THORWARE Simocode DTM

MANUAL

THORSIS
TECHNOLOGIES

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Note: ifak system GmbH is now Thorsis Technologies GmbH. The still visible logos and references to the ifak system GmbH in the pictures are therefore not current.

Table of content

1.   Introduction

The TW SIMOCODE DTM is a configuration tool according
to the FDT specification 1.2 to configure the
drive control SIMOCODE-DP of Siemens

1.1   Simocode-DP

1.1.1   Protection and Control

SIMOCODE-DP (Siemens Motor Protection and Control Device - distributed I/O device) is a motor protection and control device with communication capability which can be linked to the PROFIBUS-DP. It protects three-phase loads (1.25 A - 820 A) against thermal overloading by means of integrated motor protection functions. All protection functions can be parameterized to respond by issuing a warning or shutting down the controller.

The SIMOCODE-DP assumes control of the motor feeder by means of four freely assignable inputs and outputs (which can be expanded to include a further 8 inputs and 4 outputs) and the predefined control functions (direct-on-line/reversing starters etc.). You can, however, also configure your own control functions by means of integrated truth tables, timers and counters.

1.1.2   Communication

The SIMOCODE-DP also ensures that the load feeders and process control level communicate efficiently.
The system communicates with the automatic control level via the PROFIBUS-DP.

1.1.3   Diagnosis

The SIMOCODE-DP can also operate as an independent functional unit without communicating with other systems.
The SIMOCODE-DP is a distributed system which means that all mechanisms for protecting and controlling the motor
will continue to function normally even if communication fails.

1.1.4   Function Overview

Current-dependent Motor Protection

The basic unit features several protection mechanisms for current-dependent motor protection:

• Overload protection
• Current imbalance
• Phase failure
• Blocking protection
• Current limit values

Thermistor Motor Protection

Device types 3UF50.1-A. enable thermistors for monitoring the motor temperature to be connected.
The following sensor types can be connected:

• Binary PTC
• Analog PTC
• Analog NTC

Earth Fault Detection

The basic unit incorporates:

- an internal earth fault detection facility. In the case of motors with three-wire connection systems, the device detects a possible earth fault current from the current balance.
- an external earth fault detection facility (device types 3UF50.1-B). The basic unit evaluates rated residual currents via a summation current transformer (3UL22, Catalog NSK, Part 4) which is connected externally.

Control Functions

The system incorporates the following parameterizable control functions:

- Direct-on-line starter
- Reversing starter
- Star-delta starter
- Pole-changing control
- Dahlander circuit
- Gate valve control
- Solenoid valve
- SIKOSTART 3RW22

Communication

The system is equipped with two standard interfaces:

- PROFIBUS-DP
- RS 232 for connecting a PC with Win-SIMOCODE-DP or a hand-held controller

Signal Processing in the Feeder

The system also features a number of additional, configurable functions:
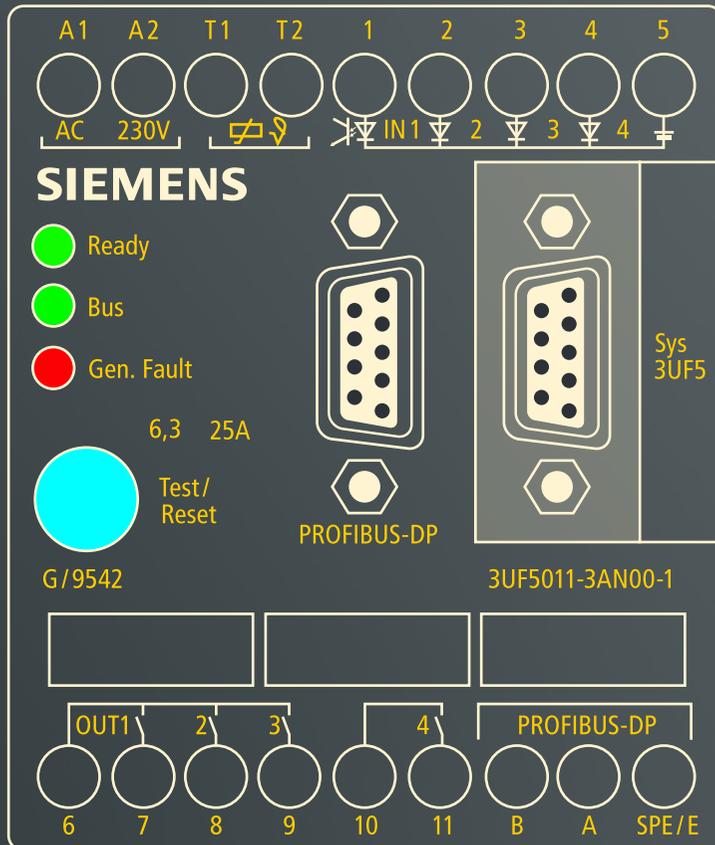
- Signal matching
- Truth tables
- Timers
- Counters

Data

SIMOCODE-DP supplies data such as:

- Operating current
- Operating hours
- Number of switching cycles
- Tripping current

1.1.5   SIMOCODE-DP Basic Unit

The SIMOCODE-DP protects motors in the load feeder against over-loading, phase failures and current imbalance by means of stored current-time functions (tripping characteristic). In the event of an overload, the SIMOCODE-DP responds either by shutting down the contactor controllers or by issuing a warning.

The basic unit measures the current of the three phases using an integrated current transformer. The basic unit detects imbalances greater than approx. 40 % and phase failures.

You can find further information on measuring small motor currents in the enclosed supplement.

You must select the appropriate device type in accordance with the magnitude of the motor current:

- Feed-through technique up to 100 A
- Bar connection technique from 50 A to 820 A, also for direct mounting on Siemens contactors

1.1.6 Expansion Module

20   21   22   23   24   25   26   27   28

IN 1   2   3   4   5   6   7   8

Sys
3UF5

Sys
3UF5

<300V
AC/DC   OUT1   2   3   4

30   31   32   33   34   35   PE
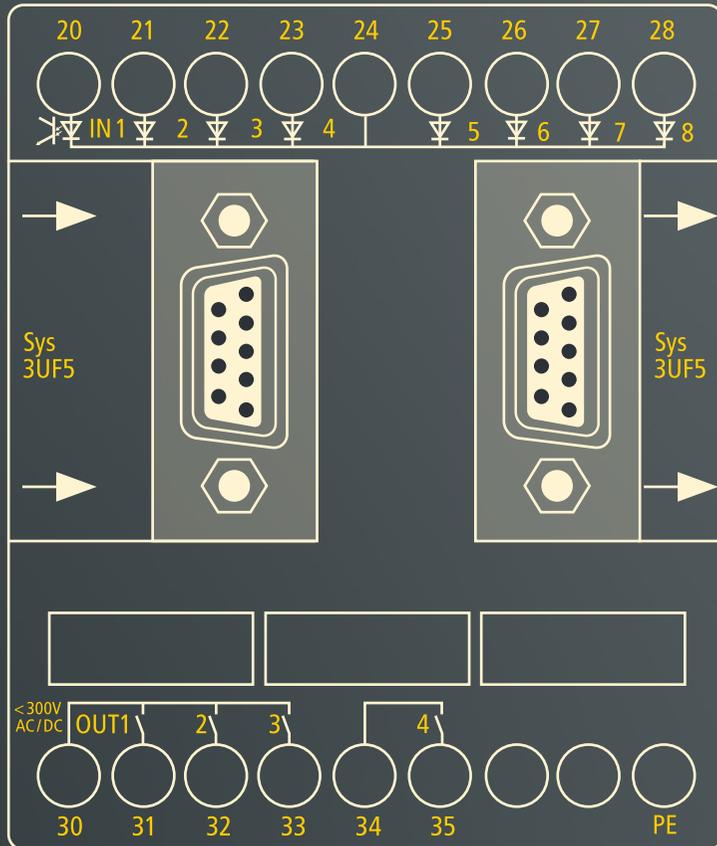
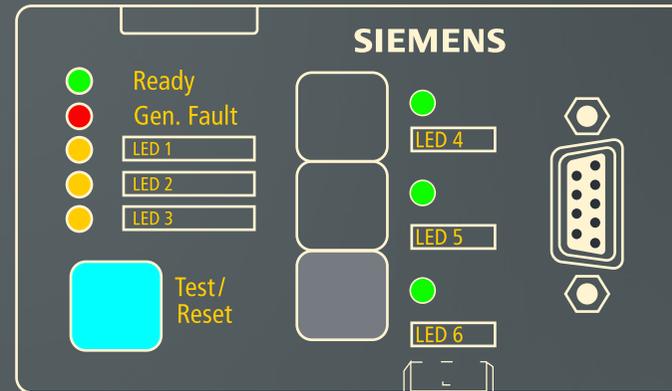You will require the expansion module to integrate an additional eight inputs and four outputs in the system.

1.1.7 Operator Panel

SIEMENS

Ready
Gen. Fault
LED 1
LED 2
LED 3

LED 4

LED 5

LED 6

Test/
Reset

The operator panel has three keys which are used, for example, to control a motor from the cabinet door (On1, On2, Off) and furthermore 6 LEDs which can be used to indicate various states.

You can assign key functions and LED indicators with TW SIMOCODE DTM in accordance with the specific requirements of the application.

1.2   TW Simocode DTM

TW SIMOCODE DTM is a DTM according to the FDT specification 1.2. The DTM communicates with the SIMOCODE-DP system via PROFIBUS-DP (in the sense of FDT via a PROFIBUS-DP Communication-DTM).

The user interface enables you to:
- enter and modify device parameters
- use online display and diagnostic functions
- use online control and signaling functions

Once you have selected a control function with SIMOCODE-DP, you must then parameterize the device.

Parameterize here means:
- selecting suitable values for CLASS or for the motor set current, for example
- establishing internal connections

You can establish logical connections between individual device functions within the system, i.e. you can establish internal connections (see example on "Assigning Logical Outputs"). It is thus possible, for example, to assign a device input to an auxiliary control input (e.g. reset).

You can use these buttons to open the window showing the outputs (sockets) inside the device and can assign the outputs by mouse click.
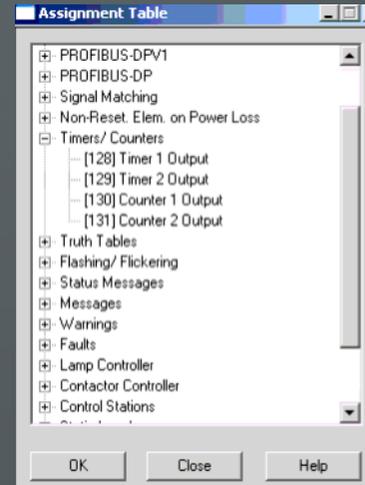
You can use online functions to control the device, read and edit display and diagnostic data.

1.2.1   Configuration of TW SIMOCODE DTM

It is possible to define several DTM specific settings in the Windows registry.

The registry path "HKEY_LOCAL_MACHINE\SOFTWARE\ [WOW6432Node\]Thorsis Technologies\SIMOCODE DTM" contains the following entries:

- Configuration: bit array for several settings
  - Bit 0: DTM allows to change bus address and baudrate
- UpdateRate: update rate for the online dialogs Control/Signals, Display/Diagnostics, Statistical Data and Test

1.3 Examples

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1.3.1 Assigning Logical Outputs

The aim of the following example is to illustrate the principle of defining logical assignments:

You want to switch output relay 2 on the basic unit with a signal at input 4.

Proceed as follows:

1. Select the "Parameter" in Win-SIMOCODE-DP
2. Click on "Device outputs/LEDs"
3. Click on "Basic unit"
4. Click on the [>>] button in the field Out 2
5. Then click on [003] GG:IN4 under "Basic unit" in the list that appears
6. Confirm your selection by clicking on the OK button

Initial situation
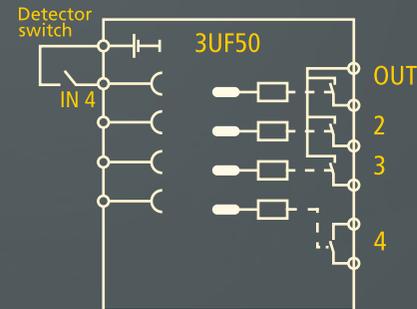
Assigning output relay 2 to input 4
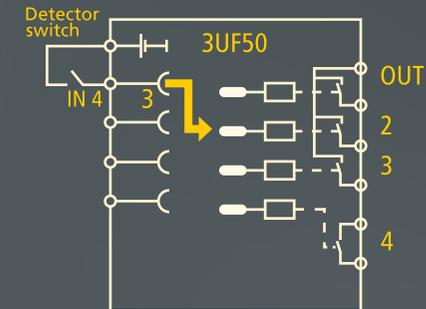
2. Offline/Online Parameterization

The Dialog "Offline Parameterization" resp. "Online Parameterization" offers all Possibilities to configure the drive control SIMOCODE-DP.

By using the tree view the several pages to configure the parameters are selectable.

If the DTM in offline state all changes and settings are stored local in the DTM and are not send to the device.

If later the DTM is in online state, it is possible to transfer these changes to the drive control by perform a parameter download.

If the dialog "Online Parameterization" is opened in online state, the changes are transfered to the device directly after pressing the buttons "OK" resp. "Apply".
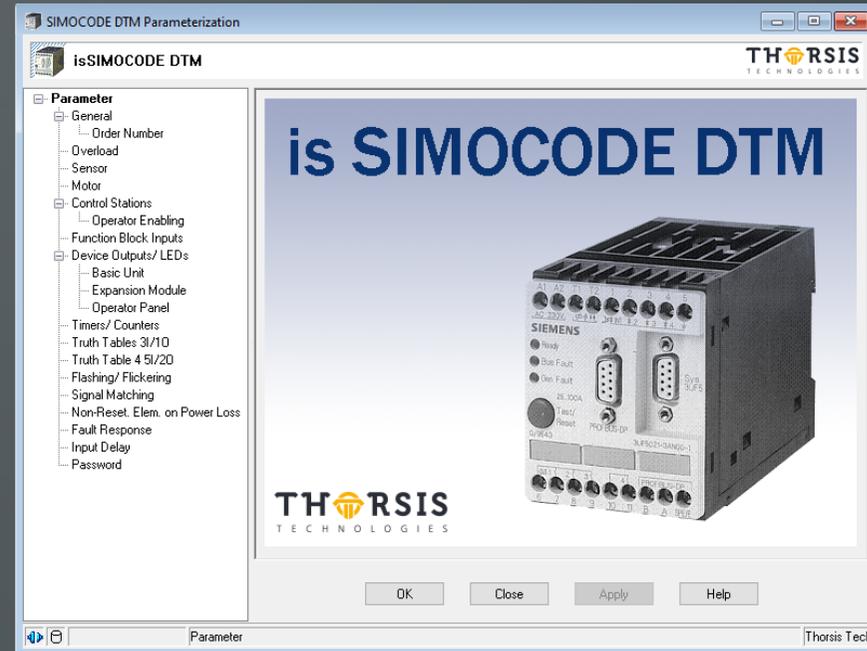
2.1 General

The page shows general information about the device.

The designation and comment are internal information to enable you to assign the device (you can specify this information).

The Button "..." opens the page "Order Number".

2.1.1 Order Number

The device hardware differs in a number of respects in order to cover a wide range of different applications

The following information is required in order to be able to configure the parameters correctly with Win-SIMOCODE-DP:

• what setting range does the device have for the motor current Ie (Type of Construction)
• are the device outputs monostable or bistable in the event of a control supply voltage failure? (Output Relays)
• does the device have an input for thermistor motor protection or for external earth fault detection (Input Functionality)

The necessary information is encoded in the order number.
If the DTM is in offline state these settings (and therewith the order number) are changeable. If the DTM goes in online state the information is get from device and no further changeable.

You can find further information on the device types in the Catalog "Low Voltage-Switchgear" (NSK).

2.2   Overload

This page is used to define all of the values which are necessary to protect the load feeder against overloading:

Response – Overload
Here you can specify whether SIMOCODE-DP is to respond to an overload by shutting down the contactor controller or by issuing a warning.

Class
Class (trip class) varies the time during which SIMOCODE-DP must trip. The class specifies the maximum time during which a protective device must trip from the cold state at 7.2x the set current (motor protection to IEC 947). Please note that it may be necessary to derate the permissible three-phase AC current of the motor contactor for startups > class 10. The data (for the rated currents Ie/three-phase AC) can be found in Appendix D.5 of the SIMOCODE-DP System Manual.

Load
Here you can specify whether SIMOCODE-DP is to protect a single-phase or three-phase load.

Reset
Here you can set a manual or automatic reset. SIMOCODE-DP responds in the following ways in the event of a fault or malfunction:

- the contactor controllers are deactivated
- the LED "Gen. Fault" lights up on the basic unit and operator control block; if bus faults occur, the "Bus" LED is extinguished

The malfunctions must be rectified and the faults acknowledged with a reset in order to return the SIMOCODE-DP to its normal operating state.

Stalled Rotor
When a specific settable current value is reached, SIMOCODE-DP assumes that the load is blocked and shuts down the contactor controller instantaneously. You can enter a limit value which, when exceeded, causes SIMOCODE-DP to shut down the contactor controller instantaneously. This value is defined as a percentage of the rated current In. Block protection does not become active until the class time has expired (for bridging the startup phase).

Cooling Time

Cooling time is the time specified for the cooling characteristic after which a reset can be performed following overload tripping. Power failures which occur during this time result in the time interval being extended. The recovery time after overload tripping is at least 5 minutes.

Idle Time

Idle time is a time interval specified for the cooling characteristic when the motor is shutdown under normal operating conditions, i.e. not as a result of overload tripping. The "thermal memory" of the SIMOCO-DE-DP is erased after this time interval has expired and a cold start can then be performed. Frequent startups are thus possible. The following diagram shows the cooling characteristic with and without the idle time:

Motor
On
Off
t

Without Idle Time
υ
Tripping limit
Overload tripping
t

With Idle Time
υ
Tripping limit
No Overload Tripping
Idle Time
t
Thermal Memory is erased after idle time has expired
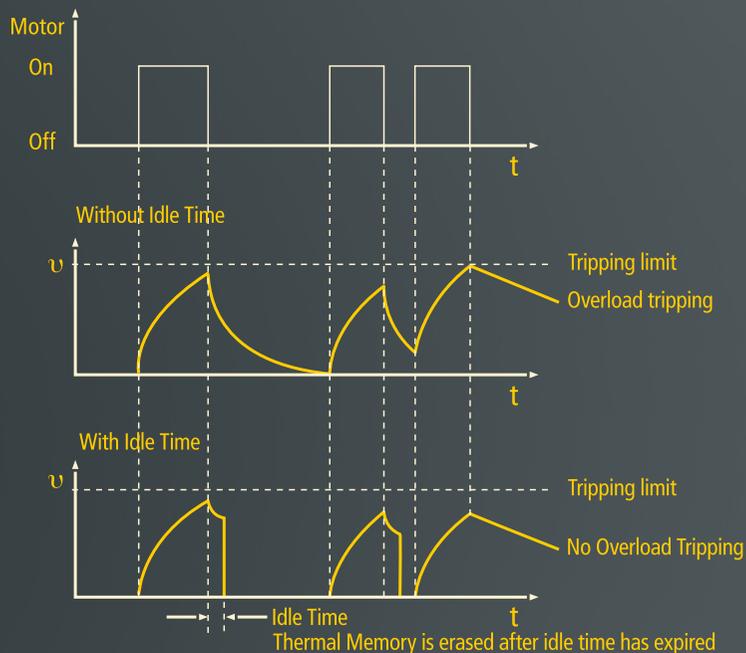
Set Currents

Here you can enter the set current which the feeder (switching devices and motor) can carry under uninterrupted continuous operating conditions. Set current 2 need only be entered for the operating mode "Fast" for Dahlander circuits or pole-changing control. Otherwise the value "0" is entered.

Current Limits

You can enter an upper and/or a lower current limit value.

Examples:

- "Stirred mass too viscous", i.e. upper current limit value overshot
- "Idling because drive belt is torn", i.e. lower current limit value undershot

The current limit values do not become active until the class time has expired (for bridging the startup phase). If these limit values are undershot or overshot, SIMOCODE-DP responds either by:

- shutting down the contactor controller or
- by issuing a warning

You can specify the desired response in the "Response" mask. The response threshold for the current limit values can be specified as a percentage of the set current. Current limit values can range from 20 % to 1000 % of the parameterized set current.

2.3   Sensor

Depending on the device type, you can either connect a thermistor or an internal or external earth fault detector to the SIMOCODE-DP basic unit.

Thermistor Motor Protection
You can connect a thermistor to device types 3UF50.1-3A.. in order to measure the temperature directly.

As soon as the selected resistance limit values are exceeded, the SIMOCODE-DP responds either by:
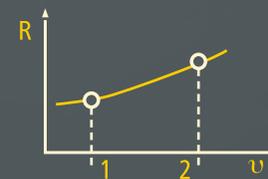
• shutting down the contactor controller or
• issuing a warning

The desired response can be set in the field "Response".
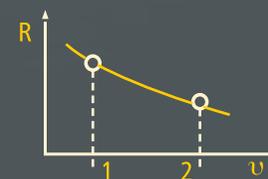Es können drei Fühlerarten ausgewertet werden:

• PTC binary: Either "warning" or "shutdown" can be set

• PTC analog: Two thresholds can be evaluated, 1. Warning and 2. Shutdown

• NTC analog: Two thresholds can be evaluated, 1. Warning and 2. Shutdown

Internal Earth Fault Detection

Internal earth fault detection is only suitable for motors with three-wire connection systems and for grounded networks. Internal earth fault detection covers two operating conditions:

- Normal operation up to 2 x Ie. The current operating current must be less than 2 x the set current Ie. Fault currents > 30 % of the set current Ie are detected
- Startup or overload greater than 2 x Ie. The current operating current is greater than 2 x the set current Ie. Fault currents > 15 % of the motor current are detected

External Earth Fault Detection

You can connect a 3UL22 summation current transformer to device types 3UF50.1-3B.. .
This is used to evaluate rated residual currents of 0.3 A / 0.5 A / 1 A. Response delay > 200 ms. As soon as the earth fault limit values are exceeded, the SIMOCODE-DP responds either by:

- shutting down the contactor controller or
- issuing a warning

The desired response can be set in the field "Response".

2.4   Motor

This page is used to define the behavior of the motor feeder and to select a control function.

Control Function

The drop-down list box Control function enables you to select one of the nine control functions implemented.

SIMOCODE-DP uses the parameterizable control functions to control the motor contactors, monitor execution of commands by means of checkback signals, check operational sequences and lock the motor contactors when certain control functions are carried out.

The following control functions can be set:

- Overload: SIMOCODE functions as a straightforward overload re-lay with the settings entered for motor protection and the current limit value. This control function is active for contactor controller QE3. Control stations are ignored; "Test", "Reset", "Ext.CS1 to 3" and "Emerg. start" are available as auxiliary control inputs.

- Direct Starter: SIMOCODE-DP uses this control function to switch a motor on and off via contactor controller QE1.

- Rerversing Starter: SIMOCODE-DP uses this function to control the direction of rotation of AC motors via contactor controllers QE1 and QE2. The direction of rotation can only be reversed if the motor is switched off beforehand and the parameterizable locking time has expired.

- Star Delta Starter: During startup, the stator winding of a motor is first star-connected and then delta-connected by SIMOCODE-DP via contactor controllers QE1-QE3. Switchover is current-dependent with falling current at 0.9 x Ie or time-dependent after 2 x class time.

- Pole Changing Starter, Dahlander Starter: SIMOCODE-DP uses these control functions to switch between two motor speeds via contactor controllers QE1, QE2 (and QE3 for DAHL). Stator windings with different pole numbers are switched on here by SIMOCODE-DP.

- Pole-changing control:
  speed can only be switched after the "Off" command. The parameterizable locking time must have expired.
- Dahlander circuit:
  speed can be switched directly. The locking time is not active.

⚠️ You must parameterize two set currents and two current limit values for Pole Changing Starter and Dahlander Starter. Depending on the current range, current measurements can, in many cases, be carried out directly via SIMOCODE-DP. Otherwise you will require a basic unit with a setting range of 1.25 to 6.3 A and two external 3UF18 current transformers. The current transformers supply a secondary rated current of 1 A. You can find further information on measuring small motor currents in the enclosed supplement.

- Positioner: SIMOCODE-DP uses this function to control actuators via contactor controllers QE1 and QE2. This control function evaluates the auxiliary control inputs "CSO", "CSC", "TO" and "TC". The actuator must, therefore, be equipped with a torque and/or limit switches. The auxiliary control inputs must be assigned accordingly. We recommend that inputs and outputs of the basic unit be used for this control function to enable shutdown to take place after approx. 50 ms.

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The gate-valve controller can initiate shutdown in five different ways at the limit positions:

Version	Close ← Torque Close	Limit Close	Limit Open	Open → Torque Open
	TC	CSC	CSO	TO
ECOD 1	non active	active	active precondition	non active
ECOD 2	active	active precondition	active precondition	active
ECOD 3	active	active precondition	active	non active
ECOD 4	non active	active	active precondition	active
ECOD 5	Antvalent activ		Antvalent activ	

- non active for switch off (cyan)
- active precondition for: (light yellow)
- active (orange)

You can assign the 3RW22 signal "end of startup" to the auxiliary control input "Ext.CS1", for example. This signal is thus available via PROFIBUS-DP.This time interval must be greater than the gentle deceleration time of the 3RW22.

Times

In the Times input fields you can set the standard time functions for motor feeders.

Various time intervals which are active for the control functions can be set in the "Motor" mask. All of the time intervals listed can be set to values between 0.5 s and 60 min. If "0:0.0" is entered, the corresponding time monitor is deactivated.

- Solenoid Valve: SIMOCODE-DP uses this control function to switch solenoid valves on and off via contactor controller QE1. This control function evaluates the auxiliary control inputs "CSO" and "CSC". The solenoid valve must, therefore, be equipped with switching outputs for "Valve open" and "Valve close". The auxiliary control inputs must be assigned accordingly.

- Soft Starter (SIKOSTART): SIMOCODE-DP uses this function to control a SIKOSTART® 3RW22 device via contactor controllers QE1-QE3. 3RW22 is thus linked to the PROFIBUS-DP via SIMOCODE-DP.Basically speaking, the SIKO control function behaves in the same way as the DIRE control function. Furthermore, contactor controller QE2 is reset after a delay (approx. 3 s after I = 0) and the auxiliary control input "Ext.Fa1" is evaluated when the "off" command is issued. QE3 is typically set for 20 ms when "Ext.Fa1" is acknowledged.

- Run Time: During this time interval, the checkback "Current flowing" must be present after the "On" command and the checkback "No current" after the "Off" command. The appropriate limit positions must be reached during this time interval for gate valves or valves. If this is not the case, a fault is signaled and the QE outputs are deactivated (except in the case of gate valves). The activated time interval is valid for all control functions. The time monitor is deactivated if you enter 0.

- Check-Back Time: time interval during which
  1. a power failure may occur when the motor is switched on
  2. a current may be detected when the motor is switched offwithout a fault being signaled

- Lock-Out Time: For switching over speeds or directions of rotation. The flywheel of the drive must come to a standstill during this time interval before the next switching command can be carried out. For reversing starters (REV) and pole changing switches (PREV) only. SIMOCODE-DP switches instantaneously if you enter 0.

The settings in the "Motor" mask affect the behavior of the software outputs QE1, QE2 and QE3 which drive the SIMOCODE relay outputs which, in turn, activate or deactivate the contactors of the load feeder.

QLE1, QLE2, QLA and QLS are software outputs which drive the indicator lamps. Depending on the selected settings, the indicators either flash, flicker or are continuously lit.

You can evaluate a total of 80 signals and transfer them via the PROFIBUS-DP or assign them to the SIMOCODE hardware outputs.

2.5   Control Stations

Control points are locations from which switching commands (e.g. motor on or motor off) can be issued. A control point can be a:

- Local control point in the immediate vicinity of the motor
- PROFIBUS-DP, e.g. switching commands from a PLC
- Monitoring and control station as additional control option
- Operator panel, e.g. situated in the door of the switchgear cabinet
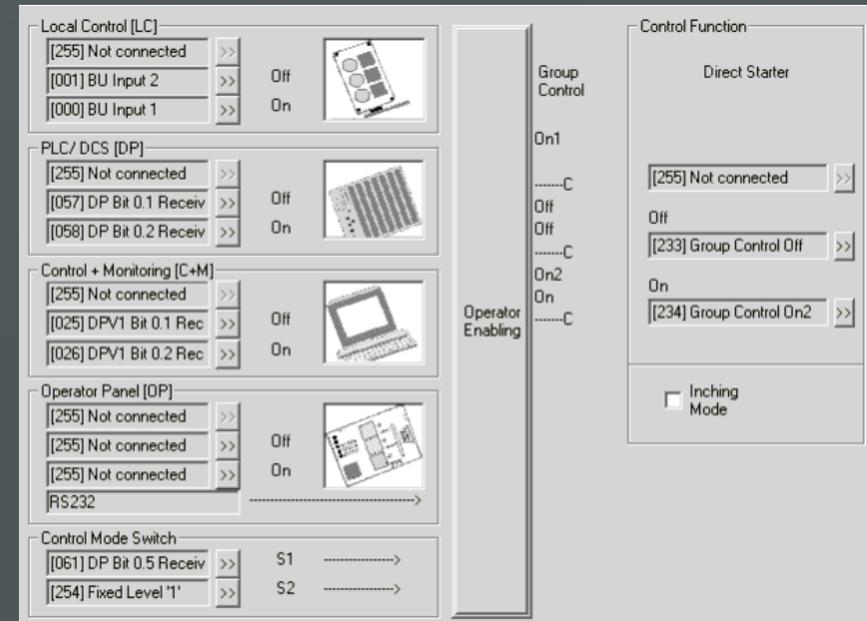
You can set the number of control points with changeover switches S1 and S2.

If you do not assign S1 and S2, the local control point and PROFIBUS-DP are set at the factory.

When step mode is active, a switching command is effective only with an „1" signal is present. When step mode is inactive, a switching command remains saved; it can only be cancelled by an opposite command.

Example 1: "Local" - "Remote"
You wish to switch between a local control station and the controller via PROFIBUS-DP. You must, for this purpose, connect the contact of the keyswitch to an input terminal of the basic unit and assign the input terminal to software changeover switch S1.
Assign S2 to the "1" signal (assignment number 254).

If you wish to carry out the switchover via the bus, assign S1 to the bus control bit 0.5 (assignment number 61).
You also have the option of switching between the control stations "selectively" with the two keyswitches:
You also have the option of switching between the control stations "selectively" with the two keyswitches:

Example 2: Switching from "Local" to "Remote"
You wish to switch between a local station and the controller via PROFIBUS-DP with a keyswitch and enable a further operator control station at the cabinet with equal priority to the local control station.

You must, for this purpose, connect the contact of the keyswitch to an input terminal of the basic unit and assign the input terminal to software changeover switch S1.

Assign S2 to the "1" signal (assignment number 254).

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2.5.1   Operator Enabling

Control Mode	Control Mode Switch		Control Sations							
	S1	S2	Local Control [LC]		PLC/ DCS [DP]		Control + Monitoring [C+M]		Operator Panel [OP]	
	Signal		On	Off	On	Off	On	Off	On	Off
1	"0"	"0"	Free	Free	Free	Free	Free	Free	Free	Free
2	"0"	"1"	Free	Free	Free	Free	Blocked	Blocked	Blocked	Blocked
3	"1"	"0"	Blocked	Blocked	Blocked	Blocked	Free	Free	Free	Free
4	"1"	"1"	Blocked	Blocked	Free	Free	Blocked	Blocked	Blocked	Blocked

Back

Operator enabling are switching authorizations for various control points. All "locked" buttons can be set to free or locked.

You will find full information in the system manual.

2.6   Function Block Inputs

Standard function blocks are internal inputs which you can assign as desired. You can use them, for example, to interrogate circuit-breakers or limit switches. All function blocks are mapped in the PROFIBUS-DP message (device-specific diagnostics) and activate a diagnostic message if modified.

CST, Check-Back Signal Test	External Fault 1	External Signal 1	UVO, Undervoltage Off
[003] BU Input 4 >>	[255] Not connected >>	[255] Not connected >>	[255] Not connected >>
OPO, Operation Protection Off	External Fault 1	External Signal 2	UVO - Time
[255] Not connected >>	[255] Not connected >>	[255] Not connected >>	00:00.0 [min:sec]
RTS, Ready to Start	External Warning	External Signal 3	Grading Time
[255] Not connected >>	[255] Not connected >>	[255] Not connected >>	00:00.0 [min:sec]
		Reset 1	
		[062] DP Bit 0.6 Receiv >>	
Emergency Start	Test 1	Reset 2	
[060] DP Bit 0.4 Receiv >>	[059] DP Bit 0.3 Receiv >>	[030] DPV1 Bit 0.6 Rec >>	
External Diagnosis	Test 2	Reset 3	
[255] Not connected >>	[027] DPV1 Bit 0.3 Rec >>	[255] Not connected >>	

- CST: Checkback signal test. This signal enables the system for the "Cold operation" functional test. You must assign the auxiliary contact of the master switch to the CST auxiliary control input for this purpose. You can use "Cold operation" to test all of the switching functions as soon as you have switched off the low-voltage feeder with the master switch (master switch OFF --> CST = 1). You can modify assignments or signal statuses for test purposes. Once CST has been removed (master switch ON --> CST = 0), the old configuration is reset automatically. This signal is not evaluated for the control function "Overload" (OVL).

- OPO: Operating protection off. You can use this signal to lock the low-voltage branch. When a motor cover is removed, for example, an earthing contact may respond, SIMOCODE-DP deactivates the QE outputs and a fault signal is sent. This signal is evaluated with 0-active (0 = fault). In the case of gate valves. The encoder control is operated up to the limit position "closed". This signal is not evaluated for the control function "Overload" (OVL), when the load feeder is switched off or in the event of undervoltage tripping (UVO=1).

- RTS: Ready to Start. This signal informs SIMOCODE-DP that the supply voltage for the contactors is available. You can use this signal to interrogate the auxiliary contact of an automatic control voltage device. If RDY fails, SIMOCODE-DP deactivates the QE outputs and a fault signal is output (0 = fault). This signal is not evaluated for the control function "Overload" (OVL), when the load feeder is switched off or when CST = 1.

- Emergency Start: This option bypasses the recovery time enabling you to erase the thermal memory and thus perform a restart (reset and starting signal also necessary). Emergency start also erases the thermal memory without prior overload tripping. An emergency start is only activated by means of edges. It is not possible to prevent overload retripping.

- External Diagnosis: This bit, if assigned accordingly, can be used to evaluate specific process statuses. It is processed separately and evaluated via the master diagnostics.

- External faults: These signals deactivate the QE outputs and activate a general fault. A fault signal with the appropriate bits is also output (0 = fault). These signals are not evaluated for the control function "Overload" (OVL) or in the event of overvoltage tripping (UVO = 1).

- External Warning: This signal generates a general warning and the appropriate diagnostic channel is activated. It does not have any effect on the control functions.

-

- Test 1 (with shutdown): Functional test for device with shutdown. The QE outputs are deactivated after 5s.

- Test 2 (without shutdown): Functional test for device without shutdown. Primarily for tests via the bus while the motor is running.

- External Signals: These signals do not have any effect on the control functions. They are mapped in the diagnostic channel.

- Reset 1-3: 3 reset inputs with identical functionality to acknowledge faults.

- UVO: Undervoltage off. This signal is formed by means of an external voltage monitor. When the signal is present, the contactor controllers are deactivated, a time monitor T-UVO is started and the following responses are triggered: if the signal is canceled within the configurable time T-UVO, SIMOCODE-DP reinstates the old operating status after the grading time T-grad has expired (star-connected first with star-delta startup). If the signal is not canceled within this time, SIMOCODE-DP reports a fault and the QE outputs remain deactivated. The supply voltage of SIMOCODE-DP must remain available. This signal is not evaluated for the control function "Overload".

- UVO-Time: Time monitor for "undervoltage off". This time interval is used in conjunction with the auxiliary control input UVO. If UVO is present, the contactor controllers are deactivated, the time monitor T-UVO is started and the following responses are triggered: if the signal is canceled during T-UVO, SIMOCODE-DP reinstates the old operating status after the grading time has expired. If not, a UVO fault occurs, the QE outputs are deactivated and a fault signal is output. A UVO fault occurs immediately if you enter 0.

- Grading Time: This initiates time-graded restarts after a power failure. If you enter 0, all drives are started simultaneously. The supply voltage of SIMOCODE-DP must be present during graded startups.
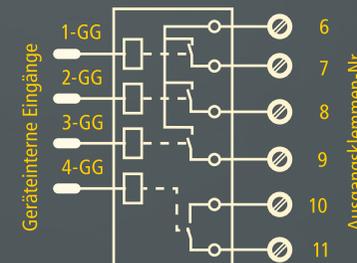
2.7   Device Outputs/LEDs

On the next pages it is possible to parameterize the outputs resp. LEDs of the different modules.

2.7.1   Basic Unit

The basic unit has 4 relay outputs which you can assign arbitrary output signals. You can use the relay outputs to switch contactors or lamps
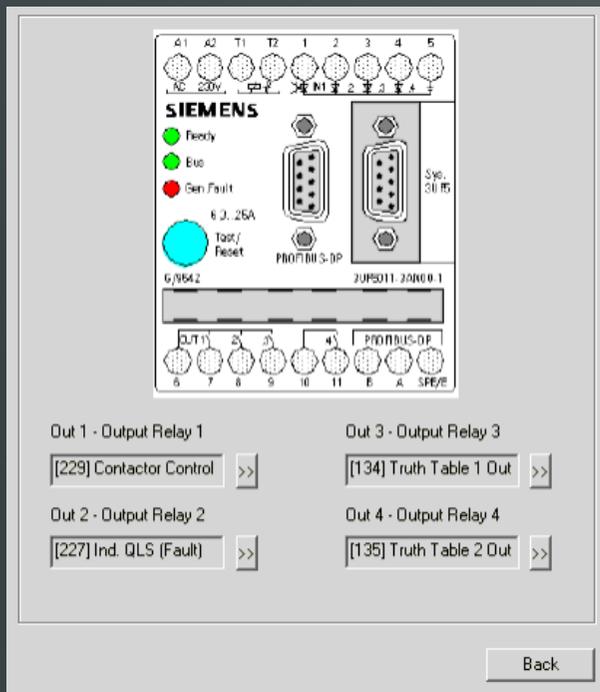
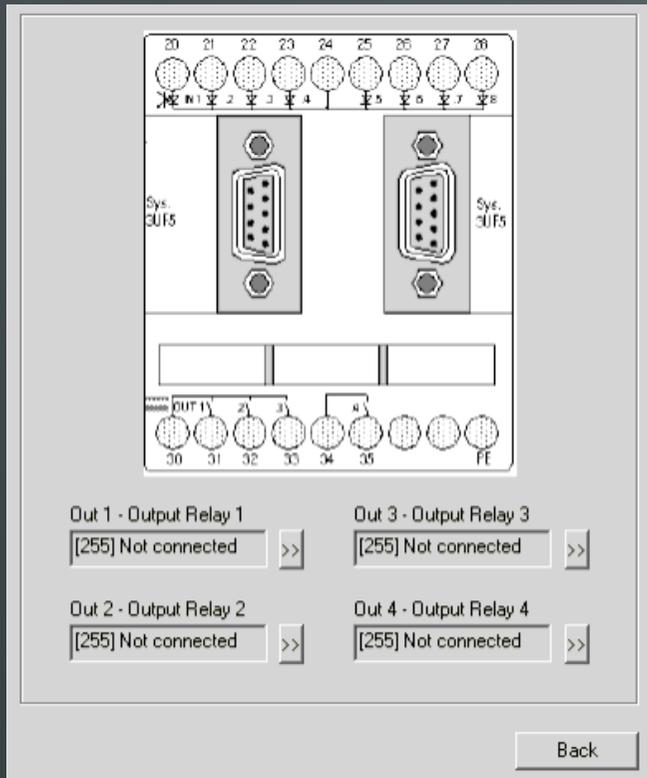The following schematic representation shows the relay outputs:

If, in the event of a power supply failure, the switching statuses of the relay outputs are to be retained, you must select a 3UF50..-3..10-1 basic unit (bistable characteristic).

You must also set the parameters:
- CPU fault response
- Control Voltage Fault response

to "Retain status".

You can set these parameters in the "Fault Response" page (see "Fault Response").

2.7.2   Expansion Module

The expansion module has four relay outputs which you can assign arbitrary output signals. You can use the relay outputs to connect contactors or lamps, for example.

If, in the event of a power supply failure, the switching statuses of the relay outputs are to be retained, you must select a 3UF50..-3..10-1 basic unit (bistable characteristic).

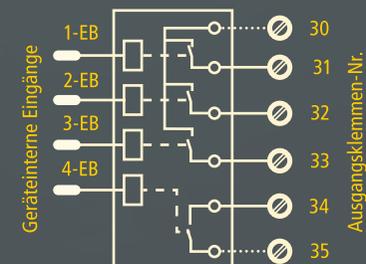You must also set the parameters:

- CPU fault response
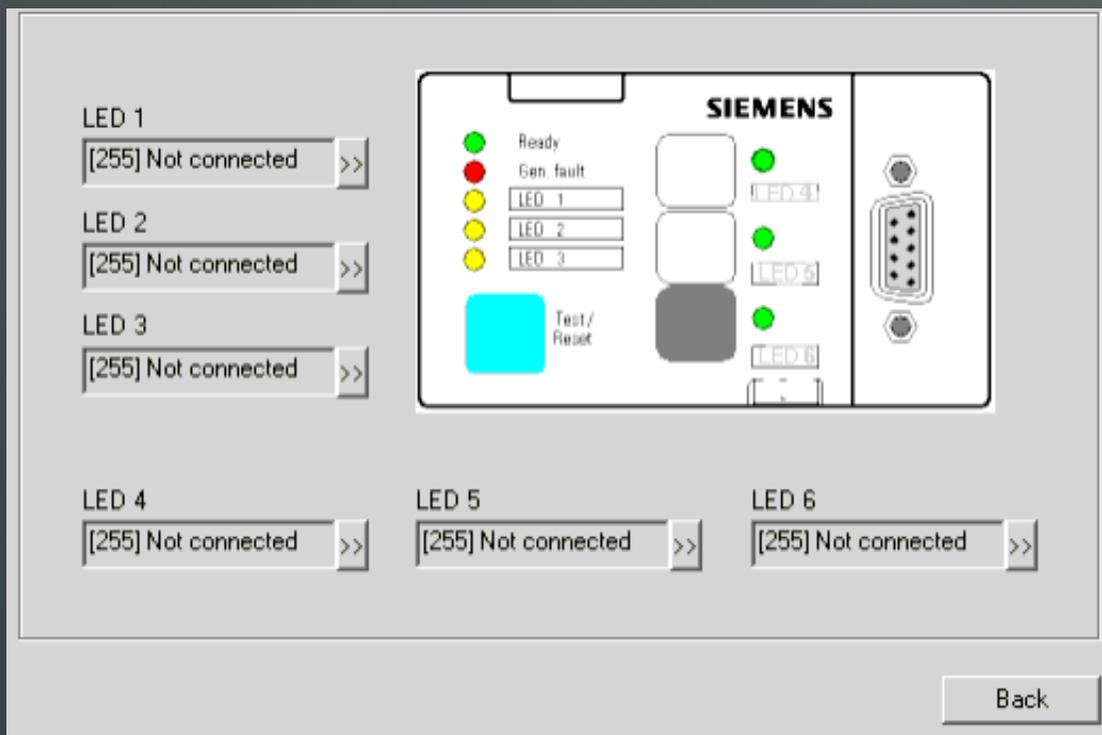- Control Voltage Fault response

to "Retain status".

You can set these parameters in the "Fault Response" page (see "Fault Response").

If you use a basic unit with monostable characteristic, the expansion module is also monostable.

The following diagram shows a schematic representation of the relay outputs:

2.7.3   Operator Panel

The device also features 6 LEDs which can be used to indicate various states. Each LED you can assign an arbitrary output signal.

On the right of the operator control keys you will find 3 green LEDs which indicate the switching states of the keys, e.g. On1, On2, Off. You must assign the lamp controllers QLE1, QLE2 and QLA to these for this purpose. These LEDs can also be assigned in accordance with the specific requirements of the application.

2.8   Timers / Counters
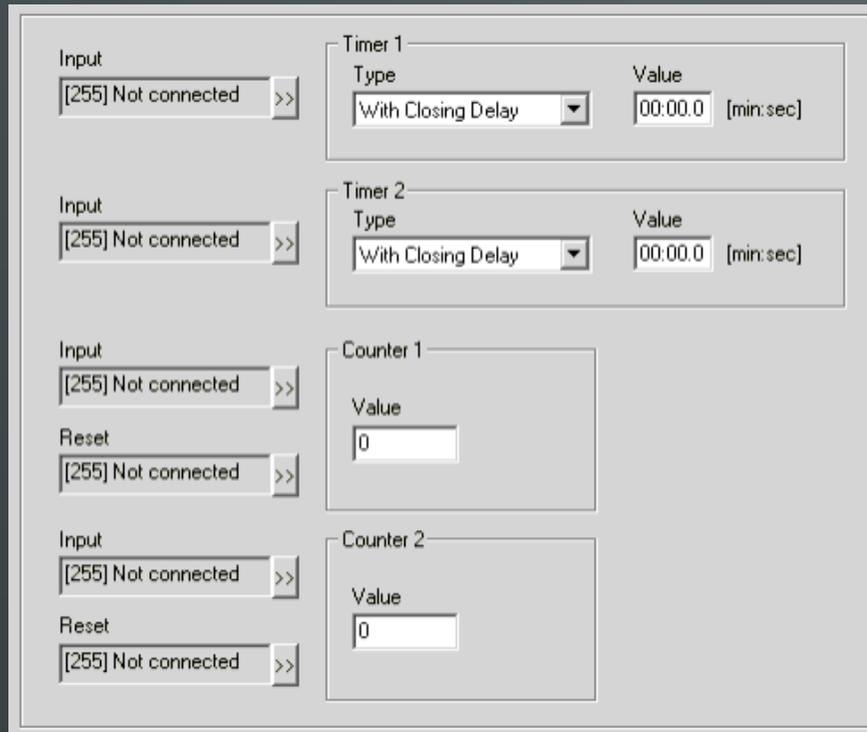
The SIMOCODE-DP has two counters and two timers which you can parameterize in accordance with the specific requirements of the application.

The timers each have one internal input and one internal output. You can define the output behaviour and set the time. The time can be set to a value between 0.5 s and 60 min in steps of 100 ms.
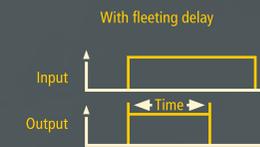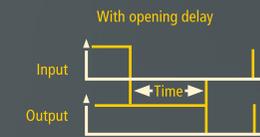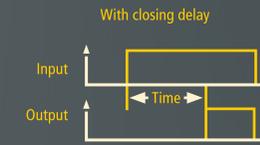
The counters each have two internal inputs (count input and reset) and one internal output. You can set an upper limit value (max. 65535) at which the counter supplies an output signal. You can reset the counter to 0 with the reset signal

⚠ The time interval between the events to be counted must be at least 200 ms.The counter reading remains unchanged during parameterization or if the supply voltage fails.

2.9 Truth Tables 3I/1O

Truth Table 1 3I/1O

Input 1 [000] BU Input 1
Input 2 [001] BU Input 2
Input 3 [002] BU Input 3

I1	I2	I3	O
1	1	1	0
0	1	1	0
1	0	1	0
0	0	1	1
1	1	0	0
0	1	0	1
1	0	0	0
0	0	0	0

Truth Table 2 3I/1O

Input 1 [000] BU Input 1
Input 2 [001] BU Input 2
Input 3 [002] BU Input 3

I1	I2	I3	O
1	1	1	1
0	1	1	1
1	0	1	1
0	0	1	0
1	1	0	1
0	1	0	0
1	0	0	0
0	0	0	1

Truth Table 3 3I/1O

Input 1 [255] Not connected
Input 2 [255] Not connected
Input 3 [255] Not connected

I1	I2	I3	O
1	1	1	0
0	1	1	0
1	0	1	0
0	0	1	0
1	1	0	0
0	1	0	0
1	0	0	0
0	0	0	0

The system incorporates a total of three parameterizable truth tables 3I/1O. Each truth tables comprises:

- three internal inputs which you can assign arbitrary output signals
- one logic circuit
- one internal output

From the eight possible input conditions, you can choose those for which you wish to produce an output signal.
The following diagram illustrates the functional principle behind this:

Input
Input
Input
Truth tables (3x)
Output
Terminal 134-136

2.10 Truth Table 5I/2O

Input 1 [255] Not connected
Input 2 [255] Not connected
Input 3 [255] Not connected
Input 4 [255] Not connected
Input 5 [255] Not connected

	I1	I2	I3	I4	I5	O1	O2			I1	I2	I3	I4	I5	O1	O2
1	1	1	1	1	1	0	0		17	1	1	1	1	0	0	0
2	0	1	1	1	1	0	0		18	0	1	1	1	0	0	0
3	1	0	1	1	1	0	0		19	1	0	1	1	0	0	0
4	0	0	1	1	1	0	0		20	0	0	1	1	0	0	0
5	1	1	0	1	1	0	0		21	1	1	0	1	0	0	0
6	0	1	0	1	1	0	0		22	0	1	0	1	0	0	0
7	1	0	0	1	1	0	0		23	1	0	0	1	0	0	0
8	0	0	0	1	1	0	0		24	0	0	0	1	0	0	0
9	1	1	1	0	1	0	0		25	1	1	1	0	0	0	0
10	0	1	1	0	1	0	0		26	0	1	1	0	0	0	0
11	1	0	1	0	1	0	0		27	1	0	1	0	0	0	0
12	0	0	1	0	1	0	0		28	0	0	1	0	0	0	0
13	1	1	0	0	1	0	0		29	1	1	0	0	0	0	0
14	0	1	0	0	1	0	0		30	0	1	0	0	0	0	0
15	1	0	0	0	1	0	0		31	1	0	0	0	0	0	0
16	0	0	0	0	1	0	0		32	0	0	0	0	0	0	0

The system incorporates one parameterizable truth table 5I/2O. The truth tables comprises:

- five internal inputs which you can assign arbitrary output signals
- one logic circuit
- two internal outputs

It functions on the same principle as truth table 3I/1O.From the 32 possible input conditions, you can choose those for which you wish to produce output signals.

Tab-In1
Tab-In2
Tab-In3
Tab-In4
Tab-In5
Truth table 4
Tab4-Out1 1 32
Tab4-Out2 1 33
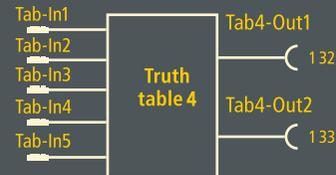
2.11 Flashing/Flickering

Flashing and Flickering are functions which you can assign, for example, to LEDs 1-3 of the operator panel or to the relay outputs. It is thus possible to indicate various different statuses. A total of 6 functions of this type are available. The flashing frequency is approx. 2 Hz, and the flicker frequency approx. 8 Hz.

The following diagram shows a schematic representation of these blocks.

Die geräteinternen Eingänge (Stecker) können Sie beliebigen Ausgängen (Buchsen) zuordnen.

2.12 Signal Matching
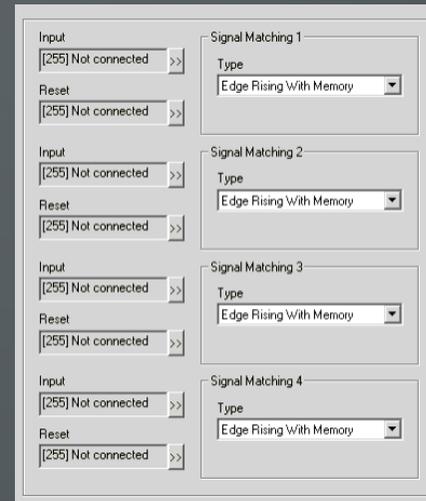
The signal matching function can be used to match external signal sequences to the internal device functions. You can thus invert signals, define responses to signal levels or edges and set or reset memories

The following schematic representation shows one of the four blocks for signal matching:
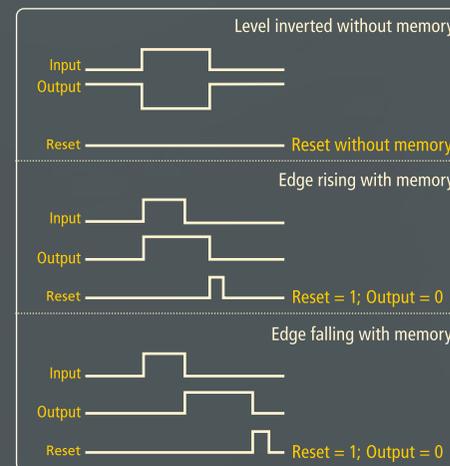
There are various ways in which you can process the signals at the internal inputs.
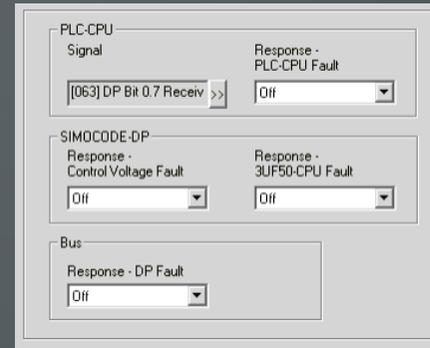
2.13 Non Resetable Elements
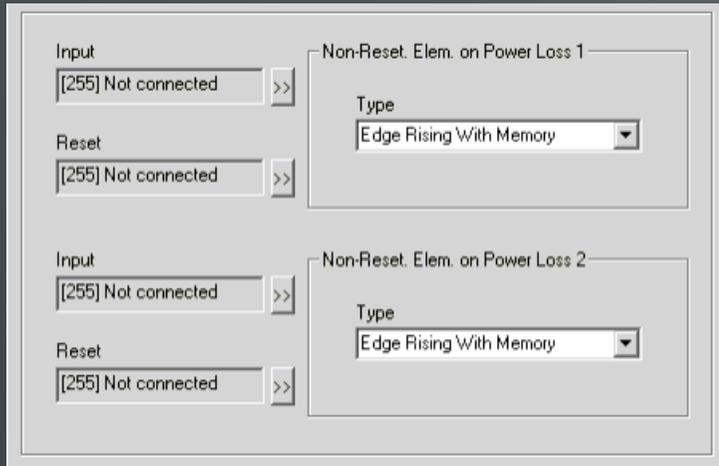
Non-volatile elements behave like signal matchings (see "Signal Matching"). But the settings are retained in the event of supply voltage failure. You have 2 blocks available.

The following schematic representation shows one of the two blocks for non-volatile elements:

2.14 Fault Response

The parameterizable fault response option enables you to specify whether, in the event of certain faults, the motor feeder is to be switched off or whether the current switching status is to be retained.

PLC-CPU

PLC fault: programmable logic controller failure.

- Signal: The auxiliary control input "Signal" must be assigned to bit 0.7 of the process data. SIMOCODE-DP detects a fault when the signal changes from 1 to 0.
- Response - PLC-CPU Fault: "Retain status" means that the QE contactor controller and QL lamp controller remain activated."Status off" means that the QE contactor controller and QL lamp controller are deactivated.

The fault must be acknowledged once the PLC has been recovered.

SIMOCODE-DP

SIMOCODE-DP device fault.

- Response – Control Voltage Fault:
  "Retain status" means that the output relays remain activated.
  "Off" means that the output relays are deactivated.

  •

  ⚠️ Only for bistable device types,
  otherwise a parameter error occurs.

- Response – CPU Fault:
  "Retain status" means that the output relays remain activated.
  "Off" means that the output relays are deactivated

  ⚠️ Only for bistable device types,
  otherwise a parameter error occurs.

Once the supply voltage has been restored, SIMOCODE-DP first deactivates the relay outputs. You must then switch the system on again.

Bus
Bus-fault.

- Response – DP Fault:
  "Retain status" means that the QE contactor controller and QL lamp controller remain activated."Status off" means that the QE contactor controller and QL lamp controller are deactivated.

Conditions for detecting bus faults:

- The "PROFIBUS-DP" control station must be enabled with the software switches S1 and S2 when the operating mode is set (see "Control Stations").
- Cyclical data exchange between the DP master and SIMOCODE-DP must have already been initiated.

The fault must be acknowledged once the PROFIBUS-DP has been recovered.

2.15   Input Delay

For reasons of interference immunity, you can set a debounce time for the inputs.Use the debounce time whenever you assign such devices as timers and counter to the inputs. This will suppress interference pulses.

2.16   Password

You can use this page to:

- activate a password
- deactivate an active password
- modify or delete an active password

If a password has been activated, both input fields ("Password" and "Repeat") are enabled. If a password has been deactivated, only the field "Password" is enabled.
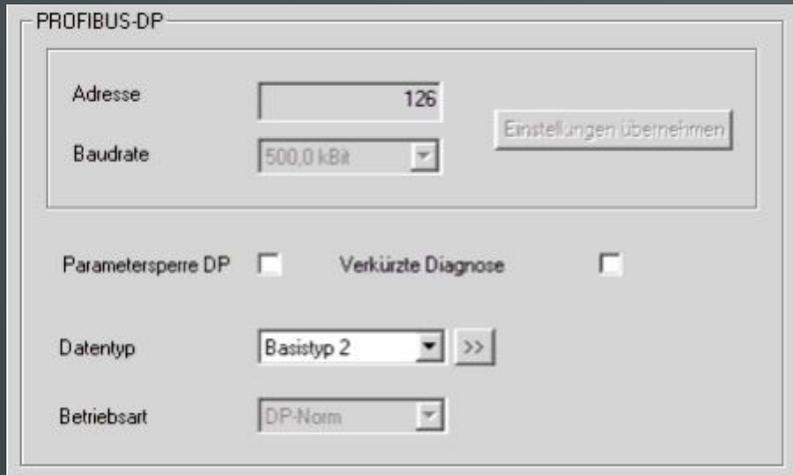
You can only send parameter data records to the SIMOCODE-DP basic unit if you have activated a password.

3.   Configuration

The TW SIMOCODE DTM provides a dialog to configure the PROFIBUS-DP.
By using the tree view the several pages to configure the bus are selectable.
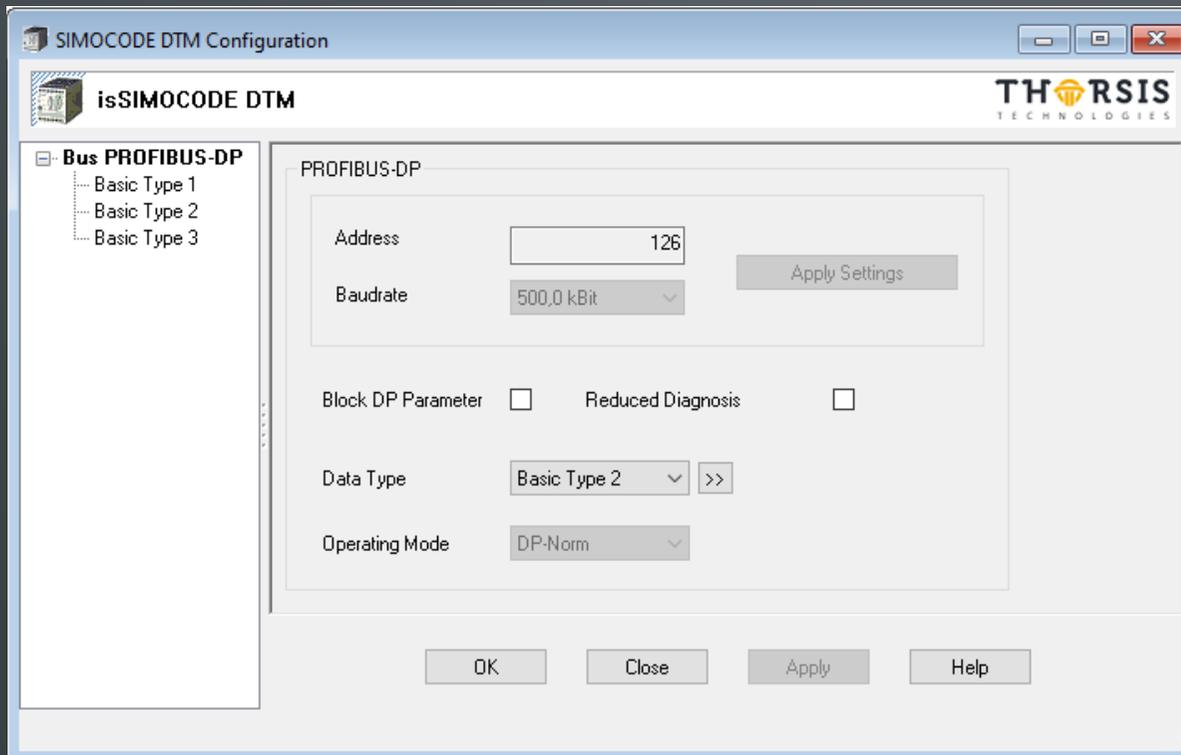
3.1   Bus PROFIBUS-DP

This page shows settings relative to the bus PROFIBUS-DP.

The settings for address, baudrate and operating mode are not modifiable offhand

To change address and baudrate a specific registry key is neccessary:

In registry path:
„HKEY_LOCAL_MACHINE\SOFTWARE\[WOW6432Node\]Thorsis Technologies\SIMOCODE DTM"
a value "Configuration" is needed.

If the low-order bit of this value is set (e.g. value 1) the changes are possible in online state.

Attention: changing of address or baudrate results in an abort of the communication with the SIMOCODE-DP device.

"Block DP Parameter" instructs the SIMOCODE-DP that it is to ignore all parameter data which is sent to the individual devices when the DP master is started. The current parameter data which has been saved by the SIMOCODE-DP is, in this case, not overwritten by the DP master. When the "Block DP Parameter" is active, the parameter data can only be edited by entering new parameter values with Win-SIMOCODE-DP or with a hand-held controller.

You must always set the "Reduced Diagnosis" parameter when the IM 308B interface module is used as the DP master. The SIMOCODE-DP then only sends 16-byte diagnostic data (instead of 20-byte data). You can find further information on this in Chapter 7 of the SIMOCODE-DP System Manual.

You can select one of the following basic types for cyclical data exchange between the SIMOCODE-DP and DP master:

Basic type	Send DP-Master --> SIMOCODE	Receive SIMOCODE --> DP-Master
1		12 bytes in total 1-2 bytes user-specific
2	1-4 bytes user-specific	4 bytes in total 1-2 bytes user-specific
3		4 bytes in total 1-4 bytes user-specific

Changing the basic type effects the preparation of process channels (according to the input resp. output data) of the DTM

With the button ">>" you can open a specific page according to the selected data type to parameterize the several bits.

3.1.1 Basic Type 1

If you use basic type 1 there are transfered 12 bytes in total from SIMOCODE-DP to the DP-Master.
The bits of the first 2 bytes are parameterizable user-specific.

3.1.2 Basic Type 2

If you use basic type 2 there are transfered 4 bytes in total from SIMOCODE-DP to the DP-Master.
The bits of the first 2 bytes are parameterizable user-specific.

3.1.3 Basic Type 3

If you use basic type 3 there are transfered 4 bytes in total from SIMOCODE-DP to the DP-Master.
All bits of this 4 bytes are parameterizable user-specific

4.   Online Control and Diagnosis

In online state the TW SIMOCODE DTM offers some dialogs to show messages and diagnosis data and to control SIMOCODE-DP.

4.1   Control/Signal
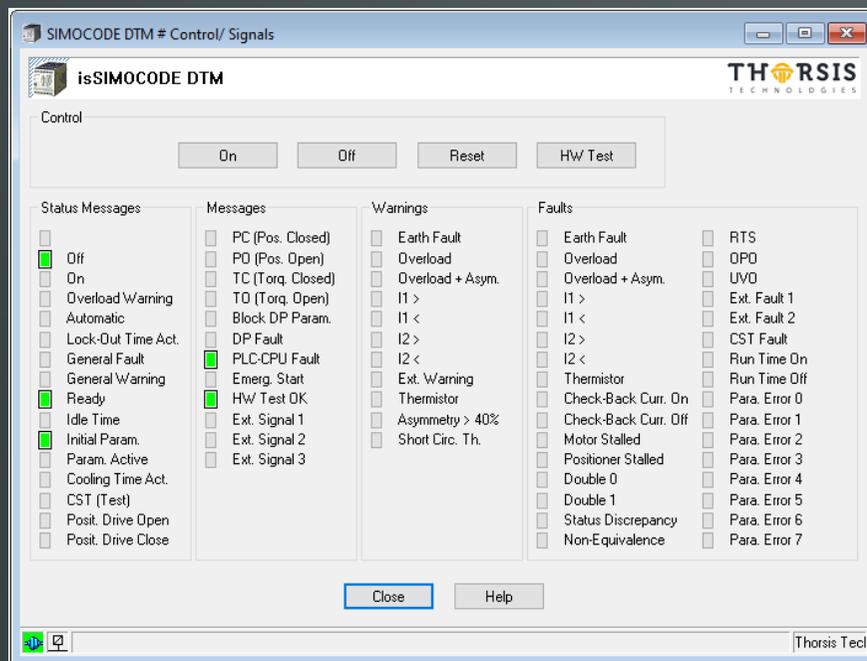
Control

The buttons On1, On2 and Off at the top of the mask "Control and Signal", which is selected via the menu group "Online", can be used to control the feeder. This functionality corresponds to that of an operator control block. The operator control block must, therefore, be enabled (see "Operator Enabling").

You can use the Reset button to acknowledge faults and return the device to its initial status.

You can use the HW Test button to initiate a hardware test.

You can use the TW SIMOCODE DTM to test various device functions. The "operator panel" control station must, however, be enabled for this purpose (see "Control Stations").

You can carry out a hardware test only when the following conditions are fulfilled:
• Parameters have been assigned to the device, i. e. the initial parameters are no longer set
• The bus master has switched the device to "Manual Mode", i.e. the status LED "Automatic" of the Win-SIMOCODE-DP menu is turned off
• There must be no fault indication present

You can perform the test with or without primary current. If the primary current is activated, the complete current measurement function is also tested. You can cancel an ongoing test immediately by pressing the "Reset" button.

The following are tested without primary current:

- the evaluation electronics for overload, thermistor or ground fault detection
- (indirectly) the assignment paths from the contactor controllers to the relay outputs
- the relay outputs themselves and the wiring to the contactors

The system performs an automatic HW test each time the power supply is switched on.

<u>LEDs</u>
Status messages, warnings and faults are indicated by means of a green lamp symbol.
Status messages and signals indicate the following:

- the operating status of the feeder
- all active times (Run Time)
- set standard function blocks

Warning messages need not be acknowledged. The device is ready for operation again after these have been output.

- Earth Fault: Earth fault detected
- Overload: Overload detected
- Overload + Asym.: Overload and imbalance detected (refer to SIMOCODE System Manual, Chapter 2.3)
- I1(I2) >: Motor current I1 or I2 greater than the selected current
- I1(I2) <: Motor current I1 or I2 less than the selected current
- Ext. Warning: Standard function block "Ext. Warning" set
- Thermistor: Thermistor warning
- Asymmetry > 40 %: Imbalance detected
- Short Circ. Th.: Short-circuit in the thermistor lead
-

Fault messages must always be acknowledged. If the device has been parameterized accordingly, faults will cause the feeder to be deactivated.

- Earth Fault: Earth fault detected
- Overload: Overload detected
- Overload + Asym.: Overload and imbalance detected (refer to the SIMOCODE System Manual, Chapter 2.3)
- I1(I2) >: Motor current I1 oder I2 greater than selected
- I1(I2) <: Motor current I1 oder I2 less than selected
- Thermistor: Thermistor has detected a fault
- Check-Back Curr. On: Feeder energized for longer than Check-Back time without ON command
- Check-Back Curr. Off: Feeder de-energized for longer than Check-Back time without OFF command
- Motor Stalled: Motor blocked
- Positioner Stalled: Positioner blocked

On the page "Overload" (see "Overload") you can enter a limit value which, when exceeded, causes SIMOCODE-DP to shut down the contactor controller instantaneously. This value is defined as a percentage of the rated current In. Block protection does not become active until the class time has expired (for bridging the startup phase).

- Double 0: Both torque switches have responded at the same time
- Double 1: Both limit switches have responded at the same time
- Status Discrepancy: Encoder control has left end position without an ON command
- Non-Equivalence: Torque switch defective
- RTS: "Ready" signal not present
- OPO: "Protection off" signal present
- UVO: "Undervoltage off" signal present
- Ext. Fault 1: Signal present at auxiliary control input "Ext. Fault 1"
- Ext. Fault 2: Signal present at auxiliary control input "Ext. Fault 2"
- CST Fault: Signal present at auxiliary control input "CST" and current is flowing in the feeder
- Run Time On: Feeder de-energized after ON command and runtime
- Run Time Off: Feeder energized after OFF command and runtime
- Parameter Error 0: Discrepancy in current setting I1/I2

- Parameter Error 1: Incorrect device type for external ground fault/thermistor protection
- Parameter Error 2: Discrepancy in sensor settings
- Parameter Error 3: Discrepancy between current setting and control function
- Parameter Error 4: Assignment without operator control block
- Parameter Error 5: Assignment without expansion module
- Parameter Error 6: Bistable characteristic not available
- Parameter Error 7: Hardware error - memory defective

4.2   Display/Diagnostics
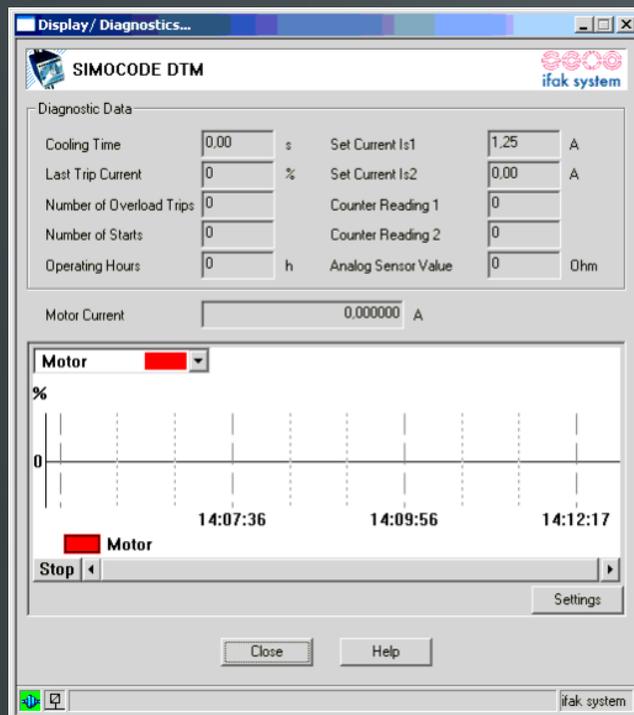
The "Display/Diagnostics" dialog displays the operating current as well as the following values:

- the parameterizable set current
- the current in the feeder the last time an overload trip occurred (% of the set current)
- the (remaining) cooling time
- the number of starts
- the operating hours
- the number of overload trips
- counter readings 1 and 2
- the analog value of the thermistor

4.3   Statistical Data
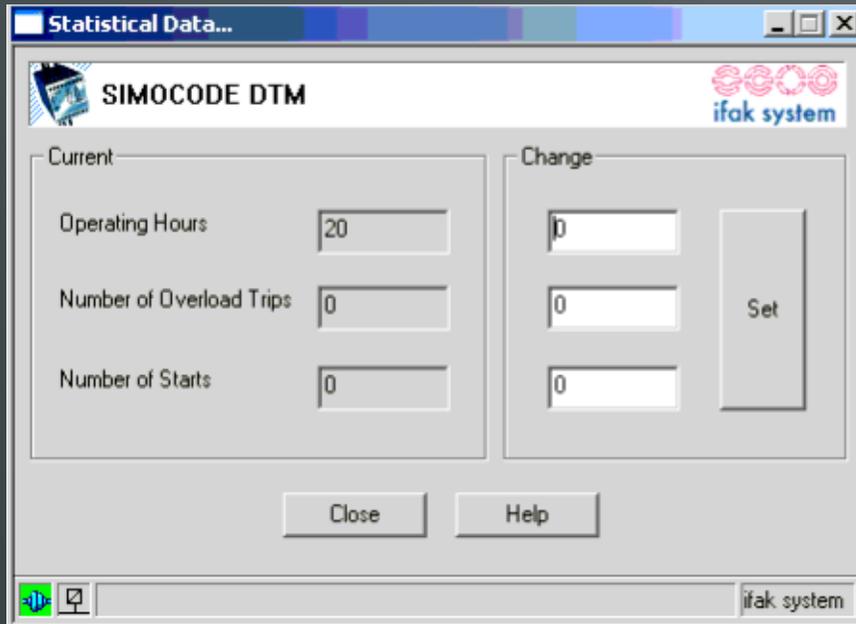
The following values are displayed in the „Statistics data" dialog:

- Operating hours [h]: 0 ... 655350
- Number of trips: 0 ... 65535
- Number of starts: 0 ... 16777215

You can change these values by entering a new value in the input field on the right and by pressing the "Set" button. The value is then transferred to the device.

The operating hours can be input in steps of ten only.

4.4   Test
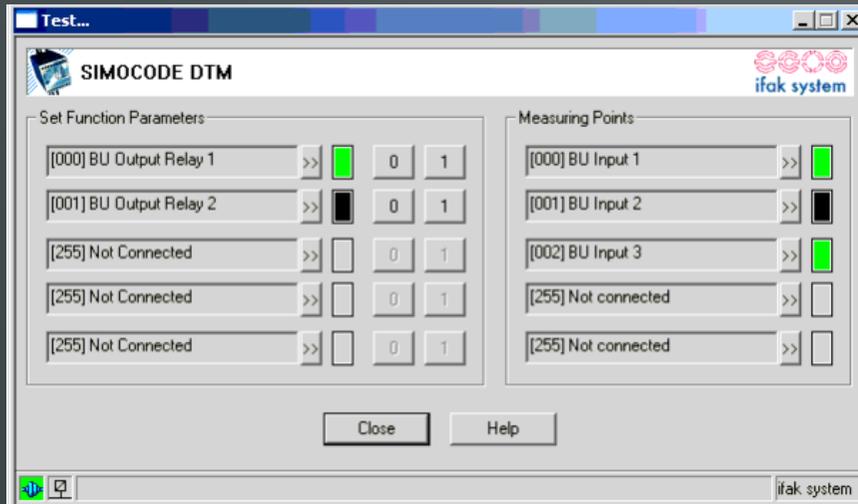
You can display the logical states of the internal inputs (connectors) in the "Test" dialog. You must set function parameters or assign measuring points for this purpose.

The lamp symbols indicate the logical state:
- green indicates logical 1
- black indicates logical 0
- grey indicates the case of outputs which have not been assigned

You can set all function parameters to logical 0 or logical 1 by pressing one of the assigned buttons.

"Measuring points" can be used to interrogate the status of any input or output.It is thus possible, for example, to perform a functional test on truth tables.

⚠️ Functional tests can only be carried out if the auxiliary control input "CST" has been set to logical "1".

5.   Manual Update

version	date	description
1.0	16.11.2006	Initial Version
1.1	01.10.2019	new pictures and graphics

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