3I - 1O)

13.1.5.1 Table 4 (3I - 1O)

Table 4 (3I - 1O)

The Truth Table for 3I/1O consists of:

- 3 plugs
- 1 logic component
- 1 socket (Truth Table Output).

You can choose from the 8 possible input conditions the one with which to generate an output signal.

8 Truth Tables (1 to 6, 10, 11) are available for SIMOCODE pro V PN Basic Unit.

13.1.5.2 Input Table 4 (3I - 1O)

Input Table 4 (3I - 1O)

Activate the Truth Table with any signal (any sockets, e.g. device inputs, control bits from PROFINET, etc).

13.1.5.3 Logic Table 4 (3I - 1O)

Logic Table 4 (3I - 1O)

You can choose from the 8 possible input conditions the one with which to generate an output signal.

13.1.6 Table 5 (3I - 1O)

13.1.6.1 Table 5 (3I - 1O)

Table 5 (3I - 1O)

The Truth Table for 3I/1O consists of:

- 3 plugs
- 1 logic component
- 1 socket (Truth Table Output).

You can choose from the 8 possible input conditions the one with which to generate an output signal.

8 Truth Tables (1 to 6, 10, 11) are available for SIMOCODE pro V PN Basic Unit.

13.1.6.2 Input Table 5 (3I - 1O)

Input Table 5 (3I - 1O)

Activate the Truth Table with any signal (any sockets, e.g. device inputs, control bits from PROFINET, etc).

13.1.6.3 Logic Table 5 (3I - 1O)

Logic Table 5 (3I - 1O)

You can choose from the 8 possible input conditions the one with which to generate an output signal.

13.1.7 Table 6 (3I - 1O)

13.1.7.1 Table 6 (3I - 1O)

Table 6 (3I - 1O)

The Truth Table for 3I/1O consists of:

- 3 plugs
- 1 logic component
- 1 socket (Truth Table Output).

You can choose from the 8 possible input conditions the one with which to generate an output signal.

8 Truth Tables (1 to 6, 10, 11) are available for SIMOCODE pro V PN Basic Unit.

13.1.7.2 Input Table 6 (3I - 1O)

Input Table 6 (3I - 1O)

Activate the Truth Table with any signal (any sockets, e.g. device inputs, control bits from PROFINET, etc).

13.1.7.3 Logic Table 6 (3I - 1O)

Logic Table 6 (3I - 1O)

You can choose from the 8 possible input conditions the one with which to generate an output signal.

13.1.8 Table 10 (3I - 1O)

13.1.8.1 Table 10 (3I - 1O)

Table 10 (3I - 1O)

- 8 Truth Tables (1 to 6, 10, 11) for SIMOCODE pro V PN Basic Unit.

13.1.8.2 Input Table 10 (3I - 1O)

Input Table 10 (3I - 1O)

Activate the Truth Table with any signal (any sockets, e.g. device inputs, control bits from PROFINET, etc).

13.1.8.3 Logic Table 10 (3I - 1O)

Logic Table 10 (3I - 1O)

You can choose from the 8 possible input conditions the one with which to generate an output signal.

13.1.9 Table 11 (3I - 1O)

13.1.9.1 Table 11 (3I - 1O)

Table 11 (3I - 1O)

The Truth Table for 3I/1O consists of:

- 3 plugs
- 1 logic component
- 1 socket (Truth Table Output).

You can choose from the 8 possible input conditions the one with which to generate an output signal.

8 Truth Tables (1 to 6, 10, 11) are available for SIMOCODE pro V PN Basic Unit.

13.1.9.2 Input Table 11 (3I - 1O)

Input Table 11 (3I - 1O)

Activate the Truth Table with any signal (any sockets, e.g. device inputs, control bits from PROFINET, etc).

13.1.9.3 Logic Table 11 (3I - 1O)

Logic Table 11 (3I - 1O)

You can choose from the 8 possible input conditions the one with which to generate an output signal.

13.1.10 Table 7 (2I - 1O)

13.1.10.1 Table 7 (2I - 1O)

Table 7 (2I - 1O)

The Truth Table for 2I/1O consists of:

- 2 plugs
- 1 logic component
- 1 socket (Truth Table Output).

You can choose from four possible input conditions the one with which to generate an output signal.

In total, 2 Truth Tables (7 to 8) are available for the SIMOCODE pro V PN Basic Units.

13.1.10.2 Input Table 7 (2I - 1O)

Input Table 7 (2I - 1O)

Activate the Truth Table with any signal (any sockets, e.g. device inputs, control bits from PROFINET, etc).

13.1.10.3 Logic Table 7 (2I - 1O)

Logic Table 7 (2I - 1O)

You can choose from four possible input conditions the one with which to generate an output signal.

13.1.11 Table 8 (2I - 1O)

13.1.11.1 Table 8 (2I - 1O)

Table 8 (2I - 1O)

The Truth Table for 2I/1O consists of:

- 2 plugs
- 1 logic component
- 1 socket (Truth Table Output).

You can choose from four possible input conditions the one with which to generate an output signal.

In total, 2 Truth Tables (7 to 8) are available for the SIMOCODE pro V PN Basic Units.

13.1.11.2 Input Table 8 (2I - 1O)

Input Table 8 (2I - 1O)

Activate the Truth Table with any signal (any sockets, e.g. device inputs, control bits from PROFINET, etc).

13.1.11.3 Logic Table 8 (2I - 1O)

Logic Table 8 (2I - 1O)

You can choose from four possible input conditions the one with which to generate an output signal.

13.1.12 Table 9 (5I - 2O)

13.1.12.1 Table 9 (5I - 2O)

Table 9 (5I - 2O)

The Truth Table for 2I/1O consists of:

- 5 plugs
- 1 logic component
- 2 socket (Truth Table Outputs).

You can choose from four possible input conditions the one with which to generate an output signal.

In total, 1 Truth table (9) are available for the SIMOCODE pro V PN Basic Units.

13.1.12.2 Input Table 9 (5I - 2O)

Input Table 9 (5I - 2O)

Activate the Truth Table with any signal (any sockets, e.g. device inputs, control bits from PROFINET, etc).

13.1.12.3 Logic output 1 (I1 is 0)

Logic output 1 (I1 is 0)

If input 1 = 0 you can select the input conditions for which you want to generate an output signal from 16 possible input conditions.

13.1.12.4 Logic output 1 (I1 is 1)

Logic output 1 (I1 is 1)

If input 1 = 1 you can select the input conditions for which you want to generate an output signal from 16 possible input conditions.

13.1.12.5 Logic Output 2 (I1 is 0)

Logic Output 2 (I1 is 0)

If input 1 = 0 you can select the input conditions for which you want to generate an output signal from 16 possible input conditions.

13.1.12.6 Logic Output 2 (I1 is 1)

Logic Output 2 (I1 is 1)

If input 1 = 1 you can select the input conditions for which you want to generate an output signal from 16 possible input conditions.

13.2 Counter

13.2.1 Counter

Counter

Counters are integrated in the SIMOCODE pro system. These are activated via the plugs "Input +" or "Input -".

The Counter output switches to "1" when the preset limit is reached. The Counter is reset with "Reset".

The actual value is available as a socket for further processing and can also be transmitted to the automation system.

- Input +: increases actual value by 1 (maximum: limit value)
- Input -: decreases the actual value by 1 (minimum: 0)
- Reset: resets the actual value to 0.

The Counter consists of:

- 3 plugs (input +, input - and reset)
- 1 logic component
- 1 socket (Counter Output)
- 1 "Actual Value" analog socket with the current value in the range between 0 and the limit. It remains even if there is a voltage failure.

In total, 6 counters (1 to 6) for the SIMOCODE pro V PN basic unit are available.

Note

The time between the events to be counted depends on:

- the input delay
 - the device cycle time.
-

Note

The actual value remains the same:

- during parameterization or failure of the supply voltage
 - if there are simultaneous input signals at Input + and Input -.
-

Note

The output is always 0 if a reset is pending.

13.2.2 Counter 1-6

Counter 1-6

Limit	The maximum value that can be reached when counting and where the counter issues an output signal. Range: 0 - 65535
Input +	Increases the actual value by 1. Activation by any signal (any sockets e.g. device inputs, control bits from PROFINET, etc.
Input -	Decreases the actual value by 1. Activation by any signal (any sockets e.g. device inputs, control bits from PROFINET, etc.
Reset	Resets the Counter to 0 (count value and output). Activation by any signal (any sockets e.g. device inputs, control bits from PROFINET, etc.)

13.3 Timer

13.3.1 Timer

Timer

Timers are integrated in the SIMOCODE pro system. These are activated via the plugs "+" or "-".

The Timer output switches to "1" when the timer reaches 0 from the preset limit. The Timer is reset with "Reset".

The timer consists of:

- 2 plugs (input and reset)
- 1 socket (Timer Output)
- 1 "Actual Value" analog socket with the actual value.

The actual value is available as a socket for further internal processing and can also be transmitted to the automation system.

If an input signal is pending, the timer can issue an output signal according to the chosen timer type:

- With closing delay
- With closing delay with memory
- With OFF delay
- With fleeting closing.

In total, 6 timers (1 to 6) for the SIMOCODE pro V PN basic unit are available.

Note

The output is always 0 if a Reset is pending.

Note

The response of the sockets of all Timers (Input, Reset) has been completely changed to level-active for Basic Unit 1 from version *E05* and higher and Basic Unit 2 from version *E03* and higher. Use of an unchanged parameter file utilizing integrated Timers may thus result in a different response if such Basic Units are used. For example, if "fixed level - 1" is set at the Timer input, the timer function is automatically restarted after the Timer reset occurs. However, in Timers with the parameterized Type = "fleeting closing" there is no change in the response.

13.3.2 Timer 1-6

Timer 1-6

Type	Different Output Responses. Range: closing delay , closing delay with memory, closing delay with fleeting closing
Limit	Time during which the Timer provides an output signal when activated, depending on the output response (type). Range: 0 to 65535, unit 100 ms
Input	Activation by any signal (any sockets, e.g. device inputs, control bits from PROFINET, etc.)
Reset	Resets the actual value to 0. Activation by any signal (any sockets, e.g. device inputs, control bits from PROFINET, etc.)

13.4 Signal Conditioner

13.4.1 Signal Conditioner

Signal Conditioner

If an input signal is pending, the Signal Conditioner can issue an output signal according to the chosen Timer type:

- Non Inverting
- Inverting
- Edge rising with memory
- Edge falling with memory.

You can set the output response.

The Signal Conditioner consists of:

- 2 plugs (input and reset)
- 1 logic component
- 1 socket (Signal Conditioner Output).

In total, 6 signal conditioners (1 to 6) for the SIMOCODE pro V PN basic unit are available.

Note

The Output is always 0 if a Reset is pending.

13.4.2 Signal Conditioner 1-6

Signal Conditioner 1-6

Type	Different output responses. Range: Level not inverted , level inverted, edge rising with memory, edge falling with memory
Input	Activation by any signal (any sockets, e.g. device inputs, control bits from PROFINET, etc.)
Reset	Resets the Signal Conditioner to 0. Activation by any signal (any sockets, e.g. device inputs, control bits from PROFINET, etc.)

13.5 Non-volatile Element

13.5.1 Non-volatile Element

Non-volatile Element

Non-Volatile Elements behave like Signal Conditioners. The output signals remain after failure of the supply voltage.

If an input signal is pending, the signal conditioner can issue an output signal according to the type of Signal Conditioner chosen:

- Non Inverting
- Inverting
- Edge rising with memory
- Edge falling with memory.

You can set the output response.

The Non-Volatile Element consists of:

- 2 plugs (input and reset)
- 1 logic component
- 1 socket (Non-volatile Element Output).

In total, 4 non-volatile elements (1 to 4) for the SIMOCODE pro V PN basic unit are available.

Note

The output is always 0 if a reset is pending.

13.5.2 Non-volatile Element 1-4

Non-volatile Element 1-4

Settings:

Type	Different output responses. Range: Level not inverted , level inverted, edge rising with memory, edge falling with memory
Input	Activation by any signal (any sockets e.g. device inputs, control bits from PROFINET, etc.)
Reset	Resets the Signal Conditioner to 0. Activation by any signal (any sockets e.g. device inputs, control bits from PROFINET, etc.)

13.6 Flashing

Flashing

If an input signal is pending at its plug, the Flashing logic module issues a signal to its socket, which alternates between binary 0 and 1 with a fixed frequency of 1 Hz. You can use this to make the LEDs on the Operator Panel flash.

The logic module consists of:

- 1 plug
- 1 logic component
- 1 socket (Flashing Output).

Overall, there are 3 Flashing 1 to 3 logic modules.

Settings Flashing

Input	Activation by any signal (any sockets e.g. device inputs, signals, status, etc.).
-------	---

13.7 Flickering

Flickering

You can use the Flickering logic modules to assign the "Flickering" function to the Operator Panel LEDs (for example).

If an input signal is pending, the Flickering function block issues an output signal with a frequency of 4 Hz.

The function block consists of:

- 1 plug
- 1 logic component
- 1 socket (Flickering Output).

Overall, there are 3 Flickering 1 to 3 logic modules.

Settings Flickering

Input	Activation by any signal (any sockets e.g. device inputs, signals, status, etc.).
-------	---

13.8 Limit Monitor

13.8.1 Limit Monitor

Limit Monitor

Any analog values (2 bytes/1 word) can be monitored for limit overshooting or undershooting. The Limit Monitor issues the "limit" signal to its socket. In addition, Limit Monitors can be "labeled" according to their function. Example: Monitoring the individual sensor measuring circuits of the Temperature Module (Temperature 1 - 3) for overtemperature.

The limit monitor consists of:

- 1 analog plug
- 1 logic component
- 1 socket (Event-Limit Monitor Output).

In total, 6 limit monitors (1 to 6) for the SIMOCODE pro V PN basic unit are available.

Functional principle

The limit signal issued depends on:

- The operating state of the motor
- The TPF function
- The parameterized "activity".

Hysteresis for Limit Monitor

You can set the hysteresis for limit monitors here:

Range 0 - 15 % of the threshold value in 1 % increments (5 %)

Note

When using Limit Monitors, always ensure that the correct range and unit are used for the analog values connected to the limit input. These always have a direct influence on the unit of the limit value to be set.

Examples of typical units and ranges in SIMOCODE pro:

	Unit	Range
Temperatures (e.g. max. temperature)	1 K	0 - 65535
Operating hours	1 s	0 - 1193046
Motor stop time	1 h	0 - 65535
Active power	1 W	0 - 4294967295
Apparent power	1 VA	0 - 4394967295
Timer actual value	100 ms	0 - 65535
Currents (e.g. max. current I _{max})	1 % I _e	0 - 66535
Analog Module inputs	-	0 - 27648 (S7-Format)

Thus, for example, a limit value of 473 (K) should be parameterized for a Limit Monitor to monitor a maximum temperature of 200 °C.

13.8.2 Limit Monitor 1-6

Limit Monitor 1-6

Settings:

Input	Analog plug of the Limit Monitor to be connected with the analog value (2 bytes) which is to be monitored, (e.g. maximum current I_{max} , remaining cooling time, actual value of Timers, etc.).
Type	Specifies if the limit value has to be monitored for overshooting or undershooting.
Activity	Determines in which motor operating state the Limit Monitor is to be evaluated: <ul style="list-style-type: none"> • on, i.e. always evaluate, independent of whether the motor is running or not • on+, i.e. always evaluate, independent of whether the motor is running or not; exception: "TPF", i.e. motor feeder is in test position. • run, i.e. evaluate only if the motor is in the ON state and not in test position (TPF) • run+, i.e. evaluate only if the motor is running and the start-up procedure is finished (i.e. the "start active" message is no longer pending) and there is no Test Position Feedback (TPF); Example: Cos phi Monitoring.
Limit	Monitor response value. The return value is always determined by the "Limit Monitor - delay" parameter. Range: 0 - 65535.
Delay	Specifies the time period for which the limit must be constantly overshoot before the "signal - limit" output is set. Range: 0 - 25.5 s (0.5 s)
Marking	No parameters. Optional marking to designate the signal, e.g. "Limit>"; Range: Max. of 10 characters.

13.9 Calculation Modules

13.9.1 Calculation Modules

Calculation Modules

Calculation Modules 1 and 2

Both the Calculator 1 and Calculator 2 logic modules integrated in Basic Unit 2 contain the standard calculation modes and enable all analog values that occur in SIMOCODE pro to be adapted, calculated and converted, e.g.

- Conversion of the measured temperatures from K (Kelvin) to °F or °C
- Conversion of the motor current from % to A
- Conversion of the 0/4 - 20 mA signals of the Analog Module directly into fill levels, pressures and flow rates.

The analog value (2 Byte/1 Word) present at the analog socket is calculated using a defined formula and using freely-selectable parameters (counters, denominators, operators, offsets). The result of the calculation is output as an analog value at the analog socket of the logic module (2 Bytes/1 Word) for further processing.

Each Calculator consists of:

- 1 analog plug (Calculator 1) or two analog plugs (Calculator 2)
- 1 logic component
- 1 analog socket (Calculation Module Output).

Formula Calculator 1

$$\text{Output} = \frac{\text{Numerator } 1}{\text{Denominator } 1} * \text{Input } 1 + \text{Offset}$$

Formulas Calculator 2

- Operation mode 1: Both inputs of type word.

$$\text{Output} = \frac{\text{Numerator } 1}{\text{Denominator } 1} * \text{Input } 1 [\text{Operator}] \frac{\text{Numerator } 2}{\text{Denominator } 2} * \text{Input } 2 + \text{Offset}$$

- Operation mode 2: Inputs 1 and 2 correspond to a D-word input.

$$\text{Output} = \frac{\text{Numerator } 1}{\text{Denominator } 1} * \text{D-Word} + \text{Offset} \quad (\text{Input } 2 = \text{High-D-Word, Input } 1 = \text{Low-D-Word})$$

- Offset value range: - 2147483648 to 2147483647, increment 1.

Calculation modules 3 and 4

Description

The Calculator 3 and Calculator 4 function blocks (for basic unit SIMOCODE pro V PN only) can be used to process analog values according to the following arithmetic:

$$\text{Output} = \text{Input 1} [\text{Operator 1}] \text{Input 2} [\text{Operator 2}] \text{Input 3} [\text{Operator 3}] \text{Input 4}.$$

You can interconnect corresponding analog signals to the four inputs.

You can select one of the four standard operators ("+", "-", "*", or "/") for Operators 1-3.

With "Calculator - Priority 1-3" you can specify the processing sequence (high, medium, low). You must clearly define a priority for each operator. The priority determines the processing sequence comparable to the placement of a term inside parentheses.

Example:

Output = I1 OP1 I2 OP2 I3 OP3 I4, where

- OP1 = "*"; Medium
- OP2 = "+"; High
- OP3 = "-"; Low

Associated equation: Output = (I1 * (I2 + I3)) - I4.

If you interconnect the input to the device-internal analog output data element "Output 1 - Fixed level", the input is assigned the constant "Const x" (x = 1 - 4). In this case, the respective edit field for the constant is activated.

You can enter a value between 0 and 65535.

The "Calculator 3" and "Calculator 4" function blocks each consist of:

- 4 analog plugs
- 1 analog socket
- Logic.

Settings

Calculator 3/4	Description
Input	Any analog value
Output	Calculated analog value
Constant 1 to 4	Any analog value
	Range: 0 - 65535
Operator 1 to 3	<ul style="list-style-type: none"> • "+": Addition • "-": Subtraction • "*": Multiplication • "/": Division
Priority 1 to 3	<ul style="list-style-type: none"> • Medium • High • Low

Formula

Output = Input 1 [Operator 1] Input 2 [Operator 2] Input 3 [Operator 3] Input 4.

13.10 Analog Multiplexer

Analog Multiplexer

Description

The analog multiplexer (for the SIMOCODE pro V PN and SIMOCODE pro V PN GP basic unit only) outputs one of four possible analog values Input 1 to Input 4 at the output, depending on the control signals S1 and S2.

If you interconnect the input to "Fixed level", the input is assigned the constant "Const x" (x = 1 - 4). In this case, the respective edit field for the constant is activated.

You can enter a value between 0 and 65535.

The "Analog Multiplexer" function block consists of:

- 2 digital plugs (control signal 1 and 2)
- 4 analog plugs (Input 1 to 4)
- 1 analog socket (Analog Multiplexer Output)
- Logic.

Settings

Analog Multiplexer	Description
Control signals S1/S2	Activation by any signal (any sockets , e.g., device inputs, control bits from PROFINET, etc.).
Input 1 to 4	Any analog value or "Fixed level"
Output	Output value according to panel (see below)
Constant 1 to 4	Any analog value Range: 0 - 65535

13.11 Pulse width modulator**Pulse width modulator****Description**

The pulse width modulator (for basic unit SIMOCODE pro V PN and SIMOCODE pro V PN GP only) modulates the analog input value "PWM Input" to a digital pulse output signal "PWM Output". The pulse width is proportional to the "PWM Input" analog value.

If you interconnect the input to "Fixed value", the input is assigned the parameterized constant "Input (const)". In this case, the edit field for the constant is activated. You can enter a value between 0 and 65535.

The "Pulse Width Modulator" function block consists of:

- 1 analog plug (input)
- 1 digital socket (PWM output)
- logic.

Settings

Pulse Width Modulator	Description
Input	Activation by any analog signal or "Fixed value"
Constant input	Any constant; range: 0 ... 65535 (Default Value: 0)
Input minimum	Any constant; range 0 ... 65535 (Default Value: 0)
Input maximum	Any constant; range 0 ... 65535 (Default Value: 0)
Time period	0.2 - 6553.5 s (Default Value: 2s)

Formulas

- *Length of 1-signal = PWM period * (PWM Input - PWM input minimum) / (PWM input maximum - PWM input minimum)*
- *Length of 0-signal = PWM period - Length of 1-signal.*

Note

The shortest signal duration for 0 and 1 is 0.1 s in each case.

If the calculation yields a duration for the 1-signal of less than 0.1 s, the output remains 0, and if a duration for the 0-signal of less than 0.1 s is calculated, the output remains 1.

Operator Panel with Display

Operator Panel with Display

Setting	Value/Range
Return to main display (after)	<ul style="list-style-type: none">• Manual• 3 seconds• 10 seconds• 1 minute• 5 minutes
Language	<ul style="list-style-type: none">• English• German• French• Polish• Spanish• Portuguese• Italian• Finnish• Chinese• Russian
Contrast	10 - 90 % (50 %)

Profile

- **IL1, IL2, IL3 [A]**
- IL1, IL2, IL3 [%]
- I_max [A]
- I_max [%]
- I_max, Cos
- I_max, U L1N, Cos, S
- I_max, U L1L2, Cos, S
- I_max, U L1N, Cos, P
- I_max, U L1L2, Cos, P
- [mA] In1/Out AM1
- [mA] In2/Out AM1
- [mA] Inputs AM1
- [mA] In1/Out AM2
- [mA] In2/Out AM2
- [mA] Inputs AM2
- Max. Temp. °C TM1
- Temp. °C TM1
- Max. Temp. °F TM1
- Temp. °F TM1
- Max. Temp. °C TM2
- Temp. °C TM2
- Max. Temp. °F TM2
- Temp. °F TM2
- U L1N, U L2N, U L3N
- U L1L2, U L2L3, U L3L1
- I max, UL1N, Cos
- I max, UL1L2, Cos
- I max, UL1N, °C
- I max, UL1L2, °C
- I max, UL1N, °F
- I max, UL1L2, °F
- Calc. Module_1
- Calc. Module_2
- Energy used [kWh]

Lighting automatically OFF (after)

- Off (= never)
- 3 seconds
- **10 seconds**
- 1 minute
- 5 minutes

Warnings

- **Do not display**
- Display

Faults

- **Display**
- Do not display

PROFlenergy

PROFlenergy

Description

PROFlenergy, a protocol defined by the PROFINET User Organization, lays the foundations for a vendor-neutral, universal system for flexible, short-term, and intelligent shutdown of individual loads or whole production units.

SIMOCODE pro V PN supports the functions defined in the protocol in the form of a switchgear with switching and measuring functions.

Setting

Here you can set the minimum pause time for the motor (0.0 - 65.5 s (0.1 s)).

Analog Value Recording

16.1 Analog Value Recording - Settings

Analog Value Recording - Settings

Recording is carried out directly in SIMOCODE pro on the basis of the motor feeder and independently of PROFINET or the automation system. Every analog value present at the "allocated analog value" analog socket is recorded and saved. The recording starts on the basis of the edge (positive/negative) via any binary signal at the Trigger Input of the function block. Up to 60 values can be saved internally in the device.

The time frame of the recording is indirectly determined by the selected sampling rate:
Sampling time = sampling rate [s] x 60 values.

The Pre-trigger can be used to specify how far in advance the recording should commence before the trigger signal is issued. The Pre-trigger is set as a percentage of the entire sampling time.

Settings:

Signal/Value	Range
Trigger-Eingang	Analog value recording starts when any signal is issued (arbitrary sockets , e.g. device inputs, motor current flowing).
Allocated analog value	Any value (1 word/2 byte) in SIMOCODE pro
Trigger edge	positive / negative
Sampling rate	0.1 to 50 s in 0.1-s-increments
Pre-trigger	0 to 100 % in 5-%-increments

Online Settings and Displays

17.1 Error Buffer - Error Protocol

17.1.1 Error Buffer - Error Protocol

Error Buffer - Error Protocol

See Error Buffer - Error Protocol - Events (Page 141)

See Error Buffer - Error Protocol - Events DM-F (Page 142)

17.1.2 Error Buffer - Error Protocol - Events

Error Buffer - Error Protocol - Events

The timestamping in the fault memory is based on the operating hours (resolution: 1 s) of SIMOCODE pro.

The "Error/Fault" and "Mains on" events are recorded. Each of these events are annotated with a timestamp.

- Error/Fault:
The last 21 faults are stored in a ring buffer. The fault that occurs (rising edge) is always recorded. A fault that is disappearing (falling edge) is not recorded.
- Mains on:
If the most recent entry was "Mains on", this is not recorded multiple times. Instead, the fault number is used as a mains-on counter. This means that the fault memory cannot be deleted by frequent ON/OFF operations.

Entry 1 is the most recent entry and entry 21 the oldest.

17.1.3 Error Buffer - Error Protocol - Events DM-F

Error Buffer - Error Protocol - Events DM-F

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"
- 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".

17.2 Command

Command

In dialogue "Command" the following commands can be sent to SIMOCODE pro:

Note

Commands are immediately carried out!

Command	Meaning
Program memory module	Transfer of the parameters into the memory module. The memory module must be plugged into the system interface.
Erase memory module	Parameters in the memory module are deleted. The memory module must be plugged into the system interface.
Read memory module	Transfer of the parameters from the memory module to the basic unit. The memory module must be plugged into the system interface.

Command	Meaning
Memory module write protection on	<p>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 for the connected SIMOCODE pro V PN basic unit., pro V 3.1 and pro S.</p> <p>An inadvertent change of parameters for a motor feeder is prevented.</p> <p>SIMOCODE pro signals the successful execution of the command with the event "Memory module write-protected"</p>
Memory module write protection off	With this command you can cancel the write protection of the memory module.
Initialization module write protection on	<p>All contents of the initialization module are write protected. This prevents any inadvertent changes to the contents of the initialization module and any parameter change for the connected SIMOCODE pro V PN basic unit, pro V 3.1 and pro S.</p> <p>An inadvertent change of parameters for a motor feeder is prevented.</p> <p>SIMOCODE pro signals the successful execution of the command with the event "Initialization module write-protected".</p>
Initialization module write protection off	With this command you can cancel the write protection of the initialization module.
Initialization module identification data write protection on	<p>(Identification & Maintenance) are write-protected. With this command you can:</p> <ul style="list-style-type: none"> Prevent inadvertent changes to the PROFINET parameters (e.g., device names) and the I&M data for the motor feeder. Continue making parameter changes in the initialization module as well as in the SIMOCODE pro V PN basic unit, pro V 3.1 and pro S, if the address data and I&M data are identical to the data already contained in the device when parameters are downloaded. <p>SIMOCODE pro signals the successful execution of the command with the event "Initialization module identification data write-protected".</p>
Initialization module identification data write protection off	With this command you can cancel the write protection of the identification data of the initialization module.

Command	Meaning
Delete initialization module data	<p>With this command:</p> <ul style="list-style-type: none"> • All contents of the initialization module are deleted • The initialization module is reset to the delivery state. <p>SIMOCODE pro signals the successful deletion with the event "Initialization module deleted".</p> <p>In the event of a startup with an empty initialization module, the basic unit signals "Trip - Parameterization". The "General Fault" LED of the basic unit flashes red.</p> <p>Reparameterization of the device, e.g., with Device Integration Manager, writes valid parameters to the basic unit and the initialization module again. You can then acknowledge the event.</p>
Restart - Cold Start	Re-start: Initializing SIMOCODE pro. New run-up.
Basic factory default settings	All parameters are reset to the basic factory default settings. Only possible if no password protection exists or the password is known to the user.
Set time (= PC time)	<p>If an NTP server address has not been configured or a server was not found on the network, you can set the time of day here.</p> <p>If a valid time of day is available (either synchronized by NTP or set via Device Integration Manager), the entries in the error buffer/error protocol (i.e. log) will be additionally displayed with the time of day. In addition, the "Clock set (NTP)" and "Clock synchronized (NTP)" messages are displayed.</p> <p>If you would like to set up the time in device to UTC time (recommended) please set first +/- offset in NTP Time shift parameter in minutes respective to current time zone and then upload the data to the device.</p>
Test	Carry out test function. Same function as "TEST/RESET" button on the basic device and operator panel.
Reset	Carry out reset. Acknowledging errors. Same function as "TEST/RESET" button on the basic device and operator panel.

17.3 Actual Configuration/HW-Diagnostics

17.3.1 Actual Configuration/HW-Diagnostic

Actual Configuration/HW-Diagnostic

See Actual Configuration (Page 145)

See HW-Diagnostic (Page 145)

17.3.2 Actual Configuration

Actual Configuration

In dialogue "Actual Configuration" the existing configuration can be read if a connection has already been established via SIMOCODE pro.

Symbol	Description
ok	Module available and operational
not available	Module not available

In the case of DM1 = DM-F Local, the actual DIP switch position from data record 105 (see System Manual SIMOCODE pro) is shown in "Modules" and the DIP switch position from data record 130 (see System Manual SIMOCODE pro) is shown in "Parameterized Configuration". The meaning of the individual DIP switches is as follows: See Safety-oriented tripping.

17.3.3 HW-Diagnostic

HW-Diagnostic

In dialogue "HW-Diagnostic" you can verify if the projected device configuration matches the real device configuration:

Symbol	Description
ok	Module available and operational
faulty	Module faulty

In the case of DM1 = DM-F Local or DM-F PROFIsafe the actual DIP switch position from data record 105 (see System Manual SIMOCODE pro) is shown in "Modules" and the DIP switch position from data record 130 (see System Manual SIMOCODE pro) is shown in "Parameterized Configuration". The meaning of the individual DIP switches is as follows: See Safety-oriented tripping.

17.4 Password

17.4.1 Password

Password

See Set Password (Page 146)

See Change Password (Page 146)

17.4.2 Set Password

Set Password

Password protection: Indicates whether password protection is activated or deactivated.

Password: In this field, you can assign a password for SIMOCODE pro. Protection in the basic unit is activated/deactivated with "Set/Remove Password".

To switch password protection off, you must enter the correct password in the "Password" field.

Parameters can only be saved or exported from the basic unit when protection is deactivated.

17.4.3 Change Password

Change Password

In this dialog box, you can change an already assigned password for SIMOCODE pro. To change the password, enter the old password and the new password and click on the "Change Password" button.

Note

If you do not know the password, parameters can only be changed by "Resetting the Basic Factory Default Settings with Test/Reset at the basic unit".

The current parameters (including Password) will be reset to the basic factory default settings.

17.5 Measured Values

Measured Values

In dialogue "Measured Values > Measured Values" the following measured values are shown.

Current	Range	Unit
Max. Current I _{max}	0 to 65535	% I _s
Current I _{L1}	0 to 65535	% I _s
Current I _{L2}	0 to 65535	% I _s
Current I _{L3}	0 to 65535	% I _s
Last Trip Current	0 to 65535	% I _s
Phase Unbalance	0 to 100	% (100 % corresponds to the failure of a phase)

Further Information on the set current I_s can be found under Overload Protection.

Thermal Motor Model	Range	Unit
Thermal Memory	0 to 255	%, related to symmetrical tripping level Representation in 2-%-steps in bits 6...0 (range of values 0 to 254 %); Bit 7 indicates unbalance (firm level 50 %)
Cooling Down Period	0 to 6553.5	s
Time to Trip	0 to 65535	s

(The motor is not at present in an overload situation. Under current load conditions the motor is switched off however in x seconds because of overload.)

Voltage	Range	Unit
Phase voltage UL1-N	0 to 65535	V
Phase voltage UL2-N	0 to 65535	V
Phase voltage UL3-N	0 to 65535	V
Line-to-line voltage UL1-L2	0 to 65535	V
Line-to-line voltage UL2-L3	0 to 65535	V
Line-to-line voltage UL3-L1	0 to 65535	V

SIMOCODE pro V with a current/voltage measurement module is necessary for voltage measurements.

Power/Power Factor	Range	Unit
Active Power P	0 to 4294967,295	W
Apparent Power S	0 to 4294967,295	VA
Cos-phi	0 to 100	% (Power Factor. 100 % when no motor current is flowing and/or no voltage is measured)

SIMOCODE pro V with a current/voltage measurement module is necessary for power considerations.

Analog Module	Range	Unit
Analog Module - Input 1	0 to 27648	S7-format: 0/4 mA=0, 20 mA = 27648
Analog Module - Input 2	0 to 27648	S7-format: 0/4 mA=0, 20 mA = 27648
Analog Module - Output	0 to 27648	S7-format: 0/4 mA=0, 20 mA = 27648

In the dialog box "Measured Values > Temperature module", the following values are represented graphically.

Temperature Module	Range	Unit
Max. Temperature	-273 to 65262	°C
Temperature 1	-273 to 65262	°C
Temperature 2	-273 to 65262	°C
Temperature 3	-273 to 65262	°C

Sensor type: **PT100**, PT1000, KTY83, KTY84, or NTC.

SIMOCODE pro with a temperature module and corresponding temperature sensor is necessary for temperature measurements.

In the dialog box "**Measured Values > Temperature Module**", the Temperatures Max.Temperature, Temperature 1, Temperature 2, Temperature 3 and Sensor type PT100, PT1000, KTY83, KTY84, or NTC and the associated measured curves are represented.

In the dialog box "**Measured Values > U(t) diagram**", the phase voltages UL1-N, UL2-N and UL3-N and the associated measured curves are represented.

In the dialog box "**Measured Values > I(t) diagram**", the conductor currents I_L1, I_L2 and I_L3 and the associated measured curves are represented.

When SIMOCODE pro V(PN) is configured and connected with a current/voltage measurement V2 following float values are displayed in addition to available readings.

Current (Float Values)	Unit
Max. Current I _{max}	A
Current I _{L1}	A
Current I _{L2}	A
Current I _{L3}	A
Average Current	A
Frequency	Hz

SIMOCODE pro V with a current/voltage measurement module is necessary for voltage measurements.

Line-to-line Voltage (Float values)	Unit
Current I _{L1}	V
Current I _{L2}	V
Current I _{L3}	V

Power/Power Factor (Float Values)	Unit
Active Power P	W
Apparent Power S	VA
Cos-phi	0/1 (1 when no motor current is flowing and/or no voltage is measured)

17.6 Service Data - Statistical Data

Service Data - Statistical Data

The following values are shown in the Motor section:

Motor	Range
Motor operating hours	0 to 1193046 h
Number of overload trips	0 to 65535
Number of starts	0 to 4294967295
Permissible starts - actual value	0 to 255
Just one start possible	See Warnings.
No start possible	See Warnings.
Motor stop time	0 to 65535 h
Motor stop time >	See Warnings.
Time until test required	0 to 255 w (weeks)
Test required	See Warnings, DM-F Test requirement.

By specifying "Motor operating hours" and "Number of starts", for example, you can decide whether motor and/or motor contactors should be replaced. To change these values enter a new value in the right hand input field and press "Set". The value is accepted by the device.

Basic Unit	Range	Description
Device operating hours	0 to 1193046 h	indicate, how long voltage supply of SIMOCODE pro was switched on. Further information: Error Buffer-Error Protocol.
Module time:		Time information for the unbuffered real time clock (only in conjunction with SIMOCODE pro V PN basic unit).
<ul style="list-style-type: none"> • Date • Time 		The real time clock can be synchronized using an NTP server or via Target System -> Command.
Time shift		Configured time difference between module time and UTC (Universal Time Coordinated) (only in conjunction with SIMOCODE pro V PN basic unit)
Int. number of parametrizations	0 to 65535	

Timer	Range
Timer 1-6 - actual value	0 to 6554 s
Counter	Range
Counter 1-6 - actual value	0 to 65535
Calculators	Range
Calculator 1-4 - output	0 to 65535

Note

Service Data - Parameters at Statistical Data online menu are read-only if "Motor is in operation" or "Feedback On" is set to 1.

17.7 Control - Status Information

Control - Status Information

In the section "Control/Status Information", you can initiate the following operations in the "Control" field:

- Control the branch via "ON<<, ON<, OFF, ON>, ON>>".
The number of buttons depends on the control function chosen. The buttons are not necessary for overload relays; only "OFF" and "ON" are shown for direct starters. This functionality matches that of an operator panel. Thus, the operator panel must be activated for operator enable.
The buttons are only active if:
 - when connecting via the system interface the operating clearances for the operator panel [OP] are set.
 - when connecting via PROFINET the operating clearances for PC/OPC-UA are set.
- Acknowledges faults with "Reset" and switch the device back to operation readiness.
- Start a hardware test with "Test".

The different messages are displayed in the "Status" field by checkboxes.

17.8 Control Stations

Control Stations

Control Stations - Operation Mode Selector

See Operation Mode Selector.

Control Stations Local Control [LC]

See Local Control [LC].

Control Station - PLC-DCS [PN]

See PLC-DCS [PN].

Control Stations PC/OPC-UA

See PC/OPC-UA

Control Stations - Operator Panel

See Operator Panel [OP].

17.9 Faults - Warnings - Status Information

Faults - Warnings - Status Information

See Faults.

See Warnings (Page 159).

See Status Information.

17.10 Faults

Faults

Different warnings are indicated via checkboxes in the "Faults" register of the target system
> Faults/Warnings/Events mask.

Controlling

Indication	Meaning/Possible cause/Acknowledgement/Error processing
Execution ON command	<p>The motor feeder could not be turned on after an ON command.</p> <p>Possible causes:</p> <ul style="list-style-type: none"> • Main circuit is interrupted (fuse, circuit breaker) • Motor contactor or contactor control is defective • Parameter execution time is too short. <p>Acknowledge with "Reset" or OFF command/counter command.</p>
Execution stop command	<p>The motor feeder could not be turned off after a Stop command.</p> <p>Possible causes:</p> <ul style="list-style-type: none"> • The contactor contact is welded • Parameter execution time is too short • The "Open" end position has not been reached during the parameterized runtime (only in the case of the "Slider" and "Valve" control functions). <p>Following fault rectification, acknowledge with "Reset".</p>
Feedback (F) ON	<p>The motor feeder could not be turned on after an ON command.</p> <p>Possible causes:</p> <ul style="list-style-type: none"> • Main circuit is interrupted (fuse, circuit breaker) • Motor contactor or contactor control is defective, "Execution time" parameter is too short. • Only in the case of the "Slider/Solenoid valve" control function. The end position "CLOSE" has not been reached during the parameterized runtime. <p>Following fault rectification, acknowledge with "Reset" or OFF command.</p>
Feedback (F) OFF	<p>The current flow in the motor feeder was interrupted without the motor feeder being turned off.</p> <p>Possible causes:</p> <ul style="list-style-type: none"> • Main circuit is interrupted (fuse, circuit breaker, main switch) • Motor contactor or contactor control is defective. <p>Acknowledge with "Reset" respectively OFF command.</p>

Indication	Meaning/Possible cause/Acknowledgement/Error processing
Test Position Feedback (TPF)	Current flows in the motor feeder even though the motor feeder is in the test position (TPF). The main circuit is not interrupted in test operation. Acknowledge with "Reset" respectively OFF command.
Power failure monitoring (UVO).	The network failure lasted longer than the configured network failure time. Following fault rectification, acknowledge with "Reset" or OFF command.
Blocked positioner	Control function "positioner": The torque switch has been activated without or before the corresponding end position switch. Possible cause: The positioner is blocked. Acknowledge the fault with "free-wheeling" with the counter command "OPEN/CLOSE". Check the slide application and the end position switches.
Double 0	Control function "positioner": Both torque switches have been activated simultaneously (DMA=0 and DMZ=0). Possible causes: <ul style="list-style-type: none"> • Open circuit torque switch • Torque switch is defective.
Double 1	Control function "positioner": Both end position switches have been activated simultaneously (RMA=1 and RMZ=1). Possible cause: <ul style="list-style-type: none"> • End position switch is defective.
End position	Slider/solenoid valve has left the final position without a command being issued. The motor feeder was turned off. Acknowledge the fault with "free-wheeling" using the counter command "OPEN/CLOSE".
Antivalence	Control function "positioner": The end position switches are not registering any antivalent signals. Possible cause: <ul style="list-style-type: none"> • Open circuit of the end position switch. Check the slide application and the end position switches. Acknowledge the fault with counter command "OPEN/CLOSE".

Protection

Indication	Meaning/Possible cause/Acknowledgement/Error processing
Overload	<p>The motor feeder was overloaded.</p> <p>Check the motor and the application which is driven by the motor.</p> <p>The motor can only be switched on again after the cooling down time has expired or after an emergency start is carried out.</p> <p>Acknowledge with "Reset", if Auto-Reset is not activated.</p> <p>Further information: Overload.</p>
Overload + loss of a phase	<p>The motor feeder was overloaded.</p> <p>Possible cause: Failure of a phase.</p> <p>Check the motor feeder and the motor.</p> <p>The motor can only be switched on again after the cooling down time has expired or after an emergency start is carried out.</p> <p>Acknowledge with "Reset", if Auto-Reset is not activated.</p> <p>Further information: Overload, Unbalance.</p>
Unbalance	<p>The limit value for the phase asymmetry was exceeded.</p> <p>Check the motor feeder and the motor.</p> <p>The motor can only be switched on again after the cooling down time has expired or after an emergency start is carried out.</p> <p>Acknowledge with "Reset".</p> <p>Further information: Unbalance.</p>
Stalled Rotor	<p>The maximum motor current has exceeded the threshold for the blocking protection.</p> <p>Possible cause: The motor is blocked.</p> <p>Please check the application which is driven by the motor.</p> <p>Acknowledge with "Reset".</p> <p>Further information: Stall.</p>
Thermistor trip level	<p>The thermistor protection has been activated.</p> <p>The temperature of the motor is too high.</p> <p>Check the motor and the application which is driven by the motor.</p> <p>The motor cannot be switched on again until the temperature has reached the switch-back point of the thermistor.</p> <p>Acknowledge with "Reset", if Auto-Reset is not activated.</p> <p>Further information: Thermistor.</p>

Safety engineering

Indication	Meaning/Possible cause/Acknowledgement/Error processing
DM-F - Safety-oriented tripping	The DM-F has tripped the enabling circuit for safety reasons. The motor can only be switched on again after the DM-F module enabling circuits have been closed. Acknowledge with "Reset", if auto-reset is not active. Further Information: See Safety-oriented tripping.
DM-F - Wiring	DM-F module wiring fault (short-circuit to ground in the sensor circuit / feedback circuit). Please check the sensor circuit / feedback circuit wiring and rectify the fault. Acknowledge with "Reset". Further Information: See Safety-oriented tripping.
DM-FL - Cross circuit	DM-F Local sensor circuit cross circuit. Please check the wiring of the two sensor circuits for cross circuiting and rectify the fault. Acknowledge with "Reset". Further Information: See Safety-oriented tripping.

Monitoring

Indication	Meaning/Possible cause/Acknowledgement/Error processing
Trip level I>	The maximum current has overshoot the trip level. Check the application which is driven by the motor. Further information: Current limits I> (upper level).
Trip level I<	The maximum current has undershot the trip level. Check the application which is driven by the motor. Further information: Current Limits I< (lower level).
Internal Earth Fault	The internal earth-fault monitoring has been activated. A fault current of too high a value is flowing. Please check the motor connection cable for damage. Acknowledge with "Reset". Further information: Internal Earth fault.
External Earth Fault	The external earth-fault monitoring has been activated. A fault current of too high a value is flowing. Check the motor connection cable for damage. Acknowledge with "Reset". Further information: External Earth fault.

Indication	Meaning/Possible cause/Acknowledgement/Error processing
Trip level P>	The real power of the motor has overshoot the trip level. Check the application which is driven by the motor. Further information: Active Power Monitoring.
Trip level P<	The real power of the motor has undershot the trip level. Check the application which is driven by the motor. Further information: Active Power Monitoring.
Trip level U<	The voltage in the motor feeder has undershot the trip level. Possible causes: <ul style="list-style-type: none"> • Undervoltage in the network • Fuse has tripped. Check the motor feeder. Further information: Voltage Monitoring.
Trip level Cos-Phi<	The power factor has undershot the trip level. Possible cause: The motor is operated without a load. Check the application which is driven by the motor. Further information: Cos-Phi Monitoring.
Analog module 1/2 Trip level 0/4-20 mA>	The measured value on the analog input has overshoot the trip level. Check the measuring station. Further information: 0/4-20 mA Signal Monitoring.
Analog module 1/2 Trip level 0/4-20 mA<	The measured value on the analog input has undershot the trip level. Check the measuring station. Further information: 0/4-20 mA Signal Monitoring.
No. of starts>	The permitted number of starts in the monitoring time frame was exceeded. The next start should not be carried out until the interlocking time has expired. Further information: Monitoring the Number of Starts.
Trip level T>	Temperature module 1/2 Trip level 0/4-20 mA< - Trip level overshoot. Check the temperature measuring station. Further information: Analog Temperature Monitoring.

Miscellaneous - General

Indication	Meaning/Possible cause/Acknowledgement/Error processing
External Fault 1 to 6	<p>A signal is pending at the input (socket) of the standard function.</p> <p>External fault 1, 2, 3, 4,5 or 6.</p> <p>Check the motor feeder.</p> <p>Acknowledgement depends on parameterization.</p> <p>Further information: External Fault (1 to 6).</p>
Bus	<p>The PROFINET communication has been or is being interrupted.</p> <p>Check the PROFINET connection (plugs, cables, etc).</p> <p>Acknowledge with "Reset", if Auto-Reset is not activated.</p> <p>Further information: Watchdog (PLC/DCS monitoring)</p>
PLC/DCS	<p>The PLC which controls the feeder was or is in the STOP state.</p> <p>Check the operating status of the PLC.</p> <p>Acknowledge with "Reset", if Auto-Reset is not activated.</p> <p>Further information: Watchdog (Bus Monitoring, PLC/DCS Monitoring).</p>
Hardware fault Basic Unit	<p>The hardware of the SIMOCODE pro basic device is defective.</p> <p>Replace the basic unit.</p>
Module fault	<p>At least one SIMOCODE pro module is not ready for use.</p> <p>Possible causes:</p> <ul style="list-style-type: none"> Connecting cable is defective or has not been plugged in correctly. Module is defective. Replace the module. <p>Acknowledge with "Reset".</p>
Temporary components	<p>Fault - Temporary components (memory module, addressing plug, PC cable).</p> <p>Replace the defective component.</p> <p>Acknowledge with "Reset".</p>
Configuration fault	<p>The configured device configuration does not match the current configuration.</p> <p>Approach: Check if all configured components are present.</p> <p>Check the actual configuration using "Configuration".</p> <p>Acknowledge with "Reset".</p> <p>Further information: Actual configuration.</p>
analog module 1/2 open circuit	<p>A wire break has occurred in the analog value measuring circuit.</p> <p>Check the measuring transducer and the measuring circuit.</p> <p>Acknowledge with "Reset".</p> <p>Further information: Analog Module.</p>

Indication	Meaning/Possible cause/Acknowledgement/Error processing
Thermistor short circuit	A short circuit has occurred in the thermistor sensor cable. Check the thermistor sensor cable and the thermistor. After fault repair acknowledge with "Reset". Further information: Thermistor.
Thermistor open circuit	A wire break has occurred in the thermistor sensor cable. Check the thermistor sensor cable and the thermistor. After fault repair acknowledge with "Reset". Further information: Thermistor.
Temperature Module 1/2 sensor fault	Either a short circuit or a wire break has occurred in the temperature sensor circuit. Check the temperature sensor and the sensor cable. Acknowledge with "Reset".
Temperature Module 1/2 out of range	The temperature sensor is yielding values which are not permitted. Check the temperature sensor. Acknowledge with "Reset".
Parameterization	Parameterization faulty: <ul style="list-style-type: none"> • Parameterize again. • Switch the control voltage off and on.
Test shutdown	The motor feeder was checked and switched off by a test switch-off. Acknowledge with "Reset".
Operational Protection Off (OPO)	The "Operational Protection Off" signal (OPO) is pending. A switched-on motor feeder was switched off. Switching on is not possible as long as the OPO signal is pending. Acknowledge with "Reset".

17.11 Warnings

Warnings

Different warnings are indicated via lamp symbols in the "Warnings" register of the target system > Faults/Warnings/Events mask.

Protection

Indication	Meaning/Possible cause/Acknowledgement/Error processing
Pre-Warning overload ($I > 115\%$)	<p>The motor feeder is in overload operation. It will be tripped within a short period of time due to overloading if this condition continues to persist.</p> <p>Please check the motor and the application which is driven by the motor.</p>
Overload	<p>The motor feeder was overloaded.</p> <p>Check the motor and the application which is driven by the motor.</p> <p>The motor can only be switched on again after the cooling down time has expired or after an emergency start is carried out.</p> <p>Acknowledge with "Reset", if Auto-Reset is not activated.</p> <p>Further information: Overload (Page 23).</p>
Overload + loss of a phase	<p>The motor feeder was overloaded.</p> <p>Possible cause: Failure of a phase.</p> <p>Check the motor feeder and the motor.</p> <p>The motor can only be switched on again after the cooling down time has expired or after an emergency start is carried out.</p> <p>Acknowledge with "Reset", if Auto-Reset is not activated.</p> <p>Further information: Overload (Page 23), Unbalance (Page 28).</p>
Unbalance	<p>The limit value for the phase asymmetry was exceeded.</p> <p>Check the motor feeder and the motor.</p> <p>The motor can only be switched on again after the cooling down time has expired or after an emergency start is carried out.</p> <p>Acknowledge with "Reset".</p> <p>Further information: Unbalance (Page 28).</p>
Stalled Rotor	<p>The maximum motor current has exceeded the threshold for the blocking protection.</p> <p>Possible cause: The motor is blocked.</p> <p>Please check the application which is driven by the motor.</p> <p>Acknowledge with "Reset", if Auto-Reset is not activated..</p> <p>Further information: Stall (Page 29).</p>
Thermistor trip level	<p>The thermistor protection has been activated.</p> <p>The temperature of the motor is too high.</p> <p>Check the motor and the application which is driven by the motor.</p> <p>The motor cannot be switched on again until the temperature has reached the switch-back point of the thermistor.</p> <p>Acknowledge with "Reset", if Auto-Reset is not activated.</p> <p>Further information: Thermistor (Page 30).</p>

Safety engineering

Indication	Meaning/Possible cause/Acknowledgement/Error processing
	<p>The DM-F Local / DM-F PROFIsafe enabling circuits have not been opened and closed again within the configured time period.</p> <p>The function of the enabling circuit relay contacts can only be tested when they are switched.</p> <p>Further Information: See monitoring - interval for mandatory testing (Page 67).</p>
DM-F - Safety-oriented tripping	<p>The DM-F has tripped the enabling circuit for safety reasons. The motor can only be switched on again after the DM-F module enabling circuits have been closed.</p> <p>Further Information: See Safety-oriented tripping.</p>
DM-F - Simultaneity	<p>The DM-F Local has detected a discrepancy fault in the two-channel sensor circuit.</p> <p>Please check the contact blocks in the sensor circuit.</p>
DM-FL - Feedback circuit	<p>The DM-F has detected a fault in the feedback circuit.</p> <p>When the enabling circuit is being switched on, the feedback circuit must be closed.</p> <p>Please check the feedback circuit of the DM-F Local and/or the DM-F PROFIsafe.</p>

Monitoring

Indication	Meaning/Possible cause/Acknowledgement/Error processing
Warning level I>	<p>The maximum current has overshoot the Warning level.</p> <p>Check the application which is driven by the motor.</p> <p>Further information: Current limits I> (upper level) (Page 50).</p>
Warning level I<	<p>The maximum current has undershot the Warning level.</p> <p>Check the application which is driven by the motor.</p> <p>Further information: Current Limits I< (lower level) (Page 51).</p>
Internal Earth Fault	<p>The internal earth-fault monitoring has been activated.</p> <p>A fault current of too high a value is flowing.</p> <p>Please check the motor connection cable for damage.</p> <p>Acknowledge with "Reset".</p> <p>Further information: Internal Earth fault (Page 43).</p>
External Earth Fault	<p>The external earth-fault monitoring has been activated.</p> <p>A fault current of too high a value is flowing.</p> <p>Check the motor connection cable for damage.</p> <p>Acknowledge with "Reset".</p> <p>Further information: External Earth fault (Page 45).</p>

Indication	Meaning/Possible cause/Acknowledgement/Error processing
Warning level P>	The real power of the motor has overshoot the Warning level. Check the application which is driven by the motor. Further information: Active Power Monitoring (Page 55).
Warning level P<	The real power of the motor has undershot the Warning level. Check the application which is driven by the motor. Further information: Active Power Monitoring (Page 55).
Warning level U<	The voltage in the motor feeder has undershot the Warning level. Possible causes: <ul style="list-style-type: none"> • Undervoltage in the network • Fuse has tripped. Check the motor feeder. Further information: Voltage Monitoring (Page 52).
Warning level Cos-Phi<	The power factor has undershot the Warning level. Possible cause: The motor is operated without a load. Check the application which is driven by the motor. Further information: Cos-Phi Monitoring (Page 54).
Warning level 0/4-20 mA>	The measured value on the analog input has overshoot the Warning level. Check the measuring station. Further information: 0/4-20 mA Signal Monitoring (Page 60).
Warning level 0/4-20 mA<	The measured value on the analog input has undershot the Warning level. Check the measuring station. Further information: 0/4-20 mA Signal Monitoring (Page 60).
No. of starts>	The permitted number of starts in the monitoring time frame was exceeded. The next start should not be carried out until the interlocking time has expired. Further information: Monitoring the Number of Starts (Page 64).
Just one start possible	The start after the next one should not be carried out until the interlocking time has expired.
No start possible	The permitted number of starts in the monitoring time frame was achieved. The next start should not be carried out until the interlocking time has expired. Acknowledge with "Reset".
Motor operating hours >	The configured limit value for the motor operating hours has been exceeded. Implement the maintenance measures planned for the feeder.
Motor stop time >	The configured limit value for the stopped time has been exceeded. Implement the maintenance measures planned for the feeder. If possible, switch on the feeder.

Indication	Meaning/Possible cause/Acknowledgement/Error processing
Warning level T>	Temperature module 1/2 - warning level overshoot. Check the temperature measuring station. Further information: Analog Temperature Monitoring (Page 65).
DM-F - Test requirement	The DM-F Local / DM-F PROFIsafe enabling circuits 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. Please adopt the measures intended for this case.

Miscellaneous - General

Indication	Meaning/Possible cause/Acknowledgement/Error processing
External Fault 1 to 6	A signal is pending at the input (socket) of the standard function. External fault 1, 2, 3, 4,5 or 6. Check the motor feeder. Further information: External Fault (1 to 6).
Analog Module 1/2 open circuit	A wire break has occurred in the analog value measuring circuit. Check the measuring transducer and the measuring circuit. Acknowledge with "Reset". Further information: Analog Module.
Thermistor short circuit	A short circuit has occurred in the thermistor sensor cable. Check the thermistor sensor cable and the thermistor. After fault repair acknowledge with "Reset". Further information: Thermistor (Page 30).
Thermistor open circuit	A wire break has occurred in the thermistor sensor cable. Check the thermistor sensor cable and the thermistor. After fault repair acknowledge with "Reset". Further information: Thermistor (Page 30).
Temperature Module 1/2 sensor fault	Either a short circuit or a wire break has occurred in the temperature sensor circuit. Check the temperature sensor and the sensor cable. Acknowledge with "Reset".
Temperature Module 1/2 out of range	The temperature sensor is yielding values which are not permitted. Check the temperature sensor. Acknowledge with "Reset".

17.12 Status Information

Status Information

Different events are indicated in the plain language in the "Events" register of the Target system > Faults/Warnings/Status information mask:

Indication	Meaning/Possible cause/Acknowledgement/Error processing
Parameter blocking during startup active	<p>The start-up parameter block prevents SIMOCODE pro parameters which could be saved in the controller from being accepted.</p> <p>The block must be set when SIMOCODE ES or Device Integration Manager is used for parameterizing.</p> <p>The block may not be set when SIMOCODE pro is integrated in STEP 7 via the SIMOCODE pro Object Manager (OM) or SIMOCODE pro C was parameterized via GSD.</p>
Configuration fault	<p>The configured device configuration does not match the current configuration.</p> <ul style="list-style-type: none"> • Please check if all configured components are present. • Check the actual configuration using "Configuration". <p>Rectify the fault; Reset.</p>
Required function is not supported	<p>At least one parameterized function is not supported by the product version of the Basic Unit.</p> <ul style="list-style-type: none"> • Only activate functions that are supported by the product version of the Basic Unit. For example, SIMOCODE pro V Basic Units with the product version E01 do not support the voltage measuring module, the temperature module and the analog module.
Parameter is faulty	<p>There is a fault in the parameter data transmitted to the device. Faults can occur in the parameter data, for example, if the device parameterization was not carried out with SIMOCODE ES or Device Integration Manager.</p> <ul style="list-style-type: none"> • Check the parameter data (data records 130 - 133) transmitted to the device to make sure that the contents are correct.
Changing of the parameters is not permissible in the current mode	<p>Changing of a least one parameter is not possible in the current operating state. A lot of parameters can only be changed when the motor feeder is switched off and is not in the "Remote" operating mode.</p>
Wrong password	<p>The SIMOCODE pro parameters are protected by a password. An attempt was made to change the parameters without entering the password.</p> <ul style="list-style-type: none"> • If you do not know the password, new parameters cannot be set until the factory default settings have been reset.

Indication	Meaning/Possible cause/Acknowledgement/Error processing
DM-F Safety-oriented tripping	<p>The DM-F Local / DM-F PROFIsafe have tripped the enabling circuit for safety reasons.</p> <p>The motor can only be switched on again after the DM-F module enabling circuits have been closed.</p> <p>Further information: See Safety-oriented tripping.</p>
Monitoring - interval for mandatory testing	<p>The DM-F Local / DM-F PROFIsafe enabling circuits have not been opened and closed again within the configured time period.</p> <p>The function of the enabling circuit relay contacts can only be tested when they are switched.</p> <p>Further Information: See monitoring - interval for mandatory testing.</p>
DM-F Local o.k.	The DM-F Local is ready for operation.
PROFIsafe active	The DM-F PROFIsafe is in the "PROFIsafe active" state.
DM-F Local configuration mode	<p>The DM-F PROFIsafe is in "Configuration mode".</p> <p>Please complete the configuration.</p>
DM-F Local actual configuration fault	<p>The effective configuration of the DM-F Local does not correspond to the parameterized set configuration.</p> <p>Please check whether the effective configuration corresponds to the parameterized set configuration and correct the effective configuration as necessary by setting the DIP switches or correct the parameterized set configuration.</p>
DM-F Local waiting for start-up test	The DM-F Local is in the "Waiting for start-up test" state.
DM-F incorrect PROFIsafe address or incorrect PROFIsafe	<p>The specified parameters of the PROFIsafe profile are faulty, or the specified PROFIsafe address does not correspond to the configuration.</p> <p>Check the PROFINET/PROFIsafe parameters of SIMOCODE pro that were set on the controller.</p>
Status - Enabling circuit closed	The DM-F Local / DM-F PROFIsafe enabling circuits are closed.
Module supply voltage is not present	<p>Supply voltage on the DM-F is too low or not present.</p> <ul style="list-style-type: none"> • Please check whether the terminals have been wired correctly. • The DM-F module might be defective. Replace the module.
Initialization module write-protected	<p>The initialization module is completely write-protected.</p> <p>Deactivate write protection of the initialization module.</p>
Initialization module write-protected, parameter changes not allowed	<p>The initialization module is completely write-protected.</p> <p>Reparameterization of SIMOCODE pro is denied because the initialization module is write-protected.</p> <p>Deactivate the write protection of the initialization module.</p>

Indication	Meaning/Possible cause/Acknowledgement/Error processing
Initialization module identification data write-protected	<p>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.</p> <ul style="list-style-type: none"> • Select a parameterization with identical addressing and I&M data • 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 deleted	The initialization module was deleted and is now back in delivery state.
Memory module read in	The parameters of the memory module were read into SIMOCODE.
Memory module deleted	The memory module was deleted and is now back in delivery state.
Memory module programmed	The reparameterization was accepted in the memory module.
Memory module write-protected	<p>The Memory module is completely write-protected.</p> <p>Deactivate write protection of the initialization module.</p>

17.13 Test Online

Test Online

Test

In this dialog box, you can;

- Select device-internal outputs (sockets) and show logic conditions
- Select device-internal inputs (plugs) and set their input signal 0 or 1
- Show the logic conditions of the device-internal inputs (plugs).

This procedure can, for example, be used to test the functioning of truth tables.

Read and set analog function block - input

In this dialog box, you can select the device-internal inputs (plugs) and set their input signals 0 or 1.

Function Block - Select Output

In this dialog box, you can select device-internal outputs (sockets).

Function Block - Read Output

In this dialog box, you can select device-internal outputs (sockets) and show logic conditions.

Function Block - Read and Set Input

In this dialog box, you can select device-internal inputs (plugs) and set their input signals 0 or 1.

17.14 Hardware inputs and outputs

Hardware inputs and outputs

The "Hardware inputs and outputs" dialog displays the current status of the modules.

17.15 Device - Trend

Device - Trend

With the menu command Device > Trend you can:

- Display the progress of the various measured values once you have already established a connection with SIMOCODE pro. A minimum of one and a maximum of five measured values can be selected.
- Display the level change of up to any five binary signals (sockets/plugs) of SIMOCODE pro. Binary inputs and outputs can be displayed.

17.16 Trend - Settings

Trend - Settings

In the menu Trend > Settings you can select the measured values that you would like to see in the trend dialog. To do so, check the relevant checkboxes.

Note

Once five measured values have been activated the remaining selection options are disabled. It is not possible to select another measured value until one of the checkboxes has been deactivated again.

17.17 Trend - Trend

Trend - Trend

In the menu **Trend > Trend** the measured curves for the selected measured values are displayed. The various setting options for measured curves and the meaning of the checkboxes are described in the operating manual "PCS 7 Process Control System - Device Integration Manager".

17.18 Analog value recording

17.18.1 Analog Value Recording - Gradient

Analog Value Recording - Gradient

Gradient of any value (1 word/2 byte) in SIMOCODE pro:

- Y-axis: Analog value
- X-axis: time
- Display "Trigger event occurred" and "Analog value record currently".

Troubleshooting Download Failures

18.1 Troubleshooting Download Failures

In case of download failures, possible causes can be seen in following online menu(s).

Faults/warning /status information

Device -> (Faults/warning /status-information) ->Status Information-> parameterizing

Parameterizing options shows following flags/status from device which can lead to download failures:

- Parameter blocking during start-up active
- Parameter change in current operation state not allowed
- Required functions not supported
- Wrong parameter
- Wrong password
- Password protection active
- Factory setting loaded
- Parameter setting active.

Cause of download failures

- Password Protection Activated but wrong or no password entered.

The SIMOCODE pro parameters are protected by a password. An attempt was made to change the parameters without entering the password or wrong password was entered. To change parameters please use the correct password. If you do not know the password, new parameters cannot be set until the factory default settings have been reset.

In case of password protection active user can disable the password in Device -> Password. The menu gives options to change password/remove password.

- Parameter change in current operation state not allowed + Wrong parameter.
- Error during download to switching device. Possible causes:
 - Motor is on
 - Remote mode is activated
 - ON command is present
 - Input Feedback On is set to the value = 1
 - Wrong basic device in device configuration
 - Initialization Module write protected
 - Calculators (only pro V *E03* and higher)
 - Current Measuring Module: Value not in valid range.

To check further information user can go to:

- Check and Status related to device state and motor operation
 - Device -> Control / Status information
 - Device -> faults/warning/Status information
- Check and reset the device states or parameter-value in respective menus, few examples:
 - Device -> Command (write-protection on/off)
 - Device -> Control / Status information (Motor control or device mode)
 - Overload protection -> Current value/transformation ratio