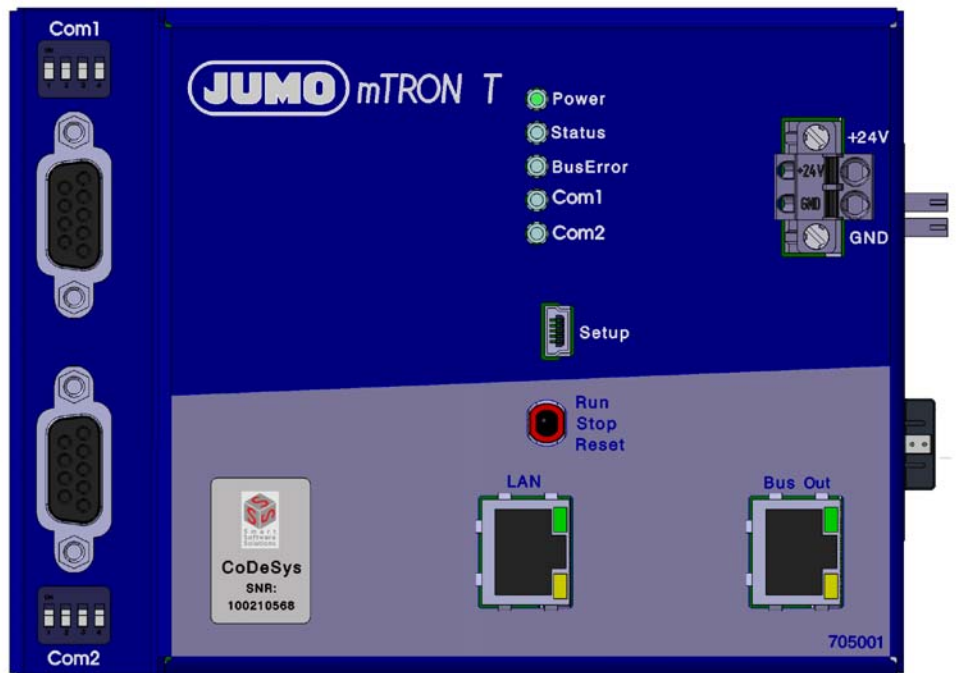


# JUMO mTRON T

## Measuring, Control, and Automation System Central Processing Unit



## Operating Manual



70500100T90Z001K000

V3.00/EN/00575582



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## 1.1 Available technical documentation

The documents specified below are available for the measuring, control, and automation system (previous document number in parentheses).

### 1.1.1 General information

Product	Type of documentation	No.	Printed	PDF file
Measuring, control, and automation system	Data sheet	70500000T10...	-	X
	System manual <sup>1</sup>	70500000T90... (B 705000.0)	X	-
	Setup program manual	70500000T96... (B 705000.6)	-	X
	System description <sup>2</sup>	70500000T98... (B 705000.8)	-	X

<sup>1</sup> Accessory subject to charge

<sup>2</sup> Includes an overview of the purpose and content of all documents

### 1.1.2 Base units

Product	Type of documentation	No.	Printed	PDF file
Central processing unit	Data sheet	70500100T10...	-	X
	Operating manual	70500100T90... (B 705001.0)	-	X
	Modbus interface description	70500100T92... (B 705001.2.0)	-	X
	PROFIBUS-DP interface description	70500103T92... (B 705001.2.3)	-	X
	digiLine interface description	70500106T92...	-	X
	Installation instructions	70500100T94... (B 705001.4)	X	X
	CODESYS OPC server operating manual	70500151T90... (B 705001.5.1)	-	X
	Process engineering application operating manual	70500152T90...	-	X
	Operating manual Thyristor power controller (type 70906x; integration in the measuring, control, and automation system)	70500153T90...	-	X

# 1 Introduction

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## 1.1.3 Input/output modules

Product	Type of documentation	No.	Printed	PDF file
Multichannel controller module	Data sheet	70501000T10...	-	X
	Operating manual	70501000T90... (B 705010.0)	-	X
	Installation instructions	70501000T94... (B 705010.4)	X	X
Relay module 4-channel	Data sheet	70501500T10...	-	X
	Operating manual	70501500T90... (B 705015.0)	-	X
	Installation instructions	70501500T94... (B 705015.4)	X	X
Analog input module 4-channel	Data sheet	70502000T10...	-	X
	Operating manual	70502000T90... (B 705020.0)	-	X
	Installation instructions	70502000T94... (B 705020.4)	X	X
Analog input module 8-channel	Data sheet	70502100T10...	-	X
	Operating manual	70502100T90... (B 705021.0)	-	X
	Installation instructions	70502100T94... (B 705021.4)	X	X
Analog output module 4-channel	Data sheet	70502500T10...	-	X
	Operating manual	70502500T90...	-	X
	Installation instructions	70502500T94...	X	X
Digital input/output module 12-channel	Data sheet	70503000T10...	-	X
	Operating manual	70503000T90... (B 705030.0)	-	X
	Installation instructions	70503000T94... (B 705030.4)	X	X

## 1.1.4 Special modules

Product	Type of documentation	No.	Printed	PDF file
Router module	Data sheet	70504000T10...	-	X
	Installation instructions	70504000T94... (B 705040.4)	X	X

## 1.1.5 Operating, visualization, recording

Product	Type of documentation	No.	Printed	PDF file
Multifunction panel 840	Data sheet	70506000T10...	-	X
	Operating manual	70506000T90... (B 705060.0)	-	X
	Modbus interface description	70506000T92... (B 705060.2.0)	-	X
	Installation instructions	70506000T94... (B 705060.4)	X	X
Operating panels	Data sheet	70506500T10...	-	X
	Operating manual	70506500T90...	-	X

## 1.1.6 Power supply units

Product	Type of documentation	No.	Printed	PDF file
24 V power supply units	Data sheet	70509000T10...	-	X
	Operating instructions QS5.241		X	-
	Operating instructions QS10.241		X	-

# 1 Introduction

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## 1.2 Safety information

### 1.2.1 Warning symbols



**DANGER!**

This symbol indicates that **personal injury caused by electrical shock** may occur if the respective precautionary measures are not carried out.



**WARNING!**

This symbol in connection with the signal word indicates that personal injury may occur if the respective precautionary measures are not carried out.



**CAUTION!**

This symbol in connection with the signal word indicates that **damage to assets or data loss** will occur if the respective precautionary measures are not taken.



**CAUTION!**

This symbol indicates that **components could be destroyed** by electrostatic discharge (ESD = Electro Static Discharge) if the respective cautionary measures are not taken. Only use the ESD packages intended for this purpose to return device inserts, assembly groups, or assembly components.



**READ DOCUMENTATION!**

This symbol – placed on the device – indicates that the associated **device documentation has to be observed**. This is necessary to recognize the kind of the potential hazards as well as the measures to avoid them.

### 1.2.2 Note signs



**NOTE!**

This symbol refers to **important information** about the product, its handling, or additional use.



**REFERENCE!**

This symbol refers to **further information** in other sections, chapters, or manuals.



**FURTHER INFORMATION!**

This symbol is used in the tables and refers to **further information** in connection with the table.



**DISPOSAL!**

This device and the batteries (if installed) must not be disposed in the garbage can after use! Please ensure that they are disposed properly and in an **environmentally friendly manner**.

## 1.2.3 Intended use

The modules described are intended for measuring, control, and automation tasks in an industrial environment, as described in the technical data. Other uses or uses beyond those defined are not viewed as intended uses.

The modules are built according to the relevant standards and directives as well as the applicable safety regulations. Nevertheless, incorrect use may lead to bodily injury or property damage.

To avoid danger, the modules may only be used:

- For the intended use
- When in good order and condition
- When taking into account the technical documentation provided

Even if a module is used correctly and according to the intended use, it may still cause application-related dangers (e.g. due to missing safety devices or incorrect settings).

## 1.2.4 Qualification of personnel

This document contains the necessary information for the intended use of the modules to which it relates.

It is intended for technically qualified personnel who have received special training and have the appropriate knowledge in the field of automation technology (measuring, process, and control technology).

The appropriate level of knowledge and the technically fault-free implementation of the safety information and warnings contained in the technical documentation provided are prerequisites for risk-free mounting, installation, and startup as well as for ensuring safety when operating the described modules. Only qualified personnel have the required specialist knowledge to correctly interpret and implement the safety information and warnings contained in this document in specific situations.

# 1 Introduction

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## 1.3 Acceptance of goods, storage, and transport

### 1.3.1 Checking the delivery

- Ensure that the packaging and contents are not damaged
- Check that the delivery is complete using the delivery papers and the order details
- Inform the supplier immediately if there is any damage
- Store damaged parts until clarification is received from the supplier

### 1.3.2 Notes on storage and transport

- Store the module in a dry and clean environment. Observe the admissible ambient conditions (see "Technical data")
- The transport of the module is to be shockproof
- The original packaging provides optimum protection for storage and transport

### 1.3.3 Returning goods

In the event of repair, please return the module in a clean and complete state. Use the original packaging to return goods.

#### ***Accompanying letter for repair***

Please include the completed accompanying letter for repair when returning goods. Do not forget to state the following:

- Description of the application and
- Description of the error that has occurred

The accompanying letter for repair can be downloaded online from the manufacturer's website (use the search function if necessary).

#### ***Protection against electrostatic discharge (ESD)***

(ESD = electrostatic discharge)

To prevent damage from ESD, electronic modules or components must be handled, packaged, and stored in an ESD-protected environment. Measures against electrostatic discharge and electrical fields are described in DIN EN 61340-5-1 and DIN EN 61340-5-2 "Protection of electronic devices from electrostatic phenomena".

When returning electronic modules or components, please note the following:

- Sensitive components must only be packaged in an ESD-protected environment. Workspaces such as this divert electrostatic charges to ground in a controlled manner and prevent static charges due to friction capacities.
- Only use packaging for ESD-sensitive modules/components. These must consist of conductive plastics.

No liability can be assumed for damage caused by ESD.

**CAUTION!**

Electrostatic charges occur in non-ESD protected environments.  
Electrostatic discharges can damage modules or components.  
For transport purposes, use only the ESD packaging provided.

## 1.3.4 Disposal

### Disposing of the device

**DISPOSAL!**

Devices and/or replaced parts should not be placed in the refuse bin at the end of their service life as they consist of materials that can be recycled by specialist recycling plants.

Dispose of the device and the packaging material in a proper and environmentally friendly manner.

For this purpose, observe the country-specific laws and regulations for waste treatment and disposal.

### Disposing of the packaging material

The entire packaging material (cardboard packaging, inserts, plastic film, and plastic bags) is fully recyclable.

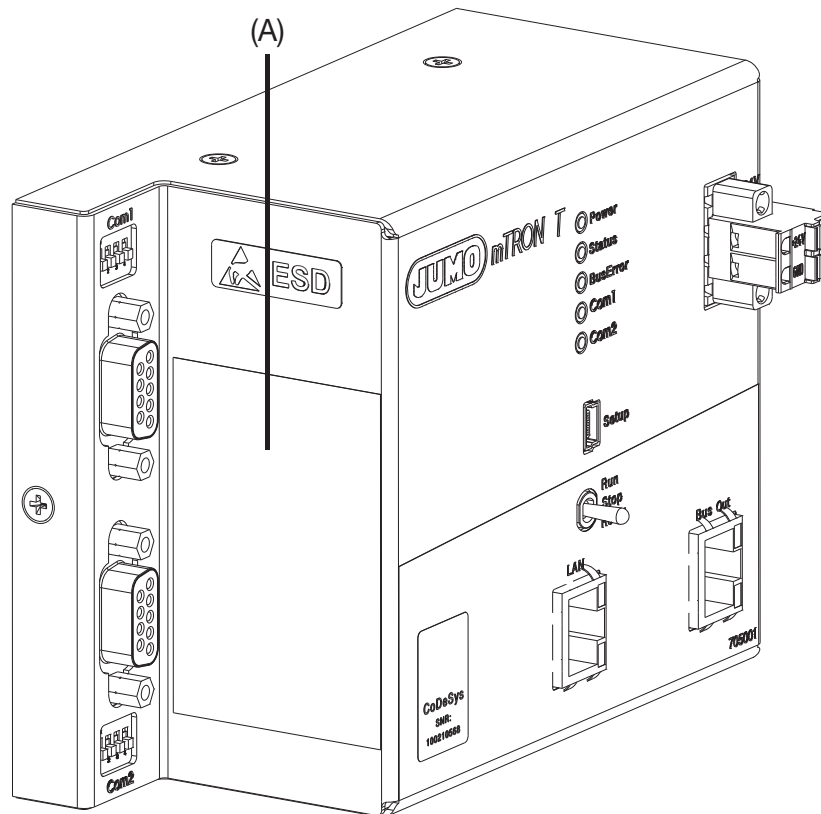
# 1 Introduction

## 1.4 Identifying the device version

### 1.4.1 Nameplate

#### Position

The nameplate (A) is affixed to the module case.



#### Contents

It contains important information. This includes:

Description	Designation on the nameplate	Example
Device type	Type	705001/08-51-54-36/000
Part no.	TN	00XXXXXX
Fabrication number	F-Nr	0070033801211010006
Voltage supply	-	DC 24 V -20/+25 %

#### Device type

Compare the specifications on the nameplate with the order.

Identify the supplied device version using the order details of the respective module.

#### Part no. (TN)

The part no. clearly identifies an article in the catalog. It is important for communication between the customer and the sales department.

## Fabrication no. (F-Nr)

Among other things, the fabrication number contains the date of production (year/week).

Example: F-Nr = 00700338012**1101**0006

The figures concerned are in positions 12, 13, 14, and 15 (from the left).

The device was therefore produced in the 1st calendar week of 2011.

## 1.4.2 Order details

<b>(1) Basic type</b>	
705001	Central processing unit (1x Ethernet (RJ45), 1x system bus (RJ45), 1x system bus (E-Bus), monitoring of 64 limit values)
<b>(2) Basic type extension</b>	
0	Standard
<b>(3) Version</b>	
8	With factory settings
<b>(4) Interface Com1</b>	
00	Not used
51	RS232 Modbus RTU <sup>1</sup>
54	RS422/485 Modbus RTU <sup>a</sup>
<b>(5) Interface Com2</b>	
00	Not used
51	RS232 Modbus RTU <sup>a</sup>
54	RS422/485 Modbus RTU <sup>a</sup>
64	PROFIBUS-DP (slave; as of system version 02)
<b>(6) Voltage supply</b>	
36	DC 24 V +25/-20 %
<b>(7) DNV GL approval</b>	
000	Without approval
062	With DNV GL approval <sup>2</sup>
<b>(8) Extra codes</b>	
000	Without extra code
214	Math/logic function (activation for all connected controller modules)
224	PLC acc. to IEC 61131-3 (CODESYS V3.5)
225	Program generator 1 to 9
228	Program generator 1 to 9 with process steps (as of system version 02)

<sup>1</sup> Any interface protocols can be implemented with the PLC (extra code 224).

<sup>2</sup> The power supply unit used must also have a DNV GL or GL type approval (e.g. type 705090).

Order code      (1)      (2) (3)      (4)      (5)      (6)      (7)      (8)  
 Order example    705001 / 0 8 - 00 - 00 - 36 / 000 , 214 , ...<sup>1</sup>

<sup>1</sup> List extra codes in sequence, separated by a comma.

# 1 Introduction

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## 1.4.3 Delivery package

1 central processing unit in the ordered version
1 cover for system bus
2 screw-on end clamps for DIN rail
1 Installation Instructions
Setup program with program editor JUMO mTRON T (30-day trial version, on MiniDVD)

Content of the Mini-DVD:

- Setup program with program editor JUMO mTRON T (30-day trial version)
- CODESYS programming software (free version)
- CODESYS Repository Package - Operating panels (free version)
- GSD file JUMO mTRON T - CPU (free version)
- PC Evaluation Software PCA3000 (30-day trial version)
- PCA Communication Software PCC (30-day trial version)
- Documentation in PDF format

## 1.4.4 Accessories

Description	Part no.
Interface modules (expansion boards):	
RS232 Modbus RTU	00569505
RS422/485 Modbus RTU	00569506
PROFIBUS-DP (slave; as of system version 02 and as of the central processing unit's production date 27/2013 (calendar week))	00569507
Extra codes (activations):	
Math/logic module (activation for all connected controller modules)	00569509
PLC according to IEC 61131-3 (CODESYS V3.5)	00569510
Program generator 1 to 9	00569511
Program generator 1 to 9 with process steps (as of system version 02)	00606498

## 1.4.5 General accessories

Description	Part no.
JUMO mTRON T system manual, English	00575577
Setup program with program editor JUMO mTRON T (on MiniDVD), incl. USB cable (A-plug to mini-B-plug, 3 m)	00569494
Program editor JUMO mTRON T (on MiniDVD), incl. USB cable (A-plug to mini-B-plug, 3 m)	00622333
PCA3000/PCC JUMO software package	00431884
PC Evaluation Software PCA3000	00431882
Release automatic print for PC Evaluation Software PCA3000	00505548
PCA Communication Software PCC	00431879
Plant Visualization Software JUMO SVS3000: See data sheet 700755	-
USB cable A-plug mini-B-plug 3 m	00506252

Content of the Mini-DVD:

- Setup program with program editor JUMO mTRON T in case of part no. 00569494
- Program editor JUMO mTRON T in case of part no. 00622333
- CODESYS programming software (free version)
- CODESYS Repository Package - Operating panels (free version)
- GSD file JUMO mTRON T - CPU (free version)
- PC Evaluation Software PCA3000 (30-day trial version)
- PCA Communication Software PCC (30-day trial version)
- Documentation in PDF format

## 1.5 System version

The system version of the measuring, control, and automation system is determined by the compatibility index of the base unit.

Example composition of a version number for the central processing unit: 248.xx.yy

248 = basic version, **xx = compatibility index (system version)**, yy = current version

In this document, functions which depend on the system version are marked accordingly (e.g. "as of system version 02").

# 1 Introduction

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### 2.1 Brief description

The central processing unit is the heart of the system. It contains the process image of the application and manages the configuration and parameter data of the complete system.

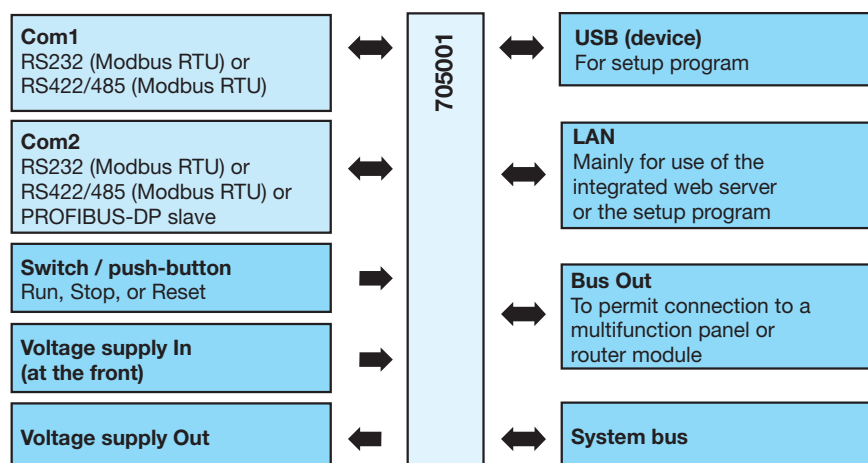
For individual control tasks nine program generators and extensive limit value monitoring functions are available.

LEDs are used to indicate applied voltage supply, the operating status of the PLC, system messages, as well as the communication through interfaces.

A USB device interface, a LAN connection (Ethernet), and two system bus connections are available as standard. Up to two interfaces can be optionally equipped for fieldbus applications. The central processing unit, the input/output modules connected laterally, and modules integrated by a router are comfortably configured and parameterized with the setup program or the multifunction panel 840.

The integrated CODESYS V3.5 PLC completes the parameterizable functions with a powerful control unit. This allows to realize even complex applications.

### 2.2 Block diagram



## 2 Description

---

### 3.1 General information on installation/dismounting

**DANGER!**

With multichannel controller module 705010 and relay module 705015, the load circuits from relay or solid state relay outputs can be operated with a dangerous electrical voltage (e.g. 230 V).

There is a risk of electric shock.

Prior to the installation/dismounting of these modules or the removal of the module insert, the load circuits are to be disconnected from the voltage and the terminal strips are to be removed from the module. This work must only be performed by qualified personnel.

**WARNING!**

The modules must never be installed in areas with an explosion hazard.

There is the risk of an explosion.

The entire system must only be used outside of areas with an explosion hazard.

**Mounting site**

All modules have protection type IP20 and are only intended for use in fireproof control cabinets or switch boxes. The mounting site should be virtually vibration-free. Electromagnetic fields caused by equipment such as motors or transformers should be avoided.

Multifunction panel 840 has protection type IP67 at the front and is intended for installation in a panel cut-out. The rear has protection type IP20.

**Climatic conditions**

The ambient temperature and the relative humidity at the mounting site must correspond to the technical data. Aggressive gases and vapors have a negative effect on the operating life of the modules. The mounting site must be free from dust, powder, and other suspended matter so that the cooling slots do not become blocked.

**DIN rail**

All modules are mounted on a DIN rail according to DIN EN 60715 (35 mm × 7.5 mm × 1 mm). For reasons of stability, the spacing of the fastening screws for the DIN rail should not exceed 200 mm. The minimum distances for the modules that are specified in the module-specific installation or operating instructions must be observed.

**Installation position**

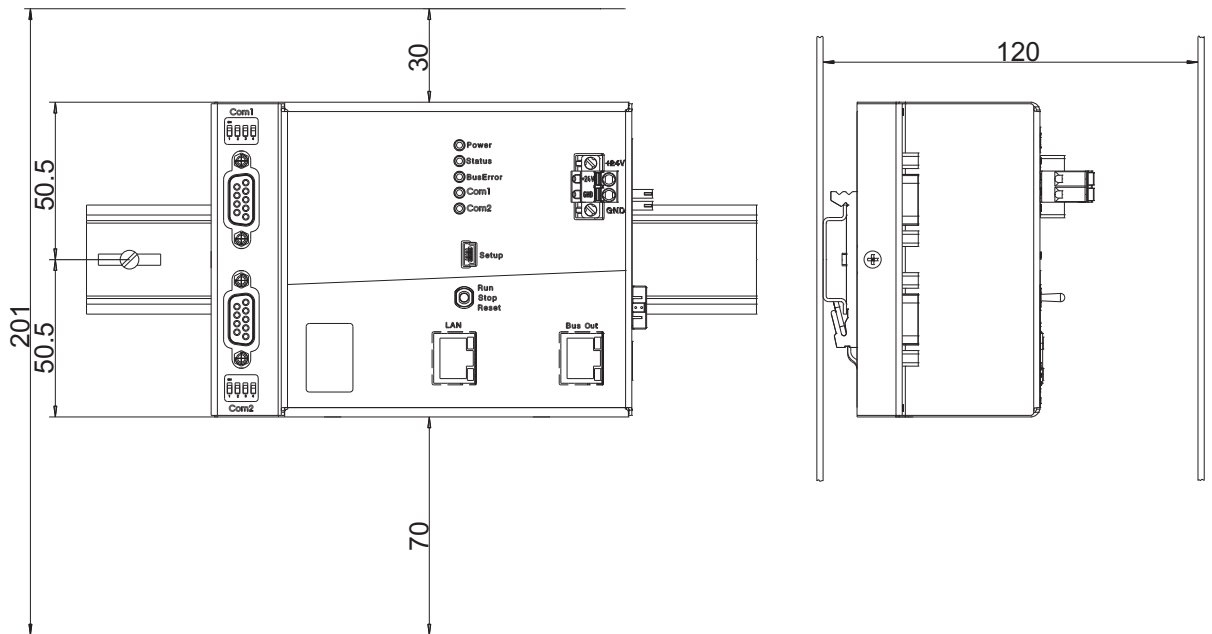
The DIN rail should be mounted horizontally so that all modules are arranged vertically. Otherwise the admissible ambient temperature range will be restricted.

**Space requirement**

The modules require the minimum distances shown in the following figure for the purpose of installation/dismounting and for future maintenance or replacement. In the event of shorter distances the minimum bending radius of the cables, the performance of the electrical installation, and the clear arrangement of the plant are no longer guaranteed.

# 3 Installation

## Minimum distances



## 3.2 Installation/dismounting on DIN rail

All modules in the system are intended for installation on a DIN rail according to DIN EN 60715 (35 mm × 7.5 mm × 1 mm).

The following must always be installed on the left, at the start of the DIN rail:

- A central processing unit *or*
- A router module

These modules connect the input/output modules to the voltage supply and the system bus.



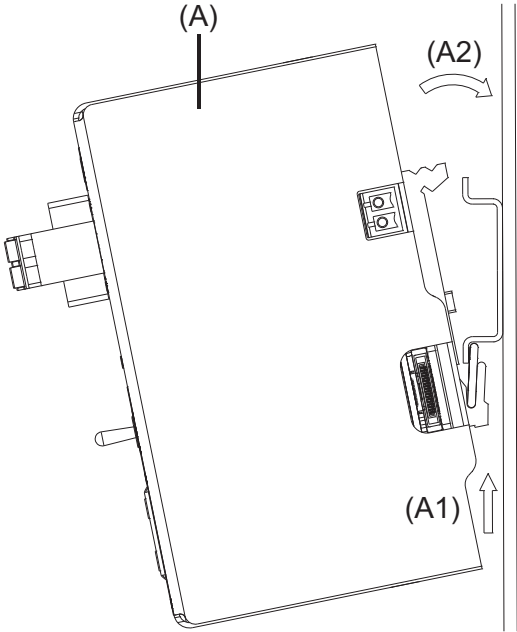
### NOTE!

To determine the required minimum width of the DIN rail, the widths of the individual modules are to be added (see technical data of the modules in the respective data sheet or the module-specific installation instructions).

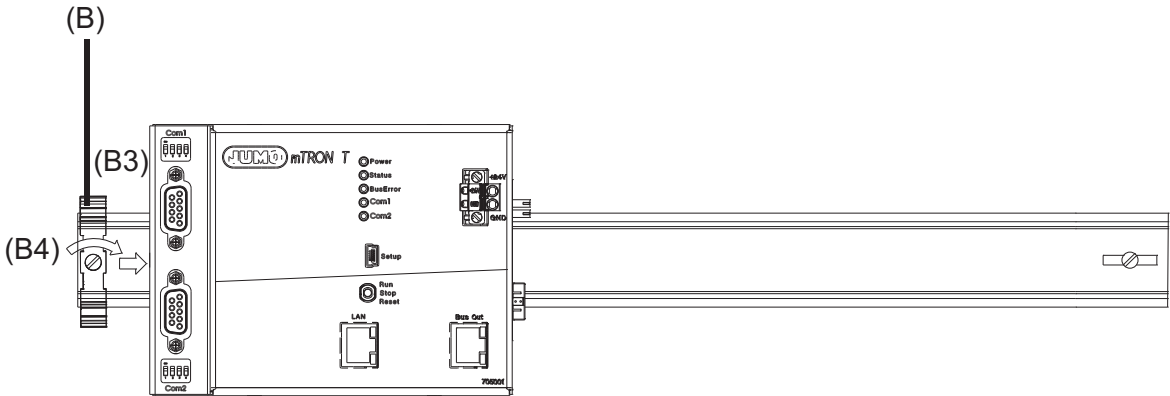
The widths of the cover (17.5 mm) and both end brackets (each 9.5 mm) should also be taken into consideration:  $17.5 \text{ mm} + 2 \times 9.5 \text{ mm} = 36.5 \text{ mm}$ .

## 3.2.1 Base units

Installation of a base unit, using the example of a central processing unit 705001



### Installing the end brackets

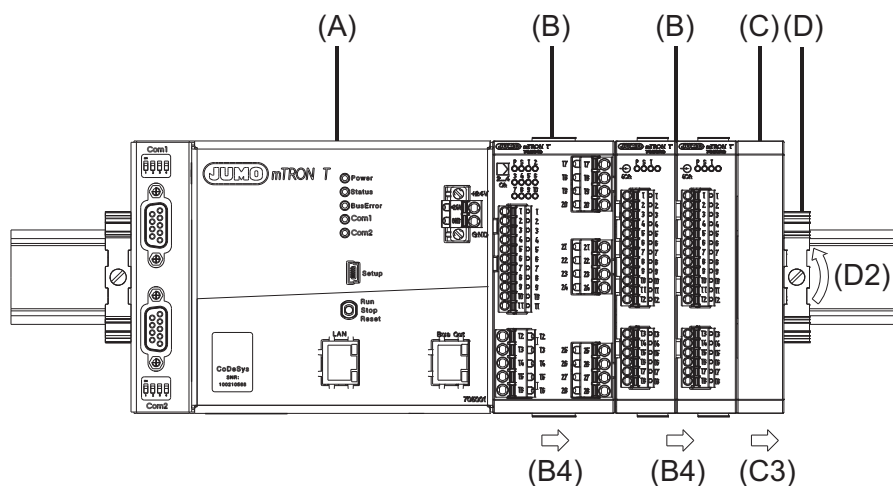


Procedure:

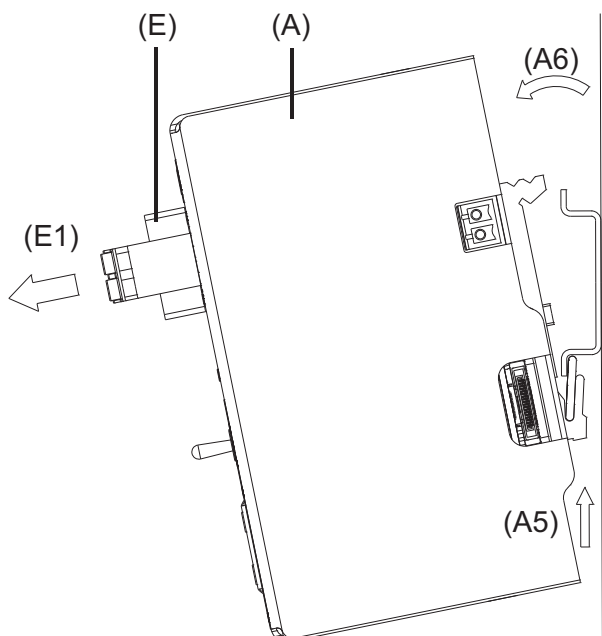
Step	Activity
1	Mount the central processing unit (A) on the DIN rail from below and press upward (A1).
2	Pivot the central processing unit (A) toward the rear until it snaps into place (A2).
3	Position the end bracket (B) on the DIN rail and move to the right against the central processing unit (B3). Fasten the end bracket using a screwdriver (B4).

# 3 Installation

## Dismounting a base unit, using the example of a central processing unit 705001



## Removing the central processing unit from the DIN rail



Procedure:

Step	Activity
1	Remove the connection cables if required (Setup, LAN, Bus Out).
2	If required, use a screwdriver to release the wired terminal (E) of the central processing unit (A) and pull off toward the front (E1).
3	Fully release the end bracket (D) using a screwdriver (D2), press upward from below, pivot toward the front, and remove from the DIN rail. Note: The end bracket does not need to be removed from the DIN rail if there is sufficient space to the side to move it at least 10 mm to the right.

## 3 Installation

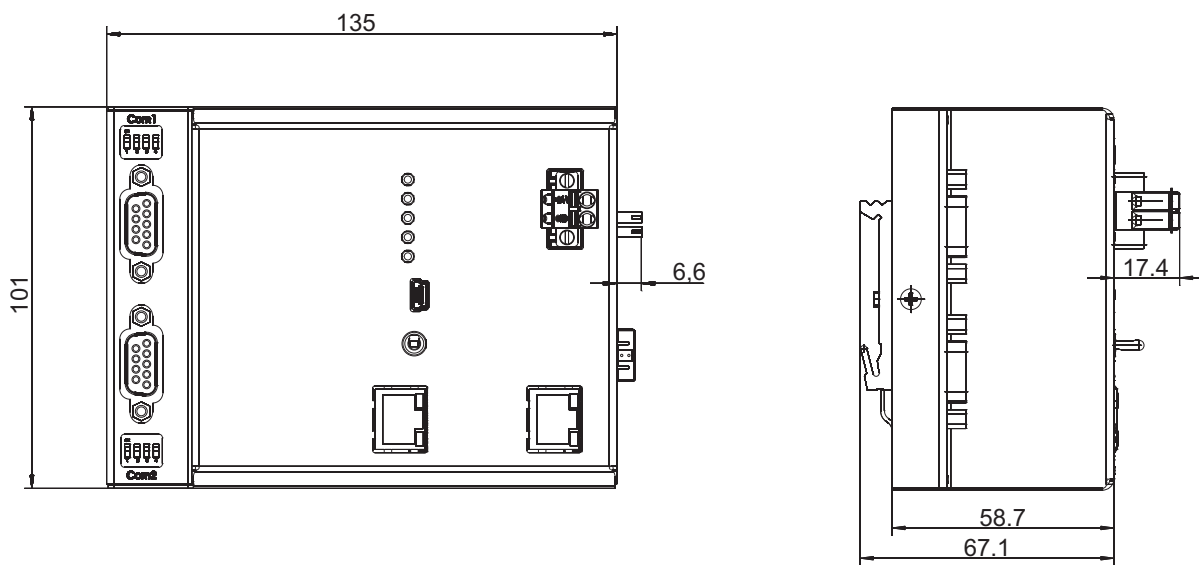
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Step	Activity
4	<p>Move the cover (C) to the right (C3) until the side contacts of the neighboring module are exposed. Then release the cover at the bottom using a screwdriver, press upward, and remove from the DIN rail.</p> <p>Note: The cover does not need to be removed from the DIN rail if there is sufficient space to the side to move it at least 10 mm to the right.</p>
5	<p>Move the modules (B) on the right next to the central processing unit (A) to the right (B4) until the side contacts of the central processing unit are exposed.</p> <p>➡ These modules are isolated from the voltage supply and the system bus.</p>
6	<p>Press the central processing unit (A) upward from underneath (A5), pivot off the DIN rail toward the front (A6), and remove.</p>

# 3 Installation

---

## 3.3 Dimensions



## 4.1 Installation notes



### NOTE!

These installation notes apply for the entire measuring, control, and automation system and, on some occasions, are only applicable for a specific module.

The respective connection diagram shows the context.

### Requirements for the personnel

- Work on the modules must only be carried out to the extent described and, like the electrical connection, only by qualified personnel.
- Before plugging and unplugging connection cables ensure that the person performing the work is electrostatically discharged (e.g. by touching grounded metallic parts).

### Cables, shielding, and grounding

- When selecting the cable material, when installing, and when performing the electrical connection of the module, the regulations of DIN VDE 0100 "Erection of power installations with rated voltages up to 1000 V" and the respective national regulations (e.g. on the basis of IEC 60364) are to be observed.
- Certain cables must be heat resistant up to at least 80 °C at maximum load. The relevant instructions in the connection diagram of the affected modules must be observed.
- Route input, output, and supply cables separately and not parallel to one another.
- Only use shielded and twisted probe and interface cables. Do not route the lines close to current-carrying components or cables.
- For temperature probes, ground the shielding on one side in the control cabinet.
- Do not perform loophroughs on the grounding cables, but route the cables individually to a shared grounding point in the control cabinet; in doing so, ensure that the cables are as short as possible.  
Ensure that the equipotential bonding is correct.

### Electrical safety

- Isolate power supply units from the voltage supply on the primary side if there is a risk of touching parts with dangerous electrical voltage (e.g. 230 V) in the course of work.
- The fuse rating of the power supply units on the primary side should not exceed a value of 10 A (inert).
- With modules with relay or solid state relay outputs, the load circuits can be operated with a dangerous electrical voltage (e.g. 230 V). Disconnect load circuits from the voltage supply during installation/dismounting and electrical connection.
- In order to prevent the destruction of the relay or solid state relay outputs in the event of an external short circuit in the load circuit, the load circuit should be fused to the maximum admissible output current.
- The modules are not suitable for installation in areas with an explosion hazard.
- In addition to a faulty installation, incorrectly set values on the module could also impair the correct function of the following process. Therefore, ensure that safety devices independent of the module (e.g. overpressure valves or temperature limiters/monitors) are available and that it is only possible for qualified personnel to define settings. Please observe the corresponding safety regulations in this context.

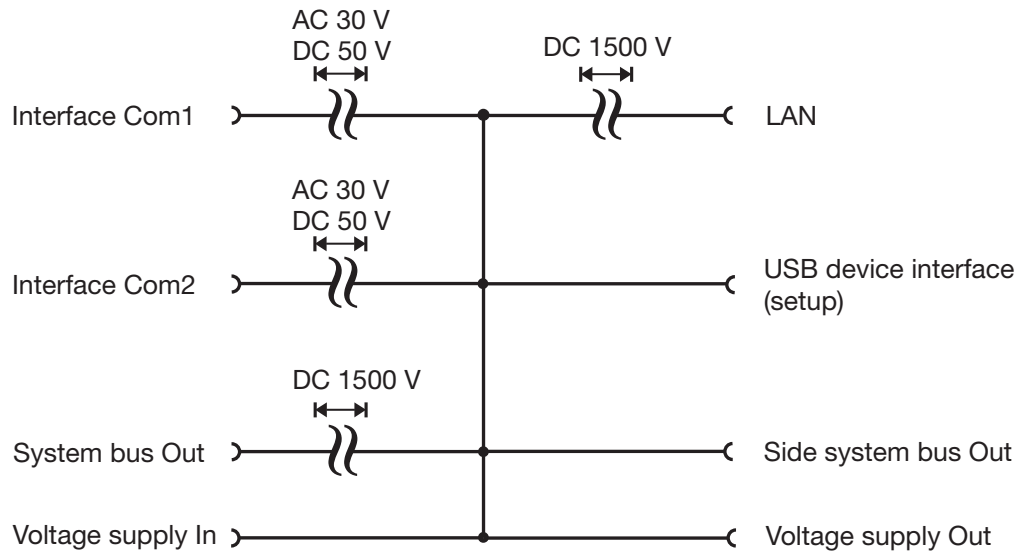
# 4 Electrical connection

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## References to other information

- The electromagnetic compatibility meets the standards and regulations cited in the technical data.
- The USB device interface and voltage supply in the central processing unit 705001 are **not** electrically isolated. In general, please observe the specifications regarding electrical isolation.

## 4.2 Electrical isolation



## 4.3 Connection diagram



### CAUTION!

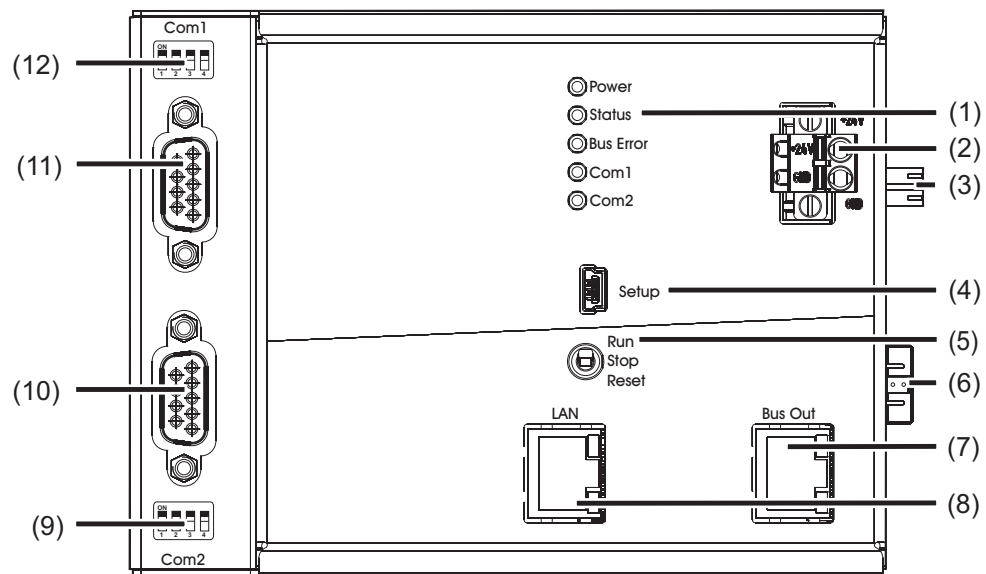
At maximum load, the temperature at the "+24 V" and "GND" terminals (Voltage supply In) may exceed 60 °C.

As a result the insulation of the cable may be damaged.

The cable must be heat resistant up to at least 80 °C.

### 4.3.1 Display, operating, and connection elements


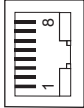
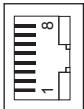
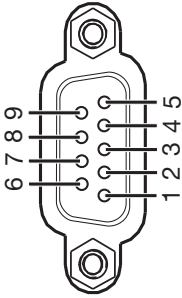
This overview shows the position of the display, operating, and connection elements. The assignment to individual functions is illustrated in the following sections.



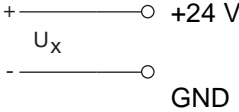
- (1) Status displays (LED)
- (2) Voltage supply In, DC 24 V
- (3) Voltage supply Out, DC 24 V
- (4) USB device interface (Setup)
- (5) Switch/button for Run, Stop, or Reset
- (6) Side system bus Out
- (7) System bus Out
- (8) LAN interface
- (9) Com2 terminating resistors
- (10) Com2 interface
- (11) Com1 interface
- (12) Com1 terminating resistors

## 4 Electrical connection

### 4.3.2 Interfaces

Connection	Designation	Number	Connection element	
USB device	Setup	(4)		
System bus Out	Bus Out	(7)		1 TX+ Transmit data + 2 TX- Transmit data - 3 RX+ Receive data + 6 RX- Receive data -
Ethernet	LAN	(8)		1 TX+ Transmit data + 2 TX- Transmit data - 3 RX+ Receive data + 6 RX- Receive data -
Serial interface (RS232), option	Com1, Com2	(11), (10)		2 RxD Receive data 3 TxD Transmit data 5 GND Ground
Serial interface (RS422), option	Com1, Com2	(11), (10)		3 TxD+ Transmit data + 4 RxD+ Receive data + 5 GND Ground 8 TxD- Transmit data - 9 RxD- Receive data -
Serial interface (RS485), option	Com1, Com2	(11), (10)		3 TxD+/RxD+ Transmit/Receive data + 5 GND Ground 8 TxD-/RxD- Transmit/Receive data -
PROFIBUS-DP, option (as of system version 02)	Com2	(10)		8 RxD/TxD-N (A) Transmit/Receive data - 3 RxD/TxD-P (B) Transmit/Receive data + 6 VP (+5 V) Voltage supply + 5 DGND Data ground

### 4.3.3 Voltage supply

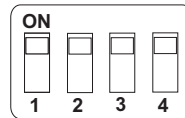
Connection	Designation	Number	Symbol and terminal designation
Voltage supply In	+24 V and GND	(2)	 + ———— ○ +24 V U <sub>x</sub> - ———— ○ GND

## 4.3.4 Terminating resistors

The internal terminating resistors for the Com1 and Com2 interfaces are only relevant for RS422/485.

The terminating resistors are deactivated by default. To activate them, DIP switches 1 to 4 for the relevant interface must be pushed upward using a suitable tool such as a ballpoint pen (ON position).

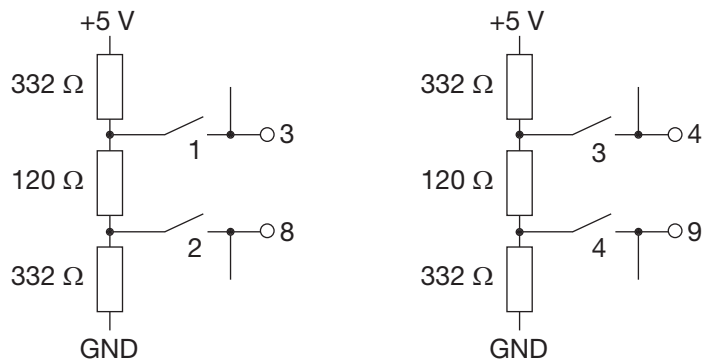
The following figure shows the position of the DIP switches when the terminating resistors are activated.



### NOTE!

To ensure fault-free operation, terminating resistors are required at the start and end of an RS422/485 transmission path.

### Internal terminating resistors



## 4 Electrical connection

### 4.4 Functional check

Once the electrical connection is complete, the following points must be checked:

- 1) Voltage supply
- 2) LED function
- 3) Errors during initialization

#### Voltage supply

If	Then
"Power" LED (green) <b>is lit</b>	The central processing unit is supplied with voltage.
"Power" LED is <b>not lit</b>	The central processing unit is not supplied with voltage, or the electrical function of the LED is faulty. Remedy: <ul style="list-style-type: none"><li>• Check voltage supply to "+24 V" and "GND" terminals of the central processing unit.</li><li>• Check power supply unit and connection between power supply unit and central processing unit.</li></ul> If the "Power" LED does not light up, despite a voltage supply being present, the central processing unit must be replaced.

#### LED function

When the voltage supply is connected, the LEDs on the central processing unit are tested automatically.

If	Then
The following LEDs <b>light up in red</b> simultaneously for approx. two seconds: Status BusError Com1 Com2	The electrical function of the LEDs is in order.
One of the listed LEDs <b>does not light up</b>	The central processing unit must be replaced.
After the test of the red LEDs, the following LEDs <b>light up in green</b> simultaneously for approx. two seconds: Status Com1 Com2	The electrical function of the LEDs is in order.
One of the listed LEDs <b>does not light up</b>	The central processing unit must be replaced.

(If a voltage supply is present, the "Power" LED is permanently lit in green.)

## 4 Electrical connection

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### Errors during initialization

If	Then
After the LED test, the "Status" LED <b>lights up in red</b> and the "BusError" LED <b>does not light up</b>	There is an internal error and the central processing unit must be replaced.
After the LED test, the "Status" LED <b>flashes red</b> and the "BusError" LED <b>does not light up</b>	The internal buffer battery is dead and must be replaced. For buffer battery replacement, please contact the device manufacturer or plant installer.

### Startup

The checks described above complete the process of installation and electrical connection. For startup, use the additional documentation (operating manual or system manual).

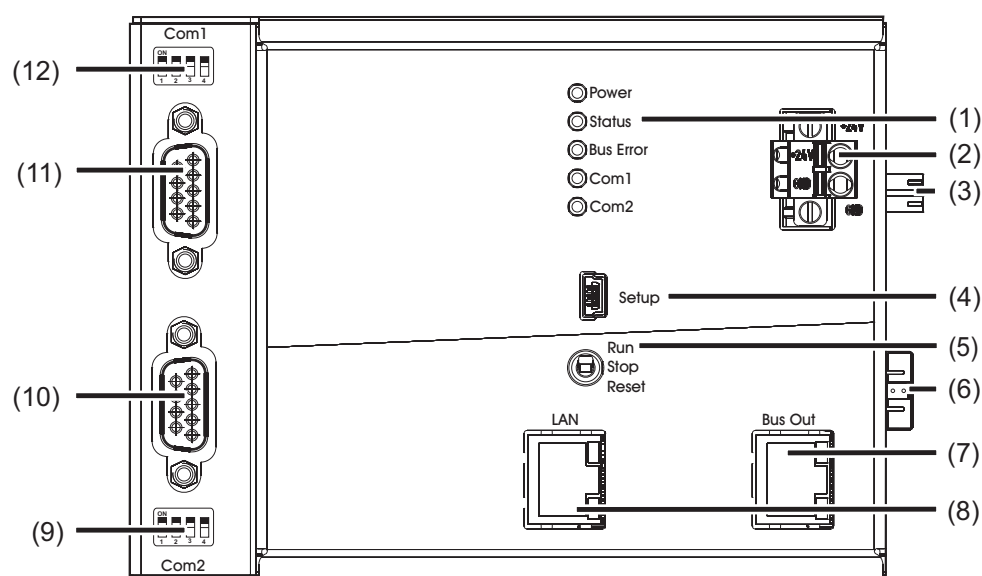
The "Introduction" section of this document contains an overview of all documentation for the measuring, control, and automation system.

## 4 Electrical connection

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## 5.1 Display, operating, and connection elements

This overview shows the position of the display, operating, and connection elements.



- (1) Status displays (LED)
- (2) Voltage supply In, DC 24 V
- (3) Voltage supply Out, DC 24 V
- (4) USB device interface (Setup)
- (5) Switch/button for Run, Stop, or Reset
- (6) Side system bus Out
- (7) System bus Out
- (8) LAN interface
- (9) Com2 terminating resistors
- (10) Com2 interface
- (11) Com1 interface
- (12) Com1 terminating resistors

# 5 Operation

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## 5.2 System states

The following characteristics indicate the various system states:

### "Run" system state

- To achieve this state, use the system switch (Run) or the setup program; if there is an error in a mandatory module, the system does not enter the "Run" state. Requirement: the system must not be in the "Init" state.
- Input values are adopted by the system; outputs are actuated (are active).
- Interfaces (Com1 and Com2) are active.
- The system switch, setup program, or PLC can be used for changeover to "Stop".
- The setup program can be used to transfer the configuration; here the user can make the adjustment whether the system is set to the safe "Stop" state beforehand.
- Software update is possible, but the system is set to "Stop" automatically.

### "Stop" system state

- To achieve this state, use the system switch (Stop), setup program, or PLC. Requirement: the system must not be in the "Init" state.
- Input values are adopted by the system; outputs are switched off (inactive).
- Modules are in safe state (except independent controller modules).
- Interfaces (Com1 and Com2) are active.
- The setup program can be used for changeover to "Run", provided this is not prevented by the "Stop" switch setting.
- The setup program can be used to transfer the configuration.
- Recording function continues to run, default values are used in part.
- Software update is possible.
- Three-step controller in manual mode: control element can still be operated, provided communication with the multifunction panel is available.

### "Init" system state

- To achieve this state, use the system switch ("Origin" reset).
- Outputs are switched off (inactive).
- Modules are in safe state (except independent controller modules).
- Interfaces (Com1 and Com2) are active.
- Changeover to "Run" and "Stop" is not possible using the setup program or PLC.
- System startup must be performed with the setup program.
- Recording function continues to run; analog inputs of the multifunction panel are set to default values.
- PLC program and all internal PLC memory areas are deleted; PLC is set to original state.

### "Calibration mode" system state

- Activation in setup program using the "Calibrate / test" function (online parameter) for the relevant module
- The entire system enters calibration mode.
- PLC in "Stop" state; system bus in "Run" state (outputs are actuated)

## 5.3 System switch

The central processing unit switch (Run/Stop/Reset) allows the various system states to be set. However, the system state does not just depend on the switch position; it also depends on internal errors, which may prevent changeover to another state. For example, an error may result in a system start being blocked, even though the switch is set to "Run".

Error states are indicated by the "Status" and "BusError" LEDs.

⇒ Chapter 5.4 "LED displays", page 40

The setup program or a Web browser is used for diagnostics and, if necessary, also for troubleshooting.

### "Run" switch position

The system enters the "Run" state, provided there are no internal errors that prevent this.

⇒ Chapter 5.2 "System states", page 36

During changeover from the "Stop" state to the "Run" state, an event message is issued (plant "Run").

### "Stop" switch position

The system enters the "Stop" state.

⇒ Chapter 5.2 "System states", page 36

During changeover from the "Run" state to the "Stop" state, an event message is issued (plant "Stop").



#### **NOTE!**

In the "Stop" state it is not possible to set the PLC to the "Start" state using the CoDeSys programming system.

### "Reset" switch position (button function)

This switch position triggers three different functions. Starting from the "Stop" position, the switch must be pushed down in a specific sequence (button function) and held. If the relevant sequence and the required times are not observed, the entire sequence must be repeated. During a sequence, LEDs signal the end of the time periods and successful completion of the sequence.

The following diagrams show the time sequence for the switch position (Reset, Stop) and the signaling from the "Status" (S) and "BusError" (BE) LEDs. See also:

⇒ Chapter 5.4.1 "Display modes", page 41

When the switch is pushed to the "Reset" position, both LEDs switch off. When the first threshold in the sequence is reached (2 s), the "Status" (S) LED lights up in red. When the second threshold is reached (10 s or 2 s if pushed again in "Origin" reset), the "BusError" (BE) LED lights up in red. This allows you to see when the switch can be released.

If the sequence was completed successfully, the relevant reset is triggered. Both LEDs flash for approx. 2.5 seconds as confirmation. If the sequence was incorrect, a reset is not triggered and the LEDs resume the state that they were in before the start of the sequence.



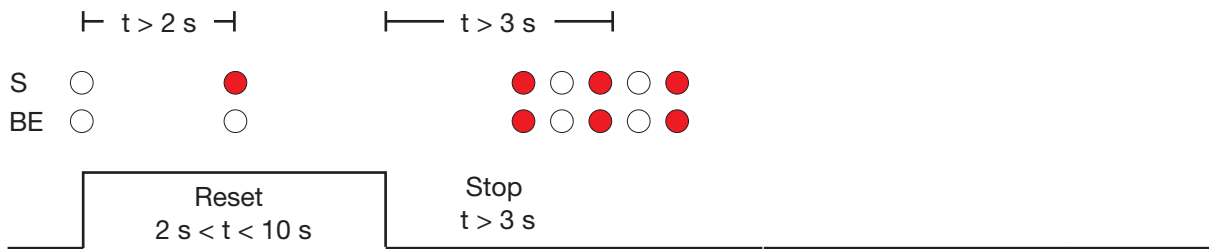
#### **NOTE!**

The following reset sequences – except "origin" reset – can be performed only after basic initialization of the system.

# 5 Operation

## "Warm" reset:

The "warm" reset is initialized by holding the switch in the "Reset" position between 2 s and 10 s.



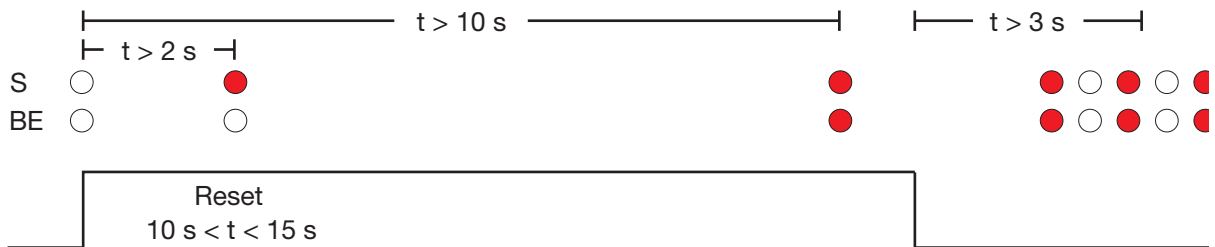
The PLC performs a warm start, which means that the retain area is retained (see CoDeSys documentation on warm start of PLC).

The retain variables of external inputs (interfaces) are also retained.

An event message is issued (warm start reset).

## "Cold" reset:

The "cold" reset is initialized by holding the switch in the "Reset" position for at least 10 s.



A "cold" reset resets the system bus (master restarts, data of the modules on the bus is read in again).

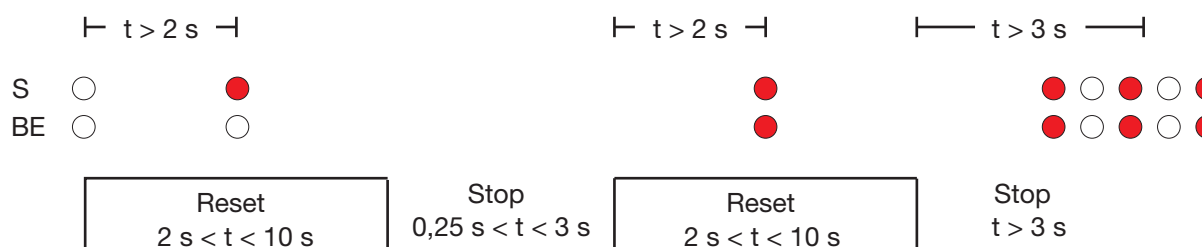
The PLC performs a cold start, which means that the retain area is deleted (see CoDeSys documentation on cold start of PLC).

The retain variables of external inputs (interfaces) are reset.

An event message is issued (cold start reset).

## "Origin" reset:

The "origin" reset is initialized by holding the switch in the "Reset" position between 2 s and 10 s, briefly releasing it (between 0.25 s and 3 s), and then holding it in the "Reset" position again between 2 s and 10 s.



An "origin" reset resets the system bus (master starts again, data of the modules on the bus is read in again) and deletes the bus configuration.

The PLC performs a full reset, which means that the PLC program and the retain area are deleted (see CoDeSys documentation on origin (full) reset of PLC).

The retain variables of external inputs (interfaces) are reset.

The system enters "Init" state.

⇒ Chapter 5.2 "System states", page 36

An event message is issued (origin reset).



### NOTE!

A "origin" reset is also possible during the basic initialization of the system. For this purpose, after switching on the system, the switch must be held in the "Reset" position until the reset sequence starts (observe the LEDs). This makes it possible, for example, to delete a faulty PLC program that would otherwise block the start of the system.



### CAUTION!

An "origin" reset deletes the entire configuration.

The system can no longer be started in the "Run" switch position.

To operate the system again, the configuration – incl. PLC program and bus configuration – must be loaded into the central processing unit with the setup program.

# 5 Operation

---

## 5.4 LED displays

### "Power" LED

If the central processing unit is being supplied with voltage, the LED is lit permanently in green.

### "Status" LED

This LED indicates the system state and – in combination with the "BusError" LED – errors in the system. Possible displays are listed in the "System states and errors" section.

⇒ Chapter 5.4.2 "System states and errors", page 42

### "BusError" LED

This LED indicates problems relating to the system bus and the modules that are connected to the central processing unit.

In combination with the "Status" LED, it also indicates errors in the system. Possible displays are listed in the "System states and errors" section. Diagnostics requires the setup program or a Web browser.

### "Com1" and "Com2" LEDs

These LEDs indicate the status of the relevant interface. The display depends on the system version.

#### **System version 01:**

- LED off: Interface module is not equipped
- LED flashes green and red: Error (defective interface, wrong setting, or wrong connection)
- LED flashes green: Communication is active

#### **As of system version 02:**

- LED off: Interface module is not equipped
- LED is lit green: Interface module is equipped, no communication
- LED flashes green: Communication is active
- LED flashes red: Communication error
  - for Modbus master: Slave does not answer.
  - for Modbus slave: Timeout detected (master does not answer).
  - for PROFIBUS (Com2): External communication to the master is disrupted.
- LED is lit red, only for PROFIBUS (Com2): Internal error

For diagnostics in the event of an error, the setup program or a web browser is required.

## 5.4.1 Display modes

The following table lists all the states that the "Status" (red/green) and "BusError" (red) LEDs can display.

Display mode	Description	Green symbol	Red symbol
---	LED state not relevant	---	---
Off	LED off	○	○
On	LED on (permanently lit)	■	●
Flickering	LED flickers (50 ms on, 50 ms off)	■ ■ ■ ■	● ● ● ●
Single flickering	LED flashes briefly (50 ms on, 200 ms off)	■ □ □ □ □	● ○ ○ ○ ○
Blinking	LED flashes (200 ms on, 200 ms off)	■ □ ■ □ ■	● ○ ● ○ ●
Single flash	LED flashes once (200 ms on, 1000 ms off)	■ □ □	● ○ ○
Double flash	LED flashes twice (on/off/on for 200 ms each time, 1000 ms off)	■ ■ □ □	● ● ○ ○
Triple flash	LED flashes three times (on/off/on/off/on for 200 ms each time, 1000 ms off)	■ ■ ■ □ □	● ● ● ○ ○
Quadruple flash	LED flashes four times (on/off/on/off/on/off/on for 200 ms each time, 1000 ms off)	■ ■ ■ ■ □ □	● ● ● ● ○ ○
Blinking red/green	LED flashes red and green (200 ms red, 200 ms green)	● ■ ● ■	

# 5 Operation

## 5.4.2 System states and errors





The following table lists all the system states and errors that are indicated by the "Status" and "BusError" LEDs. In most cases, further diagnostics must be performed with the setup program.

Category	"Status" LED	"BusError" LED	Meaning	Diagnostics with	Recommended action
Start error	●	○	Internal error (1st boot-loader) Internal error (2nd boot-loader) No firmware (2nd boot-loader)	LED	Replace central processing unit.
Start error/ operation	●●●●	○	Internal error	Setup program	Perform restart, read out error.  After several restart attempts with an internal error: replace central processing unit.
Start error	●○●○●	○	Buffer battery dead (system start only possible with "cold" reset)	LED	Replace buffer battery.
Start error	●	●	Various errors when starting the system bus (e.g. no memory, initialization error, error when reading the bus configuration)  Bus configuration not available.  If the "Com1" and "Com2" LEDs also light up red, the input voltage is too low (< 19 V).	Setup program or Web browser	Re-transfer configuration with the setup program.
Start error	●	●○●○●	Error in topology  Bus configuration does not correspond to the actual state.  Target state of hardware configurator does not correspond to the actual state.	Setup program or Web browser	Check that all (mandatory) modules are present and correctly connected; check LED display of modules; if necessary, re-transfer configuration with the setup program.

## 5 Operation

Category	"Status" LED	"BusError" LED	Meaning	Diagnostics with	Recommended action
Start error			<p>Incompatible module on system bus</p> <p>No firmware present in module</p> <p>Incorrect (incompatible) hardware (actual/target)</p> <p>Incorrect (incompatible) hardware VdN (actual/target)</p> <p>Incorrect (incompatible) software in module (actual/target)</p> <p>Incorrect (incompatible) software in module (incompatible with central processing unit)</p> <p>Incorrect (incompatible) software in module (incompatible with hardware)</p> <p>Incorrect (incompatible) software VdN in module (actual/target)</p> <p>Optional board 1 incorrect (actual/target)</p> <p>Optional board 2 incorrect (actual/target)</p> <p>Optional board 3 incorrect (actual/target)</p>	Setup program or Web browser	<p>Use the setup program to determine which module is incompatible; replace module, or load, replace, or remove optional board.</p> <p>Perform firmware update, observe versioning.</p> <p>⇒ Manual for setup program B 705000.6</p>
Operation		---	Calibration mode	LED/setup program	
Operation		---	<p>DHCP error (no IP address)</p> <p>Battery pre-warning/battery dead (after "cold" reset, see "Buffer battery dead" start error)</p> <p>PLC program not available.</p>	LED/setup program	<p>Buffer battery is dead or almost dead; replace buffer battery.</p> <p>Re-transfer configuration with the setup program.</p>
Operation		---	System in "Run" (OP) state – no error	LED	
Operation		---	System in "Stop" (INIT) state – no error, only in start phase	LED	
Operation		---	System in "Stop" (PREOP) state – no error, only in start phase	LED	

## 5 Operation

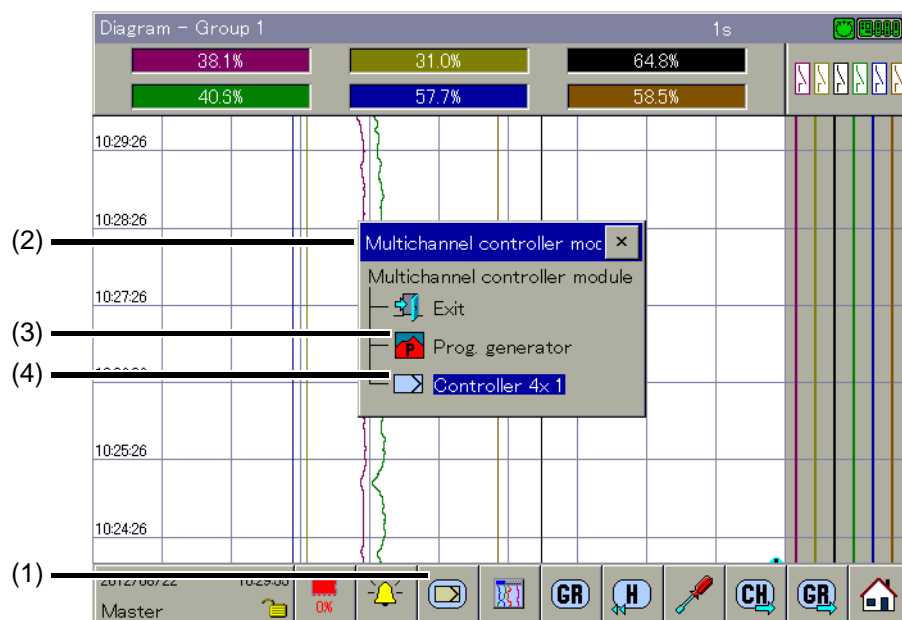
Category	"Status" LED	"BusError" LED	Meaning	Diagnostics with	Recommended action
Operation		---	System in "Stop" (SAFEOP) state – no error	LED	
Operation	---		Error in a mandatory module	LED/setup program, Web browser, or multifunction panel	Check that all mandatory modules are present and correctly connected; check function of modules, replace affected module if necessary.
Operation	---		Error in an optional module	LED/setup program, Web browser, or multifunction panel	Check that all optional modules are present and correctly connected; check function of modules, replace affected module if necessary.
Operation	---		Module error (central processing unit performs bus scan)	LED	None (modules that are still located on the system bus are started automatically).

## 5.5 Operation on the multifunction panel

The basic steps for operation and visualization are described in the operating manual of the multifunction panel (B 705060.0).

This operating manual describes how to operate the program generator.

### Multifunction panel – "Controller" button



(1) "Controller" button (operation)

(2) "Controller" menu (opened with the "Controller" button)

(3) Operate program generator; opens the generator screen

(4) Operate multichannel controller module; opens the controller screen

⇒ Operating manual for multichannel controller module (B 705010.0)

To operate the program generators, select the "Program generator" entry (3).

# 5 Operation

## 5.5.1 Program generator

Program generator operation (option) covers the following settings and functions:

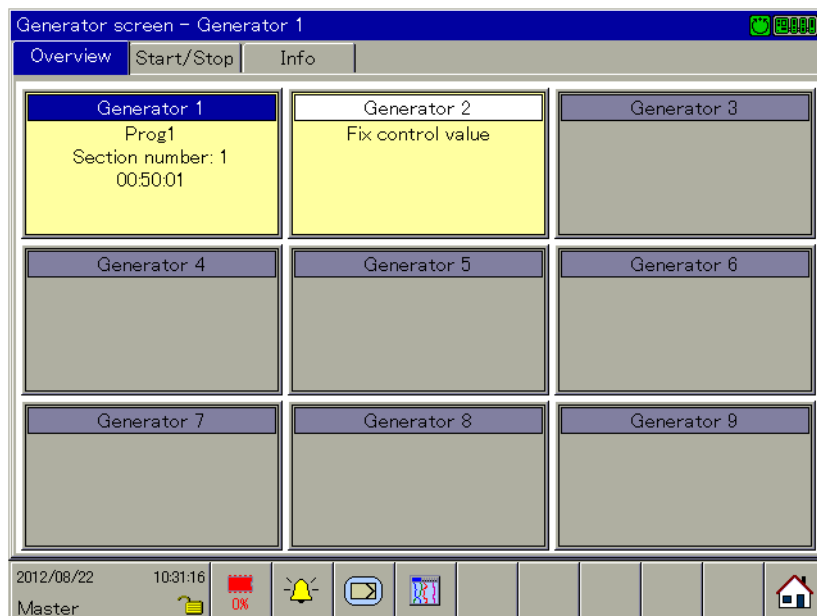
- Selecting a program
- Specifying the program section and delay time for program start
- Starting and stopping the program
- Changing the program temporarily
- Changing to manual mode and setting the setpoint values and operating contacts
- Display of setpoint values, operating contacts, program names and sections, tolerance band signal, and running times; as of system version 03, the number of program repetitions is also displayed



### NOTE!

The channel and setpoint value of the program generator must be assigned to the input signal (setpoint value) of the relevant controller channel in the controller module NV connecting list.

### Generator screen – overview of the nine program generators



This overview shows the following information for all activated program generators:

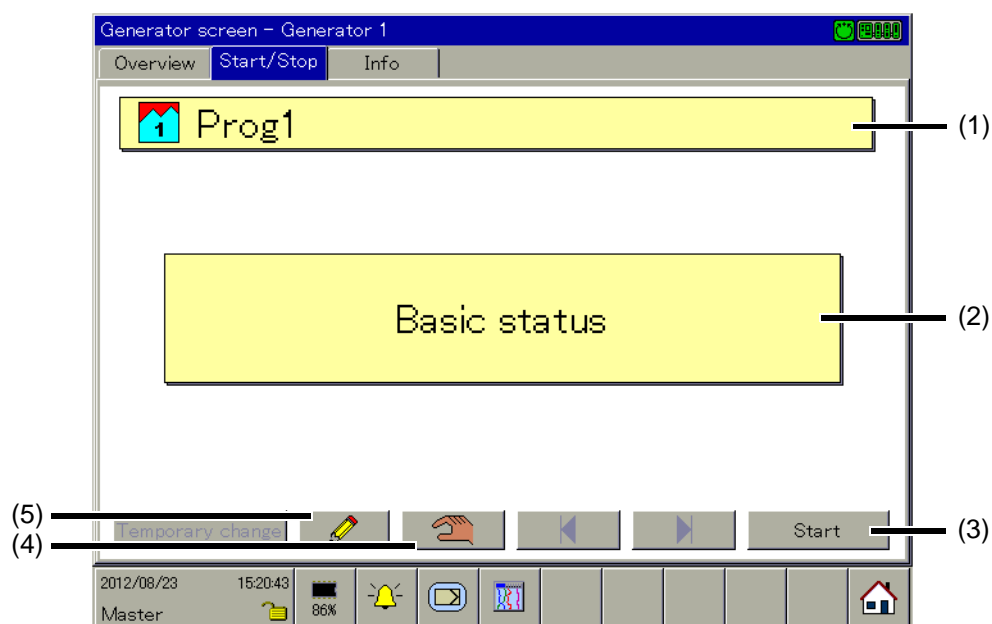
- Function: program generator (or current program) or fixed-setpoint generator
- Current program section of first program channel
- Remaining running time of program or of current cycle (in case of a program repetition)

To select a program generator, touch the relevant box. Program generators shown on a gray background are switched off and cannot be selected. The colors of the background and foreground – except for gray – can be configured for each program generator (central processing unit).

The "Start/Stop" and "Info" tabs always relate to the selected program generator.

If only one program generator is switched on, the Start/Stop screen of the relevant program generator is displayed in place of the overview.

### Generator screen – Start/Stop screen for the selected program generator (basic status)

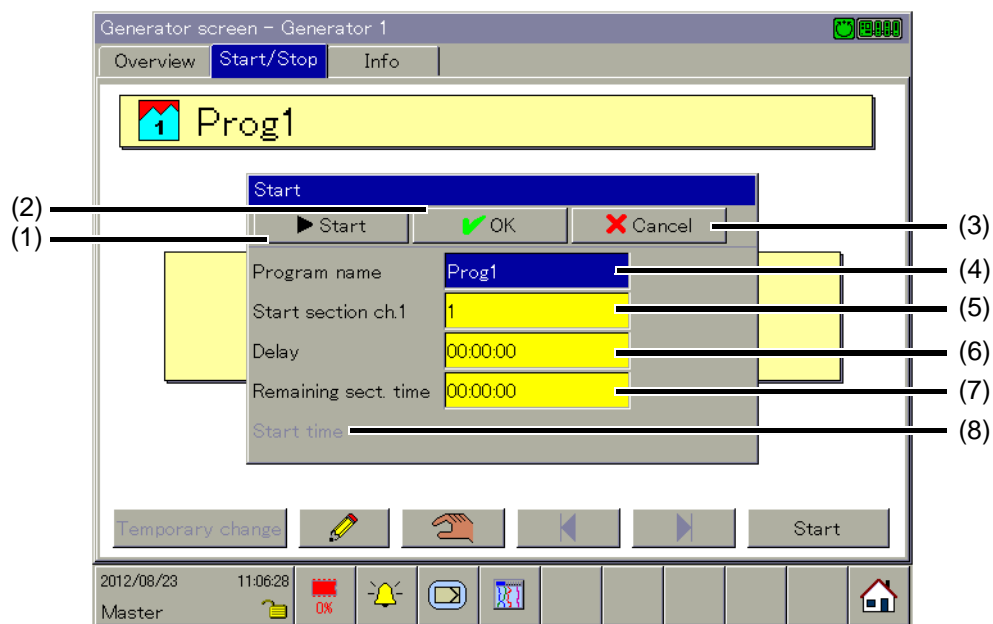


- (1) Program name
- (2) Program generator is in basic status (program is not running)
- (3) "Start" button; opens the Start/Stop screen
- (4) Changeover to manual mode
- (5) Change the setpoint values (incl. tolerance band) and operating contacts for basic status  
(For description, see manual mode)

Setpoint values, tolerance band, and operating contacts for basic status can be configured.

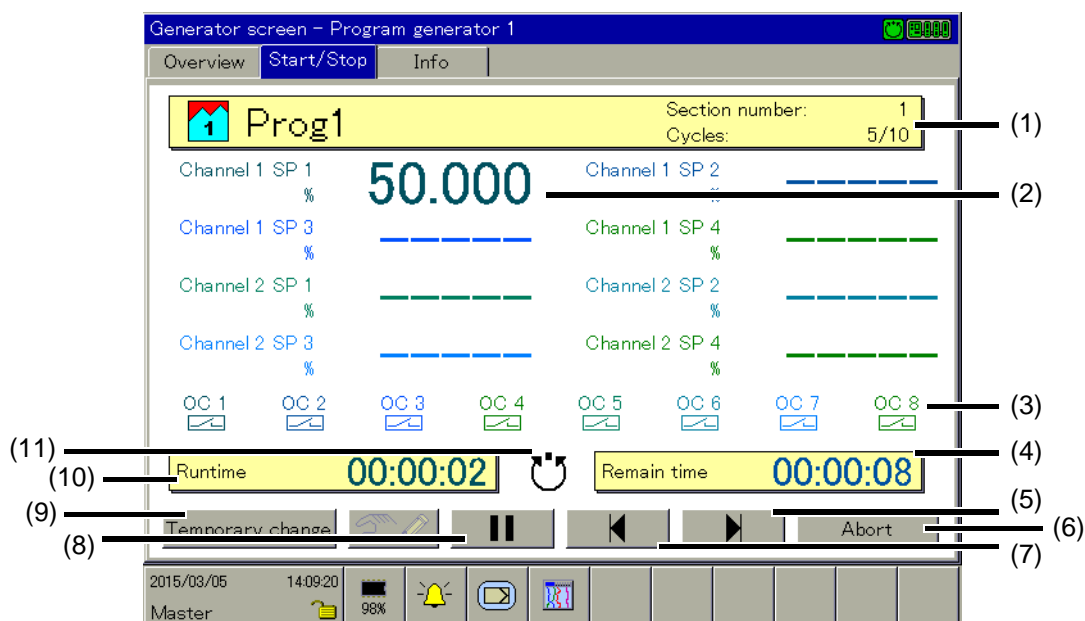
# 5 Operation

## Generator screen – Start/Stop screen after "Start" button has been pushed



- |  |  |
|--|--|
| (1) Program start<br>Starts the selected program.  | (2) Apply entries without program start (return to basic status)   |
| (3) Cancel dialog without applying the entries (return to basic status)  | (4) Program selection<br>All programs that were assigned to the relevant program generator in the program editor are available for selection here. |
| (5) Program section that is used for the start of the program generator<br>(Only for program start)  | (6) Delay of program start<br>(Not for program start = time or start with time)  |
| (7) Remaining time in program section<br>(Only for program start)<br>If 00:00:00 is set, the program starts when the relevant program section starts. If 00:10:00 is set (example), the program starts 10 minutes before the end of the program section. | (8) Start time (date and time)<br>(Only for program start = time or start with time)   |

## Generator screen – program running



- |  |   |
|--|---|
| (1) Program name and number of current program section in channel 1; number of cycles (program repetitions; as of system version 03) | (2) Current setpoint value of program generator (here: setpoint value 1 of channel 1) |
| (3) Switch position of operating contacts  | (4) Remaining running time of program   |
| (5) Skip to next program section of channel 1 (carried out for channel 2 and 3 at same time if present)                              | (6) Abort program   |
| (7) Skip to previous program section of channel 1 (carried out for channel 2 and 3 at same time if present)                          | (8) Pause program   |
| (9) Temporary change to program with program editor  | (10) Running time of program that has elapsed   |
| (11) "Program running" display   |   |

The appearance of (2), (3), (4), and (10) can be configured: selection of the signals (or of running time) and the color, assignment of name and unit.



### NOTE!

Temporary changes to setpoint values on the multifunction panel are only displayed on the generator screen for running programs. If the program is paused, temporary changes are applied, but not displayed. The changes do not take effect and are not shown on the generator screen until the program continues to run.

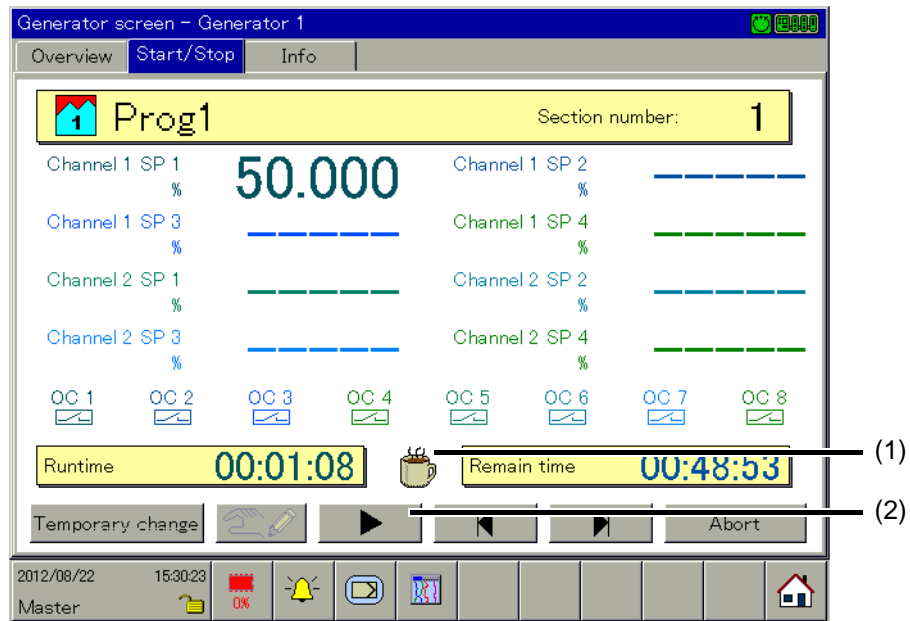


### NOTE!

Cycles (program repetitions) are displayed only if this function has been activated in the program schema (endless or number). During the first program run, the current cycle is 0, while 1 is displayed during the first repetition. If a number of repetitions has been set in the program schema, the number is also displayed. Example: 3/10 means that the program is currently in the third of ten repetitions (i.e. in the fourth program run).

# 5 Operation

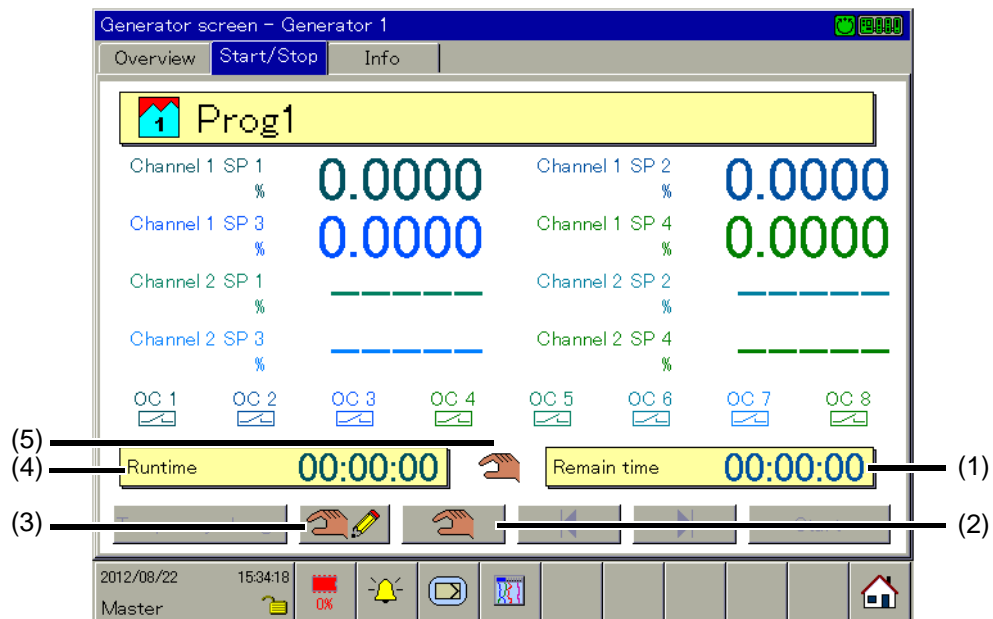
## Generator screen – program paused



(1) "Program paused" display

(2) Continue program

## Generator screen – Start/Stop image of selected program generator in manual mode



(1) Time display (not relevant in manual mode)

(2) Changeover to basic status

(3) Change the setpoint values (incl. tolerance band) and operating contacts for manual mode

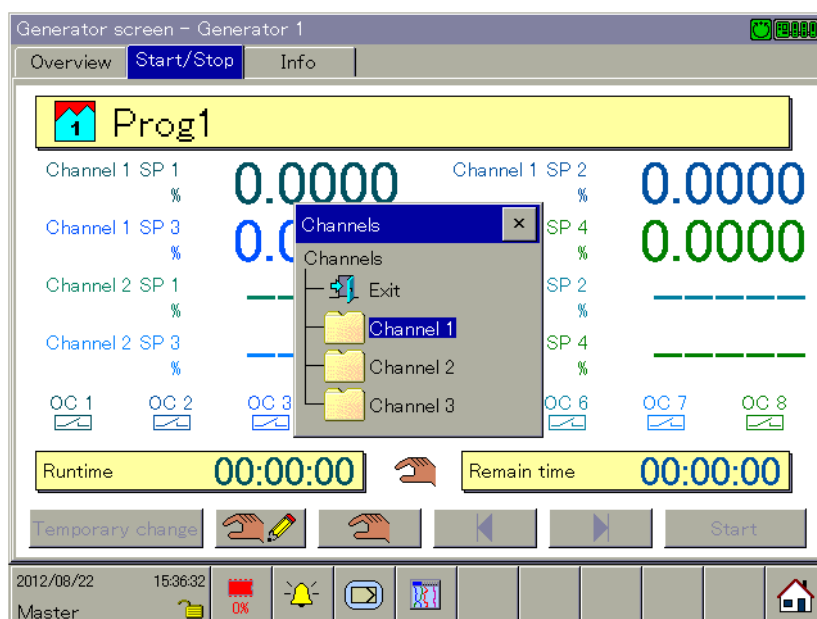
(4) Time display (not relevant in manual mode)

(5) Manual mode is active

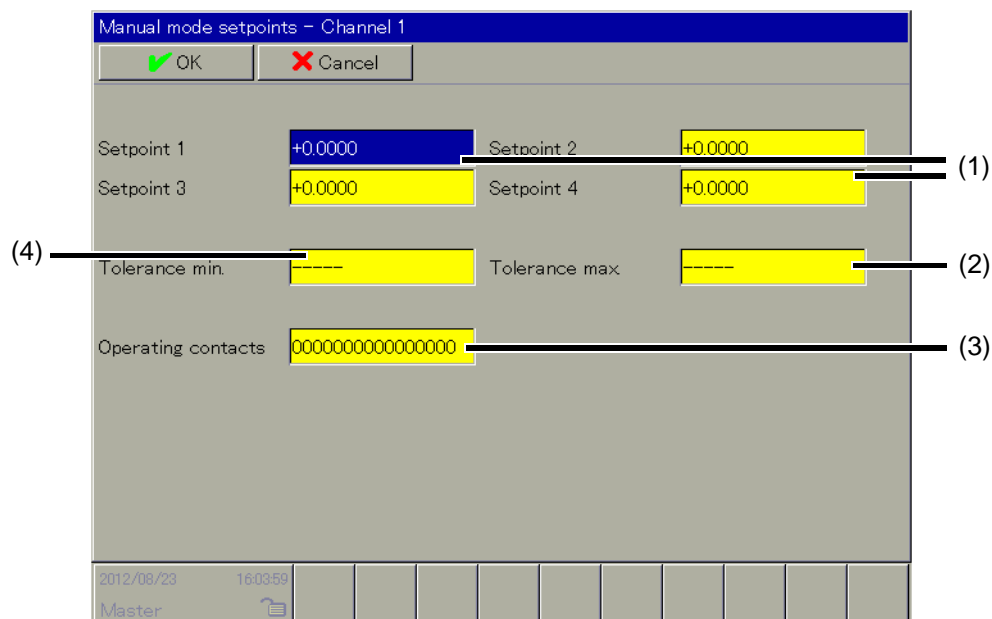
Setpoint values, tolerance band, and operating contacts for manual mode can be configured.

## Generator screen – program channel selection in manual mode

This screen appears when the button (3) for changing the setpoint values and operating contacts is pushed.



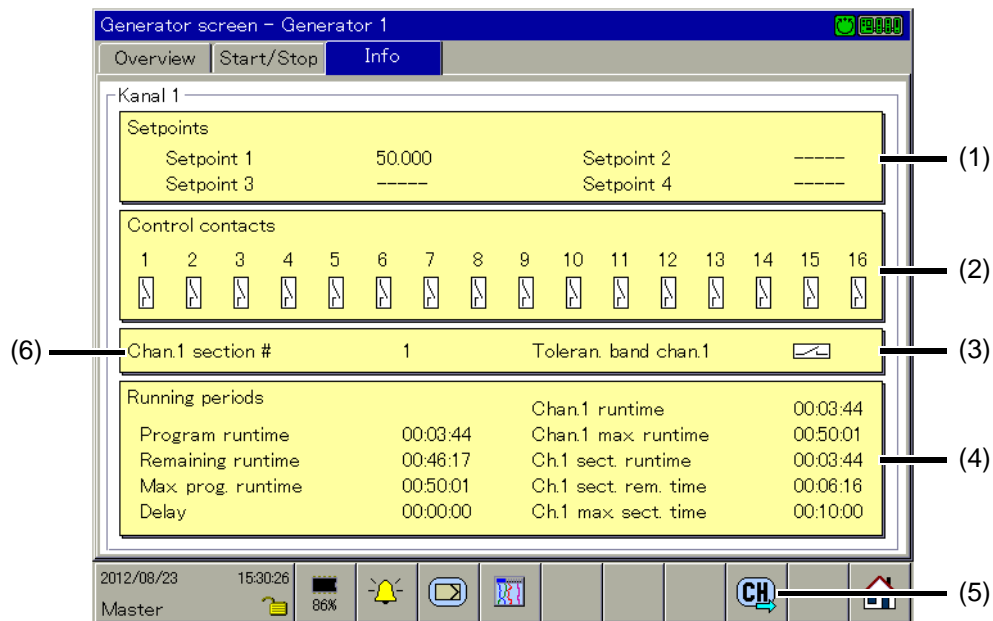
## Generator screen – setting the setpoint values and operating contacts in manual mode



- |   |  |
|---|--|
| (1) Setpoint value 1 to 4 in selected program channel 1                         | (2) Upper limit of the tolerance band (for setpoint value 1) |
| (3) 16 operating contacts in the selected program channel 1 (contact 1 = right) | (4) Lower limit of the tolerance band (for setpoint value 1) |

# 5 Operation

## Generator screen – information about the selected program generator







- (1) Setpoint values
- (2) Operating contacts
- (3) Tolerance band signal of setpoint value 1
- (4) Runtimes
- (5) Switch to next program channel (if available)
- (6) Current program section

16 operating contacts can be defined in each of the three program channels (maximum three program channels). These are linked with OR, so that 16 operating contacts are available for each program generator.

### Program generator state

In some cases, the state of the program generator is indicated by symbols.

Symbol	Status
	Program is running (automatic mode)
	Program stopped
	Program stopped by tolerance band monitoring
	Manual mode

The following states are displayed by text:

- Basic status
- Delay (program start is delayed, delay time elapses)
- End signal (program has ended, program end time elapses, end signal is active)

### **Operating with barcode scanner**

Operating the program generator is also possible by reading barcodes; the following functions are supported:

- Program selection (program number 1 to 99)
- Program start
- Program stop

The corresponding barcodes can be found in the operating manual of multifunction panel 840 (B 705060.0).

## 5 Operation

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**NOTE!**

The parameters described in this section can be configured either with the setup program, or on the multifunction panel (exception: setup info in the device data).

## 6.1 Selectors

The selectors contain all analog and digital signals that are available for configuration in the central processing unit.

These are, firstly, the central processing unit (CPU) signals. This relates to internal signals (incl. PLC) and variables. The values of the variables are read in via an interface, such as Com1.

⇒ Chapter 6.3 "Variables", page 65

⇒ Chapter 8.2 "Modbus frames for reading", page 123

Secondly, they are signals originating from the input/output modules (incl. multichannel controller module) and multifunction panel. As of system version 04, the signals of the thyristor power controller (type 70906x) are also available in the selectors.

### 6.1.1 Analog selector

The following table lists all analog signals.

Category	Signal	Description
Inactive		No signal selected
<b>Central processing unit</b>		
Analog variables	Analog variable 1 to 64	Analog variable 1 to 64 (via interface)
Program generator 1 to Program generator 9	Channel 1 SP1 to Channel 3 SP1	Setpoint value 1 of program channel 1 to 3
	Channel 1 SP2 to Channel 3 SP2	Setpoint value 2 of program channel 1 to 3
	Channel 1 SP3 to Channel 3 SP3	Setpoint value 3 of program channel 1 to 3
	Channel 1 SP4 to Channel 3 SP4	Setpoint value 4 of program channel 1 to 3
	PLC Analog output 13 to 16	Signal of PLC analog output 13 to 16
Analog PLC output block 10 to block 18	PLC Analog output 1 to 16	Signal of PLC analog output 1 to 16

## 6 Configuration

Category	Signal	Description
<b>Multichannel controller module</b>		
Controller	C01ActualValue to C04ActualValue	Actual value of controller channel 1 to 4
	C01Setpoint to C04Setpoint	Setpoint value of controller channel 1 to 4
	C01OutpLevelMon to C04OutpLevelMon	Output level (display value) of controller module 1 to 4
Analog inputs	AI01 to AI04	Measured value of analog input 1 to 4
Mathematics	Math01 to Math04	Result of math function 1 to 4
HW counter	HWCounter	Counter reading of hardware counter
Setpoint value	SP01RampValue to SP04RampValue	Ramp end value of ramp function 1 to 4 (if ramp function switched on) or Active setpoint value (external setpoint value + setpoint value) of setpoint function 1 to 4 (if ramp function switched off)
<b>Analog input module 4-channel</b>		
Analog inputs	AI01 to AI04	Measured value of analog input 1 to 4
<b>Analog input module 8-channel</b>		
Analog inputs	AI01 to AI08	Measured value of analog input 1 to 4
<b>Multifunction panel 840</b>		
System bus analog inputs	Counter/Int 1 to Counter/Int 27	Current value of counter or integrator
	Counter/Int clo 1 to Counter/Int clo 27	Value of counter or integrator in most recent closed measuring period
Process image	Current process image	Number of current process image on the display of the multifunction panel 0 = process image 1, 1 = process image 2 etc. (-1 = no active process image)

Category	Signal	Description
<b>Thyristor power controller, type 70906x</b>		
Measured values master	Individual analog signals of the power controller: See operating manual 70500153T90... (or following table)	Measured values of the power controller in single-phase operation or of the master in case of three-phase economy circuit or three-phase circuit
Measured values slave/slave1		Measured values of the slave in case of three-phase economy circuit or of slave 1 in case of three-phase circuit
Measured values slave2		Measured values of slave 2 in case of three-phase circuit

### 6.1.2 Digital selector

The following table lists all digital signals.

Category	Signal	Description
Inactive		No signal selected
<b>Central processing unit</b>		
Digital variables	Digital variable 1 to 64	Digital variable 1 to 64 (via interface)

## 6 Configuration

Category	Signal	Description
Program generator 1 to Program generator 9	Operating contact 1 to 16	Operating contact 1 to 16 of program channels (in the three program channels, operating contacts with the same name are linked with OR)
	Mode: Basic status	Status: Program is not running (basic status)
	Mode: Automatic	Status: Program is running (automatic mode, no delay time or program end time)
	Mode: Automatic 1	Status: Program is running (automatic mode, incl. delay time and program end time)
	Mode: Standstill	Status: Program stopped during automatic mode (time base stopped)
	Mode: Delay	Status: Program start delayed (delay time runs)
	Mode: Program end	Status: Program ends (program end time runs, corresponds to length of end signal)
	Mode: Manual	Status: Manual mode
	Tolerance band channel 1 to 3	Tolerance band signal of program channel 1 to 3
	Batch control	Signal to control the batch recording (OR-linked signals "Automatic", "Standstill", and "Program end").
PLC Binary output 28 to 32	Signal of PLC digital output 28 to 32	
Limit monitoring	Limit monitoring 1 to 64	Output signal of limit value monitoring 1 to 64
Binary linking	Binary linking 1 to 8	Result of binary linking 1 to 8
	PLC Binary output 9 to 32	Signal of PLC digital output 9 to 32
Binary PLC output block 13 to block 18	PLC Binary output 1 to 32	Signal of PLC digital output 1 to 32
Alarm analog variables	Alarm1 ExAI1 to Alarm1 ExAI64	Alarm signal 1 of analog variable 1 to 64
	Alarm2 ExAI1 to Alarm2ExAI64	Alarm signal 2 of analog variable 1 to 64
Alarm integer variables	Alarm1 ExInt1 to Alarm1 ExInt64	Alarm signal 1 of integer variable 1 to 64
	Alarm2 ExInt1 to Alarm2ExInt64	Alarm signal 2 of integer variable 1 to 64

## 6 Configuration

Category	Signal	Description
Alarms/ Faults	CAlarm/Fault	System collective alarm or system fault (central processing unit and modules)
	CAlarm/Fault ackn.	System collective alarm or system fault with acknowledgement Signal remains active until acknowledgement.
	CAlarm device	System collective alarm (central processing unit and modules)
	CAlarm ackn.	System collective alarm with acknowledgement Signal remains active until acknowledgement.
	Fault	System fault (central processing unit and modules)
	Fault ackn.	System fault with acknowledgement Signal remains active until acknowledgement.
	CAlarm Basis	Central processing unit collective alarm
	System Run	System state (Run = 1, Stop = 0)
	Reserve 1	(Reserved for future use.)
	Fieldbus error	Error at fieldbus interface
	System error mandatory	Error in a mandatory module
	System error optional	Error in an optional module
	No PLC	No PLC program available
	PLC stop	„Stop“ system state
	Battery empty	Battery alarm (central processing unit buffer battery is dead and must be replaced) Notify service department! Attention: RAM memory content is deleted!
	Battery low	Battery pre-warning (central processing unit buffer battery can be replaced within 4 weeks without data loss) Notify service department!

## 6 Configuration

Category	Signal	Description
<b>Multichannel controller module</b>		
Controller	C01ManualMode to C04ManualMode	Manual mode active for controller channel 1 to 4
	C01TuneActive to C04TuneActive	Self-optimization active for controller module 1 to 4
	C01Output1 to C04Output1	Switch position of first controller output of controller channel 1 to 4
	C01Output2 to C04Output2	Switch position of second controller output of controller channel 1 to 4
	C01CollAlarm to C04CollAlarm	Collective alarm of controller channel 1 to 4 (can be configured with signals from the digital selector)
Setpoint	SP01RampTolBand to SP04RampTolBand	Alarm signal of tolerance band monitoring of ramp function 1 to 4
	SP01Changeover1 to SP04Changeover1	Bit 0 of setpoint changeover of setpoint value function 1 to 4
	SP01Changeover2 to SP04Changeover2	Bit 1 of setpoint changeover of setpoint value function 1 to 4
Analog inputs	AI01Alarm1 to AI04Alarm1	Alarm signal 1 of analog input 1 to 4
	AI01Alarm2 to AI04Alarm2	Alarm signal 2 of analog input 1 to 4
Digital inputs	DI01, DI02, DI05 to DI10	Signal of digital input 1, 2, 5 to 10 If the HW counter is activated, the signal of digital input 1 is inactive.
Limit monitoring	LI01 to LI04	Output signal of limit value monitoring 1 to 4
Mathematics	Logic01 to Logic04	Result of logic function 1 to 4
Miscellaneous	CollectiveAlarm	Controller module collective alarm
	HWCounterSignal	Signal of hardware counter in "fill" operating mode (as shut-down signal when threshold value reached)

## 6 Configuration

Category	Signal	Description
<b>Analog input module 4-channel</b>		
Analog inputs	AI01Alarm1 to AI04Alarm1	Alarm signal 1 of analog input 1 to 4
	AI01Alarm2 to AI04Alarm2	Alarm signal 2 of analog input 1 to 4
Digital inputs	DI01	Signal of digital input
Alarm	CollectiveAlarm	Module collective alarm
<b>Analog input module 8-channel</b>		
Analog inputs	AI01Alarm1 to AI08Alarm1	Alarm signal 1 of analog input 1 to 8
	AI01Alarm2 to AI08Alarm2	Alarm signal 2 of analog input 1 to 8
Digital inputs	DI01	Signal of digital input
Alarm	CollectiveAlarm	Module collective alarm
<b>Digital input/output module 12-channel</b>		
Digital inputs	DI01 to DI12	Signal of digital input 1 to 12
Alarm	CollectiveAlarm	Module collective alarm
<b>Multifunction panel 840</b>		
System bus digital inputs	Alarm batch 1 to Alarm batch 9	Collective alarm of batch 1 to 9 (process values)
	CollectiveAlarm	Collective alarm of multifunction panel (process values)
	Fault	Fault in multifunction panel (independent of process values)
	Batch 1 active to Batch 9 active	Signal for active batch 1 to 9
	Push button 1 to Push button 18 (as of system version 02: 32)	Status of push button 1 to 18 (as of system version 02: 1 to 32) in process screen

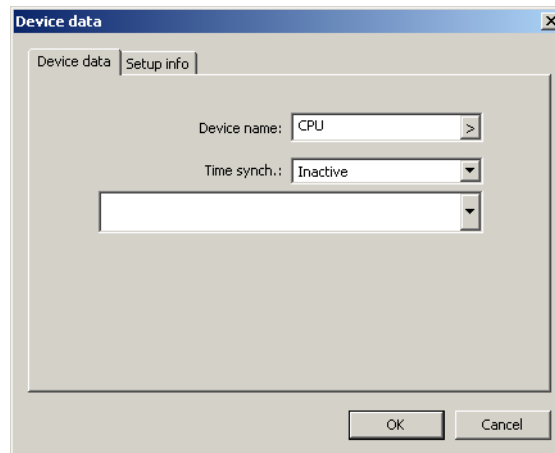
## 6 Configuration

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Category	Signal	Description
<b>Thyristor power controller, type 70906x</b>		
Device status	Individual digital signals of the power controller: See operating manual 70500153T90... (or following table)	Device status signals
Faults master		Faults of the power controller in single-phase operation or of the master in case of three-phase economy circuit or three-phase circuit
Faults slave/ slave1		Faults of the slave in case of three-phase economy circuit or of slave 1 in case of three-phase circuit
Faults slave2		Faults of slave 2 in case of three-phase circuit
Faults master slave		Faults of master slave connection and communication
Hardware input/ output		Binary values of hardware inputs and outputs

## 6.2 Device data

### Setup dialog



### Parameters

Parameter	Selection/settings	Description
Device name	The device name (max. 20 characters) is used in the setup program, Web server, and the PCC and PCA3000 PC programs.	
	CPU (Example)	Use or edit name from list.
Time synch. 	Synchronization of central processing unit time	
	<b>Inactive</b> Module (source of signal)	No synchronization Synchronization by means of a signal (low to high edge) that must be selected in the following field (digital selector).

### Time synch.

Time synchronization is relevant if the time of the central processing unit is to be synchronized with the time of a different system or device (for example the multifunction panel).

At the point of the low to high edge of the signal, the time is set to the nearest full minute.

Example: 12:55:30 -> 12:55:00; 12:55:31 -> 12:56:00

# 6 Configuration

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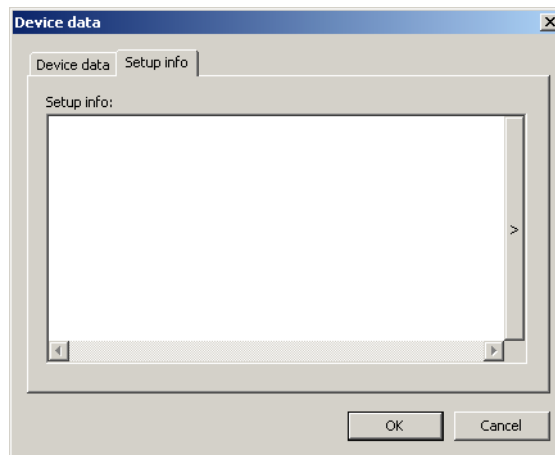
## 6.2.1 Setup info



**NOTE!**

The text for the setup info can only be entered with the setup program.

### Setup dialog



### Parameters

Parameter	Selection/settings	Description
Setup info	Enter text.	The text is used to describe the system within the setup program. It is saved in the system when the configuration is transferred. When the configuration is read out from an existing system, it can provide you with important information. The text can be entered for language 1 and language 2 (">" button).

## 6.3 Variables

Variables are transferred using the serial interfaces (Com1, Com2; Modbus RTU) or LAN interface (Ethernet; Modbus/TCP). During this process, the central processing unit can serve as a Modbus master or Modbus slave.

⇒ Chapter 6.7 "Serial interface", page 83

⇒ Chapter 6.6 "Modbus/TCP", page 81

This means that up to 64 float variables, 64 integer variables, 64 digital variables, and 9 (as of system version 02: 27; as of system version 04: 90) text variables are available to be freely used in the system. As of system version 05, 128 float variables, 128 integer variables, and 128 digital variables are available.

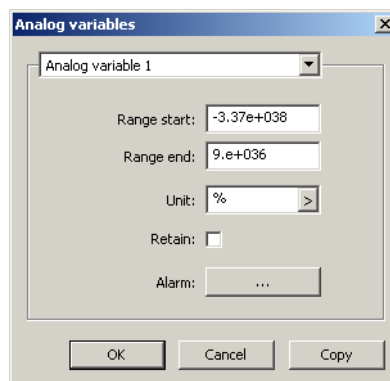
As of system version 02, a PROFIBUS-DP interface (slave) is also available which supports the transfer of float and integer variables.

⇒ Chapter 6.8 "PROFIBUS (as of system version 02)", page 88

### 6.3.1 Analog variables

64 (128) analog variables are available.

#### Setup dialog



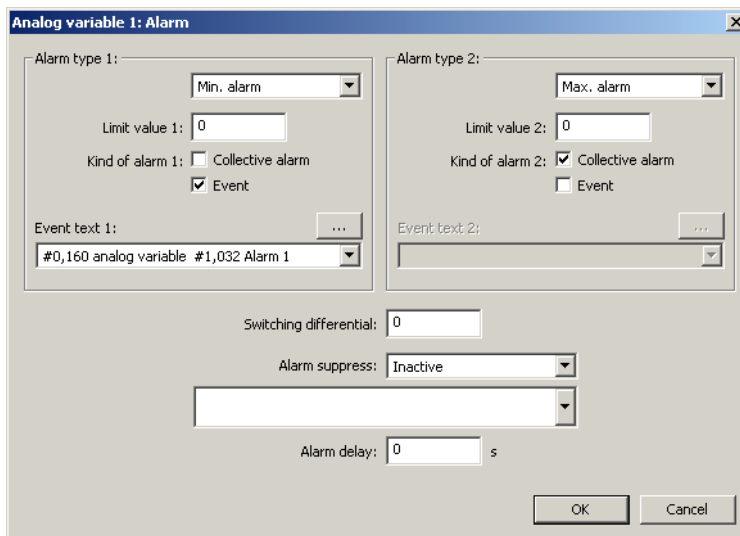
#### Parameters

Parameter	Selection/settings	Description
Range start	<b>-3.36E+38</b> to +9.0E+36	Start value for the range of the analog variables
Range end	-3.36E+38 to <b>+9.0E+36</b>	End value for the range of the analog variables
TAG number (as of system version 05)	Max. 42 characters	Identification marking (documentation in PLC)
Retain	Retains the analog value in the event of power off	
	<b>Not selected (empty)</b>	Value is set to 0 after power on.
	Selected (checkmark)	Value is retained.
Unit	Max. 5 characters (%)	Unit that is used to display the analog value.

# 6 Configuration

## Alarm

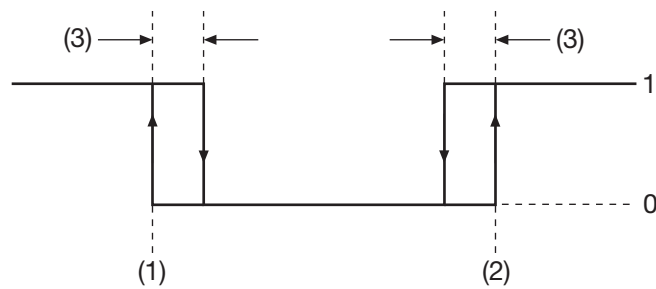
To open this window, use the "Alarm" button:



## Parameters

Parameter	Selection/settings	Description
Alarm type 1, 2 	<b>Inactive</b> Min. alarm  Max. alarm	Monitoring is not active Alarm is issued if the limit value is not met.  Alarm is issued if the limit value is exceeded.
Limit value 1, 2	-3.37E+38 to <b>0</b> to +3.37E+38	Limit value at which an alarm is issued.
Kind of alarm 1, 2	The alarm type is <b>not</b> set by default.	
	Collective alarm	Alarm is used to form the collective alarm.
	Event	Alarm results in an entry (event text) in the event list.
Event text 1, 2 	Use default text or select other text from the list.	Text that is entered in the event list for an alarm (for "Event" alarm type).
Switching differential 	<b>0</b> to 3.37E+38	Used to suppress constant switching operations in the event of minor fluctuations of the input signal around the limit value.
Alarm suppress	Signal to activate the alarm suppression	
	<b>Inactive</b>	No alarm suppression
	Module (source of signal)	Alarm suppression by a signal (high active) that must be selected in the following field (digital selector).
Alarm delay	<b>0</b> to 32767 s	Delay time for alarm activation

## Alarm type and switching differential



- |                            |             |
|----------------------------|-------------|
| (1) Min. alarm/limit value | 1 Alarm on  |
| (2) Max. alarm/limit value | 0 Alarm off |
| (3) Switching differential |             |

## Event text

**Setup program:** Selection of the event text from a list

Click the "..." button to open a list with the text numbers and the associated event texts. The event texts can be edited.

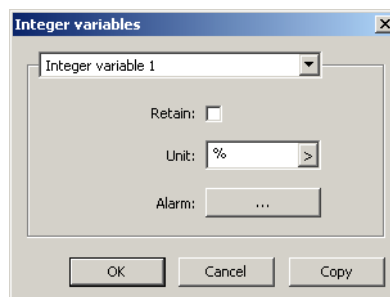
**Multifunction panel:** Selection of event texts using the text number

The setup program is required to view and edit the event texts.

## 6.3.2 Integer variables

64 (128) integer variables are available.

## Setup dialog



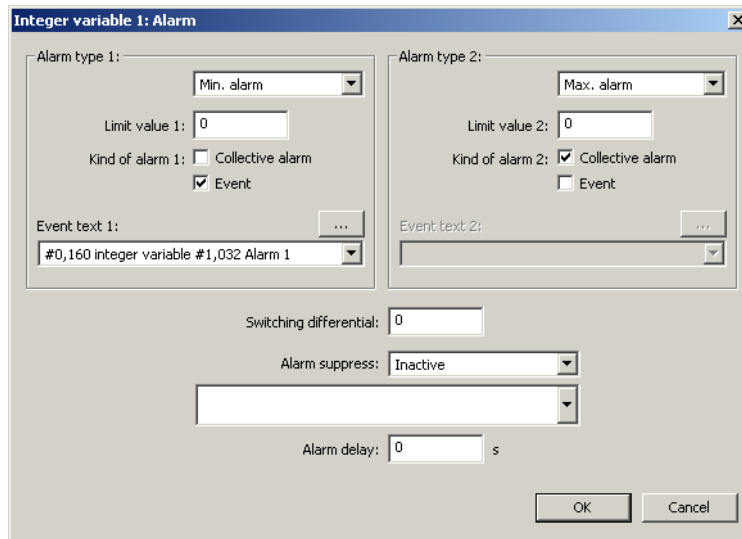
## Parameters

Parameter	Selection/settings	Description
Retain	Retains the integer value in the event of power off	
	<b>Not selected (empty)</b> Selected (checkmark)	Value is set to 0 after power on. Value is retained.
TAG number (as of system version 05)	Max. 42 characters	Identification marking (documentation in PLC)
Unit	Max. 5 characters (%)	Unit that is used to display the integer value.

# 6 Configuration

## Alarm

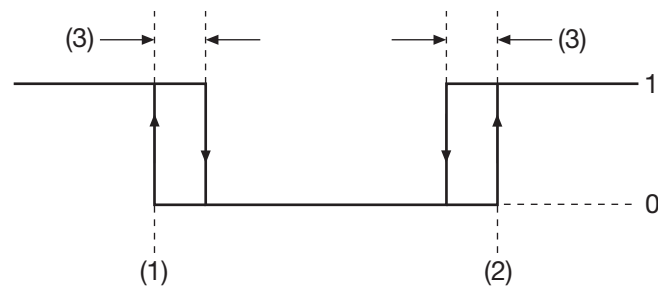
To open this window, use the "Alarm" button:



## Parameters

Parameter	Selection/settings	Description
Alarm type 1, 2 	<b>Inactive</b> Min. alarm  Max. alarm	Monitoring is not active.  Alarm is issued if the limit value is not met.  Alarm is issued if the limit value is exceeded.
Limit value 1, 2	-2147483648 to <b>0</b> to 2147483647	Limit value at which the alarm is issued.
Kind of alarm 1, 2	The alarm type is <b>not</b> set by default.	
	Collective alarm	Alarm is used to form the collective alarm.
Event	Alarm results in an entry (event text) in the event list.	
Event text 1, 2 	Use default text or select other text from the list.	Text that is entered in the event list for an alarm (for "Event" alarm type).
Switching differential 	<b>0</b> to 2147483647	Used to suppress constant switching operations in the event of minor fluctuations of the input signal around the limit value.
Alarm suppress	Signal to activate the alarm suppression	
	<b>Inactive</b> Module (source of signal)	No alarm suppression  Alarm suppression by a signal (high active) that must be selected in the following field (digital selector).
Alarm delay	<b>0 s</b> to 32767 s	Delay time for alarm activation

## Alarm type and switching differential



- (1) Min. alarm/limit value
- (2) Max. alarm/limit value
- (3) Switching differential

- 1 Alarm on
- 0 Alarm off

## Event text

**Setup program:** selection of the event text from a list

Click the "... " button to open a list with the text numbers and the associated event texts. The event texts can be edited.

**Multifunction panel:** selection of event texts using the text number

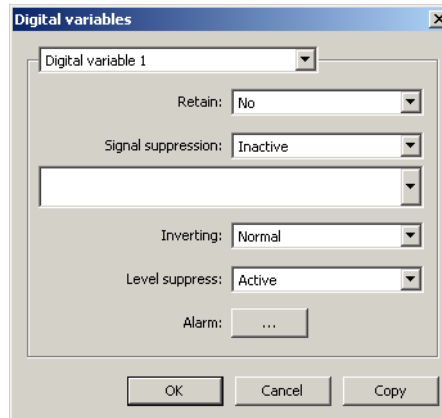
The setup program is required to view and edit the event texts.

# 6 Configuration

## 6.3.3 Digital variables

64 (128) digital variables are available.

### Setup dialog

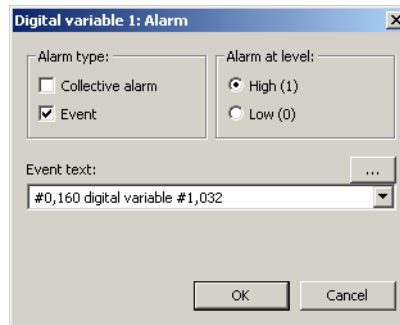


### Parameters


Parameter	Selection/settings	Description
Retain	Retains the binary value in the event of power off	
	<b>No</b> Yes	Value is set to 0 after power on. Value is retained.
TAG number (as of system version 05)	Max. 42 characters	Identification marking (documentation in PLC)
Signal suppress	Signal to activate signal suppression	
	<b>Inactive</b> Module (source of signal)	No signal suppression Signal suppression by a signal (high active) that must be selected in the following field (digital selector).
Inverting	Inversion of the input signal	
	<b>Normal</b> Inverse	Not inverted Inverted
Level suppress	Input signal level during active signal suppression	
	Inactive <b>Active</b>	Low level (0) High level (1)

## Alarm

To open this window, use the "Alarm" button:



## Parameters

Parameter	Selection/settings	Description
Alarm type	The alarm type is <b>not</b> set by default.	
	Collective alarm	Alarm is used to form the collective alarm.
	Event	Alarm results in an entry (event text) in the event list.
Alarm at level	<b>High (1)</b>	Alarm at high level (1)
	Low (0)	Alarm at low level (0)
Event text 	Use default text or select other text from the list.	Text that is entered in the event list for an alarm (for "Event" alarm type).

## Event text

**Setup program:** Selection of the event text from a list

Click the "..." button to open a list with the text numbers and the associated event texts. The event texts can be edited.

**Multifunction panel:** Selection of event texts using the text number

The setup program is required to view and edit the event texts.

# 6 Configuration

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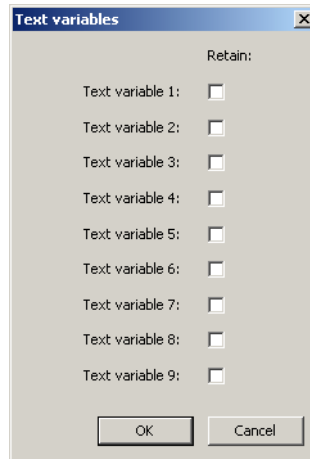
## 6.3.4 Text variables

9 text variables are available (text variable 1 to 9).

As of system version 02: 27 text variables (text variable 1 to 27)

As of system version 04: 90 text variables (text variable 1 to 90)

### Setup dialog



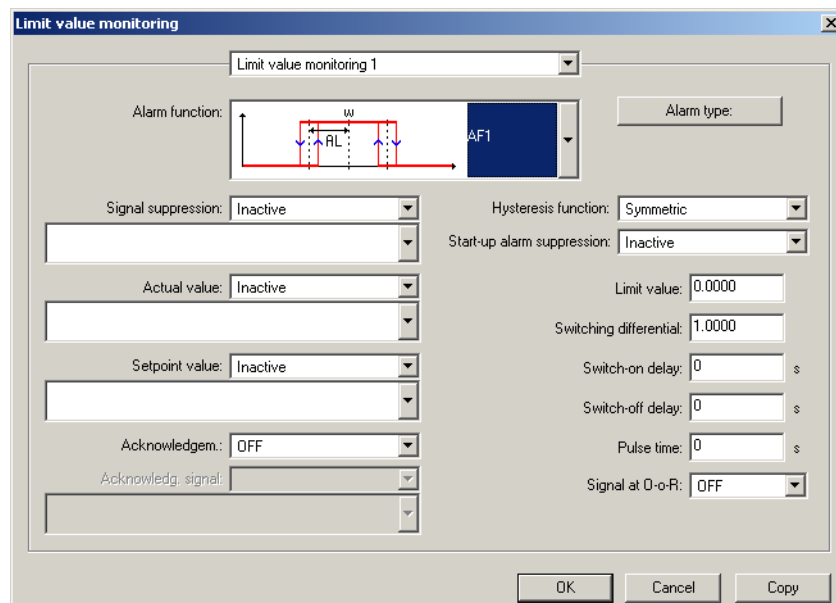
### Parameters

Parameter	Selection/settings	Description
Retain	Retains the text of the relevant text variables in the event of power off	
	<b>Not selected (empty)</b>	Text is not retained.
	Selected (checkmark)	Text is retained.

## 6.4 Limit value monitoring

Up to 64 limit values can be monitored at the same time (limit value monitoring 1 to 64). One of eight alarm functions can be selected for each limit monitoring, to monitor a freely selectable input value (actual value) with respect to a fixed limit value or a limit value relating to the setpoint value (setpoint value  $\pm$  limit value). Each limit monitoring provides an output signal.



### Setup dialog



### Parameters

Parameter	Selection/settings	Description
Alarm function 	<b>Inactive</b> AF1  AF2 AF3 AF4 AF5 AF6 AF7 AF8	Limit value monitoring is inactive Limit value above and below the setpoint value (monitoring band around the setpoint value) As for AF1, output signal inverted Limit value below the setpoint value As for AF3, output signal inverted Limit value above the setpoint value As for AF5, output signal inverted Fixed limit value As for AF7, output signal inverted
Name (as of system version 05)	Max. 42 characters (enter individual text, if applicable)	Designation or description
Signal suppression	Signal to activate alarm suppression <b>Inactive</b> Module (source of signal)	No signal suppression Signal suppression by a signal (high active) that must be selected in the following field (digital selector).

## 6 Configuration

Parameter	Selection/settings	Description
Actual value	Analog signal as actual value (signal to be monitored)	
	<b>Inactive</b> Module (source of the analog signal)	No signal selected. The analog signal must be selected in the following field (analog selector).
Setpoint value	Analog signal as setpoint value (reference signal for AF1 to AF6)	
	<b>Inactive</b> Module (source of the analog signal)	No signal selected. The analog signal must be selected in the following field (analog selector).
Acknowledgem.	Condition for acknowledgement of the output signal (self-maintaining)	
	<b>OFF</b>	No acknowledgement required (output signal is deactivated automatically if the alarm condition is no longer present).
	If inactive	Acknowledgement only possible if alarm condition is no longer present.
	Always	Acknowledgement always possible
Acknowledg. signal	Signal to acknowledge the output signal	
	<b>Inactive</b> Module (source of signal)	No signal selected. Acknowledgement by means of a signal (high active) that must be selected in the following field (digital selector).
Hysteresis function 	Switching differential position around the limit value	
	<b>Symmetric</b>	Switching differential is positioned with half above and half below the limit value.
	Asymmetric left	Switching differential below the limit value (typically)
	Asymmetric right	Switching differential above the limit value (typically)
Start-up alarm suppression 	<b>Inactive</b>	Limit value monitoring always operates according to its alarm function.
	Active	No alarm after power on or if limit value or setpoint value is changed
Limit value	-3.37E+38 to <b>0</b> to +3.37E+38	Admissible deviation of the actual value
Switching differential	0 to <b>1</b> to 99999	Switching thresholds of the output signal (difference from limit value)
Switch-on delay	<b>0</b> to 65535 s	Delay time for activation of the output signal if alarm condition is present.
Switch-off delay	<b>0</b> to 65535 s	Delay time for deactivation of the output signal if alarm condition is no longer present.
Pulse time	<b>0</b> to 65535 s	Output signal is deactivated automatically after this time.

Parameter	Selection/settings	Description
Signal at O-o-R	Output signal if measurement range is exceeded or not met	
	<b>OFF</b>	Output signal inactive
	<b>ON</b>	Output signal active

### Alarm function

For alarm function AF1 to AF6, the resulting limit value depends on the setpoint value – the entered limit value is added to the setpoint value or subtracted from the setpoint value. Alarm functions AF7 and AF8 work with a fixed limit value that corresponds to the entered limit value.

⇒ Chapter 6.4.2 "Alarm and hysteresis functions", page 78

### Hysteresis function

The designations "Asymmetric left" and "Asymmetric right" typically relate to alarm functions AF3/AF4 and AF7/AF8. The designation is not conclusive for alarm functions AF1/AF2 and AF5/AF6.

⇒ Chapter 6.4.2 "Alarm and hysteresis functions", page 78

### Start-up alarm suppression

An active start-up alarm suppression means:

- After power on, the output signal remains inactive, even if the actual value is in the alarm range.
- If the limit value or setpoint value is changed so that the actual value is then within the alarm range, while the actual value is outside of the alarm range, the output signal remains inactive.
- The limit value monitoring only starts to operate according to its alarm function again once the actual value has left the alarm range. This means that the output signal remains inactive until the actual value returns to the alarm range.

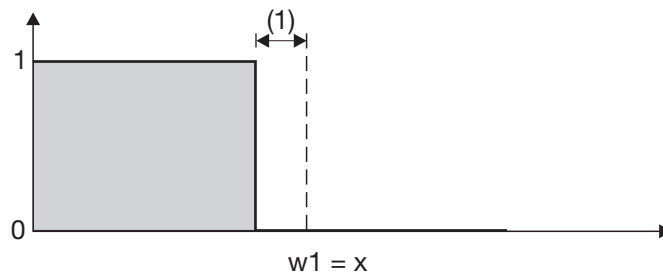
## 6 Configuration

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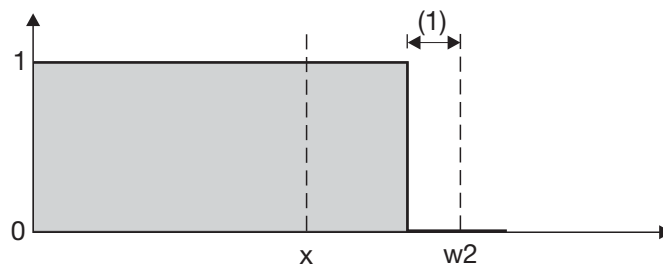
### Example of active start-up alarm suppression

The following example shows monitoring of the actual value "x" with the alarm function AF4 (without switching differential) for a specified limit value (1). The setpoint value is changed from w1 to w2.

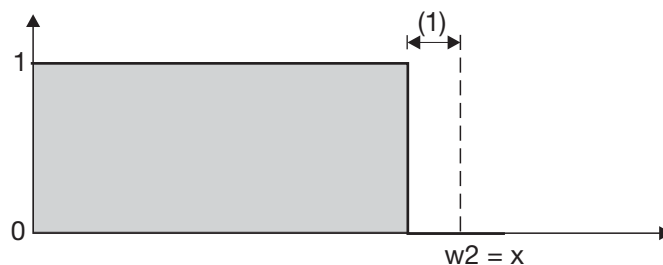
**Output state:** The output signal is not active as the actual value is outside of the alarm range (gray area).



**Change of setpoint value:** The output signal remains inactive, although the actual value is now within the alarm range.



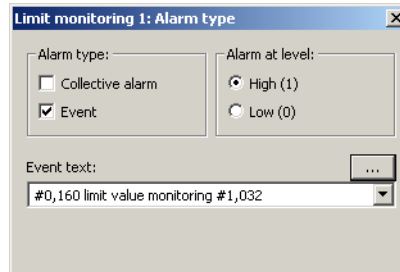
**Adjusted state:** The actual value has left the alarm range and reached the new setpoint value. The output signal remains inactive until the actual value returns to the alarm range.




## 6.4.1 Alarm

In addition to evaluation of the output signal of limit value monitoring, there is also the option to make an entry into the event list in the event of an alarm or to form a collective alarm.

### Setup dialog



### Parameters

Parameter	Selection/settings	Description
Alarm type	The alarm type is <b>not</b> set by default.	
	Collective alarm	Alarm is used to form the collective alarm.
	Event	Alarm results in an entry (event text) in the event list.
Alarm at level	<b>High (1)</b>	Alarm at high level (1)
	Low (0)	Alarm at low level (0)
Event text 	Use default text or select other text from the list.	Text that is entered in the event list for an alarm (for "Event" alarm type).

### Event text

**Setup program:** selection of the event text from a list

Click the "..." button to open a list with the text numbers and the associated event texts. The event texts can be edited.

**Multifunction panel:** selection of event texts using the text number

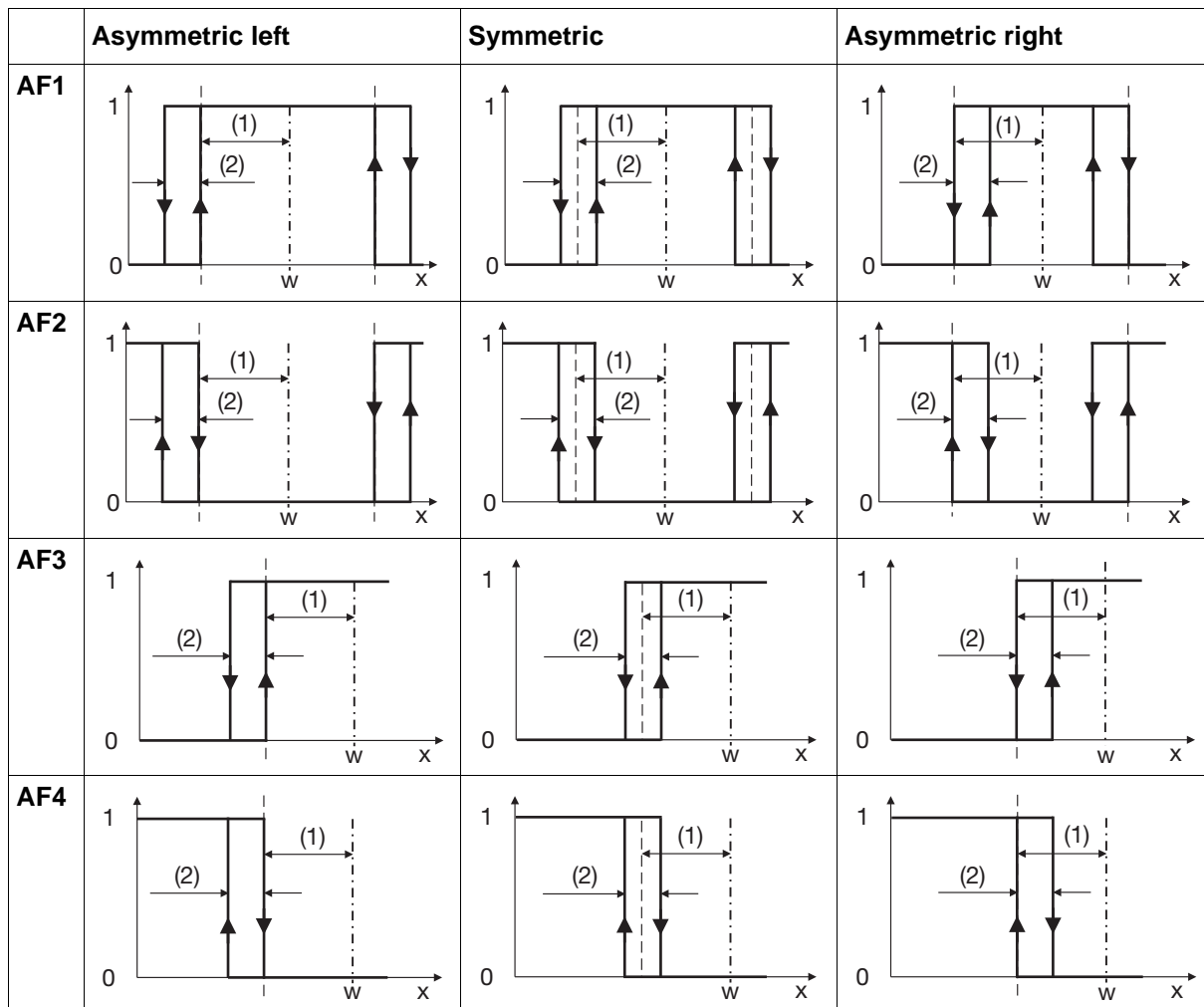
The setup program is required to view and edit the event texts.

# 6 Configuration

## 6.4.2 Alarm and hysteresis functions

This section describes the limit value monitoring alarm function AF1 to AF8 and the associated hysteresis functions (asymmetric left, symmetric, asymmetric right).

### Limit value in relation to the setpoint value



1 Output signal active  
 x Actual value  
 (1) Limit value

0 Output signal not active  
 w Setpoint value  
 (2) Switching differential

# 6 Configuration

	Asymmetric left	Symmetric	Asymmetric right
<b>AF5</b>			
<b>AF6</b>			

- 1 Output signal active
- 0 Output signal not active
- x Actual value
- w Setpoint value
- (1) Limit value
- (2) Switching differential

## Fixed limit value

	Asymmetric left	Symmetric	Asymmetric right
<b>AF7</b>			
<b>AF8</b>			

- 1 Output signal active
- 0 Output signal not active
- x Actual value
- (1) Limit value
- (2) Switching differential

# 6 Configuration

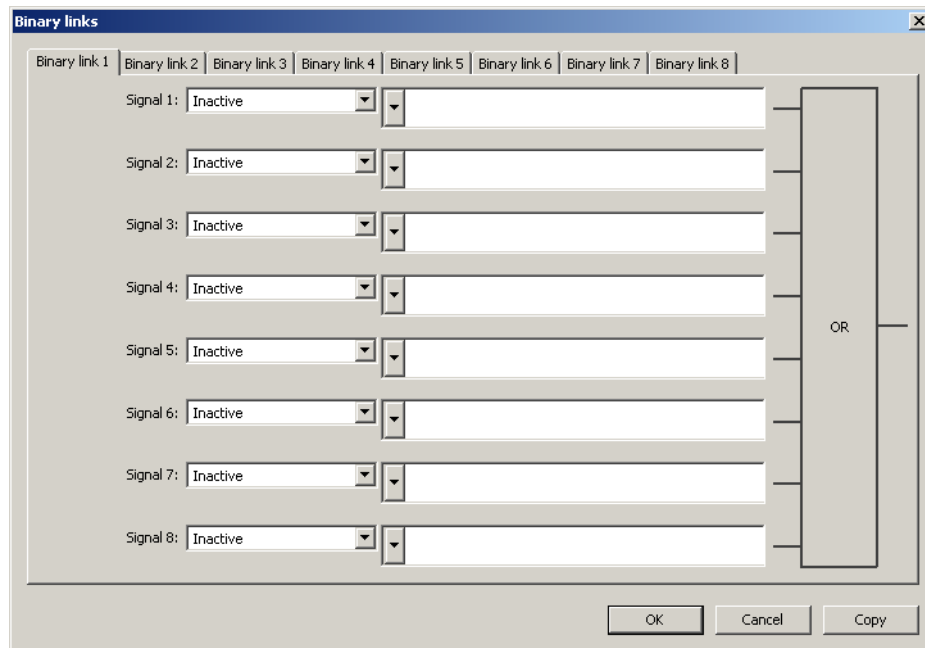
## 6.5 Binary links

A maximum of eight independent binary links (binary link 1 to 8) can each be configured with up to eight signals. The signals in a binary link are linked with OR.

Use the "Copy" button to transfer the settings for the selected binary link to another binary link and to then make changes there as desired.

The result of a binary link is available in the digital selector for other functions.

### Setup dialog



### Parameters

Parameter	Selection/settings	Description
Name (as of system version 05)	Max. 42 characters (enter individual text, if applicable)	Designation or description
Signal 1 to 8	Signal for binary link <b>Inactive</b> Module (source of signal)	No signal selected. The signal must be selected in the following field (digital selector).

## 6.6 Modbus/TCP

This menu is used to make settings for the Modbus TCP operating mode.

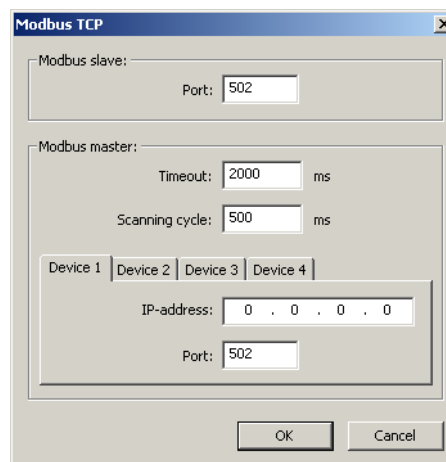
⇒ Chapter 8.2 "Modbus frames for reading", page 123

⇒ Chapter 8.3 "Modbus frames for writing", page 124

If the central processing unit is operating as the Modbus master, it can communicate with up to four external devices (Modbus slaves; device 1 to 4). If it is operating as the Modbus slave, two external devices (Modbus masters) can access the central processing unit at the same time.

Communication through the Modbus is described in more detail in the separate Modbus interface description (B 705001.2.0).

### Setup dialog



### Parameters

Parameter	Selection/settings	Description
<b>Modbus slave</b> (central processing unit as Modbus slave)		
Port	0 to <b>502</b> to 1024	TCP port for Modbus/TCP Changes to the port are not applied until after the system has been restarted.
<b>Modbus master</b> (central processing unit as Modbus master)		
Timeout	60 to <b>2000</b> to 10000 ms	A request sent by the master is defined as faulty if no answer is received within this time.
Scanning cycle	60 to <b>500</b> to 99999 ms	The Modbus master requests the Modbus master data from the Modbus slave at these intervals.
IP-address	<b>0.0.0.0</b>	IP address of the external device (Modbus slave) The address must be set.
Port	0 to <b>502</b> to 1024	TCP port of the external device for Modbus/TCP

## 6 Configuration

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**NOTE!**

To ensure that fixed IP addresses are used, the DHCP must be deactivated in the devices involved, if applicable.



**NOTE!**

The transfer times in an Ethernet network depend in part on the network architecture and the capacity utilization. This may result in delays during updates of process values.

## 6.7 Serial interface

Each serial interface (Com1, Com2) can be executed with two different interface cards in the central processing unit (for option, see order details). One RS232 interface and one RS422/485 interface are available. The type of interface card used is automatically identified by the central processing unit (hardware ID).

⇒ Chapter 1.4 "Identifying the device version", page 14

⇒ Chapter 11 "Retrofitting interfaces", page 163

Both serial interfaces can be operated as a master or slave with the Modbus protocol (Modbus RTU).

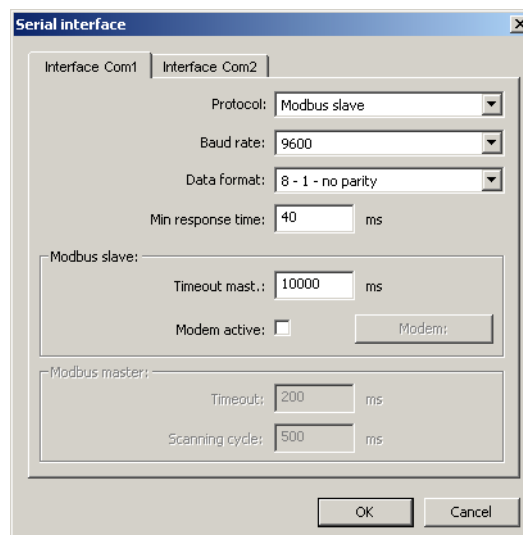
For more information on using the serial interface with the Modbus protocol, see:

⇒ Chapter 8.2 "Modbus frames for reading", page 123

⇒ Chapter 8.3 "Modbus frames for writing", page 124

Communication through the Modbus is described in more detail in the separate Modbus interface description (B 705001.2.0).

### Setup dialog



### Parameters

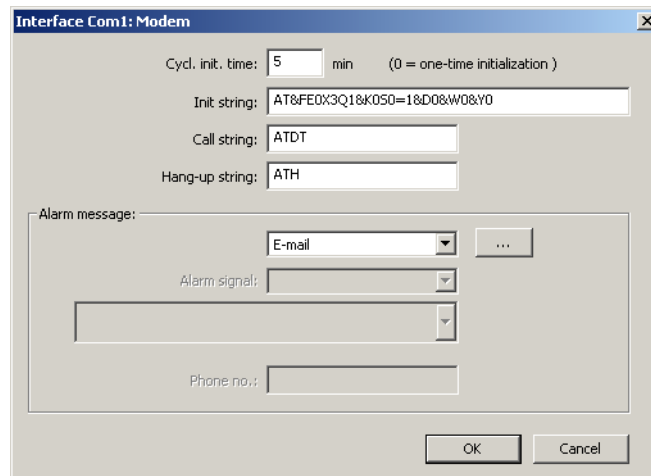
Parameter	Selection/settings	Description
Protocol	<b>Modbus slave</b>	Modbus RTU (central processing unit as Modbus slave) The device address is assigned dynamically during hardware configuration.
	Modbus master	Modbus RTU (central processing unit as Modbus master)
Baud rate	Baud rate with which the interface is operated.	
	<b>9600</b>	9600 baud
	19200	19200 baud
	38400	38400 baud

## 6 Configuration




Parameter	Selection/settings	Description
Data format	Data format with which the interface is operated.	
	<b>8 - 1 - no parity</b>	8 data bits, 1 stop bit, no parity
	8 - 1 - odd parity	8 data bits, 1 stop bit, odd parity
	8 - 1 - even parity	8 data bits, 1 stop bit, even parity
Min response time	0 to <b>40</b> to 500 ms	The minimum response time is adhered to by the Modbus slave before a response is sent following a data request.
<b>Modbus slave</b>		
Timeout mast.	60 to <b>10000</b> to 60000 ms	Master monitoring time After this time, a timeout is identified in the Modbus master. An internal digital signal is set in the event of a timeout.
Modem active	<b>Not selected</b> (empty)  Selected (checkmark)	No modem operation (Modbus slave is connected directly to serial bus).  Modem operation (Modbus slave is connected to the Modbus master via the modem).  Additional settings are required here ("Modem" button).
<b>Modbus master</b>		
Timeout	60 to <b>200</b> to 10000 ms	A request sent by the master is defined as faulty if no answer is received within this time.
Scanning cycle	60 to <b>500</b> to 99999 ms	The Modbus master requests the Modbus master data from the Modbus slave at these intervals.

## 6.7.1 Modem

### Setup dialog



### Parameters

Parameter	Selection/settings	Description
Cycl. init. time	0 to 5 to 255 min	Time for cyclical initialization of the modem (if the modem is switched on after the system). 0 = one-time initialization (after system has been switched on)
Init string 	<b>AT&amp;FE0X3Q1&amp;K0S0=1&amp;D0&amp;W0&amp;Y0</b> (ASCII; max. 40 characters)	AT command for modem initialization This default initialization string configures the modem so that it can be called from an external source, answers independently, and receives Modbus commands.
Call string 	<b>ATDT</b> (ASCII; max. 24 characters)	AT command for establishing a connection via the modem ATDT = selection with dial tone (DTMF)
Hang-up string 	<b>ATH</b> (ASCII; max. 16 characters)	AT command for disconnection via the modem ATH (or ATH0) = hang up
<b>Alarm message</b>		
Alarm type	Issue of alarm message	
	<b>E-mail</b>	In the event of an alarm, an e-mail is sent (via the e-mail server after connecting to the Internet).
	PC visualization	In the event of an alarm, a modem connection is established to a PC with process visualization software.

## 6 Configuration

Parameter	Selection/settings	Description
Alarm signal	Signal that triggers the alarm message (only for "PC visualization" alarm type)	
	<b>Inactive</b> Module (source of signal)	No alarm message Alarm message is triggered by a signal (high active) that must be selected in the following field (digital selector).
Phone no.	<b>(None)</b> (ASCII; max. 24 characters)	Telephone number for establishing connection to a PC with process visualization software (Only for "PC visualization" alarm type)

### Init string

The following Init string is required for operation as a Modbus slave:  
AT&FE0X3Q1&K0S0=1&D0&W0&Y0

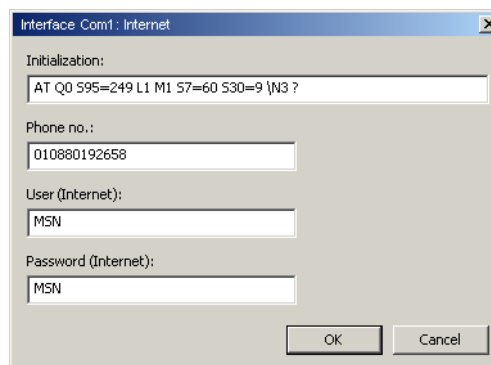
AT&F = Load current manufacturer profile  
E0 = Deactivate character echo  
X3 = Deactivate dial tone detection, activate busy tone detection  
Q1 = Deactivate command responses  
&K0 = Deactivate data flow control  
S0=1 = Auto answer after first ring  
&D0 = Ignore DTR signal  
&W0 = Save current configuration as profile 0  
&Y0 = Use profile 0 after switch-on

### Call string, hang-up string

The dialing and hang-up strings are required if the modem needs to establish a connection to the Internet (to send e-mail via e-mail server) or a PC with process visualization software in the event of an alarm.

### Additional settings

To open this window, use the "..." button:



### Parameters

Parameter	Selection/settings	Description
Initialization	<b>AT Q0 S95=249 L1 M1 S7=60 S30=9 \\N3 ?</b> (ASCII; max. 50 characters)	AT command for modem changeover This default initialization string switches the modem to the mode for connecting to the Internet (e-mail server).
Phone no.	<b>010880192658</b> (ASCII; max. 24 characters)	Telephone number for connecting to the Internet (to be requested from the Internet provider)
User (Internet)	<b>MSN</b> (ASCII; max. 64 characters)	User name for logon when connecting to the Internet (to be requested from the Internet provider)
Password (Internet)	<b>MSN</b> (ASCII; max. 64 characters)	Password for logon when connecting to the Internet (to be requested from the Internet provider)

# 6 Configuration

## 6.8 PROFIBUS (as of system version 02)

As of system version 02, a PROFIBUS-DP interface module is supported (option for interface Com2, see order details).

⇒ Chapter 1.4 "Identifying the device version", page 14

⇒ Chapter 11 "Retrofitting interfaces", page 163

The PROFIBUS-DP interface is operated as slave and works according to the V0 protocol (cyclic data transfer). To connect to a master (e. g. external PLC), a GSD file is required which contains information about the communication characteristics of the system.

A GSD file is included in the scope of delivery of the system. It supports the transfer of 21 input values (output data of the master) and 21 output values (input data of the master) of float or integer data type (2 or 4 bytes). All process values of the central processing unit and of the connected modules are available as output values.

GSD files with different configuration can be generated customer-specifically by the manufacturer on request.

For addressing the variables which are read or written via PROFIBUS, frame 5 of the Modbus frames is used in each case. This frame must be configured as Modbus slave.

⇒ Chapter 8.2 "Modbus frames for reading", page 123

⇒ Chapter 8.3 "Modbus frames for writing", page 124



**CAUTION!**

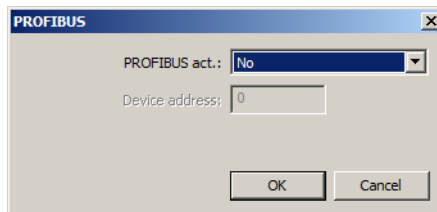
The use of frame 5 for Modbus and PROFIBUS at the same time is not inhibited by the system.

Variables may be accidentally overwritten.

For simultaneous operation of Modbus and PROFIBUS frame 5 is not allowed to be used for Modbus.

Communication via PROFIBUS is described in more detail in the separate PROFIBUS-DP interface description (B 705001.2.3).

### Setup dialog



### Parameter

Parameter	Selection/settings	Description
PROFIBUS active	<b>No</b>  Yes	PROFIBUS interface is not active.  PROFIBUS interface is active. Prerequisite: Interface module is equipped.
Device address	<b>0</b> to 127	PROFIBUS device address

**NOTE!**

Internal and external errors of the PROFIBUS-DP interface are classified as fault and are used to generate the "system fault" signal (collective fault). In addition, the errors are entered in the event list of the central processing unit.

**CAUTION!**

In case of an external fault (e. g. interface cable disconnected), the last received value is retained.

Thus, there is a risk that the used value is out of date.

Therefore, it is necessary to evaluate the status of the "fieldbus error" signal. Therefore, it is necessary to evaluate the status of the "fieldbus error" signal. This allows to set outputs to a safe state by the PLC if applicable.

# 6 Configuration

## 6.9 Web server

The integrated Web server provides you with convenient access via LAN to process values and the event list of the system from a PC (Web browser). Access can be protected by a password. There is a maximum of 1 MB memory for HTML pages available in the central processing unit. The start page index.htm is available by default; access with the Web browser is performed by entering the IP address of the central processing unit.



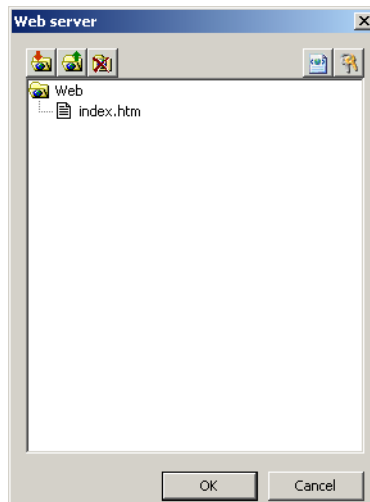
**NOTE!**

This function requires the Microsoft Silverlight<sup>1</sup> plug-in. A message appears in the Web browser if the plug-in is missing. At that point the installation of the plug-in becomes available.

<sup>1</sup> Microsoft and Silverlight are registered trademarks of Microsoft Corporation.

Further information can be found in the interface description B 705001.2.0.

### Setup dialog

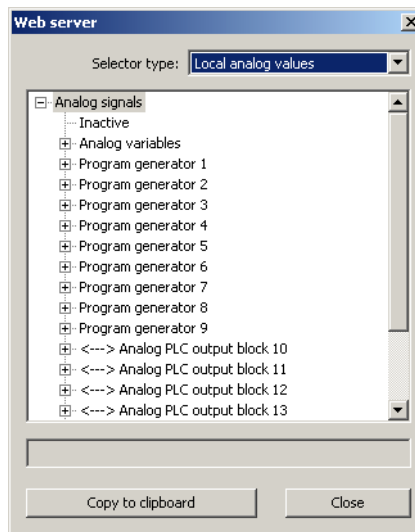


### Function of buttons

Button	Designation	Description
	Import Web	Select the folder that contains the files required for the Web application (incl. HTML files).
	Export Web	Select the folder to which the files used for the Web application should be exported.
	Delete Web	After answering the security request, all files (except index.htm) are removed from the setup file.
	HTML tags 	HTML tags are used to convert names of variables into addresses for Web server programming.
	Security 	User name, password, and timeout time are specified here.

## HTML tags

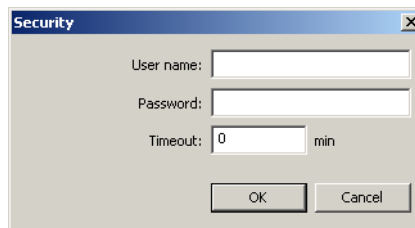
To open this window, use the "HTML tags" button:



Select the required variable names from the relevant selectors.

## Security

To open this window, use the "Security" button:



## Parameters

Parameter	Selection/settings	Description
User name	<b>Master</b> (ASCII; max. 31 characters)	User name for logon to the Web server
Password	<b>9200</b> (ASCII; max. 31 characters)	Password for logon to the Web server
Timeout	<b>0</b> to 1092 min	Time until automatic logout if no user activity is detected. 0 min = No automatic logout

# 6 Configuration

## 6.10 PLC configuration

Up to 50 (as of system version 02: 200) parameters can be defined here for the PLC. These are only used in the PLC program.

By assigning the name and unit, and by defining limits (min. and max.) and the data type, the PLC programmer can compile each of the required input masks individually for each parameter and therefore adapt them to the relevant application.

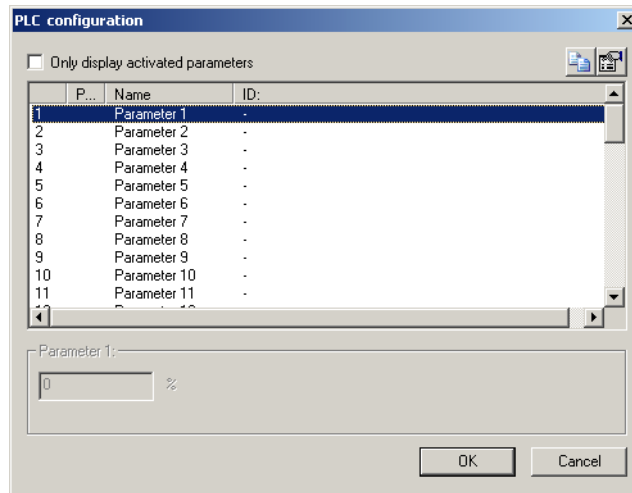
The screen configured in the setup program is essential for entering parameter values, both in the setup program and on the multifunction panel.



**WARNING!**

The relevance of the PLC parameters depends on the PLC program. Changes to parameters may have unintentional effects. The parameters should only be changed if an express instruction was given by the manufacturer to do so.

**Setup dialog**



This window shows all parameters with their names and values. Alternatively, only activated parameters are displayed (checkbox selected).

The name and unit are specified in the input mask; the parameters are also activated there. The parameter value is entered in this window.


**Parameters**

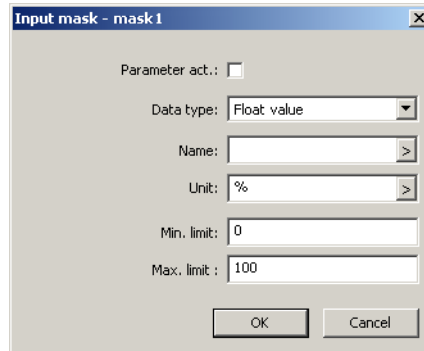
Parameter	Selection/settings	Description
Parameter active (P..)	(Display only)	X = Parameter is active
Name	Entry in the "Input mask" menu	Name that was assigned in the input mask for the relevant parameter. If no name is assigned, "Parameter x" is shown here (x = 1 to 50).
Value	Entry in lower field (here: "Parameter 1")	Value of the relevant parameter and its unit The unit is also specified using the input mask.

## 6 Configuration

Parameter	Selection/settings	Description
Parameter 1 (example)	Enter value.	Input field for the parameter value

### Input mask

To open this window, use the  (Input mask) button:



This window is used to configure the input mask for each of the (max.) 50 parameters (mask 1 to 50).

### Parameters

Parameter	Selection/settings	Description
Parameter active	<b>Not selected (empty)</b> Selected (checkmark)	Parameter not active Parameter active
Data type	Selection of data type <b>Float value</b> Integer value Selection Boolean value	Floating parameter Integer parameter Selector parameter Boolean parameter
Name	<b>(Empty)</b> (Max. 21 characters)	Name of the parameter
Unit	<b>%</b> (Max. 5 characters)	Unit of the parameter
Min. limit	-2147483648 to <b>0</b> to 2147483647 or -3.37E+38 to <b>0</b> to +3.37E+38	Minimum value for value analysis  (Range depends on data type)
Max. limit	-2147483648 to <b>100</b> to 2147483647 or -3.37E+38 to <b>100</b> to +3.37E+38	Maximum value for value analysis  (Range depends on data type)

# 6 Configuration

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## 6.11 Program generator

This dialog is available when the "Program generator" option or the "Program generator with process steps" option (additionally available as of system version 02) has been activated in the setup program (Project: Hardware arrangement > Globals).

⇒ Manual for setup program B 705000.6, "Project configuration" section

To access this function in the central processing unit, it must be enabled with the setup program (CPU: Online parameters > Enabling of extra codes).

⇒ Operating manual for central processing unit B 705001.0, "Online parameters" section

You can use nine independent program generators (program generator 1 to 9) to enable nine independent programs to run asynchronously at the same time. In total, up to 100 programs can be managed in a program pool.

### Program generator use

The program generator (extra code 225) is specially designed for heat treatment or thermal processes and allows the definition of setpoint value profiles. A setpoint value profile forms a program, together with the states of the operating contacts.

The program generator with process steps (extra code 228, as of system version 02) is required for ripening, cooking, and smoking plants or for heating, cooling, climatic, and test cabinets. In this branches, process steps are defined by the plant manufacturer as a PLC application, for example. The user has no access to this, since specific knowledge about the functioning of the plant is required. While creating the program, the user completes the process steps to program sections – taking into account the presetting defined by the plant manufacturer.

In the program generator with process steps the switchover from one program section to the next depends on section time or on setpoint 2 (core setpoint value, compared to actual value). Either the section time or setpoint 2 can be entered in the program schema. As of system version 03, the behavior is configurable.

### Create programs

The program editor, which is a component of the setup program and the multifunction panel, is used to create programs. Each program can consist of a maximum of three program channels with up to four setpoint values (e.g. for setpoint changeover) and up to 16 operating contacts. Up to 100 program sections are possible. Tolerance band monitoring can be set up for the first setpoint value of each program channel.

⇒ Chapter 9 "Program editor", page 135

### Example of assignment of setpoint values to a controller channel of a multichannel controller module

- 1) In the configuration menu for the setpoint values of the multichannel controller module, the appropriate external signals (analog selector, e.g. NV\_SP01Ext to NV\_SP04Ext) are assigned to setpoint values 1 to 4.
- 2) In the NV connecting list, these external signals (here: NV\_SP01Ext to NV\_SP04Ext) are connected to the corresponding signals of a central processing unit program generator (e.g. Channel 1 SP1 to Channel 1 SP4).

## Example of using the operating contacts in the multichannel controller module

- 1) In the configuration menu for the digital outputs of the multichannel controller module, the appropriate external signals are selected as signal sources (digital selector, e.g. NV\_DO03, etc.)
- 2) In the NV connecting list, these external signals (here: NV\_DO03, etc. ) are connected to the operating contact signals of a central processing unit program generator (e.g. operating contact 1, etc.).



### NOTE!

In the setup program, the NV connecting list is in the configuration level of the relevant input/output module (here: multichannel controller module). In the multifunction panel, there is a central NV connecting list in the configuration menu of the central processing unit.



### NOTE!

If the configuration of a program generator is changed, all program generators that are running stop and are set to basic status to prevent potential malfunctions.

## 6.11.1 General



### NOTE!

In the multifunction panel 840 the corresponding menu item is named "Prog. generator" instead of "Globals".

## Setup dialog

**Prog. generator**

Generator 1  
  Globals  
  Process engineering  
  Setpoint limits  
  Basic status setpoints  
  Manual mode setpoints  
  Setpoint specification  
  Names of operating cont  
  Tolerance band monitor.  
  Events  
  Process screen  
+ Generator 2  
+ Generator 3  
+ Generator 4  
+ Generator 5  
+ Generator 6  
+ Generator 7  
+ Generator 8  
+ Generator 9

Name:

Function:

Start program:

Behavior at O-o-R:

Power off:

Actual value difference:  %

Start with time:

End signal:  s

Start program:

Stop program:

Abort program:


Previous section:

Next section:

OK Cancel Copy

# 6 Configuration

## Parameters

Parameter	Selection/settings	Description
Function	<b>Without function</b> Program generator Fixed-setpoint generator	Program generator is switched off. Program generator is controlled by a program. The program generator operates as a fixed-setpoint generator. In this case, the setpoint values for the basic status or manual mode are used.
Start program	<b>Program start</b> Actual value Time	Program starts at the first programmed setpoint value. The actual value of program channel 1 is adopted as the first setpoint value. All other channels run synchronously from this point in time. A start time specified for program start is adopted as the start time in a 24 h program. Example: Start time: 06:00:00; 24 h program from 00:00 to 24:00: The program starts at 6 a.m. and runs until midnight.
Behavior at O-o-R	Behavior of the program generator if measurement range is exceeded or if there is measuring range underflow (Out-of-Range) <b>Continuous operation</b> Program stop	Program continues to run. Program is stopped.
Power off 	Behavior of the program generator when the power failure is over. <b>Abort</b> Continuous operation Standstill Proceed at x % Proceed at actual value	Program is aborted; the program generator enters basic status. Program continues running to the point that it was at when the power failed. Program is stopped (program generator stays in automatic mode). The program can be set to continue or abort. If the difference of the actual value before and after the power failure is below or equal to x %, the program continues running to the point that it was at when the power failed. If this is not the case, the program generator enters standstill. The program continues running at the actual value; consideration is given to whether the program profile had a positive or negative trend at the time of the power failure.

## 6 Configuration

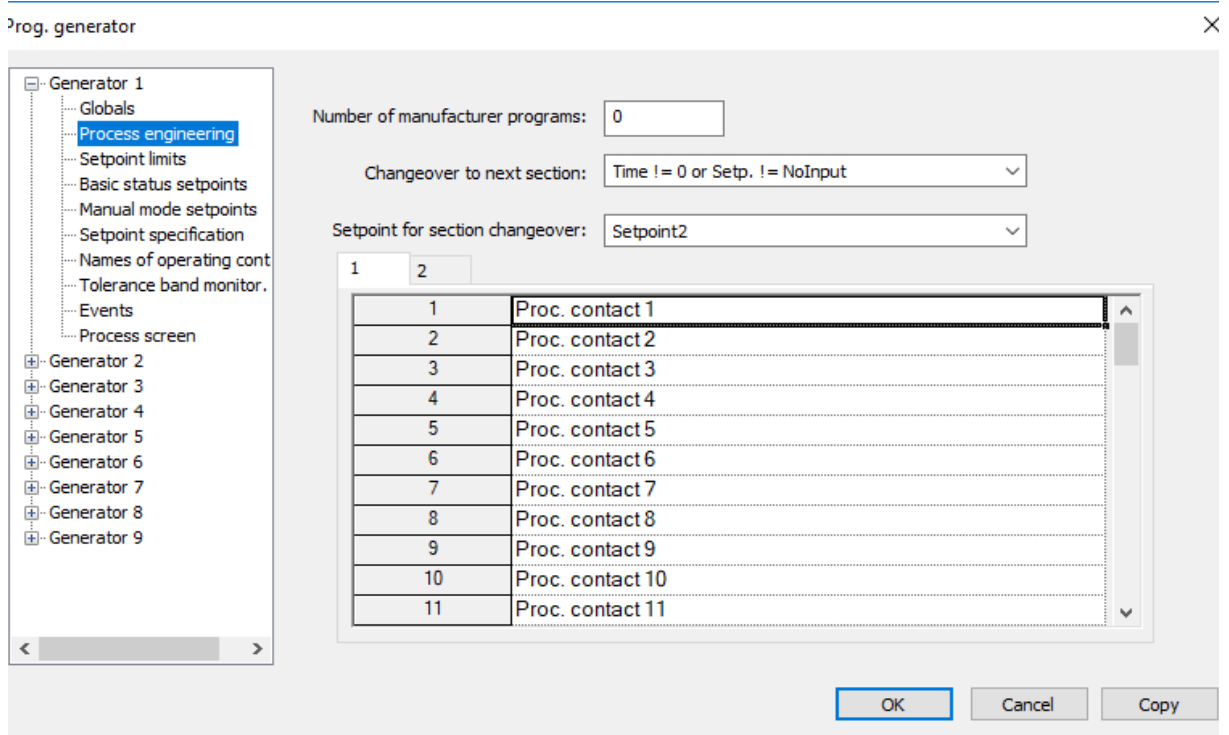
Parameter	Selection/settings	Description
Actual value difference	0 to 100 %	The maximum admissible difference between the actual value before and after the power failure for the program to continue running.
Start with time	The program can be started at a specific time (entry of date and time during operation).	
	<b>No</b>	Immediate program start (e.g. by operation or digital signal)
	Yes	Program start at a specific time
End signal	0 to 32767 s	Length of the program end signal
Start program	Program is started with a digital signal.	
	<b>Inactive</b> Module (source of signal)	No signal selected. The signal must be selected in the following field (digital selector).
Stop program	Program is stopped with a digital signal.	
	<b>Inactive</b> Module (source of signal)	No signal selected. The signal must be selected in the following field (digital selector).
Abort program	Program is aborted with a digital signal.	
	<b>Inactive</b> Module (source of signal)	No signal selected. The signal must be selected in the following field (digital selector).
Previous section (as of system version 02)	A digital signal triggers changeover to previous section.	
	<b>Inactive</b> Module (source of signal)	No signal selected. The signal must be selected in the following field (digital selector).
Next section	A digital signal triggers changeover to next section.	
	<b>Inactive</b> Module (source of signal)	No signal selected. The signal must be selected in the following field (digital selector).

# 6 Configuration

## 6.11.2 Process engineering (as of system version 03)

The following parameters are available if the option "Program generator with process steps" (extra code 228) is active.

### Setup dialog



### Parameters

Parameters	Selection/settings	Description
Number of manufacturer programs 	0 to 50	Number of manufacturer programs This parameter is available for program generator 1 only, but it applies to all program generators.
Changeover to next section 	Condition for switching to the next program section	
	Time	After expiry of section time (setpoint can be used, but not as criterion for section changeover)
	Setpoint value	After reaching the setpoint value (actual value = setpoint value; section time is not available)
	Time and setpoint value	After expiry of section time AND after reaching the setpoint value
	Time or setpoint value	After expiry of section time OR after reaching the setpoint value
	Time != 0 or Setp. != NoInput	Either after expiry of section time OR after reaching the setpoint value

Parameters	Selection/settings	Description
Setpoint for section changeover	<b>Setpoint 1</b> to Setpoint 10	Setpoint for section changeover Setpoint which is decisive for section changeover (core setpoint value, compared to actual value)
Names of the process contacts (as of system version 05)	Use default name or edit text (in language 1 and language 2)	Designation or description Different texts can be assigned to the process contacts of the individual program generators.

### Number of manufacturer programs

This parameter determines how many programs can only be edited by the system manufacturer.

Manufacturer programs can only be edited with the full version of the setup program. It is not possible to edit these programs in the setup program with "Program editor" license or on the multifunction panel 840; here these programs are only displayed. Manufacturer programs start with program number 1. When entering the number 5, for example, programs 1 to 5 are manufacturer programs.

### Changeover to next section

Selection "Time != 0 or Setp. != NoInput": Either the section time or the setpoint value can be entered in the program schema. This is the same behavior as in system version 02, but in system version 03 the setpoint can be selected (system version 02: setpoint 2).

# 6 Configuration

## 6.11.3 Setpoint limits

This window is used to specify the setpoint value limits (setpoint value 1 to 4) and tolerance band limits (setpoint value 1) for each of the three program channels. The number of decimal places can also be set and an individual designation can be specified for each setpoint value. The setpoint value limits, tolerance band limit (for setpoint value 1), and the step or ramp setpoint input are set for each of the four setpoint values of a relevant program channel.

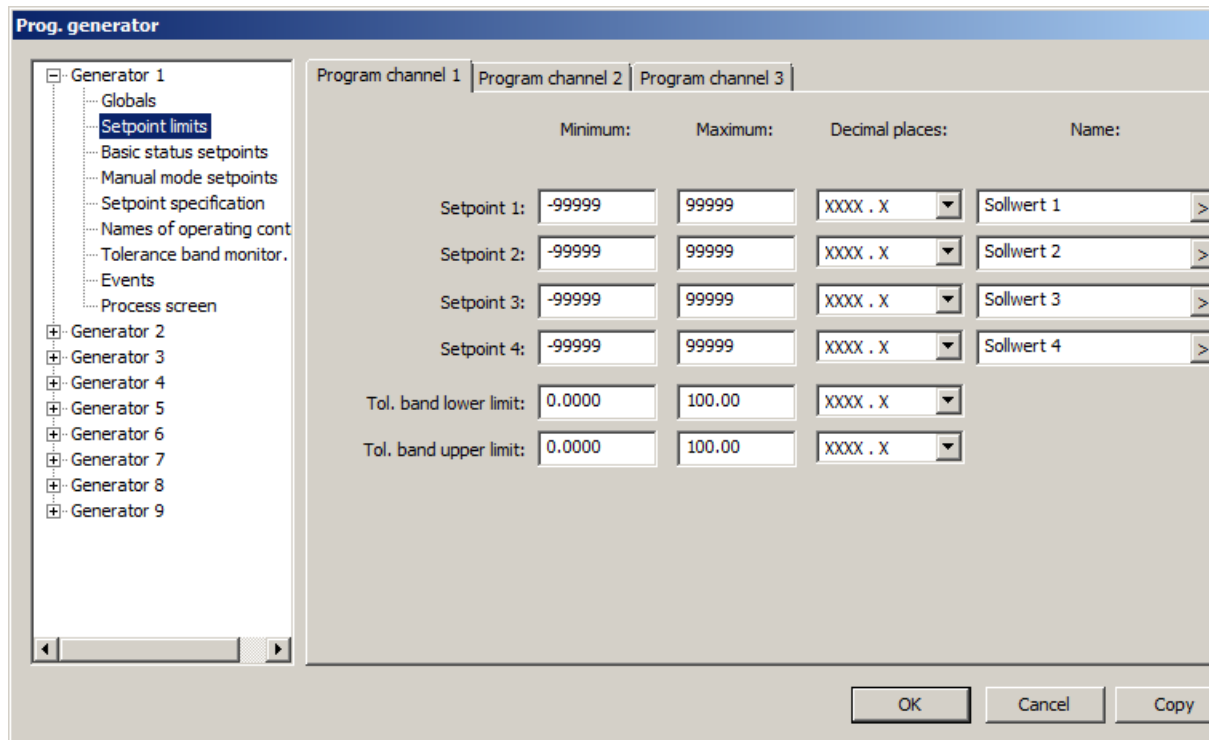


**NOTE!**

In the program generator configuration the setpoints are distributed on three program channels. This corresponds to the use in the simple program editor (with active option "Program generator"). A distinction between channels does not exist in the program editor for process engineering (with active option "Program generator with process steps"). In this case the following assignment applies:

- Program channel 1 / Setpoints 1 to 4 > Setpoints 1 to 4
- Program channel 2 / Setpoints 1 to 4 > Setpoints 5 to 8
- Program channel 3 / Setpoints 1 and 2 > Setpoints 9 and 10 (11 and 12 are not used)

### Setup dialog



### Parameters

Parameter	Selection/settings	Description
<b>Setpoint value 1 to 4</b>		
Minimum	-99999 to <b>-9999</b> to +99999	Minimum admissible setpoint value
Maximum	-99999 to <b>9999</b> to +99999	Maximum admissible setpoint value

## 6 Configuration

---

Parameter	Selection/settings	Description
Decimal places	Auto	Number of decimal places is selected automatically.
	XXXX.	No decimal places
	<b>XXX.X</b>	One decimal place
	XX.XX	Two decimal places
	X.XXX	Three decimal places
Name	Use default name or edit text. (Max. 16 characters)	Name of the setpoint value
<b>Tol. band lower limit</b>		
Minimum	-99999 to <b>0</b> to +99999	Minimum admissable value
Maximum	-99999 to <b>100</b> to +99999	Maximum admissible value
<b>Tol. band upper limit</b>		
Minimum	-99999 to <b>0</b> to +99999	Minimum admissible value
Maximum	-99999 to <b>100</b> to +99999	Maximum admissible value

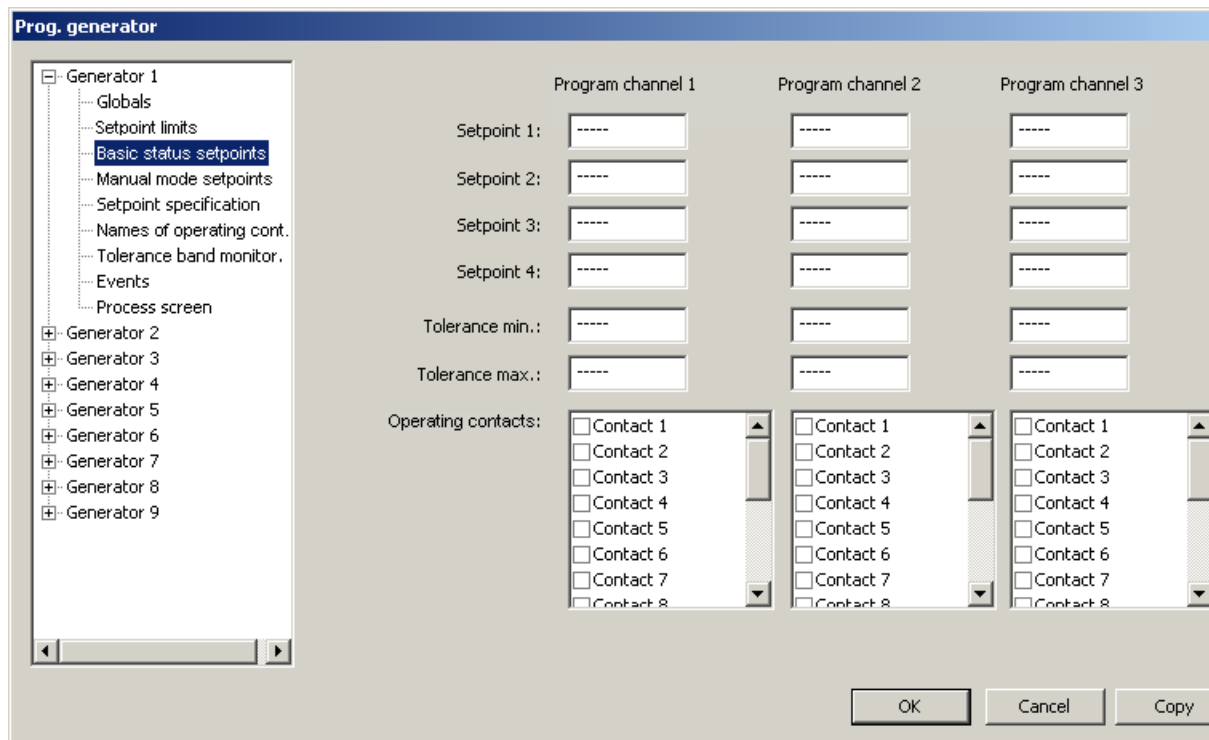
# 6 Configuration

## 6.11.4 Basic status setpoints

Specific values can be specified for each of the program channels for when the program is not running (basic status). This relates to all setpoint values, the tolerance band, and the 16 operating contacts.

These values are also used if the program generator has been configured as a fixed-setpoint generator.

### Setup dialog



### Parameters

Parameter	Selection/settings	Description
<b>Program channel 1 to 3</b> (setpoint values and operating contacts in basic status)		
Setpoint 1	-99999 to <b>0</b> to +99999	Setpoint value 1
Setpoint 2	-99999 to <b>0</b> to +99999	Setpoint value 2
Setpoint 3	-99999 to <b>0</b> to +99999	Setpoint value 3
Setpoint 4	-99999 to <b>0</b> to +99999	Setpoint value 4
Tolerance min.	-99999 to <b>0</b> to +99999	Minimum value of the tolerance band
Tolerance max.	-99999 to <b>0</b> to +99999	Maximum value of the tolerance band
Contact 1 to 16	<b>Not selected (empty)</b> Selected (checkmark)	Operating contact not active Operating contact active

## 6.11.5 Manual mode setpoints

Specific values can be specified for each of the program channels for manual mode. This relates to all setpoint values, the tolerance band, and the 16 operating contacts.

These values are also used if the program generator has been configured as a fixed-setpoint generator.

### Setup dialog

### Parameters

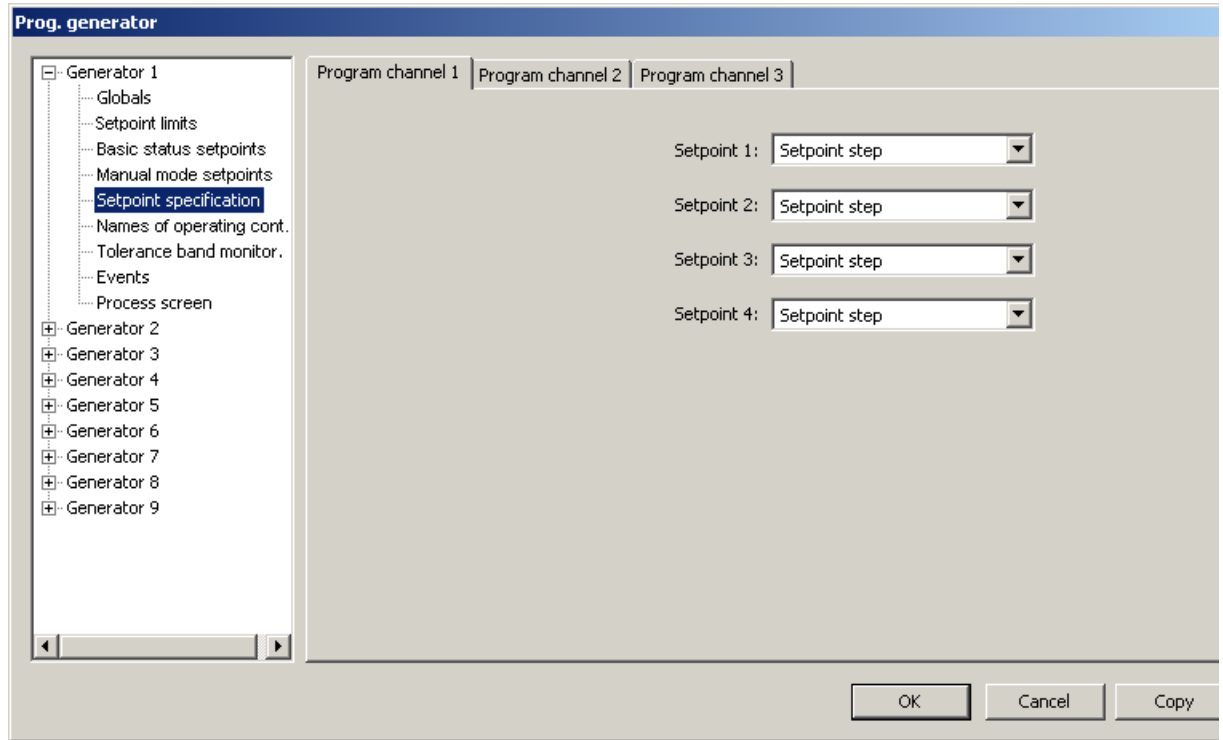
Parameter	Selection/settings	Description
<b>Program channel 1 to 3</b> (setpoint values and operating contacts in manual mode)		
Setpoint 1	-99999 to <b>0</b> to +99999	Setpoint value 1
Setpoint 2	-99999 to <b>0</b> to +99999	Setpoint value 2
Setpoint 3	-99999 to <b>0</b> to +99999	Setpoint value 3
Setpoint 4	-99999 to <b>0</b> to +99999	Setpoint value 4
Tolerance min.	-99999 to <b>0</b> to +99999	Minimum value of the tolerance band
Tolerance max.	-99999 to <b>0</b> to +99999	Maximum value of the tolerance band
Contact 1 to 16	<b>Not selected (empty)</b> Selected (checkmark)	Operating contact not active Operating contact active

# 6 Configuration

## 6.11.6 Setpoint specification

A specification for whether a setpoint value change is performed as a step or a ramp can be made for each of the four setpoint values of a program channel (program channels 1 to 3). In addition, a ramp function with end value can be configured as of system version 03.

### Setup dialog



### Parameters

Parameter	Selection/settings	Description
Setpoint 1 to 4	Setpoint input for setpoint value 1 to 4	
	<b>Setpoint step</b> Setpoint ramp End value for setp. ramp 1 ... End value for setp. ramp 10 (as of system version 03)	Setpoint value change as step Setpoint value change as ramp The relevant setpoint (1 to 4) acts as end value for the ramp function of the setpoint (1 to 10) which is selected here. If there is no end value specified in a program section, then the program generator works in accordance to its configuration (setpoint step or setpoint ramp).

### Setpoint 1 to 4

Example: Setpoint 3 is the end value for the ramp of setpoint 1. The value at the beginning of the section is determined by setpoint 1, the value at the end of the section by setpoint 3. At the end of the section the setpoint 1 jumps to the value of the next section.

⇒ Chapter 9.4.1 "Ramp function with end value (as of system version 03)", page 149

For this example, the following conditions apply:

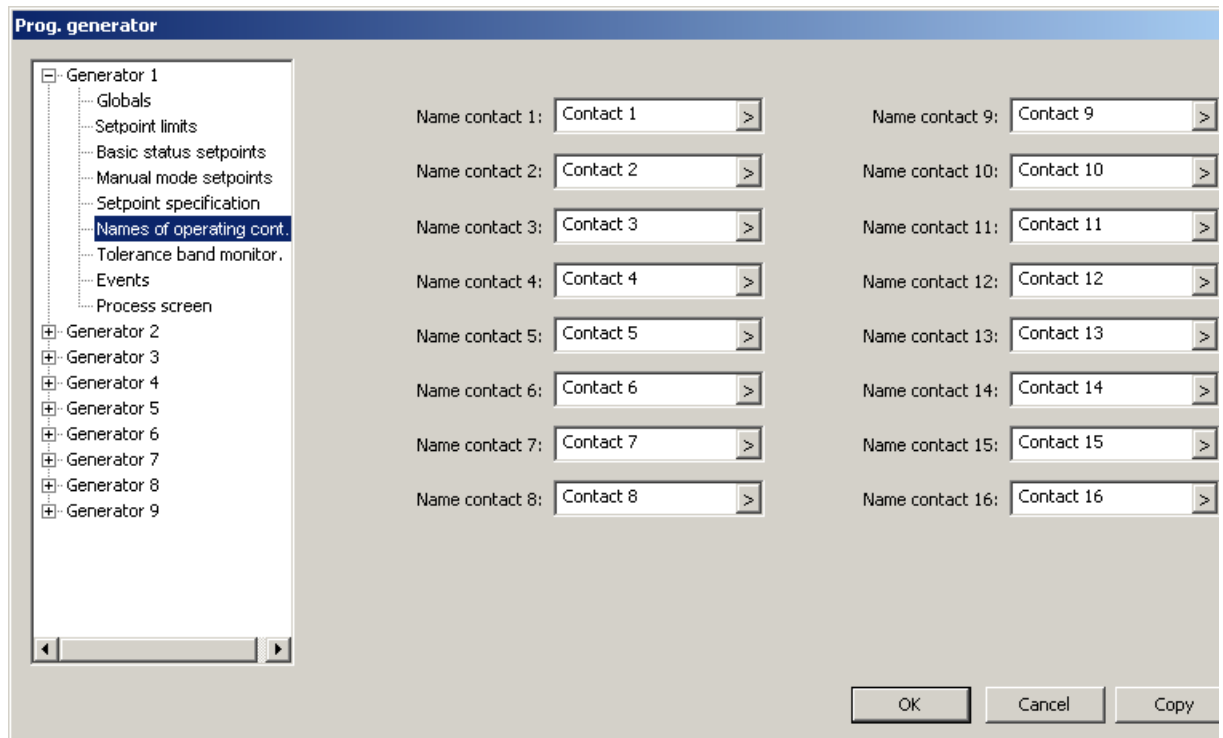
- Setpoint 1 and setpoint 3 must be enabled in the process step (option "Program generator with process steps" required) and their value must not be equal to "-----".
- Setpoint 1 must not be configured as end value for the ramp of another setpoint. Other settings in the configuration of setpoint 1 (setpoint step or setpoint ramp) do not matter.
- If setpoint 2 is also configured as end value for the ramp of setpoint 1, then setpoint 2 (setpoint with lower number) is used instead of setpoint 3. But setpoint 2 must be enabled in the process step. Otherwise, setpoint 1 does not work as setpoint ramp with end value; instead it would then work in accordance with its own configuration (setpoint step or setpoint ramp). Setpoint 3 does not matter in this case, even if it is enabled in the process step.

## 6.11.7 Names of operating contacts

Assignment of names for the 16 operating contacts of the program channels

No distinction is made here between the individual program channels as the operating contacts of the program channels are linked with OR.

### Setup dialog



### Parameters

Parameter	Selection/settings	Description
Name contact 1 to 16	Use default name or edit text. (Max. 16 characters)	Name of the operating contact on the process screen

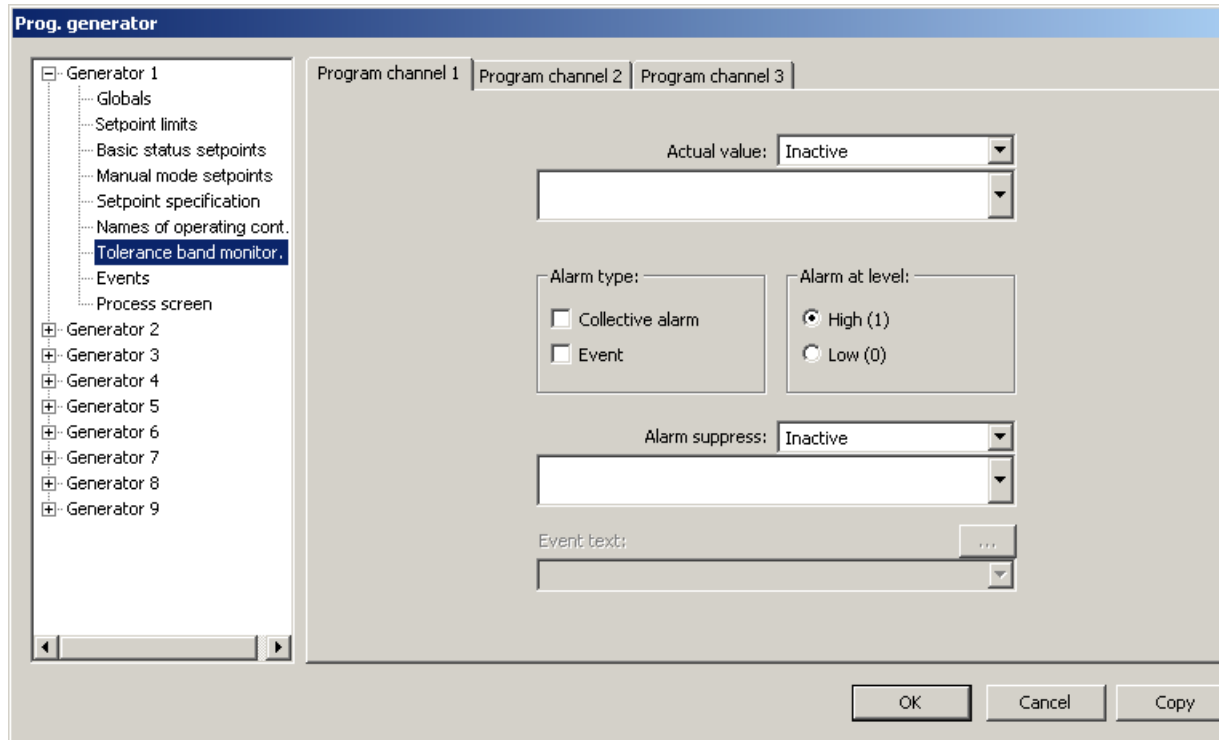
# 6 Configuration

## 6.11.8 Tolerance band monitoring

This window is used to select the analog signal (actual value) to be monitored and to specify the settings for an alarm in the event of a tolerance band infringement.


A tolerance band can be set for the first setpoint value (setpoint 1) of each program channel. When the program is running, the actual value must be within the tolerance band. If it is not, this constitutes a tolerance band infringement. In the event of a tolerance band infringement, the relevant program is stopped until the actual value returns to a value that is within the band.

### Setup dialog



### Parameters

Parameter	Selection/settings	Description
Actual value	Analog signal to be monitored	
	<b>Inactive</b> Module (source of the analog signal)	No signal selected. The analog signal of the relevant module must be selected in the following field.
Alarm type	The alarm type is <b>not</b> set by default.	
	Collective alarm Event	Alarm is used to form the collective alarm. Alarm results in an entry (event text) in the event list.
Alarm at level	<b>High (1)</b>	Alarm at high level (1)
	Low (0)	Alarm at low level (0)

Parameter	Selection/settings	Description
Alarm suppress	Signal to activate the alarm suppression	
	<b>Inactive</b> Module (source of signal)	No alarm suppression Alarm suppression by a signal (high active) that must be selected in the following field (digital selector).
Event text 	Use default text or select other text from the list.	Text that is entered in the event list for an alarm (for "Event" alarm type).

### Event text

**Setup program:** Selection of the event text from a list

Click the "..." button to open a list with the text numbers and the associated event texts. The event texts can be edited.

**Multifunction panel:** Selection of event texts using the text number

The setup program is required to view and edit the event texts.

# 6 Configuration

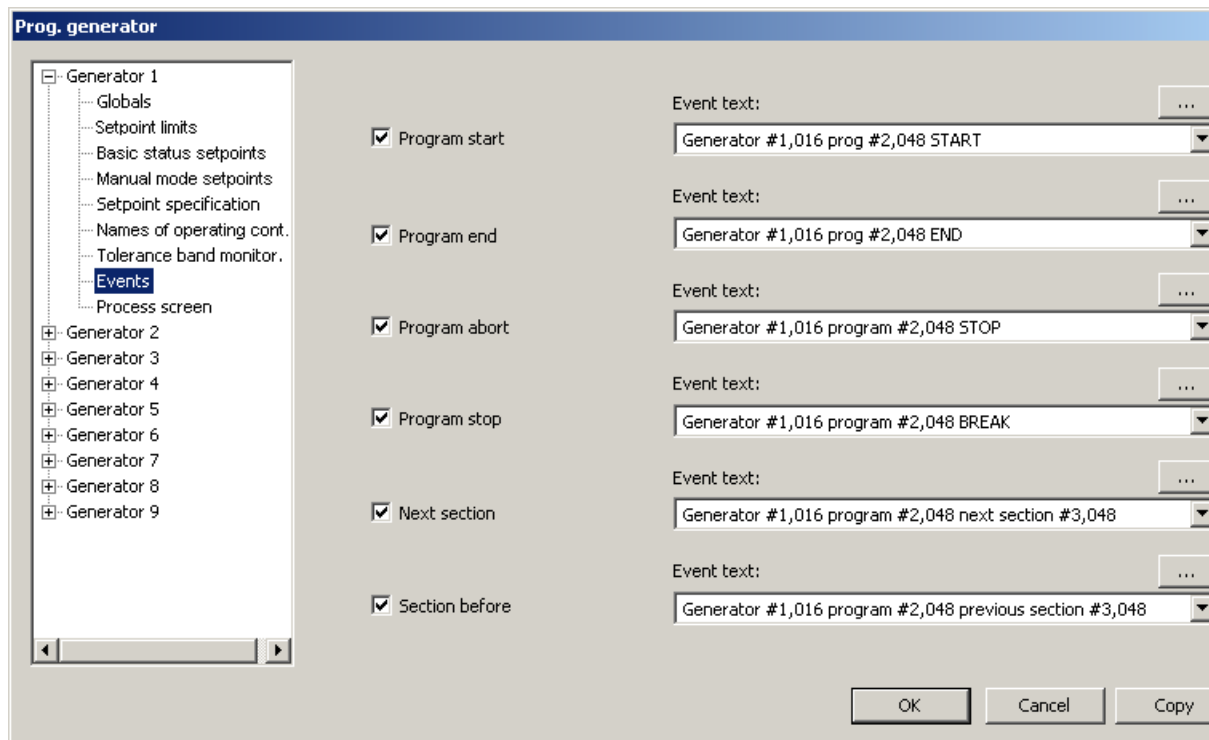
## 6.11.9 Events

Activation of event messages during a program sequence and specification of the associated event texts

The texts are specified using text numbers.

⇒ Chapter 8.7 "Texts", page 128

### Setup dialog



### Parameters

Parameter	Selection/settings	Description
Program start	Activated (checkmark)	Event message at program start (event text according to text number)
	<b>Not activated</b>	No event message
Program end	Activated (checkmark)	Event message at program end (event text according to text number)
	<b>Not activated</b>	No event message
Program abort	Activated (checkmark)	Event message when program aborted (event text according to text number)
	<b>Not activated</b>	No event message
Program stop	Activated (checkmark)	Event message at program stop (event text according to text number)
	<b>Not activated</b>	No event message
Next section	Activated (checkmark)	Event message at changeover to next program section
	<b>Not activated</b>	No event message

## 6 Configuration

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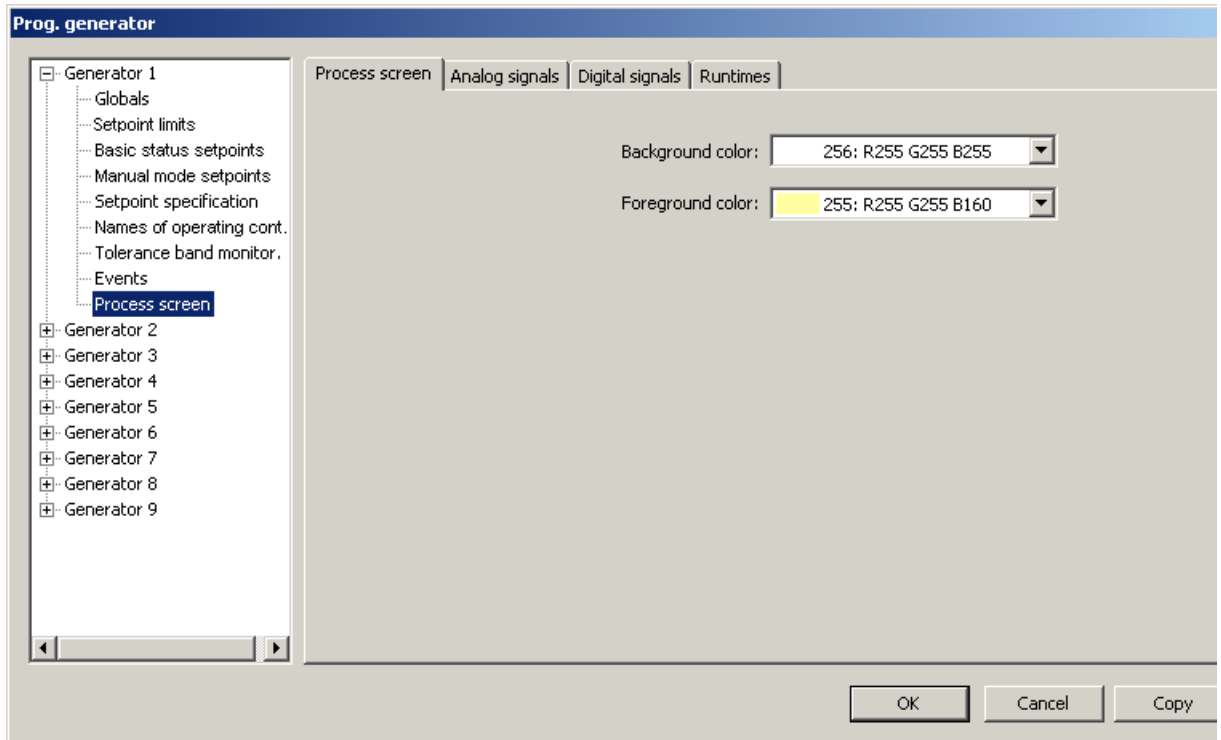
Parameter	Selection/settings	Description
Section before	Activated (checkmark)	Event message at changeover to previous program section
	<b>Not activated</b>	No event message

# 6 Configuration

## 6.11.10 Process screen

This window is used to make all the settings for the process screen. In particular, these are the foreground and background colors, selection of signals to be displayed (signal source, name, unit, color), and display of running times.

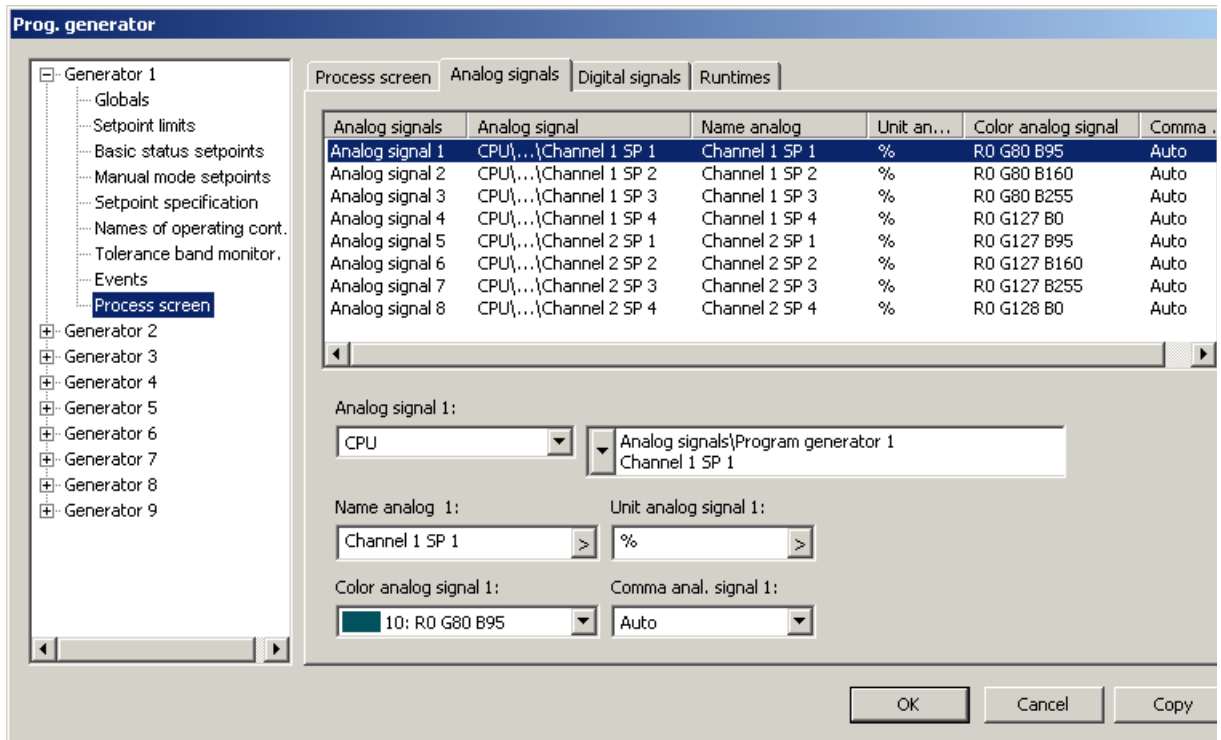
### Setup dialog – Process screen – Background/Foreground color



### Parameters

Parameter	Selection/settings	Description
Background color	Use default color (256 = white) or select another color from the list (256 colors).	Background color of process screen
Foreground color	Use default color (255) or select another color from the list (256 colors).	Foreground color of the process screen

## Setup dialog – Process screen – Analog signals



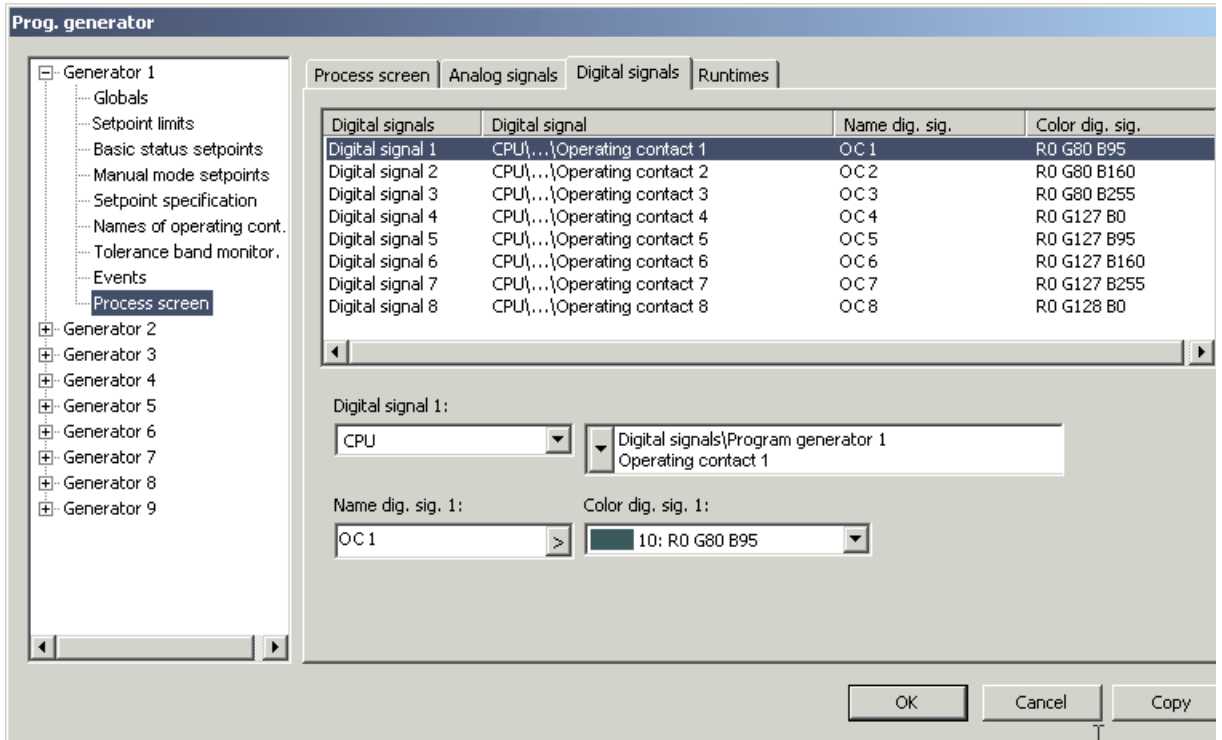
### Parameters

The overview pane shows the eight analog signals of the process screen with their current settings. Before changing the settings of an analog signal, select the signal in the overview pane.

Parameter	Selection/settings	Description
Analog signal 1 to 8	Analog signal that is displayed on the process screen.	
	Inactive	No signal selected.
	Module (source of the analog signal)	The analog signal of the relevant module must be selected in the adjacent field.
Name analog 1 to 8	Use default name or edit text. (Max. 16 characters)	Name of the analog signal on the process screen
Color analog signal 1 to 8	Use default color or select another color from the list (256 colors).	Color in which the analog signal is displayed on the process screen.
Unit analog signal 1 to 8	Max. 5 characters (%)	Unit of the analog signal on the process screen
Comma anal. signal 1 to 8	<b>Auto</b>	Number of decimal places is selected automatically.
	XXXX.	No decimal places
	XXX.X	One decimal place
	XX.XX	Two decimal places
	X.XXX	Three decimal places

# 6 Configuration

## Setup dialog – Process screen – Digital signals

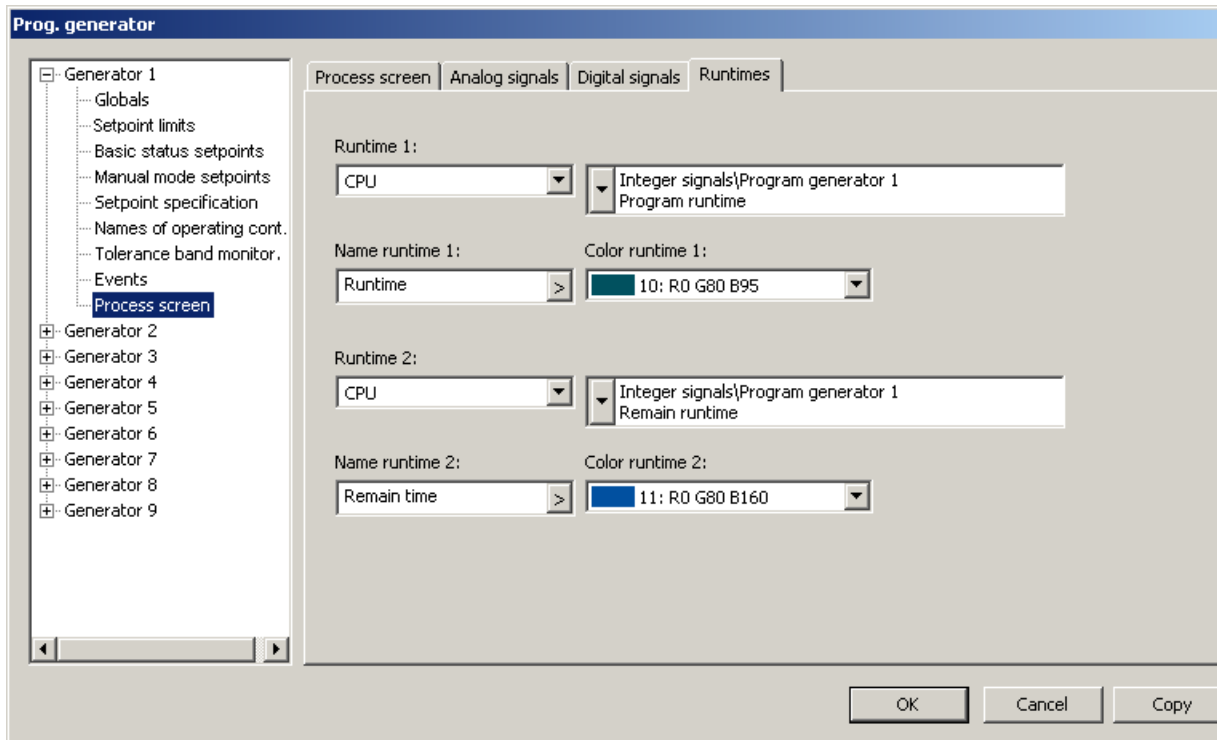


### Parameters

The overview pane shows the eight digital signals of the process screen with their current settings. Before changing the settings of a digital signal, select the signal in the overview pane.

Parameter	Selection/settings	Description
Digital signal 1 to 8	Inactive	No signal selected.
	Module (source of the analog signal)	The signal of the relevant module must be selected in the adjacent field.
Name dig. sig. 1 to 8	Use default name or edit text. (Max. 16 characters)	Name of the signal on the process screen
Color dig. sig. 1 to 8	Use default color or select another color from the list (256 colors).	Color in which the signal is displayed on the process screen.

## Setup dialog – Process screen – Runtimes



## Parameters

Parameter	Selection/settings	Description
Runtime 1, 2	Signal (integer) that is displayed in numeric form on the process screen as time.	
	Inactive Module (source of signal)	No signal selected. The signal of the relevant module must be selected in the adjacent field.
Name runtime 1, 2	Use default name or edit text. (Max. 16 characters)	Name of the signal on the process screen
Color runtime 1, 2	Use default color or select another color from the list (256 colors).	Color in which the signal is displayed on the process screen.

## 6 Configuration

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**NOTE!**

The parameters described in this section can be configured either with the setup program, or on the multifunction panel.

## 7.1 PLC parameter

Up to 50 (as of system version 02: 200) parameters can be defined here for the PLC (parameter level). These are only used in the PLC program.

By assigning the name and unit, and by defining limits (min. and max.) and the data type, the PLC programmer can compile each of the required input masks individually for each parameter and therefore adapt them to the relevant application.

The screen configured in the setup program is essential for entering parameter values, both in the setup program and on the multifunction panel.



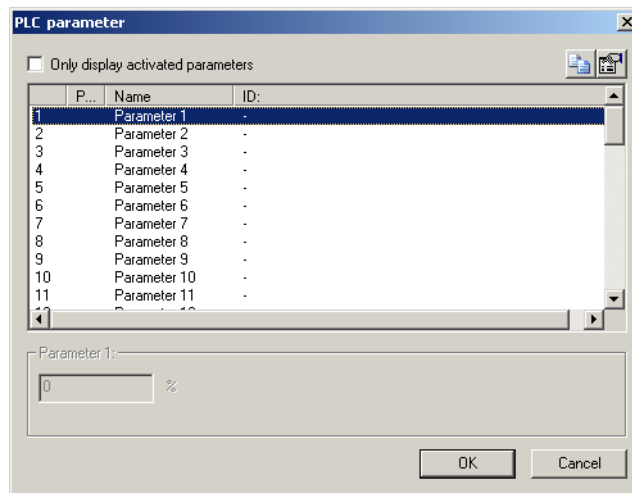
**WARNING!**

The relevance of the PLC parameters depends on the PLC program.

Changes to parameters may have unintentional effects.

The parameters should only be changed if an express instruction was given by the manufacturer to do so.

### Setup dialog



This window shows all parameters with their names and values. Alternatively, only activated parameters are displayed (checkbox selected).

The name and unit are specified in the input mask; the parameters are also activated there. The parameter value is entered in this window.

### Parameters


Parameter	Selection/settings	Description
Parameter active (P...)	(Display only)	X = Parameter is active

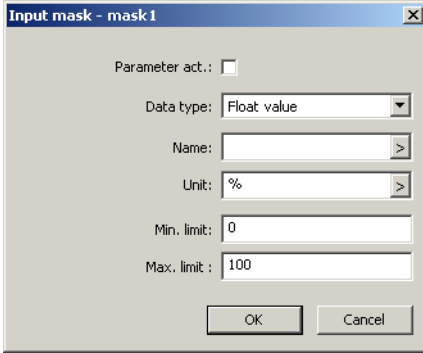
## 7 Parameterization

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<b>Parameter</b>	<b>Selection/settings</b>	<b>Description</b>
Name	Entry in the "Input mask" menu	Name that was assigned in the input mask for the relevant parameter. If no name is assigned, "Parameter 0" is shown here.
Value	Entry in lower field (here: "Parameter 1")	Value of the relevant parameter and its unit The unit is also specified using the input mask.
Parameter 1 (example)	Enter value.	Input field for the parameter value

## Input mask

To open this window, use the  (Input mask) button:



This window is used to configure the input mask for each of the (max.) 50 parameters (mask 1 to 50).

## Parameters

Parameter	Selection/settings	Description
Parameter act.	<b>Not selected (empty)</b> Selected (✓)	Parameter not active Parameter active
Data type	Selection of data type <b>Float value</b> Integer value Selection (selector) Boolean value	Floating parameter Integer parameter Selector parameter Boolean parameter
Name	<b>(Empty)</b> (Max. 21 characters)	Name of the parameter
Unit	<b>%</b> (Max. 5 characters)	Unit of the parameter
Min. limit	-2147483648 to <b>0</b> to 2147483647 or -3.37E+38 to <b>0</b> to +3.37E+38	Minimum value for value analysis  (Range depends on data type)
Max. limit	-2147483648 to <b>100</b> to 2147483647 or -3.37E+38 to <b>100</b> to +3.37E+38	Maximum value for value analysis  (Range depends on data type)

## 7 Parameterization

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# 8 Configuration – in setup program only

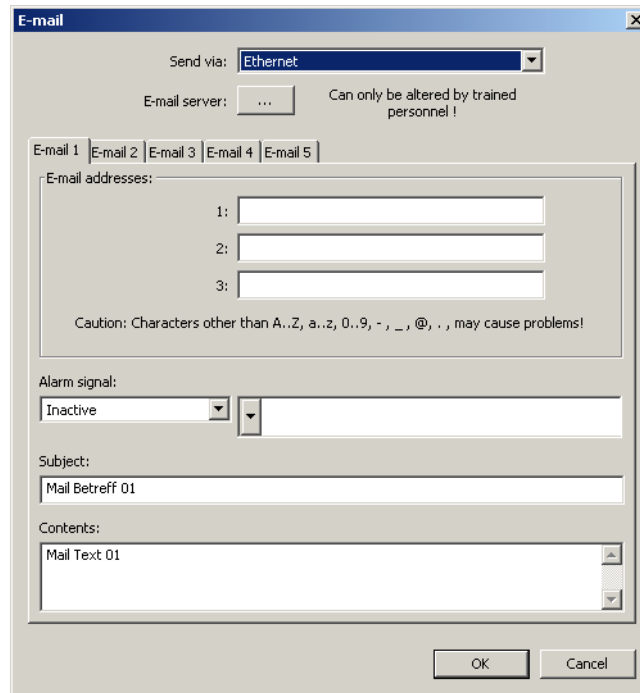


**NOTE!**

The parameters described in this section can only be configured with the setup program.

## 8.1 E-mail

### Setup dialog



### Parameters

Parameter	Selection/settings	Description
Send via	<b>Ethernet</b>  Modem	E-mail is sent via Ethernet (LAN). The mail server is in a company network and should be able to forward e-mails via the Internet.  E-mail is sent via a modem (after connecting to the Internet). The mail server is on the Internet. ⇒ Chapter 6.7.1 "Modem", page 85
<b>E-mail 1 to E-mail 5</b> (e-mail settings for the 5 alarm texts)		
E-mail addresses	The e-mail is sent to up to 3 e-mail addresses (each with max. 64 characters) at the same time.	
	1	Enter first e-mail address
	2	Enter second e-mail address
	3	Enter third e-mail address

## 8 Configuration – in setup program only

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Parameter	Selection/settings	Description
Alarm signal	Signal that triggers sending of an e-mail	
	<b>Inactive</b> Module (source of signal)	No signal selected Select the signal of the relevant module in the field on the right (digital selector).
Subject	Text (max. 120 characters) for the subject line of the e-mail	
	<b>Mail Betreff 01</b> (For e-mail 1)	Use or edit text from list
Contents	Text (max. 120 characters) for the text field of the e-mail	
	<b>Mail Text 01</b> (For e-mail 1)	Use or edit text from list

# 8 Configuration – in setup program only

## 8.1.1 E-mail server



**NOTE!**

The following settings may only be performed by specialists.

### Setup dialog

### Parameters

Parameter	Selection/settings	Description
Authentication	Authentication at logon to e-mail server	
	<b>No</b>	No authentication
	SMTP-After-POP	Authentication with user name and password on POP3 server
	SMTP-Auth	Authentication with user name and password on SMTP server
User name	User name (max. 64 characters) for logon to the e-mail server	
	Your user name (Example)	Enter name (also applies if Authentication = no)
Password	Password (max. 64 characters) for logon to the e-mail server	
	Your password (Example)	Enter password (only for SMTP-After-POP or SMTP-Auth)
POP3 server	Address (URL, max. 64 characters) of the e-mail server for POP3	
	pop3.example.net (Example)	Enter server address (only for SMTP-After-POP)
SMTP server	Address (URL, max. 64 characters) of the e-mail server for SMTP	
	smtp.example.net (Example)	Enter server address
Mail sender	E-mail address (max. 64 characters) as sender address	
	device@example.net (Example)	Enter address

## 8 Configuration – in setup program only

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Parameter	Selection/settings	Description
SMTP port number (as of system version 05)	0 to 25 to 65535	Port number of the email server for SMTP

# 8 Configuration – in setup program only

## 8.2 Modbus frames for reading

This function is used to compile up to eight Modbus frames for reading process values of external devices (via interface) individually for each opposite side. The process values (analog, integer, and digital values, and text) are written to the selected variables from the received Modbus telegram and are available for use in the system. Each frame can be used to configure up to 64 entries (variables); the process values are then grouped and transferred in a Modbus telegram.

### Setup dialog

No.	Variables	Modb.add...	Modb.add...	Data type	Bit pos...	Factor
1	Process values\inactive	0x0000	0x8000	None	-	-
2	Process values\inactive	0x0000	0x8000	None	-	-
3	Process values\inactive	0x0000	0x8000	None	-	-
4	Process values\inactive	0x0000	0x8000	None	-	-
5	Process values\inactive	0x0000	0x8000	None	-	-
6	Process values\inactive	0x0000	0x8000	None	-	-
7	Process values\inactive	0x0000	0x8000	None	-	-
8	Process values\inactive	0x0000	0x8000	None	-	-
9	Process values\inactive	0x0000	0x8000	None	-	-
10	Process values\inactive	0x0000	0x8000	None	-	-
11	Process values\inactive	0x0000	0x8000	None	-	-
12	Process values\inactive	0x0000	0x8000	None	-	-
13	Process values\inactive	0x0000	0x8000	None	-	-
14	Process values\inactive	0x0000	0x8000	None	-	-



### CAUTION!

A variable can be used in multiple frames. This means that different process values are written to the same variable. You must ensure that no variables are overwritten unintentionally.

Configuration and use of the Modbus frames for reading is described in the Modbus interface description B 705001.2.0.

## 8 Configuration – in setup program only

### 8.3 Modbus frames for writing

This function is used to compile up to eight Modbus frames for writing process values to external devices (via interface) individually for each opposite side. The process values (analog, integer, and digital signals, and text) are written to the frames by the system and are available to external devices.

Each frame can be used to configure up to 64 entries (process values), which are then grouped and transferred in a Modbus telegram.

#### Setup dialog

Modbus frames for writing

Frame 1 | Frame 2 | Frame 3 | Frame 4 | Frame 5 | Frame 6 | Frame 7 | Frame 8

Comment:

Interface:

Device address:

Modbus start addr.:  Master: Address to be read  
 Slave address for ext. master

No.	Process values	Modb.add...	Modb.add...	Data type	Bit pos....	Factor
1	Inactive\	0x0000	0x8800	None	-	-
2	Inactive\	0x0000	0x8800	None	-	-
3	Inactive\	0x0000	0x8800	None	-	-
4	Inactive\	0x0000	0x8800	None	-	-
5	Inactive\	0x0000	0x8800	None	-	-
6	Inactive\	0x0000	0x8800	None	-	-
7	Inactive\	0x0000	0x8800	None	-	-
8	Inactive\	0x0000	0x8800	None	-	-
9	Inactive\	0x0000	0x8800	None	-	-
10	Inactive\	0x0000	0x8800	None	-	-
11	Inactive\	0x0000	0x8800	None	-	-
12	Inactive\	0x0000	0x8800	None	-	-
13	Inactive\	0x0000	0x8800	None	-	-
14	Inactive\	0x0000	0x8800	None	-	-

Frame length:  Error value:

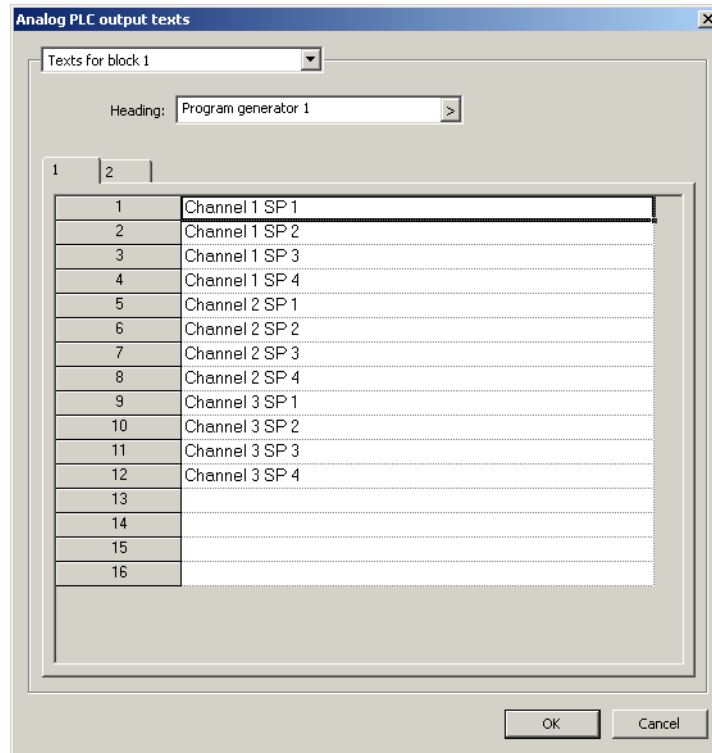
Configuration and use of the Modbus frames for writing is described in the Modbus interface description B 705001.2.0.

# 8 Configuration – in setup program only

## 8.4 Analog PLC output texts

To make it easier to work with the PLC, the PLC analog outputs (system I/O buffer variables) are assigned representative names. These names are specified to the CoDeSys programming system by the setup program.

### Setup dialog



### Parameters

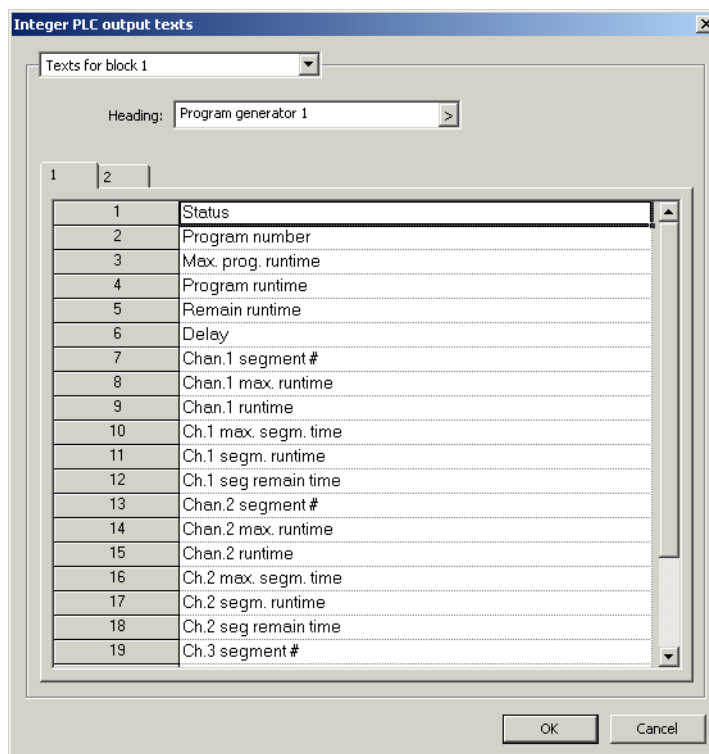
Parameter	Selection/settings	Description
Texts for block 1 to Texts for block 18	Select a block	A block consists of a text for the heading and up to 16 texts for the signals. Some headings and texts are already specified but can be changed if necessary. For example, block 1 contains the texts for program generator 1.
Heading	Use the ">" button to open a window in which the text can be entered or edited.	Heading in the NV connecting list Up to four different languages can be managed (language 1 to 4).
Text output 1 to Text output 16	Enter text or use text provided (edit if necessary)	Texts for output 1 to output 16 Up to four different languages can be managed (tab 1 to 4).

## 8 Configuration – in setup program only

### 8.5 Integer PLC output texts

To make it easier to work with the PLC, the PLC integer outputs (system I/O buffer variables) are assigned representative names. These names are specified to the CoDeSys programming system by the setup program.

#### Setup dialog



#### Parameters

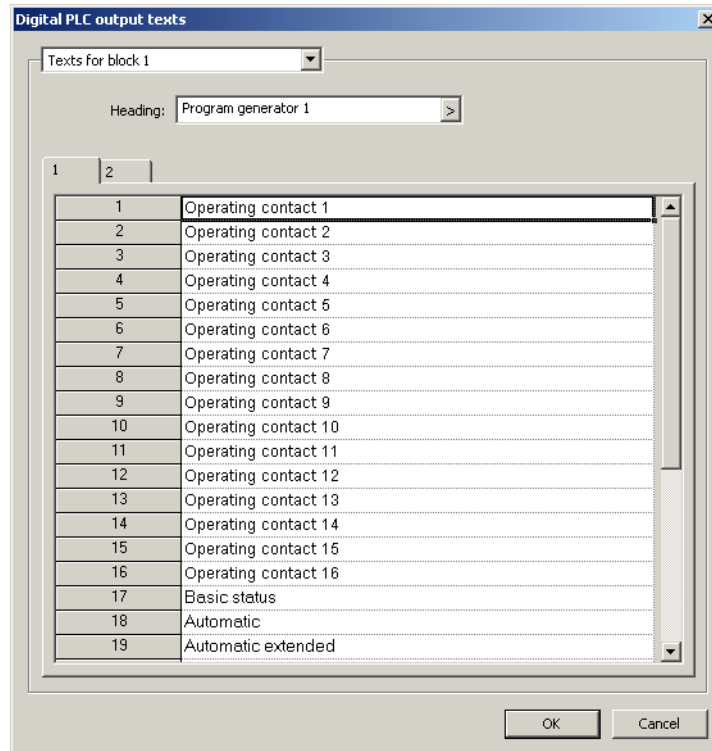
Parameter	Selection/settings	Description
Texts for block 1 to Texts for block 12	Select a block	A block consists of a text for the heading and up to 24 texts for the outputs. Some headings and texts are already specified but can be changed if necessary. For example, block 1 contains the texts for program generator 1.
Heading	Use the ">" button to open a window in which the text can be entered or edited.	Heading in the NV connecting list Up to four different languages can be managed (language 1 to 4).
Text output 1 to Text output 24	Enter text or use text provided (edit if necessary)	Texts for output 1 to output 24 Up to four different languages can be managed (tab 1 to 4).

# 8 Configuration – in setup program only

## 8.6 Digital PLC output texts

To make it easier to work with the PLC, the PLC digital outputs (system I/O buffer variables) are assigned representative names. These names are specified to the CoDeSys programming system by the setup program.

### Setup dialog



### Parameters

Parameter	Selection/settings	Description
Texts for block 1 to Texts for block 18	Select a block	A block consists of a text for the heading and up to 32 texts for the outputs. Some headings and texts are already specified but can be changed if necessary. For example, block 1 contains the texts for program generator 1.
Heading	Use the ">" button to open a window in which the text can be entered or edited.	Heading in the NV connecting list Up to four different languages can be managed (language 1 to 4).
Text output 1 to Text output 32	Enter text or use text provided (edit if necessary)	Texts for output 1 to output 32 Up to four different languages can be managed (tab 1 to 4).

## 8 Configuration – in setup program only

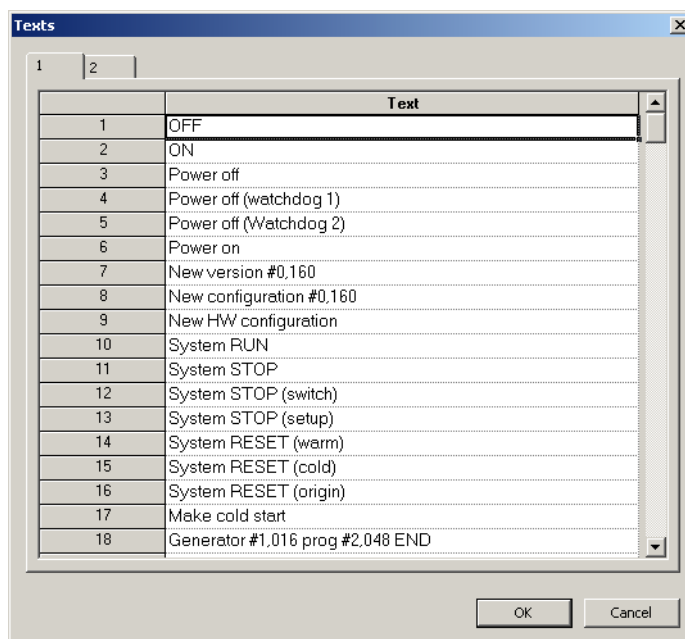
### 8.7 Texts

This window is used to specify all texts for names, events, and alarms for the entire system. Up to 250 (as of system version 02: 500) texts can be managed, many of which are already set by default.



Some of the texts specified by default contain variables for module names, names for the inputs and outputs, etc. This means that one text can be used for multiple modules, for example. Texts with variables should not be changed if possible.

In the central processing unit, the event texts are entered into a general event list when an event or alarm occurs. In the multifunction panel, there are separate lists for events and alarms. Along with the event text, the list entry also includes the date and time.

#### Setup dialog



#### Parameters

Parameter	Selection/settings	Description
"Text 1" to "Text 250 (500)" 	Click the relevant line "Text 1" to "Text 250 (500)" to select it	The text number is used to assign a text to an event or alarm.
Text 	Enter text or use text provided (edit if necessary)	Text for the relevant event Up to four different languages can be managed (tab 1 to 4).

#### "Text 1" to "Text 250"

When events and alarms are configured with the multifunction panel, the text is assigned using the text number.

#### Text

When events and alarms are configured with the setup program, the event text is selected directly from the list.

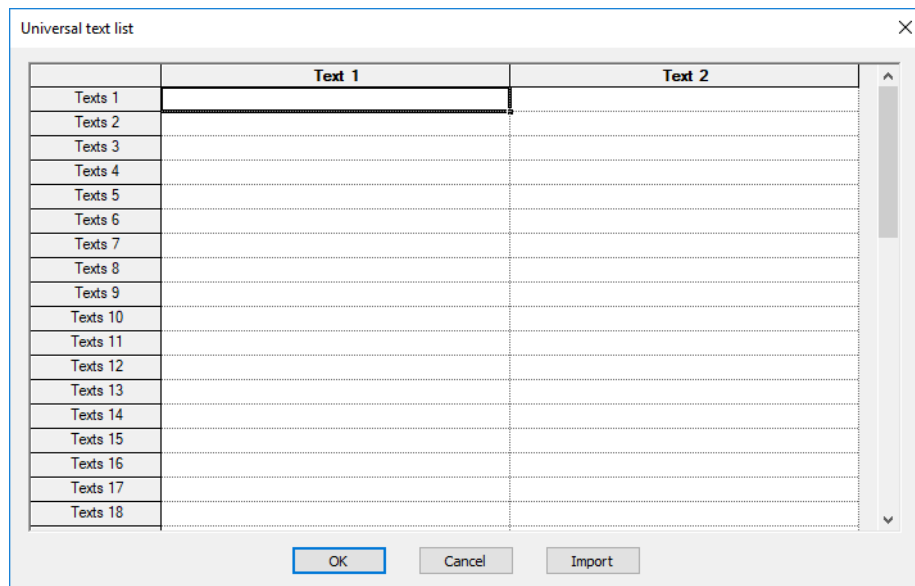
# 8 Configuration – in setup program only

## 8.8 Universal text list (as of system version 05)

By means of this universal text list, up to 50 text pairs (Text 1, Text 2) can be managed which are usable within a special PLC application.

The user login via interface using an RFID chip card is one possible PLC application. In this case, the text list may contain the RFID UID and the associated user ID for up to 50 users.

### Setup dialog box



### Parameter

Parameter	Selection/settings	Description
"Texts 1" to "Texts 50"	Click the relevant line ("Text 1" or "Text 2") to select it.	The texts depend on the special PLC application in which they are used. Example: text pairs for users 1 to 50
Text 1	Enter text or edit existing text if applicable (max. 32 characters).	Example: user ID of the relevant user (see user list)
Text 2	Enter text or edit existing text if applicable (max. 32 characters).	Example: UID (Unique Identification Number) of the RFID chip card

### Import

With this function the texts can be imported from another setup file.

## 8 Configuration – in setup program only

### 8.9 Process steps (as of system version 02)

In a process step, requirements for creating the program with the process engineering program editor are defined (extra code 228 required). There a certain process step is assigned to each program section. All process steps which have been assigned to the allocated program generator are available for this purpose. As a result, the requirements defined in the process step apply to the program section in question. This means that only the admissible setpoint values are used and that the section time lies within the predefined limits.

Furthermore, in a process step 16 process contacts are available to control PLC functions (not to be confused with the operating contacts of the program generators). As of system version 03, the function of the process contacts can be configured. As of system version 05, up to 64 process contacts are available whose names (designations) are editable (configuration of the program generators).


#### Setup dialog

No.	Process step name	Min. section time	Max. section time	Enabled setpoints	Assigned generators	Process contacts
1	Process step 01	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
2	Process step 02	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
3	Process step 03	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
4	Process step 04	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
5	Process step 05	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
6	Process step 06	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
7	Process step 07	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
8	Process step 08	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
9	Process step 09	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
10	Process step 10	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
11	Process step 11	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
12	Process step 12	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
13	Process step 13	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
14	Process step 14	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
15	Process step 15	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
16	Process step 16	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
17	Process step 17	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
18	Process step 18	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
19	Process step 19	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
20	Process step 20	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		

#### Parameter

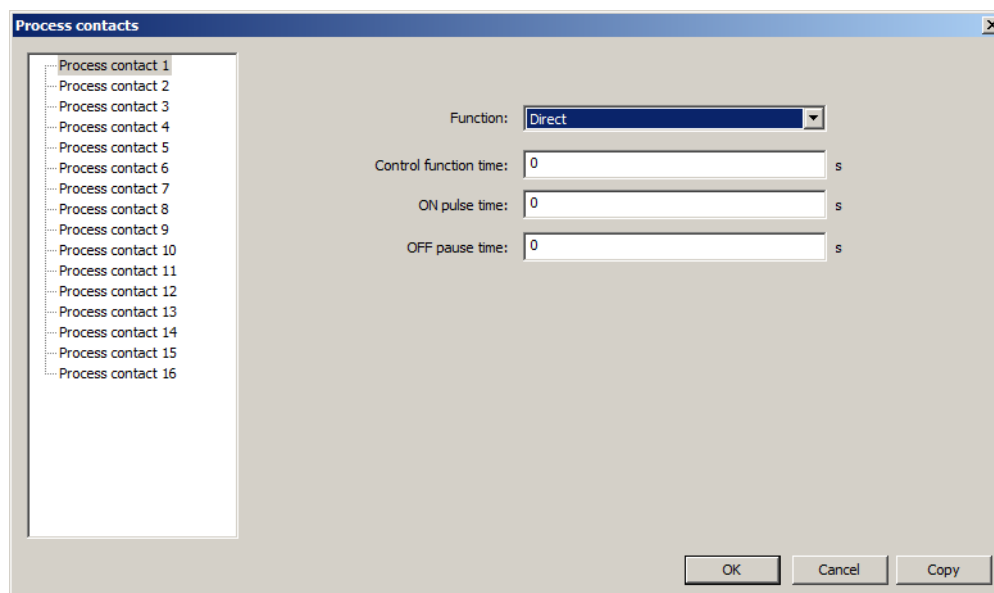
Parameter	Selection/settings	Description
No. Number	Select process step from 1 to 100 to be programmed (starting with process step 1)	Number of the process step
Process step name	<b>Process step 01 to 100</b> Enter name (max. 21 characters) or use default name.	Free choice of name for the process step Use the ">" button to open a window in which the text can be entered in up to four national languages.
Min. section time	<b>00:00:00</b> to 99:59:59 s	Minimum admissible value when entering the section time in the program editor

## 8 Configuration – in setup program only





Parameter	Selection/settings	Description
Max. section time	00:00:00 to <b>99:59:59</b> s	Maximum admissible value when entering the section time in the program editor
Enabled setpoints	<b>All</b> Open drop-down menu for disabling or enabling.	Enabled setpoints can be used in the program editor. A setpoint which is used as a criterion for the section changeover is always available in the program editor (even if it is not enabled here).
Assigned generators	<b>None</b> Select program generator from the drop-down menu.	The process step is assigned to one or more program generators and therefore is available in the program editor.
Process contacts 	<b>None</b> System version 02: Open drop-down menu for activation or deactivation. As of system version 03: Select button "... " for activation, for deactivation, and for the selection of the function.	Process contacts are used to control PLC functions.
Copy	Select the button	Use this button to copy lines (process steps) that have been marked.

## 8 Configuration – in setup program only

### Process contacts: Setup dialog (as of system version 03)



### Parameters

Parameters	Selection/settings	Description
Function 	Activation and function of the process contact  Inactive <b>Direct</b>  Switch-on delayed  Switch-off delayed  Switch-on advanced	The process contact is inactive.  The process contact is active during the process step (no special switching behavior).  The process contact is activated with delay (delay time = control function time $T_S$ ).  The process contact is deactivated with delay ( $T_S$ , see above).  The process contact is activated before the start of the process step ( $T_S$ , see above).
Control function time 	<b>0</b> to 99999 s	The control function time $T_S$ is the time period of the switch-on or switch-off delay or of the switching advance.
ON pulse time 	<b>0</b> to 99999 s	The ON pulse time $T_{ON}$ and the OFF pulse time $T_{OFF}$ define a pulse action of the process contact while the contact is active.
OFF pause time 	<b>0</b> to 99999 s	

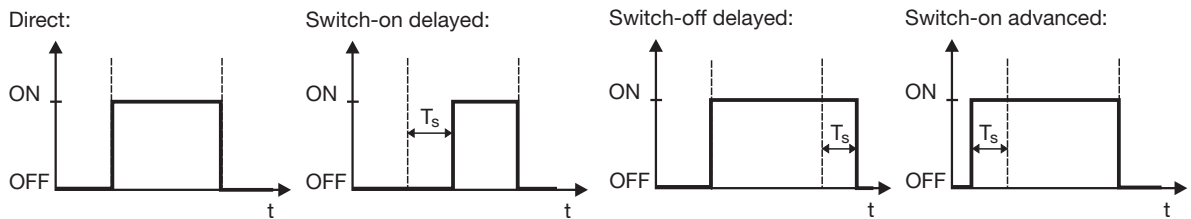
### Names of the process contacts

As of system version 05, the names of the process contacts are editable within the configuration of the individual program generators. The names shown here are from the configuration of the assigned program generator. If an assignment is missing or the assignment of several pro-

## 8 Configuration – in setup program only

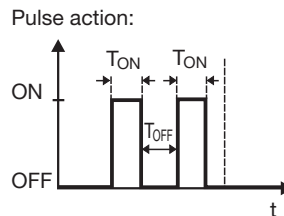
gram generators is the case, the names from the configuration of program generator 1 are displayed.

### Function, control function time



### ON pulse time, OFF pulse time

ON pulse time and OFF pause time must be greater than zero in order to get a pulse action. Pulse action occurs only when the process contact is active (delay or advance time is considered) and always starts with an ON pulse.



### Example for using a process contact

A smoke generator needs a certain advance time in order to provide the smoke which is required for the "smoking" process step. For this purpose, in the correspondent process step, the process contact for starting the smoke generator is defined as "switch-on advanced" and the advance time (control function time) is specified.

## 8 Configuration – in setup program only

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**NOTE!**

The parameters described in this section can be configured either with the setup program, or on the multifunction panel.

## 9.1 General information

The program editor, which is a component of the setup program and the multifunction panel, is used to create programs.

The program editor is available when the "Program generator" option (extra code 225) or the "Program generator with process steps" option (extra code 228, as of system version 02) has been activated in the setup program (Project: Hardware arrangement > Globals).

⇒ Setup program manual B 705000.6

Each program can consist of a maximum of three program channels with four setpoint values and 16 operating contacts. There can be up to 100 program sections for each program channel. Tolerance band monitoring can be set up for the first setpoint value of each program channel. This means that the relevant actual value is monitored; if it leaves the tolerance band, the program is stopped until it returns to a value that is within the tolerance band.

A total of 100 programs can be managed in a program pool.

A program generator is required to execute a program. Nine independent program generators are available as an option, meaning that nine programs can run asynchronously and independently from each other. A program can also be assigned multiple program generators.

A program can be started, stopped, and aborted by an action on the multifunction panel, a digital signal, or via the PLC. It is also possible to switch between program sections. A program can also be started by specifying the date and time. The individual program channels start synchronously. Program selection, program start, and program stop are also possible via barcode scanner.

A program ends when all program channels of the program are completed. If a program channel is completed prematurely, its setpoint values and operating contacts are set to a defined value (basic status).

For manual mode, separate setpoint values and operating contacts can be defined for each program channel (basic status), which are applied after changeover to the manual mode. The setpoint values can be adjusted via the multifunction panel.

The behavior after a mains interruption can be configured (e.g. program abort, continuation of run, or continuation/abort with the multifunction panel).

As of system version 03, the repetition of the whole program is supported – in addition to the repetition of program sections.

### Process steps (as of system version 02)

The option "Program generator with process steps" (extra code 228) is required for this function.

Limit values and selection options for certain parameters of the program editor are predefined by the configuration of up to 100 process steps in the setup program. This configuration is usually performed by the plant manufacturer since specific knowledge about the plant is required.

⇒ Chapter 8.9 "Process steps (as of system version 02)", page 130

The plant operator (or the PLC programmer) can change the function of the program generator by programming a function module in the PLC. Thus it is possible to adapt the program generator to the specific requirements of the single process steps in a production process.

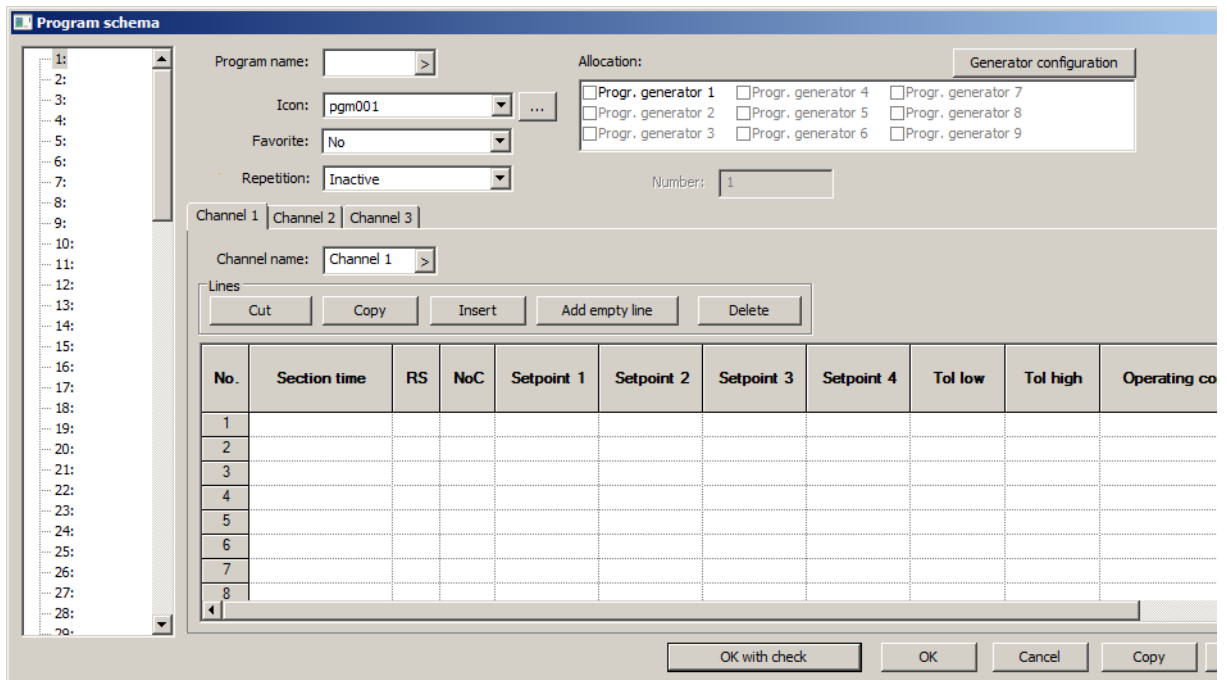
# 9 Program editor

Functions of the program editor if the option "Program generator with process steps" is enabled:



- Up to 90 programs with one program channel and 100 program sections each
- 10 setpoint values (without tolerance band monitoring) and 8 operating contacts per program
- Selection of one process step per program section

## 9.2 Program schema with option "Program generator"







### Setup dialog






### Parameters

Parameter	Selection/settings	Description
Program name 	<b>(No name)</b> Enter program name (max. 24 characters).	Free choice of name for the program Use the ">" button to open a window in which the text can be entered in two national languages.
Icon 	<b>(pgm001)</b> Select icon from the drop-down list.	Icon for graphical identification marking of the program Use the "..." button to open a window with a list of all icons, including a pre-view.
Favorite (as of system version 02)	A program that is labeled as favorite is set to the beginning of the program start menu. If there is more than one favorite, the program number is the decisive criterion (in ascending order). <b>No</b> Yes	Program is not a favorite. Program is labeled as favorite.

## 9 Program editor

Parameter	Selection/settings	Description
Repetition (as of system version 03) 	Cyclic program repetition	
	<b>Inactive</b>	Program is not repeated (only one program run)
	Endless Number	Program is repeated endlessly. Program is repeated as often as defined.
Number	1 to 99999	Number of repetitions (active if "Repetition" = "Number")
Allocation 	Selection of program generators to be used to execute the program.	
	Activated (checkmark) <b>Not activated</b>	Program generator selected Program generator not selected
Generator configuration 	Select the button	Use this button to open a menu for configuring the program generators.
<b>Channel 1 to Channel 3</b> (Selection of the channel to be programmed)		
Channel name 	<b>Channel 1</b> (Channel 2, Channel 3) Enter channel names (max. 14 characters). The default setting depends on the channel selected.	Free choice of name for the program channel A program channel is only valid if it has been assigned a name. Use the ">" button to open a window in which the text can be entered in two national languages.
Cut	Select the button	Use this button to cut lines (program sections) that have been marked.
Copy	Select the button	Use this button to copy lines (program sections) that have been marked.
Insert	Select the button	Use this button to insert lines (program sections) that have been cut or copied above a selected line.
Add empty line	Select the button	Use this button to insert an empty line above a marked line (program section).
Delete	Select the button	Use this button to delete lines (program sections) that have been marked.
No. 	Select section from 1 to 100 to be programmed (starting with section 1)	Number of program section
Section time	<b>0</b> to 360000 s (Max. 59:59:59 hh:mm:ss)	Length of program section Up to 100 program sections can be defined in a program channel. A program channel is only valid if at least one of the program sections has a section time of > 0 s.
RS (Repeat section) 	1 to 100	Number of program section that is to be repeated with the following section.

## 9 Program editor

Parameter	Selection/settings	Description
NoC (Number of cycles) 	<b>0</b> to 99	Number of repetitions of a program section (or multiple linked program sections)
Setpoint 1 to 4	-99999 to <b>0</b> to +99999 The limits depend on the minimum and maximum admissible setpoint values 1 to 4 of the program generator.	Setpoint value 1 to setpoint value 4 The texts of the program generator with the lowest number (1 to 9) are used as designations for the setpoints.
Tol low (Lower limit of tolerance band) 	-99999 to <b>0</b> to +99999 The limits depend on the minimum and maximum admissible lower limit of the tolerance band for the program generator.	Lower limit value for tolerance band monitoring of setpoint value 1
Tol high (Upper limit of tolerance band) 	-99999 to <b>0</b> to +99999 The limits depend on the minimum and maximum admissible upper limit of the tolerance band for the program generator.	Upper limit value for tolerance band monitoring of setpoint value 1
Operating contacts	Activation of operating contacts by selection (drop-down list)	
	Selected (checkmark)	Operating contact is active Active operating contacts are displayed in the "Operating contacts" field.
	<b>Not selected</b>	Operating contact is not active
OK	Select the button	Before the entered values are accepted, it is checked whether the setpoint values and the tolerance band limits lie within the limits which have been defined in the program generator configuration.
OK with check	Select the button	The whole program plan is checked whether the limits which have been defined in the program generator configuration are not exceeded.

### Program name, channel name

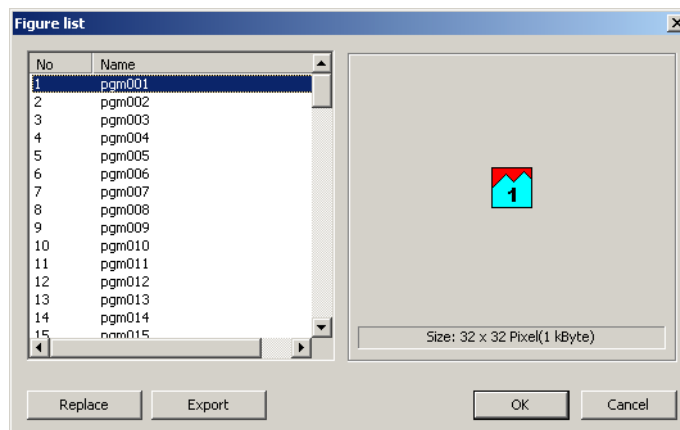


#### NOTE!

The name can be entered in two languages, but only the text in language 1 is transmitted to the device. Language switching at the device has no effect on this text. Optionally, the language order before transmission needs to be changed.

### Icon

Up to 100 icons are available in a pool. The following screenshot shows a list of the icons available by default, with a preview image for the selected icon.



"Replace" button: The selected icon is replaced by different icon, which must be selected from a file directory as a graphic in BMP format (max. 32 × 32 pixels; 256 colors). During this process, the name that is used for the icon in the list can be changed so that it is different to the file name. If the "Transparent import" option is active (checkbox selected), white areas in the icon become transparent in the multifunction panel.

"Export" button: The selected icon is saved in a file directory as a graphic in BMP format.

### Repetition

A program is completely repeated only after the expiry of the longest channel. The setpoint values of the longest channel jump from the value in the last section to the value in the first section, regardless of the specification (step or ramp).

The setpoint values in those channels with shorter runtime move to basic status after the channel has expired. At the beginning of the repetition, the setpoint values jump to the values of the first section.

Repetitions of program sections are executed even when a program is repeated.

Temporary changes during a program run will be also performed during the following program repetitions. Program repetitions cannot be changed temporarily.

A delayed program start affects only the first program run and does not affect the program repetition. The end signal becomes active when all repetitions are over.

The signal for batch control is activated at program start and remains active until the last program repetition is finished or until the program is aborted manually.

Running program repetitions are maintained after a power failure and will be processed at the point at which the power failure occurred. If program channel 1 is already elapsed before the power failure occurs while other program channels are still running, then, after the power failure is over, the program starts at the beginning of the program and the cycle counter is increased by 1.

### Allocation

To execute a program, at least one program generator must be selected. A program can be executed via up to 9 program generators at the same time.

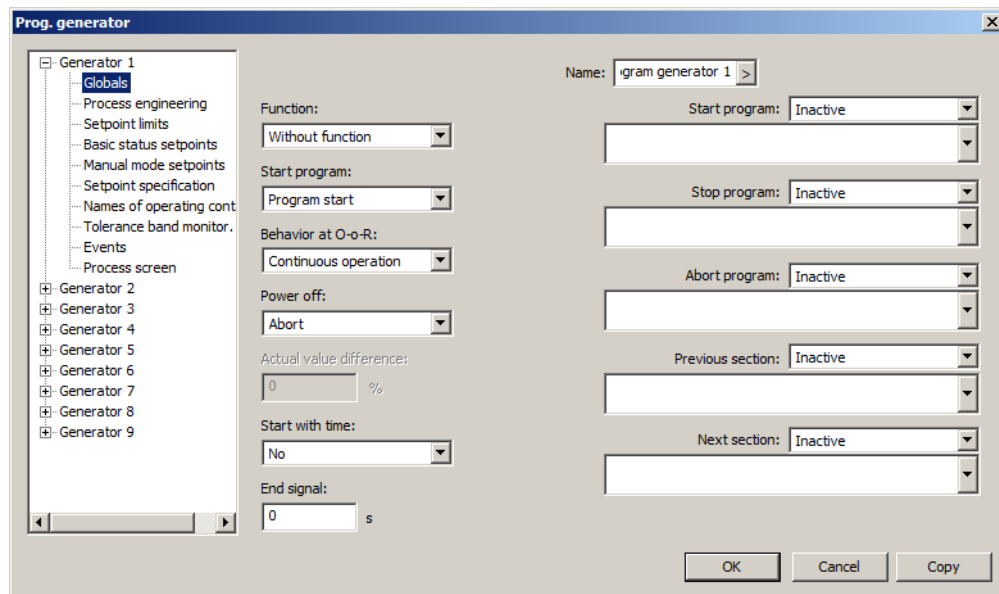
The setpoint values are checked for compliance with the input limits of all selected program generators (even if temporarily entered).

If multiple programs are executed at the same time, these must be assigned different program generators.

# 9 Program editor

## Generator configuration

Use the "Generator configuration" button to open this window:



The individual sub-items and parameters for generator configuration depend on the system version and are described in this section:

Chapter 6.11 "Program generator", page 94

### No.

To create a program, the individual program sections are programmed consecutively. Up to 100 program sections can be defined in this way.

Program sections can be copied, inserted at different positions, and edited if necessary.

### RS, NoC

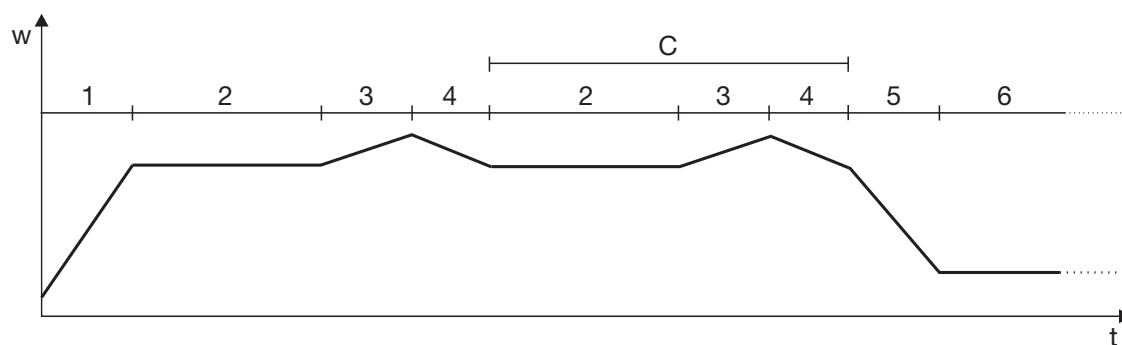
The program sections to be repeated form a repeat cycle. The number of cycles (NoC) and the start of the repeat section (RS) are programmed in the last program section of a repeat cycle.

#### Example:

Program sections 2 to 4 are repeated once. Therefore, the following settings must be made in section 4:

NoC (number of cycles) = 1

RS (repeat section) = 2

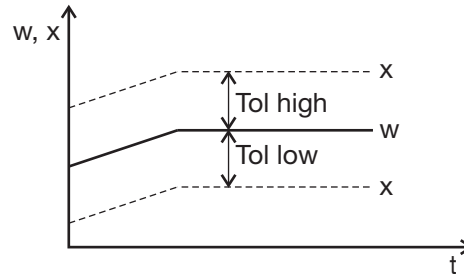


1 to 6 Program sections

C Repeat cycle

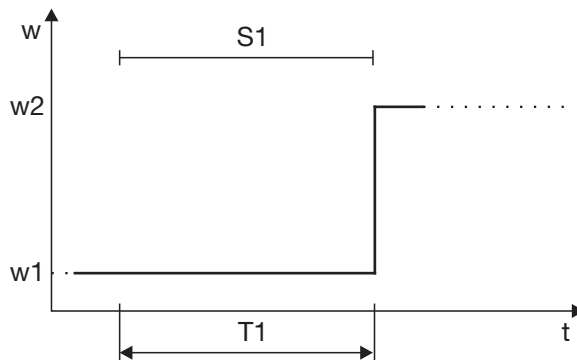
## Tol low, Tol high

Lower limit value and upper limit value (Tol low, Tol high) form a tolerance band for setpoint value 1 ( $w$ ) of the respective program channel and are used for monitoring an arbitrarily selectable actual value ( $x$ ). If the actual value is out of the tolerance band, the program is stopped until the actual value is within the tolerance band again. Moreover the tolerance band signal of the program channel is activated during tolerance band infringement. Alarm type (event, collective alarm), alarm level (High, Low), and alarm suppression are configurable (configuration of the program generator). If Tol low = 0 and Tol high = 0, the tolerance band monitoring is not active.

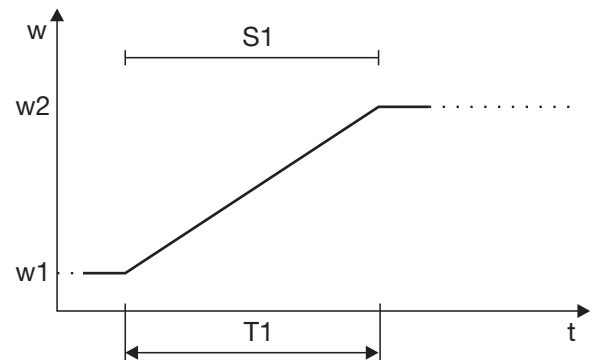


## Program profile

The following diagrams show the progression of a setpoint value within a program section, if "Step" or "Ramp" is specified for the setpoint input (generator configuration parameter).



S1 Program section 1  
T1 Section time 1



w1 Setpoint value in program section 1  
w2 Setpoint value in program section 2

The programmed setpoint value determines the setpoint value at the start of the relevant program section.

If "Step" is specified for the setpoint input, the setpoint value remains constant in the program section. It does not change until the next section that has been programmed with a different setpoint value starts.



If "Ramp" is specified for the setpoint input and the next section has been programmed with a different setpoint value, the setpoint value follows a ramp course within the program section. The ramp slope is determined by the section time and the difference between the two setpoint values.

## 9 Program editor





### 9.3 Program schema with option "Program generator with process steps"

#### Setup dialog

#### Parameters

Parameters	Selection/settings	Description
Program name 	<b>(No name)</b> Enter program name (max. 24 characters).	Free choice of name for the program Use the ">" button to open a window in which the text can be entered in two national languages.
Icon	<b>(pgm001)</b> Select icon from the drop-down list.	Icon for graphical identification marking of the program Use the "..." button to open a window with a list of all icons, including a preview.
Favorite	A program that is labeled as favorite is set to the beginning of the program start menu. If there is more than one favorite, the program number is the decisive criterion (in ascending order). <b>No</b> Yes	Program is not a favorite. Program is labeled as favorite.
Repetition (as of system version 03) 	Cyclic program repetition <b>Inactive</b> Endless Number	Program is not repeated (only one program run) Program is repeated endlessly. Program is repeated as often as defined.

## 9 Program editor

Parameters	Selection/settings	Description
Number	1 to 99999	Number of repetitions (active if "Repetition" = "Number")
Allocation 	Selection of program generators to be used to execute the program.	
	Activated (checkmark)	Program generator selected
	<b>Not activated</b>	Program generator not selected
Process steps 	Select the button	Use this button to open the menu for configuring the process steps.
Generator configuration	Select the button	Use this button to open a menu for configuring the program generators.
Cut	Select the button	Use this button to cut lines (program sections) that have been marked.
Copy	Select the button	Use this button to copy lines (program sections) that have been marked.
Insert	Select the button	Use this button to insert lines (program sections) that have been cut or copied above a selected line.
Add empty line	Select the button	Use this button to insert an empty line above a marked line (program section).
Delete	Select the button	Use this button to delete lines (program sections) that have been marked.
No.	Select section from 1 to 100 to be programmed (starting with section 1)	Number of program section
Process step 	Select process step from the drop-down list.	The process step specifies the limits of the section time and defines which setpoints are available.
Section time	0 to 360000 s (Max. 59:59:59 hh:mm:ss)	Duration of program section The section time must be within the limits specified by the process step.
RS (Repeat section)	1 to 100	Number of program section that is to be repeated with the following section.
NoC (Number of cycles)	0 to 99	Number of repetitions of a program section (or multiple linked program sections)
Setpoint 1(1) to Setpoint 2(10) 	-99999 to 0 to +99999 The limits depend on the minimum and maximum admissible setpoint values of the program generator.	Setpoint 1 to setpoint 10 Only those setpoints can be edited which are enabled in the process step.
Operating contacts	Activation of operating contacts by selection (drop-down list)	
	Selected (checkmark)	Operating contact is active Active operating contacts are displayed in the "Operating contacts" field.
	<b>Not selected</b>	Operating contact is not active

## 9 Program editor

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Parameters	Selection/settings	Description
OK	Select the button	Before the entered values are accepted, it is checked whether the setpoint values and the tolerance band limits lie within the limits which have been defined in the program generator configuration.
OK with check	Select the button	The whole program plan is checked whether the limits which have been defined in the program generator configuration are not exceeded.

### Program name

**NOTE!**

The name can be entered in two languages, but only the text in language 1 is transmitted to the device. Language switching at the device has no effect on this text. Optionally, the language order before transmission needs to be changed.

### Repetition

A program is completely repeated after the expiry of the last section. The setpoint values jump from the value in the last section to the value in the first section regardless of the specification (step or ramp).

Repetitions of program sections are executed even when a program is repeated.

Temporary changes during a program run will be also performed during the following program repetitions. Program repetitions cannot be changed temporarily.

A delayed program start affects only the first program run and does not affect the program repetition. The end signal becomes active when all repetitions are over.

The signal for batch control is activated at program start and remains active until the last program repetition is finished or until the program is aborted manually.

Running program repetitions are maintained after a power failure and will be further processed.

### Allocation

To execute a program, at least one program generator must be selected. A program can be executed on up to 9 program generators at the same time.

The setpoint values are checked for compliance with the input limits of all the selected program generators (even if temporarily entered).

If several programs are executed at the same time then different program generators must be assigned to these programs.

The section changeover of the program generator with the lowest number (1 to 9) is used in the program schema. By clicking "OK with check" button, all sections are checked for compliance with the criteria for section changeover. This check considers all selected program generators.

The allocation of program generators affects which process steps are selectable.

## Process steps

By clicking the "Process steps" button the window for configuring the process steps is opened (example with system version 02):

No.	Process step name	Min. section time	Max. section time	Enabled setpoints	Assigned generators	Process contacts
1	Process step 01	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
2	Process step 02	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
3	Process step 03	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
4	Process step 04	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
5	Process step 05	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
6	Process step 06	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
7	Process step 07	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
8	Process step 08	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
9	Process step 09	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
10	Process step 10	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
11	Process step 11	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
12	Process step 12	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
13	Process step 13	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
14	Process step 14	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
15	Process step 15	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
16	Process step 16	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
17	Process step 17	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
18	Process step 18	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
19	Process step 19	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		
20	Process step 20	00:00:00	99:59:59	1,2,3,4,5,6,7,8,9,10		

The individual sub-items and parameters are described in this section:

⇒ Chapter 8.9 "Process steps (as of system version 02)", page 130

## Process step

A process step must be provided for the selected program generator (allocation in process step configuration) to be available in the program schema.

If several program generators are selected in the program schema then only those process steps are available which are assigned to all selected program generators.

## Setpoint 1(1) to Setpoint 2(10)

In program generator configuration the setpoints are distributed on three program channels. This corresponds to the use in the simple program editor (with active option "Program generator"). A distinction between channels does not exist in the program editor for process engineering (with active option "Program generator with process steps"). In spite of this, the setpoint designation is based on the channel structure:

Setpoint 1(1) = Setpoint 1 of program channel 1 (Setpoint 1)

...

Setpoint 4(4) = Setpoint 4 of program channel 1 (Setpoint 4)

Setpoint 1(5) = Setpoint 1 of program channel 2 (Setpoint 5)

...

Setpoint 4(8) = Setpoint 4 of program channel 2 (Setpoint 8)

Setpoint 1(9) = Setpoint 1 of program channel 3 (Setpoint 9)

Setpoint 2(10) = Setpoint 2 of program channel 3 (Setpoint 10)

The texts of the program generator with the lowest number (1 to 9) are used as designation for the setpoints.

If the setpoint designation is shown without brackets, this means that this setpoint is used as criterion for section changeover (core setpoint value). With system version 02, this is setpoint 2, as of system version 03, the setpoint is selectable (setpoint 2 is set as default).

# 9 Program editor

⇒ Chapter 6.11.2 "Process engineering (as of system version 03)", page 98

## 9.4 Program simulation

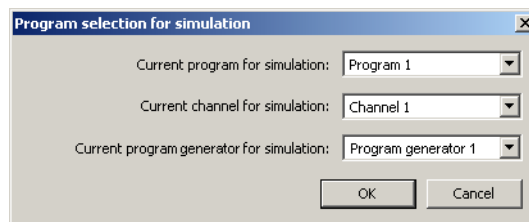
The setup program can simulate a program that was created with the program editor. During this process, the setpoint value progression and the state of the activated operating contacts are displayed.

This simple program is used for examples 1 and 2 shown below:

No.	Section time	RS	NoC	Setpoint 1	Setpoint 2	Setpoint 3	Setpoint 4	Tol low	Tol high	Operating contacts
1	00:10:00	1	0	20.000	---	---	---	0.0000	0.0000	1
2	00:30:00	1	0	100.00	---	---	---	0.0000	0.0000	2
3	00:10:00	1	0	100.00	---	---	---	0.0000	0.0000	3
4	00:20:00	1	0	80.000	---	---	---	0.0000	0.0000	2
5	00:20:00	1	0	80.000	---	---	---	0.0000	0.0000	3
6	00:00:01	1	0	20.000	---	---	---	0.0000	0.0000	

### Program selection

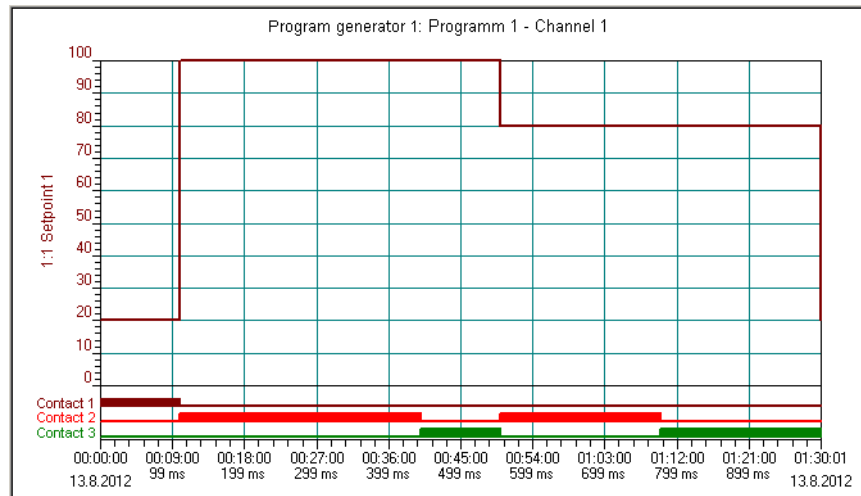
Before the program simulation starts, select the program, the program channel, and the program generator assigned to the program (only program generators that have been assigned are available here). The program generator configuration determines settings such as whether the setpoint value changes in steps or as a ramp.



Select the "OK" button to start the simulation and display the result as a diagram.

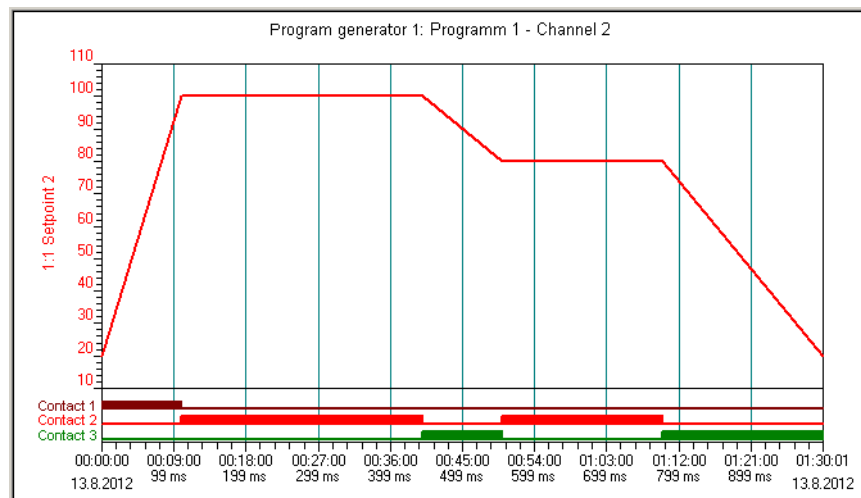
The examples in the following sections show the different setpoint value progressions depending on the setpoint input (setpoint step or setpoint ramp).

## Simulation – example 1 with setpoint steps



The setpoint value programmed in a section (e.g. 20 in section 1) remains constant for the entire duration of a section. At the start of the next section, the setpoint value jumps to the value for this section (e.g. 100 in section 2).

## Simulation – example 2 with setpoint ramp



The setpoint value programmed in a section (e.g. 20 in section 1) changes gradually during that section to the setpoint value of the next section (e.g. 100 in section 2). This produces a course in a ramp shape. For a setpoint value to remain constant in a section (e.g. 100 in section 2), the same setpoint value must be specified for the next section (e.g. 100 in section 3).

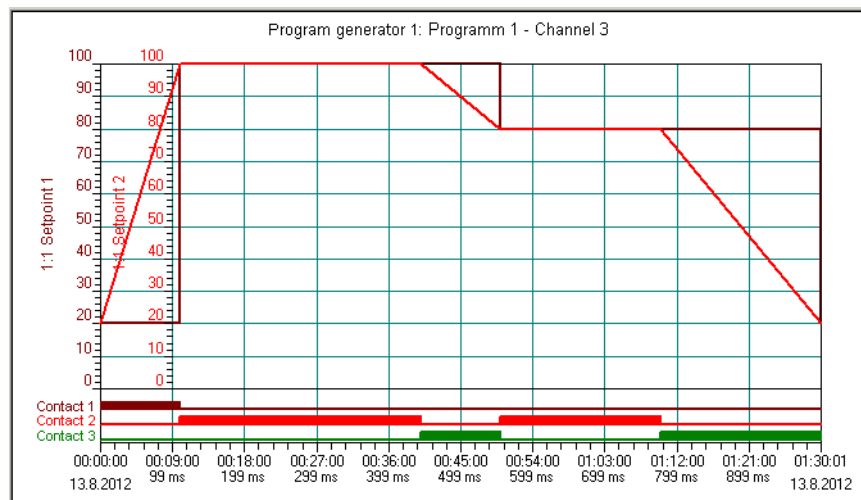


### NOTE!

The setpoint input – setpoint step or setpoint ramp – is specified in the configuration of the program generator. Different settings can be made here for each program channel and each setpoint value.

# 9 Program editor

## Simulation – example 3 with setpoint steps and setpoint ramp



This example is intended to illustrate again the different setpoint value progressions according to the setpoint input. For this example, the same value was assigned in the program editor for setpoint 1 and setpoint 2; for setpoint value 1, "Setpoint step" was specified for the program generator, for setpoint value 2, "Setpoint ramp" was specified.

## 9.4.1 Ramp function with end value (as of system version 03)

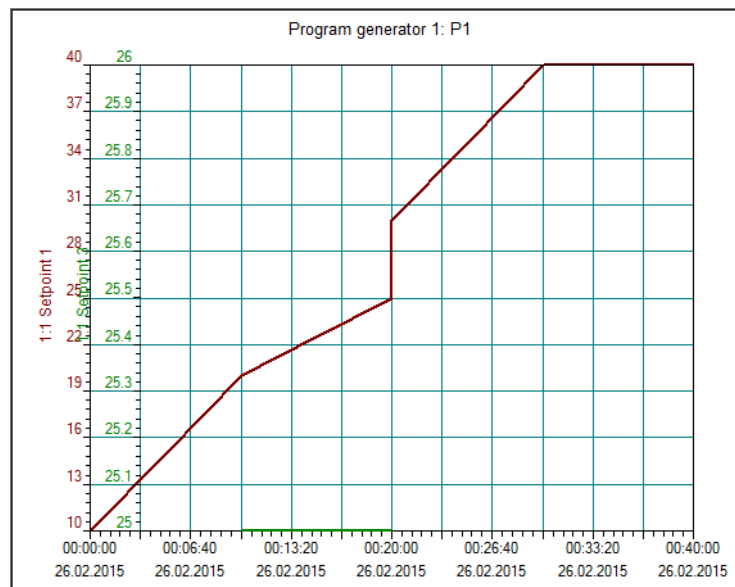
This function allows to select another setpoint as ramp end value. The option "Program generator with process steps" is required for this function. Both setpoints must be enabled in the process step.

Example: In the program generator configuration, setpoint 3 has been selected as end value for the ramp of setpoint 1. Now, in the program schema, setpoint 3 is used in the second section as end value for the ramp of setpoint 1.

Program schema:

No.	Processing step	Section time	RS	NoC	Setpoint 1 (1)	Setpoint 2	Setpoint 3 (3)
1	1: Process step	00:10:00	1	0	10.000	---	---
2	1: Process step	00:10:00	1	0	20.000	---	25.000
3	1: Process step	00:10:00	1	0	30.000	---	---
4	1: Process step	00:10:00	1	0	40.000	---	---

Simulation:



The value at the beginning of the second section is determined by setpoint 1 (20), the value at the end of the section by setpoint 3 (25). At the end of the section, setpoint 1 jumps to the value of the next section (30).

In sections without end value, the setpoint curve depends on the program generator configuration ("setpoint ramp" in this example).

# 9 Program editor

## 9.5 License dependance

The functions provided by the setup program depend on the registered license number. A distinction is made between the following licenses:

- Setup program with program editor (full version)
- Program editor



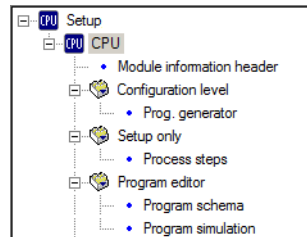
### NOTE!

If the setup program is operated as a full version, the view can be switched so that only the features of the program editor, of the program generators, and of the process steps are available (Menu bar: Window > Program editor).

In the "Program editor" view, the options "Program generator" or "Program generator with process steps" are irrelevant.

### 9.5.1 "Program editor" license

With the "Program editor" license, only the functions of the program editor and the program generator configuration are available:



### Functions

The functions of the program editor do not differ from those in the full version of the setup program.

⇒ Chapter 9.2 "Program schema with option "Program generator"", page 136

⇒ Chapter 9.4 "Program simulation", page 146

With the ability to configure the program generators and the process steps, certain parameters can be specified which are important for the program schema (programming) and the program simulation:

- Setpoint value limits and tolerance band limits for verification of the corresponding values in the program schema
- Setpoint specification for program simulation with setpoint step or setpoint ramp
- Criteria for the section changeover
- Process steps (section time, setpoint values, program generator)

All other program generator parameters are editable, but will not be evaluated.

### Data transfer between setup program and system

When transferring data from the setup program to the system, only program data is transferred. During this process, the setup program checks whether the program is compatible with the system settings (e.g. setpoint limits, section times). If this is not the case, an error message is issued which offers various options to the user. The configuration data is not transferred to the system (including the program generator configuration which was created for verification and simulation).

## 9 Program editor

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When reading data from the system, the relevant configuration data (hardware, program generator) – in addition to the program data – is also transferred to the setup program.

## 9 Program editor

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**NOTE!**

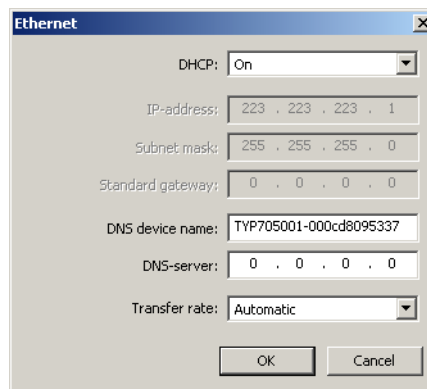
An active connection between the setup program and the central processing unit is required to configure the parameters described in this section.

## 10.1 Ethernet

These settings are required for the setup program to communicate with the central processing unit via LAN and for the Web server function of the central processing unit.

Up to five PCs can be connected to a central processing unit at the same time.



### Setup dialog



### Parameters

Parameter	Selection/settings	Description
DHCP 	<b>ON</b>  OFF	The central processing unit takes its IP address from the DHCP server.  The IP address of the central processing unit must be assigned manually.
IP-address 	0.0.0.0 to <b>223.223.223.1</b> to 255.255.255.255	Manual allocation of the IP address for the central processing unit (active if DHCP = OFF)  The IP address may need to be requested by the responsible administrator.
Subnet mask 	0.0.0.0 to <b>255.255.255.0</b> to 255.255.255.255	Manual setting of the subnet mask (active if DHCP = OFF)  The structure of the subnet mask may need to be requested from the administrator responsible.
Standard gateway 	<b>0.0.0.0</b> to 255.255.255.255	Manual setting of the IP address of the standard gateway (router) (active if DHCP = OFF)  The IP address may need to be requested from the administrator responsible.

# 10 Online parameters

Parameter	Selection/settings	Description
DNS device name 	TYP705001-000cd8095337 Admissible characters: a to z, A to Z, -, 0 to 9 (max. 63 characters); name must start with a letter and must not end with "-" (hyphen).	Example of unique DNS device name for central processing unit (assigned by default) If necessary, the name can also be assigned individually, but it must be unique.
DNS-server 	<b>0.0.0.0</b> to 255.255.255.255	IP address of DNS server The IP address may need to be requested by the responsible administrator.
Transfer rate	<b>Automatic</b> 10 Mbit/s half duplex 10 Mbit/s full duplex 100 Mbit/s half duplex 100 Mbit/s full duplex	Data transfer rate of Ethernet connection



**NOTE!**

Changes to the configuration do not take effect until after a system restart.

## DHCP



**NOTE!**

If applicable, deactivate the DHCP to ensure that the central processing unit uses a fixed IP address.

## IP-address



**NOTE!**

The IP addresses for the Ethernet and the system bus must not be in the same subnet.

## Subnet mask

The subnet mask determines which part of the IP address indicates the network and which part is available for addressing a device within a network. The length of the mask is 32 bits (IPv4), which is the same length as an IP address.

Example: in a network with a mask of 255.255.255.0, the first 24 bits (from left) are used for the network address; these are set to "1" in the mask. The remaining 8 bits are set to "0" in the mask and can be used for device addresses. There are therefore 254 device addresses available (256 - 2 because the network has assigned itself the address "0" and the address 256 is used for broadcast).

## Standard gateway

All network requests to addresses that do not belong to the relevant network are routed through the standard gateway.

### DNS device name

The DNS device name is a representative name that can be used for addressing instead of an IP address.

If a DNS device name is entered, it is communicated to the DHCP server so that the central processing unit can be addressed with the name entered if the function is supported in the relevant LAN. If no DNS device name is entered, the central processing unit can only be addressed using the assigned IP address.



#### **NOTE!**

If DHCP is active, a DNS device name should always be used so that the central processing unit can also be addressed if the IP address is changed.

### DNS-server

The DNS server responds to requests from the network seeking to convert a DNS device name into an IP address.

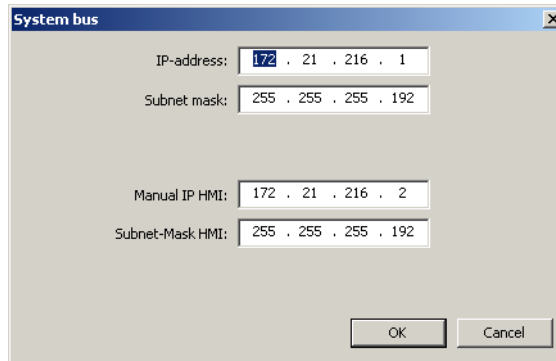
This IP address must be known if the central processing unit uses a representative name to address a device or server (for example when sending an e-mail).

A valid IP address that is entered here is always used, even if the DHCP server provides a different DNS server address. If this is not the case, the DNS server address received from the DHCP server is used (DHCP must be active).

# 10 Online parameters

## 10.2 System bus

### Setup dialog



### Parameters

Parameter	Selection/settings	Description
IP-address	<b>192.168.2.101</b>	IP address of the central processing unit for the system bus The address can be changed.
Subnet mask	<b>255.255.255.0</b>	Subnet mask of the central processing unit for the system bus The mask can be changed.
Manual IP HMI	<b>192.168.2.102</b>	IP address of the multifunction panel for the system bus (if assigned manually) The address can be changed.
Subnet-Mask HMI	<b>255.255.255.0</b>	Subnet mask of the multifunction panel for the system bus (if assigned manually) The mask can be changed.

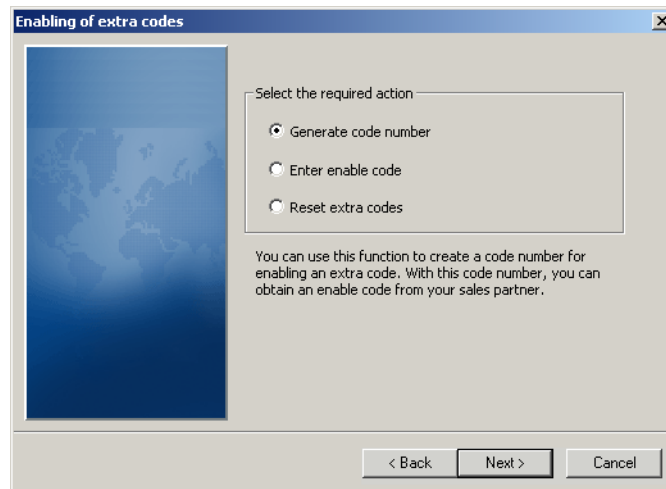


#### NOTE!

The IP addresses for the Ethernet and the system bus must not be in the same subnet.

## 10.3 Enabling of extra codes

### Setup dialog



### Parameters

Parameter	Selection/settings	Description
Generate code number	To generate a code number, click the function to select it and then click the "Next" button. Further instructions are then given.	This function is used to generate a code number to enable extra code. The code number is required to obtain an enable code from a sales partner.
Enter enable code	To enter an enable code, click the function to select it and then click the "Next" button. Further instructions are then given.	This function is used to enable extra code. This requires the enable code received from the sales partner.
Reset extra codes	To reset extra code, click the function to select it and then click the "Next" button. Further instructions are then given.	This function can be used to lock extra code that has been enabled. Locked extra code can only be activated by re-enabling. This procedure is subject to charge!

# 10 Online parameters

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## 10.4 Resetting the user list

This function is used to reset the user list in the central processing unit to the default settings (user: Master, password: 9200; user: User, password: 0).

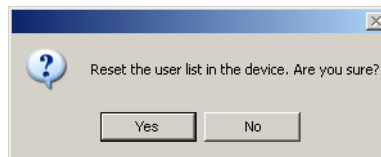
The function is only available if the user that has logged in on the setup program has the rights to use the function (e.g. specialist has logged in).



**NOTE!**

If the project includes a multifunction panel, the user list must be reset on the multifunction panel.

### Setup dialog



## 10.5 Date and time

This dialog window is used to set the date and time of the system. These can be entered directly or can be synchronized with the PC on which the setup program is running.

By contrast, the settings for the time zone and daylight saving time are set in the general settings for the project (project configuration).

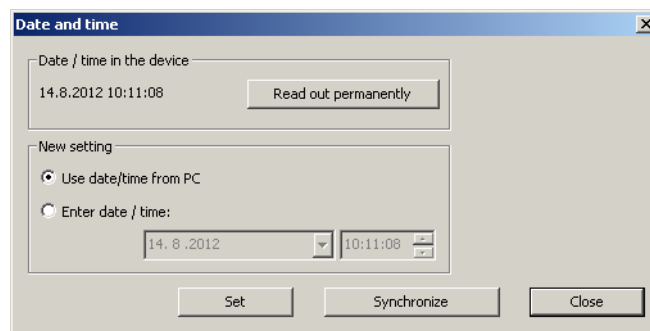
⇒ Operating manual B 705000.6 (setup program)



### NOTE!

If the project includes a multifunction panel, the date and time must be set on the multifunction panel. They are transferred when the system state is "Stop" or when the system is switched on from the central processing unit.

### Setup dialog



### Parameters

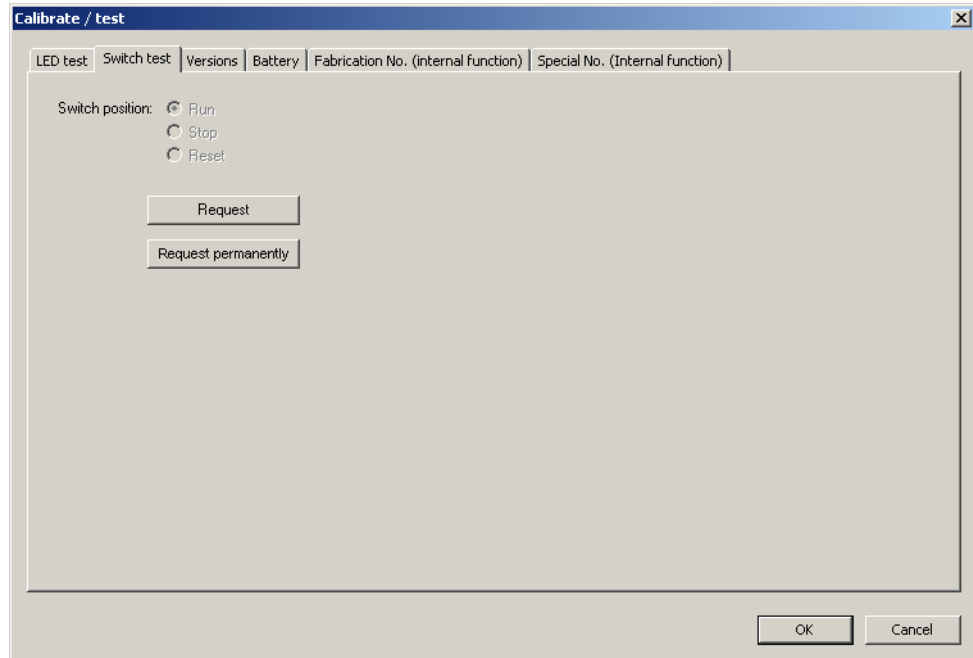
Parameter	Selection/settings	Description
Date / time in the device	Select "Read out permanently" button	The current date and time are read out from the system in cycles. To set the date and time, the cyclical read-out must first be cancelled ("Stop" button).
New setting	<b>Use date/time from PC</b>  Enter date / time	The PC's date and time settings are used for setting in the system. The entered date and time are used for setting in the system.
Set	Select the "Set" button	The date and time are set according to the selection in the "New setting" pane.
Synchronize	Select the "Synchronize" button	The time is synchronized according to the selection in the "New setting" pane. If the difference between the current time in the system and the new time is greater than 30 seconds, the function is not executed.

# 10 Online parameters

## 10.6 Calibrate / test

### 10.6.1 LED test

#### Setup dialog



#### Parameters

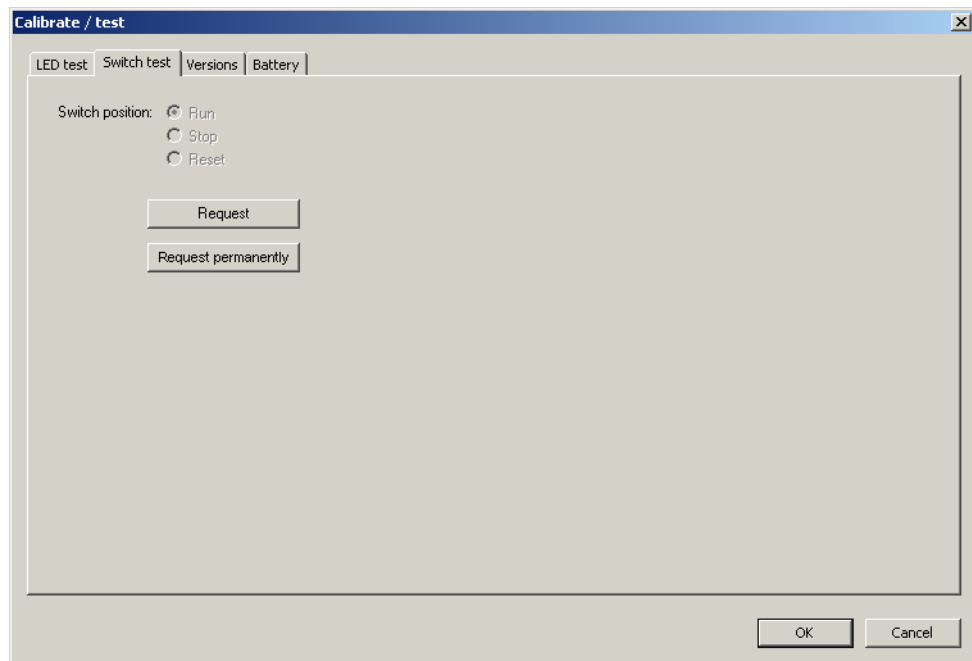
Parameter	Selection/settings	Description
Status LED	To test the LED, click the required status to select it (OFF, red, or green). After selection, the LED enters the chosen status immediately.	This function is used to test the electrical function of the "Status" LED.
Bus Error LED	To test the LED, click the required status to select it (OFF, red, or green). After selection, the LED enters the chosen status immediately.	This function is used to test the electrical function of the "Bus Error" LED.
Com1 LED	To test the LED, click the required status to select it (OFF, red, or green). After selection, the LED enters the chosen status immediately.	This function is used to test the electrical function of the "Com1" LED.
Com2 LED	To test the LED, click the required status to select it (OFF, red, or green). After selection, the LED enters the chosen status immediately.	This function is used to test the electrical function of the "Com2" LED.
Request	To request the current LED status, select the "Request" button.	The current LED statuses are displayed.

**NOTE!**

An LED maintains the set status until a new status is set or until the "LED test" dialog window is closed.

## 10.6.2 Switch test

### Setup dialog



### Parameters

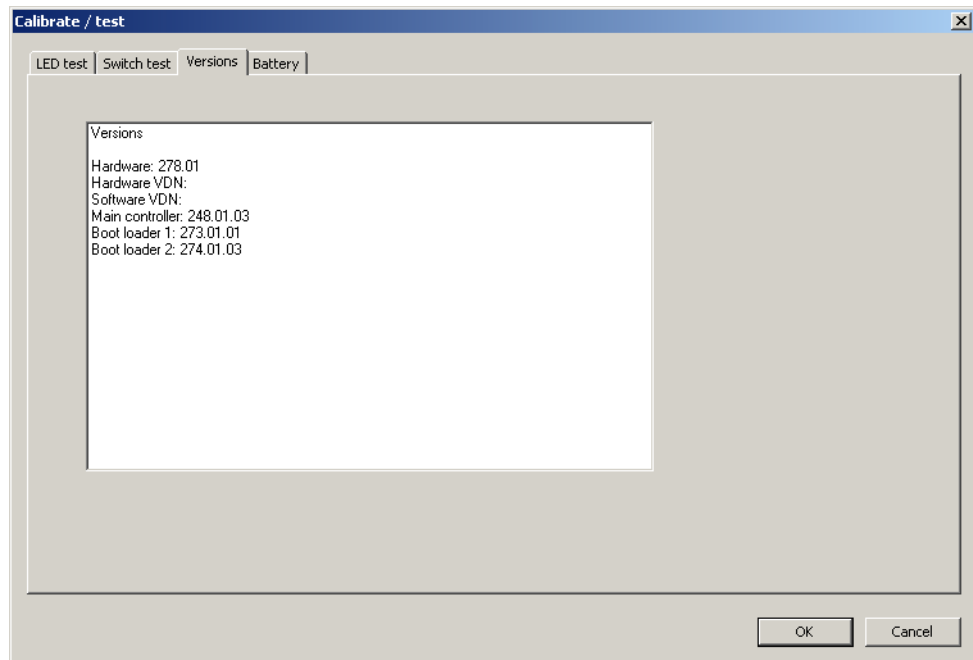
Parameter	Selection/settings	Description
Request	Select the "Request" button	The current switch position (Run, Stop, or Reset) is displayed.
Request permanently	Select the "Request permanently" button	The switch position (Run, Stop, or Reset) is requested and displayed in cycles.

# 10 Online parameters

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## 10.6.3 Versions

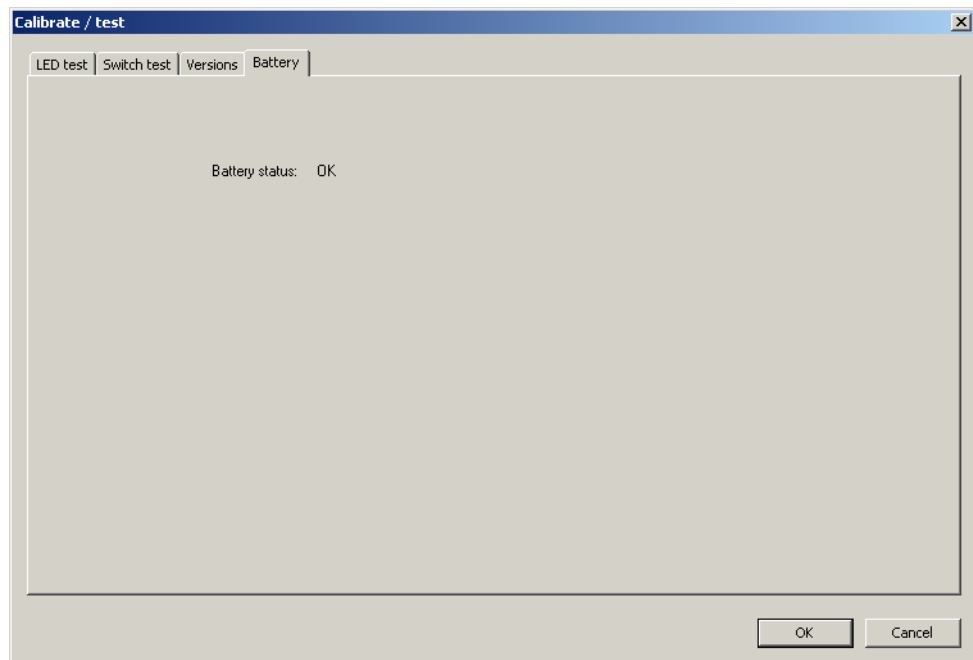
### Setup dialog



This dialog window displays the versions of the modules.

## 10.6.4 Battery

### Setup dialog



This dialog window displays the status of the buffer battery.

# 11 Retrofitting interfaces

This section describes how to retrofit the modules for optional interfaces RS232 and RS422/485 of central processing unit 705001.



### CAUTION!

Incorrect handling may result in damage or malfunctions. This compromises the function of the central processing unit or the system as a whole. Only qualified personnel are permitted to carry out module retrofits. Existing country-specific requirements for changes at an electrical device have to be observed. Before a retrofit, the system must be shut down and disconnected from the power supply.

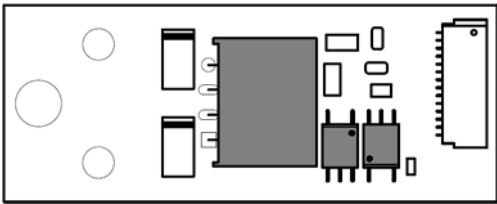
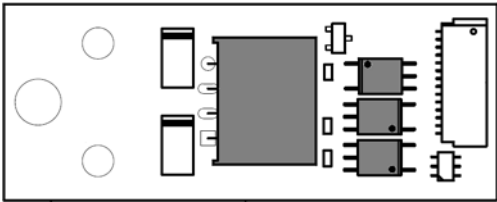
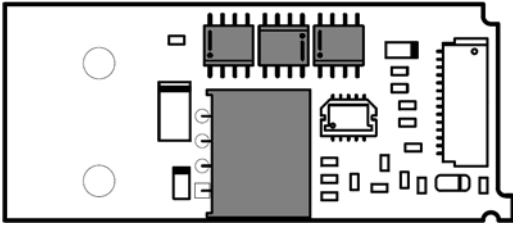


### CAUTION!

Modules may be damaged by electrostatic discharge. This compromises the function of the central processing unit or the system as a whole. Modules may only be retrofitted at a grounded workstation and in compliance with the relevant safety measures.

## Identifying the module

The module can be identified using the part no. on the packaging.

Module	Code (order code)	Part no.	Compatible with interface
RS232 Modbus RTU 	51	00569505	Com1 (D), Com2 (E)
RS422/485 Modbus RTU 	54	00569506	Com1 (D), Com2 (E)
PROFIBUS-DP  (as of system version 02 and as of the central processing unit's production date 27/2013 (calendar week))	64	00569507	Com2 (E)

# 11 Retrofitting interfaces



**NOTE!**

The production date of the central processing unit is part of the fabrication number (F-Nr.) and can be found on the nameplate. Refer to „Nameplate“ section in operating manual B 705001.0 or installation instructions B 705001.4 (the installation instructions are included in the scope of delivery of the central processing unit).

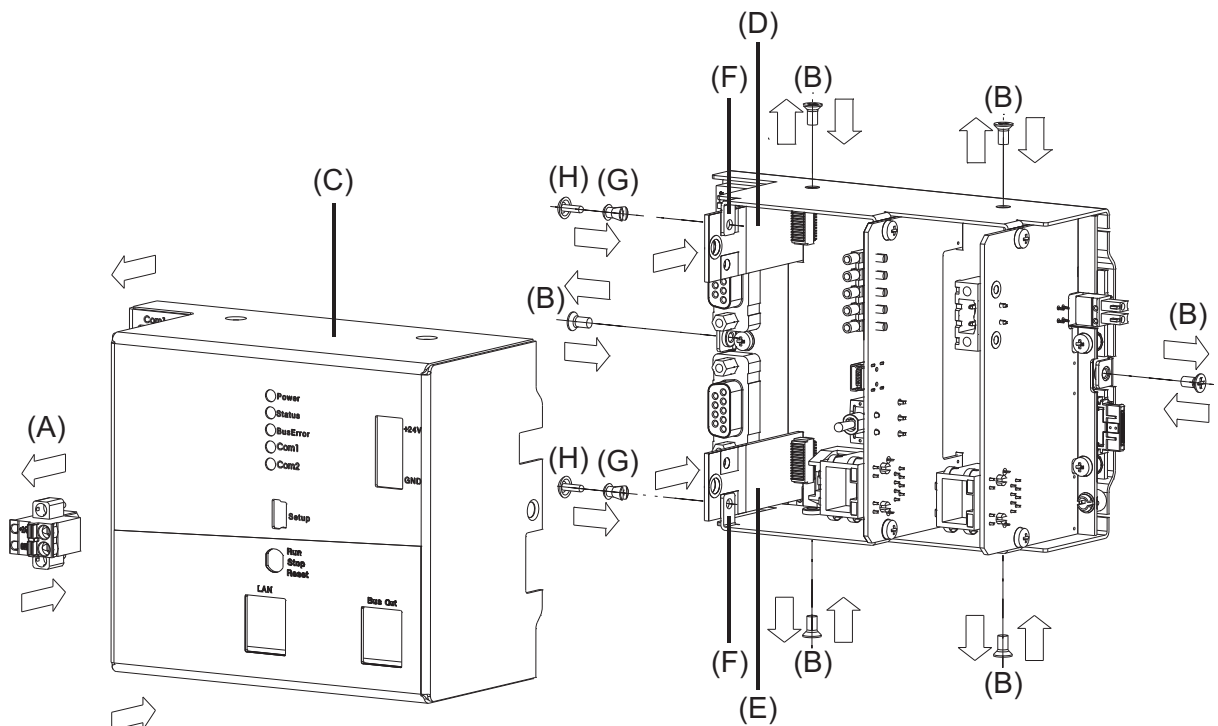


**NOTE!**

For modules that have already been assembled **ex-works**, the type designation on the nameplate of the central processing unit indicates the module type and interface (Com1 or Com2).

If required, further information can be found in the "Identifying the device version" section in operating manual B 705001.0 or installation instructions B 705001.4.

**Overview diagram**



**Shutting down the system and removing the central processing unit from the DIN rail**

Step	Activity
1	Shut down the system and disconnect it from the voltage supply. To do this, pull off the wired terminal strip (A) toward the front.
2	If necessary, remove other connection cables (Setup, LAN, Bus Out).
3	Disconnect the central processing unit from the modules and remove from the DIN rail. To do this, please follow the instructions on dismounting previously provided in this document.

# 11 Retrofitting interfaces

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## Opening the case

Step	Activity
1	Loosen screws (B) and remove.
2	Take of the upper part of the case (C).

## Retrofitting modules

Step	Activity
1	Select expansion slot: Com1 (D) slot or Com2 (E) slot. The diagram shows the slots with modules already assembled.
2	Carefully move module (D) or (E) into position until the plug-in connection is connected. When doing so, ensure that the mounting bracket (F) is located as shown next to the module and that the holes in the module are aligned with the holes in the mounting bracket.
3	Insert expanding rivet (G) from the left through the holes in the module and the mounting bracket. Then push the pin (H) into the expanding rivet until the module and mounting bracket are firmly connected.

## Closing the case

Step	Activity
1	Place the upper part of the case (C) in position.
2	Insert screws (B) and tighten.

## Positioning the central processing unit on the DIN rail and starting up the system

Step	Activity
1	Position the central processing unit on the DIN rail and connect the other modules to the central processing unit. To do this, please follow the instructions on dismounting previously provided in this document.
2	If necessary, reconnect the connection cables (Setup, LAN, Bus Out).
3	Attach wired terminal strip (A). Restart the system.

## 11 Retrofitting interfaces

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## 12.1 Technical data

### 12.1.1 Interfaces

<b>USB device</b> Connector designation Connector type Number Application Max. current	Setup Mini-B 1 Connection to a PC (setup program) 100 mA
<b>System bus Out</b> Connector designation Connector type Number Application Connection cable Cable length	Bus Out RJ45 1 Connection of a router module or a multifunction panel Network cable (patch or crossover cable), at least CAT5 (S/FTP) Up to 100 m
<b>Ethernet</b> Connector designation Connector type Number Application Protocol Transfer rate	LAN RJ45 1 Communication with PC (setup program, web server), e-mail server, and Modbus master/slave TCP/IP, HTTP, DHCP, SMTP+POP3, Modbus/TCP 10 Mbit/s, 100 Mbit/s
<b>RS232 or RS422/485 (serial interfaces)</b> Connector designation Connector type Number Application Protocol Transfer rate	Depending on the device type Com1 and Com2 D-Sub 2 Fieldbus applications, communication via modem with a PC (setup program) or with an e-mail server Modbus RTU (master or slave); PROFIBUS-DP (slave, Com2 only) Modbus: 9600 Bd, 19200 Bd, 38400 Bd; PROFIBUS: max. 12 Mbit/s

### 12.1.2 Electrical data

<b>Voltage supply</b> Connection Voltage Residual ripple	At the front (removable 2-pole terminal strip with Push-In technology) DC 24 V +25/-20 % SELV 5 %
<b>Current consumption</b>	Max. 350 mA (at DC 19.2 V) Current consumption of lined-up modules also has to be considered (see „Hardware configuration“ in the setup program)!
<b>Power consumption</b>	Max. 7 W

# 12 Appendix

Conductor cross section (voltage supply)	
Wire or strand without ferrule	Min. 1.5 mm <sup>2</sup> , max. 2.5 mm <sup>2</sup>
Strand with ferrule	Min. 1.5 mm <sup>2</sup> , max. 2.5 mm <sup>2</sup>
2 x strand with twin ferrule with plastic collar	1.5 mm <sup>2</sup>
Stripping length	10 mm
Electrical safety	Acc. to EN 61010-1 Overvoltage category III, pollution degree 2
Electromagnetic compatibility	Acc. to EN 61326-1
Interference emission	Class A – only for industrial use –
Interference immunity	To industrial requirements
Data backup	Buffered RAM
Buffer battery service life	Approx. 10 years (Lithium battery)

## 12.1.3 Case and ambient conditions

Case type	Metal case for DIN rail mounting in the control cabinet (indoor use); DIN rail acc. to DIN EN 60715, 35 mm x 7.5 mm x 1 mm
Dimensions (W x H x D)	135 mm x 101 mm x 67.1 mm (without connection elements)
Weight (fully equipped)	Approx. 670 g
Protection type	IP20, acc. to DIN EN 60529
Ambient temperature range	-20 to +55 °C
Storage temperature range	-40 to +70 °C
Resistance to climatic conditions	Relative humidity ≤ 90 % annual average without condensation (climatic class 3K3 acc. to DIN EN 60721-3-3 with extended temperature and humidity range)
Site altitude	Up to 2000 m above sea level
Mechanical ambient conditions <sup>1</sup>	Classification acc. to DIN EN 60721-3-3, table 6, class 3M2

<sup>1</sup> Test conditions are listed in the System Description B 705000.8.

## 12.1.4 Approval/approval marks

Approval mark	Testing agency	Certificate/certification number	Inspection basis	Valid for
c UL us	Underwriters Laboratories	E201387	UL 61010-1 (3. Ed.), CAN/CSA-22.2 No. 61010-1 (3. Ed.)	all types
DNV GL	DNV GL	TAA000016N	Class Guideline DNVGL-CG-0339	all types; a power supply unit with DNV GL or GL type approval is required (e.g. type 705090)

## 12.2 Cycle time, sampling rate, and shut-down time

	Min.	Max.	Typical
PLC cycle time (FastTask) <sup>1</sup>	7.5 ms	25 ms (depending on telegram repetitions)	10 ms
Adjustable PLC cycle time (Task) <sup>2</sup>	50 ms	500 ms	-
System bus cycle time for - Multichannel controller module - 4-channel analog input module - 8-channel analog input module - 4-channel analog output module - Multifunction panel	30 ms	-	30 ms
System bus cycle time <sup>1</sup> for - Relay module - Digital input/output module	7.5 ms	-	10 ms
Multichannel controller module sampling rate <sup>2</sup>	-	-	50 ms
4-channel analog input module sampling rate <sup>2</sup>	-	-	50 ms
8-channel analog input module sampling rate <sup>2</sup>	-	-	375 ms
4-channel analog output module sampling rate <sup>2</sup>	-	-	20 ms
Relay module sampling rate <sup>1</sup>	-	-	0 ms
Digital input/output module sampling rate <sup>1</sup>	-	-	0 ms
Multifunction panel sampling rate <sup>2</sup>	-	-	125 ms
Shut-down time (detection of module failure) for - Multichannel controller module - 4-channel analog input module - 8-channel analog input module - 4-channel analog output module - Multifunction panel	-	-	100 to 750 ms
Shut-down time (detection of module failure) for - Relay module - Digital input/output module	-	-	25 ms

<sup>1</sup> Synchronous with system bus

<sup>2</sup> Asynchronous with system bus

# 12 Appendix

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## 12.3 Resources for customer specific PLC programs

The following resources are available for customer specific PLC programs (in addition to the boot project).


### **Free memory**

1.4 MByte for program code and data  
and  
80 000 Byte for retain data

### **Free computing capacity (task call 125 ms)**

Approx. 60 000 float multiplications  
or  
approx. 200 000 boolean operations

## 12.4 China RoHS

 产品组别 Product group: 705001 部件名称 Component Name	产品中有害物质的名称及含量 China EEP Hazardous Substances Information					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
外壳 Housing (Gehäuse)	○	○	○	○	○	○
过程连接 Process connection (Prozessanschluss)	○	○	○	○	○	○
螺母 Nuts (Mutter)	○	○	○	○	○	○
螺栓 Screw (Schraube)	○	○	○	○	○	○

本表格依据SJ/T 11364的规定编制。  
 This table is prepared in accordance with the provisions SJ/T 11364.  
 ○：表示该有害物质在该部件所有均质材料中的含量均在GB/T 26572规定的限量要求以下。  
 Indicate the hazardous substances in all homogeneous materials' for the part is below the limit of the GB/T 26572.  
 x：表示该有害物质至少在该部件的某一均质材料中的含量超出GB/T 26572规定的限量要求。  
 Indicate the hazardous substances in at least one homogeneous materials' of the part is exceeded the limit of the GB/T 26572.







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