Air Sampling Smoke Detection System
TITANUS *RACK·SENS*® 1U

Technical Manual
Detection

WAGNER®

Air Sampling Smoke Detection System

TITANUS *RACK·SENS*® 1U

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Detection

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0 General

0.1 Introduction

This manual is designed for people which are planning, installing and servicing fire alarm systems. These are mainly engineers, service technicians, and installers etc who have specialist knowledge in the field of fire alarm technology but who may be working with this equipment for the first time.

WAGNER Group GmbH, referred to below as WAGNER, accepts no liability for damage and breakdowns which occur because of a failure to comply with this manual.

This manual relates to the TITANUS *RACK·SENS*® 1U aspirating smoke detection system which is to be used exclusively for early and earliest fire detection.

0.2 Safety Information

The following symbols identify parts of the text in this manual which require special attention so that damage can be avoided and so that operations can run smoothly.

ATTENTION

This symbol warns against actions which might cause damage if it is ignored.

INSTRUCTION

This symbol warns against actions which could cause operational breakdowns if it is ignored.

TIP

Operational improvements can be achieved if this symbol is observed.

0.3 Warranty

The manual is subject to technical modification without notice and makes no claim to be complete.

In principle our “Terms and Conditions of Supply and Assembly” apply. Warranty and liability claims for damage to persons or property are expressly excluded if they are based on one or more of the following causes:

- Inadequate compliance with instructions regarding project planning, installation of the air sampling smoke detection system, installation of the pipe system, commissioning and maintenance
- Improper use of the air sampling smoke detection system
- Inadequate monitoring of wear and tear elements
- Incorrectly performed repairs
- Own structural modifications to the air sampling smoke detection system
- Force majeure

0.4 Copyright

0.5 Packaging

The individual air sampling smoke detection systems are packed in accordance with the anticipated transport conditions. Exclusively environmentally friendly materials were used for the packaging.

The packaging is intended to protect the air sampling smoke detection system from being damaged until it is installed. For that reason, it should only be removed from its packaging shortly before installation.

The packaging material is to be disposed of in accordance with applicable statutory provisions and local regulations.

- Dispose of the packaging materials in an environmentally friendly manner.
- Observe local disposal regulations.

INSTRUCTION

Packaging materials are valuable raw materials and in many cases can be re-used or expediently processed and recycled. Improper disposal of packaging materials can harm the environment.

0.6 Disposal

If no take-back or disposal agreements have been made, disassembled components are to be taken for recycling:

- Take metal parts for scrapping.
- Take plastic parts to be recycled.
- Sort the remaining components by material quality and dispose of them.

0.7 Instructions for the user

- Regular visual inspections and functional tests must be carried out to ensure the system remains functional. Such tests are an integral part of the system documentation and must be set out by the installer of the system in accordance with the system parameters.

Any physical modification to the protected object must be coordinated with the installer to ensure the system remains fully functional.

1 Product Description

1.1 Features of the TITANUS *RACK·SENS*® 1U air sampling smoke detection system

TITANUS *RACK·SENS*® 1U is the latest generation of the renowned WAGNER air sampling smoke detection systems. TITANUS *RACK·SENS*® 1U was specially developed for use in 19" server racks and control cabinets.

Sensitivity

TITANUS *RACK·SENS*® response threshold can be set between 0.1 or 0.5 % and 2 %/ obs./m, depending on the design. The setting is adjusted at intervals of 0.1 % obs./m. Alarm forwarding is possible starting from 0.01% obs./m via an adjustable pre-warning threshold (10 – 80% of the main alarm threshold). An optional bar graph provides a display sensitivity from 0.01% or 0.05% obs./m. The reliable **High-Power-Light- Source** in TITANUS systems ensures uniform response behaviour for different types of fires in accordance with EN54-7 and EN54-20.

Intelligent signal processing

The TITANUS *RACK·SENS*® 1U features **LOGIC·*SENS*,** an intelligent signal processing for avoiding false alarms**.** Complex algorithms based on numerous fire trials and decades of experience ensure a high level of safety in differentiating between a false alarm and a fire event.

Safe airflow monitoring

PIPE·GUARD, the comprehensive package for airflow monitoring, detects safely malfunctions breakdowns such as pipe breakages or blocked sampling holes.

Airflow monitoring is temperature-compensated and can be set to be air pressure-dependent.

Plug and Play

Installation and commissioning of the TITANUS *RACK·SENS*® 1U are simple with the Plug & Play function.

The TITANUS *RACK·SENS*® 1U detection unit is pre-set for standard application usage. TITANUS *RACK·SENS*® 1U is immediately ready for operation once it has been connected to the mains or 24 V supply and is properly commissioned.

Networking

If fitted with on optional network card, TITANUS *RACK·SENS*® 1U devices can be linked together in an Ethernet network. From a central point the user can, for example, via VisuLAN T® monitor all connected units for smoke levels, airflow values etc. In addition, the TITANUS *RACK·SENS*® 1U can be integrated via the so-called OPC server into existing hazard and alert building management systems.

Potential free contacts

TITANUS *RACK·SENS*® 1U provides potential-free contacts for “main alarm” and “pre alarm”, “fault”, “service blocked” and “released” as well as for 5 programmable relays. The air sampling smoke detection system interfaces there for collective and addressable[1] status signal easily with any type of central fire alarm system.

2. Detection-unit

TITANUS *RACK·SENS*® 1U can be fitted with an optional second detector to perform as a double knock system. Each detection unit includes 2 alarm thresholds (pre-alarm and main alarm) and is provided with a sensibility of 0.1 or 0.5 % obs./m.

Shutdown

In order to carry out an object shutdown (electrical disconnection) a potential-free relay contact is provided which can be cascaded with a high power relay for shut down of high power server racks. Object shutdown is essential to prevent potential re-ignition when a fire is being extinguished after extinguishing gas concentration has depleted below effective levels.

Diagnostics

The optional DIAG 3 diagnostics device, provides quick and easy device configuration and visualisation during commissioning, inspection and servicing. For diagnostics purposes events are stored in the TITANUS *RACK·SENS*® 1U.

Designing detection points

The respective project planning instructions for object protection in this manual must be complied with when planning the TITANUS *RACK·SENS*® 1U ® sampling points.

Patented detection points

WAGNER’s patented aspiration reduction film sheets, clips and banderols make assembly simple and comfortable and avoid whistling noises during operation. Another advantage is the quick and easy identification and monitoring of the aspiration sampling point diameters.

[1] Via the address module of the particular CFAS

Options for extension and extension modules

The TITANUS *RACK·SENS*® 1U system is modular configurable and offers optional extensions such as a second air sampling smoke detector, temperature indication, smoke level bar graph, mains and emergency power supply as well as integrated extinguishing systems in the compact 19-inch 2U design. TITANUS *RACK·SENS*® 1U offers highly flexible options for extension in the form of shutdown modules and extinguisher/shutdown modules as well as external extinguishing cylinders.

Comprehensive accessories

The comprehensive assortment of accessories ranging from pipe components and network cards through to optical alarm indicators enables the TITANUS air sampling smoke detection system to be adapted perfectly to the application in question.

Temperature monitoring

Up to 5 external temperature sensors can be installed as part of the optional temperature module. These sensors can be placed anywhere within the monitored area. Temperature alarms are adjustable and, with the aid of programmable relays, allow appropriate counteractive measures to be implemented if necessary.

Programmable relays

The 5 programmable relays enable specific action to be taken in the case of specific events. This could be the forwarding of a temperature alarm from the optional temperature module.

1.2 Areas of Application

TITANUS *RACK·SENS*® 1U is a fire protection system to protect servers and control cabinets in 19" format.

Due to its specific characteristics, TITANUS *RACK·SENS*® 1U is particularly suitable for use in 19″ racks when:

- Fires need to be detected as early as possible in order to initiate counteractive measures and/or automatic shutdown,
- False alarms must be avoided,
- Only 1 height unit of space is available for the fire protection system,
- High to very high air speeds are present,
- A staged alarm concept needs to be implemented.

Object protection

TITANUS *RACK·SENS*® 1U is especially suited to monitor non-ventilated, forced-air cooled and air conditioned equipment/ cabinets such as:

EDP cabinets, server racks and network cabinets,
the basic hardware/software equipment to provide data processing and storing

Telecommunication racks,
vital for linking to the rest of the world using modern communication technology

Production control cabinets
which manage all manufacturing processes

Distribution, emergency power supply and other control cabinets,
which ensure a company's steady power supply to systems (light, air-conditioning, etc.)

Air samples are taken from the monitored cabinets (see fig. 1.1) via a pipe system with pre-defined aspiration sampling points. The samples are analysed for smoke by the TITANUS *RACK·SENS*® 1U. Staged alarm concepts can be easily implemented by using user selectable pre- and main alarm thresholds.

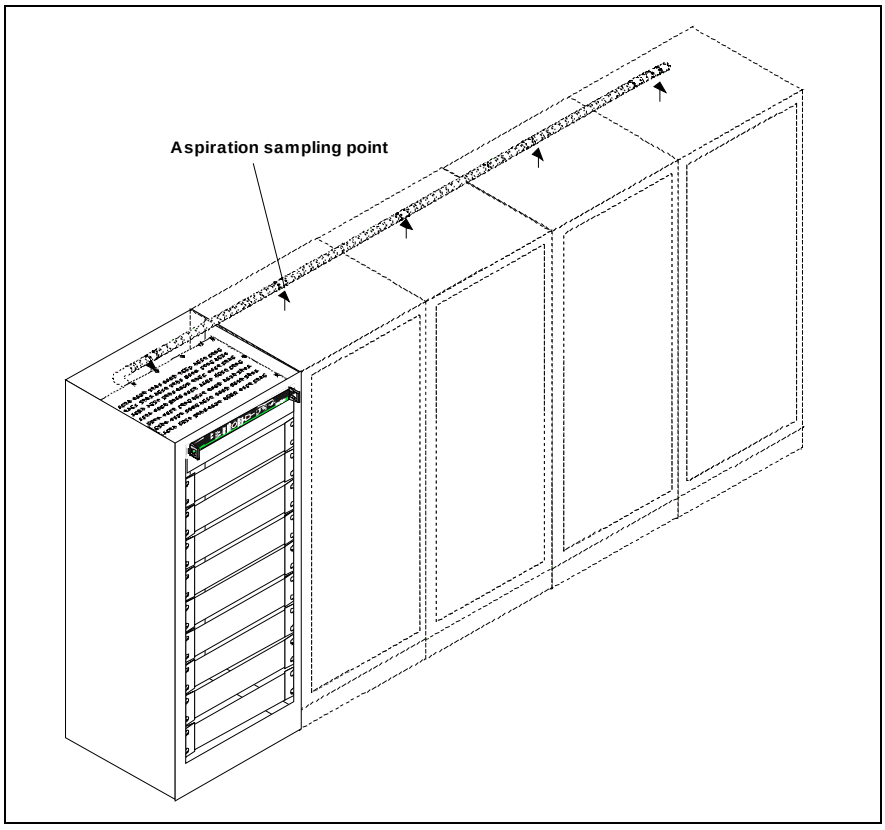


Fig. 1.1: Typical application of a TITANUS *RACK·SENS*® *1U monitoring a 19" cabinet her smoke*

2 Technical Description

2.1 System description

The TITANUS *RACK·SENS*® 1U air sampling smoke detection system consists of a 1U basic device with a detection unit and a pipe system.

The TITANUS *RACK·SENS*® 1U basic device consists of the following modules:

- One or two detection units for the detection of smoke aerosols whereby the second detection unit can be selected with a higher sensitivity for an even more sensible pre-alarm or on the other hand to implement a double knock system (2-detector coincidence detection). Main alarm will only be triggered if both detection units have reached their individual main alarm threshold.
- An aspiration unit (suction pressure generated by fan) to transport aspiration samples via the connected pipe system into the TITANUS *RACK·SENS* ® 1U.

The integrated air flow monitoring system monitors the pipe system for ruptured and blocked pipes. The pipe system mainly consists of pipes and fittings made of PVC or ABS.

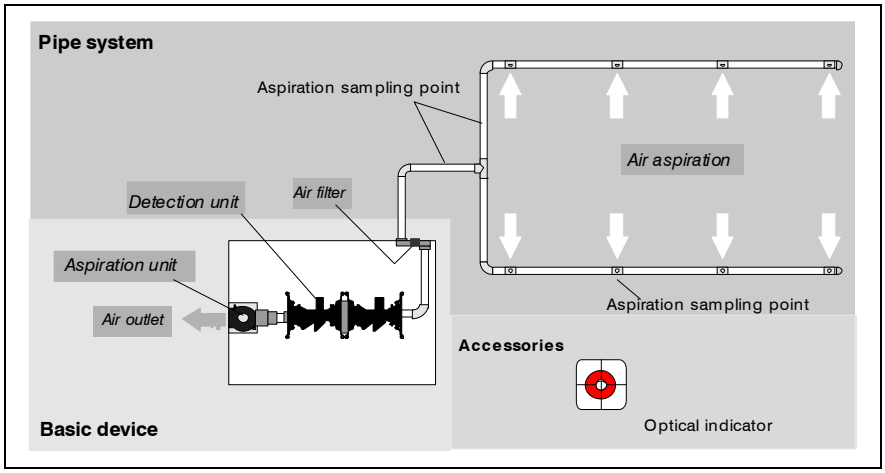


Fig. 2.1: Overview of TITANUS *RACK·SENS*® *air sampling smoke detection system*

In order to function properly even under severe conditions, an integrated air filter filters the incoming air for larger particles.

Optical indicators are optionally available for remote annunciation.

2.1.1 Functional description

1 U basic device Fire detection

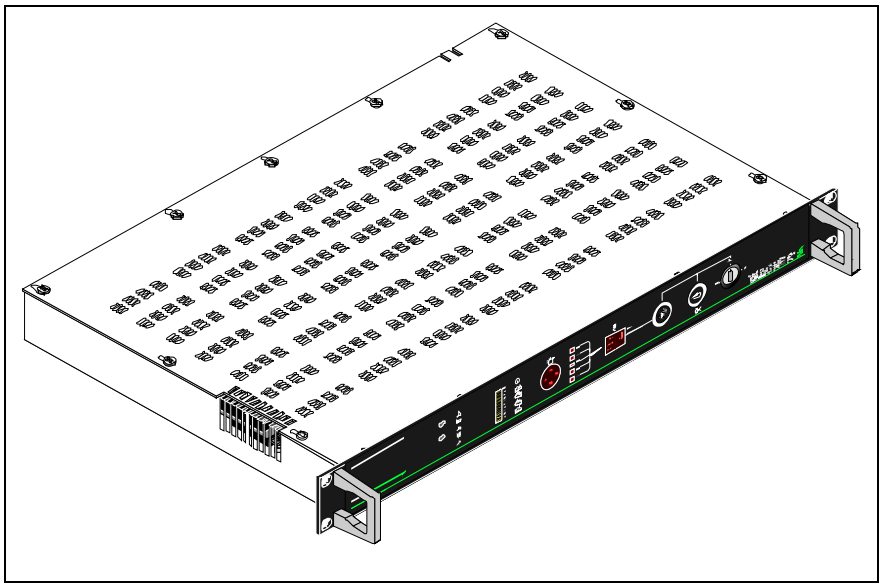


Fig. 2.2: TITANUS *RACK·SENS*® *1 U base device for fire detection*

The 1U basic device is a self-contained unit which can be used simply as a detection unit, or can be extended through an external extinguisher/shutdown module which activates external extinguishing cylinders.

Detection options

- 2nd detection unit
- Bargraph display (smoke)
- Temperature display
- Network capability
- Mains supply/emergency power

Detection and alarm

The air sampling smoke detector (optional second detector with the same or higher sensitivity) takes in air samples from the cabinet being monitored via the pre-defined aspiration sampling points in a pipe or hose system.

Once the pre- defined alarm thresholds are exceeded, a pre- or main alarm will be indicated.

Air flow monitoring

An air flow sensor checks the connected pipe system for breaks and blockages.

The airflow monitoring is **temperature-compensated** and can be configured **air pressure-dependent**.

After an adjustable fault delay period finishes, the fault is displayed on the front panel and, if connected to a fire alarm system, an appropriate signal is forwarded to the fire alarm system via a potential-free contact.

The basic signal process in the air flow sensor is shown in Fig. 2.3.

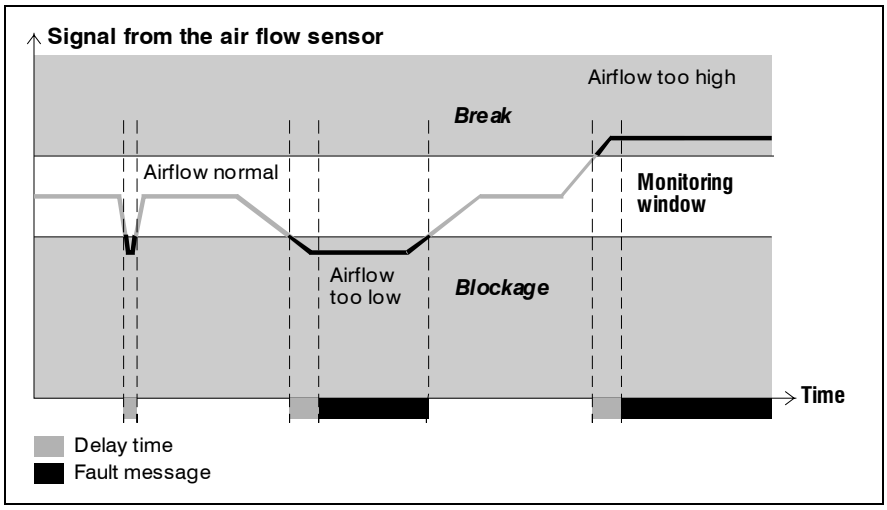


Fig. 2.3: Example of signal process in the air flow sensor in the event of a fault

Airflow adjustment

Air flow initialisation in the TITANUS *RACK·SENS*® 1U system is fully automatic by pressing the “Config” and “Reset” buttons simultaneous on the front panel. This reduces commisssionig time to a minimum.

Reset

A fault signal is reset using the reset button on the front panel of the device or by remote reset either via the connected fire alarm system or by an external contact.

Optical and acoustic alarm

In the event of a main alarm in the TITANUS *RACK·SENS*® 1U system, an internal optical and acoustic alarm is activated. The optical alarm is provided by a red alarm lamp on the front panel. The acoustic alarm is performed by an integrated buzzer.

2.1.2 Display panel [1]

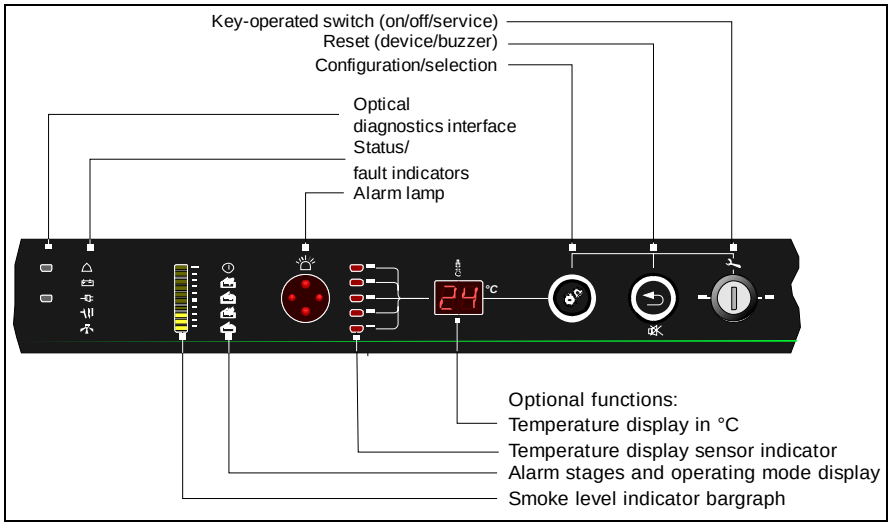


*Fig. 2.4: Display panel (*)*

Common fault(Fault) Active detector, network or battery-faults generate a common fault message, which is displayed by a “Fault” LED on the front panel. The fault can be forwarded via a potential-free contact to a fire alarm system, for instance. Further fault information details will be provided by the DIAG 3 diagnostics tool.

Other fault messages* A separate LED is provided for the following fault signals:

- Battery fault (Battery)
- Mains fault (Mains)

Status signals

Service / blocked Blocking of extinguisher activation by the door contact switch or in service mode by activating the key-operated switch.

Released The red LED “Released” serves two functions. Firstly it flashes once an optional electrical shutdown process has been initiated and secondly it will be permanently on if an optionally connected TITANUS *RACK·SENS*® extinguishing systems has been set off (discharge of extinguishing agent).

Bargraph* The current smoke level in the detection unit is displayed by a ten-digit bargraph display.

[1] ***** depending on actual featureset (options)

Operating mode indicator

The TITANUS *RACK·SENS*® 1U operating mode indicator is continually lit up during normal operation. The operating mode indicator flashes in the event of data transmission for fault diagnostics in the DIAG 3 via the infrared diagnostics interface as well as when air flow is initiated.

Indicators for * pre- and main alarm

Each detector unit has a pre-alarm and main alarm indicator. If 2 detection units are installed, these are automatically linked together as a double knock system (2 detector coincidence detection). This means that if both indicators display main alarm, this could optionally lead to a shutdown of external equipment, or activate the extinguishing system after a pre-warning period.

Alarm lamp

The alarm lamp is a large-surfaced, highly visible indicator light for the main alarm.

Sensor indicator*

The sensor indicator consists of a vertical array of five LED indicators (numbered from 1 to 5) and shows which sensor of the maximum of 5 connectable temperature sensors is in alarm status. You will find further information on this in the description of the “Config/Temp” button.

Temperature indicator *

This 2-digit 7-segment indicator displays the current temperature for the connected temperature sensors in ºC. The “Config/Temp” button enables the current temperature readings to be shown for all sensors.

„Config / Temp“ button

The “Config / Temp” button provides dual functionality. On the one hand it allows to eliminate (disable) faulty or detached bus modules such as extinguishing-/shutdown or just shutdown modules. On the other hand individual temperature readings of up to five connected temperature sensors can be selected by this button.

Reset/ Buzzer Off button

The TITANUS *RACK·SENS*® 1U device has a reset button on the front of the base device to reset alarm and fault indicators. This button enables the alarm and fault signals to be reset once the cause has been eliminated. The internal buzzer can also be switched off using this button.

Key-operated switch Off/Service/On

The key-operated switch enables the device to be turned on and off and switched to service mode for maintenance purposes.

Network

Several TITANUS *RACK·SENS*® 1U devices can optionally be connected to a network.

This network system enables the user to monitor status messages in all connected TITANUS *RACK·SENS*® 1U devices. In doing so, all processes for aspects such as smoke levels, air flow values and alarm and fault statuses are transmitted via the bus system.

The visualisation software VisuLAN-T and an associated TITANUS *RACK·SENS*® 1U network module are required to operate TITANUS *RACK·SENS*® 1U in a network and are available as an option.

2.2 TITANUS *RACK·SENS*® 1U and accessories

2.2.1 Overview

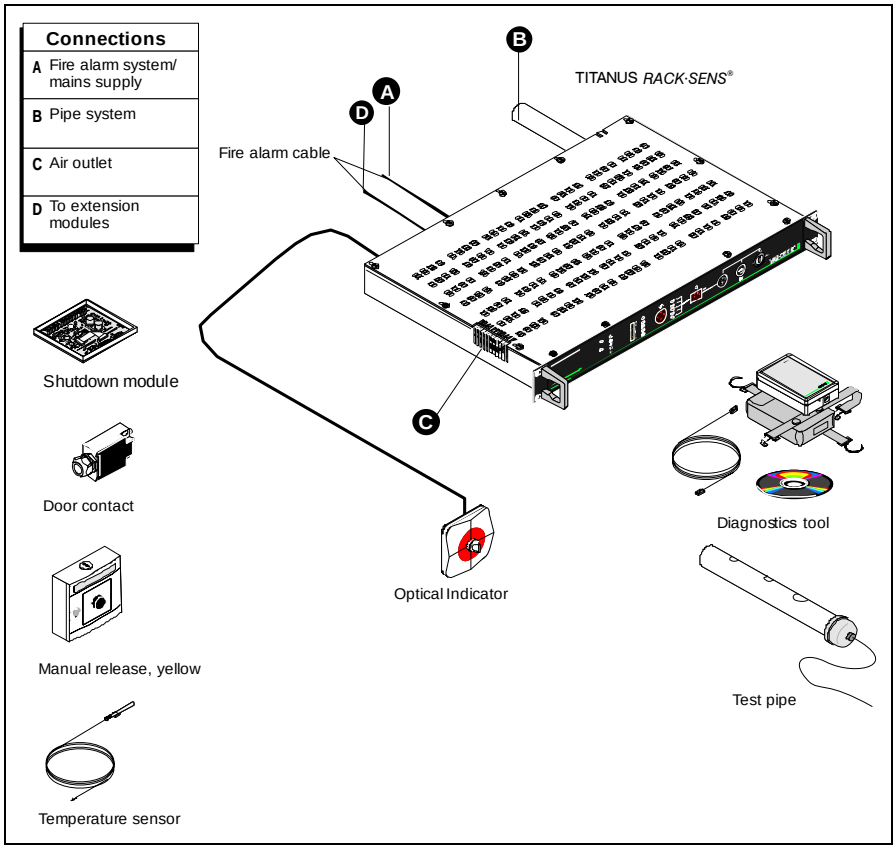


Fig. 2.5: Overview TITANUS *RACK·SENS*® 1U

The components pictured above are optional.

2.2.2 TITANUS *RACK·SENS*® 1U air sampling smoke detection system

The TITANUS *RACK·SENS*® 1U air sampling smoke detection system consists of a detection unit connected to a pipe system.

Detection unit

- Connection for 25mm sampling pipe
- Potential-free contacts to connect to a fire alarm system
- Connecting terminals for the mains supply or 24 V supply
- Sensitive detection with state-of-the-art technology based on the scattered light alarm principle with integrated air flow monitoring
- Optical indicators for smoke levels, pre-alarm, main alarm, fault, service/blocked status, temperature display and power on
- Infrared interface for diagnostics
- Key-operated switch to isolate device from fire alarm panel and for switching the device off
- Reset buttons on front panel
- Config/Temp button

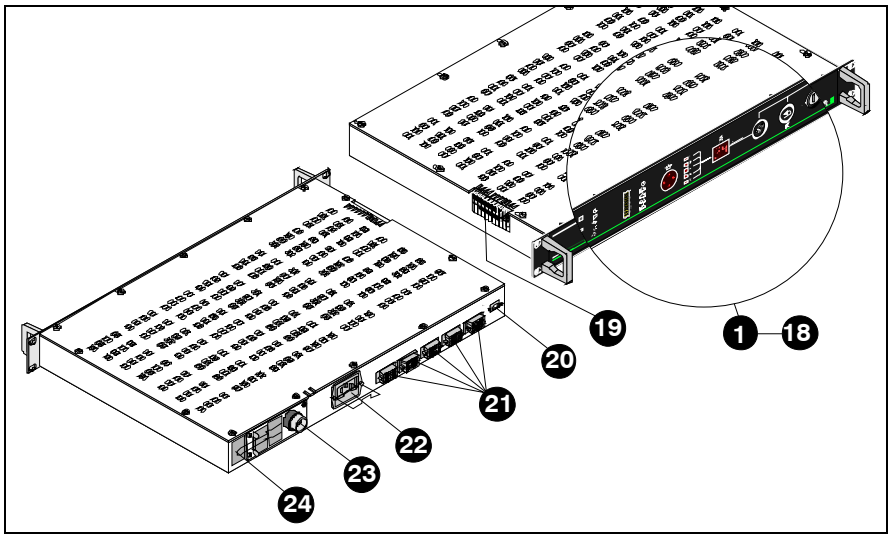


Fig. 2.6: TITANUS *RACK·SENS*® 1U *indicators and connections (or explanation, see table on next page)*

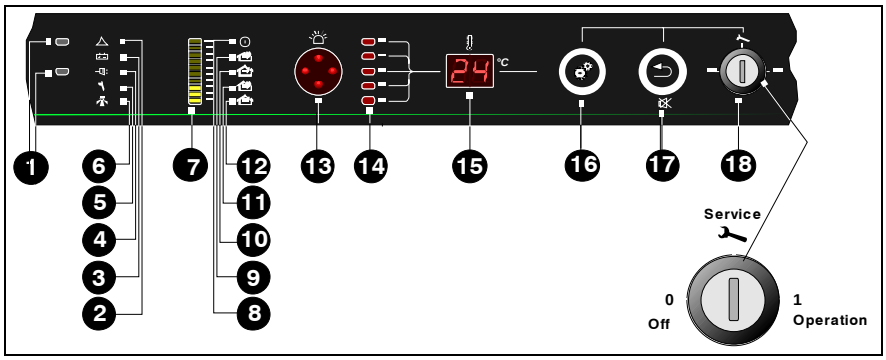


Fig. 2.7: TITANUS *RACK·SENS*® 1U *indicators and connections (for explanation, see number 1in table on next page)*

TITANUS *RACK·SENS*® 1U Front

Number in Fig. 2.6		Function	Explanation
		Indicators (see Fig. 2.7)	
1		Indicator – interface for diagnostic tool	Commissioning and diagnostics
2		Indicator for common fault	Common fault
3		Indicator for Battery fault *	Battery fault
4		Indicator for mains fault *	Mains fault
5		Indicator for Service / blocked	Isolate mode for service, blocked by door contact
6		Indicator for extinguishing triggered or shutdown (flashing)	
7		Bargraph (10 yellow LED's) *	Current smoke level
8		Operating mode indicator	Operating mode
9		Indicator for main alarm detector 1	
10		Indicator for pre alarm detector 1	Pre-alarm detector 1, adjustable to 10% - 80% of main alarm
11		Indicator for main alarm detector 2 *	
12		Indicator for pre alarm detector 2 *	Pre-alarm detector 2, adjustable to 10% - 80% of main alarm
13		Indicator for main alarm	Large main alarm indicator
14		Localisation temperature sensors *	Indicators for temperature sensors
15		Temperature display *	
16		Button for configuration and temperature module	Setting of temperature module configuration
17		Reset Buzzer Off (button)	Resetting of device and switching off of buzzer
18		Key-operated switch	Device on/off and isolation for servicing

* depends on actual configuration

	Connector (see Fig. 2.6)	
19	Air outlet	
20	Network cable connection	
21	Connection board	
See terminal assignment in section 5	X1	Fire Panel
	X2	Fire Panel
	X3	Exting. Modul
	X4	Temp. Sensors
	X5	Relays
22	Mains input	
23	Connection for sampling pipe	For ∅ 25 mm pipe system
24	Air filter	

2.2.3 Operation

TITANUS *RACK·SENS*® 1U operation may be required due to:

- A fire
- Servicing / inspection
- A fault in the device

Isolate/blocked

TITANUS *RACK·SENS*® 1U provides on isolate function to suppress alarm and fault signals and to inhibit the release of an extinguishing agent. The functions described below are primarily useful for installers and and service technicians.

Key switch

The TITANUS *RACK·SENS*® 1U device can be put into the following 3 operating models via the key switch:

1. OFF
2. ON/Service
3. ON/operational

In Service-Mode all fault and alarm relays will be deactivated (isolated). No alarm or fault signals will be forwarded to the fire panel. This operation mode is flagged up by the service/blocked relay contact output. This contact will also be activated if one of the door contact switches is not closed (door open).

This contact output (Service) is to be seen as an additional fault signal. For a proper installation this contact needs to be forwarded to a fire panel. In order to save the additionally required input line at the fire panel, an alternative wiring scheme is provided in chapter 5.

Blockage

Extinguishing is blocked/disabled when a door is opened. Note, that object shutdown is independent of this and will take place when key switch is “ON” and a main alarm is present.

The following table shows depending on key switch and door contact conditions when shutdown or extinguishing is enabled or disabled.

	Key switch	**Door contact**
Shutdown enabled	„ON“	Open or closed
Shutdown disabled	„Service“	Open or closed
Extinguishing enabled	„ON“	Closed
Extinguishing disabled	„ON“	Open
	„Service“	Open or closed

If the unit is set to key switch position “ON”, activation of the manual release will result in an immediate discharge of extinguish ant and can only be disabled via the door contact switches (release blocked). Once extinguishing has been activated, it cannot be stopped.

Before re-enabling extinguishing via key switch activation, all alarms must have cleared out and the manual release must be reset!

Device fault If the fault indicator lights up, a trained employee or WAGNER service must be informed.

In the event of fire

- Detection unit 1 and detection unit 2 (according to selected options) detect smoke fumes and activate alarm.
- “Pre-alarm 1”, “Alarm 1” and, if present, “Pre-alarm 2”, “Alarm 2”
  - are flashing during a possible alarm delay period.
  - change to a continuous light after the delay period finishes.
- The internal buzzer sounds.
- The large red “alarm lamp” indicator flashes.
- The TITANUS *RACK·SENS*® 1U can carry out control functions such as shutting down cabinet fans via the 5 user programmable relays (only 24 V fans, otherwise through auxiliary relays).
- If necessary, the TITANUS *RACK·SENS*® 1U will control the shutdown of the electronics cabinets being monitored via the external shutdown module.
- Extinguishing will take place after a main alarm was triggered plus a maximum time of 60 sec. pre-warning time.
  LED “Extinguishing release” flashes during pre-warning time and will be permanently on thereafter.

Please note, that if the protected objected was not disconnected from its power source when a fire incident was detected, it is possible, that the fire may re-ignite due to loss of extinguishing agent concentration after discharge.

After release The unit will stay in alarm until it has been reset.

2.2.4 Diagnostics tool

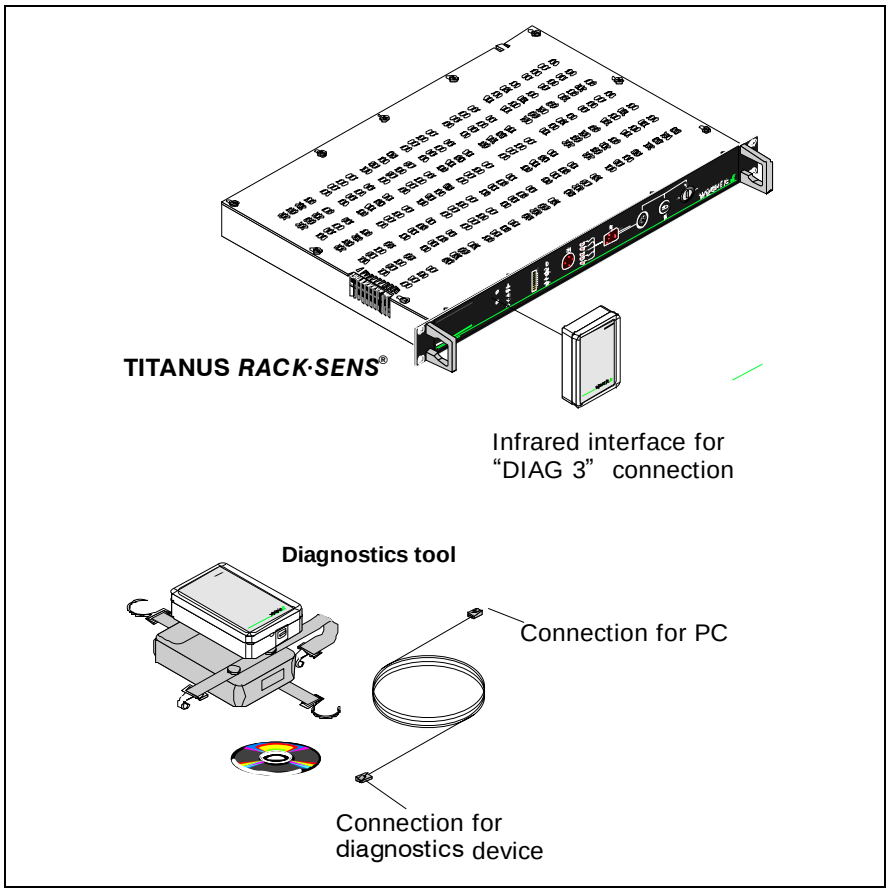


Fig. 2.8: Diagnostics tool to retrieve and store device data

The DIAG 3 diagnostics tool allows for configuration changes for the TITANUS *RACK·SENS*® 1U during commissioning. For maintenance and servicing, the diagnostics software offers the option of displaying the stored and current device status as well as fault messages from the TITANUS *RACK·SENS*® on a PC or laptop. Data is transmitted to the diagnostics device via the TITANUS *RACK·SENS*® 1U infrared interface. A USB cable is provided to transmit data from the diagnostics to the PC or laptop.

TIP

It is recommended to copy all relevant set-up data during commissioning and store this data together with the commissioning report.

The DIAG 3 diagnostics tool allows to delete stored fault signals at any time. The signals remain stored in the TITANUS *RACK·SENS*® 1U until they are reset. This enables short, sporadic faults to be evaluated (e.g. after changing operating conditions).

2.2.5 Optical Indicator

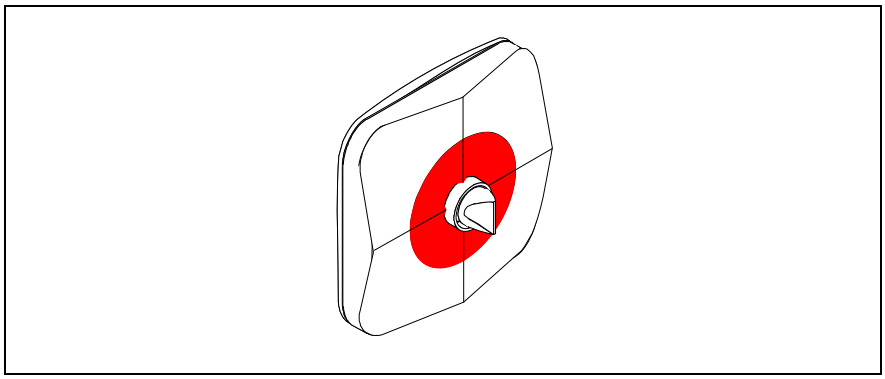


Fig. 2.9: Optical Indicator

When installing TITANUS *RACK·SENS*® 1U, optical indicators can be used as a remote alarm indicator. It requires a separate 24V supply.

2.3 Pipe system

The pipe system serves to take representative air samples from the protected area. TITANUS *RACK·SENS*® 1U systems are preferably integrated into the cabinet in order to keep the sampling system as simple as possible. Cabinets with re-circulated air can be monitored with a so-called standard sampling pipe with a single aspiration hole. Cabinets with several air outlets must be equipped with individually configured pipe system.

2.3.1 Complete overview of available pipe components

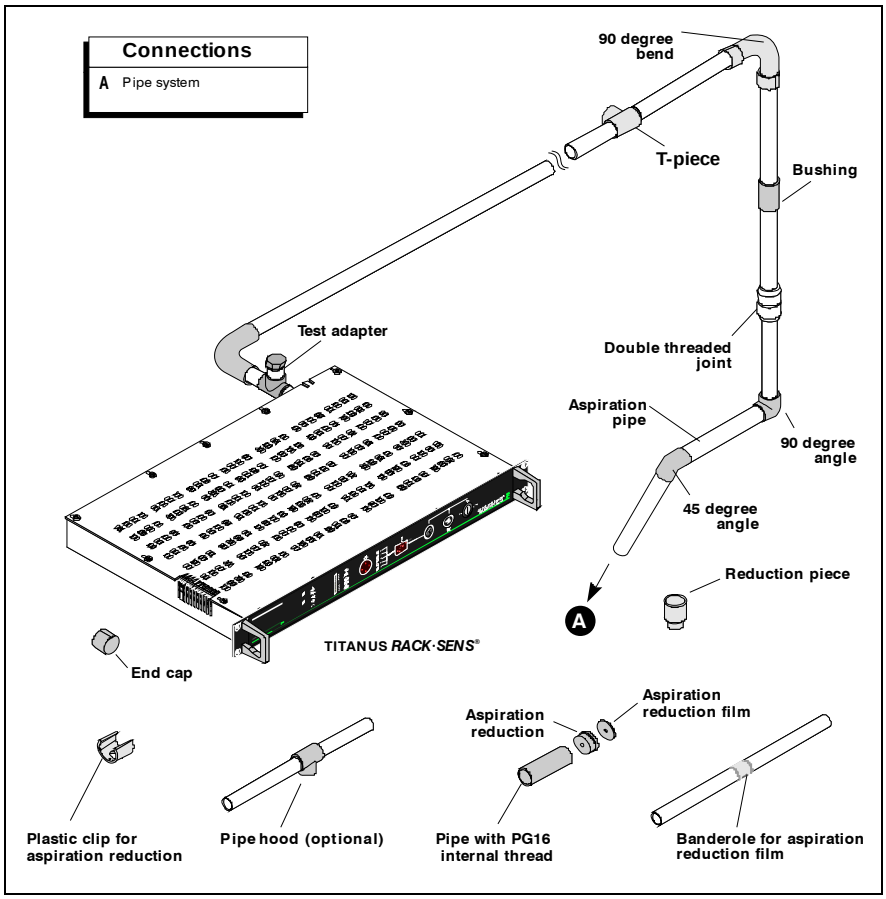


Fig. 2.10: Pipe system components for air sampling smoke detection systems

The accessory components shown in fig. 2.10 should be selected for the respective cases of operation and can be used in different combinations.

2.3.1.1 Standard sampling pipe

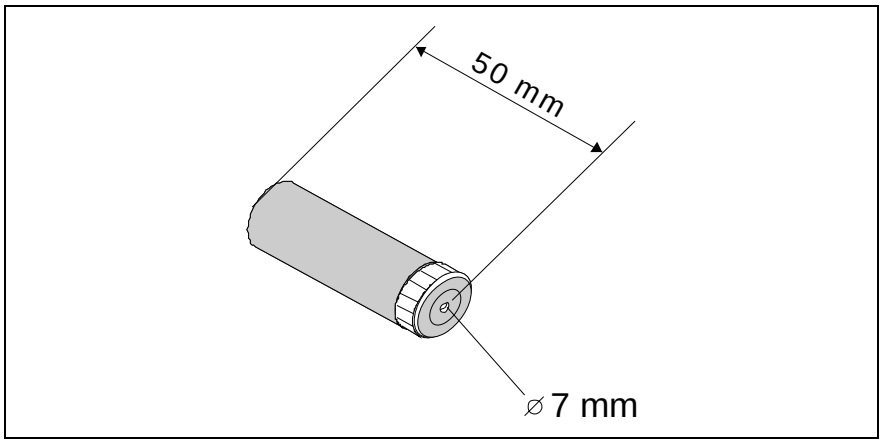


Fig. 2.11: Standard sampling pipe Type AP-1

The standard sampling pipe type AP-1 is especially designed for cabinets cooled by re-circulated air. As any possible smoke fumes are evenly distributed in such cabinets, this standard sampling pipe can be used here in order to save on installation expenses for a conventional pipe system.

By installing in the TITANUS *RACK·SENS*® 1U uppermost rack, the unit should be cable to detect smoke, even in a case when ventilation fails as smoke will typically climb upwards in the event of fire.

ATTENTION

Only to be used for cabinets cooled by re-circulated air.

2.3.2 Aspiration Reduction Films

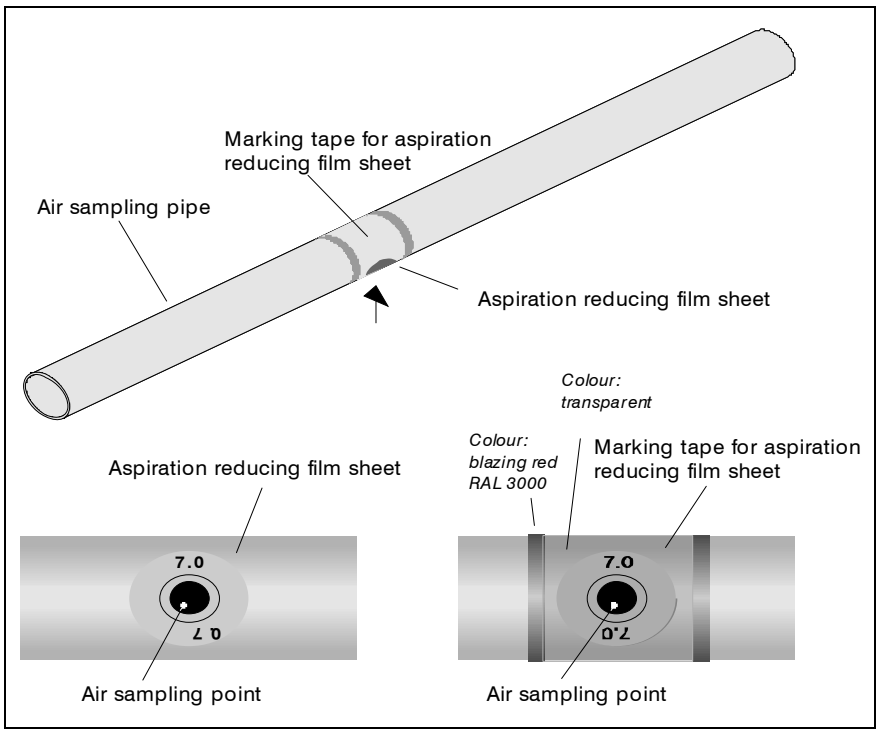


Fig. 2.12: Aspiration aperture with aspiration reduction film and banderol

A sampling vent is a 10 mm bore hole in a sampling pipe which is covered with a patented aspiration-reducing film sheet with the required opening diameter. The size of the opening depends on the pipe system installation (see section 4 – “Project Planning”).

To prevent the aspiration reduction film coming loose, it is held in place by a banderol. The banderol is a transparent adhesive film with red edges and a 10 mm large hole. It is stuck over the aspiration reduction film in such a way that the aspiration aperture is not covered and is also visible at larger distances.

2.3.3 Integrated air filter

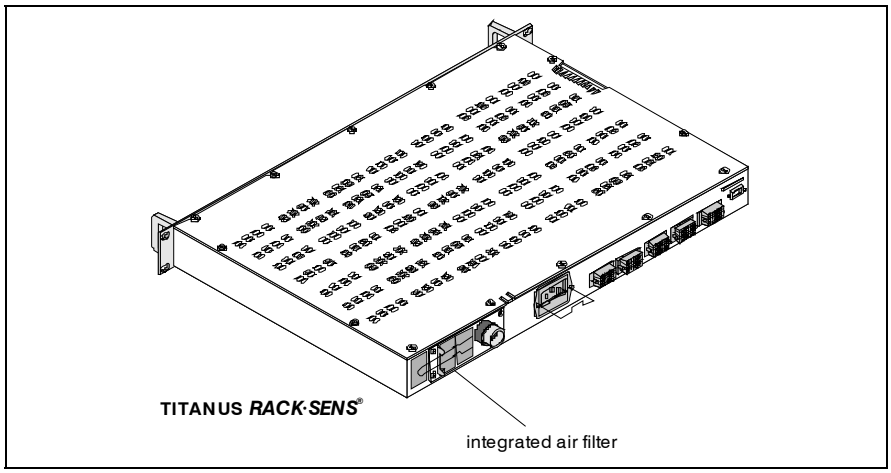


Fig. 2.13: TITANUS *RACK·SENS*® 1U *with air filter*

TITANUS *RACK·SENS*® 1U has an integrated air filter which is automatically monitored for contamination (blockage) by the air flow monitoring system. If the air filter is dirty, the filter insert should be replaced by opening up the filter casing.

2.3.4 Shutdown module

-

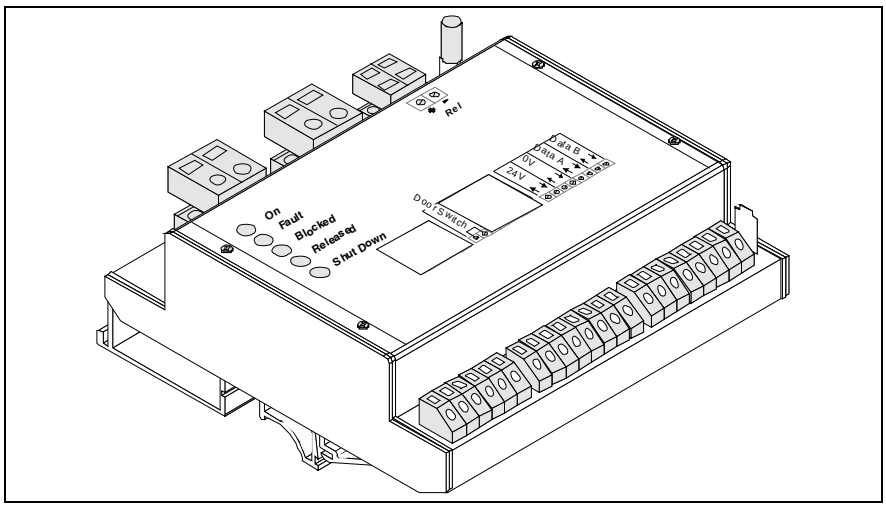


Fig. 2.14: Shutdown module

Shutdown of external devices or a cabinet is possible using a type SU-3 shutdown module. When TITANUS *RACK·SENS*® 1U is installed, shutdown takes place via a shutdown relay via a monitored output in the shutdown module. A suitable power relay should be provided for larger electrical loads (see section 4.7).

2.3.5 Temperature sensor

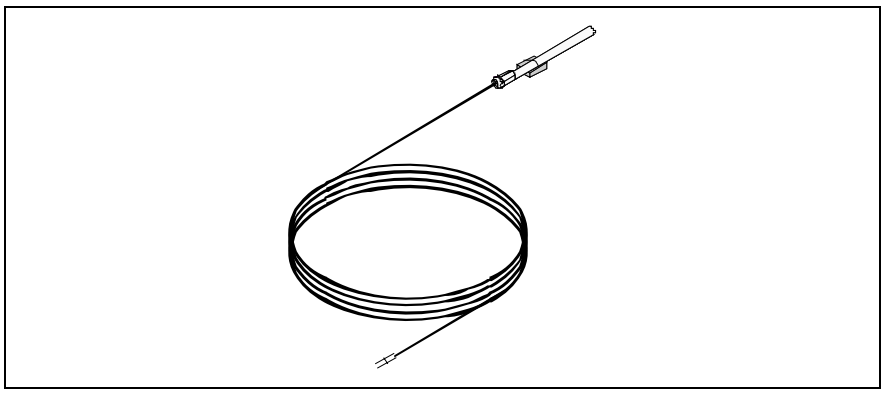


Fig. 2.15: Temperature sensor

Up to 5 external temperature sensors can be connected as an extension for an optional temperature module to monitor local temperature increases in the cabinet being monitored. A maximum of 5 selectable temperature sensors can be fitted anywhere in the cabinet.

2.3.6 Door contact switch

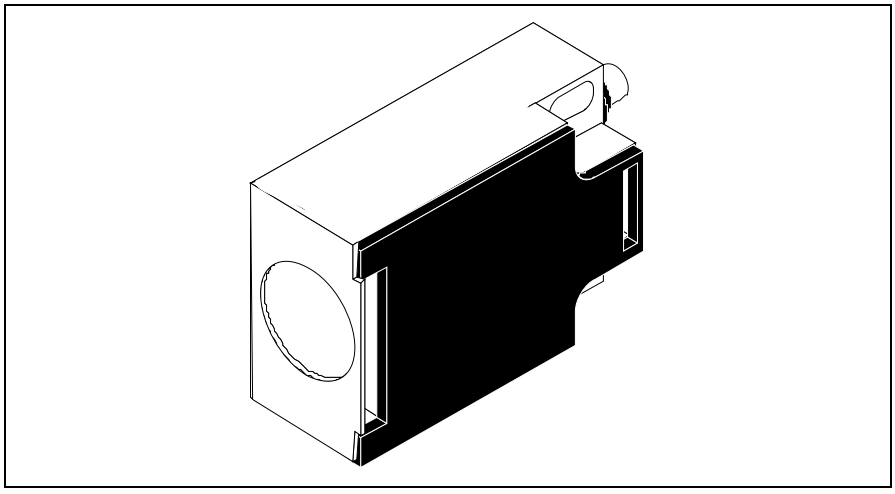


Fig. 2.16: Door contact switch

The door contact switches enable the position of the cabinet doors to be monitored in the area monitored by TITANUS *RACK·SENS*® 1U. As soon as doors are opened for longer than ten seconds without acknowledging their status by the key-operated switch, a fault will be displayed on the front panel and a connected fire alarm system. In such a case, the fault signal is forwarded via a potential-free contact to a fire alarm system. A large number of door contact switches can be connected in series to provide supervision for multiple doors.

3 Technical Data

INSTRUCTION

All power consumption figures relate to an ambient temperature of 20°C.

3.1 TITANUS *RACK·SENS*® 1U

		TITANUS *RACK·SENS*® 1U			
Supply 24 V	Supply voltage (Ue) Nominal supply voltage	15 - 30 V 24 V DC			
Optional mains supply 230 V	Supply voltage (Ue) Nominal supply voltage	100 – 240 V AC 230 V AC			
Current		U_L[1]= 9 V (at 24 V)	U_L = 10,5V (at 24 V)	U_L = 12 V (at 24 V)	U_L = 13,5V (at 24 V)
	Starting current[2], IN-Rush current [2]	190 mA	190 mA	190 mA	190 mA
	Standby current[2]	160 mA	175 mA	215 mA	255 mA
	Alarm current[2]	205 mA	220 mA	260 mA	310 mA
		Standby		Alarm/ to activate	
	Other: Bargraph and pre-alarm	-		70 mA	
	Additionally: 2. Detector	10 mA		15 mA	
	Additionally: Shutdown module	10 mA		50 mA	
Dimension	Dimensions (H x W x D mm)	43,6 x 443 x 300			
	Dimensions with front panel (H x W x D mm)	43,6 x 483 x 300			
Weight	Weight full featured	ca. 6,4 kg			
Outputs	Contact loading capacity of the alarm and fault relays	1 A / 30 VA / 30 V			

[1] U_L = Fan voltage
[2] without extra module

		TITANUS *RACK·SENS*® 1U
Sound pressure level	L_a acc. to DIN 45633/IEC-651	41 dB(A) at U_L = 9 V
Protection class	Protection class (EN 60 529)	IP20
Housing	Material	Steel sheet, hot-dip galvanised
	Colour	zinc grey
Front panel	Material	Aluminium, chrome-plated and paint finish
	Colour	RAL 7021 black grey RAL 9018 papyrus white
Temperature range		0°C – 40 °C
Humidity	non-condensing	Class F acc. to DIN 40040
Fan	Design	Radial
	Service life for fan (12 V)	60000 h at 40 °C
Display	Operating	green operating display
	Service / blocked	yellow fault display
	Alarm	red alarm display
	Pre-alarm	red alarm display
	Fault	yellow common fault
	Battery	yellow fault display
	Mains	yellow fault display
	Released	red display
	Smoke level indicator	yellow smoke level indicator 1 to 10
	Alarm indicator	red indicator
	Temperature display	Red 2 x 7 segment display
	Temperature sensor location	5 red LEDs

Infrared interface

	TITANUS *RACK·SENS*® 1U
Infrared interface	IR Transmitter/ receiver

Connections

Terminal connections	1 mm^2
Cable	twisted pair
Conical pipe plug-in connection	1 x for sampling pipe ∅ 25 mm

Reaction sensitivity

Detection unit	
TR1-10	0,1 to 2,0 % obs./m
TR1-50	0,5 to 2,0 % obs./m

3.2 Pipe system TITANUS *RACK·SENS*® 1U

Pipe system

TITANUS *RACK·SENS*® 1U	**Pipe system**
max. pipe length ∅ 25 mm	15 m
plus max. pipe length ∅ 12 mm	8 x 3 m
max. no. of aspiration holes	10
Temperature range PVC-pipe ABS-pipe	 0° C – +60° C -40° C – +80° C

3.3 TITANUS *RACK·SENS*® 1U accessories

Shutdown module

	TITANUS *RACK·SENS*® 1U
Dimensions	49 x 111 x 111
Temperature range	0 – 40 °C
Connections	Terminal strips, multi-pin connectors
Weight	approx. 300 g
Operation	green operating display
Blocked	yellow fault display
Fault	yellow fault display
Released	red display
Shutdown	red display

4 Design

4.1 General

The following describes the project planning of the air sampling smoke detection system to EN 54-20. The basic conditions are described in Chapter 4.1. The project planning is to be conducted in accordance with Chapter 4.2.

EN 54-20:

Project planning criterion	Technical solution	Basic Principles	Limitations
Device protection/cabinet monitoring	Simplified pipe project planning	Chapter 4.2	Chapter 4.4.3

4.1.1 Regulations

The current respective national regulations in each particular country must also be complied with and project planning must be adjusted to such regulations.

EN 54-20

The air sampling smoke detection systems shall be planned in accordance with the project planning guidelines described in Chapter 4.2.1 in order to be compliant with EN 54-20.

The following guidelines must also be complied with for systems in accordance with the requirements of VdS Schadenverhütung:

- "Guideline for automatic fire alarm systems, planning and installation", VdS Schadenverhütung GmbH, Cologne, Germany (VdS 2095)
- "Local application protection for electric and electronic equipment - rules for planning and installation" guideline, VdS Schadenverhütung GmbH, Cologne, Germany (VdS 2304)
- The technical bulletin “Project Planning for air sampling fire alarms” VdS Schadenverhütung GmbH, Cologne, Germany (VdS 3435)

The following national regulations must also be complied with in Germany, for instance:

- DIN VDE 0833 part 1 and 2 "Alarm systems for fire, intrusion und hold-up"
- Additional regulations for installing fire alarm systems which are laid down by fire authorities and building supervisory boards or building regulation authorities and are only valid locally.

4.1.2 Positioning the TITANUS RACK·SENS® 1U and the pipe system for detection

The following aspects should be taken into consideration when deciding on where to position the TITANUS *RACK·SENS*® 1U device:

- The TITANUS *RACK·SENS*® 1U indicators must be clearly visible. They should be preferably visible from the entrance door.
- Doors, inspection accesses and operational controls must remain easily accessible for the device itself.
- Ventilation must not be obstructed in the equipment being monitored.
- The TITANUS *RACK·SENS*® 1U installation must be protected against damage.

4.2 Project planning – Smoke aspiration

Section 4.3 contains the project planning guidelines for smoke aspiration in the TITANUS *RACK·SENS*® 1U - cabinet system.

4.2.1 TITANUS *RACK·SENS*® 1U

TITANUS *RACK·SENS*® 1U is designed for direct installation in a 19“-cabinet. Air samples are drawn in by the TITANUS *RACK·SENS*® 1U basic unit via a pipe system and analysed for smoke.

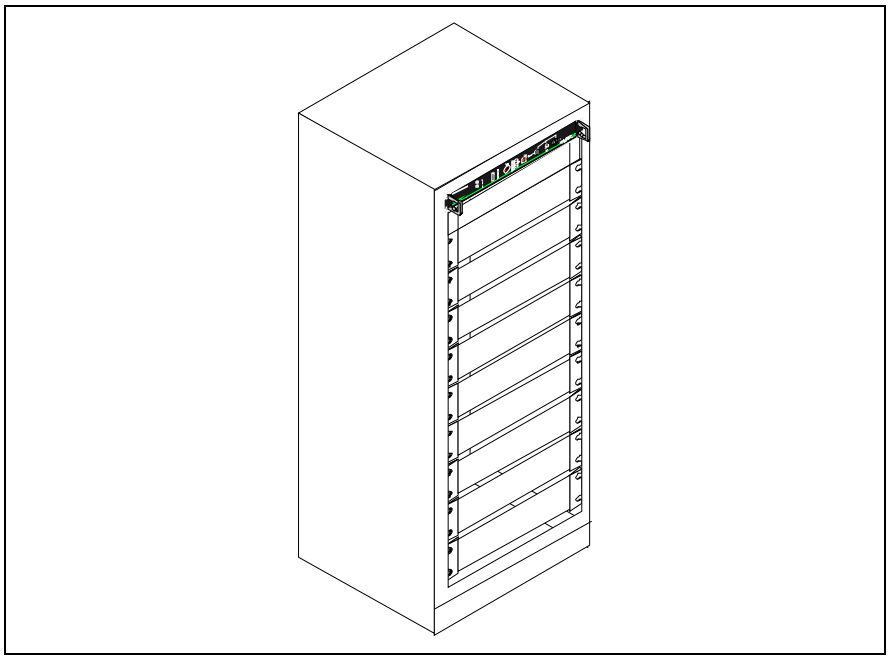


Fig. 4.1: Example of TITANUS *RACK·SENS*® *1U installation*

4.3 Project planning for 19” cabinets

4.3.1 Smoke detection in 19” cabinets with standard sampling pipe

In most cases the standard sampling pipe can be used for enclosed racks. It should, however, be re-assured by additional tests, that adequate detection is guaranteed in the event of an air circulation/air-conditioning failure.

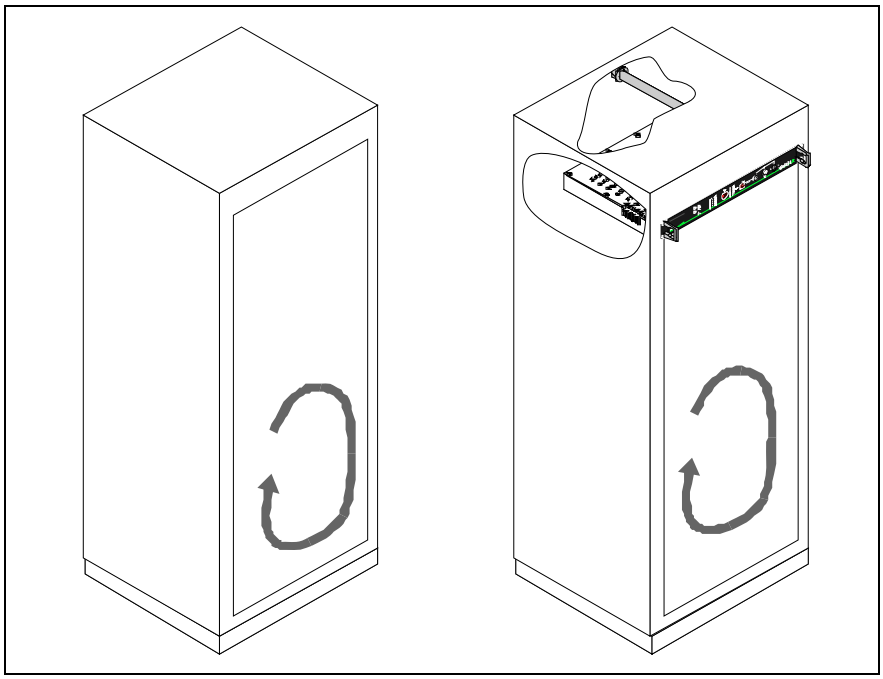


Fig. 4.2: 19“ closed cabinet

Cabinet type	Closed cabinet with air circulation
Detection	With standard sampling pipe

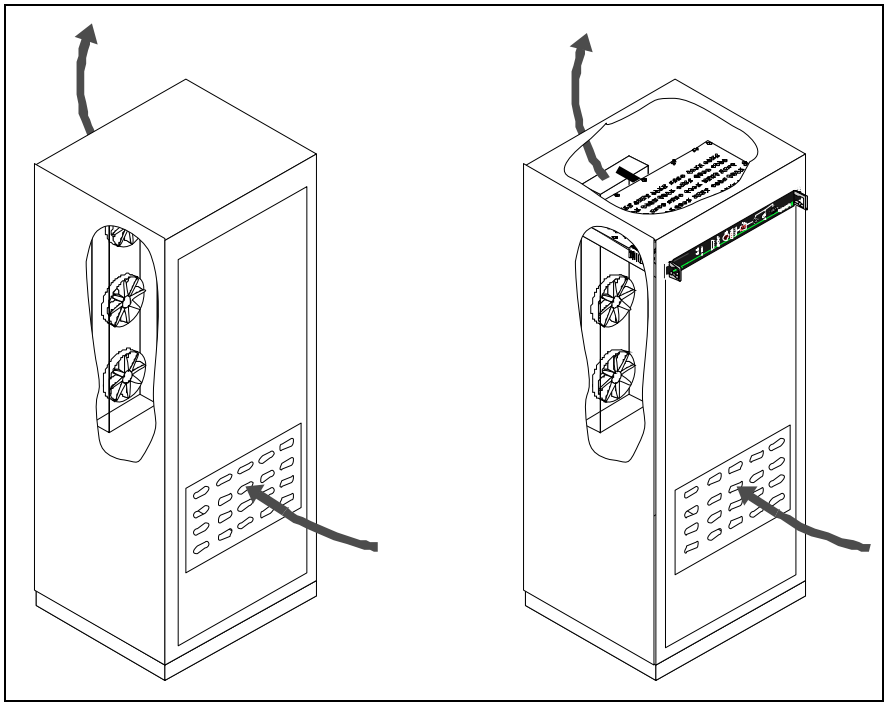


Fig. 4.3: 19“closed cabinet with air inlet at front

Cabinet type	Closed, with air inlet at front and air outlet at rear
Detection	Position standard sampling pipe in air outlet at rear

4.3.2 Smoke detection in 19” cabinets with customised sampling pipe

In cabinets with natural convection or forced air flow (e.g. through ventilator), customised sampling pipes should be used according to the following project planning instruction.

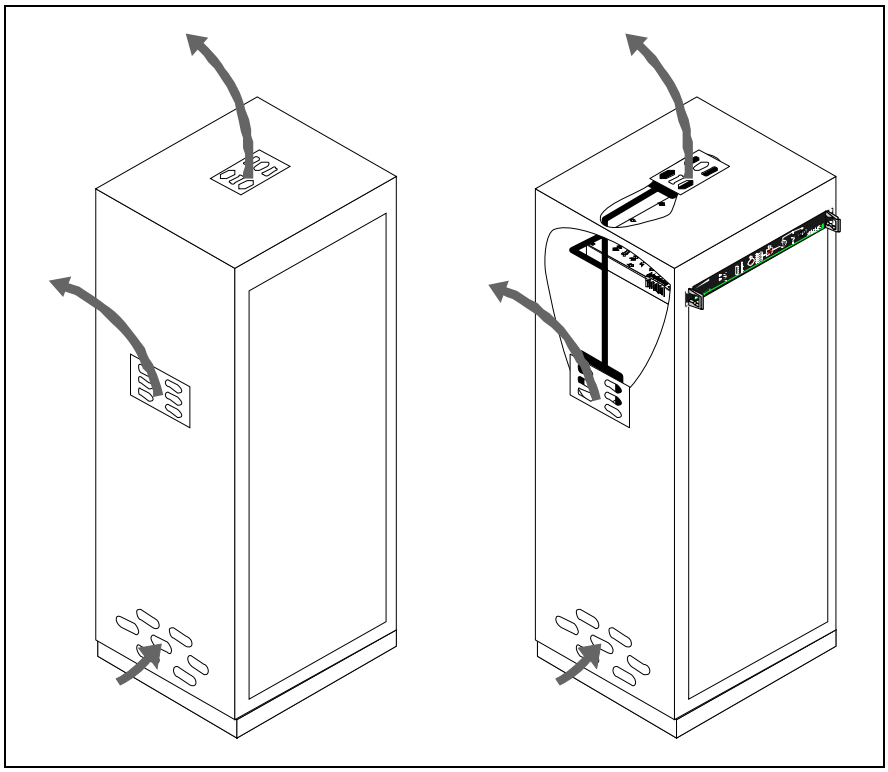


Fig. 4.4: 19“ closed cabinet with defined air outlets

Cabinet type	Closed rack with defined vents Cooling by natural convection with air inlet and discharge air outlets
Detection	Position sampling pipe in front of discharge air outlet grille

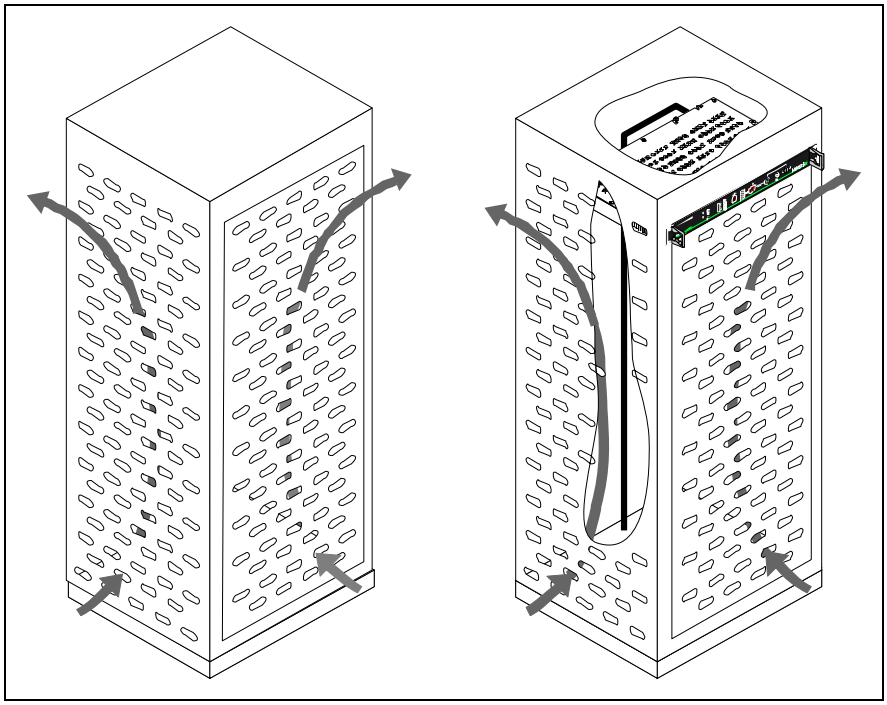


Fig. 4.5: 19“ open cabinet

Cabinet type	Open cabinet with perforated metal doors Cooling by natural convection Air flow is undefined
Detection	Test air flow current (dependent on built-in devices) Plan and position sampling pipe according to test results

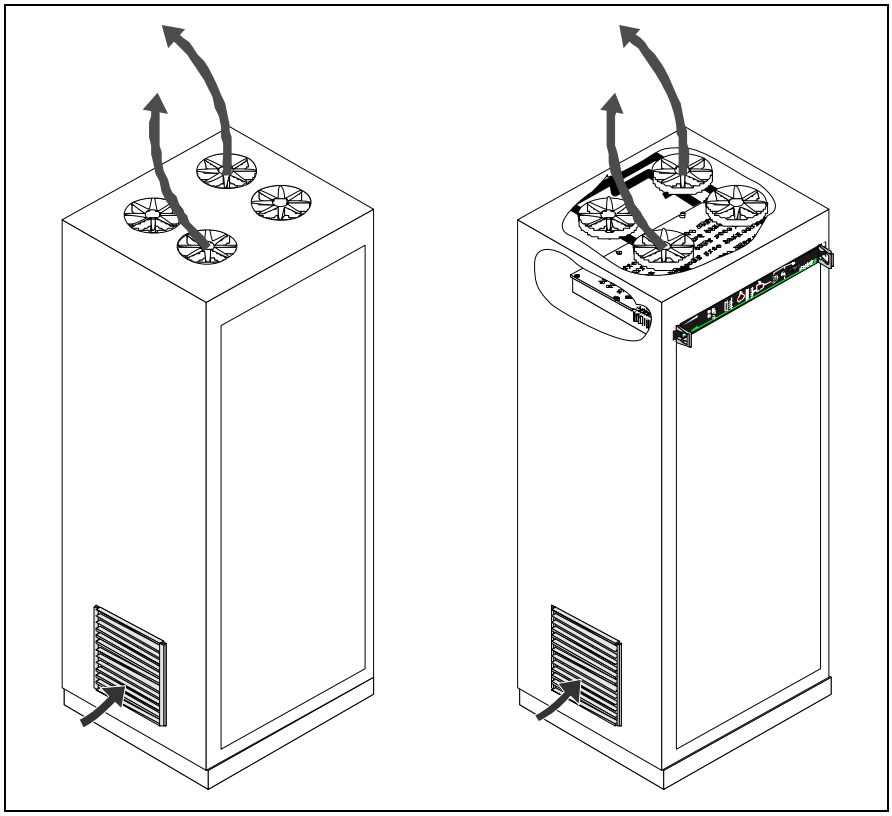


Fig. 4.6: 19“enclosed cabinet with forced air cooling

Cabinet type	Closed cabinet with forced-air cooling through roof fans
Detection	Position sampling pipe in U-shape under the roof fans

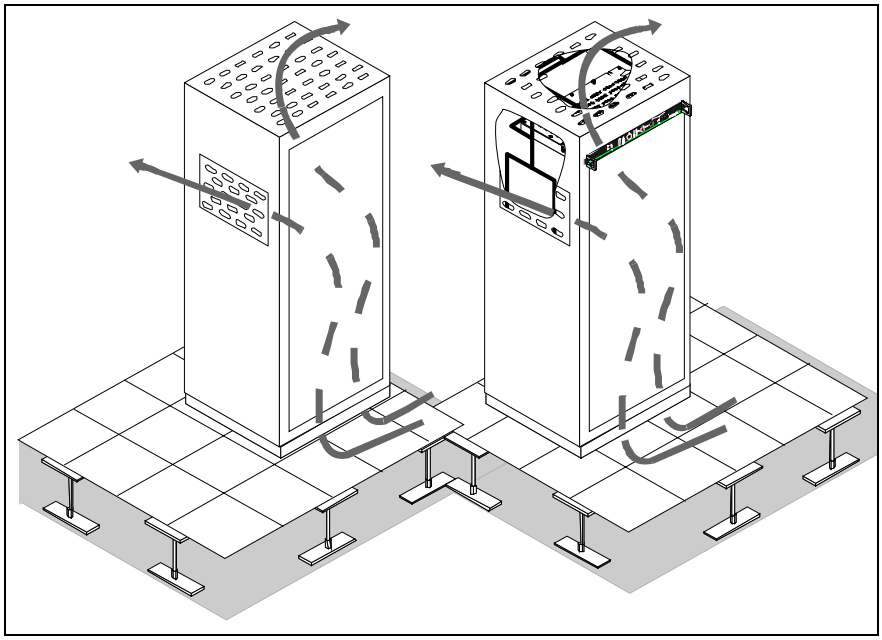


Fig. 4.7: 19“cabinet cooled through false floor

Cabinet type	Cooled through false floor
Detection	Position sampling pipe in U-shape at outlet grille

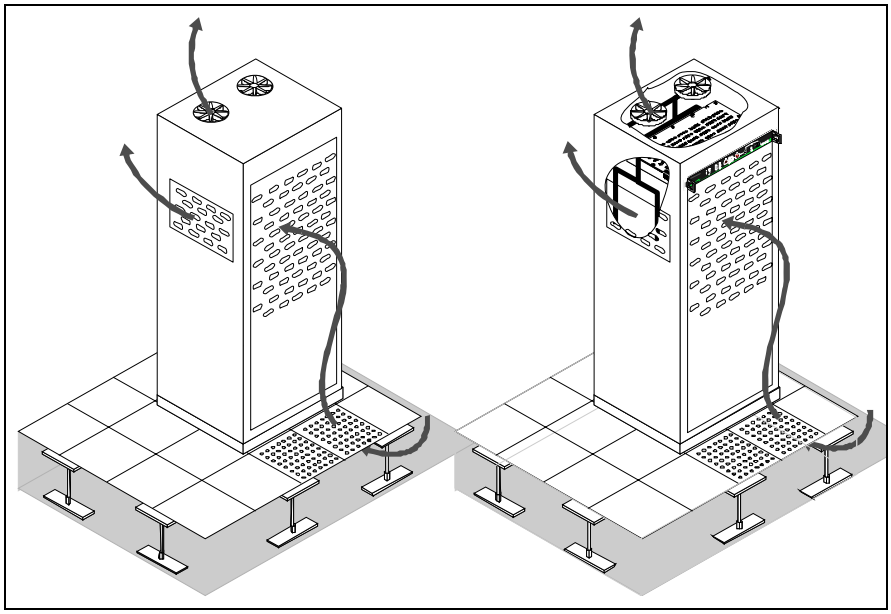


Fig. 4.8: 19“ cabinet with front ventilation through false floor

Cabinet type	Front ventilation through false floor. Bottom of cabinet sealed to false floor
Detection	Position sampling pipe in U-shape at outlet grille

4.3.3 Protection for cabinets in rows or consecutive cabinets

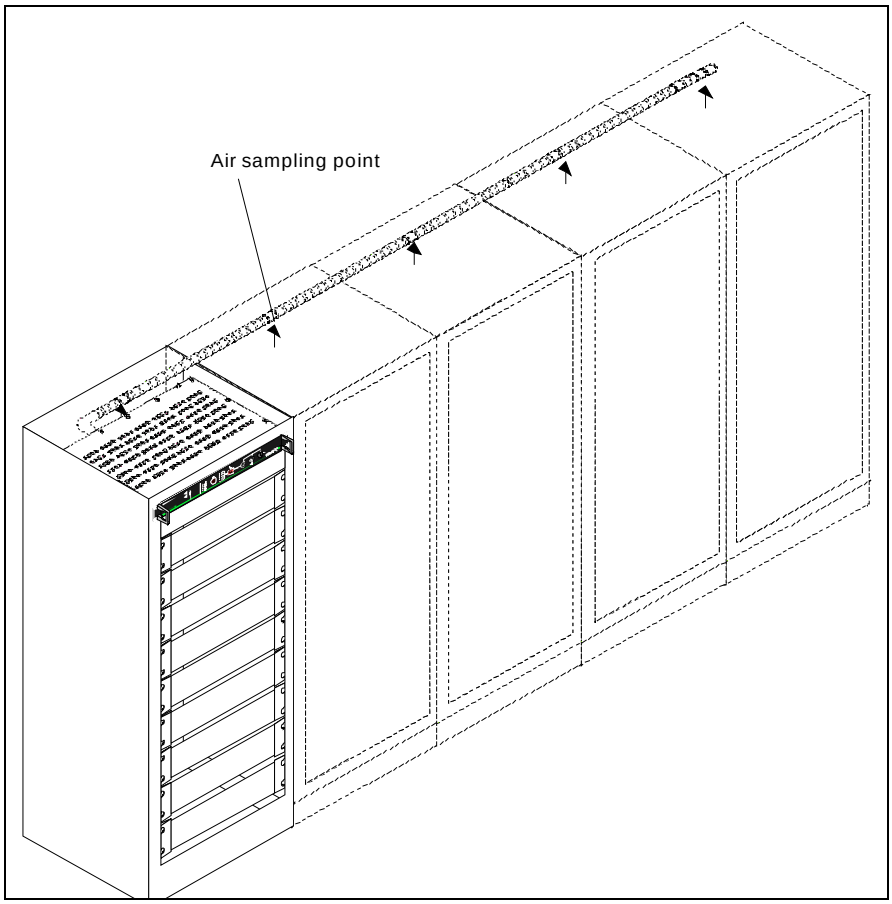


Fig. 4.9: Row of cabinets without sealed partitions

Row of cabinets	Closed, without sealed partitions between cabinets
Detection	Air flow smoke sampling with one device for a maximum of 5 cabinets which must **not** be separated from one another by air tight partitions

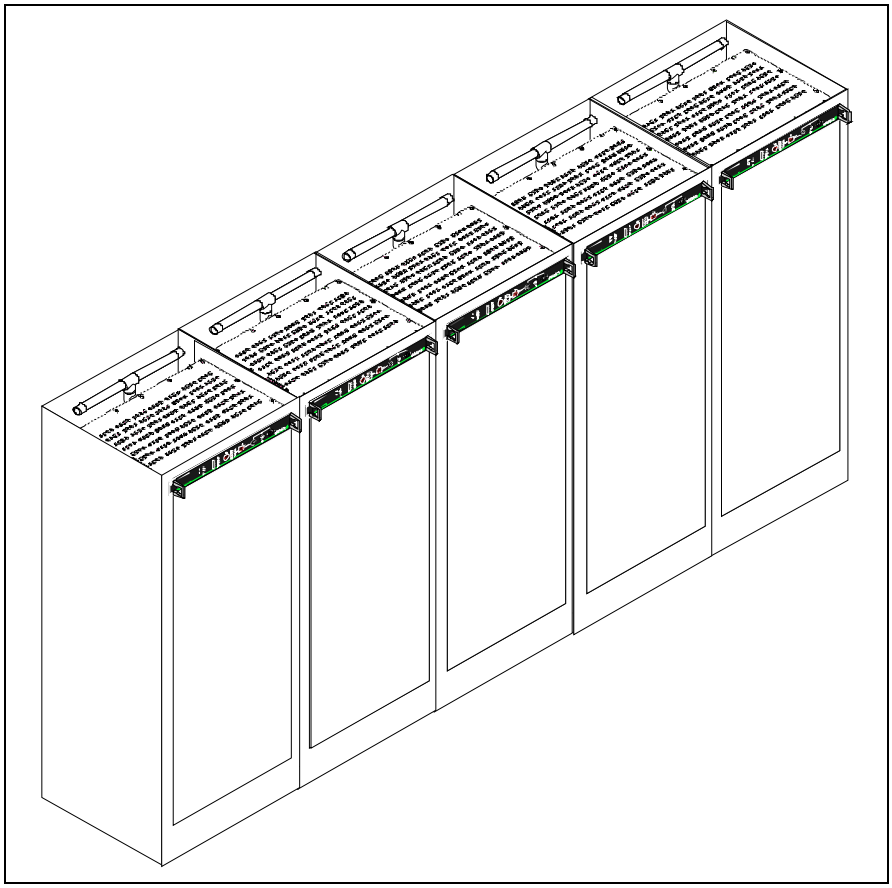


Fig. 4.10: Row of cabinets with air-tight partitions

Row of cabinets	With closed cabinets with circulating air and partitioned off from one another
Detection	Air flow smoke sampling with one device per cabinet required

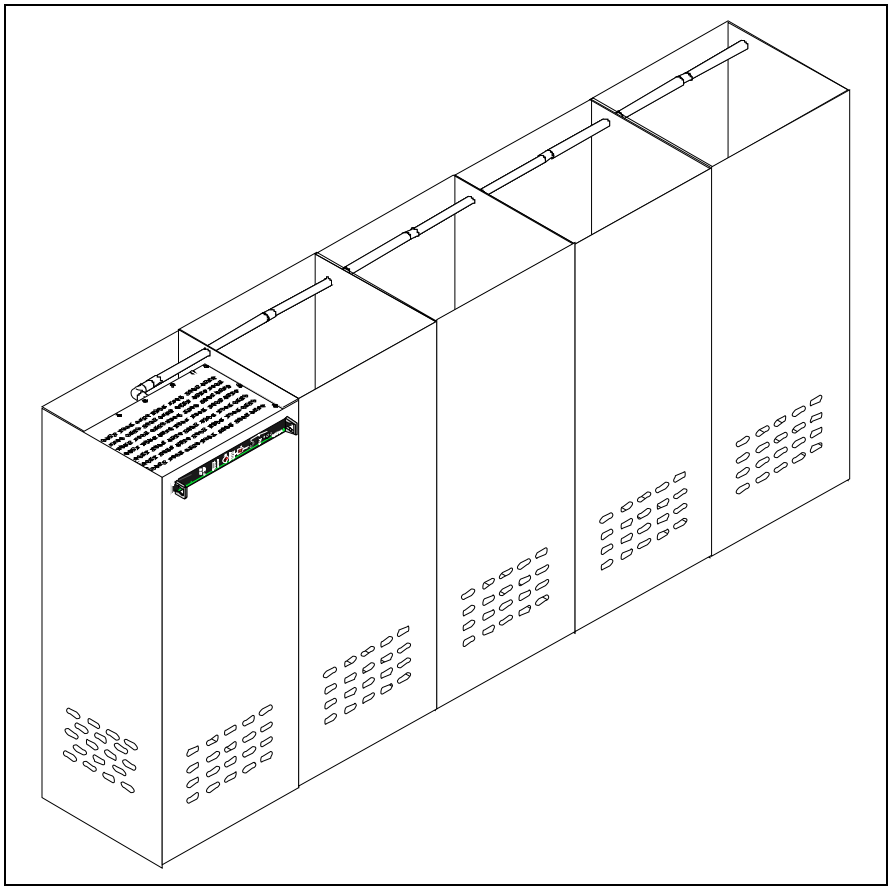


Fig. 4.11: Row of open cabinets with or without partitions

Row of cabinets	Open with or without partitions
Detection	Air flow smoke sampling with one device for a maximum of 5 cabinets which have ventilation openings to the surrounding area and present no or little difference in pressure from each other. The sampling pipe must monitor the outgoing air current.

4.4 General pipe system project planning

4.4.1 Pipe system configurations

When planning the pipe system, it must be ensured that reliable fire detection is guaranteed for any fire present in an installation or in a monitored area.

The number of sampling holes and the pipe system layout depends on the size, ventilation and shape of the monitored area. The pipe system is to be fitted in accordance with the project planning guidelines in this section while taking into consideration the following points:

Symmetrical design

The pipe system shall preferably be designed to be symmetrical, i.e.:

- equal number of sampling holes per pipe branch
- equal lengths of pipeline (must not exceed ± 30 % deviation)
- Equal distances between adjacent sampling holes in sampling pipe (do not exceed deviation of ±30%)
- Similar air pressure conditions along the sampling pipe
- If air outlets located at cabinet doors are to be monitored, then it is advised to use short, flexible tube interconnections (max. length 30 cm)
- The pipe system is should be constructed with rigged pipe. Flexible tube interconnections are only to be used as an exception. This is due to possible air flow changes once the tube is moved.
- Please keep the length of tube interconnections as short as possible.

Asymmetrical design

If the pipe system must be laid out asymmetrically due to structural constraints, the following specifications apply:

- The number of sampling holes as well as the length of the shortest and longest pipe branch in the pipe system must not exceed a quantity or length ratio of **1:2**.
- The distances between adjacent sampling holes in the sampling pipe must be equal (do not exceed deviation of ±20%).
- The diameters of the sampling vents are determined for each pipeline branch individually and depend on the number of sampling vents on the pipeline branch in question.

Branch length

In order to ensure that smoke aerosols are transported quickly through the sampling pipe and to ensure fast detection, it is better to plan several shorter branches than a few long ones (preferably a “double U-shape pipe system” instead of a “I or U shape pipe system”).

Pipe designs 4 types of pipe layouts can be used depending on the cabinet geometry (see Fig. 4.12).

I- pipe An air sampling smoke detection pipe system without branches.

U- pipe An air sampling smoke detection pipe system which branches into 2 air sampling branches after the connection to the TITANUS *RACK·SENS*® 1U.

M-pipe An air sampling smoke detection pipe system which branches into 3 air sampling branches after the connection to the TITANUS *RACK·SENS*® 1U.

Double U-pipe An air sampling smoke detection pipe system which branches into 4 air sampling branches after the connection to the TITANUS *RACK·SENS*® 1U.

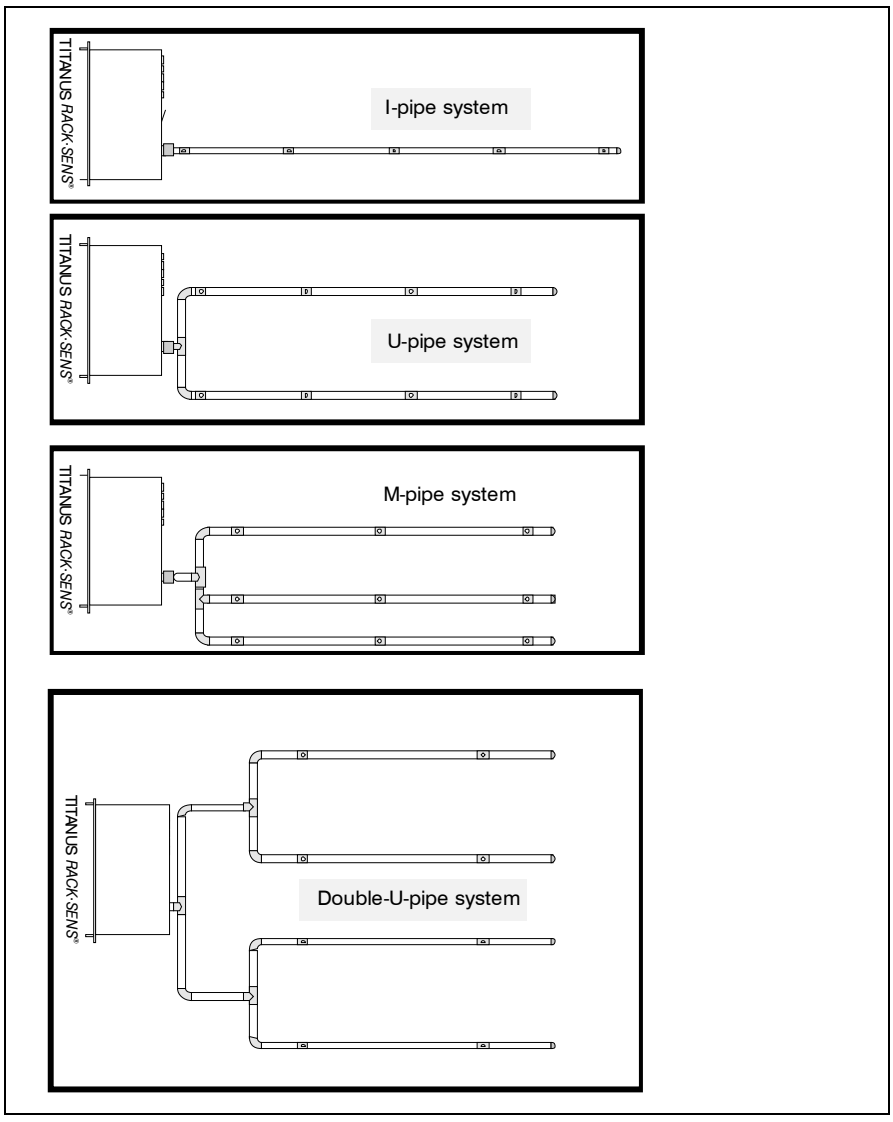


Fig. 4.12: Pipe configurations

Direction change

90° angles and bends (elbows) increase flow resistance. They are therefore to be avoided as much as possible.

90° swept bends should preferably be used, as 90° elbows have a high flow resistance. So 90° elbows should only be used where they cannot be avoided because of structural restrictions.

	equivalent straight pipe length
90° elbow	1,5 m
90° swept bend	0,3 m

If 90° elbows or swept bends are used, the maximum overall length of the pipe system is reduced.

INSTRUCTION

90° swept bends are to be preferred over 90° elbows.
Too many changes in direction will seriously influence the detection time.

Special cases

If because of structural restrictions the pipe system does not correspond to the design guidelines given here, each case must be calculated separately by WAGNER.

Checking

In critical applications, check there is safe detection by carrying out simulated smoke tests (see chapter 7.5). Check also for proper suction pressure at the individual aspiration holes.

TIP

To increase the transport speed in the pipe system in critical areas, the fan voltage can be raised in steps from 9 V (Standard) to 13.5V.

4.4.2 Sensitivity

According to EN 54-20, the sensitivity of a air sampling smoke detection system can be divided into particular fire sensitivity classes. These sensitivity classes describe particular example applications in which the systems can be used. Permissible system project planning can be determined for each classification according to Chapter 4.2.

Air sampling smoke detection systems with a higher sensitivity class according to EN 54-20 also meet the requirements of the lower classes.

Class	Description	Example application
A	Air sampling smoke detector with very high sensitivity	**Very early detection:** Highly diluted smoke in air conditioned IT areas
B	Air sampling smoke detector with increased sensitivity	**Early detection:** Diluted smoke in conventional cooled IT areas.
C	Air sampling smoke detector with standard sensitivity	**Standard detection:** Fire detection with the benefits of air sampling smoke detection systems

INSTRUCTION

The fire sensitivity classes A, B and C can be achieved with each detector module available, depending on the number of aspiration apertures.

The following sensitivity selections can be set with different detector modules.

Sensitivity class:

Type	sensitivity (% obs./m)	Number of holes									
		1	2	3	4	5	6	7	8	9	10
TR-DM-10	0,1	A	A	A	A	A	A	A	A	A	A
	0,2	A	A	A	A	A	A	B	B	B	B
	0,3	A	A	A	A	B	B	B	B	B	B
	0,4	A	A	A	B	B	B	B	C	C	C
TR-DM-50	0,5	A	A	B	B	B	B	C	C	C	C
	0,6	A	A	B	B	B	C	C	C	C	C
	0,7	A	B	B	B	C	C	C	C	C	C
	0,8	A	B	B	C	C	C	C	C	C	C
	0,9	A	B	B	C	C	C	C	C	C	C
	1	A	B	B	C	C	C	C	C	C	
	1,1	A	B	C	C	C	C	C	C		
	1,2	A	B	C	C	C	C	C	C		
	1,3	B	B	C	C	C	C	C			
	1,4	B	B	C	C	C	C				
	1,5	B	B	C	C	C	C				
	1,6	B	C	C	C	C	C				
	1,7	B	C	C	C	C					
	1,8	B	C	C	C	C					
	1,9	B	C	C	C	C					
	2	B	C	C	C						

4.4.3 Pipe Design

4.4.3.1 Simplified Pipe Design (local application protection)

Simplified project planning is used for equipment protection.

4.4.3.2 I-Pipe system

1 Pipe system

TITANUS *RACK·SENS*® 1U

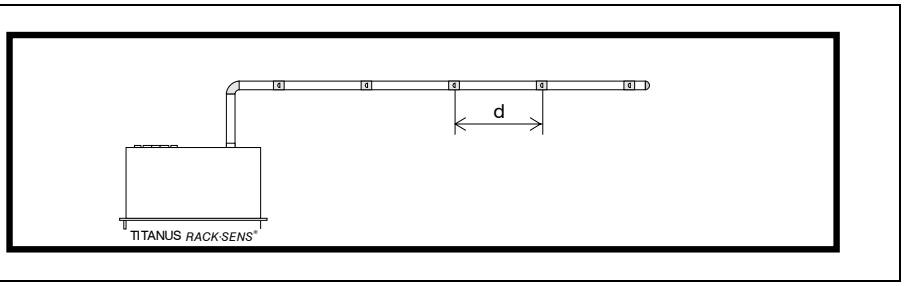


Fig. 4.13: I-pipe system, e.g. for equipment protection

Limit values

min. distance TITANUS® – 1st aspiration hole	0,2 m
max. distance TITANUS® – 1st aspiration hole	10 m
max. pipe length per pipe system pipe ∅ 25 mm in addition to the pipe ∅ 12 mm	15 m 8 x 3 m
max. number aspiration holes (n) per pipe system	10
maximum distance between the aspiration holes (d)	0,1 m
minimum distance between the aspiration holes (d)	4 m

Aspiration holes

Number of holes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
∅ of all aspiration holes in mm[1])	6,8	4,6	4,0	3,6	3,4	3,2	3,0	3,0	2,5	2,5

[1] Opening diameter of the aspiration reduction film

4.4.3.3 U-Pipe system

1 Pipe system

TITANUS *RACK·SENS*® 1U

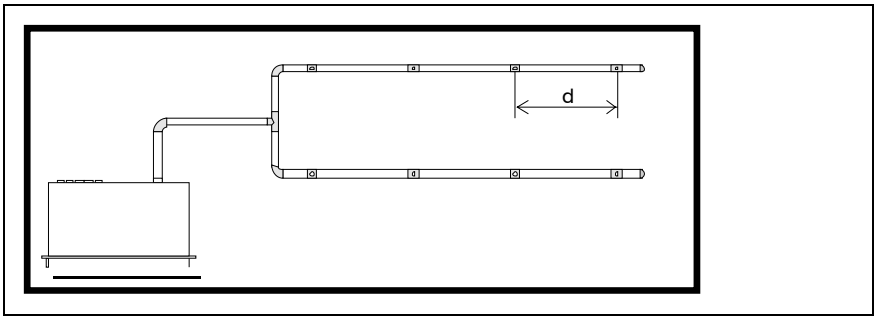


Fig. 4.14: U-pipe system, e.g. for equipment protection

Limit values

min. distance TITANUS® – T piece	0,2 m
max. distance TITANUS® – T piece	10 m
max. branch length	7,5 m
max. pipe length per pipe system pipe ∅ 25 mm in addition to the pipe ∅ 12 mm	 15 m 8 x 3 m
max. number aspiration holes (n) per pipe system	10
maximum distance between the aspiration holes (d)	0,1 m
minimum distance between the aspiration holes (d)	4 m

Aspiration holes

Number of holes	**2**	**4**	**6**	**8**	**10**
∅ of all aspiration **holes** in mm[2])	6,0	4,2	3,4	3,0	2,5

[2] Opening diameter of the aspiration reduction film

4.4.3.4 M- Pipe system

1 Pipe system

TITANUS *RACK·SENS*® 1HE

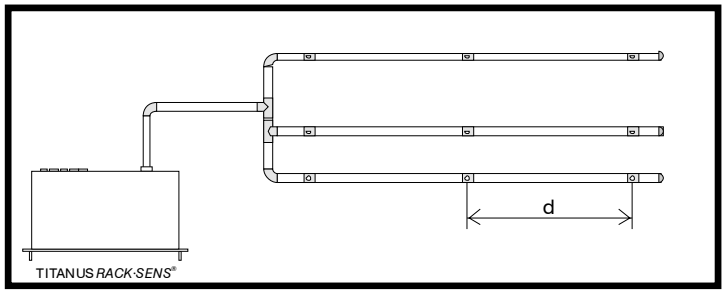


Fig. 4.15: M--pipe system, e.g. for equipment protection

Limit values

min. distance TITANUS® – T piece	0,2 m
max. distance TITANUS® – T piece	10 m
max. branch length	5 m
max. pipe length per pipe system pipe ∅ 25 mm in addition to the pipe ∅ 12 mm	 15 m 8 x 3 m
max. number aspiration holes (n) per pipe system	9 No.
maximum distance between the aspiration holes (d)	0,1 m
minimum distance between the aspiration holes (d)	4 m

Aspiration holes

Number of holes	**3**	**6**	**9**
∅ of all aspiration **holes** in mm[3])	4,6	3,4	3,0

[3] Opening diameter of the aspiration reduction film

4.4.3.5 Double-U-Pipe system

1 Pipe system

TITANUS *RACK·SENS*® 1U

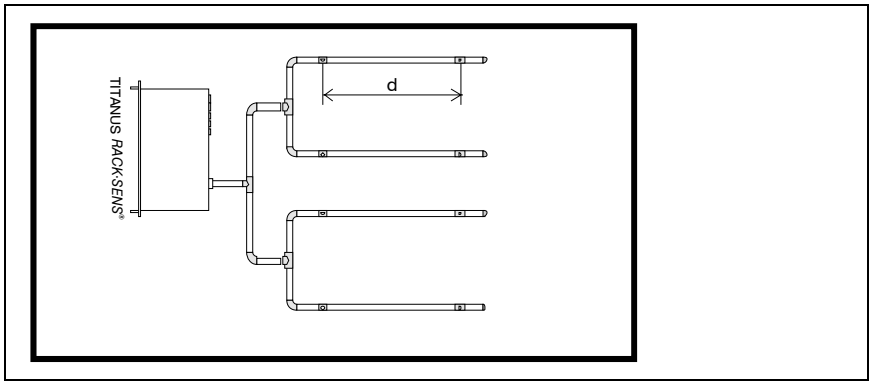


Fig. 4.16: Double-U-Pipe system, e.g. for equipment protection

Limit values

min. distance TITANUS® – last T piece	0,2 m
max. distance TITANUS® – last T piece	10 m
max. branch length	3,5 m
max. pipe length per pipe system pipe ∅ 25 mm in addition to the pipe ∅ 12 mm	15 m 8 x 3 m
max. number aspiration holes (n) per pipe system	8
maximum distance between the aspiration holes (d)	0,1 m
minimum distance between the aspiration holes (d)	4 m

Aspiration holes

Number of holes per pipe system	**4**	**8**
∅ of all aspiration holes in mm[4])	4,4	3,0

[4] Opening diameter of the aspiration reduction film

4.5 Temperature monitoring

The optional temperature module enables heat build-up to be monitored within the rack or special “hot spots” such as cooling plates on servers.

Up to 5 external temperature sensors type TS-1 can be installed as part of the temperature module. These can be attached to the components being monitored with cable straps or adhesive pads.

Via the diagnostics tool alarm thresholds can be set for individual temperature alarms and forwarded via the programmable relay contacts. The settings via the diagnostics tool are described in more detail in the commissioning chapter.

4.6 Device shutdown

The extension module type SU-1 enables external equipment to be shut down via a type SR-1 shutdown relay.

Equipment with a power rating of up to 400 W for inductive loads and up to 2,000 W for resistive loads can be shut down via the relay contact. A suitable high power relay should be activated via the shutdown relay for equipment with higher power consumptions. Schematics for the shutdown relay and the high power relay is described in more detail in section 5.2.12 or 5.2.13 “Installation / TITANUS *RACK·SENS*® 1U device shutdown“.

4.7 Door contact switch

Cabinet doors can be monitored with door contact switches for supervision. This is especially required if the TITANUS *RACK·SENS*® 1U is triggering an optional extinguishing system. Door contact switches are to be positioned in such a way that the switch is activated when the door is closed and the contact is closed. If the door is opened, the contact in the switch opens and the TITANUS *RACK·SENS*® 1U device is blocked. After a delay of 10 seconds, the TITANUS *RACK·SENS*® 1U device indicates a fault. If several door contact switches are connected to the door contact input, they are to be connected in series, so that the TITANUS *RACK·SENS*® 1U device is interrupted at the door contact switch input if only one of the doors is opened.

4.8 Air flow monitoring

EN54-20 requires detection of a 20% airflow volume deviation. In order to accomplish this, the airflow threshold must be set to ≤ 20 %.At this point it is recommended to perform an air-pressure dependent airflow initialisation adjustment.

For installations not complying with EN-54-20 the airflow threshold can be set as desired.

The airflow monitoring of the connected pipe work must comply with national directives.

Adjusting airflow sensitivity

The airflow monitoring sensitivity must be chosen according to the application. Pipe rupture or blockage have to be detected safely. If a different airflow monitoring sensitivity than 20% is required, the diagnostics tool needs to be used for setup.

Dynamic air flow sensor technology

The integrated air flow monitoring enables the system to detect both pipe breakages or sudden blockage (e.g. in the event of sabotage in the pipe system). As the dynamic air flow sensors are only active if the “Dynamic air flow ON” settings are programmed in the software when the device is put into operation, the following aspects must be taken into account.

- Dynamic airflow monitoring is usually not suitable for monitoring of cabinets with forced airflow, as the systems will respond in this operation mode to small airflow variations.

The following limits must always be complied with for the TITANUS *RACK·SENS*® 1U system:

- The minimum pipe length between 2 aspiration holes is **0.1 m**.
- The maximum pipe length between 2 aspiration holes is **4 m**.
- The maximum monitoring surface area per aspiration holes corresponds to the monitoring area of a point-detector according to the regulations in the particular national standards.
- Maximum 10 aspiration holes are possible[5].

INSTRUCTION

Because of country-specific regulations, there may be restrictions compared to the design limits in this manual!

[5] Designs / design forms not given in the manual are to be requested.

4.8.1 General project planning instructions for shutdown and cooling Shutdown

Shutdown For electrical shutdown of racks or external equipment, please pay attention to the following issues:

ATTENTION

- If complete units/racks are disconnected from power by shutdown, make sure that sufficient cooling is provided.
- The shutdown process should be carried out in a proper way, by means of a controlled shutdown with no damages to equipment and no loss of important data (i.e. soft-shutdown, save data, use an established shutdown procedure provided by the owner/user).
- Some types of racks will automatically open their doors when disconnected from power. In this case extinguishing is blocked by door contacts.
- Therefore it is essential that for successful extinguishing the doors stay closed during shutdown.

Cooling When using TITANUS *RACK·SENS* ® 1U in racks with forced airflow the following points need to be considered:

ATTENTION

- Cooling of the rack and its components must not be impaired by installing the TITANUS *RACK·SENS* ® 1U unit and its components.
- In case of power disconnection (shutdown) of the rack and its components the minimum required cooling requirements must be preserved.

4.10 Calculating detection sensitivity

Selecting the sensitivity on the TITANUS *RACK·SENS*® 1U detection unit must be carried and in such a way that the desired sensitivity will be achieved at the individual detection points (smoke aspiration holes). This can be calculated by multiplying the detector sensitivity with the number of all smoke aspiration holes designed for the system.

$$S_{DP} = S_{RACKSENS} \times N_{proj.DP}$$

S_{DP}	=	*Sensitivity of a individual detection point*
$S_{RACKSENS}$	=	*Selected detector sensitivity for the* TITANUS *RACK·SENS*® 1U
$N_{proj.\ DP}$	=	*Number of all detection points in the system*

Project planning for an area to be monitored is always carried out according to specifications for point type smoke detectors. For cabinet monitoring at least one or two aspiration holes need to be provided per cabinet.

When several areas are monitored using an aspirating smoke detection system, it must be ensured that the overall sensitivity of the aspiration apertures is ≤ 3.5 %/m light obscuration within a closed area. If this value is not reached, the sensitivity must be set higher.

4.11 Power Supply

4.11.1 Calculating capacity for external power supply

The alarm-ready status in the fire protection system and the event of an emergency are taken into account when rating the external power supply.

The minimum supply current in the power supply unit must be calculated in such a way that the system's full functioning capacity is guaranteed by the power supply unit in itself.

In case of alarm the current is calculated by the following formula:

Supply current

$$I_{Tot.} = I_{Alarmtot.} + I_{Charging}$$

$$I_{Tot.} = I_{PSU}$$

I_{Tot}	=	*Total current for all operating devices in [A]*
$I_{Alarmtot}$	=	*Alarm current in all TITANUS RACK·SENS® devices in [A]*
$I_{Charging}$	=	*Charging current for battery (within 24 hours 100% of rated capacity)in [A]*
I_{PSU}	=	*Minimum supply current in the power supply unit in [A]*
$K_{nominal}$	=	*Nominal capacity of batteries in [Ah]*
t	=	*Required backup time in[h] (object protection 4h)*

According to the table below and the selected device configuration, the total current for an alarm indication, signal forwarding, device shutdown according to the following formula:

$$I_{Alarm.tot.} = I_{Alarm1U} + n * I_{Shutdown.Alarm}$$

The required charging current for the batteries is calculated as follows:

Charging on current

$$I_{charging} \quad \frac{1\ K_{nominal}}{24}$$

The standby current for the connected devices for a typical protection period of 4 hours and the alarm currents for 30 minutes must be provided to calculate the battery capacity.

$$I_{quiescent.tot}. = I_{quiescent1U} + n * I_{Shutdownm.quiescent}$$

Emergency power supply unit calculation

The nominal capacity is calculated by means of the following formula:

$$K_{nominal} = (I_{quiescenttot.} * t + I_{Alarmtot.} * 0.5h) * 1{,}25$$

Power consumption for external supply			
TITANUS *RACK·SENS*®	**Power consumption (quiescent) / mA**	**Power consumption (alarm) / mA**	**Number of modules**
1U (*fully featured systems*)	I_{1U} = 400	$I_{Alarm1U}$ = 450	1
Ext. Shutdown module (incl. shutdown relay)	$I_{shutdownm.quiescent}$ = 10	$I_{shutdownm.Alarm}$ = 50	n (max. 5)

$I_{quiescent1U}$	=	*Quiescent base device 1U (fully featured systems)*
$I_{Alarm1U}$	=	*Alarm current base device 1U (fully featured systems)*
$I_{Shutdownm.quiescent}$	=	*Quiescent current external shutdown module incl. relay*
$I_{Shutdownm.Alarm}$		*Alarm current external shutdown module incl. relay*
n		*Number of external shutdown modules (max. 5)*

5 Installation and wiring of TITANUS *RACK·SENS*® 1U

ATTENTION

The use of metal components such as tools or installation material made of metal should be avoided when working on racks in operation. During installation of TITANUS *RACK·SENS* ® 1U and its components possible damages due to falling tools or installation material must be avoided at all costs!

5.1 General

The regulations, guidelines and provisions set out in Chapter 4.1 apply.

The following must be taken into account when installing or activating the TITANUS *RACK·SENS*® 1U air sampling smoke detection system:

1. Interventions, changes and modifications to equipment are to be avoided. If adjustments are unavoidable, they must be approved by the operator, the manufacturer and/or the supplier (written approval).
2. All changes in the building power network (230 V supply) and third-party systems are to be carried out by the system owner. This includes:
   - provision of a dedicated fused 230 V mains outlet
   - any connections to external systems (e.g. fire panels)
   - lightning and surge protection measures which are required to comply with standards

5.2 Installation site

5.2.1 Mounting the TITANUS *RACK·SENS*® 1U air flow smoke sampling system

When deciding on the installation position, ensure the device is installed in the highest rack position possible in the cabinet and that the indicators are clearly visible.

INSTRUCTION

When installing the TITANUS *RACK·SENS* ® 1U, ensure that the device is completely supported by rack rails. This may otherwise result in damage to the device. Contact cabinet/rack manufacturer for suitable rack rails.

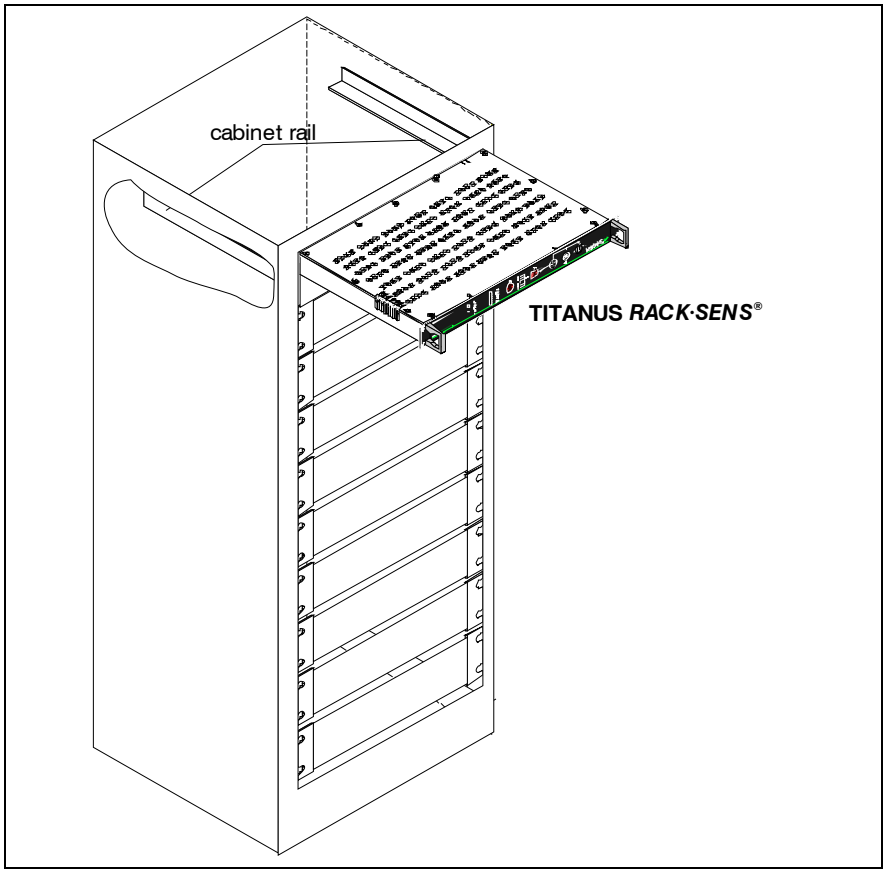


Fig. 5.1: TITANUS *RACK·SENS*® 1U *installation*

Aspiration

When installing TITANUS *RACK·SENS*® 1U ensure that the air outlet on the top left-hand side of the device is not blocked.

A minimum gap of 1 cm must be kept from the surrounding components when installing the device.

5.2.2 TITANUS *RACK·SENS*® 1U installation

1. Fit the cabinet rails specified by the cabinet manufacturer into the highest rack position possible in the 19” cabinet.

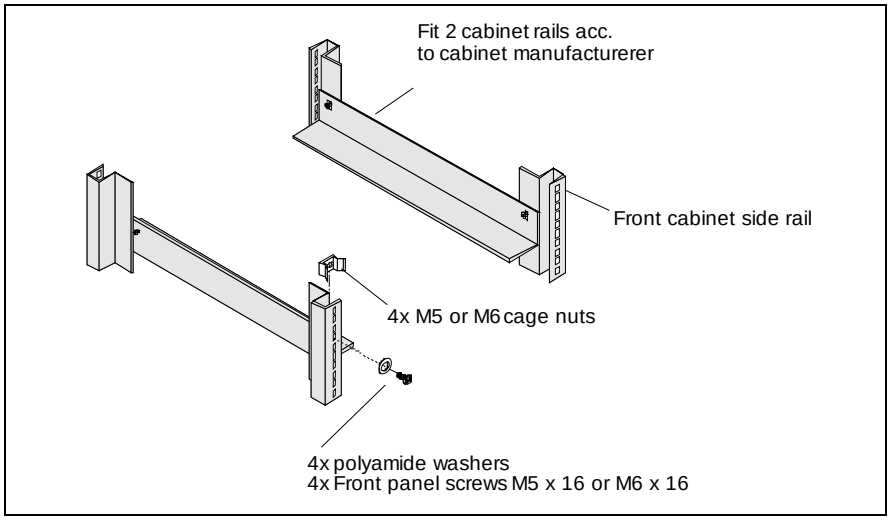


Fig. 5.2: TITANUS *RACK·SENS*® 1U *mounting material*

2. Attach 4 suitable cage nuts in the 19“ frame for each TITANUS *RACK·SENS*® 1U according to the screw hole spacing for the TITANUS *RACK·SENS*® 1U device.
3. Now slide the TITANUS *RACK·SENS*® 1U device into the cabinet provided and fasten it with 4 screws in the four mounting holes on the front panel.

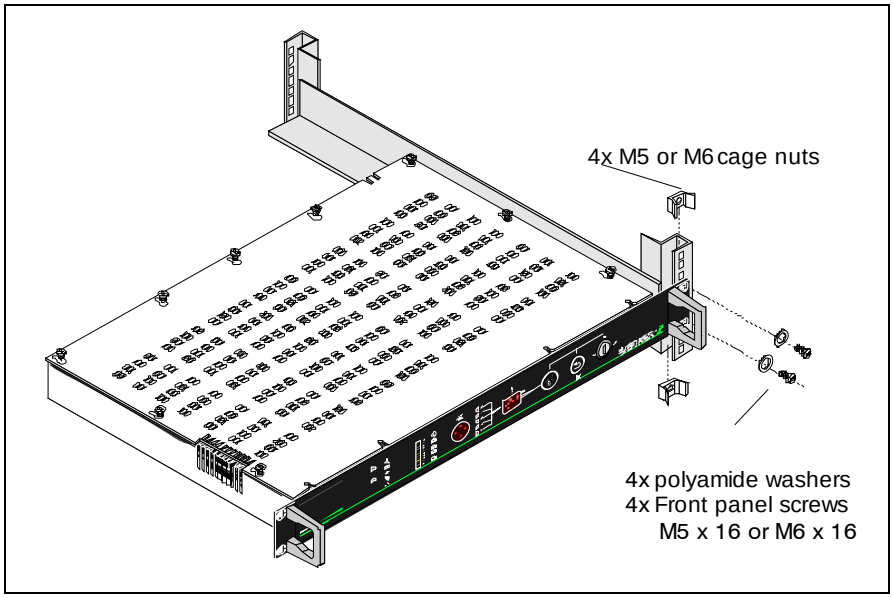


Fig. 5.3: Mounting the TITANUS *RACK·SENS*® 1U *device*

5.2.3 Connection for sampling pipe

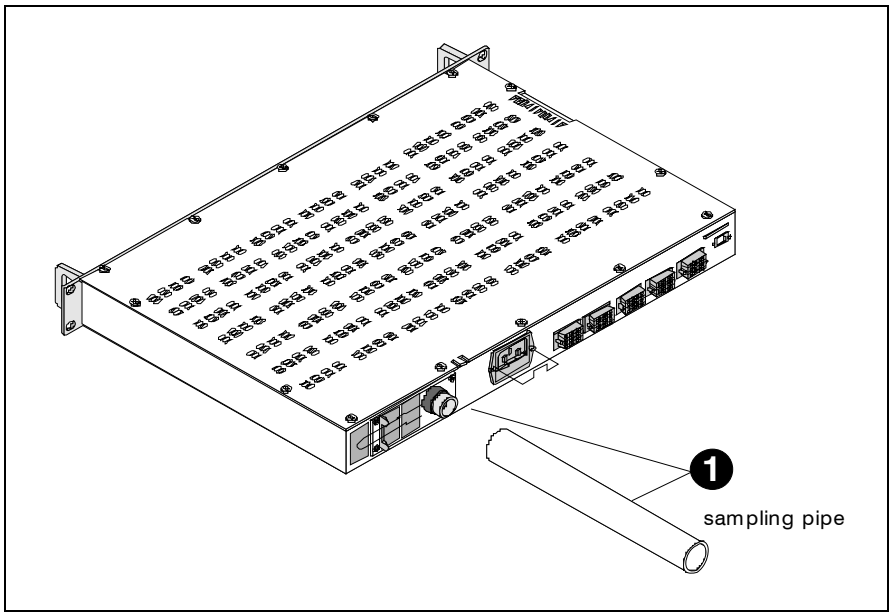


Fig. 5.4: TITANUS *RACK·SENS*® 1U *sampling pipe connection*

Connection for sampling pipe

❶ Insert the sampling pipe into the pipe connection provided in order to connect the sampling pipe to the TITANUS *RACK·SENS*® 1U device.

INSTRUCTION

The standard aspiration pipe AP-1 is only to be used in cabinets cooled by re circulated air.

INSTRUCTION

Under no circumstances use adhesive to connect the sampling pipe to the pipe connection.
If wide variations in temperature are expected, the pipe must be fixed additionally close to the device, so that the pipe does not come loose due to fluctuations in length (see section 6.1).

INSTRUCTION

Ensure that the sampling pipe (if longer than 15 cm) is securely fastened to the cabinet with a pipe clip. If not, the pipe may detach itself from the pipe connection due to mechanical stress.

5.2.4 TITANUS *RACK·SENS*® 1U electrical connection

The TITANUS *RACK·SENS*® 1U device is connected to the mains supply via a terminal strip at the rear of the device.

Field wiring is to be connected to the removable terminal blocks, which are capable of handling wire sizes from a minimum of 0.5 mm^2 up to 1.0 mm^2. The use of fire protection cable in a twisted pair configuration is advised.

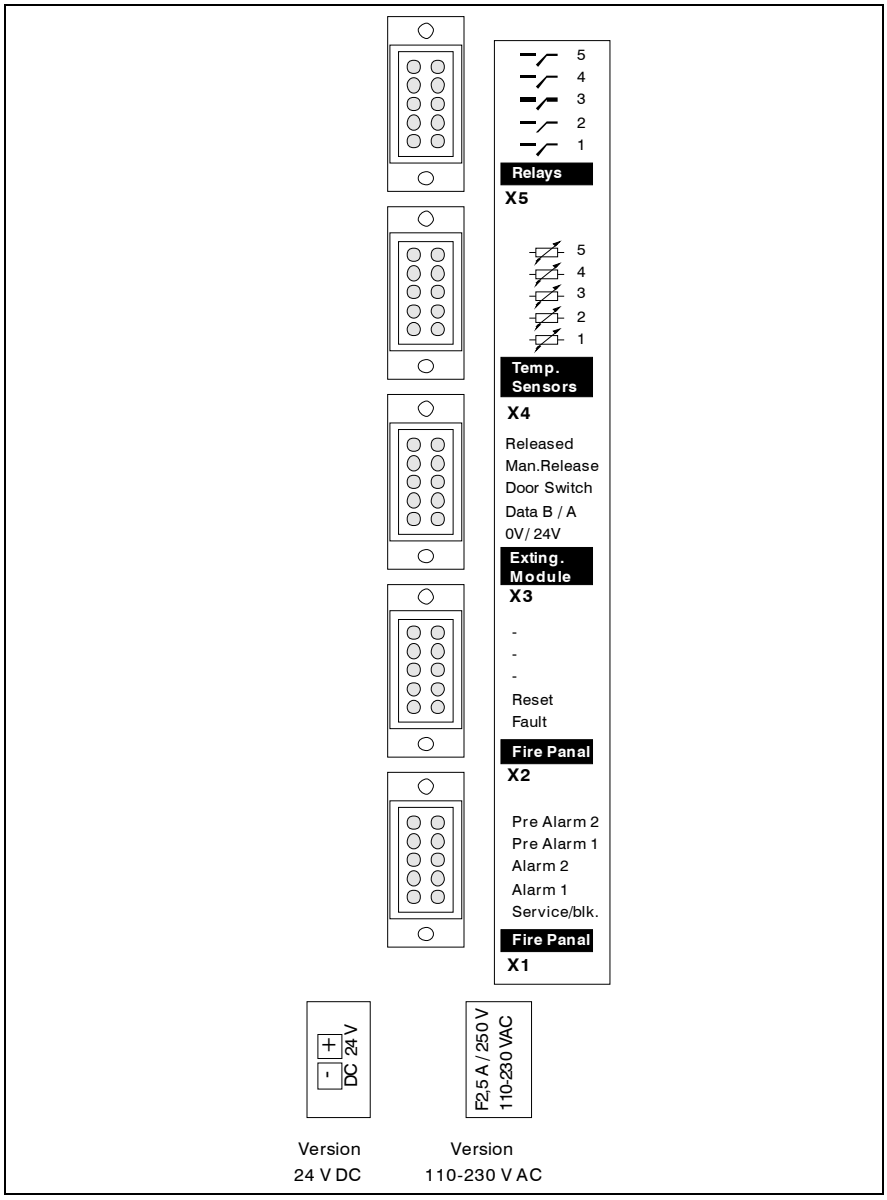


Fig. 5.5: Terminal connection assignment on the TITANUS RACK·SENS® 1U device for mains or 24V supply

ATTENTION

Carry out all circuit wiring work with the device fully disconnected!

Alarm, pre-alarm, service/blocked, release and fault contacts an be used for purposes such as connection to a fire alarm system or activation of signal devices and building management systems.

Name	Type	Potential-free contact	Description
Service/blk.	Output	yes	NC
Alarm 1	Output	yes	NO
Alarm 2	Output	yes	NO
Pre Alarm 1	Output	yes	NO
Pre Alarm 2	Output	yes	NO
Fault	Output	yes	NC
Reset	Input	no	To be connected to external, potential free contact (NO). Reset will occur on closed contact.
24 V / 0 V	Output	no	Supply for ext. bus modules
Data A/B	Output	no	Data bus for ext. bus modules
Door Switch	Input	no	To be connected to external, potential free door contact (NO, door open)
Man. Release	Input	no	Expects 4.7 kΩ for operation and 1 kΩ for release
Released	Output	yes	NO
Temp. 1 Temp. 2 Temp. 3 Temp. 4 Temp. 5	Input Input Input Input Input	no no no no no	Expects 10 kΩ NTC temperature sensor (default)
Relais 1 Relais 2 Relais 3 Relais 4 Relais 5	Output Output Output Output Output	yes yes yes yes yes	NO NO NO NO NO

5.2.5 Connecting the external 24 V supply

Devices with a 24 V input are fed via an external power supply. The fault contact (“PSU Fault”) can thus be wired to a fault signal line connected to an optional fire alarm system for fault supervision.

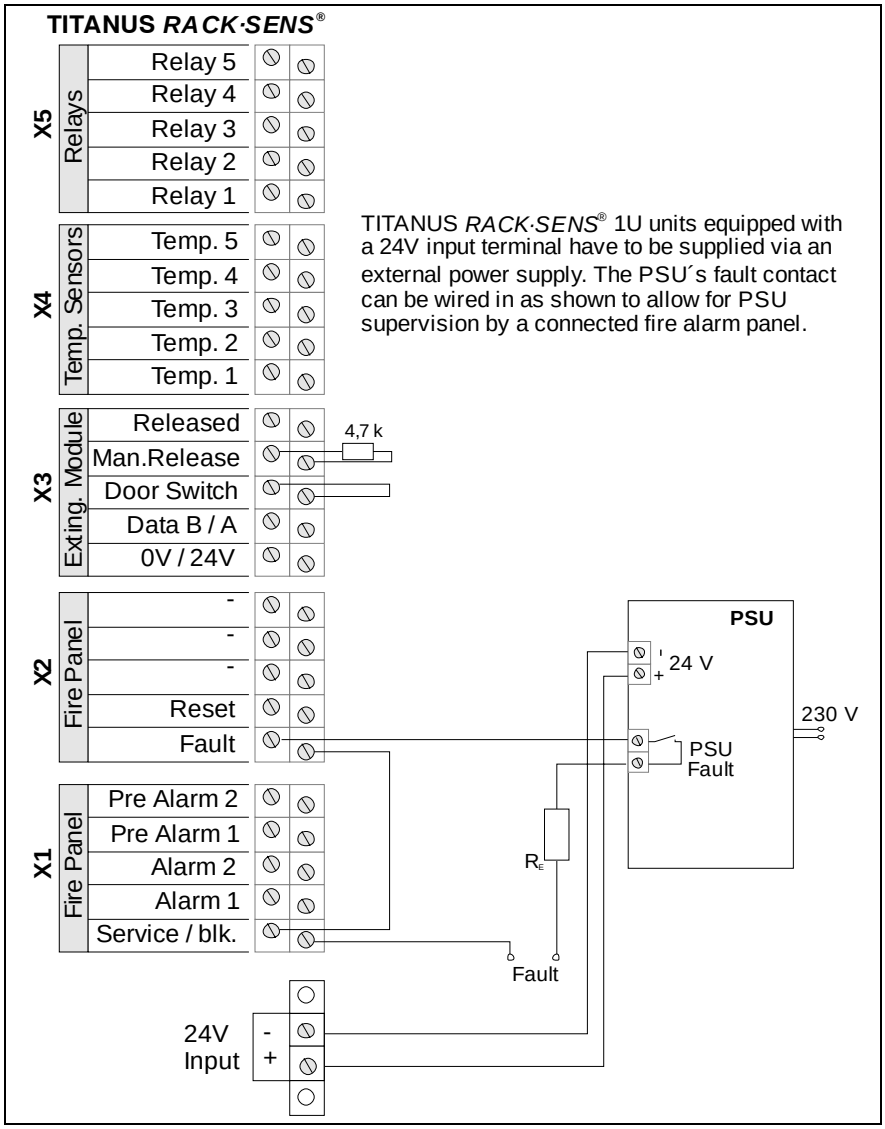


Fig. 5.6: Connection to an external power supply for 24 V supply

ATTENTION

Ensure, that each TITANUS *RACK·SENS* ® 1U device is powered by individually fused 24V supply lines.

5.2.6 Connection to mains supply 230 V

For TITANUS *RACK·SENS*® 1U devices equipped with the integrated power supply unit and backup battery package, the connection is to be carried out as follows

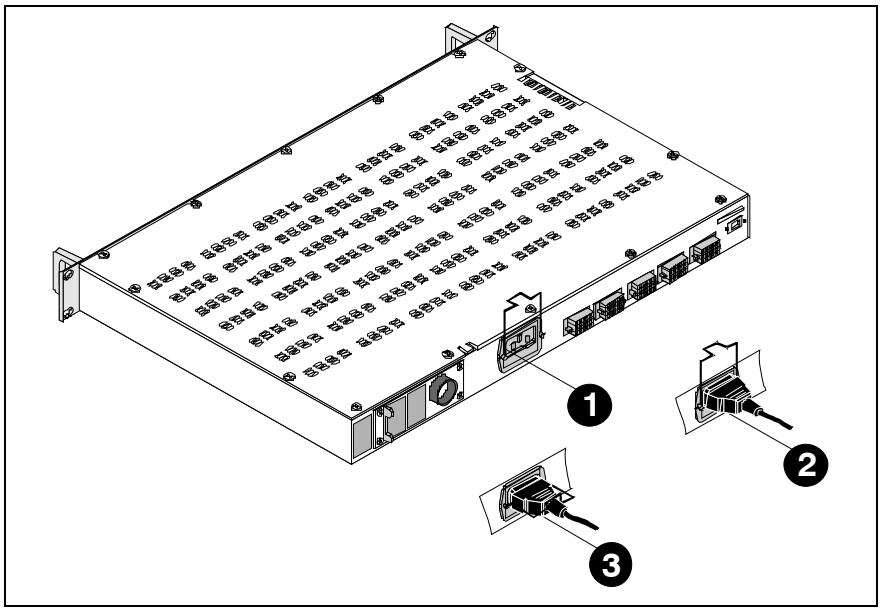


Fig. 5.7: Installing the mains plug for the mains supply

1. Lift up the safety bracket in the mains input module.
2. Insert the mains plug into the mains input module.
3. Pull the safety bracket down again, so that it secures the low-heat plug in position and protects it from being pulled out unintentionally.

ATTENTION

Ensure, that each 230 V mains supply, which is provided by the owner/ supplied by the client is separately fused.

5.2.7 Circuit diagram TITANUS *RACK·SENS*® 1U for connecting to a fire alarm panel with potential-free contacts

Connection of the TITANUS *RACK·SENS*® 1U unit to a fire alarm panel is carried out in two possible ways as described below:

Model 1 An extra dedicated line for “Service/Blocked” is provided.

Model 2 The “Service/Blocked” contact is wired into the fault line.

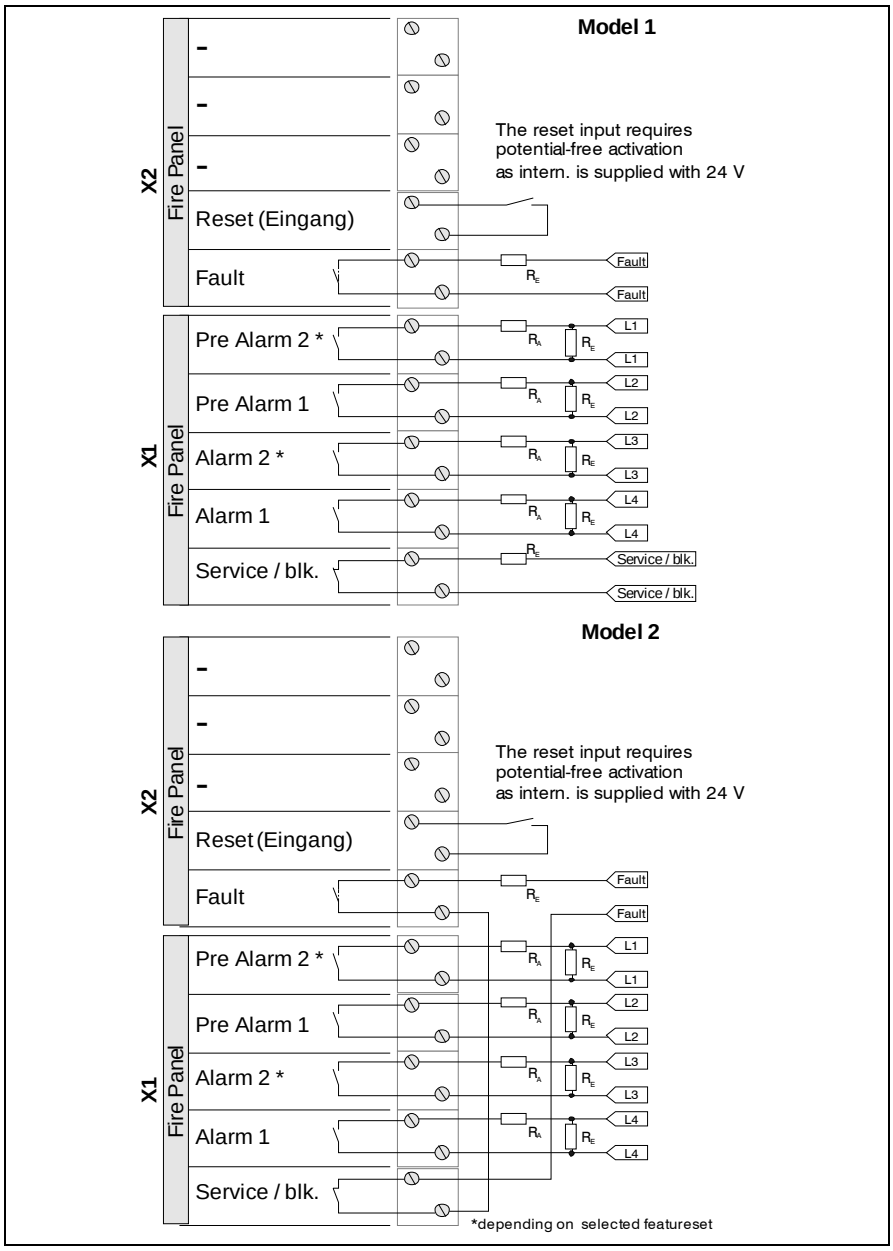


Fig. 5.8: Circuit diagram for connecting to fire alarm panel with potential-free contacts – Models 1 and 2

ATTENTION

The “Service/Blocked” contact is closed, when the key switch is set into position “Service”.
Since TITANUS *RACK·SENS* ® 1U is not operational in this mode, a separate fault line needs to be spend. Alternatively, the “Service/Blocked” contact can be wired into the “fault” line as detailed in model 2.

5.2.8 Device “reset” circuit diagram for individual TITANUS *RACK·SENS*® 1U devices

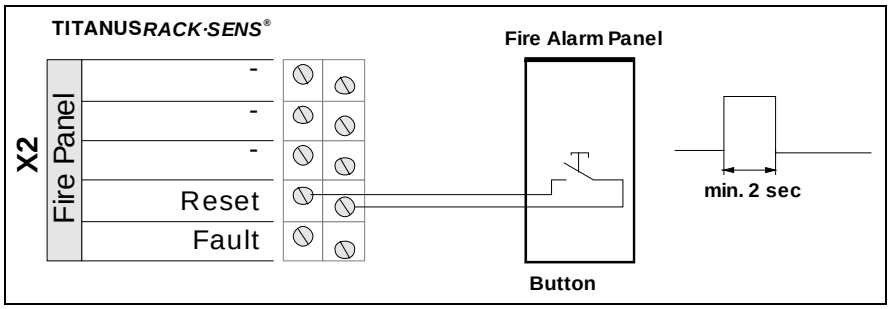


Fig. 5.9: Device “reset” circuit diagram for individual TITANUS *RACK·SENS® 1U devices*

ATTENTION

It is essential to reset using a button.

5.2.9 Device “reset” circuit diagram for several TITANUS *RACK·SENS*® 1U devices

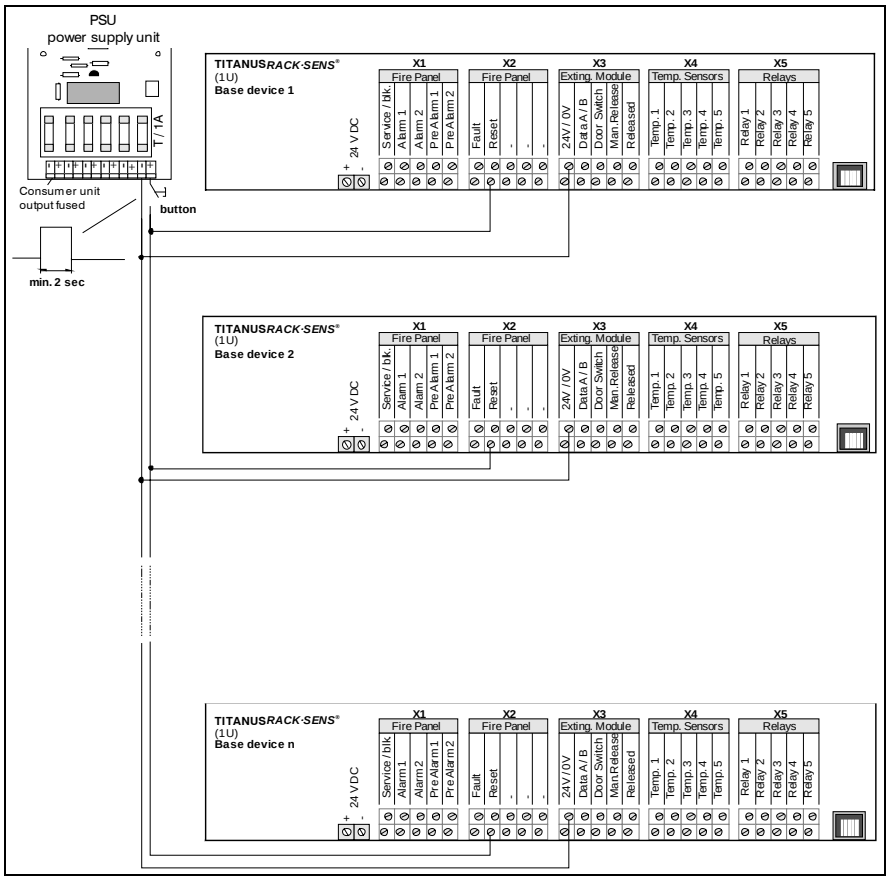


Fig. 5.10: Device “reset” circuit diagram for several TITANUS *RACK·SENS*® *1U devices and extinguishing systems*

ATTENTION

It is essential to reset using a button.

5.2.10 Installation and connection of door contact switch

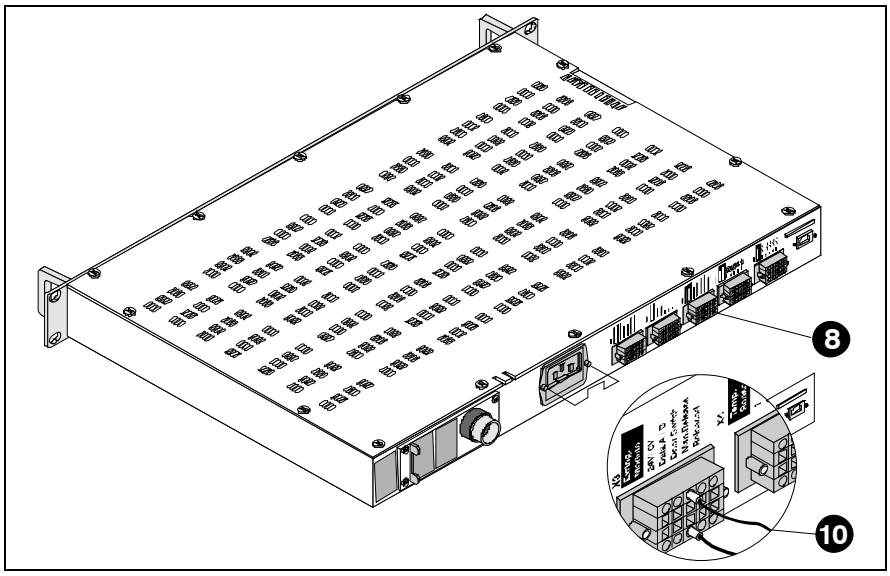


Fig. 5.11: Connecting door contact switch

1. Find a position for the door contact switch where it will always be activated when the cabinet door is closed and can be easily fitted with 2 screws. Aluminium profiles on the 19“cabinet door frame are best suited.
2. We advise to use hardware compatible mounting plates for the door contact switches which are recommended by the associated cabinet/rack manufacturer.
3. Using the screws and elongated holes, align the door contact switch, so that the switch will be activated when the door is closed.
4. After the switch is aligned, tighten the screws in such a way that the switch is firmly attached to the rack and cannot be displaced by continuous opening and closing of doors.

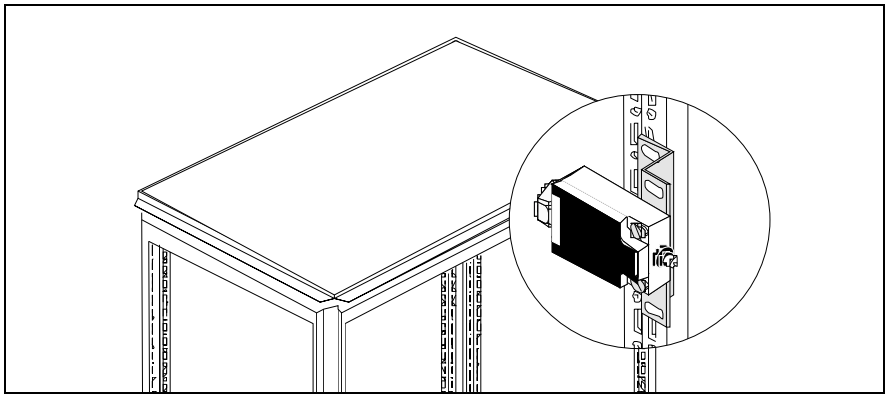


Fig. 5.12: Example of a mounting position for a door contact switch

5. Now screw in the provided cable gland into the designated opening in the door contact switch.
6. The door contact switch is wired according to the following circuit connection.

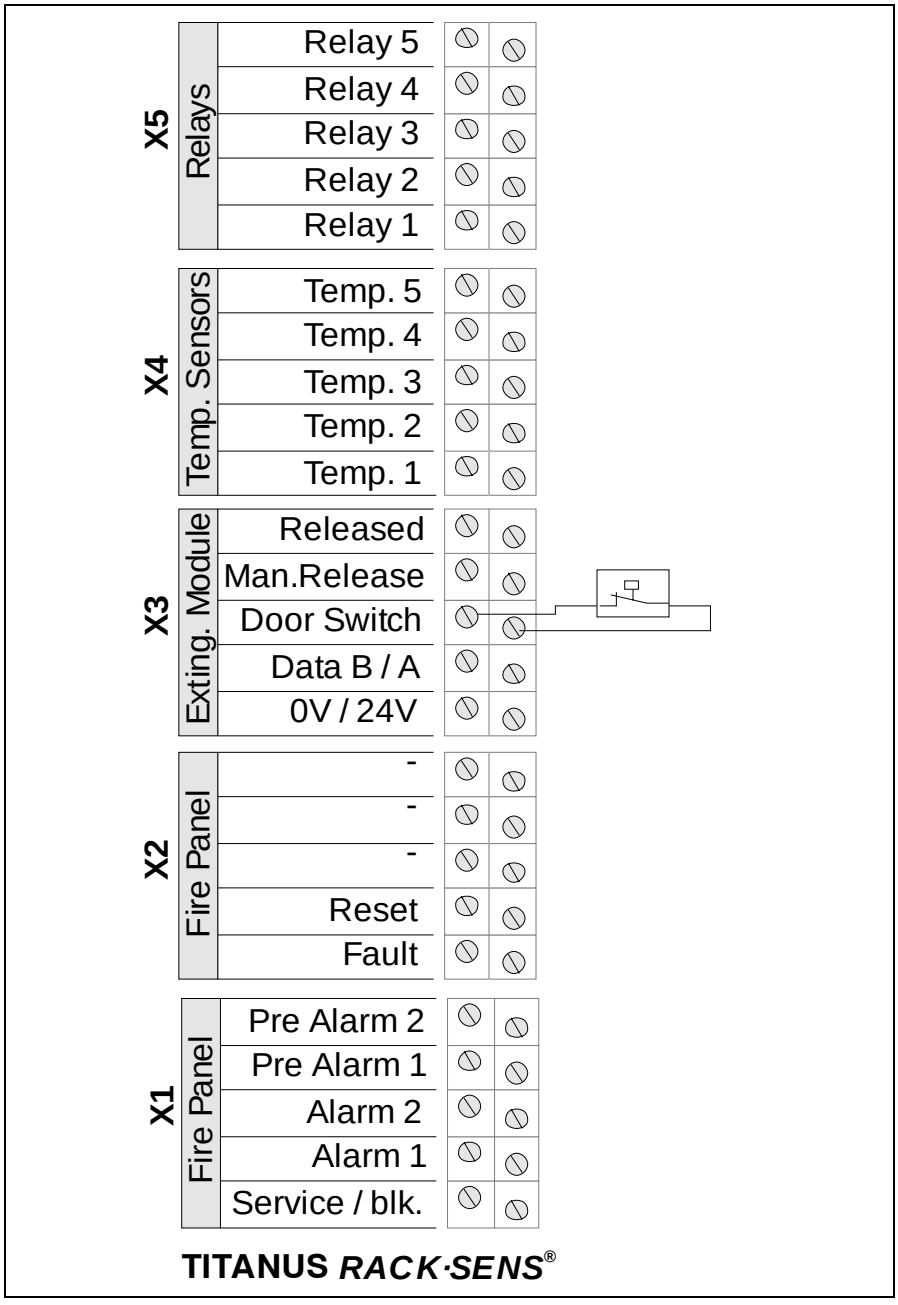


Fig. 5.13: Wiring for door contact switch

7. When wiring the door contact switch, the contact in the switch should be selected in such a way that it is closed when in an activated state. These are terminals 13 and 14 in the type DS-1 door contact switch.
8. After connecting the circuit, the door contact switch cable connection should be tightened in such way that the connection cable sits firmly in the connection and cannot slip out.

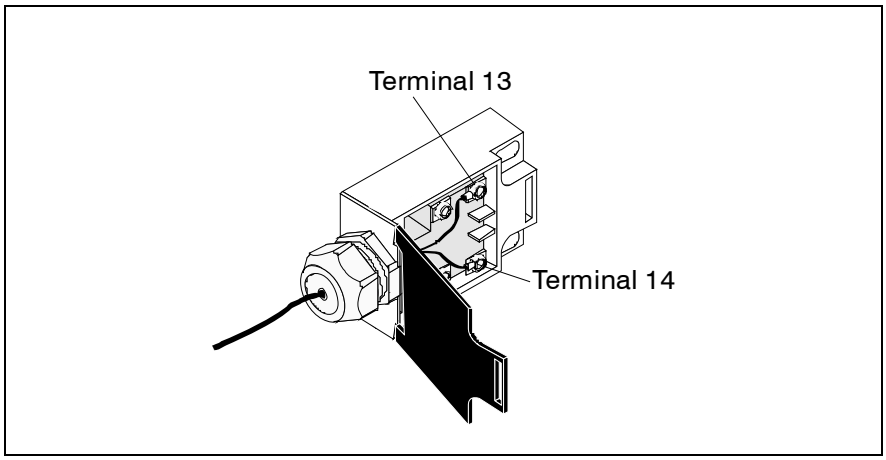


Fig. 5.14: Wiring in door contact switch

5.2.11 Installation and connection of temperature sensors

Up to 5 type TS-1 temperature sensors can be connected to a TITANUS *RACK·SENS*® 1U device with an optional temperature module.

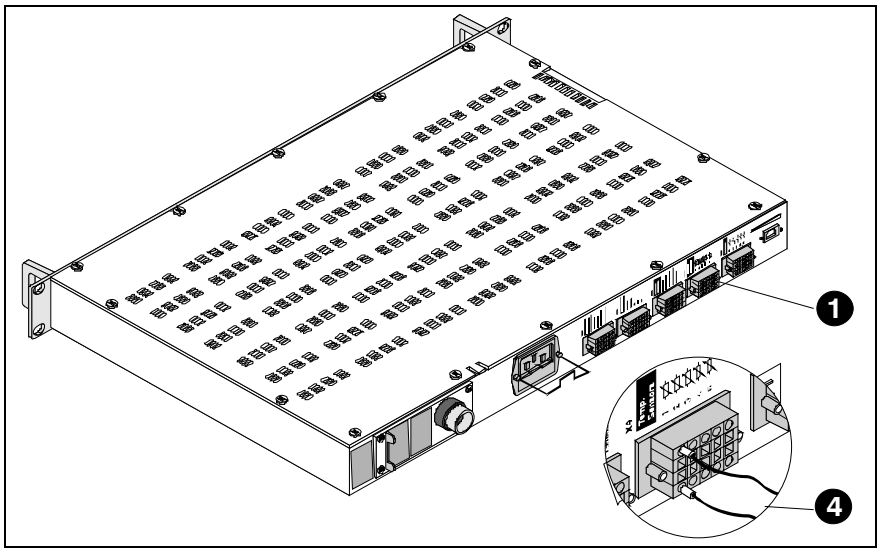


Fig. 5.15: Connection for temperature sensors

The temperature sensors should be connected as follows:

1. Attach the temperature sensors to the positions provided in cabinets or on designated components with a cable strap or similar and feed the cable through to the temperature sensor connection on the TITANUS *RACK·SENS*® 1U device.
2. Open the upper caged spring terminal at connection 1 for the temperature sensors with a slotted screw driver max. 2.5 mm wide.
3. Feed a cable end sleeve belonging to the first temperature sensor into the open connection terminal. When you pull out the screwdriver again, the terminal will close.
4. Now open the lower caged spring terminal at connection 1 for the temperature sensors on the TITANUS *RACK·SENS*® 1U device and feed the second cable end sleeve belonging to the first temperature sensor into the open connection terminal.
5. Carry out the same process with the other temperature sensors.
6. The temperature sensor is wired according to the following circuit connection.

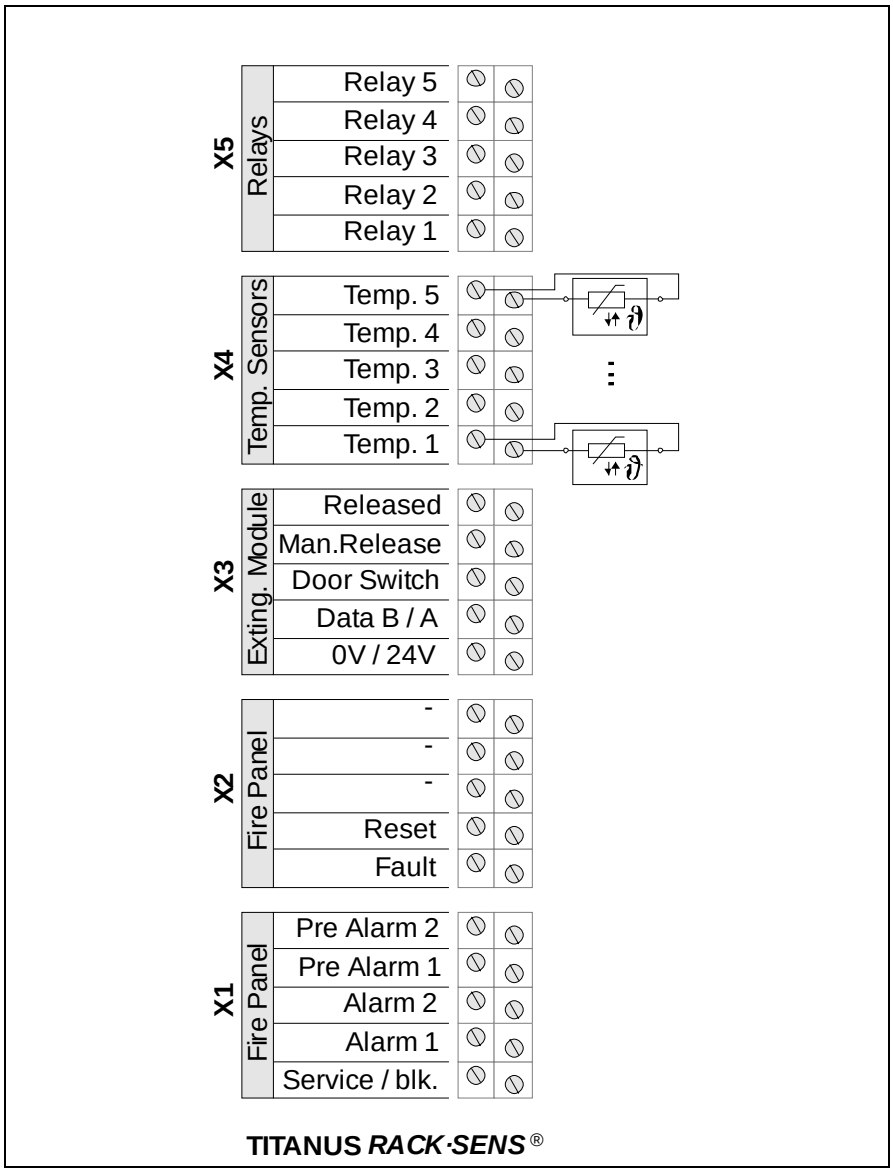


Fig. 5.16: Wiring for temperature sensors

5.2.12 Installation and connection of shutdown module (low power)

The optional shutdown module can be connected to the TITANUS *RACK·SENS*® 1U device. This module is designed for power shutdown of external equipment such as server cabinets (observe max. power rating).

1. Install the shutdown module in its designated position using a DIN-rail. In order to protect it from external interference, the module can be installed in a casing housing a DIN-rail.
2. Connect the shutdown module in accordance with the following circuit connection diagram.

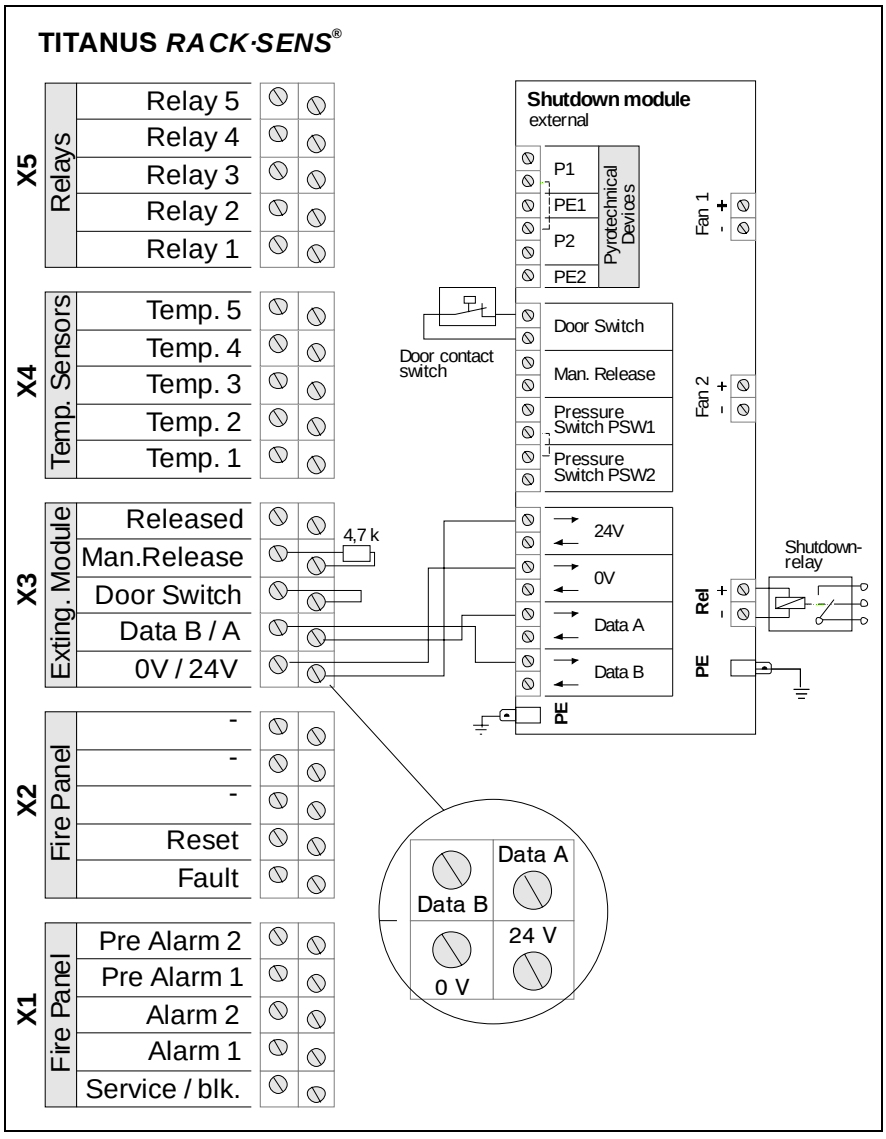


Fig. 5.17: Shutdown module connection

ATTENTION

If no door contact switch is installed, the input must be bypassed using a jumper.

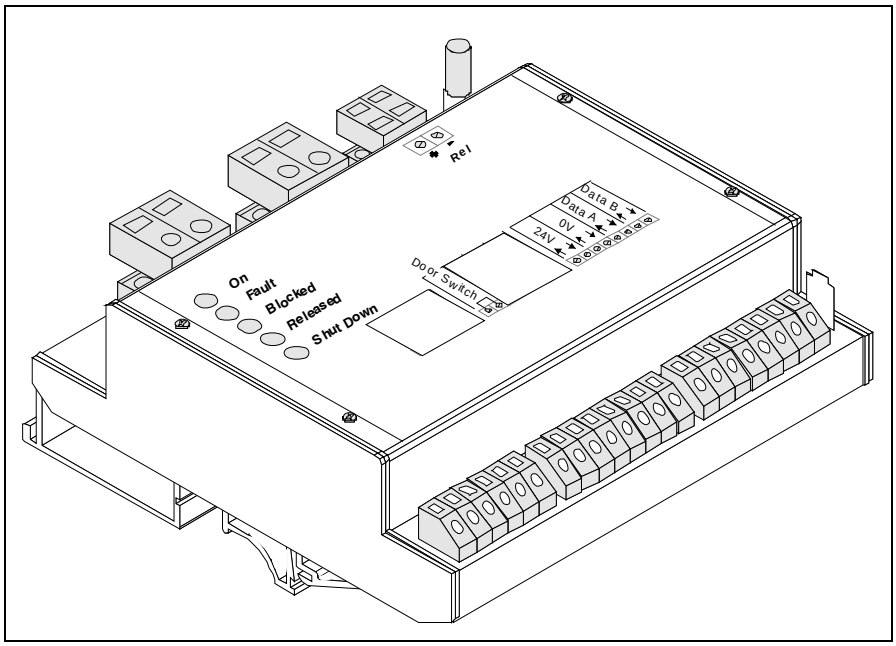


Fig. 5.18: Shutdown module connection

Name	Type	Potential-free contact	Implementation
Door Switch	Input	no	Ext. NO expected
24 V in	Input	no	24 V power supply input
24 V out	Output	no	24 V power supply output for further modules
0 V in	Input	no	0 V power supply input
0 V out	Output	no	0 V power supply output for further modules
Data A in	Input	no	Data bus input
Data A out	Output	no	Data bus input for further modules
Data B in	Input	no	Data bus input
Data B out	Output	no	Data bus input for further modules
Rel -	Output	no	Coil connection for ext. shutdown relay
Rel +	Output	no	Coil connection for ext. shutdown relay

5.2.13 Installation and connection for device shutdown (high power)

In the event of fire detection, the shutdown module connected to the TITANUS *RACK·SENS*® 1U device shuts down external equipment via a shutdown relay or high power relay. In the event of a shutdown, the backup power is removed from an incipient fire and thus prevents the fire from spreading further.

1. Install the shutdown relay and the high power relay, if there is one, on a DIN-rail in such a way that you can wire it without any problems.
2. Now connect the components in accordance with the following connection diagram.

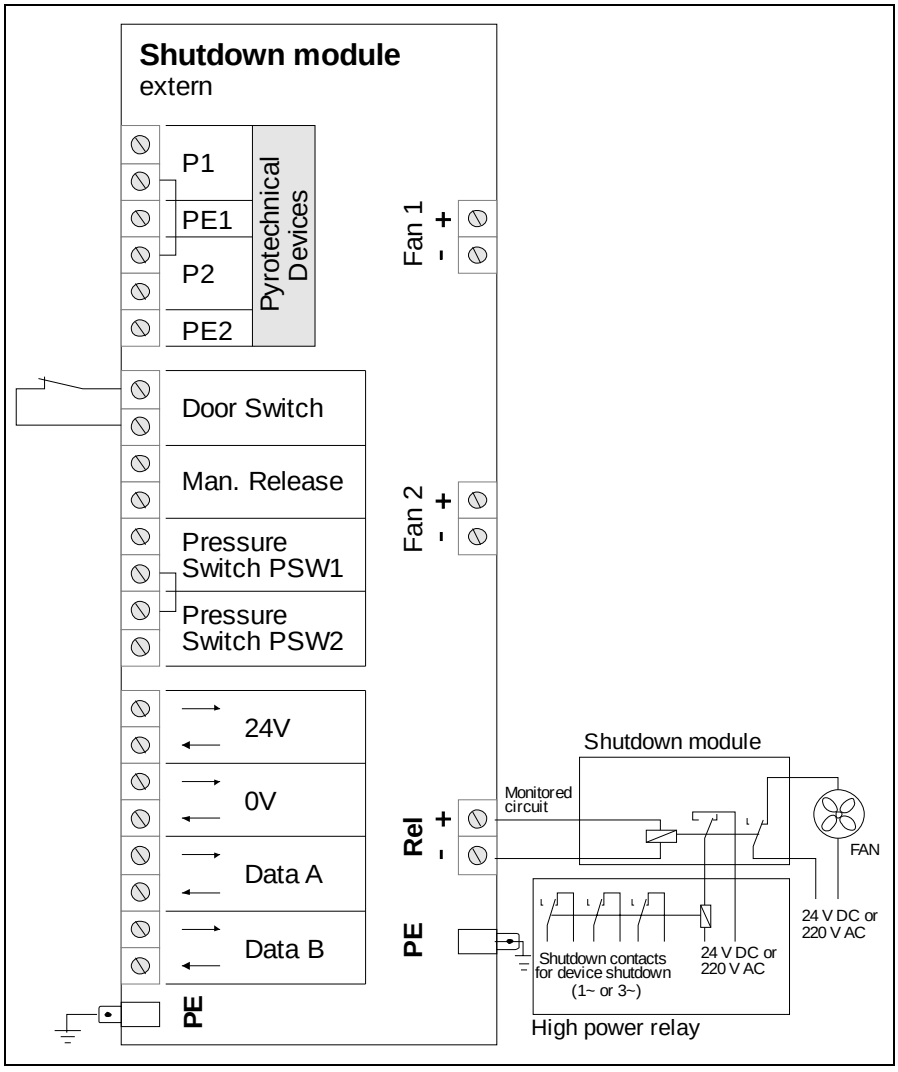


Fig. 5.19: Device shutdown connection diagram

5.2.14 Connecting the response indicator to the TITANUS *RACK·SENS*® 1U

Connect the response indicator via terminal block X5 at the rear of the device TITANUS *RACK·SENS*® 1U. The response indicator needs to be supplied by on external power supply.

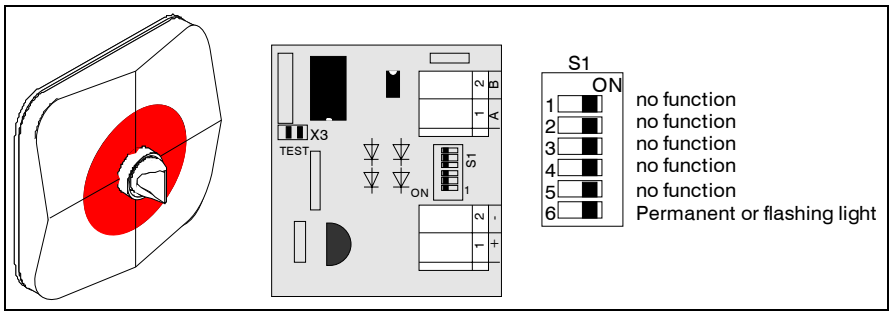


Fig. 5.20: Response indicator board addressing

ATTENTION

Jumper X3 must be fitted.

INSTRUCTION

Switch S1/6 sets the display mode of the response indicator (premanent or flashing LED).

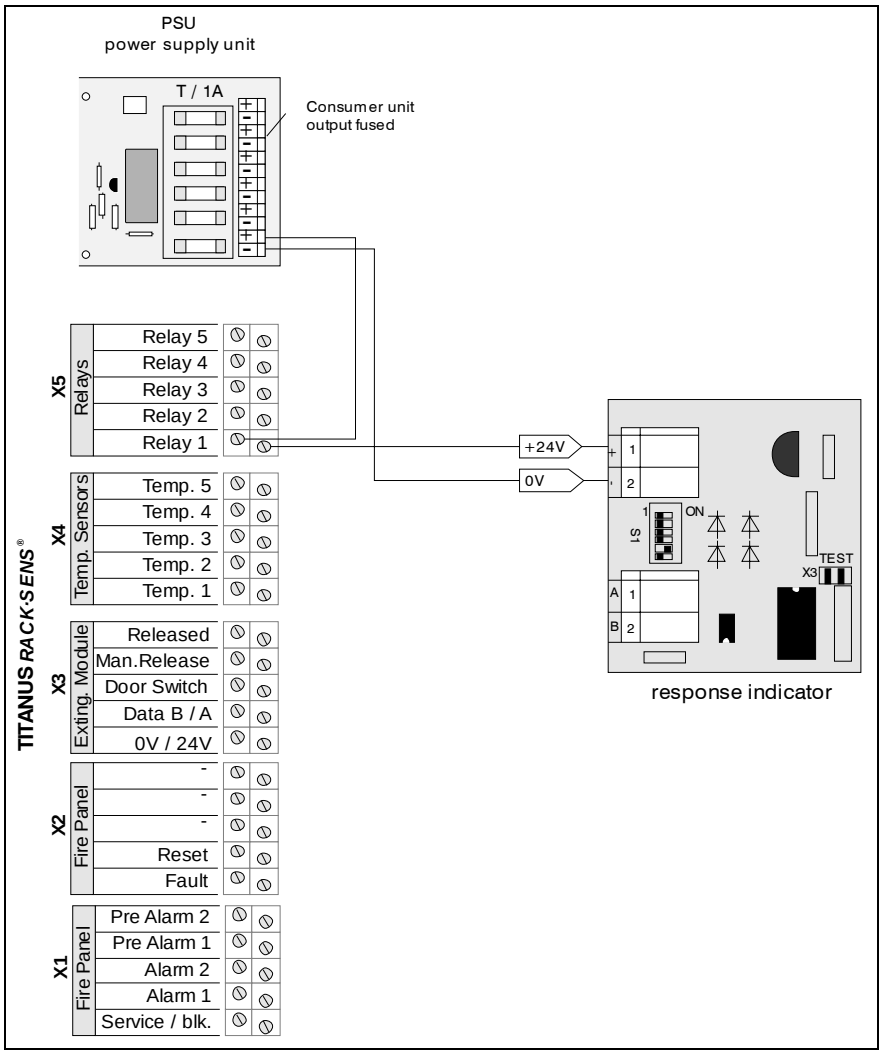


Fig. 5.21: Connecting the response indicator

ATTENTION

The corresponding, user programmable relay 1 has to programmed for main alarm detector 1 or main alarm detector 1 and detector 2 for this example.

6 Installation of the Pipe System

The pipes and fittings used for the pipe system must always meet requirements for Class 1131 in accordance with EN 61386-1, 2004.

Class 1131 puts the following requirements on the pipe system used:

characteristics	**severity code**
compression resistance	125 N
impingement resistance	0,5 kg, drop height at 100 mm
temperature range	-15 °C to +60 °C

In principle, the following pipes as well as the related fittings are to be used in configuring the pipe system:

	external diameter	**internal diameter**	
		ABS	**PVC**
air sampling pipe	25 mm	21,4 mm	21,2 mm

ATTENTION

Take note of the temperature range specified in the “Technical data” chapter under “3.3 Pipe system” when configuring the pipe system.

ATTENTION

When installing TITANUS *RACK·SENS*®1U and its components, special attention must be paid to avoid damaging them through dropping tools or installation material!
Cooling of the rack and its components must not be impaired due to installation of the TITANUS *RACK·SENS*® 1U unit and its components.

Installation Instructions

The pipe system must be designed according to the requirements of the project and the pipe design guidelines (see chapter 4 "Pipe Design").

1. Cut the pipes with a pipe cutter or a metal saw. Chips must be removed and rough edges trimmed.
2. **Before** gluing, remove any dirt and grease from the joints with the recommended cleaning agent. Glue the pipe ends to the corresponding fittings so that they are airtight.

Air Sampling Pipe, halogen-free	Air Sampling Pipe (PVC)	Cleaning Agent	Adhesive	Pipe Cutter
ABSR-2518,	R-2519,	Tangit cleaner	Tangit adhesive	pipe cutter or 38mm saw

3. Keep the pipe lengths and direction changes to a minimum. Elbows and bends have an extremely high flow resistance. Use them only where this is unavoidable. Should this be necessary, the pipe length must then be reduced in relation to the fitted bends[1].

INSTRUCTION

Sweep elbows should be used instead of elbows. If there are too many direction changes, an air flow fault can occur in TITANUS *RACK·SENS*® 1U and detection time can be affected.

4. The pipes must be installed in such a way that they do not sag or move. They should be fixed with pipe clips **without** rubber core. The space between the pipe clips should be no more than 80cm. Reduce the space between clips to no more than 30cm if there are high temperature variations.

[1] An arc equals a straight piece of pipe of 0.3m
an elbow equals a straight piece of pipe of 1.5m

INSTRUCTION

Do not use pipe clips with rubber cores as these do not expand lengthwise and the pipes would sag or crack.

5. Close open pipe ends with an end cap.

INSTRUCTION

After pipe installation is complete, check for the following:
- air tightness (eg due to damage)
- any faulty connections
- correct design of the air sampling holes

Pipe Clips

As a rule, plastic pipe clips, type 23, are used for the installation of pipe systems (∅ 25mm). They do not allow for linear expansion and in areas with high temperature variations the plastic pipe shells, type CLIC-PA must be used. (see fig. 6.1).

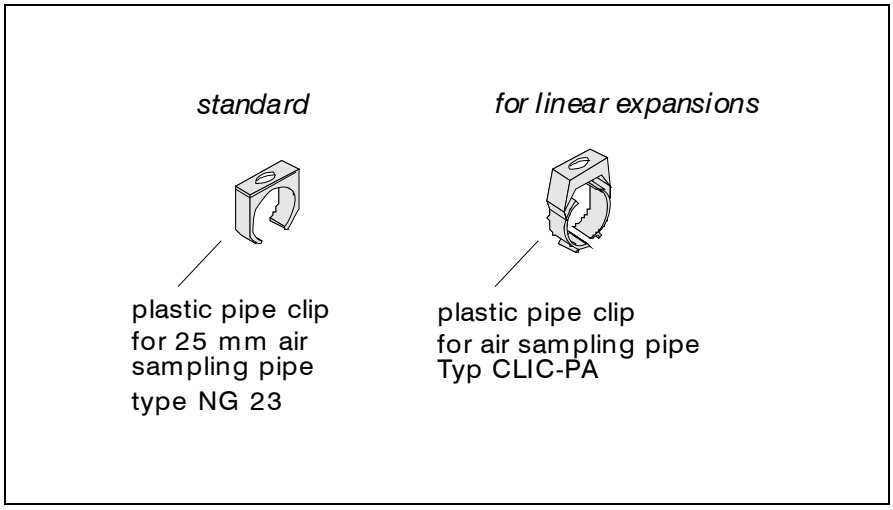


Fig. 6.1: Pipe clips

6.1 Patented Air Sampling Points

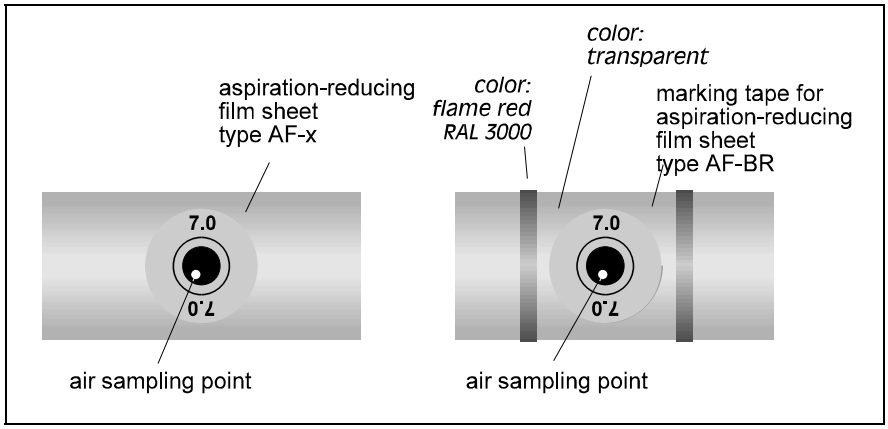


Fig. 6.2: Example of an air sampling point with aspiration-reducing film sheet

Air Sampling Point

Design air sampling points (bore holes) and their positioning according to project requirements and pipe design guidelines.

ATTENTION

Ensure that all mechanical work (i.e. drilling of aspiration holes etc.) is carried outside of the cabinet.

Bore Holes

1. Drill a hole with a 10mm drill at a right angle to the pipe.
2. Carefully de-burr the holes.
3. Clean the area around the hole (around the whole pipe) from dirt and clean with Tangit cleaner.
4. Select the size of the aspiration-reducing film sheet according to the pipe design guidelines
5. Stick the aspiration-reducing film sheet over the hole (see fig. 6.3, ❶).
6. Prevent the film sheet from coming loose by sticking marking tape over it (see fig. 6.3, ❷).

INSTRUCTION

The holes in the aspiration-reducing film sheet and the marking tape must be placed exactly over the bore holes. The perforations in the aspiration-reducing film sheet must not be altered.

To keep the surface of the film sheet dust and grease free, avoid any contact.

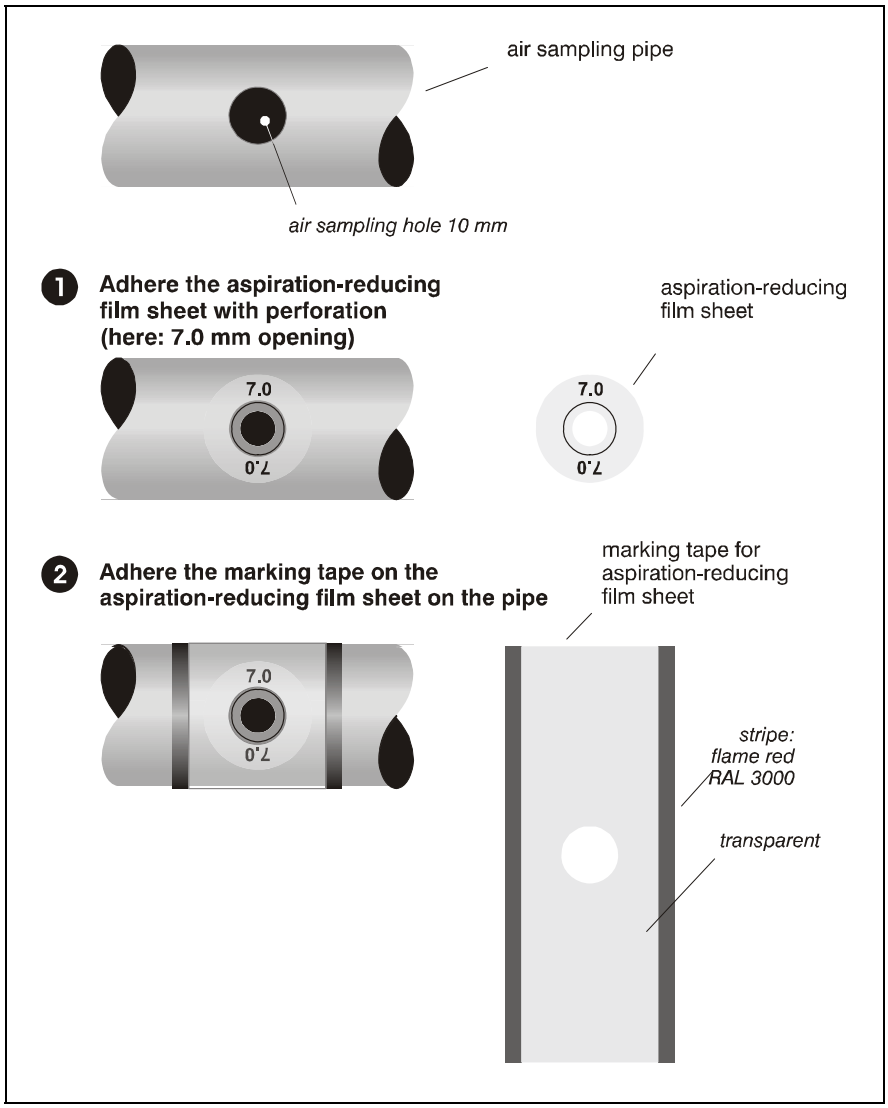


Fig. *6.3: Attaching the aspiration-reducing film sheet*

6.2 Monitoring in Forced Air Flow Systems (Ventilation or Climatic Applications)

6.2.1 Detection at Air Inlets/Outlets

INSTRUCTION

If aspiration takes place in a forced air flow system (ventilator, climatic systems), the air sampling points must be positioned as shown in fig. 6.4.

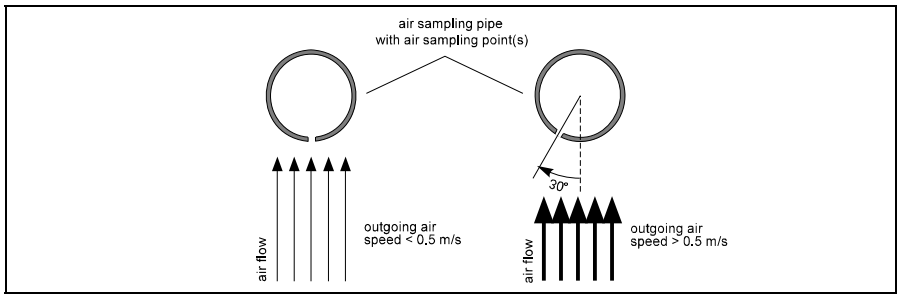


Fig. 6.4: Positioning of air sampling point, depending on air speed

7 Commissioning

After the TITANUS *RACK·SENS*® 1U device and its components have been fully installed, the device can be put into operation.

7.1 Operating TITANUS *RACK·SENS*® 1U

7.1.1 Key switch

The TITANUS *RACK·SENS*® 1U can be operated in different operating modes using the key switch.

ON:

In this switch setting the TITANUS *RACK·SENS*® 1U system is ready for operation. In this mode, alarms and fault signals are forwarded to an optional connected fire alarm system. In the event of a main alarm, a connected shutdown module can also be activated.

Service:

In this switch setting the TITANUS *RACK·SENS*® 1U system is isolated from the fire alarm line. In the event of a main alarm, forwarding of alarms and fault signals to an optional connected fire alarm system likewise electrical shutdown or extinguishing will be disabled.

Off:

In this switch setting the TITANUS *RACK·SENS*® 1U system is switched off.

7.1.2 Config. Temp. button

The „Config. Temp.“ button features a dual functionality.

On the one hand it provides selection and display (in __ °C) for all physically connected temperature sensors (only available with optional temperature module).

On the other hand a given configuration for a TITANUS *RACK·SENS*® 1U can be “featured down”. This can be useful in cases where modules have to be removed from the system configuration such as:

- in a fault condition (i.e. defective shutdown module). There may be a request, that the device must be operational without faults. (A defective module as well as a removed module will cause a fault, since it was added automatically to the system configuration during installation and power up.)
- after a module was exchanged. In this case the defective module needs to be removed from the system configuration. New modules will be detected and added to the system configuration automatically.

ATTENTION

Removing active modules (i.e. extinguishing-shutdown modules) will usually lead to a reduced functionality of the fire protection system and possibly to a loss of fire protection altogether.
A defective module must be replaced immediately.

A defective module can be removed from the system configuration by using the „Config.“ button as follows:

- Put the key switch in position „Service“.
- Press „Config.“ button for 10 seconds.
  The device will perform a LED- and buzzer test. System configuration mode is indicated by the service / blocked and fault LED-symbols which are flashing simultaneously.
  If the optional temperature module is installed, the associated display will show in this special case the number of connected extinguishing-/shutdown modules. Regardless of the presence availability of the temperature module, the device will be now in configuration mode.
- By pressing again the „Config.“ button for another 10 seconds, the actual system configuration will be updated and stored. The device is confirming the update with three beeps by the internal buzzer. The service/blocked indicator will stop flashing and be continuously on.
- Alternatively by pressing the „Reset“ button or by putting the key-switch into the “ON” position, the actual system configuration will be ignored. In this case the device will show a fault when switched to the „On“ position since the defective module was not removed from the system configuration.

INSTRUCTION

Display of connected temperature sensors and modules is only available with an installed temperature module. Removing modules from the system configuration is still possible without this temperature module, but displaying the number of connected modules is not available.
An actual system configuration can be checked via the diagnostics tool DIAG 3.

7.1.3 Reset and buzzer off button

This button enables alarms and faults to be reset when the TITANUS *RACK·SENS*® 1U device is in service mode if the event which caused it is no longer present. To do so, the key switch must be switched to the “Service” position and the “Config.” button be held down for about 3 seconds.

In normal operating mode the TITANUS *RACK·SENS*® 1U internal buzzer can be switched off using this switch. The buzzer will come back on for each new fault or each new alarm which occurs. The buzzer is reset by pressing the button.

7.1.4 Air flow initialisation

In service mode airflow initialisation can be activated by pressing the „Reset“ and „Config.“ buttons simultaneously.

Put the key switch into position „Service“and press both buttons for 3 seconds. During initialisation the power on indicator LED will flash.

7.2 Commissioning TITANUS *RACK·SENS*® 1U

Before putting the TITANUS *RACK·SENS*® 1U device into operation, the pipe system must be fully installed, in working order and connected to the sampling vent at the rear of the device.

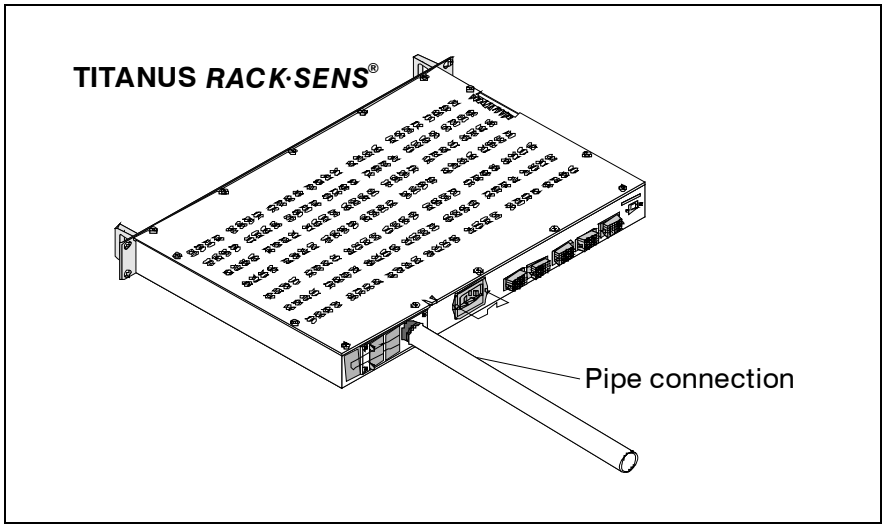


Fig. 7.1: Pipe system connection

7.2.1 Termination of unused inputs

After installation and wiring of the basic unit, its accessories and the pipe systems the TITANUS *RACK·SENS* ® can be put into operation.

Ensure, that all unused electrical inputs of the TITANUS *RACK·SENS* ® 1U unit or the are either terminated by an appropriate resistor or by a jumper wire:

- Door switch
- Man. Release
- Shutdown relay (Rel)

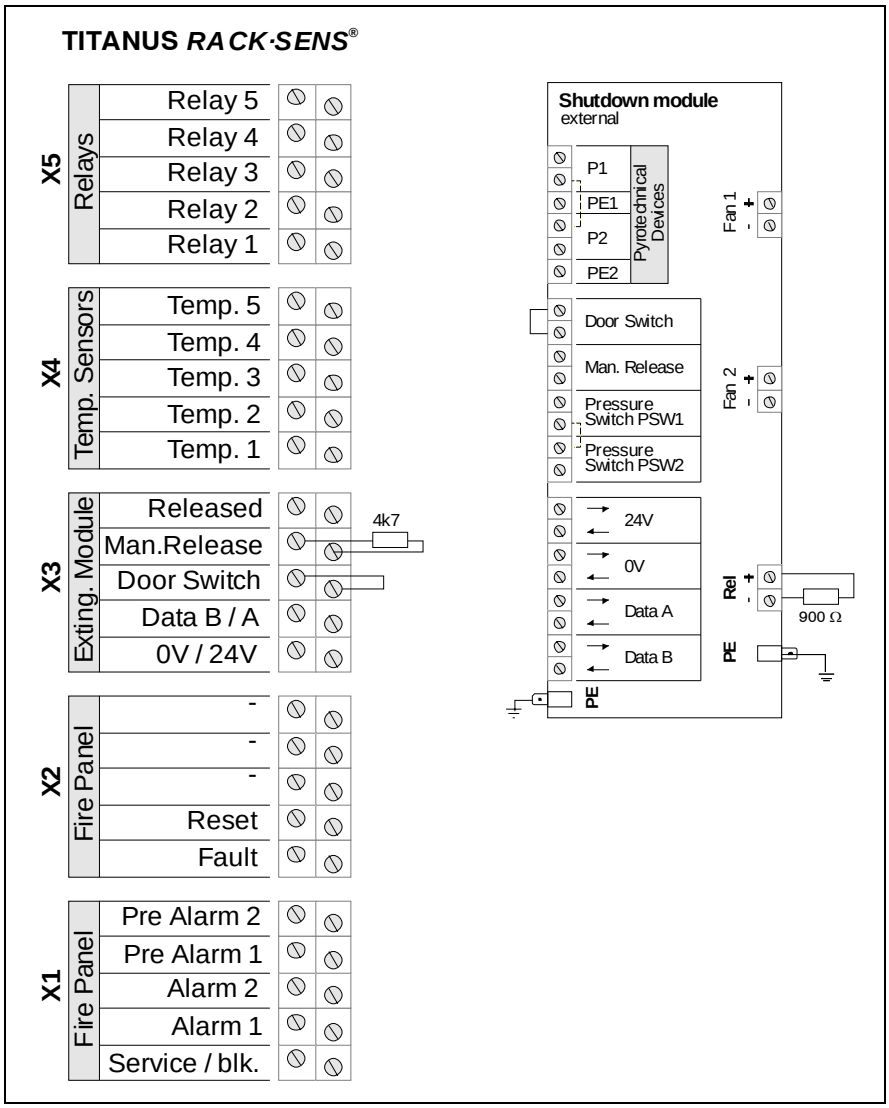


Fig. 7.2: TITANUS *RACK·SENS*® 1U *termination of unused inputs*

7.2.2 Commissioning procedure

Laptop or DIAG 3 diagnostics tool is not required for standard commissioning default settings will not be changed.

1. Switch on the supply voltage.
2. Switch the key switch on the front of the TITANUS *RACK·SENS*® 1U device to the “Service” position.
3. Now press the “Config” and “Reset” buttons on the front of the TITANUS *RACK·SENS*® 1U device at the same time to initialise the air flow. Air flow initialisation will now take place automatically.

The green operation mode indicator will flash while the TITANUS *RACK·SENS*® 1U is initialising. If initialisation is completed, the operation mode indicator will light up continuously.

INSTRUCTION

Air flow initialisation can take up to 2 hours. It is successfully completed when a constant air flow has been attained in the TITANUS *RACK·SENS*® 1U

The air flow in the TITANUS *RACK·SENS*® 1U should not be altered during the initialisation phase.

In a normal situation the TITANUS *RACK·SENS*® 1U should now run without any problems. If this is not the case, follow the procedures described in section 8.2 (Procedure in the event of a fault).

4. If no faults or alarms are shown on the TITANUS *RACK·SENS*® 1U display, you can now switch the key-operated switch on the front of the TITANUS *RACK·SENS*® 1U device to the “On” position.
5. The device is now ready for operation and is no longer isolated from the fire alarm line. Alarms and fault signals will now be forwarded to an optional associated fire alarm system. Likewise in the event of an alarm, an optionally connected relay (via shutdown module) will be energised for electrical shutdown and, if not blocked/inhibited by an door contact, an optionally connected extinguishing systems will be activated.

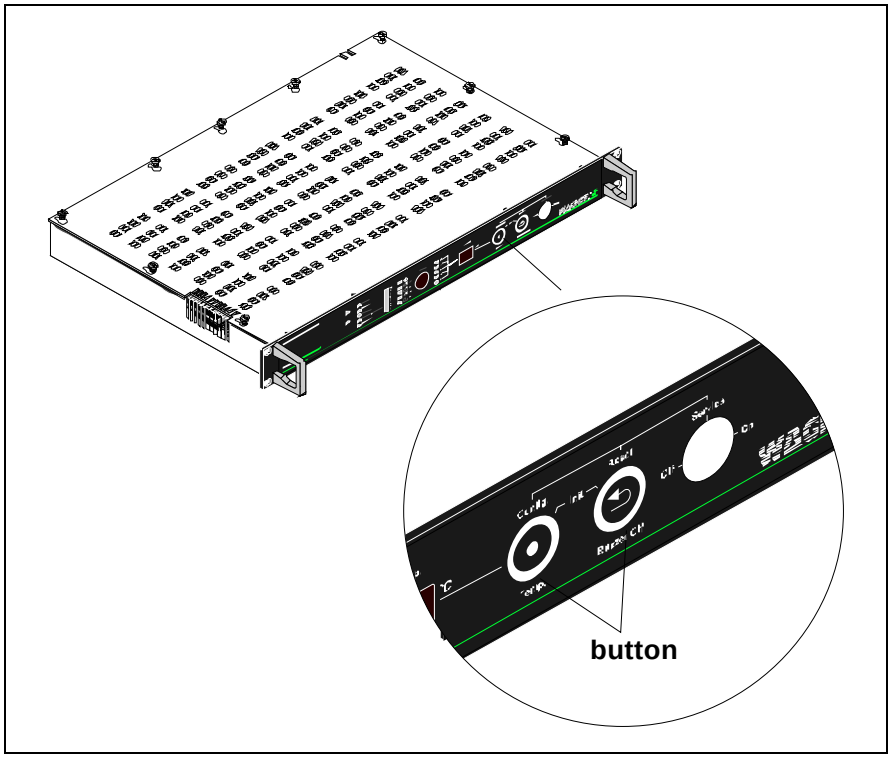


Fig. 7.3: Air flow initialisation

7.2.3 Settings adjustment with the diagnostics tool

The diagnostics tool allows to alter pre-settings such as detection unit sensitivity, alarm delay for individual alarm stages, air flow fault delay, programmable relay configuration, alarm thresholds and temperature alarm.

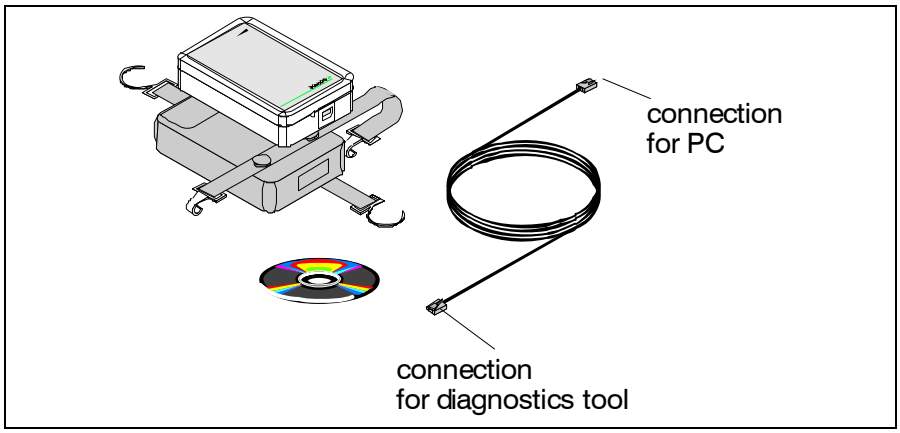


Fig. 7.4: diagnostics tool

7.2.4 Settings for main board and detector module

All TITANUS *RACK·SENS*® 1U settings are made using the diagnostics tool. Diagnostics tool installation and usage are described in more detail in section 7.9.

Pressing the “Settings” button enables you to access the screen where you can change individual settings. Pressing the “Accept” button stores the new settings in the TITANUS *RACK·SENS*® 1U device. Pressing the “Default” button re-establishes the default settings.

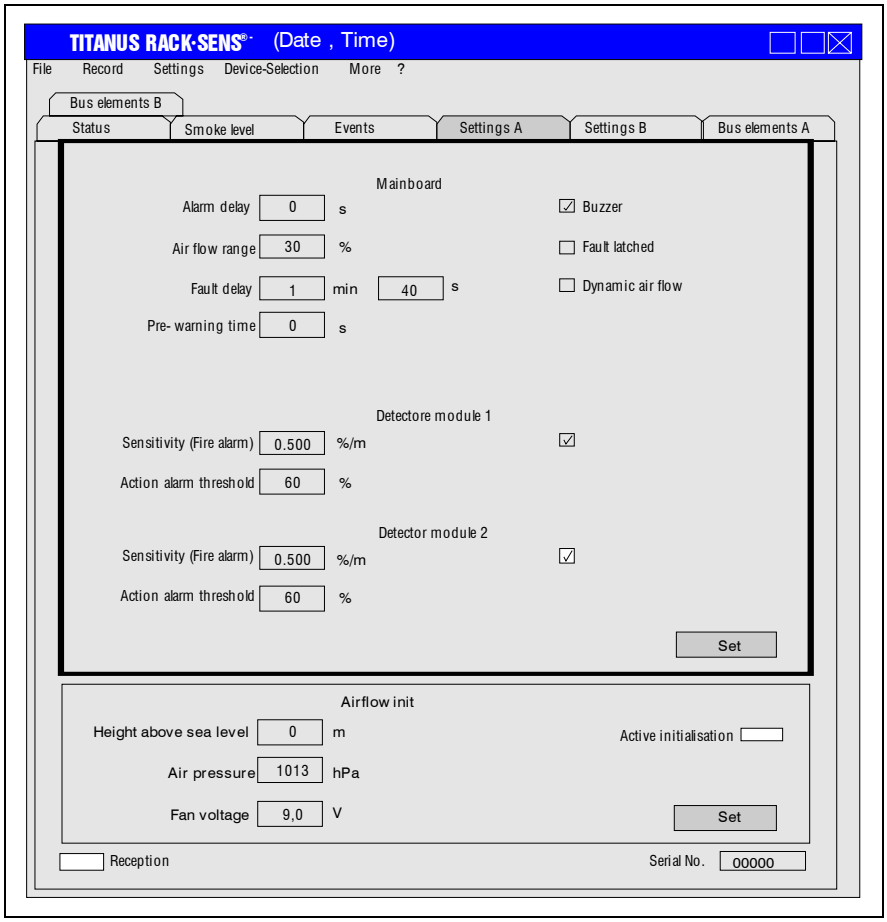


Fig. 7.5: Settings for sensitivity, alarm delay, air flow range and fault delay

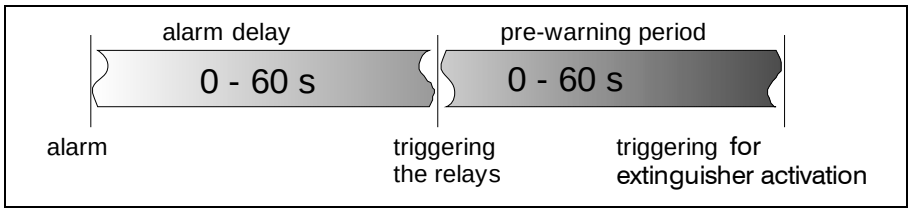
7.2.4.1 Alarm delay setting

The default delay period for the alarm threshold can be changed using the diagnostics tool. The default setting for the alarm delay period is 10 seconds. If the smoke level rises to the alarm threshold while in operation, the delay period starts to run. The signal is only forwarded if the delay period is expired and the smoke level still persists. The alarm LED flashes during the delay period.

Alarm delay	Default alarm delay	Setting intervals
0 s – 60 s	10 s	1 s

TIP

The alarm delay period should only be set to 0 seconds for testing purposes.



7.2.4.2 Air flow range setting

The default release threshold for an air flow fault can be changed using the diagnostics tool. The air flow fault threshold indicates the percentage of change in air flow where an air flow fault is displayed.

threshold range	Default threshold	Setting intervals
10 % - 50 %	20 %	1 %

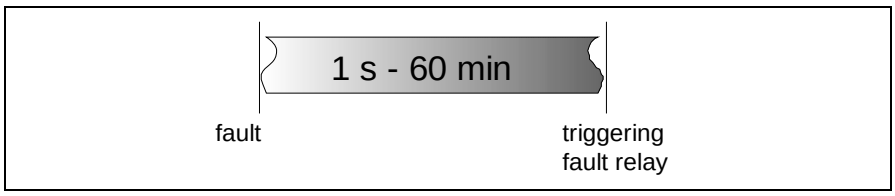
The air flow fault threshold should be left at the default setting of 20% when monitoring racks with forced-air cooling.

7.2.4.3 Fault delay setting

You can set the delay period for air flow faults here.

Fault delay	Default fault delay	Setting intervals
1 s – 60 min	100 s	1 s

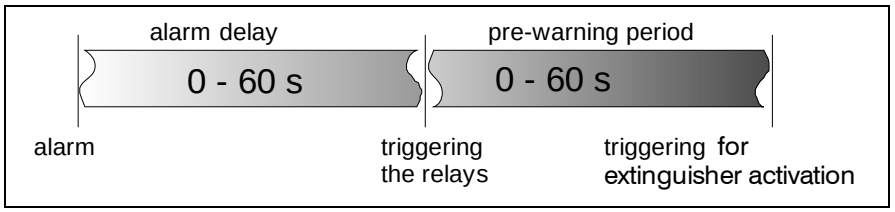
The default setting for the delay period is 100 seconds. Other delay periods should be set for areas with temporary fault levels (such as changes in air pressure) in accordance with the duration of the fault level.



7.2.4.4 Pre-warning period setting

You can set the pre-warning period for extinguisher activation here. The pre-warning period delays extinguisher activation.

Pre-warning period	Default pre-warning period	Setting intervals
0 s – 60 s	10 s	1 s



7.2.4.5 Buzzer setting

You can activate or deactivate the TITANUS *RACK·SENS*® 1U internal buzzer here. When you exit the diagnostics software, you will be notified that the buzzer is still deactivated if the buzzer happens to be switched off.

Buzzer	Default buzzer setting
off - on	on

7.2.4.6 Fault indicator setting

The common fault indicator can optionally be set latching or non latching (default). It can be activated or deactivated using the TITANUS *RACK·SENS*® 1U diagnostics tool.

fault latching	fault non latching Default
off - on	off

7.2.4.7 Dynamic air flow setting

Dynamic air flow can be activated or deactivated using the TITANUS *RACK·SENS*® 1U diagnostics tool.

Detection unit	Dynamic air flow Default
off - on	off

7.2.4.8 Sensitivity setting (main alarm)

Detection unit sensitivity can be activated or deactivated using the TITANUS *RACK·SENS*® 1U diagnostics tool.

Detection unit	Sensitivity	Default sensitivity	Setting intervals
TR1-10	0,1 - 2 obs. %/m	0,1 obs. %/m	0,1 obs. %/m
TR1-50	0,5 - 2 obs. %/m	0,5 obs. %/m	0,1 obs. %/m

obs. = obscuration

7.2.4.9 Pre-alarm threshold setting

The pre-alarm threshold can be set here as a percentage of the main alarm threshold sensitivity.

Pre-alarm threshold	Default Pre-alarm threshold	Setting intervals
10 – 80 %	60 %	1 %

7.2.4.10 Setting LOGIC·*SENS*

LOGIC·*SENS* intelligent signal processing can be activated or deactivated using the TITANUS *RACK·SENS*® 1U diagnostics tool. When **LOGIC·*SENS*** is switched on, it can prevent false alarms by signal evaluation with smoke pattern recognition.

LOGIC·*SENS*	LOGIC·*SENS* Default
off - on	on

7.2.5 Air flow initialisation setting

The current values in the TITANUS *RACK·SENS*® 1U device are shown on the settings screen in the diagnostics software.

Values can be changed after clicking the “Set” button.

Air flow initialisation must be carried out after changing the settings. This will update the set values.

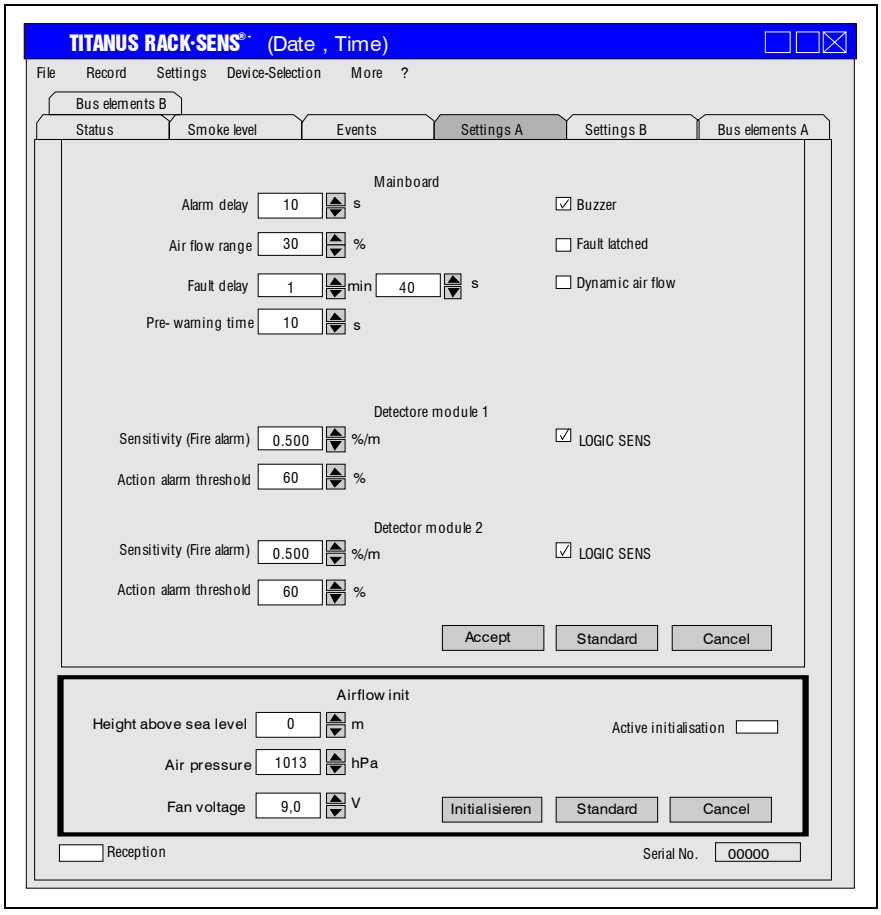


Fig. 7.6: Height, air pressure, fan voltage and air flow initialisation settings

Pressing the “Cancel” button allows to exit the screen and individual settings are not saved.

Air flow initialisation can take up to a maximum of 2 hours. After 2 hours, initialisation is cancelled and a fault message is displayed (initialisation cancelled).

Air flow initialisation is cancelled immediately if one of the following faults occurs:

- Air flow measurement defect
- Fan control defect

INSTRUCTION

The settings in sections 7.2.5.1 and 7.2.5.2 do not apply in the case of monitoring forced-air cooled cabinets and equipment.

7.2.5.1 Setting height above Normal Sea Level (NN)

The figure for the height above normal sea level is the value for the actual installation site of the TITANUS *RACK·SENS*® 1U above sea level. The figure is input by using the diagnostics tool. The standard setting is 0 m. The figure has to be changed if an air pressure dependent adjustment is desired (see Chap.7).

ATTENTION

If the default setting for air pressure or the height above sea level is changed, the air flow in the TITANUS *RACK·SENS*® 1U system must be re-initiated by activating the Init button in the DIAG software.

7.2.5.2 Setting the current air pressure

The current air pressure for the monitoring area must be input by using the TITANUS *RACK·SENS*® 1U diagnostics tool if air pressure-dependent adjustment is required.
The standard setting is 1013 hPa, corresponding to the average air pressure at sea level.

7.2.5.3 Fan voltage setting

The default setting for the fan voltage is 9 V. When applications are critical, the fan voltage can be set higher in order to shorten the transport time in the pipe system and to work against any air flow anomalies caused by ventilation. Please contact **WAGNER** regarding any queries in this respect.

Fan voltage	Default fan voltage	Setting intervals
9 V – 13,5 V	9 V	0,1 V

ATTENTION

The settings can only be saved in the system configuration by pressing the Init button in the DIAG software.

7.2.6 Setting the programmable relays and the temperature alarm

Settings for programmable relays

These settings enable the relays to become logically linked to the alarms (“AND” or “OR”).

Settings for temperature alarms

The temperature alarms 1 -5 are continuously adjustable between 0 °C and 100 °C.
In the example below relay 1will be activated on main alarm by detector unit 1 (main alarm detector module 1) or temperature alarm 1.

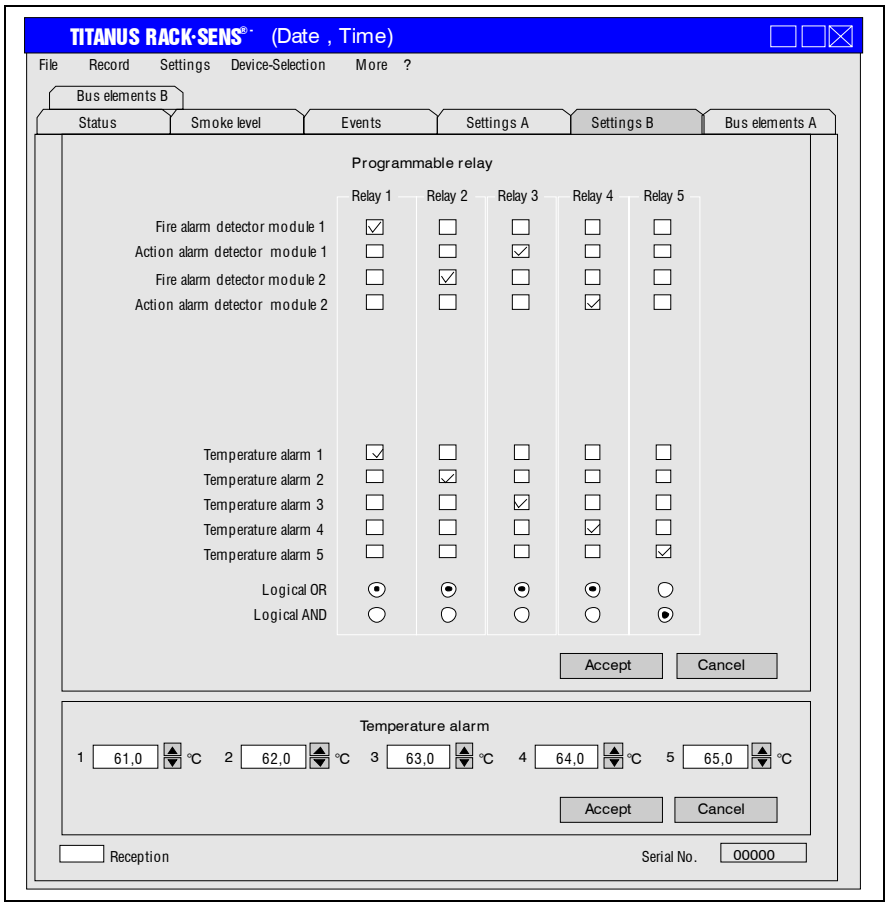


Fig. 7.7: Settings for programmable relays and temperature alarm

Application example

In the example given below it is shown how to electrically disconnect a roof fan in case of a fire.

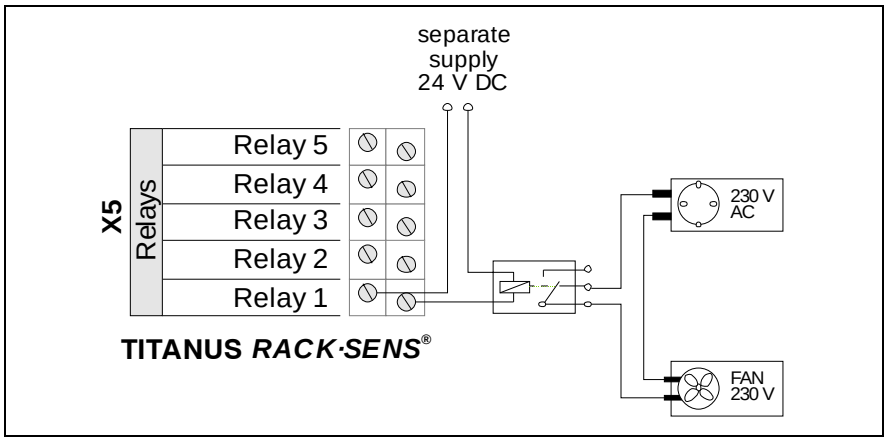


Fig. 7.8: Application example disconnect a roof fan

In order to cut off the power from the fan, the user programmable relay 1 has to be configured in such a way, that it will be activated when both main alarms (detector 1 and 2) are activated. The setup within the diagnostics tool is shown below.

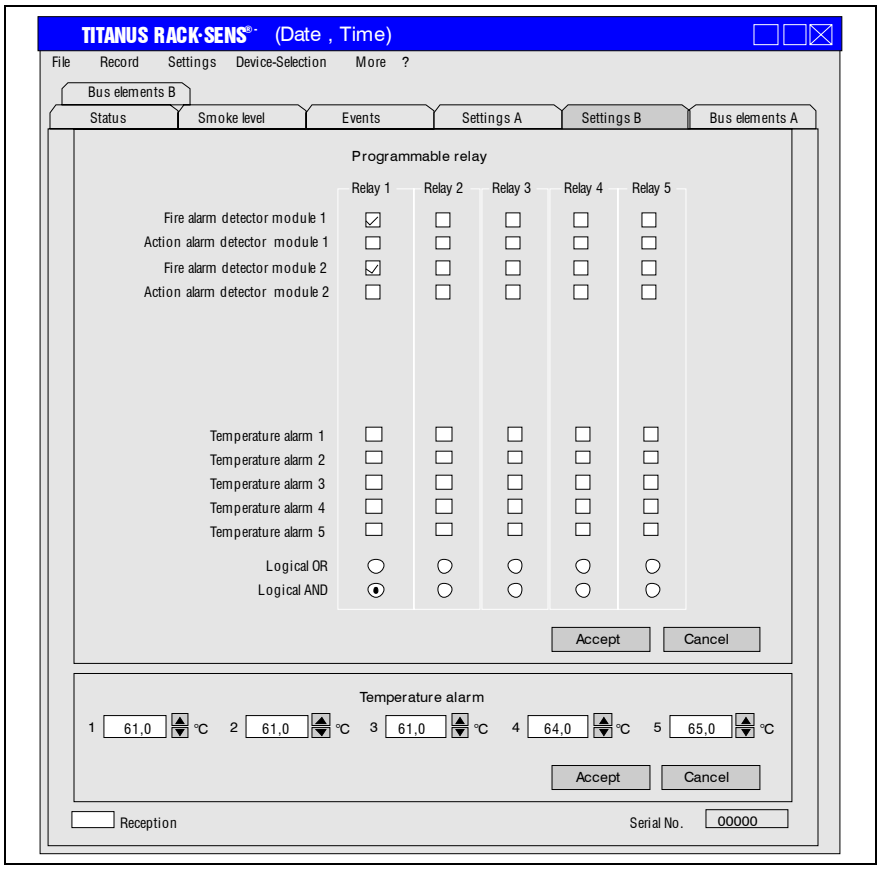


Fig. 7.9:: Settings for programmable relays

INSTRUCTION

It is recommended to print out the device log after completing the set-up operation and keep it with the system documentation so that device settings can be checked at a later date.

7.3 Data logging

A basic device test is possible using the diagnostics tool. With its message and status readouts, the diagnosis programme facilitates considerably simplified servicing. The DIAG 3 can be attached to the TITANUS *RACK·SENS*® 1U using a device mount or be kept up to 3 m away along a straight line (±10°) from the infrared interface.

Data is read via an infrared interface on the TITANUS *RACK·SENS*® 1U using the DIAG 3, which is linked to the PC with a USB cable.

Since the infrared interface provides reception and transmission within a range of 3 meters, several adjacent installed TITANUS *RACK·SENS*® 1U units may appear in the device selection window (DIAG 3). Each one can be addressed separately.

Diagnostics tool commissioning is described in the section 7 “Commissioning”.

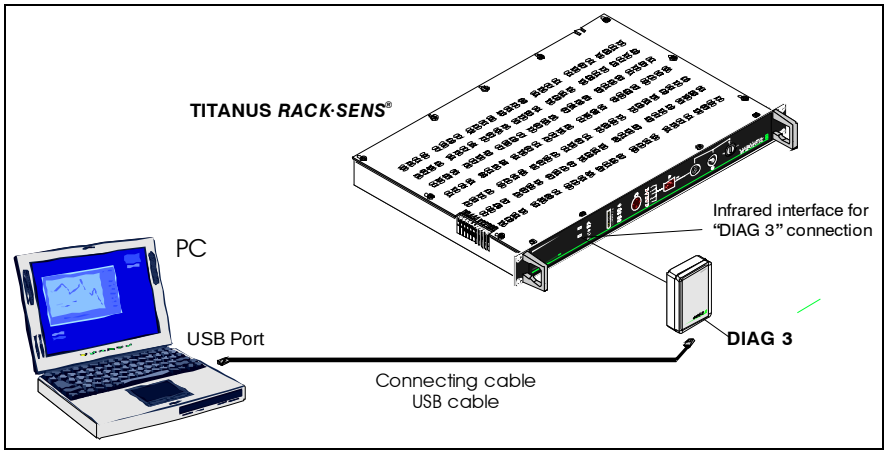


Fig. 7.10: PC connection to TITANUS *RACK·SENS*® *1U*

TIP

It is recommended to print out the device log after completing the set-up operation and keep it with the system documentation so that device settings can be checked at a later date. Alternatively, the diagnostics file can be saved.

TIP

Diagnostics file save:
Menu File, Save data
File type .di3

Service calls to:
WAGNER Group GmbH or our local representative

7.3.1 Example of a commissioning log (2 pages)

```
Test
------------------------------------------------------------------------
TITANUS RACK·SENS - [17.07.2007 15:33:19]

Serial No.: 1234567   Software No.: 0056.01.003   Parameter No.: 0056.001.001
Status
------
Fault                           -
Battery                         -
Mains                           -
Service/Blocked                 -
Released                        -

Fire alarm 1                    -
Action alarm 1                  -
Fire alarm 2                    -
Action alarm 2                  -

                                Detector module 1       Detector module 2
Serial No.                      187448                  187445
Software No.                    0041.01.009             0041.01.009
Parameter No.                   0041.100.001            0041.100.001

Smoke level                     0,000 %/m               0,000 %/m
Detector state                  2 %                     0 %
Air flow                        2 %  (1,29 m/s)
Temperature                     30,7 °C

Temperature Sensor:             1         2         3         4         5
                                29,1 °C   29,4 °C   29,0 °C   29,4 °C   29,5 °C

Settings A
----------
Alarm delay                     10 s
Air flow range                  30 %
Fault delay                     1 min 40 s
Pre- warning time               10 s

Buzzer                          X
Fault latched                   -
Dynamic air flow                -

                                Detector module 1       Detector module 2
Sensitivity (Fire alarm)        0,500 %/m               0,500 %/m
Action alarm threshold          60 %                    60 %
LOGIC·SENS                      X                       X

Height above sea level          0 m
Air pressure                    1013 hPa
Fan voltage                     9,0 V

Settings B
       ----------
Programmable relay:             1         2         3         4         5
Fire alarm detector module 1    X         -         -         -         -
Action alarm detector module 1  -         -         X         -         -
Fire alarm detector module 2    -         X         -         -         -
Action alarm detector module 2  -         -         -         X         -
Temperature alarm 1             X         -         -         -         -
Temperature alarm 2             -         X         -         -         -
 Temperature alarm 3             -         -         X         -         -
Temperature alarm 4             -         -         -         X         -
Temperature alarm 5             -         -         -         -         X
Logical OR                      X         X         X         X         X
Logical AND                     -         -         -         -         -

Temperature alarm:              1         2         3         4         5
                               60,0 °C   60,0 °C   60,0 °C   60,0 °C   60,0 °C
```

```
--------------------------------------------------------------------------------
       TITANUS RACK·SENS - [17.07.2007 15:33:19]

Serial No.: 1234567   Software No.: 0056.01.003   Parameter No.: 0056.001.001

TITANUS RACK·SENS - More settings
---------------------------------
Settings Beta-Values:            1         2         3         4         5
                                 3927      3927      3927      3927      3927

Settings manual release:
Alarm resistor value             1000 Ohms
Nominal resistor value           4700 Ohms
Resistor tolerance               20 %

Bus elements
------------
Serial No.                       10001           10021           10030
Online                           X               X               X
Fault                            -               -               -
Service/Blocked                  -               -               -
Ignition line activated          -                               -
Shutdown activated               -               -               -
Software No.                     0063.01.001     0063.01.001     0063.01.001
Parameter No.                    0063.002.001    0063.003.001    0063.001.001
Alarm resistor value                                             1000 Ohms
Nominal resistor value                                           4700 Ohms
Resistor tolerance                                               20 %
```

7.4 Testing the detection unit and alarm forwarding

ATTENTION

In the order to check alarm forwarding it is absolutely essential to block the TITANUS *RACK·SENS*® 1HE via door contact switch (door open).
In case of an implemented shutdown relay you MUST DISCONNECT THE RELAY

INSTRUCTION

If **LOGIC·*SENS*** is set to “ON” on the diagnostics tool “Settings” screen (see section 7.2.1.7 “Settings”), it should be set to “Off” during the alarm testing with the test aerosol in order to speed up alarm evaluation.

Pull out the TITANUS *RACK·SENS*® device and check alarm forwarding to the fire alarm system in the following way:

1. Open at least one door of the associated monitored doors in order to block any connected extinguishing systems.
2. In case of an implemented shutdown relay, disconnect the relay.
3. Spray the test aerosol into the first aspiration hole or into the test adapter in the TITANUS *RACK·SENS*® 1U pipe system.
4. Proceed according to the table below.

Check whether...	**If this is not the case....**
the alarm is displayed in the air sampling smoke detection system.	1. check whether the display panel board is connected. 2. there is a defect in the air sampling smoke detection system.
the alarm is forwarded to the fire alarm system and is signalled on its respective line.	1. check the signal paths.

5. Wait until the smoke level has come down and all alarms have cleared off.
6. Do not close the doors, before all alarms have cleared out and the TITANUS *RACK·SENS*® 1U has been reset.

INSTRUCTION

Record all test data in the test log in the appendix.

7.5 Testing response behaviour in cabinets

INSTRUCTION

The TITANUS *RACK·SENS*® 1U system must be switched to service mode for the following tests.

Ensure, that the TITANUS *RACK·SENS*® 1U unit will only be set to “ON” after the test, if all alarms have cleared out.

The PYS 100 pyrolysis system determines fire alarm system response behaviour, especially for highly sensitive air sampling smoke detection systems. The pyrolysis system is designed to simulate an electric fire in a compressed time period through a reproducible smoke test.

The system generates defined quantities of pyrolysis particles and smoke to be reproduced under the same ambient conditions, so that changes in the response behaviour of the fire alarm system can be detected when the test is repeated.

- Pyrolysis phase when invisible smoke particles are released.
- Smouldering fire stage when visible smoke particles are released in quantities which match the response sensitivity required by system design.

The pyrolysis box is kept closed when operating in difficult-to-access installations such as control cabinets as well as false floors and cable conduits. The pyrolysis particles produced are then fed in a tube into the cabinet being monitored.

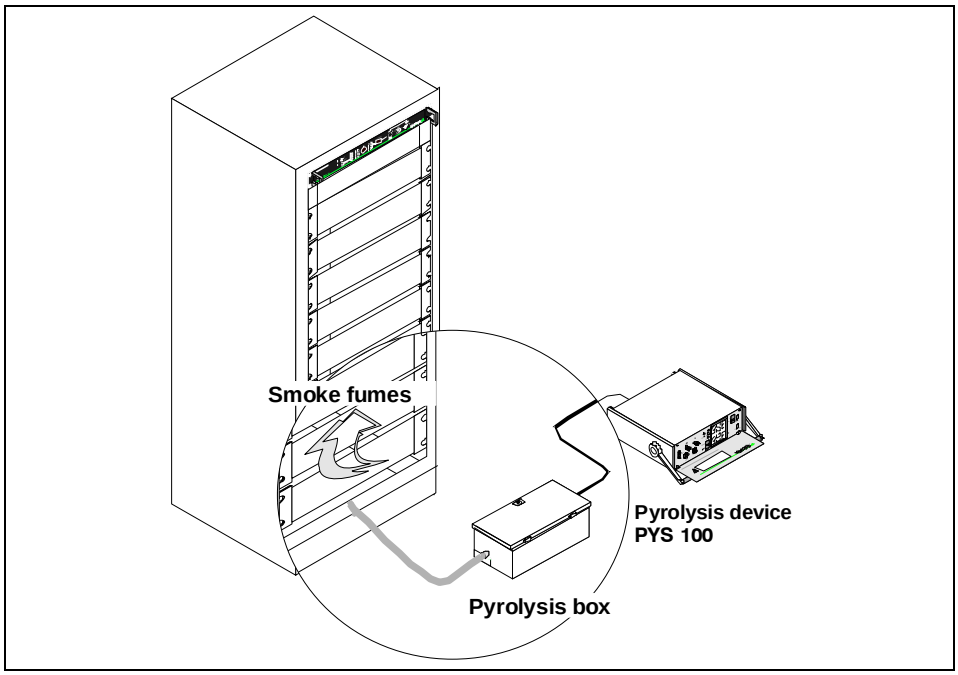


Fig. 7.11: Using the PYS 100 pyrolysis system for object protection

7.6 Testing air flow monitoring

ATTENTION

The following steps can only be carried out after air flow adjustment is completed in accordance with section 7.3 “Air flow sensor adjustment".

INSTRUCTION

Before checking the airflow monitoring set the key switch into “Service” mode to avoid forwarding of alarms and faults to a possibly connected fire and alarm panel.

Pipe breaks

Test that a pipe break will be detected:

1. Loosen the pipe at the connection to the TITANUS *RACK·SENS*® 1U or open the test adapter.
2. Check whether the fault display on the aspirating smoke detector is flashing.
3. Check the air flow sensor data using the DIAG 3 diagnosis tool and a PC or laptop.
4. Enter the result in the test record (appendix).

Blockage

Test that a blockage will be detected:

1. Close all aspiration holes.
2. Check whether the fault display on the aspirating smoke detector is flashing.
3. Check the air flow sensor data using the DIAG 3 diagnosis tool and a PC or laptop.
4. Enter the results for the corresponding closed aspiration holes in the test record (appendix).

Trouble shooting

If air flow faults are not correctly recognised by the device, proceed as follows:

Check whether ...

1. All holes are free.
2. The pipe system has any breaks or cracks.
3. All pipe connections are sealed.
4. The fan can blow freely.
5. The correct aspiration reduction films have been used.

If no defects are identified, the TITANUS *RACK·SENS*® 1U device or the air flow sensor’s operational capability should be checked using a test pipe or diagnostics software.

If airflow monitoring test is completed, set the key switch into position “ON”.

Ensure that no alarms and faults are present at this time.

7.7 Testing Fault Forwarding

To check for fault forwarding please carry out the following steps:

ATTENTION

The following steps can only be carried out after air flow adjustment is completed in accordance with section 7.4 “Air flow sensor adjustment".

1. Set key switch into position “ON.
2. Close the required number of aspiration holes within the range of the airflow fault threshold, in order to activate an airflow fault.
3. Check if the fault message will be displayed at a connected fire and alarm panel or building management system.
4. After testing please reset the TITANUS *RACK·SENS* ® 1U unit and its connected modules.

INSTRUCTION

This check is not required if the TITANUS *RACK·SENS*® 1U is used as a stand-alone device and is therefore not connected to an alarm and fire panel or other annunciation systems.

7.8 Installing the diagnostics software and the USB driver

The diagnostics software can be installed on a PC or laptop with a CD-ROM drive, USB port and Windows 2000 or XP operating system (with their respective service packs).

The diagnostics software should be installed as follows:

1. Place the installation CD in the CD-ROM drive.
2. The set-up will start automatically. You can select the language for the installation menu at this point.
3. There will then be a message saying that all other applications should be closed before starting the installation, so installation can take place without any problems. Continue the installation by clicking on “OK” and set-up ends with “Finish set-up” to close the open applications.
4. The directory folder is chosen at this point. A default folder is shown, which can be changed if required by clicking the “Change directory” button.
5. The installation process is started by clicking on the button with the computer.

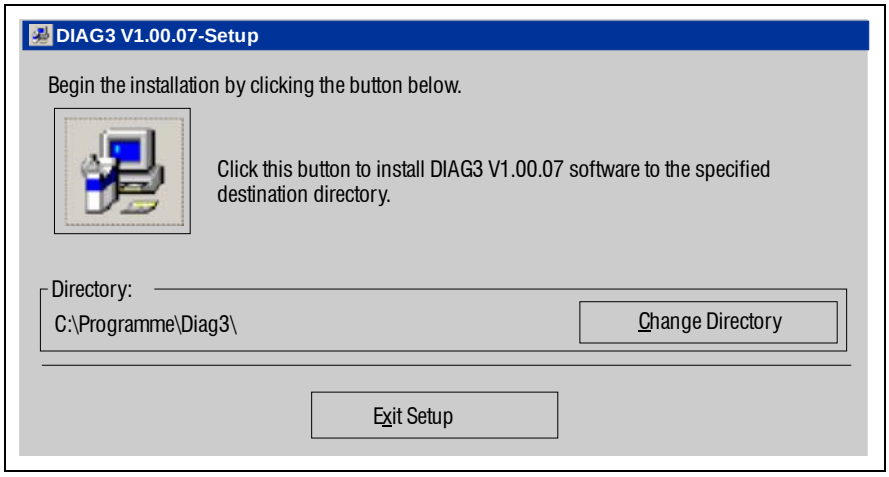


Fig. 7.12: Setup

6. The programme group is also selected before installation takes place. The programme group can be selected from the existing programme groups or can be created.
7. The programme files will now be installed and then the “Set-up successfully completed” message will appear.
8. Installation is completed by clicking on “OK”.

7.8.1 Installing the USB driver

1. Place the “DIAG 3 diagnostics interface USB driver” CD in the CD-ROM drive.
2. Connect the DIAG 3 to the PC via the USB port.
3. Windows will detect DIAG 3 and will start the installation assistant to install the driver.
4. The next step in the procedure is then selected. Select “Search for a suitable driver”.
5. The driver source is selected. In this case, it is the CD-ROM drive where the CD with the USB drive had been inserted.
6. Windows will now search for a suitable drive in the CD-ROM drive.
7. The correct driver (driver for the DIAG 3 diagnostics interface) is displayed and installation is started by clicking on “Next”.
8. Finally a message appears that the driver was installed successful. Click on “Finish” to complete the installation.
9. After that, the driver for the virtual com port “CP2101 USB to UART Bridge controller” needs to be installed. This will allow the diagnostics software to identify the USB-device as a serial device.
10. The software assistant for hardware detection identifies the virtual com port automatically.
11. Select “Automatic Installation” and confirm by pressing the button “Next”.
12. The driver will now be installed.
13. Finalise the installation by pressing the button “Finish”.

7.8.2 TITANUS *RACK·SENS*® 1U operation using DIAG 3

1. Data transmission to the TITANUS *RACK·SENS*® 1U device is bidirectional and takes place via the infrared interface on the front of the TITANUS *RACK·SENS*® 1U device to the DIAG 3. The DIAG 3 is connected via a USB cable to the PC installed with the diagnostics software and the USB driver.
2. After starting the installation software, the DIAG 3 virtual COM port is set in the settings/interface menu item.
3. If a TITANUS *RACK·SENS*® 1U device is detected by the DIAG 3, the software loads the device's current statuses and settings and displays them on the following screen.

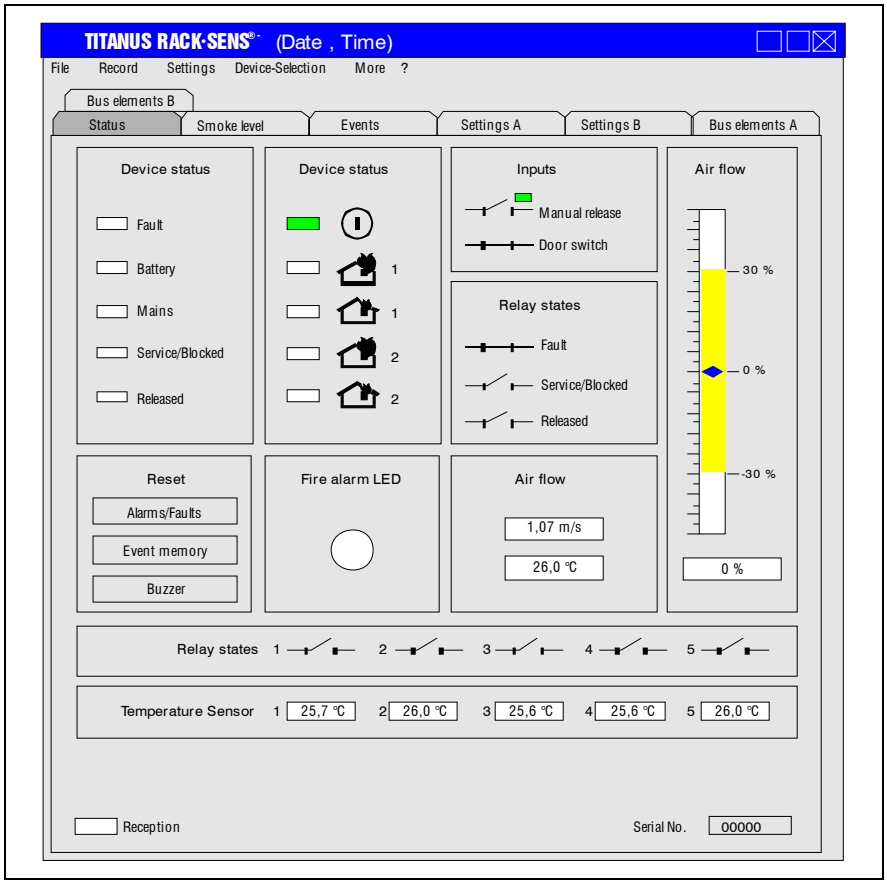


Fig. 7.13: Statuses

4. The current statuses in the TITANUS *RACK·SENS*® 1U device can now be read and certain settings can be made.

TIP

If a question mark is displayed next to the mouse pointer, a context-sensitive help text can be called up automatically. A Diag-Help-xxx.pdf file will be opened.

INSTRUCTION

The monitor and graphic card in use must be able to display 256 colours (minimum) to display colours correctly.

8 Maintenance

8.1 Procedure for servicing

If servicing or an inspection is carried out on the TITANUS *RACK·SENS*® 1U device, the key-operated switch on the front of the TITANUS *RACK·SENS*® 1U device should be switched to the “Service” position within 10 seconds for a system with monitored cabinet doors. If not, a fault will be released.

In the “Service” setting, forwarding of alarms and fault signals as well as any optional associated shutdown or fire alarm system will be disabled.

ATTENTION

Before the TITANUS *RACK·SENS*® is switched to the “On” operating mode again, alarms or faults must no longer be present as otherwise shutdown will be set off immediately after changing the switch position.

8.2 Trouble shooting

If fault messages appear on the TITANUS *RACK·SENS*® 1U, proceed as follows:

1. Open the cabinet door of the monitored cabinet and switch the key-operated switch on the front of the TITANUS *RACK·SENS*® 1U device to the “Service” position within 10 seconds.
2. Look to see which fault indicator is displayed on the front of the TITANUS *RACK·SENS*® 1U device.
3.  If the TITANUS *RACK·SENS*® 1U has an internal power supply unit and the “Mains” fault indicator is lit up, check the power connection to the power input module.
4.  If the “Battery” fault indicator lights up, check the connection from the internal battery to the charge controller. If the connection to the charge controller is OK, replace the TITANUS *RACK·SENS*® 1U battery.
5.  If the “Fault” common fault LED lights up, a number of reasons could be behind such a fault indication. First of all, look to see whether there is a fault in one of the connected extension modules.
6. If this is the case, then the fault is with the extension module.
7. If this is not the case, the cause of the fault is in the TITANUS *RACK·SENS*® 1U.
8. If you have now identified the device or an extension module as the cause of the fault, check connections to all connected components such as temperature sensors, door contact switches, the shutdown module and shutdown relay are in working order.
9. If you locate the source of the fault and were able to eliminate it, reset the device using the reset button on the front of the device. This should be done as the “Save fault” may be switched on via the diagnostics tool and the fault is displayed on the front, even though the cause of the fault has been eliminated.
10. If a fault is still indicated, then use the DIAG 3 diagnostics tool to further diagnostics the fault and follow the instructions in the troubleshooting help topics.

If the fault could not be eliminated after carrying out the indicated instructions, save the active diagnostics data.

Contact **WAGNER Group GmbH** and provide a detailed description of the fault as well as the saved diagnostics data (File type x.di3).

8.3 Inspection

8.3.1 Visual Inspection

Check whether ...

- the pipe system is freely accessible and is firmly mounted and undamaged.
- the aspiration holes in the pipe system are not blocked
- aspiration pipe and connection cable are firmly connected.
- the TITANUS *RACK·SENS*® 1U is undamaged.

8.4 Testing Detector and Alarm Forwarding

Proceed as described in Chapter 7.4 "Detection Unit and Alarm Forwarding". Also check the detection unit visually for external dirt or damage and if necessary make replacements.

INSTRUCTION

A hardware error on the detection unit is displayed in the “Messages” screen of the diagnostics tool.

8.5 Filter replacement in the integrated air filter

The integrated air filter protects the TITANUS *RACK·SENS*® 1U detection units from environmental factors such as dust. The air filter should be replaced every six months as a precautionary measure.

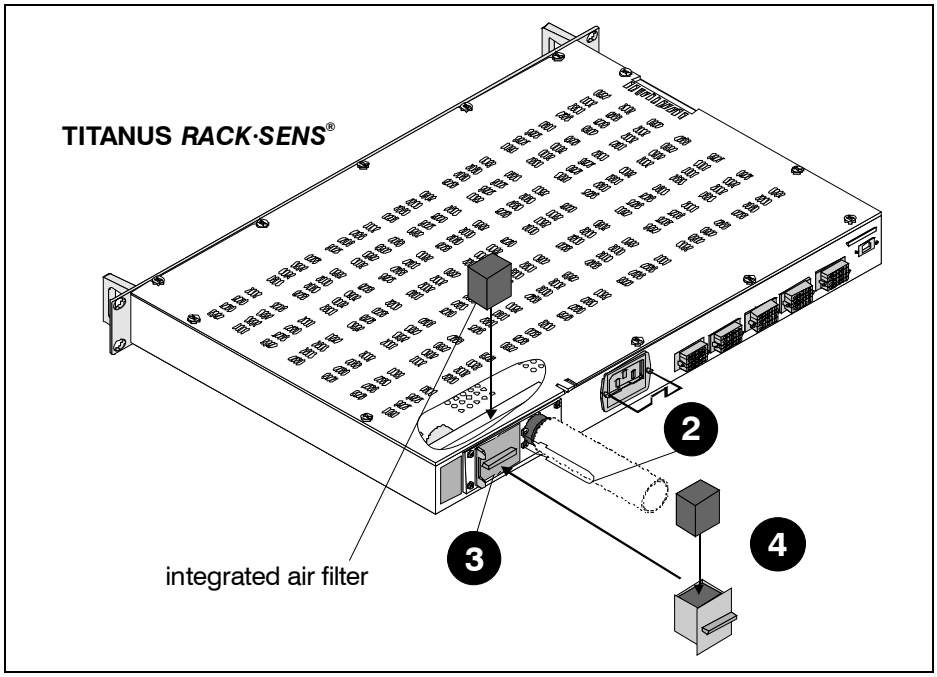


Fig. 8.1: Filter replacement in the integrated air filter

Clean or replace the filter insert according to the following procedure:

1. Set key switch into position “Service”
2. Open up the air filter retaining bracket on the TITANUS *RACK·SENS*® 1U device.
3. Take the integrated air filter casing out of the device.
4. Replace the air filter.
5. Reinsert the filter casing and close the retaining bracket once more.
6. Once the filter has been replaced, ensure that the key switch is set back to position “ON” provided all alarms and faults are cleared out.

INSTRUCTION

During replacement of the integrated air filter at the rear of the TITANUS *RACK·SENS*® 1U, an airflow fault may be activated due to the sudden change in airflow. It is advised to set the key switch into position “Service” while performing the replacement.

8.6 Backup battery replacement

The backup battery may have to be replaced in the event of a fault or servicing (replacement intervals: every 3 years).

The following tools are required:

- Phillips screw driver PZ1

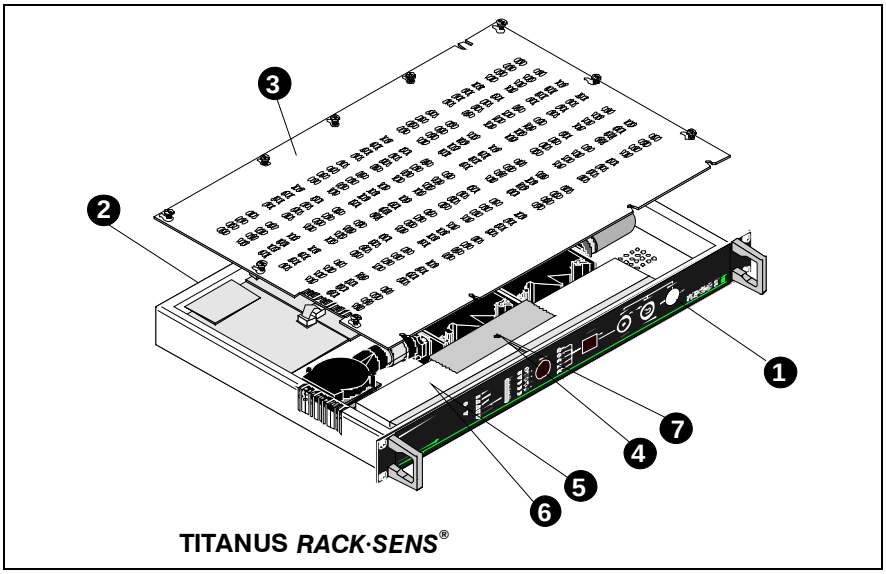


Fig. 8.2: Battery replacement

Replace the battery according to the following procedure:

1. Turn off the TITANUS *RACK·SENS*® 1U using the key-operated switch on the front of the device.
2. Disconnect the mains plug as well as all the other plugs at the rear of the TITANUS *RACK·SENS*® 1U.
3. Remove the TITANUS *RACK·SENS*® 1U from the rack and unscrew the lid.
4. Detach the battery holder from the device by loosening the screw in the middle of the holder.
5. Remove the 4 connectors from the batteries and replace the batteries.
6. Connect the “+ Akku” (“+ battery”) on the charge controller with the connector marked in red on the 1st battery. Connect the connector marked in black on the 1st battery the charge controller with the connector marked in red on the 2nd battery. The connector marked in black on the 2nd battery is connected to the “- Akku” (”- battery”) connector on the charge controller.
7. Re-install the battery holder and close the TITANUS *RACK·SENS*® 1U.
8. The TITANUS *RACK·SENS*® 1U is fitted back into the rack and all plugs and pipe connections are reinserted into the rear of the device.

❾ Once the TITANUS *RACK·SENS* ® 1U has been completely re-installed into the cabinet, set the key switch into position “Service”.

❿ Ensure, that the TITANUS *RACK·SENS* ® 1U unit will only be set to “ON if all alarms and faults have cleared out!

INSTRUCTION

Exchanged batteries are to be sent to WAGNER for appropriate disposal.

8.7 Checking the air flow sensor adjustment

Check the air flow sensor value with the diagnostics software.

Operating principle

During initialisation, the device first stores the measured actual value of the air flow as set point, via integrated air flow monitoring. This set point thereafter serves as the reference value for further evaluation of any air flow fault. Depending on the air flow threshold selected (see Chapter 4.3, section on Adjusting Air Flow Sensitivity), the current air flow value can vary more or less around this set point during operation, without triggering an air flow fault. Only if the air flow threshold selected is exceeded the air flow fault signalled by the device will be forwarded.

Checking the actual value

The tolerance range for the air flow threshold selected as well as the actual and set points are shown in the diagnostics software. The limits correspond to the air flow range set.

Check the deviation between the actual value and the set point. If there is a deviation of 75% (taking into account the service interval) from the preset threshold, you should carry out a prophylactic test on the pipe system (see the paragraph on “Air flow fault elimination”)

INSTRUCTION

The current air flow value may not only deviate from the set point just because of a fault in the pipe system (break or blockage) but also because of air pressure variations in the environment.

Troubleshooting an air flow fault

If air flow adjustment has been carried out air pressure dependent and the actual value is still not within the preset air flow threshold tolerance range (air flow fault is displayed on the device), another problem besides an air pressure or temperature variation may be present.

1. In such a case, check the pipe system is air-tight and not blocked (see section 7.6).

INSTRUCTION

If the pipe network was changed during troubleshooting, the original pipe system layout must be restored afterwards and the air flow must be re-initialised.

2. If this inspection does not flag up a problem, check the air flow monitoring system by attaching the test pipe and carrying out the functional test described in section 7.8.2.

ATTENTION

If the airflow monitoring unit is suspected to be faulty, the TITANUS *RACK·SENS*® 1U unit needs to be returned to WAGNER Group GmbH for repair.

If no deviations are detected in the process described during the functional test, this confirms there is no defect in the air flow monitoring system.

3. Carry out the adjustment process again with the connected pipe system.

INSTRUCTION

It is essential to record the adjustment type (air-pressure-dependent or non-dependent) in the test log along with the air pressure and height above sea level if required.

4. Monitor the actual air flow value during routine servicing or check it during the next inspection at the latest.

TIP

All stored and actual device data as well as settings made using the diagnostics tool can be saved by the diagnostics software, or printed out or saved as a log.

5. If there is a similar set point deviation as before, unfavourable environmental factors are the cause for this deviation. If such negative influences to the air flow monitoring system cannot be eliminated, the air flow range should be enlarged.

8.8 Checking the detector status

Check the detection unit data with the diagnostics software.

Contamination in the detection unit or the sampled air is displayed in a bar graph and as a percentage.

The blue bar in the graph shows the current level of contamination. This value is also given as a percentage underneath the graph. A value of 0% corresponds to the detection unit as new in clean ambient air. If the detection unit reading goes outside the permitted range (±100 %), there is a fault in the detection unit. The blue bar will then be outside the permitted range, which is highlighted in yellow in the bar graph. Small deviations are acceptable. Such deviations may appear due to contamination (e.g. dust) in the air sampled by the air sampling smoke detection system.

A positive deviation indicates contamination in the sampled air. This can be remedied by inserting an air filter or, if possible, by switching to a lower sensitivity. Deposits of bright dirt particles inside the detection unit may lead to an increase in the reading. If the status reading does not improve after carrying out such measures, the detection unit must be replaced.

A negative change is due to decreasing light output inside the detection unit. This can be caused by dirt in the optical chamber or dark dirt particle deposits inside the detection unit. If the detection unit status reading goes outside the permitted negative range, the detection unit should be changed.

8.9 Testing Air Flow Monitoring

A break or a blockage in a pipe are displayed on the diagnosis tool “Message” screen.

Test air flow monitoring in accordance with the instructions described in Chapter 7 "Air Flow Monitoring".

8.10 Testing Fault Forwarding

A fault is displayed on the TITANUS *RACK·SENS*® 1U and possibly on the fire panel.

Proceed as described in Chapter 7 "Fault Forwarding ".

8.11 Maintenance intervals

Maintenance includes carrying out regular inspections and servicing. Air sampling smoke detection systems are first tested during set-up operations and then every three months.

If the TITANUS *RACK·SENS*® 1U is connected to a hazard alert system, the following tests are required in accordance with VDE (German Electrical Engineering Association) 0833:

- quarterly check **Inspection**
- annual check **Servicing + inspection**

If the TITANUS *RACK·SENS*® 1U is operated as a stand-alone device (not connected to a hazard alert system), servicing can take place at the operator's discretion.

However, it is recommended to carry out servicing every 18 months. Country-specific guidelines must be complied with at all times.

Type of Check	**Measure**	**Other Information in Chapter**
Inspection	Visual check	8.3
	Detection unit and alarm forwarding	8.4
	Air flow adjustment	8.6
	Fault signal forwarding	7.4
	every six months Filter replacement	8.5
Servicing + 4th inspection in year	Visual check	8.3
	Detection unit and alarm forwarding	8.4
	Air flow adjustment	8.6
	Fault signal forwarding	7.4
	Air flow monitoring	7.6
Every three years	Battery replacement	8.6

Appendix

System Product List

Projection Tables

Certificate of Approval of Components and Systems

Testing Record

Conformity certification pursuant to EU

TITANUS RACK·SENS, DNL-Delivery Transaction

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order no.	description	unit

TITANUS RACK·SENS

90-00-1200	TITANUS RACK·SENS 1 HU	pc.
<P> <Z>		
<3> <>		
90-00-1300	TITANUS RACK·SENS 2 HU	pc.
<P> <Z>		
<3> <>		
90-00-1400	TITANUS RACK·SENS 2 HU extension device	pc.
<P> <Z>		
<3> <>		

TITANUS RACK·SENS, DNL-Delivery Transaction

--

order no.	description	unit

Air Sampling Smoke Detection Systems

AD-05-4700	TITANUS RACK·SENS	pc.
<P> <Z>	type TR1-50	
<3> <>		
AD-05-4705	TITANUS RACK·SENS	pc.
<P> <Z>	type TR1-10	
<3> <>		
AD-05-4710	TITANUS RACK·SENS	pc.
<P> <Z>	type TR2-50-NO	
<3> <>		
AD-05-4715	TITANUS RACK·SENS	pc.
<P> <Z>	type TR2-10-NO	
<3> <>		
AD-05-4720	TITANUS RACK·SENS	pc.
<P> <Z>	type TR2-50-FM	
<3> <>		
AD-05-4725	TITANUS RACK·SENS	pc.
<P> <Z>	type TR2-10-FM	
<3> <>		
AD-05-4730	TITANUS RACK·SENS	pc.
<P> <Z>	type TR2-ED-NO	
<3> <>		
AD-05-4735	TITANUS RACK·SENS	pc.
<P> <Z>	type TR2-ED-FM	
<3> <>		
AD-05-4760	TITANUS RACK·SENS	pc.
<P> <Z>	type TR2-50-NO	
<3> <>		
AD-05-4762	TITANUS RACK·SENS	pc.
<P> <Z>	type TR2-50-2NO	
<3> <>		

TITANUS RACK·SENS, DNL-Delivery Transaction

--

order no.	description	unit

Modules

AD-05-4800	Mains supply TITANUS RACK SENS	pc.
<P> <Z>	type TR-PS-1	
<3> <>		
AD-05-4805	Network module TITANUS RACK·SENS	pc.
<P> <Z>	type TR-NU	
<3> <>		
AD-05-4810	Temperature-module TITANUS RACK·SENS	pc.
<P> <Z>	type TR-TU	
<3> <>		
AD-05-4815	2nd detector TITANUS RACK·SENS	pc.
<P> <Z>	type TR-DM-50	
<3> <>		
AD-05-4816	2nd detector TITANUS RACK·SENS	pc.
<P> <Z>	type TR-DM-10	
<3> <>		
AD-05-4820	Bargraph TITANUS RACK·SENS	pc.
<P> <Z>	type TR-B	
<3> <>		
AD-05-4835	Air return TITANUS RACK·SENS	pc.
<P> <Z>	type TR-AR2	
<3> <>		
AD-05-4840	Extinguishing cylinder TITANUS RACK·SENS	pc.
<P> <Z>	type TR-EC-NO	
<3> <>		
AD-05-4850	Extinguishing cylinder TITANUS RACK·SENS	pc.
<P> <Z>	type TR-EC-FM	
<3> <>		
AD-05-5048	Cabinet Rail Module TITANUS RACK·SENS	pc.
<P> <Z>	type CR-1-FM	
<3> <>		
AD-05-5049	Cabinet Rail Module TITANUS RACK·SENS	pc.
<P> <Z>	type CR-1-NO	
<3> <>		

TITANUS RACK·SENS, DNL-Delivery Transaction

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order no.	description	unit

Accessories

AD-05-0563	diagnostic tool	pc.
<P> <Z>	type DIAG 3/a	
<2> <>		
AD-05-2000	response indicator	pc.
<P> <Z>	type DJ-TM	
<0> <>		
AD-05-5000	Extinguishing- / shut-down module	pc.
<P> <Z>	type ESU-1	
<3> <>		
AD-05-5005	Shut-down module TITANUS RACK·SENS	pc.
<P> <Z>	type SU-3	
<3> <>		
AD-05-5010	On-cabinet housing TITANUS RACK·SENS	pc.
<P> <Z>	type HS-TR1	
<1> <>		
AD-05-5015	On-cabinet housing TITANUS RACK·SENS	pc.
<P> <Z>	type HS-TR2	
<1> <>		
AD-05-5020	Exting. fan TITANUS RACK·SENS	pc.
<P> <Z>	type EF-1	
<3> <>		
AD-05-5025	Door contact TITANUS RACK·SENS	pc.
<P> <Z>	type DS-TR	
<1> <>		
AD-05-5030	Air sampling pipe TITANUS RACK·SENS	pc.
<P> <Z>	type AP-1	
<3> <>		
AD-05-5035	Temperature sensor TITANUS RACK·SENS	pc.
<P> <Z>	type TS-1	
<1> <>		
AD-05-5040	Shut-down relay TITANUS	pc.
<P> <Z>	type SR-1	
<1> <>		

TITANUS RACK·SENS, DNL-Delivery Transaction

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order no.	description	unit
AD-05-5050	adjustable Slide Bar	pc.
<P> <Z>	type SB-1	
<0> <>		
AD-05-5055	Extinguishing Pipe extension	pc.
<P> <Z>	type EPE-1	
<3> <>		
AD-05-5060	Extinguishing Pipe TITANUS RACK·SENS	pc.
<P> <Z>	type EP-1	
<3> <>		
AD-05-5110	Extinguishing Unit TITANUS RACK·SENS	pc.
<P> <Z>	type TR-EU-1-NO	
<3> <>		
AD-05-5112	Extinguishing Unit TITANUS RACK·SENS	pc.
<P> <Z>	type TR-EU-1-FM	
<3> <>		
AD-05-5130	Fastening bracket TITANUS RACK·SENS	pc.
<P> <Z>	type TR-FB-1	
<3> <>		
AD-05-5132	Fastening Plate TITANUS RACK·SENS	pc.
<P> <Z>	type TR-FP-1	
<3> <>		
AD-10-0550	test pipe for air sampling systems	pc.
<P> <Z>	type DIAG-Pipe	
<0> <>		
CO-35-3010	high pressure - steel pipe	
<P> <Z>	type EO 12x1,5	
<0> <>		
LZ-15-0035	Manual release (yellow)	pc.
<P> <Z>	Type HM-11105	
<0> <>		

TITANUS RACK·SENS, DNL-Delivery Transaction

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order no.	description	unit

Spare Parts

02-55-0244	relay	pc.
<P> <Z>	type Finder, 24V DC 2 two-way contacts	
<0> <>		
02-55-0246	module for standard LED-socket	pc.
<P> <Z>	type Finder, Diode+LED, 24V DC, 99.80	
<0> <>		
02-55-0247	screw terminal socket for relais	pc.
<P> <Z>	type Finder, 2 two way contacts, 99.80	
<0> <>		
AD-05-0570	transport case for diagnostic tool	pc.
<P> <Z>	type DIAG-Case	
<0> <>		
AD-05-0575	adapter cable for diagnostic interface	pc.
<P> <Z>	type AC-DIAG 3	
<0> <>		
AD-05-0578	connecting cable f. diagnostic interface	pc.
<P> <Z>	type CC-DIAG 3	
<0> <>		
AD-05-0628	diagnostic interface	pc.
<P> <Z>	type IF-DIAG 3	
<2> <>		
AD-05-0635	holding device for diagnostic interface	pc.
<P> <Z>	type DIAG 3-Clip/a	
<0> <>		
AD-05-0637	holding device for diagnostic interface	pc.
<P> <Z>	type DB-DIAG 3-TM	
<0> <>		
AD-05-0639	holding device for diagnostic interface	pc.
<P> <Z>	type DB-DIAG 3-TR	
<0> <>		
AD-05-3585	air filter for TITANUS RACK·SENS	pc.
<P> <Z>	type SP-TR-1 (PU=10 pcs.)	
<0> <>		

TITANUS RACK·SENS, DNL-Delivery Transaction

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order no.	description	unit
AD-05-4900 <P> <Z> <3> <>	Extinguishing cylinder TITANUS RACK·SENS type TR-EC-NO-2	pc.
AD-05-4950 <P> <Z> <3> <>	Extinguishing cylinder TITANUS RACK·SENS type TR-EC-FM-2	pc.
AD-05-5065 <P> <Z> <3> <>	Extinguishing Nozzle TITANUS RACK·SENS type EN-1	pc.
AD-05-5089 <P> <Z> <0> <>	Pyrotechnical actuator type PG-TR	pc.
AD-05-5093 <P> <Z> <0> <>	spare battery type EA-TR	pc.

Design

Type	sensitivity (% obs./m)	Number of holes									
		1	2	3	4	5	6	7	8	9	10
DM-TR-10	0,1	A	A	A	A	A	A	A	A	A	A
	0,2	A	A	A	A	A	A	B	B	B	B
	0,3	A	A	A	A	B	B	B	B	B	B
	0,4	A	A	A	B	B	B	B	C	C	C
DM-TR-50	0,5	A	A	B	B	B	B	C	C	C	C
	0,6	A	A	B	B	B	C	C	C	C	C
	0,7	A	B	B	B	C	C	C	C	C	C
	0,8	A	B	B	C	C	C	C	C	C	C
	0,9	A	B	B	C	C	C	C	C	C	C
	1	A	B	B	C	C	C	C	C	C	
	1,1	A	B	C	C	C	C	C	C		
	1,2	A	B	C	C	C	C	C	C		
	1,3	B	B	C	C	C	C	C			
	1,4	B	B	C	C	C	C				
	1,5	B	B	C	C	C	C				
	1,6	B	C	C	C	C	C				
	1,7	B	C	C	C	C					
	1,8	B	C	C	C	C					
	1,9	B	C	C	C	C					
	2	B	C	C	C						

Certificate

of

Approval

of

Components and Systems

Holder of the Approval:

WAGNER Group GmbH
Schleswigstraße 1 - 5
DE-30853 Longenhagen

Approval No.:	*No. of pages:*	*Valid from:*	*Valid to:*
G 206004	39	01.07.2009	30.06.2013

Subject matter of the Approval:

Aspirating Smoke Detectors
Type TITANUS *MICRO·SENS*®; TITANUS *RACK·SENS*®

Use:

in Automatic Fire Detection and Fire Alarm Systems

Basis for approval:

DIN EN 54-20 (02/09) - Aspirating Smoke Detectors
DIN EN 54-17 (03/06) - Short Circuit Isolators
VdS 2344 (12/05) - Procedure Guidelines

This approval
is valid only for the specified component/system as submitted for the test

- ■ together with the parts listed in enclosure 1
- ■ documented in the technical papers acc. to enclosure 2 (n/a for systems)
- ■ for application in the specified fire protection and security installations. Use of the subject matter of the approval, is subject to the hints/comments of enclosure 3.

The validity of the approval can be extended upon application. Application for extension shall be submitted six months before expiry of the current approval at the latest.

This certificate may only be reproduced in its present form without any modification including all enclosures. All changes of the underlying conditions of this approval shall be reported at once to the VdS Certification Body enclosing the required documentation.

Any advertising with this VdS approved component/system shall reflect the correct contents of the certificate and shall not violate the trade practice rules.

Köln (Cologne), 01.07.2009

Schüngel
Managing Director

ppa. Stahl
Head of the VdS Certification Body

Deutscher Akkreditierungs Rat
DAR
DAT-ZE 005/92

VdS Schadenverhütung GmbH
Zertifizierungsstelle
Amsterdamer Str. 174
D-50735 Köln

A company of the German Insurance Association (GDV) (German federation of insurance companies)

Accredited by the "Deutsche Akkreditierungsstelle Technik (DATech)" as a certification body for the areas of fire protection and security

VdS Schadenverhütung GmbH • Amsterdamer Straße 172-174 • D-50735 Köln

Notifizierte Zertifizierungsstelle für Bauprodukte • Kenn-Nummer 0786
Notified Certification Body for Construction Products • Registration No. 0786

EG-Konformitätszertifikat
EC-Certificate of Conformity

0786 – CPD - 20322

Gemäß der Richtlinie 89/106/EWG des Rates der Europäischen Gemeinschaften vom 21. Dezember 1988 zur Angleichung der Rechts– und Verwaltungsvorschriften der Mitgliedstaaten über Bauprodukte (Bauproduktenrichtlinie – CPD), geändert durch die Richtlinie 93/68/EWG des Rates der Europäischen Gemeinschaften vom 22. Juli 1993, wird hiermit bestätigt, dass das Bauprodukt

In compliance with the Directive 89/106/EEC of the Council of European Communities of 21 December 1988 on the approximation of laws, regulations and administrative provisions of the Member States relating to the construction products (Construction Products Directive - CPD), amended by the Directive 93/68/EEC of the Council of European Communities of 22 July 1993, it has been stated that the construction product

Ansaugrauchmelder
Serien TITANUS MICRO·SENS®;
TITANUS RACK·SENS®

(Produktmerkmale siehe Anlage 1)

Aspirating Smoke Detector
Series TITANUS MICRO·SENS®;
TITANUS RACK·SENS®

(Product parameters see appendix 1)

in Verkehr gebracht durch

placed on the market by

WAGNER Group GmbH
Schleswigstraße 1 - 5
DE 30853 Langenhagen

und erzeugt im Herstellwerk

and produced in the factory

WAGNER Group GmbH
Schleswigstraße 1 - 5
DE 30853 Langenhagen

durch den Hersteller einer werkseigenen Produktionskontrolle sowie zusätzlichen Prüfungen von im Werk entnommenen Proben nach festgelegtem Prüfplan unterzogen wird und dass die notifizierte Stelle VdS Schadenverhütung GmbH eine Erstprüfung der relevanten Eigenschaften des Produkts, eine Erstinspektion des Werkes und der werkseigenen Produktionskontrolle durchgeführt hat und eine laufende Überwachung, Beurteilung und Anerkennung der werkseigenen Produktionskontrolle durchführt.

Dieses Zertifikat bescheinigt, dass alle Vorschriften über die Bescheinigung der Konformität und die Leistungseigenschaften, beschrieben im Anhang ZA der Norm(en)

is submitted by the manufacturer to a factory production control and to the further testing of samples taken at the factory in accordance with a prescribed test plan and that the notified body VdS Schadenverhütung GmbH has performed the initial type-testing for the relevant characteristics of the product, the initial inspection of the factory and of the factory production control and performs the continuous surveillance, assessment and approval of the factory production control.

This certificate attests that all provisions concerning the attestation of conformity and the performances described in the Annex ZA of the standard

EN 54-20: 2005
EN 54-17: 2005

angewendet wurden und dass das Produkt alle darin vorgeschriebenen Anforderungen erfüllt.

Dieses Zertifikat wurde erstmals am 25.01.2008 ausgestellt und gilt solange, wie die Festlegungen in der angeführten harmonisierten technischen Spezifikation oder die Herstellbedingungen im Werk oder die werkseigene Produktionskontrolle selbst nicht wesentlich verändert werden.

were applied and that the product fulfils all the prescribed requirements.

This certificate was first issued on 25.01.2008 and remains valid as long as the conditions laid down in the harmonised technical specification in reference or the manufacturing conditions in the factory or the FPC itself are not modified significantly.

Köln, 06.07.2009

VdS SCHADENVERHÜTUNG VdS CE 0786 Köln Zertifizierungsstelle

(ppa. Stahl)
Leiter der Zertifizierungsstelle
Head of Certification Body

Test log for air sampling smoke detection system TITANUS *RACK· SENS*® - 1U

Costumer						
Address						
Device number						
Serial number						
		Measurement reading & setting values	Measurement reading & setting values	Measurement reading & setting values	Measurement reading & setting values	Measurement reading & setting values
Commissioning						
Visual inspection	(✓/ –)					
Suction pressure						
Sensitivity DM1	[%/m]					
Sensitivity DM2	[%/m]					
Alarm delay	[s]					
Fault delay	[min]					
Release threshold	[%]					
Fault latching	(yes/no)					
LOGIC·*SENS*	(yes/no)					
air-pressure-dependent adjustment	(yes/no)					
air-pressure-in dependent adjustment	(yes/no)					
Height	[m ab. sea lev.]					
Air pressure	[hPa]					
Temperature	[°C]					
Commissioning report generated (DIAG)						
Fault blockage						
LED flashes	(✓/ –)					
Relay is deactivated after delay time	(✓/ –)					
Signal forwarding to fire panel	(✓/ –)					
Problem eliminated, LED off	(✓/ –)					
Relay is activated below threshold	(✓/ –)					
Problem eliminated, LED stored	(✓/ –)					
Relay stay deactivated	(✓/ –)					
Fault Breakage						
LED flashes	(✓/ –)					
Relay is deactivated after delay time	(✓/ –)					
Signal forwarding to fire panel	(✓/ –)					
Problem eliminated, LED off	(✓/ –)					
Relay is activated below threshold	(✓/ –)					
Problem eliminated, LED stored	(✓/ –)					
Relay stay deactivated	(✓/ –)					
Service / blocked						
LED ON during service or door contact open	(✓/ –)					
Service / blocked/ relay activated	(✓/ –)					
Signal forwarding to fire panel.	(✓/ –)					
Fault relay is activated during "blocked" after 10 sec	(✓/ –)					
In switch position "Service" fault relay is not activated when door is opened	(✓/ –)					
Other components						
Backup battery	(✓/ –)					
Fault message battery	(✓/ –)					
Fault mesaage mains	(✓/ –)					
Reset input at rear panel	(✓/ –)					
Reset at front panel	(✓/ –)					
Internal buzzer, operational	(✓/ –)					
"Buzzer Off" button at front panel, operational	(✓/ –)					
Key-operated switch at front panel, operational	(✓/ –)					
Temperature sensor, operational	(✓/ –)					
Alarm threshold temperature sensor, operational	(✓/ –)					
Programmable relay, operational	(✓/ –)					
External indicator, operational	(✓/ –)					
Bargraph, operational	(✓/ –)					

During the following tests make sure that the device is blocked via door contact switches (door open). The key switch must be set to "On". Otherwise extinguishing may be triggered during an alarm condition or during test.

Action-alarm (detector 1 and optional detector 2)						
LED flashes	(✓/ –)					
Relay operates after delay time	(✓/ –)					
Signal forwarding to fire panel	(✓/ –)					
LED saved	(✓/ –)					
Relay saved	(✓/ –)					
Fire-alarm (detector 1 and optional detector 2)						
LED flashes	(✓/ –)					
Relay operates after delay time	(✓/ –)					
Signal forwarding to fire panel	(✓/ –)					
LED saved	(✓/ –)					
Relay saved	(✓/ –)					
Shutdown module						
Device number						
Serial number						
Detection of bus components	(✓/ –)					
Manual release function test	(✓/ –)					
Door contact function test	(✓/ –)					
Shutdown relay function test	(✓/ –)					
Released LED flashes	(✓/ –)					

Date: ……

Issuer: …… **Signature: ……**

Key:	✓ O.K.
	– not O.K.

Conformity certification pursuant to EU Construction Products Directive 89/106/EEC

- The conformity of the „**air sampling smoke detector for fire detection and fire alarm systems in buildings**“ according to DIN EN 54-20 has been established by a test at the VdS laboratory.
- The EC certificate of conformity has been issued by notified product certification body (ID no. 0786, VdS).
- The CE designation according to DIN EN 54-20 has been carried out.

CE

0786

WAGNER Group GmbH
Schleswigstrasse 1 - 5 30853 Langenhagen

09
Nr. 0786 – CPD – 20322

EN 54-20: 2006
Air sampling smoke detector for fire detection
and fire alarm systems in buildings

0,1 % light obscuration/m
Class: A, B and C

0,5 % light obscuration/m
Class: A, B and C

Technical data: see chapter 3 of technical manual.

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