MSA
The Safety Company

Operating Manual

SUPREMATouch

Fire and Gas Warning Unit

Order No.: 10121863/06

For countries of Russian Federation, Republic of Kazakhstan and Republic of Belarus, the gas detector will be delivered with a passport document that includes valid approval information. On the CD with manual instruction attached to the gas detector the user will find the documents "Type Description" and "Test Method" - appendixes to Pattern Approval Certificate of Measuring instrument, valid in the countries of use.

The Declaration of Conformity can be found under the following link: **https://MSAsafety.com/DoC**.

Software Versions

The operation manual refers to the following software versions:

Module	Software version Flash or EPROM
MCP 20	3.03.01
MDO 20	3.03.01
MGO 20	3.01.02
MAO 20	3.01.02
MAI30/MAR30	1.02.01
MGI30/MGR30	1.02.01

Software status ATEX and TÜV SIL 3

MSA Europe GmbH
Schlüsselstrasse 12
8645 Rapperswil-Jona
Switzerland
info.ch@MSAsafety.com
www.MSAsafety.com

Contents

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User Instruction Manual

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1 Safety Regulations

1.1 Correct Use

The SUPREMATouch is a stationary gas warning system with multiple measurement sites, which operates continuously to monitor work sites for the presence of combustible and toxic mixtures of gas and/or vapor with air and to monitor the ambient air for oxygen content. The system supplies power to the sensors, displays the measured concentrations, and monitors the limit values, but it also actuates alarm devices. The various functions of the gas warning system (the acquisition of the measurement values, the evaluation of the signals, the actuation of the alarm devices etc.) are performed by the various modules of the SUPREMATouch.

The SUPREMATouch can process the standardized current and voltage outputs of various types of sensors. This means that the system can display and evaluate not only gas measurements but other measurement variables as well (e.g., temperature and pressure).

The SUPREMATouch is a modular system, allowing a wide variety of applications.

It is imperative that this operating manual be read and observed when using the product. In particular, the safety instructions, as well as the information for the use and operation of the product, must be carefully read and observed. Furthermore, the national regulations applicable in the user's country must be taken into account for safe use.

⚠ DANGER!

This product is supporting life and health. Inappropriate use, maintenance or servicing may affect the function of the device and thereby seriously compromise the user's life.

Before use the product operability must be verified. The product must not be used if the function test is unsuccessful, it is damaged, a competent servicing/maintenance has not been made, genuine MSA spare parts have not been used.

Alternative use, or use outside this specification will be considered as non-compliance. This also applies especially to unauthorised alterations to the product and to commissioning work that has not been carried out by MSA or authorised persons.

1.2 Liability Information

MSA accepts no liability in cases where the device has been used inappropriately or not as intended. The selection and use of the device are the exclusive responsibility of the individual operator.

Product liability claims, warranties and guarantees made by MSA with respect to the device are voided, if it is not used, serviced or maintained in accordance with the instructions in this manual.

2 System Concept

2.1 System Features

- Modular system
- 19” rack system for the connection of up to 256 sensors
- Complete system for up to 64 sensors with common relays (Alarms 1–4, signal fail, horn, inhibit, power) in one 19” rack
- Maximum number of switching outputs in the system: 512
- Minimal installation work (bus system)
- Redundancy possible
- Maximum refresh rate of 3–4 seconds for alarm outputs (1–2 s for data acquisition; 1 s for computation; 1 s for data output)
- Maximum refresh rate of 3–5 seconds for signal fail outputs (1–2 s for data acquisition; 1–2 s for computation; 1 s for data output)
- Maximum response time of 15 seconds for system fails
- External voltage operation (85–265 VAC) no switching necessary
- Power supply unit on the rack, 250 W
- For higher power requirements, external power supplies can be connected
- Battery connection for emergency power operation
- Operating voltage range of the system modules: 19.2 VDC–32 VDC.
  Recommended voltage: 24 VDC.
- Universal sensor interface with automatic sensor detection
- Operation of passive catalytic/semiconductor sensors, 3- or 5-wire.
- Automatic pre-setting of passive detectors in first calibration
- Operation of active transmitters with 4–20 mA output, 2- or 3-wire
- System operation via a graphical touch screen with a resolution of 320 x 240 pixels and individual function keys
- Self-explanatory error messages
- System configuration and parametrization optionally via laptop (Windows user interface)
- The SUPREMATouch can be connected via a bus connection to the company communications network (data evaluation, data display, etc.)
- Key switch connection or three password levels to control access
- Key switch connection for relay inhibiting
- Remote key switches for acknowledgment and reset
- Common alarm LEDs for 1st to 4th alarm, signal fail (sensor), system fail, inhibit, power supply fail
- Protocol printout of status changes + system operations (standard ASCII, 80 CHR)
- 1 x USB + 1 x RS232 or 2 x RS232 interfaces for data transfer to an industrial PC/laptop/printer
- RS232 interfaces are electrically isolated
- RS232/RS485 converters used for longer transmission distances
- 8 MRO Module common alarm relays supplied by the rack power supply unit
- External relays are supplied with power separately
- Recommended operational lifetime according to EN 50271: 20 years

2.2 Design

The modules of the SUPREMATouch are mounted in a rack. For expanded systems, additional modules can be placed in a second rack or installed on top hat rails in a switch box.

Data is exchanged between the modules over a CAN bus, so it is possible to connect satellites over long distances.

For measurement tasks that require redundant signal input and processing, additional modules can be added at any time to expand the gas warning system.

The sensors must have the type of protection against ignition prescribed for the installation site. The connection between the input module of the SUPREMATouch and the sensors is established by a screened remote-measurement cable of the 2, 3, 4 or 5 wire type.

For servicing, the sensors can be electrically isolated from the SUPREMATouch by mechanically disconnecting the plug-in connection (MAT, MAT TS modules).

The following block circuit diagram shows the possible layout of a non-redundant system.

Sensors

The system distinguishes between passive detectors and active transmitters.

As a general rule, passive detectors simply consist of a highly sensitive (half) measuring bridge while active transmitters possess their own electronics and have a standardised signal output (4–20 mA).

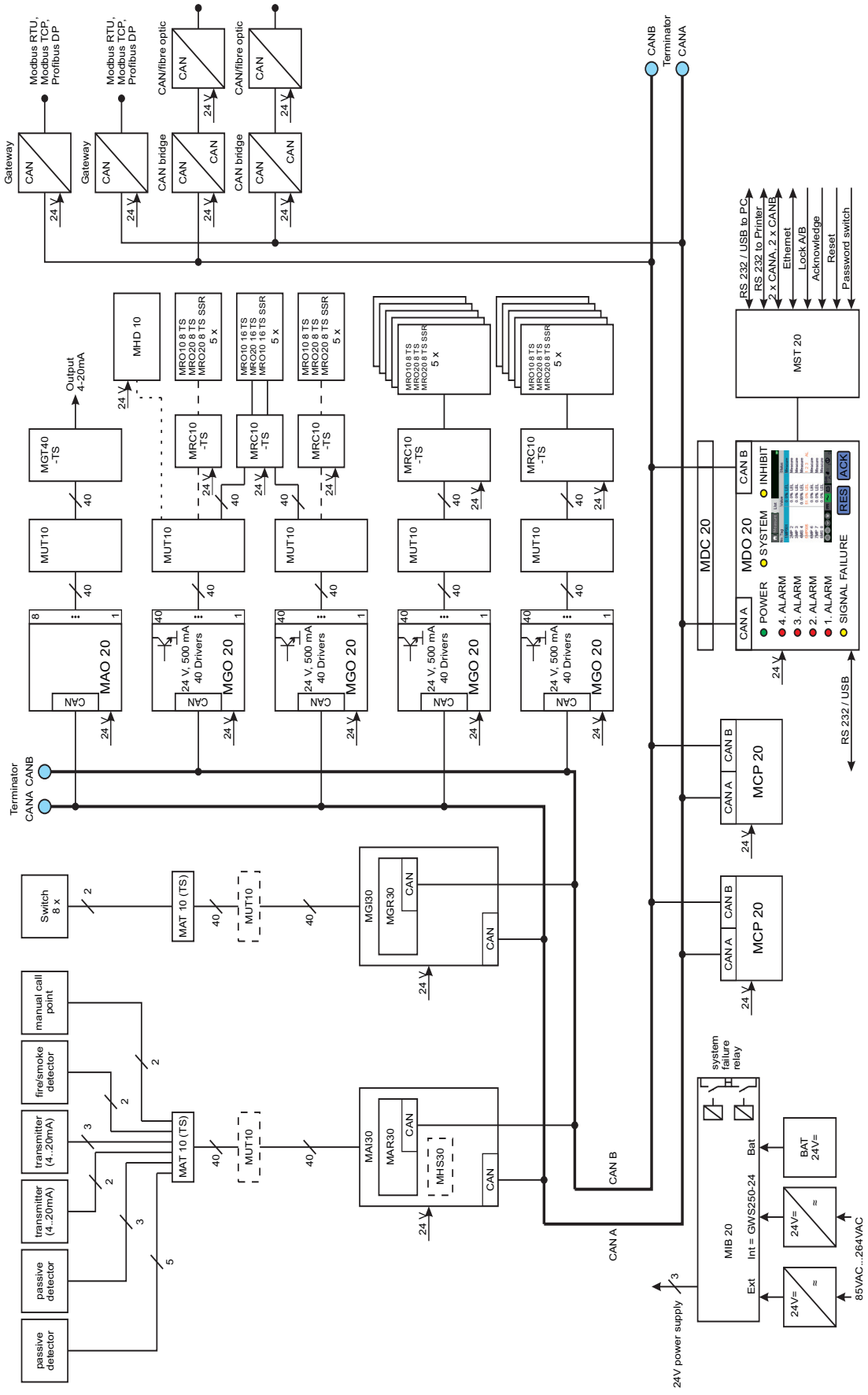

Fig. 1 Block circuit diagram of a system layout (redundant)

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Fail Conditions

Signals that are above full-scale range or signal fails that were caused by an interruption of the digital communication are always latched.

Signal fails caused by signals below the measuring range are non-latching. Measurement values that are over the full-scale range will trigger all 4 alarms.

Horn

If an audible alarm device is connected to the horn relay, it will sound as soon as a new alarm is triggered. It continues to sound even when the alarm condition no longer exists. Pressing the ACKNL key silences the horn, regardless of whether or not the alarm condition still exists.

When a redundant system is used, the ACKNL or RESET key has to be pressed for at least 1 second.

2.3 Operation and Display unit MDO

The operation and display unit includes the following components:

- Colour TFT touch screen with 320 x 240 resolution
- 2 keys
- 8 LED indicators
- 1 beeper

The TFT screen is a full graphic display with a resistive touch panel. The character height is approximately 4 mm.

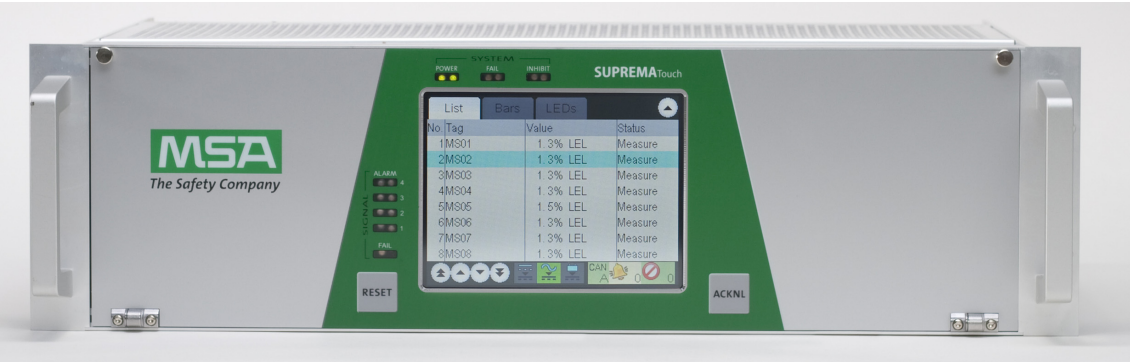

Fig. 2 Display and Operation Module (MDO)

NOTICE

To prevent damage to the touch screen, avoid touching it with sharp objects. Only use fingers or the touch screen pen provided.

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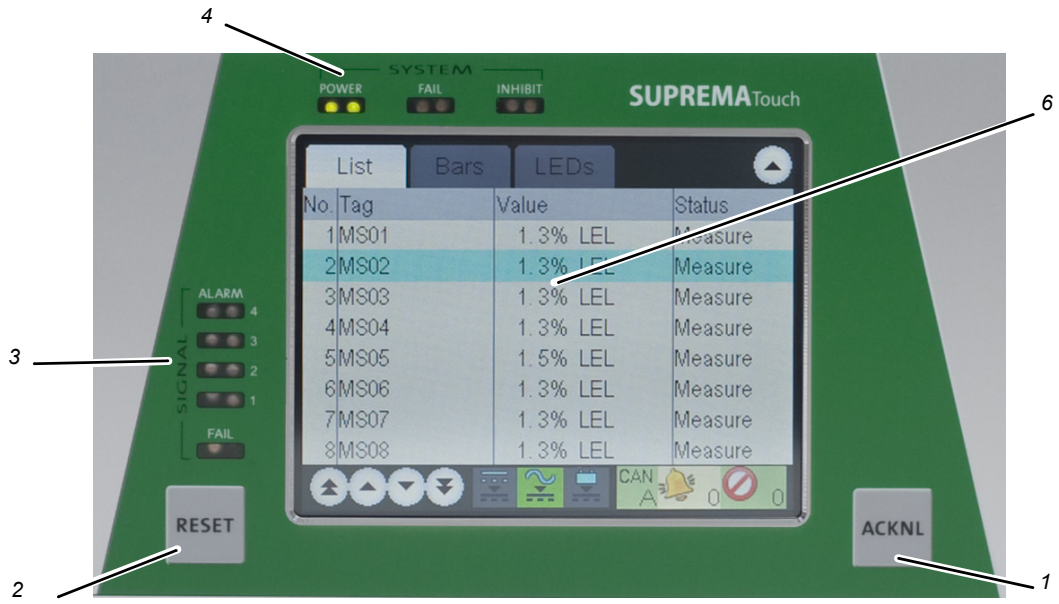

Fig. 3 Display with keys

1	*ACKNL (acknowledge) key*	*4*	*SYSTEM LEDs*
2	*RESET key*		
3	*SIGNAL LEDs*	*6*	*Display*

2.4 Keys

⚠ WARNING!

All alarms, failures and overrange indications are reset with the keys (if the conditions no longer apply).

It is possible to selectively reset alarms in two steps using the graphical user interface.

ACKNL key	To acknowledge all alarms, press the ACKNL key to make the LED change to ‘steady state’. Pressing the ACKNL key silences the horn, regardless of whether or not the alarm condition still exists.
RESET key	If a signal no longer exceeds the alarm threshold and the alarm has been acknowledged, the LED is turned off by pressing the RESET key. For non-latching alarms or if the signal still exceeds the alarm threshold, the RESET key has no effect.

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2.5 LED Indicators

The 8 LED indicators provide system and signal status information.

SYSTEM:			
POWER	(green)	power supply on/off	
FAIL	(yellow)	system specific error (e.g. defective CPU)	
INHIBIT	(yellow)	on:	inputs are inhibited or a calibration is pending
		flashing:	outputs connected to one or more inputs are locked

SIGNAL:		
AL 1–AL 4	(red)	input signal alarms (each input can have up to four alarms)
FAIL	(yellow)	specific input signal statuses (measurement values that are over full-scale, below the measurement range and signal failures)

2.6 Bus Protocol

The SUPREMATouch uses the CAN bus protocol. On the Interconnection Board (MIB module), the DIL switch can be used to set the transfer speed to 10, 20, 50, 125, 250, 500 or 1,000 kBits/s for all of the connected modules. All modules on one bus must operate at the same bit rate; if one of the modules uses a different rate, an error state occurs on the bus. This is detected, and appropriate messages are displayed.

Each module receives a code (Node ID) in the range of 1–127 by the use of the DIL switch of the MIB module board on the basis of its slot in the rack. Each of the modules on one bus must have its own code. If duplicate codes are detected, an error message is generated.

2.7 System Power Supply

The system is supplied with an operating voltage of 24 VDC (19.2–32 VDC). 3 pairs of terminals for the connection of three 24 VDC power supply sources (EXT, INT, BAT) are provided on the Interconnection Board (MIB module). Therefore the power can be taken from 3 different sources (redundancy). If all three supply voltages (EXT, INT and BAT) are present, the system selects only one of these to supply the module, in the following order of prioritisation:
1st = EXT, 2nd = INT, 3rd = BAT.

The system module hardware manages the power supply changeover.

When an external power pack or battery supply is used, MSA recommends that the power is filtered through an appropriate EMC (electromagnetic compatibility) filter. See chapter 12.2 "Installation Instructions for Following the EMC Directives"for low voltage installation information.

In order to protect the battery and the SUPREMATouch against damage, an additional deep discharge contactor component is required in the corresponding 24 V feeder (e.g. deep discharge contactor C1900-TLS, Mentzer or similar).

- The customer is responsible for providing a safety cut-out (maximum rack power, 480 W/20 A).
- 85–264 VAC is supplied via screw terminals directly on the power supply unit.
- The EXT, INT and BAT voltages are supplied to each system module.
- Voltages required for the individual modules are obtained in the modules themselves from the 24 V.
- The power requirement that must be met is derived from the type and number of sensors connected and from the components installed in the system.
- Maximum power provided for one rack is 480 W (maximum current of 20 A).
- The transmitter/detector input modules measure all input voltages and can generate error messages, which can be shown on the display unit. In addition, a POWER FAIL relay (optional: redundant) is de-energized when the status of the system power supply changes.

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EXT Terminals (External Power Supply, 24 VDC)

- Connection for voltage supply from an external power supply unit; power is sent to all units in the rack.
- Required when a redundant power supply is provided or when the internal rack power supply is not sufficient to operate all of the sensors.
- Maximum supply current of 20 A for one rack.

INT Terminals (Internal Power Supply, 24 VDC 250 W)

- Connection for voltage supply from an internal rack power supply or an external power supply unit.
- Power supplied to all rack units and the sensors.
- Internal power supply unit (MSP module) has a supply voltage input of 85–265 VAC (47–63 Hz) or 120–330 VDC.
- If the rack power supply unit cannot supply enough power, the sensors, modules or relays must be supplied by external power supply units.
- The internal rack power supply can be omitted if, because of a high power requirement or a redundant design, the power is being supplied by an external power supply via the INT terminals.
- Maximum supply current of 20 A.

BAT Terminals (Backup Battery Power Supply)

- Backup battery power supply for all units of a rack (21 –28 VDC).
- In the case of failure of internal and/or external power supply, the backup battery power supply will supply power to the system.
- Maximum supply current of 20 A.

Power Supply Plans

All of the system cards and the sensors can be supplied from each of the 3 pairs of terminals connections. A voltage changeover switch is provided on each system card, which ensures that only one of the voltages being applied is accepted. Various power supply plans are available to suit the number and type of sensors and/or the required degree of redundancy in the power supply.

If the internal rack power supply unit is not sufficient to power all the sensors, an external unit must be provided. The internal unit must then be disconnected. A redundant power supply is then provided by external units via the BAT or INT terminals.

Supply Plan A: Internal Power Supply Unit

All of the units of the system and the sensors are supplied by the rack power supply unit (INT terminals). This variant is used when power supply redundancy is not required and the power which can be supplied by the unit installed in the rack (250 W) is sufficient to supply all of the rack modules and the connected sensors.

Supply Plan B: External Power Supply Unit

All system modules housed in the rack and the sensors are supplied by the external power supply unit (EXT terminals). This variant is used when power supply redundancy is not required and the power of the unit installed in the rack (250 W) is not sufficient to supply all of the system modules and the connected sensors. A maximum of 20 A can be supplied across the terminals (480 W system power).

Supply Plan C: Internal Power Supply Unit + Battery

All units of the system and the sensors are supplied by the rack power supply unit (INT terminals) or by the backup power supply (BAT terminals). This variant is used when there must be redundancy in the power supply and the power of the unit installed in the rack (250 W) is sufficient for all rack modules and the connected sensors.

Supply Plan D: External Power Supply Unit + Battery

All modules of the system and the sensors are supplied by the external power supply unit (EXT terminals) or by the backup power supply (BAT terminals). This variant is used when the power supply must be redundant and the power that can be supplied by the unit installed in the rack is not sufficient to supply the system modules and the connected sensors. A maximum of 20 A can be supplied across the terminals (480 W system power).

2.8 Safety Concept

The individual functional modules are connected to each other by a CAN bus. The CAN bus is designed to be virtually error-proof. Every module can detect errors on the bus and handle them appropriately. The probability of an undiscovered communications error on the bus is $4.7 * 10^{-14}$. Error statuses on the CAN bus are indicated on the DISPLAY + OPERATION unit (MDO module).

Each module with a microcontroller has a watchdog timer, which can trigger the system fail signal line of its rack. As a result, the SYSTEM FAIL common relays on the interconnection board (MIB module) are de-energized. This common failure signal is also indicated by the DISPLAY + OPERATION unit.

All modules are checked for signs of activity at fixed periodic time intervals by the CENTRAL PROCESSING unit (MCP module) via the CAN bus. The failure of a module can thus be recognized, and the appropriate messages will be generated. These messages are logged in the MDO's log books and, parallel to it, the System Fail is activated by the relevant modules.

The operating voltages of the connected voltage supply units (EXT, INT and BAT) are monitored by the transmitter/detector input modules. If a malfunction occurs here, the POWER-FAIL common relay is released.

Gas Warning Systems

In simpler expansion stages of safety requirements according to EN 61508, the gas warning system can be operated via one of the two possible CAN bus connections. Starting with SIL 3, both CAN bus connections are required. In this case, two CENTRAL PROCESSING units (MCP modules) are present and all of the input and output signals important for system operations are available over additional modules on both CAN buses in parallel. If one of these CAN bus connections fails, a SYSTEM FAIL message is generated. **The system still remains functional by using the remaining CAN bus connection**.

In the case of a SYSTEM FAIL message, the SYSTEM FAIL LED will light up and the system fail relays change to failure condition. A System Fail message indicates a malfunction of the SUPREMATouch and therefore an service is required immediately. The connection of the switching outputs of the system fail relays has to enable an immediate triggering message.

Gas Warning Systems with Higher Safety Requirements

For gas warning systems with higher safety requirements according to EN 61508 SIL 3 the system can be provided with redundancy using additional modules. Redundant signal processing has the same structure and functions the same way as standard non-redundant processing. Communications between the modules proceed over an internal connection, which is designed as a redundant CAN bus.

If one of the two signal processing routes malfunctions, an error message appears on the DISPLAY + OPERATION unit (MDO module) (SYSTEM FAIL). The remaining signal processing channel takes over all of the necessary functions until the defective module can be replaced. The failure of individual modules does not lead automatically to the failure of the entire system. Only the functions assigned to the specific module in question are unavailable. The system fail relay has to be connected and monitored (see chapter 9 "Special conditions to comply with the requirements of DIN EN 61508 for SIL 1-3 according to TÜV Certificate"and 10 "Special conditions to comply with the requirements of ATEX").

2.9 During Operation

⚠ WARNING!

In case of operation with catalytic combustion detectors: To guarantee the unambiguity of catalytic combustion sensor operation it must be ensured at all times (e.g. by checking with hand-held test instruments) that the environmental atmosphere to be monitored by the sensors is free of combustible gases prior to the sensors and the system being switched on or overrange indications are reset.

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3 System Operation

The modular control system's user interface is the integrated operation and display unit. This unit displays alarms and warnings as well as system parameters.

Selection and input are touch-controlled, which means that the integrated Display and Operation module is very easy to use..

Connecting the operating unit to a PC provides a more user-friendly interface with additional features.

The software SUPREMA Manager can be used to create and manage the configuration and parametrization of multiple SUPREMA systems. See separate operating manual for SUPREMA Manager for details.

Both the PC program and the SUPREMATouch system use graphical user interfaces (GUIs). The input fields are set up as selection fields as much as possible, with all known inputs displayed.

3.1 Operation Menu

The operation menu is divided into four submenus:

- Measure
- Setup
- Maintain
- Diagnosis

These submenus can be selected by tapping the corresponding menu item. The *Measure* submenu is automatically activated at system start-up.

If another menu is active and there is no operator activity for 3 minutes, the system returns to the Measure submenu. If an alarm occurs the Measure submenu is automatically activated.

3.2 Access Authorisation

In the various windows, data can be displayed and entered and certain actions can be initiated by using the touch screen (e.g., starting a calibration procedure). However, editing items or initiating actions requires access authorization by entering the password required for the control level or operating a keyswitch, if fitted.

Three user groups with different password control levels are defined:

- Maintenance
- Parametrization
- Configuration

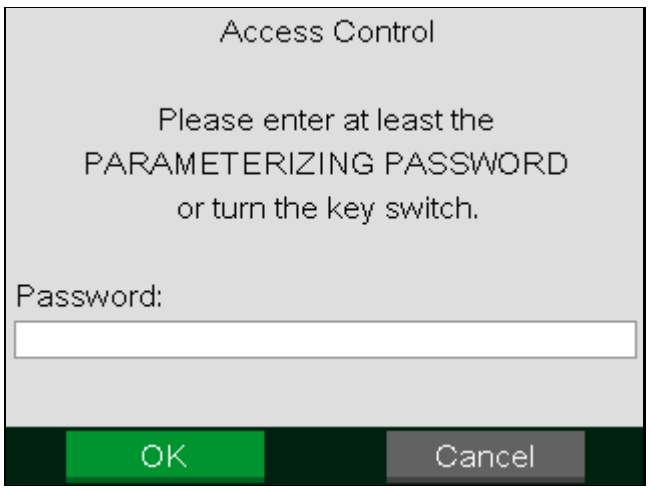

Fig. 4 Access control

If the user wants to change a value or press a button when the required authorization is not yet issued, the appropriate password must be entered in the pop up window or the key switch must be activated. Password authorization remains in effect until measurement mode is activated either through user input or automatically due to inactivity of 3 minutes or alarms.

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If a user with modification authorization is logged in at the PC and there has not been any communication between the PC and the SUPREMATouch system for more than 5 minutes, password authorization will automatically expire.

While SUPREMA Manager is connected to the SUPREMATouch, it is not possible to simultaneosly change settings via the MDO.

The system is delivered with the default password *AUER* for all three password levels. MSA recommends to change the passwords when accessing the SUPREMATouch for the first time.
In the *Measure* and *Diagnosis* submenus, data is only displayed, password access control is not required.

Changing the Password
The password must have a minimum of four characters and may not have more than eight. Any symbol from the ASCI character set can be used. The password is case-sensitive.
If no password at all is wanted, the password can be deleted by entering nothing instead of a new password. Authorisation can then be granted only by using the key switch. In this case, an additional security dialog is initiated with the warning that the approval of the system is revoked in the event of unauthorized changes.
To change a current password/create a new password, carry out the following:

(1) Select the corresponding password field in the *Setup/System* menu.
Enter the current password or actuate the key switch.

(2) After entering the password or actuating the key switch, leave the window with the OK button. When the key switch was actuated, it can be released again after leaving the password window.

(3) Enter the new password in the *Password* and *Confirmation* fields of the *Setup/System* menu.

(4) Confirm the new password with *OK*.

To replace a forgotten password, a higher-level password can be entered. If the current parameterisation password is also lost, a new password can be entered by actuating the key switch. If there is no key switch to close, connect terminal contacts 1 (GND) and 2 (PSW) on the MST module with a wire jumper, provided that these terminals can be accessed safely.

3.3 Notification Area

In the upper right corner of the screen is a notification area. In this area status information will be indicated using symbols.

Symbol	Meaning
	Password authorization is not effect. The user cannot modify settings in the current window.
	Password authorization is in effect. The user can modify settings in the current window.
	A user with modification authorization is logged in with a PC. No modification can be done on the MDO.

Additional information is indicated using the following symbol:

Symbol	Meaning
	An SDcard is inserted and can be accessed by the SUPREMA.
	A new configuration was stored and will become valid after a restart.

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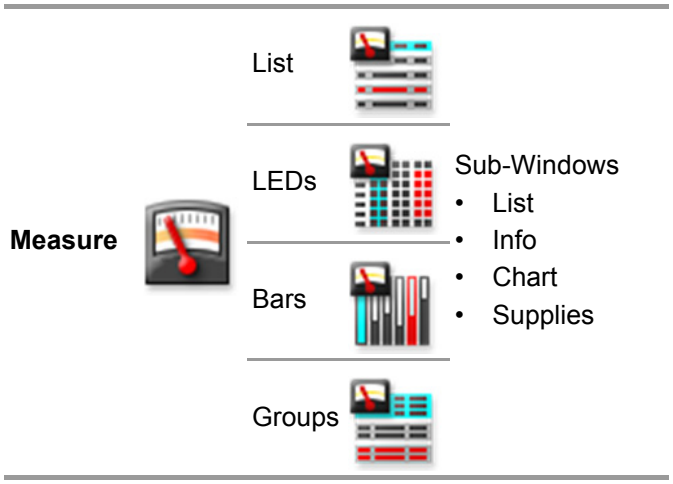
3.4 Measure Menu

When the system configuration is successfully completed, the *Measure* menu will appear automatically after the system is started.



For display of measured values, it is possible to choose from different display types:

- List (default after start-up)
- Bars
- LEDs
- Groups

Displayed measurement and status values are updated once per second.

Unlike the common alarm LEDs on the MDO front panel, the touch screen display of alarms and failures does not flash.

If the user is in the *List*, *Bars* or *LEDs* window and does not tap any key for 60 seconds, the window automatically starts scrolling (one page per 5 seconds).

(1) To scroll through the list manually use the arrow buttons in the lower left corner of the window or move the list while touching it.

For all display types, it is possible to manually switch between different modes of displaying the measured information. In one mode all inputs are shown, in the other modes only the inputs in alarm or fail status are shown.

(2) To switch between modes touch the bell or the sign symbol in the lower right corner of the measure window.

If one of these selection modes is chosen, the corresponding symbol has a blue background. The number of measuring points in alarm and in fail and the CAN bus, A or B, currently selected as the information source is also shown in this area.

It is possible to switch to the CAN bus by touching the *CAN* symbol. If the CAN bus is manually selected, the *CAN* symbol has a blue background. If the CAN bus is automatically selected, the *CAN* symbol has a grey background.

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Modes

Mode	Display	Indicated by
All Inputs	In this mode, all the measured inputs in the system are displayed. The inputs are arranged by their input number.	
Alarm Inputs	When no alarm is triggered, this mode behaves like the *All Inputs Mode*. As soon as alarms are triggered, only the inputs in alarm are displayed, sorted by the time of alarm triggering.	
Fail Inputs	When no measuring point is in fail status, this mode behaves like the *All Inputs Mode*. As soon as at least one input is in fail status, only the inputs in fail status are displayed, arranged by their input number.	

Power Supply Indicator

The power supply indicator gives a quick overview of the current status of the power supply of the system.

Fig. 5 Power Supply Indicator

By tapping on the Power Supply Indicator, a window with information on the measuring values of all transmitter/detector input nodes appears.
The 3 different power supplies are indicated with 3 different symbols.

Power Supply	Symbol
External	
Internal	
Battery supply	

Status (indicated by background colour)			
good:	connected, the voltage is below 30 V and above 21V (for battery above 22 V)	=	
not configured		=	
failure		=	

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Measuring Information

Any item in the measuring list can be selected with a double-tap. A selected item is highlighted in blue. By double-tapping an item in the List/Bar/LED window, a window pops up that shows additional information on the selected item and gives the option to inhibit, acknowledge or reset this input. Tapping on the shown chart enlarges the chart to full screen. Tapping again reduces the size again.

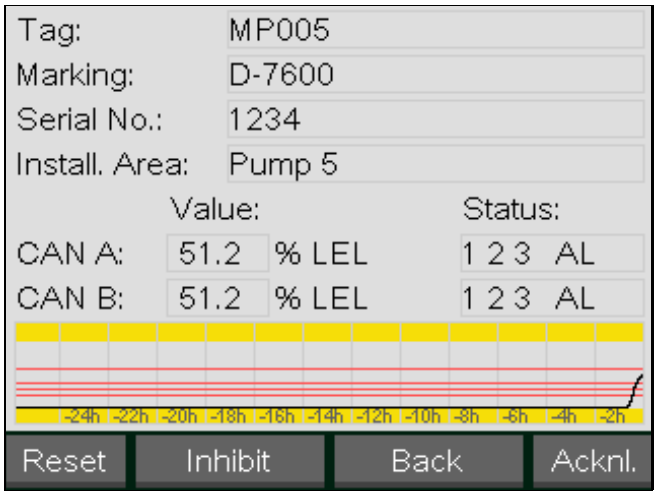

Fig. 6 Measuring information

Using the reset button allows to reset the alarms locally. If the connected detector allows a remote reset, the system will request whether this reset request shall be forwarded to the detector.

List Window

In this window, the current input data is displayed as a text list.

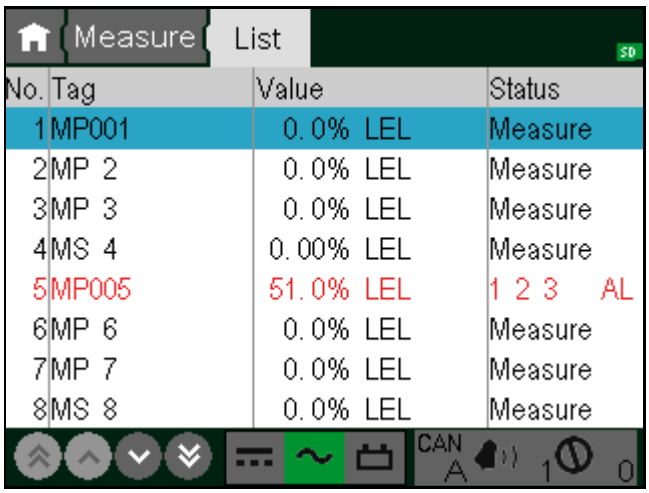

Fig. 7 List display (with a measuring point in Alarm)

The following input data is shown in this display:

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No.	The number of measured input in the system. This number is defined by the system configuration.
Tag	The customer defined input description.
Value	Numerical value and dimension of measurement. The measured values are displayed in intervals of 1 second, as long as they are within measuring range. If measuring range is exceeded, the highest value reached is retained. In case of signal fail or an alarm suppression (during the warm-up period of specific sensor types), dashes are displayed instead of the measured value.
Status	Current status of the input. The status is updated at intervals of 1 second. The following values can be displayed: • Measure • Calib. (Measurement point in calibration mode) • Inhibit (Measurement point inhibited) • Overflow (Measured value above full scale) • SignalErr. (Measured value below measurement range, or value missing) • SystemErr. (It was not possible for the MDO to get the measured value) • PA-failed (Preadjustment error) • For specific sensor types, text can be defined for special statuses. These are labelled with F: (e.g. F:OpticErr). • suppressed (Alarm suppressed during warm-up period of specific sensor types) • alarms 1, 2, 3 and 4 • Free (measuring point has not been parameterized)

LED Display

This window shows the status values of the inputs as LEDs. Under each LED column the corresponding input number is shown. In redundant systems, the information is shown separately for each CAN bus.

- LED off (grey): not inhibited, no alarm, no failure
- LED on: inhibited, alarm, failure

If an input is not configured no LEDs are displayed in that column.

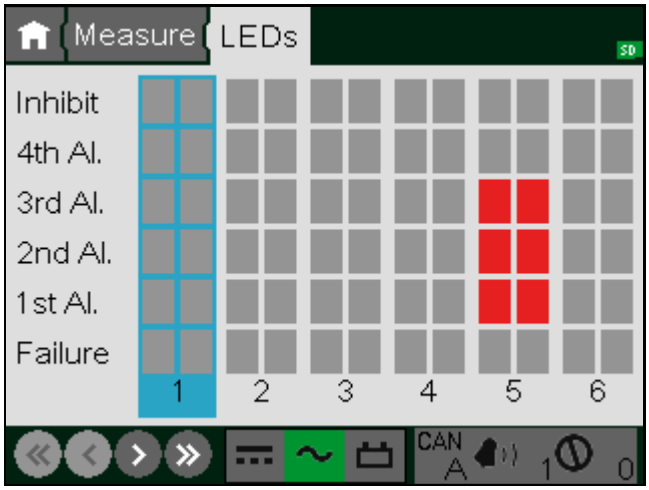


Fig. 8 LED Display

Bar Display

This display shows the measured values as vertical bars, where each bar represents the relative measurement value of an input with respect to full scale. The value range that can be displayed is 0–100% of full scale.

The corresponding input number is shown in each bar.

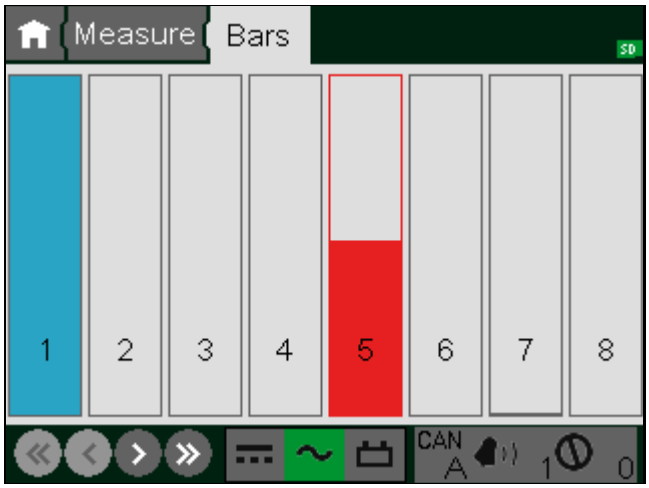


Fig. 9 Bar display

Measured values are displayed as solid bars. In error-free operation with no alarms, the bars are grey. Any alarm will cause the corresponding bar to change to red. When a status message occurs for an input, the bar is shown only as an outline with a status identification letter.

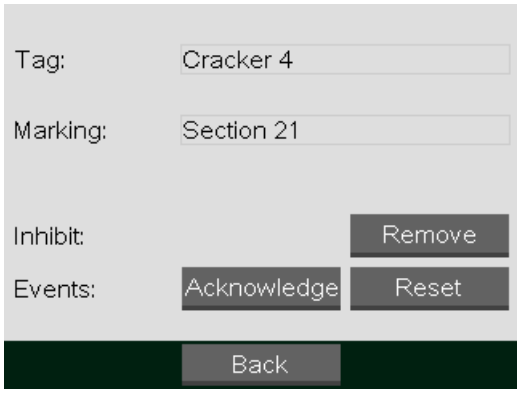
Letter	Meaning
I	Inhibit
C	Calibrating
F	Fault (measuring value below range, measuring value missing)
O	Measurement range exceeded (overflow)
S	Alarm suppressed (during the warm-up period of special sensor types)

If an input is not configured no bar is displayed in that column.

GB

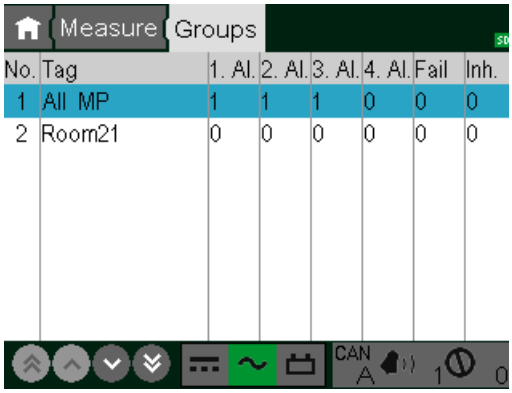
Group Information

Any item in the group list can be selected by tapping it. A selected item is highlighted in blue. By double-tapping an item, a window pops up that shows additional information on the selected item and gives the option to de-inhibit, acknowledge or reset all measuring points of this group.



Group View

In this window, the status of each group of measuring points is displayed as a text list.



The following status information is shown in this display:

No.	The number of the group in the system. This number is set by the system and cannot be changed by the user.
Tag	The customer defined group description.
n. Al.	Number of measuring points in this group which have the n-th alarm pending.
Fail	Number of measuring points in this group which have a signal fail pending or are suppressed.
Inh.	Number of measuring points in this group which are inhibited or in calibration mode.

GB

4 Entering System Parameters

The TFT display touch screen is used to select data for editing or to enter data. At the top of the screen is a breadcrumb menu where an item can be selected by simply tapping it. Tapping an item more left the current item, returns to the related menu level. Tapping on the house symbol returns to the root menu. Each menu level is represented by a mask with different icons for each menu entry which can be selected by tapping it.

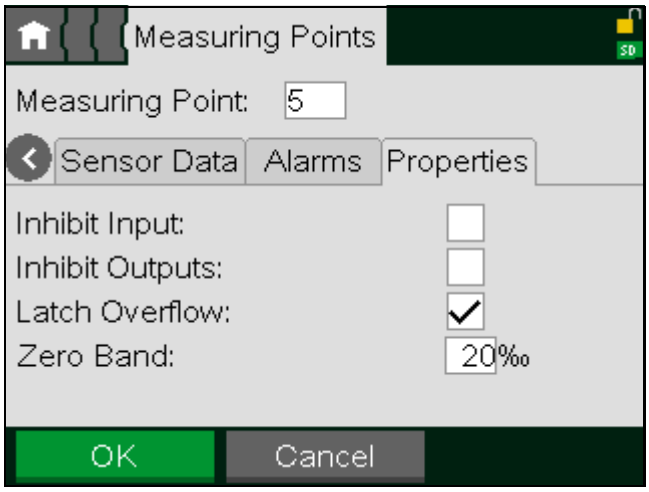


Fig. 10 Menu list and input

All types of controls are used by just touching them. The following types of interactive controls are available:

Buttons

Buttons trigger actions. They are activated by tapping them.

Selection Fields

Selection fields contain a list of possible values that can be selected. By tapping an item, a new window pops up and shows all available values. To select a new value, tap it and press the *OK* button.

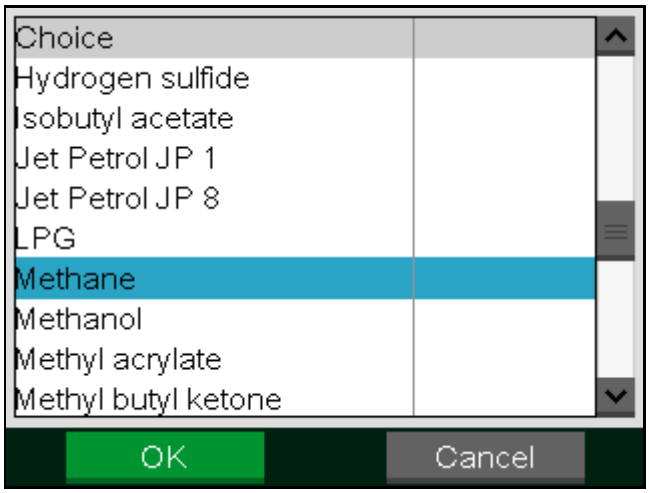


Fig. 11 Selection window

GB

Number Fields

Test Gas:	50.00	% LEL

Number fields can contain integers or decimal numbers that can be changed. When tapping the field, a new window pops up that allows a new value to be entered. To store a new value, press the *OK* button. It is not possible to store a value if it is not in the range indicated by the *min* and *max* values.

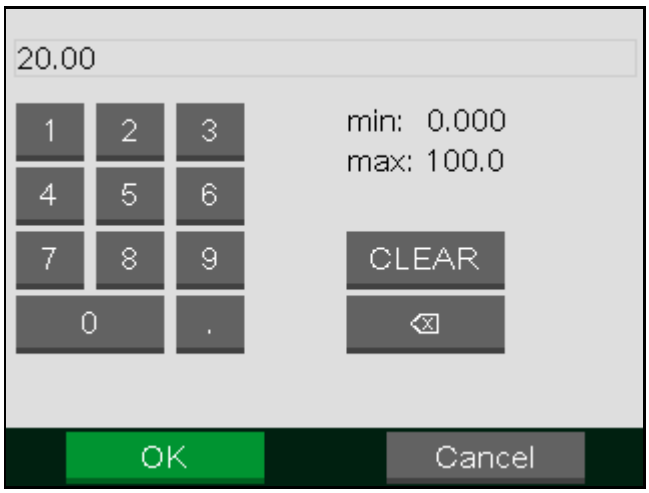


Fig. 12 Number input

Pressing the *CLEAR* button deletes the entered number. Pressing the ⌫ button deletes the last digit.

Text Fields

Tag:	MP005

Text fields can contain numbers, letters and special characters that can be changed by the operator. By tapping the field, a new text editor window pops up. To save the text, press the *OK* button.

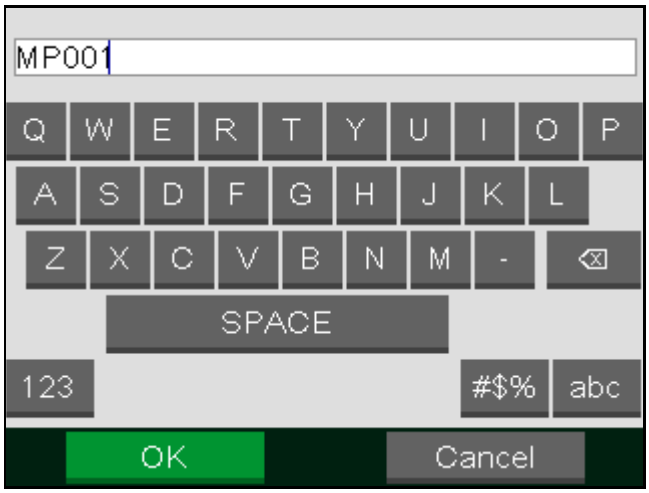


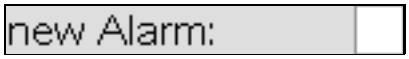
Fig. 13 Text editor window

The new character is always inserted at the position indicated by the cursor. To change the cursor position, tap the required new position. Pressing the ⌫ button deletes the character in front of the cursor.

Display Fields

Display fields display information that cannot be changed. They are not affected by tapping it.

Check Boxes



Check boxes represent options that can be enabled or disabled. Tapping the box switches between enabled and disabled status.
An enabled check box shows a cross. A disabled check box is empty.

Lists

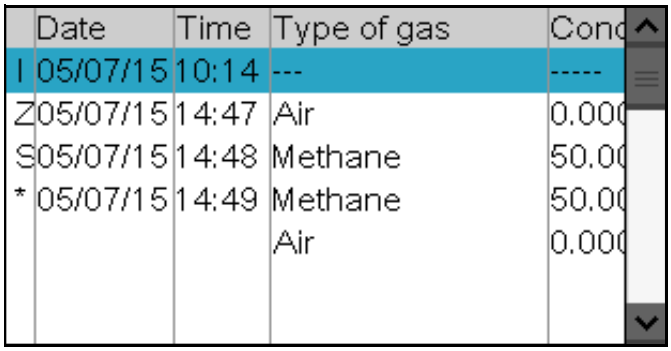


Fig. 14 List

Lists display information. No parameters can be entered. To scroll through the list, use the scrollbar or press down and drag the list in the desired direction (up/down or left/right).
In some lists (e.g. *SystemEventList*), additional information about the selected item can be displayed by double-tapping the item.

GB

4.1 Setup Menu

Using the *Setup* menu, the operator can set parameters for sensor inputs and relay outputs, as well as other system parameters. Although data can be retrieved and displayed, changing and activating of actions is possible only after entering the parameterization password or operating the key switch. The menu is structured as follows:

Setup 	Inputs & Outputs 	Measuring Points 	• Information • Sensor Data • Relays • Alarms • Properties
		Relay Outputs 	• Information • Sensor Conn. • Relay Conn.
		Groups 	• Information • Measuring Points
		Switch Inputs 	-
	Configuration 		• Properties • Modules • Measuring Points • Relay Outputs • Switch Inputs • Analog Outputs

GB

- **Setup**
  - System
    - Passwords
    - Display
    - Time
    - TCP/IP
    - Sensors
      - Head Params
      - Dimensions
      - Status Texts
      - Lin. Tables
      - Gas Names
      - Assignment
      - Ranges
      - Allocation
    - Logging
      - SD Card
      - Printer
  - Status

GB

4.1.1 Inputs and Outputs Menu

4.1.1.1 Measuring Points Mask

This window shows all parameters that describe a sensor input. Input parameters can be viewed and changed here.
The Measuring Point window is divided into four subwindows:

- Information
- Sensor data
- Alarms
- Properties

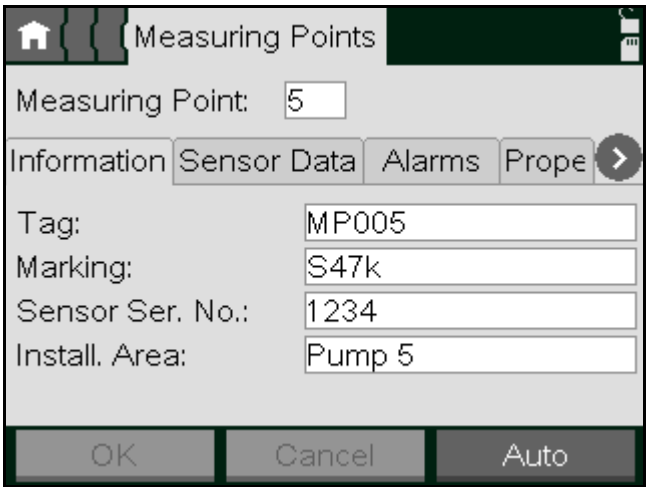


Fig. 15 Measuring Point Setup

The following paragraphs describe the functions of the individual window fields and buttons. The first fields described are identical in all subwindows.

All parameter changes using the window fields described below apply to the inputs selected in that field.

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Field	Field Type	Function
Measuring Point	Selection field	List of all configured sensor inputs. If an input is displayed that has not yet been set up, the settings from the last input setting remain or default values are used as the preliminary settings for the input of certain fields. This field can be accessed without a key switch or password if an input is entered for which input parameters have already been set. If a number is entered that has not been used before, authorization with a password or key switch is required.
Information, Sensor Data, Alarms and Properties	Button	Press this button to display the corresponding subwindow.
OK	Button	Tap this button to accept the settings entered in all subwindows for the selected input. After tapping the button, the parameters are immediately checked to see if they are valid. If the parameters are valid, they become part of the system's parameter set. If they are not valid, a warning appears.
Cancel	Button	Press this button to discard the settings entered in all subwindows for the selected input.
Auto	Button	Using this button, certain fields are filled with data that is automatically detected, (i. e. read-out via HART). The auto button must be pressed on each sub-window separately.

Sensor Data Subwindow

The *Sensor data* subwindow contains settings for the sensor at the selected input.

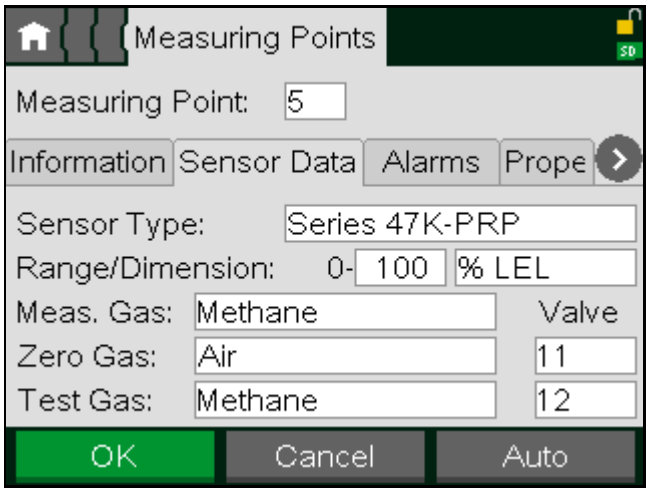

Fig. 16 "Sensor data" subwindow

GB

Field	Field Type	Function
Sensor Type	Selection, empty by default	Contains a list of supported input device types. Set the type of device used for the selected input.
Range	Selection, default: 100	Contains a list of supported measurement ranges. Set the measurement range that applies for the selected input.
Dimensions	Selection, default: %LEL	Contains a list of supported measurement dimensions. Set the measurement dimension for the selected input.
Meas. Gas	Selection, empty by default	Contains a list of supported gases. Set the gas to be measured with the sensor for the selected input.
Zero Gas	Selection, empty by default	Contains a list of 'Zero' gases used to calibrate the zero-point of the gas sensors. Set the zero gas that will be used to calibrate the gas sensor for the selected input.
(Zero Gas) Valve No.	Selection, empty by default	Contains a list of available outputs that can be used as zero gas valve output. This valve will be used during the calibration of the input. If no valve should be used, select *free*.
Test Gas	Selection, empty by default	Contains a list of supported 'Test gases' to calibrate the span-point of the sensors. Set the test gas that will be used to calibrate the sensor at the selected input.
(Test Gas) Valve No.	Selection, empty by default	Contains a list of available outputs that can be used as test gas valve output. This valve will be used during the calibration of the input. If no valve should be used, select *free*.
Auto	Button	Using this button, certain fields are filled with data that is automatically detected, (i. e. read-out via HART). The auto button must be pressed on each sub- window separately.

Alarms Subwindow

Alarms can be latching or non-latching (also see Measuring Points submenu).

Non-latching alarms:
When a signal exceeds the alarm threshold, a new alarm is triggered and the corresponding LED flashes at a frequency of 0.5 Hz. Pressing the ACKNL (acknowledge) key makes the LED change to 'steady state'. When the signal is below the alarm threshold, the LED will turn off, regardless of whether the alarm has been acknowledged or not. For non-latching alarms, the RESET key has no effect.

Latching alarms:
When a signal exceeds the alarm threshold, a new alarm is triggered and the corresponding LED flashes at a frequency of 0.5 Hz. Pressing the ACKNL (acknowledge) key makes the LED change to 'steady state'. When the signal no longer exceeds the alarm threshold, the LED remains in 'steady state' if the alarm has been acknowledged, or in the 'flashing state' if the alarm has not been acknowledged. If the signal no longer exceeds the alarm threshold and the alarm has been acknowledged, the LED is extinguished by pressing the RESET key. If the signal still exceeds the alarm threshold, pressing RESET has no effect.
In the *Alarms* subwindow, parameters can be set for up to four alarm levels for the selected input. A limit value can be set for each alarm to trigger either on a rising or falling input signal. In addition, relay outputs can be selected to operate if an alarm occurs. For every alarm, *latching* or *non-latching* parameters can be set.

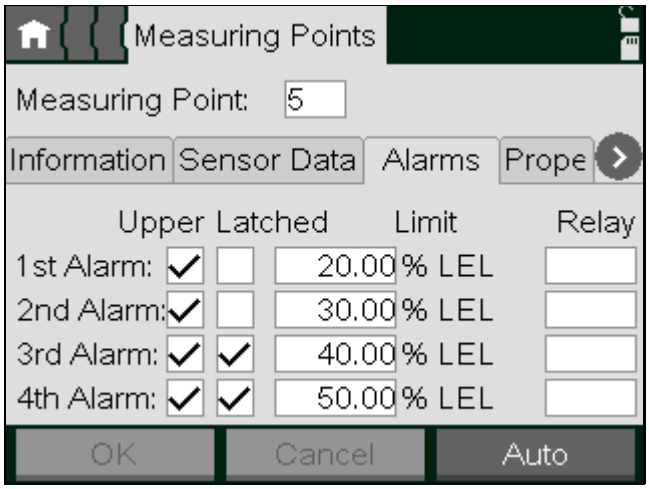

Fig. 17 "Alarms" sub-window

Field	Field Type	Function
Upper (Rising/ Falling Alarm)	Check Box, set by default	For each alarm, this check box sets the alarm to trigger when the signal is rising or falling. If this box is checked it is a rising alarm, if not checked, it is a falling alarm.
Latched	Check Box, not set by default	The alarm is latching if the box is checked, if the box is not checked, it is non-latching. This parameter has an effect on the behaviour of the MDO front panel LEDs, on the information in the *Measure* menu, and on the relay outputs assigned to an alarm.
Limit	decimal number, range is selected range of measuring point; 20, 30, 40, 50 by default	A limit value can be set for each alarm of the selected input, to trigger on either a rising or falling input signal. This limit value can be set in a range from 0 till the range value set in the sub-window *Sensor Data*. It is also possible to deactivate an alarm: Press the *Clear* button. A message box appears. Confirm with *OK* to delete the contents of the field.
Relay	Selection, cleared by default	These fields contain a list of available relay outputs. The relay outputs that will be used for the individual alarms at the selected input can be set here. After selecting a relay output, the relay output assignment window opens up.
Auto	Button	Using this button, certain fields are filled with data that is automatically detected, (i. e. read-out via HART). The auto button must be pressed on each sub-window separately.

Properties Subwindow

The Properties subwindow contains behavioral data on the selected input.

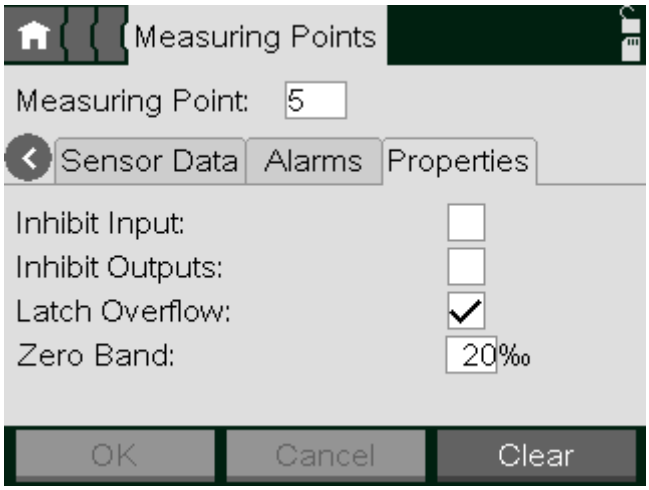

Fig. 18 "Properties" subwindow

Field	Field Type	Function
Inhibit Inputs	Check Box, not set by default	If enabled, the selected input cannot trigger alarms.
Inhibit Outputs	Check Box, not set by default	**If enabled, assigned outputs will not be activated in the event of an alarm or failure of selected measuring points!** During a multiple assignment (Voting), the corresponding measuring point is ignored when assessing the status. If enabled for at least one of the measuring points, the inhibit LED on the MDO as well as the common alarm relay 'Inhibit' starts flashing with a frequency of 0.5 Hz.
Latch Over-flow	Check Box, set by default	If enabled, overflows are latched. This option can not be disabled for passive sensors.
Zero Band	decimal number, range is 0..50‰; 20‰ by default	Defines the size of a window around 0 where all measuring values will be displayed as 0.
Clear	Button	Press this button to delete the parametrization of the selected input. Default values are used as the preliminary settings. The delete function will not work if the input is being calibrated or linked with a relay output.

4.1.1.2 Relay Output Assignment Window

This is not a subwindow of the Measuring Point menu, but an independent window that can only be reached from the Measuring Point menu. It is used to assign relay outputs to the input selected in the Measuring Point menu. This window also provides the same function as the *Relay Output* window.

The top three rows of the menu cannot be accessed here and are only shown for information. The behavior of a relay output depends on its parameter settings and the settings of the appropriate measuring points.

GB

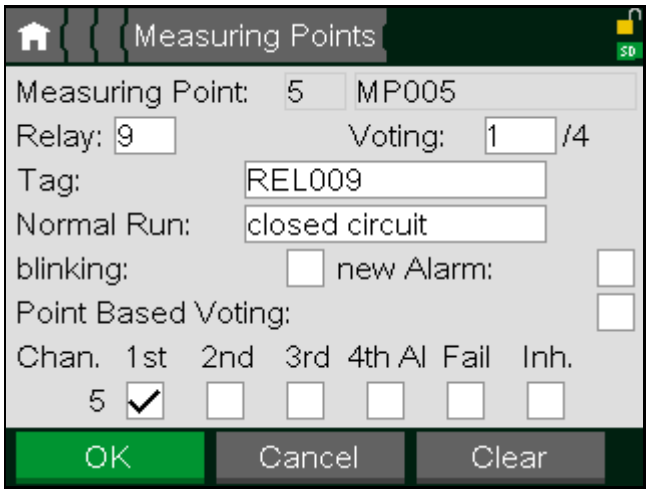

Fig. 19 Relay output assignment

The functions of the individual window elements are described below:

All parameter changes using the menu elements described below apply to the relay output selected in the *Relay* field.

Field	Field Type	Function
Relay	Selection	Contains a list of all available relay outputs. After an output number is selected, the rest of the window is filled, if settings have already been entered for that output. If an output number is selected that has not been configured before, the settings from the last displayed output remain and are used as the preliminary settings for the new output. This makes it easy to copy the settings from one output to another. If an output is displayed that has not yet been configured, default values are used as the preliminary settings. This input field can be accessed without a key switch or password if an output has been selected for which parameters have already been set. If a number is entered that has not been used before, authorization with a password or key switch is required. When first opened, the field contains the relay output that was last selected in the Measuring Point window.
Tag	text, 10 characters; empty by default	Enter a customer-specific designation for the selected relay output.
Normal run	Selection, default is closed-circuit	Set the operating mode for the selected relay output: • Closed circuit (normally energized): The relay coil is energized in the no alarm status and is de-energized in the alarm status. • Open circuit (normally de-energized): The relay coil is de-energized in the no alarm status and is energized in the alarm status.
blinking	Checkbox, not set by default	If enabled, the relay flashes at a frequency of approx. 0.5 Hz when activated until the alarm is acknowledged. This function doesn't work combined with the inhibit condition.

GB

Field	Field Type	Function
New Alarm	Checkbox, not set by default	If enabled, the relay output selected can be set to the status defined by the input field Normal Run by acknowledging the selected conditions, even if the conditions are still pending.
Point based voting	Checkbox, not set by default	If enabled, the counting for the voting is done by counting the effected measuring points instead of the effected conditions.
Voting (Alarm Logic)	Integer, range is 1 to number of selected conditions; 1 by default	The value entered here applies to the configuration conditions described above. Optional status combinations (alarm, fail, and inhibit) can be formed when the selected relay output is configured. The number value selected here determines how many of the conditions configured in the control boxes must be met for the selected relay output to be switched. The number of conditions entered in the check boxes is displayed in the field beside the voting to be configured. The following types of links can be formed in this manner: **Single link: (1-out-of-1):** Exactly one condition is set, and the value of 1 is entered as the voting. **“OR” link: (1-out-of-m)** Multiple conditions are set, and the value of 1 is entered as the voting, i.e., if any one or more of the set conditions are met, the relay output will be switched. Parameters for a global alarm or common alarms can be set in this manner. **“AND” link: (m-out-of-m)** The value entered for the voting corresponds to the number of set conditions, i.e. all of the set conditions must be met for the relay output to be switched. **Voting link: (n-out-of-m)** If ‘m’ conditions are set, and the value of ‘n’ is entered as the voting, then the selected relay output will only be switched if ‘n’ out of the ‘m’ conditions are met.
		After each change of the voting conditions, the complexity of the alarm logic is checked. If a certain level is exceeded, a warning will be displayed or eventually the changes will be rejected.
Al. 1-4 (1st-4th Alarm)	Checkbox, not set by default	Enable to select the alarms that will cause the selected relay output to trigger for the input shown in the *Chan.* column.
Fail	Checkbox, not set by default	If enabled, the selected relay output is switched when an error (fault) occurs for the input displayed in the *Chan.* column.
Inhibit	Checkbox, not set by default	If enabled, the selected relay output is switched when the input displayed in the *Chan.* column is inhibited.
OK	Button	Tap this button to accept the settings entered for the selected relay output. After tapping the button, the parameters are immediately checked to see if they are valid. If the parameters are valid, they become part of the system’s parameter set. If they are not valid, a warning appears.
Cancel	Button	Pressing this button discards the settings entered for the selected relay output.
Clear	Button	Pressing this button deletes all of the parameters for the selected relay output. The output then returns to the status it was before it was set up the first time.

Field	Field Type	Function
New Alarm	Checkbox, not set by default	If enabled, the relay output selected can be set to the status defined by the input field Normal Run by acknowledging the selected conditions, even if the conditions are still pending.
Point based voting	Checkbox, not set by default	If enabled, the counting for the voting is done by counting the effected measuring points instead of the effected conditions.
Voting (Alarm Logic)	Integer, range is 1 to number of selected conditions; 1 by default	The value entered here applies to the configuration conditions described above. Optional status combinations (alarm, fail, and inhibit) can be formed when the selected relay output is configured. The number value selected here determines how many of the conditions configured in the control boxes must be met for the selected relay output to be switched. The number of conditions entered in the check boxes is displayed in the field beside the voting to be configured. The following types of links can be formed in this manner: **Single link: (1-out-of-1):** Exactly one condition is set, and the value of 1 is entered as the voting. **“OR” link: (1-out-of-m)** Multiple conditions are set, and the value of 1 is entered as the voting, i.e., if any one or more of the set conditions are met, the relay output will be switched. Parameters for a global alarm or common alarms can be set in this manner. **“AND” link: (m-out-of-m)** The value entered for the voting corresponds to the number of set conditions, i.e. all of the set conditions must be met for the relay output to be switched. **Voting link: (n-out-of-m)** If ‘m’ conditions are set, and the value of ‘n’ is entered as the voting, then the selected relay output will only be switched if ‘n’ out of the ‘m’ conditions are met.
		After each change of the voting conditions, the complexity of the alarm logic is checked. If a certain level is exceeded, a warning will be displayed or eventually the changes will be rejected.
Al. 1-4 (1st-4th Alarm)	Checkbox, not set by default	Enable to select the alarms that will cause the selected relay output to trigger for the input shown in the *Chan.* column.
Fail	Checkbox, not set by default	If enabled, the selected relay output is switched when an error (fault) occurs for the input displayed in the *Chan.* column.
Inhibit	Checkbox, not set by default	If enabled, the selected relay output is switched when the input displayed in the *Chan.* column is inhibited.
OK	Button	Tap this button to accept the settings entered for the selected relay output. After tapping the button, the parameters are immediately checked to see if they are valid. If the parameters are valid, they become part of the system’s parameter set. If they are not valid, a warning appears.
Cancel	Button	Pressing this button discards the settings entered for the selected relay output.
Clear	Button	Pressing this button deletes all of the parameters for the selected relay output. The output then returns to the status it was before it was set up the first time.

4.1.1.3 Relay Outputs Mask

Parameter values for relay outputs can be viewed and changed here.
The functions of window are similar to the *Relay Output* assignment window described in the previous section. There, starting from a particular input, a connection to a relay output was made. In this menu, the setting conditions are configured starting from a particular relay output.
The behaviour of a relay output depends on its parameter settings and the settings of the appropriate measuring points.

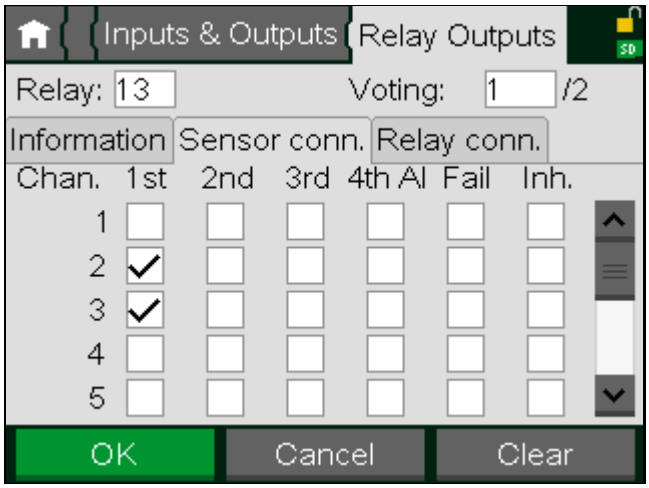

Fig. 20 Relay output

The Relay Outputs window is divided into three subwindows:

- Information
- Sensor connections
- Relay connections

The following paragraphs describe the functions of the individual window fields and buttons. The first fields described are identical in all three subwindows.

All parameter changes using the menu elements described below apply to the relay output selected in the *Relay* field.

Field	Field Type	Function
Relay	Selection	Contains a list of available relay outputs. As the first 8 relay outputs of the system are tied to the common messages, the first relay output which can be configured is No. 9. After an output number is selected, the rest of the window is filled, if settings have already been entered for that output. This input field can be accessed without a key switch or password if an output is selected for which parameters have already been set. If an output is selected that has not been used before, authorisation with password or key switch is required. If an output is displayed that has not yet been configured, default values are used as the preliminary settings for the certain fields. This makes it easy to copy the settings from one output to another.

GB

Field	Field Type	Function
Voting (Alarm Logic)	Integer	The value entered here applies to the configuration conditions described above. Optional status combinations (alarm, fail, inhibit, calib, suppressed) can be formed when the selected relay output is configured. The number value selected determines how many of the conditions configured in the check boxes must be met for the selected relay output to be switched. The number of conditions entered in the check boxes is displayed in the field beside the voting to be configured. The following types of links can be formed in this manner: **Single link: (1-out-of-1):** Exactly one condition is set, and the value of 1 is entered as the voting. **“OR” link: (1-out-of-m)** Multiple conditions are set, and the value of 1 is entered as the voting, i.e., if any one or more of the set conditions are met, the relay output will be switched. Parameters for a global alarm or common alarms can be set in this manner. **“AND” link: (m-out-of-m)** The value entered for the voting corresponds to the number of set conditions, i.e. all of the set conditions must be met for the relay output to be switched. **Voting link: (n-out-of-m)** If ‘m’ conditions are set, and the value of ‘n’ is entered as the voting, then the selected relay output will only be switched if ‘n’ out of the ‘m’ conditions are met.
		After each change of the voting conditions, the complexity of the alarm logic is checked. If a certain level is exceeded, a warning will be displayed or eventually the changes will be rejected.
OK	Button	Tap this button to accept the entered settings for the selected relay output. After tapping the button, the parameters are immediately checked to see if they are valid. If the parameters are valid, they become part of the system’s parameter set. If they are not valid, a warning appears.
Cancel	Button	Tapping this button cancels the settings entered for the selected relay output.
Clear	Button	Tapping this button deletes all of the parameters for the selected relay output. The output then returns to the status it had before being set up the first time. Default values are used as the preliminary settings for the input of certain fields.

GB

Information Subwindow

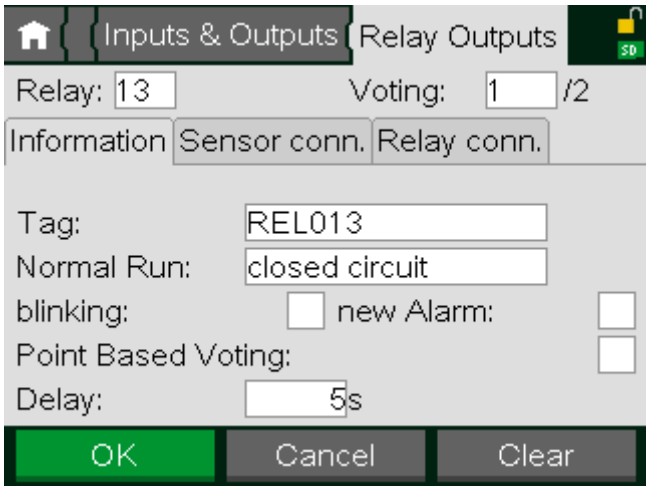

Fig. 21 Information subwindow

Field	Field Type	Function
Tag	Text, 10 characters; empty by default	Enter a customer-specific designation for the selected relay output.
Normal Run (Normally energised/Normally de-energised)	Selection, default is closed-circuit	Set the operating mode for the selected relay output: • Normally energised (*closed circuit*): The relay coil is energised in the no alarm status and is de-energised in the alarm status. The output delivers in the set-condition (Alarm, Failure) a LOW-Signal, this is called a connected relay is not energised. (The Normally energised principle) • Normally de-energised (*open circuit*): The relay coil is de-energised in the no alarm status and is energised in the alarm status. The output delivers in the set-condition (Alarm, Failure) a HIGH-Signal, this is called a connected relay is energised. (The Normally de-energised principle)
blinking	Checkbox, not set by default	If enabled, the relay flashes at a frequency of approx. 0.5 Hz when activated until the alarm is acknowledged. This function doesn't work combined with the inhibit condition.
Point based voting	Checkbox, not set by default	If enabled, the counting for the voting is done by counting the effected measuring points instead of the effected conditions.
New Alarm	Checkbox, not set by default	If this field is set, the relay output selected can be set to the status defined by the input field Normal Run by acknowledging the selected conditions, even if the conditions are still pending.
Delay	Integer, Range is 0 to 10; 0 by default	Defines a delay between the occurence of the switching conditions for this output and the actual switching of the output.

Time delays for relays should not be used for safety-relevant purposes. If the use cannot be avoided, the minimum possible value for the given application must be set.

GB

Sensor Connections Subwindow

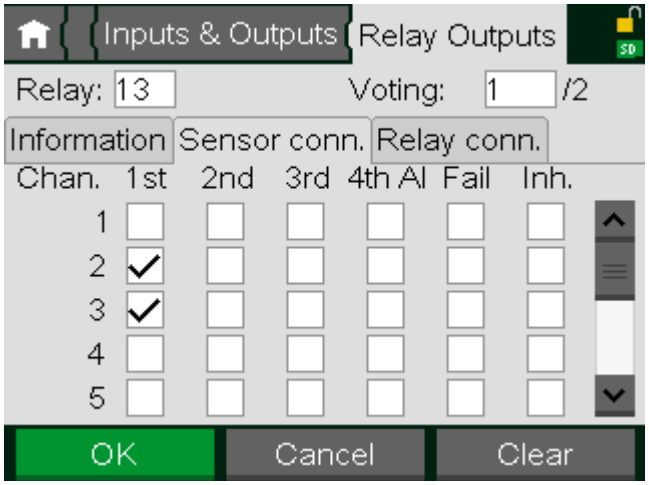

Fig. 22 Sensor connections subwindow

Field	Field Type	Function
Al. 1-4 (1st-4th Alarm)	Check box, not set by default	Select the alarms that will cause the selected relay output to be activated, for the input shown in the *channel* column in the specific line.
Fail	Check box, not set by default	If this condition is set, the selected relay output is activated when an error (fault) occurs for the input shown in the *channel* column in the specific line.
Inhibit	Check box, not set by default	If this condition is set, the selected relay output is activated when the input shown in the *channel* column in the specific line is inhibited.
Voting (Alarm Logic)	Integer	The value entered here applies to the configuration conditions described above. Optional status combinations (alarm, fail, inhibit, calib, suppressed) can be formed when the selected relay output is configured. The number value selected determines how many of the conditions configured in the check boxes must be met for the selected relay output to be switched. The number of conditions entered in the check boxes is displayed in the field beside the voting to be configured. The following types of links can be formed in this manner: **Single link: (1-out-of-1):** Exactly one condition is set, and the value of 1 is entered as the voting. **“OR” link: (1-out-of-m)** Multiple conditions are set, and the value of 1 is entered as the voting, i.e., if any one or more of the set conditions are met, the relay output will be switched. Parameters for a global alarm or common alarms can be set in this manner. **“AND” link: (m-out-of-m)** The value entered for the voting corresponds to the number of set conditions, i.e. all of the set conditions must be met for the relay output to be switched. **Voting link: (n-out-of-m)** If ‘m’ conditions are set, and the value of ‘n’ is entered as the voting, then the selected relay output will only be switched if ‘n’ out of the ‘m’ conditions are met.
		After each change of the voting conditions, the complexity of the alarm logic is checked. If a certain level is exceeded, a warning will be displayed or eventually the changes will be rejected.

GB

Relay Connections Subwindow

Maximum three relays can be connected in series.The acknowledgment status will be handed over from the child relay to the parent relay. The blinking and new alarm configuration of the child relay are not relevant here.

Relays are treated as one event in voting, regardless of the settings in point based voting.

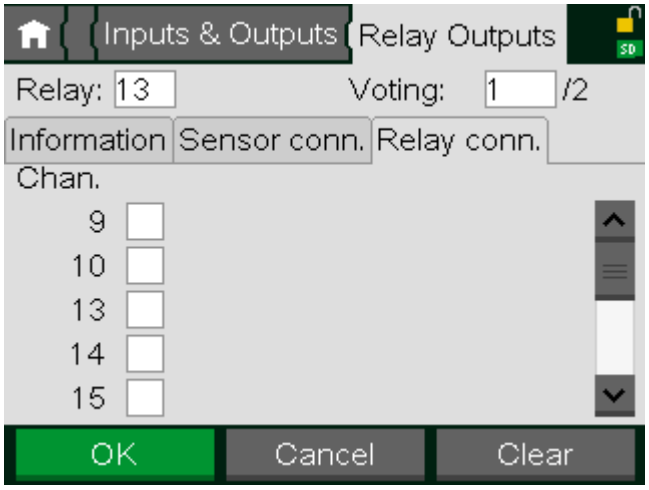

Fig. 23 Relay connections subwindow

Field	Field Type	Function
Channel	Checkbox, not set by default	If this condition is set, the selected relay output is activated when the switching condition occurs for the relay shown in the channel column in the specific line.

4.1.1.4 Groups Mask

Parameters for groups of measuring points can be viewed and changed here.The Groups window is divided into two subwindows:

- Information
- Measuring Points

The following paragraphs describe the functions of the individual window fields and buttons. The following fields described are identical in both subwindows:

Field	Field Type	Function
Group No.	Selection Field	List of all available groups. After a group number is selected, the available space of the window is filled with data.
OK	Button	Press this button to accept the settings entered in both subwindows for the selected group. After tapping the button, the parameters are immediately checked to see if they are valid. If the parameters are valid, they become part of the system's parameter set. If they are not valid, a warning appears.
Cancel	Button	Press this button to discard the settings entered in both subwindows for the selected group.
Clear	Button	Press this button to delete all parameters for the selected group. The group will then return to the status it had before being set up the first time.

GB

Information Subwindow

The *Information* subwindow contains general data of the selected group.

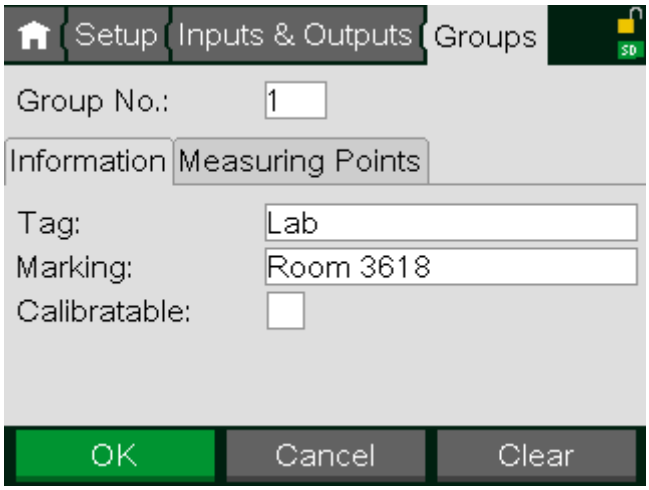

Fig. 24 Information subwindow

Field	Field Type	Function
Tag	Text, 10 characters; empty by default	Enter a customer specific designation for the selected group.
Marking	Text, 20 characters; empty by default	Enter a customer specific description for the selected group.
Calibratable	Check Box, not set by default	Setting this check box allows to use this group for group calibrations. A group can only be set as calibratable when ranges and dimensions of the measuring point belonging to this group are compatible.

Measuring Points Subwindow

The *Measuring Points* subwindow contains a list of measuring points belonging to this group. Each measuring point can belong to more than one group.

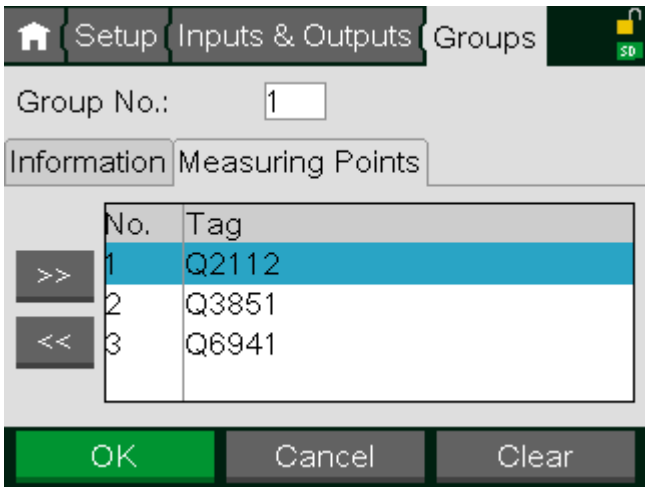

Fig. 25 Measuring points subwindow

Field	Field Type	Function
>>	Button	Opens a list of all measuring points. The selected measuring point is added to the group with *OK*.
<<	Button	Pressing this button deletes the measuring point currently selected in the list.

GB

Field	Field Type	Function
List	List	This list shows all measuring points currently belonging to this group.

4.1.1.5 Switch Inputs Mask

Parameters for switch inputs can be viewed and changed here.

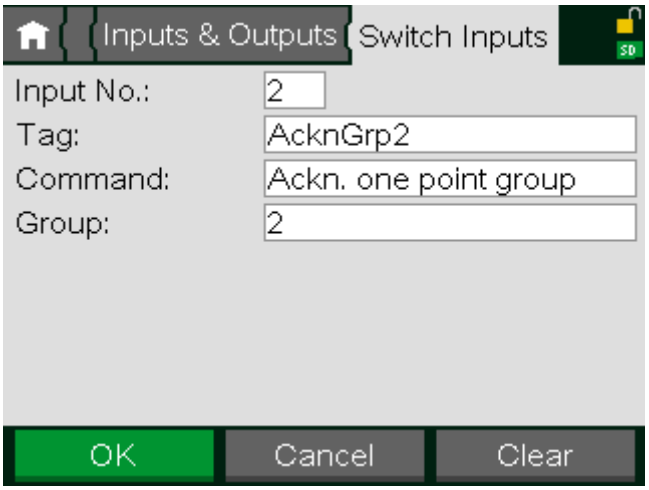

Fig. 26 Switch Inputs Window

Field	Field Type	Function
Input No.	Selection Field	List of all configured switch inputs. After a group number is selected, the rest of the window is filled with data.
Tag	Text input, 10 characters; empty by default	Enter a customer specific designation for the selected group.
Command	Selection Field	List of all available commands for switch inputs. Commands: reset and acknowledge of single measuring points, single measuring point groups, all events, power faults. Power fault has no effect in standard operation mode.
Group	Selection Field	List of all available entities (e.g. measuring points or groups) this command should be applied to.
OK	Button	Press this button to accept the settings entered for the selected switch input. After tapping the button, the parameters are immediately checked to see if they are valid. If the parameters are valid, they become part of the system's parameter set. If they are not valid, a warning appears.
Cancel	Button	Press this button to discard the settings entered for the selected switch input.
Clear	Button	Press this button to delete all parameters for the selected switch input. The switch input will then return to inactive status.

GB

4.1.2 Configuration Mask

To run the SUPREMA system properly, a valid configuration has to be created that matches the installed modules. This window is intended to view and to modify this configuration. Each change of the configuration needs a restart of the system to become valid.

Properties Subwindow

This window contains a name for the system and the basic operation mode of this system.

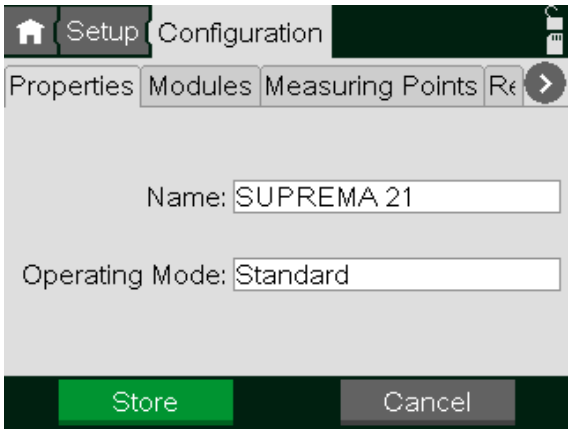

Fig. 27

Field	Field Type	Function
Name	Text, 20 characters; empty by default	This a name for the SUPREMA Touch system.
Operating Mode	Selection, Standard by default	The current operating mode of the SUPREMA Touch system. Only two operating modes are available: 'Standard' for all countries except China and 'GB16808-2008' which is only for use in China. All information in this manual, including the approval information, refers to the Standard operating mode.

Modules Subwindow

This window shows a list of modules installed in the system. This list must exactly match the real installation.

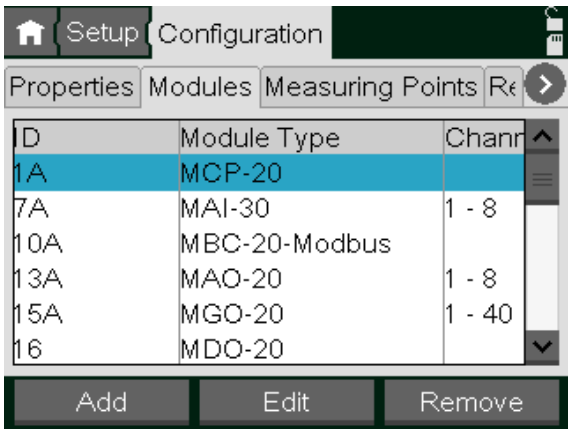

Fig. 28

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Field	Field Type	Function
List	List	This list shows all modules currently configured for the system.
Add	Button	Pressing this button allows to add a new module. First the type of the module has to be selected. Then the details window for this module pops up to make additional settings or changes. A new module can only be added behind existing modules of the same type.
Edit	Button	Pressing this button opens the details window for this module pops up to make additional settings or changes.
Remove	Button	Pressing this button removes the selected module from the configuration. I/O-modules can only be deleted if no parameterized inputs or outputs are mapped to this module.

The details window contains information related to each module.

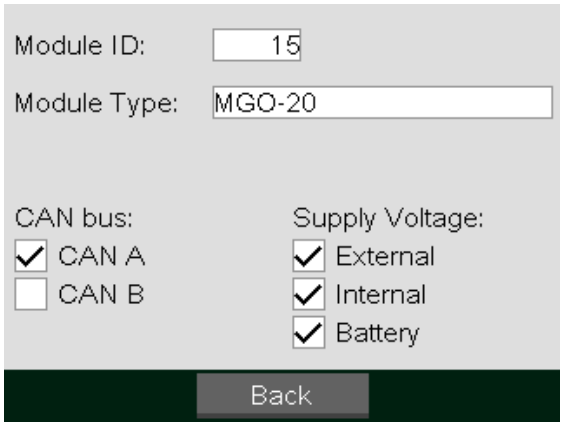

Fig. 29

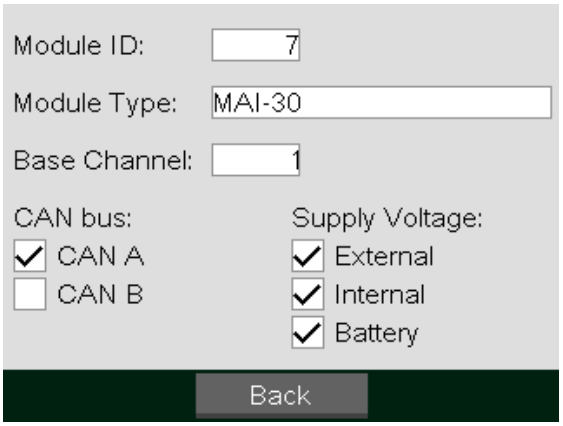

Fig. 30

Field	Field Type	Function
Module ID	Number Edit	This is the CAN bus ID of the module. This ID can only be changed to another value if the new value is not already used and if no mapping is influenced.
Module Type	Selection	This field contains the type of the module. The type can only be changed to compatible types (like external Gateway to MBC20-Modbus).
Base Channel	Number Edit	This field exists only for analog input modules. It contains the number of the first channel of the module. This number can only be changed to another value if the new range of channel starting with this number is free.
CAN A/ CAN B	Checkbox	These fields show whether CAN A and/or CAN B is used by this module.
External/ Internal/ Battery	Checkbox	These fields show which power supply input is used by this module. This setting is equal for all modules in the same rack. Changing this setting for one module will change the setting for all other modules in the same rack.

If the module type is changed from MDA to MAI30, the MDA will be removed and all classic MAI modules used with this MDA will be replaced with MAI30 modules.

GB

Measuring Points Subwindow

This window shows a list of all measuring points of the system and their mapping to channels of analog output modules.

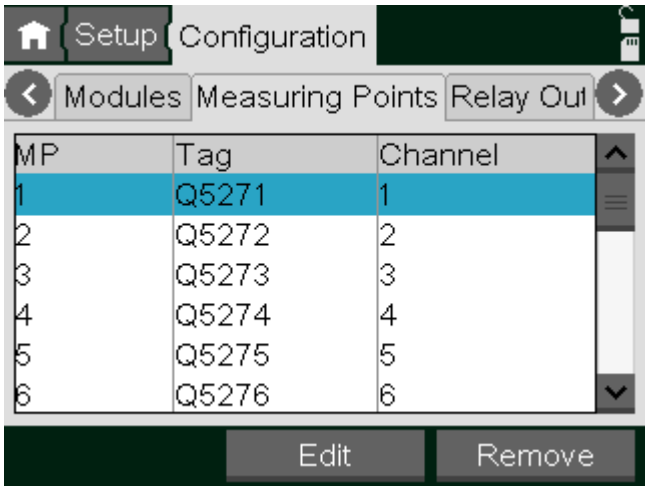

Fig. 31

Field	Field Type	Function
List	List	This list shows all measuring points and their mappings to analog outputs configured for the system. The entry 0 for the channel means, that this analog output is not mapped.
Edit	Button	Pressing this button opens a number edit window to modify the analog output channel to which the selected measuring point is mapped.
Remove	Button	Pressing this button removes the mapping for the selected measuring point.

Relay Outputs Subwindow

This window shows a list of all relay outputs of the system and their mapping to channels of relay output modules.

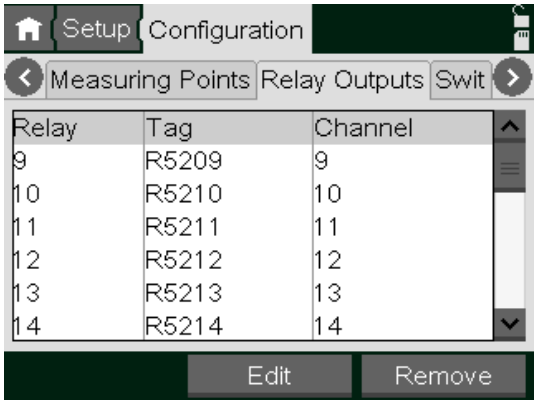

Fig. 32

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Field	Field Type	Function
List	List	This list shows all relay outputs and their mappings configured for the system. The entry 0 for the channel means that this relay output is not mapped.
Edit	Button	Pressing this button opens a number edit window to modify the channel to which the selected relay output is mapped.
Remove	Button	Pressing this button removes the mapping for the selected relay output. Mappings can only be deleted if the target is not parameterized.

Switch Inputs Subwindow

This window shows a list of all switch inputs of the system and their mapping to channels of switch input modules.

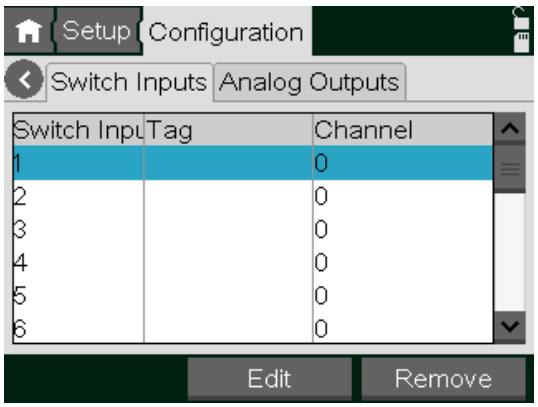

Fig. 33

Field	Field Type	Function
List	List	This list shows all switch inputs and their mappings configured for the system. The entry 0 for the channel means, that this switch input is not mapped.
Edit	Button	Pressing this button opens a number edit window to modify the channel to which the selected switch input is mapped.
Remove	Button	Pressing this button removes the mapping for the selected switch input. Mappings can only be deleted if the target is not parameterized.

Analog Outputs Subwindow

This window shows a list of all measuring points of the system and their mapping to channels of analog output modules.

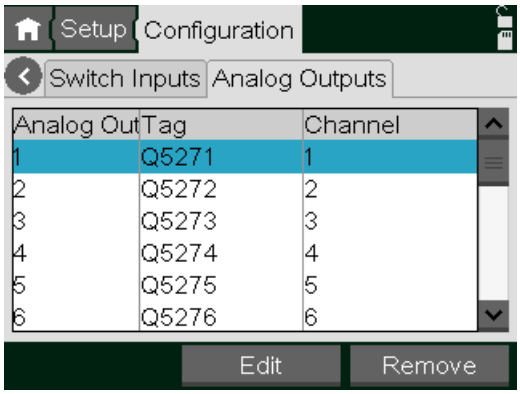

Fig. 34

GB

Field	Field Type	Function
List	List	This list shows all measuring points and their mappings to analog outputs configured for the system. The entry 0 for the channel means, that this analog output is not mapped.
Edit	Button	Pressing this button opens a number edit window to modify the analog output channel to which the selected measuring point is mapped.
Remove	Button	Pressing this button removes the mapping for the selected measuring point.

Information Subwindow

The *Information* subwindow contains general data on the selected input.

Field	Field Type	Function
Tag	text, 10 characters; empty by default	Enter a customer specific designation for the selected input
Marking	text, 20 characters; empty by default	Enter a customer specific description for the selected input.
Sensor Serial No.	text, 10 characters; empty by default	Enter serial number of the input device for the selected input.
Installation Area	text, 20 characters; empty by default	Enter a customer specific description of the installed location of the input device for the selected input.

4.1.3 System

4.1.3.1 Password Mask

This window displays parameters that affect the entire system.

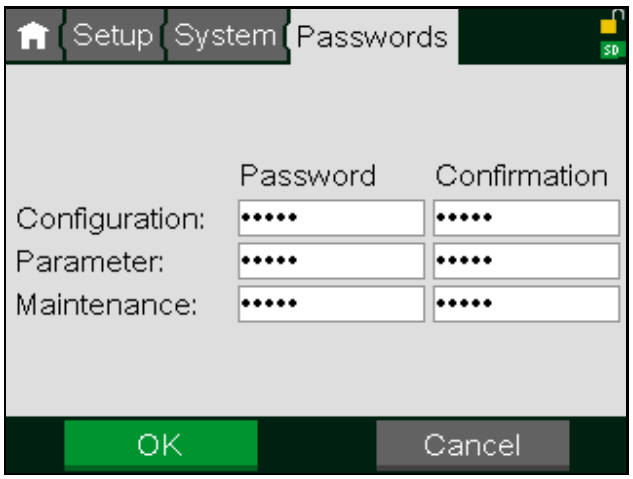

Fig. 35 Password

Field	Field Type	Function
Password/ Confirmation:	Text input, 8 characters; AUER by default	See chapter 2.8 "Safety Concept"
OK	Button	Tap this button to accept the settings entered. After the button is tapped, the parameters are immediately checked to see if they are valid. If the parameters are valid, they become part of the system's parameter set. If they are not valid, a warning appears.
Cancel	Button	Tapping this button cancels the settings entered.

4.1.3.2 Display Mask

This window displays parameters that affect the entire system.

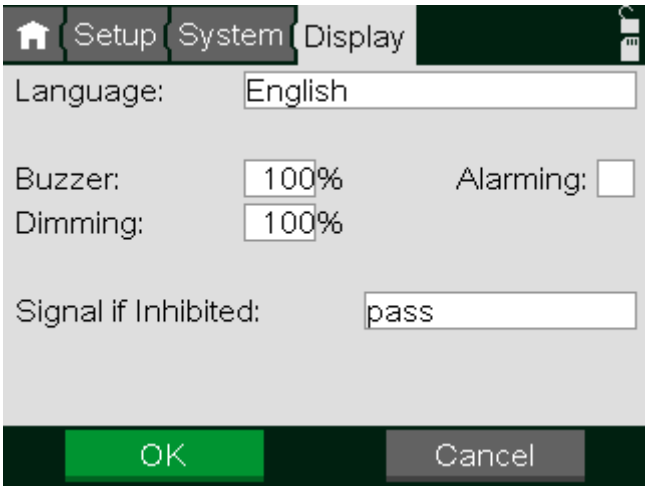

Fig. 36 Display

Field	Field Type	Function
Language	Selection, English by default	Set the language for the user interface (GUI).
Buzzer	Number Input, Range is 0 to 100; 100 by default	Sets the loudness of the internal beeper.
Dimming	Number Input, Range is 0 to 100; 100 by default	Sets the dimming of the display.
Signal if Inhibited	Selection, pass by default	If a MAO module is used to output sensor signals, there are three different ways of analogue signal behavior for inhibited inputs: • pass: The received measurement values are sent on. • hold: The last measured value before inhibiting occurred is retained. • maintain: The signal goes to the maintenance level (corresponds to 3.0 mA). The setting is essential for all measuring points in the whole system.
Alarming	Checkbox, not set by default	Activating this field activates the internal sounder as indication for alarms and signal fail conditions. Alarms will be indicated with a permanent sound. Signal fault will be indicated with an interrupted sound. Activating this function activates an automatic test of the internal sounder during startup. For a manual test refer to Section 6.7 "LED and Sounder Test".
OK	Button	Tap this button to accept the settings entered. After the button is tapped, the parameters are immediately checked to see if they are valid. If the parameters are valid, they become part of the system's parameter set. If they are not valid, a warning appears.
Cancel	Button	Tapping this button cancels the settings entered.

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4.1.3.3 Time Mask

This window displays the date and time of the system.

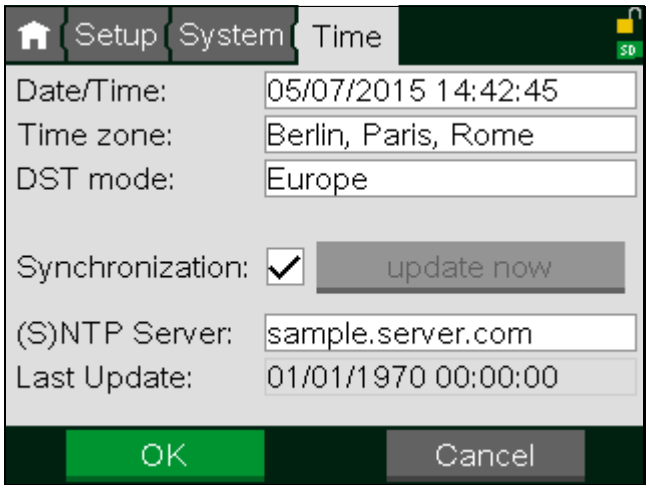
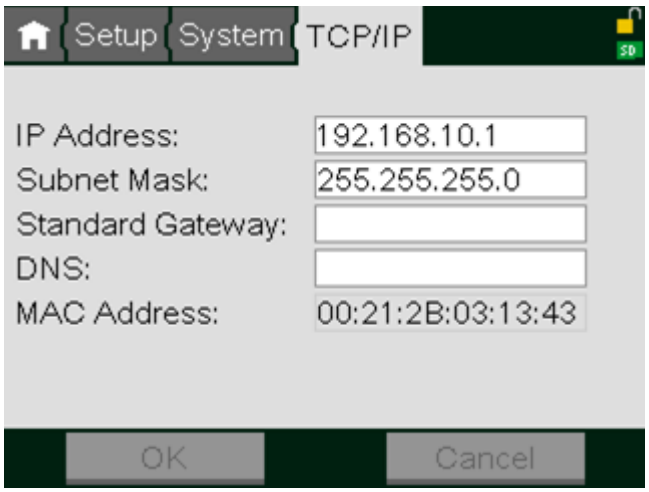


Fig. 37 Date/Time

Field	Field Type	Function
Date/Time	Date/Time input	Date and time are set by tapping the input field and entering the new date and time in the date/time field. After this window is closed, the new date and time is displayed, but it does not become valid until the (OK) button is tapped.
Time zone	Selection, UTC by default	Tap this field to select the time zone. The correct setting of the timezone is required for the automatic time synchronization function.
DST mode	Selection, none by default	Tap this field to select and activate the automatic adjustment for daylight saving time. This function works independent for the time synchronization, but the correct setting of is required for the automatic time synchronization function.
Synchroniza-tion	Checkbox, not set by default	Activating this field activates the automatic time synchroniza-tion.
Update now	Button	Tapping this button starts a time synchronization immediately.
(S)NTP Server	Text, 40 char-acters; empty by default	This field defines the time server to be used for automatic time synchronization. It is possible to define the time server using a IP address or a server name. When using a server name, a valid DNS server has to be set in the TCP/IP window.
Last update	Static	This field gives information about the last successful time synchronization.
OK	Button	Tap this button to accept the entered settings. After tapping the button, the parameters are immediately checked to see if they are valid. If the parameters are valid, they become part of the system's parameter set. If they are not valid, a warning appears.
Cancel	Button	Tapping this button cancels the settings entered.

4.1.3.4 TCP/IP Mask

Parameters for TCP/IP connections can be viewed and changed here. Contact the responsible IT department to get valid data if required.



Field	Field Type	Function
IP Address	IP input, 192.168.10.1 by default	This field shows and changes the IP address of the MDO.
Subnet Mask	IP input, 255.255.255.0 by default	This field shows and changes the subnet mask of the MDO.
Standard Gateway	IP input, empty by default	This field shows and changes the IP address of the standard gateway. The standard gateway is used by the MDO to access IP addresses outside the own subnet.
DNS	IP input, empty by default	This field shows and changes the IP address of a domain name server. The domain name server is used by the MDO to translate domain names into IP addresses.
MAC Address	Static	This field shows the MAC address of this device (MDO20).
Ok	Button	Press this button to accept the settings entered for the selected TCP/IP settings. After tapping the button, the parameters are immediately checked to see if they are valid. If the parameters are valid, they become part of the system's parameter set. If they are not valid, a warning appears.
Cancel	Button	Press this button to discard the settings entered for the TCP/IP settings.

4.1.3.5 Sensors Submenu

Through the submenu *Sensors*, the parameters of the predefined remote sensors can be viewed as well as set for some predefined parameter in specific ranges. The menu contains the following items described consecutively in this section:

- Head parameters
- Status texts
- Gas names
- Ranges
- Dimensions
- Lin.- tables
- Assignment
- Allocation

GB

Head Parameters

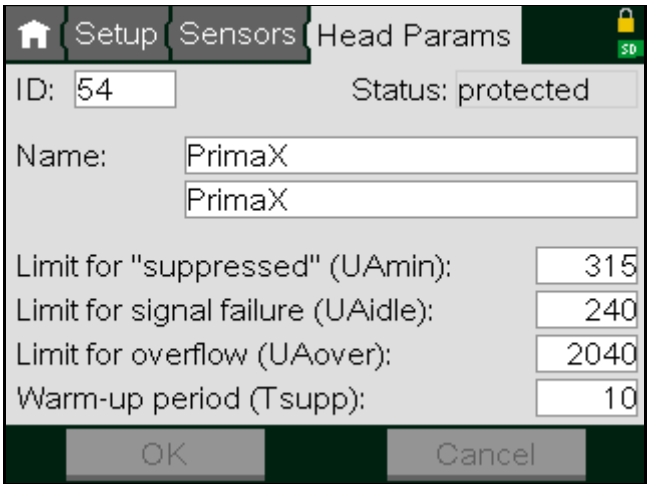


Fig. 38 Head parameter

This window displays the significant parameters of the remote sensors. During normal operation the SUPREMATouch software continuously checks the detector output signal sent to the SUPREMATouch. In case the detector output signal falls below UA_{min} an inhibit indication, and below UA_{idle} a fault indication will be set for this measuring point. In case the detector output signal exceeds UA_{over} an overflow will be indicated. Data fields that are not used for a specific remote sensor are empty.

It is possible to enter user specific data for some active remote transmitters (4–20 mA signal). For this purpose, the following fields can be changed: Name (English and local language), UA_{min}, UA_{idle}, UA_{over} and T_{supp}. The *ID* of modifiable remote sensors begins with the value *10000* and their status is displayed as *changeable*.

Field	Field Type	Function
ID (Remote sensor ID)	Selection	A remote sensor can be selected by its ID
Status (Status of this data cell)	Display	Displays the status of the cell used for data saving. If this status is *protected*, then no data can be changed and the following input fields are simply display fields.
2 x Name (Head name in English (upper) and local language (lower)	Text, 16 characters	In these fields, the name of the remote sensor is displayed in both supported languages. The remote sensor can be selected as *Sensor type* in the setting of the measuring points through these names. The user can freely define the names in changeable remote sensors. They must be unique, that is, no name can be given twice. If a name is given for only one language, the same name can also be used for the other language while saving it.
UA_{min} (Limit for "suppressed")	Number (integers) Adjusting range: 50–350	To leave empty, press clear This field displays the maximum signal UA for the status *suppressed*. Measuring values below this limit value are displayed as *suppressed*. If field is empty (tap *Clear* in the number input window), then this status will not be tested. This value can only be set for the three user-changeable data sets.

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Field	Field Type	Function
UA_{idle} (Limit for signal fail)	Number (integers) Adjusting range: 50–350, must be < UA_{min}	This field displays the maximum signal UA for the status *signal fail*. Measuring values below this limit value are displayed as *signal fail.* This value can only be set for the three user-changeable data sets.
UA_{over} (Limit for "overflow")	Number (integers) Adjusting range: 2000–2200	This value defines the sensor signal UA of the remote sensor for the measuring range overflow display. Measuring values above this value are displayed as *overflow*. This value can only be set for the three user-changeable data sets.
T_{supp} (Warm-up period)	Number (integers) Adjusting range: 10–300	The warm-up time in seconds can be set here. This specifies how long a sensor will remain in the warm-up status (display *suppressed*) after it has been switched on. This time is necessary because different sensors need a different length of time to warm up and the correct measuring value is displayed. This value can only be set for the three user-changeable data sets.
OK	Button	By tapping this button, the completed settings are applied to the selected head.
Cancel	Button	By tapping this button, the completed settings of the selected head are canceled.

Dimensions

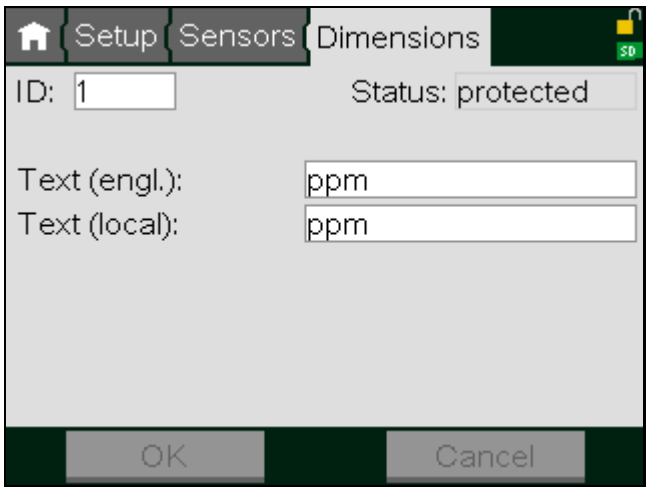

Fig. 39 Dimensions

Use this window to view dimensions provided and to adjust some predefined changeable dimensions.
Dimensions can be selected arbitrarily. Identical names are not allowed and will be rejected with the message: `Error: Name not unique!`

GB

Field	Field Type	Function
ID (ID of this Dimension)	Selection	A dimension can be selected by its ID.
Status (Status of this data cell)	Display	This field displays the status of the cell used for data saving. If the status is *protected*, then data cannot be changed and the following input fields are display-only fields.
Text (English)	Text, 5 characters	The English text for the dimension can be entered here.
Text (local)	Text, 5 characters	The text in local language for the dimension can be entered here.
OK	Button	By tapping this button, the completed settings are applied.
Cancel	Button	By tapping this button, the completed settings are cancelled.

Status Texts

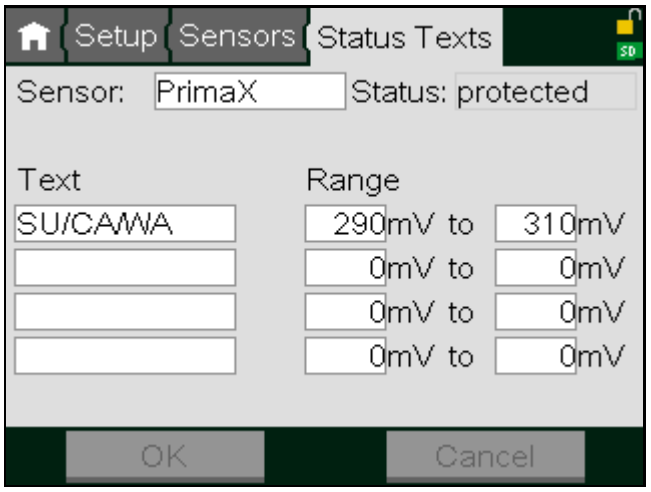

Fig. 40 Status texts

Use this window to define sensor type specific texts for specific signal ranges.
These are displayed in the measuring value list with a letter *F* prefix. (e.g. *F:OpticErr*). Texts can be defined for all remote sensors provided that ranges are specified for them. Texts can be defined arbitrarily, the same texts are allowed for more than one sensor.
In addition, the user can freely define the signal ranges in the range from 0–400 mV for changeable remote sensors. However, the signal ranges must not overlap.

Field	Field Type	Function
Sensor	Selection	The head, on which status texts should be put or for which it should be changed can be selected with this field.
Status (Status of this data cell)	Display	This field displays the status of the cell used for data saving. If this status is *protected*, then data cannot be changed and the following input fields are display-only fields.
Status text	Text, 8 characters	Texts displayed in the measuring value lists can be entered here. This text will be displayed if the measured value lies within the specified signal range.
Range	Number input This signal range can be set in a range from 0–400.	Lower and Upper limits of respective signal range. This is a display-only field if the status for this sensor is *protected*.

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Field	Field Type	Function
OK	Button	By tapping this button, the completed settings are applied to the selected head.
Cancel	Button	By tapping this button, the completed settings of the selected head are cancelled.

Linearity Tables

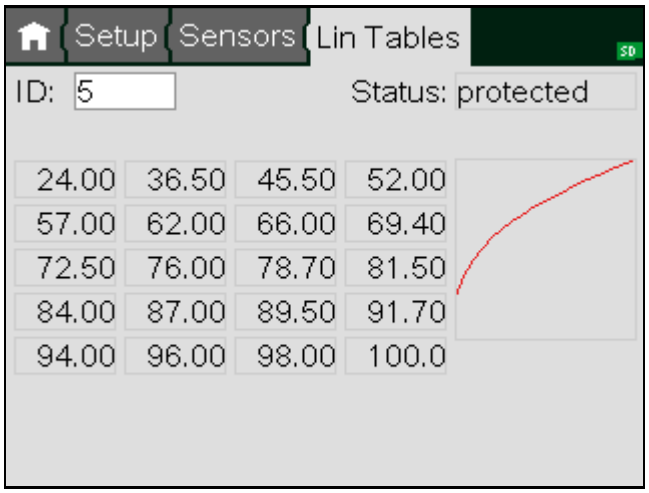

Fig. 41 "Lin. tables" window

Use this window to view provided linearisation tables.

Field	Field Type	Function
ID (ID of this linearizion table)	Selection	A linearizion table can be selected by its ID.
Status (Status of this data cell)	Display	Displays the status of the cell used for data saving. This status is always *protected* so the data cannot be changed and the following input fields are display-only fields.
Node	Number input (Locked)	Nodes are defined for each 5% increment along the X axis. The linearity curve is shown in the diagram on the right.

Gas Names

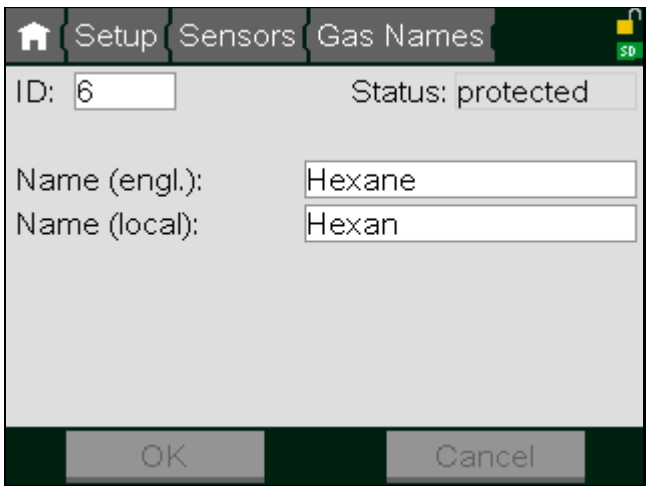

Fig. 42 Gas names

Use this window to view the provided protected gas names and to adjust some predefined changeable gas names.
User defined texts can be entered. Identical names are not allowed and will be rejected with the message `Error: Name not unique!`.

Field	Field Type	Function
ID (ID of this gas name)	Selection	A gas name can be selected by its ID.
Status (Status of this data cell)	Display	Displays the status of the cell used for data saving. If status is *protected*, then data cannot be changed and the following input fields are display-only fields.
Name (English)	Text, 20 characters	The English gas name can be entered here.
Name (local)	Text, 20 characters	The gas name in local language can be entered here.
OK	Button	By tapping this button, the completed settings for the selected gas name are applied.
Cancel	Button	By tapping this button, the completed settings for the selected gas name are cancelled.

Assignment

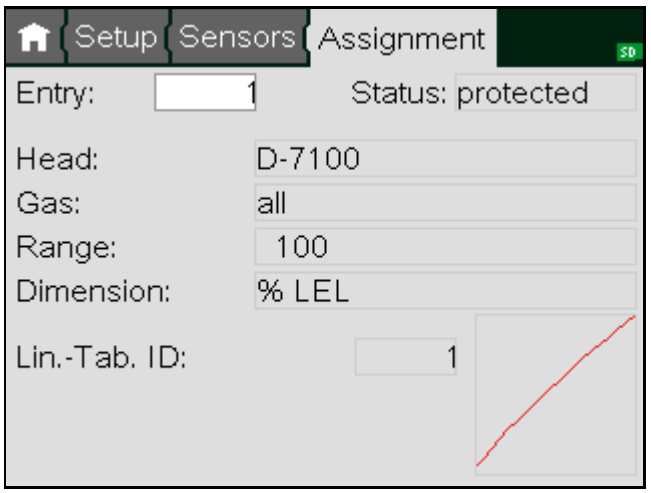

Fig. 43 "Assignment" window

Use this window to view assignments of the sensors, gases, ranges, dimensions and linearisation tables.
In the assignment window, all used entries are sorted in a descending sequence of their cell number. When the parameters for sensor, gas, measuring range and dimension match the values of the corresponding measuring point for the first time, the linearisation table to be used is assigned for the measuring point.

Field	Field Type	Function
Entry (Number of this cell)	Selection	An assignment entry can be selected by its cell through this field.
Status (Status of this data cell)	Display	Displays the status of the cell used for data saving. This status is always *protected* and so data cannot be changed.
Head ID and assignment	Display	Displays the remote sensor used in the selected assignment.

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Field	Field Type	Function
Gas ID and assignment	Display	Displays the gas name used in the selected assignment.
Range ID and assignment	Display	Displays measuring range used in the selected assignment.
Dimension ID and assignment	Display	Displays the dimension used in the selected assignment.
Lin. tab. ID	Display	Displays the linearisation curve of the selected assignment.

Measuring Ranges

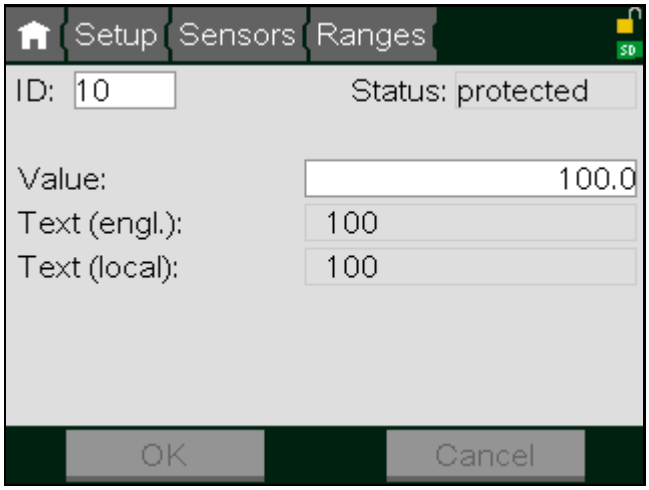

Fig. 44 Measuring ranges

Use this window to view the measuring ranges provided and to adjust some changeable predefined changeable ranges.
User defined ranges can be selected. Identical values are not allowed and will be rejected.

The functions of the individual fields are described below:

Field	Field Type	Function
ID (ID of this measuring range)	Selection	A measuring range can be selected by its ID.
Status (Status of this data cell)	Display	This field displays the status of the cell used for data saving. If the status is *protected*, then data cannot be changed and the following input fields are display-only fields.
Value	Text Adjusting range: 0.100–99999	The value for the measuring range can be set here. In case of very high 5-digit measuring range the display may show five arrows pointing upwards/downwards instead of the measured value, if the value cannot be displayed with 5 digits.
Text (English)	Display	The English value for this measuring range is displayed here.
Text (local)	Display	The value in local language for this measuring range is displayed here.
OK	Button	By tapping this button, the completed settings are applied.
Cancel	Button	By tapping this button, the completed settings are cancelled.

GB

Allocation

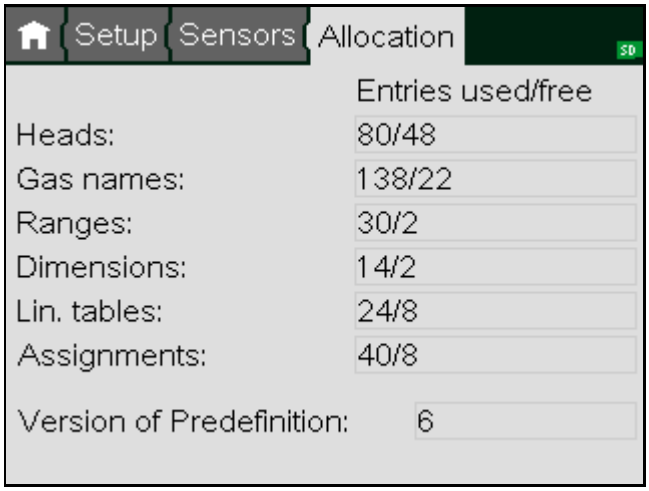

Fig. 45 Allocation

This window displays:

- how many cells are used for individual parameter operations
- how many cells are still free
- the version of the predefined dataset (Version of Predefinition).

4.1.4 Logging

4.1.4.1 SD Card Window

Parameters for measuring data logging on a microSD card can be viewed and changed here.

Use only MSA approved microSD cards (P/N 10179005).

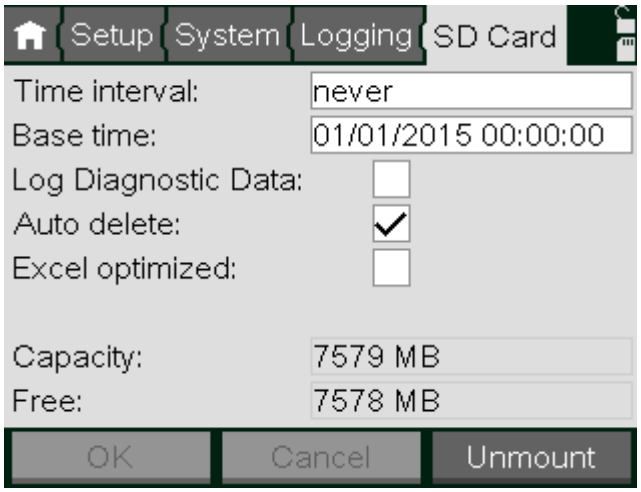

Fig. 46

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Field	Field Type	Function
Time interval	Selection Field, never by default	The time interval/repetition rate of the measuring data logging (never, annually, monthly, daily, every second etc.) can be set here.
Base time	Date/Time input, 01.01.2015 00:00:00 by default	The base time for the measuring data logging can be set here. The base time is the point of time when the data will be written on the microSD card. Depending on the selected interval this will be repeated.
Auto delete	Check Box, set by default	Setting this check box allows the system to delete the oldest measuring data when the SD card is full.
Excel optimized	Check Box, not set by default	Setting this check box changes the logging into a more Excel compatible format.
Capacity	Static	This field shows the capacity of the inserted microSD card.
Free	Static	This field shows the free space on the inserted microSD card.
Ok	Button	Press this button to accept the settings entered for the selected SD card parameters. After tapping the button, the parameters are immediately checked to see if they are valid. If the parameters are valid, they become part of the system's parameter set. If they are not valid, a warning appears.
Cancel	Button	Press this button to discard the settings entered for the selected SD card parameters.
Unmount	Button	Pressing this button unmounts to microSD card so that it can be removed safely.
Log Diagnostic Data	Checkbox, not set by default	Activating this field activates the logging of diagnostic data to the SD card. Refer to Section 4.3 "Diagnosis Menu" for details about the diagnostic data.

The log data is stored as CSV file in folder LOGDATA on the microSD card. For each day a separate file is created with a name in the format "YYYYMMDD.CSV".The columns of this file have to following meaning:

Time	Time stamp in seconds since 01.01.1970 00:00:00 (or Excel time stamp if "Excel optimized" is enabled)
Point	Number of the measuring point this line is referring to
Head	Head ID (see window head parameters for detector correlated to the ID)
Gas	Gas ID (see window gas names for gas correlated to the ID)
Range	Range ID (see window measuring ranges for range correlated to the ID)
Dim	Dimension ID (see window Dimensions for dimension correlated to the ID)
Value(A)	Current gas concentration value measured by partial system A (CAN bus A)
UA(A)	Current UA value measured by partial system A (CAN bus A)
Err(A)	Error Status of the measuring point on partial system A (CAN bus A)
Al(A)	Alarm Status of the measuring point on partial system A (CAN bus A)
Value(B)	Current gas concentration value measured by partial system B (CAN bus B)
UA(B)	Current UA value measured by partial system B (CAN bus B)
Err(B)	Error Status of the measuring point on partial system B (CAN bus B)
Al(B)	Alarm Status of the measuring point on partial system B (CAN bus B)

The Error status is encoded as enumeration as follows:

0	No error
1	Measuring value to low
2	Measuring value to high
3	No signal
4	No data received

The Alarm Status is encoded as bit-mask as follows

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bit 0 1st alarm is pending
bit 1 2nd alarm is pending
bit 2 3rd alarm is pending
bit 3 4th alarm is pending

4.1.4.2 Printer

This window is used to change the paper feed format in a printer connected to the SUPREMATouch printer port. A printer alive-message can be activated and formatted.

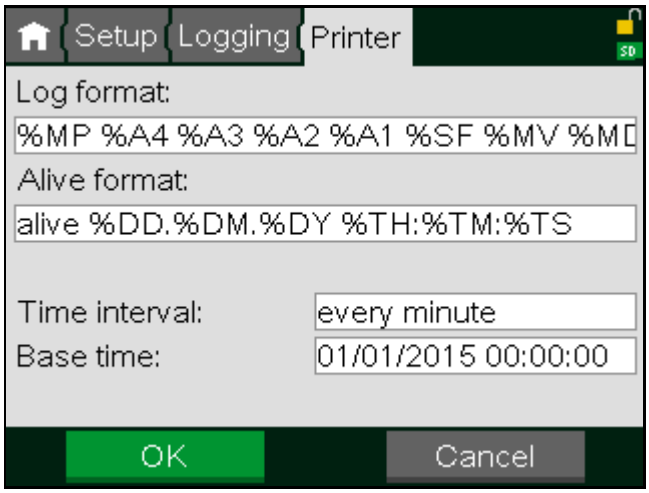

Fig. 47 "Printer" window

Field	Field Type	Function
Log format	Text, "%MP %A4 %A3 %A2 %A1 %SF %MV %MD %MG %MT %DD.%DM.%DY %TH:%TM:%TS" by default	The paper feed format in a printer can be specified here. Apart from free text, predefined tags can be used. See table below for a listing of possible tags.
Alive format	Text, "alive %DD.%DM.%DY %TH:%TM:%TS" by default	The format of the alive-message can be specified here. Apart from free text, predefined tags can be used. See table below for a listing of possible tags.
Time interval	Selection, never by default	The time interval/repetition rate of the alive-message (never, annually, monthly, daily, every second etc.) can be set here.
Base time	Date/time input, 01.01.2015 00:00:00 by default	The base time for the alive-message can be set here. The base time is the point of time when the alive message will be printed. Depending on the selected interval this will be repeated.
OK	Button	By tapping this button, the completed settings are applied.
Cancel	Button	By tapping this button, the completed settings are cancelled.

Available tags:

Tag	Printout
%%	%
%DD	day (length = 2)
%DM	month (length = 2)

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%DY	year (length = 2)
%TH	hour (length = 2)
%TM	minute (length = 2)
%TS	second (length = 2)
%A1	‘S’ if alarm 1 was set,‘R’ if alarm 1 was reset
%A2	‘S’ if alarm 2 was set,‘R’ if alarm 2 was reset
%A3	‘S’ if alarm 3 was set,‘R’ if alarm 3 was reset
%A4	‘S’ if alarm 4 was set,‘R’ if alarm 4 was reset
%SF	‘S’ if signal fail was set,‘R’ if signal fail was reset
%MP	‘MP’ and the Measuring point number (length = 5)
%MD	Measuring dimension (length = 5)
%MG	Measuring gas (length = 14)
%MT	Measuring tag (length = 11)
%ML	Measuring place (length = 21)
%MM	Measuring marking (length = 21)
%MS	Measuring serial number (length = 11)
%MV	Measuring value (length = 6)

4.1.5 Status Mask

This window shows two checksums reflecting the current system configuration and parameters.

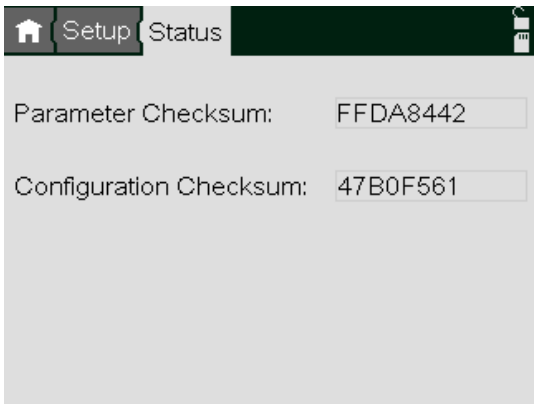

Fig. 48

Each change to the configuration will result in a changed Configuration Checksum.
Each change to the parameters will result in a changed Parameter Checksum, excluding the following changes:

- Calibration of a measuring point
- Calibration of the touch screen
- Changing the serial number field of a measuring point
- Changing the system time

GB

4.2 Maintain Menu

Access to the fields in the *Maintain* menu is restricted. Data can be displayed, but changes and deletions are only possible after entering the maintenance password (or higher level) or operating a key switch.

The menu is structured as follows:

Maintain	Calibration	Standard	Sub-Windows • Start • Running
		Remote	
		Group	
		IBR	
	Interface Test	Analog	-
		Driver Output	-
		Serial	-
		Display	-
	SD Backup		-

4.2.1 Calibration Submenu

For details about the usage of the calibration see chapter 7.

4.2.1.1 IBR (Bridge Current) Window

CAUTION!

Setting the sensor bridge current deletes all calibration data for the measuring point.

Use this window to automatically set the sensor bridge current (I_{BR}).
For details, see chapter 7.9 "Setting the Bridge Current".

A setting that has been started or carried out cannot be canceled or discarded.

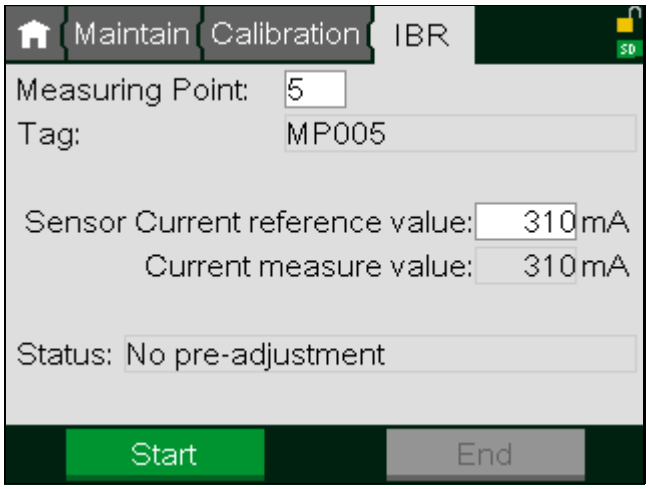

Fig. 49 IBR

Field	Field Type	Function
Measuring point	Display	To select the measuring point, for which the sensor current should be set.
Tag	Display	Displays the tag defined for the selected measuring point.
Sensor current reference value	Number input	The value to which the bridge current should be set can be defined here. This value is sensor type dependent, but it can also be adjusted for special applications.
Current measure value	Display	Displays the actual measured bridge current.
Status	Display	Displays the current preadjustment status of this measuring point.
Start	Button	The preadjustment is started by tapping this button.
End	Button	The preadjustment is finished by tapping this button.

4.2.2 Interface Tests

Test of the analogue outputs

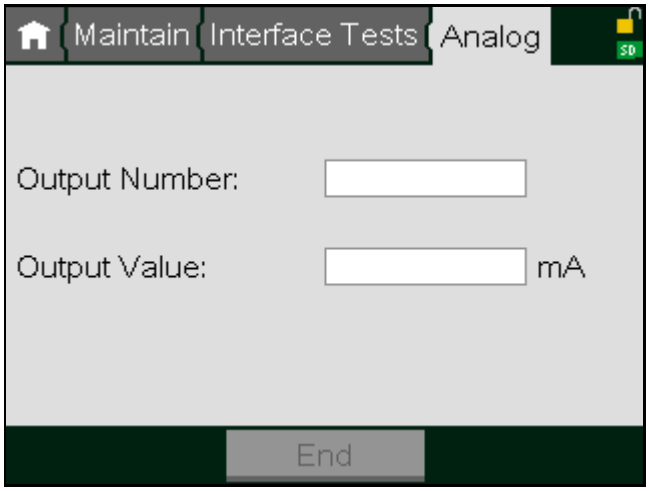

Fig. 50 Test of the analogue outputs

Analogue outputs can be tested with the help of this subwindow. The desired analogue output is selected using the output number field and the current to be tested is set using the output value field. The test can be completed using the *End* button. The regular, input dependent value is displayed again in the output thereafter.

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Test of the digital driver outputs

After an output driver has been selected by its appropriate ‘Partial System’ and output number, the normal output of this driver is inhibited. With the *Output value* field the output test value can be changed. The value set is displayed directly at the output selected. After finishing the test tap the *End* button, or start testing another driver output. The normal status of the previous driver output is automatically restored.

WARNING!

This test may trigger alarm devices connected to the system!

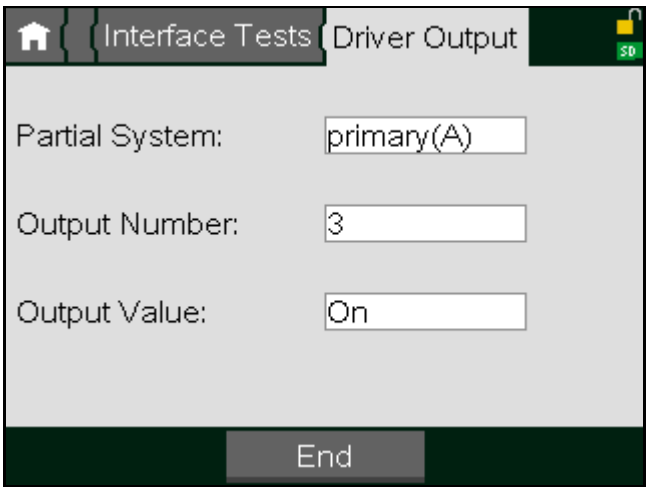

Fig. 51 Test of the digital driver interfaces

Test of the serial interfaces

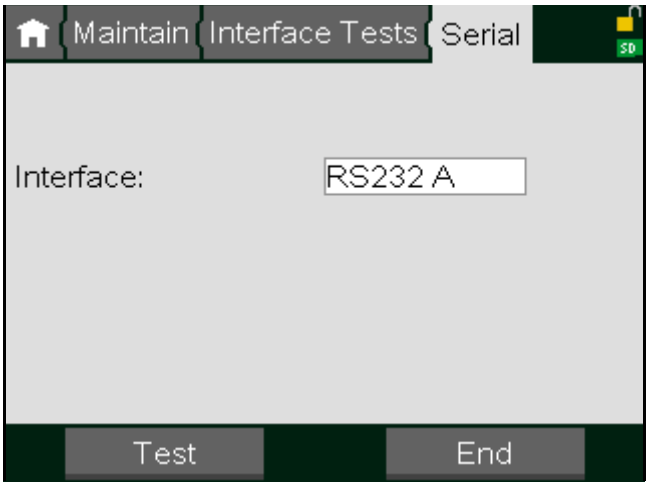

Fig. 52 Test of the serial interfaces

From the list of interfaces in the SUPREMATouch, an interface can be selected. As soon as this interface has been selected, its normal function is inhibited. Therefore, this test cannot be carried out via PC/laptop for all serial interfaces.

WARNING!

During this test, the SUPREMATouch has to be treated as non-functional.
This test can therefore also be used to test the effects of a system fail.

In this test (RS232 A and RS232 B), the system fail is activated after approximately 3 seconds.

Every time the *Test* button is tapped, a test text consisting of all printable characters is sent to the interface. The text is started by the *Carriage-Return* character and terminated by *Line-Feed*.
By selecting another interface or by tapping the *End* button, the interface inhibit is removed.

Test of the display

Within this window 2 possibilities for the touch screen interface are available.

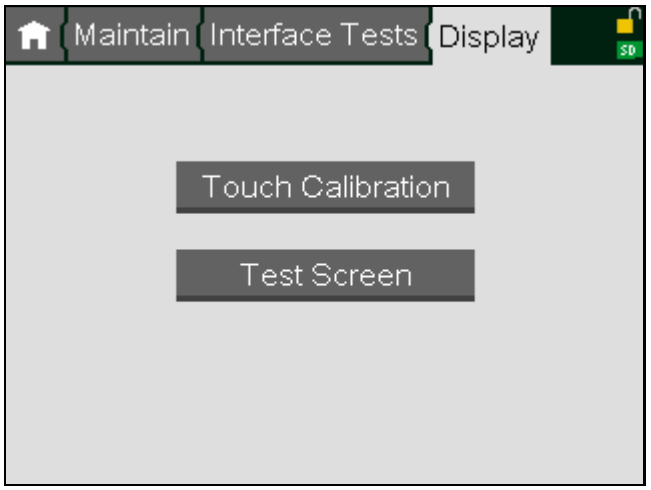

Fig. 53 Display test and calibration

By tapping the *Touch Calibration* button the touch screen calibration procedure is started. During this procedure several points on the screen have to be touched.

A faulty touch screen calibration may make it impossible to operate the GUI using the touch screen. In this case a new touch calibration process has to be started using a PC.

By tapping the *Test Screen* button, a series of 3 test screens will be displayed and all front panel LEDs will be activated serially. To jump to the next test screen, tap anywhere on the screen. The test mode will be left after the 3rd test screen. The first test screen must look like Fig. 54, the second test screen must be completely black and the 3rd test screen must be completely white.

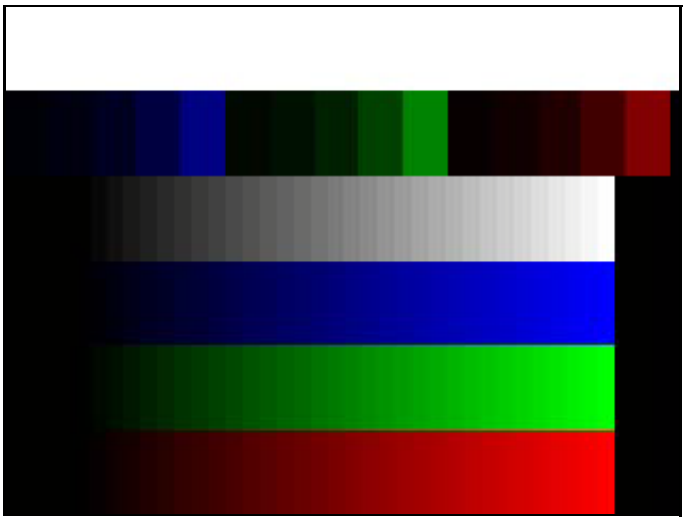

Fig. 54 Test screen

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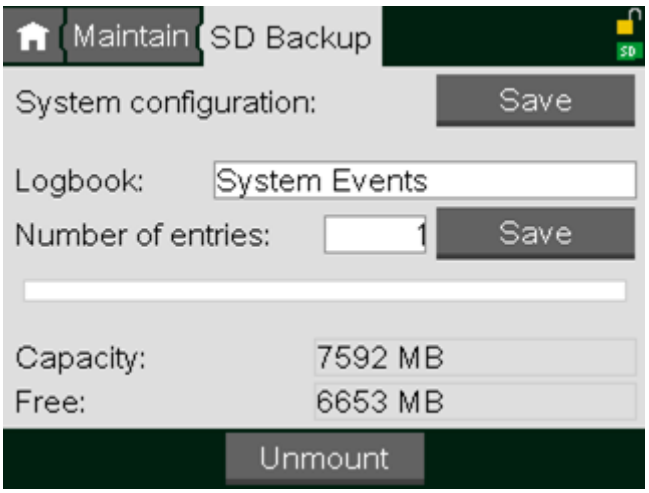
4.2.3 SD Backup Window

This window can be used to store the system configuration or logbook entries on a microSD card.

Use only MSA approved microSD cards (P/N 10179005).



Field	Field Type	Function
Save (System Configuration)	Button	Pressing this button saves the whole system configuration and all parameters to an inserted microSD card.
Logbook	Selection Field	The logbook to be saved can selected here.
Number of entries	Number input	The number of entries to be saved can selected here.
Save (Logbook)	Button	Pressing this button saves the selected amount of entries of the selected logbook to an inserted microSD card.
Capacity	Static	This field shows the capacity of the inserted microSD card.
Free	Static	This field shows the free space on the inserted microSD card.
Unmount	Button	Pressing this button unmounts to microSD card so that it can be removed safely.

4.3 Diagnosis Menu

The menu is structured as follows:

Diagnosis		Logbooks	System Events	-
			Alarm Events	-
			Signal Events	-
			Changes	-
			Sensor History	-
			Calibrations	-
			Supply Voltage	-
			Temperatures	-
		Modules	Display	-
		Measuring Points		Subwindows • Signal • Diagnosis
		Switch Inputs		-

4.3.1 Logbooks

System Events Logbook

This logbook stores the system failures and start messages.

Each entry includes the following data:

- Date/Time that the event occurred
- Brief description of the event type
- Additional hexadecimal description of event. (For use by MSA service personnel.)

By double-tapping an entry a window opens containing a detailed error description in plain text.

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Alarm Events Logbook
In this logbook, alarm events, acknowledge and reset are saved.
An entry is made up of the following data:
- Date/time of the event
- Brief description of the event

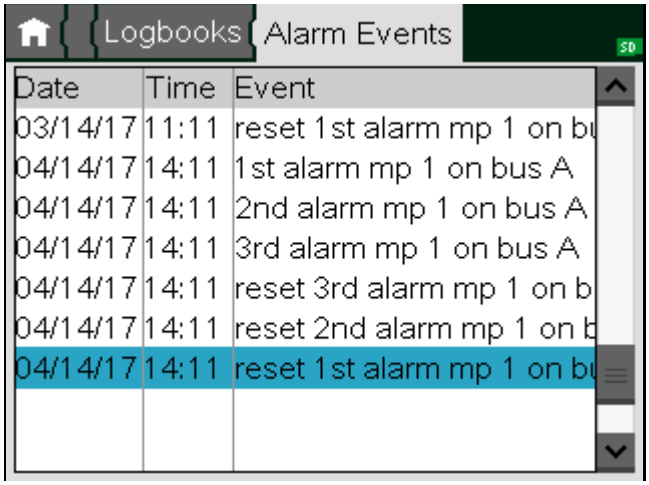

Fig. 55 Alarm events logbook

Signal Events Logbook
In this logbook, signal events, acknowledge and reset of signal failures and the switch over of the primary system (only in redundant systems) are saved.
An entry is made up of the following data:
- Date/time of the event
- Brief description of the event

Changes Logbook
This logbook stores changes of parameter settings. When changing the parameters of measuring points, groups of measuring points, relay outputs or switch inputs, an entry is created.
Each entry includes the following data:
- Date/Time of change
- Entry type and number
- Name of the parameter changed
- New value of the parameter changed (except for relay logic and group members)

Calibrations Logbook
This logbook saves the calibration process data independent from the input number or whether the calibration was successful.
The data stored for each entry is similar to the data stored in the sensor history logbook with the following extensions:
- Point indicates the input that was calibrated (the suffix R indicates a remote calibration)
- Status indicates whether the calibration was successful or not

GB

Sensor History Logbook

This logbook saves the calibration process data for each input. Up to four entries can be stored for each input, and older entries are overwritten, except for the first calibration and pre-settings.

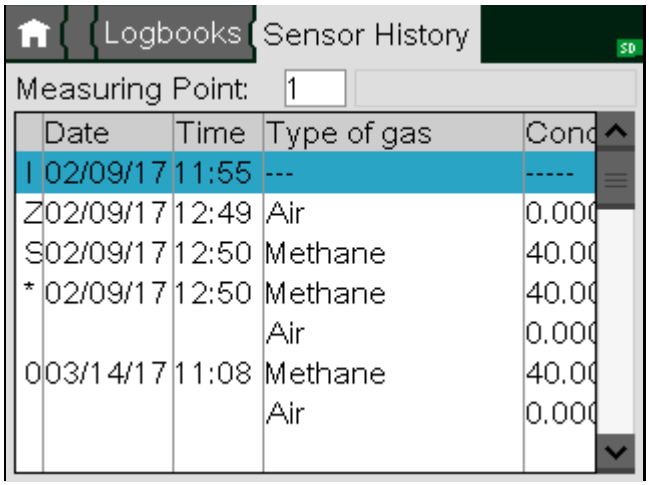

Fig. 56 Sensor history logbook

When an input is selected, the appropriate sensor history is displayed in the corresponding field, if the input has already been calibrated. The entry for each calibration process consists of two rows, first the test gas and then the zero gas setting. A pre-setting entry is made up of only one row.

If a separate zero adjustment has been carried out, the values for *Concentration* and *Measurement value* are blanked in the Span Gas Measurement line by "———".

The type of entry is identified by a character in the first column:

I	Bridge current setting (IBR)
Z	Preadjustment Zero point (ZERO)
S	Preadjustment Sensitivity (SPAN)
*	First calibration
Number n	n-last calibration

Each entry includes the following data (if applicable; scroll to see all):

- Date/Time of accepting and closing the calibration menu
- Gas types for zero and, if applicable, test gases (not used for bridge current setting)
- Gas concentrations for the zero and, if applicable, test gases (not used for bridge current setting)
- Measured values for the zero and test gases
- Difference signal U_x for the zero and test gases (relevant for calibration only)
- Reference value (relevant for pre-settings only)
- Response time until 90% of the final signal was reached

Supply Voltage Logbook

This logbook stores over-limit and under-limit power supply events (internal power, external power, battery backup) for analog input modules. An entry is made every time a voltage crossing the limits is measured.

Each entry includes the following data:

- Date/Time of the power measurement
- Name of the power type
- Node ID and bus of the module
- Measured voltage value

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Processor Temperature Logbook

This logbook stores the over-limit and under-limit temperature events for the analog input modules. When the temperature goes above or below the permitted range, the current temperature value is stored, and when it returns to within the permitted range, the peak value from the deviation is stored.

Each entry includes the following data:

- Date/Time of the over-limit or under-limit event
- Serial number of the analog input module
- Node ID and bus of the module
- Temperature value (0 - 55 °C)
- Information on whether it remained out of the permitted range or returned to it

4.3.2 Modules Menu

From the *Module* menu, the user can recall information about the system modules.

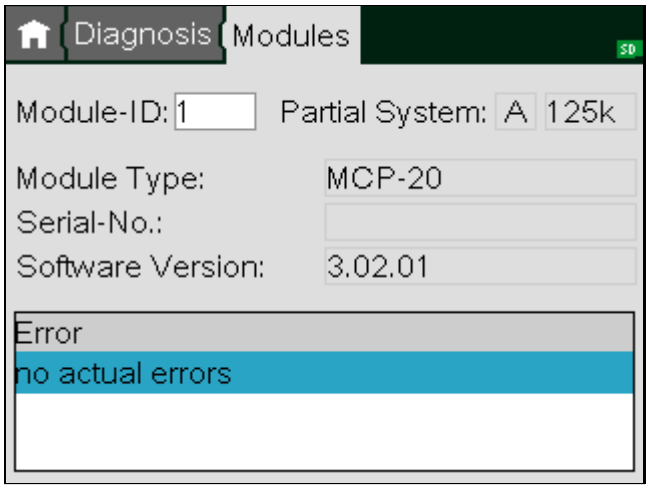

Fig. 57 Modules

The functions of the individual fields are described below:

Field	Field Type	Function
Module ID	Selection	Contains the CAN node IDs of all system modules which are connected to the CAN bus. After an ID has been selected, the remaining fields are filled with all data available for this particular module.
Partial System	Display	The letter of the partial system to which the module belongs and, for some modules (e.g. MCP20 and MDO20), the system CAN baud rate is displayed. When two modules are used with the same module ID (e.g. MAI/MAR), this field can be used to toggle between CAN buses.
Module Type	Display	Contains the type of module selected.
Serial No.	Display	Contains the serial number of the module selected (if set).
Software version	Display	Displays the software version of the module selected.
Module status	List	The current errors, if any, of the selected module are displayed.

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4.3.3 Measuring Points

Signal

This displays the current signal measurement values of one input.

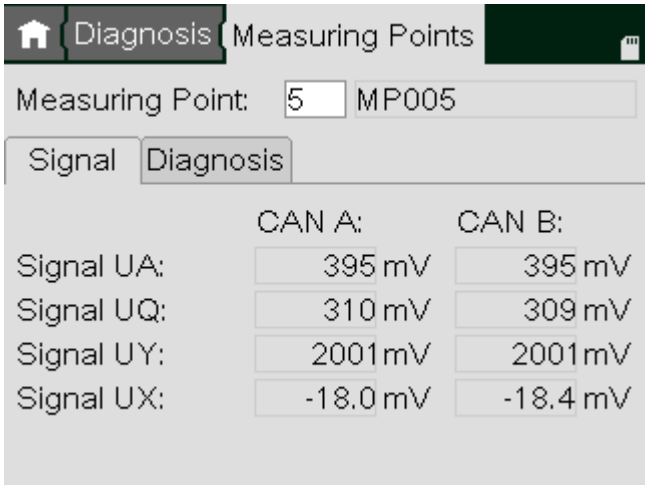

Fig. 58 Signal

Field	Field Type	Function
Measuring Point No.	Selection	After selection of a measuring point number, the current signals of the selected point are displayed.
Signal U_A	Display	The amplified sensor signal is displayed in these fields separated by bus. When transmitters are used, 4 mA equal 400 mV.
Signal U_Q	Display	When passive detectors are used, the bridge current is displayed as a voltage value (1 mV equals 1 mA) in these field separated by bus. When active transmitters are used, the draw current is shown similarly.
Signal U_Y	Display	When passive detectors are used the amplified sensor signal U_Y is displayed in these fields separated by bus. The signal consists of a fixed gain that depends on the detector type used and an offset voltage. When active transmitters are used, these fields are empty.
Signal U_x	Display	When passive detectors are used, the measured U_X signal is displayed in these fields, separated by bus. When transmitters are used, these fields are empty.

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Diagnosis

This window shows diagnostic information related to the selected measuring point.

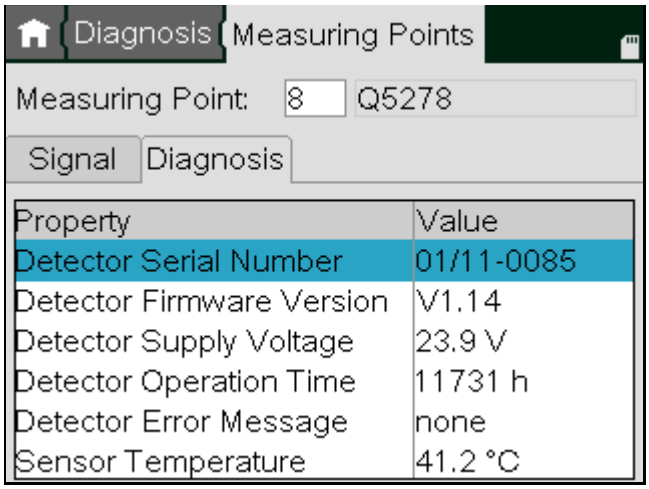


Fig. 59 Diagnosis

The values are based on data transfers with slow update rates (like HART) or static data. So these values cannot be seen as live values. The data is updated cyclically for all measuring points. An update can take some minutes.

Dependent on the used input module and detector, the following diagnostic information entries are available.

Entry	Source	Description
Node	System Configuration	
Rack	System Configuration	
Slot	System Configuration	
Channel	System Configuration	
Voltage Terminal X	Input Module (MAI30)	The voltage measured on terminal X of the input.
Current Supplied	Input Module (MAI30)	The current supplied by the input module to the detector.
Detector Type	Input Module (MAI30)	The detector type identified by the input module.
Reading	Detector	The current reading, digitally transferred by the detector.
Range	Detector	The full scale value used by the detector.
Dimension	Detector	The dimension used by the detector.
Measuring gas	Detector	The gas measured by the detector.
Detector Serial Number	Detector	The serial number of the detector.
Detector Firmware Version	Detector	The firmware revision of the detector.
Detector Temperature	Detector	The temperature internally measured by the detector.
Detector Supply Voltage	Detector	The supply voltage arriving at the detector.
Detector Operation Time	Detector	The time the detector is operating.
Delay	Detector	The time delay used by the detector for alarming.
Detector Error Message	Detector	The error identified by the detector.
Sensor Firmware Version	Detector	The firmware version of the sensor.

Entry	Source	Description
Sensor Life Time Remaining	Detector	For transmitters this value is the remaining lifetime of the sensor, estimated by the transmitter. See instruction manual of the transmitter/sensor for details.
	System	For passive sensors this value is estimated by the MDO based on the sensitivity of the first calibration, the sensitivity of the last calibration and the minimum required sensitivity of the used sensor type.
Sensitivity	Detector	The sensitivity setting of the sensor.
Sensor Self Test Result	Detector	The self test result of the sensor.
Sensor Error Message	Detector	The error identified by the sensor.
Sensor Blockage	Detector	The blockage level of the sensor.

4.3.4 Switch Inputs Window

This window can be used to display the current status of one switch input. In the following the functions of the individual window fields and buttons are described.

Entry	Source	Description
Sensor Temperature	Detector	The temperature internally measured by the sensor.
Sensor Supply Voltage	Detector	The supply voltage arriving at the sensor.
Sensor Operation Time	Detector	The time the sensor is operating.

Field	Field Type	Function
Input No.	Selection Field	After selection of a switch input, the current status of the selected input are displayed.
(Tag)	Static	This field shows the tag of the selected switch input.
Status	Static	The status is displayed in these fields separated by bus.

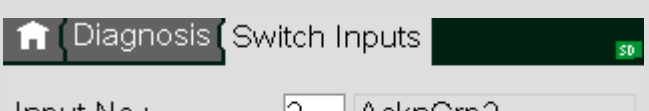
4.4 PC Operation

For entering all parameters and configurations with a PC the MSA program SUPREMA Manager has to be used.

See separate operating manual for SUPREMA Manager for details.

NOTICE

All parameters and configuration made with a PC must be checked for correctness on the SUPREMA-Touch, or they must be checked for correctness on the PC after they have been read back to the PC.



Service and Maintenance Guide

SUPREMATouch

Fire and Gas Warning Unit

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MSA Europe GmbH
Schlüsselstrasse 12
8645 Rapperswil-Jona
Switzerland
info.ch@MSAsafety.com
www.MSAsafety.com

5 Maintenance

The system must be checked at regular intervals (at least every 6 months) to ensure that it is functioning properly in accordance with EN 60079-29-2 and applicable international, national, industry-specific or company regulations.

5.1 Sensor Simulation Modules

For function test of the SUPREMATouch sensor inputs, simulation modules can be used depending on sensor type.

The sensor simulation module may only be used to check and preadjust, not for calibration.

Function of Sensor Simulation Module 4–20mA, Catalytic Combustion, Semiconductor Design

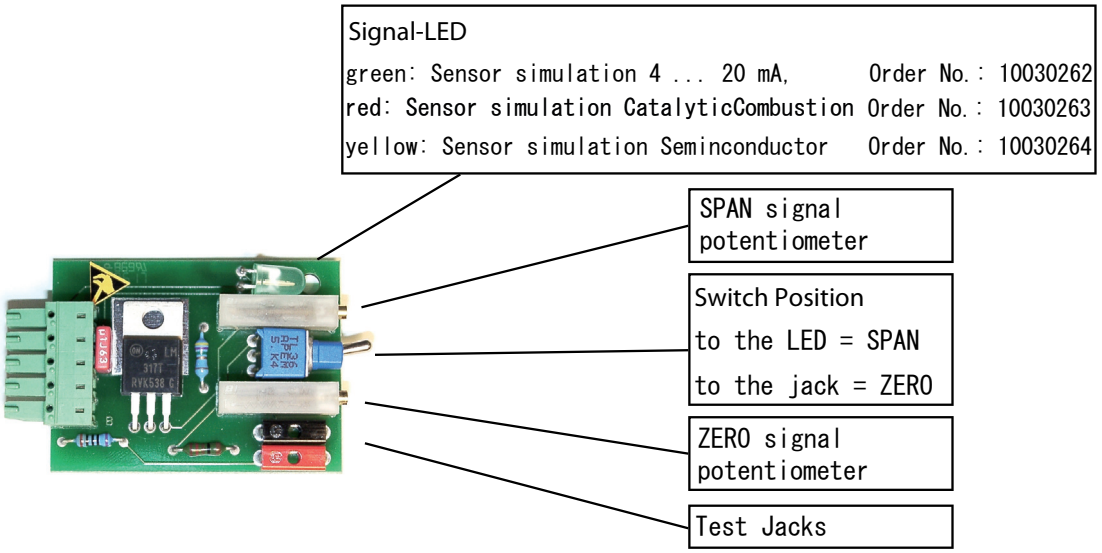

Fig. 60 Sensor simulation Module with rocker switch

Setting and Operation

After plugging the sensor simulator into a MAT, adjust the measuring value to be simulated for operation with zero signal by turning the zero signal potentiometer. By switching over to the other switch position, another measuring value is simulated which is regulated by the span signal potentiometer. This value can be measured at both of the test jacks.

Example for Sensor simulation module 4–20 mA

Sensor type:	PrimaX
Measuring gas:	Carbon monoxide
Zero gas:	Air
Reference gas:	Carbon monoxide
Ua at open switch (Normal operation):	400 mV
Ua at closed switch (Alarm) :	1.9 V

Example for Sensor simulation module Catalytic Combustion Sensors

Sensor type:	Series 47K
Measuring gas:	Methane
Zero gas:	Air
Reference gas:	Methane
Ux at open switch (Normal operation):	0 mV

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Ux at closed switch (Alarm) :	100 mV

Example for Sensor simulation module Semiconductor Sensors

Sensor type:	D-8101
Measuring gas:	Acetone
Zero gas:	Air
Reference gas:	Acetone
Ux at open switch (Normal operation):	1.6 V
Ux at closed switch (Alarm) :	1.1 V

5.2 Replacing Sensors

Sensors must be replaced when:

- they are no longer able to measure the minimum signals
- the zero point can no longer be adjusted
- they no longer function properly for some other reason

Replacement Procedure for Passive Sensors

This is just an overview, always follow the replacement procedure as described in the manual of the sensor.

(1) Inhibit corresponding measuring point in “Setup//Input and Outputs/Measuring Points” menu.

(2) Remove connector plug of sensor from MAT/MAT TS module or sensor cable from MGT40 TS module.

(3) Replace sensor according to the manual of the detector.

(4) Reconnect connector plug of sensor to MAT/MAT TS module or sensor cable to MGT40 TS module.

(5) Check parametrization of sensors in the “Setup//Input and Outputs/Measuring Points” menu.

(6) Perform a first calibration as described in Chapter 7.3 "First Calibration with Pre-Adjustment", taking into account required sensor warm-up time.

(7) Remove inhibit from measuring point.

Replacement Procedure for Transmitters

This is just an overview, always follow the replacement procedure as described in the manual of the transmitter.

(1) Inhibit corresponding measuring point in “Setup//Input and Outputs/Measuring Points” menu.

(2) If a deactivation of the power supply is required, remove connector plug of sensor from MAT/MAT TS module or sensor cable from MGT40 TS module.

(3) Replace sensor according to the manual of the transmitter.

(4) If a deactivation of the power supply was required, reconnect connector plug of sensor to MAT/MAT TS module or sensor cable to MGT40 TS module.

(5) Check parametrization of sensors in the “Setup//Input and Outputs/Measuring Points” menu.

(6) Follow the instructions in transmitter operating manual to calibrate the transmitter and for all other required steps.

(7) Remove inhibit from measuring point.

5.3 Manual Input Device Type Selection (MAI30 only)

The MAI30 automatically detects the connected input device type. This does not apply for D-7010 detectors. In this case the automatic detection can be overwritten with a manual selection as follows:

(1) Activate the manual input device type selection mode by pressing the buttons *UP* and *DOWN* simultaneously.

(2) Select the measuring point of the MAI by pressing the button *MP* multiple times.

(3) Select the device type now by pressing the *UP/DOWN* button multiple times.
The current selection is indicated by the mode LEDs (red, yellow, green).

(4) Store the new setting and leave the manual selection by pressing the SEL button.

The meaning of each indication is shown in the following table:

LED Indication	Input Device Type
Chase light (red-yellow-green)	Automatic device type detection (default)
Red blinking 1,6 Hz	D-7010
Red blinking 1,0 Hz	Other passive combustible detectors (e.g. S47k)
Yellow blinking 1,6 Hz	Passive semiconductor detectors
Yellow blinking 1,0 Hz	Switches
Yellow blinking 0,7 Hz	Smoke and Heat detectors
Green blinking 1,6 Hz	Transmitters (2 wires)
Green blinking 1,0 Hz	Transmitters (3 wires)
Green blinking 0,7 Hz	Transmitters (4 wires)

(5) Exit the selection mode by pressing the *MODE button*.

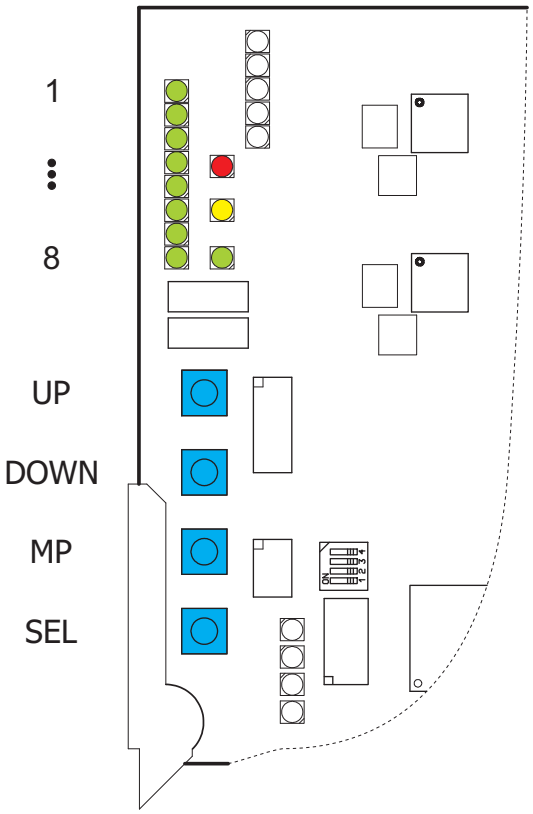

Fig. 61 MAI30 button interface

WARNING!

An invalid selection can cause a signal error for this measuring point. If possible the automatic detection shall be used.

6 Service

The system must be checked at regular intervals (at least every 6 months) to ensure that it is functioning properly in accordance with EN 60079-29-2 and applicable international, national, industry-specific or company regulations.

6.1 Plug-In Modules– Status LED

For modules designed as plug-in modules, status LEDs are located in the upper left corner.

Position of Status LEDs for MCP, MDC, MBC, MDA, MGO, MAO Modules

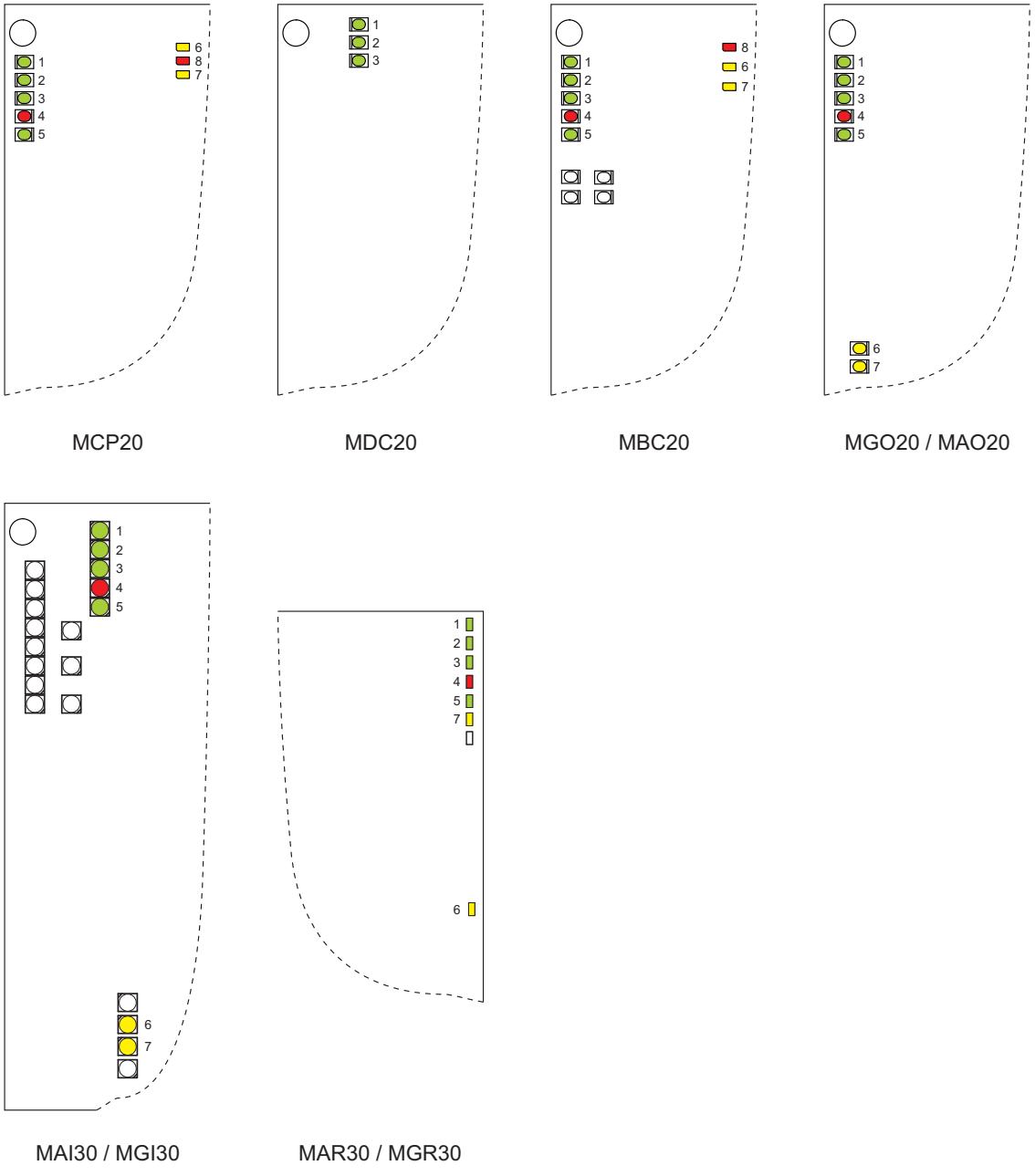

Fig. 62 Status LEDs

LED-No.	Colour	Function	
1	green	ON:	The external voltage supply is selected by the module.
2	green	ON:	The internal voltage supply is selected by the module.
3	green	ON:	The battery voltage supply is selected by the module.
4	red	ON:	A failure has occurred in the module.
5	green	ON:	The module's CAN bus communications are proceeding correctly.
6	yellow	ON:	System fail
7	yellow	ON:	Voltage fail
8	red	ON:	Module is in reset state

During normal operation, only one of the first three LEDs is on. If no LED is on, there is a problem with the voltage supply to the module.
If the FAIL LED (LED No. 4) is on, contact an MSA service technician. If this cannot be done immediately, the module can be replaced if a spare unit is available (→ 6.2 "Replacing Modules"). The failure which occurred is stored in the SUPREMATouch logbook and can be found in the "Diagnosis/Logbook/System events" menu.

6.2 Replacing Modules

When a module is found to be defective, it must be replaced.
MSA recommends that an MSA service technician is called in to help with the diagnosis and to help determine whether the module has to be replaced.

When replacing modules, ensure that the DIP switches are in the correct position (see chapter 12.6 "Module Configuration").

NOTICE

Only replace plug-in modules after the voltage to the SUPREMATouch system has been shut off. Always disconnect the supply voltages before removing/inserting any plug-in modules.

In the following, the procedure for replacing individual modules is described.

6.2.1 Plug-In Modules

Replacing MCP and MDO Modules

The voltage to the system must be shut off before these modules can be replaced.

(1) Save the current system configuration [setup/measuring points, relay outputs, system] with the SUPREMA Manager.

(2) Remove power from the system [e.g., by disconnecting the supply voltage connections at the MIB module].

NOTICE

When rail-mounted relay modules are being used, the triggering of an alarm associated with the shut-off of the voltage can be prevented by locking the relays on the MRC TS module, provided that the MRC TS module is supplied with a voltage separate from that of the system [Chapter 12.10 "Connecting the Relay Outputs"]

(3) Replace the MCP20, or MDC20 and MDO20 modules [be careful with the ribbon cable connection between the MDC20 and the MDO20 modules].

(4) Turn the voltage supply back on.

(5) Reconfigure the system.

(6) Unlock the relays again if necessary.

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Replacing MAI30/MAR30 Modules

When replacing the MAI and/or the MAR module, the system must first be switched off.

Always ensure that the correct assignment to the connected sensors is preserved (Chapter 12.9 "Connecting the Sensors").

When passive sensors are connected to the MAI/MAR to be replaced, the following points must be kept in mind:

- The preadjustment of the MAI module (Chapter 13.4 "Preadjusting Passive Detectors") must be performed again.

NOTICE

When passive sensors are connected to the MAI to be replaced, always electrically separate the connected sensor to prevent damage as a result of uncompensated sensor current.

Replacing the MGO Module

When replacing the MGO module, the system must first be switched off. To prevent alarms and malfunction messages, the relays must be inhibited directly on the MRC TS module (→ part Installation and Start-Up Manual).

Replacing the MAO Module

When replacing the MAO module, the system must first be switched off. The failure message can be prevented from being sent any farther by inhibiting the relays on the MST module (MRO8 module) or on the MRC TS module (MRO8 TS module) (→ chapter 12.10 "Connecting the Relay Outputs").

Replacing the MBC Module

When replacing the MBC module, the system must first be switched off. To prevent alarms and malfunction messages, the relays must be inhibited directly on the MRC TS module (→ chapter 12.10 "Connecting the Relay Outputs").

Connection Modules

Replacing MAT/MAT TS, MUT, and MGT 40 TS Modules

These modules can be replaced without turning off the system, although the function in question [sensor input, relay driver or analogue output] is not available during the replacement.

When the modules which implement sensor connections are replaced, the assigned measuring points must be locked to prevent alarms or failure messages (→ chapter 12.10 "Connecting the Relay Outputs").

When a MUT module that is connected to a MRC TS module must be replaced, the connected relays can be locked by using the LOCR connection on the MRC TS module, provided that the MRC TS module has a voltage supply separate from the system (→ chapter 12.10 "Connecting the Relay Outputs").

Replacing MRO8/MR 8 TS Modules

It is not necessary to turn off the system to replace MRO8/MRO8 TS modules. Alarm devices which are connected to the modules must be deactivated, however (especially when the relays are operating Normally energized).

6.3 Diagnostic Functions

The structure and operation of the “Diagnostics” menu are described in detail in chapter 4.3 "Diagnosis Menu". The functions of all means of alarm and system fail relays have to be checked regularly (once a year). For details, see chapter 9.1 "Conditions for configuration, installation, operation and maintenance"

6.4 System Fail Messages

No.	Fail Message Text	Module	Appears in case of	Disappears in case of	Error LED	Fail LED	Info 1 (BYTE)	Info 2 (DWORD)	Remarks/ Remedial action
1	dynamic memory overflow	All	Stack overflow or stack underflow detected	Restart	X	X	Task ID	Memory address	Generally software problems (e.g. wrong stack dimensions) Perhaps sequence error to No. 2,3 or 6
2	error in work memory	All	RAM failure detected (Self-test)	Whole RAM tested failure-free (after approx. 24 h)	X	X	Bit pattern fault bits	Memory address	Hardware defect: exchange module
3	error in program memory	All	ROM failure detected (Self-test)	Whole ROM tested failure-free (after approx. 24 h)	X	X	1 → found during system start; 0 → otherwise	loWord → CRC found; hiWord → CRC should be	Hardware defect: exchange module
4	internal timeout	All	Life sign of at least one task is missing	All tasks gave life sign in time	X	X	Nominal value of task flags (8 lowest Bits)	loWord → task flags is; hiWord → task flags should be	Perhaps sequence error of CAN bus failure. Check bus.
5	data lost on bus	MAI30, MGI30, MAR3, MGR3, MGO, MAO, gateways	CAN controller detects overflow	CAN Controller in normal mode	X	X	Always 0	Always 0	Perhaps not correctly terminated bus or modules with wrong bitrate at the bus. (Green CAN-LED indicates the status of the bus.) May also be defect hardware
6	fatal internal error	All	Exception Interrupt (e.g. write access to ROM, invalid memory address...)	Restart	X	X	Exception number	Memory address	Hardware defect: exchange module Perhaps sequence error to No. 1, 2 or 3
7	buffer overflow	MCP, MDO, MAI30, MGI30, MAR30, MGR30, MBC	Overflow of the internal processing queues	Restart	X	X	Queue number	Queue Status	Perhaps in combination with No. 4 at system overload or sequence error to CAN bus failures
8	communication error on bus	MCP, MDO	Error during SDO transfer (transfer of configuration and parameter data)	SDO transfer successfully ended	X	X	CAN-I/O error code	Additional data (error code depended)	Perhaps CAN-bus failure: check bus. Check MCP and MDO for incompatible software status. May occur when hot plugging modules.
9	system error of configuration memory	MCP, MDO, MBC	Error on accessing flash memory which contains parameter and configuration data	Restart	X	X	Flash error code	Additional data (error code depended)	Hardware defect: exchange module Perhaps in combination with No. 10 or 15.
10	error in configuration memory	MCP, MDO, MBC	Flash error detected (Self-test of the configuration and parameter memory)	Whole flash tested error-free (after approx. 24 h)	X	X	Always 0	Always 0	Hardware defect: exchange module
11	data lost at serial communication	MDO	Error at serial communication	Restart	X	X	Interface number	loWord → number of characters; hiWord → status	Data lost at PC or printer interface: Check cables Perhaps hardware defect: exchange MDO module

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No.	Fail Message Text	Module	Appears in case of	Disappears in case of	Error LED	Fail LED	Info 1 (BYTE)	Info 2 (DWORD)	Remarks/ Remedial action
12	node guarding error detected	MCP, MDO	Module does not respond to node- guarding, or does not send any heartbeat	All nodes respond again	X	X	ID of node that doesn't respond	If the node in info 1 is an MDA and info 2 is not 0, this is the MAI number	CAN bus failure, module defect or missing: Check bus and modules
		MGO, MAO			X	X	Always 0	Time in system-ticks	no output data was received for a certain time: check bus and MCP/ MDO modules
13	program error	MCP, MDO, MBC	Application program error	Restart	X	X	Application error code	Additional data (error code depended)	Normally software problems (not plausible internal software status) or invalid MAC address
14	data error	MCP, MDO	Application data error	Restart	X	X	Application error code	Additional data (error code depended)	Normally software problems (not plausible internal software data) Often sequence error of No. 9 or 10
15	system configuration error	MCP, MDO	The system configuration detected does not correspond to the configuration stored or configuration/ parameterization is not consistent	Restart	X	X	Configuration error code	Additional data (error code depended)	Modules on wrong plug position? Several racks of the same ID (switch) in the system?
		MAI30, MGI30, MAR30, MGR30	Module in invalid slot	Restart	X	X	Slot number	Always 0	The module is in an invalid slot
		MAO, MGO	Module in invalid slot	Restart	X	X	Always 0	Always 0	The module is in an invalid slot
16	data acquisition error	MAI30, MGI30, MAR30, MGR30	communication error of onboard communication; invalid test values; No communication or not matching measuring values on primary and secondary module	All errors gone	X	X	error code	Additional data (error code depended)	MAI30 / MGI30 or MAR30 / MGR30 defect.
		MGO	SPI communication error at digital outputs (MGO)	SPI communication respectively outputs all right again	X	X	1-5 → number of erroneous output block FF → hardware defect	MGO: diagnosis code	Outputs short circuited or open or module defect.

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6.5 ID Rack Assignment in decimal and hexadecimal figures

Rack 1	Slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	ID dec.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	ID hex.	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	10
Rack 2	Slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	ID dec.	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
	ID hex.	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F	20
Rack 3	Slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	ID dec.	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
	ID hex.	21	22	23	24	25	26	27	28	29	2A	2B	2C	2D	2E	2F	30
Rack 4	Slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	ID dec.	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
	ID hex.	31	32	33	34	35	36	37	38	39	3A	3B	3C	3D	3E	3F	40
Rack 5	Slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	ID dec.	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
	ID hex.	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F	50
Rack 6	Slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	ID dec.	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
	ID hex.	51	52	53	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F	60
Rack 7	Slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	ID dec.	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112
	ID hex.	61	62	63	64	65	66	67	68	69	6A	6B	6C	6D	6E	6F	70
Rack 8	Slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	ID dec.	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	
	ID hex.	71	72	73	74	75	76	77	78	79	7A	7B	7C	7D	7E	7F	

Tab. 63 ID Rack Assignment in decimal and hexadecimal figures

Slot No. 16 of a rack is reserved for the MDO only. Only one MDO can be installed in one system.

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6.6 Digital Message Priority

Message	Priority	Display [List]	LEDs/Relays
Alarm 1	9	Measuring points status 1st Alarm	Signal AL 1 on
Alarm 2	8	Measuring points status 2nd Alarm	Signal AL 2 on
Alarm 3	7	Measuring points status 3rd Alarm	Signal AL 3 on
Alarm 4	6	Measuring points status 4th Alarm	Signal AL 4 on
System error	1		System Fail on
Signal error	3	Meas. point status Signal fail	Signal Fail on
Module error	1		Module fail on
CAN bus failure	1		
Free	1	Measuring point status free	
Measuring	10	Measuring point status measuring	
Inhibit	2	Measuring point status inhibited	Inhibit on
DO [Disable Output]	2	Measuring point status	Inhibit flashing
Calibration	6	Measuring point status calibration	Inhibit on
Sensor warm-up	4	Measuring point status suppressed	Inhibit on
Measuring range overflow	5	Measuring point status overflow	Signal Fail on
New value	1		Signal flashing

The highest priority messages [with “1” being of highest priority] are displayed first. Messages with a lower priority are displayed in addition if these use other indicating ranges for message display.

6.7 LED and Sounder Test

An LED and sounder test is provided for the MDO which enables a visual functional test of the front panel LEDs and an acoustical test of the sounder. This test can be carried out independently from the active operating state of the SUPREMATouch and does not affect the mode of operation of the SUPREMATouch. To carry out this test, press the button shown in the illustration. The front panel LEDs should now be illuminated (System–power, fail, inhibit and Signal–1st to 4th alarm, fail). If there is an LED that is not illuminated when the switch is pressed, it is possible that the MDO module needs to be replaced.

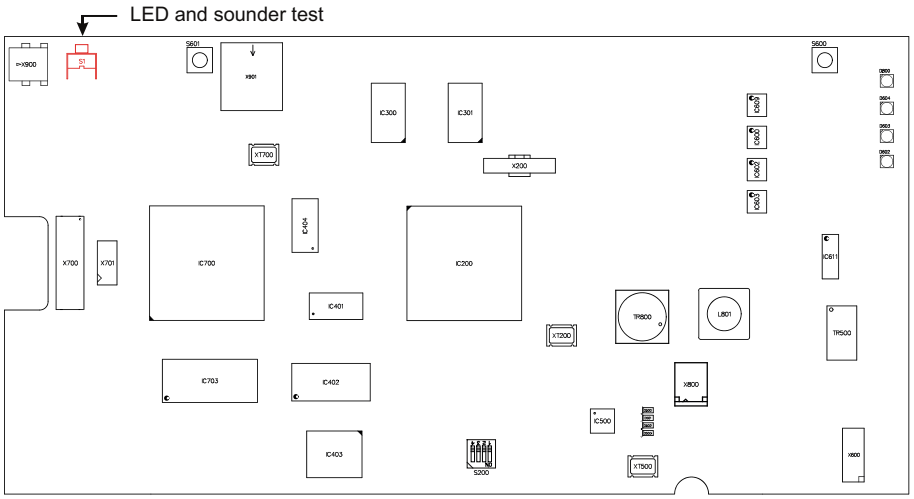

Fig. 64 MDO Module, Switch for LED Test

6.8 System Configuration

Configuration during initial installation

If there is no configuration saved in the SUPREMATouch during transfer of the configuration and the first MCP is not plugged into Slot1 of the rack, the PC program "SUPREMA Manager" displays an error message "transmission failed". This can be ignored.

Varying or manual selection of a configuration

If there are different configurations in the SUPREMATouch modules, e.g. because of replacement of an MCP, a system configuration message appears when the system is switched on for the first time after the modification. The module from which the [effective] configuration is to be taken must be specified.

(1) If the configuration is to be taken manually from a particular module, press the RESET button for approx. 1 second directly after switch-on.

The system configuration message appears after the system starts so that the configuration of a module can be selected.

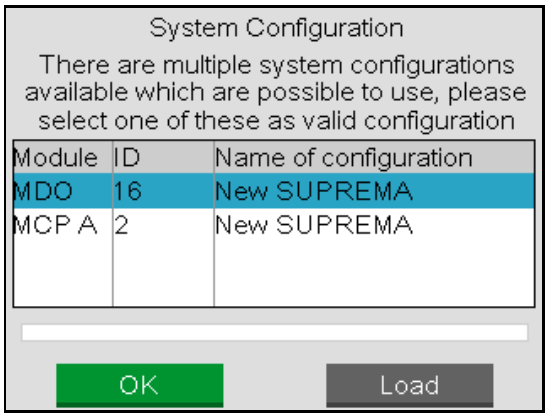

Fig. 65 System Configuration Message

Selecting a Configuration

(2) Touch the desired configuration to select it.

(3) Press OK to copy the selected configuration to other MDO and/or MCP modules.

If a configuration is transferred to the SUPREMATouch with the "SUPREMA Manager", this configuration is always saved in the MDO. If it is not certain that the configuration was distributed to the system, choose *MDO* as the system configuration.

Loading a Configuration from SDcard

If an SDcard is inserted the Load button is activated. Press this button loads the stored configuration from SDcard and continues the start-up with this configuration.

GB

7 Calibration

Sensitivity and zero point of the connected sensors must be adjusted as necessary in accordance with the operating instructions for the types of sensors connected to the system.
Sensors which are no longer able to generate the minimum signals must be replaced.
Two calibration modes are available:

- In one mode two persons are required to perform calibrations. Person 1 operating the SUPREMATouch and Person 2 supplying the sensors with gas. It is necessary for them to communicate during the calibration.
- In the other mode only one person is required. This person starts the calibration, goes to the sensors to apply gas and finally finishing the calibration back at the SUPREMATouch.

NOTICE

Observe and follow all regulations and rules regarding use of communication devices in the area where the SUPREMATouch is installed.

7.1 Calibration Submenu

Calibration parameters for the individual inputs can be set in the calibration menu. From that point on the calibration is controlled by the SUPREMATouch.

The preadjustment is applied immediately and cannot be cancelled or discarded.

The window is divided into two subwindows:

- *Start calibration*
- *End calibration*

If an input is selected that is not already in calibration mode, the *Start calibration* window appears.
If an input is selected that is already in calibration mode, the *End calibration* window appears.
The fields *Measuring Point* and *Tag* fields are available in both windows.

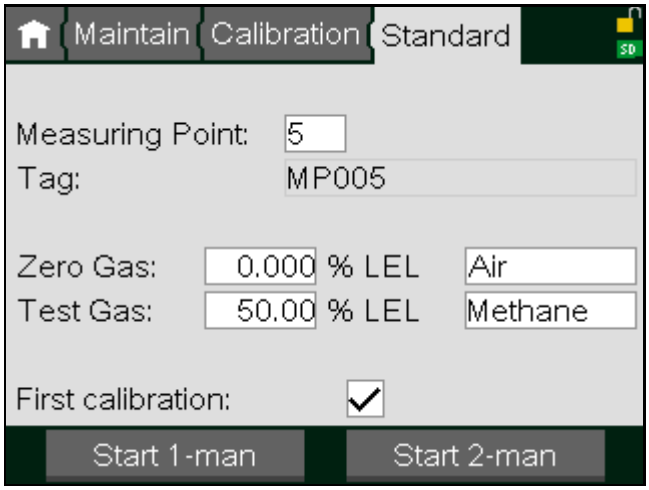

Fig. 66 Start calibration

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Field	Field Type	Function
Measuring Point	Selection	Contains a list of all parameterised inputs. After an input number is selected, the rest of the fields are filled, depending on whether or not the input is in calibration mode. Global parameter changes and actions using the fields described below apply to the input selected in this field.
Tag	Display	Shows the designation of the selected input.
Zero Gas (concentration)	decimal number	Enter the zero gas concentration (in the defined measuring dimension) here. This value can be set in a range between 0 and the range value defined in the measuring point parameters, but should be the same as the measurement range zero (i.e. usually zero). The field defaults to the value of the last calibration, if the input has already been calibrated.
Zero Gas (type)	Display	Contains a list of zero gases that can be used to calibrate the inputs. The field defaults to the zero gas (Measuring Point window) for the selected input.
Test Gas (concentration)	decimal number	Enter the test gas concentration (in the defined measuring dimension). This value can be set in a range between 10% of the measuring range and the range value defined in the measuring point parameters. The field defaults to the value of the last calibration, if the input has already been calibrated.
Test Gas (type)	Selection	Contains a list of test gases that can be used to calibrate the inputs. The field defaults to the test gas (Measuring Point window) for the selected input.
First calibration	Checkbox	If this field is set, a first calibration and, if applicable and confirmed, an automatic preadjustment will be carried out. If a first calibration takes place, entries in the calibration history for the selected measuring point will be deleted. If no previous calibration has been done, a first calibration will always be carried out independent from this setting.
Start 1-man **Start 2-man**	Button	Tapping this button starts the calibration process in one-man mode and automatically inhibits the output. Tap this button to accept the entered settings. After tapping the button, the parameters are immediately checked to see if they are valid. If the parameters are valid, the calibration starts. If they are not valid, a warning appears. When the calibration is started in one-man mode, taking over zero and span values in the Calibration End mask is automatically done by theSUPREMATouch. All other functions are identical.
Time	Display	The shown time is the time between detected application of the calibration gas and reaching 90% of the final value.

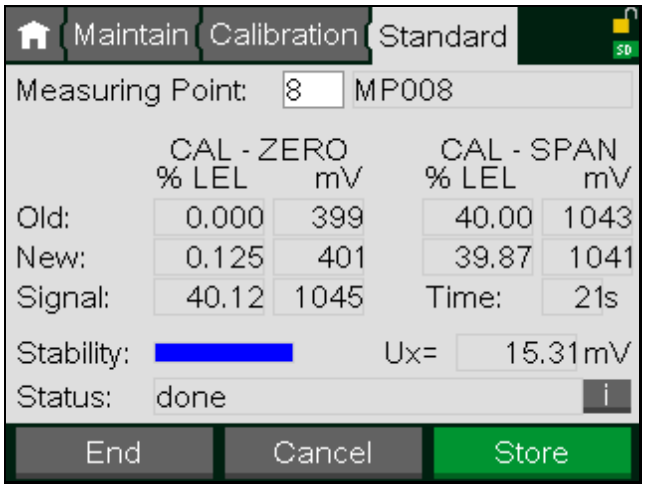

Fig. 67 End calibration

Old	Display	Here the data from the last calibration is displayed, if the input has already been calibrated. • CAL-ZERO: Measurement value and internal signal UA for zero gas • CAL-SPAN: Measurement value and internal signal UA for test gas The dimensions of the values are shown directly above the values.
New	Display	These fields display the data for the current calibration process similar to the values in the “Old” line. The current measurement value is captured and placed in the corresponding field when the “Store” button is pressed, depending on the calibration phase.
Sig.	Display	The current measured signal value and the current internal signal UA are displayed and updated every second.
Ux	Display	Displays the current signal Ux for passive detectors, if the measuring point has already been calibrated. Otherwise no value is displayed (which means: no first calibration has been done). For active transmitters this field is not displayed. At first calibration the difference signal Ux for zero gas is set to 0 mV. At all following calibrations the current difference signal is always based on the defined value, which is the value resulting from the first calibration.
Stability	Progress bar	Indicator for a stable difference signal Ux for passive detectors. Only when the Progress Bar is full should the measured values be accepted. For active transmitters this field is not displayed.
Status	Display	The current calibration status is briefly displayed in this field. To get more detailed information tap the “i” button beside the Status field.
End	Button	When readings for zero gas and test gas measurement are displayed in the corresponding fields, they can be validated by tapping the “End” button. When only the zero gas measurement are displayed in the corresponding fields, a zero point calibration can be performed by tapping this button. This is not possible when the current calibration is a first calibration.

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Store	Button	If this button is tapped during zero gas measurement, the current measurement value is placed into the zero gas field. If it is tapped during test gas measurement, the current measurement value is placed in the test gas field.
Cancel	Button	Tapping this button will cancel a calibration process at any time, provided there is no preadjustment in progress. The results up to that time will be voided (except pre-adjustment settings).

7.2 Calibrating Passive Detectors

Before calibration, make sure that the sensors have warmed up.

Maximum 32 sensors can be calibrated at once.

Warm-up time depends on the sensors and on the measuring components (see the appropriate sensor data, chapter 16 "Sensor Data").

The required zero and test gases as well as test adapters and hose connections (see the sensor operating and maintenance instructions) for supplying the gas are necessary for the successful completion of the calibrations.

The duration and flow rate of the zero and test gas supplies can be found in the operating and maintenance instructions for the sensor as well as the sensor data sheet (see chapter 16 "Sensor Data") for the sensor in question.

NOTICE

MSA recommends using a test gas with a concentration of approximately 50% of the measuring range of the measuring point. Under no circumstances should the test gas concentration be less than 25% of the measuring range. If possible, the test gas (the gas used to calibrate the sensor) and the measurement gas (the gas to be monitored) should be identical. If this is not the case and a reference gas is used, the response factor of the gas concentration used must be known (see operating and maintenance instructions for the sensor, reference curve).

Exceptions to this rule are sensor types D-8101, D-8113, DF-8201, DF-8250, DF-8401 and DF-8603. Because of the nonlinear output signal of these sensors, they should always be calibrated to the rating (100% of the measuring range), provided that this is below the LEL (lower explosion limit).

For a two-man calibration, person 1 (at the SUPREMATouch) and person 2 (at the sensor in question) must perform the following steps:

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2-Man Calibration

Person 1	Person 2
(1) Select *Maintain/Calibration/Standard* menu. (2) Select input to be calibrated in “Measuring Point” field (3) Enter gas concentration in *Zero Gas* field: a) Enter the concentration of the test gas in the zero gas (usually 0%), not the concentration of the zero gas. (4) Enter test gas concentration in *Test Gas* field. (5) If test gas used is different from reference gas entered in the *Setup/Inputs&Outputs/ Measuring points* menu, change the entry in field *Test Gas* of the *Calibration* submenu. (6) Start calibration with *Start 2-Man* button.	
	(7) Supply zero gas via test adapter to the sensor assigned to the selected measuring point (duration and flow rate according to sensor operating and maintenance instructions).
(8) After tapping the *Start* button, enter the required password or use the key switch. *“End Calibration” submenu appears.* *Values of preceding calibration are shown in line OLD.* *Values of current calibration are shown under NEW after the Store button has been pressed. OLD is blank for first calibrations.* *The field Signal= displays the current measurement value of the measuring point to be calibrated.* (9) After zero gas has been supplied for a sufficient period of time–bar display completely filled–confirm value with *Store* button. In one-man calibration mode, this step is done automatically. *Value is now shown in CAL-ZERO.*	
	(10) After person 1 confirms that the zero point calibration has been completed successfully, cut off zero gas supply and start with test gas supply.

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Person 1	Person 2
Current measurement value of measuring point to be calibrated is shown in *Sig:* field. (11) After test gas has been supplied for a sufficient period of time–progress bar is completely filled–confirm value with *Store* button. In one-man calibration mode, this step is done automatically. *Value is shown in CAL-SPAN.* (12) Finish calibration of selected input with *End* button. *Signals U_A above 600 mV are not valid for zero point calibration.* *Signals U_A below 600 mV are not valid for span calibration.* (13) Select the next input in menu *Start calibration*, and repeat procedure.	
	(14) After person 1 confirms that sensitivity calibration has been completed successfully, shut off test gas supply and start zero gas supply at next input to be calibrated.

WARNING!

If the signal voltage exceeds 2000 mV or is too weak during the test gas supply, the calibration is invalid. Under no circumstances may the calibration value be accepted. Check test gas concentration and make sure it is being supplied correctly. It may be necessary to check and correct the preadjustment of the measuring point.

If the preadjustment was correct, the ACTUAL VALUES for the zero point will be approximately in the range of 350 mV–450 mV. The signal voltage shown is calculated according to the formula: Signal = C / 100 * 1600 mV + 400 mV (for sensors with a linear output signal), where C is the concentration of the test gas in % of the measuring range. The tolerance is approximately equal to the signal value in mV ± 100 mV.

1-Man Calibration

For a one-man calibration, the person must perform the following steps:

(1) Select *Maintain/Calibration/Standard* menu.

(2) Select input to be calibrated in “Measuring Point” field

(3) Enter gas concentration in *Zero Gas* field:

a) Enter the concentration of the test gas in the zero gas (usually 0%), not the concentration of the zero gas.

(4) Enter test gas concentration in *Test Gas* field.

(5) If test gas used is different from reference gas entered in the *Setup/Inputs&Outputs/ Measuring points* menu, change the entry in field *Test Gas* of the *Calibration* submenu.

(6) Start calibration with *Start 1-Man* button.

a) Confirm messages immediately shown on the screen.

(7) Go to the sensor in the field.

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(8) Supply zero gas via test adapter to the sensor assigned to the selected measuring point for a sufficient period of time (duration and flow rate according to sensor operating and maintenance instructions).

(9) Stop zero gas supply and supply test for a sufficient period of time.

(10) Stop test gas supply and return to the SUPREMA.

The measurement values taken over during the calibration process is shown in the NEW line.

(11) Check the measuring values taken over and shown on the display.

If plausible, complete the calibration by pressing the “End” button; otherwise cancel the calibration by pressing the “Cancel” button.

⚠ WARNING!

If the signal voltage exceeds 2000 mV or is too weak during the test gas supply, the calibration is invalid. Under no circumstances may the calibration value be accepted. Check test gas concentration and make sure it is being supplied correctly. It may be necessary to check and correct the preadjustment of the measuring point.

If the preadjustment was correct, the ACTUAL VALUES for the zero point will be approximately in the range of 350 mV–450 mV. The signal voltage shown is calculated according to the formula: Signal = C / 100 * 1600 mV + 400 mV (for sensors with a linear output signal), where C is the concentration of the test gas in % of the measuring range. The tolerance is approximately equal to the signal value in mV ± 100 mV.

7.3 First Calibration with Pre-Adjustment

7.3.1 Passive Detectors

The first calibration for passive detectors is carried out as described in chapter 7.2 "Calibrating Passive Detectors". Carrying out a first calibration deletes the calibration history of the sensor. During a first calibration, it is not possible to perform a separate zero calibration.

NOTICE

The first calibration may not be performed until after the preadjustment of the MAI module (chapter 13.4 "Preadjusting Passive Detectors") has been properly completed for all connected passive detectors.
Signals U_A above 600 mV are not valid for the zero point calibration. During the sensitivity calibration, the value in the signal field must exceed the value in the zero gas field by at least 200 mV.

NOTICE

The first calibration may not be performed until after the preadjustment of the MAI module (chapter 13.4 "Preadjusting Passive Detectors") has been properly completed for all connected passive detectors.
Signals U_A above 600 mV are not valid for the zero point calibration. During the sensitivity calibration, the value in the signal field must exceed the value in the zero gas field by at least 200 mV.

Active Transmitters

A first calibration on the SUPREMATouch system is not required for active transmitters (sensors with a 4–20 mA output). The first calibration is to be performed directly at the sensor in accordance with the operating and maintenance instructions of the sensor. As default values, the SUPREMATouch system interprets an input current of 4 mA as 0% of the measuring range and an input current of 20 mA as 100% of the measuring range.

NOTICE

In case of sensors that do not send a maintenance level during calibration, it is recommended to inhibit the input in the *Setup/Measuring Points* menu during the first calibration.
As part of the start-up procedure, it is recommended that the correctness of the displayed values be checked either by supplying gas to the sensors or by supplying a constant current to the MAT module from a source of constant current. The method for correcting the 4–20 mA input is described in chapter 7.4 "Calibrating Active Transmitters".

NOTICE

In case of sensors that do not send a maintenance level during calibration, it is recommended to inhibit the input in the *Setup/Measuring Points* menu during the first calibration.
As part of the start-up procedure, it is recommended that the correctness of the displayed values be checked either by supplying gas to the sensors or by supplying a constant current to the MAT module from a source of constant current. The method for correcting the 4–20 mA input is described in chapter 7.4 "Calibrating Active Transmitters".

7.4 Calibrating Active Transmitters

For active transmitter (sensors with an output of 4–20 mA), calibration is to be carried out directly on the sensor in accordance with the sensor's operating and maintenance instructions. As default values, the SUPREMATouch system interprets an input current of 4 mA as 0% of the measuring range and an input current of 20 mA as 100% of the measuring range.

For sensors which do not transmit a maintenance level during calibration, MSA recommends to lock the measuring point during calibration in the *Setup/Measuring point* menu.

Checking the Display

If, in spite of correctly calibrated active transmitters, the expected values (0% of the measuring range for a signal current of 4 mA and 100% of the measuring range for a signal current of 20 mA) do not appear on the SUPREMATouch, the calibration on the SUPREMATouch must be checked and corrected if necessary.
For this purpose, either the signal current of the connected sensor or a variable power source can be used. If the signal current of the sensor is used, make sure that the sensor is supplying the correct values.
To correct a possibly incorrectly set measuring point, change the selected type of sensor:

(1) Go to the *Setup/Input and Outputs/Measuring Points/Sensor Data* menu.

(2) Select any other type of sensor.

(3) Confirm the selection with *OK*.

(4) Re-select the type of sensor connected and confirm with *OK*.
The measuring point will be set back again to the standard setting of 4 mA = 0% of the measuring range and 20 mA = 100% of the measuring range.

NOTICE

During this calibration the measuring point must be inhibited manually (alarm rejection).

NOTICE

Adjustments on the MAI module are neither necessary nor possible for active transmitters.

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7.4.1 Calibration with a Variable Power Source

(1) Lock the measuring point in question in the *Setup/Input and Outputs/Measuring points* menu to prevent triggering an alarm.

(2) Detach cable connections of sensor to MAT module.

(3) Connect the variable power source to the MAT module as follows:
MAT module terminal 1: + pole of the power source (signal)
MAT module terminal 4:–pole of the power source (GND)

(4) Set output current of power source to 4 mA.

(5) Unlock measuring point in question in the *Setup/Input and Outputs/Measuring points* menu to allow a calibration.

(6) Select *Maintain/Calibration/Standard* menu.

(7) Select measuring point to be calibrated in *Measuring Point* field.

(8) Enter 0 % of measuring range in the field *Zero Gas* as zero gas concentration.

(9) Enter 100 % of measuring range in the field *Test Gas* as test gas concentration.

(10) After tapping the *Start* button, enter the required password or use the key switch.
End Calibration submenu displays.
Current measurement value UA of the measuring point to be calibrated will appear in Sig: field.
For an input current of 4 mA, a value of 400 mV ± 10 mV should be displayed.
*In the field Ux= no value or ***** is displayed.*

(11) If value U_A is within tolerance range (400 mV ± 10 mV), confirm with *Store* button.
The value will be appear in CAL-ZERO.

(12) Set output current of power source to 20 mA.
Current measurement value U_A of measuring point to be calibrated will appear in Sig: field.
For an input current of 20 mA, a value of 2000 mV ± 10 mV should be displayed.

(13) If the value U_A is within tolerance range (2000 mV ± 10 mV), confirm with *Store* button.
The value will display in CAL-SPAN.

(14) End calibration of selected measuring point with *End* button

(15) Set the power source back to 4 mA and lock the measuring point again.

(16) Cut the connection between the MAT module terminal and the power source and reconnect the sensor.

(17) After allowing the sensor to recover sufficiently, unlock the measuring point.

(18) The calibration menu displays.

(19) Select the next measuring point and repeat the procedure.

7.4.2 Calibration Using the Transmitter

Make sure before calibration that the sensors have recovered. This calibration procedure can also be used to compensate for small deviations in the output current of the sensors from the system setup of the SUPREMATouch (4 mA = 0% of the measuring range, 20 mA = 100% of the measuring range). The deviations in the current should not exceed ± 0.5 mA, however, or otherwise the error evaluation (leaving the measuring range in one direction or the other) will be impaired.
Again, the required zero and test gases, test adapters, and hose connections (see operating and maintenance instructions of the sensor) for supplying the gases are necessary for a successful calibration.

The duration and flow rate of the zero and test gas supplies can be found in the operating and maintenance instructions for the sensor in question.

Sensors with a linear output signal:The test gas concentration should be in the upper third of the measuring range. The displayed signal voltage is calculated according to the formula: Signal = C / 100 * 1600 mV + 400 mV. Sensors with a nonlinear output signal must be calibrated to the rating. (Take note of the LEL.) Signal voltage for full scale: 2000 mV ± 10 mV.

For the calibration procedures for 1-man and 2-man calibration, see chapter 7.2 "Calibrating Passive Detectors".

7.5 Calibration with Automatic Valve Control

Check sensor manuals for necessary equipment.

If valves have been configured in the menu *Setup/Inputs and Outputs/Measuring Points*, the gas applications of person 2 described in chapters 7.2 and 7.4 will be done automatically using these valves. But person 1 is still required to check and confirm the values.

7.6 Separate Zero Adjustment

If the primary calibration has been completed, it is possible to only adjust the zero point in the course of maintenance work. The appropriate span value is then processed by the SUPREMA-Touch based on the data from the last completed calibration. Carry out the steps for zero adjustment as described in the previous sections. After storing the zero value (*Store* button) the zero adjustment can be carried out with the *End* button. The following dialog must be confirmed with <YES>.

NOTICE

If the value is below the zero adjustment range, the separate zero setting is cancelled and a warning is displayed. Exceeding the calculated span value is also invalid and results in cancelling of the separate zero setting. It is then recommended that a complete calibration is carried out and if necessary, the sensor is replaced.

NOTICE

After the separate zero setting, no SPAN value is shown in the calibration menu and in the logbook for these settings.

7.7 Calibration of Groups of Measuring Points

When a group of measuring points is defined and parameterized as calibratable, the complete group can be set to calibration mode at once. The start screen and the values that have to be entered are similar to a calibration of a single measuring point.

The measuring gas, range and dimension have to be similar for all measuring points in a group if the group should be used for this calibration process. A group can contain up to 32 measuring points.

After pressing the appropriate Start button for 1- or 2-man calibration, all measuring points of the group will be set to calibration mode. Afterwards a list with all measuring points and their calibration status will be shown. The calibration process is similar to a single point calibration. The current value of the selected measuring point can be taken over by pressing the *Store* button or by entering the single point calibration mask by double tapping the measuring point.

7.8 Remote Calibration of Transmitters

When a digital communication between the SUPREMA and a supported transmitter is available, e.g. a HART enabled PrimaX is connected to a MAI30 with MHS30 module, it is possible to calibrate the transmitter itself remotely controlled from the SUPREMA.

For a remote calibration, the following steps must performed:

(5) If test gas used is different from reference gas entered in the *Setup/Inputs&Outputs/Measuring points* menu, change the entry in field *Test Gas* of the Calibration submenu.

(6) Select the calibration mode.

Not all modes may be supported by the connected transmitter.

(7) Start calibration with *Start*.

(8) Follow the transmitter dependent instruction shown on the SUPREMA display.

7.9 Setting the Bridge Current

Before a passive sensor can be calibrated and used, the bridge current has to be set according to the sensor manual. The value to be set can be gas dependent. After a change of the bridge current, a new warm-up time has to be considered.

Setting the bridge current requires an already parameterized measuring point.

A setting that has been started or carried out cannot be canceled or discarded.

WARNING!

Setting the bridge current deletes the calibration history of the sensor. The current calibration for the selected measuring point will be reset.

In order to avoid accidental damage and destruction of the sensors by an excessive bridge current, the setting must be carried out using a corresponding sensor equivalent network (see chapter 5.1 "Sensor Simulation Modules" or sensor simulator).

To set the bridge current:

(1) Select *Maintain/Calibration/Remote*.

(2) Select input to be calibrated in *Measuring Point* field.

(3) Enter gas concentration in *Zero Gas* field.

(4) Enter test gas concentration in *Test Gas* field.

(7) Connect desired sensor.

When the bridge current is set and the sensor has warmed-up properly, carry out the first calibration of the measuring point.

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(1) Connect sensor simulation module.

(2) Enter the sensor type dependent current in the *Sensor Current reference value.*

(3) Start the setting with *Start*.

(4) Wait until the *Status* field indicates completion of the process.

(5) End the process with *End*.

(6) Remove sensor simulation module.

8 System Expansions

Up to 256 inputs can be connected to a SUPREMATouch system. Up to 512 digital outputs are available. A complete system for up to 64 inputs can be installed in one 19” rack. Depending on the size of the current system already in place, various additional modules are required to expand the system. Connecting additional modules, inputs, and relays increases the power demand of the system and may mean that a new system power supply is required.

Any additional modules that have been installed must be configured in the system using the SUPREMA Manager.

8.1 Connecting Additional Sensors

NOTICE

Whenever connecting additional sensors, always ensure that the voltage supply to the system is still adequate (→ part Installation and Start-Up Manual). If necessary, install a voltage supply which meets the new requirements.

Up to 256 sensors can be connected to a SUPREMATouch system.

A single MAI30 module allows up to 8 sensors to be connected.

When a rail-mount system is used for connecting the sensors (MAT TS or MGT40 TS module) a maximum of 8 MAI and therefore 64 sensors can be installed in one rack.

When the rack-mount system is used for connecting the sensors (MAT module) a maximum of 4 MAI and therefore 32 sensors can be installed in one rack.

For connecting additional sensors it is necessary that the sensors themselves and their connecting cables have been installed properly. The sensors can then be connected according to the instructions (→ see chapter 12.9 "Connecting the Sensors").

There are three possible ways to expand the system, depending on the extent the system has already been expanded:

1. Not all of the 8 possible inputs on an existing MAI30 module have been assigned. The number of free inputs equals the number of new inputs to be connected.

In this case no additional modules are required.

The additional inputs must just be connected, parameterised, preadjusted (passive detectors only), and calibrated.

A detailed description can be found in the part Installation and Start-Up Manual.

2. All existing MAI modules are assigned, or the number of free inputs is smaller than the number of new sensors to be connected.

A sufficient number of free slots for additional MAI modules are available in the existing racks.

Additional MAI30 modules (one MAI module required for every 8 sensors) are required, depending on the number of new sensors to be connected. Additional MAT/MAT TS/MUT/MGT 40 TS modules will also be needed. For redundant systems additional MAR modules are required in the same amount as MAI modules.

To avoid alarm and error messages, the connected relays must be inhibited (see chapter 12.10 "Connecting the Relay Outputs").

The new inputs are configured and parameterized in the system, they must be preadjusted (passive detectors only), configured, and calibrated.

These steps are described in detail in chapter 12 "Installation".

3. All existing MAI modules are assigned, or the number of free inputs is smaller than the number of new inputs to be connected. No free slots for additional MAI modules are present in the existing racks.

One or more new racks and the necessary CAN bus connecting cables are required.

Additional MAI modules (one MAI module required for every 8 sensors) are required, depending on the number of new sensors to be connected. Additional MAT/MAT TS/MUT/MGT40 TS modules will also be needed. For redundant systems additional MAR modules are required in the same amount as MAI modules.

WARNING!

Always switch off the power supply when connecting a new rack.

(1) After switching off the power supply, mount and install the additional racks.

The connection of the racks and the required configuration changes (MIB module) are described in chapter 12 "Installation".

Choose the correct CAN bus Bit rate and CAN node number (see chapter 12.6 "Module Configuration").

8.2 Connection of Additional Relay Driver Outputs

WARNING!

In all cases, the relay outputs must be configured as instructed (→ chapter 12.10 "Connecting the Relay Outputs").

WARNING!

When connecting additional outputs, make sure that the system power supply is still adequate (→ chapter 12.14 "Connecting the System Power Supply"). If necessary, install a power supply which meets the new requirements.

A single SUPREMATouch system can provide a maximum of 512 relay driver outputs.

A single MGO module allows for 40 relay driver outputs.. A maximum of 10 MGO modules can be plugged into one rack. This number of modules requires at least one additional rack containing the appropriate number of MAI modules that enable the sensors to be connected.

There are three possible ways to expand the system, depending on the extent the system has already been expanded:

1. A sufficient number of free relay driver outputs is still available on an existing MGO module.

1.a) Only the common alarms of the MRO module plugged into the rack have been used:

The MRO8 module must be replaced with MRO8 TS modules. These are connected with ribbon cable via MRC TS and MUT modules to the MGO module plugged into the rack (→ chapter 12.2 "Installation Instructions for Following the EMC Directives"). 5 MRO8 TS modules, each with 8 relays, can be connected per MRC TS module.

The connection procedure is described in detail in chapter 12.10 "Connecting the Relay Outputs".

1.b) MRO8 TS modules are already installed:

The connection can be made to existing MRO 8 TS modules; otherwise, additional MRO8 TS modules must be installed.

2. An additional MGO module is required.

2.a) Free slots are still available in the existing racks:

Both the additional MGO module and the additional MRO8 TS modules are required to be installed. These are connected via MRC TS and MUT modules with ribbon cable to the MGO module plugged into the rack (→ chapter 12.2 "Installation Instructions for Following the EMC Directives"). 5 MRO8 TS modules, each with 8 relays, can be connected per MRC TS module.

The connection procedure is described in detail in chapter 12.10 "Connecting the Relay Outputs".

2.b) There are no free slots for MGO modules available in the existing racks:

WARNING!

Always switch off the power supply when connecting a new rack.

(2) After switching off the power supply, mount and install the additional rack.

The connection of the racks and the necessary configuration changes (MIB module) are described in chapter 12 "Installation". Ensure that the correct CAN bus baud rate and CAN node number have been selected.

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Additional relay modules are to be connected as described under 2.a).

Additional Switching Outputs

The same guidelines (especially those for the MGO module) apply here as to the connection of additional relays (see chapter 12.10 "Connecting the Relay Outputs"). Instead of the MRO and MRC TS modules, however, MGT 40 TS modules are required, which are connected via ribbon cable and an MUT module to the MGO module plugged into the rack (→ chapter 12 "Installation").

8.3 Connection of Additional Analog Outputs

A maximum of 256 analogue outputs are provided by the SUPREMATouch, corresponding to the maximum number of sensors that can be connected.

One MAO module makes 8 analogue outputs available. Up to 10 MAO modules can be plugged in per rack. This is based, however, on the use of at least one additional rack containing the corresponding MAI modules, which make it possible to connect the sensors.

One of the following procedures must be carried out, depending on the extent to which the system has already been expanded:

1. Not all 8 possible analogue outputs on an existing MAO module have been assigned. The number of free analogue outputs is equal to the number of new analogue outputs to be connected.

No additional modules are required. The additional analogue outputs can be connected to the existing MAT or MAT TS module.

2. All existing MAO modules are assigned, or the number of free analogue outputs is smaller than the number of new analogue outputs to be connected. A sufficient number of free slots for additional MAO modules are present in the existing racks.

In this case, additional MAO modules are required in correspondence with the number of new analogue outputs to be connected.

Additional MAT/MAT TS/MUT modules are also required.

3. All existing MAO modules are full, or the number of free analogue outputs is smaller than the number of new analogue outputs to be connected. No free slots for additional MAO modules are available in the existing racks.

In this case, additional MAO modules are required, in correspondence with number of new analogue outputs to be connected.

Additional MAT/MAT TS/MUT modules are also required.

One or more new racks and the necessary CAN bus connecting cables will also be needed.

⚠ WARNING!

Always switch off the power supply when connecting a new rack.

(1) After switching off the power supply, mount and install the additional rack.

The connection of the racks and the necessary configuration changes (MIB module) are described in the part Installation and Start-Up Manual.

Ensure that the correct CAN bus baud rate and CAN node number have been selected.

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Installation and Start-Up Manual

SUPREMATouch

Fire and Gas Warning Unit

GB

MSA Europe GmbH
Schlüsselstrasse 12
8645 Rapperswil-Jona
Switzerland
info.ch@MSAsafety.com
www.MSAsafety.com

9 Special conditions to comply with the requirements of DIN EN 61508 for SIL 1-3 according to TÜV Certificate

9.1 Conditions for configuration, installation, operation and maintenance

The following criteria have to be considered for all **safety-related applications**

(1) The Locking (Inhibit) of measuring inputs is only allowed during maintenance and repair.

(2) After any configuration or parameterization, a verification has to be completed by reading back the data and comparing with SUPREMA Manager.

(3) The alarm conditions of the SUPREMATouch must be periodically checked together with the typical gas calibration checks.

(4) The alarm and relay functions including the System Fail relays must be tested at least once per year.

(5) The locking (inhibit) of measuring points must be safety related processed via the inhibit relay.

(6) Failure of measuring points must be safety related signaled via the signal fail relay.

(7) Sensor cables must be protected from mechanical damage (e. g. by using armored cable).

(8) The relays must be energized under normal conditions.

(9) The relay contacts must be protected with a fuse rated at 0.6 of the nominal specified relay contact current.

(10) The system fail relay contacts (even for satellites) must be safety related processed and supervised for warning purposes.

(11) In galvanically coupled system components the ground connections of all power supply must be connected.

(12) In case of failure of any component the repair or replacement must be completed within 72 hours.

(13) Only modules and components with the Hardware and Software Versions specified in chapter 9.7 "Permitted Software Versions" may be used.

(14) The notes in this manual for installation, operation and maintenance have to be considered.

(15) An ambient temperature above 40 °C is to be avoided.

(16) All devices connected to one MRO module must have the same voltage level.

(17) External power supplies must fulfill, as a minimum, the requirements of EN 60950 and EN 50178.

(18) During installation of the SUPREMATouch - Fire and Gas Warning System the national regulations and standards must be complied with.

(19) The installation of the SUPREMATouch - Fire and Gas Warning System has to be done in such a way that a maximum degree of pollution 1 (EN 60664-1) is ensured (no or only dry, not conductive contamination arises. The contamination does not have influence).

(20) In case of using the MLE modules the conditions which are described in Technical Report No: 968/EZ 163.04/04 dated 2004-11-22 are to be considered.

9.2 Additional conditions to fulfill the requirements of IEC 61508 for a certain SIL

In addition to the general conditions the following criteria must be met for a specific SIL:

SIL 1:

The installation must be carried out in accordance with configuration 1 in chapter 9.4 "Configurations".

SIL 2:

The installation must be carried out in accordance with configuration 1or 2 in chapter 9.4 "Configurations".

Configuration 1 has a HFT of 0 causing a reduced availability in case of an error compared to configuration 2 which has a HFT of 1 due to redundancy.

For configuration 2 when using the MRO8 and/or MRO8 TS modules the contacts of the relays for the same alarm (Alarm A and Alarm B) of subsystem A and B have to be interconnected serially or processed safety-related.

(By using the MRO16 TS modules this interconnecting is already internally realized.)

SIL 3:

The installation has to be carried out in accordance with configuration 3 in chapter 9.4 "Configurations".

Two independent sensors have to be used in the same area. The sensors in the same area have to be connected to different MAI20 (analogue input) modules.

For configuration 3 when using the MRO8 and/or MRO8 TS modules the contacts of the relays for the same alarm (Alarm A and Alarm B) of subsystem A and B have to be interconnected serially or processed safety-related.

(By using the MRO16 TS modules this interconnecting is already internally realized.)

9.3 Possible Configurations and Acquirable SILs

The following table shows which configuration has to be selected to fulfill the requirements of a special SIL.

	SIL 1		SIL 2		SIL 3	
	LDM	HDM	LDM	HDM	LDM	HDM
Configuration 1	X	X	X			
Configuration 2	X	X	X			
Configuration 3	X	X	X	X	X	X

(LDM = Low Demand Mode; HDM = High Demand or Continuous Mode)

Depending on the selected configuration the following safety-relevant parameters have to be considered while implementing the safety loop:

Safety-relevant parameters without using the MLE10 Modules

	PFH	PFD	SFF	λ_{DU}	λ_{DD}	HFT
Configuration 1	$3.47*10^{-7}$ (3.5 % of SIL1)	$1.9*10^{-3}$ (1.9% of SIL1)	97 %	347 fit	4897 fit	0
Configuration 2	$1.60*10^{-8}$ (1.6 % of SIL2)	$5.82*10^{-5}$ (0.6% of SIL2)	97 %	347 fit	4897 fit	1 [1]
Configuration 3	$7.55*10^{-9}$ (7.6 % of SIL3)	$9.78*10^{-6}$ (1.0% of SIL3)	97 %	347 fit	4897 fit	1

[1)] Except analog stage of input modules MAI and MGI which have HFT = 0!

MTBF = 16 years for the safety function (for all configurations)

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Safety-relevant parameters using the MLE10 Modules

	PFH	PFD	SFF	λ_{DU}	λ_{DD}	HFT
Configuration 1	$3.8*10^{-7}$ (3.8 % of SIL1)	$2.07*10^{-3}$ (2.1% of SIL1)	97 %	380 fit	5224 fit	0
Configuration 2	$1.67*10^{-8}$ (1.7 % of SIL2)	$5.88*10^{-5}$ (0.6% of SIL2)	97 %	380 fit	5224 fit	1 [1]
Configuration 3	$8.21*10^{-9}$ (8.2 % of SIL3)	$1.04*10^{-5}$ (1.0% of SIL3)	97 %	380 fit	5224 fit	1

[1] Except analog stage of input modules MAI and MGI which have HFT = 0!

MTBF = 16 years for the safety function (for all configurations)

Concerning the configuration variations it has to be considered that the sensors were not part of the test and their suitability for the respective Safety Integrity Level (SIL) has to be proven separately.

9.4 Configurations

Configuration 1

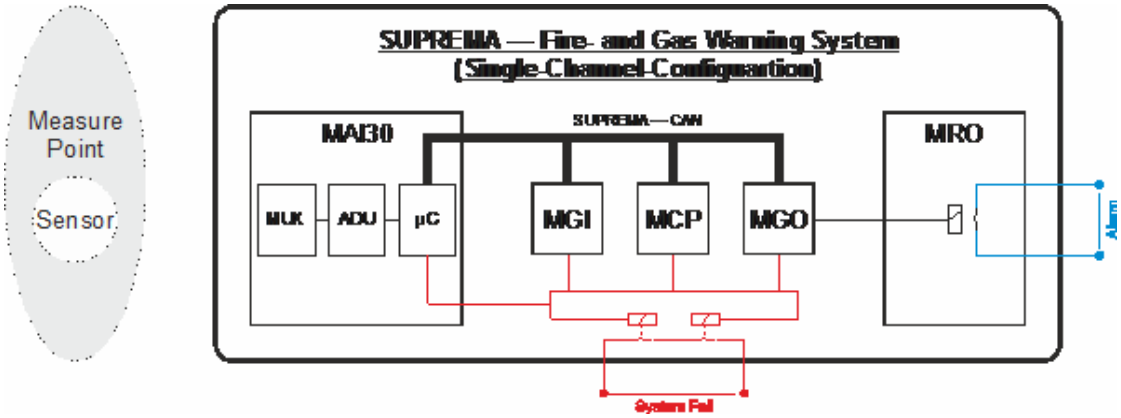

Fig. 68 In case of a single-channel-configuration the MLE Modules cannot be used

Configuration 2

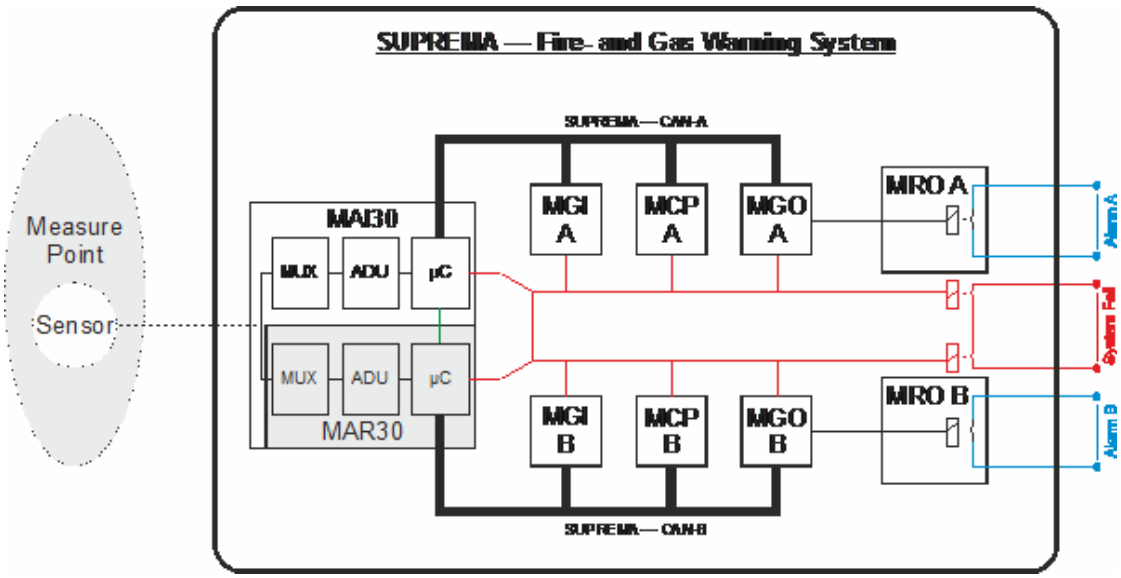

Fig. 69 Configuration without MLE10 Modules

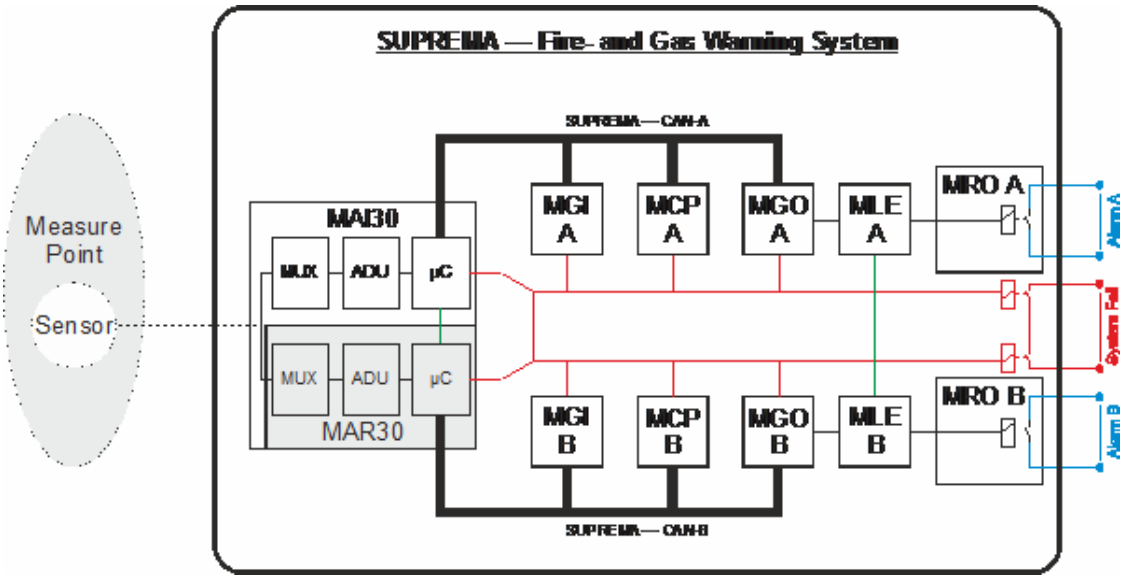

Fig. 70 Configuration with MLE10 Modules

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Configuration 3

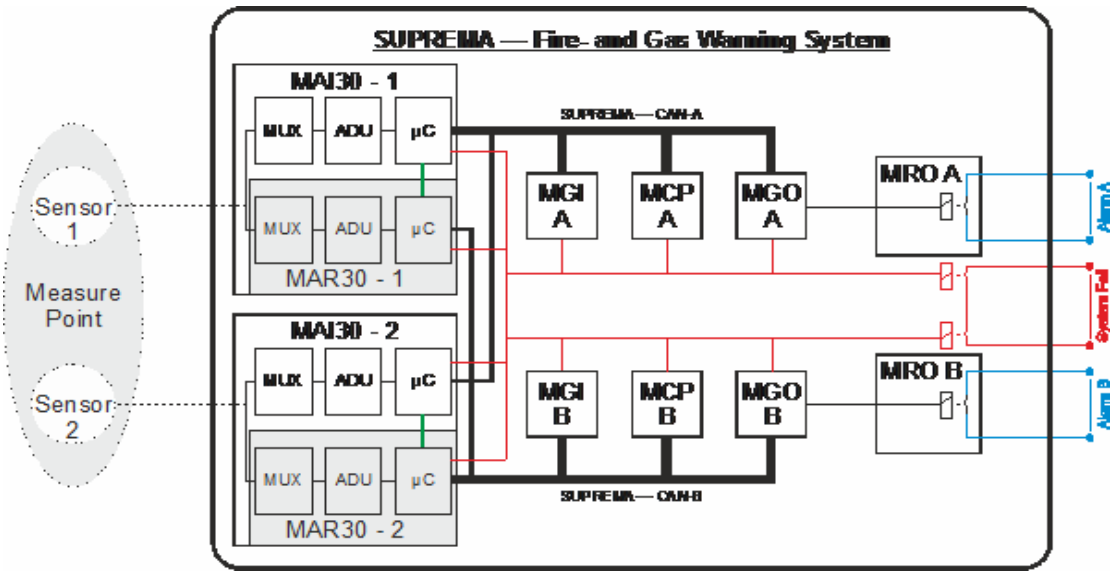

Fig. 71 Configuration without MLE10 Modules

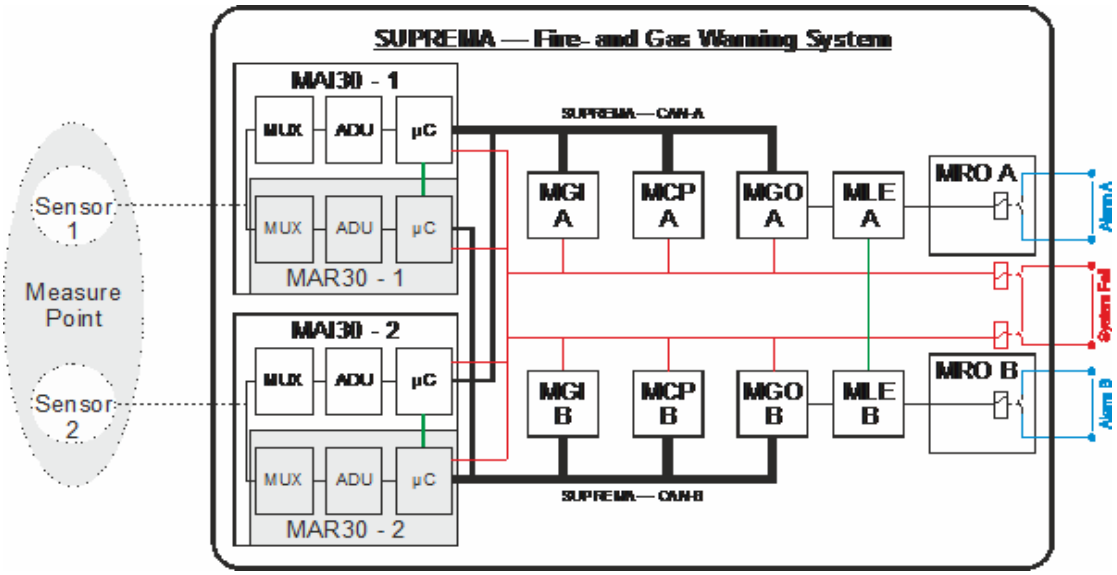

Fig. 72 Configuration with MLE10 Modules

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9.5 Permitted System Expansions over CAN Bus

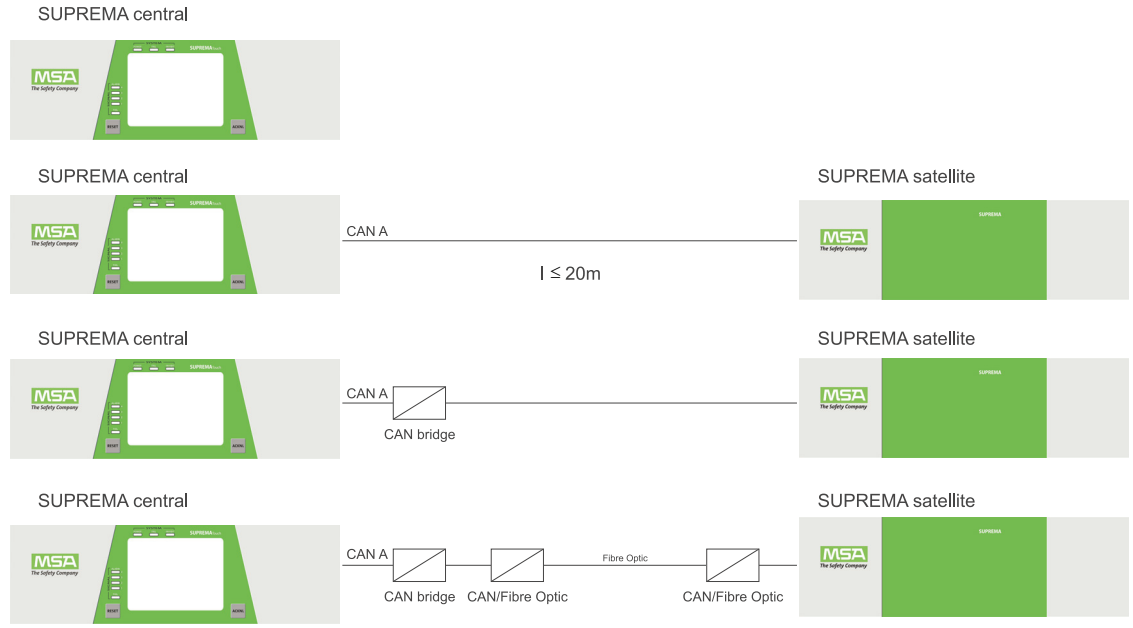

Fig. 73 System expansions with CAN bus and single-channel-configuration

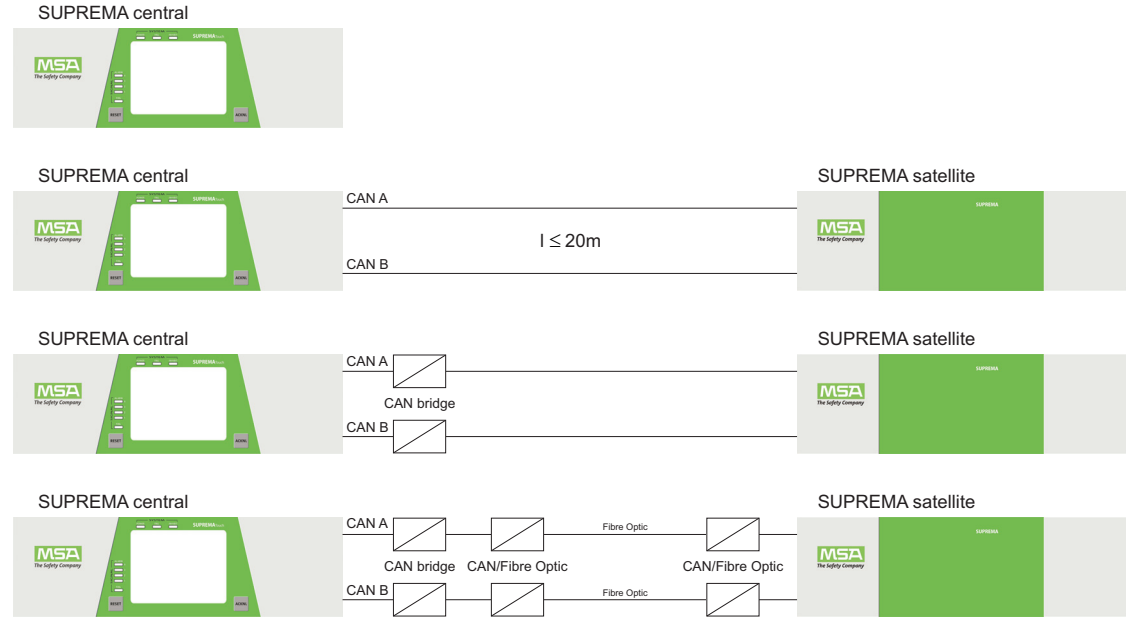

Fig. 74 System expansions with CAN bus and redundant configuration

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9.6 Permitted Hardware Modules and Software Versions

Permitted Hardware Modules

Module	Layout Version	Meaning
MIB20	2	Interconnection Board
MCP20	5	Central Processing Unit
MDO20	3, 4, 5	Display & Operation
MDA20	4	Data Acquisition
MGO20	4	General Output
MAI30	7	Analogue Input Module
MAR30	4	Analogue Input Redundancy Module
MGI30	7	General Input Module
MGR30	4	General Input Redundancy Module
MAI20	6	analogue Input Unit
MAR10	6	analogue Redundant
MST10	8	System Terminals
MST20	6	System Terminals
MSI10	4	Switch Input
MFI10	5, 7	Fire Input
MCI20 MCI20 BFE	11	Current Input
MAT10	4	analogue Terminal
MAT10 TS	6	analogue Terminal
MPI10 WT 100 MPI10 WT 10 MPI10 HL 8101 MPI10 HL 8113	6	Passive Detector Input
MUT10	4	Universal Terminal
MRC10 TS	3	Relay Connection
MRO10 8	7	Relay Output (8 Relays)
MRO10 8 TS	3	Relay Output (8 Relays)
MRO10 16 TS	3	Relay Output (16 Relays)
MRO20 8 TS	1	Relay Output (8 Relays)
MRO20 16 TS	1	Relay Output (16 Relays)
MRO10 16 TS SSR	3	Solid State Relay Output (16 Relays)
MRO20 8 TS SSR	1	Solid State Relay Output (8 Relays)
MRD10	1 2	Relay Dummy
MGT40 TS	10026772 (part number)	General Terminal
MLE10	4	Logic Extension Modules
SUPREMA Rack-Type 20/E 20 (with or without internal 150 W power supply)		
SUPREMA CAN BRIDGE CBM		
SUPREMA CAN-LWL Konverter - Fiber Optics Converter		
MDC20	2	Display Connection Module

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For non safety-related applications (e.g. analogue output, data communication to a PLS) the following components can also be used:

Module	Layout Version	Meaning
MAO10	6	Analogue Output Unit
MAO20	4	Analogue Output Unit
MHD10	2	High Driver
SUPREMA PKV 30-COS/AUER		

9.7 Permitted Software Versions

Module	Software version	Component
MDA20	2.01.02	Controller
MGO20	3.01.02	Controller
MCP20	3.03.01	Controller
MDO20	3.03.01	Controller
MAI30/MAR30	1.02.01	Controller
MGI30/MGR30	1.02.01	Controller
MAI20	MAI MA01	CPLD
MAR10	MAR MA01	CPLD
MAO10	2.02.01	Controller
	MAO MA01	CPLD
MLE10	MLE 10_4_XXX_YYY_ZZ	
	(XXX_YYY_ZZ: Ident. No. of the customer specified application, for which a separate suitable qualification has to be verified.)	

9.8 TÜV-Certificate

Certificate number: 968/EZ 163.24/16

10 Special conditions to comply with the requirements of ATEX

Manufacturer:	MSA Europe GmbH Schlüsselstrasse 12 8645 Rapperswil-Jona Switzerland
Product:	SUPREMATouch
Type of protection:	see Remote Sensor, the control system must be installed outside of the hazardous area
Performance:	DIN EN 60079-29-1 :2008-07 DIN EN 50104 :2011-04 DIN EN 50271 :2011-04
Marking:	 II (1) G (2) G
EU-Type Examination Certificate:	DMT 03 ATEX G 003 X
Quality Assurance Notification:	0158
Year of Manufacture:	see label
Serial No.:	see label

Conformance in accordance with the Directive 2014/30/EU (EMC)

DIN EN 50270 : 2015 Typ 2, DIN EN 61000 - 6 - 4 : 2011

LVD Conformance in accordance with the Directive 2014/35/EU (LVD)

DIN EN 61010 : 2010

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Special Conditions for Safe Use in accordance with EU-type examination certificate DMT 03 ATEX G 003 X

- When using 4-20 mA transmitters, pay particular attention to the following:
  - The specifications of the 4-20 mA interface
  - Behavior with currents less than 4 mA
  - Behavior with currents in excess of 20 mA
- Catalytic remote sensors shall be connected with 5-core cable when the 3-core cable length allowed for proper cable control has been exceeded (see chapter 16 "Sensor Data".
- The system fault relays of all racks in the system shall be monitored.
- For each channel, the alarm with the highest significance for safety shall be configured as Latching.
- Relay Outputs for safety-related switching operations shall be configured as *New Alarm* not selected.
- Time delayed relays should not be used for safety related purposes. If their use is unavoidable, the delay time shall be set to the minimum possible for the required operation. The maximum possible rate of increase of gas concentration shall be taken into account when determining the delay time.
- All controls, including digital inputs and inputs from communication interfaces shall be protected against unauthorized or inadvertent interference or operation.

Modules tested according to DMT 03 ATEX G 003 X

Module	Layout version	Function
MAI30	7	Analogue Input Module
MAR30	4	Analogue Input Redundancy Module
MGI30	7	General Input Module
MGR30	4	General Input Redundancy Module
MAO20	4	Analogue Output Unit
MAR10	6	Analogue Redundant
MAT10	4	Analogue Terminal
MAT10 TS	6	Analogue Terminal
MBC20-AdvEl*	5	Bus communication unit
MBC20-Modbus*	5	Bus communication unit
MCP20	5	Central Processing Unit
MDC20	2	Display Connection Module
MDO20	3, 4, 5	Display and Operation
MGO 20	4	General Output
MGT40 TS		General Terminal
MIB 20	2	Interconnection Board
MRC10 TS	3	Relay Connection
MRD10	2	Relay Dummy
MRO10 8	7	Relay Output (8 Relays)
MRO10 8 TS	3	Relay Output (8 Relays)
MRO10 16 TS	3	Relay Output (16 Relays)
MRO10 16 TS SSR	3	Solid State Relay Output (16 Relays)
MRO20 8 TS	1	Relay Output (8 Relays)
MRO20 8 TS SSR	1	Solid State Relay Output (8 Relays)
MRO20 16 TS	1	Relay Output (16 Relays)
MST20	6	System Terminals
MUT10	4	Universal Terminal
SUPREMA CAN BRIDGE CBM		10034641
SUPREMA CAN LWL Converter		10052948
SUPREMATouch rack (With or without internal 250 W power supply)		

*Not part of the functional test.

Detectors according to DMT 03 ATEX G 003 X

- Series 47 K-ST
- Series 47 K-PRP
- Series 47 K-HT
- Series 47K HT-PRP

10.1 Standards

The system was developed to comply with the following standards and directives and must be installed, operated and maintained in accordance with these standards.

Directives	Standards	Descriptions
2014/34/EU (ATEX)	EN 60079-29-1	Performance requirements of detectors for flammable gases
	EN 60079-29-2	Selection, installation, use and maintenance of detectors for flammable gases and oxygen
	EN 50271	Requirements and tests for apparatus using software and/or digital technologies
	EN 50104	Detection and measurement of oxygen - Performance requirements and test methods
2014/30/EU (EMC)	EN 50270	Electromagnetic compatibility - Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen
	EN61000-6-4	Electromagnetic Compatibility. Generic standards - Emission standard for industrial environments
2014/35/EU (LVD)	EN61010	Safety requirements for electrical equipment for measurement, control and laboratory use
	IEC61508	Functional safety of electrical/electronic/programmable electronic safety related systems.
2011/65/EU	EN50581	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

11 Modules

The SUPREMATouch is a modular system, in the following all module functions are described in details.

11.1 Measurement Value Input

The measurement values are acquired by the following units

Modules for Measurement Value Input	
MAI Module	analogue INPUT Module (signal processing + digitisation for 8 inputs).
MAR Module	analogue REDUNDANT Module (redundant signal input, digitisation).

MAI Module: Analogue Input Module

The MAI module can operate 8 sensors and process the input signals of those sensors. The power supply outputs for the sensors and the signal inputs are protected against short-circuits and overloads in the 24 VDC power system.

The bridge current, zero point, and sensitivity can be adjusted with the display and the adjusting elements on the MAI module or using software functions. (Adjustment is only required when a sensor is replaced and with manual preadjustment).

Instead of sensors, switching contacts or smoke detectors can also be connected. The signal to be evaluated now changes between ”closed circuit” state (approximately 4 mA) and ”alarm signal” state (approximately 20 mA).

Functions:

- 1 slot for the MAR module (redundancy)
- Display and operating elements (bridge current, zero, sensitivity)
- Measurement of the signal voltage + sensor supply (24 VDC)
- Connection terminals for the sensors are on the MAT module (power supply, signals)
- Status LEDs for supply voltage, AD conversion, adjusting procedures.
- Sensors are monitored by evaluation of the measurement signals
- Euro card with a 96-way connector
- Up to 8 MAI modules can be installed in one rack for the evaluation of 64 input signals.

MAR Module (Analogue Redundant Module)

This module is used for the redundant processing of input signals. It is plugged into the MAI module. The sensor signals are digitized and forwarded in parallel with the MAI module. The signals measured by the MAI30 will be compared to the signals measured by the MAR30.

The function here is identical to that of the MAI module.

- Used for the redundant processing of input signals
- Measurement values are digitized in parallel with the MAI module
- Supply and input signal take-over are provided by the MAI
- In redundant systems, a MAR module is required for every MAI module

11.2 Data Processing/MCP Module (Central Processing Module)

The data is processed by the Central Processing Module (MCP Module).

This module controls all system functions. The CPU communicates with the other system modules over one or more CAN buses. The measurement values are acquired via the transmitter/detector input module, and the results of the signal evaluation are output via the MGO module (relay driver outputs) and the MDO module (Display).

For higher safety requirements a second additional MCP module can be integrated into the system for redundant processing and signal evaluation.

- Monitoring and control of all system functions
- Evaluation of the signals from up to 256 sensors
- Control of up to 512 switching outputs (relay driver outputs)
- Storage of the system parameters
- Data output (MDO module, Graphic-LCD (via MDO), MAO module 4–20 mA (via MDO), MGO module, relays, printer (via MDO), etc.)
- Communication with the other modules over the CAN bus
- Storage of the history of the calibration data, measurement values, and temperature values
- Sensor calibration
- Linearisation of characteristic curves
- System Fail relay activated when a system malfunction occurs
- Euro card with a 96-way connector

11.3 Display + Operation/MDO Module (Display and Operating Module)

The Display + Operation Module (MDO module) is used to display information and for entering commands by hand.

The system is operated from the MDO module; status messages are displayed (common alarm LEDs) and alarm messages are shown in plain text. The system is operated with a touch panel in conjunction with a Windows type user interface (configuration, performance of calibrations, etc.).

- Graphic display (320 x 240 pixels) with backlit LCD screen
- System operated via touch screen
- Individual function keys for horn acknowledgment and alarm reset
- Plain text messages for alarms and malfunctions at the sensors
- Graphic display of alarm and failure states (“LED field”)
- Bar graphs of the measurement values
- Display of the system status
  (common LEDs for alarms, signal fail, power system fail, inhibit)
- PC control (data display, printer control)
- System clock (RTC) with backup battery
- 1 x USB/RS232, electrically isolated (laptop/PC)
- 1 x RS232, electrically isolated (printer interface)
- System Fail Relay is activated when a system malfunction occurs
- Flash memory log book, divided into Calibration (4 calibration entries as well as 3 presettings per measuring point), system events (10,000 entries), alarm events (50,000 entries), signal events (50,000 entries), Changes (400 entries), Supply voltage (200 entries) and Processor temperature (200 entries) for diagnostic purposes

Display Connection/MDC Module

The Display Connection Module (MDC module) is used to connect the MDO module to the system. Its only functions are the physical connection and the selection of the power supply.

11.4 Digital + Analog Output

MGO Module	GENERAL OUTPUT Module (40 switching outputs, 24 V/0.5 A)
MRC TS Module	RELAY CONNECTION Module (5 x MRO, 2 x 40 channels, ribbon cable)
MRO10 8 Module	RELAY OUTPUT module (rack relay module, 8 relays, 230 VAC/3 A contacts)
MRO10 8 TS Module	RELAY OUTPUT Module (rail-mounted relay module, 8 relays, 230 VAC/3 A contacts)

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MRO10 16 TS Module	RELAY OUTPUT Module (rail-mounted relay module, redundant, 16 relays, 230 VAC/3 A
MRO10 16 TS SSR	SOLID STATE RELAY OUTPUT Module (rail-mounted solid state relay module, 16 relays, 24 VAC/100 mA)
MRO20 8 TS	RELAY OUTPUT Module (rail-mounted relay module, 8 relays, 230 VAC/5 A contacts)
MRO20 8 TS SSR	SOLID STATE RELAY OUTPUT Module (rail-mounted solid state relay module, 8 relays, 24 VAC/100 mA)
MRO20 16 TS	RELAY OUTPUT Module (rail-mounted relay module, 16 relays, 230 VAC/5 A contacts)

MGO Module (General Output Module)

The MGO module indicates alarms or other control signals. It receives the switching data for the relay output drivers from the MCP module via the CAN bus. The output is protected against short-circuits and overloads. Driver outputs 1–8 of the first MGO module present in the system are used to control the 8 common alarms (Alarms 1–4, signal fail, horn, inhibit, power).

In redundant versions of the system, each of the two MGO modules controls 8 relays on the MRO16 TS module (16 common alarm relays/redundant), the working contacts of these relays are connected in series.

- 40 relay driver outputs for relays, contactors, magnetic valves, lamps, or LEDs (24 V/0.3 A)
- The data is transmitted via the CAN bus from the MCP module
- The System Fail Relay is activated when a system error occurs
- Euro card with a 96-way connector

MRO Module: Relay Output Module

- Relay module, installed on rear of rack
- 8 relays for common alarms (Alarms 1–4, signal fail, horn, inhibit, power)
- Actuated by MGO modules
- Relays locked via the MST/MRC module (LOCK)
- Switching status display (green LED, made = ON)
- Series connection of 2 contacts for redundant versions
- Connection across 2 terminals
- Up to 2 change over contact per relay

MRC TS Module (Relay Connection) / MRO TS Module (Relay Output)

The output signals of the MGO module are sent over a 40-way ribbon cable from the MUT module to the MRC TS module and from there over 20-way ribbon cables to the MRO TS relay modules.

- Connection module for 5 MRO8 TS/MRO16 TS modules on MUT module
- Divides 2 x 40-channel FRC ribbon cables over 5 x 20-channel MRO ribbon cables
- Connections for EXT, INT, and BAT relay power supplies
- Connection for relay locking

MAO Module (Analog Output)

This module is used when analogue outputs (max. 256) are installed in the system. Each MAO module has 8 analogue signal outputs for 4–20 mA current loops. The assignment between the outputs and the signal inputs can be configured.

- 0–24 mA output drivers, measurement signal outputs (galvanic isolated from system)

Measurement signal output:	4–20 mA
Measuring range over flow:	22 mA (Values between 20 and 22 mA are still valid measuring values, but out of range)
Signal for Inhibit	3.0 mA
Signal for Signal fail:	3.2 mA
Fail dependent of Free A/Free B	(see chapter 12 "Installation")

- Values below 3 mA and above 22 mA must be handled as failure
- Maximum load: 500 Ohm
- Data transmitted from the MDO module via the CAN bus A
- The System Fail Relay is activated when a processor error occurs
- Euro card with a 96-way connector

11.5 Power Supply, Bus Connections, Connecting Technique

MAT Module	analogue Terminal Module (terminals for sensors on the rack)
MAT TS Module	analogue TERMINAL module (terminals for sensors on mounting rail)
MIB Module	Interconnection Board (rack, bus circuit board)
MSP Module	System Power Module (power supply module, 85–265 VAC/24 VDC)
MST Module	System Terminals (RS232, RES, ACK, LOCK, CAN)
MUT Module	Universal Terminals (40-way ribbon cable connection)

11.5.1 MSP Module (System Power Module)

- Rack power supply module, 250 VA
- Wide range input, 85–265 VAC
- Output voltage, 24 VDC

11.5.2 MIB Module (Interconnection Board)

This circuit board handles the system wiring of the rack. There are 15 slots for modules. Some of these slots are reserved only for certain module types. The modules installed in the rack can be connected by plugging in “terminal modules” (MAT module, MUT module, etc.) at the rear of the rack.

- Rack rear-panel wiring for 2 x MCP modules, 1 x MDC+MDO module, 2 x MDA modules (to be downward compatible), 8 x MAI/MGO/MAO/MBC modules, and additional 2 x MGO/MAO/MBC modules
- Power supply for all modules (INT, EXT, BAT)
- Connections for 3 x 24 VDC power supplies, screw terminals (4 mm^2)
- Provides uninterruptible 24-V-system power
- Data transfer between the modules over the CAN bus or the SPI bus
- 2 system error relay, 1 change-over contact, 3 connecting terminals
- DIL switch for CAN rack ID, CAN bus termination, system behaviour (Free A/B) and baud rate
- Electric connection for the inserted modules
- Terminal or connection modules (MST, MAT, MUT etc.) are plugged into the rear of the MIB module

11.5.3 MST Module (System Terminals)

- Connection module for system expansions.
- Installed at the rear of the rack.
- Ports MST10: 2 x CAN A, 2 x CAN B, RS232-A (PC operation), RS232-B (serial printer, output of messages), RS232-C (unused), alarm reset (RES), horn acknowledge (HACK), relay inhibit (LOCR), password key switch (PSW).
- Ports MST20: 2 x CAN A, 2 x CAN B, RS232-A (PC operation), RS232-B (serial printer, output of messages), USB (PC operation), Ethernet, alarm reset (RES), horn acknowledge (HACK), relay inhibit (LOCR), password key switch (PSW).

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11.5.4 MAT Module (analogue Terminal Module)

- Connecting terminals for remote measuring heads
- Terminals for sensors, 4–20 mA outputs, etc. (1.5 mm^2)
- 8 inputs, each with 5 terminal connections
- Up to 4 MAT modules can be provided for the connection of up to 32 sensors

11.5.5 MAT Module TS (analogue Terminal Module)

Similar to the MAT module but for installation on C-type or top-hat rail separate from the rack. A 40-way ribbon cable and a MUT module are required to connect it to the rack.

11.5.6 MUT Module (Universal Terminals)

This module is used to connect modules which are separate from the rack (MRC TS module, MAT TS module, etc.) to the module inserted in the rack with a 40-way ribbon cable.(Adapter plug, 96-way to 40-way.)

Relay Outputs

Up to 512 switching outputs can be controlled by the system via MGO modules (40 open collector drivers each). These switching outputs can be used to drive relays, magnetic valves, contactors, lamps, LEDs (24 VDC/0.3 A). If relay outputs are required, various relay modules can be used:

MRC TS module	Relay connection, actuation of 5 relay modules
MRO8 module	8 common alarm relays on the rack
MRO8 TS module	8 relays, installed on mounting rail
MRO8 SSR TS	Optional 8 solid state relays, installed on mounting rail (for very low current switching applications)
MRO16 TS module	16 relays, redundant layout, installed on mounting rail
MRO16 SSR TS	Optional 16 solid state relays, redundant layout, installed on mounting rail (for very low current switching applications)

11.5.7 MRO8 Module (Relay Output Module: Common Alarms)

This module must be used when relays alone are required for actuating common alarms and installation is to be accomplished directly in the rack. The module can be plugged directly into the MIB module (rear of the rack). It then makes the 8 common alarm relays available. If more relay outputs are to be provided, then MRO 8 TS modules are to be used together with the MRC TS module (installed on the mounting rail). Each relay has a changeover contact connected to screw terminals.

Function of the Module

- The module is plugged into the rear of the rack
- It is driven by the MGO module in the rack
- 8 relays for giving common alarms, i.e., 1st alarm, 2nd alarm, 3rd alarm, 4th alarm, signal fail, horn, inhibit, power supply
- One changeover contact, connected to screw terminals, is provided for each relay
- Standard design: Relay energised = no alarm. The relay is de-energised when an alarm is triggered at one or more measuring point (normally energised)
- Custom design: (not allowed for safety relevant applications) Relay de-energised = no alarm. The relay is energised when an alarm is triggered at one or more measuring point (normally de-energised)
- The relays can be inhibited via the MST module (to prevent alarms)

MRO8 Module: Relay Assignment

Relay 1:	1st Alarm
Relay 2:	2nd Alarm
Relay 3:	3rd Alarm
Relay 4:	4th Alarm
Relay 5:	Signal fail (sensor)
Relay 6:	Horn
Relay 7:	Inhibit
Relay 8:	Power supply failure

11.5.8 MRC TS Module (Relay Connection Module)

This module is used when relay modules separate from the rack are installed on a mounting rail. An MRC TS module is used to connect up to 5 TS Relay modules. The relay power supply and the ribbon cable, which are required for the control of the relays by the MGO module, are attached to this MRC TS module. It is possible to control 5 MRO modules (with alternatively 8 or 16 Relays each). The MRC TS module is connected to the MGO module over a 40-way ribbon cable (2 for the redundant version) and a rack mounted MUT module. In the redundant version 2 MGO modules are used and are connected via 2 MUT modules and 2 ribbon cables to the MRC TS module.

- Connections for the relay power supply (3 x 24 VDC)
- Connections for relay inhibiting
- Bridge (BR1) for the selected type of inhibit (normally energised/normally de-energised)

11.5.9 MRO8 TS Module (Relay Output Module: Non-redundant)

This module is provided when not only common alarms but also other messages are required. Each relay has a changeover contact (230 VAC/3 A). The module makes 8 relays available, each with its own changeover contact. The relays are controlled by an MGO module, operating via the MRC TS module.

11.5.10 MRO8 TS Module: Function of the Module

- The module is controlled by an MGO module operating via the MRC module
- 8 relays for alarms or control functions
- 1 changeover contact per relay connected to terminals
- The relays can be inhibited by the LOCK function (no alarm). The LOCK function can be controlled via the MRC TS module

11.5.11 MRO8 TS Module: Relay Assignment

The first 8 outputs of the system are allocated to the common alarm signals. The other outputs can be assigned to any desired signal.

11.5.12 MRO16 TS Module (Relay Output Module (Redundant))

For systems that are designed for redundancy, the MRO 16 TS module is used. To transmit a message, the working contacts of 2 relays are connected in series and connected to 2 terminals. The relays are controlled by different MGO modules and are configured in such a way that the relay is de-energised when an alarm is triggered (normally energised).

11.5.13 MRO16 TS Module: Module Function

- Relay module for a redundant system
- 2 x 8 relays for alarms or control functions
- The module is controlled by 2 MGO modules, operating via the MRC module
- The two working contacts of 2 relays are connected in series on the MRO 16 TS module and connected to 2 terminals. In an alarm situation, one or both contacts open
- Controlled by 2 separate MGO modules
- Relays can be inhibited via the MRC TS module (no alarm)

11.5.14 MRO16 TS Module: Relay Assignment

The first 8 outputs of the system are allocated to the common alarm signals. The other outputs can be assigned to any desired signal.

11.6 Minimal Module Requirements

In the minimal version for 8 inputs, the following units are to be used:

MAI30 Module	analogue Input Module.
MCP Module	Central Processing Module
MDO&MDC Module	Display + Operation Module
MGO Module	General Output Module
MRO8 Module	Relay Output Module (Common Alarms)
Power supply and external wiring/modules	
Rack	

By integrating additional units of the type listed above, a system can be expanded to handle as many as 256 sensors and as many as 512 relay driver outputs.

Redundant systems for higher safety classes are realised by adding one more CENTRAL PROCESSING module (MCP module), a double set of the appropriate data acquisition (MAR) and alarm control modules (MGO), a second CAN bus and a second or third voltage supply.

(→ Chapter 15 "Redundant Systems").

12 Installation

12.1 Installation Site

The SUPREMA control unit may only be installed in areas not subject to the danger of explosion. The specified temperature and humidity conditions must also be satisfied, and contact with corrosive substances must be avoided.

NOTICE

The SUPREMATouch installation site must be located outside of hazardous area Zones 0,1 and 2 and be free of combustible, explosive or corrosive gases.

12.2 Installation Instructions for Following the EMC Directives

The devices of MSA have been developed and tested in accordance with the EMC Directive 2014/30/EU and the corresponding standards EN 50270. The requirements of the EMC Directive can only be met by following the manufacturer's installation instructions. This applies only to tested devices and systems of the manufacturer.

General Instructions on the Installation of Tested Devices and Systems of MSA Europe to ensure that the EMC Directives are followed

- For the connection of the various devices to the power supply system a clean ground or clean potential ground must be provided.
- An appropriate supply voltage free of feedback to the external source in accordance with the EMC Directives must be used.
- If the devices are supplied from a direct voltage (dc) source, the supply cable must be screened.
- Screened cable is to be used to connect the sensors.
- Control cables must be screened (reset, acknowledge, measurement current output, printer, etc.).
- Screened cable must have at least 80% coverage by the screening.
- Control and sensor cables must be laid physically apart from power supply cables.
- Screened cables must be laid in one piece. If it should prove necessary to extend a cable by way of a terminal box, the terminal box must be screened, and the connections in the box must be kept as short as possible.
- Unscreened cables and cables from which the insulation has been stripped must be as short as possible and must be laid without loops to the appropriate terminal posts.
- External devices that are operated by the gas warning units (horns, contactors, pumps, motors, etc.) must be radio-screened and follow the EMC Directives.
- If the EMC filters of the device are physically remote, the power supply cable between the filter and the device must be screened.
- If additional high-voltage surge protection measures are required an appropriate high-voltage protection filter, approved by MSA Europe, must be installed in the sensor cable.

12.2.1 Instruction on Meeting the EMC Requirements on the SUPREMATouch Control System

To meet the EMC product standard EN 50270 (Electromagnetic Compatibility. Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen), the following points must be observed:

- The site chosen for the installation of the system must ensure that there are no excessive electromagnetic loads present.
- The power supply connection must be equipped with a line filter of type FN 2060 (Schaffner) or equivalent.
- For the external 24-volt supply, a line filter of type FN 660 (Schaffner); 20 A or equivalent must be provided.
- Care must be taken to ensure that the line filters are in good contact (low resistance) with the mounting plate of the service cabinet.
- A clean grounding point must be provided for the potential ground.
- Power supply cables are to be kept away from remote measurement/data lines (> 30 cm).
- All cables, unless otherwise specified, must be screened (> 80% coverage); they are to be connected to the rack.
- The rack is to be equipped with separate potential ground.
- The connection of the cable screen should be as short as possible.
- Cables for data transmission (CAN, RS232, etc.) must be screened. There must not be any potential difference between the interface of the cable screen and ground. The cable screen must have good contact with the housings of the plug connectors.
- The cables for remote racks must be laid protected against mechanical damages (CAN, RS232 etc.).

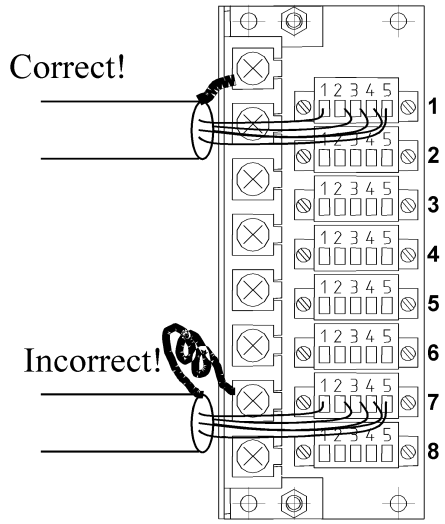

Fig. 75 MAT Module, connection of the screening

Connection of the Sensors:

(21) Via the MAT module, directly to the rack:

The remote measuring cables for passive/active transmitters must be screened (>80 % coverage), and the cable screen is to be connected to the terminals provided.

(22) Via the MAT TS module in the service cabinet (40-way ribbon cable):

The maximum length for 40-way ribbon cables is 5 meters.

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MUT Module connected to MAT TS Module

Passive/active transmitter cables and analogue output cables are usually screened. The cable screen is to be connected directly, over the shortest possible distance, to the screening terminal provided.

MUT Module connected to MRC TS Module

The ribbon cable is to be screened. The cable screen is to be connected directly, over the shortest possible distance, to the screening terminal provided.

MRC TS Module connected to MRO16 (8) TS Module

Screened cables are not required to connect the individual relay modules.

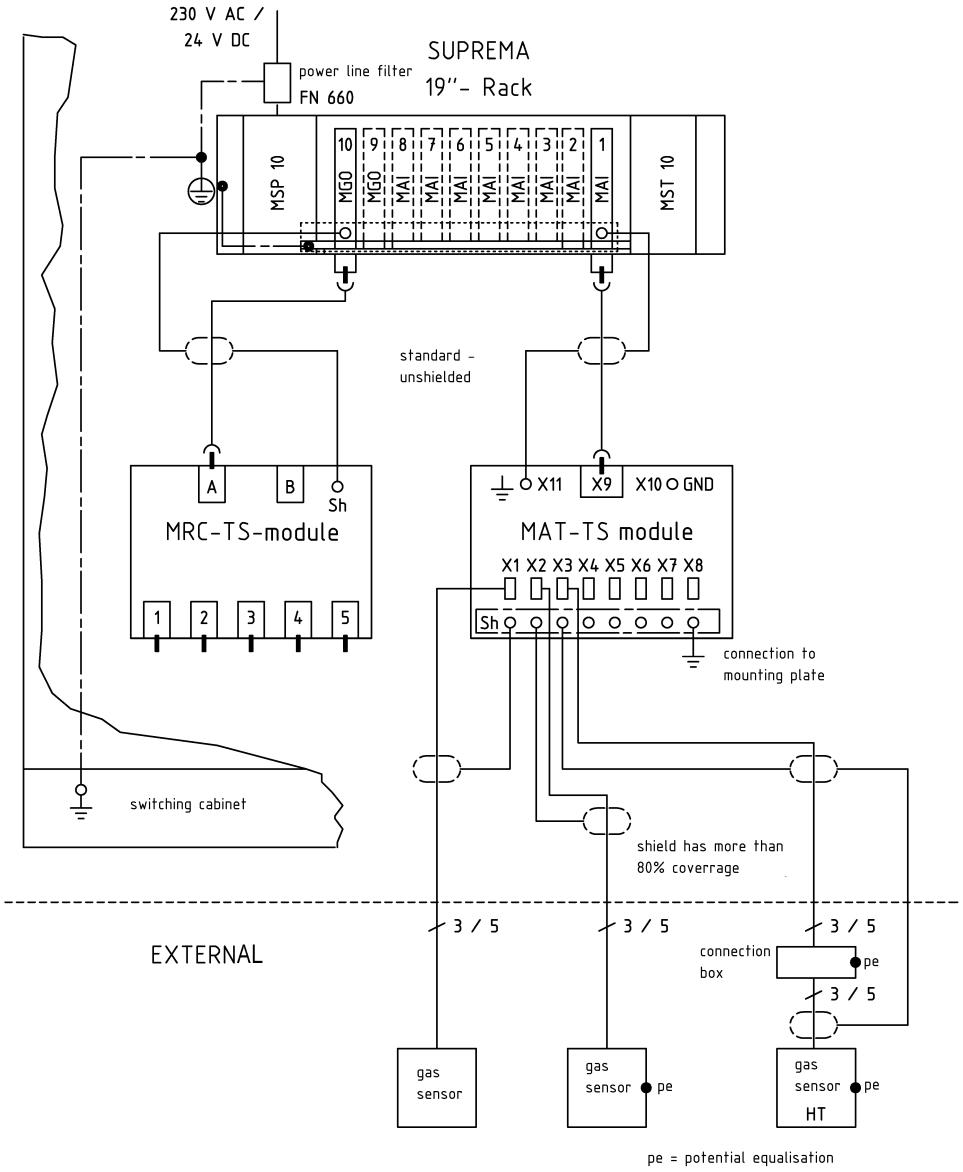

Fig. 76 SUPREMATouch shielding and grounding concept

12.3 Installation, Step by Step

NOTICE

Follow the instructions for components subject to damage from static electricity!
Follow the installation instructions for hazardous areas!

(1) Unpack and inspect the device and its components.

(2) Check the suitability of the installation site and the cabling requirements.

(3) Check the current and voltage supply and make sure it is suitable.

(4) Depending on the type of system shipped, install the switch cabinet, or the 19” mounting rack.

(5) Check the configuration of the modules and reconfigure if necessary.

(6) Install the modules in the 19” mounting rack (unless already installed at the factory).

a) If possible, fix the modules to the back with screws (1 Nm torque).

(7) In case of expanded systems with more than one 19” mounting rack, connect the CAN bus or check the connection if it has already been made.

(8) Install the sensors and connect the wiring to the SUPREMATouch.

If possible, fix the modules on the back with screws (torque: 1 Nm).

(9) Connect the relay and current outputs to the external devices to be actuated.

(10) Connect the current and voltage supply.

(11) After installation is complete, perform the start-up procedure as instructed in Chapter 13 "Start-Up".

12.4 Unpacking

Perform the following steps on receipt of the shipment:

(1) Carefully unpack the device or its components, observing all of the instructions printed on or accompanying the packaging.

(2) Inspect the contents of the delivery to determine if any transport damage has occurred and verify that everything listed in the shipping papers has in fact been received.

12.5 Cabling

The terminal posts on the **analogue Terminal Units** (MAT module and MAT TS module) are designed for the connection of conductors with a cross section in the range of 0.2–1.5 mm^2.
The terminal posts on the **Relay Output Units** (MRO8, MRO8 TS, and MRO16 TS modules) are designed for the connection of conductors with a cross section in the range of 0.2–2.5 mm^2.
The terminal posts on the **External Connection Module MGT40 TS** are designed for the connection of conductors with a cross section in the range of 0.2–2.5 mm^2.
On the **Interconnection Board** (MIB module), the terminal posts for the connection of the supply voltages are designed for conductor cross sections of 0.2–4.0 mm^2, and the terminals for the system fail relays are designed for conductor cross sections of 0.14–1.5 mm^2.
On the **System Terminals Module** (MST module), the terminals for Alarm Reset, Horn Reset, Relay Inhibit, and Key Switch are designed for conductor cross sections in the range of 0.2–2.5 mm^2. The **System Terminals Module** (MST module) also has 2 SUB-D plug connector strips (9-way) for the connection of the CAN bus and 3 SUB-D socket terminal strips for RS232 connections.
The terminals for the supply voltage on the **Relay Connection Module** (MRC TS module) are designed for conductor cross sections of 0.2–2.5 mm^2.

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The modules installed separately from the rack (MAT TS, MRC TS, and MGT40 TS modules) and the Universal Terminal Module (MUT module) are connected with a 40-way screened ribbon cable. The Relay Connection Module (MRC TS module) is connected to the Relay Output Modules (MRO8 TS, MRO16 TS) by a 20-way ribbon cable.

Allowed Conductor Cross Sections	
Module	**Conductor Cross Section**
MAT/MAT TS Module	0.2 mm^2–1.5 mm^2
MRO8/MRO8 TS/MRO16 TS Module	0.2 mm^2–2.5 mm^2
MRC TS Module (Supply Voltage, Relay Lock)	0.2 mm^2–2.5 mm^2
MGT40 TS Module	0.2 mm^2–2.5 mm^2
MIB Module (Supply Voltage)	0.2 mm^2–4.0 mm^2
MIB Module (System Fail relays)	0.14 mm^2–1.5 mm^2
MSP Module (rack power supply, 250)	0.2 mm^2–4.0 mm^2
MST Module (Alarm Reset, Horn Reset, Relay Inhibit, Key Switch)	0.2 mm^2–2.5 mm^2

Cable Specifications

Type of Sensor	**Number of Wires**	**Cable Type**	**Max. cable loop resistance in ohms**	**Maximum Length**	**Remarks**
Series 47K	5 x 0.75 mm^2 5 x 1.5 mm^2	Y(C)Y Y(C)Y	36 ohms 36 ohms	750 m 1500 m	Screened cable is required.
Series 47K	3 x 0.75 mm^2 3 x 1.5 mm^2	Y(C)Y Y(C)Y	36 ohms (3.4 ohms for ATEX) 36 ohms (3.4 ohms for ATEX)	750 m (70 m for ATEX 1500 m (140 m for ATEX)	Screened cable is required.
Ultima X 2 wire	2 x 0.5 mm^2	Y(C)Y		2000 m	Screened cable is required.
Ultima X 3 wire	3 x 0.5 mm^2 3 x 1.0 mm^2 3 x 1.5 mm^2	Y(C)Y		300 m 750 m 1250 m	Screened cable is required.
PrimaX					See transmitter specific manual.
PrimaX IR					See transmitter specific manual.
FlameGard 5 MSIR	3 x 1.5 mm^2	Y(C)Y	20 Ohm loop	1000 m	See transmitter specific manual.
FlameGard 5 UV/IR	3 x 1.5 mm^2	Y(C)Y	20 Ohm loop	700 m	See transmitter specific manual.
FlameGard 5 UV/IR-E	3 x 1.5 mm^2	Y(C)Y	20 Ohm loop	700 m	See transmitter specific manual.
Ultima MOS-5	3 x 1.5 mm^2	Y(C)Y	20 Ohm loop	500 m	See transmitter specific manual.
Ultima MOS-5E	3 x 1.5 mm^2	Y(C)Y	20 Ohm loop	500 m	See transmitter specific manual.

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Cable Specifications					
Type of Sensor	**Number of Wires**	**Cable Type**	**Max. cable loop resistance in ohms**	**Maximum Length**	**Remarks**
Ultima OPIR-5	3 x 1.5 mm^2	Y(C)Y	20 Ohm loop	200 m	Receiver w/o relay and heater. See transmitter specific manual.
UltraSonic EX-5	3 x 1.5 mm^2	Y(C)Y	20 Ohm loop	1000 m	See transmitter specific manual.
UltraSonic IS-5	3 x 1.5 mm^2	Y(C)Y	40 Ohm loop	1800 m	See transmitter specific manual.
Ultima X5000					See transmitter specific manual.
S5000					See transmitter specific manual.
Senscient ELDS					See transmitter specific manual.

The maximum length of a cable is calculated as follows

$$l = \frac{R * K * A}{2}$$

where R is the maximum load in ohms

$$k = 56 \frac{m}{Ohm * mm^2}$$

(conductivity of copper); and A is the cross section of the conductor in mm².

If no information is available on the maximum load, only the specified maximum length may be used.
The maximum allowable length of the CAN bus can be found in the following table. It is possible to enlarge the distances by reducing the bit rate using a CAN bridge.

Maximum Allowable CAN Bus Length							
Bit rate in kBit/s	10	20	50	125	250	500	1000
Maximum bus in m	5000	2500	1000	500	250	100	25

NOTICE

Follow the instructions for components subject to damage from static electricity!
Cable must be laid in accordance with the previous EMC instructions and regulations.

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12.6 Module Configuration

The modules should be configured in the order given here with no voltage applied. For systems that have already been configured, the configuration of the individual modules must be checked.

12.6.1 Configuration MIB Module

A DIL switch is provided on the back of the MIB module. This switch is used to set the CAN bus parameters.

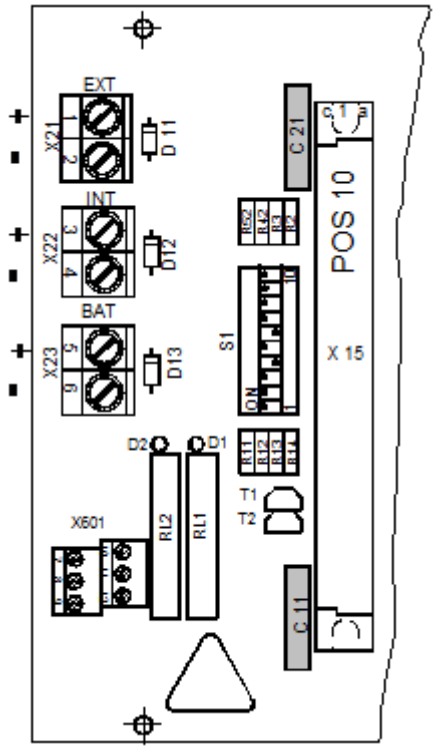

Fig. 77 MIB Module, DIL Switch (BGT = Rack No.)

CAN Bus Bit Rate Setting

The CAN bus bit rate has to be set with respect to the system size and cable length. The minimum bit rate for the central rack (the rack containing the MCP and MDO) is 125kbit/s.

CAN Bus Bit Rate Setting

	CAN		FREE		Baud			Rack		
	A	B	A	B	4	2	1	4	2	1
Switch No.	1	2	3	4	5	6	7	8	9	10
In case of alternative assembly	10	9	8	7	6	5	4	3	2	1
Bit rate = 125 Kbit					ON	ON	ON			
Bit rate = 10 Kbit					ON	ON	OFF			
Bit rate = 20 Kbit					ON	OFF	ON			
Bit rate = 50 Kbit					ON	OFF	OFF			
Bit rate = 125 Kbit					OFF	ON	ON			
Bit rate = 250 Kbit Standard setting for up to 256 MP					OFF	ON	OFF			
Bit rate = 500 Kbit					OFF	OFF	ON			
Bit rate = 1 Mbit					OFF	OFF	OFF			

= Any switch

Rack-CAN Node Number (BGT No.)

The CAN node numbers to be set when several racks (BGTs) are being used are listed. The standard setting for an individual rack is BGT 1.

Rack-CAN Node Number (BGT No.)										
	CAN		FREE		Baud			Rack		
	A	B	A	B	4	2	1	4	2	1
	1	2	3	4	5	6	7	8	9	10
In case of alternative assembly	10	9	8	7	6	5	4	3	2	1
BGT 1 Standard setting for a single rack (BGT)								ON	ON	ON
BGT 2								ON	ON	OFF
BGT 3								ON	OFF	ON
BGT 4								ON	OFF	OFF
BGT 5								OFF	ON	ON
BGT 6								OFF	ON	OFF
BGT 7								OFF	OFF	ON
BGT 8								OFF	OFF	OFF

= Any switch

CAN Bus Terminating Resistors

Both CAN bus systems (CAN-A + CAN-B) of the SUPREMATouch must have a terminating resistor at each end of the bus. One end of the bus is located on the MDO module. Here a terminating resistor is permanently connected. For a 1-rack system, the other end of the bus is at the rear-panel wiring of the MIB. If the system consists of only one rack, switches 1 and 2 of the DIL switch must be set to the ON position.

If an additional rack is provided for the system, the racks are connected to each other at the rear via the MST modules with ready-made CAN bus cables.

For a “multi-rack” system, the DIL switch contacts 1 and 2 (CAN-A, CAN-B) of the last rack–by which the CAN bus is ending - must be set to the lower position, all DIL switch contacts 1 and 2 (CAN-A, CAN-B) on the intermediate racks must be set to the upper position.

CAN Bus Terminating Resistors										
	CAN		FREE		Baud			Rack		
	A	B	A	B	4	2	1	4	2	1
Switch No.	1	2	3	4	5	6	7	8	9	10
In case of alternative assembly	10	9	8	7	6	5	4	3	2	1
Terminating Resistor Closed (Standard)	ON	ON								
Terminating Resistor Open	OFF	OFF								

= Any switch

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Turn-on Behavior and Failure Behavior MGO Module

If the settings for FREEA / FREEB are done locally on the MGO or MAO modules (position INT), or if no such modules are installed in the rack, then the switches FREEA / FREEB on the MIB have to be set to the ON position.

MGO Module, Configuration of turn-on behaviour and failure behaviour

		CAN		FREE		Baud			Rack		
		A	B	A	B	4	2	1	4	2	1
Turn-on behavior	Behavior at CAN bus failure	1	2	3	4	5	6	7	8	9	10
In case of alternative assembly		10	9	8	7	6	5	4	3	2	1
All relays remain de-energized	All relays keep their last state. (Standard)			ON	ON						
All relays remain de-energized	After 72 h, all relays are de-energized			OFF	ON						
All relays are energized	All relays keep their last state			ON	OFF						
All relays are energized	After 72 h, all relays are energized.			OFF	OFF						

= Any switch

Turn-on Behavior and Failure Behavior MAO Module

After turn-on, at the analog outputs a 0 mA signal is issued for 10 - 15sec.

If the settings for FREEA / FREEB are done locally on the MGO or MAO modules (position INT), or if no such modules are installed in the rack, then the switches FREEA / FREEB on the MIB have to be set to the ON position.

MAO Module, Configuration of turn-on behavior and failure behavior

		CAN		FREE		Baud			Rack		
		A	B	A	B	4	2	1	4	2	1
Turn-on behavior	Behavior at CAN bus failure	1	2	3	4	5	6	7	8	9	10
In case of alternative assembly		10	9	8	7	6	5	4	3	2	1
All analogue outputs at 2 mA.	All analogue outputs at 2 mA after 2 min.			OFF	OFF						
All analogue outputs at 2 mA.	Last status is kept.			OFF	ON						
All analogue outputs at 0 mA.	All analogue outputs at 0 mA after 2 min.			ON	OFF						
All analogue outputs are 0 mA.	Last status is kept.			ON	ON						

= Any switch

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12.6.2 Configuration MAT Module

Two solder bridges are provided for each input on the bottom of the circuit board for 3 or 5 wire operation of the sensors:

Solder bridge OPEN	= 5 wire operation
Solder bridge CLOSED	= 3 wire operation

⚠ CAUTION!

The solder bridges for 3 wire operation must only be closed when passive detectors (MPI module) are connected. For 5 wire operation with active transmitters (MCI module), the solder bridges must be open!

Assignment:	BR1, BR2	⇨	input 1
	BR3, BR4	⇨	input 2
	BR5, BR6	⇨	input 3
	BR7, BR8	⇨	input 4
	BR9, BR10	⇨	input 5
	BR11, BR12	⇨	input 6
	BR13, BR14	⇨	input 7
	BR15, BR16	⇨	input 8

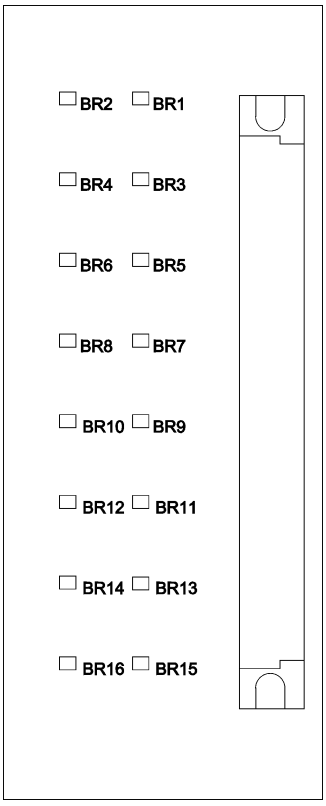

Fig. 78 Configuration of MAT Module

12.6.3 Configuration MAT TS Module

On top of the circuit board, next to the ribbon cable plug, 2 solder bridges for each input are provided for the 3 or 5 wire operation of the sensors:

Solder bridge OPEN	= 5 wire operation
Solder bridge CLOSED	= 3 wire operation

⚠ CAUTION!

The solder bridges for 3 wire operation must only be closed when passive detectors are connected. For 5 wire operation with active transmitters, the solder bridges must be open!

	Equivalent to X1/1-X1/2		Equivalent to X1/4-X1/5
Assignment:	BR1, BR2	⇨	input 1
	BR3, BR4	⇨	input 2
	BR5, BR6	⇨	input 3
	BR7, BR8	⇨	input 4
	BR9, BR10	⇨	input 5
	BR11, BR12	⇨	input 6
	BR13, BR14	⇨	input 7
	BR15, BR16	⇨	input 8

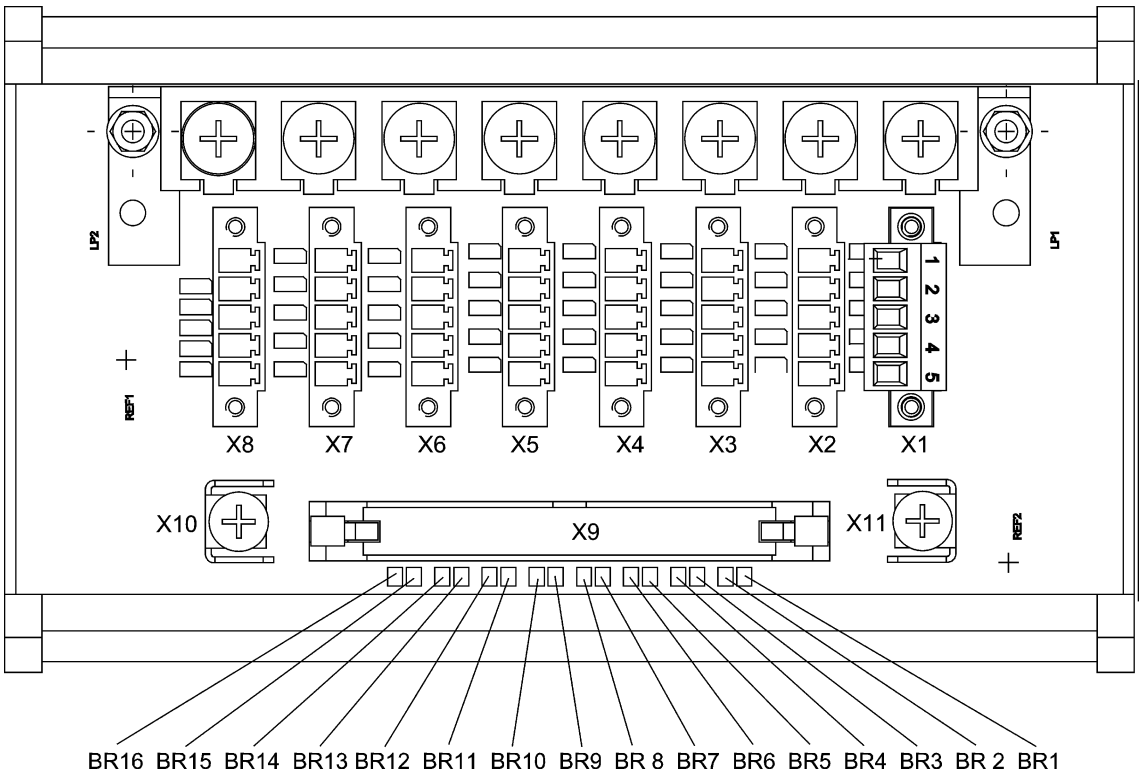

Fig. 79 Configuration MAT TS Module

12.6.4 Configuration MRO8 Module

On the module is a solder bridge (BR1), which is used to define the function of the relay inhibit of the common alarms (Chapter 12.13 "System Ports (MST Module)") is established:
Solder bridge BR1 = OPEN = relays are energised when the relay inhibit is turned on
Solder bridge BR1 = CLOSED = relays are de-energised when the relay inhibit is turned on

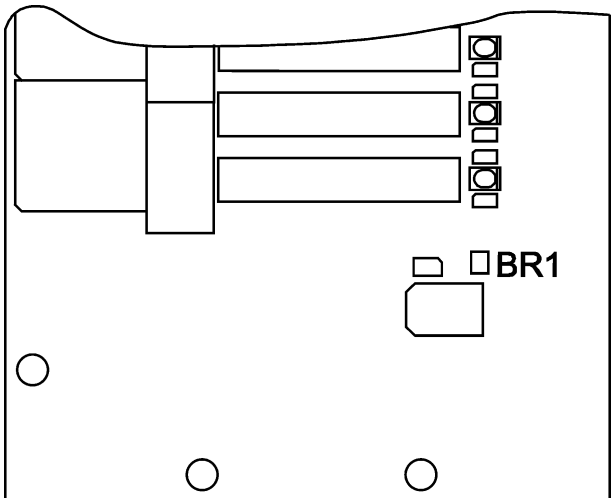

Fig. 80 Configuration of the MRO 8 Module

NOTICE

Because the common alarms are normally energised and this is fixed in the system and cannot be changed, solder bridge BR1 should never be closed under any circumstances (unless an alarm is to be triggered when the relays are inhibited).

12.6.5 Configuration MRC TS Module

On the module is a solder bridge (BR1), which is used to determine the function of the relay inhibit (Chapter 12.10 "Connecting the Relay Outputs") for the connected relay modules:

Solder bridge BR1 =OPEN =	relays are energised when the relay inhibit is turned on
Solder bridge BR1 = CLOSED =	relays are de-energised when the relay inhibit is turned on

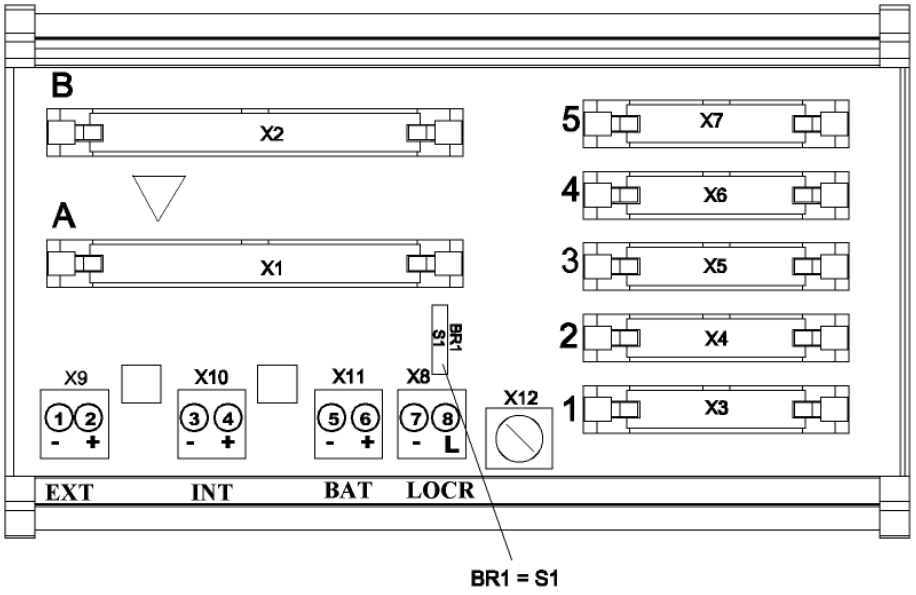

Fig. 81 Configuration of the MRC TS Module

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NOTICE

Because the common alarms are normally energised and this is fixed in the system and cannot be changed, solder bridge BR1 on the first MRC TS module in the system (the first 40 relay outputs) should never be closed (unless an alarm is to be triggered when the relays are inhibited). In addition, the first 32 available relay outputs
(relay output 9–40; 1st MGO module in the system) should also be configured according as normally energised, like the common alarms, when the option of inhibiting the relays via the LOCK connection is used.

12.6.6 Configuration MRO8 TS Module

The function of the relay inhibit is determined by solder bridge BR1 on the MRC TS module.

12.6.7 Configuration MRO16 TS Module

The function of the relay inhibit is determined by solder bridge BR1 on the MRC TS module.

12.6.8 Configuration MUT Module

No configuration

12.6.9 Configuration MAR Module

No configuration

12.6.10 Configuration MST Module

No configuration

12.6.11 Configuration MAO Module (MAO20)

Switch S200				Function
1	2	3	4	
ON	ON	ON	ON	Factory setting/Do not change
OFF	X	X	X	Bootloader active

FREE-A-/B settings

After turn-on, at the analogue outputs a 0 mA signal is issued for 10 - 15sec.

Switch S3				Function
1	2	3	4	
OFF	OFF	ON	ON	Function FREE-A/B by switches on the MIB module
X	X	OFF	OFF	Function by switch FREE-A/B on the MAO module

				Turn-on behaviour	Behaviour at CAN failure
OFF	OFF	OFF	OFF	All analogue outputs at 2 mA	All analogue outputs at 2 mA after 2 min
OFF	ON	OFF	OFF	All analogue outputs at 2 mA	Last status is kept
ON	OFF	OFF	OFF	All analogue outputs at 0 mA	All analogue outputs at 2 mA after 2 min
ON	ON	OFF	OFF	All analogue outputs at 0 mA	Last status is kept

X: Any switch

CAN-A-/B settings

Switch S4				Function
1	2	3	4	
ON	ON	OFF	OFF	Control of the MAO module by CAN-A bus (also for redundant applications)

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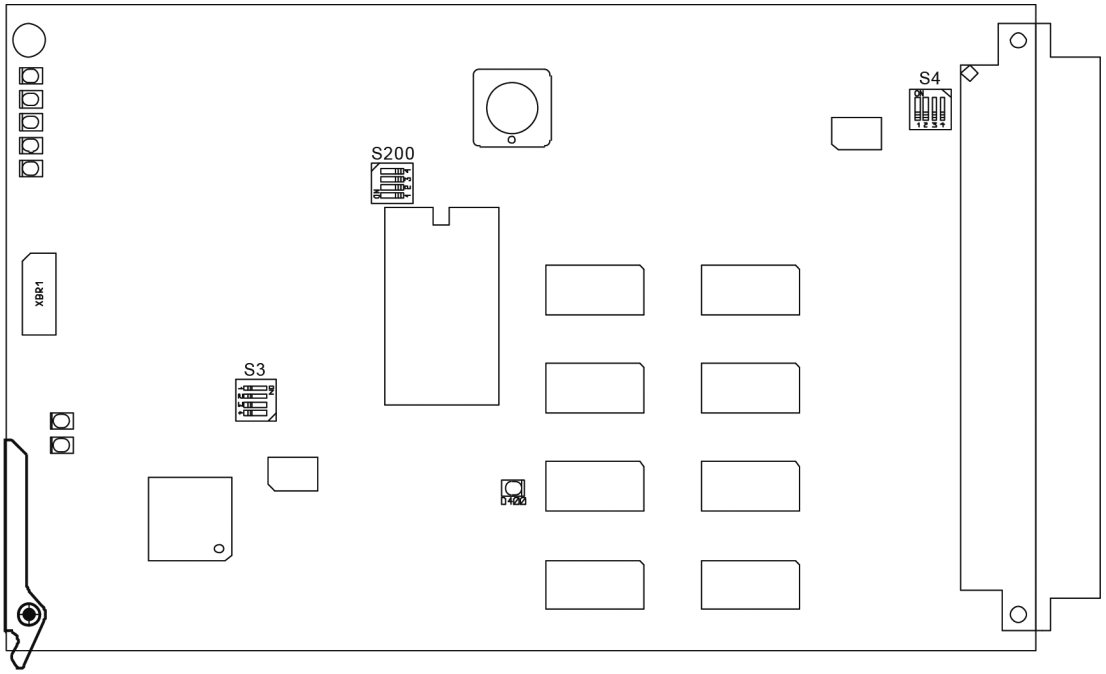

Fig. 82 Configuration MAO20 Module

The MAO module is always controlled by the CAN bus A.

Configuration MGO20 Module

The operating mode for the input signal through the CAN-A or CAN-B bus as well as the switch-on and configuration properties are to be set with DIL switches S3 and S4. Switch S1 is omitted. Figures 83 show the switch positions on the printed circuit board.

The module MGO20 is furnished with a boot loader for installing new firmware. The switch S2-1 = OFF activates the boot loader mode.

CAUTION!

The normal function of the module is deactivated in the boot loader mode. This mode should therefore only be used by the MSA service personnel!

Configuration of turn-on and failure behavior of the MGO module is effected via the DIL switch on the MIB module (FREE A + FREE B).

GB

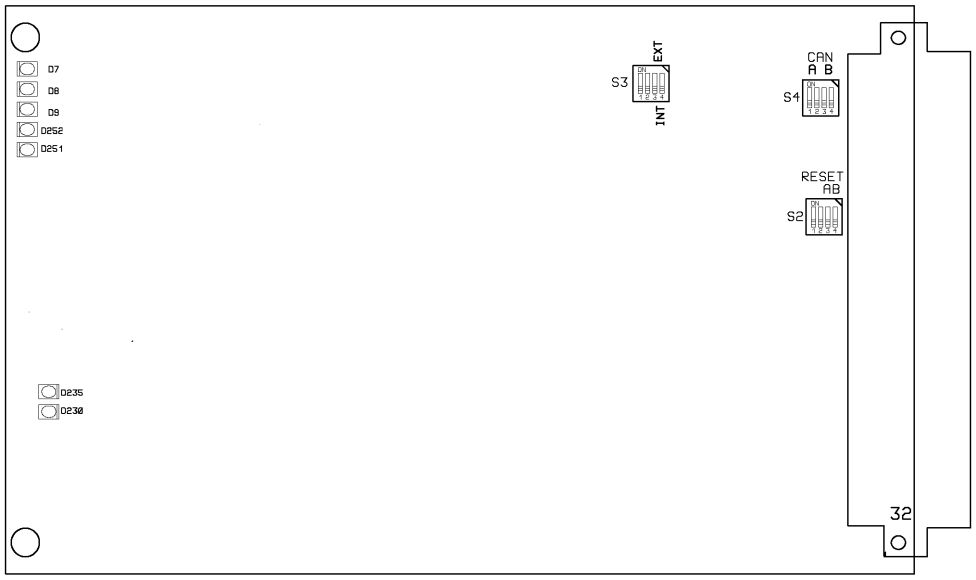

Fig. 83 MGO20 Module

As of layout version 12, for SIL applications, the operating modes for control via CAN-A or CAN-B buses, the turn-on behaviour must be configured with the S3 and S4 DIL switches.

Switch S2				**Function**
1	2	3	4	
ON	ON	OFF	OFF	Factory setting/Do not change
OFF	X	X	X	Bootloader active

FREE-A-/B settings

Switch S3				**Function**	
1	2	3	4		
OFF	OFF	ON	ON	Function by switch FREE-A/B by switch on the MIB module (Standard)	
X	X	OFF	OFF	Function by switch FREE-A/B 1+2 on the MGO module	
				Relay behaviour	
				Behaviour at CAN failure	**Turn-on behaviour**
OFF	OFF	OFF	OFF	Activated after 72 h	Activated
OFF*	ON*	OFF*	OFF*	De-activated after 72 h*	De-activated*
ON	OFF	OFF	OFF	Last state is kept	Activated
ON	ON	OFF	OFF	Last state is kept	De-activated

* For SIL 3 operation, the de-activation function is set to 72 h.

CAN-A/B settings

Switch S4				**Function**
1	2	3	4	
ON	ON	OFF	OFF	Control of the MGO module by CAN-A bus
OFF	OFF	ON	ON	Control of the MGO module by CAN-B bus

GB

12.6.12 Configuration MCP20 Module

The MCP20 module is shipped factory-configured. No provisions are made for changing the configuration.

Within the scope of the installation and start-up of the system or of the replacement of the MCP20 module, however, the switch setting (S700 set to all OFF) illustrated in Figure 84, MCP20 module, standard configuration, must be checked and corrected if necessary.

Switch S700				
1	2	3	4	
OFF	OFF	OFF	OFF	Factory setting / Do not change
ON	X	X	X	Boot loader active
X	X	X	X	Reserved

The module MCP-20 is furnished with a boot loader for installing new firmware.

NOTICE

The normal function of the module is deactivated in the boot loader mode. This mode should therefore be used only by the MSA service personnel!

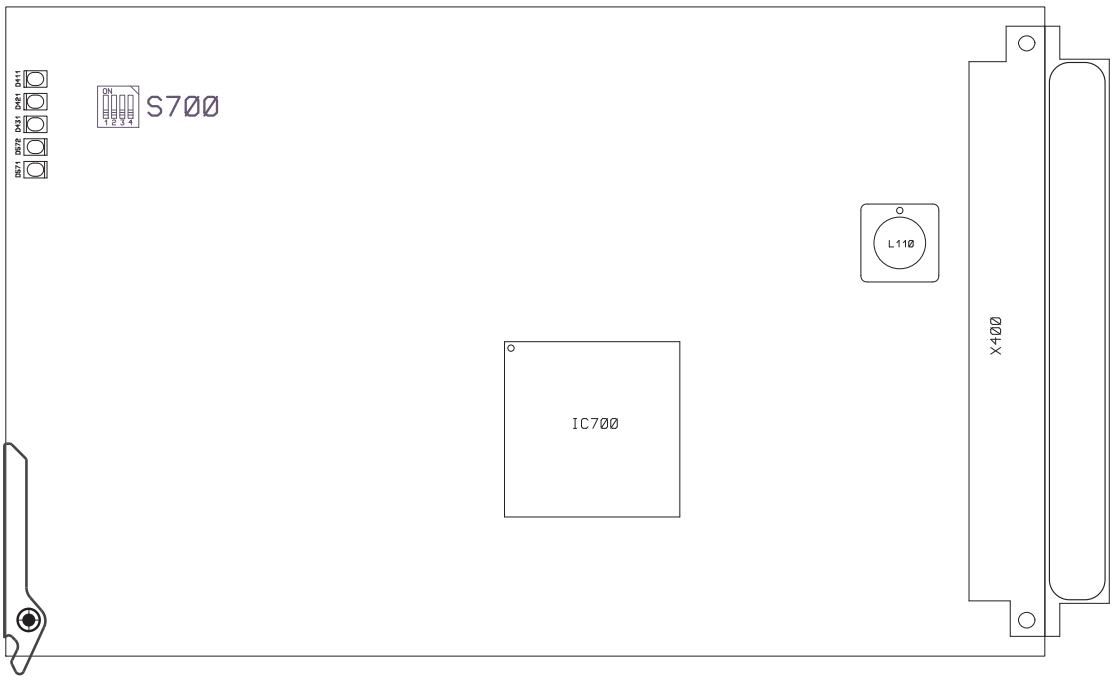

Fig. 84 MCP Module, standard configuration

12.6.13 Configuration MDO20 Module

The MDO20 module is shipped factory-configured. No changes to the configuration are planned.

Within the scope of the installation and start-up or the replacement of the MDO20 module, however, the switch setting (S200 set to all OFF) shown in Figure 85, MDO20 module, standard configuration, must be checked and corrected if necessary.

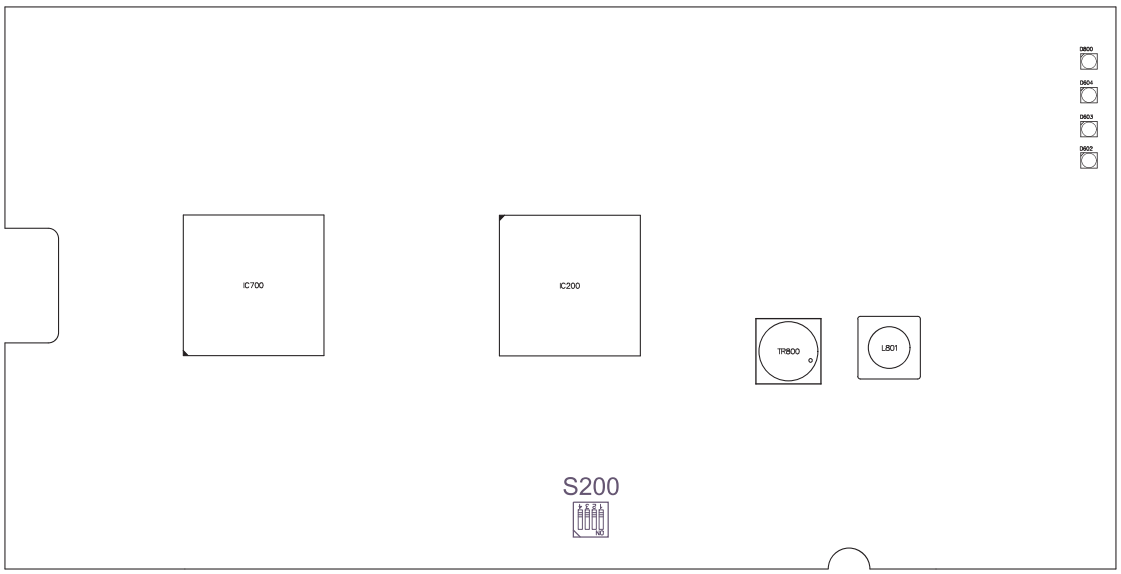

Fig. 85 MDO Module, standard configuration

Switch S200				
1	2	3	4	
OFF	OFF	OFF	OFF	Factory setting / serial baud rate 19200 baud
OFF	OFF	OFF	ON	serial baud rate 115200 baud
ON	X	X	X	Boot loader active
X	X	ON	ON	Reserved

The module MDO20 is furnished with a boot loader for installing new firmware.

NOTICE

The normal function of the module is deactivated in the boot loader mode. This mode should therefore only be used by the MSA service personnel!

12.6.14 Configuration MDC20 Module

No configuration

12.6.15 Configuration MAI30/MGI30

The MAI30/MGI30 module is shipped factory-configured. No provisions are made for changing the configuration.

Within the scope of the installation and start-up of the system or of the replacement of the MAI30/MGI30 module, however, the switch setting (S100 set to all OFF) illustrated in Figure Fig. 86 must be checked and corrected if necessary.

Switch S100				
1	2	3	4	
OFF	OFF	OFF	OFF	Factory setting for standard operation mode
OFF	OFF	OFF	ON	Setting for compatibility mode (operation with MDA); MAI only
ON	X	X	X	Boot loader active
X	X	X	X	Reserved

The module MAI30/MGI30 is furnished with a boot loader for installing new firmware.

GB

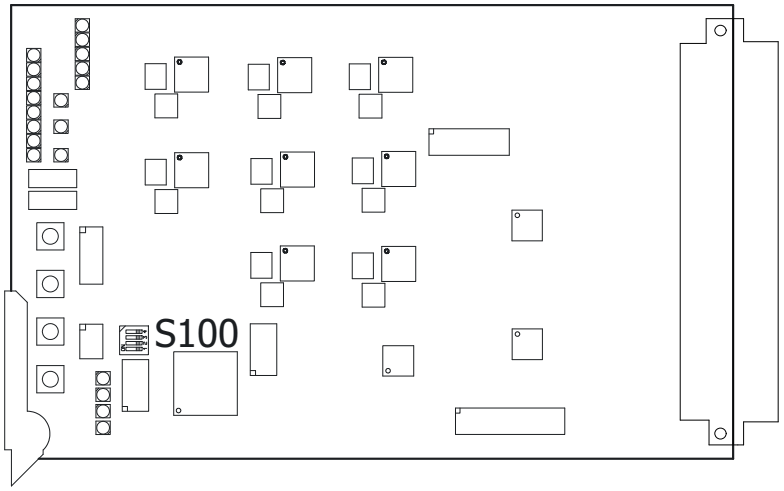

Fig. 86

The normal function of the module is deactivated in boot loader mode. This mode should therefore be used only by MSA service personnel!

12.6.16 Configuration MAR30/MGR30

The MAR30/MGR30 module is shipped factory-configured. No provisions are made for changing the configuration.

Within the scope of the installation and start-up of the system or of the replacement of the MAR30/MGR30 module, however, the switch setting (S100 set to all OFF) illustrated in Figure Fig. 87 must be checked and corrected if necessary.

Switch S100				
1	2	3	4	
OFF	OFF	OFF	OFF	Factory setting for standard operation mode
OFF	OFF	OFF	ON	Setting for compatibility mode (operation with MDA); MAR only
ON	X	X	X	Boot loader active
X	X	X	X	Reserved

The module MAR30/MGR30 is furnished with a boot loader for installing new firmware.

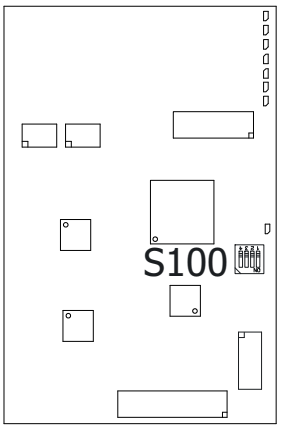

Fig. 87

The normal function of the module is deactivated in boot loader mode. This mode should therefore be used only by MSA service personnel!

12.6.17 Configuration MHS30

No configuration

12.6.18 Configuration MBC20 Module

The MBC20 module is shipped factory-configured. No provisions are made for changing the configuration.

Within the scope of the installation and start-up of the system or of the replacement of the MBC20 module, however, the switch setting (S500 set to all OFF) illustrated in Figure 88 must be checked and corrected if necessary.

Switch S500				
1	2	3	4	
OFF	OFF	OFF	OFF	Factory setting / operation on CAN A
OFF	OFF	OFF	ON	operation on CAN B
ON	X	X	X	Boot loader active
X	X	ON	ON	Reserved

The module MBC20 is furnished with a boot loader for installing new firmware.

WARNING!

The normal function of the module is deactivated in the boot loader mode. This mode should therefore only be used by the MSA service personnel!

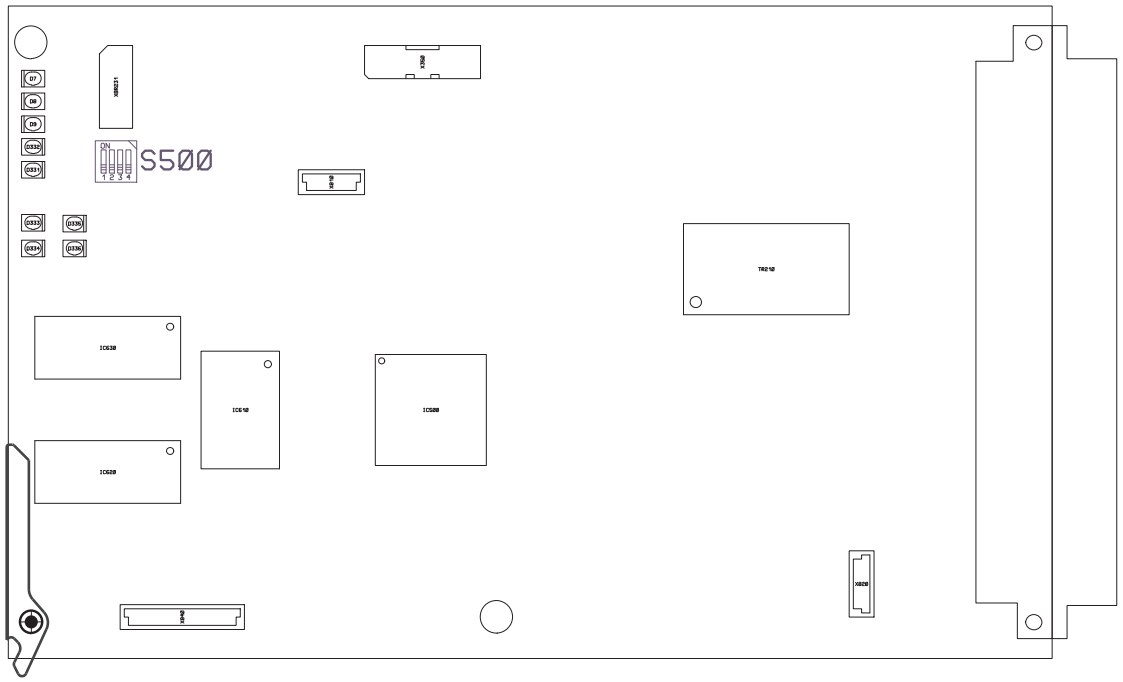

Fig. 88 Configuration of the MBC20 Module

12.6.19 Configuration MBT20 Module

No configuration

12.6.20 Configuration in the SUPREMATouch menu Settings/Measuring points/Sensor data

Sensor	MFI
Measuring range	0–100 %
Units	any

12.6.21 MRD Dummy Relay

Module application/function

Up to 5 relay modules can be connected (MRO8/MRO16) to the MRC module. If not all 5 relay modules are connected, an MRD module must be plugged into each of the unused relay module connectors. The unused relays are simulated by this module.

With an MRD module connected the driver outputs of the MGO module are provided with a fixed load. Monitoring the driver outputs therefore allows a failure state to be recognized.

All 40 outputs of the MGO modules are monitored. Output failures (open/short circuit) are identified and are reported as a system fail.

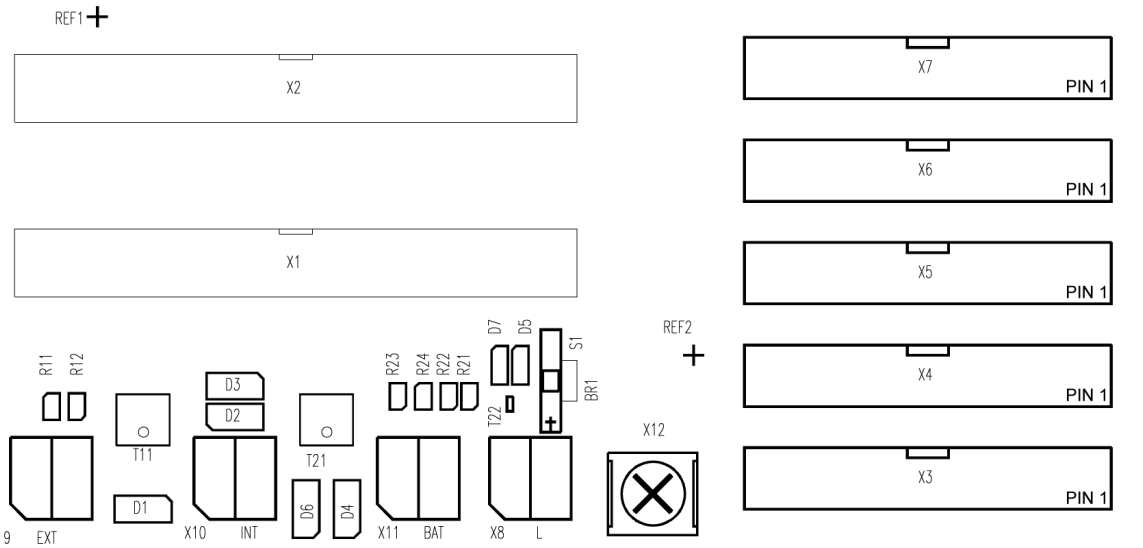

Fig. 89 View of the MRC Module

MRC

X3 -X7 = 20-pin connection for relay modules MRO 8/MRO 16

Unused relay module connections have to be fitted with MRD modules.

Module use/connection

On each MRD module one resistor is connected in series with a light-emitting diode to provide the load for the MGO module. The light-emitting diodes show the switching state of the MGO driver output.

LED ON	= driver output conducting	= relay activated
LED OFF	= driver output not conducting	= relay deactivated

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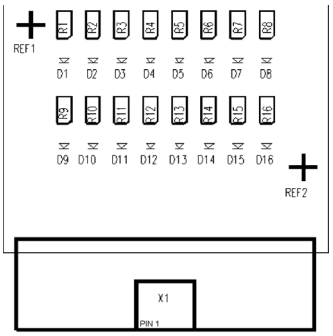

Fig. 90 View of MRD Module

LED 1–8	= Driver outputs channel A
LED 9–16	= Driver outputs channel B

NOTICE

Note the correct polarity of the modules, see illustration Fig. 90 "View of MRD Module".

12.7 System Configuration (Hardware)

Slot Assignments

After all modules have been configured (or after their configuration has been checked), insert all required modules into the racks or push them from behind onto the contacts and fasten in place mechanically with the retainers provided.

Assignment:	**Front:**	⇨	**Rear:**
	Slot 1	⇨	MST Module
	Slot 2–5	⇨	free
	Slot 6–15	⇨	Pos 1–10

Rear:	MST					MxT	MxT	MxT	MxT	MxT	MxT	MxT	MxT	MxT	MxT
						Pos. 1	Pos. 2	Pos. 3	Pos. 4	Pos. 5	Pos. 6	Pos. 7	Pos. 8	Pos. 9	Pos. 10
	Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7	Slot 8	Slot 9	Slot 10	Slot 11	Slot 12	Slot 13	Slot 14	Slot 15
Front:	MCP MDC	MCP MDC	MCP MDC	MDA	MDA	MAI MGO MAO MBC	MAI MGO MAO MBC	MAI MGO MAO MBC	MAI MGO MAO MBC	MAI MGO MAO MBC	MAI MGO MAO MBC	MAI MGO MAO MBC	MAI MGO MAO MBC	MGO MAO MBC	MGO MAO MBC

Fig. 91 Slots and Positions on the rack

For each slot on the front there is a corresponding module connector plug on the rear. To install modules from the front, detach the front plate and flip it down. Observe the following rules:

12.7.1 Front:

Slots 1–3:

Use the first 3 slots only for the MCP and/or MDC module. In systems without redundancy, slot 2 is the standard slot for the MCP module (Chapter 15 "Redundant Systems").

Slots 4–5:

Use slots 4 and 5 only for the downward compatible MDA module.

Slots 6–13:

Slots 6–13 can be used for MAI, MAO, MBC or MGO modules.

Slots 14–15:

Use slots 14 and 15 only for MAO, MBC or MGO modules.

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12.7.2 Rear:

Connection site 1:

The first connection site is only to be used for the MST module. The racks are shipped with the MST module installed as standard equipment, so only positions 1–10 are available for configuration.

Position 1–10:

Positions 1–10 can be used for either MAT, MUT, MRO, or MBT modules.

NOTICE

The MRO8 module must only be installed in position 9! It is not possible to use more than one MRO8 module in one rack.

Slots in the Rack	
Slots 1–3:	slots for MCP and/or MDC modules only
Slots 4–5:	slots for MDA modules only (deprecated)
Slots 6–13:	slots for INPUT/OUTPUT modules
Slots 14–15:	slots for INPUT/OUTPUT (but no MAI) modules only
INPUT:	MAI/MAR modules MBC modules MGI/MGR modules
OUTPUT:	MGO module
	MAO module
	MBC module

Connection sites on the rear of the rack:

MST:	**connection site for the MST module only**
(Positions 1–10):	**connection site for:**
	- MAT module (8 x 5 terminals) **- MUT module** (40-way ribbon cable) **- MRO8 module (Position 9!)**

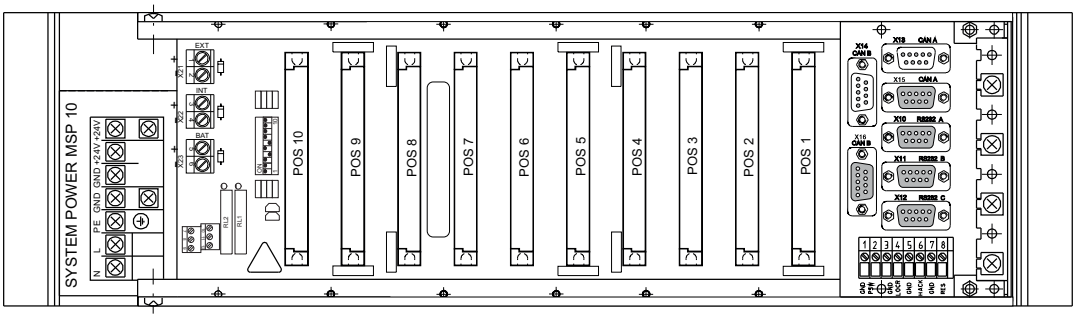

Fig. 92 Rear of the Rack

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12.7.3 System Requirements

The following requirements must be fulfilled to build a functional system:
Exactly one MCP module, one MDC module and one MDO module are required for a system (up to 8 racks) (non-redundant design). The MDC module must be properly connected by ribbon cable to the MDO module mounted in the front panel.

NOTICE

In the standard design with a MAT module installed in the rack, the first MAI module must be inserted into slot 7 (Pos. 2), the 2nd MAI module into slot 9 (Pos. 4), etc. Thus the measurement channel numbers obtained are: 1st MAI module (Pos. 2): 9–16. 2nd MAI module (Pos. 4): 25–32, etc.

It is extremely important to ensure that the modules plugged into the rear are compatible with the modules inserted in the front (e.g., the combination of an MAI module with an MRO8 module is non-functional [see table below]).
The modules plugged into the rear must be located at the same slots as the modules with the associated functions plugged into the front.

A MAT module covers 2 slots; a MRO8 module covers 3 slots.

The following combinations of modules installed in the front and in the rear are possible or required:

Assignment of the Connection Modules	
Front	**Rear**
MCP module	MST module
MAI module	MAT module (direct connection of sensors) MUT module (connection to the MAT TS module or the MGT40 TS module for remote connection of sensors)
MGO module	MRO8 module (direct connection of relay outputs) only POS 9/Slot 14 MUT module (connection to the MRO 8 TS module or the MRO 16 TS module via the MRC TS module for remote connection of relay outputs) MUT module (connection to the MGT40 TS module for providing driver outputs for the connection of magnetic valves, etc.)
MAO module	MAT module (direct connection of the 4–20 mA outputs) MUT module (connection to the MAT TS module or the MGT40 TS module for remote connection of the 4–20 mA outputs)
MBC module	MBT module

Further information on the functions of the individual modules can be found in Chapter 11 "Modules"

12.7.4 Maximum Loads

NOTICE

Ensure that the maximum loads are not exceeded to guarantee a reliable operation.

Operating voltage may vary from 19.2 VDC to 32 VDC. The values specified below are for an operating voltage of 24 VDC.

System Configuration/Maximum Loads	
Maximum output current of an input	400 mA
Maximum output power of an input (Sensor and cable)	5 W
Maximum output power for a MAI module	40 W

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System Configuration/Maximum Loads	
Maximum output power for 8 MAI modules	320 W
Maximum input power for 8 MAI module	400 W
Maximum input power for a MIB module (for a track)	480 W
Maximum current load for a MIB module	20A
Maximum current load MIB module/GND terminal (MAI module and MGO module current)	32A
Maximum output current for a MSP module (Rack - power pack)	6.5 A
Maximum output power for a MSP module (Rack - power pack)	150 W

MGO Module/Maximum Loads	
Normal current of a driver output	0.3 A
Maximum current of a driver output	1.0 A
Maximum current for 8 driver outputs (a MGO module has each 5 driver ICs with each 8 driver outputs)	4.0 A (8 x 0.5 A)
Maximum current total of all currents loads of a MGO module (one MGO module is disposing of 40 driver outputs)	12 A (40 x 0.3 A)

When setting the maximum number of modules per rack, the following factors must be observed:

- The power of the sensors to be connected including the losses resulting from the cable lengths (MAI module/ MIB module).
- The currents of the modules connected to the relay driver outputs (MGO module/ MIB module: GND terminal).
- The power requirement of the system modules (see table Power Requirements of the System Modules in chapter 12.14 "Connecting the System Power Supply").
- The power available from the supply voltage.

For further details, see the tables in Chapter 12.14 "Connecting the System Power Supply" and Chapter 17 "Technical Data" and the operation and maintenance manuals of the sensors to be connected.

NOTICE

A cooling fan must be installed and operated to prevent overheating in the installation framework if more than 32 measuring points are used with passive detectors.

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12.7.5 Configuration Examples
Standard System with 8 Inputs/8 Common Alarm Relays

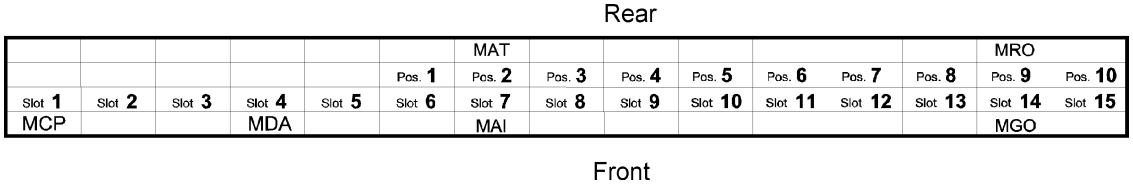

Fig. 93 Configuration example 1

Standard System with 32 Inputs/8 Common Alarm Relays

Rear

						MAT		MAT		MAT		MAT	MRO	
					Pos. 1	Pos. 2	Pos. 3	Pos. 4	Pos. 5	Pos. 6	Pos. 7	Pos. 8	Pos. 9	Pos. 10
Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7	Slot 8	Slot 9	Slot 10	Slot 11	Slot 12	Slot 13	Slot 14	Slot 15
MCP			MDA			MAI		MAI		MAI		MAI	MGO	

Front

Fig. 94 Configuration example 2

Standard System with 64 Inputs/8 Common Alarm Relays

Rear

					MUT	MUT	MUT	MUT	MUT	MUT	MUT	MUT	MRO-8	
					Pos. 1	Pos. 2	Pos. 3	Pos. 4	Pos. 5	Pos. 6	Pos. 7	Pos. 8	Pos. 9	Pos. 10
Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7	Slot 8	Slot 9	Slot 10	Slot 11	Slot 12	Slot 13	Slot 14	Slot 15
MCP			MDA		MAI	MAI	MAI	MAI	MAI	MAI	MAI	MAI	MGO	

Front

Fig. 95 Configuration example 3

Standard System with 32 Measurement Sites, Redundant Design

Rear

MST						MAT		MAT		MAT		MAT	MUT	MUT
					Pos. 1	Pos. 2	Pos. 3	Pos. 4	Pos. 5	Pos. 6	Pos. 7	Pos. 8	Pos. 9	Pos. 10
Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7	Slot 8	Slot 9	Slot 10	Slot 11	Slot 12	Slot 13	Slot 14	Slot 15
MCP	MCP		MDA	MDA		MAI + MAR		MAI + MAR		MAI + MAR		MAI + MAR	MGO	MGO

Front

Fig. 96 Configuration example 4

12.8 Systems Consisting of Several Racks

12.8.1 Systems with Central Recording of Measuring Values

In systems with several racks, which are not isolated from each other, the following points should be kept in mind:

- Each rack must have a guaranteed voltage supply. The GND-connectors of all racks must be interconnected.
- When the central unit or the satellites consist of several racks, in each rack-group the GND-connectors must be interconnected.
- The racks must be connected to each other by a CAN bus and the system fail relay must be connected and monitored on each rack.
- The racks are connected via the MST modules on the rear with ready-made CAN bus cables.
- For a “multi-rack” system, contacts 1 and 2 (CAN-A, CAN-B) of the DIL switch on the MIB module in the last rack–i.e., the one where the CAN bus ends–should be closed. All DIL switch contacts 1 and 2 (CAN-A, CAN-B) on the racks in between must be open (Chapter 12.6 "Module Configuration").
- The setting of the CAN bus bit rate must be the same for all racks and should correspond to the standard settings defined for the total number of inputs in question (Chapter 12.6 "Module Configuration").
- Each rack must have it own CAN node number. The standard setting for the first rack is 111 (Chapter 12.6 "Module Configuration").
- In case of non-redundant systems, the standard practice is to use the CAN-A bus connection; when a redundant system is built, the CAN-B is also connected (Chapter 15 "Redundant Systems").
- A cooling fan must be installed and operated to cool the installation framework if more than 32 measuring points are used with passive detectors.

The following description only covers MST versions with 2 connectors (male + female) for each CAN bus.

Only one CAN bus is described, the optional second CAN bus is connected the same way.

For connections and terminal assignment see Chapter 12.13 "System Ports (MST Module)".

NOTICE

The system fault relay must be connected and monitored for all racks!

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Connection of 2 racks:
The CAN terminating resistor at Rack 1 is not set, at Rack 2 it is set.

Connection of 3 racks:

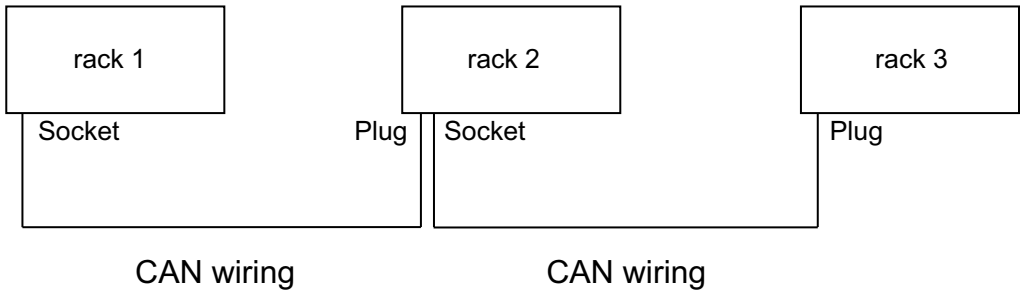

Fig. 97 Connection of 3 racks

The CAN terminating resistor at Rack 1 and Rack 2 is not set, at Rack 3 it is set.

Connection of 4 racks:
The CAN terminating resistor on Rack 1, Rack 2 and Rack 3 is not set, on Rack 4 it is set.
For every additional rack a CAN line socket/plug is necessary.
A list of CAN bus Connection Elements can be found in chapter 19 "Ordering Information".
To reduce the installation cost for systems with large distances between sensors or alarms and SUPREMA evaluation unit, the recording of measuring values as well as control of alarms can be carried out near the sensors.
This can be achieved by installing SUPREMA rack (rack with MDO module) in a control station, and a satellite SUPREMA rack (rack without MDO), equipped only with measuring points and/or outputs, installed in the field. Both racks communicate with one another via the CAN bus.

This means that instead of up to 64 sensor cables, only one CAN bus cable (or 2 for a redundant system) has to be connected and the system fail relays on all racks has to be connected.

NOTICE

At distances >20 m, a CAN bridge has to be used.

Examples of Satellite Applications:
With one satellite

Fig. 98 System with one satellite and CAN bridge

GB

With two or n satellites:

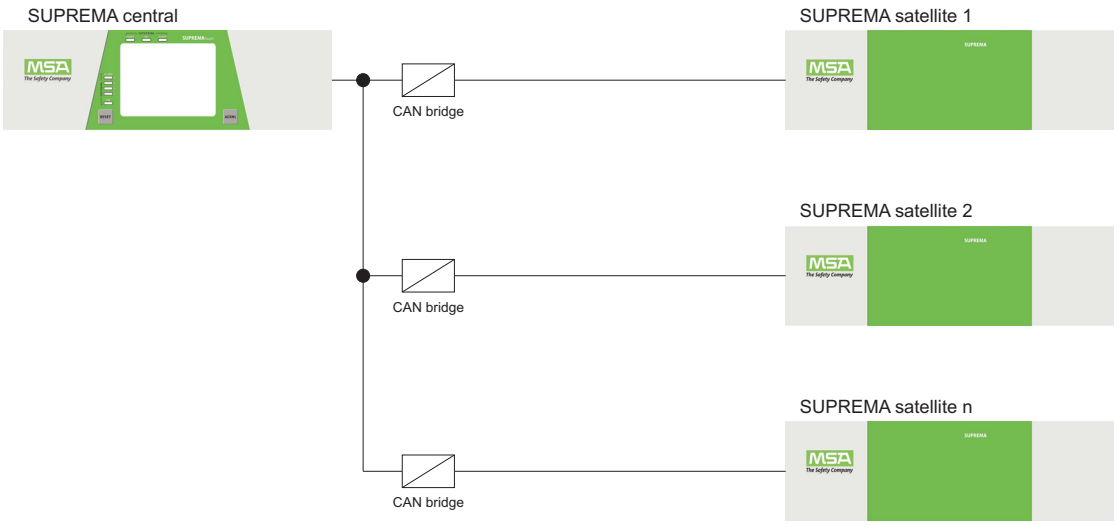

Fig. 99 System with multiple satellites and CAN bridges

Connection Information:

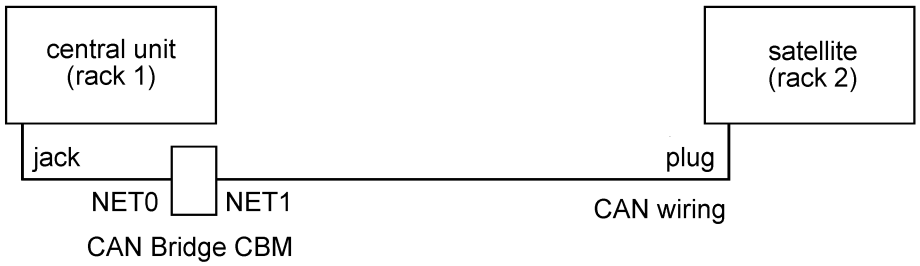

Fig. 100 Connection CAN-Bridge CBM

The terminating resistor of rack 1 must be deactivated, and a 120 Ohm resistor connected between terminal 2 and 4, NET 0, of the CAN connection.
A 120 ohms resistor for Net 1 must be connected under the terminal (2 to 4) NET1 of the CAN connection. The CAN terminating resistor at Rack 2 has to be set.

SUPREMA CAN Bridge CBM

If a satellite is operated with a cable length > 20 metres, a SUPREMA CAN BRIDGE CBM must be provided. It is necessary for galvanic isolation, the matching of bit rates and the filtering of CAN Identifiers (data reduction).

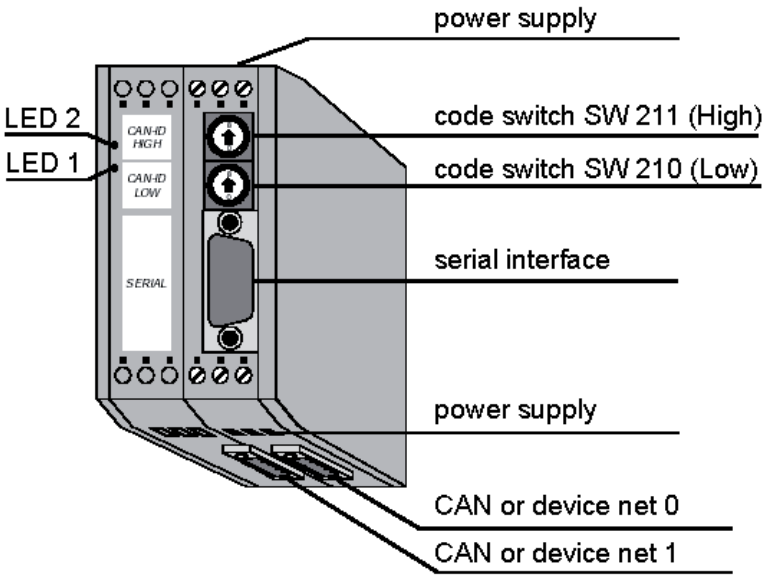

Fig. 101 SUPREMA CAN-Bridge CBM

The SUPREMA CAN BRIDGE is supplied with 24 V DC (X101). The CAN bus of the Basic Rack is connected to NET 0 (X400), and the satellite rack is connected to NET1 (X400) (Exact connection assignments are to be seen from the CAN Bridge hardware manual).
For parameter setting, a serial interface (DSUB plug connector X100) is provided. The CAN Bridge parameters can be set using the "CAN bridge calculator" function of the SUPREMA Manager.
The code switches SW211 and SW210 of the CAN Bridge are only for internal service purposes and must always be in position 0. When both LEDs (1 and 2) are on the status is ‘good‘. If there is a failure at one of the two CAN buses, the corresponding LED will flash, LED 1 for NET 1, and LED 2 for NET 0.
To be considered for the correct function of the SUPREMA CAN bridge:

- Baud rate setting at the Central Rack (depends on the number of measuring points)
- Baud rate setting at the satellite rack (depends on the distance of the satellite)
- Rack number (DIP switch at the MIB module)
- Components of the Satellite racks (Plug positions of the MGO, MAO, MAI/MAR, MGI/MGR modules)
- If more than one rack is connected and at least one of those racks is operated outside of the electrical cabinet, the CAN bridge calculator function of the SUPREMA Manager software must be used to calculate the necessary reduction in Baud rate depending on the distance in meters.

32 filters max. may be set, i.e., in a satellite,15 MGO/MAO or 10 MAI modules max. can be integrated.

Baud rate setting at the Central Rack

Measuring points	Bit rate setting in kbit/s
Simplex/Duplex	
1–256	250

Baud rate setting at the satellite rack

Measuring points	Distance in m	Bit rate setting in kbit/s
1–64	0–800	50
65–128	0–400	125
129–256	0–200	250

The parameter setting of a CAN bridge for the CAN bus B is carried out the same way as the parameter setting for the CAN bus A.

Technical Data:

Supply voltage	Nominal voltage 24 VDC±10 % Current consumption (at 20 °C): typ. 85 mA
Plug connector	**X 100** (DSUB9, plug) - serial interface
	X 101 (6-pin screw connector UEGM) - 24 V supply voltage
	X 400-SIO331 (Combicon design, 5-pin MSTB2.5/5-5.08) - CAN or DeviceNet NET 0
	X 400-SIO-CAN2 (Combicon design, 5-pin MSTB2.5/5-5.08) - CAN or DeviceNet NET 1)
Temperature range	5–50 °C environmental temperature
Humidity	90 % max., noncondensing
Dimensions of the cabinet (W x H X D)	Width: 40 mm, Height: 85 mm, Depth: 83 mm (including mounting rail and protruding connector DSUB9, without CANDeviceNet plug)
Weight	approx. 200 g

Systems with peripheral data logging (satellites) and LWL converters

For great distances or expected electromagnetic disturbances, the optical fibre (LWL) transfer can be used. In this case, no potential equalization between base station and satellite will occur. The LWL converter changes electrical signals to optical signals, which are not disturbed by other electrical signals. A star-shaped network topology is compulsory, to avoid critical values of the CAN bus capacity.

Examples of Satellite applications

With one satellite and an LWL converter:

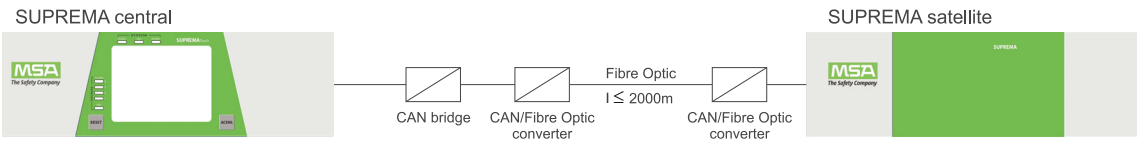

Fig. 102 System with one satellite and LWL converter

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With 2 or n satellites and a LWL converters:

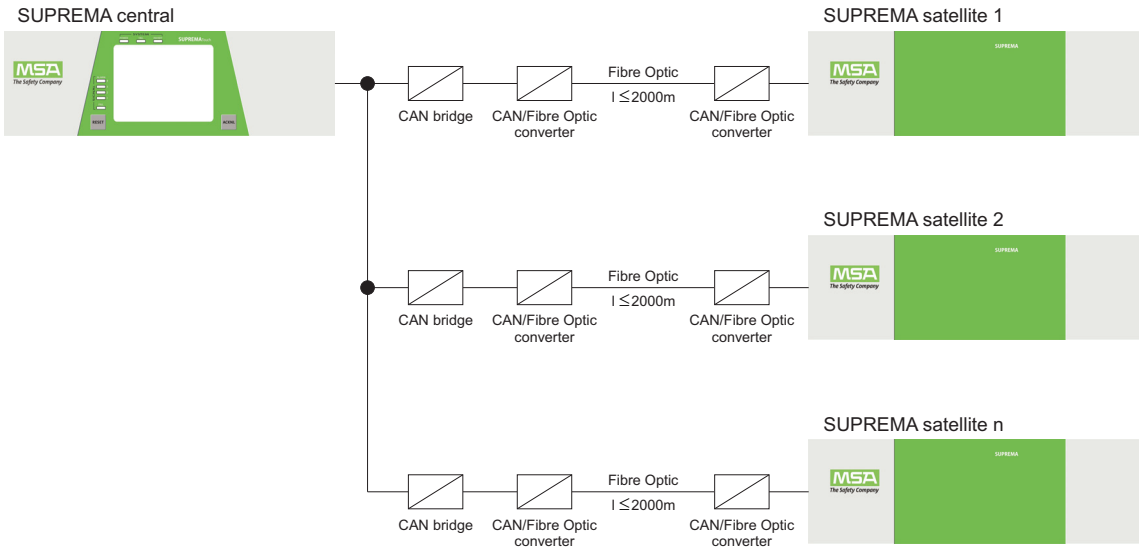

Fig. 103 System with multiple satellites and LWL converters

Here, only CAN A is displayed, CAN B is assembled in the same way.

Connection Information:

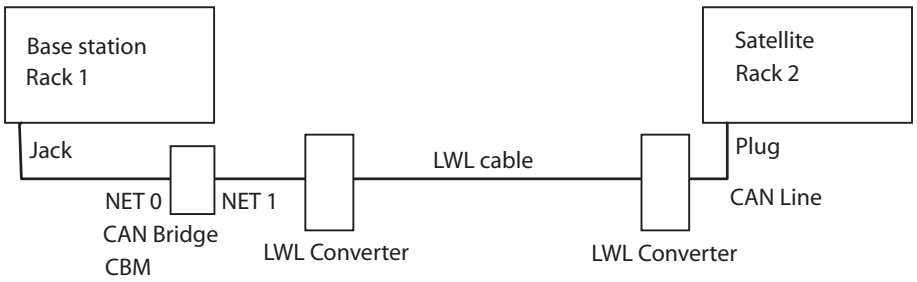

Fig. 104 LWL converter connection scheme

The terminator at rack 1 must be de-activated, and a 120 ohms resistor has additionally to be clamped under the terminal (2 to 4) NET 0 of the CAN connection.
For Net 1 a 120 ohms resistor has additionally to be clamped under the terminal (2 to 4) NET 1 of the CAN connection. The terminators of both LWL converters must be activated (S5) as well as the satellite terminator.

SUPREMA CAN LWL Converter

The voltage supply (24 V) of the CAN LWL converter is effected via a COMBICON connector, which is also equipped with a relay contact for failure output. The CAN bus is also connected via a 4-pin COMBICON connector. The LW line is connected via an ST connector. The baud rate of the converter can be set with DIP switches. Additionally, there is an extra switch for the CAN terminator in the converter.
The LWL converters have a very good diagnosis function which enables them to locate errors very quickly. A bar graph displays the signal quality at the optical fibre side, and a LED indicates possible errors at the “copper“ side.
To be considered for the correct function of the SUPREMA LWL converters:

- The CAN baud rate must match with that of the SUPREMA (or CAN bridge).
- The line length must align with the baud rate (max. 2000 m).
- Notice the optical fibre line crossing between TD and RD.

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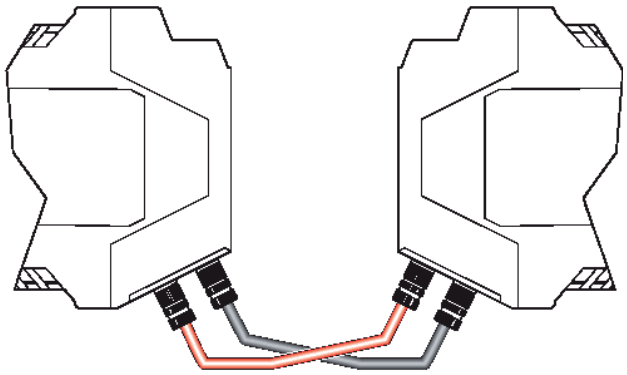

Fig. 105 LWL converter connector allocation

Terminals/LEDs of the LWL Converter

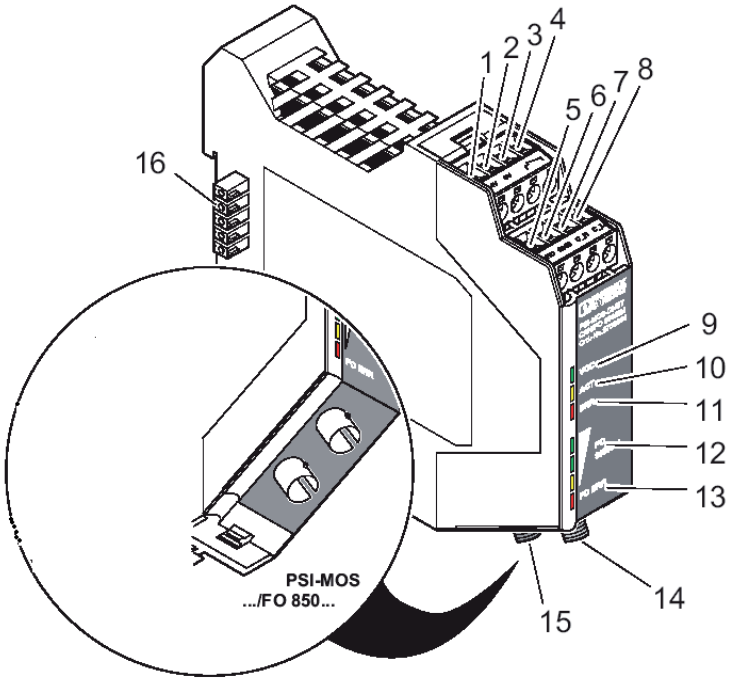

Fig. 106 LWL converter terminals/LEDs

1.	*Voltage supply: 24 VDC*
2.	*Voltage supply: 0 VDC*
3.	*Connection switching contact (onlybase module)*
4.	*Connection switching contact (onlybase module)*
5.	*CAN connection: Shield (onlybase module)*
6.	*CAN connection: GND (onlybase module)*
7.	*CAN connection: C_High (onlybase module)*
8.	*CAN connection: C_Low (onlybase module)*
9.	*LED: Ready for operation/Redundancy-Standby operation*
10.	*LED: Bus activity*
11.	*LED: Bus error*
12.	*LED field: Quality of LWL Signal*
13.	*LED: LWL error*
14.	*LWL connection: Sending path*
15.	*LWL connection: Receive path*
16.	*Backplane*

Technical data:

Voltage supply	10 V–48 VDC
Current compumption	max. 100 mA
Connection of bus interface	CANopen, 4-pin COMBICON
Bus terminator	120 Ohm connectable
Data rate	10, 20, 50, 125, 250, 500, 800 kBit/s adjustable
Connection LWL interface	ST (B-FOC)
Wavelength	850 nm
Operating temperature	-20 °C to +60 °C
Function text EX AM	+5 °C to +55 °C
Storage temperature	-40 °C to +85 °C
Dimensions (W x H x D)	22.5 mm x 105 mm x 115 mm
Weight	approx.120 g
Humidity	10 %–95 %, non-condensing

LWL Line Specification:

Line type	Wave length	Connector	Damping	Maximum length
F-S200/230	850 nm	ST® (B-FOC)	8 dB/Km	1500
F-G 62.5/125	850 nm	ST® (B-FOC)	3 dB/Km	2000*
F-G 50/125	850 nm	ST® (B-FOC)	2.5 dB/Km	2000*

* Other line lengths after consultation with MSA.
For use with the SUPREMATouch, multi mode fibers are required. For further technical data and operating conditions, see the LWL Converter Manual.

12.9 Connecting the Sensors

⚠ WARNING!

Always switch off the system power supply before connecting the sensors.

⚠ CAUTION!

Incorrect connection of the sensors can cause damage both to the SUPREMATouch and to the sensor itself.

- Ensure that the adapter modules corresponding to the sensors are plugged into the appropriate MAI module (verify that the sequence is correct (Chapter 12.6 "Module Configuration").
- After the sensors have been connected, separate them electrically again by pulling the connector plug on the MAT or MAT TS module. Plug them in again individually only as part of the start-up procedure (Chapter 13 "Start-Up"). If the MGT 40 TS module is being used, disconnect this module by pulling the ribbon cable connector to the MUT module.
- To ensure that the system will function correctly, tthe EMC Directive and its provisions must be observed (Chapter 12.2 "Installation Instructions for Following the EMC Directives").

The cables intended to be connected to the SUPREMA and to the sensors must comply with the permissible cable cross sections and the maximum cable lengths. A detailed description of the connections can be found in the connection diagram for the sensor in question and in the sensor data sheet (see chapter 16 "Sensor Data"). The operating and maintenance instructions of the sensor to be connected should also be noted.

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Notes for the Operation With Catalytic Combustion Sensors

Sensor poisons

For the safe operation of the catalytic combustion sensors it must be ensured that in the environmental air no substances and gases which damage or poison the sensor are present. These sensor poisons are for example Silicone, Silane compounds, Hydrogen Sulphide, Sulphur compounds. If in doubt, immediately contact an MSA employee who must determine the possible presence of sensor poisons and suggest alternative measurement procedures.

Oxygen Concentration

Catalytic combustions sensors operation is only possible at an O2 concentration of above 10 Vol.%. At O2 concentrations above 22 Vol.%, the EX approval for remote measuring heads becomes invalid.

Measuring Free

Before the installation of the sensors it must be made sure that the environmental atmosphere is free of combustible gases (e.g. by checking with hand-held test instruments). The unambiguity otherwise cannot be ensured to the measuring value indication at the SUPREMATouch.

3-wire operation of passive detectors

At use of passive detectors in 3-wire operation, the requirements of line control according to EN 60079-29-1 are comply only up to a maximum line- resistance of 1.7 Ohm pro lead respectively 3.4 Ohm loop resistance. If the line-resistance exceeds 1.7 Ohm pro lead respectively 3.4 Ohm loop resistance the 5-wire operation is recommended.

Overview of the Terminal Assignment

If the sensors are to be connected directly to the rack, the MAT module is to be used. For remote connection (installation on a mounting rail), the MAT TS module (maximum conductor cross section, 1.5 mm^2; sensors can be electrically isolated individually) or the MGT40 TS module (maximum conductor cross section, 2.5 mm^2; 8 sensors per module, can be isolated electrically only as a group) can be used. The remote modules are connected to the MUT module on the rack by the associated ribbon cable.

MAT Module/MAT TS Module/Sensor Connections

The function of the terminal connections of the MAT/MAT TS module depends on the module card plugged into the rack.

Terminal Assignment, Sensor Connections to MAI

Sensor Type	Terminal 1	Terminal 2	Terminal 3	Terminal 4	Terminal 5
Catalytic/ Passive 5-wire	K'(white)	K (brown) + IBr	0 (green) + UX	D (yellow) - IBr	D' (grey)
Catalytic/ Passive 3-wire (MSA)	Bridge K	K (brown) + IBr Bridge K	0 (green) + UX	D (yellow) - IBr Bridge D	Bridge D
active/ 2-wire	4–20 mA signal (GND)	+24 V			
active/ 3-wire	4–20 mA signal	+24 V		GND	
Semicon-ductor/ active 4-wire	+M (white)	+H (green)	-M (brown)	-H (yellow)	

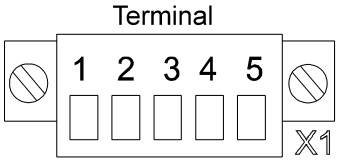

Fig. 107 MAT Module/MAT TS Module, Connector Plug

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For the 3-wire operation of the passive WT sensors, provide bridges:

Terminal 1–2:	BR K-K’
Terminal 4–5:	BR D-D’

If wire jumpers cannot be installed at the terminals, they can be provided on the rear of the MAT module in the form of solder bridges. (next to the ribbon plug of the MAT TS module).
(Chapter 12.6 "Module Configuration")

MGT40 TS Module/Terminal Assignments for Sensor Connections to MAI Module

Measurem. Point No.	MGT40 TS Module Terminal No.	Catalytic/ passive 5-wire	Catalytic/ passive 3-wire	active/ 2-wire	active/ 3-wire	Semicon-ductor/ 4-wire
1	2	K' (white)		signal	signal	+M (white)
	1	K' (brown)	K (brown)	+24 V	+24 V	+H (green)
	4	0 (green)	0 (green)			-M (brown)
	3	D (yellow)	D (yellow)		GND	-H (yellow)
	6	D' (grey)				
2	5	K' (white)		signal	signal	+M (white)
	8	K' (brown)	K (brown)	+24 V	+24 V	+H (green)
	7	0 (green)	0 (green)			-M (brown)
	10	D (yellow)	D (yellow)		GND	-H (yellow)
	9	D' (grey)				
3	12	K' (white)		signal	signal	+M (white)
	11	K' (brown)	K (brown)	+24 V	+24 V	+H (green)
	14	0 (green)	0 (green)			-M (brown)
	13	D (yellow)	D (yellow)		GND	-H (yellow)
	16	D' (grey)				
4	15	K' (white)		signal	signal	+M (white)
	18	K' (brown)	K (brown)	+24 V	+24 V	+H (green)
	17	0 (green)	0 (green)			-M (brown)
	20	D (yellow)	D (yellow)		GND	-H (yellow)
	19	D' (grey)				
5	22	K' (white)		signal	signal	+M (white)
	21	K' (brown)	K (brown)	+24 V	+24 V	+H (green)
	24	0 (green)	0 (green)			-M (brown)
	23	D (yellow)	D (yellow)		GND	-H (yellow)
	26	D' (grey)				
6	25	K' (white)		signal	signal	+M (white)
	28	K' (brown)	K (brown)	+24 V	+24 V	+H (green)
	27	0 (green)	0 (green)			-M (brown)
	30	D (yellow)	D (yellow)		GND	-H (yellow)
	29	D' (grey)				
7	32	K' (white)		signal	signal	+M (white)
	31	K' (brown)	K (brown)	+24 V	+24 V	+H (green)
	34	0 (green)	0 (green)			-M (brown)
	33	D (yellow)	D (yellow)		GND	-H (yellow)
	36	D' (grey)				
8	35	K' (white)		signal	signal	+M (white)
	38	K' (brown)	K (brown)	+24 V	+24 V	+H (green)
	37	0 (green)	0 (green)			-M (brown)
	40	D (yellow)	D (yellow)		GND	-H (yellow)
	39	D' (grey)				

MGT40 TS Module/Allocation MAT–MGT connections

	MAI Module	
Measurement Point No.	MAT Terminal No.	MGT40 TS-Module Terminal No.
1	1	2
	2	1
	3	4
	4	3
	5	6
2	1	5
	2	8
	3	7
	4	10
	5	9
3	1	12
	2	11
	3	14
	4	13
	5	16
4	1	15
	2	18
	3	17
	4	20
	5	19
5	1	22
	2	21
	3	24
	4	23
	5	26
6	1	25
	2	28
	3	27
	4	30
	5	29
7	1	32
	2	31
	3	34
	4	33
	5	36
8	1	35
	2	38
	3	37
	4	40
	5	39

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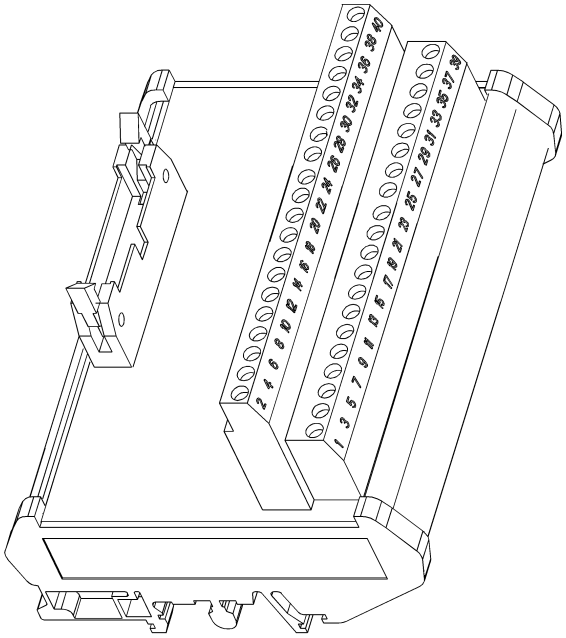

Fig. 108 MGT40 TS Module

12.10 Connecting the Relay Outputs

The function of the individual relay modules is described in detail in Chapter 11 "Modules". Depending on the application, the following relay modules can be used:

MRO8 module	8 common alarm relays on the racks.
MRC TS module	Connection of 5 relay modules (MRO 8 TS modules), installed on mounting rail.
MRO8 TS module	8 relays, installed on mounting rail.
MRO16 TS module	16 relays, redundant design (Chapter 15 "Redundant Systems"), installed on mounting rail.
MRO8 TS SSR module	8 solid state relays, installed on mounting rail.
MRO16 TS SSR module	16 solid state relays, redundant design, installed on mounting rail.

The relay modules are controlled by the MGO module, which has 40 switching outputs available per module. The first 8 switching outputs of the first MGO module in the system are permanently assigned to the common alarms, whereas the other outputs can be configured freely (see section Configuration of the Relay Driver Outputs).

In addition, two system fail relays are available on the MIB module, which are controlled in the event of a system fail (SYSTEM FAIL, LED is on). The following table provides information on the contact load capacity of MRO modules:

MRO Module, Contact Load Capacity	
Maximum Switching Voltage	400 VAC 300 VDC
Maximum Switching Power, ac:	1500 VA
Nominal Current	3 ADC
Maximum Switching Power, dc: (from the load limit curve)	24 VDC/3 A 50 VDC/0.3 A 100 VDC/0.1 A

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NOTICE

To ensure the safe use of each relay, the alarm and failure relays of the SUPREMATouch system must be used in the following condition:
1. Relay under power
2. Alarm or fault contact is closed
This ensures that the relay contacts will give a failsafe signal at power fail or line disconnection
To ensure safe relay contact operation the relay output must be fused to get a overload protection. To calculate the fuse rating, multiply the maximum permissible nominal current by factor 0.6.

MRO8 Module Relay Output Unit Common Alarms

This module is used only when relays are required for common alarms and installation is to be done directly on the rack. The module offers 8 common alarm relays and can be plugged directly into the rear of the rack. Each relay has a changeover contact, which is connected to terminals. The common alarm relays can be inhibited by connecting a switch to the LOCR contact of the MST module (see section 12.13 "System Ports (MST Module)"). As standard practice, the common alarm relays are normally energized (i.e. a relay is energized–no alarm. The relay is de-energized when an alarm is triggered at one or more inputs.).

NOTICE

To ensure the safe use of each relay, the alarm and failure relays of the SUPREMATouch system must be used in the following condition:
1. Relay under power
2. Alarm or fault contact is closed
This ensures that the relay contacts will give a failsafe signal at power fail or line disconnection
The MRO8 module must be installed in POS 9 only! It is impossible to be use more than one MRO8 module in one rack.

For the relay assignment see chapter 11.5 "Power Supply, Bus Connections, Connecting Technique".

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MRO8 Module Relay Terminal Assignment

Relay No.	Terminal No.	Contact
1	1	NO
	2	C
	3	NC
2	13	NO
	14	C
	15	NC
3	4	NO
	5	C
	6	NC
4	16	NO
	17	C
	18	NC
5	7	NO
	8	C
	9	NC
6	19	NO
	20	C
	21	NC
7	10	NO
	11	C
	12	NC
8	22	NO
	23	C
	24	NC

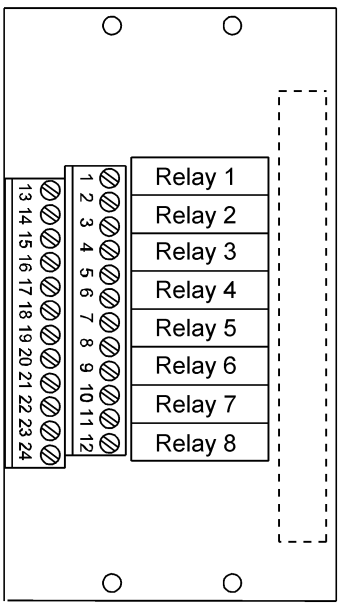

Fig. 109 MRO8 Module, Terminal Assignment

Additional Relay Outputs

If more relay outputs are required, MRO8 TS modules are used together with the MRC TS module (mounting rail installation). Remember that the first 8 switching outputs of the first MGO module in the system are permanently assigned to the common alarms. Thus the first MRO8 TS module which is connected by way of the MRC TS module to the first MGO module in the system is always assigned to the 8 common alarms. The connection of the MRO16 TS module provided for redundant systems is described in Chapter 15 "Redundant Systems".

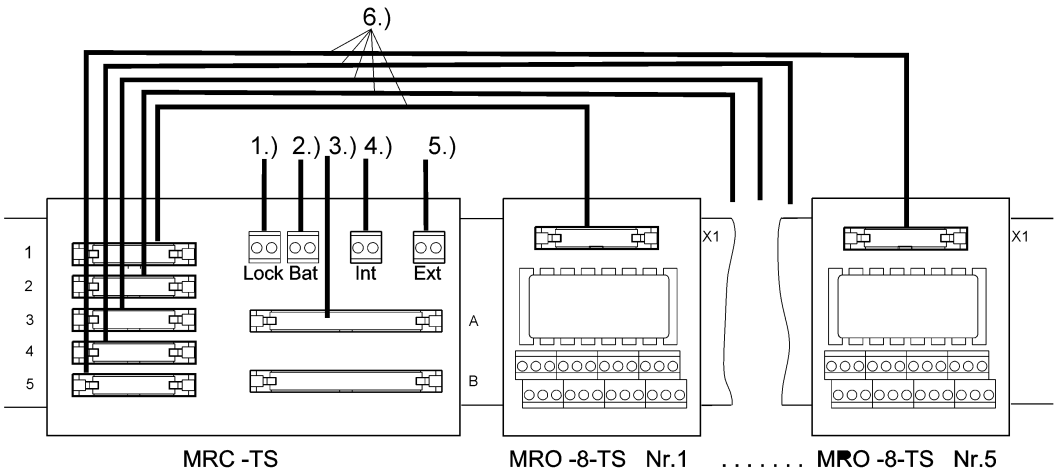

Fig. 110 Connection diagram of the MRC TS and MRO8 TS Modules

NOTICE

The GND of the Bat, Int, and Ext connections of the MRC TS module must be connected to the GND of the SUPREMATouch supply voltage.

The MRC TS module is connected via connector A with a 40-way screened ribbon cable to the MUT module plugged into the rear of the rack. The MUT module establishes the connection with the MGO module plugged into the rack (Chapter 12.7 "System Configuration (Hardware)"). MRO8 TS modules Nos. 1–5 are connected to the MRC TS connector 1–5 with a 20-way ribbon cable. In addition, the supply voltage for the relays must be connected to the terminals Bat, Int, and/or Ext.

As an option, a switch can be connected to the Inhibit (Lock) terminal for the purpose of inhibiting the relays. (Chapter 12.6 "Module Configuration").

MRC TS Module, Relay Connection Module

This module is used when relay modules for remote rail mounting installation from the rack are used. Up to 5 TS relay modules (MRO8 TS) are connected by way of an MRC TS module. Connected to this module are the relay power supply and the ribbon cable required for the control of the relays by the MGO module. The MGO module is connected to the MRC TS module with a 40-way ribbon cable and a rack mounted MUT module.

The power supply to the relays must be provided by appropriate connections on the MRC TS module. Also note the following points:

- The power supply set-up of the MRC TS module must agree with that of the rack (assignment of the External/Internal/Battery terminals must agree).
- When different voltage supplies are used for the MRC TS module and the associated rack, the GND terminals must be connected together, otherwise the relays will not switch.

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Relay Inhibit

- By connecting a switch to the LOCR contact of the MRC TS module, all of the relays of the connected MRO8 TS modules can be inhibited simultaneously.
- Individual relays cannot be inhibited in this way. The only way to inhibit an individual relay is to inhibit the associated input (Chapter 12.6 "Module Configuration").
- Via the bridge (BR1), the type of inhibiting (normally energized or normally de-energized) can be specified (Chapter 12.6 "Module Configuration").

normally de-energized	**=**	**relay energized**	**=**	**alarm**
normally energized	**=**	**relay de-energized**	**=**	**alarm**

NOTICE

The type of inhibiting must comply with the type selected on the operating menu for the relay outputs and must be the same for all relays connected to the MRC TS module (Chapter 12.7 "System Configuration (Hardware)")
Because the common alarms operate according to normally energized principle and cannot be changed, the first 32 freely configurable relay outputs must also be configured according to the normally energized principle (normal: ON) if relay inhibiting is provided.

NOTICE

If the normally energized principle is selected for inhibiting, then, to ensure the voltage supply to the relays, after the SUPREMATouch voltage supply is turned off, an independent external voltage supply must be connected to the appropriate terminals of the MRC TS module (EXT/BAT, 24 VDC).

NOTICE

If service is finished the inhibit status of the relays must be canceled. During the time the relays are inhibited, the system fail is set.

MRO8 TS Module, Relay Output Unit

The MRO8 TS module is used in conjunction with the MRC TS module when additional types of messages are required in addition to the common alarms. The module has 8 relays, each with its own changeover contact (250 VAC/3 A). They are controlled by an MGO module, operating by way of the MRC TS module. For this purpose, the MRO8 TS module is connected by a 20-way ribbon cable to the MRC TS module. The inhibiting of the relays is accomplished via the LOCK function of the associated MRC TS module. (The LOCR terminal on the MST module affects only the common alarms when an MRO8 module is plugged into the rack).

MRO10 8 TS Module, Relay Assignment

The first 8 outputs of the system are assigned to the common alarm messages. The outputs of additional modules can be assigned to any message desired.
For the relay assignment see chapter 11.5 "Power Supply, Bus Connections, Connecting Technique".

MRO10 8 TS Module

The terminals are assigned as follows:

Relay No.	Terminal No.	Contact
1	1	NO
	2	C
	3	NC
2	13	NO
	14	C
	15	NC
3	4	NO
	5	C
	6	NC
4	16	NO
	17	C
	18	NC
5	7	NO
	8	C
	9	NC
6	19	NO
	20	C
	21	NC
7	10	NO
	11	C
	12	NC
8	22	NO
	23	C
	24	NC

MRO20 8 TS Module

The terminals are assigned as follows:

Relay Number	Terminal	Contact
1	1	NO
	2	M
	3	NC
	25	NO
	26	M
	27	NC
2	4	NO
	5	M
	6	NC
	28	NO
	29	M
	30	NC
3	7	NO
	8	M
	9	NC
	31	NO
	32	M
	33	NC
4	10	NO
	11	M
	12	NC
	34	NO
	35	M
	36	NC
5	13	NO
	14	M
	15	NC
	37	NO
	38	M
	39	NC
6	16	NO
	17	M
	18	NC
	40	NO
	41	M
	42	NC
7	19	NO
	20	M
	21	NC
	43	NO
	44	M
	45	NC

Relay Number	Terminal	Contact
8	22	NO
	23	M
	24	NC
	46	NO
	47	M
	48	NC

MRO10/MRO20 16 TS Module

The terminals are assigned as follows:

Relay Number	Terminal	Contact
1	1	NO 1
	2	
2	3	NO 2
	4	
3	5	NO 3
	6	
4	7	NO 4
	8	
5	9	NO 5
	10	
6	11	NO 6
	12	
7	13	NO 7
	14	
8	15	NO 8
	16	
9	17	NO 9
	18	
10	19	NO 10
	20	
11	21	NO 11
	22	
12	23	NO 12
	24	
13	25	NO 13
	26	
14	27	NO 14
	28	
15	29	NO 15
	30	
16	31	NO 16
	32	

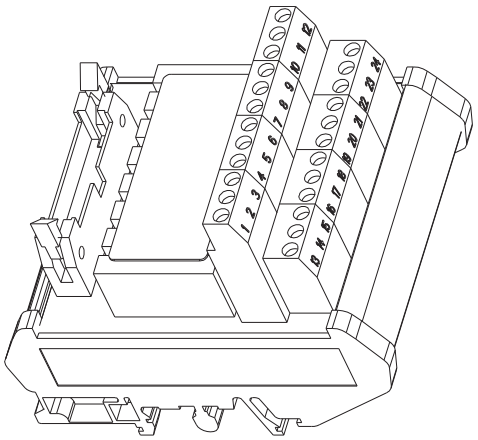

Fig. 111 MRO8 TS Module

Relay monitoring

All relay outputs of the MGO20 are checked for the presence of all relays. If at the MRC module not all relay modules are attached, then a dummy (MRD module) must be used for each missing module, so that the relay monitoring does not generate an error.
The MRD module can be attached directly to the MRC module. The MRD module has LED displays for the relay condition. Missing or defective relay modules are indicated with a red LED on the MDO module, and at the same time an error message with "data acquisition error" is registered in the log.

System Fail Relay

There are two system fail relays on the MIB module, designed as changeover contacts. They are operated according to the normally energized principle. Both relays are de-energized when a failure occurs. The terminal contacts are located directly next to the relays on the MIB module.

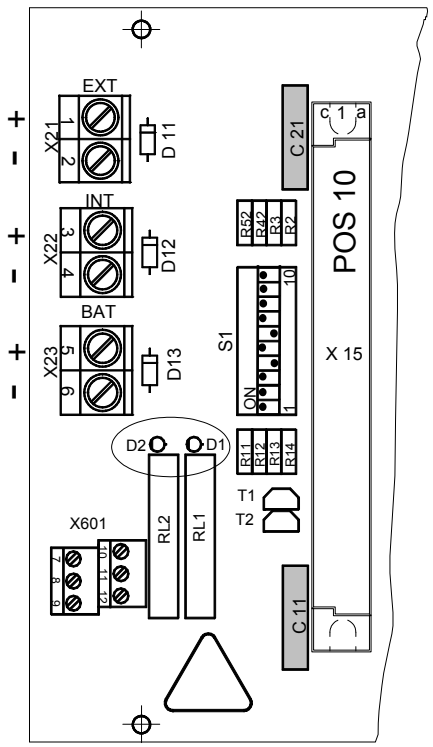

Fig. 112 MIB Module, connection terminals for the system fail relay

Terminal Assignment:

System Fail Relay and Terminal Assignment	
X 601 Terminal No.	**Contact**
7	Break contact relay 1
8	Centre contact relay 1
9	Make contact relay 1
10	Break contact relay 2
11	Centre contact relay 2
12	Make contact relay 2

NOTICE

Both system fail relays must be interconnected to ensure that the failure report is triggered already when one relay is de-activated. This applies for remote racks, too.

12.11 Connecting the Switching Outputs

Up to 512 switching outputs can be controlled by the system via the MGO module (40 open collector drivers per module). These switching outputs can be used to drive relays, magnetic valves, and LEDs (24 VDC/300 mA). The first 8 switching outputs of the first MGO module in the system are permanently assigned to the common alarms, whereas the other outputs can be configured as desired (Chapter 12.7 "System Configuration (Hardware)"). The switching outputs can be accepted by an MGT40 TS module installed on a mounting rail. The MGT40 TS module must be connected to the MUT module assigned to the MGO module by a 40-way ribbon cable.

NOTICE

The connection of switching outputs via the MAT module or the MAT TS module is not provided for and not permitted!

NOTICE

The outputs from this module (maximum +24 VDC/300 mA) are referenced to the SUPREMA-Touch ground. Therefore, the ground of the module supply voltage must be connected to the ground of the SUPREMATouch (ground of the power supply terminal at the MIB module).

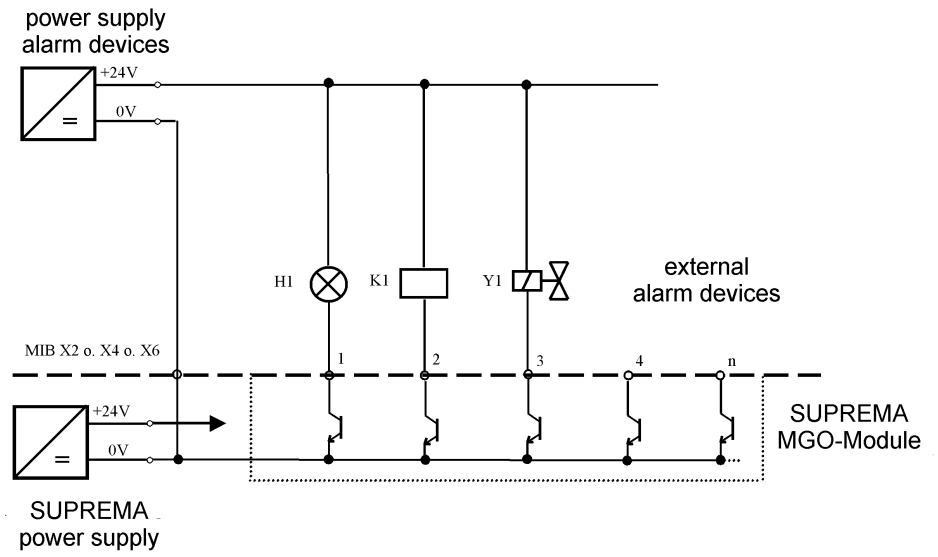

Fig. 113 Principle circuit diagram, connection of the switching outputs

NOTICE

The load limits described in Chapter 12.7 "System Configuration (Hardware)" must be met!

Switching outputs are run as "open-collector" outputs, that is, an internal transistor of SUPREMATouch switches the negative connection of the demand while the positive connection of the load is to be connected directly to the 24 V supply.

Terminal Assignments of the Switching Outputs	
MGO Driver Output (Switching Output)	**Terminal No. (MGT40 TS)**
1	2
2	4
3	6
4	8
5	1
6	3
7	5
8	7
9	10
10	12
11	14
12	16
13	9
14	11
15	13
16	15
17	18
18	20
19	22
20	24
21	17
22	19
23	21
24	23
25	26
26	28
27	30
28	32
29	25
30	27
31	29
32	31
33	34
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35	38
36	40
37	33
38	35
39	37
40	39

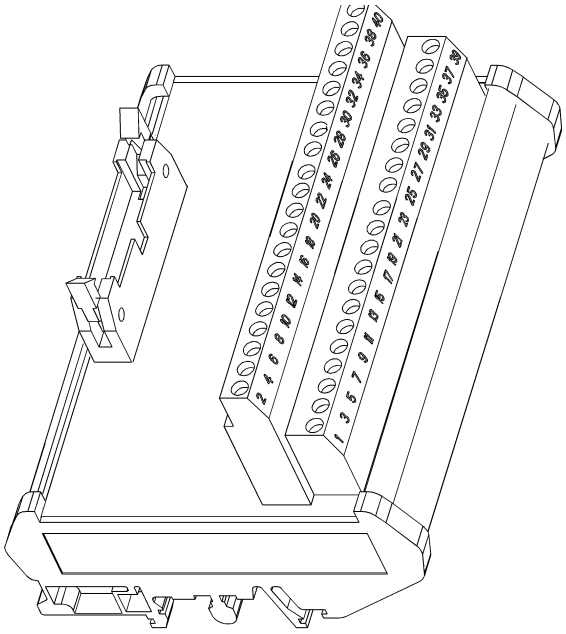

Fig. 114 MGT40 TS Module

The cables must be screened if there is a risk of excessive electromagnetic loads (Chapter 12 "Installation").

MHD TS Module (High Driver)

- The MHD uses 10 IC drivers for driving 40 capacitive or inductive outputs (output 1–4, 5–8, 9–12 etc.).
- The drivers are over-temperature- and over-voltage-safe.
- The maximum power loss per driver is limited, the more outputs are active the less must be the current per output.

The MHD module is an external supplement of the MGO module inverting the MGO output signal. Unlike the MGO module (= Low Driver), the MHD assembly switches loads which are jointly connected to GND (= High Driver).

The MHD module is connected to the rack by 40-pin ribbon cable, and thus makes 40 outputs available (24 V/0.3 A).

40-pin ribbon cable connection at MUT (of MGO).

- 24 V supply and load connections (20 A maximum)
- Mounting on C or standard rail
- Outputs short-circuit-proof

Redundant supply must be realized externally.

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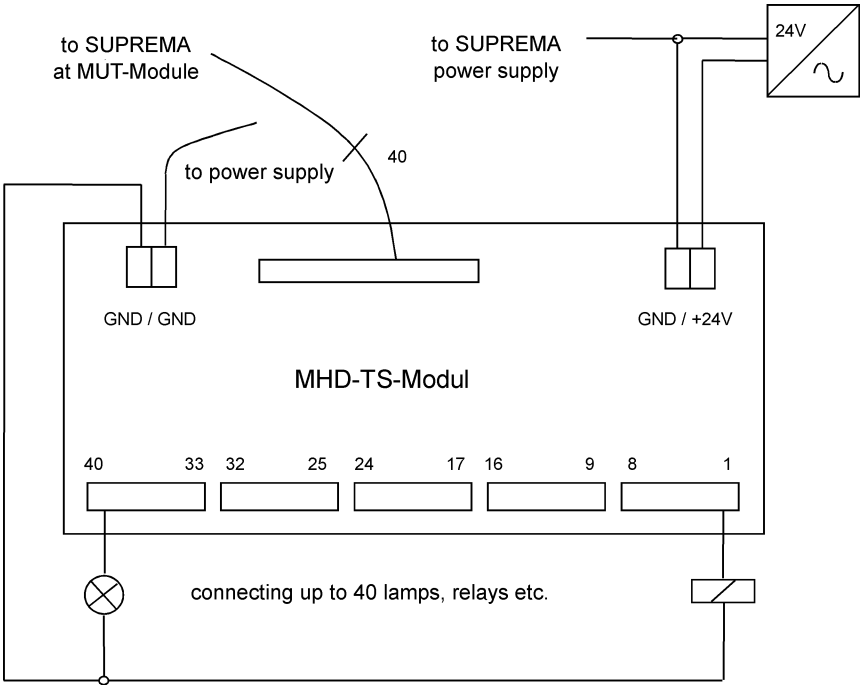

Fig. 115 MHD TS Module Connection (Switching outputs inverted)

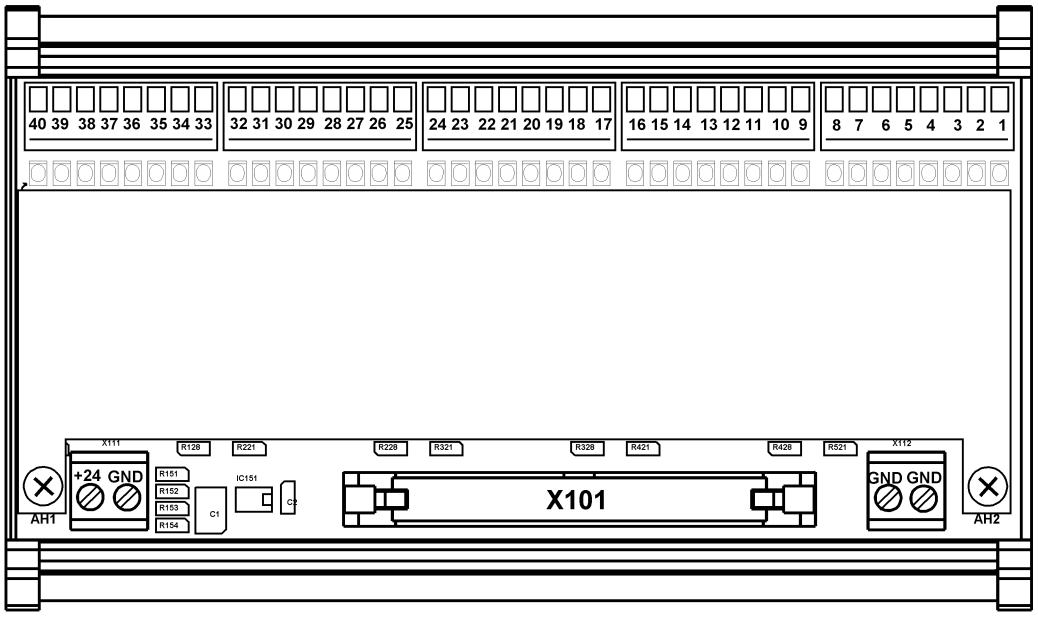

Fig. 116 MHD TS Module

12.12 Connecting the Analog Outputs

Analog outputs can be used to generate external records of the sensor signals using the MAO module that supplies an electrically isolated 0–20 mA output current. Each MAO module offers 8 analogue outputs that follow the level of the sensor signal. The assignment between signal inputs and analogue outputs is freely configurable. The system automatically assigns measurement channel nos. 1–8 and the associated measurement values to the first plugged-in MAO module (measurement channel nos. 9–16 being assigned to the second MAO module etc.).

The analogue signals can be accepted directly on the rack at the terminals of a MAT module plugged into the rear of the rack.

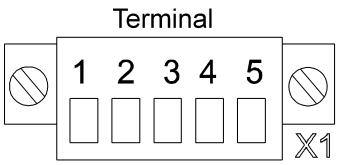

Fig. 117 MAT Module/MAT TS Module, connector plug

Terminal No. 1	Terminal No. 2	Terminal No. 3	Terminal No. 4	Terminal No. 5
			- Ia	+Ia

Tab. 118 MAT/MAT TS Module Terminal Assignment, analogue Outputs

For remote connection with rail mounting installation, the MAT TS module (conductor cross section, 0.2–1.5 mm^2) or the MGT40 TS module (conductor cross section, 0.2–2.5 mm^2) is provided, which are connected to the MAO module by a 40-way ribbon cable and the MUT module.

Terminal Assignment, analog Outputs		
Analog output	**Terminal no. (MGT-40-TS)**	**Function**
1	6	+Ia
	3	-Ia
2	9	+Ia
	10	-Ia
3	16	+Ia
	13	-Ia
4	19	+Ia
	20	-Ia
5	26	+Ia
	23	-Ia
6	29	+Ia
	30	-Ia
7	36	+Ia
	33	-Ia
8	39	+Ia
	40	-Ia

The cables must be screened (Chapter 12.2 "Installation Instructions for Following the EMC Directives").

An external device with voltage input (e.g. recorder, PC with a DAQ card) can be connected to the analogue outputs by connecting a resistor across the input terminals of the recorder.
When a 100-Ohm resistor is used, a voltage range of 0–2 V is obtained for a 0–20 mA signal.

NOTICE

Maximum load 500 ohms. The accuracy of the measured voltage depends on the tolerance of the resistor used.

12.13 System Ports (MST Module)

The system expansions and system connections described in the following can be realised by using the MST module, plugged into the rear of the rack.

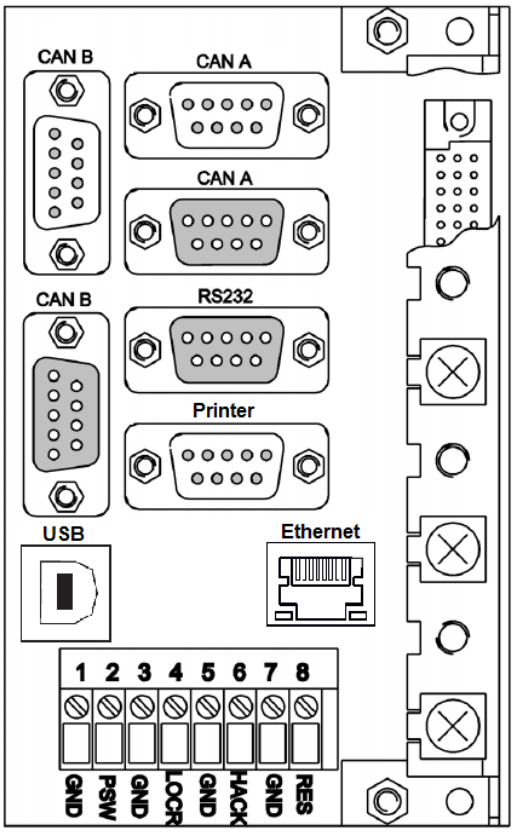

Fig. 119 MST Module Connections

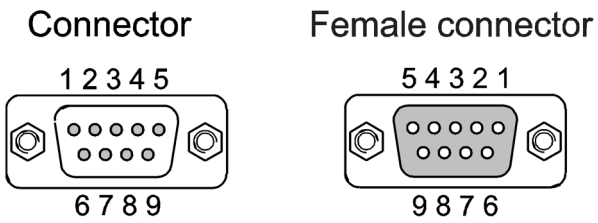

Fig. 120 SUB-D pin assignment

For simplification of the CAN bus connection at systems with several racks, the MST module has been revised. For every CAN bus an additional connection was added so that the T pieces are saved when connecting racks (Chapter 12.8 "Systems Consisting of Several Racks").

CAN Bus Ports (CAN-A/CAN-B)

The two system buses in the system, i.e., CAN-A and CAN-B, are provided to allow expansion of the system (systems with several racks). The measurement value input (MDA + MAI module) or the switching outputs (MGO module) can be set up separately from the main rack to reduce the cabling. In systems without redundancy, the individual racks are connected to each other by ready-made CAN bus cables via the CAN-A bus port (Chapter 12.7 "System Configuration (Hardware)").

Plug Assignment:

Plug	Name	Terminal No.	Assignment
X13, X15	CAN A	2	CAN_L
		3	GND
		6	GND
		7	CAN_H
X14, X16	CAN B	2	CAN_L
		3	GND
		6	GND
		7	CAN_H

Tab. 121 MST Module, Pin Assignment, CAN Bus Ports

Only screened (>80 % coverage) CAN-cables may be used. These must have separate cable screen, which is connected to the plug housing. A wire is to be provided in the cable for the CAN GND.

PC/Laptop Port (System Operation, RS232A/USB)

A PC or a laptop can be plugged into this port. By using the SUPREMATouch operating program, the system can be operated with a Windows interface. This is recommended, especially for the initial setup of a new system with an average or large number of inputs (Chapter 14.1 "Connecting a PC/Laptop"), It also makes it easier to perform calibrations and routine maintenance. The PC/ laptop should meet the following minimum requirements:

System Requirements for PC:
- Minimum Pentium IV, 2GHz, 2 GB of RAM
- Windows XP SP 3
- Connecting cable USB: miniUSB / RS232: RS232 extensions, SUB-D connector 9-way, plug and socket (do not use a null-modem cable!)
- RS232 configuration: 19200/115200 kBits/sec., 8 data bits, 1 stop bit, Parity none

The terminal assignment of the RS232A connection is given in the following table (see figure Tab. 122 "RS232A Terminal Assignment"). Connect the screening to the pin housing.

Socket No.	Assignment
1	
2	TxD
3	RxD
4	
5	GND
6	
7	
8	
9	

Tab. 122 RS232A Terminal Assignment

Printer Port (Printer, RS232 B)

Using this port, the alarm messages can be sent to a printer so that records can be kept.

- Connecting cable: RS232 extension (do not use a null-modem cable!)
- RS232 configuration: 19200 kBits/sec., 8 data bits, 1 stop bit, Parity none

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The pin assignment of the RS232B port is given in the following table (see also figure Fig. 120 "SUB-D pin assignment"). Connect the screening to the pin housing.

Socket No.	Assignment
1	
2	RxD
3	TxD
4	
5	GND
6	
7	
8	
9	

Tab. 123 RS232B, Pin Assignment

When a signal event occurs (alarm, fail, the following information is transmitted by default in a single line through this port to a printer:

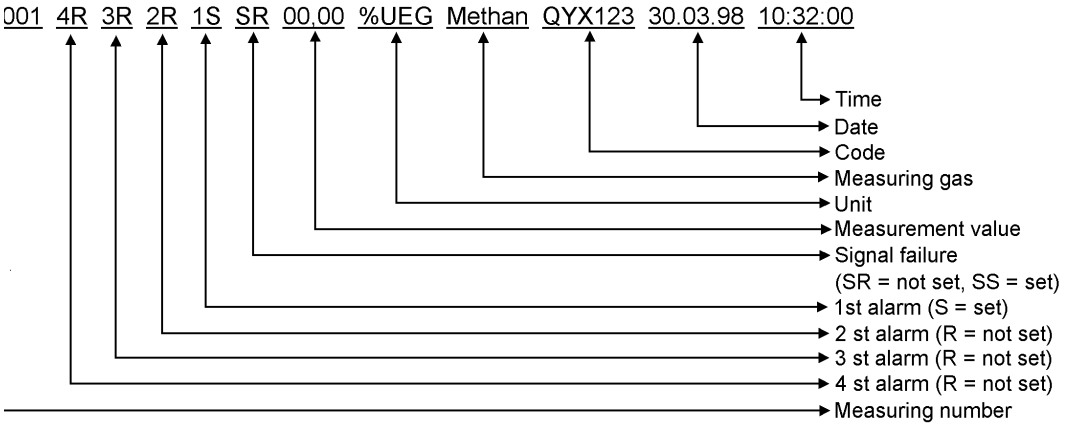

Fig. 124 Protocol Printer, Data Structure

The results are printed each time the measurement value exceeds or falls below the alarm threshold, in the event of a system fail, in the event of a successful manual reset or a signal fail. The current status of the input is printed out in accordance with the data structure shown in Figure 124.

NOTICE

This formatting can be changed by the user! See the section Operation -> Menu -> Settings -> Printer

Reset Terminal (Reset Latching Alarms)

Latching alarms can be released via terminals 7 and 8 by closing a contact (key, etc.) (same function as the RESET key on the front panel).

	MST Terminal 8: RES
	MST Terminal 7: GND

Ethernet

This port is intended to connect the system to an Ethernet network. When this connection is used, it is possible to access the current measuring values and status informations as well as to synchronize the system internal clock with a time server.

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Acknowledge Terminal (Reset Horn Relay)
The horn relay can be reset via terminals 5 and 6 by closing a contact (key, etc.) (same function as the ACKNL key on the front panel).

MST Terminal 6: HACK
MST Terminal 5: GND

⚠ WARNING!

For safety reasons, the SUPREMATouch and the accessed/accessing devices should be used in a distinct, separated network!

LOCR Terminal
The relay inhibit for the MRO8 module (common alarms) on the rear of the rack can be activated via terminals 3 and 4 by closing a contact (key, etc.). All 8 modules are inhibited as a block. This terminal has no effect on the MRO8 TS modules. These modules are inhibited via the LOCK terminal on the MRC TS module (Chapter 12.11 "Connecting the Switching Outputs").

MST Terminal 4: LOCR
MST Terminal 3: GND

NOTICE

If the voltage supply for the MIB module is interrupted, the inhibiting function of the MRO8 modules is no longer active.

Password Terminal
The input of the configuration password can be replaced via terminals 1 and 2 by closing a contact (key switch). If the current password has been forgotten, this terminal can be used to enter a new password (Chapter 12.8 "Systems Consisting of Several Racks").

MST Terminal 2: PSW
MST Terminal 1: GND

12.14 Connecting the System Power Supply

Before beginning installation, ensure that chapter 12.10 "Connecting the Relay Outputs" has been read and understood. Care must also be taken to ensure that the complete system, including the sensors and relay modules, does not exceed the maximum load of the selected supply voltage. If an external power supply or a battery is used, the supply voltages must operated via an appropriate EMC filter. The requirements of the EMC and Low Voltage Directive must be adhered to. All power supply inputs must be protected with appropriate fuses.

Calculation of the Required Power Supply
The power consumption for supplying the sensors is based on the number and types of connected sensors and on the resistance of the cables used.

Power Requirement of the Sensors and Cables		
Type of Sensor	**Sensor Power**	**Power per Ohm of Cable Resistance**
D-7100	1.5 W	0.1 W*
Series 47 K	1.5 W	0.1 W*
D-7010	2.5 W	0.1 W*
DF-7100	2.5 W	0.05 W, max.
DF-7010	4 W	0.05 W, max.
DF-8603	4 W	0.1 W
DF-8201	1.5 W	0.05 W, max.
DF-8250	1.5 W	0.05 W, max.

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Power Requirement of the Sensors and Cables		
DF-8502	5 W	0.1 W
DF-9500	1 W	not applicable
DF-9200	1 W	not applicable
SafEye	8 W**	0.1 W
GD10	3.5 W	0.05 W, max.
Ultima X	4 W	0.1 W
Ultima X IR	7 W	0.1 W
DF-8510	2 W	0.65 W, max.
FlameGard	5 W	0.1 W
PrimaX I	1 W	not applicable
PrimaX P	2.5 W	0.05 W
PrimaX IR	5 W	0.1 W
FlameGard 5 MSIR	3.6 W	0.1 W
FlameGard 5 UV/IR	3.6 W	0.1 W
FlameGard 5 UV/IR-E	3.6 W	0.1 W
Ultima MOS-5	5 W	0.1 W
Ultima MOS-5E	5 W	0.1 W
Ultima OPIR-5	10 W	0.1 W
UltraSonic EX-5	5 W	0.1 W
UltraSonic IS-5	2.5 W	0.05 W
Ultima X5000	See transmitter specific manual	
S5000	See transmitter specific manual	
Senscient ELDS	See transmitter specific manual	

* Value applies to a bridge current of Ibr = 300 mA

** Only detector and source greater than 6 W. Both (detector and source) should be supplied by external voltage source.

After adding the power consumption for the sensors, the following power values can be given for the individual modules:

Power Requirements of the System Modules	
Type of Module	**Power (VA) Module**
MCP module	5
MDO module	10
MDA module	1
MGO module	1
MAI/MAR module	2
MAO module	5
MRO8	1.5
MRO8 TS	1.5
MRO16 TS	3
MBC module	2.5

NOTICE

The supply voltage may be switched on only after all required installation steps have been completed and the installation has been verified during the start-up procedure (Chapter 13 "Start-Up").

Connection of the DC-Voltage Supply (MIB Module)

The system is supplied with 24 VDC (19.2–32 VDC). There are 3 pairs of connection terminals on the MIB module, so that the supply can originate from 3 different sources (redundancy). The supplies are functionally equivalent, but the order in which the power is drawn is prioritised: 1st = EXT, 2nd = INT, 3rd = BAT. The changeover from one power source to another is accomplished on the system modules.

⚠ WARNING!

The input voltage range (19.2–32 VDC) must not be exceeded! Higher voltage values can lead to the destruction of the unit!

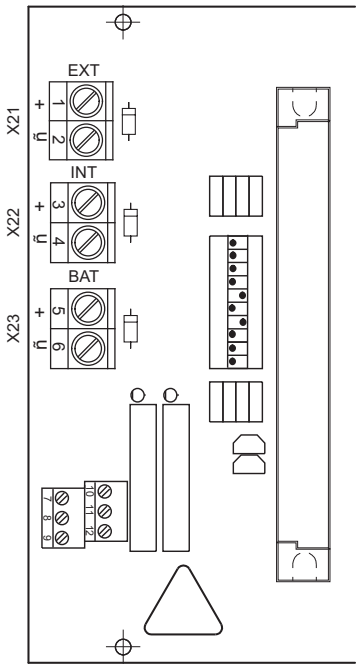

Fig. 125 MIB Module, supply voltage terminals

When an external power supply or a battery is used, the supply voltages must be operated via an appropriate EMC filter. The requirements of the EMC and Low Voltage Directive must be complied with.

EXT Connection (External Power Supply Unit, 24 VDC)

- Connection for external power to supply all assemblies of a rack.
- Required when a redundant power supply is to be provided or when the internal rack power supply unit is unable to supply all the sensors.
- Maximum supply current of 20 A for one rack.

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INT Connection (Rack Power Supply Unit, 24 VDC, 250 VA)

- Connection for an internal rack power supply or an external power supply.
- Power supplied to all the rack units and sensors.
- If the rack power supply cannot supply sufficient current, the sensors, modules or relays must be supplied by external units.
- The internal rack power supply can be omitted if, because of a high power requirement or a redundant design, the power is supplied by an external power supply via the INT connection terminals.
- Maximum supply current of 20 A.

BAT Connection (Continuous Battery Power Supply)

- Continuous battery power supply for all units in a rack (21–28 VDC).
- If the internal and/or the external power supply unit fails, the system is supplied from here
- Maximum supply current, 20 A.

Connection of the Internal Rack Power Supply Unit (MSP Module)

The system can be supplied by the power supply built into the rack. The power supply has a wide-range input (85–265 VAC, 47–63 Hz or 120 –330 VDC).

Terminal Assignment			
Power Supply Unit - Terminal Designation		**Function**	
+ 24 V	+ S	Output: +24 VDC	Sense Connection
+ 24 V		Output: +24 VDC	
GND		Output: GND	
GND	- S	Output: GND	Sense Connection
PE		Ground Wire Connection	
L		Line	
N		Neutral	

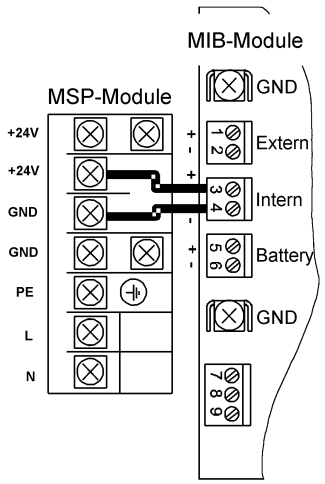

Fig. 126 Connection diagram of the MSP Module

WARNING!

Connection of the line power must be made with the power switched off and all relevant safety regulations must be complied with.

As shown in Figure 126, the +24 V output terminal of the MSP module must be connected to the +ve terminal of the INT connection, and the GND output terminal of the MSP module must be connected to the -ve terminal of the INT connection of the MIB module.

The line power is supplied via the terminals “L” and “N” of the MSP module.

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NOTICE

Do not supply line power to the MIB module. This will damage the SUPREMA system.

The ground wire is connected to the PE terminal of the MSP module.

CAUTION!

Before turning on the line voltage during the start-up procedure, reinstall the Plexiglas cover over the connection terminals of the MSP module in order to prevent any risk of accidental contact with the line voltage.

12.15 Labelling Concept

Labelling fields are provided on the various modules for the numbering of the plug-in modules, the connector plugs, and connected inputs and outputs. The customer is free to mark them in any way deemed fit except for the plug-on modules, which cannot be marked because of a lack of space. In the following, the labelling fields and a possible plan for marking them is presented. This plan is merely a suggestion and the customer is free to label the fields in accordance with their own concept of the system.

Plug-In Modules

The labelling field for the plug-in modules (MCP, MDA, MAI, MGO and MAO modules) is located on the front, on the release lever for the module. It is therefore immediately visible as soon as the front panel of the rack has been swung down. The type of module is printed on the lower half. The upper half is available for the customer to mark. A possible labelling system is illustrated in the following.

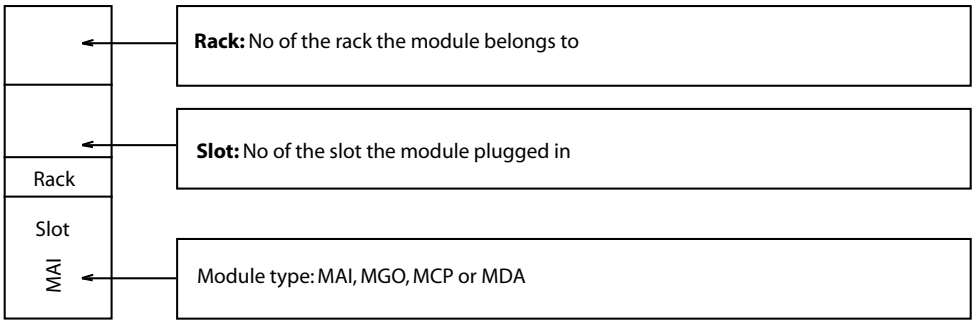


Fig. 127 Labelling field, plug-in Modules

Slots in the Rack

In the rack, a labeling field is provided in front of the slots. The slot numbers and the types of modules allowed for each slot are printed on it. In the first rack, the input numbers assigned to the slot are also printed on this field (if the slot has been filled with an MAI module). In addition, the customer can mark the type of module used in each slot, and, when MGO or MAO modules are used, can enter the output channel number corresponding to the position of the module in the system. When several racks are installed and MAI modules are being used, it is necessary to enter the input numbers, starting with the second rack, corresponding to the position in the system.

The following rules apply to the numbering of the input and output channels:

MAI Modules/Measurement Sites:

The input nos. are assigned permanently to the slots in the rack; 8 inputs can be connected per MAI module. For example, if the first MAI module has been plugged into the 7th slot in the first rack, the first 8 inputs acquire the nos. 9–16.

MGO Modules/Relay Driver Outputs:

The relay driver output nos. are assigned to the MGO module; each MGO module makes 40 relay driver outputs available. That is, regardless of the slot no. and the rack no., the relay driver outputs

GB

of the first MGO module acquire the nos. 1–40, those of the second MGO module, the numbers 41–80, etc.

MAO Modules/Analog Outputs:

The analogue output numbers are permanently assigned; 8 analogue outputs are available per MAO module. The assignment between the analogue output numbers and the input numbers can be parameterized.

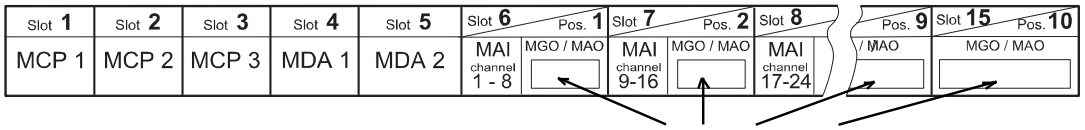


Fig. 128 Labeling of the slots in the 1st rack

Connection and Terminal Modules on the Rack

A free labelling field is provided for the modules plugged into the rear of the rack (MRO 8, MAT, and MUT modules).

A possible labelling system:

Assignment:	Front:		Rear:
	Slot 1	⇨	**MST module**
	Slot 2–4	⇨	**free**
	Slot 5–15	⇨	**Positions 1–10**

The following rules apply to the assignment of the rear plug positions to the slot numbering on the front:

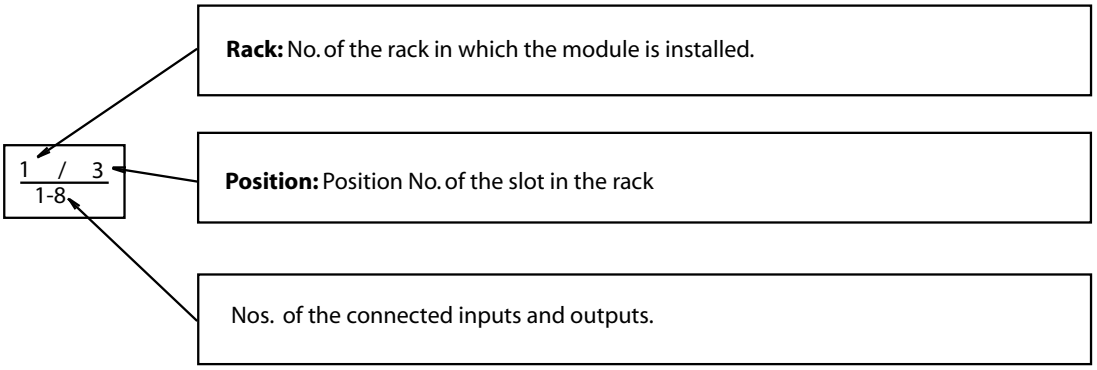


Fig. 129 Labelling of the connection and terminal Modules in the rack

Connection and Terminal Modules in Rail-Mounted Installation

A free labelling field is provided for modules installed on mounting rails (MRO 8 TS, MAT TS, MRC TS, and MGT 40 TS modules). Figure 130 shows a possible labelling system.

GB

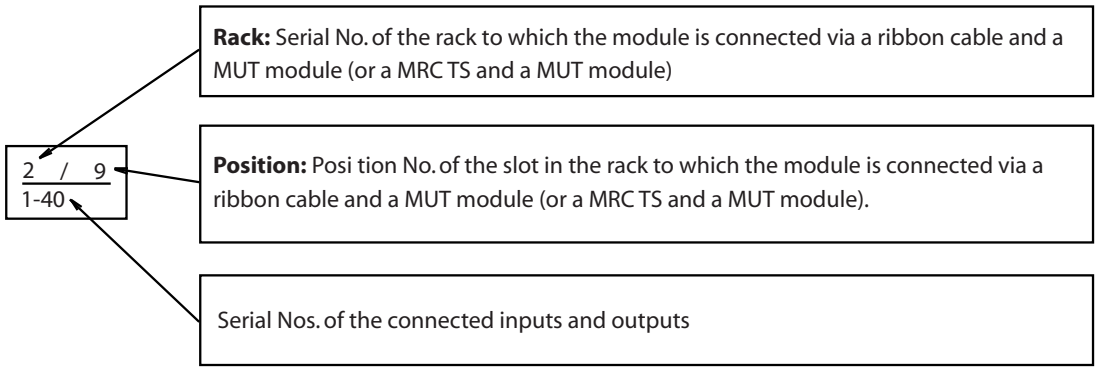


Fig. 130 Labelling of the rail-mounted connection and terminal Modules

MAT (TS) Connector Plug

A free labelling field is provided on the bottom of the connector plug of the MAT and MAT TS modules. Figure 131 shows a possible labelling system.

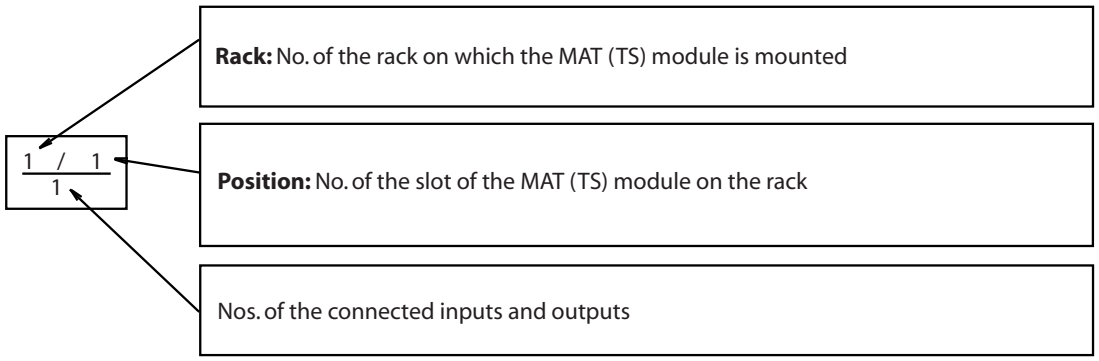


Fig. 131 Labelling of the MAT (TS) connector plug

GB

13 Start-Up

NOTICE

High voltages can be present in the MSP module and at the relay terminals of the relay modules. Suitable safety measures must be taken when starting up the system.Start-up procedures may be performed only by authorised and qualified personnel. Before start-up, it must be ensured that all installation steps have been executed properly and that the cable connections and configurations of the individual modules as well as of the entire system are correct.

13.1 Start-up Procedure Overview

(1) Ensure that the supply voltage is switched off.

(2) Check that the sensor, relay (secondary side), switching output, and analogue output connections of the system are disconnected.

(3) Ensure that all the required modules have been properly mounted in the system and are connected to each other.

(4) In systems with several racks, ensure the CAN bus connection is correct (cabling, baudrate, CAN node no., terminating resistor).

(5) Switch on the supply voltage (→ chapter 13.2 "Switch On the Supply Voltage").

(6) Carry out a system configuration (→ chapter 4 "Entering System Parameters").

(7) Connect and configure the sensors (→ chapter 12.9 "Connecting the Sensors").

(8) Connect and configure the relay or switching outputs (→ chapter 12.10 "Connecting the Relay Outputs").

(9) Carry out an IBR adjustment (see chapter 4.2 "Maintain Menu").

(10) Carry out a first sensor calibration (→ chapter 7.3 "First Calibration with Pre-Adjustment").

(11) Subject the overall system to a function test with gas.

13.2 Switch On the Supply Voltage

(1) Switch on the supply voltage to the system under consideration of all relevant safety measures.

After the power is switched on, the message “SUPREMA - MDO-20” appears on the display of the front panel (MDO module) along with the current software and hardware revision.
During the start-up, a self-test is performed. The progress of this self-test is indicated by a successive activation of all LEDs as a binary counter. When communication between the MDO and the MCP(s) is established, all alarm LEDs will be switched off. After the module has run through the self-test, it starts the system with the message “`System start in progress`”. After the system starts successfully, the number of inputs corresponding to the plugged-in MAI modules is displayed in the *Measure/List* menu.

NOTICE

If this procedure is not completed in 5 minutes, check the installation again and, if necessary, call in an MSA service technician to correct the problem.

13.3 System Configuration/Parameterisation

The required configuration/Parameterisation can be created via the MDO (see chapter 4 "Entering System Parameters") or with the PC program "SUPREMA Manager".
The following data has to be entered:

- System configuration (SUPREMA Manager only)
- Sensor parameters
- Relay driver outputs (switching output parameters)

GB

13.4 Preadjusting Passive Detectors

For passive detectors some sensor type-dependent presettings are necessary in the first commissioning and also when replacing a sensor. The operating and maintenance instructions of the sensor to be connected must also be followed.

NOTICE

If errors occur during start-up which cannot be corrected with the System Fail Messages table in chapter 6.4 "System Fail Messages" or the entries in the logbook, call in an MSA service technician to correct the problem.

In order to avoid false alarms during the commissioning of sensors, MSA recommends locking all affected measuring points before starting.

Preadjustment of bridge current

See chapter 7.9 "Setting the Bridge Current"for details.

Preadjustment of Zero/Sensitivity

After the sensors have been allowed to stabilize for a sufficient period of time–which depends on the types of sensors and measuring components (see the associated sensor manual)–the MAI module must be first calibrated, which includes a preadjustment.

Preadjusting Active Transmitters (MAI Module)

For active transmitters no preadjustments are necessary. The buttons for setting the bridge voltage, the zero point, and the sensitivity are inactive.

After the supply voltage has been turned on and the system has started successfully, the active transmitters can be connected to the SUPREMA without any further preadjustments. In case of systems with passive and active transmitters, MSA recommends to adjust the passive detectors before the active transmitters are connected.

13.5 First Calibration with Pre-Adjustment

See chapter 7.3 "First Calibration with Pre-Adjustment" for details.

13.6 Completing Startup

To check if all adjustments are correct, MSA recommends that all inputs are tested using test gas. Verify that the correct alarm is triggered and that the correct relay driver output is actuated. Keep a record of this test.

Start-up is complete after a successful final check of the SUPREMATouch system and of the completed installation and calibration procedures. Now the external alarm and warning systems can be connected.

⚠ WARNING!

To guarantee the unambiguity of catalytic combustion sensor operation ensure (e.g. by checking with hand-held test instruments) each time that the environmental atmosphere to be monitored by the sensors is free of combustible gases before switching on the sensors and the system.

GB

14 Connecting Peripheral Equipment

To simplify operation (especially the configuration) of the SUPREMATouch, a PC or laptop with operating software can be connected using different connectors.

A protocol printer can be connected via the RS232-B interface on the MST.

14.1 Connecting a PC/Laptop

For this connection, either the RS232-A or USB port on the MST20 module or the RS232/USB port on the MDO-20 module can be used.

⚠ WARNING!

Only one PC/laptop may be connected to the SUPREMATouch system at any one time, even if more than one USB/RS232 port is available.

Connecting cable: RS232 extension, 9-pin SUB-D connector, plug/jack (**do not use a null modem cable!**) or miniUSB (MDO) / USB-B (MST) with a maximum length of 3m..

To connect a PC/laptop to the MDO20 module, remove the front panel screws and open the front panel.

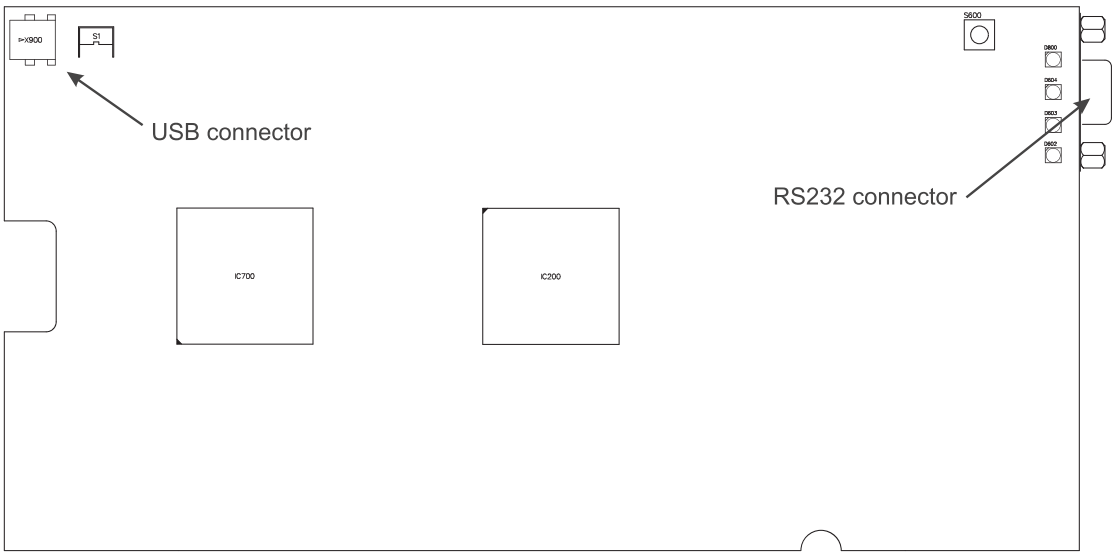


Fig. 132 MDO Module, RS232 port

The terminal assignment of the RS232/USB port on the MDO20 module is the same as the one used for the RS232-A port on the MST module (Chapter 12.13 "System Ports (MST Module)"). The MST module is mounted on the rear of the rack, behind Slots 1–5.

GB

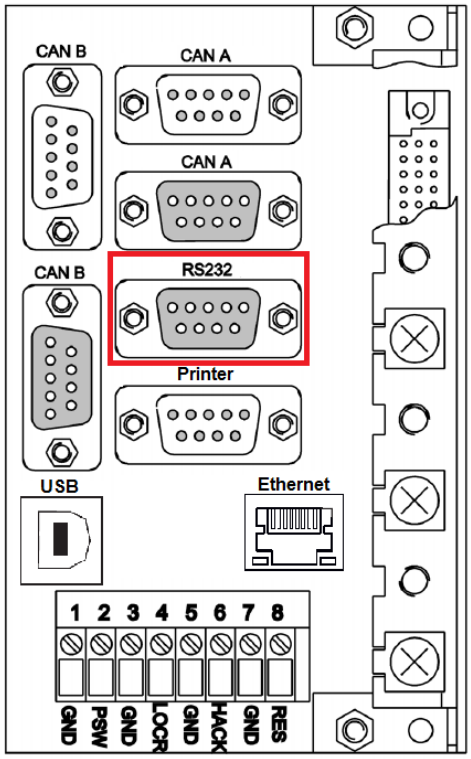


Fig. 133 MST Module, RS232-port

For connecting the PC/laptop, an USB and alternatively a serial interface (RS232) is provided. The serial interface of the PC/laptop must be configured in accordance with the following specifications:

- RS232 configuration (COM1): 19200 baud (by setting DIP switch S200-4 on the MDO, the baud rate can be changed to 115200 baud), 8 data bits, 1 stop bit, parity none

Operating Software

PC operating software "SUPREMA Manager" is available as an option to improve the convenience of the operation and configuration of the SUPREMATouch system.

Display Software

On request, display software customised to customer specifications can be provided.

The program is made available on CD-ROM.

How to use the software is described in detail at the enclosed operation instructions.

GB

14.2 Connecting a Protocol Printer

For continuous recording of events, a protocol printer can be connected to the RS232-B port on the MST module. The MST module is mounted on the rear of the rack, behind Slot 1–3.

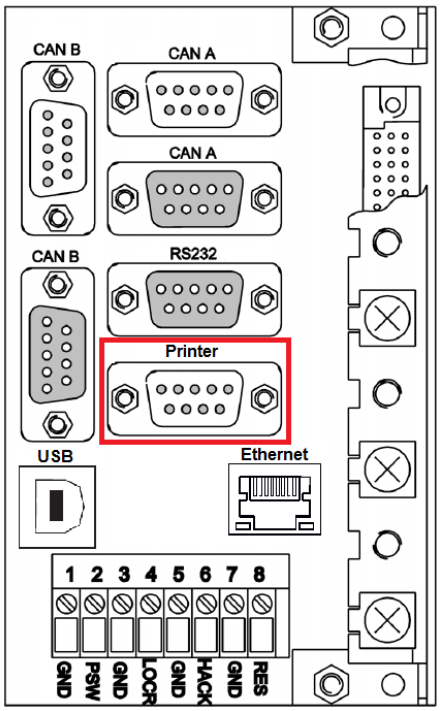


Fig. 134 MST Module, RS232-B port

The terminal assignment of the RS232-B connection is described in chapter 12.13 "System Ports (MST Module)".

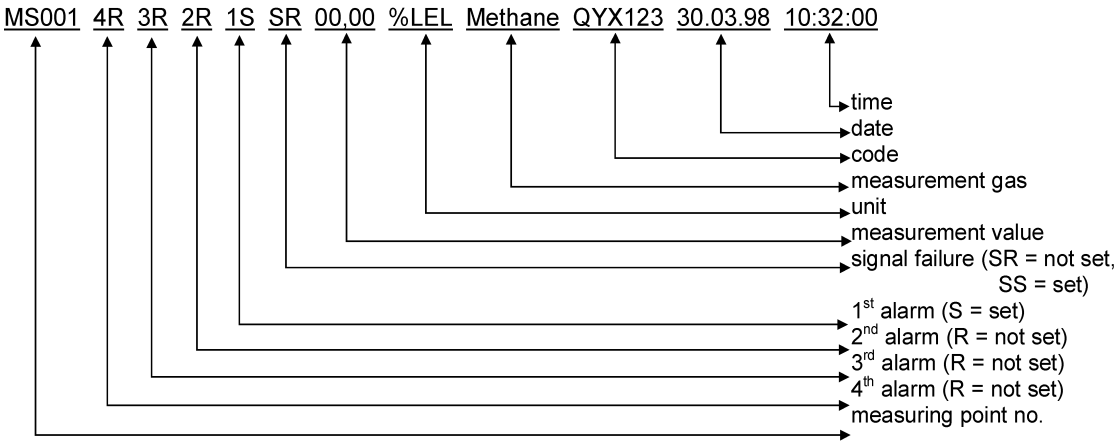


Fig. 135 Protocol printer, Default data Structure

This output is generated each time a change occurs in the status of a sampling point; whenever the upper or lower alarm threshold is crossed (unless the alarm is self-locking), whenever a signal error is received, and whenever a self-locking alarm or a signal error is successfully reset manually (status no longer exists). The current status of the sampling point with the data structure shown in the figure above is printed out along with the date and time of the most recent change of status.

This formatting can be changed by the user!

GB

14.3 Bus Connection

To connect the SUPREMA system to existing industrial control systems, it is necessary to communicate with other data buses for processing of measuring values, alarms/failures.
The signal conversion necessary is realised by SUPREMA gateways.

Two gateways per CAN channel can be connected.

Not all gateways are included in all approvals!

At the moment, the following bus systems are supported:

- Modbus (TCP and RTU)
- Profibus DP

Further data bus systems on request.

SUPREMA Gateway CAN/Modbus

See manual for MBC20-Modbus.

SUPREMA-Gateway CAN/Profibus DP

Not contained in EU-type examination certificate DMT 03 ATEX G 003 X.

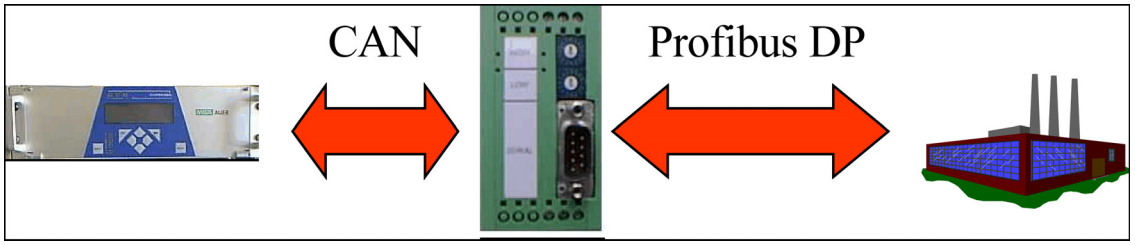


Fig. 136 Connection the SUPREMA to external systems using a Profibus gateway

The SUPREMA Gateway Profibus DP can be integrated to the available, SPS-controlled system. The gateway is equipped for rail mounting and supplied with a 24 VDC voltage. For the connection of the CAN interface, a Combicon plug connector is available. The 9-pin plug connector X100 is provided for connection of the Profibus interface.
The following 2 manuals for installation, parameterisation and operation are enclosed with the gateway:

- CAN-CBM-DP PROFIBUS-DP/CAN-Gateway Hardware Manual
- CAN-CBM-DP PROFIBUS-DP/CAN-Gateway with SUPREMA CANopen Firmware Software Manual

GB

Connection to the SUPREMA:

Fig. 137 Connection Suprema Gateway CAN/Profibus DP

The CAN terminating resistor of BGT 1 has not been set. At the CAN bus terminal (from 2 to 4), a 120 Ohm resistor is connected together with the CAN cable.

Technical Data	
Supply voltage	Nominal voltage: 24 V/DC ± 10 % current consumption (at 20 °C): 125 mA max. (+20 mA on TTY operation of the serial interface)
Plug connector	X100-SIO331 (DSUB9, plug) - serial interface X100-CBMPB (DSUB9, socket) - profibus-DP-interface X101 (6-pin screw connector UEGM) - 24 V supply voltage X400 (Combicon design, 5-pin MSTB2.5/5.08) - CAN or DeviceNet
Temperature range	0–50 °C environmental temperature
Humidity	max. 90 %, noncondensing
Dimensions of the cabinet (L x W x H)	Width: 40 mm, Height: 85 mm, Depth: 83 mm (including mounting rail and protruding connector DSUB9, without CAN/DeviceNet plug
Weight	Approx. 200 g

GB

15 Redundant Systems

15.1 Application/Function Safety

For the safety functions of gas warning measuring instruments, the European standards EN 60 079-29-1, EN 50 104, EN 50 271 and EN 50 402 apply for the monitoring of combustible gas and vapors as well as oxygen.

Additionally, if systems are using microcomputers, EN 61 508 must be considered regarding functional safety in a measuring and control application.

This standard divides the application types into Safety Integrity Levels SIL 1–4. The system must be designed to meet the safety level required.

For Safety Integrity Level SIL 3 according to EN 61 508, the SUPREMATouch must be provided with a redundant power supply. The redundant power supply for the system as well as for the MRC TS module must have a failure rate of less than 6.73 * 10-6 1/h.

For Safety Integrity Level SIL 4, additional conditions must be met which are not achievable with the SUPREMATouch.

By adding the MCP module, a second CAN bus and the necessary double modules for data acquisition and setting alarms, the non-redundant system can be converted into a redundant system. There must be sufficient spare slots in the rack for the additional MGO modules and sufficient additional space in the cabinet for additional relay modules (MRO).

The following module types are needed for retrofitting:

MCP Module	Central Processing
MAI30 Module	Analogue Input
MAR Module	analogue Redundant
MGO Module	General Output
MRO8 Module	Relay Output (8 Relay)
MRO16 Module	Relay Output (2 x 8 Relay, redundant)

15.2 Function of Redundant Systems

The block diagram (Fig. 138) of the redundant system shows its design and function:

The signal from the sensors connected to the MAT modules is amplified by 2 separate A/D converters (on MAI + MAR), the measuring signal is digitised and transferred to the two CAN bus systems (channels). The signal processing and evaluation of one channel is carried out independently from the other. The table “Rack Modules” in chapter 15.3 "Design of the Redundant System" shows the different components of the rack for a non-redundant and a redundant system.

For module functions, see chapter 11 "Modules".

GB

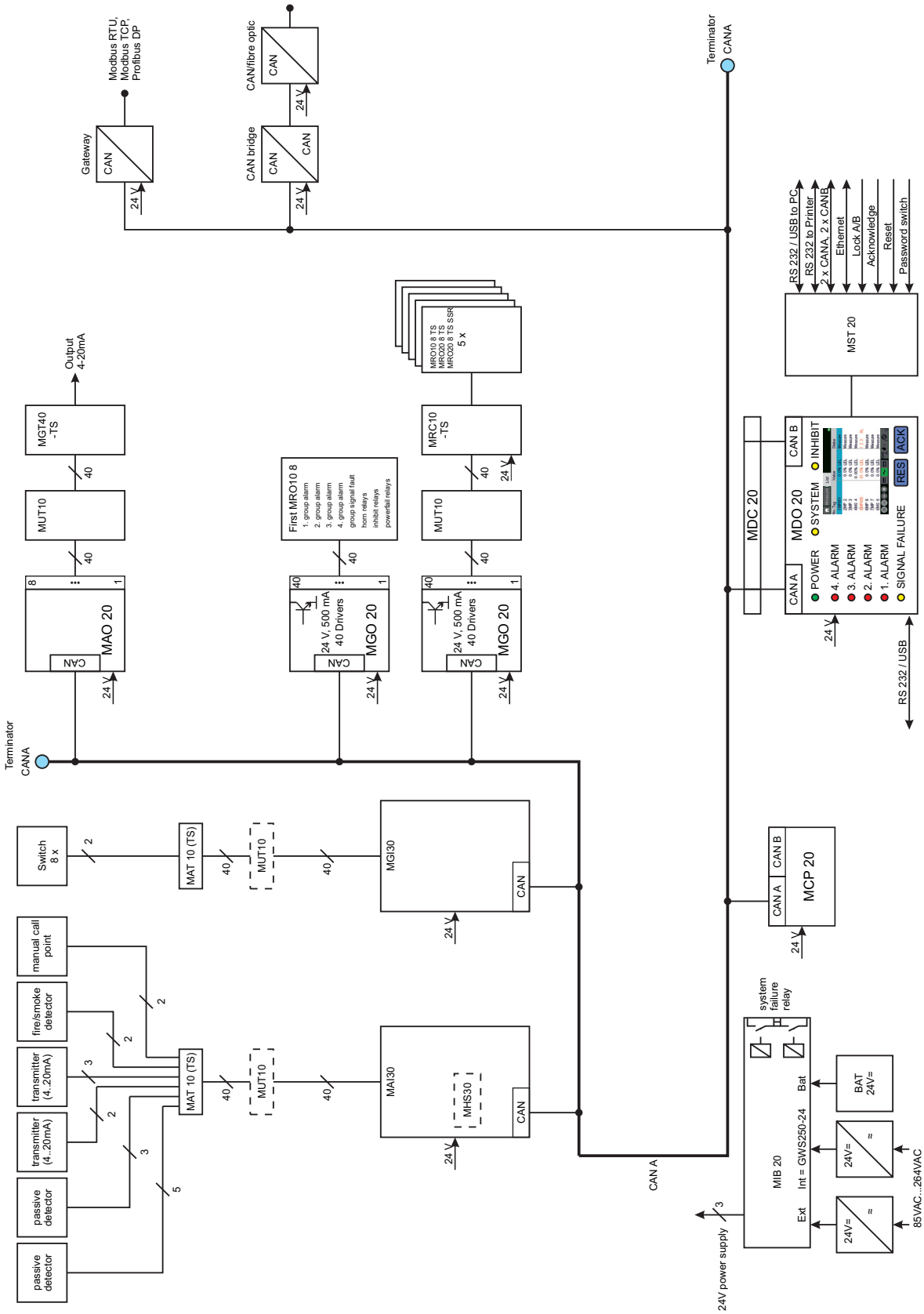


Fig. 138 Circuit Diagram Rack System (non-redundant)

GB

15.3 Design of the Redundant System

Rack Components

In the non-redundant version, the system consists of only one channel (channel A). By retrofitting modules for channel B, the system can be designed to be redundant in one rack for up to 64 measuring points.

⚠ WARNING!

Retrofitting necessary modules for redundant design must only be carried out voltage-free, i.e. the whole SUPREMATouch system must be switched off. The following reboot must be carried out accounting for the necessary configuration and parameter setting steps.
When retrofitting, the Regulations for Handling Electrostatic Sensitive Components must be followed!

Rack Modules			
Slot	**Name**	**Non redundant (Channel A)**	**Redundant (Channel B)**
1	Slot 1	MCP	MCP
2	Slot 2		MCP
3	Slot 3	MDC + MDO	MDC + MDO
4	Slot 4 / MDA 1		
5	Slot 5 / MDA 2		
6	Slot 6/POS 1	MAI	MAI + MAR
7	Slot 7/POS 2	MAI	MAI + MAR
8	Slot 8/POS 3	MAI	MAI + MAR
9	Slot 9/POS 4	MAI	MAI + MAR
10	Slot 10/POS 5	MAI	MAI + MAR
11	Slot 11/POS 6	MAI	MAI + MAR
12	Slot 12/POS 7	MAI	MAI + MAR
13	Slot 13/POS 8	MAI	MAI + MAR
14	Slot 14/POS 9	MGO	MGO
15	Slot 15/POS 10		MGO

By adding further racks (8 max. per system) and the appropriate modules, the system can be extended up to 256 measuring points with up to 512 outputs.

- The MAR modules are plugged into the MAI modules.
- The MGO modules: configuration with plug-in jumpers for CAN A or CAN B
- The same number of MGO modules at CAN A and CAN B
- Connection of 2 gateways at CAN A and CAN B

Installation of the MAR/MGR Module

This module is used for redundant evaluation of the input signals.
It is plugged on the MAI/MGI module. The analogue output signals of the sensors are digitised in parallel to the MAI module by a ADC, and are transferred to the second CAN bus.
Here, the function is identical to the MAI/MGI module.
For connecting the MAR/MGR module, the MAI/MGI module has to be unplugged from the rack which must be voltage-free. For every MAI/MGI module, a MAR/MGR module is necessary.

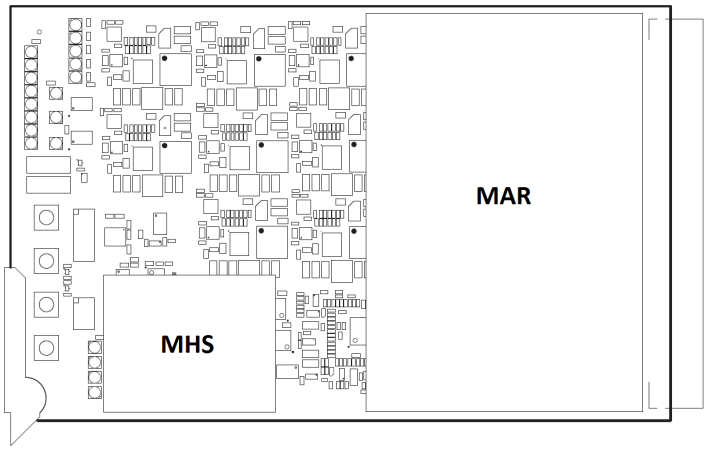


Fig. 139 MAI Module with MAR Module

Installation of MCP Module

The second MCP module must be plugged into rack position Slot 2.
Before plugging in the modules, the SUPREMA system must be voltage-free.
These modules are operated as CAN B, a hardware configuration is not necessary.

Output Drivers/Relay Outputs

The MGO modules provide switching outputs (24 V DC / 300 mA, short-circuit safe and overload safe) for controlling information and alarms (LEDs, relays, solenoid valves etc.). In redundant systems, both channels must have the same number of MGO modules connected.
If relays are needed instead of the driver outputs, because a separation of potentials is required or other voltages have to be switched, the relay modules MRO8 TS or MRO16 TS may be used. Both modules are suitable for “G” or Top Hat type DIN rail mounting and provide 8 relay outputs per module. The MRO8 TS module has 1 changeover contact per relay. The relay contacts are connected via screw terminals.
The use of MRO16 TS modules permits the redundant layout of the following wiring and control of actuators and alarm elements.
With the use of MRO8 TS modules, only the non-redundant control of actuators and alarm elements is possible.

WARNING!

The layout of the circuit connected to the MRO8 TS or MRO16 TS modules depends on the requirements of the respective application. The user is responsible for observing the valid standards and guidelines.

WARNING!

The MRO16 TS modules do not have changeover contacts. The working contacts of the redundant relays are connected in series. (1 or 2 contacts open = alarm). Two terminal blocks with screw terminals are used to connect to the relay contacts.

Installation MGO Module

Before plugging in modules, the SUPREMA system must be voltage-free.
The module must be configured via switches for the CAN B bus, see chapter 12.6 "Module Configuration".

Connection MRO8 TS Module

On redundant systems, the outputs of 2 MGO modules must always be connected (channel A + B).

The 40 driver outputs of the MGO modules are connected to the MRC TS modules of Plug A using a 40-way ribbon cable via MUT modules on the rear side of the rack. Plug B is only used if MRO16 TS modules are connected. Using a 20-way ribbon cable each of the plugs 1–5 are connected to the 8 driver outputs of the MGO module to up to 5 MRO8 TS modules.

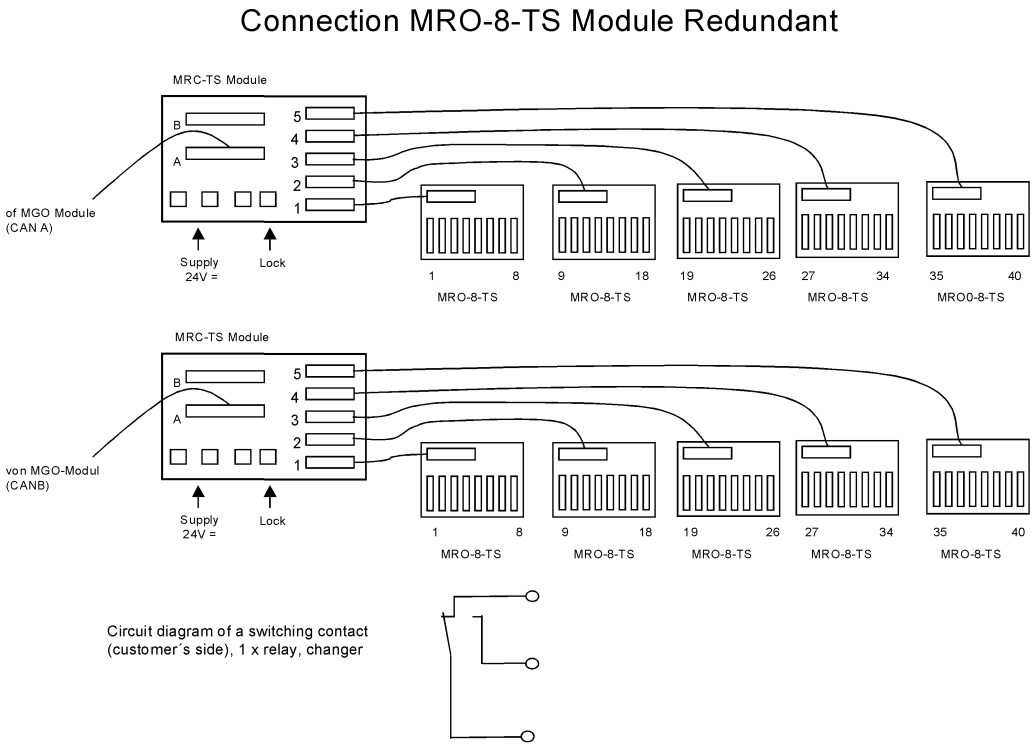


Fig. 140 Connection MRO8 TS Redundant Module

The terminal connections and the relay assignment of the MRO8 TS module are described in detail in chapter 12.6 "Module Configuration".

Connection MRO16 TS Module

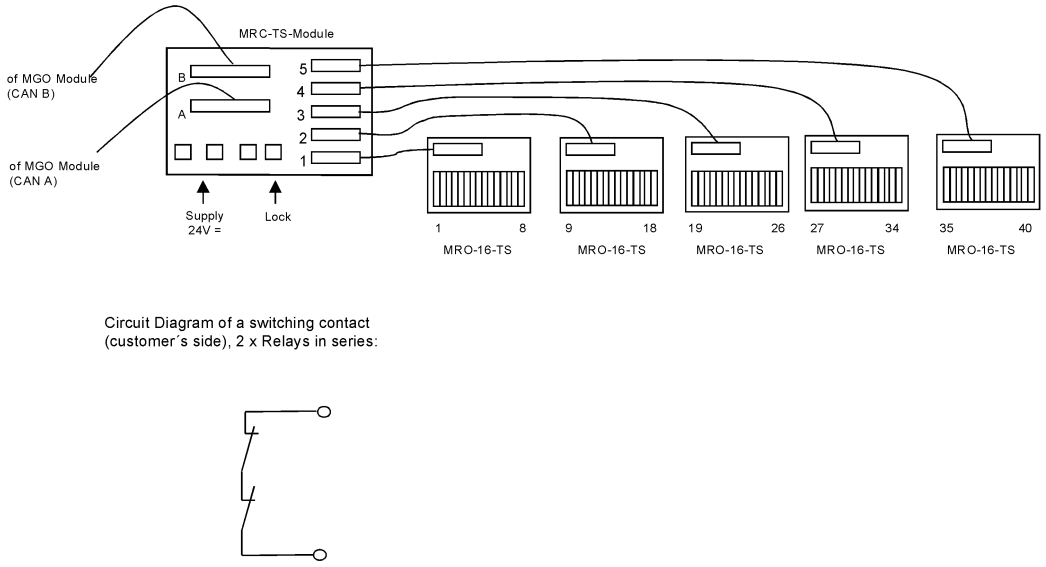
If the system is redundant, the outputs of 2 MGO modules must always be evaluated (channel A + B). The connection of up to 5 MRO16 TS modules (40 outputs) is achieved via 1 MRC TS module. Using 20-way ribbon cables, each of the plugs, 1–5, are connected via the 8 driver outputs (channel A + B) of the MGO modules to up to 5 MRO16 TS modules.

The 40 driver outputs of the MGO module of channel A are connected to the MRC TS modules at Plug A using a 40-way ribbon cable via the appropriate MUT module at the rear of the rack.

The 40 driver outputs of the MGO module of channel B are connected to the MRC TS modules at Plug B using a 40-way ribbon cable via the appropriate MUT module at the rear side of the rack

GB

Connection MRO-16-TS Module Redundant



Circuit Diagram of a switching contact
(customer´s side), 2 x Relays in series:

Fig. 141 Connection MRO16 TS Redundant Module

Relays specified are connected in series to effect hardware redundancy. The relays 1–8 are selected by CAN A (MCP A), the relays 9–16 by CAN B (MCP B).

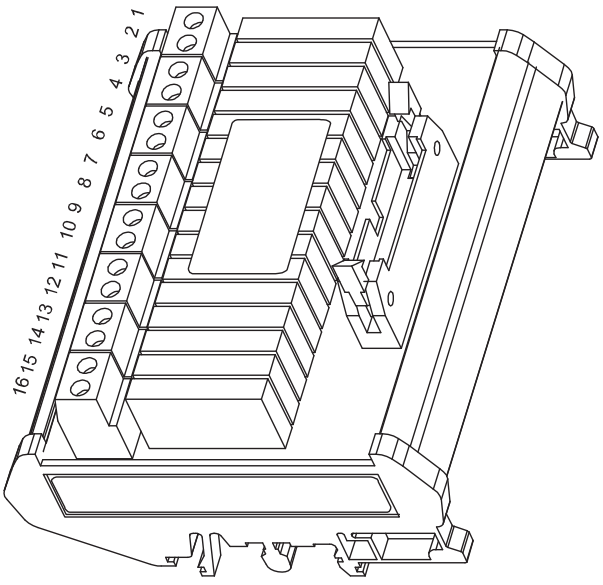


Fig. 142 MRO16 TS Module

MAO Module

The MAO module does not support redundancy, therefore retrofitting of MAO modules is not necessary.

By default, it is supplied configured via switches for the CAN A.

GB

Logic extension MLE10 (with SIL-3 Approvals)

This module can be inserted into redundant systems to implement special logic functions, switching delays, etc. for the 40 switching outputs of a MGO module. Logic extension MLE10 is connected between MGO and MRC / MGT. It is connected with the 40-pole ribbon cable.

This module is checked for safety-related applications up to and including SIL3.

For detailed information on use, operation and Technical Data, see the operating and maintenance instructions for logic extension MLE10 (Mat-no. 10056386).

15.4 Start-Up

The data stored in every MCP and MDO module contains information on system configuration, i.e. the modules used, supply voltages, measuring points and alarm outputs.

Also included are the measuring point parameters (sensor type, calibration etc.) and switching output parameters (switching direction etc.) stored in additional maps in every MCP and MDO module.

If the configuration does not correspond to the system status, *SYSTEM fail* will be displayed after start-up.

After connecting the modules, the configuration stored in the SUPREMATouch memory has to be updated according to the system status. For detailed information, see chapter 12.6 "Module Configuration".

Configuration Tool

All configuration has to be done, and all Parameterisation can be done with the PC program SUPREMAManager. For version and ordering information see chapter 19 "Ordering Information".

Function Check

After configuration and setting parameters for the system, a functional check must be carried out.

System Start

By switching OFF/ON the system, a reboot is initiated. During start-up, several internal system checks are carried out. An system error-free will show the following settings after start-up:

Front Panel Display

1. LED SYSTEM POWER	ON
2. LED SYSTEM FAIL	OFF
3. LED SYSTEM INHIBIT	OFF
4. LED SIGNAL 1 AL	OFF
5. LED SIGNAL 2 AL	OFF
6. LED SIGNAL 3 AL	OFF
7. LED SIGNAL 4 AL	OFF
8. LED SIGNAL FAIL	OFF
9. LED Display	Display Listing

Displays of the Modules

All CAN bus modules have the following LED displays:

LED	Function	Required
LED 1 GN	EXT = used	OFF
LED 2 GN	INT = used	ON*
LED 3 GN	BAT = used	OFF
LED 4 RT	Software failure	OFF
LED 5 GN	CAN bus in operation	ON

*= Rack operation via INT terminals

Displays of the MAI Modules

LED	Function	Required
LED 1-8	MS 1-8 = selected	OFF
LED EXT	EXT = used	OFF
LED INT	INT = used	ON*
LED BAT	BAT = used	OFF
LED IBR	IBR ON SOCKETS	OFF
LED ZER	UY ON SOCKETS	OFF
LED SIG	UA ON SOCKETS	OFF
LED of connector strip	Signal Request	FLASHING

*= Rack operation via INT terminals

Check of the Signal Processing/Alarming

After a successful start-up and setting of the system parameters, a functional check must be carried out:

- Trigger alarms by applying test gas.
- Test the switching output functions according to the relay configuration.

16 Sensor Data

The following types of transmitters and detectors can be connected to the SUPREMATouch system:

Designation	Module Type	Measuring Principle	Use	Active	Passive
D-7010	MAI30	catalytic	EX		X
D-7100	MAI30	catalytic	EX		X
DF-7010	MAI30	catalytic	EX	X	
DF-7100	MAI30	catalytic	EX	X	
DF-8201	MAI30	semiconductor	TOX	X	
DF-8250	MAI30	semiconductor	EX	X	
DF-8502	MAI30	semiconductor	Fire Detection	X	
DF-8510	MAI30	electrochemical	Fire Detection	X	
DF-8603	MAI30	semiconductor	TOX	X	
DF-9200	MAI30	electrochemical	TOX/OX	X	
DF-9500	MAI30	electrochemical	TOX/OX	X	
Fire	MAI30				
FlameGard	MAI30	infrared	Flame	X	
FlameGard 5 MSIR	MAI30	infrared	Flame	X	
FlameGard 5 UV/IR	MAI30	infrared/ultraviolet	Flame	X	
FlameGard 5 UV/IR-E	MAI30	infrared/ultraviolet	Flame	X	
GD10	MAI30	infrared	EX	X	
MAC	MAI30				
PrimaX	MAI30	various	EX/TOX/OX	X	
PrimaXIR	MAI30	infrared	EX	X	
S5000	MAI30	various	EX/TOX/OX	X	
SafEye 700	MAI30	infrared	EX	X	
Senscient ELDS	MAI30	infrared	EX/TOX	X	
Series 47K	MAI30	catalytic	EX		X
Smoke	MAI30				
Switch	MAI30/MGI30				
Ultima MOS-5	MAI30	semiconductor	H_2S	X	
Ultima MOS-5E	MAI30	semiconductor	H_2S	X	
Ultima OPIR-5	MAI30	infrared	EX	X	
Ultima X	MAI30	various	EX	X	
Ultima X5000	MAI30	various	EX/TOX/OX	X	
UltraSonic EX-5	MAI30	acoustic	leakage	X	
UltraSonic IS-5	MAI30	acoustic	leakage	X	

(EX: Explosive gases or vapours; TOX: Toxic gases; OX: Oxygen; Fire Detection: Smoldering Fire Detection; Flame: Flame Detector)

NOTICE

Other types of sensors may be operated in conjunction with the SUPREMATouch only after consulting with MSA.

Individual sensor connections are described in the following chapters.

Passive detectors and transmitters are monitored by SUPREMATouch for open or short circuits and these failures are reported as listed.
For active transmitters, the input current signal is monitored, so that each failure is detected and reported by the SUPREMATouch system.

For further information on the sensors, see the Operating and Maintenance Instructions for the individual sensor types.

NOTICE

For passive detectors, the requirements according to EN 60079-29-1a are fulfilled if in 3-wire operation mode the output resistance does not exceed 1.7 Ohm per lead or 3.4 Ohm per loop. If the loop resistance exceeds 3.4 Ohm, the 5-wire operation mode is recommended.

16.1 4-20 mA (2-wire)

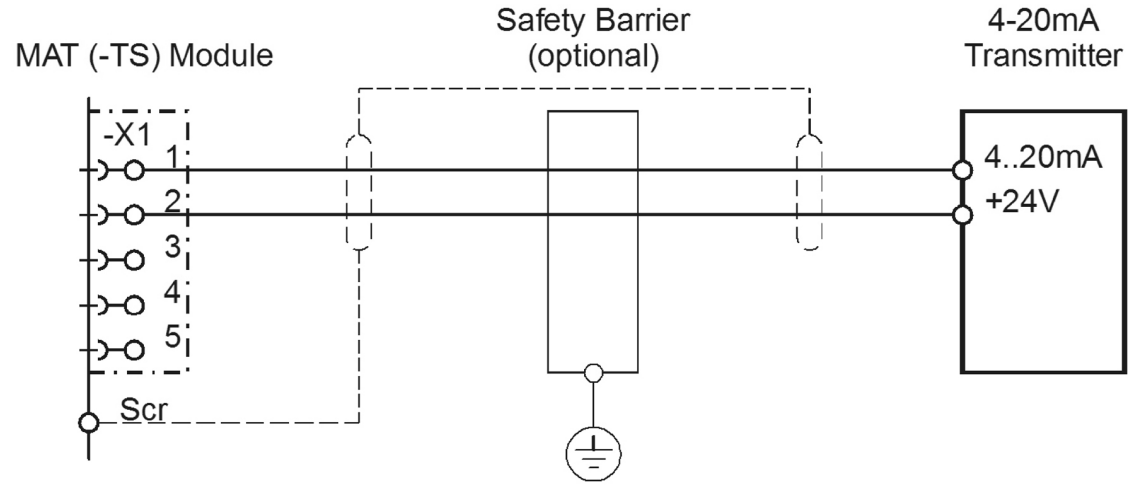


Fig. 143

The cable screen is only connected to the SUPREMA.

Connection module MAI30 (active; 2-wire; 4–20 mA; current sink)
Sensor simulation module 4–20 mA (Order No.: 10030262)

Connection data	
Supply current	max. 400 mA
Maximum power consumption	40 mA
Cable type	2-core, 80 % screened
Maximum load	Transmitter dependent
Maximum cable length	Transmitter dependent
Cable diameter	9– 17 mm
Cross section per wire allowed	0.75–2.5 mm^2

Conditions for use
For further details see operation manual of the transmitter.

Open or Short Circuit Fault Indication:
X= Signal fail (FAIL-LED)

Open-circuit at the MAT (TS) Module	Wire -X1/1	Wire -X1/2	Disconnect plug of MAT (TS)
Failure indication	X	X	X

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Open-circuit at max. cable length	Wire -X1/1	Wire -X1/2
Failure indication	X	X
Short-circuit at the MAT (TS) Module	Wire -X1/1/ -X1/2	
Failure indication	X	
Short-circuit at max. cable length	Wire -X1/1/ -X1/2	
Failure indication	X	

16.2 4-20 mA (3-wire)

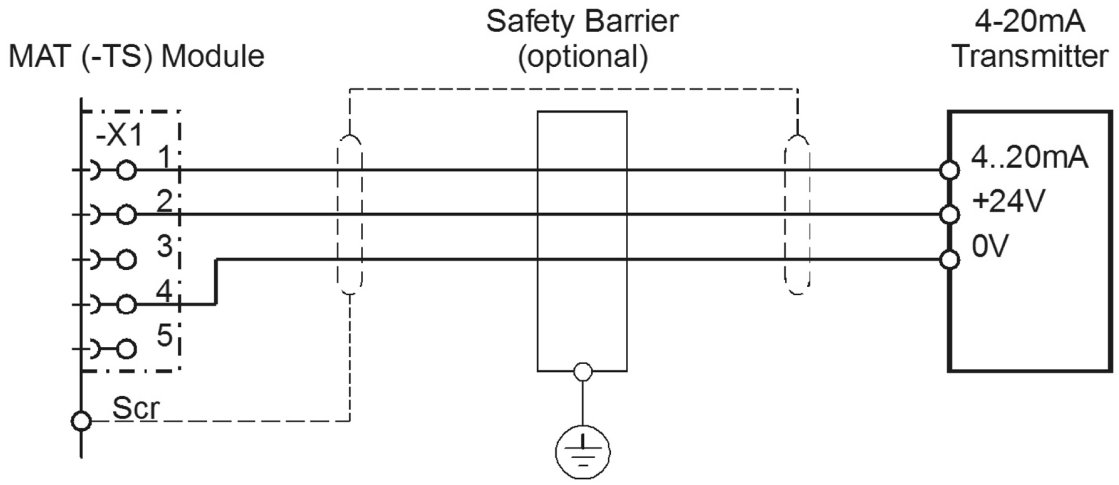

Fig. 144

The cable screen is only connected to the SUPREMA.

Connection module MAI30 (active; 3-wire; 4–20 mA; current source)
Sensor simulation module 4–20 mA (Order No.: 10030262)

Connection data	
Supply voltage	19–30 VDC
Supply current	max. 400 mA
Cable type	3-core, 80 % screened
Maximum load	Transmitter dependent
Maximum cable length	Transmitter dependent
Cable diameter	9– 17 mm
Cross section per wire allowed	0.75–2.5 mm^2

Conditions for use
For further details see operation manual of the transmitter.

Open or Short Circuit Fault Indication:
X= Signal fail (FAIL-LED)

Open-circuit at the MAT (TS) Module	Wire -X1/1	Wire -X1/2	Wire -X1/4	Disconnect plug of MAT (TS)
Failure indication	X	X	X	X
Open-circuit at max. cable length	Wire -X1/1	Wire -X1/2	Wire -X1/4	
Failure indication	X	X	X	

Short-circuit at the MAT (TS) Module	Wire -X1/1/ -X1/2	Wire -X1/1/ -X1/4	Wire -X1/2/ -X1/4
Failure indication	X	X	X
Short-circuit at max. cable length	Wire -X1/1/ -X1/2	Wire -X1/1/ -X1/4	Wire -X1/2/ -X1/4
Failure indication	X	X	X

16.3 4-20 mA with ext. power supply

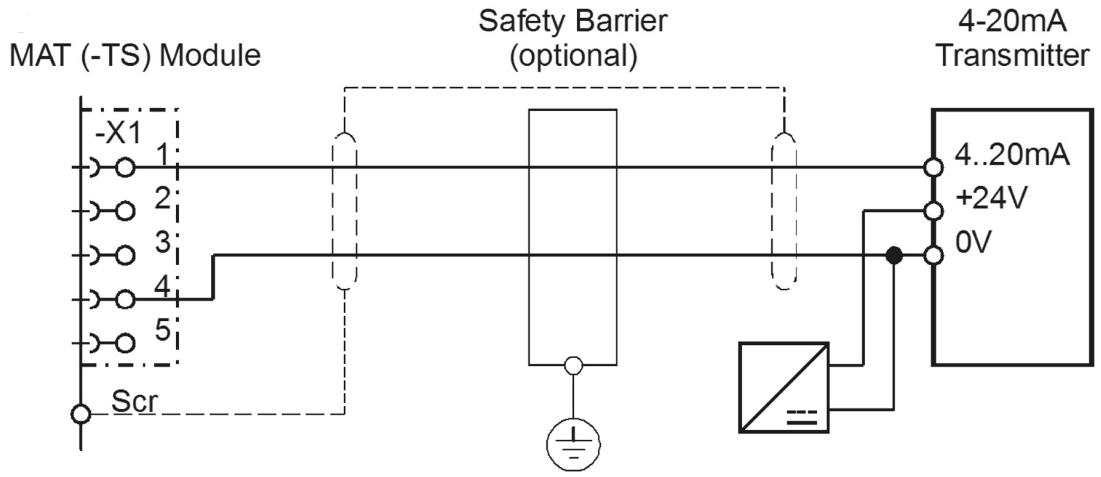

Fig. 145

The cable screen is only connected to the SUPREMA.

Connection module	MAI30 (active; 2-wire; 4–20 mA; current supply)
Sensor simulation module	4–20 mA (Order No.: 10030262)

Connection data	
Supply voltage	See operation manual
Cable type	2-core, 80 % screened
Maximum load	Transmitter dependent
Maximum cable length	Transmitter dependent
Cable diameter	9– 17 mm
Cross section per wire allowed	0.75–2.5 mm^2

Conditions for use

For further details see operation manual of the transmitter.

Open or Short Circuit Fault Indication:

X= Signal fail (FAIL-LED)

Open-circuit at the MAT (TS) Module	Wire -X1/1	Wire -X1/4	Disconnect plug of MAT (TS)
Failure indication	X	X	X
Open-circuit at max. cable length	Wire -X1/1	Wire -X1/4	
Failure indication	X	X	
Short-circuit at the MAT (TS) Module	Wire -X1/1/ -X1/4		
Failure indication	X		

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Short-circuit at max. cable length	Wire -X1/1/ -X1/4
Failure indication	X

16.4 Series 47K-ST, -PRP (3-wire)

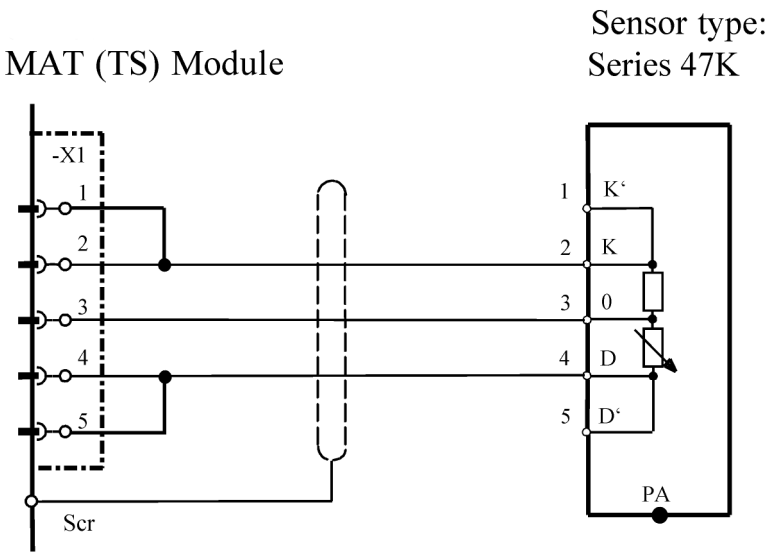

Fig. 146 Connection diagram Series 47K (3-wire)

CAUTION!

Before connecting measuring head, reduce sensor current to minimum

The cable screen is only connected to the SUPREMA.Alternatively, the bridges -X1/1 -X1/2 and -X1/4 -X1/5 can be set as solder bridges on the MAT10 module resp. MAT10 TS module.

Connection module	MAI30/passive/3-wire/Constant current/Preadjustment required
Sensor simulation module	WT (= catalytic combustion), (Order No.: 10030263)

Connection data	
Bridge current	310 mA
Maximum nominal current	350 mA
Power consumption	1.0 W typical (without cable length)
Cable type	3-core, 80 % screened
Maximum loop resistance	36 ohms (3.4 ohms for ATEX applications)
Maximum cable length	1000 m (at 1.5 mm^2 cross section per wire
Cable diameter	7–12 mm
Cross section per wire allowed	1.0–2.5 mm^2
Connection box Ex d 2 x 3/4“ NPT	Order No.: 10051080
Connection box Ex e 2 x M25 x 1.5 mm	Order No.: 10051091

Conditions for use	
Mounting	Wall mounting
Explosion protection/Sensor	II 2G Ex d IIC T4 (-40 °C to +90 °C)–ST II 2G Ex d IIC T6 (-40 °C to +40 °C)–PRP

GB

Conditions for use	
Certificate/Sensor	INERIS 03 ATEX 0208
Terminal box Ex d 2 x 3/4“ NPT	CESI 012 ATEX 091
Dimensions W x D x H	100 mm x 100 mm x 100 mm
Weight	400 g
Temperature	-40 °C to +55 °C (T5) / -40 °C to +40 °C (T6)
Terminal box Ex d 2 x M25 x 1.5 mm	KEMA 99 ATEX 3853
Dimensions W x D x H	90 mm x 90 mm x 75 mm
Weight	490 g
Temperature	-40 °C to +60 °C (T5) / -40 °C to +40 °C (T6)
Humidity	5–95% rel. humidity; noncondensing
Pressure 47 K-ST/47 K-PRP	800–1200 hPa

For further details see operation manual. (Order no.: 10052472)

Start-up	Preadjustment required before first calibration and when changing sensor	
Preadjustment	Connect the digital multimeter to the test sockets on the MAI module.	
	Bridge current setting:	310 mA
	Zero adjustment by zero gas:	Zero setting Ua = 400–450 mV
	Sensitivity adjustment with measuring gas	Measuring range level Ua = 1950–2100 mV or with the value of the existing gas concentration according to: Ua (mV) = C / 100 * 1600 + 400 C = Span gas concentration in % of measuring range
Warm-up period	15 min minutes for preadjustment, 2 hours for calibration	
Function test	Span gas application via: • Test cap with 1.0 l/ min	
Calibration	Calibration procedure according to chapter 7 "Calibration". For approved gas types, measuring ranges, lower alarm levels and conditions for calibration see list of components (Order No.: D0792420) Possible other gas types and measuring ranges on request.	

Open or Short Circuit Fault Indication:	
X=	Signal fail (FAIL-LED)
XX=	Alarm LEDS, Signal exceeded, Signal fail (FAIL-LED)
XXX=	only alarms
XXXX=	no influence on operation

Open-circuit at the MAT (TS) Module	Wire -X1/2	Wire -X1/3	Wire -X1/4	Bridge -X1/1 /-X1/2	Bridge -X1/4 /-X1/5	Disconnect plug of MAT (TS)
Failure indication	X	X	XX	XX	X	X
Open-circuit at max. cable length	Wire -X1/2	Wire -X1/3	Wire -X1/4			

GB

Failure indication	X	X	XX
Short-circuit at the MAT (TS) Module	Wire -X1/2/-X1/ 3	Wire -X1/2/-X1/ 4	Wire -X1/3/-X1/ 4
Failure indication	XX	X	X
Short-circuit at max. cable length	Wire -X1/2/-X1/ 3	Wire -X1/2/-X1/ 4	Wire -X1/3/-X1/ 4
Failure indication	XX	XXXX	X
At conductor resistance 0–1.7 Ohm per lead	XX	X	X

16.5 Series 47K-ST, -PRP (5-wire)

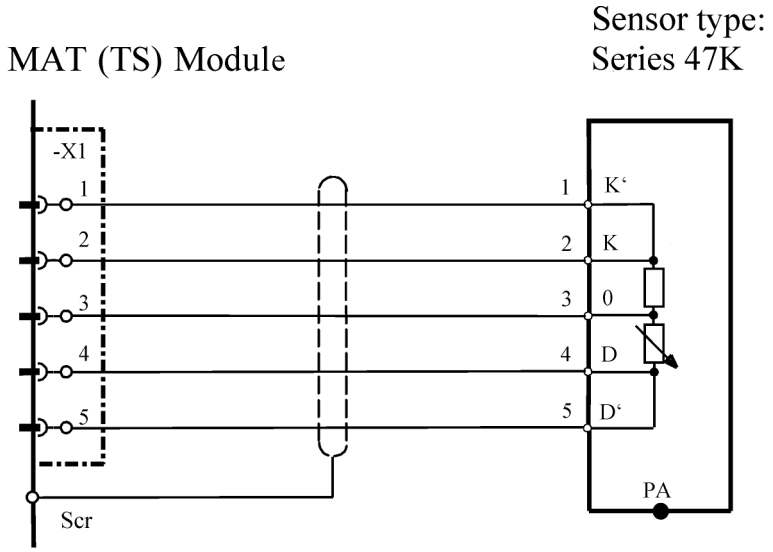

Fig. 147 Connection diagram Series 47K (5-wire)

CAUTION!

Before connecting measuring head, reduce sensor current to minimum

The cable screen is only connected to the SUPREMA.Alternatively, the bridges -X1/1 -X1/2 and -X1/4 -X1/5 can be set as solder bridges on the MAT10 resp. MAT10 TS module.

Connection module	MAI30/passive/5-wire/Constant current/Preadjustment required
Sensor simulation module	WT (= catalytic combustion), (Order No.: 10030263)

Connection data	
Bridge current	310 mA
Maximum nominal current	350 mA
Power consumption	1.0 W typical (without cable length)
Cable type	5-core, 80 % screened

GB

Connection data	
Maximum loop resistance	36 ohms
Maximum cable length	1500 m (at 1.5 mm^2 cross section per wire
Cable diameter	7– 12 mm
Cross section per wire allowed	1.0–2.5 mm^2
Connection box Ex d 2 x 3/4“ NPT	Order No.: 10051080
Connection box Ex e 2 x M25 x 1.5 mm	Order No.: 10051091

Conditions for use:	
Mounting	Wall mounting
Explosion protection/Sensor	II 2G Ex d IIC T4 (-40 °C to +90 °C)–ST II 2G Ex d IIC T6 (-40 °C to +40 °C)–PRP
Certificate/Sensor	INERIS 03 ATEX 0208
Terminal box Ex d 2 x 3/4“ NPT	CESI 012 ATEX 105
Dimensions W x D x H	100 mm x 100 mm x 100 mm
Weight	400 g
Temperature	-40 °C to +60 °C (T5) / -40 °C to +40 °C (T6)
Terminal box Ex d 2 x M25 x 1.5 mm	KEMA 99 ATEX 3853
Dimensions W x D x H	90 mm x 90 mm x 75 mm
Weight	490 g
Temperature	-40 °C to +55 °C (T5) / -40 °C to +40 °C (T6)
Humidity	5–95% rel. humidity; noncondensing
Pressure 47 K-ST/47 K-PRP	800–1200 hPa
For further details see operation manual. (Order no.: 10052472)	

Start-up	Preadjustment required before first calibration and when changing sensor	
Preadjustment	Connect the digital multimeter to the test sockets on the MAI module.	
	Bridge current setting:	310 mA
	Zero adjustment by zero gas:	Zero setting Ua = 400–450 mV
	Sensitivity adjustment with measuring gas	Measuring range level Ua = 1950–2100 mV or with the value of the existing gas concentration according to: Ua (mV) = C / 100 * 1600 + 400 C = Span gas concentration in % of measuring range
Warm-up period	15 min minutes for preadjustment, 2 hours for calibration	
Function test	Span gas application via: • Test cap with 1.0 l/ min	
Calibration	Calibration procedure according to chapter 7 "Calibration". For approved gas types, measuring ranges, lower alarm levels and conditions for calibration see list of components (Order No.: D0792420) Possible other gas types and measuring ranges on request.	

Open or Short Circuit Fault Indication:

GB

X=	Signal fail (FAIL-LED)
XX=	Alarm LEDS, Signal exceeded, Signal fail (FAIL-LED)
XXX=	only alarms
XXXX=	no influence on operation

Open-circuit at the MAT (TS) Module	Wire -X1/1	Wire -X1/2	Wire -X1/3	Wire -X1/4	Wire -X1/5	Disconnect plug of MAT (TS)
Failure indication	XX	X	X	X	XX	X
Open-circuit at max. cable length	Wire -X1/1	Wire -X1/2	Wire -X1/3	Wire -X1/4	Wire -X1/5	Disconnect plug of MAT (TS)
Failure indication	XX	X	X	X	XX	X

Short-circuit at the MAT (TS) Module	Wire -X1/1/-X1/2	Wire -X1/1/-X1/3	Wire -X1/1/-X1/4	Wire -X1/1/-X1/5	Wire -X1/2/-X1/3	Wire -X1/2/-X1/4	Wire -X1/2/-X1/5	Wire -X1/3/-X1/4	Wire -X1/3/-X1/5	Wire -X1/4/-X1/5
Failure indication	X	XX	XX	X	XX	X	X	X	X	XX
Short-circuit at max. cable length	Wire -X1/1/-X1/2	Wire -X1/1/-X1/3	Wire -X1/1/-X1/4	Wire -X1/1/-X1/5	Wire -X1/2/-X1/3	Wire -X1/2/-X1/4	Wire -X1/2/-X1/5	Wire -X1/3/-X1/4	Wire -X1/3/-X1/5	Wire -X1/4/-X1/5
Failure indication	XXXX	XX	X	X	XX	X	X	X	X	XXXX

16.6 Series 47K-HT (3-wire)

Order No.: according to order sheet

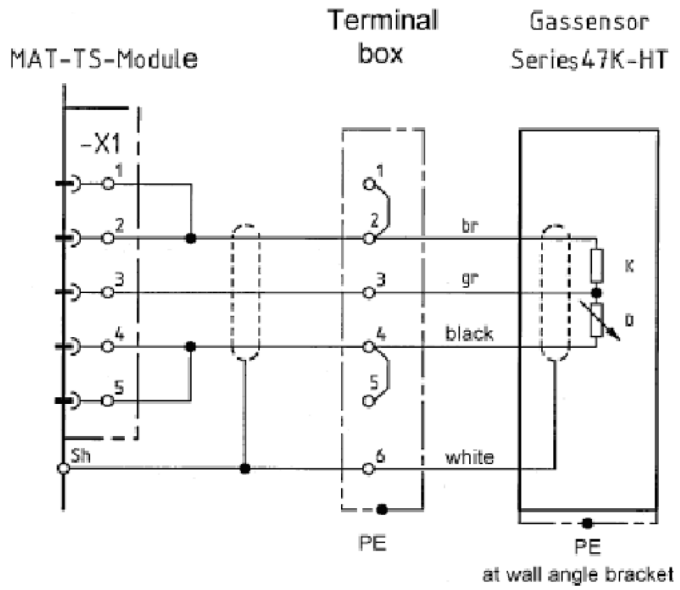

Fig. 148

⚠ CAUTION!

Before connecting measuring head, reduce sensor current to minimum

The cable screen is only connected to the SUPREMA.Alternatively, the bridges -X1/1 -X1/2 and -X1/4 -X1/5 can be set as solder bridges on the MAT10 TS module.

Connection module	MAI30/passive/3-wire/Constant current/Preadjustment required
Sensor simulation module	WT (= catalytic combustion) (Order No.: 10030263)

Connection data	
Bridge current	280 mA
Maximum nominal current	350 mA
Power consumption	1.0 W typical (without cable length)
Cable type	3-core, 80 % screened
Maximum loop resistance	36 ohms (3.4 ohms for ATEX applications)
Maximum cable length	1000 m (at 1.5 mm^2 cross section per wire
Cable diameter	6– 12 mm
Cross section per wire allowed	1.0–2.5 mm^2
Connection box II 2 G Ex e II/PTB 00 ATEX 1063	Order No.: 10062674
Wall angle bracket with connection of potential equalisation	Order No.: 10048829
Constant cable length of sensor	2.0 m

Conditions for use	
Mounting	Wall mounting
Explosion protection/Sensor	II 2 G Ex d IIC T3 (-40 °C to +160 °C)–HT

GB

Conditions for use	
Certificate/Sensor	INERIS 03 ATEX 0208
Dimensions W x D x HWeightTemperature	100 x 100 x 100 mm400 g-40 °C to +55 °C (T5)/-40 °C to +40 °C (T6)
Terminal box Ex e 2 x M25 x 1.5 mmDimensions W x D x H Weight Temperature	KEMA 99 ATEX 385390 x 90 x 75 mm490 g-20 °C to +55 °C (T5)/-20 °C to +40 °C (T6)
Humidity	5–95 % rel. humidity; noncondensing
Pressure	800–1200 hPa

For further details see operation manual. (Order No.: 10052472)

Start-up	Preadjustment required before first calibration and when changing sensor	
Preadjustment	Connect the digital multimeter to the test sockets on the MAI module.	
	Bridge current setting:	310 mA
	Zero adjustment by zero gas:	Zero setting Ua = 400–450 mV
	Sensitivity adjustment with measuring gas	Measuring range level Ua = 1950–2100 mV or with the value of the existing gas concentration according to: Ua (mV) = C / 100 * 1600 + 400 C = Span gas concentration in % of measuring range
Warm-up period	15 min minutes for preadjustment, 2 hours for calibration	
Function test	Span gas application via: • Test cap with 1.0 l/ min	
Calibration	Calibration procedure according to chapter 7 "Calibration". For approved gas types, measuring ranges, lower alarm levels and conditions for calibration see list of components (Order No.: D0792420) Possible other gas types and measuring ranges on request.	

Open or Short Circuit Fault Indication:	
X=	Signal fail (FAIL-LED)
XX=	Alarm LEDS, Signal exceeded, Signal fail (FAIL-LED)
XXX=	only alarms
XXXX=	no influence on operation

Open-circuit at the MAT (TS) Module	Wire -X1/2	Wire -X1/2	Wire -X1/4	Bridge -X1/1/ -X1/2	Bridge -X1/4/ -X1/5	Disconnect plug of MAT (TS)
Failure indication	X	X	XX	XX	X	X
Open-circuit at max. cable length	Wire -X1/2	Wire -X1/3	Wire -X1/4			
Failure indication	X	X	XX			

GB

Short-circuit at the MAT (TS) Module	Wire -X1/2/ -X1/3	Wire -X1/2/ -X1/4	Wire -X1/3/ -X1/4
Failure indication	XX	X	X
Short-circuit at max. cable length	Wire -X1/2/ -X1/3	Wire -X1/2/ -X1/4	Wire -X1/3/ -X1/4
Failure indication	XX	XXXX	X
At output resistance0–1.7 Ohmper wire	XX	X	X

16.7 Series 47K-HT (5-wire)

Order No.: according to ordering information

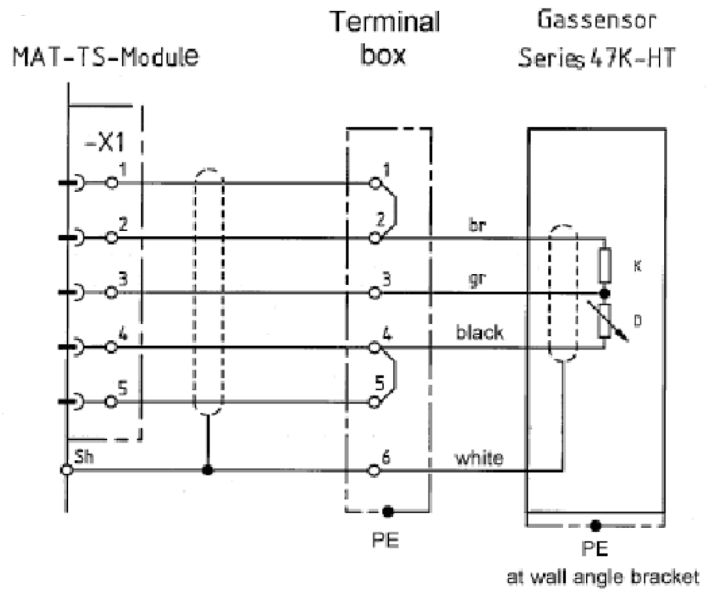

Fig. 149

CAUTION!

Before connecting measuring head, reduce sensor current to minimum

The cable screen is only connected to the SUPREMA.Alternatively, the bridges -X1/1 -X1/2 and -X1/4 -X1/5 can be set as solder bridges on the MAT10 TS module.

Connection module	MAI30/passive/5-wire/Constant current/Preadjustment required
Sensor simulation module	WT (= catalytic combustion), (Order No.: 10030263)

Connection data	
Bridge current	280 mA
Maximum nominal current	350 mA
Power consumption	1.0 W typical (without cable length)
Cable type	35 -core, 80 % screened
Maximum loop resistance	36 ohms
Maximum cable length	1500 m (at 1.5 mm^2 cross section per wire
Cable diameter	6– 12 mm
Cross section per wire allowed	1.0–2.5 mm^2

Connection data	
Connection box II 2 G Ex e II/PTB 00 ATEX 1063 with cable inlet Ex e II KEMA 99	Order No.: 10062674
Wall angle bracket with connection of potential equalization	Order No.: 10048829
Constant cable length of sensor	2.0 m

Conditions for use	
Mounting	Wall mounting
Explosion protection/HT Sensor	II 2G Ex d IIC T3 (-40 °C to +160 °C)–HT
Certificate/Sensor	INERIS 03 ATEX 0208
EG Type Approval	DMT 03 ATEX G 003 x (SUPREMA)
Air velocity	0–6 m/s
Humidity	5–95 % rel. humidity; noncondensing
Pressure	800–1200 hPa

For further details see operation manual. (Order no.: 10052472)

Start-up	Preadjustment required before first calibration and when changing sensor	
Preadjustment	Connect the digital multimeter to the test sockets on the MAI module.	
	Bridge current setting:	310 mA
	Zero adjustment by zero gas:	Zero setting Ua = 400–450 mV
	Sensitivity adjustment with measuring gas	Measuring range level Ua = 1950–2100 mV or with the value of the existing gas concentration according to: Ua (mV) = C / 100 * 1600 + 400 C = Span gas concentration in % of measuring range
Warm-up period	15 min minutes for preadjustment, 2 hours for calibration	
Function test	Span gas application via: • Test cap with 1.0 l/ min	
Calibration	Calibration procedure according to chapter 7 "Calibration". For approved gas types, measuring ranges, lower alarm levels and conditions for calibration see list of components (Order No.: D0792420) Possible other gas types and measuring ranges on request.	

Open or Short Circuit Fault Indication:	
X=	Signal fail (FAIL-LED)
XX=	Alarm LEDS, Signal exceeded, Signal fail (FAIL-LED)
XXX=	only alarms
XXXX=	no influence on operation

Open-circuit at the MAT (TS) Module	Wire -X1/1	Wire -X1/2	Wire -X1/3	Wire -X1/4	Wire -X1/5	Disconnect plug of MAT (TS)
Failure indication	XX	X	X	X	XX	X

GB

Open-circuit at max. cable length	Wire -X1/1	Wire -X1/2	Wire -X1/3	Wire -X1/4	Wire -X1/5	Disconnect plug of MAT (TS)
Failure indication	XX	X	X	X	XX	X

Short-circuit at the MAT (TS) Module	Wire -X1/1/-X1/2	Wire -X1/1/-X1/3	Wire -X1/1/-X1/4	Wire -X1/1/-X1/5	Wire -X1/2/-X1/3	Wire -X1/2/-X1/4	Wire -X1/2/-X1/5	Wire -X1/3/-X1/4	Wire -X1/3/-X1/5	Wire -X1/4/-X1/5
Failure indication	X	XX	XX	X	XX	X	X	X	X	XX
Short-circuit at max. cable length	Wire -X1/1/-X1/2	Wire -X1/1/-X1/3	Wire -X1/1/-X1/4	Wire -X1/1/-X1/5	Wire -X1/2/-X1/3	Wire -X1/2/-X1/4	Wire -X1/2/-X1/5	Wire -X1/3/-X1/4	Wire -X1/3/-X1/5	Wire -X1/4/-X1/5
Failure indication	XXXX	XX	X	X	XX	X	X	X	X	XXXX

16.8 Fire Detector Apollo Series 65 (not explosion-proof) (without safety barrier)

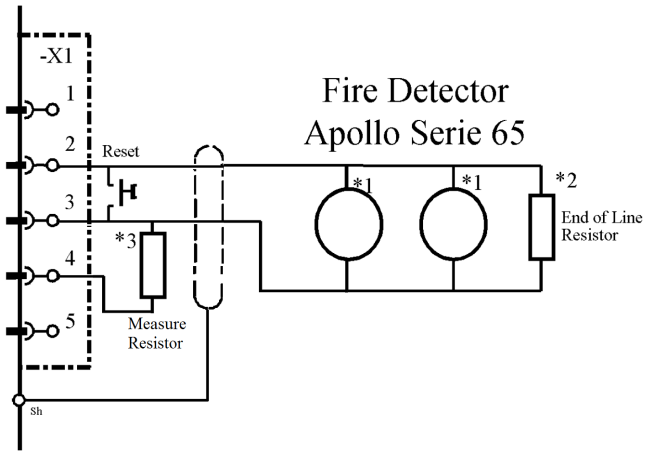

Fig. 150

**1 Apollo Fire Detector Series 65*
Connect according to Apollo Mounting support 45681-200 Series 60/65 connection diagram
Max. 20 Fire Detector
**2 End of Line Resistor 2K2/0.5 W according to Apollo connection diagram 45681-200*
**3 Measuring resistor 120 Ohm.*

Connection module:	MAI30

Connection data	
Maximum nominal current	42 mA
Maximum nominal voltage	22 V
Power consumption	Ø 1.5 W (including cable length)
Cable type	2-core, 80 % screened
Maximum loop resistance	10 ohms (cable resistance)
Maximum cable length	400 m (1.5 mm^2 cross section per wire)
Cross section per wire allowed	0.5–2.5 mm^2

GB

Conditions for use	
Mounting	Wall mounting
Ingress protection	IP 42 according to DIN 400 50
Explosion protection	-
Certificate	-
Temperature	Type SMOKE detector -20 °C to +60 °C Type HEAT detector -20 °C to +90 °C
Humidity	0–95% rel. humidity; noncondensing
Pressure	950–1100 hPa
Weight	approx. 120 kg
Dimensions	Diameter 100 mm x 50 mm

Simulation of normal operation / Alarm / RESET / Open or short-circuit fault indication:

Simulation	Effect
Normal operation END OF LINE resistor 2K2 connected according to circuit diagram	Normal operation
Alarm END OF LINE resistor 2K2 connected according to circuit diagram Connect resistor 1.0 K 1% 0.5 W between terminals 3 and 4	Alarm message
RESET Connect wire jumper between terminals 3 and 4	Alarm message disappears, normal operation. Failure message after 45 s maximum appears.
Open-circuit of line END OF LINE resistor 2K2 not connected	Failure message
Line short-circuit END OF LINE resistor short-circuited	Failure message after 45 s maximum.

16.9 Push-Button Detector (not explosion-proof) (without safety barrier)

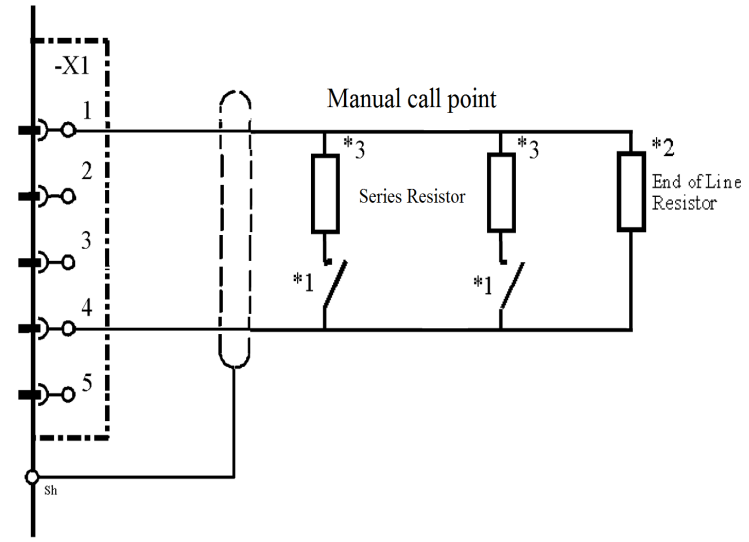

Fig. 151

**1 Push-button detector; max. 20 pieces; Connection according to manual of the push-button detector*
**2 End of Line Resistor 2K2 / 0.5 W*
**3 Series resistor 2K2 / 0.5 W*

The cable screen is only connected to the SUPREMA.

Connection module:	MAI30/MGI30

Connection data	
Maximum nominal current	42 mA
Maximum nominal voltage	22 V
Power consumption	≤ 1.5 W (including cable length)
Cable type	2-core, 80 % screened
Maximum loop resistance	10 ohms (cable resistance)
Maximum cable length	400 m (1.5 mm^2 cross section per wire)
Cross section per wire allowed	0.5–2.5 mm^2

Conditions for use	
Mounting	Wall mounting
Ingress protection	IP 42 according to DIN 400 50
Explosion protection	-
Certificate	-
Temperature	-
Humidity	-
Pressure	-
Weight	-
Dimensions	125 x 125 x 36 mm
Housing material	Plastic

Simulation of normal operation / Alarm / RESET / Open or short-circuit fault indication:

Simulation	**Effect**
Normal operation END OF LINE resistor 2K2connected according to circuit diagram	Normal operation
Alarm END OF LINE resistor 2K2 connected according to circuit diagramConnect resistor 1.0 K 1% 0.5 W between terminals 3 and 4	Alarm message
RESET Connect wire jumper between terminals 3 and 4	Alarm message disappears, normal operation.After max. 45 s failure message appears.
Open-circuit of line END OF LINE resistor 2K2 not connected	Failure message
Line short-circuit END OF LINE resistor short-circuited	Failure message

16.10 Explosion-proof Push-Button Detector with Barrier Z 787

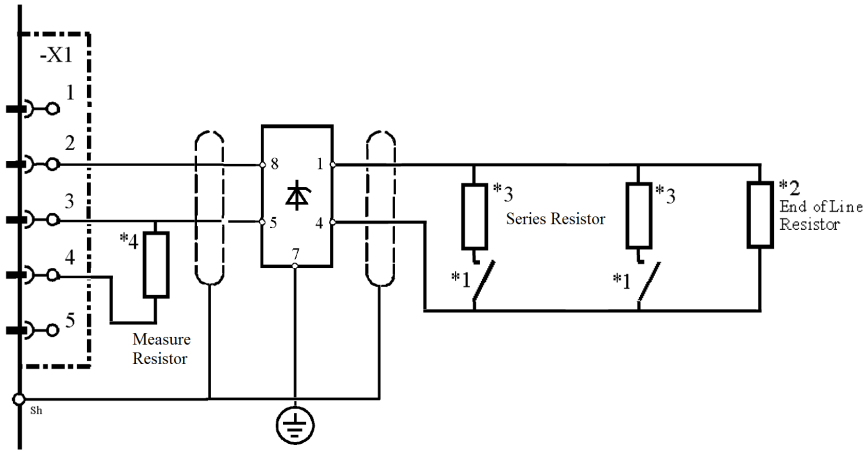

Fig. 152

**1 Connect push-button detector according to manufacturer's specification;*
MEDC NG16 6JF Type BGI WIRING DIAGRAM BGE/I/W + PBE/IW
Contact type: NORMALLY OPEN (terminal 2–3 inside the detector)
Carry out installation according to NFPA 72
- *With resistor 2.2 kOhms / 0.5 W in series with the contact; max. 10 Pieces*
- *With zener diode 10 V / 1.3 W in series with the contact; max. 20 Pieces*

Check polarity

**2 End of Line Resistor 2K2 / 0.5 W to be mounted in the last mounting support of the detection zone circuit or in the portable detector according to the documents specified under *1.*

**3 Series resistor 2K2 / 0.5 W*

**4 Measuring resistor 120 Ohm*

The cable screen is only connected to the SUPREMA.

Connection module: MAI30

Connection data	
Maximum nominal current	42 mA
Maximum nominal voltage	22 V
Power consumption	≤ 1.5 W (including cable length)
Cable type	2-core, 80 % screened
Maximum loop resistance	50 ohms (cable resistance)
Maximum cable length	2000 m (1.5 mm^2 cross section per wire)
Cross section per wire allowed	0.5–2.5 mm^2

Conditions for use	
Mounting	Wall mounting
Ingress protection	IP 54 according to DIN 400 50
Explosion protection	yes
Certificate	BASEEFA 03ATEX0084X
Temperature	-20 °C to +55 °Cv
Humidity	-
Pressure	-
Weight	approx. 1100 g
Dimensions	120 x 125 x 75 mm
Housing material	Aluminium, pressure-resistant

Simulation of normal operation / Alarm / RESET / Open or short-circuit fault indication:

Simulation	Effect
Normal operation External power supply 23–32 Vconnected according to circuit diagramEND OF LINE resistor 2K2connected according to circuit diagramConnect resistor 10 K 0.5 Wbetween terminal 1 and 2	Normal operation Voltage of terminal 1–2 shall be <0.1 V
Alarm External power supply 23–32 V connected according to circuit diagram END OF LINE resistor 2K2 connected according to circuit diagramConnect resistor 1.0 K 1% 0.5 W between terminal 3 and 44	Alarm message
RESET Connect wire jumper between terminals 3 and 4	Normal operation After max. 45 s failure message appears.
Open-circuit of line External power supply 23–32 V connected according to circuit diagramEND OF LINE resistor 2K2 not connected	Failure message
Line short-circuit External power supply 23–32 V connected according to circuit diagram END OF LINE resistor short-circuited	Failure message
Interruption of the supply voltage External power supply 23–32 V not connected END OF LINE resistor 2K2 connected according to circuit diagram	Failure message after max. 45 s
Leakage current External power supply 23–32 V connected according to circuit diagramEND OF LINE resistor 2K2 connected according to circuit diagramConnect resistor 10 K 0.5 W between terminal 1 and 2Connect resistor 18 K between terminals 4 and 5, or connect resistor 330R between terminals 3 and 5.	Failure message Voltage of terminals 1–2 shall be >22

16.11 Ex-Fire Detector Apollo Series 60 with Barrier Z 787 and MTL 710pressure-resistant

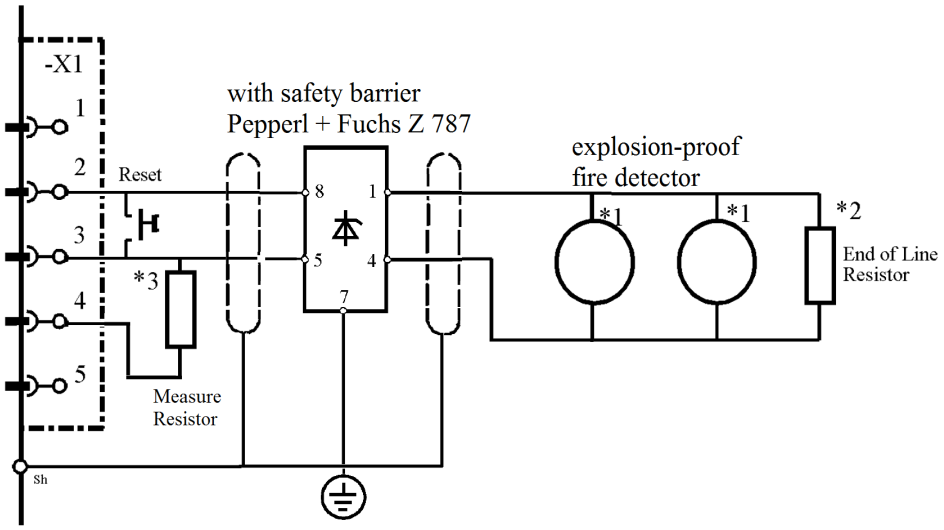

Fig. 153

*1	*Connect according to manufacturer´s specification for Apollo Series 60:* *SERIES 60 INTRINSICALLY SAFE SYSTEM DRAWING Z209883. Carry out installation according to NFPA 72.* *Only the mounting support Order No. 45681-207 specified in the data sheets must be used.* *For each detection zone circuit, max. 20 fire detectors are allowed.*
*2	*End of Line Resistor 2K2 / 0.5 W has to be mounted in the last mounting support of the detection zone circuit or in the portable detector according to the documents specified under *1*
*3	*Indication of leakage current. In case of failure, the "OPEN COLLECTOR" transistor is conducting to terminal 5*

The cable screen is only connected to the SUPREMA.

Connection module:	MAI30

Connection data	
Maximum nominal current	42 mA
Maximum nominal voltage	22 V
Power consumption	≤ 1.5 W (including cable length)
Cable type	2-core, 80 % screened
Maximum loop resistance	50 ohms (cable resistance)
Maximum cable length	2000 m (1.5 mm^2 cross section per wire)
Cross section per wire allowed	0.5–2.5 mm^2

Conditions for use	
Mounting	Wall mounting
Ingress protection	IP 42 according to DIN 400 50
Explosion protection	yes
Certificate	BASEEFA EX97D2054 BAS02ATEX1288
Temperature	SMOKE detector -20 °C to +60 °C HEAT detector -20 °C to +105 °C
Humidity	0–95% rel. humidity; noncondensing
Pressure	950–1100 hPa
Weight	approx. 153 g including mounting support
Dimensions	Diameter 100 mm x 50 mm including mounting support

Conditions for use	
Housing material	Plastic

Simulation of normal operation / Alarm / RESET / Open or short-circuit fault indication:

Simulation	Effect
Normal operation External power supply 23–32 V connected according to circuit diagram	Normal operation
END OF LINE resistor 2K2 connected according to circuit diagram	
Connect resistor 10 K 0.5 Wbetween terminal 1 and 2	Voltage of terminal 1–2 shall be <0.1 V
Alarm External power supply 23–32 V connected according to circuit diagramEND OF LINE resistor 2K2 connected according to circuit diagramConnect resistor 1.0 K 1% 0.5 Wbetween terminal 3 and 4	Alarm message
RESET Connect wire jumper between terminals 3 and 4	Normal operation After max. 45 s failure message appears.
Open-circuit of line External power supply 23–32 V connected according to circuit diagramEND OF LINE resistor 2K2 not connected	Failure message
Line short-circuit External power supply 23–32 V connected according to circuit diagramEND OF LINE resistor short-circuited	Failure message
Interruption of the supply voltage External power supply 23–32 V not connected END OF LINE resistor 2K2connected according to circuit diagram	Failure message after max. 45 s
Leakage current External power supply 23–32 V connected according to circuit diagramEND OF LINE resistor 2K2 connected according to circuit diagramConnect resistor 10 K 0.5 W between terminal 1 and 2 Connect resistor 18 K between terminals 4 and 5, or connect resistor 330R between terminals 3 and 5.	Failure message Voltage of terminals 1–2 shall be >22

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16.12 Explosions-Proof Fire Detector CERBERUS DO1101EX/DT1101EX with Barrier Z 787

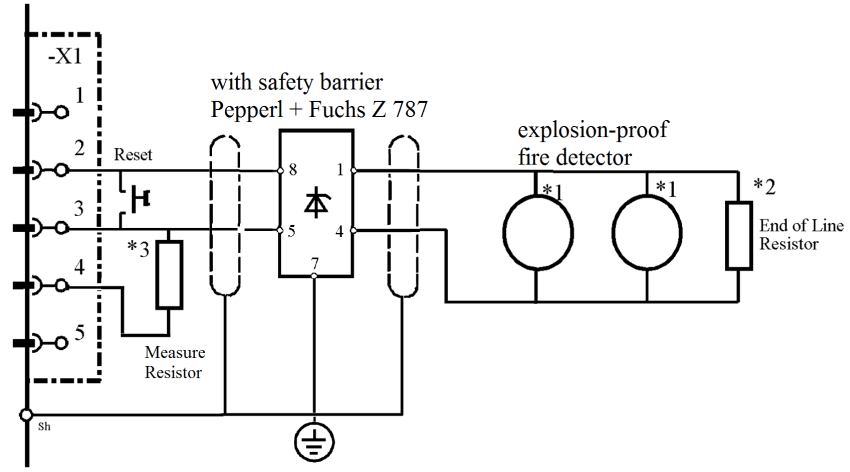

Fig. 154

*1	*Connect according to manufacturer´s specification.* *CERBERUS DO1101EX / DT1101EX: Document No. e1469.* *Only the mounting support Order No. 45681-207 specified in the data sheets must be used.* *For each detection zone circuit, max. 20 fire detectors are allowed.* *Carry out installation according to NFPA 72*
*2	*End of Line Resistor 2K2 / 0.5 W has to be mounted in the last mounting support of the detection zone circuit or in the portable detector according to the documents specified under *1*
*3	*Indication of leakage current. In case of failure, the "OPEN COLLECTOR" transistor is conducting to terminal 5*

The cable screen is only connected to the SUPREMA.

Connection module:	MAI30

Connection data	
Maximum nominal current	42 mA
Maximum nominal voltage	22 V
Power consumption	≤ 1.5 W (including cable length)
Cable type	2-core, 80 % screened
Maximum loop resistance	50 ohms (cable resistance)
Maximum cable length	2000 m (1.5 mm^2 cross section per wire)
Cross section per wire allowed	0.5–2.5 mm^2

Conditions for use	
Mounting	Wall mounting
Ingress protection	IP 42 according to DIN 400 50
Explosion protection	Ex ib IICT4
Certificate	DO 1101A-EX PTB 02 ATEX 2135DT1101A-EX: PTB 02 ATEX 2097
Temperature	DO1101: -25 °C to +50 °CDT1101: -25 °C to +70 °C
Humidity	DO1101: 0–95 % rel. humidity; noncondensingDT1101: 0–100 % rel. hum.; surface condensing
Pressure	950–1100 hPa
Weight	approx. 130 g
Dimensions	Diameter 115 mm x 55 mm including mounting support
Housing material	Plastic

Simulation of normal operation / Alarm / RESET / Open or short-circuit fault indication:

Simulation	Effect
Normal operation	
External power supply 23–32 V connected according to circuit diagram END OF LINE resistor 2K2 connected according to circuit diagram Connect resistor 10 K 0.5 W between terminal 1 and 2	Normal operation Voltage of terminal 1–2 shall be <0.1 V
Alarm	
External power supply 23–32 V connected according to circuit diagram END OF LINE resistor 2K2 connected according to circuit diagram Connect resistor 1.0 K 1% 0.5 W between terminal 3 and 4	Alarm message
RESET	Normal operation
Connect wire jumper between terminals 3 and 4	After max. 45 s failure message appears.
Open-circuit of line	
External power supply 23–32 Vconnected according to circuit diagramEND OF LINE resistor 2K2 not connected	Failure message
Line short-circuit	
External power supply 23–32 Vconnected according to circuit diagramEND OF LINE resistor short-circuited	Failure message
Interruption of the supply voltage	
External power supply 23–32 Vnot connected END OF LINE resistor 2K2connected according to circuit diagram	Failure message after max. 45 s
Leakage current	
External power supply 23–32 V connected according to circuit diagramEND OF LINE resistor 2K2 connected according to circuit diagramConnect resistor 10 K 0.5 W between terminal 1 and 2Connect resistor 18 K between terminals 4 and 5, or connect resistor 330R between terminals 3 and 5.	Failure message Voltage terminals 1-2 must be 23–32 V

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16.13 Explosion-Proof Push-Button Detector with Barriers MTL 728 and MTL 710

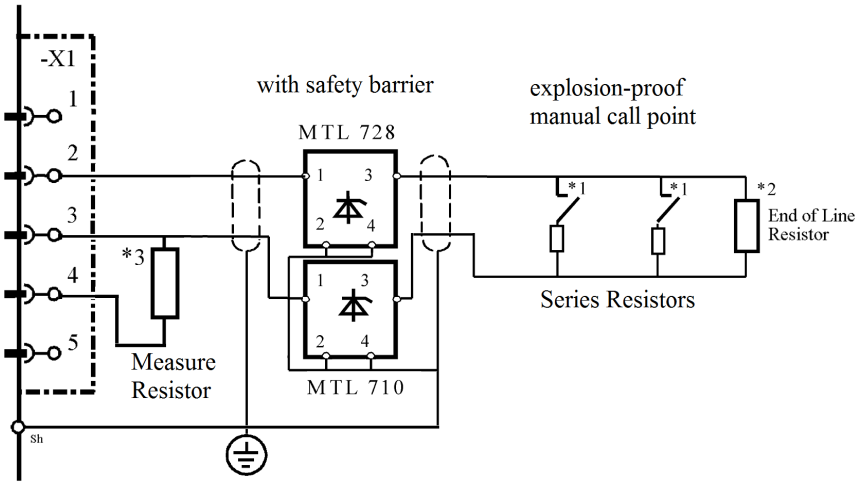

Fig. 155

*1	*Connect push-button detector according to manufacturer´s specification.MEDC NG16 6JF Type BGI. WIRING DIAGRAM BGE/I/W + PBE/IWContact type: NORMALLY OPEN (terminals 2-3 inside the detector). Carry out installation according to NFPA72With resistor 1.8 KW / 0.5 W in series with the contact; max. 10 PiecesWith zener diode 10 V /1.3 W in series with the contact; max. 20 PiecesCheck polarity*
*2	*End of Line Resistor 2K2 / 0.5 W has to be mounted in the last mounting support of the detection zone circuit or in the portable detector according to the documents specified in *1*
*3	*Indication of leakage current. In case of failure, the "OPEN COLLECTOR" transistor is conducting to terminal 5*

The cable screen is only connected to the SUPREMA.

Connection module:	MAI30

Connection data	
Maximum nominal current	42 mA
Maximum nominal voltage	22 V
Power consumption	≤ 1.5 W (including cable length)
Cable type	2-core, 80 % screened
Maximum loop resistance	50 ohms (cable resistance)
Maximum cable length	2000 m (1.5 mm^2 cross section per wire)
Cross section per wire allowed	0.5–2.5 mm^2

Conditions for use	
Mounting	Wall mounting
Ingress protection	IP 54 according to DIN 400 50
Explosion protection	yes
Certificate	BASEEFA 03ATEX0084X
Temperature	-20 °C to +55 °C
Humidity	-
Pressure	-
Weight	approx. 1100 g
Dimensions	120 x 125 x 75 mm
Housing material	Aluminium, pressure-resistant

Simulation of normal operation / Alarm / RESET / Open or short-circuit fault indication:

Simulation	Effect
Normal operation External power supply 23–32 V connected according to circuit diagramEND OF LINE resistor 2K2 connected according to circuit diagramConnect resistor 10 K 0.5 W between terminal 1 and 2	Normal operation Voltage of terminal 1–2 shall be <0.1 V
Alarm External power supply 23–32 V connected according to circuit diagramEND OF LINE resistor 2K2 connected according to circuit diagramConnect resistor 1.0 K 1% 0.5 W between terminal 3 and 4	Alarm message
RESET Connect wire jumper between terminals 3 and 4	Normal operation After max. 45 s failure message appears.
Open-circuit of line External power supply 23–32 V connected according to circuit diagramEND OF LINE resistor 2K2 not connected	Failure message
Line short-circuit External power supply 23–32 V connected according to circuit diagramEND OF LINE resistor short-circuited	Failure message
Interruption of the supply voltage External power supply 23–32 V not connected END OF LINE resistor 2K2 connected according to circuit diagram	Failure message after max. 45 s
Leakage current External power supply 23–32 V connected according to circuit diagramEND OF LINE resistor 2K2 connected according to circuit diagramConnect resistor 10 K 0.5 W between terminal 1 and 2Connect resistor 18 K between terminals 4 and 5, or connect resistor 330R between terminals 3 and 5.	Failure message Voltage terminals 1-2 must be 23–32 V

16.14 Explosion-Proof Fire Detector Apollo Series 60 with Barriers MTL 728

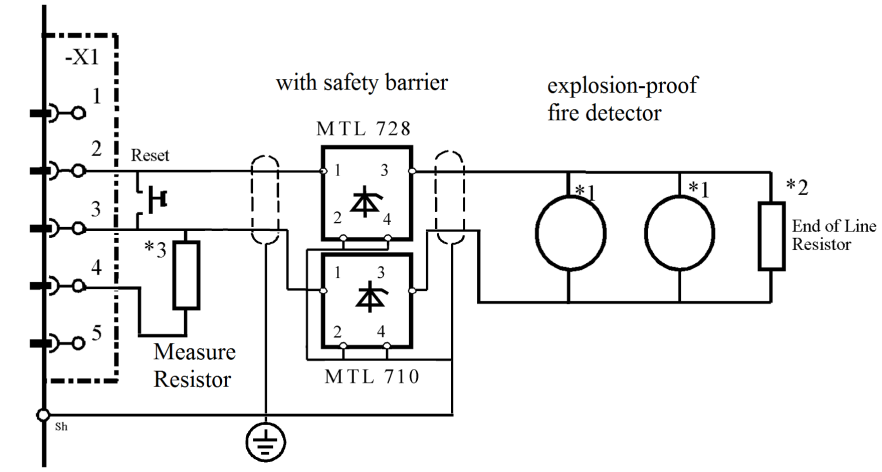

Fig. 156

**1*	*Connect according to manufacturer´s specification Apollo Series 60: SERIES 60 INTRINSICALLY SAFESYSTEM DRAWING Z209883. Carry out installation according to NFPA72.Only the mounting support Order No. 45681-207 specified in the data sheets must be used.For each detection zone circuit, max. 20 fire detectors are allowed*
**2*	*End of Line Resistor 2K2 / 0.5 W has to be mounted in the last mounting support of the detection zone circuit or in the portable detector according to the documents specified in *1*
**3*	*Indication of leakage current. In case of failure, the "OPEN COLLECTOR" transistor is conducting to terminal 5*

The cable screen is only connected to the SUPREMA.

Connection module:	MAI30

Connection data	
Maximum nominal current	42 mA
Maximum nominal voltage	22 V
Power consumption	≤ 1.5 W (including cable length)
Cable type	2-core, 80 % screened
Maximum loop resistance	50 ohms (cable resistance)
Maximum cable length	2000 m (1.5 mm^2 cross section per wire)
Cross section per wire allowed	0.5–2.5 mm^2

Conditions for use	
Mounting	Wall mounting
Ingress protection	IP 42 according to DIN 400 50
Explosion protection	yes
Certificate	BASEEFA EX97D2054BAS02ATEX1288
Temperature	SMOKE detector -20 °C to +60 °C HEAT detector -20 °C to +105 °C
Humidity	0–95% rel. humidity; noncondensing
Pressure	950–1100 hPa
Weight	approx. 153 g including mounting support
Dimensions	Diameter 100 mm x 50 mm including mounting support
Housing material	Plastic

Simulation of normal operation / Alarm / RESET / Open or short-circuit fault indication:

Simulation	Effect
Normal operation External power supply 23–32 V connected according to circuit diagramEND OF LINE resistor 2K2 connected according to circuit diagramConnect resistor 10 K 0.5 W between terminal 1 and 2	Normal operation Voltage of terminal 1–2 shall be <0.1 V
Alarm External power supply 23–32 V connected according to circuit diagramEND OF LINE resistor 2K2 connected according to circuit diagramConnect resistor 1.0 K 1% 0.5 W between terminal 3 and 4	Alarm message
RESET Connect wire jumper between terminals 3 and 4	Normal operation After max. 45 s failure message appears.
Open-circuit of line External power supply 23–32 V connected according to circuit diagramEND OF LINE resistor 2K2 not connected	Failure message
Line short-circuit External power supply 23–32 V connected according to circuit diagramEND OF LINE resistor short-circuited	Failure message
Interruption of the supply voltage External power supply 23–32 V not connected END OF LINE resistor 2K2 connected according to circuit diagram	Failure message after max. 45 s
Leakage current External power supply 23–32 V connected according to circuit diagramEND OF LINE resistor 2K2 connected according to circuit diagram Connect resistor 10 K 0.5 W between terminal 1 and 2Connect resistor 18 K between terminals 4 and 5, or connect resistor 330R between terminals 3 and 5.	Failure message Voltage terminals 1-2 must be 23–32 V

16.15 Explosion-Proof Fire Detector CERBERUS DO1101EX/DT1101EX with Barriers MTL 728 and MTL 710

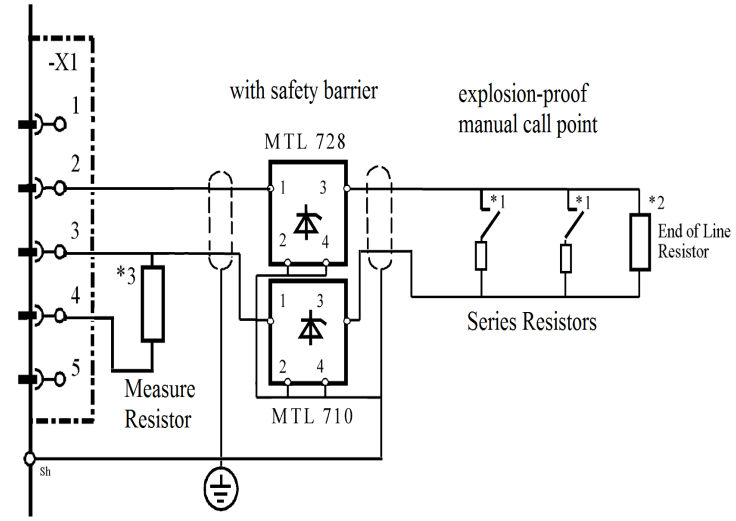

Fig. 157

*1	*Connect according to manufacturer´s specification. CERBERUS Document No. e1469Tyco M600 Series smoke and heat detectors. Document 01B-04-D12 Issue 1, Date 7/02 Only the mounting support Order No. 45681-207 specified in the data sheets must be used.*
*2	*End of Line Resistor 2K2 / 0.5 W has to be mounted in the last mounting support of the detection zone circuit or in the portable detector according to the documents specified in *1*
*3	*Indication of leakage current. In case of failure, the "OPEN COLLECTOR" transistor is conducting to terminal 5*

The cable screen is only connected to the SUPREMA.

Connection module:	MAI30

Connection data	
Maximum nominal current	42 mA
Maximum nominal voltage	22 V
Power consumption	≤ 1.5 W (including cable length)
Cable type	2-core, 80 % screened
Maximum loop resistance	50 ohms (cable resistance)
Maximum cable length	2000 m (1.5 mm^2 cross section per wire)
Cross section per wire allowed	0.5–2.5 mm^2

Conditions for use	
Mounting	Wall mounting
Ingress protection	IP 42 according to DIN 400 50
Explosion protection	Ex ib IICT4
Certificate	DO 1101A-EX PTB 02 ATEX 2135DT1101A-EX: PTB 02 ATEX 2097
Temperature	DO1101: -25 °C to +50 °CDT1101: -25 °C to +70 °C
Humidity	DO1101: 0–95 % rel. humidity; noncondensingDT1101: 0–100 % rel. hum.; surface condensing
Pressure	950–1100 hPa
Weight	approx. 130 g
Dimensions	Diameter 115 mm x 55 mm including support

Conditions for use	
Housing material	Plastic

Simulation of normal operation / Alarm / RESET / Open or short-circuit fault indication:

Simulation	Effect
Normal operation External power supply 23–32 V connected according to circuit diagramEND OF LINE resistor 2K2 connected according to circuit diagramConnect resistor 10 K 0.5 W between terminal 1 and 2	Normal operation Voltage of terminal 1–2 shall be <0.1 V
Alarm External power supply 23–32 V connected according to circuit diagramEND OF LINE resistor 2K2 connected according to circuit diagramConnect resistor 1.0 K 1% 0.5 W between terminal 3 and 4	Alarm message
RESET Connect wire jumper between terminals 3 and 4	Normal operation After max. 45 s failure message appears.
Open-circuit of line External power supply 23–32 V connected according to circuit diagramEND OF LINE resistor 2K2 not connected	Failure message
Line short-circuit External power supply 23–32 V connected according to circuit diagramEND OF LINE resistor short-circuited	Failure message after max. 45 s
Interruption of the supply voltage External power supply 23–32 V not connected END OF LINE resistor 2K2 connected according to circuit diagram	Failure message
Leakage current External power supply 23–32 V connected according to circuit diagramEND OF LINE resistor 2K2 connected according to circuit diagramConnect resistor 10 K 0.5 W between terminal 1 and 2Connect resistor 18 K between terminals 4 and 5, or connect resistor 330R between terminals 3 and 5.	Failure message Voltage terminals 1-2 must be 23–32 V

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17 Technical Data

System Data		
Racks per system	1–8	
Number of inputs	- per system:	1–256
	- per rack:	up to 64
Switching output/relay outputs	0–512	
Analog outputs 0–20 mA	0–256	
Operation and Display	• 320 x 240 pixel color display • resistive touch panel • function keys	
Interfaces	2 x RS232/1 x USB (max. 3m cable length) • PC operation • printer 2 x CAN bus	
System operating voltage	19.2 V–32.0 VDC	
System power supply (3x redundancy)	3 x 24 VDC	
Rack power supply, 150 W	85–265 VAC	
Output voltage, rack power supply	24 VDC	
Output current, rack power supply	6.5 A	
System power supply limits	• maximum permissable operating current feed (+24 V): 20 A • maximum rack load current of all MAI modules (+24 V): 10 A • maximum rack load current of all MGO modules (GND): 12 A	
Connectable sensors	- active	4–20 mA, 2-wire
	- active	4–20 mA, 3-wire
	- active	4–20 mA, 4-wire
	- passive	3-wire
	- passive	5-wire
	- passive	4-wire (semiconductor sensors)
	- switches	
	- fire	
Housing	19“ rack, 3HE	
Storage temperature for all parts of the system (including spare parts)	-25 °C to +55 °C	

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17.1 MAI30/MGI30 Module: Analog Input Unit

Operating voltage feed (3 x 24 VDC)	18.5–32 VDC
Internal power draw	typically 70 mA
Allowable total power draw (with 8 sensor module)	3 A, maximum
Plug connector (leading contacts for power supply)	96-channel VG terminal strip
Temperature range	5 °C to 55 °C
Humidity	0–90 % relative humidity noncondensing
Dimensions	100 x 160 mm
Weight	120 g

17.2 MAR30/MGR30 Module: analogue Redundant

Operating voltage feed (3 x 24 VDC)	18.5–32 VDC
Internal power draw	typically 40 mA
Temperature range	5 °C to 55 °C
Humidity	0–90 % relative humidity noncondensing
Dimensions	95 x 24 mm
Weight	30 g

17.3 MAT Module: Analogue Terminal Unit

Number of measuring head connections	8
Number of terminals per sampling point	5
Allowable wire cross section	1.5 mm^2
Temperature range	5 °C to 55 °C
Humidity	0–90 % relative humidity noncondensing
Dimensions	125 x 50 mm
Weight	155 g

17.4 MAO20 Module: Analog Output Unit

Operating voltage feed	19–32 VDC
Operating current	270 mA (maximum)
Temperature range	5 °C to 55 °C
Humidity	0–90 % relative humidity noncondensing
Maximum load	500 ohms
Output current range	0–24 mA
Inhibit signal	3.0 mA
Failure signal	3.2 mA
Measurement signal range	4–20 mA
Over range signal	22 mA
Dimensions	100 x 160 mm
Weight	80 g

17.5 MBC Module: Bus Communication

- Connection to external buses (function is software dependent)

Operating voltage feed (3 x 24 VDC)	14–32 VDC
Operating current	100 mA
Temperature range	5 °C to 55 °C
Humidity	0–90 % relative humidity noncondensing
Dimensions	100 x 160 mm
Weight	115 g

17.6 MCP Module: Central Processing Unit

Operating voltage feed (3 x 24 VDC)	14–32 VDC
Operating current	125 mA
Plug connector(leading contacts for power supply)	96-channel VG terminal strip
Temperature range	5 °C to 55 °C
Humidity	0–90 % relative humidity non-condensing
Dimensions	100 x 160 mm
Weight	125 g

17.7 MDC Module: Display Connection

Operating voltage feed (3 x 24 VDC)	14–32 VDC
Operating current	40 mA
Plug connector	50-channel ribbon cable
Temperature range	5 °C to 55 °C
Humidity	0–90 % relative humidity noncondensing
Dimensions	100 x 160 mm
Weight	100 g

17.8 MDO Module: Display + Operating Unit

Operating voltage feed (3 x 24 VDC)	14–32 VDC
Operating current	350 mA
RTC backup battery type	BR2325
RTC backup battery life time	10 years
Plug connector	50-channel ribbon cable
Temperature range	5 °C to 55 °C
Humidity	0–90 % relative humidity noncondensing
Dimensions	213 x 108 mm
Weight	470 g

17.9 MGO Module: General Output Unit

Operating voltage feed (3 x 24 VDC)	14–32 VDC
Operating current logic	40 mA
Total load current, switching outputs	12 A
Nominal switching voltage	24 VDC
Nominal switching current	0.3 A
Maximum driver IC limit data (8 outputs per driver)	

Output current (all outputs ON, per output)	500 mA
Output current (1 output ON)	1 A
Total current of all outputs of one driver IC	4 A
Plug connector (leading contacts for power supply)	96-channel VG terminal strip
Temperature range	5 °C to 55 °C
Humidity	0–90 % relative humidity noncondensing
Dimensions	100 x 160 mm
Weight	100 g

17.10 MHD TS Module: Modular High Driver

Relay Driver supply INT, EXT, BAT	19–32 VDC
Maximum input current (24 V terminals)	12 A
No-signal current consumption (all outputs off)	95 mA at 24 V
Output current	300 mA/output typical
Maximum current 1 output	1 A
Maximum current 1 driver	2 A (4 x 500 mA)
Maximum current all drivers	12 A
Temperature range	5 °C to 55 °C
Humidity	0–90 % relative humidity noncondensing
Dimensions	150 x 90 x 60 mm
Weight	approx. 165 g

17.11 MHS30 Module: Module HART Support

Relay Driver supply INT, EXT, BAT	18.5–32 VDC
Temperature range	5 °C to 55 °C
Humidity	0–90 % relative humidity noncondensing
Dimensions	32 x 42 mm
Weight	10 g

17.12 MIB Module: Interconnection Board

Operating voltage feed	19.2–32 VDC
Maximum allowable operating current	
- feed (+24 v)	20 A
- (GND)	32 A
Feed connector cross section	4 mm^2, flexible
6 mm^2, rigid	
Power supply terminals	EXT, INT, BAT
Setting elements (rack no., CAN bit rate)	10-channel DIL switch
System error relay	3 A
Temperature range	5 °C to 55 °C
Humidity	0–90 % relative humidity noncondensing
Dimensions	377 x 128 mm
Weight	650 g

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17.13 MRC TS Module: Relay Connection

Relay operating voltage (INT, EXT, BAT)	19–32 VDC
Relay operating current	7 mA
Relay operating current 5 x MRO 8 TS	280 mA
Relay operating current 5 x MRO 16 TS	560 mA
Temperature range	5 °C to 55 °C
Humidity	0–90 % relative humidity noncondensing
Dimensions	90 x 153 x 65 mm
Weight	180 g

17.14 MRD Module: Dummy Relay

- Simulates the load provided by a Relay Output Module (MRO).
- A system fail will be triggered if each Relay Connection Module (MRC) output connector (X3 to X7) is not connected to either an MRO or a MRD.

Operating voltage	18–32 VDC
Temperature range	5 °C to 55 °C
Humidity	0–90 % relative humidity noncondensing
Dimensions	approx. 29 x 30 x 8 mm
Weight	approx. 5 g

17.15 MRO10 8 Module: Relay Output Unit

Relay operating voltage	24 VDC
Relay operating current	7 mA
Contact type	change-over contact
Contact load capacity	see relay contact data
Temperature range	5 °C to 55 °C
Humidity	0–90 % relative humidity noncondensing
Dimensions	125 x 69 mm
Weight	142 g

17.16 MRO10 8 TS Module: Relay Output Unit (Rail-Mount Installation)

Relay operating voltage	19–32 VDC
Relay operating current	7 mA
Contact type	change over contact
Contact load capacity	see relay contact data
Temperature range	5 °C to 55 °C
Humidity	0–90 % relative humidity noncondensing
Dimensions	90 x 71 x 68 mm
Weight	160 g

17.17 MRO10 16 TS Module: Redundant Relay Output Unit (Rail-Mount Installation)

Relay operating voltage	19–32 VDC
Relay operating current	7 mA
Contact type	normally open
Contact load capacity	see relay contact data
Temperature range	5 °C to 55 °C
Humidity	0–90 % relative humidity noncondensing
Dimensions	90 x 103 x 65 mm
Weight	201 g

17.18 MRO20 8 TS

Relay operating voltage	19–32 VDC
Relay operating current	16 mA
Contact type	2 x change-over contact
Contact load capacity	see relay contact data
Temperature range	5 °C to 55 °C
Humidity	0–90 % relative humidity noncondensing
Dimensions	132x 68 x 90 mm
Weight	348 g

17.19 MRO20 8 TS SSR

Relay operating voltage	19–32 VDC
Relay operating current	10 mA
Contact type	1 x NO contact
Contact load capacity	see relay contact data
Temperature range	5 °C to 55 °C
Isolation	Galvanic
Humidity	0–90 % relative humidity noncondensing
Dimensions	103 x 60 x 90 mm
Weight	140 g

17.20 MRO20 16 TS

Relay operating voltage	19–32 VDC
Relay operating current	16 mA
Contact type	2 x normally open
Contact load capacity	see relay contact data
Temperature range	5 °C to 55 °C
Humidity	0–90 % relative humidity noncondensing
Dimensions	252 x 68 x 90 mm
Weight	514 g

Relay Contact Data (MRO 20-8(16)-TS)

Maximum switching voltage	AC 250 / 400 VAC
Nominal current	5 A
Maximum switching power	
- AC voltage	2000 VA
- DC voltage (from load limit curve)	24 VDC/5 A
50 VDC/5 A	
100 VDC/0.4 A	
Minimum switching power	24 VDC/100 mA

17.21 MRO10 16 TS SSR

Relay operating voltage	19–32 VDC
Relay operating current	10 mA
Contact type	1 x NO contact
Contact load capacity	see relay contact data
Temperature range	5 °C to 55 °C
Isolation	Galvanic
Humidity	0–90 % relative humidity noncondensing
Dimensions	103 x 60 x 90 mm
Weight	150 g

Relay Contact Data (MRO 20-8-TS SSR/MRO 10-16-TS SSR)

Maximum switching voltage	max 32 VDC
Nominal current	0.3 A (1 A peak / 80ms)
On resistance	max. 3.2 ohms
I/O isolation voltage	2.000 V AC

17.22 MSP Module: System Power Unit

Operating voltage feed	85–264 VAC
Maximum operating current	10.5 A
Maximum switch on current	40 A at 230 V (cold start)
Power connection factor	according EN 61000-3-2
Interference emissions	according to EN 55011/EN 55022-B
Output voltage	24 VDC
Maximum output current	6.5 A
Temperature range	5 °C to 55 °C
Humidity	0–90 % relative humidity noncondensing
Dimensions	65 x 92 x 198 mm
Weight	850 g

17.23 MST20 Module: System Terminals

Maximum allowable wire cross section	1.5 mm^2
Temperature range	5 °C to 55 °C
Humidity	0–90 %1.5 relative humidity noncondensing
Dimensions	125 x 76 mm
Weight	190 g

17.24 Relay Contact Data (MRO10)

Maximum switching voltage	250 VAC
250 VDC	
Nominal current	3 A
Maximum switching power	
- AC voltage	1500 VA
- DC voltage (from load limit curve)	24 VDC/3 A
50 VDC/0.3 A	
100 VDC/0.1 A	
Minimum switching power	
	6 VDC/1 A
12 VDC/100 mA	
24 VDC/1 mA	

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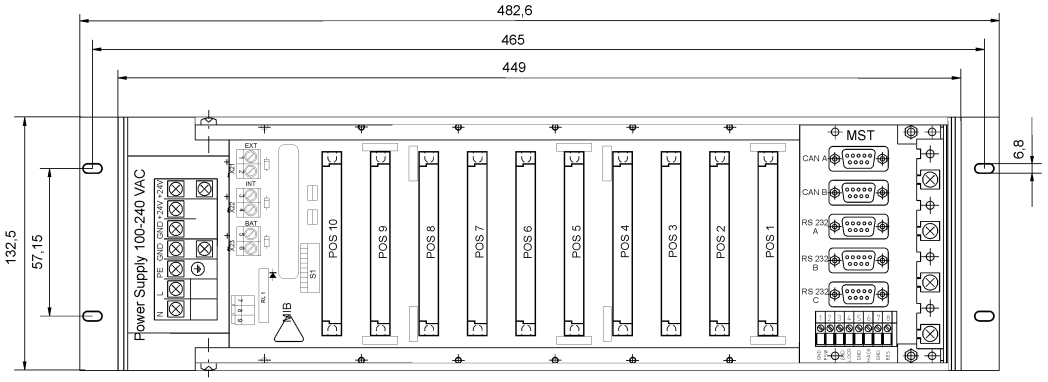
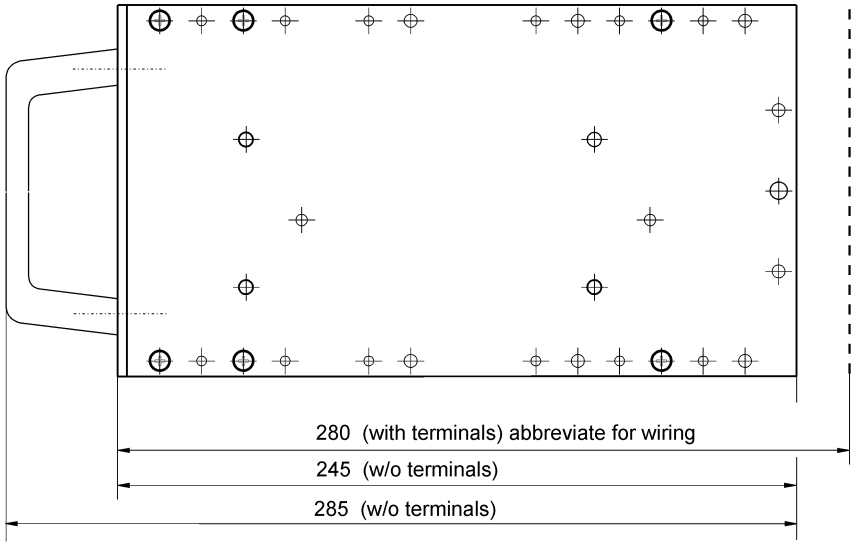
18 Dimensions

18.1 Rack





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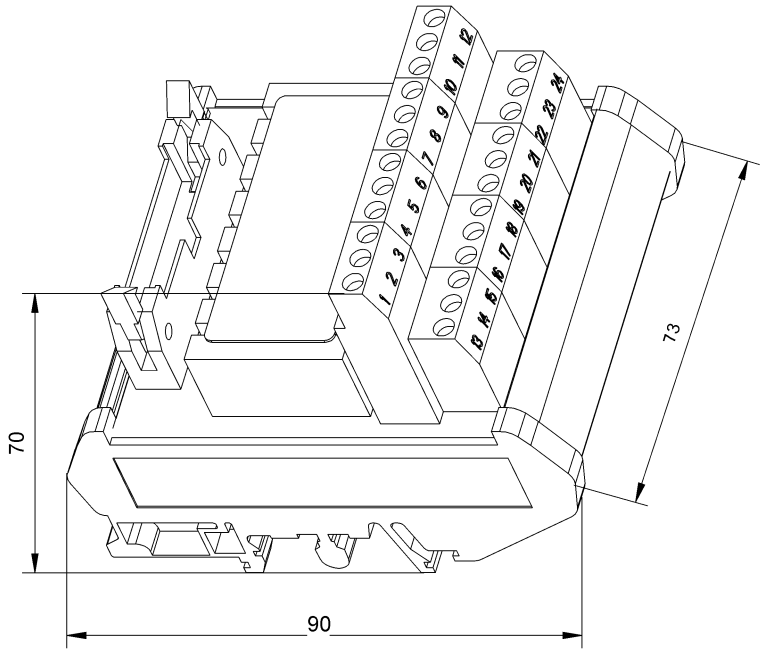
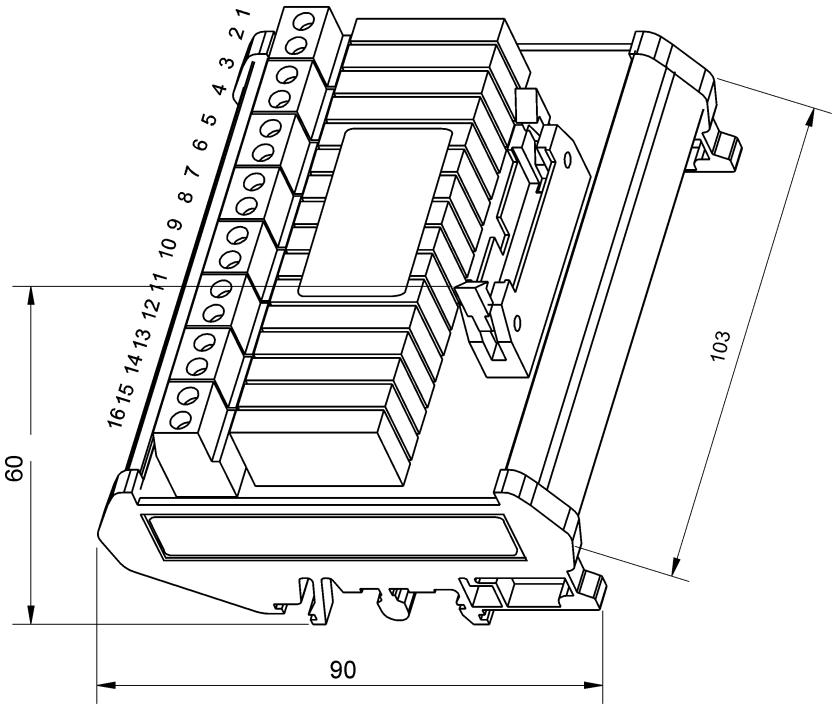
18.2 Rail-mounted Modules

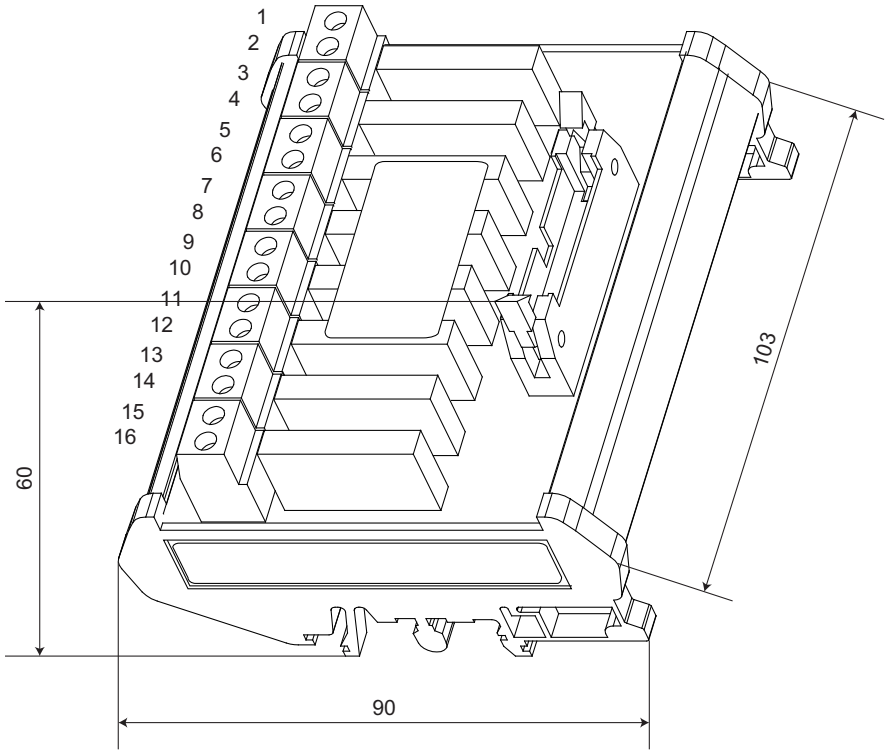
MRO8 TS Module



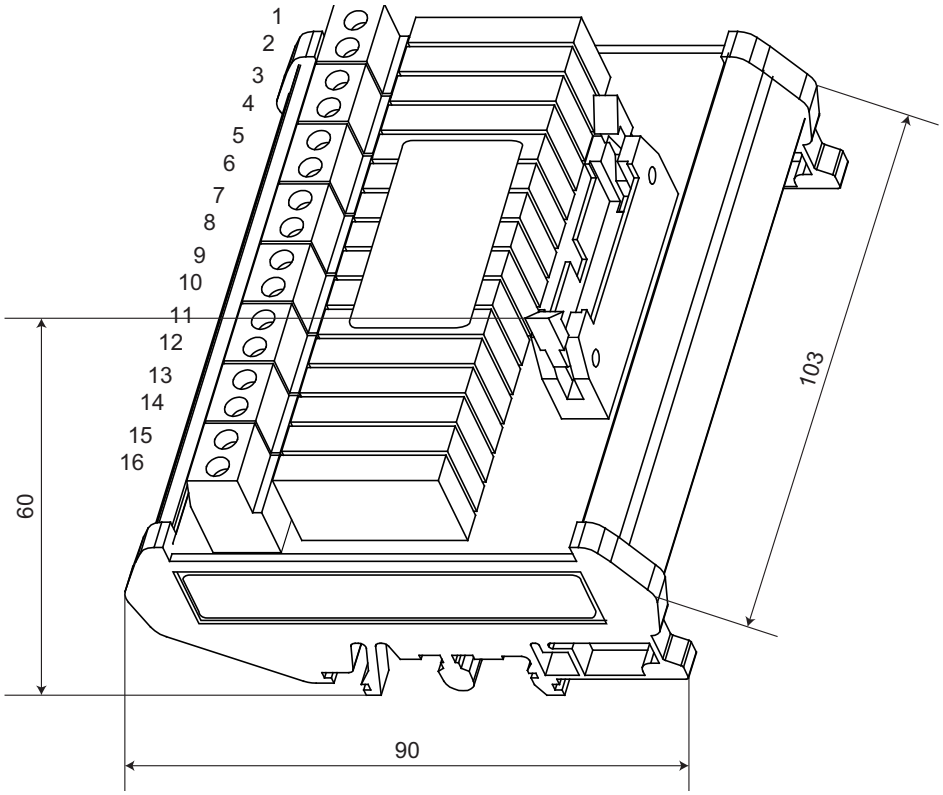
MRO16 TS Module



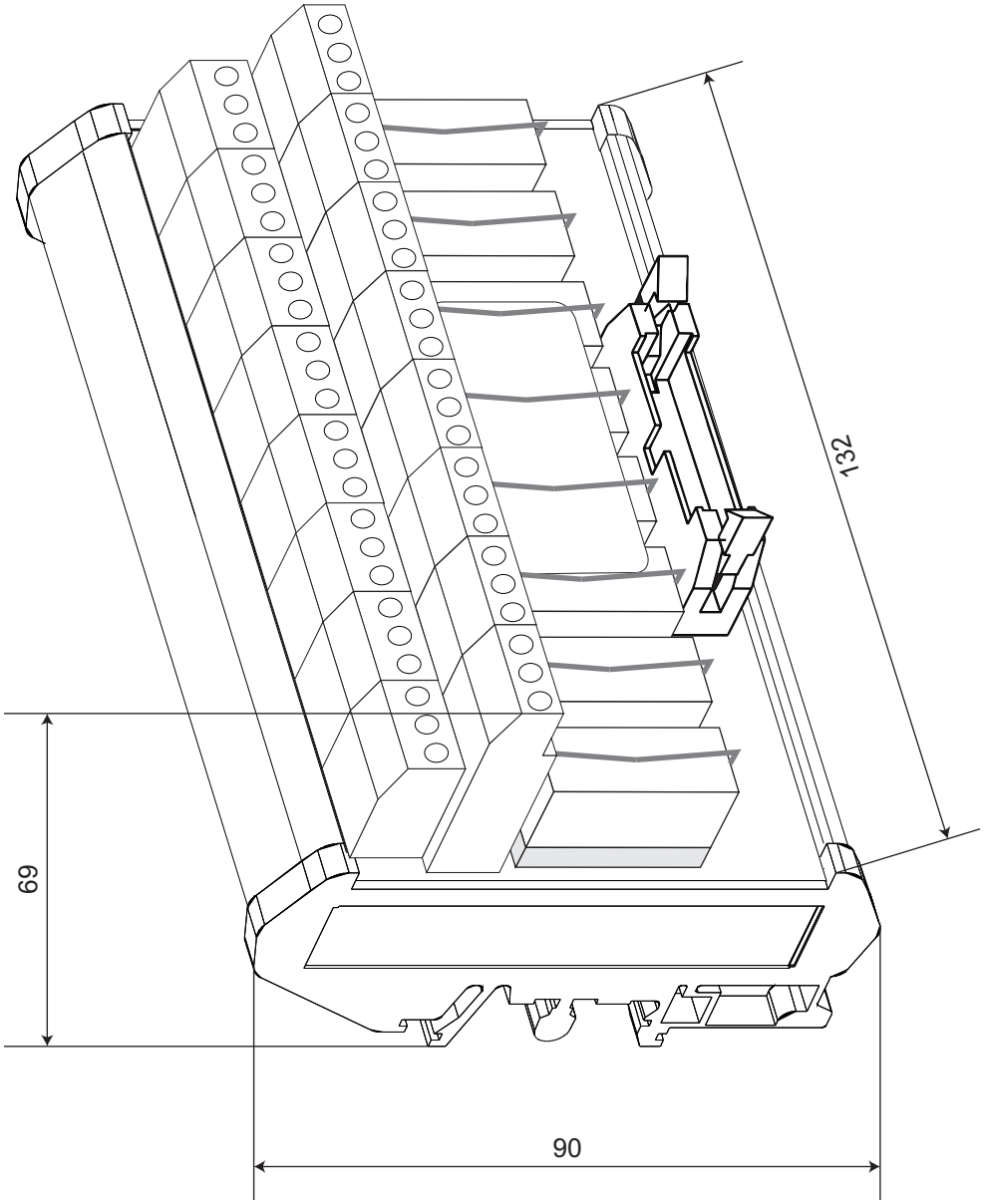
MRO20 8 TS SSR Module



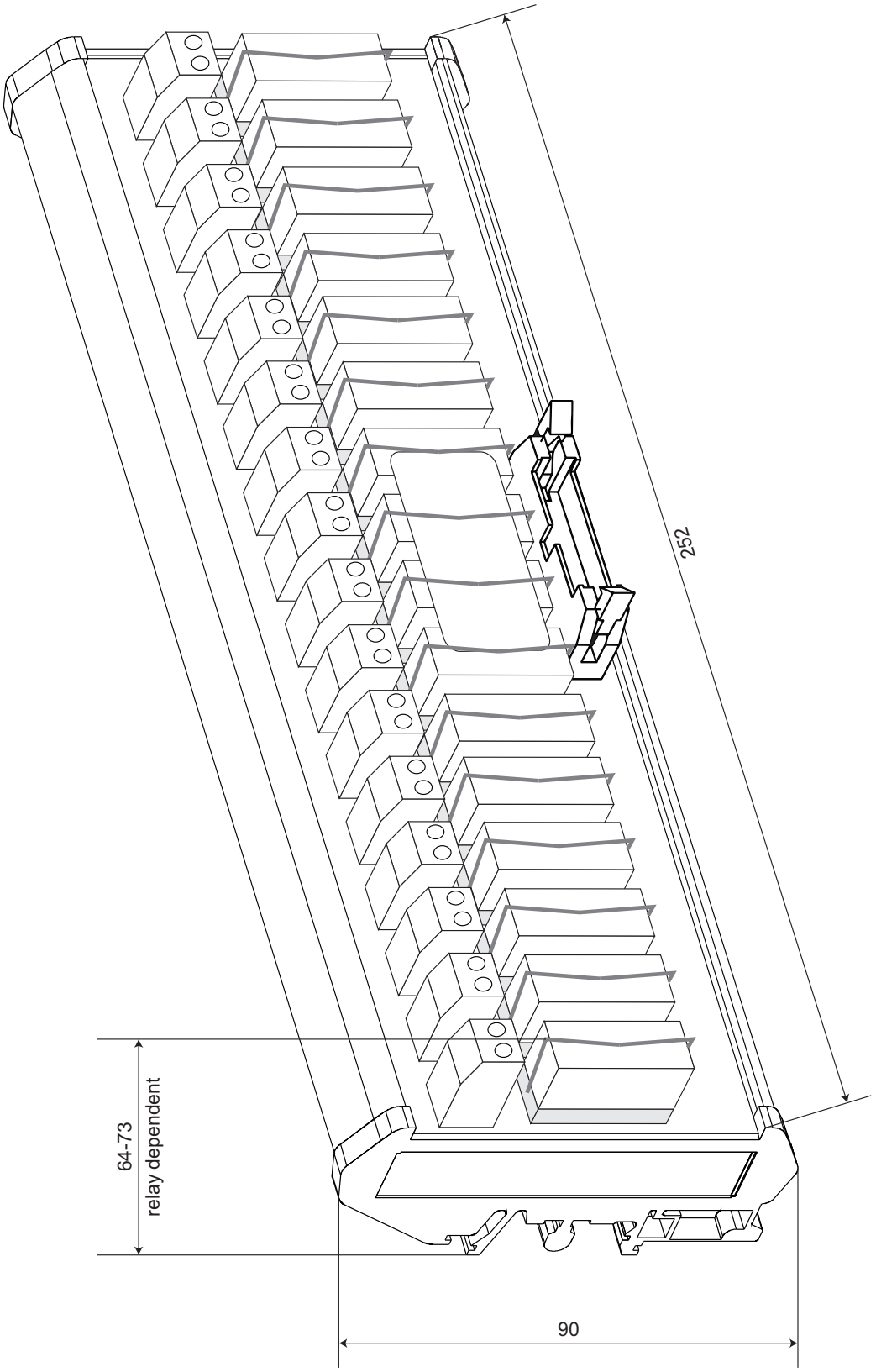
MRO10 16 TS SSR Module



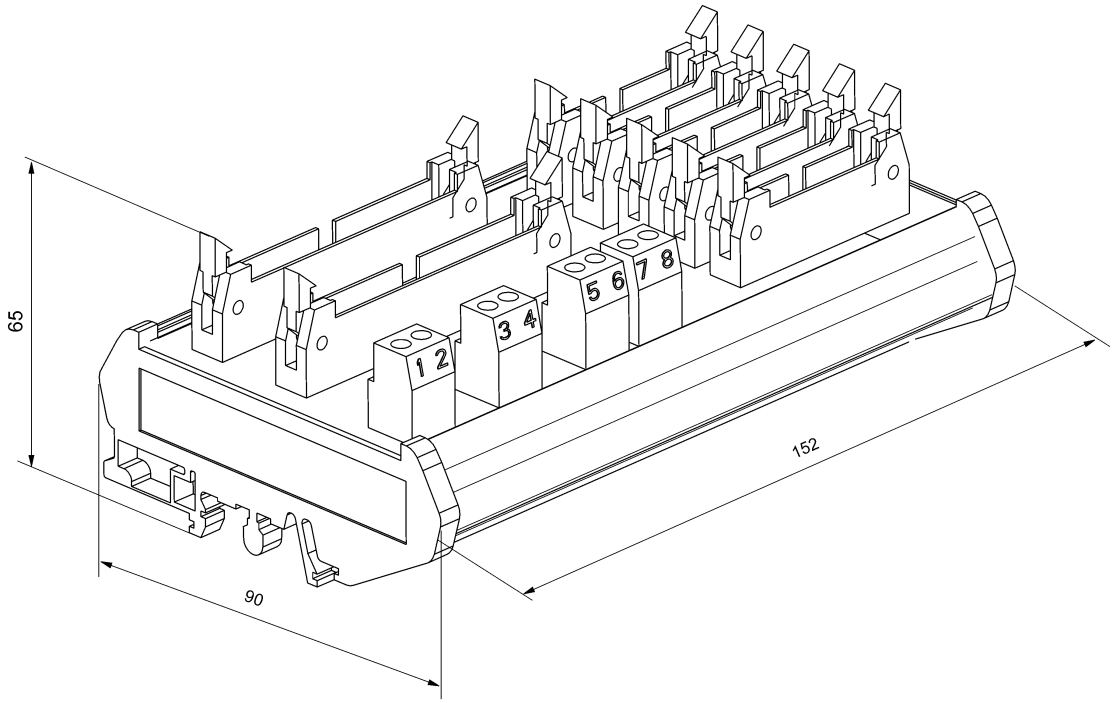
MRO20 8 TS Module



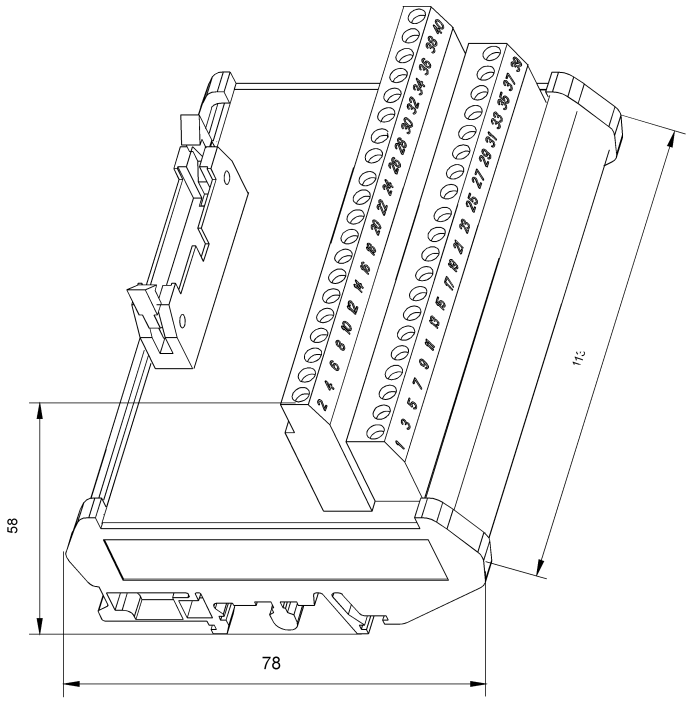
MRO20 16 TS Module



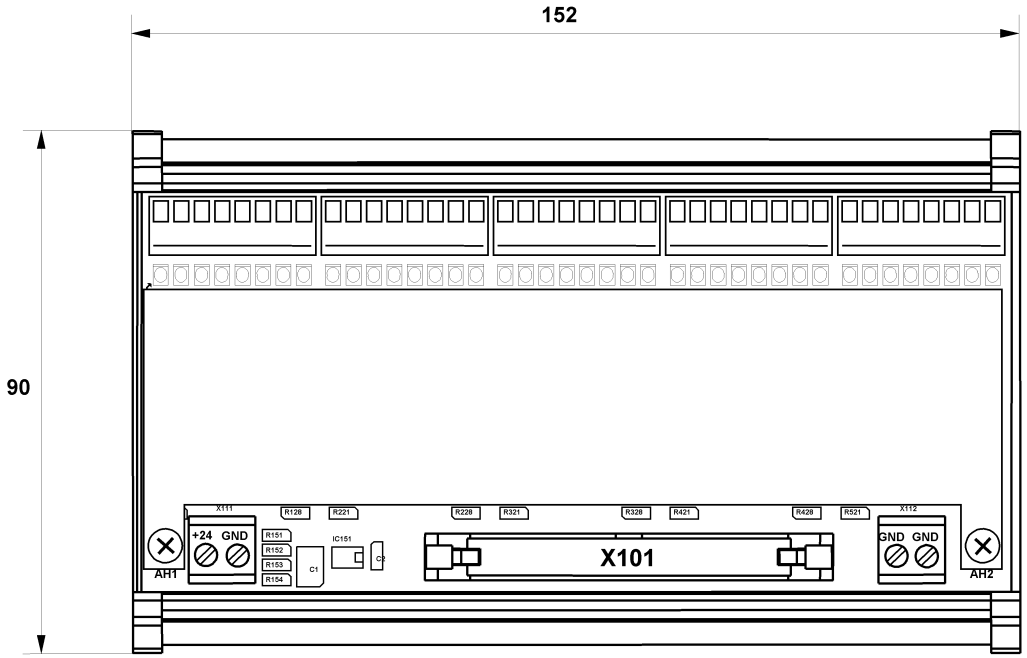
MRC TS Module



MGT40 TS Module

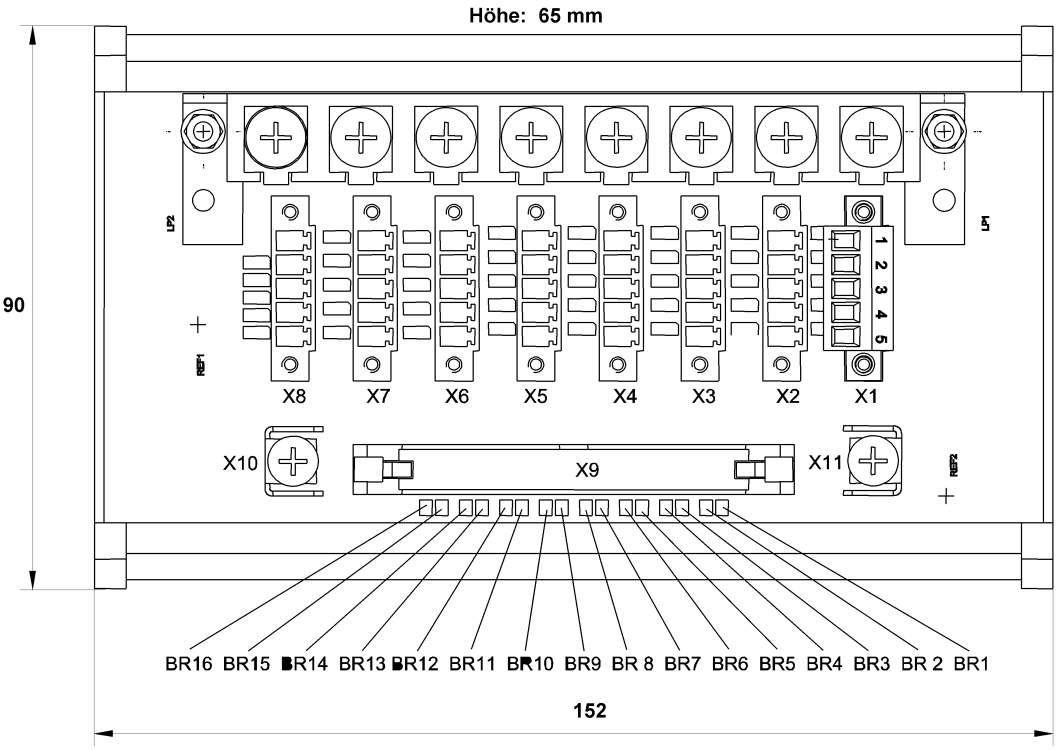


MHD TS Module



Höhe: 65 mm

MAT TS Module



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19 Ordering Information

19.1 Modules and Accessories

Description	Part No.
SUPREMA CAN Bridge CBM (29 Identifier)	10034641
SUPREMA CAN bus Cable, 0.5 m, D-SUB, female/male	10030084
SUPREMA CAN bus Cable, 5 m, D-SUB, female/male	10030083
SUPREMA CAN bus T-Piece	10030080
SUPREMA CAN/LWL	10052948
SUPREMA Flat Ribbon Cable, D-SUB	10030087
SUPREMA FRC-40 Flat Ribbon Cable	10026178
SUPREMA FRC-40 Flat Ribbon Cable Type S	10029124
SUPREMA Gateway CAN/PROFIBUS DP II	10121146
SUPREMA MAI30 Analogue Input	10151719
SUPREMA Manager	10121868
SUPREMA MAO20	10102071
SUPREMA MAR30 Analogue Redundant	10151720
SUPREMA MAT Analogue Terminal Unit	10015759
SUPREMA MAT TS Analogue Terminals (rail)	10022311
SUPREMA MBC20-AdvEl	10105277
SUPREMA MBC20-Modbus	10122578
SUPREMA MBT20	10105279
SUPREMA MCP20	10101581
SUPREMA MDA20 Data Acquisition Unit	10080011
SUPREMA MDC20	10110482
SUPREMA MDO20	10109638
SUPREMA MGI30	10170299
SUPREMA MGO20, General Output Unit	10083804
SUPREMA MGR30	10170300
SUPREMA MGT40 TS Terminals (rail)	10026772
SUPREMA MHD TS Module Modular High Driver	10038420
SUPREMA MHS30	10151731
SUPREMA MIB20 Interconnection Board	10050712
SUPREMA Modbus Gateway Kit	10126387
SUPREMA MRC TS Relay Connector	10021676
SUPREMA MRD Module: Dummy Relay	10052880
SUPREMA MRO10 16 TS-SSR	10105281
SUPREMA MRO16 TS Relay Output (rail)	10021430
SUPREMA MRO20 16 TS	10112805
SUPREMA MRO20 8 TS	10112807
SUPREMA MRO20 8 TS SSR	10115115
SUPREMA MRO8 Relay Output Unit	10018946
SUPREMA MRO8 TS Relay Output Unit (Rail-Mount Installation)	10021674
SUPREMA MSO Status Output	10069677
SUPREMA MST20 System Terminal	10104584
SUPREMA MUT Universal Terminal	10019468

Description	Part No.
SUPREMA Power supply 250W/24VDC	10152510
SUPREMA RS232 Cable, 2 m	10029644
SUPREMA Sensor Simulations Module 4–20 mA	10030262
SUPREMA Sensor Simulations Module HL	10030264
SUPREMA Sensor Simulations Module WT	10030263
SUPREMA Touch Rack (w.PS 250W,w. MDO)	10166234
SUPREMA Touch Rack (w.PS 250W,w/o MDO)	10166233
SUPREMA Touch Rack (w/o PS 250W,w. MDO)	10166236
SUPREMA Touch Rack (w/o PS 250W,w/o MDO)	10166235
Printer EPSON LX-300+	10035191
SUPREMA Touch, microSD card	10179005
Touch pen	10088569

19.2 Sensors Accessories

Description	Part No.
Test cap S47k with 1.0 l/ min	10049316
PrimaX / S47k Remote Calibration Splash Guard	10150921

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