Air sampling smoke detection system

WAGNER®

Air sampling smoke detection system

TITANUS *TOP·SENS*® /Rev.a

Technical Manual

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Appendix

Air Pressure Adjustment Tables

Projection Tables

System Product List

Inspection Protocol

Glossary

Conformity certification pursuant to EU

06/13

1 General

1.1 Introduction

This manual is for installers of air sampling smoke detection systems, in particular for engineers, technicians, and fitters etc. who have technical knowledge in the field of smoke detection technology but who are possibly working with this device for the first time.

For damage and faults resulting from the non-observance of this manual WAGNER Group GmbH, called WAGNER in the following, does not assume liability.

This manual refers to the air sampling smoke detection systems TITANUS *TOP·SENS*® and TITANUS *TOP·SENS*® 2, these systems may only be used for early and very early smoke detection. As the smoke detection systems are from one series, TITANUS *TOP·SENS*® is described here. Specific technical designs of TITANUS *TOP·SENS*® 2 are described separately.

1.2 Safety Information

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

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

NOTICE
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.

1.3 Warranty

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

In principle our "Terms and Conditions of Supply and Assembly" apply. No claims under the guarantee or for liability can be made for damage to persons or property if they are based on one or more of the following causes:

- insufficient observance of the instructions about the design, assembly of the aspirating smoke detection system, assembly of the pipe system, commissioning and maintenance
- use of the aspirating smoke detection system in contravention of the intended use
- insufficient monitoring of working parts
- improperly executed repairs
- unauthorised constructional changes to the aspirating smoke detection system
- force majeure

1.4 Copyright

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The manual is designed exclusively for the assembler and his colleagues. Reproduction of the manual, including extracts, is not allowed. Copying or distribution of the manual in any form is only allowed with permission in writing from WAGNER.

1.5 Packaging

The individual air sampling smoke detection systems are packed in accordance with the anticipated transport conditions. Exclusively environ-mentally 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.

NOTICE
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.

1.6 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.
- Give batteries to municipal collecting points,
  or send them back to WAGNER Group GmbH.

2 Product Description

2.1 Features of the TITANUS® air sampling smoke detection system

TITANUS *TOP·SENS*® is the latest generation of the renowned WAGNER air sampling smoke detection systems. Besides its use for room and equipment protection the more sensitive system can be used for monitoring climatic cabinets and ducts.

Sensitivity The device has a display sensitivity of 0.05%/m to 0.0015%/m light obscuration. According to application, further sensitivities can be set. Thanks to the innovative High-Power-Light-Source technology a wide detection range is achieved for all types of fire.

The area to be monitored can be doubled if two detector modules are used in TITANUS *TOP·SENS*®. There are three alarm levels for each detector module – alert alarm, action alarm and fire alarm. These can be separately controlled via voltage-free contacts.

Alternative sensitivity The set sensitivity of the detector modules can be adjusted one step lower via an additional input.

LOGIC·*SENS* In order to prevent false alarms, the intelligent signal processing called LOGIC·*SENS* distinguishes between interferences and the occurrence of real fire.

Safe airflow monitoring Like spot-type detectors, which are electronically monitored in order to detect line fractures and short circuits, air sampling systems require complex and safe air flow monitoring. The unique air flow sensor technology used in all WAGNER air sampling smoke detection systems guarantees the detection of faults such as pipe fractures or blockages of air sampling points.

The low-level air flow is equipped with a dynamic air flow sensor in order to detect small and quick changes.

Air flow monitoring is temperature compensated and can be adjusted depending on the air pressure.

Networkability A special feature of TITANUS® is its ability to network the system. With an optional network card in TITANUS® several smoke detection systems can be linked to one network. The operator can oversee the entire system from a central control point and observe the smoke level, air flow data etc.

Patented detection points Depending on the required pipe design the air sampling points have defined hole diameters. For these exact air sampling points WAGNER has devel-

oped patented aspiration-reducing film sheets with marking tape and clips that permit an easy mounting and avoid secondary noise. Another advantage is the quick and easy retrieval and check of the air sampling point diameters.

Spot detector spacing The system's air sampling points can be compared to spot-type detectors. The monitoring areas can therefore be designed according to the relevant valid national regulations.

Diagnostics The diagnostic software permits quick and reliable fault finding for maintenance and service. The current device condition and any saved data can be downloaded to a PC via a special interface.

Choice of fan voltage The fan voltage can be set according to project planning by re-plugging the plug-in jumpers.

With TITANUS *TOP·SENS*® devices, the fan voltage can be set between 6.9 V and 9 V by means of the plug-in jumpers on the main board.

The voltage with TITANUS *TOP·SENS*®-SL devices can be set by means of the fan control circuit boards FC-2 and FC-3.

- The voltage can be set to 6.5 V, 6.9 V and 9 V with the FC-2 fan control circuit board. The FC-2 fan control circuit board is standard in all TITANUS *TOP·SENS*® -SL devices.
- The voltage can be set to 10 V, 11 V and 12 V with the FC-3 fan control circuit board. The FC-3 fan control circuit board available as an option for all TITANUS *TOP·SENS*® -SL devices.

Shutdown module External devices of TITANUS *TOP·SENS*® (e.g. fan, calculator) can be switched off with the shutdown module modules. The shutdown is made with a monitored two-detector-dependent connection.

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2.2 Areas of Application

The air sampling smoke detection system TITANUS® is a technology used for early smoke detection and very early smoke detection for rooms and equipment.

Principle Air samples are drawn from the protected area via a pipe system with defined air sampling points and passed to the detector module.
It is particularly suitable for areas in which spot-type detectors cannot be used or only under certain conditions.
In particular these are areas:

- with high fire risk
- where a high detection sensibility is required
- with limited access and where spot-type detectors are difficult to install or service
- which are air conditioned
- which have a greater height than admissible for spot-type detectors
- where spot-type detectors are undesirable for aesthetic reasons
- where electromagnetic fields have an impact
- which are exposed to high or low temperatures
- where filters are required due to impurities in the atmosphere
- which must be protected from vandalism

TITANUS® is suitable for:

Room protection Rooms such as:

- floor voids, ceiling voids
- tunnels, ducts, voids with difficult access
- storage areas, high-rack storage, elevator shafts
- museums, cultural centre
- deep-freeze storage
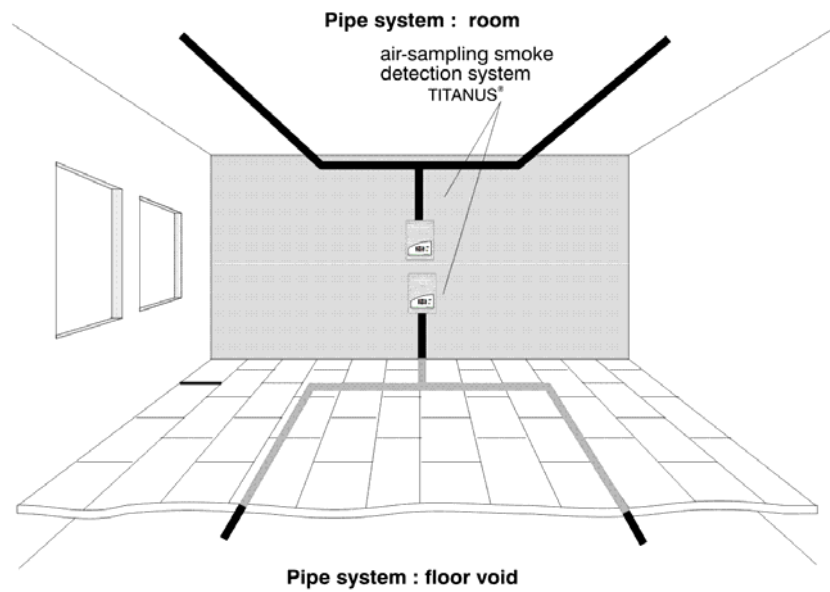
Figure 1: Principle: Room monitoring with the TITANUS® air-sampling smoke detection system

Room monitoring with air conditioning   Room monitoring takes place

- in air-conditioned rooms for servicing etc
- in ventilation ducts
- of floor voids, ceiling voids
- in EDP rooms, E-distribution cabinets, transformer cells
- in climatic cabinets or
- at air conditioning ducts in the by-pass
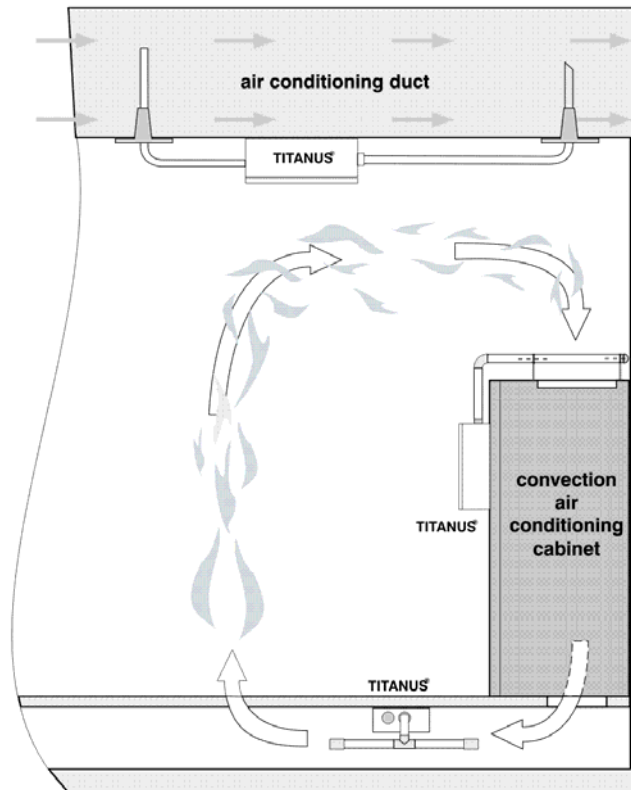
Figure 2: Principle: Monitoring possibilities of a convection air conditioning cabinet or air conditioning duct

Equipment protection non-ventilated and power-ventilated devices/cabinets such as

- distribution cabinets, switch cabinets
- telephone switching equipment
- measuring and control units
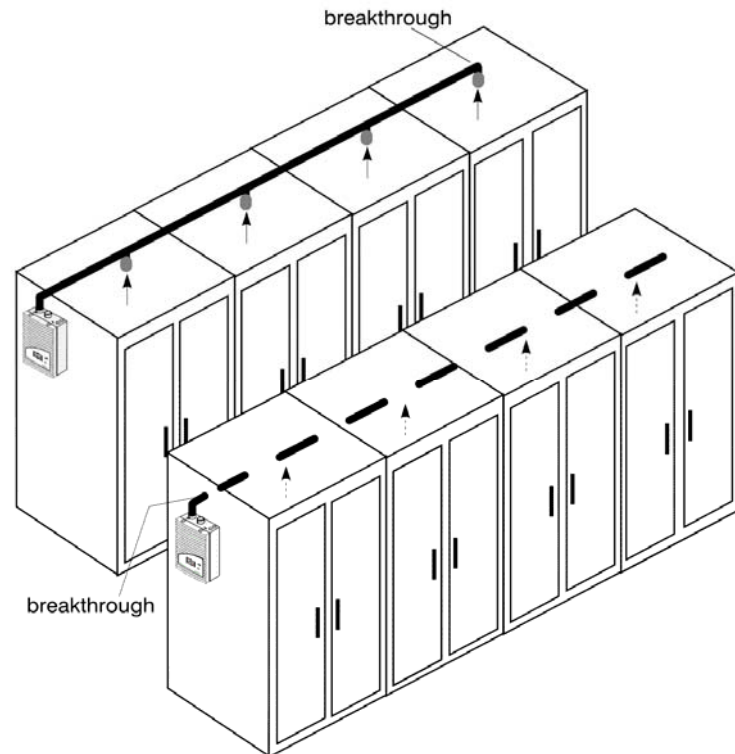
Figure 3: Principle: Equipment monitoring with TITANUS® air-sampling smoke detection system

The air sampling system TITANUS® can also be used for earliest fire detection in rooms with special air conditioning.

Valuable goods and installations can be reliably monitored due to the system's high sensitivity. Therefore, TITANUS® is especially suited for the following areas:

- where early intervention is crucial due to valuable assets
- where systems must be operational at all times
- where highly sensitive detection is required (e.g. in areas where filters keep smoke particles in the air at a minimum)
- with high air exchange rates

3 Technical Description

3.1 System Description

The air sampling smoke detection system TITANUS® consists of the basic device and the pipe system.

The most important components of the basic device include the sensitive detector modules for the detection of smoke aerosols and the aspiration unit to carry air samples to the detector module with integrated air flow sensor in order to monitor the pipe system for any fractures and blockages.

On the whole, the pipes and fittings are made of PVC or ABS plastic.
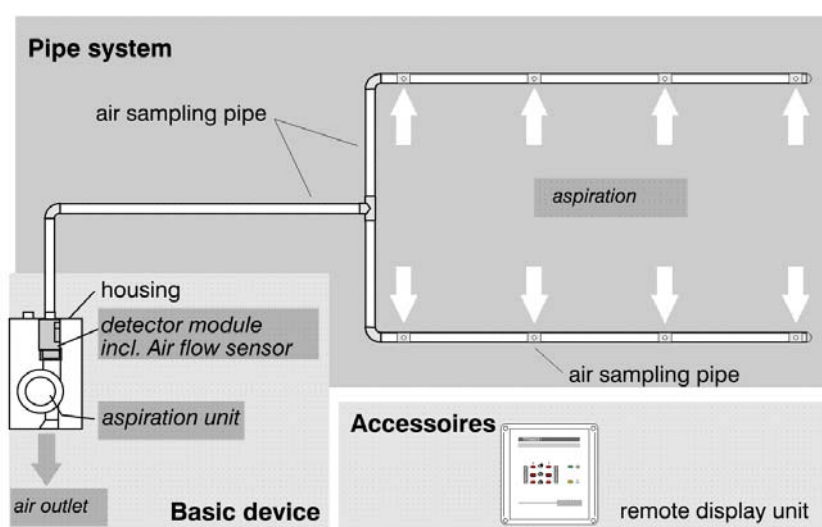
Figure 4: Overview air sampling smoke detection system TITANUS TOP·SENS®

To ensure safe operation even under the most difficult circumstances (e.g. recycling areas) a wide variety of accessories are available, e.g. different kinds of air filters or relay indicators. During installation in areas difficult to oversee, the relay indicator serves as status indicator for the basic device. During project planning, each air sampling point in the pipe system of TITANUS® represents a spot-type detector.

3.1.1 Functions

The aspiration unit in the basic device takes air samples from the protected area via a pipe system with defined sampling points and carries them to the sensitive detector module (see fig. „Overview air sampling smoke detection system TITANUS®").

Detector module Depending on the display sensitivity of the selected detector module (levels of 0.05 %/m, 0.01 %/m or 0.0015 %/m light obscuration can be selected), TITANUS *TOP·SENS*® activates the alarm when the corresponding light obscuration is achieved. Four different sensitivities can be set. Three alarm levels (alert alarm, action alarm and fire alarm) are indicated on the device via the alarm LED and transmitted to a central fire alarm system (FAS). Different delay periods can be set for the alarm thresholds, fault indicator and fault transmission (see chapter Installation „Settings").
Alarm reports are saved and the indicators have to be reset after eliminating cause of the alarm.
By using two detector modules, TITANUS *TOP·SENS*® 2 can monitor two areas as described above.

Alternative sensitivity Via the additional input "AltSens" on the connection board of TITANUS *TOP·SENS*® the adjusted detector modules can be set one step less sensitive (e.g. the sensor modules would thus be switched from a sensitivity of 0.4 %/m to 0.8 %/m).
By changing the sensitivity of the modules, it is possible to adjust the smoke detection to operational interferences such as

- increase of aerosol or dirt particles in the protected area depending on the time of day (day/night operation).
- increase of aerosol or dirt particles in the protected area depending on activity (e.g. maintenance work, welding or increase of steam, waste gases and dust).

LOGIC·*SENS* TITANUS® incorporates an intelligent signal processing system with LOGIC·*SENS*, which can be activated and deactivated with a switch at the detector module. This fades out interferences and contributes to a safe operation and avoiding false alarms.

Monitoring the detector module Each detector module is checked for soiling, signal faults and detachment. A fault is shown on the fault indicator of TITANUS® and can be transmitted to the CFDU via a fault contact. Faults caused by short-lived surround fluctuations can be masked out with a time-delayed setting.

Air flow monitoring An air flow sensor checks the connected pipe system for fractures and blockages.

The air flow sensor can recognise a blockage of the air sampling points of at least 50% to total blockage and any pipe fracture, which would result in a 50% loss of air sampling points. Depending on the design of the pipe system, blockages of individual air sampling points can also be recognised. The air flow monitoring system is temperature-compensated and can be set to be air pressure-dependent.

After a delay period, which can be programmed by switches, the fault is indicated on the air sampling smoke detection system and, if required, the fault signal is passed to the CDFU via a fault contact. The thresholds of the monitoring window can be adapted to the surrounding conditions. The dynamic air flow sensors are only activated when the air flow threshold is set to low. Following figure shows the signal curve of the air flow sensor.
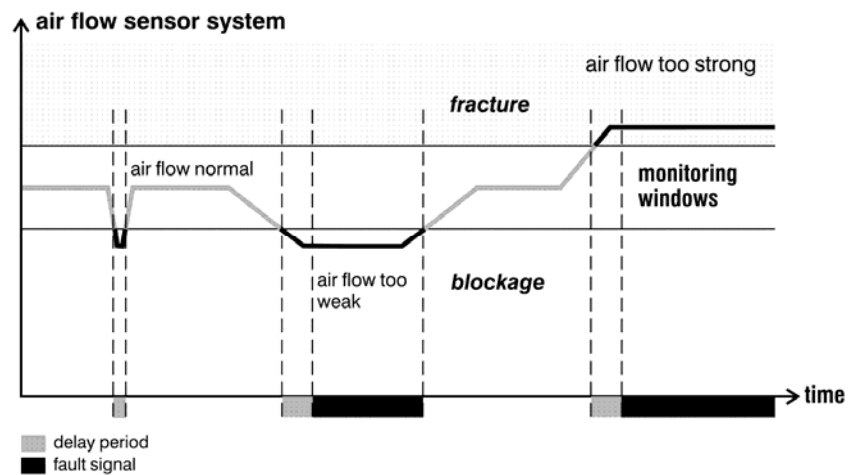
Figure 5: Signal curve of air flow sensor during fault

Fault signal A fault in the detector module or air flow activates a fault signal which is displayed on the TITANUS® display. The fault display can be set to latched (standard) or non-latched mode.

Flash code for fault detection	In order to detect the cause of a possible fault of TITANUS®, the device is equipped with LED signals on the detector module and base board, giving information about the device's condition with different flash codes.
Resetting via central fire panel	A fault signal is reset via a connected central fire panel. If it is required to reset alarm and fault signals together with the detection line (when operating TITANUS® connected to a CFDU), an optional reset board can be installed. It automatically resets the TITANUS® alarm and fault signals in the event of a temporary interruption in the line voltage.
	The reset board can only be used if the quiescent current of the line is between 5 mA and 50mA. The line must be without current during resetting.
Relay output	Each TITANUS® is equipped with a voltage-free change-over contact for the three existing alarm thresholds and the collective fault. Thus, the air sampling smoke detection system can be connected to collective and addressable (Via addressable modules of the relevant central fire panel) detection lines on any central fire panel.
Air flow adjustment	The air flow within TITANUS® is automatically adjusted so that commissioning is made easier. Initialisation can be made dependent or independent of the air pressure.
	In order to make adjustments to an air flow typical within the pipe network, a process called Air-Flow-Initialisation is used. This must be carried out for every device once after installation, after each modification to the pipe design and after any change of ventilator voltage. Thus, the device determines and memorises the air flow characteristics of the pipe network.
Pipe system	A pipe system up to a total length of 300 m with a maximum number of 32 air sampling points can be connected to TITANUS®.
	Two pipe systems can be connected to TITANUS® 2. The whole pipe system then measures 2 x 280 m and has a maximum of 2 x 32 aspiration points.
Networkability	To establish the status data of all the devices used in the network, it is also possible to connect Visu*LAN*® T to the information system. The operator of the control room can thus oversee the entire system and observe smoke level, air flow values etc.
	It is also possible to connect to Visu*LAN*® all TITANUS® systems operated within the network. Thus, all devices and operating conditions are immediately registered and any fault and alarm measures are displayed. Visu*LAN*® uses floor plans of the various buildings and levels to show the layout of the smoke detection system. To limit the incidence of fault reports, a diagnostic window with a help function is available. The smoke levels and air flow data

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from individual TITANUS® systems can be graphically displayed and printed-out. Also shown on this graph is the status of the alarm and fault relay.

Shutdown module External devices can be switched off with the shutdown module. Switch-off takes place when using the smoke detection system with shutdown module and a monitored exit with two-detector dependency.

Switch-off is either automatic or can be made via an external entry.

3.2 TITANUS *TOP·SENS*® and accessories

3.2.1 Overview
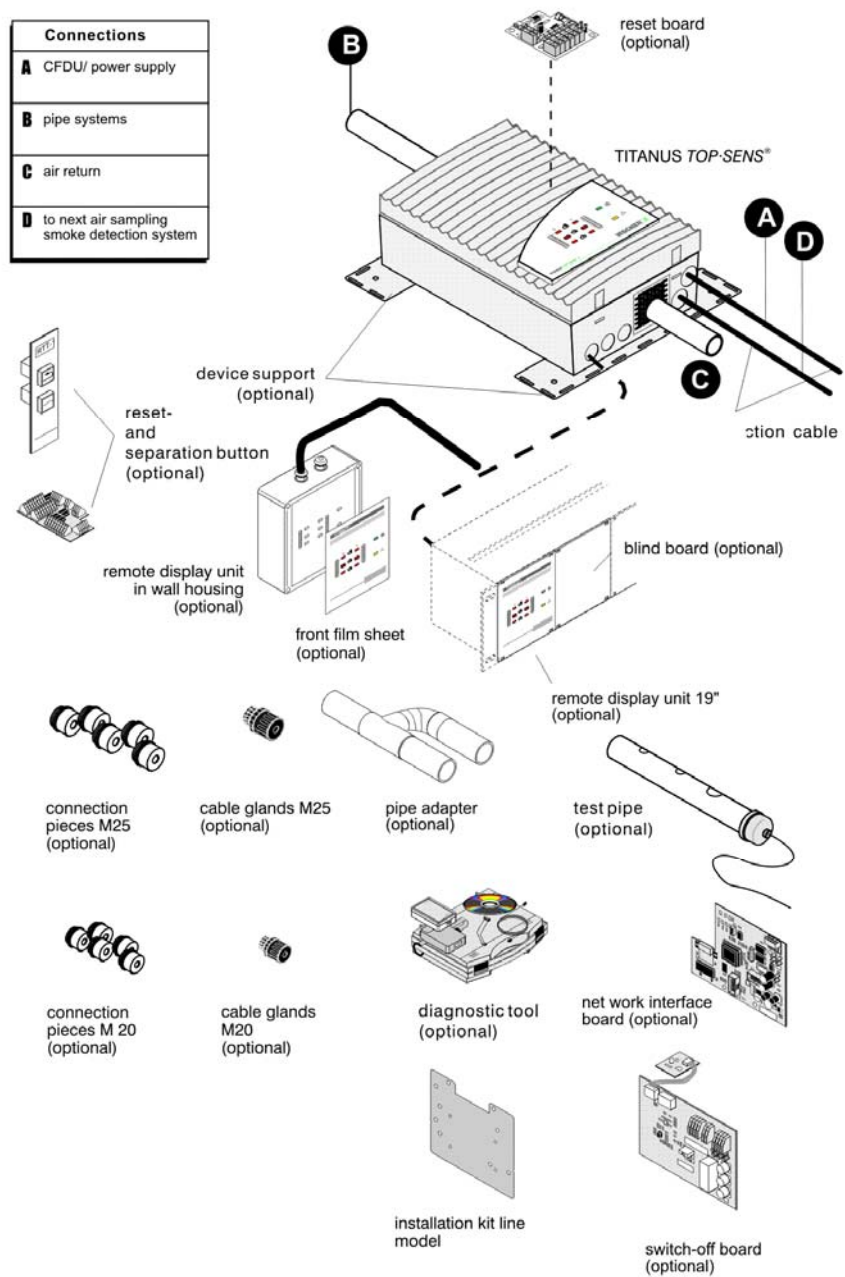
Figure 6: Overview TITANUS TOP·SENS®

The above components are optional extras.

3.2.2 Basic device TITANUS *TOP·SENS*®

The TITANUS *TOP·SENS*® basic device includes the following components:

▪ Plastic housing

  – Plastic connection pieces

  – Connector for pipes with an outer diameter of 25 mm

  – Integrated pipe return

▪ Sensitive detector module with the latest technology using scattered light detectors with integrated air flow monitoring

▪ Air sampling unit with optimised air supply

▪ Optical display for smoke level, fire alarm, action alarm, alert alarm, fault and operation

  – For TITANUS *TOP·SENS*® 2: optical displays for fire alarm 1 and 2, action alarm 1 and 2, alert alarm 1 and 2, smoke level 1 and 2

▪ Interface for diagnosis
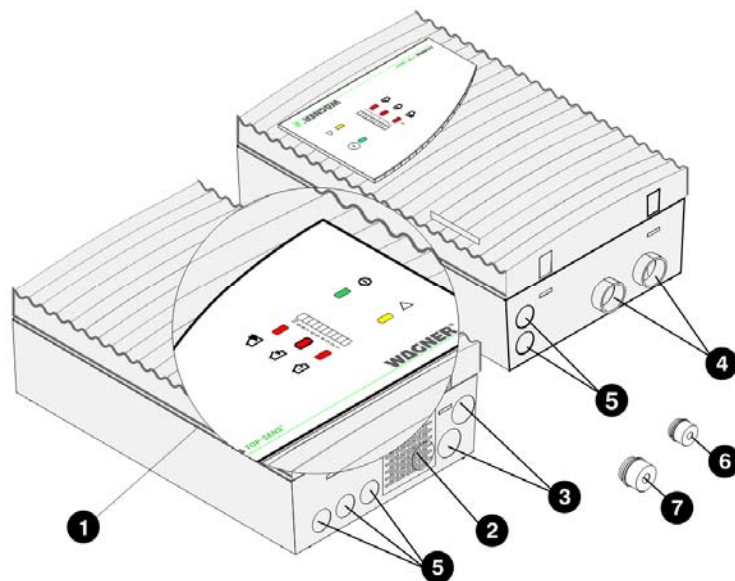
Figure 7: Displays and connections TITANUS TOP·SENS®
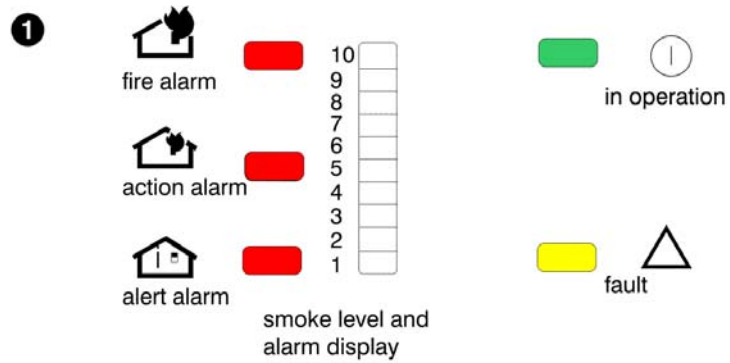
Figure 8: Displays TITANUS TOP·SENS®

Figure 9: Displays TITANUS TOP·SENS® 2

TITANUS *TOP·SENS*®

Numbers	Function	Explanation
	Displays	
1	Smoke level indicators 1 to 10 (10 yellow LED's) In operation (green LED) Fire alarm (red LED) Action alarm (red LED) Alert alarm (red LED) Fault (yellow LED)	Actual smoke level Operation display 100% Smoke level 66% Smoke level 33% Smoke level Pipe system / detector module fault or fan failure
2	Connection for air return pipe	To return the air
3	Fire detection cable entry for connection to FAS or power supply (input / output)	2 x M 25
4	Air sampling pipe connector second connector = only TITANUS *TOP·SENS*® 2	For ∅ 25 mm-pipe system
5	Cable entry for fire detection cable	5 x M 20
6	Connection piece (small)	1 x M 20 for cable with ∅ of 1 to 13 mm
7	connection piece (large)	2 x M 25 for cable with ∅ of 1 to 18 mm

3.2.3 Diagnostics
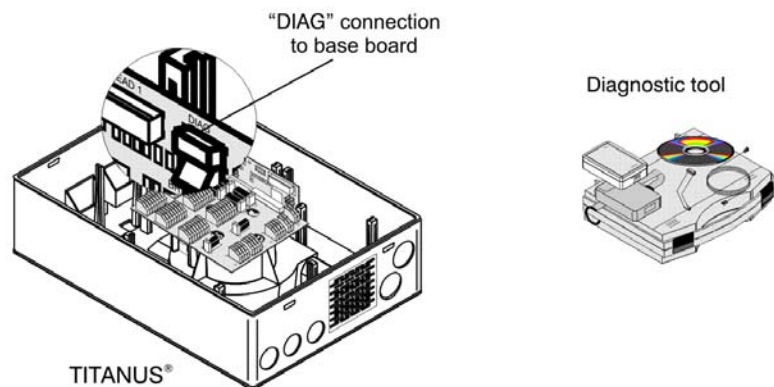
Figure 10: Diagnostic soft ware to read the device condition

For maintenance and servicing purposes, the diagnostic software can display (PC or laptop) the saved and current device status as well as any fault signals from TITANUS *TOP·SENS*®. The diagnostic cable transmits the data via the "DIAG" connector on the main board in TITANUS *TOP·SENS*® angeschlossen wird (refer to Fig. „Diagnostic soft ware to read the device condition").

In order to assess short-lived sporadically occurring faults (e.g. changed operating conditions), diagnostic messages remain in the software for at least three days. The saved messages can be deleted with the diagnostic software.

TIP
All saved and updated diagnostic data and settings made via the DIL switch can be saved as files. In order to compare the read-out data, save each individual file under a different file name.

TIP
It is a good idea to read, adjust and record the commissioning conditions.

3.2.4 Network modules
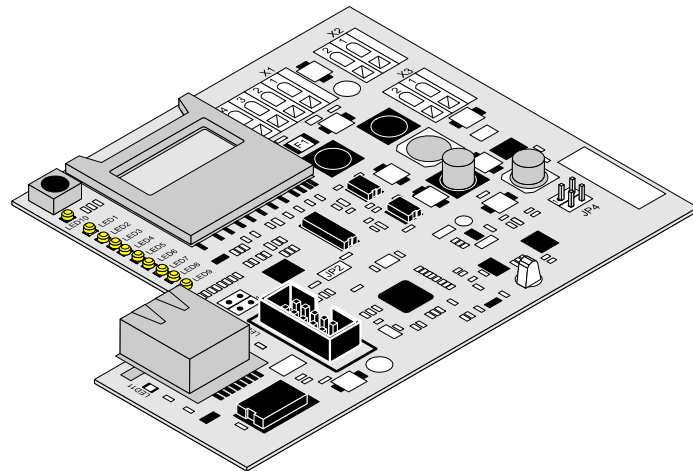
Figure 11: Network card NU-5

The log data and status information of all TITANUS® air sampling smoke detection systems can be stored with the TITANUS® network card. For applications in cold storage, special network modules for the TITANUS® available.

Variants Various upgrades of the TITANUS® network card are available for a variety of applications:

Type	Application				
	TCP/IP	SNMP	Webserver	Datenlogger	Deep-freeze
NU-5	X	X			X
NU-5-D	X	X	X	X	
NU-5-DO				X	
NU-5-D-F	X	X	X	X	X
NU-5-DO-F				X	X

TCP/IP With the help of this standard transfer protocol, the TITANUS® air sampling smoke detection system can be connected to the risk management system (e.g Visu*LAN*). All status information, as well as event and log data are available as to the risk management.

SNMP The status information and log data stored in network cards on all TITANUS® air sampling smoke detection systems can be accessed via the SNMP protocol. By installing SNMP management software, customers can constantly visualise and monitor the TITANUS® air sampling smoke detection systems. When an incident occurs (e.g. a threshold is exceeded), an alert or a fault message is sent to a managing entity or directly to another network participant via SNMP-Traps.

Data logger   The integrated data logger is used to record event data (alerts and faults) and log data (smoke level, air flow, air flow temperature, detection status, temperature sensors) from TITANUS® air sampling smoke detection system. The event and log data are saved on a memory card at pre-defined logging intervals of 1-60 seconds. The logged data saved can be analysed in the TITANUS® DataView and TITANUS® EventView software programs supplied.

Web server   For network modules with embedded web server, it is possible to display current data and status information device specific on a predefined display panel and is easily accessible via a standard Web browser. The benefit for users is that it is both convenient and easy to use. After successful setup, the information is available immediately without any special network installation required. A special setup of the Web server is not necessary.

Multi-application   The TITANUS® network card has four TCP/IP channels that support multi-application operation. Four TCP/IP applications can communicate simultaneously with a network card and additional data logger and SNMP data can be accessed.

NOTICE
When multi-application mode is used, this can cause delayed Website loading in the Web browser.

Write protection   Write protection can be activated on the network board via the jumper to protect parameter settings. Once successfully set up, network settings can be protected against overwrite.

3.2.5 Remote displays
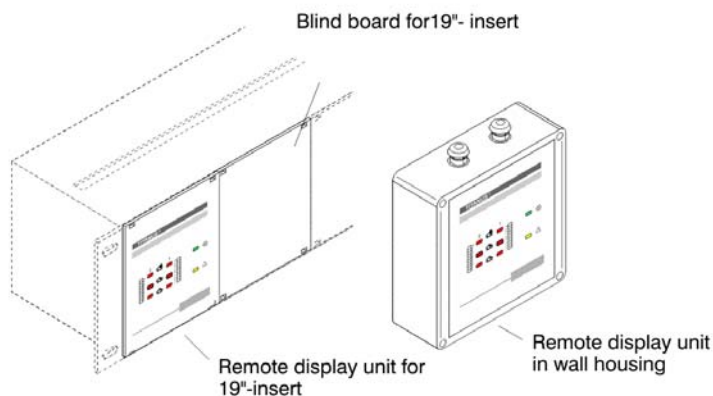
Figure 12: Remote display for 19"for inserts and wall mounting

With TITANUS® it is possible to connect one remote display per device. The indicators are identical to those on the basic device. The connection is made via the TITANUS® connection board.

A remote display can be connected at any distance up to 1000m. If two remote displays are connected in line, the total length of the connection must not exceed 500 m.

Over a short distance, power is provided directly from TITANUS®. Over longer distances an external power supply is required (see Chapter Design "Power Supply").

Two variations of remote display are available.

Variations
- for wall installation in a separate housing
- for installation in a 19" insert (3 HE, 28 TE)

The housing lid of the wall-mounted version can be so installed that it can be turned by 180 degrees. Wiring can therefore be upward or downward-facing. Up to three remote displays can be installed in a 19" insert. Blind boards are available to cover any unused voids.

3.2.6 Device supports
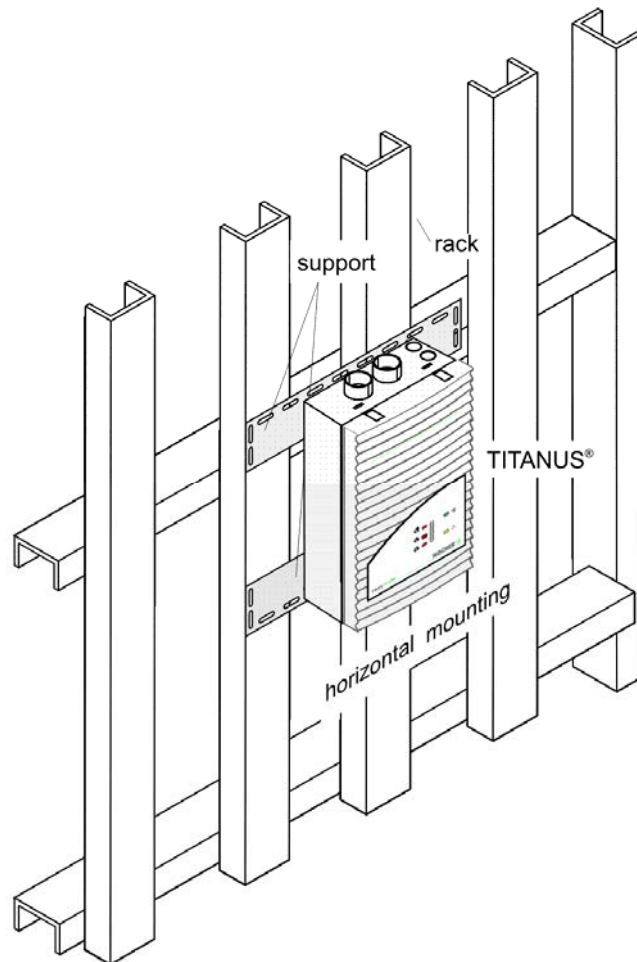
Figure 13: Support for the TITANUS TOP·SENS® air sampling smoke detection system

TITANUS® can be directly mounted to the wall. If required, additional supports are available, e.g. for fitting to racking.

3.3 Pipe system

3.3.1 Overview of available pipe components
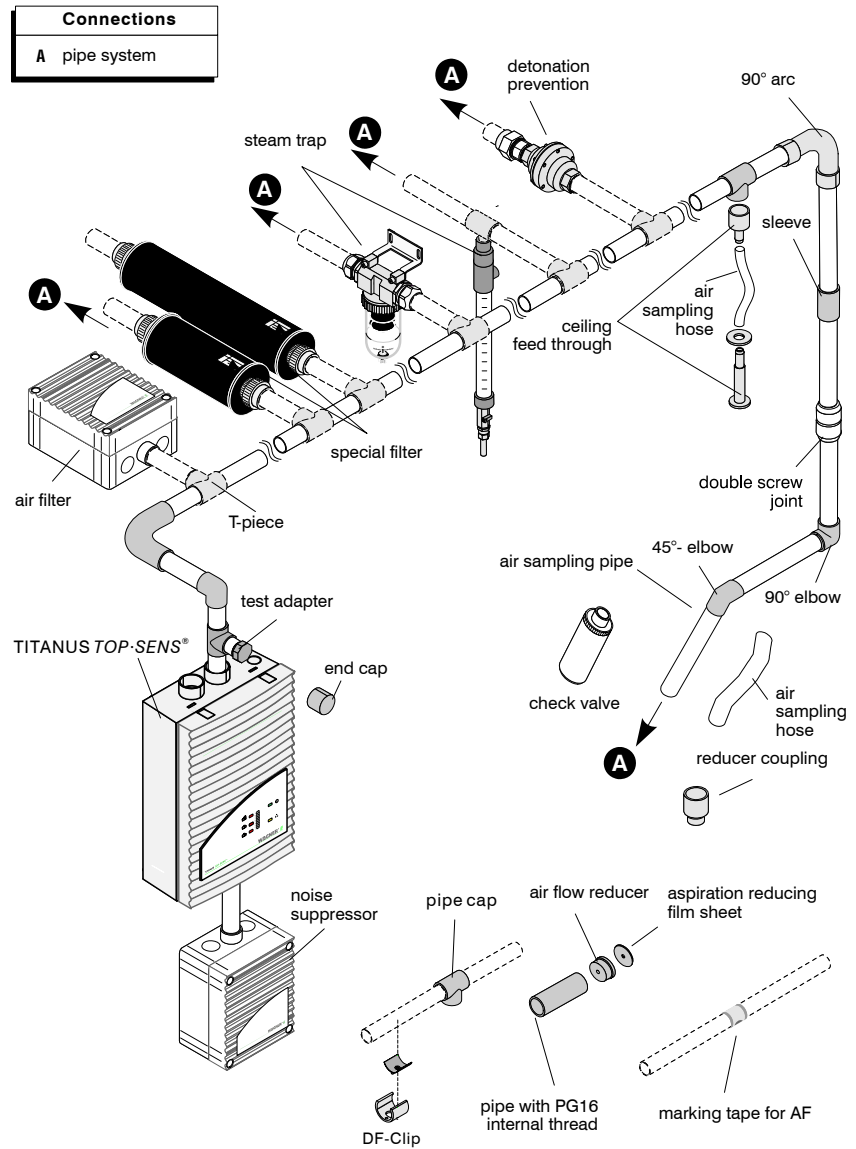
Figure 14: Components for the pipe system

The components illustrated in Fig. "Components for the pipe system" are selected for each specific application and are interchangeable.

Blow-through system   In areas where dust particles or icy conditions are possible it might be necessary to blow through the air sampling pipe system and aspiration points. The following figures show the components of a manual and automatic blow-through system. Depending on the frequency of blockages this can be done manually or automatically.
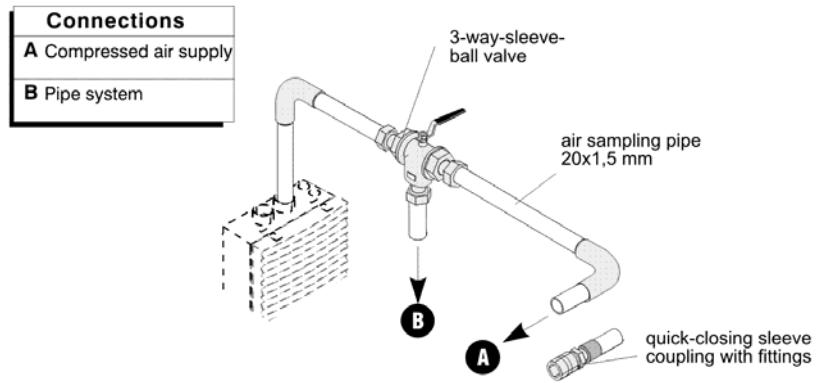
Figure 15: Components for manual blow-through
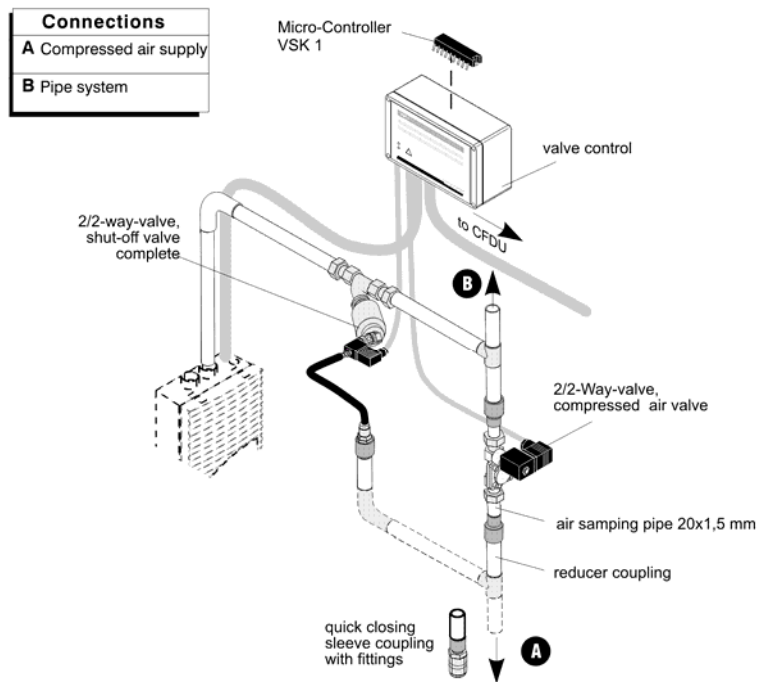
Figure 16: Components for automatic blow-through

3.3.2 Air sampling points for room monitoring

3.3.2.1 Aspiration-reducing film sheets
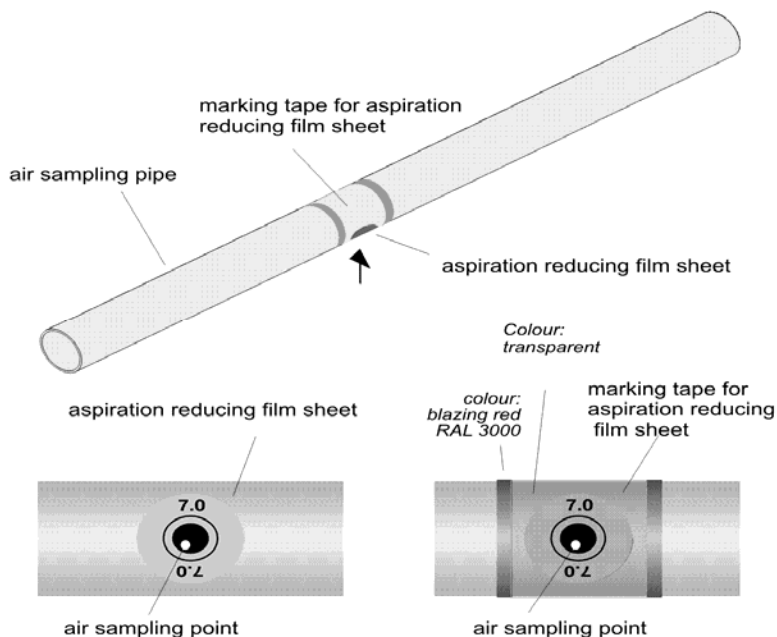
Figure 17: Aspiration aperture with aspiration reduction film and banderol

An air sampling point is a 10 mm-hole in the air sampling pipe covered with a patented aspiration-reducing film sheet with the appropriate opening diameter. The size of the opening depends on the pipe design (see chapter Design, "Pipe Design").

To prevent the film sheet from coming loose, it is fixed with transparent marking tape with red edges and a 10 mm-hole. The marking tape is fixed to the film sheet in such a way that the air sampling point is not covered and remains visible even at a distance.

The standard type AF-x aspiration reduction films and the type AF- banderol's are not suitable for use in very low temperature areas.

Aspiration reduction clips are to be used in these areas instead.

3.3.2.2 Air flow reducer clips

air flow reducer for deep freeze storage areas

plastic clip for air flow reducer
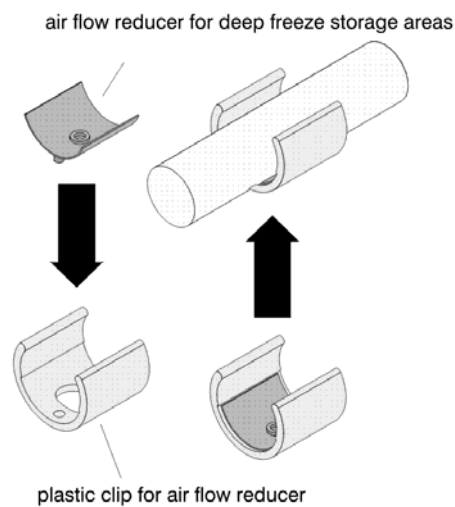
Figure 18: Air flow reducer for dirty areas and deep freeze storage

The air sampling points, when used in areas where blockages can occur, are equipped with a patented plastic clip, type AK-C, and a patented flexible air flow reducer, type AK-x.

When used in deep freeze areas, the flexible air flow reducer near the air sampling points expands and the ice is blasted off during blow-through. The special plastic clip ensures that the air flow reducer remains in place.

For designs in areas requiring a blow-through system (e.g. dusty), air flow reducers with plastic clips are used rather than aspiration-reducing film sheets with marking tapes, because the openings can be blown clear more easily. The plastic clips are more resistant at high pressures and can be cleaned more effectively due to the rubber core.

3.3.2.3 Ceiling feed-through for hidden installations
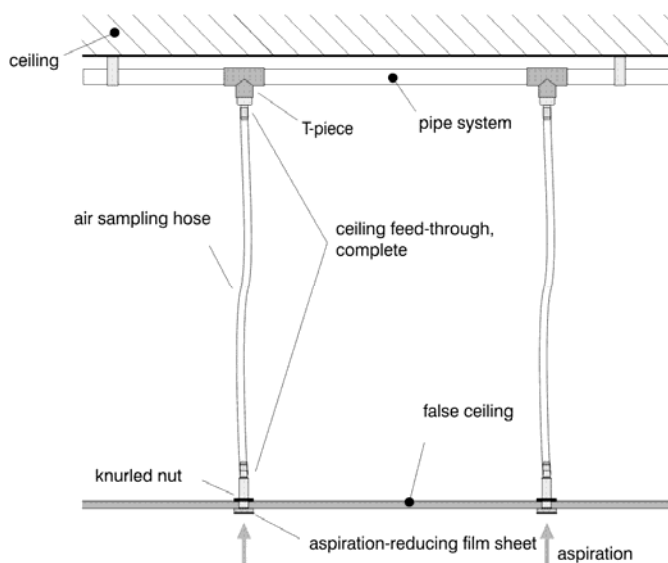
Figure 19: Ceiling feed-through for ceiling voids

Aesthetics If a hidden installation is required for monitoring of the pipe system, it can be installed in the ceiling void. The ceiling feed through are put in the false ceiling. According to the pipe design guidelines the ceiling feed-through are equipped with aspiration-reducing film sheets with defined air sampling points (see chapter Design "Pipe Design") and are connected to the pipe system with air sampling hoses.

If the maximum length of these hoses is 1 m, refer to the pipe design described in chapter "Design". If - due to construction - hose lengths of more than 1 m are required, the air sampling pipe system must be calculated separately (calculation is made by WAGNER).

The ceiling feed through is applicable for false ceiling panels with a thickness of up to approximately 35 mm. The aspiration-reducing film sheets are available in two colours (pure white, RAL 9010 and papyrus white, RAL 9018) and come in special colours if required.
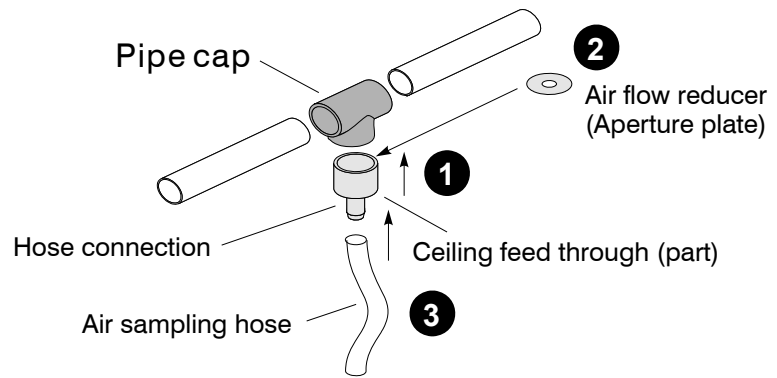
Figure 20: Capillary hose Installation and upstream aperture

For hidden installation in example lamps or stucco, the air sampling hose with upstream aspiration reduction in the tees (pipe caps) are used.

3.3.3 Air filter for dusty areas
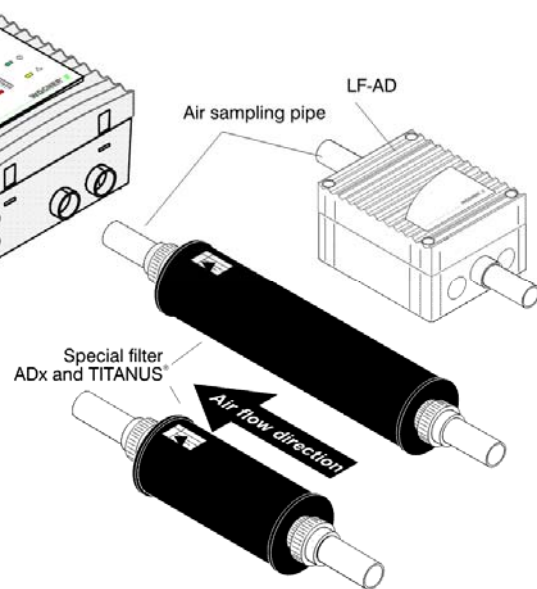
Figure 21: TITANUS TOP•SENS® with air filter

In highly dusty areas air filters must be used in order to protect the unit's detector. Impurities can occur in areas such as clean rooms with a fresh air supply.

Air filter, type LF-AD-x A rule the air filter type LF·AD is used, consisting of a plastic housing. The multi-layer filter absorbs particles larger than about 15 µm.

The air filter is automatically monitored for dirt (blockages) via the TITANUS® air flow monitoring system. If the air filters are blocked, the filter elements must be replaced after opening the filter housing.

Special Filter Type SF-x In case of a high amount of dust a special filter type SF-650 or type SF-400 with a larger surface is available. The special filter guarantees a safe filtration of dust and dirt. The particles are separated and permanently kept back from the filter medium. Even if the filter is due to be changed a constant air quality is guaranteed.
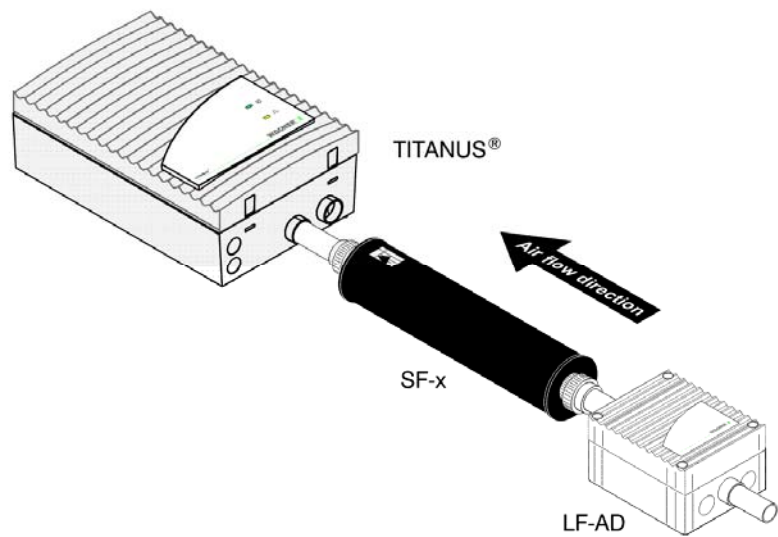
Figure 22: Special Filter and LF-AD

The filter life of special filter can be increased by the use of an upstream filter LF-AD.
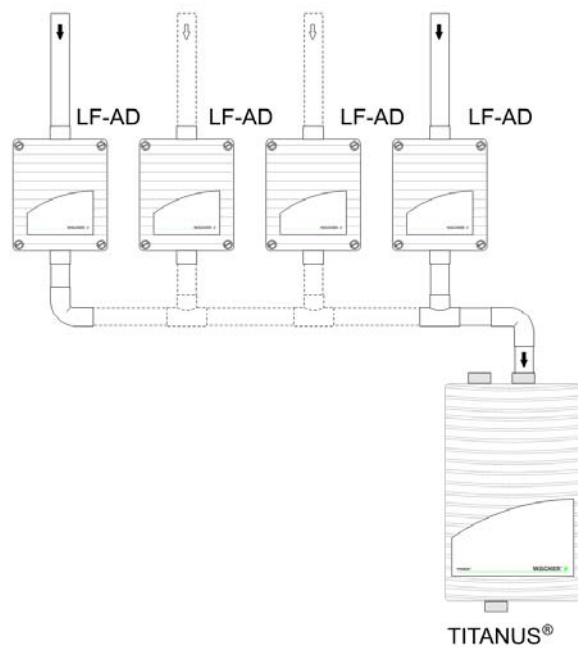
Figure 23: LF-AD filters in multiple sampling pipes

In order to extend the maintenance intervals, one air filter can be installed in every output pipe instead of one air filter inside the main sampling pipe. The

same design specifications shall apply as stated in the projection tables in the appendix.
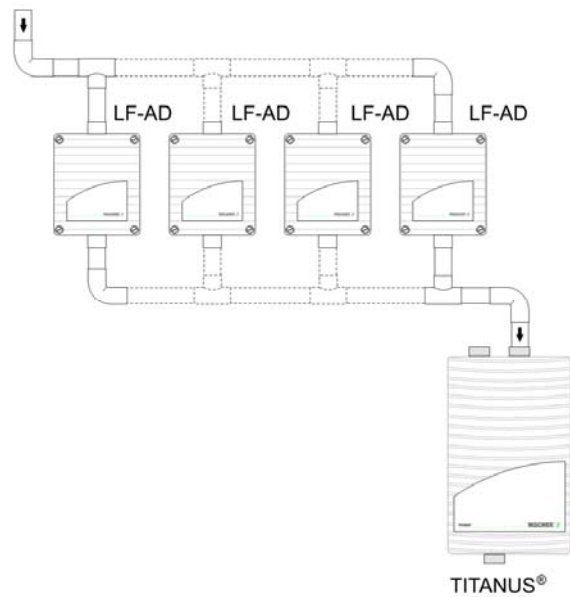
Figure 24: LF-AD filter in the main sampling pipe

Furthermore, in order to extend the maintenance intervals, several air filters can be installed in parallel in the main sampling pipe. This requires the main sampling pipe to be split into one or several pipes and to be equipped with the same air filter or the combination of air filters. The individual pipes can then alternatively be either combined again to one main sampling pipe or be separately continued into the monitoring area(s). The same design specifications for the individual air filters shall apply as stated in the projection tables in the appendix.

3.3.4 Air return for pressurised and dusty areas
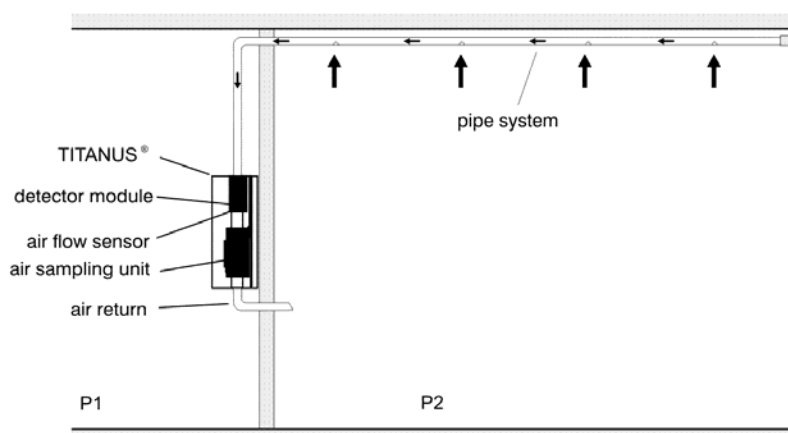
Figure 25: Principle of TITANUS® air return

If TITANUS® and the pipe system are installed in two areas - P1 and P2 – each with different air pressures, the air must be returned to the pressure area of the pipe system. The air return can be used for pressure compensation or in order to keep the air clean (e.g. from odours) in adjacent rooms.
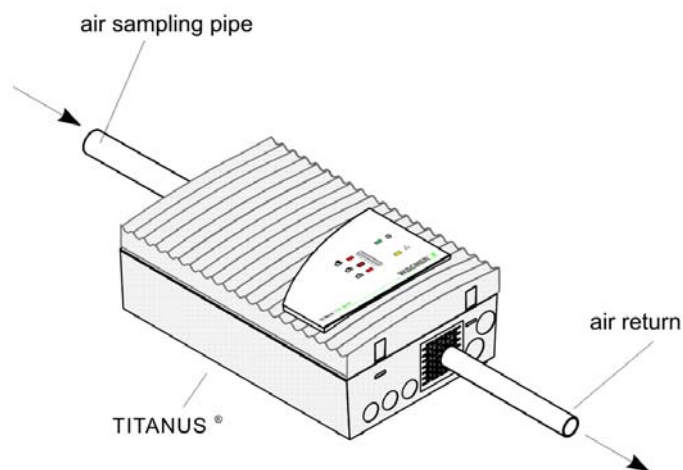
Figure 26: TITANUS TOP·SENS® with air return

The air return pipe system is directly connected through the protection grid to the air outlet inside TITANUS®. For this, the pre-punched opening in the protection grid must be used. As the air return pipe fits precisely into the air outlet a firm hold is ensured.

3.3.5 Noise suppressor
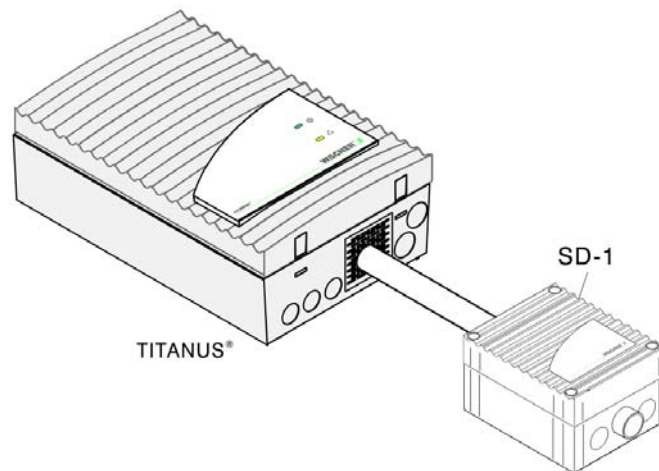
Figure 27: TITANUS TOP•SENS® with noise suppressor

By using the SD-1 noise suppressor, the noise level can be reduced by up to 10 db(A) for use in areas in which low noise emissions are required from the TITANUS® (such as in offices or hospitals).

The noise suppressor is mounted directly to the air outlet on the TITANUS®.

3.3.6 Steam trap for humid areas
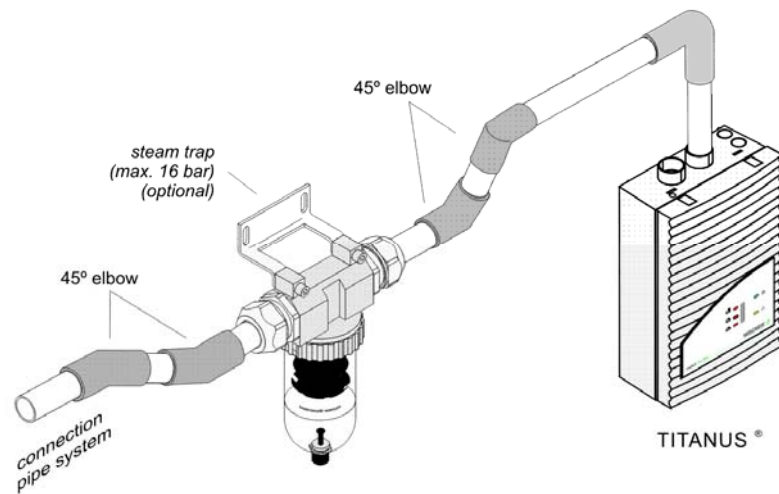
Figure 28: Steam trap to eliminate water vapour from the pipe system and to collect the condensate from the pipe system
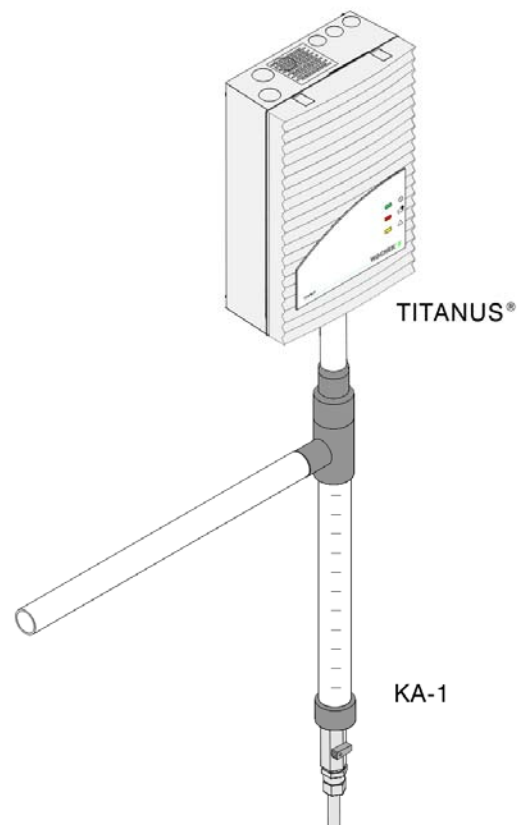
Figure 29: KA-1 Steam trap to eliminate water vapour from the pipe system and to collect the condensate from the pipe system

If TITANUS® is used in environments with high humidity condensate can oc-cur in the air sampling system. In order to collect this condensate the steam trap is installed at the deepest point of the pipe system before the air filter and the air sampling smoke detection system. The 45°-elbows permit an op-timum distance to the wall.

The steam trap can be operated in a temperature range between 0°C and +50°C. The sinter filter in the steam trap has a pore width of 50 µm and ab-sorbs also coarse dirt particles.

The steam trap is used in the following areas:

Application
- areas with widely varying temperatures (high humidity)
- areas with fresh air supply

3.3.7 Detonation prevention device for endangered areas
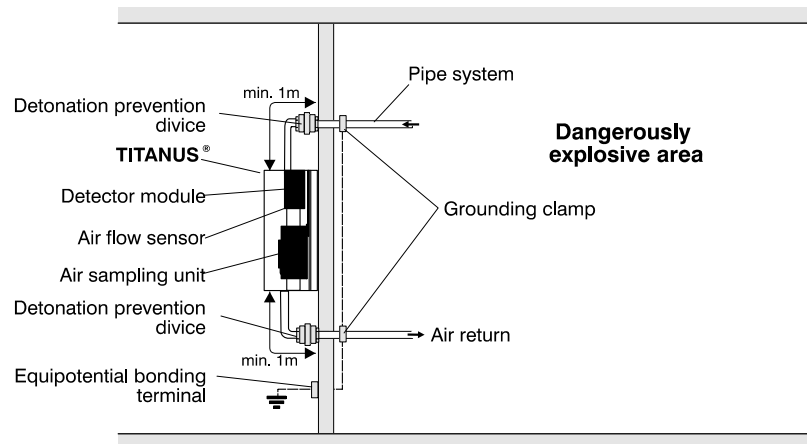
Figure 30: Detonation prevention device in the air sampling smoke detection system and air return system

TITANUS® can also be used in dangerously explosive areas by installing a detonation prevention device. Both must be installed outside the protected area.

To protect a dangerously explosive area a detonation prevention device is essential, because deflagrations or detonations can result in the TITANUS® pipe system if vapour/air mixtures should ignite. This depends on the type, concentration, starter pressure and temperature of the flammable mixture.

The detonation prevention devices, type EG xx, are flame breakthrough barriers, resistant to pipe explosions (deflagrations) as well as resistant to detonations (see fig „Detonation prevention device in the air sampling smoke detection system and air return system").

During standard operation the vapour or gas mixtures flow through the prevention device. The flow direction is interchangeable. If the mixture is ignited in the primary air sampling system the developing detonation is stopped. The flame breakthrough (nominal gap width) is avoided by means of the flame filters. If the mixture ignites near the flame filters, the detonation front could recoil. In order to avoid this minimum pipe length between the mounting locations of the detonation prevention device and the possible ignition source (air sampling system) must be **1.0 m**. Thus, indirectly, permanent fire prevention is achieved.

Protection Type	Nominal Gap Width	Explosion Groups	Approval
EG IIA	> 0,7 mm	IIA	BAM*
EG IIB3	> 0,5 mm	IIB1 – IIB3	BAM*
EG IIC	> 0,2 mm	IIC	BAM*

* Bundesanstalt für Materialprüfung (Federal German Office of Material Research)

NOTICE
The connection between the air sampling smoke detection system and the detonation prevention de-vice is a metal pipe. During installation the screw-joint connections must be sealed air-tight with Synthesol or sealing tape.

NOTICE
The installed pipe system in hazardous area must be grounded.

4 Technical Data

NOTICE
All listed power values relate to a surround temperature of 20ºC.

4.1 TITANUS *TOP·SENS*®

Voltage

	TITANUS *TOP·SENS* ®	TITANUS *TOP·SENS* ®2
Supply voltage (Ue) Nominal supply voltage	14 - 30 V DC 24 V DC	

Current

	U_L= 6,9 V	U_L= 9 V	U_L= 6,9 V	U_L= 9 V
Starting current (at 24 V) (without extra module)	300 mA		330 mA	
Quiescent current consumption (at 24 V) (without extra module)	200 mA[1]	260 mA	230 mA	310 mA
Current consumption alarm (at 24 V) (without extra module)	max. 230 mA	max. 290 mA	max. 290 mA	max. 370 mA
Current consumption reset board	max. 20 mA			
Current consumption network module	max. 40 mA			
Current consumption shutdown module	max. 6 mA			
contact load of alarm and fault relays switching power	30 V, 1 A max. 24 W			

(1) The current values may vary according to the pipe system

U_L = fan voltage

Dimensions

Dimensions (h x b x d mm)	113 x 200 x 292 mm

Weight

Weight	1.35 kg	1.45 kg

Noise level

Lwa according to EN ISO 3744, 1995 without noise suppressor	at 45 dB(A) depending on the configuration and fan voltage

Protection classification

	TITANUS *TOP·SENS* ®	TITANUS *TOP·SENS* ®2
Protection class (DIN IEC 34 part 5)	IP 20	

Housing

material	plastic (ABS)
colour	papyrus white, RAL 9018

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Temperature range

TITANUS®	– 20° to +60°C
deep freeze variety	– 40° to +60°C

Humidity

not condensed	10 to 95 % rf

Ventilator

type	radial
service life of ventilator (12 V)	43.500 h at 24°C

Displays on the device

	TITANUS *TOPSENS*®	TITANUS *TOP·SENS*®2
Level	1x smoke level 1 to 10 (10 sections)	2x smoke level 1 to 10 (10 sections)
Alarm	1x alert, action and fire alarm red alarm indicators	2x alert, action and fire alarm red alarm indicators
Fault	yellow collective fault	
ON	green operation display	

Connections

device connector	clamps for max. 1.5 mm²-strands	
cable	twisted in pairs, shielded and unshielded	
cable entries	5 x M 20 2 x M 25	
conical pipe connectors	1 x for ABS pipe ∅ 25 mm und 1x for air return ∅ 25 mm	2 x for ABS pipe 25 mm und 1x for air return ∅ 25 mm

Display sensitivity

Detector module DM-TT-50 ...	up to 0.05 % light obscuration/m
Detector module DM-TT-10 ...	up to 0.01 % light obscuration/m
Detector module DM-TT-01 ...	up to 0.0015 % light obscuration/m

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		TITANUS *TOP·SENS* ®-SL			TITANUS *TOP·SENS* ®2-SL		
Voltage	Supply voltage (Ue) Nominal supply voltage	14 - 30 V DC 24 V DC					
Current	Voltage with fan control board FC-2	$U_L=$ 6,5 V	$U_L=$ 6,9 V	$U_L=$ 9 V	$U_L=$ 6,5 V	$U_L=$ 6,9 V	$U_L=$ 9 V
	Starting current (at 24V) (without extra module)	300 mA			330 mA		
	Quiescent current consumption (at 24 V) (without extra module)	150 mA	160 mA	210 mA	190 mA	200 mA	250 mA
	Current consumption alarm (at 24V) (without extra module)	max. 180 mA	max. 190 mA	max. 240 mA	max. 220 mA	max. 230 mA	max. 280 mA
	Voltage with fan control board FC-3[(2)]	$U_L=$ 10 V	$U_L=$ 11 V	$U_L=$ 12 V	$U_L=$ 10 V	$U_L=$ 11 V	$U_L=$ 12 V
	Starting current (at 24V) (without extra module)	300 mA			330 mA		
	Quiescent current consumption (at 24 V) (without extra module)	200 mA	230 mA	260 mA	240 mA	270 mA	310 mA
	Current consumption alarm (at 24V) (without extra module)	max. 230 mA	max. 260 mA	max. 290 mA	max. 300 mA	max. 320 mA	max. 330 mA
	Current consumption reset board	max. 20 mA					
	Current consumption network module	max. 40 mA					
	Current consumption shutdown module	max. 6 mA					
	Contact load of alarm and fault relays switching power	30 V, 1 A max. 24 W					

(2) FC-3 = optional available U_L = fan voltage

Dimensions	Dimensions (h x b x d mm)	113 x 200 x 292 mm	
Weight	Weight	1,35 kg	1,45 kg
Noise level	Lwa according to EN ISO 3744, 1995 without noise suppressor	at 31 dB(A) depending on the configuration and fan voltage	
	Lwa according to EN ISO 3744:, 1995 with noise suppressor	at 23 dB(A) depending on the configuration and fan voltage	
Protection classification	Protection class (DIN IEC 34 part 5)	IP 20	
Housing	Material	plastic (ABS)	
	Colour	papyrus white, RAL 9018	
Temperature range		0° to +40°C	
Humidity	Not condensed	10 to 95 % rf	

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Fan	Type	radial
	Service life of fan (12 V)	43.500 h at 24°C

Displays on the device		TITANUS *TOPSENS*®	TITANUS *TOP·SENS*®2
	Level	1x smoke level 1 to 10 (10 sections)	2x smoke level 1 to 10 (10 sections)
	Alarm	1x alert, action and fire alarm red alarm indicators	2x alert, action and fire alarm red alarm indicators
	Fault	yellow collective fault	
	ON	green operation display	

Connections			
	Device connector	clamps for max. 1,5 mm²-strands	
	Cable	twisted in pairs, shielded and unshielded	
	Cable entries	5 x M 20 2 x M 25	
	Tapered pipe connectors	1 x for ABS pipe Ø 25 mm and 1x for air return Ø 25 mm	2 x for ABS pipe Ø 25 mm and 1x for air return Ø 25 mm

Display Sensitivity		
	Detector module DM-TT-50 ...	up to 0.05 % light obscuration/m
	Detector module DM-TT-10 ...	up to 0.01 % light obscuration/m
	Detector module DM-TT-01 ...	up to 0.0015 % light obscuration/m

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4.1.1 Accessories - TITANUS *TOP·SENS*®

	Remote display	
	TITANUS *TOP·SENS*® *TOP·SENS*®-SL	TITANUS *TOP·SENS*®2 *TOP·SENS*®2-SL

Remote display

Voltage Nominal voltage	8 to 30 V= 24 V
Current consumption (at 24 V) Idle maximum	10 mA 65 mA
Electric connection lengths Remote display	total length max. 1000 m
Protection classification	IP 65 model for wall housing

Displays on the device

Level Alarm Fault ON	2x smoke level 1 to 10 2x alert, action and fire alarm red alarm indicators yellow collective fault green operation display

Connections

Device connector	clamps for max. 4 mm²-strands
Cable entries	2 x M16 model for wall housing

4.1.2 Pipe system TITANUS *TOP·SENS*®

	Pipe system	
	TITANUS *TOP·SENS*® *TOP·SENS*®-SL	TITANUS *TOP·SENS*®2 *TOP·SENS*®2-SL

Pipe system

Max. pipe length max. number of air sampling points	300 m 32	560 m 64
Max. length of air sampling hose per ceiling feed through	1 m	
Temperature range PVC-pipe ABS-pipe	-0°C..+60°C -40°C..+80°C	
Max. monitoring area	2880 m^2	5760 m^2

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5 Design

5.1 General

The following describes the project planning of the air sampling smoke detection system to EN 54-20 or ISO 7240-20. The basic conditions are described in Chapter 5.1. The basic conditions are described in Chapter 5.1. The project planning is to be conducted in accordance with Chapter 5.2. The limiting project planning instructions in accordance with Chapter 5.2 apply to special applications in addition to Chapter 5.3 These should be taken into consideration at the beginning of project planning for special projects.

Project planning options according to EN 54-20 or ISO 7240-20:

There are various technical solutions to be selected from, depending on the project planning criteria. The chapters for the solutions are listed in the following tables.

Project planning criterion	Technical solution	Basic Principles	Limitations
General area monitoring	Standard project planning	Chapter 5.2	----
Recognition of a failure at an individual aperture	Project planning for individual aperture monitoring	Chapter 5.2	Chapter 5.3.1
Device protection/cabinet monitoring	Simplified pipe project planning	Chapter 5.2	Chapter 5.3.2
Long intake lines	Project planning with long intake lines > Ø 25 mm	Chapter 5.2	Chapter 5.3.4
Transport time reduction	Project planning with acceleration apertures	Chapter 5.2	Chapter 5.3.5
Ventilation conduits	Project planning for forced air flow	Chapter 5.2	Chapter 5.3.6

5.1.1 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 or. ISO 7240-20

The air sampling smoke detection systems shall be planned in accordance with the project planning guidelines described in Chapter 5.2.1 in order to be compliant with EN 54-20 or ISO 7240-20.

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.

5.1.2 Pipe systems

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 the intake apertures and the pipe system design depends on the size, ventilation and shape of the monitored area. The aspiration apertures should be planned like point-type detectors. The pipe system is to be fitted in accordance with the project planning guidelines in this section while taking the following points into consideration:

Symmetry of the pipe system To insure equal air intake for all aspiration holes the following rules must be obeyed:

- ▪ The length of the shortest and longest branch must not exceed a ratio of **1:2**.
- ▪ The number of aspiration holes of the corresponding branches must not exceed a ratio of **1:2**.
- ▪ The aspiration holes should be evenly distributed on the corresponding branches.

NOTICE
Each connected pipe system must comply with the design limits of TITANUS® for the selected pipe design (please refer to chapter "Project Planning Limits").
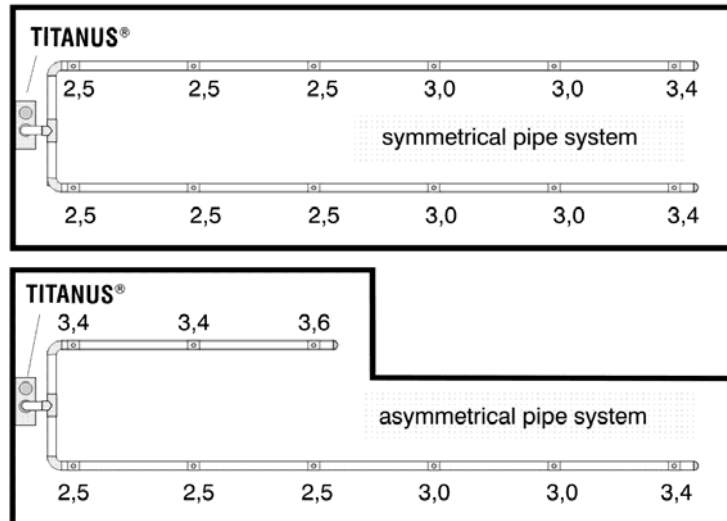
Figure 31: Example of a symmetrical and an asymmetrical U-pipe system

Figure „Example of a symmetrical and an asymmetrical U-pipe system" illustrates exemplary a U-shape pipe system with symmetrical and asymmetrical pipe designs and according to chapter ´Standard Design´ the calculated diameters of the aspiration holes. The diameters of the aspiration holes are determined for each branch of the pipe system separately and are dependent on the total number of aspiration holes of the respective branch. Please refer to chapter "Hole diameters" for corresponding tables with hole diameters.

Longer pipe intake lines Pipes with a diameter of 32 mm or 40 mm may be used for long pipe intake lines in accordance with the chapter "Special project planning".
This reduces the air resistance of the pipe intake line or makes it possible to achieve a greater equilibrium for sampling via outgoing transmission lines.

Branch length In order to ensure a short transport time for the smoke fumes in the sampling pipe and thus enable rapid detection, it is better to plan several shorter than a few long ones (preferably a U- or double U-pipe system).

Pipe designs 5 types of pipe designs can be selected, depending on the cabinet geometry (see Figure „Project planning").

	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®.
	M-pipe	An air sampling smoke detection pipe system which branches into 3 air sampling branches after the connection to the TITANUS®.
	Double-U-pipe	An air sampling smoke detection pipe system which branches into 4 air sampling branches after the connection to the TITANUS®.
	Quadruple-U-pipe	An air sampling smoke detection pipe system which branches into 8 air sampling branches after the connection to the TITANUS®.

Pipe connections The TITANUS® has 2 pipe connections. One pipe system may be connected to each of these pipe connections, as long as two detector modules are being used.

If only one detector module is being used, it will only be possible to connect one sampling pipe.
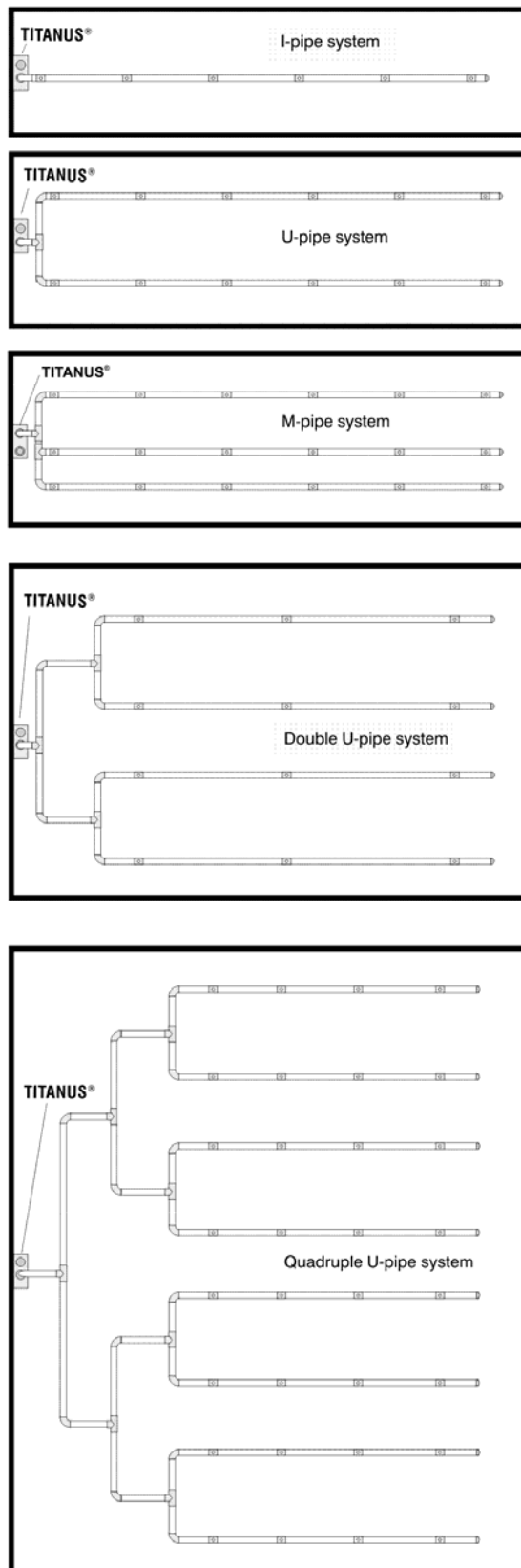
Figure 32: Pipe designs

Direction change   Change of direction in the pipe system can increase the flow resistance. Light change of direction (e.g. with 90 ° pipe bends or air sampling hose) are already approved as part of the project according to EN 54-20 or ISO 7240-20 and need not be considered further.

If the pipe system includes 90 ° angles, the maximum overall length of the pipe system will be reduced. In this case, a 90 °-angle corresponds to a straight pipe length of **about 1.5 m** air sampling pipe.

NOTICE
Bends are to be preferred over angles. An excessive number of changes in direction can change the detection time.

Special cases   If the pipe system does not match the project planning guidelines described here due to structural constraints. WAGNER should offer could provide individual calculations for such a case.

Checking   Check detection reliability with activation tests in cases where use of the system is critical. Also check whether an air flow rate is present at individual aspiration apertures.

TIP
The fan voltage can be increased in order to reduce transport time. Make sure that the current intake increases.

Dual detector dependency

according to VdS 3435   One intake line is to be allocated per detector module. The two detector modules of a device must be evaluated independently of one another. Only one extinguishing area may be monitored per air sampling smoke detection system.
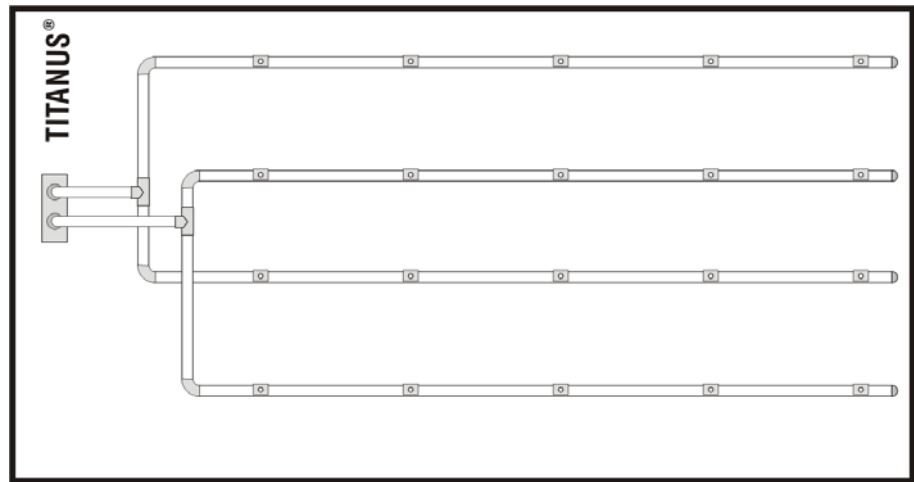
Figure 33: Pipe design for dual detector dependency

5.1.3 Air flow monitoring

EN 54-20 or ISO 7240-20 requires the recognition of a 20 percent change in the air flow volume by the detector module's air flow sensor system. In order to accomplish this, the air flow sensor system's triggering threshold must be set to level II. But level I may also be set as an alternative. It is recommended to conduct an air pressure-dependent air flow compensation for both of these settings.

Any threshold desired may be set with systems which do not require EN 54-20 or ISO 7240-20 conformity.

Project planning for the air flow monitoring system in sampling pipes is carried out while taking into consideration the respective national regulations for each country.

Adjusting the air flow sensitivity The air flow sensor sensitivity must be adjusted to the application in question. Breakage and stoppages must be detected reliability with low susceptibility to malfunction.

The triggering threshold and the air flow sensor sensitivity can be adjusted in 4 levels.

Level	I	II	III	IV
	In conformity with EN 54-20 or ISO 7240-20			
Triggering threshold	Small	Medium	Large	Very large
Sensitivity	Very high	High	Medium	Low

TIP	WAGNER
It is recommended to always select the greatest possible level which is permissible according to national standards.	

Dynamic air flow sensor system The device's air flow monitoring enables the system to detect both pipe breakages outside the device and sudden obstruction in individual aspiration apertures (e.g. in the event of sabotage to the pipe system). As the dynamic air flow sensors are **only** active if level I has been selected for the air flow monitoring, the aspects described under "Level I limitation" should be taken into account here.

Level I limitations The air flow monitoring may only be set to level I if:

- Project planning according to "Individual aperture monitoring" has been carried out (see Chap. "Pipe project planning individual aperture monitoring"),
- the air flow sensor has been compensated depending on the air pressure (see Chap. Commissioning "Air pressure dependent air flow compensation") and
- No large air flow fluctuations occur.

Air pressure differences The same air pressure must be present throughout the sampling pipe.

NOTICE
If the air sampling smoke detection system and pipe system are in areas with different air pressure, the air sampled by the TITANUS® should be recirculated in the pipe system pressure area (see Chapter "Air recirculation").

5.1.4 Sensitivity

According to EN 54-20 or ISO 7240-20, 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 5.2.

Air sampling smoke detection systems with a higher sensitivity class according to EN 54-20 or ISO 7240-20 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 IT areas
B	Air sampling smoke detector with increased sensitivity	Early detection: Diluted smoke in conventional (cooled IT areas)
C	Air sampling smoker detector with standard sensitivity	Standard detection: Fire detection with the benefits of air sampling smoke detection systems

NOTICE

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

The table shows the selectable sensitivity levels of the TITANUS *TOP·SENS*®:

Activation sensitivity (fire alarm) TITANUS *TOP·SENS*®		
Detector module Type DM-TT-50-L	Detector module Type DM-TT-10-L	Detector module Type DM-TT-01-L
	0.8 % light obscuration/m	0.12 % light obscuration/m
	0.4 % light obscuration/m (Standard)	0.06 % light obscuration/m (Standard)
1 % light obscuration/m	0.2 % light obscuration/m	0.03 % light obscuration/m
0.5 % light obscuration/m (Standard)	0.1 %light obscuration/m	0.015% light obscuration/m

Project planning for the monitored surface is always carried out according to national specifications for point-shaped smoke detectors.

5.1.5 Project planning limits

The following limit values must be complied with at all times with the TITA-NUS® per pipe system connected:

- Standard project planning
  - The minimum pipe length between 2 aspiration apertures is **4 m**.
  - The maximum pipe length between 2 aspiration apertures is **12 m**.
  - The maximum overall pipe length is **200 m**
    (**2 x 200 m** with 2 pipe systems connected).
  - A maximum of **24** aspiration apertures are possible per detector module.

- Simplified pipe project planning
  - The minimum pipe length between 2 aspiration apertures is **0.1 m**.
  - The maximum pipe length between 2 aspiration apertures is **4 m**.
  - The maximum overall pipe length is **100 m**
    (**2 x 100 m** with 2 pipe systems connected).
  - A maximum of **20** aspiration apertures are possible per detector module.

- Project planning with acceleration apertures
  - The minimum pipe length between 2 aspiration apertures is **4 m**.
  - The maximum pipe length between 2 aspiration apertures is **12 m**.
  - The maximum overall pipe length is **300 m**
    (**2 x 280 m** with 2 pipe systems connected).
  - A maximum of **100** aspiration apertures are possible per detector module.

The maximum monitoring area per sampling aperture corresponds to the monitoring area of point-shaped detectors in accordance with the applicable project planning guideline.

The maximum overall monitoring area, the maximum overall pipe length and the maximum number of aspiration apertures are independent of the project planning selected, as are the restrictions from national regulations.

5.2 Project planning

5.2.1 Project planning guidelines

In order to conduct project planning in accordance with the EN 54-20 or ISO 7240-20 standard, it is necessary to be familiar with particular factors. These are the requirements for the system's sensitivity, the number of aspiration apertures and the accessories necessary for the corresponding application. The pipe system design in conformity with the standard can be determined based on these factors using the following chapter and with the help of the project planning tables in the appendix.

5.2.1.1 Determining the necessary accessories

Since the accessory components, such as filters, have a certain influence on the dimension of the pipe planning, the suitable accessories must be selected for the corresponding application ahead of time. Retrofitting, with a fine filter, for instance, is generally only possible if a more sensitive detector module is being used or a particular reserve has been planned in advance.

NOTICE
Components which have not been approved by WAGNER are used; CE conformity on the basis of EN 54-20 or ISO 7240-20 will not be possible.

The following accessory components should be taken into consideration in the process:

- Air filters
- Steam trap
- VSK stop valves
- Detector box
- Detonation protection
- *OXY·SENS*® air sampling detector

The SD-1 noise suppressor may be used in any case with no project planning restrictions.

5.2.2 Pipe accessories

Air filters

Type	Application	Examples
LF-AD	Coarse filter for separating particles > approx. 15 µm	Dust, insects, fibres, hair, cinders, pollen
LF-AD-1	Filter for separating particles > approx. 10 µm	As above. Additionally: Colour pigments and fine dust
LF-AD-2	Fine filter for separating particles > approx. 5 µm	As above. Additionally: Fine dust in low concentrations
SF-400	Fine filter for separating particles > approx. 1 µm	As above. Additionally: Fine dust in high concentrations
SF-650	Fine filter for separating particles > approx. 1 µm	As above, but with increased filter lifetime

Steam trap

Type	Application
KA-DN-25	Condensation separator for applications with condensation moisture in the pipe
KA-1	Condensation separator for applications with condensation moisture in the pipe

Sound suppressor

Type	Application
SD-1	Sound suppressor for areas sensitive to noise

Stop valve

Type	Application
AVK-PV	Stop valve for VSK cleaning air nozzle
AVK-PV-F	Stop valve for VSK cleaning air nozzle for use in freezer areas

Detonation protection

Type	Application
EG IIA	Detonation protection for explosion group II A areas
EG IIB3	Detonation protection for explosion group II B 3 areas
EG IIC	Detonation protection for explosion group II C areas

5.2.3 Sensitivity and pipeline project planning

5.2.3.1 Pipeline project planning with pipe accessories

The following project planning tables for pipeline project planning can be found in the appendix for each previously selected pipe accessory.

- Project planning without filter
- Project planning with LF-AD air filter
- Project planning with LF-AD-1 air filter
- Project planning with LF-AD-2 air filter
- Project planning with SF-400 / SF-650 air filter

NOTICE
An area can be monitored with more than detection points than required by the national guideline in order to improve an air sampling smoke detection system's detection quality. In such case, the number of normatively required sampling points is to be used in calculating the required sensitivity of an air sampling smoke detection system.

Procedure   In the following example, a project plan is supposed to fulfil class B require-
ments without air filters, with 8 apertures and with the additional use of a
condensation separator. The red arrows show the possible project plans with
varying pipe shapes and fan voltages.

1	**Selection** Selection of the corresponding project planning table based on the air filter to be used (see Chap. 5.2.2) **Result** The project planning table has been determined
2	**Selection** Selection of the number of aspiration apertures in the project planning table **Result** The achievable sensitivity class for the selected number of apertures has been determined
3	**Selection** Determinations on the sensitivity necessary to achieve the sensitivity class **Result** Determination of the detector module and sensitivity setting
4	**Selection** Selection of other pipe components (e.g. steam trap and detonation protection see Chap. 5.2.2 described components) **Result** The project planning table has been determined
5	**Selection** Pipe length selection **Result** Determination of the pipe shape and necessary fan voltage

❶ Projection without filter

M = Modul   S = Sensitivity (% Lt/m)   HA = Fire alarm   VA = Action alarm

❷ ❸

M	S		1	2	3	4	5	6	7	8	9	10	11	...	32
0,015	0,015	HA	A	A	A	A	A	A	A	A	A	A	A		A
	0,03	HA	A	A	A	A	A	A	A	A	A	A	A		A
	0,06	HA	A	A	A	A	A	A	A	A	A	A	A		B
	0,12	HA	A	A	A	A	A	A	B	B	B	B	B		C
0,1	0,1	HA	A	A	A	A	A	A	A	A	A	B	B		B
	0,2	HA	A	A	A	A	B	B	B	B	B	B	B		C
	0,4	HA	A	A	B	B	B	B	C	C	C	C	C		
	0,8	HA	A	B	B	C	C	C							
0,5	0,33	VA	A	A	A	A	B		B	B	B	B	B		C
	0,5	HA	A	A	A	B	B	B	B	C	C	C	C		
	0,66	VA	A	A	B	B	B	C	C	C	C	C			
	1	HA	A	B	B	C	C	C	C						

without pipe accessories

Pipe shape	U_{Fan}[V]	1	2	3	4	5	6	7	8	9	10	11	...	32	
I	6,5	77	77	77	77	77	77	77	77						
	6,9	77	77	77	77	77	77	77	77	76					
	=9	100	100	100	100	100	100	100	100	100	100	100			
U	6,5	120	120	120	120	120	120	120	120	120	120	120			
	6,9	120	120	120	120	120	120	120	120	120	120	120			
	=9	150	150	150	150	150	150	150	150	150	150	150			
M	6,5	170	170	170	170	170	170	170	170	170	170	170			
	6,9	170	170	170	170	170	170	170	170	170	170	170			
	=9	180	180	180	180	180	180	180	180	180	180	180			
Double U	6,5	180	180	180	180	180	180	180	180	180	180	180			
	6,9	180	180	180	180	180	180	180	180	180	180	180			
	=9	200	200	200	200	200	200	200	200	200	200	200			
Quad-U (1 DM)	6,5														
	6,9														
	=9	300	300	300	300	300	300	300	300	300	300	300		300	
Quad-U (2 DM)	6,5														
	6,9														
	12	280	280	280	280	280	280	280	280	280	280	280		280	

permitted total pipe length [m]

with detector box and/or VSK

Pipe shape	U_{Fan}[V]	1	2	3	4	5	6	7	8	9	10	11	...	32	
I	6,5	70	70	70	70	70	70	70							
	6,9	70	70	70	70	70	70	70	70						
	=9	100	100	100	100	100	100	100	100	100	100				
U	6,5	120	120	120	120	120	120	120	120	120	120	120			
	6,9	120	120	120	120	120	120	120	120	120	120	120			
	=9	140	140	140	140	140	140	140	140	140	140	140			
M	6,5	150	150	150	150	150	150	150	150	150	150	150			
	6,9	150	150	150	150	150	150	150	150	150	150	150			
	=9	180	180	180	180	180	180	180	180	180	180	180			
Double U	6,5	140	140	140	140	140	140	140	140	140	140	140			
	6,9	150	150	150	150	150	150	150	150	150	150	150			
	=9	180	180	180	180	180	180	180	180	180	180	180			

permitted total pipe length [m]

with *OXY·SENS*® or steam trap ❹

Pipe shape	U_{Fan}[V]	1	2	3	4	5	6	7	8	9	10	11	...	32	
I	6,5	60	60	60	60	60	60								
	6,9	60	60	60	60	60	60	60							
	=9	80	80	80	80	80	80	80	80	80	80				
U	6,5	100	100	100	100	100	100	100	100	100	100				
	6,9	110	110	110	110	110	110	110	110	110	110	110			
	=9	110	110	110	110	110	110	110	110	110	110	110			
M	6,5	100	100	100	100	100	100	100	100	100	100	100			
	6,9	110	110	110	110	110	110	110	110	110	110	110			
	=9	160	160	160	160	160	160	160	160	160	160	160			
Double U	6,5	140	140	140	140	140	140	140	140	140	140	140			
	6,9	140	140	140	140	140	140	140	140	140	140	140			
	=9	160	160	160	160	160	160	160	160	160	160	160			

permitted total pipe length [m]

❺

Results: The following modules may optionally be used with the corresponding settings for class B or A:

- Module 0,015 % LT/m – with a sensitivity of min. 0.12 % LT/m
- Module 0.1 % LT/m – with a sensitivity of min. 0.2 % LT/m
- Module 0.5 % LT/m – with the setting 0.5 % LT/m, which corresponds to a sensitivity of 0.33 % LT/m in a pre-alarm threshold evaluation

Possible system parameters:

- I- pipe system
  - ≥ 9 V fan voltage, max. 80 m overall pipe length
- U- pipe system
  - 6.5 V fan voltage, max. 100 m overall pipe length
  - 6.9 V fan voltage, max. 110 m overall pipe length
  - ≥ 9 V fan voltage, max. 110 m overall pipe length
- M- pipe system
  - 6.5 V fan voltage, max. 100 m overall pipe length
  - 6.9 V fan voltage, max. 110 m overall pipe length
  - ≥ 9 V fan voltage, max. 160 m overall pipe length
- Double U- pipe system
  - 6.5 V fan voltage, max. 140 m overall pipe length
  - 6.9 V fan voltage, max. 140 m overall pipe length
  - ≥ 9 V fan voltage, max. 160 m overall pipe length

5.2.4 Aperture diameter

The aperture diameters of the aspiration apertures can be found in the corresponding table for the respective pipe configuration:
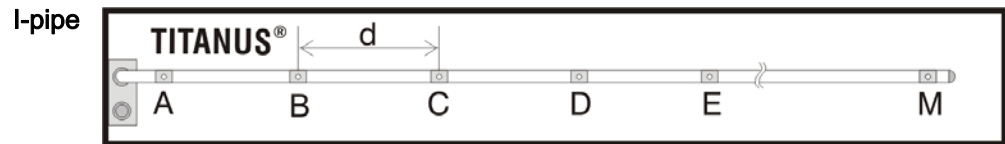
I-pipe

Figure 34: I-pipe system

Aspiration apertures

Number of apertures	1	2	3	4	5	6	7	8	9	10	11	12	13
Aspiration aperture Ø in mm (1)													
A	7,0	6,0	5,2	4,6	4,2	3,8	3,6	3,4	3,0	3,0	2,5	2,5	2,5
B	-	6,8	5,2	4,6	4,2	3,8	3,6	3,4	3,0	3,0	2,5	2,5	2,5
C	-	-	5,6	4,6	4,4	4,0	3,8	3,4	3,2	3,0	3,0	3,0	2,5
D	-	-	-	5,0	4,4	4,0	3,8	3,4	3,4	3,0	3,0	3,0	2,5
E	-	-	-	-	4,4	4,2	3,8	3,6	3,6	3,4	3,0	3,0	3,0
F	-	-	-	-	-	4,2	3,8	3,8	3,6	3,4	3,4	3,0	3,0
G	-	-	-	-	-	-	4,0	3,8	3,6	3,6	3,4	3,2	3,0
H	-	-	-	-	-	-	-	4,0	3,8	3,6	3,4	3,2	3,0
I	-	-	-	-	-	-	-	-	3,8	3,6	3,6	3,2	3,2
J	-	-	-	-	-	-	-	-	-	3,8	3,8	3,2	3,2
K	-	-	-	-	-	-	-	-	-	-	3,8	3,8	3,4
L	-	-	-	-	-	-	-	-	-	-	-	4,0	3,8
M	-	-	-	-	-	-	-	-	-	-	-	-	4,0

(1) Press cut diameter in aspiration-reducing film sheet
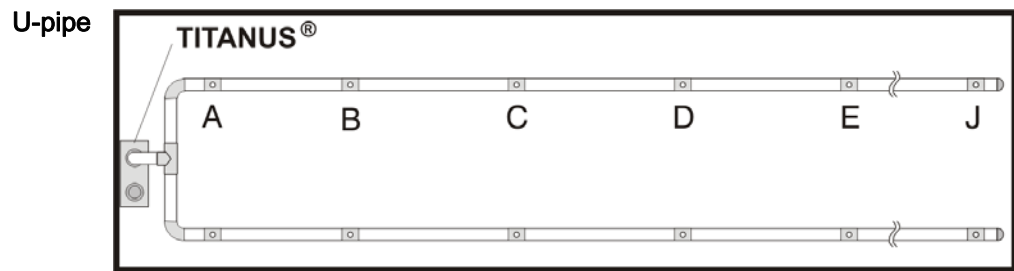
U-pipe

Figure 35: U-pipe system

Aspiration apertures

Number of apertures	2	4	6	8	10	12	14	16	18	20
Aspiration aperture ⌀ in mm (1)										
A	5,2	3,6	3,4	3,0	2,5	2,5	2,0	2,0	2,0	2,0
B	-	4,4	3,4	3,0	3,0	2,5	2,0	2,0	2,0	2,0
C	-	-	3,6	3,2	3,0	2,5	2,5	2,0	2,0	2,0
D	-	-	-	3,4	3,2	3,0	2,5	2,5	2,0	2,0
E	-	-	-	-	3,2	3,0	3,0	2,5	2,5	2,0
F	-	-	-	-	-	3,4	3,2	3,0	2,5	2,5
G	-	-	-	-	-	-	3,6	3,4	3,0	2,5
H	-	-	-	-	-	-	-	3,6	3,4	2,5
I	-	-	-	-	-	-	-	-	3,6	3,6
J	-	-	-	-	-	-	-	-	-	3,8

(1) Press cut diameter in aspiration-reducing film sheet
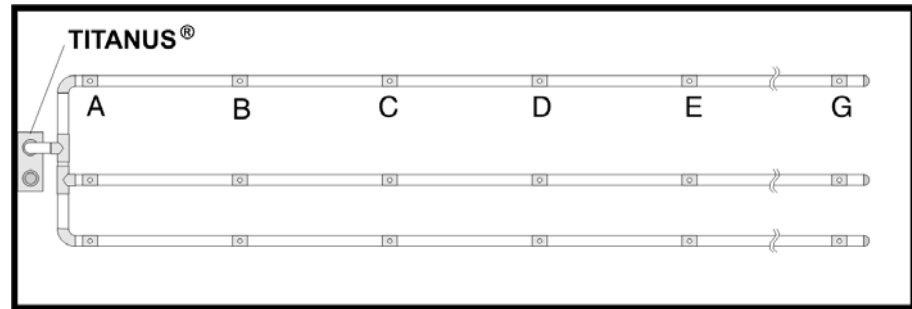
M-pipe

Figure 36: M-pipe system

Aspiration apertures

Number of apertures	3	6	9	12	15	18	21
Aspiration aperture Ø in mm (1)							
A	4,4	3,4	3,0	2,5	2,5	2,0	2,0
B	-	3,6	3,0	2,5	2,5	2,5	2,0
C	-	-	3,2	3,2	2,5	2,5	2,0
D	-	-	-	3,2	3,0	2,5	2,5
E	-	-	-	-	3,2	3,0	2,5
F	-	-	-	-	-	3,2	3,2
G	-	-	-	-	-	-	3,4

(1) Press cut diameter in aspiration-reducing film sheet
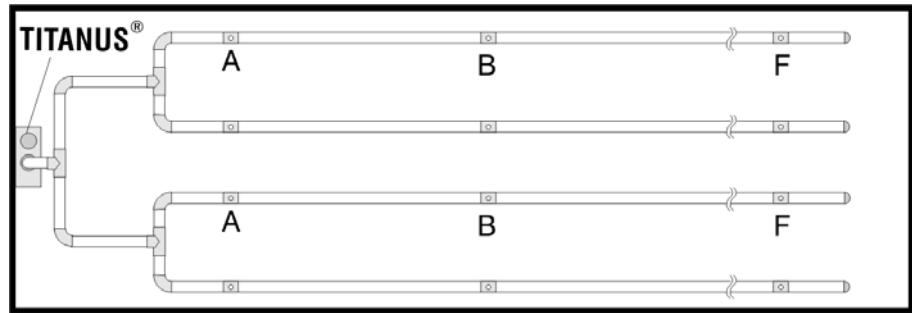
Double U-pipe

Figure 37: Double U-pipe system

Aspiration apertures

Number of apertures	4	8	12	16	20	24
Aspiration aperture ∅ in mm (1)						
A	4,0	3,0	2,5	2,0	2,0	2,0
B	-	3,4	3,0	2,5	2,0	2,0
C	-	-	3,0	3,0	2,5	2,0
D	-	-	-	3,2	2,5	2,5
E	-	-	-	-	3,6	2,5
F	-	-	-	-	-	3,6

(1) Press cut diameter in aspiration-reducing film sheet

Quadruple U-pipe
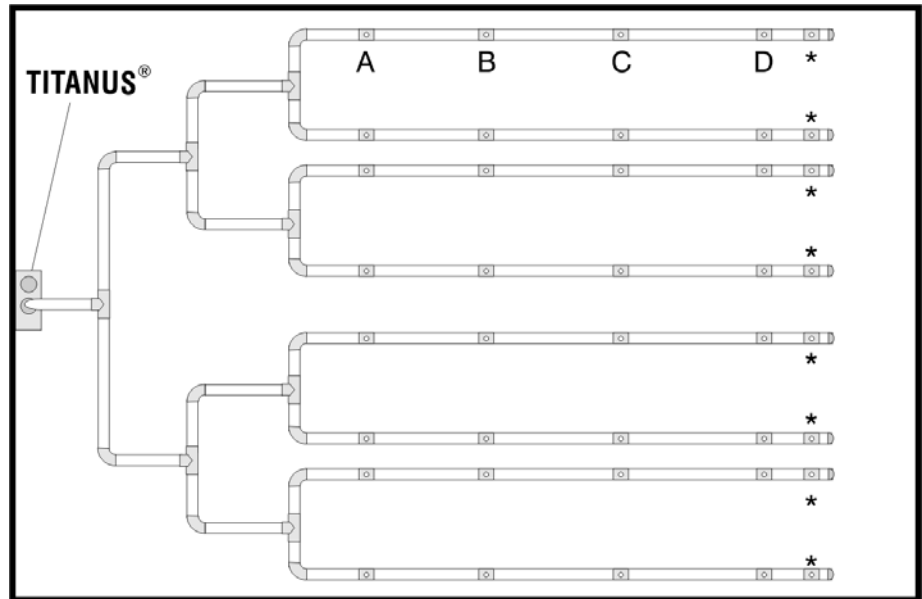
Figure 38: Quadruple U-pipe system

Aspiration apertures

Number of apertures	8	16	24	32
Aspiration aperture ∅ in mm (1)				
A	3,2	2,5	2,0	2,0
B	-	3,0	2,5	2,0
C	-	-	3,0	2,0
D	-	-	-	2,5
Acceleration aperture	-	2,5 *	3,0 *	3,0 *

(1) Press cut diameter in aspiration-reducing film sheet

* The distance of the acceleration aperture to the last sampling aperture is entirely elective.

5.3 Special project planning

5.3.1 Project planning for individual aperture monitoring

The following system parameters apply to the detection of an individual or a particular number of blocked aspiration apertures, depending on pipe configuration.

The specifications according to Chapter 5.2 apply to project planning. The following limit values and aperture diameters should also be taken into account. Additional accessories (air filters, condensation separators, etc.) can influence the maximum pipe length.

5.3.1.1 Pipe system

1 pipe system and 2 pipe systems
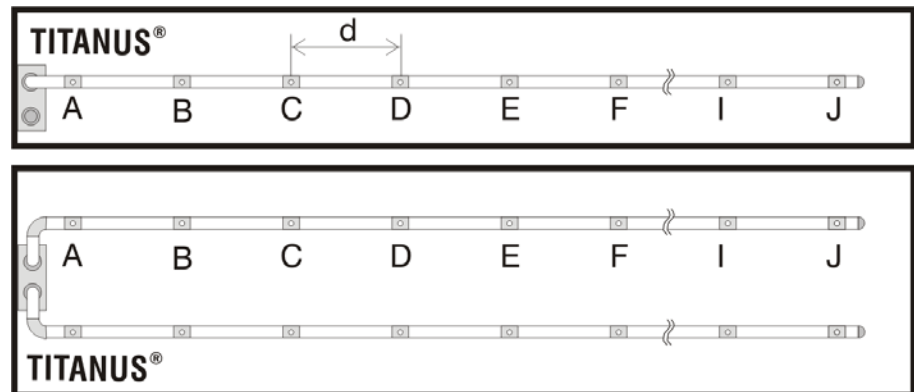
Pipe system

Figure 39: I-shape pipe system for area protection

Limit values

Min. distance from TITANUS® – 1. aspiration apertures	4 m
Max. distance from TITANUS® – 1. aspiration apertures	20 m
Max. Distance from 1. aspiration apertures – last aspiration apertures with low fan voltage 6,5 V – 6,9 V with high fan voltage 9 V – 12V	40 m 60 m
Max. Overall pipe length per pipe system with low fan voltage 6,5 V – 6,9 V with high fan voltage 9 V – 12V	60 m 80 m
Min. distance between 2 aspiration apertures (d)	4 m
Max. distance between 2 aspiration apertures (d)	12 m
Max. number of aspiration apertures (n) per pipe system	10 pcs.

Aspiration apertures

Number of aper-tures	2	3	4	5	6	7	8	9	10
Aspiration aper-turesØ in mm*)									
A	6,0	5,0	4,2	3,8	3,2	3,0	2,5	2,5	2,0
B	6,8	5,2	4,4	3,8	3,2	3,0	2,5	2,5	2,0
C	-	5,2	4,6	4,0	3,6	3,0	3,0	2,5	2,5
D	-	-	4,6	4,0	3,6	3,4	3,0	3,0	2,5
E	-	-	-	4,4	4,0	3,4	3,4	3,0	3,0
F	-	-	-	-	4,0	3,8	3,4	3,4	3,0
G	-	-	-	-	-	3,8	3,8	3,4	3,4
H	-	-	-	-	-	-	3,8	3,8	3,4
I	-	-	-	-	-	-	-	3,8	3,6
J	-	-	-	-	-	-	-	-	3,6

*) Press cut diameter in aspiration-reducing film sheet

I-pipe system triggering thresholds

Triggering threshold

Number of apertures	2	3	4	5	6	7	8	9	10
1 blocked aperture	III	III	II	I	I	—	—	—	—
2 blocked apertures	O	O	III	III	II	I	I	—	—
3 blocked apertures	O	O	O	O	III	III	II	I	I
4 blocked apertures	O	O	O	O	O	O	III	II	I
5 blocked apertures	O	O	O	O	O	O	O	O	II
… has/have been detected at setting level x									

— not possible

O not purposeful

Example If blockage of 3 aspiration apertures of a total of 7 aspiration apertures is in-tended to be detected, the air flow monitoring setting switch should be set to level III.

NOTICE

Air flow monitoring level I or II should be set in any case for project plan-ning in conformity with EN 54-20 or ISO 7240-20.

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5.3.1.2 U-pipe system

1 pipe system and 2 pipe systems
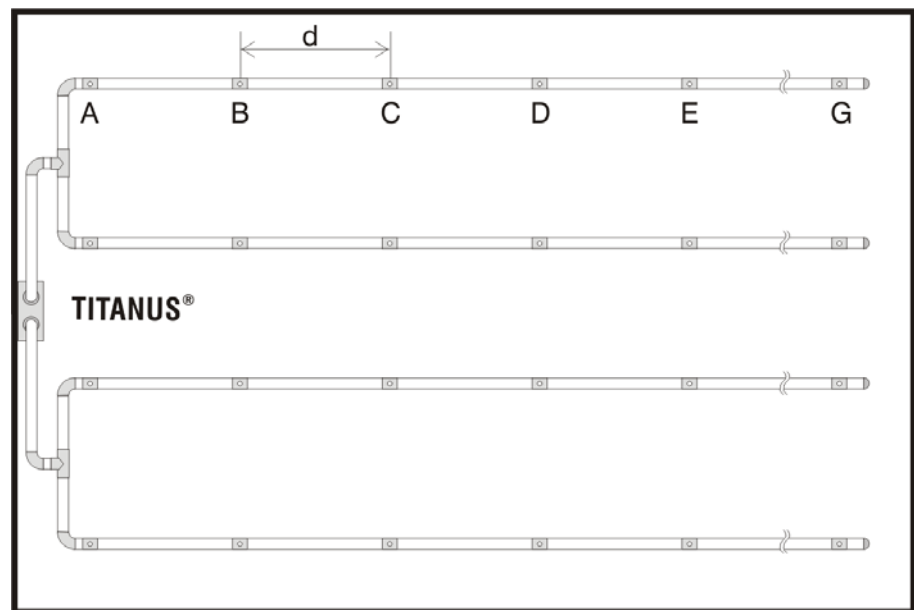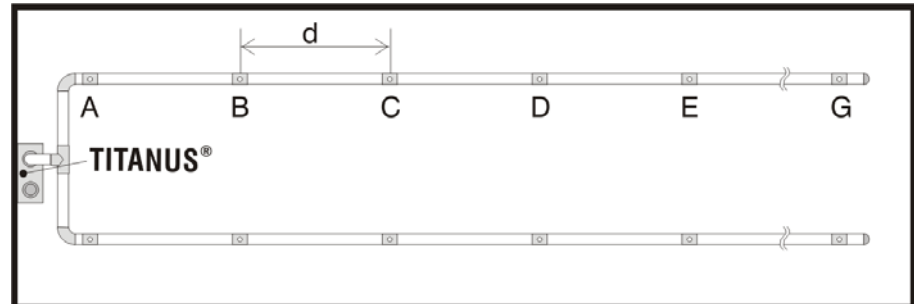
Pipe systems

Figure 40: U-shape pipe system for area protection

Limit values

Min. distance from TITANUS® to T-piece	4 m
Max. distance from TITANUS® to T-piece	20 m
Max. Branch length with low fan voltage 6,5 V – 6,9 V with high fan voltage 9 V – 12V	40 m 50 m
Max. Overall pipe length per pipe system with low fan voltage 6,5 V – 6,9 V with high fan voltage 9 V – 12V	100 m 120 m
Min. Distance between 2 aspiration apertures (d)	4 m
Max. Distance between 2 aspiration apertures (d)	12 m
Max. number of aspiration apertures (n) per pipe system	14 pcs.

Aspiration apertures

Number of aper-tures	2	4	6	8	10	12	14
Aspiration aper-turesØ in mm*)							
A	5,2	3,6	3,4	3,2	2,5	2,5	2,0
B	-	4,0	3,4	3,2	3,0	2,5	2,0
C	-	-	3,6	3,4	3,0	2,5	2,5
D	-	-	-	3,4	3,2	3,0	2,5
E	-	-	-	-	3,2	3,0	3,0
F	-	-	-	-	-	3,2	3,0
G	-	-	-	-	-	-	3,2

*) Press cut diameter in aspiration-reducing film sheet

U-pipe system triggering thresholds

Triggering threshold

Number of apertures	2	4	6	8	10	12	14
1 blocked aperture	III	II	I	—	—	—	—
2 blocked apertures	O	III	II	I	—	—	—
3 blocked apertures	O	O	III	II	I	—	—
4 blocked apertures	O	O	O	III	II	I	—
5 blocked apertures	O	O	O	O	III	II	I
6 blocked apertures	O	O	O	O	O	III	II
7 blocked apertures	O	O	O	O	O	O	III
… has/have been detected at setting level x							

— not possible

O not purposeful

Example   If blockage of 3 aspiration apertures of a total of 10 aspiration apertures is intended to be detected, the air flow monitoring setting switch should be set to level I.

NOTICE

Air flow monitoring level I or II should be set in any case for project planning in conformity with EN 54-20 or ISO 7240-20.

5.3.1.3 M-pipe system

1 pipe system and 2 pipe systems

Pipe system3
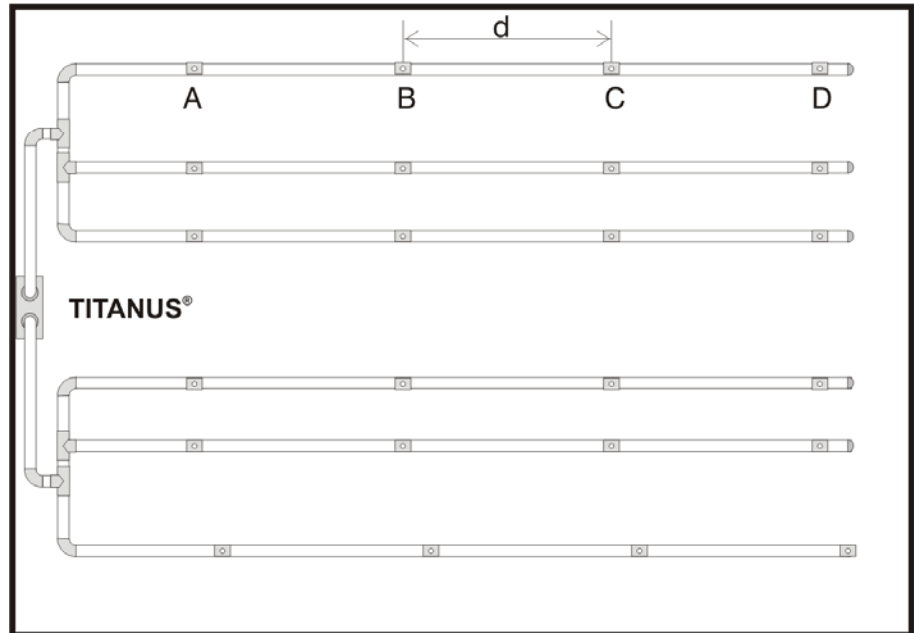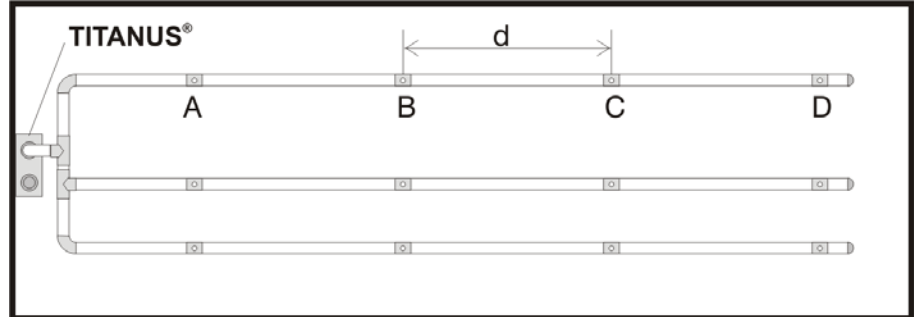
Figure 41: M-shape pipe system for area protection

Limit values

Min. distance from TITANUS® – T-piece	4 m
Max. distance from TITANUS® – T-piece	20 m
Max. Branch length with low fan voltage 6,5 V – 6,9 V with high fan voltage 9 V – 12V	30 m 40 m
Max. Overall pipe length per pipe system with low fan voltage 6,5 V – 6,9 V with high fan voltage 9 V – 12V	110 m 140 m
Min. Distance between 2 aspiration apertures (d)	4 m
Max. Distance between 2 aspiration apertures (d)	12 m
Max. number of aspiration apertures (n) per pipe system	12 pcs.

Aspiration apertures

Number of apertures	3	6	9	12
Aspiration aperturesØ in mm*) A	4,4	3,4	3,0	2,5
B	-	3,6	3,0	2,5
C	-	-	3,2	3,2
D	-	-	-	3,2

*) Press cut diameter in aspiration-reducing film sheet

M-pipe system triggering thresholds

Triggering threshold

Number of apertures	3	6	9	12
1 blocked aperture	**III**	**I**	—	—
2 blocked apertures	O	**II**	—	—
3 blocked apertures	O	**III**	**I**	—
4 blocked apertures	O	O	**II**	**I**
5 blocked apertures	O	O	O	**II**
6 blocked apertures	O	O	O	**III**
7 blocked apertures	O	O	O	O
… has/have been detected at setting level x				

— not possible

O not purposeful

Example If blockage of 3 aspiration apertures of a total of 9 aspiration apertures is intended to be detected, the air flow monitoring setting switch should be set to level I.

> **NOTICE**
>
> Air flow monitoring level I or II should be set in any case for project planning in conformity with EN 54-20 or ISO 7240-20.

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5.3.1.4 Double U-pipe system

1 pipe system and 2 pipe systems

Rohrsysteme
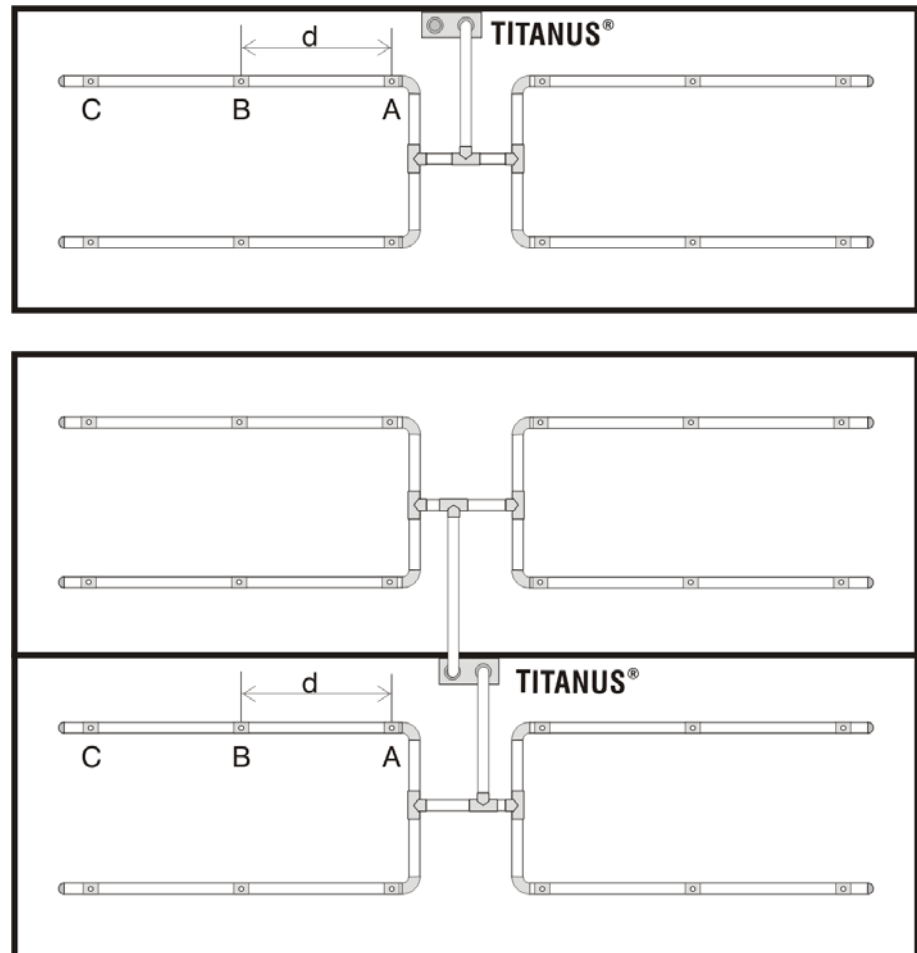
Figure 42: Double U pipe system for area protection

Limit values

Min. distance from TITANUS® – to last T-piece	4 m
Max. distance from TITANUS® – to last T-piece	20 m
Max. branch length with low fan voltage 6,5 V – 6,9 V with high fan voltage 9 V – 12V	20 m 30 m
Max. Overall pipe length per pipe system with low fan voltage 6,5 V – 6,9 V with high fan voltage 9 V – 12V	100 m 140 m
Min. distance between 2 aspiration apertures (d)	4 m
Max. distance between 2 aspiration apertures (d)	12 m
Max. number of aspiration apertures (n) per pipe system	12 pcs.

Aspiration apertures

Number of apertures	4	8	12
Aspiration apertures ø in mm*) A B C	 4,0 - -	 3,0 3,4 -	 2,5 3,0 3,0

*) Press cut diameter in aspiration-reducing film sheet

Double-U-pipe system triggering thresholds

Triggering threshold

Number of apertures	4	8	12
1 blocked aperture	I	—	—
2 blocked apertures	II	I	—
3 blocked apertures	O	II	I
4 blocked apertures	O	III	II
5 blocked apertures	O	O	III
6 blocked apertures	O	O	III
… has/have been detected at setting level x			

— not possible

O not purposeful

Example If blockage of 4 aspiration apertures of a total of 12 aspiration apertures is intended to be detected, the air flow monitoring setting switch should be set to level II.

NOTICE

Air flow monitoring level I or II should be set in any case for project planning in conformity with EN 54-20 or ISO 7240-20.


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5.3.2 Special project planning

Simplified project planning is used for equipment protection and in rooms with small dimensions. The advantage in this project planning is the uniform diameters of the aspiration apertures.

The specifications according to Chapter apply to project planning. The following limit values and aperture diameters should also be taken into account. Additional accessories (air filters, condensation separators, etc.) can influence the maximum pipe length.

5.3.2.1 I-pipe system

1 pipe system and 2 pipe systems
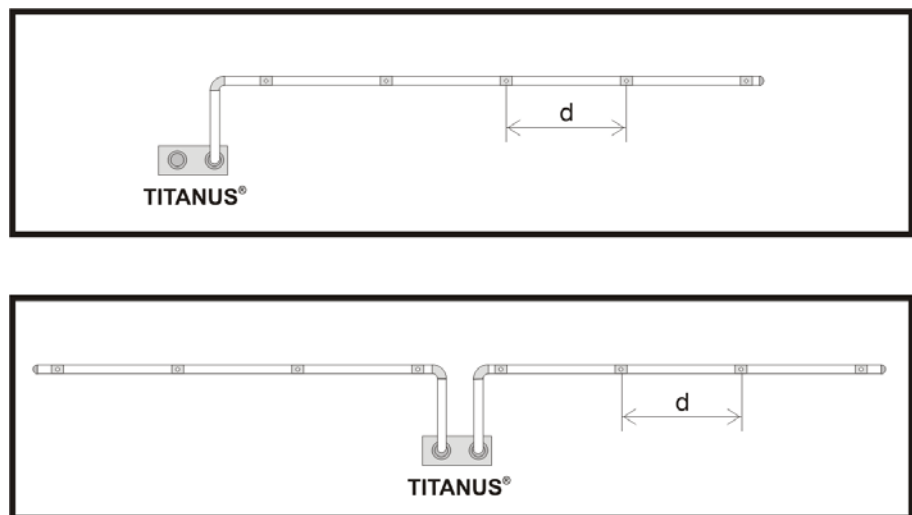
pipe systems

Figure 43: I-pipe system, such as for equipment protection

Limit values

Min. distance from TITANUS® to 1st aspiration aperture	2 m
Max. distance from TITANUS® to 1st aspiration aperture	20 m
Max. distance from the 1st aspiration aperture to the last aspiration aperture	20 m
Max. overall pipe length Ø 25 mm	40 m
Max. number of aspiration apertures (n) per pipe system	18 no.
Minimum distance between aspiration apertures (d)	0.1 m
Maximum distance between aspiration apertures (d)	4 m

Aspiration apertures

Number of aper-tures	2	3	4	5	6	7	8	9	10
Aspiration aper-tures Ø in mm*)	6,0	5,0	4,4	4,0	3,6	3,4	3,2	3,0	3,0

Number of aper-tures	11	12	13	14	15	16	17	18
Aspiration aper-tures Ø in mm*)	3,0	3,0	2,5	2,5	2,5	2,5	2,5	2,5

*) Press cut diameter in aspiration-reducing film sheet

5.3.2.2 U-pipe system

1 pipe system and 2 pipe systems
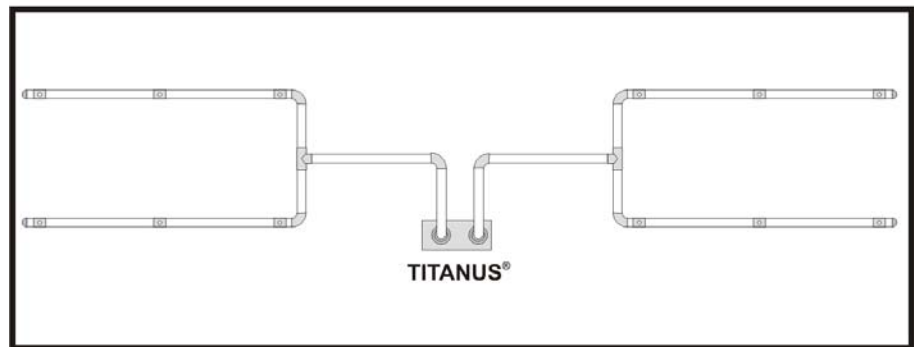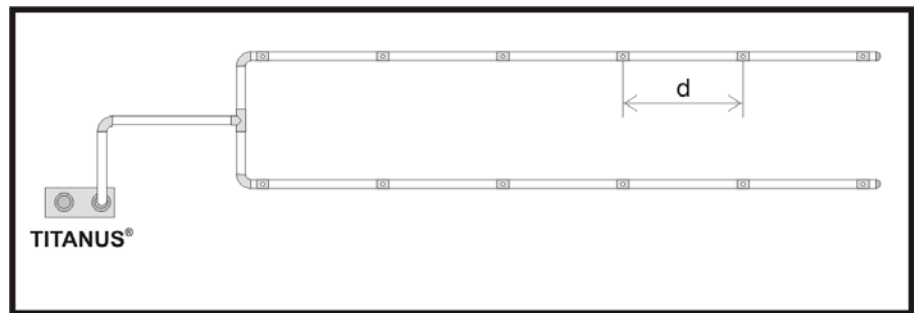
pipe systems

Figure 44: U-pipe system, e.g. for equipment protection

Limit values

Min. distance from TITANUS® to T-piece	2 m
Max. distance from TITANUS® to T-piece	20 m
Max. branch length	20 m
Max. overall pipe length Ø 25 mm	60 m

Max. number of aspiration apertures (n) per pipe system	18 no.
Minimum distance between aspiration apertures (d)	0.1 m
Maximum gap between aspiration apertures (d)	4 m

Aspiration apertures

Number of aper-tures	2	4	6	8	10	12	14	16	18
Aspiration aper-tures ∅ in mm*)	6,0	4,4	3,6	3,2	3,0	3,0	2,5	2,5	2,5

*) Press cut diameter in aspiration-reducing film sheet

5.3.2.3 M-pipe system

1 pipe system and 2 pipe systems
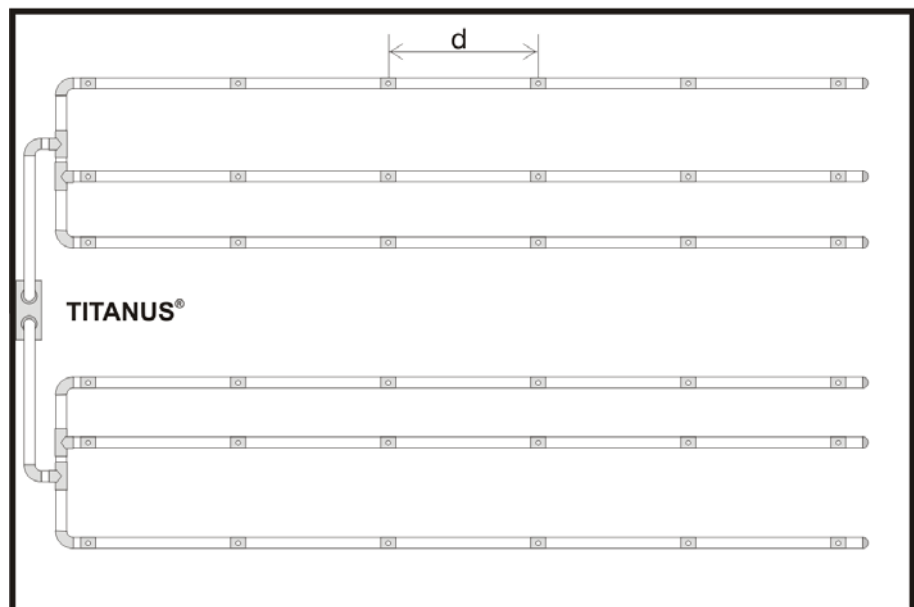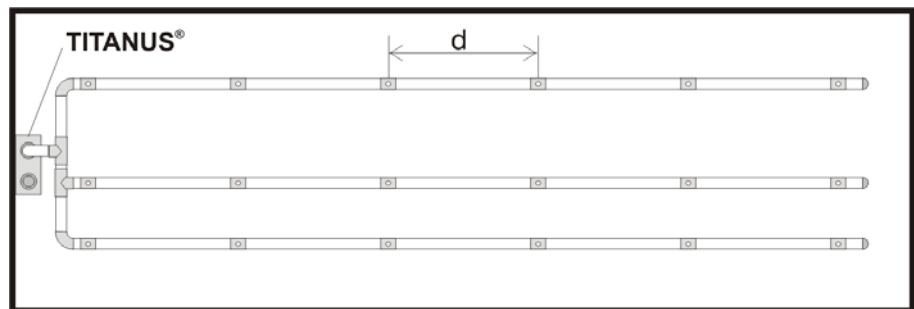
pipe systems

Figure 45: M-pipe system, such as for equipment protection

Limit values

Min. distance from TITANUS® to last T-piece	2 m
Max. distance from TITANUS® to last T-piece	20 m
Max. branch length	20 m
Max. overall pipe length Ø 25 mm	80 m
Max. number of aspiration apertures (n) per pipe system	18 no.
Min. distance between 2 aspiration apertures (d)	0.1 m
Max. distance between 2 aspiration apertures (d)	4 m

Aspiration apertures

Number of aper-tures	3	6	9	12	15	18
Aspiration aper-tures Ø in mm*)	5,0	3,6	3,0	3,0	2,5	2,5

*) Press cut diameter in aspiration-reducing film sheet

5.3.2.4 Double-U-pipe system

1 pipe system and 2 pipe systems
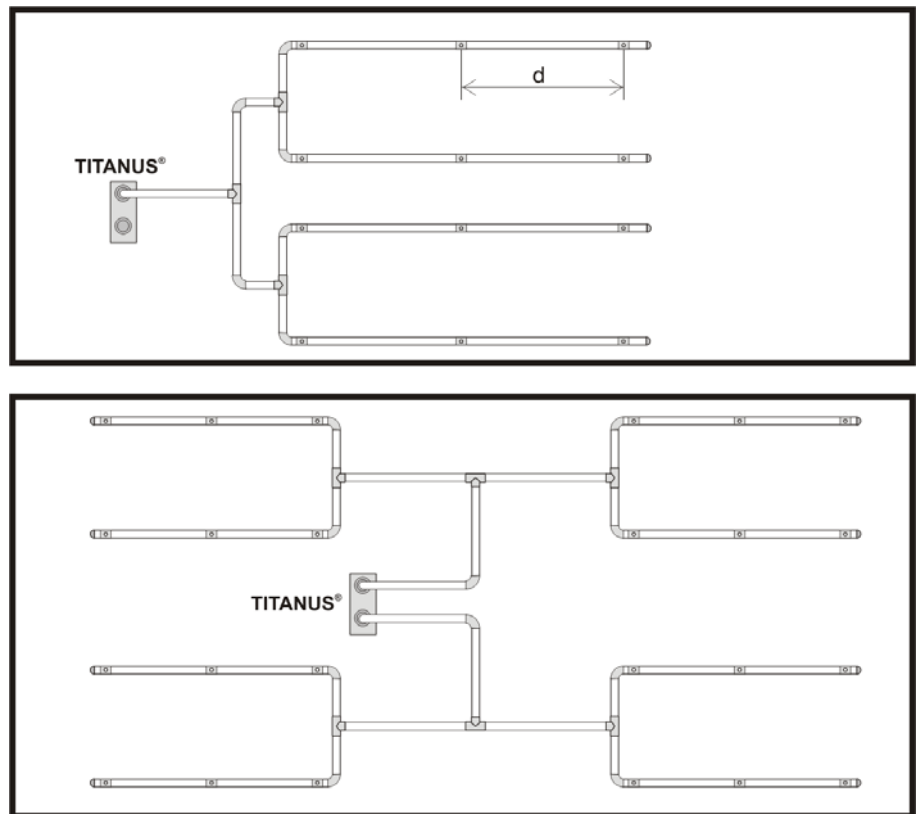
pipe systems

Figure 46: Double U-pipe system, e.g. for equipment protection

Limit values

Min. distance from TITANUS® to last T-piece	2 m
Max. distance from TITANUS® to last T-piece	20 m
Max. branch length	20 m
Max. overall pipe length Ø 25 mm	100 m
Max. number of aspiration apertures (n) per pipe system	20 no.
Minimum distance between aspiration apertures (d)	0.1 m
Maximum gap between aspiration apertures (d)	4 m

Aspiration apertures

Number of aper-tures	4	8	12	16	20
Aspiration aper-tures Ø in mm*)	4,0	3,4	3,0	2,5	2,0

*) Press cut diameter in aspiration-reducing film sheet

5.3.3 Project planning with branch pipes

Project planning with branch pipe are suitable for sampling points which are located distantly from the main run of the pipe system.
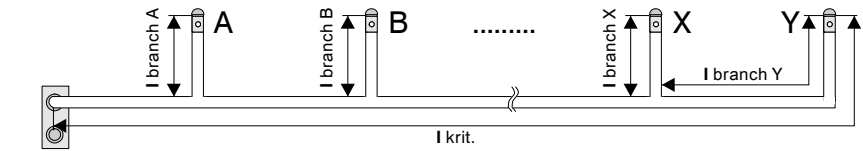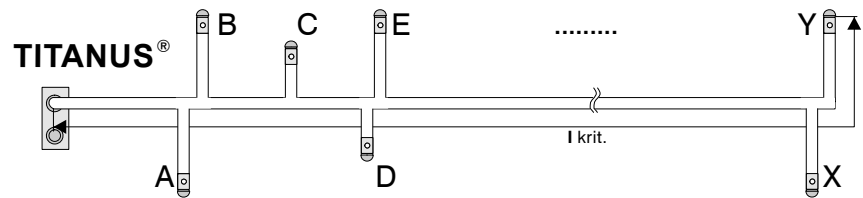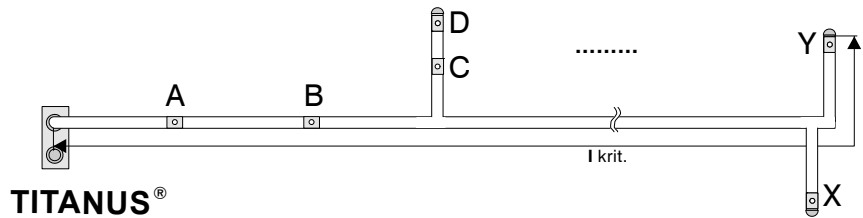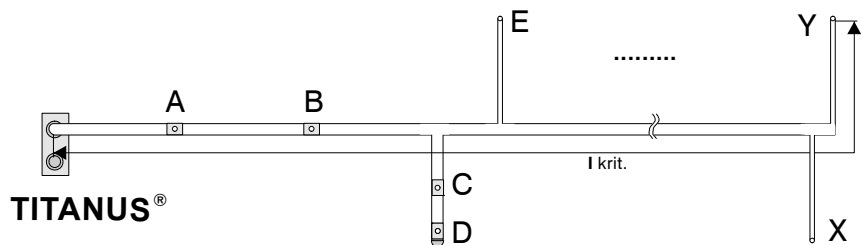
Figure 47: Project planning with branch pipes

The branch pipes must be projected in accordance to the figure (project planning with branch pipes). The project planning of I-pipe described in the

figure must be copied to every single sampling branch of other pipe forms (U, M, double-U pipe system).

. Referring to the project planning with burs please notice that the "critical length" ($l_{crit.}$) of a project planning does not exceed the maximum total length of pipe respectively of branch (referring to U, M, double-U pipe system). The critical length described the sampling point which is located most distantly from TITANUS®.

Two aspiration apertures in total can be projected on each branch pipes at which the minimal and maximum distance between the aspiration apertures must be respected.

Opening diameterr The opening diameters are valid for the projected aspiration apertures in accordance with the chapter „Opening diameter for standard project planning".
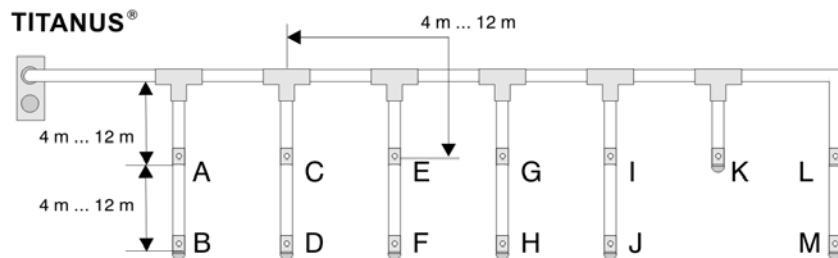
Figure 48: Distances of apertures with branch pipes

Distances of apertures The distance between the T-piece and the following branch pipe as well as the pipe length between aspiration apertures on the branch pipes must not exceed 12 m in total.
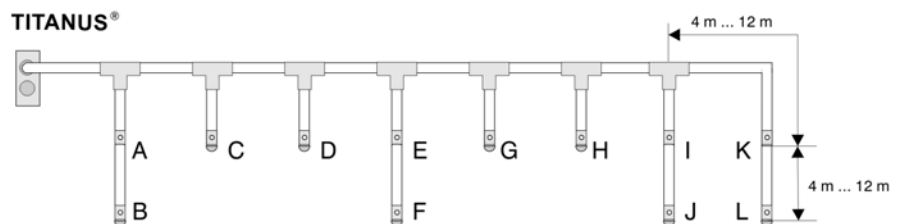
Figure 49: Maximum branch pipe

Maximum length of branch pipe The length of pipe between the last T-piece and the last aspiration apertures is the length of branch pipe. All other branch pipes need to be shorter. Two aspiration apertures in total can be projected on each branch pipe.

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If the maximum distance is exceeded a correction by an additional aspiration aperture on a branch pipe can be done. In this connection please notice that two aspiration apertures in total can be projected on each branch pipe.	

5.3.4 Project planning with long intake lines > Ø 25 mm

Project planning for long pipe intake lines may **only** be carried out under use of pipes with a diameter of 32 mm **or** 40 mm.

NOTICE
Observe national regulations during project planning!

The pipe intake line here refers to the pipe system between the air sampling smoke detection system and the last T-piece (U- and double U- pipe system) and/or the 1st sampling aperture (I-pipe system).

The general pipeline project planning is limited by the use of long pipe intake lines as follows:

- 1 m pipe with ⌀ 32 mm replaces 2 m pipe with ⌀ 25 mm
- 1 m pipe with ⌀ 40 mm replaces 3 m pipe with ⌀ 25 mm
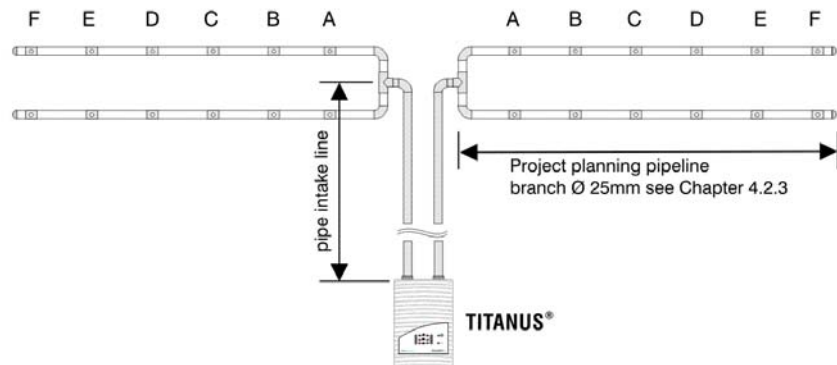
Figure 50: Example of a pipe system for project planning with long pipe intake lines

A basis pipe from which spur-shaped sampling pipes extend can be installed for the project planning of high-bay storage shelves.
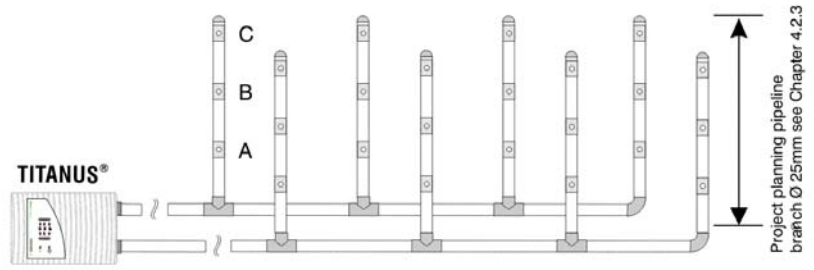
Figure 51: Example of special project planning for high-bay storage shelves

5.3.5 Project planning with acceleration apertures

It may be necessary to increase the system's transport time in order to meet individual requirements. For this purpose, acceleration apertures can be planned at the end of the pipe branch, which will increase the transport rate. For the design of pipe systems with acceleration apertures, please refer to the following table for aspiration holes and particular pipe configuration. Furthermore compliance is required with special design tables for the design of smoke aspiration systems with acceleration apertures (see appendix).

NOTICE
Due to physical properties, the detection of pipe rupture is derated when using pipe systems with acceleration apertures.

I-Pipe
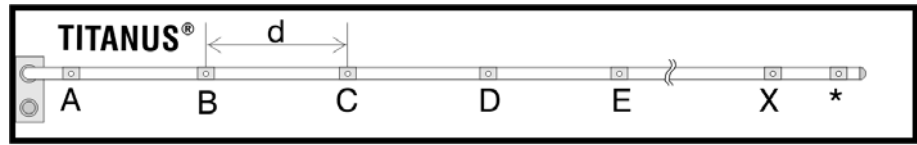
* Acceleration aperture

Figure 52: I - Pipe with acceleration apertures

	Number of apertures									
	1	2	3	4	5	6	7	8	9	10
	Sampling aperture type Ax-x.x									
A	7,0	7,0	7,0	3,2	3,0	2,5	2,0	2,0	2,0	2,0
B	a	7,0	7,0	7,0	3,8	3,0	2,5	2,0	2,0	2,0
C	-	a	7,0	7,0	6,0	3,6	3,0	2,5	2,0	2,0
D	-	-	a	7,0	7,0	5,6	3,6	3,0	2,5	2,0
E	-	-	-	a	7,0	7,0	5,2	3,4	3,0	2,5
F	-	-	-	-	a	7,0	7,0	5,0	3,6	3,2
G	-	-	-	-	-	a	7,0	7,0	4,4	3,4
H	-	-	-	-	-	-	a	7,0	7,0	4,0
I	-	-	--	-	-	-	-	a	7,0	7,0
J	-	-	-	-	-	-	-	-	a	7,0
K	-	-	-	-	-	-	-	-	-	a
L	-	-	-	-	-	-	-	-	-	-
M	-	-	-	-	-	-	-	-	-	-
N	-	-	-	-	-	-	-	-	-	-
O	-	-	-	-	-	-	-	-	-	-
P	-	-	-	-	-	-	-	-	-	-
Q	-	-	-	-	-	-	-	-	-	-
R	-	-	-	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-	-	-	-
T	-	-	-	-	-	-	-	-	-	-
U	-	-	-	-	-	-	-	-	-	-

a = Acceleration apertures = 7.0 mm

	Number of apertures									
	11	12	13	14	15	16	17	18	19	20
	Sampling aperture type Ax-x.x									
A	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
B	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
C	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
D	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
E	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
F	2,5	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
G	3,0	2,5	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
H	3,4	3,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
I	3,6	3,2	2,5	2,0	2,0	2,0	2,0	2,0	2,0	2,0
J	7,0	3,6	3,4	2,5	2,5	2,0	2,0	2,0	2,0	2,0
K	7,0	6,8	3,6	3,2	2,5	2,0	2,0	2,0	2,0	2,0
L	a	7,0	6,8	3,2	3,4	2,5	2,0	2,0	2,0	2,0
M	-	a	7,0	6,8	3,6	3,2	2,5	2,0	2,0	2,0
N	-	-	a	7,0	6,0	3,6	3,0	2,5	2,0	2,0
O	-	-	-	a	7,0	6,0	3,4	3,0	2,5	2,0
P	-	-	-	-	a	7,0	6,0	3,4	3,0	2,5
Q	-	-	-	-	-	a	7,0	5,6	3,4	2,5
R	-	-	-	-	-	-	a	7,0	5,2	3,4
S	-	-	-	-	-	-	-	a	7,0	5,0
T	-	-	-	-	-	-	-	-	a	7,0
U	-	-	-	-	-	-	-	-	-	a

a = Acceleration apertures = 7.0 mm

WAGNER®
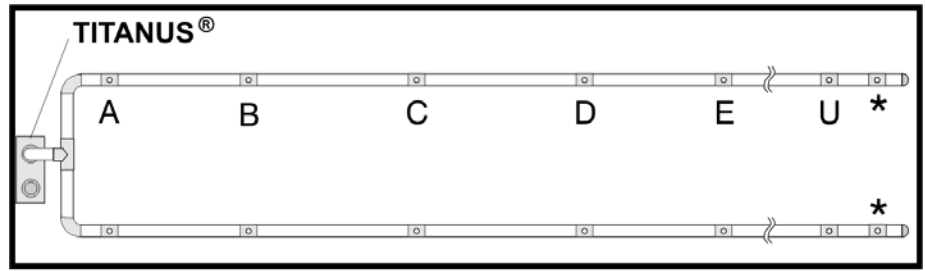
U-Pipe

* Acceleration aperture

Figure 53: U- Pipe with acceleration apertures

		Number of apertures								
		2	4	6	8	10	12	14	16	18	20
		Sampling aperture type Ax-x.x									
A		7,0	7,0	6,8	4,6	3,0	2,5	2,5	2,0	2,0	2,0
B		a	7,0	7,0	5,0	3,6	2,5	2,5	2,5	2,5	2,5
C		-	a	7,0	7,0	5,0	3,0	3,0	2,5	2,5	2,5
D		-	-	a	7,0	7,0	5,0	3,0	3,0	2,5	2,5
E		-	-	-	a	7,0	7,0	4,0	3,0	3,4	2,5
F		-	-	-	-	a	7,0	7,0	3,6	3,4	2,5
G		-	-	-	-	-	a	7,0	7,0	4,0	3,0
H		-	-	-	-	-	-	a	7,0	6,0	4,0
I		-	-	--	-	-	-	-	a	7,0	6,0
J		-	-	-	-	-	-	-	-	a	7,0
K		-	-	-	-	-	-	-	-	-	a
L		-	-	-	-	-	-	-	-	-	-
M		-	-	-	-	-	-	-	-	-	-
N		-	-	-	-	-	-	-	-	-	-
O		-	-	-	-	-	-	-	-	-	-
P		-	-	-	-	-	-	-	-	-	-
Q		-	-	-	-	-	-	-	-	-	-
R		-	-	-	-	-	-	-	-	-	-
S		-	-	-	-	-	-	-	-	-	-
T		-	-	-	-	-	-	-	-	-	-
U		-	-	-	-	-	-	-	-	-	-

a = Acceleration apertures = 7.0 mm

		Number of apertures								
		22	24	26	28	30	32	34	36	38	40
		Sampling aperture type Ax-x.x									
A		2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
B		2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
C		2,5	2,5	2,5	2,5	2,0	2,0	2,0	2,0	2,0	2,0
D		2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0
E		2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0
F		2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5
G		2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5
H		3,0	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5
I		4,0	3,0	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5
J		5,6	4,0	3,0	2,5	2,5	2,5	2,5	2,5	2,5	2,5
K		7,0	5,2	4,0	3,0	2,5	2,5	2,5	2,5	2,5	2,5
L		a	7,0	5,0	4,0	3,0	2,5	2,5	2,5	2,5	2,5
M		-	a	7,0	5,0	4,0	3,0	2,5	2,5	2,5	2,5
N		-	-	a	7,0	5,0	4,0	3,0	2,5	2,5	2,5
O		-	-	-	a	7,0	5,0	4,0	3,0	2,5	2,5
P		-	-	-	-	a	7,0	5,0	4,0	3,2	2,5
Q		-	-	-	-	-	a	7,0	5,0	4,0	3,2

Design

TITANUS *TOP·SENS*®/Rev.a

	3	6	9	12	15	18	21	24	27	30
R	-	-	-	-	-	-	a	7,0	5,0	4,0
S	-	-	-	-	-	-	-	a	7,0	5,0
T	-	-	-	-	-	-	-	-	a	7,0
U	-	-	-	-	-	-	-	-	-	a

a = Acceleration apertures = 7.0 mm

M-Pipe
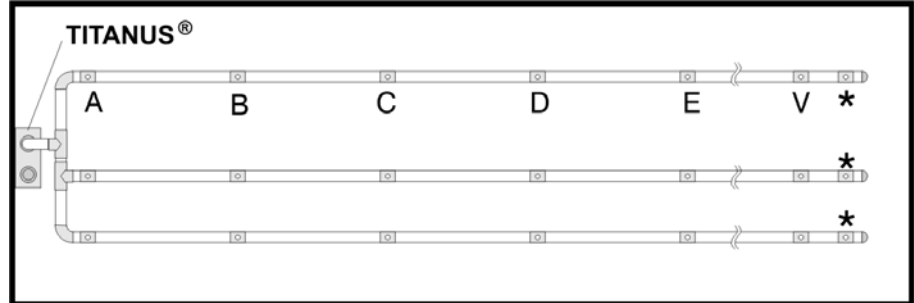
* Acceleration aperture

Figure 54: M - Pipe with acceleration apertures

	Number of apertures										
	3	6	9	12	15	18	21	24	27	30	33
	Sampling aperture type Ax-x.x										
A	7,0	7,0	6,8	4,6	3,0	2,5	2,5	2,0	2,0	2,0	2,0
B	a	7,0	7,0	5,0	3,4	2,5	2,5	2,5	2,5	2,5	2,0
C	-	a	7,0	7,0	5,0	3,6	3,0	2,5	2,5	2,5	2,5
D	-	-	a	7,0	7,0	4,6	3,4	3,0	2,5	2,5	2,5
E	-	-	-	a	7,0	7,0	4,0	3,2	3,4	2,5	2,5
F	-	-	-	-	a	7,0	6,8	3,6	3,4	2,5	2,5
G	-	-	-	-	-	a	7,0	6,8	3,6	3,2	2,5
H	-	-	-	-	-	-	a	7,0	6,0	3.6	3,4
I	-	-	--	-	-	-	-	a	7,0	6,0	3,6
J	-	-	-	-	-	-	-	-	a	7,0	5,6
K	-	-	-	-	-	-	-	-	-	a	7,0
L	-	-	-	-	-	-	-	-	-	-	a
M	-	-	-	-	-	-	-	-	-	-	-
N	-	-	-	-	-	-	-	-	-	-	-
O	-	-	-	-	-	-	-	-	-	-	-
P	-	-	-	-	-	-	-	-	-	-	-
Q	-	-	-	-	-	-	-	-	-	-	-
R	-	-	-	-	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-	-	-	-	-
T	-	-	-	-	-	-	-	-	-	-	-
U	-	-	-	-	-	-	-	-	-	-	-
V	-	-	-	-	-	-	-	-	-	-	-

a = Acceleration apertures = 7.0 mm

	Number of apertures									
	36	39	42	45	48	51	54	57	60	63
	Sampling aperture type Ax-x.x									
A	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
B	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
C	2,5	2,5	2,5	2,0	2,0	2,0	2,0	2,0	2,0	2,0
D	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0	2,0
E	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0	2,0
F	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0
G	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0
H	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5
I	3,4	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5
J	3,6	3,0	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5

K	5,0	3,6	3,0	2,5	2,5	2,5	2,5	2,5	2,5
L	7,0	4,6	3,6	3,0	2,5	2,5	2,5	2,5	2,5
M	a	7,0	4,0	3,6	2,5	2,5	2,5	2,5	2,5
N	-	a	7,0	3,6	3,0	3,0	2,5	2,5	2,5
O	-	-	a	7,0	3,6	3,6	2,5	2,5	2,5
P	-	-	-	a	7,0	3,6	3,0	2,5	2,5
Q	-	-	-	-	a	6,0	3,6	2,5	2,5
R	-	-	-	-	-	a	6,0	3,0	2,5
S	-	-	-	-	-	-	a	6,0	3,0	2,5
T	-	-	-	-	-	-	-	a	6,0	3,0
U	-	-	-	-	-	-	-	-	a	6,0
V	-	-	-	-	-	-	-	-	-	a

a = Acceleration apertures = 7.0 mm

Double-U-Pipe
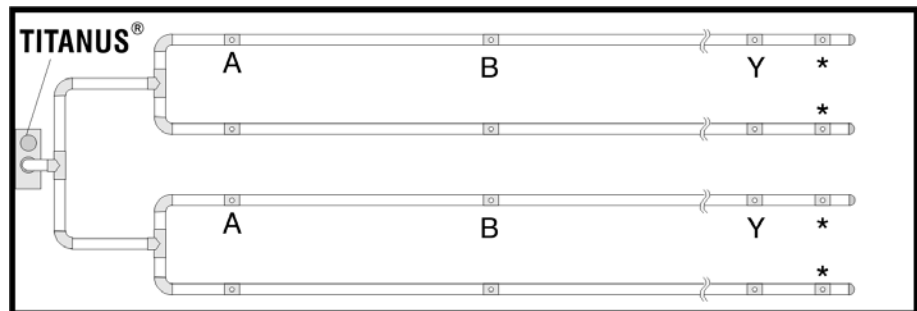
* Acceleration aperture

Figure 55: Double-U- Pipe with acceleration apertures

	Number of apertures												
	4	8	12	16	20	24	28	32	36	40	44	48	52
	Sampling aperture type Ax-x.x												
A	7,0	7,0	6,8	4,6	3,0	2,5	2,5	2,0	2,0	2,0	2,0	2,0	2,0
B	a	7,0	7,0	5,0	3,4	2,5	2,5	2,5	2,5	2,5	2,0	2,0	2,0
C	-	a	7,0	7,0	5,0	3,6	3,0	2,5	2,5	2,5	2,5	2,5	2,5
D	-	-	a	7,0	7,0	7,0	4,6	3,4	3,0	2,5	2,5	2,5	2,5
E	-	-	-	a	7,0	7,0	4,0	3,2	3,4	2,5	2,5	2,5	2,5
F	-	-	-	-	a	7,0	6,8	3,6	3,4	2,5	2,5	2,5	2,5
G	-	-	-	-	-	a	7,0	6,8	3,6	3,2	2,5	2,5	2,5
H	-	-	-	-	-	-	a	7,0	6,0	3.6	3,4	2,5	2,5
I	-	-	--	-	-	-	-	a	7,0	6,0	3,6	3,4	2,5
J	-	-	-	-	-	-	-	-	a	7,0	5,6	3,6	3,0
K	-	-	-	-	-	-	-	-	-	a	7,0	5,0	3,6
L	-	-	-	-	-	-	-	-	-	-	a	7,0	4,6
M	-	-	-	-	-	-	-	-	-	-	-	a	7,0
N	-	-	-	-	-	-	-	-	-	-	-	-	a
O	-	-	-	-	-	-	-	-	-	-	-	-	-
P	-	-	-	-	-	-	-	-	-	-	-	-	-
Q	-	-	-	-	-	-	-	-	-	-	-	-	-
R	-	-	-	-	-	-	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-	-	-	-	-	-	-
T	-	-	-	-	-	-	-	-	-	-	-	-	-
U	-	-	-	-	-	-	-	-	-	-	-	-	-
V	-	-	-	-	-	-	-	-	-	-	-	-	-
W	-	-	-	-	-	-	-	-	-	-	-	-	-
X	-	-	-	-	-	-	-	-	-	-	-	-	-
Y	-	-	-	-	-	-	-	-	-	-	-	-	-
Z	-	-	-	-	-	-	-	-	-	-	-	-	-

a = Acceleration apertures = 7.0 mm

	Number of apertures											
	56	60	64	68	72	76	80	84	88	92	96	100
	Sampling aperture type Ax-x.x											
A	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
B	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
C	2,5	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
D	2,5	2,5	2,5	2,5	2,5	2,5	2,0	2,0	2,0	2,0	2,0	2,0
E	2,5	2,5	2,5	2,5	2,5	2,5	2,0	2,0	2,0	2,0	2,0	2,0
F	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0	2,0	2,0	2,0	2,0
G	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0	2,0	2,0	2,0	2,0
H	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0	2,0	2,0	2,0
I	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0	2,0	2,0	2,0
J	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0	2,0	2,0
K	3,0	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0	2,0	2,0
L	3,6	3,0	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0	2,0
M	4,0	3,6	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0	2,0
N	7,0	3,6	3,0	3,0	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0
O	a	7,0	3,6	3,6	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0
P	-	a	7,0	3,6	3,0	2,5	2,5	2,5	2,5	2,5	2,5	2,5
Q	-	-	a	6,0	3,6	2,5	2,5	2,5	2,5	2,5	2,5	2,5
R	-	-	-	a	6,0	3,0	2,5	2,5	2,5	2,5	2,5	2,5
S	-	-	-	-	a	6,0	3,0	2,5	2,5	2,5	2,5	2,5
T	-	-	-	-	-	a	6,0	3,0	2,5	2,5	2,5	2,5
U	-	-	-	-	-	-	a	6,0	3,0	2,5	2,5	2,5
V	-	-	-	-	-	-	-	a	6,0	3,0	2,5	2,5
W	-	-	-	-	-	-	-	-	a	6,0	3,0	2,5
X	-	-	-	-	-	-	-	-	-	a	6,0	3,0
Y	-	-	-	-	-	-	-	-	-	-	a	6,0
Z	-	-	-	-	-	-	-	-	-	-	-	a

a = Acceleration apertures = 7.0 mm

5.3.6 Project design for forced air flow

Monitoring air conditioning ducts Air conditioning plants are divided into low-speed and high-speed plants (see table below). The information given in this chapter applies **only to low-speed plants**. There is insufficient information from experience with high-speed plants. Where air conditioning ducts have flow speeds of more than 10 m/s, therefore, smoke testing must be carried out for the best reaction behavior to be determined.

	Low-speed systems	High-speed systems
Flow speed	maximum 6 bis10 m/s	> 10 m/s
Duct cross-section	large	small
Differential pressures along the flow direction	small	large

The speed distribution in an air conditioning duct looks as follows:
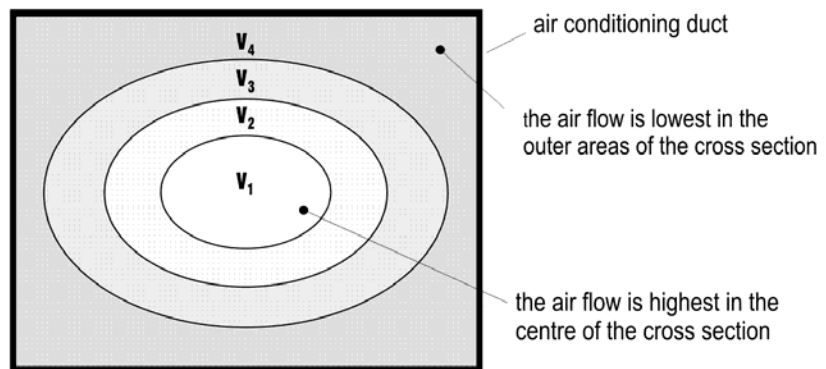
Figure 56: Speed distribution in an air conditioning duct

Aspiration To achieve optimum detection results, the pipe system must be arranged in the area v_1 to v_3.

Location of the pipe system To achieve the best location for constructing the pipe system, the exhaust duct should be as far as possible from sound dampers, air baffle plates and kinks. The guideline figure for the distance from such "obstacles" is at least 3 x the smallest duct diameter.

If it is absolutely essential to fit the pipe system directly behind baffle plates, sound dampers or bends, the main speed areas must be monitored.
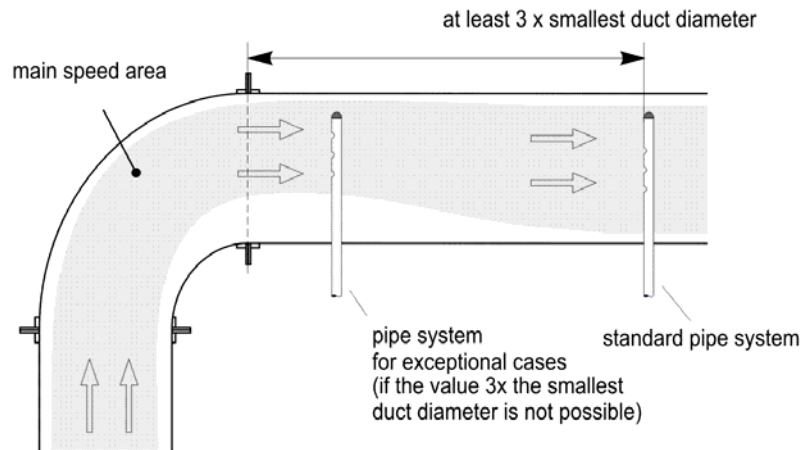
Figure 57: Duct direction change without baffle plates
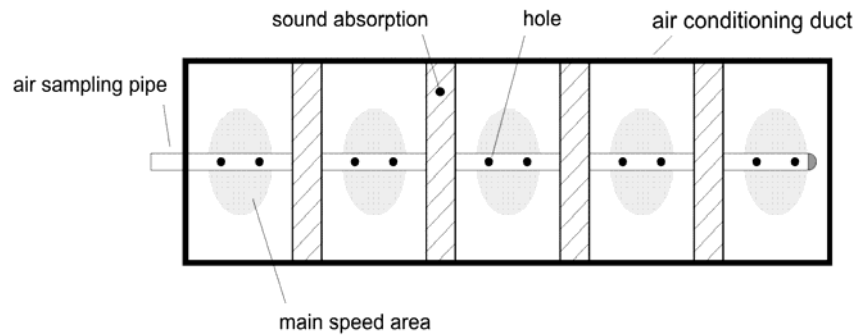
Figure 58: Sound dampers in a duct

When a pipe system is built into air conditioning ducts, the following must be observed:

▪ As the TITANUS® and the pipe system are in different pressure areas, there must be an air return arrangement (see following page).

▪ The pipe entries into the duct must be sealed air-tight.

▪ The part of the pipe system which is outside the duct must be bonded air-tight.
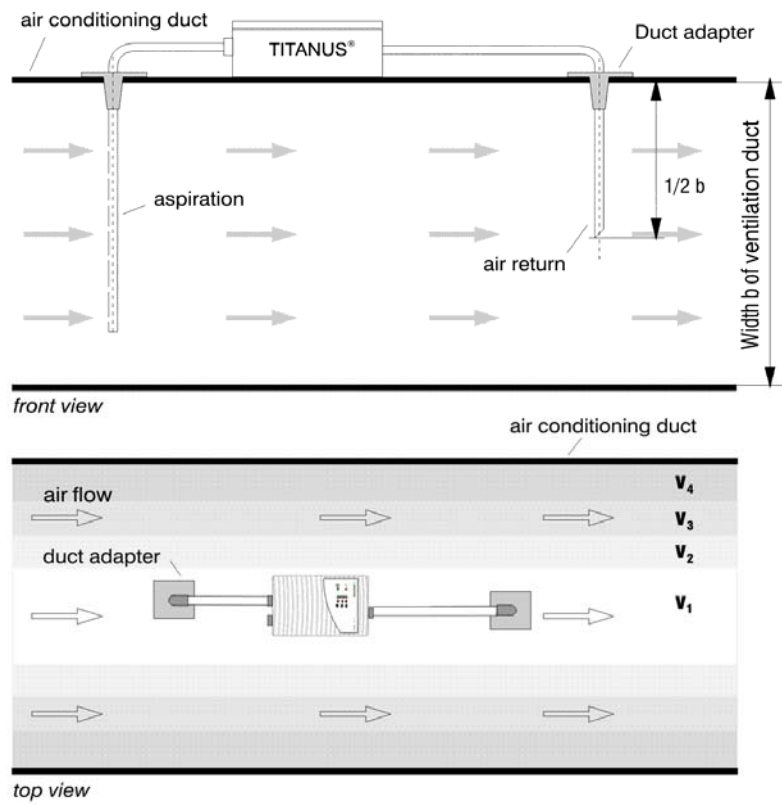
Figure 59: Air recirculation

Air recirculation　The air recirculation must take place at a distance of at least 2 m from the sampling. The open end of the air recirculation should be bevelled at a 45° angle.
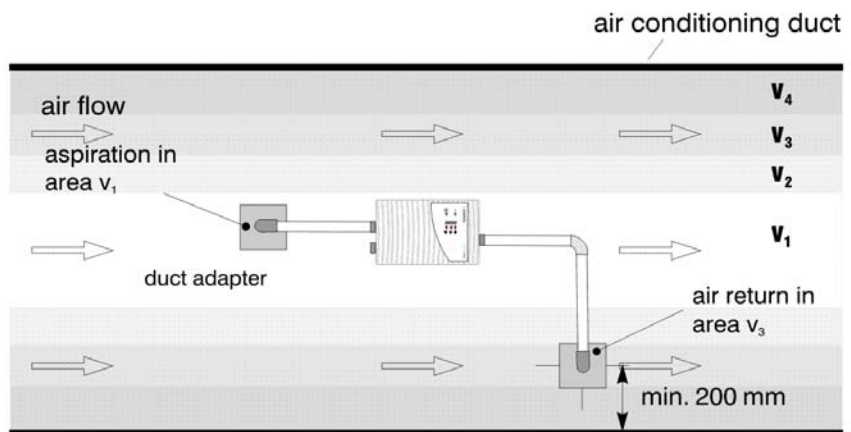
Figure 60: Offset air recirculation reengagement

If a distance of 2 m cannot be maintained, the pipes will have to be arranged in an offset manner. This make makes it possible to achieve a drop of pressure between the intake airs and exhaust air, since the pipes are located in different flow rate areas.

The distances of the aspiration apertures to each other and to the wall of the duct are represented in the following table.

Bore distance

	Duct cross section ≤ 0,5 m²	Duct cross section > 0,5 m²
Distance from aspiration apertures to wall	100 to 200 mm	200 to 300 mm
Distance of aspiration apertures to one another	100 mm	150 mm

Sampling aperture diameter The diameter of the sampling aperture results from the number of aspiration apertures. The precise value can be found in Chapter "Simplified pipeline project planning"..

The pipe is concluded with an end cap without a bore.

Arrangement The aspiration apertures should be arranged against the air flow.

During project planning, it is to be taken into account that the air conditioning ducts for mounting the pipe system are often only accessible from two sides.

Example The following illustration depicts two project planning examples of pipe systems in air conditioning ducts.

duct cross section: surface A ≤0.5m²

Duct cross section: surface A > 0.5m²
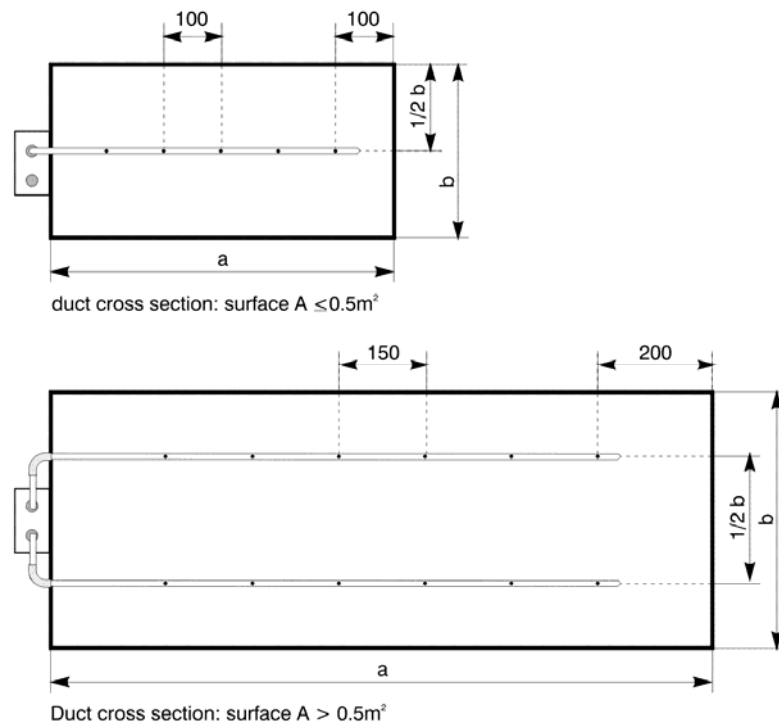
Figure 61: Ducts with small and large duct cross-section

5.3.7 Project design with air sampling hose

The application of an air sampling hose can be useful if several direction changes on a short distance of a pipe system is required, e. g. for avoiding any obstacles.

As the transport time can be manipulated negatively by application of an air sampling hose, the influence of the used air sampling hose is to be determined on the allowed total length of pipe as follows.

Consideration during application of air sampling hose:

For calculation the maximum length of air sampling pipe with air sampling hose, the length of the air sampling hose must be multiplied by the certain factor b and deducted from the allowed total length of pipe.

Air sampling pipe length = Total pipe length – (Length of the air sampling hose * Factor b)

Factor for calculation of the air sampling hoses length:

Air sampling hose type SCH-PG16

Fan voltage	Factor b
6.5 V	0.9
6.9 V	0.6
>= 9.0 V	0.7

Air sampling hose type SCH-P25

Fan voltage	Factor b
6.5 V	0.3
6.9 V	0.3
>= 9.0 V	no effect

Example 1: Altogether, the air sampling hose of type SCH-PG16 with a length of 22 m shall be connected to a TITANUS® air sampling smoke device with a fan voltage of 6.9 V. The allowed total length of pipe is 120 m. The result for the maximum air sampling pipe inclusive air sampling hose is:

Air sampling pipe length = 120 m - (22 m * 0,6) = 106,8 m

Example 2: In case of a pipe project planning, 100 m of air sampling pipe and air sampling hose shall be connected to a TITANUS® air sampling smoke device with a fan voltage of 6.5 V. In accordance to the project plan-

ning scale, the allowed total length of pipe can be 120 m for the complete pipe project planning. The result for the maximum length of the complete air sampling hose of type SCH-P25, which can be integrated within the pipe project planning, after formula adjustment is:

Length of the air sampling hose = (Total pipe length - Air sampling pipe length) / Factor b **Length of the air sampling hose = (120 - 100 m) / 0,3 = 66,67 m**

NOTICE

The complete air sampling pipe must not consist of a single air sampling hose.

NOTICE

Aspiration reduction must not put about the air sampling hose.

5.3.8 Project planning with air return

In some cases, in which differences of air pressure between the area of air sampling device and the area of air sampling point exist, a channel of air pressure of the aspirated test air in the pressure area of air sampling points can be necessary. Therefore, an air sampling hose with a right length should be connected on the air outlet of the air sampling device.

As the transport time of an air sampling smoke detection device can be manipulated negatively by an air return, the influence of the air return to the allowed total length of pipe is to be respected.

An air return with a pipe with Ø 40 mm has no influence and can be projected and/or retrofitted without reducing the total pipe length and / or retrofitted.

Consideration of air returns:

For calculation the maximum length of air sampling pipe, the length of the air return must be multiplied by the certain factor and deducted from the allowed total length of pipe.

Air sampling pipe length = Total pipe length – (Length of the air return * Factor a)

Factors to calculate the lengths of air return ($\varnothing$ 25 mm):

Length of the air return	Fan voltage		
	6.5 V	6.9 V	>= 9.0 V
0 to 5 m	0.0	1.3	0.0
> 5 to 10 m	0.8	0.5	0.5
> 10 to 25 m	0.8	0.8	0.5
> 25 to 50 m	0.8	0.8	0.5

Factors to calculate the lengths of air return ($\varnothing$ 32 mm):

Length of the air return	Fan voltage		
	6,5 V	6.9 V	>= 9.0 V
0 to 5 m	0.0	0.3	0.0
> 5 to 10 m	0.0	0.3	0.0
> 10 to 25 m	0.2	0.3	0.0
> 25 to 50 m	0.25	0.3	0.1

Example: Airs return ($\varnothing$ 25 mm) from 22 m to be connected to a TITANUS® with a fan voltage of 6.9 V. The allowed total length of pipe is 120 m. The result for the maximum air sampling pipe is:

Air sampling pipe length = 120 m – (22 m * 0,8) = 102,4 m

5.4 Mains supply

The alarm-ready status in the fire protection system and the aperture of an alarm are taken into account when rating the external mains supply. In the system's alarm-ready status, the mains supply must supply standby current to the air sampling smoke detection systems and ensure that the emergency power batteries are charging in accordance with DIN VDE 0833 Part 1 (80% load in 24 hours).

> **NOTICE**
>
> The mains supply of the air sampling smoke detection systems shall be approved according to EN 54-4.

The following formulas apply in the event of an alarm:

Power calculation The following formulae apply in case of alarm:

Room protection

$$I_{total,room} = I_{alarm} \cdot n_{max.area} + I_{quiescent}(n - n_{max area}) \leq I_{power\,sup\,ply,max.}$$

Equipment protection

$$I_{total\ equipment} = I_{alarm} \cdot \sqrt{n} + I_{quiescent}\,(n - \sqrt{n}) \leq I_{max.power}$$

The current for charging the accus is calculated by the following formula:

Charging current

$$I_{ch\arg ing} \approx \frac{0{,}8 \cdot K_{no\min al}}{24}$$

$$I_{total,equipment} = I_{quiescent} \cdot n + I_{charging} \leq I_{powersupply,max.}$$

I_{total}	=	*total current of all connected air sampling systems [A]*
$I_{power\ supply,\ max.}$	=	*max. supply current of the power supply unit [A]*
n	=	*total number of all air sampling systems connected to a power supply unit*
$N_{max.\ area}$	=	*total number of all air sampling systems in the area with the highest power consumption*
I_{alarm}	=	*alarm current of an air sampling system [A]*
$I_{quiescent}$	=	*quiescent current of an air sampling system [A]*
$K_{nominal}$	=	*nominal capacity of the accumulators [Ah]*
$I_{charging}$	=	*charging current of the accumulators (within 24 h 80% of the nominal capacity) [A]*

NOTICE

The higher figure of the total current calculated (I_{total}) is used to design the power supply!

The power consumption of the TITANUS® can be found in Chapter, "Technical Data".

Line calculation The maximum line length results from the permitted line drop on the feed. The permitted line drop is the difference resulting from the stand-by accus discharge voltage (21.5 V) and the lower operating voltage limit of the aspiration smoke detection system.

$$L_{max} = \frac{\gamma \cdot \Delta U \cdot A}{I_{total} \cdot 2}$$

Lmax	=	*Maximum line length in [m]*
A	=	*Wire cross-section in [mm²]*
Itotal	=	*Total current of the aspiration smoke detection system in [A]*
γ	=	*Conductivity: Cu=57m/Ωmm²*
ΔU	=	*Max.line drop on the feed*

To guarantee the tightness of the housing seal, the appropriate cable throughput for the particular cable must be selected.

- M 25- cable throughput: ∅ 9 to 14 mm
- M 20- cable throughput: ∅ 8 to 12 mm

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

$$K_{nominal} = (I_{quiescent} \cdot n \cdot t + I_{total} \cdot 0.5h) \cdot 1.25$$

Knominal	=	*nominal capacity of the emergency supply accumulators [Ah]*
t	=	*required bridging time [h]*

The factor 1.25 in the equation is only to be observed if bridging times are smaller equal to [sic] 24 hours.

6 Installation

6.1 General

The regulations, guidelines and instructions given in chapter "Design" are valid.

When installing the TITANUS® air sampling system, the following must be taken into consideration:

1. there should be no changes made to the equipment. Where this is un-avoidable the operator, manufacturer and/or supplier must be in-formed (written approval

2. any changes in the supply network (230 V/400 V supply) and external supply systems must be carried out by the system owner. This includes e.g.:

    ▪ the primary connection of the supply units

    ▪ any connections to external systems (e.g. central units)

    ▪ planning of possible additional lightning protection and voltage surge protection, which conform to standards

6.2 Opening the air sampling smoke detection system
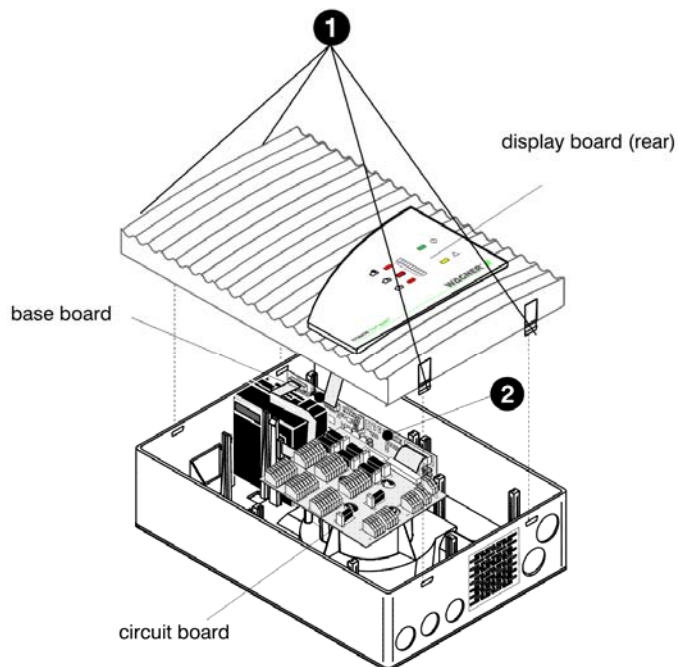
Figure 62: Opening the TITANUS TOP·SENS®

⚠	⚠ WARNING
	The components on the base and circuit board must be protected from damage with an anti-static set.

To open TITANUS® follow the steps below:

1. Using a screwdriver carefully unlocks the snap-in closures of the housing by simultaneously pressing in both clips located on one side of the housing lid. Lift the lid carefully.

2. Pull the display board cable off the base board. Remove the lid.

6.3 Settings

6.3.1 Detector module
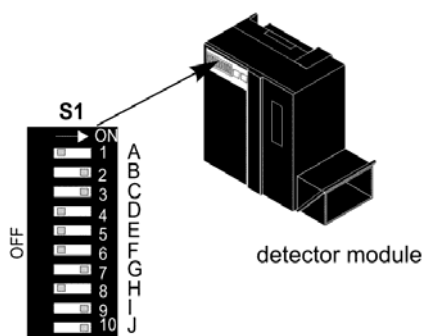
Figure 63: Standard settings on the TITANUS TOP·SENS® detector module

6.3.1.1 Setting of response sensitivity

The sensitivity of the detector module is set via switch S1 (1, 2) on the detector module (see figure "Detector module TITANUS *TOP·SENS*®"). The following table shows the response sensitivity (fire alarm) of TITANUS *TOP·SENS*®.

Detector module DM-TT-50 L	Detector module DM-TT-10 L	Detector module DM-TT-01 L	Switch S1 contact 1	Switch S1 contact 2
-	0.,8 %/m	0,12 %/m	on	on
-	**0.4 %/m (Standard)**	**0.06 %/m (Standard)**	off	on
1 %/m	0.2 %/m	0.03 %/m	on	off
0.5 %/m (Standard)	0.1 %/m	0.015 %/m	off	off

6.3.1.2 Delay period of alarm activation

The delay period for the alarm thresholds can be set via the switch S1 (3, 4). As a standard the delay period for the alarm is set to 10 sec. If the smoke level increases during operation so that the alarm threshold is reached the delay period starts. After the delay period has been expired the signal is transmitted if the alarm remains activated. Thus, a false alarm can be avoided in case of short interferences (dust).

Alarm Delay Period	switch S1 contact 3	switch S1 contact 3
0 seconds	off	off
10 seconds (Standard)	**on**	**off**
30 seconds	off	on
60 seconds	on	on

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

6.3.1.3 Activating threshold for air flow monitoring

Set the activating threshold for the air flow fault via switch S1 (5, 6) on the detector module (see figure "Detector module") of TITANUS®.

level	activating threshold	Switch S1 Contact 5	Switch S1 Contact 6
I	low	on	off
II	**medium (standard)**	**off**	**on**
III	high	off	off
IV	very high	on	on

Choose the activating threshold according to chapter "Pipe Design".

6.3.1.4 Delay period for air flow fault

Set the delay period for the transmission of a fault signal via switch S1 (7, 8)
on the detector module (see figure "Detector module") of TITANUS®.

setting of delay period	Switch S1 Contact 7	Switch S1 Contact 8
0,5 minutes	off	on
2 minutes (standard)	**on**	**off**
15 minutes	on	on
60 minutes	off	off

Usually a delay period of 2 minutes is set. In areas with time-limited faults
(e.g. air pressure variations) other delay periods – depending on the duration
of the faults – should be set.

6.3.1.5 Fault signal

The display for collective faults (air flow and detector module fault) can either
be set latched (standard) or non-latched. The setting is made via the switch
S1 contact 9 (refer to "Standard settings on the detector module ") of the de-
tector modules of TITANUS®.

Fault Signal	switch S1 contact 9
latched (standard)	**on**
no latched	off

6.3.1.6 LOGIC·*SENS*

The sophisticated signal processing LOGIC·*SENS*, is activated or deacti-
vated via switch S1, contact 10. When signal processing is switched on,
LOGIC·*SENS* recognises faults and thus avoids temporary false alarms.

LOGIC·*SENS*	Switch S1 contact 10
on (Standard)	**on**
off	off

6.3.1.7 Setting of fan voltage
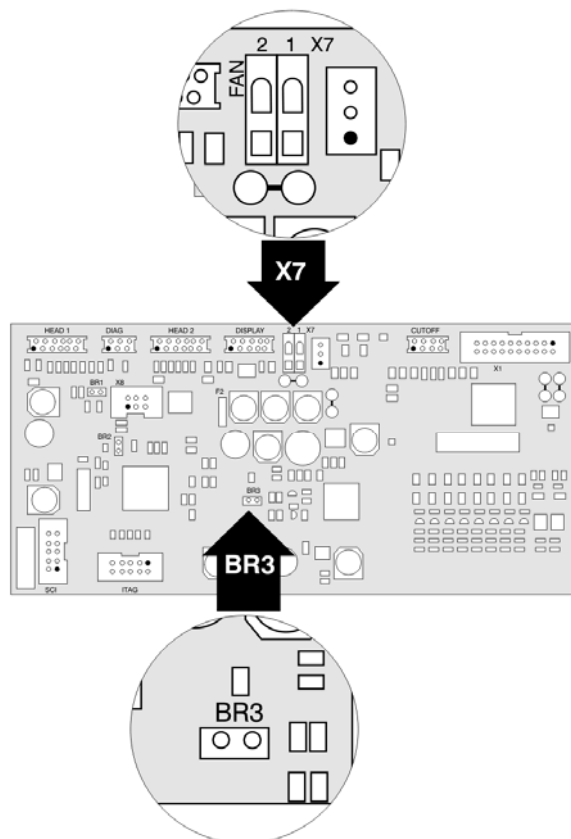
Figure 64: Switching of fan voltage on the base board

The standard setting of the ventilator voltage is 6.9 V. In critical areas the ventilator voltage can be switched from 6.9 V to 9 V by removing the jumper BR3 – this increases the transport speed in the pipe system and ensures earlier detection in longer pipes.

⚠ **WARNING**

Re-initialise the air flow if you change the ventilator voltage. Open or close the jumper BR3 only when the device is switched off.

6.3.1.8 Connecting the fan

The electrical connection of the ventilator is made via terminal block X7 (FAN) on the main board (see fig. main board) of TITANUS *TOP·SENS*®.

▪ Connect the red connecting lead of the fan with terminal block X7 / clip 1 (+)

▪ Connect the black connecting lead of the ventilator with terminal block X7 / clip 2 (-)

NOTICE
When TITANUS *TOP·SENS*® is delivered, the fan is connected at the plant.

6.3.1.9 Setting of ventilator voltage at TITANUS®-SL
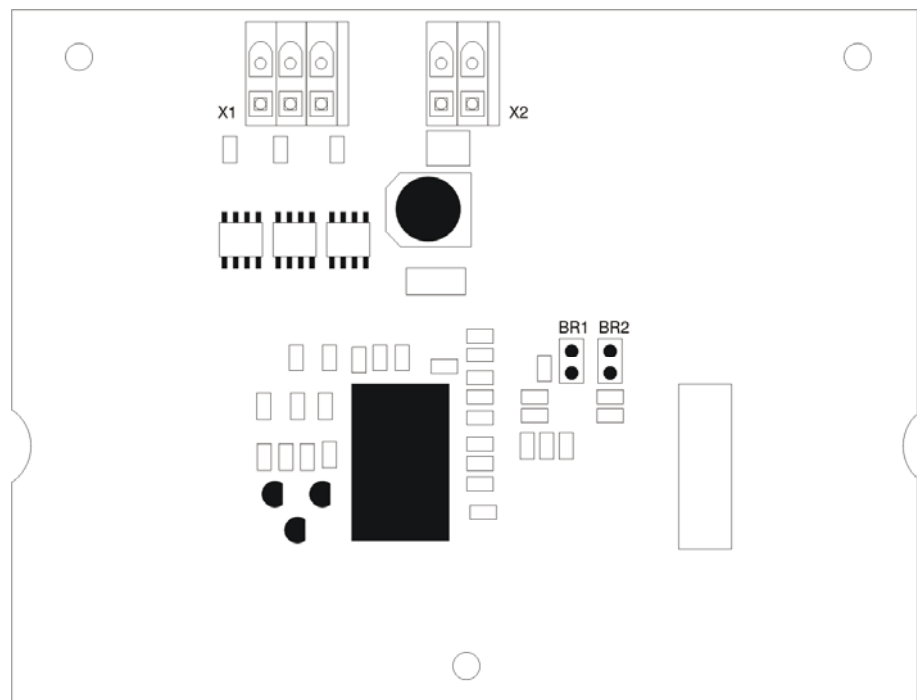
Figure 65: Switching the fan voltage and fan connection terminal board on the FC-2 or FC-3 fan control circuit board

The default setting for the fan voltage is 6.9 V. The fan voltage can be adjusted according to project planning by plugging or removing the BR 1 and/or BR 2 bridges. The symbols used mean:

X = pin pair bridge   O = pin pair open

The standard settings have a grey background.

Setting of ventilator voltage FC-2	Bridge Pin-No. BR1, 1+2	Bridge Pin-No. BR2, 1+2
6,5 V	O	X
6.9 V (standard)	**X**	**O**
9 V	O	O

Setting of ventilator voltage FC-3	Bridge Pin-No. BR1, 1+2	Bridge Pin-No. BR2, 1+2
10 V	O	X
11 V (standard)	**X**	**O**
12 V	O	O

⚠️ **WARNING**

The BR 3 bridge on the base board must always be removed.

⚠️ **WARNING**

Conduct the air flow initialisation again if you change the fan voltage. Only close or open the BR 1 and BR 2 bridges when the device is turned off.

6.3.1.10 Connecting the fan TITANUS® -SL

The electrical connection of the fan control circuit board is made via terminal block X7 (FAN) on the main board (see fig. main board) of TITANUS *TOP·SENS*®.

▪ Connect terminal 1 of terminal board X7 on the base board to terminal 2 (+) of terminal board X2 on the fan control circuit board

▪ Connect terminal 2 of terminal board X7 on the main board to terminal 1 (-) of terminal board X2 on the fan control circuit board

▪ Connect the fan's brown connection line to terminal board X1 / terminal 1 of the fan control circuit board

- Connect the fan's yellow connection line to terminal board X1 / terminal 2 of the fan control circuit board
- Connect the fan's purple connection line to terminal board X1 / terminal 3 of the fan control circuit board

NOTICE
When TITANUS *TOP·SENS*® is delivered, the fan is connected at the plant.

6.4 Installation of the reset board

The reset board can be installed into TITANUS *TOP·SENS*® as an option. If several TITANUS *TOP·SENS*® are connected to one detection line the reset board is only installed to the last TITANUS *TOP·SENS*® on the detection line. The electrical connection of the reset board is made according to the connection diagram in chapter "Electrical connection".

NOTICE
The reset board can only be used if the quiescent current of the detection line is between 5 mA and 50 mA and if the end of the detection line is an ohm-resistor. The reset-pulse is activated if the line voltage falls below 3 V while resetting the central unit.

Quiescent line current The quiescent line current, IR, is calculated as follows:

$$I_R = \frac{U_L}{R_E}$$

with R_E = original end-of-line resistor in Ω

U_L = line voltage in V

I_R = quiescent current of the line in [A]

The formulas to calculate the end-of-line resistor and the quiescent cur-rent of the detection line take into consideration the ideal state of the signal evaluation.

If there is no acknowledgement from the calculated end-of-line resistor of the reset board, the end-of-line resistor value must be reduced by about 20%.

End-of-line resistor The reset board replaces the detection line resistor. It is re-calculated and installed on the reset board (connector X1). The value of the end-of-line re-sistor R_{ER} must be calculated as follows:

$$R_{ER} = \frac{(U_L - 2{,}7V)}{I_R}$$

with R_{ER} = end-of-line resistor on the reset board in Ω

                 U_L = line voltage in V

                 I_R = quiescent current of the line in [A]
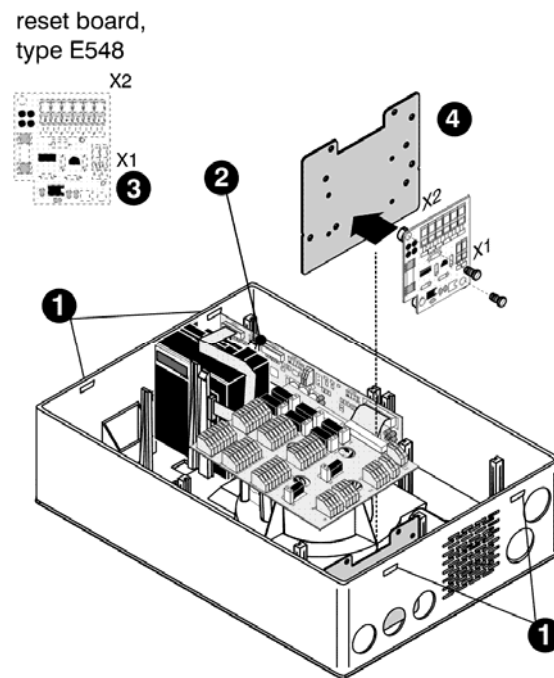
Figure 66: Installation of reset board in TITANUS TOP·SENS®

Installation in TITANUS®   In order to install the reset board in TITANUS *TOP·SENS*® the following steps must be followed:

1. Using a screwdriver carefully unlocks the snap-in closures of the housing by simultaneously pressing in both clips located on one side of the housing lid. Then, lift the lid carefully.

2. Pull the display board cable off the base board and remove the housing lid.

3. Place the calculated end-of-line resistance (End-of-line resistor not included, power 1/4W) R_{ER} into the connection terminal X1.

4. Fix the reset board to the mounting plate with 2 plastic spacers and one plastic spacer.

5. Install the mounting plate, equipped with the reset board, in the position shown in figure "Installation of reset board" in the TITANUS *TOP·SENS*®-housing.

6. The electrical connection (X2) is described in chapter "Electrical connection".

7. Re-attach the display board cable to the base board and place the lid on the housing.

8. Tighten the lid using the snap-in closures.

NOTICE
Due to its height, the reset board can only be installed in the position.

6.5 Mounting Location

6.5.1 Installation of air sampling smoke detection system

When choosing the mounting location, make sure that the displays are clearly visible. Screw the air sampling smoke detection system either directly to the wall with its bottom casing or mount it with a special support (see chapter "Device Support").

NOTICE
Ensure that the mounting location is not within the opening range of any doors.
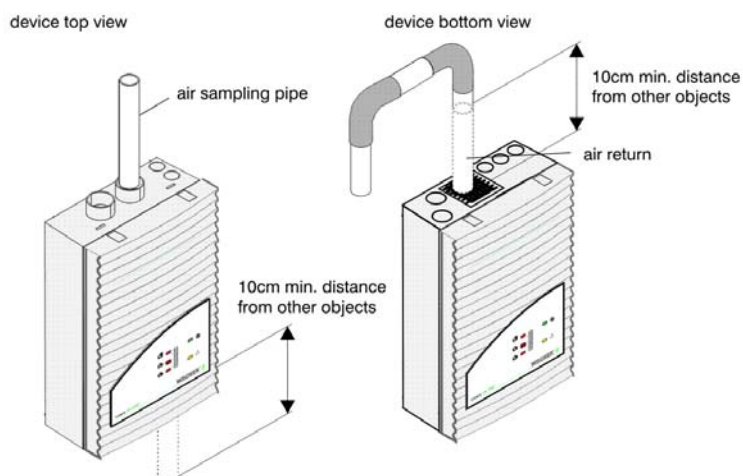
Figure 67: Installation of TITANUS TOP·SENS®

Make sure the air outlet of the system is not blocked. The distance between the air outlet of TITANUS® and adjacent objects (e.g. wall) must be at least 10 cm.

The air sampling smoke detection system TITANUS® can be mounted with the air sampling pipe connectors pointing upwards or downwards. If necessary, turn the lid by 180°.

Aspiration downward   If TITANUS® is mounted with the air sampling pipe connectors pointing downwards, ensure that no impurities or dripping water enter the upward-pointing air outlet. For this purpose use a short downward curving pipe.

Installation Material

TITANUS®	Cylinder of flat head screws – thread diameter: max. 6 mm - head diameter: max. 10 mm
Support (Type MT-1)	Cylinder or flat head screws – thread diameter: 4 mm Washer – diameter: 9 mm – hole diameter: 4,3 mm

Spacing of boreholes   The spaces between boreholes are given below (all dimensions in mm).
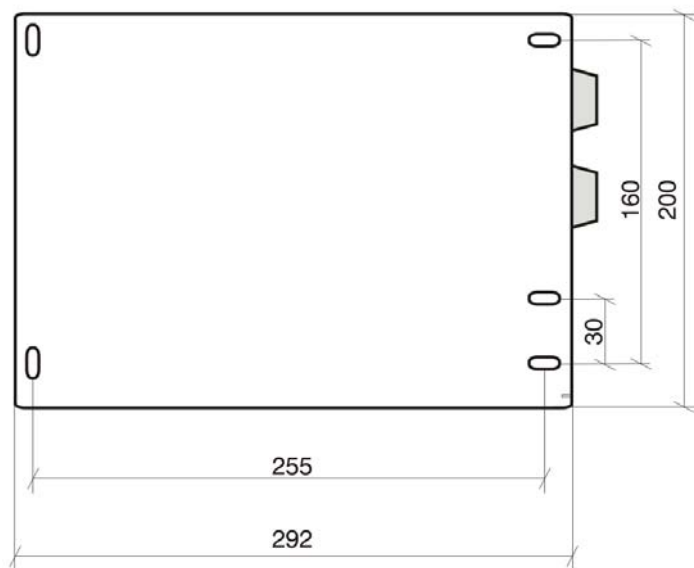
Figure 68: Borehole spaces of TITANUS® without support
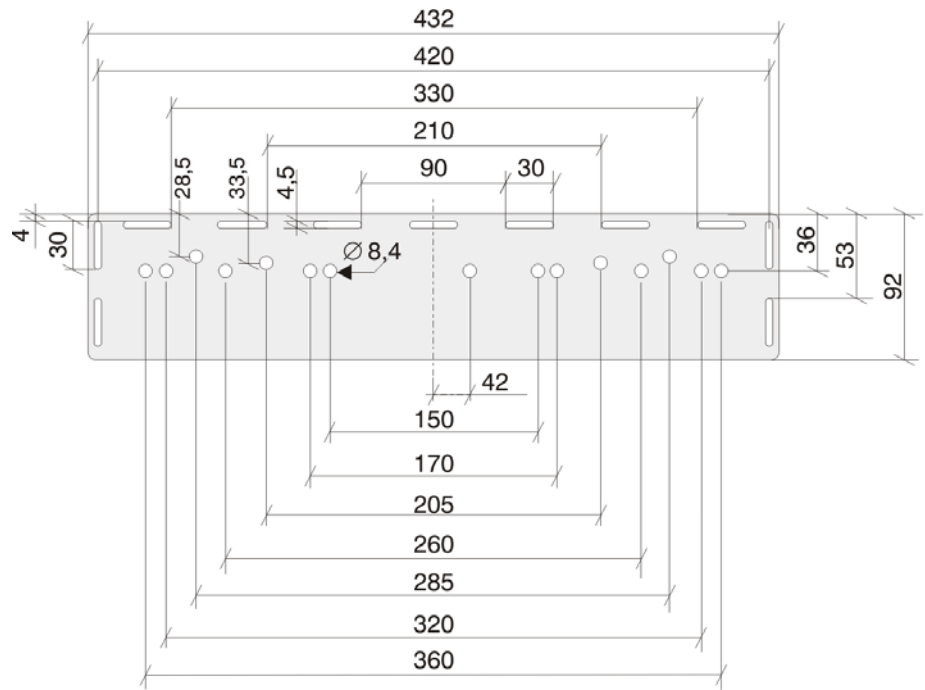
Figure 69: Borehole spaces of the support type MT-1

6.5.2 Connection of air sampling pipe
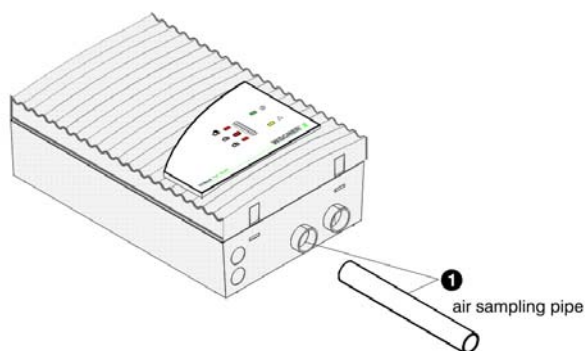
Figure 70: Connection of air sampling pipe to the TITANUS®

Connection of air sampling pipe

1. To connect the air sampling pipe to TITANUS® attach the pipe to the corresponding connection (see figure „Connection of air sampling pipe").

NOTICE
Under no circumstances use adhesives to connect the pipe to the connection piece. Wide temperature variations make it essential that the pipe is fixed firmly in place just before the entrance to the device. This will prevent the pipe being pulled from the device due to fluctuations in pipe lengths (see chapter "Installation of the pipe system").

6.6 Electrical connection

To prepare the electrical connections follow the steps below:

1. Break through the required cable entries, e.g. with a screwdriver.

2. Attach the plastic connection pieces M 20 or M 25 to the cable entries.

3. Feed the cables through the corresponding cable entries.

NOTICE

One plastic connection piece, M20, and two connection pieces, M25, are supplied with the device.

The electrical connection is made via terminal blocks X1 to X6 and X8 to X12 on the circuit board of TITANUS®. Take into account the valid wire cross sections of the screw joints and wire cross sections of the terminals for max. 1.5 mm² -cores.

⚠ WARNING

All connections must be carried out with the device switched off!

NOTICE

In order to maximise the fault safety, use shielded cables for the external wiring of the device(s).
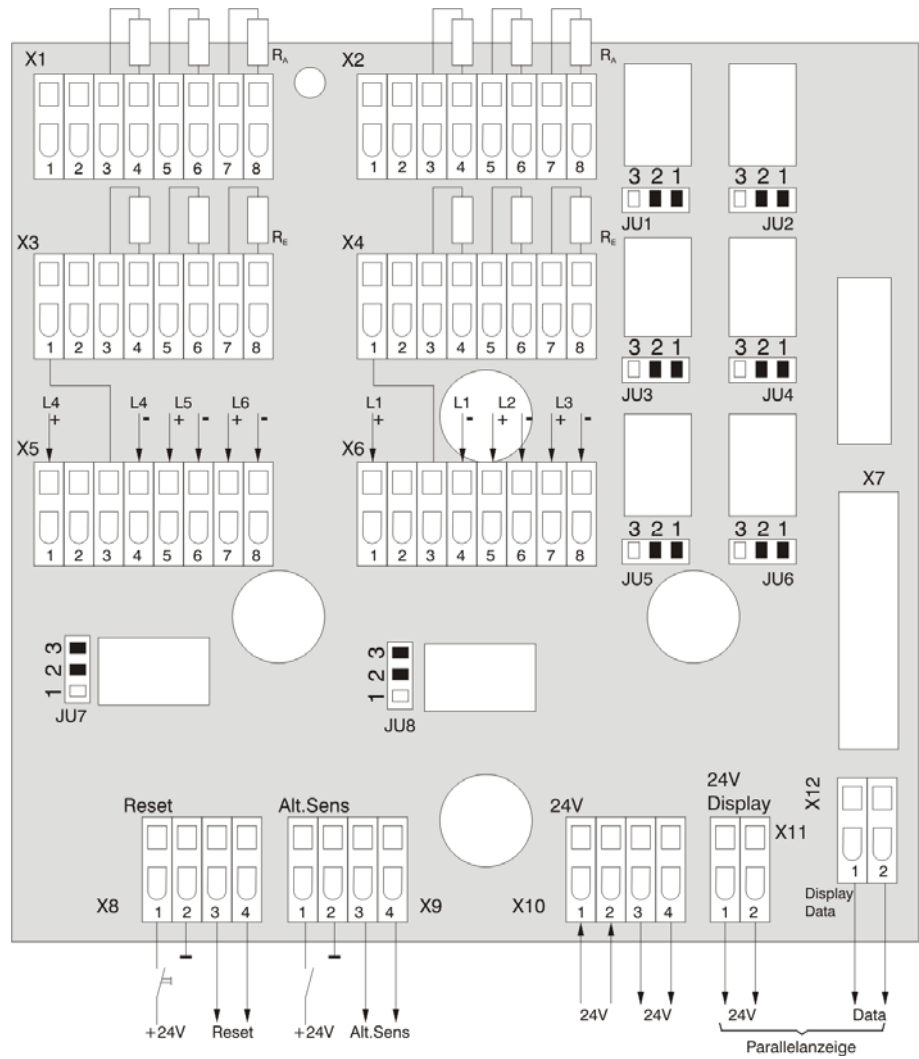
Figure 71: General outlay of the terminal blocks of the circuit board

6.6.1 Connection to FAS, with reset button

The alarm and fault contacts on the circuit board can be used to e.g. connect to a FAS activate signalling means or guidance systems etc. A remote display unit can also be connected to the device.

NOTICE
The reset input must not be permanently connected to +24 V. Otherwise all signals – even an alarm – are automatically reset after the cause of the signal has been eliminated. In this case the alarm is non-latched.

Connection to FAS, with reset button
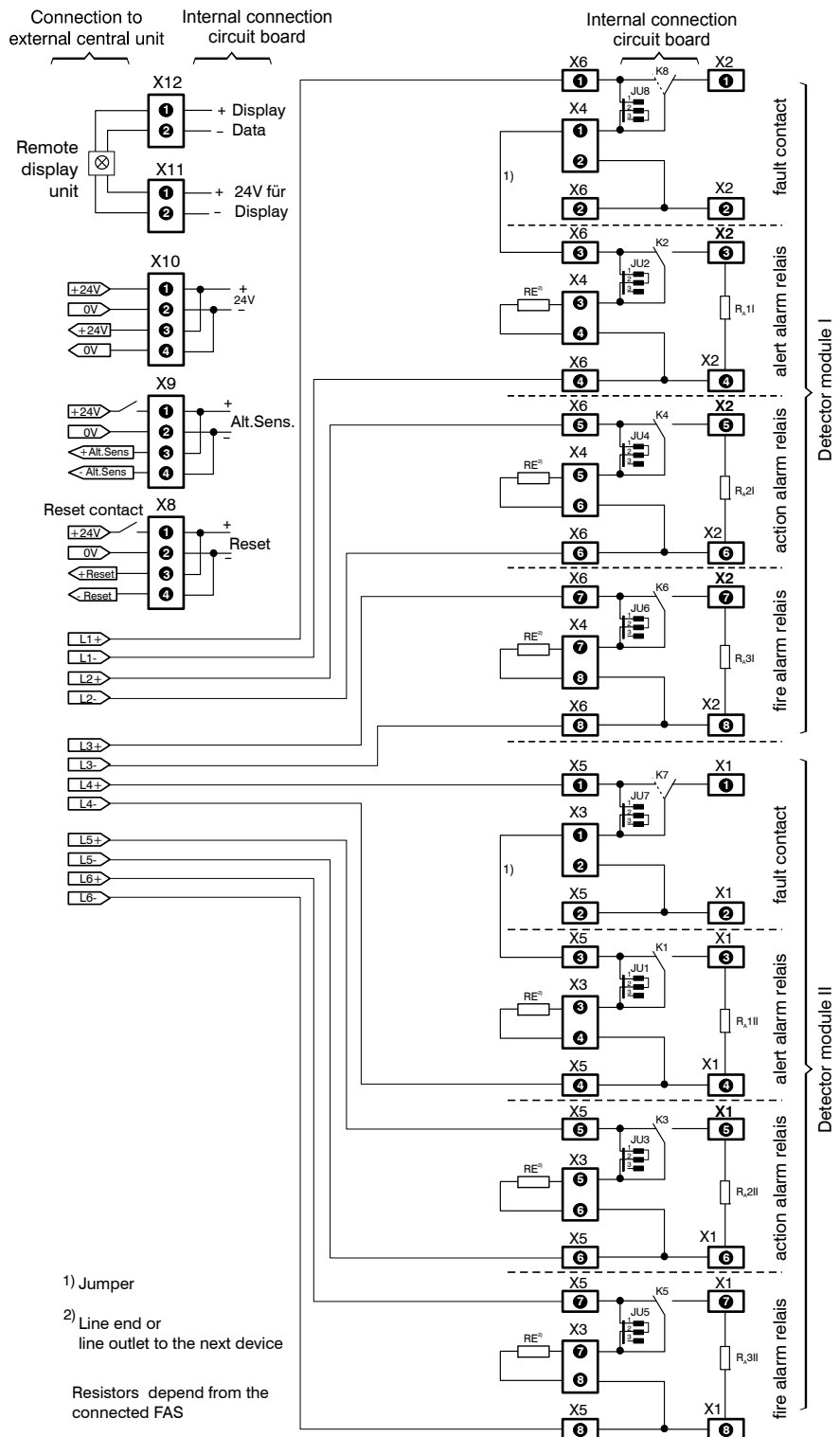
Figure 72: Example of TITANUS TOP·SENS® connection to FAS and reset contact

6.6.2 Connection to FAS with reset board
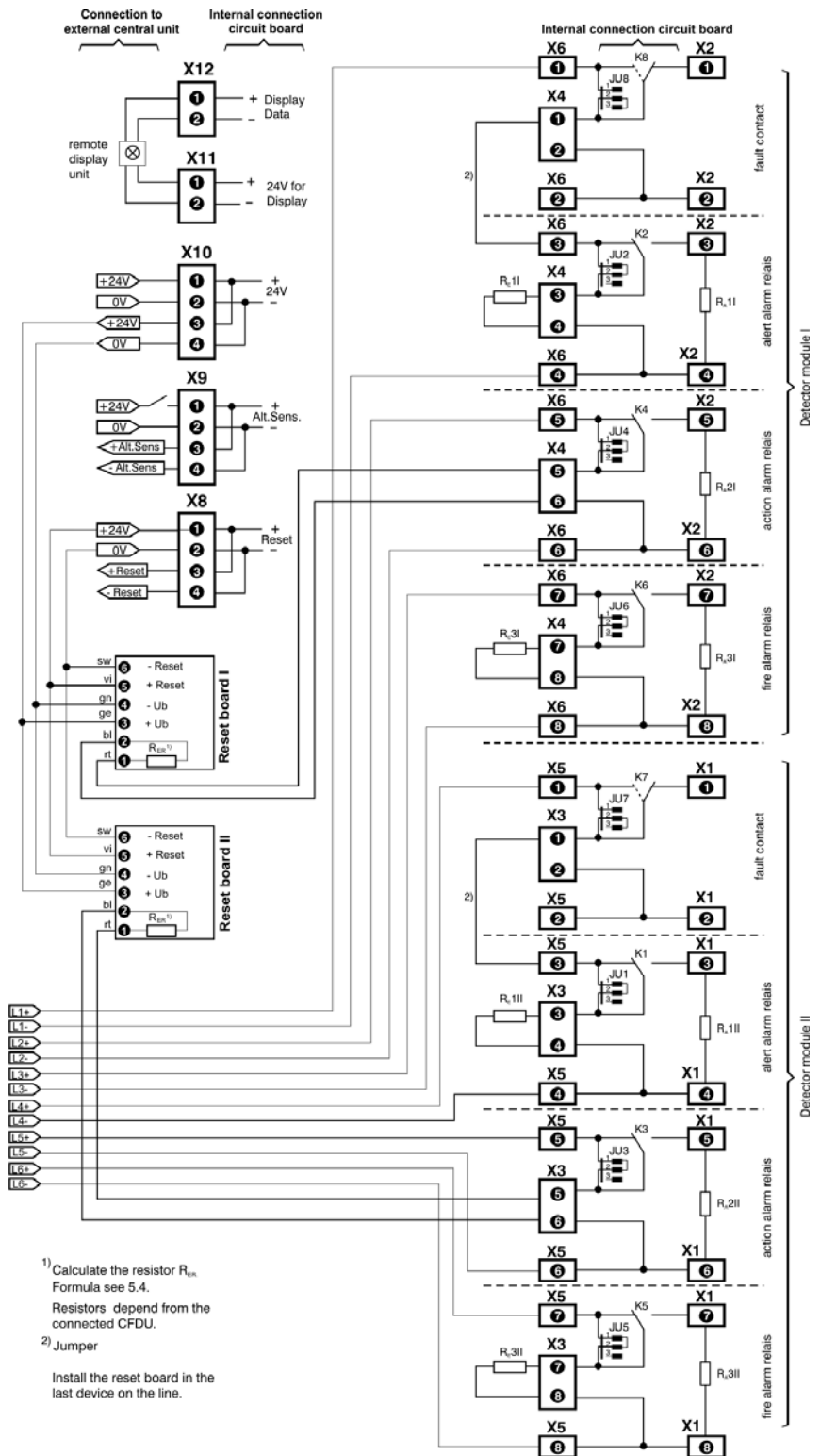
Figure 73: Example of TITANUS TOP·SENS® connection to FAS and reset board

6.7 TITANUS® for external shutdown

The installation of a shutdown module permits TITANUS® to switch off external devices such as calculators, switch cabinets, ventilators or ventilation cabinets via two-detector dependency.

6.7.1 Installation of the shutdown modules
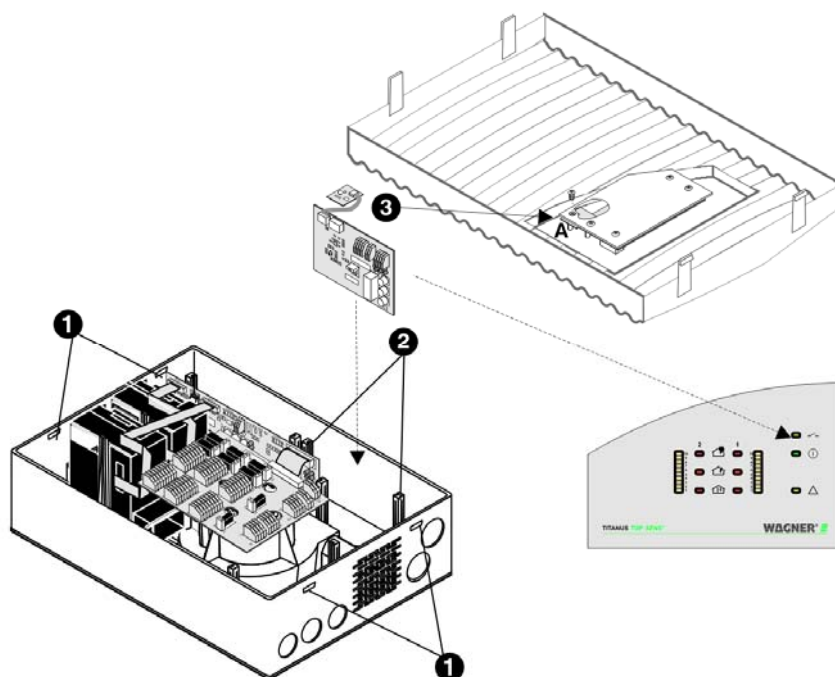
Figure 74: Installation of shutdown module in TITANUS TOP·SENS®

1. Using a crosshead screwdriver, carefully unlock the snap-in closures of the housing by simultaneously pressing in both clips located on one side of the housing lid. Lift the lid carefully. Pull the display board cable off the main board and remove the lid.
2. Install the shutdown module in the allotted slots of the TITANUS® housing.
3. Set the display board of the shutdown module in the housing lid to position "**A**" and fasten the board with the enclosed PT-screw and the insulating spacer sleeve.

4. Carry out the wiring according to the following connection diagram. Then, with the flat cable, connect the shutdown module X2 (main board) to the X6 (shutdown) of the base board.

5. Re-connect the cable of the display board with the quick coupler X5 (DISPLAY) on the base board. Connect the display board of the shutdown module to the quick coupler X1 (DISPLAY) on the shutdown module.

6. Re-lock the lid by snapping on the closures.

6.7.2 Connecting the shutdown module
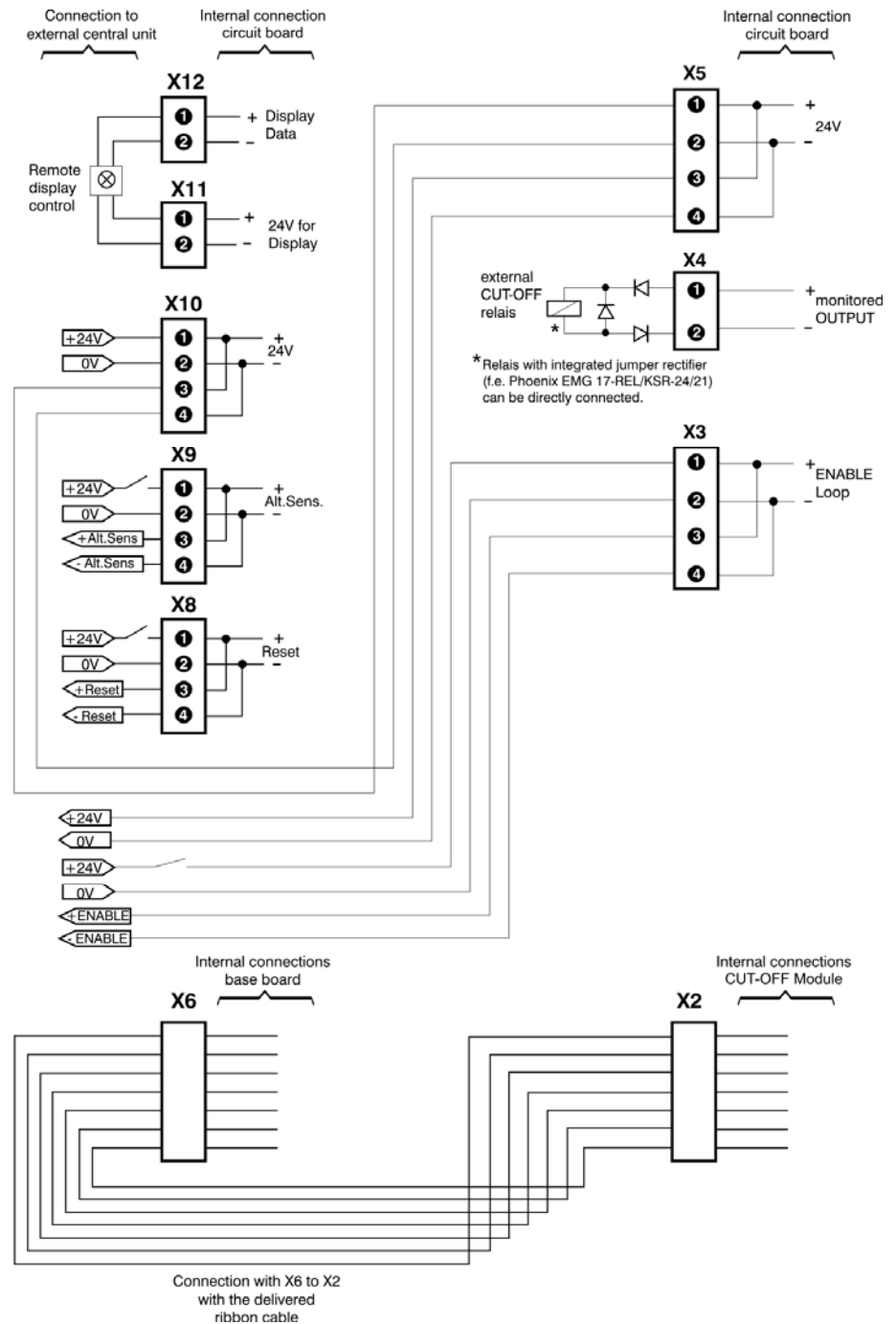
Figure 75: Connecting the shutdown module

6.7.3 Activating the shutdown

The monitored switch off can be activated automatically or an external in-put, which is operated from switch S1 of the shutdown module.

Activating shutdown	Switch S1
Automatic	on
External activating (standard)	**off**

6.8 Networking TITANUS®

⚠️ **WARNING**

Do not touch the components on the main board without an anti-static set (with the exception of the DIL switch and button)!

⚠️ **WARNING**

Only carry out assembly and connection work when the device is disconnected from the power supply.

6.8.1 Installing the network module
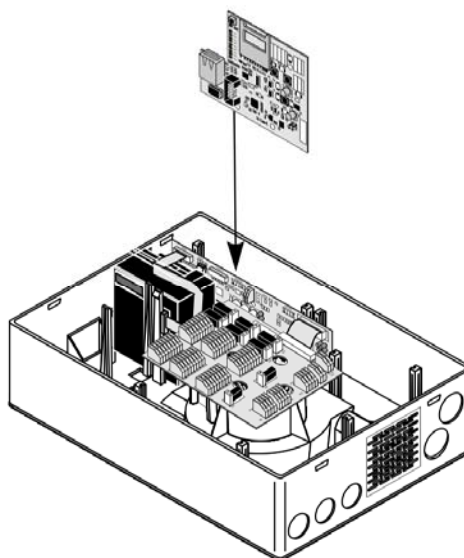
Figure 76: Installation of the TITANUS® network module

To install the network module, first open the air sampling smoke detection system. Follow these steps:

1. Carefully unlock the housing's quick-release locks with a slotted screwdriver by pressing down simultaneously on both of the clips on the side of the housing. Then carefully lift up the housing cover. Disconnect the cable from the display board and remove the housing cover.

2. Open the required, pre-stamped cable feeds (max. 8 x M20 and 6 x M25) in the housing. If necessary, use a screwdriver to help.

3. Attach M20 or M25 cable guides to the opened cable feeds. Then press the cable guides into the corresponding opening.

4. For the cabling, route the connection cable(s) (max. 1.5 mm^2) through the housing's prepared cable guide(s).

5. Connect the battery and insert the memory card into the network module (only included with types NU-5-D, -DO,-D-F, -DO-F).

6. Connect the network module as indicated in the circuit diagram.

⚠ WARNING
All network cards are assigned the same IP address by the manufacturer. It is necessary to ensure that the standard IP address (192.168.1.5) has not been allocated in the network as this can otherwise cause network interference.

7. Mount the network module only in the designated position in the TITANUS® housing.

8. Once the network module is successfully installed, reconnect the display board to the main board.

9. Close the housing cover.

10. Reconnect the voltage supply.

6.8.2 Connecting the network module

The network module connects the network to the TITANUS®. The electrical connection required for the air sampling smoke detection system circuit board is illustrated below.

| NOTICE |
|---|
| The network may only be set up in consultation with the customer's system administrator(s). |

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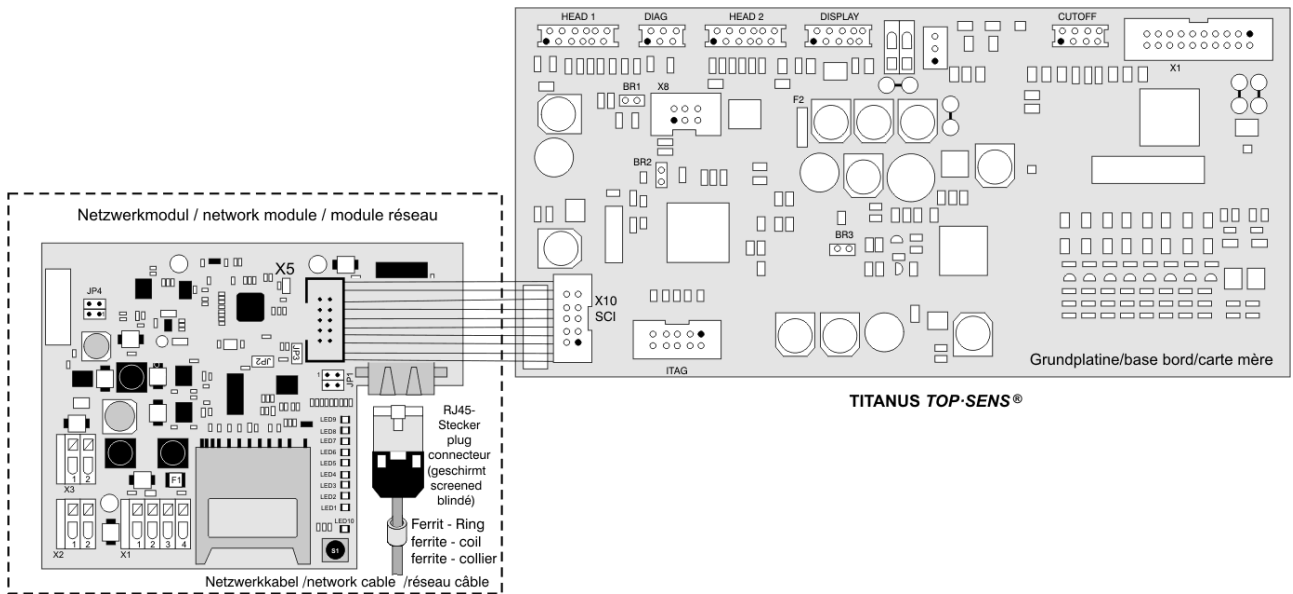
Figure 77: Connecting the TITANUS®

# 6.9 Installation of second detector module
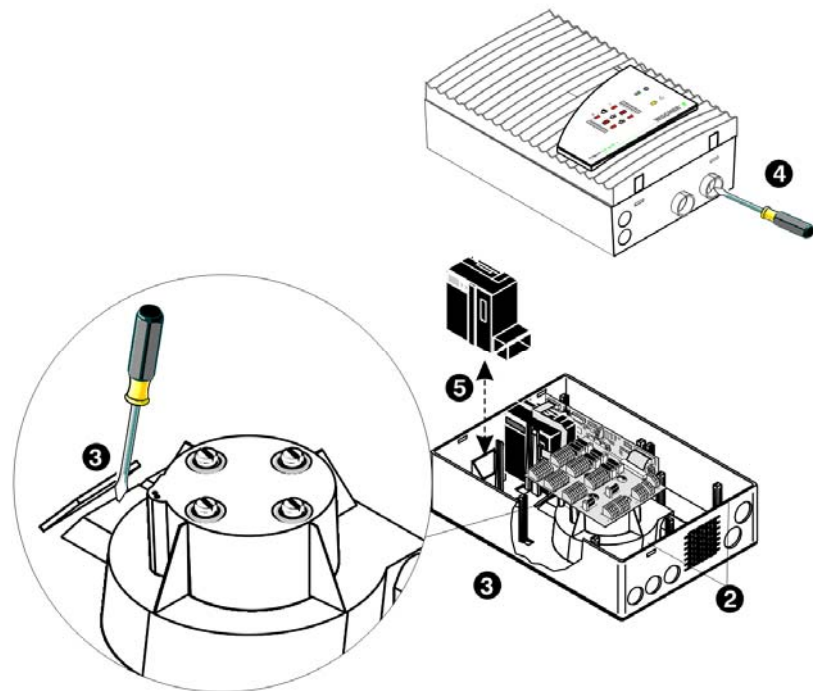
Figure 78: Installation of second detector module

1. Carry out the following steps only if the device is switched off.
2. Using a crosshead screwdriver, carefully unlock the snap-in closures of the housing by simultaneously pressing in both clips located at one side of the housing lid. Lift the lid carefully. Pull off the display board cable and remove the lid.
3. Carefully remove the cover from the second air sampling pipe (plastic self-adhesive cover). If necessary use a screwdriver to assist.
4. Carefully break the closure connecting the second pipe system and the housing (correct breaking point marked by "II"), again using a screwdriver if required.
5. Spread both support clamps and place the new detector module between them. Both clamps must fit tightly against the module and snap in audibly. Press both support clamps together.
6. Pull the jumper BR1 across to the base 1de1 board (see following figure)
7. Connect the detector module to the base board via the ribbon cable. Connection: X2 HEAD 2 (see following figure)

> **NOTICE**
>
> Ensure that the position of the marker is correct before plugging the flat cable into the main board.

8. Connect the display board with the base board. Connection: X5 DIS-PLAY
9. Before initialisation, operating power must be restored. Press the Flow-Init button at the detector module in order to initialise the pipe system.
10. Close the housing lid.

> **NOTICE**
>
> When extending to TITANUS *TOP·SENS*® 2 the front panel must be replaced.
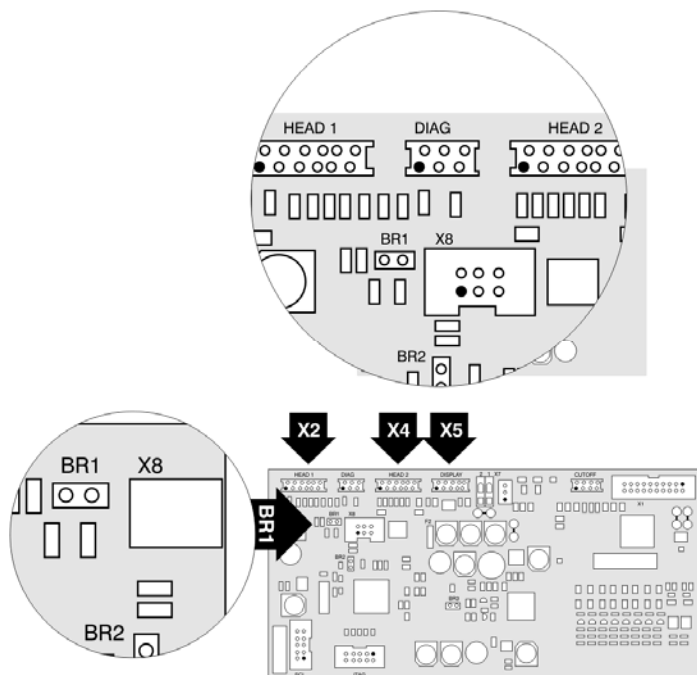
Figure 79: Connections for main board X2, X4, X5 and BR1

6.10 TITANUS® with remote display units

6.10.1 Connecting the remote display unit
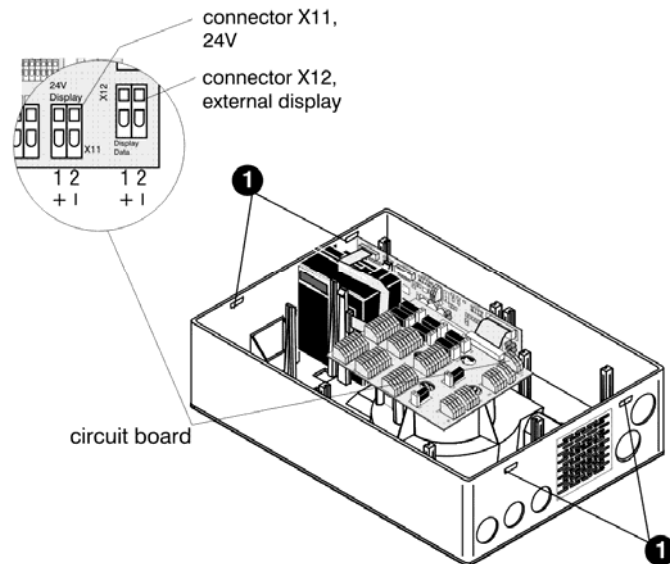
Figure 80: Connecting the remote display unit to TITANUS TOP·SENS®

In order to connect the remote display unit, follow these steps:

1. Using a crosshead screwdriver, carefully unlock the snap-in closures of the housing by simultaneously pressing in both clips located at one side of the housing lid. Lift the lid carefully. Pull off the display board cable and remove the lid.

2. Feed the fire alarm cable through cable openings of TITANUS®.

3. Carry out connection according to wiring diagram.

4. Re-connect the display board to the main board.
    Connection: DISPLAY X5

5. Close the housing lid.

6.10.2 Remote display unit housing

6.10.2.1 Attaching front panel
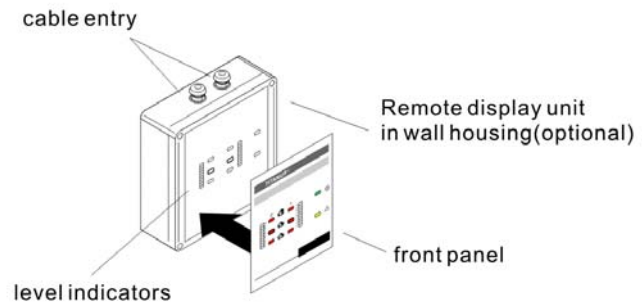
Figure 81: Attaching the front panel to remote display unit

The lid of the remote display unit can be rotated by 180º, the cable entries can be on top or bottom (see figure "Attaching the front panel to remote display unit").

Wall-mounting The remote display unit in the housing can be directly wall-mounted with the rear of the housing to the wall.

Installation material

Remote display unit	Cylinder or flat-head screw – thread diameter: max. 4 mm – head diameter: 5 to 7 mm

Bore-hole spacing The spaces between the bore holes are shown in the following figure (all dimensions in mm).
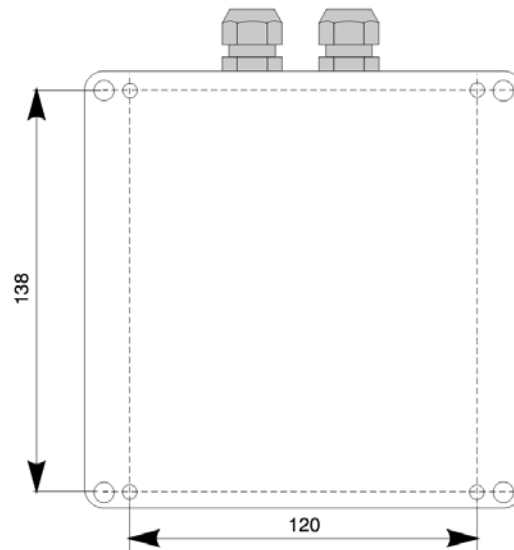
Figure 82: Bore hole spacing of remote display unit within the housing

6.10.3 Remote display unit for 19" inserts
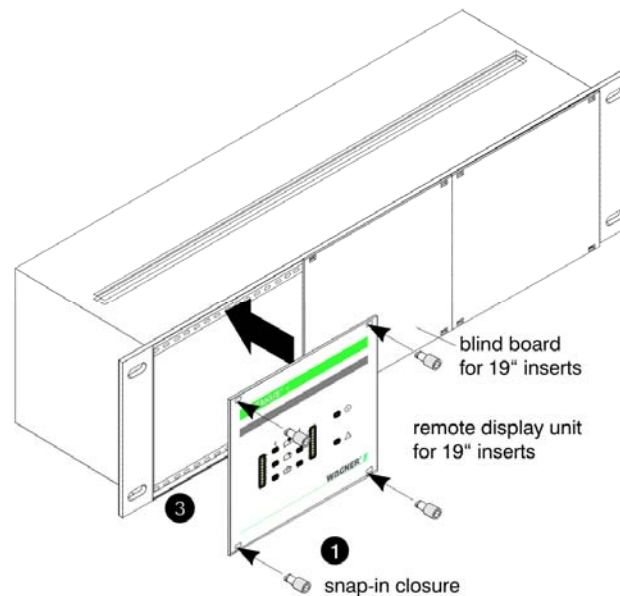
Figure 83: Remote display unit and blind board for 19" inserts

1. To prepare the remote display unit and blind board for installation, clip the snap-in closures to the right-angle openings of the front board.
2. Make the connection as shown in figure "Connection of remote display unit".

3. Place the snap-in closures into the socket and secure them with a quar-
    ter turn.

6.10.4 Electrical Connection

Connect the remote display units – either housing or 19" insert version - via
the terminal blocks X11 and X12 on the circuit board of TITANUS®. Power is
sourced from within TITANUS® or if a greater distance is involved, from an
external source. Calculate the connections as for TITANUS®, according to
chapter "Power Supply".

Note the permissible cable cross sections of the corresponding screw joints
and the permissible wire cross sections of the terminals (see chapter "Tech-
nical Data").

Remote display unit   Connect the remote display unit to the current-free TITANUS® as follows:
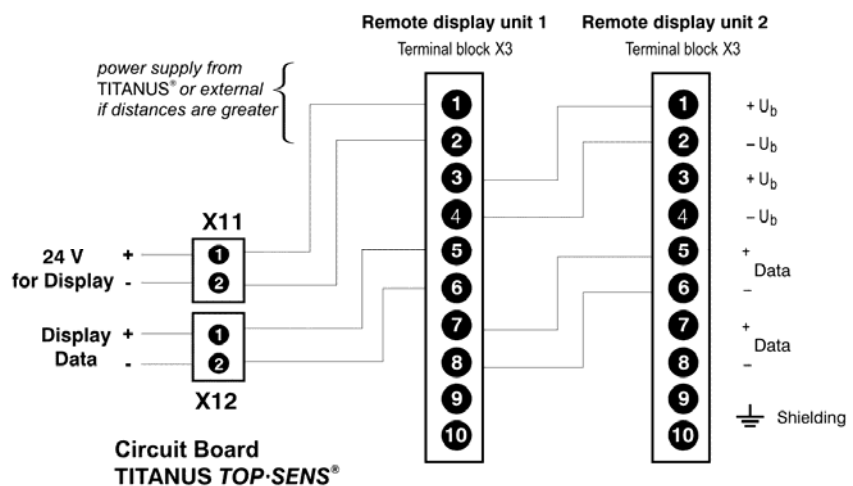
Figure 84: Connection of remote display unit to TITANUS TOP·SENS®

6.11 Data-Log

The device can be tested with the diagnostic software DIAG 3. Besides the current air flow sensor data, different status values can be read out, which help the service technician to easily recognise modified operating conditions. Air flow and smoke level values can be read out on site with a laptop. After the software has been started up, the data is read out on the PC via a USB-Port. For details refer to the diagnostic software documentation. See also chapter Commissioning "Operational Check", using diagnostic software.
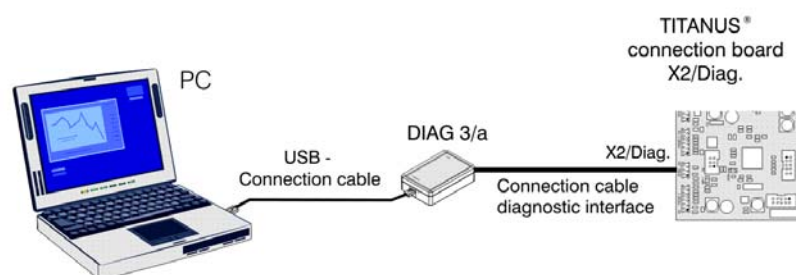
Figure 85: Connection of a PC via the connection diagnostic interface connection cable

TIP
For later checks of the device settings, save and archive the data after commissioning.

7 Installation of the pipe system

7.1 General assembly

The pipes, hoses 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	Internal diameter PVC
Air sampling pipe	25 mm	21.4 mm	21.2 mm
Air sampling hose (SCH-P-25)	25 mm	-	18.5 mm
Air sampling hose (SCH-PG16)	21.1 mm	16.4 mm	-

The following pipes and related fittings are to be used for pipe systems with long pipe intake line (see also Chapter Design "Project planning with long pipe intake line"):

	External diameter	Internal diameter ABS	Internal diameter PVC
Air sampling piper	32 mm	28 mm	28,4 mm
Air sampling pipe	40 mm	35 mm	36,2 mm

> ⚠ **WARNING**
>
> Take note of the temperature range specified in the "Technical data" chapter under "Pipe system" when configuring the pipe system.

7.1.1 Mounting pipe system

The pipe system must be designed according to the requirements of the project and the pipe design guidelines (see chapter Design "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, ABSR-3220, ABSR-4025	R-2519, R-3218, R-4019	Tangit cleaner	Tangit adhesive	Pipe cutter or 38 mm saw

> ⚠ **WARNING**
>
> Adhesives and cleaning products contain solvents and are flammable. It is essential to observe the supplier's safety information before processing.

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 (an elbow equals a straight piece of pipe of 1.5m).

> **NOTICE**
>
> Arcs should be used instead of elbows. An excessive number of bends and angles reduce the air velocity in the air sampling pipe and thus increase the detection time.

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

NOTICE

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 end caps.

NOTICE

After pipe installation is complete, check for the following:

- air tightness (e.g. due to damage)
- any faulty connections
- correct projection of the aspiration aperture

7.1.2 Mounting air sampling hose

The air sampling hose should be used in compliance with the design guidelines (see chapter "Design").

1. Cut the air sampling hose 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 hose ends to the corresponding fittings so that they are airtight.

air sampling hose halogen free	Air sampling hose (PVC)	Cleaning agent	Adhesive	Pipe cutter
SCH-PG16	SCH-P-25	Tangit cleaner	Tangit adhesive	Pipe cutter or 38 mm saw

⚠ **WARNING**

Adhesives and cleaning products contain solvents and are flammable. It is essential to observe the supplier's safety information before processing.

Glue the air sampling hose as follows:

Type SCH-PG16   Stick the air sampling hose by ABS glue into the hose bolting type SCH-PG-16-VO. Turn the hose bolting into the specified pipe with female thread type ABSR-2518-PG16.

Type SCH-P-25   Stick the air sampling hose by ABS glue into pipe fittings respectively sleeves of a pipe system with 25 mm external diameter.

NOTICE

After pipe installation is complete, check for the following:
- air tightness (e.g. due to damage)
- any faulty connections
- correct projection of the aspiration aperture

NOTICE

The complete air sampling pipe must not consist solely of air sampling hose.

NOTICE

Air flow reducers should not be applied to the air sampling hose.

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7.2 Linear expansion of the pipe system

Linear expansions (lengthening or shortening) of the pipe system are caused by variations in temperature. An increase in temperature results in lengthening of the pipe, a decrease in temperature shortens the pipe. It is very important to take this into consideration if the installation temperature differs considerably in comparison to the operating temperature.

The length change can be calculated with the following formula:

$$\Delta L = L \times \Delta T \times \delta$$

ΔL	=	*Linear expansion in [mm]*
L	=	*Length of the pipe to be calculated in [m]*
ΔT	=	*maximum temperature difference in (°C)*
δ	=	*Length change co-efficient in mm/m°C* *δPVC = 0,08 mm/m°C* *δABS = 0,101 mm/m°C*

For example, a temperature variation of 10 ºC in an ABS pipe with a length of 10 m results in an expansion of 10.1 mm.

Pipe clips As a rule, plastic pipe clips, type 23, are used for the installation of pipe systems (ø 25 mm).

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 figure "Pipe clips").

standard

for linear expansions and temperatures of up to -40°C

for high-rack storage areas and temperatures of up to -40°C

plastic pipe clip for 25 mm air sampling pipe type NG 23

plastic pipe clip for air sampling pipe Typ CLIC-PA

spring steel clip for 25 mm air sampling pipe type SNAP CLIP SC (for profiles of 1 to 4 mm)

spring steel clip for 25 mm air sampling pipe type SNAP CLIP SC (for profiles of 4 to 7 mm)

spring steel clip for 25 mm air sampling pipe type SNAP CLIP SC (for profiles of 8 to 12 mm)

Figure 86: Pipe clips

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There are two fixing points for the plastic pipe clip CLIC-PA when installing the pipes:

Position 1 (first locking into place)

Fixes the pipe so that a linear expansion is possible (used in deep freeze areas, if necessary).

Position 2 (second locking into place)

Fixes the pipe and avoids linear expansions.

Pipe Clips for ø 25 mm	Type
standard pipe clips	pipe clip type NG 23 (ø 25 mm)
pipe clips for areas with high temperature differences and deep freeze areas	plastic pipe clip type CLIC-PA (ø 25 – 28 mm)
pipe clips for deep-freeze areas and high rack storage areas	spring steel clip type SNAP CLIP SC (for profiles 1-4 mm) spring steel clip type SNAP CLIP SC (for profiles 4-7 mm) spring steel clip type SNAP CLIP SC (for profiles 8-12 mm)

7.3 Patented aspiration apertures
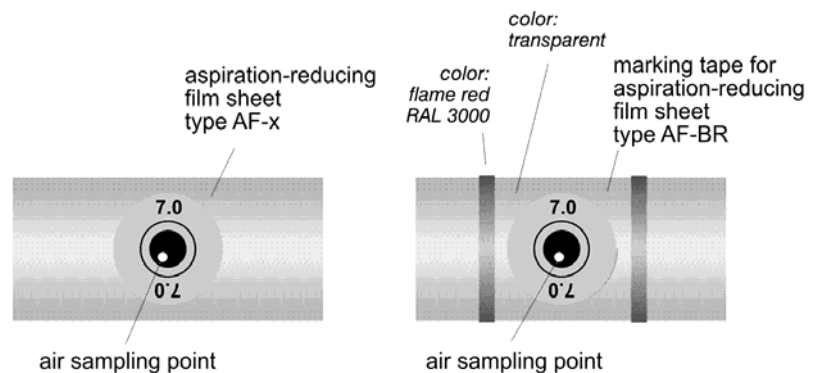
Figure 87: Example of an aspiration aperture with aspiration-reducing film sheet

Aspiration aperture   Design aspiration apertures (bore holes) and their positioning according to project requirements and pipe design guidelines.

Air sampling holes 1. Bore a hole with a 10mm drill at a right angle to the pipe.
2.   Carefully deburr the holes.
3. Clean the area around the hole (around the whole pipe) from dirt and grease 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 bore hole (see following figure point 1).
6. Prevent the film sheet from coming loose by sticking marking tape over it (see following figure point 2).

NOTICE
The perforations in the aspiration-reducing film sheet and the marking tape are to be placed exactly on the hole in the pipe. The diameter of the perforation in the aspiration-reducing film sheet must not be changed. Avoid touching the adhered in order to keep it free from dust and fat.

air sampling pipe

air sampling hole 10 mm

1 Adhere the aspiration-reducing
film sheet with perforation
(here: 7.0 mm opening)

aspiration-reducing
film sheet

7.0

2 Adhere the marking tape on the
aspiration-reducing film sheet on the pipe

marking tape for
aspiration-reducing
film sheet

stripe:
flame red
RAL 3000

transparent
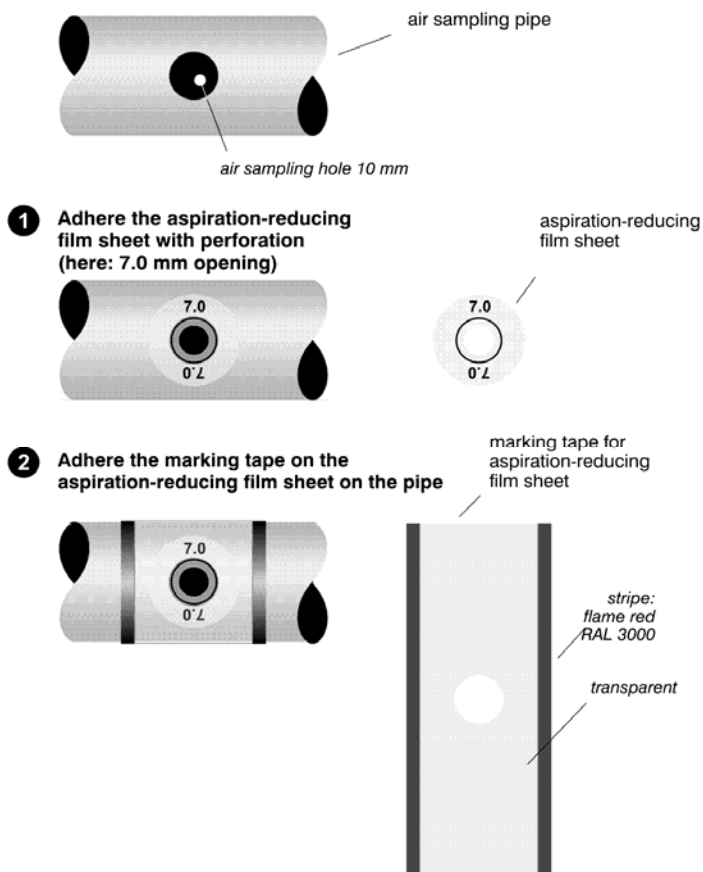
Figure 88: Attaching the aspiration-reducing film sheet

7.4 Ceiling lead through

7.4.1 Ceilings feed-through for false ceiling
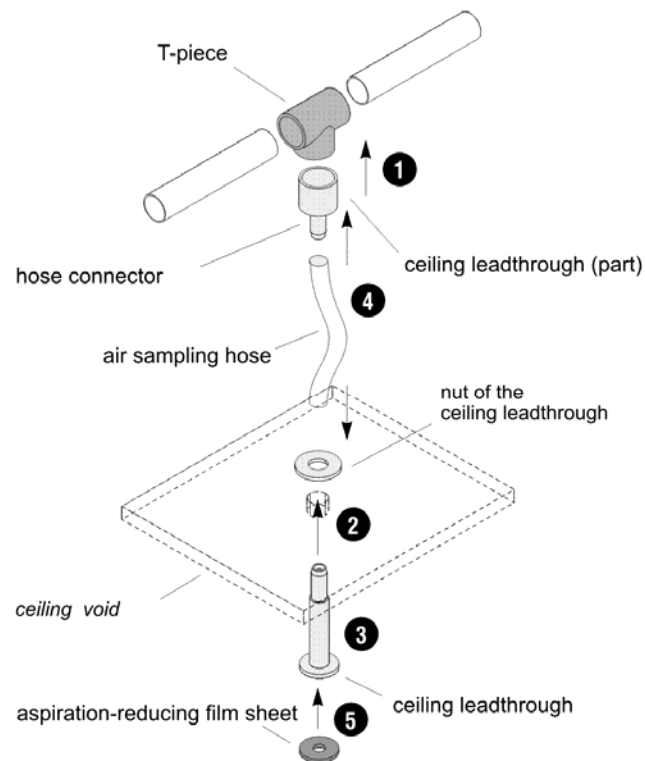
Figure 89: Installation of ceilings feed-through

To install the ceiling feed-through use the following steps:

1. Before gluing remove dirt and grease with the recommended cleaner.
2. Glue the hose connector to the corresponding T-piece with Tangit glue.
3. For each ceiling feed-through drill a hole of · 13mm through the false ceiling.
4. Install the lead-through by first removing the nut, pushing the hose sleeve from the bottom through the bore hole and then re-placing and tightening the nut above the false ceiling.
5. Determine the required length and cut the air sampling hose. Attach the hose to the sleeve of the ceiling feed-through and the hose connector at the T-piece of the air sampling pipe. If necessary soften the hose ends with a hot air fan.

6. Stick the correct aspiration-reducing film sheet (according to pipe design
    guidelines) to the ceiling feed-through.

    The aspiration-reducing film sheets are available in two colours. Depend-
    ing on the colour of the ceiling, either type AFW-x (pure white, RAL
    9010) or type AF-x (papyrus white, RAL9018) are used. On request, film
    sheets in special colours are produced.

NOTICE

The perforation of the aspiration-reducing film sheet must be placed exactly
over the opening of the ceiling lead-through and the diameter of the hole in
the film sheet must not be altered.

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

7.4.2 Other ceilings feed-through
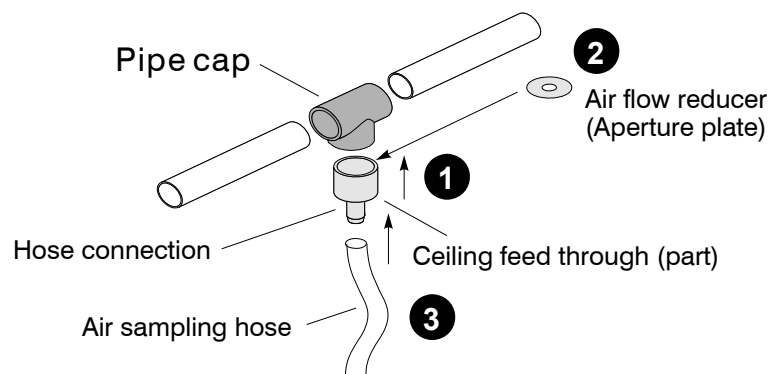
Figure 90: Assembling of capillary hose and up-streamed blind

To install the ceiling feed-through use the following steps:

1. Before gluing remove dirt and grease with the recommended cleaner.
2. Stick the correct aspiration-reducing film sheet (according to pipe design
    guidelines) to the ceiling feed-through.
3. Stick the hose pin with the certain pipe cap along the air sampling hose
    by tangit glue.
4. For each ceiling feed-through drill a hole of · 12 mm through the false
    ceiling.
5. Calculate the necessary length for air sampling hose and cut it. Tuck the
    cut hose through the intermediate ceiling and on the hose pin at the pipe

cap of the air sampling pipe. If necessary, please heat the hose by hot air gun.

NOTICE
The whole of aspiration reducing film sheet must be located over the opening of pipe cap directly. The diameter of opening in the aspiration reducing film sheet must not be changed. To keep the glued surface of the film clean from dust and grease, please avoid any contact.

⚠ WARNING
The air sampling hose cannot be monitored during the application of ceiling ducts with up-streamed aspiration reduction within the T-pieces (pipe caps).

7.5 Monitoring in forced air flow systems (ventilation or climatic applications)

For the monitoring of ventilation and air conditioning ducts special pipe configurations have to be considered.

7.5.1 Detection at air inlets/outlets

NOTICE

If aspiration takes place in a forced air flow system (ventilator, climatic systems), the air sampling points must be positioned in the air flow. Place the air sampling points as shown in following figure.
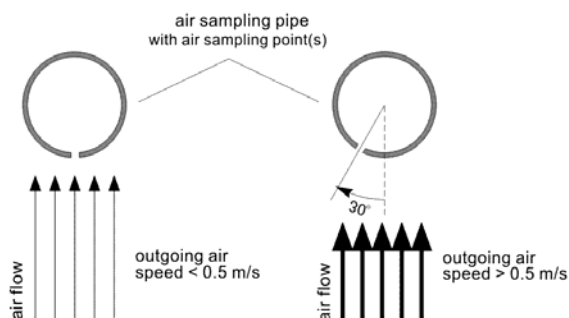
Figure 91: Positioning of air sampling point, depending on air speed

7.5.2 Detection in bypass systems

For connection of air return refer to chapter Installation Pipe System "Air Return".
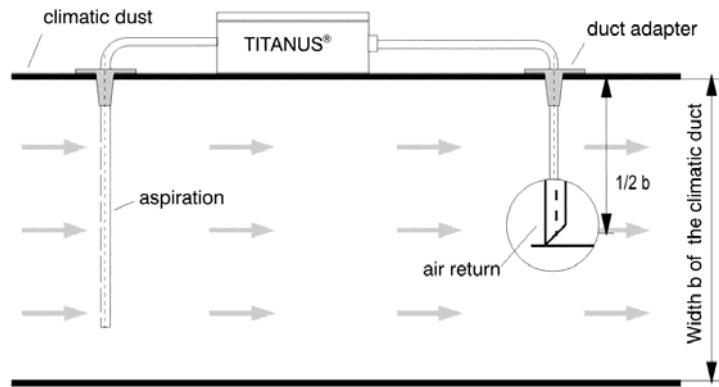
Figure 92: Positioning of air return, example of a climatic duct (bypass)

For the pipe design of air sampling smoke detection in these areas see chapter Design "Pipe Design for Forced Air Flow".

7.6 Filter

7.6.1 Installation of air filter, type LF-AD-x
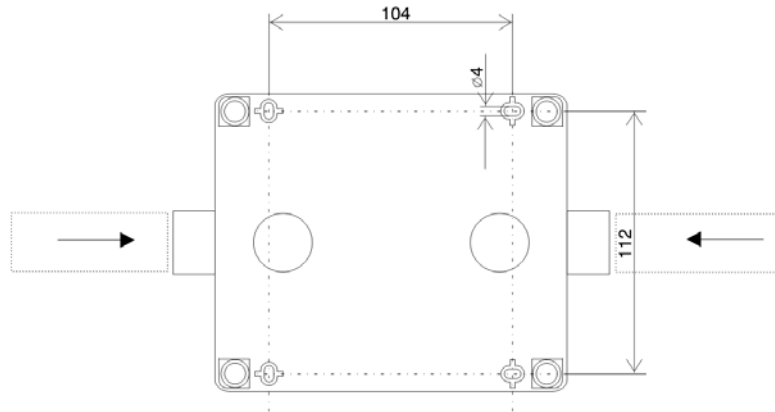
Figure 93: Spacing for bore holes on base of air filter housing

Air filter LF-AD-x
1. To connect to the air sampling pipe with the air filter, insert the air sampling pipe in the provided pipe connectors of the filter.
2. When installing the filter, ensure that the direction of air flow is shown at the side of the housing's bottom part.
3. Screw the bottom part of the housing directly to the wall.

NOTICE
Never use glue to connect the air sampling pipe and pipe connectors. If severe variations in temperature are expected, then it is required to fix the pipe right before the air filter in order to avoid elongation (see chapter installation of the pipe system „Linear expansion of the pipe system") of the pipe and therefore possible loss of pipe connectivity (pipe contraction).

Installation Material

Air filter	cylinder or flat-head screws – thread diameter: max. 4 mm – head diameter: 5 to 7 mm

7.6.2 Mounting of the special filter type SF-400/650
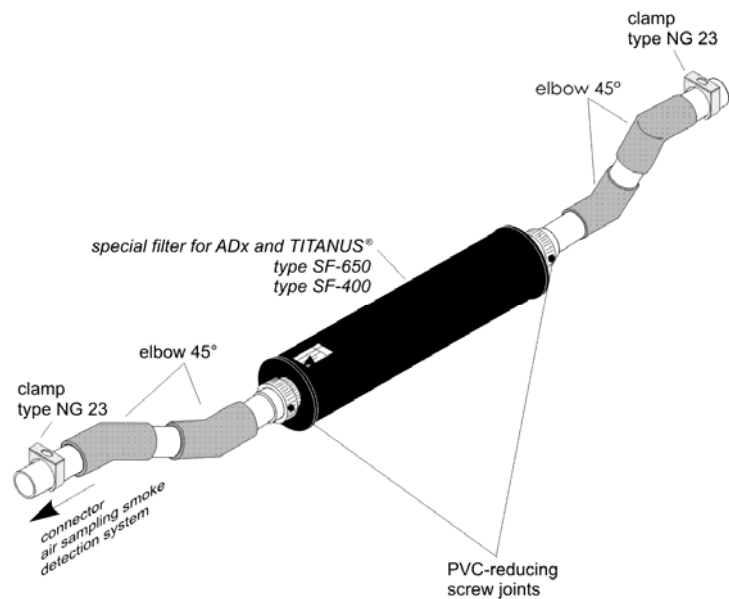
Figure 94: Mounting of the special filter into the pipe system

Special filter SF-x

1. To install or un-install the special filter use the two PVC reducer screw joints at both filter ends.
2. Glue the reducer couplings into the pipe system.
3. When installing the special filter, note the flow direction shown on the filter housing.
4. Clamp the special filter with a 45º elbow piece to the pipe system.

Installation material

Air filter	PVC or ABS pipe fittings – 45°-elbows

When using a combination of special filter type SF-x and air filter type LF-AD please install the air filter after the special filter, viewed from the aspiration system.
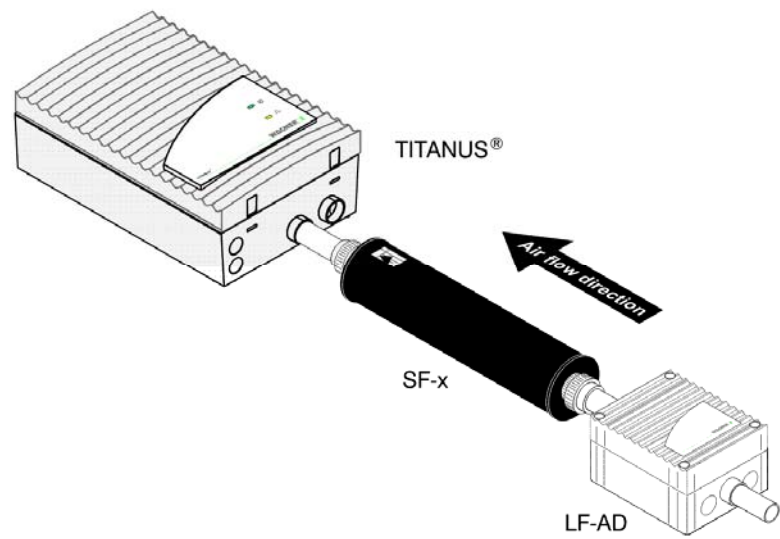
Figure 95: TITANUS® with special filter and LF-AD

To mount the air filter LF-AD, perform the steps of the assembly instructions (see chapter Installation of the pipe system „ Installation of air filter, type LF-AD-x").

7.7 Air return
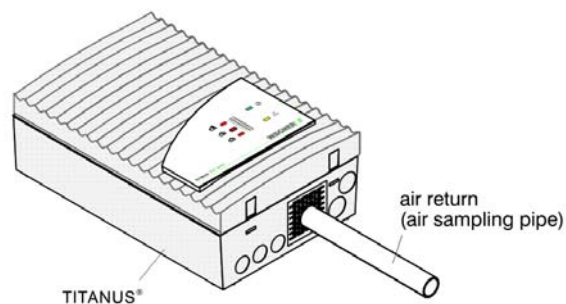
Figure 96: Mounting of the air return

1. Remove the pre-punched pipe lead-through in the protection grid of the air outlet (e.g. with a small side cutter).
2. Pass the air return through the opened feed-through in the protection grid and fix it with the existing pipe collar in the air outlet of device. As the air return pipe fits exactly into the exit air opening, a tight fit is ensured.

NOTICE
Wide temperatures variations make it necessary to fix the air return pipe tightly just in front of the device so that the pipe is not pulled from the pipe connection due to linear expansion (see chapter „Linear expansion of the pipe system") .

7.8 Noise suppressor
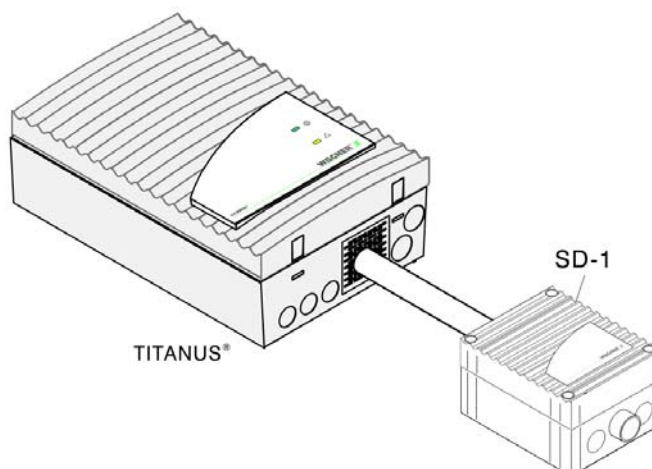
Figure 97: Mounting of noise suppressor

1. Remove the pre-punched pipe lead-through in the protection grid of the air outlet (e.g. with a small side cutter).
2. Pass the pipe (Ø 25 mm) through the opened feed-through in the protection grid and fixes it with the existing pipe collar in the air outlet of TITANUS®. As the air return pipe fits exactly into the exit air opening, a tight fit is ensured.
3. In order to connect the aspiration pipe with the noise suppressor please insert the aspiration pipe into the designated pipe connectors of the noise suppressor.
4. When installing the absorbing duct, ensure that the direction of air flow is shown at the side of the housing's bottom part.
5. Screw the bottom part of the housing directly to the wall.

NOTICE

Never use glue to connect the air sampling pipe and pipe connectors.
If severe variations in temperature are expected, then it is required to fix the pipe right before the air filter in order to avoid elongation (See chapter installation of the pipe system "Linear expansion of the pipe system") of the pipe and therefore possible loss of pipe connectivity (pipe contraction).

Installation material

Noise suppressor	Cylinder or flat-head screws – thread diameter: max. 4 mm – head diameter: 5 to 7 mm

7.9 3-Way ball valve
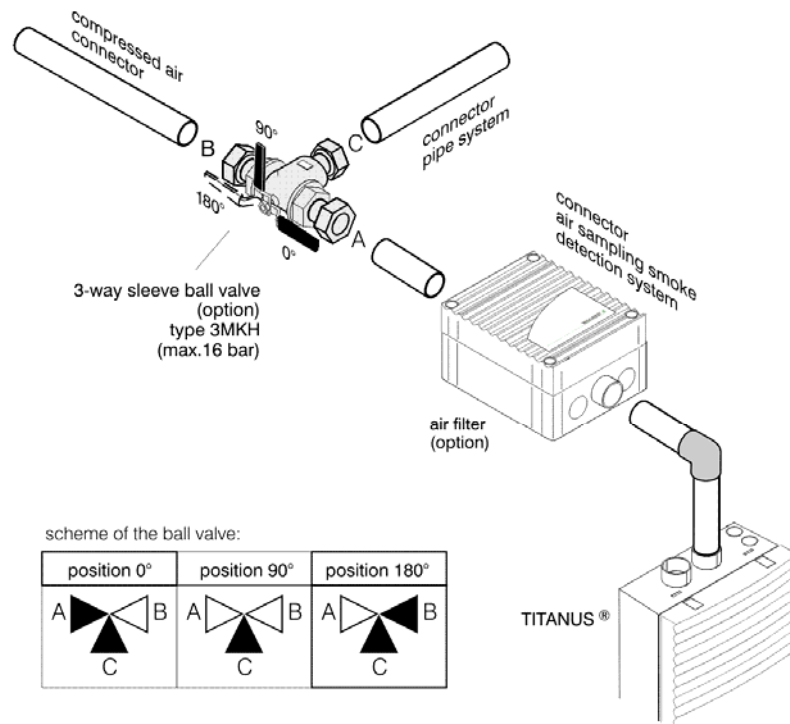
Figure 98: Installation of 3-way ball valve

The ball valve is used for blowing through with compressed air (preferably) or pressed air. Switching occurs between detection (position 0º) and blow-through (position 180º). Connect the ball valve to the pipe system via reducing screw-joints.

NOTICE

Pressed air is compressed, non-purified surround air, containing humidity. Compressed air is purified and de-humidified. If device and the pipe system are located in areas below freezing, compressed air must be used for blow-through.

Connections   During installation, ensure that the correct connections are made (see diagram):

- Connect the air sampling pipe system to C.
- Connect device to A or B and the compressed/pressed air to the remaining connection.

The following steps should be taken for the blow-through process:

1. Connect the compressed air supply (compressor or mobile blow-through device) for the blow-through of the pipes to the 3-way sleeve ball valve via the quick-acting coupling sleeve.

2. Separate the pipes to be blown through from the relevant device via the 3-way ball valve by re-setting the ball valve from operating position 0º to 180º (see figure Installation of 3-way ball valve).

3. Manually blow the pipe system through for 10 seconds.

4. Set the ball valve to 90°. In this position the device is neither connected to the pipe system nor the pressed or compressed air supply. Wait for about 20 seconds so that the dust and dirt disturbed in the pipe system can settle and not be aspirated by the smoke detection system.

5. Re-connect the blown-through pipes with the device within the next 10 second by re-positioning the ball valve to 0º.

NOTICE
A single blow-through process must be completed in 50 seconds. If another blow-through process is necessary, the above process must be repeated at the earliest after 120 seconds.

7.10 Steam trap

7.10.1 Steam trap type KA-DN-25
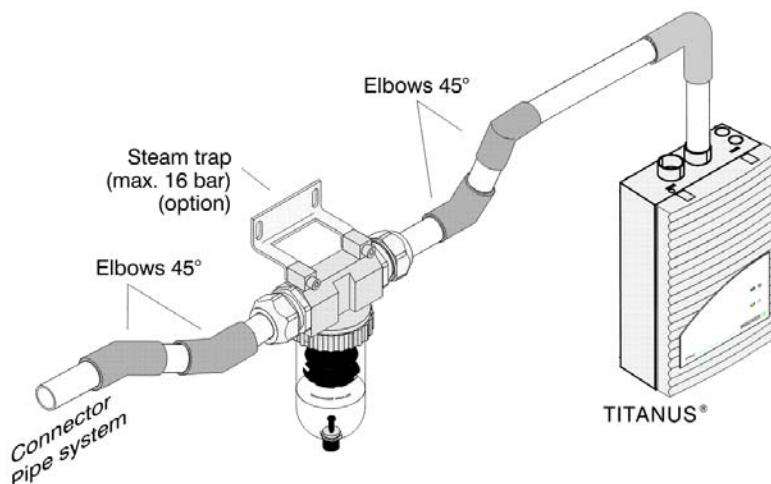
Figure 99: Installation of steam trap type KA-DN-25 to pipe system

Install the steam trap at the lowest point of the pipe system behind the air filter and TITANUS® - device and fasten it with PG screw joints.

NOTICE
Two 45º elbows are required on each connection end for the installation of the steam trap to the pipe system.

Connection When installing the steam trap, note the direction of air flow (see arrow on housing of steam trap).

1. Prepare the pipe system with two 45° elbows at each end of the steam trap and connect it to the PG screw joints.
2. Additionally, secure the steam trap with two screws and the support.

7.10.2 Steam trap type KA-1
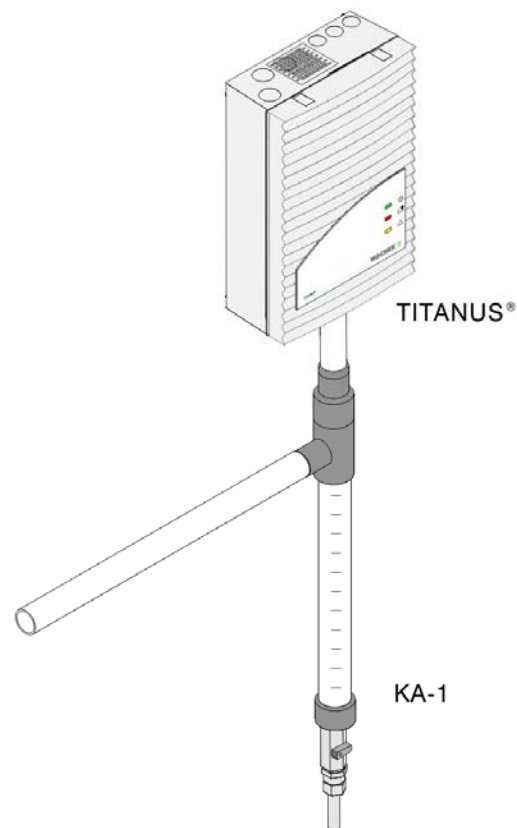
Figure 100: Installation of steam trap type KA-1 to pipe system

Install the steam trap at the lowest port of the pipe system behind the air filter and TITANUS® – device. Glue the air-tight pipe system with steam trap.

Connection 1. Place the steam trap to the intended position and fasten the steam trap with two 40 mm pipe clamps.

2. Glue the air-tight pipe system with steam trap.

7.11 Detonation prevention device

Plastic pipe for
air return

Dangerously
explosive area

Not dangerously
explosive area

Equipotential bonding
terminal

Angele 45°

Detonation prevention
divice

Aspiration pipe steel

1m

TITANUS ®

Aspiration pipe steel

1m

Detonation prevention
divice

Angele 45°

Grounding clamp

Equipotential bonding
terminal

Plastic pipe for
air return
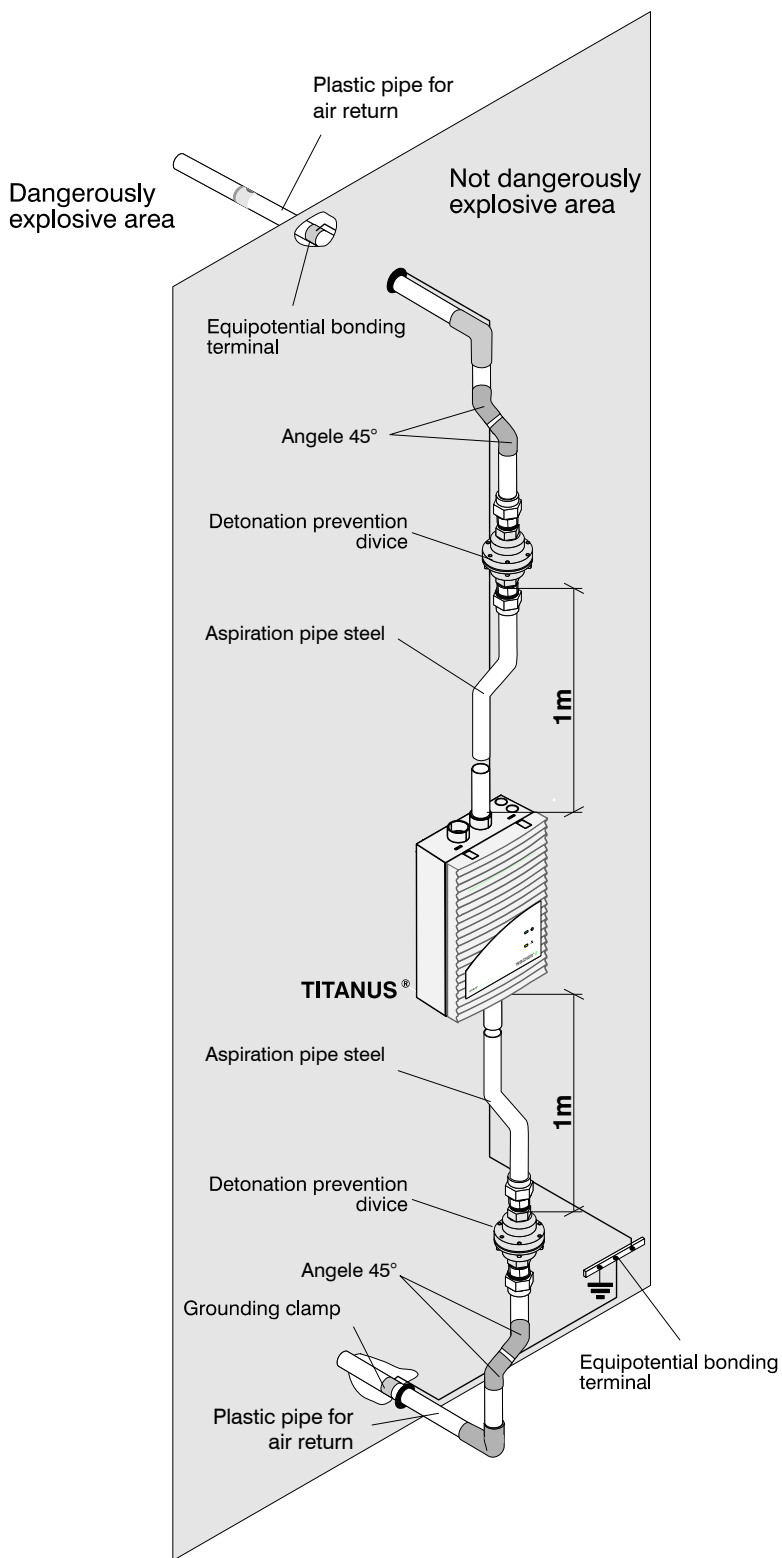
Figure 101: Installation of detonation prevention device with grounding

Detonation prevention devices are installed at a minimum distance of 1m from the air sampling system into the pipe system and air return pipes. The device is attached to these with a reducing screw-joint at the side of the pipe, and is connected by a steel pipe to TITANUS® (see figure Installation of detonation prevention device). The connection between device and screw-joint is made with a ¾" thread.

NOTICE
In order to have an air-tight seal between the detonation prevention device and the steel pipe / reducing screw joint, it is essential to use either sealing tape or joint compound.
The air flow direction plays a secondary role during installation of the device.

7.12 Test adapter
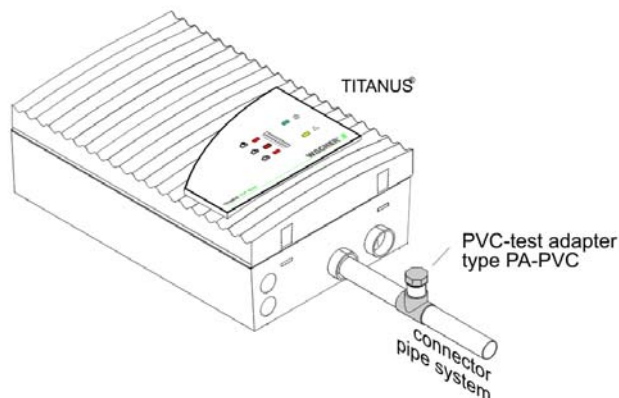
Figure 102: Installation of test adapter to pipe system

The test adapter is stuck into the pipe system immediately next to the air sampling smoke detection system. The test adapter must always be closed during normal operation and is only opened for maintenance and service purposes, to introduce test gas or smoke.

⚠ WARNING
After testing detection in the air sampling smoke detection system and alarm forwarding, the test adapter must be closed again, otherwise there will be an air flow fault!

8 Commissioning

ⓘ	**NOTICE**
	During commissioning, the inspection protocol must be filled out (see appendix). This will be needed for later evaluation of data such as air flow value, type of adjustment (see chapter "Adjustment Air Flow Sensor"), commissioning temperature, air pressure and height above sea level.

Check Settings   Before commissioning check the settings of TITANUS *TOP·SENS*® (see chapter Installation "Settings"). Afterwards connect the device to the power supply.
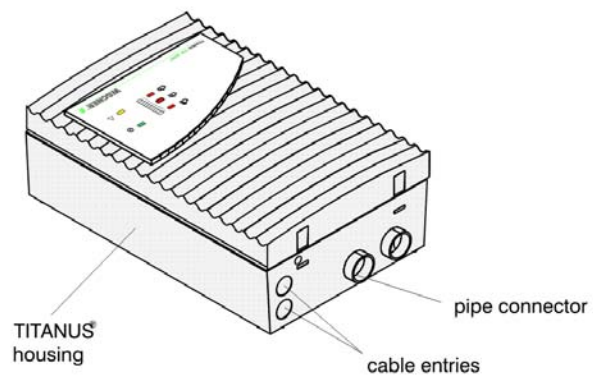
Figure 103: Check for air tightness

Complete installation and connection of the pipe system for commissioning of TITANUS *TOP·SENS*®.

8.1 Adjustment Air Flow Sensor

NOTICE
To correctly adjust TITANUS® for the connected pipe system, the device must have been in operation for at least 30 minutes.

Adjustment Types

- Adjustment can be made independent of the current air pressure (see chapter "Adjustment Independent of Air Pressure"). Any restrictions for this type of adjustment see chapter design "Air Flow Monitoring".
- The air flow sensor can be adjusted dependent on the current air pressure (see chapter "Adjustment Dependent on the Air Pressure"). Refer to the air pressure adjustment chart in the appendix.

To correctly evaluate the air flow sensor value, always record the type of adjustment in the inspection protocol.

8.1.1 Adjustment independent of the air pressure
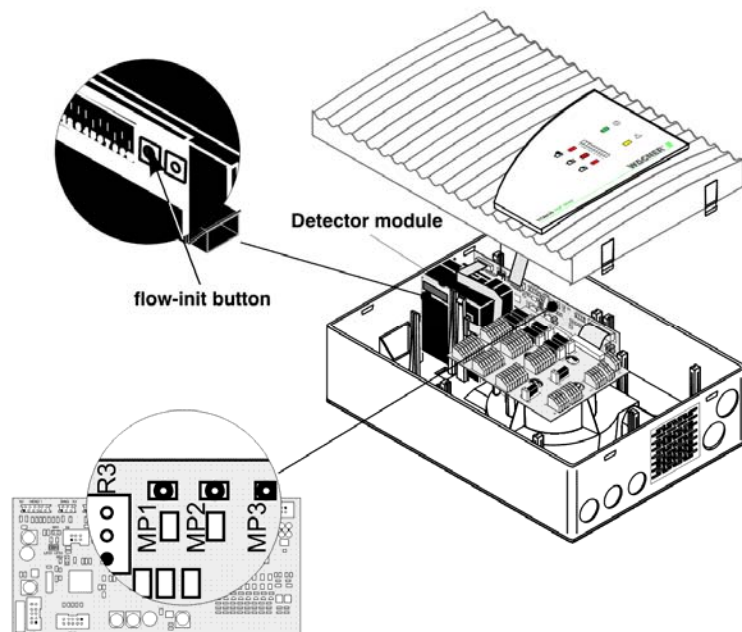
Figure 104: Adjustment independent of the air pressure of the air flow sensor

1. Make sure the device has been in operation for at least 30 minutes.
2. Check the voltage on the measuring points MP2 (+) and MP3 (-). Note the polarity. Select the "V-DC" range of the measuring device. The standard voltage of the measuring points is 1.2 V.
3. If this is not the case, set the trimming potentiometer R5 to this value by means of a small screwdriver.
4. Press the Flow-Init button on the sensor module of TITANUS *TOP·SENS*® (see Figure).
5. After pressing the Flow-Init-button, close the housing of TITANUS *TOP·SENS*®.

The learning phase of TITANUS *TOP·SENS*® is about 5 seconds. During this phase the alarm detection is fully functional, the operating-LED flashes and changes of the air flow are not allowed. After the initialization the operating-LED lights permanently and the air flow sensor has determined its current value for the connected pipe system.

8.1.2 Adjustment dependent on the air pressure
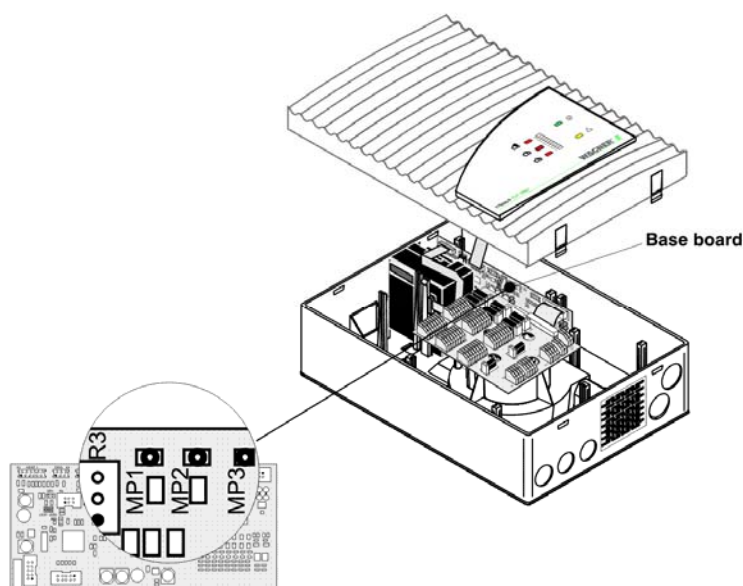
Figure 105: Adjustment dependent on the air pressure of the air flow sensor of TITA-NUS TOP·SENS®

For the adjustment dependent on the air pressure of the air flow sensor a barometer (Recommendation: digital precision pocket barometer GPB 1300, Greisinger electronic) and a multimeter are necessary. Follow the steps below:

1. Make sure the device has been in operation for at least 30 minutes.

2. Determine the height above sea level of the mounting location of the air sampling smoke detection system and register the value in the commissioning protocol.

3. Measure the air pressure by means of the pocket barometer and the ambient temperature by means of a temperature measuring instrument. Register both values in the commissioning protocol.

4. Determine the adjustment value for the air flow sensor according to the air pressure adjustment charts (refer to appendix) and register the value in the commissioning protocol. Pay attention that the adjustment chart corresponds to the design of the pipe system.

5. Connect the multimeter to the measuring points MP2 (+), MP3 (-) (see fig. „Adjustment dependent on the air pressure of the air flow sensor"). Pay attention to the polarity. Choose the "V-DC" range of the measuring device. The standard voltage at the measuring points is 1.2 V.

6. With a screwdriver set the trimming potentiometer R5 to the determined value of the adjustment chart.

NOTICE
The standard voltage of 1.2 V, set to the measuring point, corresponds to the average yearly air pressure for the relevant elevation (m above sea level).

8.2 Check detector module and alarm transmission

Activate the detector module and check the transmission value to the FAS as follows:

1. Spray test aerosol either into the first air sampling point or the test adapter of the TITANUS® pipe system.

2. Proceed as follows:

Check that...	If this is not the case ...
the alarm indicator on the detection system is functional.	1. check that the circuit board is connected. 2. check if there is a defect in the detection system. 3. exchange the detector module.
the alarm is transmitted to the FAS on the relevant line.	check the transmission lines.

NOTICE

If the LOGIC·*SENS* switch S1-10 am set to "ON" (see chapter Installation "Settings"), it has to be set to "OFF" when testing with test aerosol, so that alarm evaluation can be speeded up.

NOTICE

Record all tested data in the inspection protocol.

8.3 Check air flow monitoring

Pipe Fracture Verify the detection of a pipe fracture:

1. Loosen the connection between pipe and TITANUS® or open the test adapter.
2. Check that the fault display of the air sampling smoke detection sys-tem is lit.
3. Optionally, check the data of the air flow sensors with the diagnostic software DIAG 3 and a PC or laptop.
4. Enter the result in the inspection protocol.

Blockage Verify the detection of a blockage:

1. Close the required number of air sampling points (depending on the de-sign for air flow monitoring) with adhesive tape.
2. Check that the fault LED on the smoke detection system lights up.
3. Optionally, check the data of the air flow sensors with the diagnostic software DIAG 3 and a PC or laptop.
4. Enter the result in the inspection protocol.

NOTICE
A pipe fracture or blockage is indicated by a flashing LED on each detector module. - Fracture: 3x flashing - Blockage: 2x flashing The relevant flash code is repeated every two seconds.

Trouble shooting If faults in the air flow are not correctly detected by the device,

check that ...

1. all air sampling points are free.
2. the pipe system has no fractures or cracks.
3. all pipe connections are air tight.
4. the fan is not blocked.
5. the correct aspiration-reducing film sheets have been used.

If no faults are detected, operation of TITANUS® or the air flow sensor can be checked by using the test pipe or diagnostic software (see chapter "Operational Check of TITANUS®").

8.4 Check Fault Signal Transmission

NOTICE
The following steps can only be carried out after the air flow adjustment was made according to chapter "Air Flow Sensor Adjustment".

1. Check the fault signal transmission.

Check air flow monitoring (according to the following section) and verify that the fault signal is still lit on TITANUS® and, if applicable, on the central fire panel.

8.5 Operational check of TITANUS *TOP·SENS*®

If it is not possible to adjust TITANUS® check the operational capability with the test pipe and a digital manometer or use the diagnostic software.

8.5.1 Preparations for the operational check
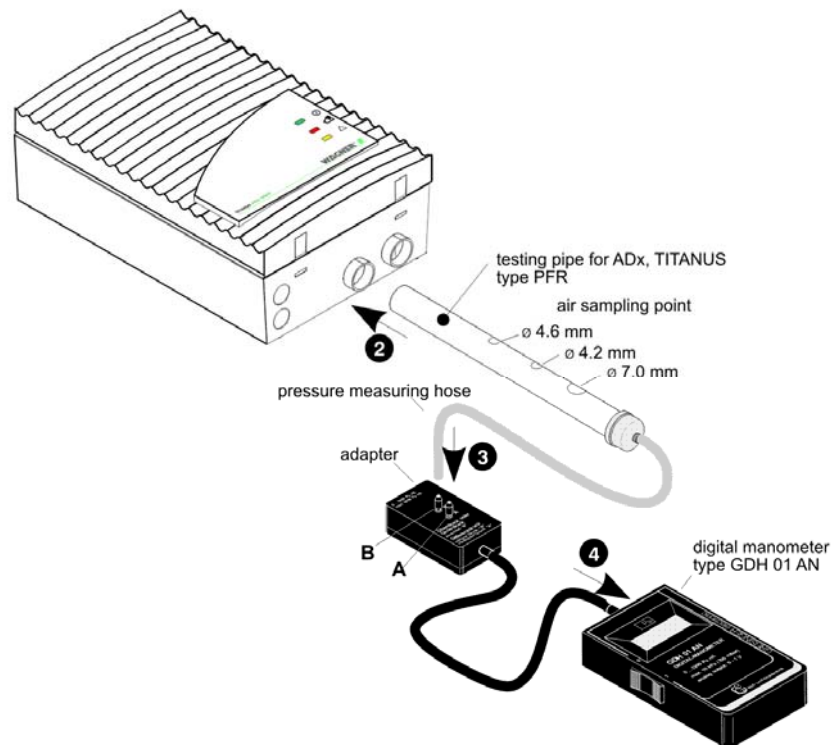
Figure 106: Operational check of TITANUS TOP·SENS®

1. Remove the pipe system from TITANUS®
2. Connect the test pipe.
3. Connect the pressure measuring hose to adapter connection B.
4. Connect the 4-pole plug of the adapter to the digital manometer and switch on.

	NOTICE
	For an operational check of TITANUS® steps 1 – 4 must be carried out for the sensor modules of both pipe systems.

8.5.2 Carrying out operational check

The operational check can be carried out with or without a digital manometer. The complete check is described below. If, during the operational check of TITANUS®, the values vary from those described, the device or its air flow sensor are damaged.

1. After about 120 seconds activate the flow-init button on the detector module. The operating display flashes and the fault display must go out (see INSTRUCTION).

2. After a short initiation period the depression generated in the device is to be approx. 250 up to 310 Pa for a set fan voltage of 6.9 V and 460 up to 530 Pa for 9 V. The LED flash code on the detector module's electronics board must indicate „**Blockage**" after a few seconds (see INSTRUCTION).

3. Re-open all air sampling points of the test pipe. After a few seconds the LED flash code must go out.

4. Remove the test pipe. After a few seconds the LED flash code on detector modules I and II must indicate „**Fracture**".

5. Re-connect the test pipe to the device. After a few seconds the LED flash code must go out.

NOTICE
A pipe fracture or blockage is indicated by a flashing LED on detector module I and II: - Fracture: 3x flashing   - Blockage: 2x flashing   The relevant flash code is repeated every two seconds.

NOTICE
For TITANUS® the operational check with steps 1 to 5 must be carried out for both pipe systems.

If no fault was registered during the operational inspection, the smoke detection system must be checked.

Connection check Check that ...

1. the pipe system is firmly connected to the pipe connection of TITANUS®.

2. all pipe fittings are glued and the pipe system is air tight. For this purpose, first seal all air sampling points (e.g. with insulating tape). Then measure the air flow at the opening for the air return.

3. the correct aspiration-reducing film sheets were taped over the air sampling points.

	NOTICE
	After adjusting the air flow sensors (chapter "Air Flow Sensor Adjustment") no further alterations must be made to the pipes. If later alterations become necessary, the air flow sensor must be readjusted.

To carry out the operational check, optional diagnostic software DIAG 3 can be used.

Follow these steps:

1. Install the diagnostic software on a laptop or PC. WINDOWS 95, 98, ME, 2000, NT, XP, Vista or 7 are suitable.

2. With the enclosed diagnostic cable TITANUS® is connected to the PC via "Diag." on the main board.

3. The diagnostic software is started up.

4. The monitor of the PC displays the current data of TITANUS® visualized.

	NOTICE
	For a correct colour interpretation, the monitor and graphic card must be able to depict more than 256 colours.

After completion of the operations check, commissioning of the device with the pipe system must be repeated from chapter "Adjustment of Air Flow Sensor.

NOTICE
After commissioning is completed, the setting values must be recorded and saved. A print-out of the setting values must be filed in the project folder for future reference.

9 Maintenance

9.1 Visual check

Check that ...

- the pipe system is easily accessible, undamaged and firmly installed.
- the air sampling points on the pipe system are not blocked.
- air sampling pipe and connection cable are tight.
- the device support - if installed –

  is fastened properly.
- the air sampling smoke detection system is not damaged.

(see flash code table)

9.2 Flash code table

The detector modules are equipped with an LED which indicates different faults and device conditions in a flash code:

Flash Codes on the detector module	
Number	**Meaning**
1 x flashing	Air flow initialising active
2 x flashing	Air flow too small (blockage in the pipe system)
3 x flashing	Air flow too large (fracture in the pipe system)
4 x flashing	Software Init-Initialising after connection of supply voltage during initialising smoke detection is not possible
permanently lit	Detector defective
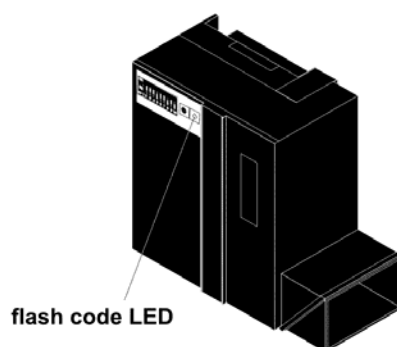
flash code LED

Figure 107: Position of flash code LED on the detector module

Flash codes of LED1 and LED 2 on the main board	
Number	**Meaning**
1 x flashing	Fault: internal voltage monitoring 1
2 x flashing	Fault: internal voltage monitoring 2
3 x flashing	Fault: monitoring of ventilator voltage
4 x flashing	Fault: monitoring of air pressure adjustment voltage
5 x flashing	Software fault
6 x flashing	Internal fault 1
7 x flashing	Internal fault 2
8 x flashing	Device initialising
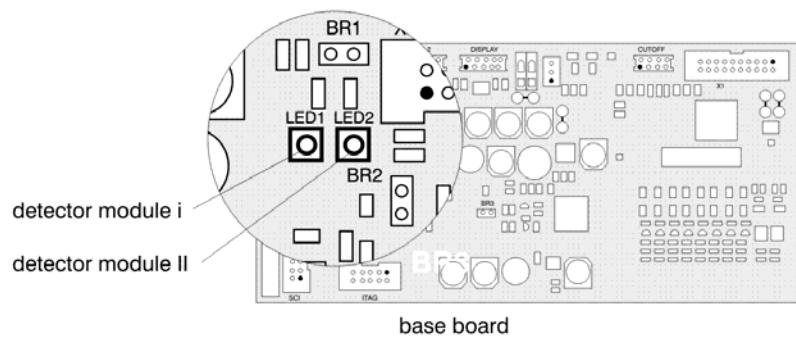
Figure 108: Position of flash code LED's for detector modules I and II on main board

9.2.1 1x Flashing (Fault: Internal Voltage Monitoring 1)

When operating two detector modules both LED's flash. To eliminate a fault, follow the steps below in sequence.

Step	Possible Cause	Diagnostics	Measures
1	Operating voltage too low	Measure the operating voltage (DC) of TITA-NUS® with a multimeter. The measuring value must lie between 14V and 30V	Correct the supply voltage
2	Main board defective	For this diagnostics you will need a second base board. If this is not available, proceed with steps 3-5 for the time being. Switch off the device. Replace the main board with one of the same type. Switch on power and let the device run for a few minutes. If the main board was the cause of the fault, this should now be corrected.	Replace defective main board
3	Display board defective	Switch off the device. On the main board, pull connection cable off display board. Switch on power and let the device run for a few minutes. If the display board is defective, there should now be no fault.	Replace defective display board
4	Network board defective (if present)	Switch off the device. On the main board, pull the connection cable off the network board. Switch on power and let the device run for a few minutes. If the network board is defective, there should now be no fault.	Replace defective network board
5	Shutdown board defective	Switch off the device. On the main board, pull the connection cable off the shutdown board. Switch on power and let the device run for a few minutes. If the shutdown board is defective, there should now be now fault.	Replace defective shutdown board
6	If a fault cannot be eliminated after following the above steps, contact **Wagner Group GmbH** and give a description of the fault together with the flash code readings..		

9.2.2 2x Flashing (Fault: Internal Voltage Monitoring 2)

When operating two detector modules both LED's flash. To eliminate a fault, follow the steps below in sequence.

Step	Possible Cause	Diagnostics	Measures
1	Operating voltage too low	Measure the operating voltage (DC) of TITA-NUS® with a multimeter: The measuring value must lie between 14V and 30V	Correct the supply voltage.
2	Main board defective	for this diagnostics you will need a second base board. If this is not available, proceed with steps 3-4 for the time being. Switch off the device. Replace the main board with one of the same type. Switch on power and let the device run for a few minutes. If the main board was the cause of the fault, this should now be corrected.	Replace defective main board
3	Detector module defective	Switch off the device. Replace detector module with a new one of the same type (inc connection cable). Switch on power and let the device run for a few minutes. If the detector module is defective, there should now be no fault. When using two detector modules, repeat the process for the second module.	Replace defective detector module
4	Shutdown board defective (if present)	Switch off the device. On the base board, pull the connection cable off the shutdown board. Switch on power and let the device run for a few minutes. If the shutdown board is defective, there should now be no fault.	Replace defective shutdown board
5	If a fault cannot be eliminated after following the above steps, contact **Wagner Group GmbH** and give a description of the fault together with the flash code readings.		

9.2.3 3x Flashing (Fault: Monitoring of Fan Voltage)

When operating two detector modules both LED's flash. To eliminate a fault, follow the steps below in sequence.

Step	Possible Cause	Diagnostics	Measures
1	operating voltage too low	Measure the operating voltage (DC) of TITA-NUS® with a multimeter. The measuring value must lie between 14V and 30V.	Correct the supply voltage
2	Fan connection depolarised	The fan is at a stand-still. Switch off the device. On main board, clamp off the connection cable of fan. Switch on power and let the device run for a few minutes. If there is no collective fault, the connection of the fan is defective.	Check ventilator connection to main board (red - cl. 1; black - cl. 2)
3	Fan defective or blocked	The diagnosis from step 2 points to depolarisation of the ventilator. The connection is correct. Measure the ventilator voltage (DC) of the connected fan with a multimeter. If the voltage lies outside the limits shown below, the fan is defective. Adjusted ventilator voltage 6.9V: max. 7.6 V min. 6 V adjusted fan 9 V : max. 10 V min. 7.8 V	Because the fan cannot be re-moved from the housing, the complete unit must be exchanged
4	Main board defective	No cause could be established in steps 1-4. Switch off the device. Replace the main board with one of the same type. Switch on power and let the device run for a few minutes. If the main board was the cause of the fault, this should now be corrected.	Replace defective main board
5	If a fault cannot be eliminated after following the above steps, contact **Wagner Group GmbH** and give a description of the fault together with the flash code readings.		

9.2.4 4x Flashing (Fault: Monitoring of Air Pressure Adjustment Voltage)

When operating two detector modules both LED's flash. To eliminate a fault, follow the steps below in sequence.

Step	Possible Cause	Diagnostics	Measures
1	Setting of potentiometer R3 for pressure-dependent air flow adjustment is incorrect.	Measure the voltage (DC) on the measuring points MP2 (+) and MP3 (-) with a multimeter. The standard pressure is 1.2 V; variations might occur due to an adjustment of the pressure-dependent air flow. If the measured voltage lies outside the range of 0.5 V and 1.9 V, the poten-tiometer R3 setting is incorrect. **Notice:** A fault occurs if voltage is lower than 0.2 V or higher than 2.3 V.	Re-adjust the voltage between measuring points MP2 (+) and MP3 (-) with the potentiometer. For air pressure- independent adjustment: 1.2 V For air pressure-dependent adjustment according to air pressure adjustment table in appendix.
2	Main board defective	The voltage cannot be adjusted in step 1. Switch off the device. On main board, pull the connection cable off the detector module. Switch on power and let the device run for a few minutes. The baseboard is defective if the voltage on MP2 and MP3 cannot be properly adjusted with the potentiometer. **Notice:** When operating without detector module, the diagnosis LED flashes 7x.	Replace main board
3	Detector module defective	Switch off the device. Connect cable of the 1st detector module with the base board and detector module. If there is still a fault, the detector module is defective. Switch on power and let the device run for a few minutes. When using two detector modules, the process must be repeated for the second module.	Replace detector module
4	If a fault cannot be eliminated after following the above steps, contact **Wagner Group GmbH** and give a description of the fault together with the flash code readings.		

9.2.5 5x Flashing (Fault: Programme Error)

When operating two detector modules both LED's flash. To eliminate a fault, follow the steps below in sequence.

9.2.6 6x Flashing or 7x Flashing (Internal Fault 1 and 2)

To eliminate faults, follow the steps below in sequence. When using two detector modules and only one of the two diagnostics LED's flashes, the fault lies most probably with the attached module or its connection cable.

Step	Possible Cause	Diagnostics	Measures
1	Wrong detector module installed	Make sure that detector module, suitable for TITANUS®, is installed.	Install a detector module, suitable for TITANUS®
2	Connection cable between base board and detector module is defective	Switch off the device. Replace connection cable. Switch on power and let the device run for a few minutes. If the fault does not recur, the connection cable is defective.	Replace defective connection cable
3	Detector module defective	After replacing the connection cable in step 2, the fault persists. Switch off the device Replace detector module with one of same type. Switch on power and let the device run for a few minutes. If the detector module caused the fault, this should now be corrected.	Replace defective detector module
4	Main board defective	When using two detector modules, both diagnosis LED's are flashing. Steps 1-3 could find no cause for the fault. Switch off the device. Replace the main board with one of the same type. Switch on power and let the device run for a few minutes. If the main board was the cause of the fault, this should now be corrected.	Replace defective main board.
5	If a fault cannot be eliminated after following the above steps, contact **Wagner Group GmbH** and give a description of the fault together with the flash code readings.		

9.2.7 8x Flashing (Device-Initialising)

This is not a fault. After connecting the operating power, the device is initial-
ised. During that process the diagnostics LED flashes eight times. When us-
ing two detector modules both LED's flash. Smoke detection is not possible
during this time.

9.3 Check detector module and alarm transmission

Proceed according to chapter Commissioning "Detector Module Alarm Relay". Also check the detector module in a visual check for external soiling or damage and exchange it if required.

NOTICE

A hardware defect of the sensor module is indicated by a permanently lit detector module LED.

9.4 Check pipe system

In areas were dust particles or icing-up are possible, check the air sampling points of the pipe system for any blockage. If necessary, free the openings with a blast of compressed air. For this purpose use a portable compressed air bottle (blow-through device) or use the manual blow-through system installed on site.

⚠ WARNING

Before blow-through, to avoid damage to the air flow sensor, disconnect TITANUS® from the pipe system.

9.5 Exchange of detector module
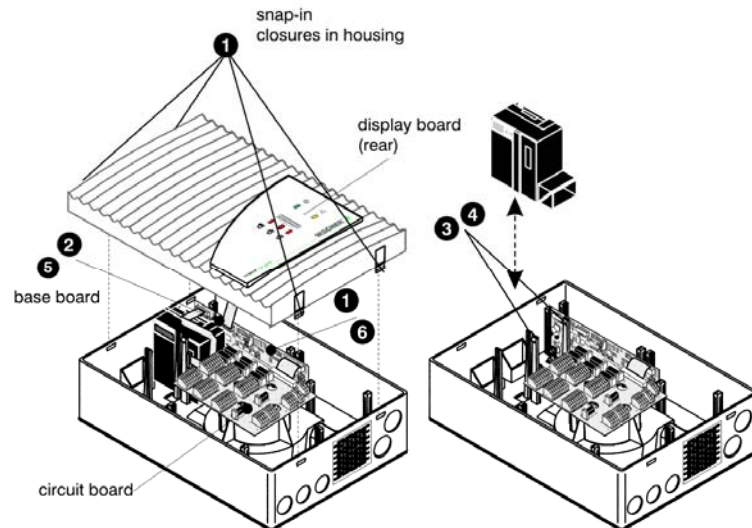
Figure 109: Exchange of detector module

1. Carry out the following steps only when the device is switched off.
    Using a screwdriver, carefully unlock the snap-in closures of the housing by simultaneously pressing in both clips located at one side of the housing lid.
2. Carefully lift the lid. Pull the display board cable off and remove the lid.
3. Pull the connection cable of the detector module off the main board.
4. Carefully spread both support clamps of the detector module and remove the module.
5. Spread both support clamps again and insert the new detector module between them. Both clamps must fit tightly and snap in audibly. Afterwards, press both support clamps together.
6. Re-connect the sensor module via the ribbon cable to the base board. Connection: HEAD 1 or HEAD2
7. Connect the display board to the main board X5 DISPLAY.
8. Before initialising, the operating voltage must be re-connected. Press the Flow-Init button on the detector module in order to initialise the pipe system (INSTRUCTION).
9. Close the housing lid.

NOTICE
In order to adjust TITANUS® correctly to the pipe system, the device must be in operation for at least 30 minutes.

9.6 Changing the air filter LF-AD-x
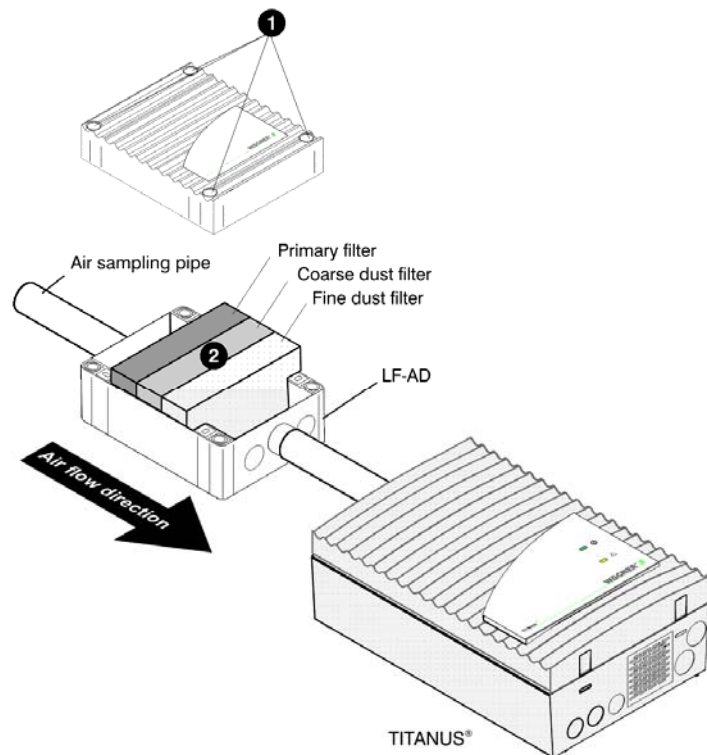
Figure 110: Change the filter inserts

To clean or change the filter inserts, carry out the following steps:

1. Loosen the four screws and remove the housing lid.

2. Remove the filter inserts and checks how soiled they are. The inserts
    can be cleaned if there is a small amount of soiling and must be replaced
    if soiling is heavy.

3. Carefully clean the inside of the housing from any dust. Replace the
    cleaned or replaced filter inserts in the correct sequence, which is shown
    on the instruction label of the housing floor.

4. Replace and screw down the housing lid.

NOTICE
Opening the housing lid of the air filter LF-AD-x causes an air flow fault in TITANUS®.

9.7 Changing special air filter SF- 400/650
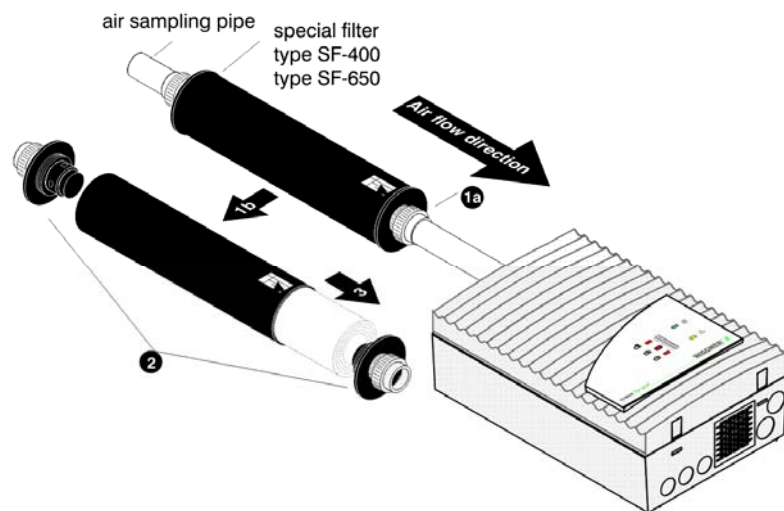
Figure 111: Exchange of filter element

To change the filter insert follow these steps:

1. Loosen the two PVC reducing couplings on the special filter **1a** and re-move it **1b**.
2. Remove the two screw-in plugs on the filter housing.
3. Remove the filter insert from the housing and replace with a new one.
4. Replace the two screw-in plugs in the filter housing.
5. Re-insert the special filter into the pipe system and fix it firmly in place with PVC reducing couplings.

	NOTICE
	When installing the special filter it is important to note the direction of air flow!

	NOTICE
	Opening the housing lid of the special air filter causes an air flow fault in TITANUS®.

9.8 Check the air flow sensor adjustment

Check the air flow adjustment using the diagnostic software.

Functioning Principle   During initialisation of the connected pipe system, the device firstly stores the measured current value of the air flow as a rated value, using the integrated air flow sensor technology. This rated value serves as a reference value for further evaluation of any air flow fault. Depending on the selected air flow threshold (see chapter Design "Adjustment of the air flow sensitivity"), the current air flow value may vary above or below the rated value during operation, without triggering an air flow fault. Only if the selected air flow threshold is exceeded, will an air flow fault be transmitted.

Check of Current Value   In the diagnostic software the tolerance range of the selected air flow threshold is displayed together with the current and rated value. The limits (maximum/minimum) always correspond to a variation of ±100 % from the set rated value.

Check the variation of the current value from the rated value. As a preventive measure, check the pipe system (see paragraph "Correction of Air Flow Fault" on next page), if a variation of > ±70 % exists.

NOTICE
Variations of the actual air flow value from the rated value are caused by faults in the pipe system (fracture or blockage) and fluctuations in air pressure and temperature of the surrounding area.

Dependent on air pressure   To ensure fault-free long-term operation of the device, the air flow sensor must be adjusted to be air pressure-dependent (see chapter „Commissioning"). Only this type of adjustment allows for small air pressure variations to be within the monitoring window and thus within the permissible tolerance range.

⚠ WARNING
At a low or medium air flow threshold an air flow-dependent adjustment **must** be made.

Independent of air pressure If the sensor adjustment was made independent of the air pressure, variations can lead to unwanted air flow faults. This type of adjustment must only be made if it can be ensured that there are not going to be any air pressure fluctuations in the immediate surroundings.

⚠ WARNING
If it is not certain that there are not going to be any air pressure fluctuations in the immediate surroundings, the air flow-dependent adjustment must be carried out.

Correction of an

air flow fault If the air flow adjustment was made dependent on the air pressure and the measured value is not within the tolerance range of the selected air flow threshold (air flow fault is indicated on the device), a fault other than that caused by air pressure or temperature fluctuations is present.

1. In that case check the pipe system for air-tightness and blockage (see chapter Commissioning, section "Trouble Shooting").

NOTICE
If the pipe network was altered during trouble shooting, the original configuration of the network must be restored afterwards and the air flow must be re-adjusted.

2. If this check is positive, check air flow monitoring by connecting the test pipe and carrying out the operational check described in chapter Commissioning.

⚠ WARNING
If the air flow monitor is damaged, only authorised personnel must exchange the detector module!

If the test results do not vary from the given values, the air flow monitor has no defect.

3. Carry out a new adjustment for the connected pipe system.

NOTICE

It is essential to enter in the inspection protocol the adjustment type (dependent or independent on air pressure), air pressure values, height above sea level and set voltage on MP2/MP3.

4. Monitor the current air flow value during maintenance work or, at the latest, check it during the next inspection.

TIP

All saved and current device information and settings (via DIL switch) can be saved via diagnostic software.
Further information about diagnostic software DIAG 3 sees separate documentation.

5. If there is a similar variation from the rated value as before, interfering environmental influences are the cause. If these negative influences on air flow monitoring cannot be remedied, the threshold should be set to the next least sensitive level.

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9.9 Check air flow monitoring

A pipe fracture or blockage is indicated for each sensor module on the electrics board via a flash code LED.

Proceed according to chapter Commissioning "Air Flow Monitoring".

9.10 Check fault signal transmission

A fault will be indicated on TITANUS® and the central control panel.

Proceed according to chapter Commissioning "Fault Signal Transmission".

9.11 Maintenance intervals

The maintenance includes regular servicing. The air sampling smoke detection systems are checked during commissioning and annually thereafter.

For each service, the following checks must be carried out:

Type of Check	Measure	Other Information in Chapter
Servicing	Visual check	Maintenance
	Detection unit and alarm forwarding	Maintenance
	Check pipe system	Maintenance
	Air flow sensor adjustment	Maintenance
	Air flow monitoring	Maintenance
	Fault forwarding	Commissioning

In addition to the annual maintenance national regulations and standards referring to the intended use must be considered, as well as application-specific requirements, if necessary.

Appendix

Air Pressure Adjustment Tables

Projection Tables

System Product List

Inspection Protocol

Glossary

Conformity certification pursuant to EU

Air Pressure Correction Table
for Adjustment of TITANUS *TOP · SENS®* and TITANUS *TOP · SENS®* 2

Equipment Protection

Height [m above sea level]	Air Pressure [hPa] at a Height of														
0	973	978	983	988	993	998	1003	1008	1013	1018	1023	1028	1033	1038	1043
50	967	972	977	982	987	992	997	1002	1007	1012	1017	1022	1027	1032	1037
100	961	966	971	976	981	986	991	996	1001	1006	1011	1016	1021	1026	1031
150	954	959	964	969	974	979	984	989	994	999	1004	1009	1014	1019	1024
200	948	953	958	963	968	973	978	983	988	993	998	1003	1008	1013	1018
250	942	947	952	957	962	967	972	977	982	987	992	997	1002	1007	1012
300	936	941	946	951	956	961	966	971	976	981	986	991	996	1001	1006
350	930	935	940	945	950	955	960	965	970	975	980	985	990	995	1000
400	924	929	934	939	944	949	954	959	964	969	974	979	984	989	994
450	918	923	928	933	938	943	948	953	958	963	968	973	978	983	988
500	912	917	922	927	932	937	942	947	952	957	962	967	972	977	982
550	906	911	916	921	926	931	936	941	946	951	956	961	966	971	976
600	900	905	910	915	920	925	930	935	940	945	950	955	960	965	970
650	894	899	904	909	914	919	924	929	934	939	944	949	954	959	964
700	888	893	898	903	908	913	918	923	928	933	938	943	948	953	958
750	882	887	892	897	902	907	912	917	922	927	932	937	942	947	952
800	877	882	887	892	897	902	907	912	917	922	927	932	937	942	947
850	871	876	881	886	891	896	901	906	911	916	921	926	931	936	941
900	865	870	875	880	885	890	895	900	905	910	915	920	925	930	935
950	860	865	870	875	880	885	890	895	900	905	910	915	920	925	930
1000	854	859	864	869	874	879	884	889	894	899	904	909	914	919	924
1050	848	853	858	863	868	873	878	883	888	893	898	903	908	913	918
1100	843	848	853	858	863	868	873	878	883	888	893	898	903	908	913
1150	837	842	847	852	857	862	867	872	877	882	887	892	897	902	907
1200	832	837	842	847	852	857	862	867	872	877	882	887	892	897	902
1250	827	832	837	842	847	852	857	862	867	872	877	882	887	892	897
1300	821	826	831	836	841	846	851	856	861	866	871	876	881	886	891
1350	816	821	826	831	836	841	846	851	856	861	866	871	876	881	886
1400	810	815	820	825	830	835	840	845	850	855	860	865	870	875	880
1450	805	810	815	820	825	830	835	840	845	850	855	860	865	870	875
1500	800	805	810	815	820	825	830	835	840	845	850	855	860	865	870
1550	795	800	805	810	815	820	825	830	835	840	845	850	855	860	865
1600	789	794	799	804	809	814	819	824	829	834	839	844	849	854	859
1650	784	789	794	799	804	809	814	819	824	829	834	839	844	849	854
1700	779	784	789	794	799	804	809	814	819	824	829	834	839	844	849
1750	774	779	784	789	794	799	804	809	814	819	824	829	834	839	844
1800	769	774	779	784	789	794	799	804	809	814	819	824	829	834	839
1850	764	769	774	779	784	789	794	799	804	809	814	819	824	829	834
1900	759	764	769	774	779	784	789	794	799	804	809	814	819	824	829
1950	754	759	764	769	774	779	784	789	794	799	804	809	814	819	824
2000	749	754	759	764	769	774	779	784	789	794	799	804	809	814	819
2050	744	749	754	759	764	769	774	779	784	789	794	799	804	809	814
2100	739	744	749	754	759	764	769	774	779	784	789	794	799	804	809
2150	734	739	744	749	754	759	764	769	774	779	784	789	794	799	804
2200	729	734	739	744	749	754	759	764	769	774	779	784	789	794	799
2250	725	730	735	740	745	750	755	760	765	770	775	780	785	790	795
2300	720	725	730	735	740	745	750	755	760	765	770	775	780	785	790
2350	715	720	725	730	735	740	745	750	755	760	765	770	775	780	785
2400	710	715	720	725	730	735	740	745	750	755	760	765	770	775	780
Titanus PS/PS 2 [V]	0,50	0,60	0,70	0,80	0,90	1,00	1,10	1,20	1,30	1,40	1,50	1,60	1,70	1,80	1,90

Air Pressure Correction Table
for Adjustment of TITANUS *TOP · SENS®* and TITANUS *TOP · SENS® 2*

Room Protection (I-shaped pipe system)

Height [m above sea level]	Air Pressure [hPa] at a height of														
0	973	978	983	988	993	998	1003		1013	1018	1023	1028	1033	1038	1043
50	967	972	977	982	987	992	997	1002	1007	1012	1017	1022	1027	1032	1037
100	961	966	971	976	981	986	991	996	1001	1006	1011	1016	1021	1026	1031
150	954	959	964	969	974	979	984	989	994	999	1004	1009	1014	1019	1024
200	948	953	958	963	968	973	978	983	988	993	998	1003	1008	1013	1018
250	942	947	952	957	962	967	972	977	982	987	992	997	1002	1007	1012
300	936	941	946	951	956	961	966	971	976	981	986	991	996	1001	1006
350	930	935	940	945	950	955	960	965	970	975	980	985	990	995	1000
400	924	929	934	939	944	949	954	959	964	969	974	979	984	989	994
450	918	923	928	933	938	943	948	953	958	963	968	973	978	983	988
500	912	917	922	927	932	937	942	947	952	957	962	967	972	977	982
550	906	911	916	921	926	931	936	941	946	951	956	961	966	971	976
600	900	905	910	915	920	925	930	935	940	945	950	955	960	965	970
650	894	899	904	909	914	919	924	929	934	939	944	949	954	959	964
700	888	893	898	903	908	913	918	923	928	933	938	943	948	953	958
750	882	887	892	897	902	907	912	917	922	927	932	937	942	947	952
800	877	882	887	892	897	902	907	912	917	922	927	932	937	942	947
850	871	876	881	886	891	896	901	906	911	916	921	926	931	936	941
900	865	870	875	880	885	890	895	900	905	910	915	920	925	930	935
950	860	865	870	875	880	885	890	895	900	905	910	915	920	925	930
1000	854	859	864	869	874	879	884	889	894	899	904	909	914	919	924
1050	848	853	858	863	868	873	878	883	888	893	898	903	908	913	918
1100	843	848	853	858	863	868	873	878	883	888	893	898	903	908	913
1150	837	842	847	852	857	862	867	872	877	882	887	892	897	902	907
1200	832	837	842	847	852	857	862	867	872	877	882	887	892	897	902
1250	827	832	837	842	847	852	857	862	867	872	877	882	887	892	897
1300	821	826	831	836	841	846	851	856	861	866	871	876	881	886	891
1350	816	821	826	831	836	841	846	851	856	861	866	871	876	881	886
1400	810	815	820	825	830	835	840	845	850	855	860	865	870	875	880
1450	805	810	815	820	825	830	835	840	845	850	855	860	865	870	875
1500	800	805	810	815	820	825	830	835	840	845	850	855	860	865	870
1550	795	800	805	810	815	820	825	830	835	840	845	850	855	860	865
1600	789	794	799	804	809	814	819	824	829	834	839	844	849	854	859
1650	784	789	794	799	804	809	814	819	824	829	834	839	844	849	854
1700	779	784	789	794	799	804	809	814	819	824	829	834	839	844	849
1750	774	779	784	789	794	799	804	809	814	819	824	829	834	839	844
1800	769	774	779	784	789	794	799	804	809	814	819	824	829	834	839
1850	764	769	774	779	784	789	794	799	804	809	814	819	824	829	834
1900	759	764	769	774	779	784	789	794	799	804	809	814	819	824	829
1950	754	759	764	769	774	779	784	789	794	799	804	809	814	819	824
2000	749	754	759	764	769	774	779	784	789	794	799	804	809	814	819
2050	744	749	754	759	764	769	774	779	784	789	794	799	804	809	814
2100	739	744	749	754	759	764	769	774	779	784	789	794	799	804	809
2150	734	739	744	749	754	759	764	769	774	779	784	789	794	799	804
2200	729	734	739	744	749	754	759	764	769	774	779	784	789	794	799
2250	725	730	735	740	745	750	755	760	765	770	775	780	785	790	795
2300	720	725	730	735	740	745	750	755	760	765	770	775	780	785	790
2350	715	720	725	730	735	740	745	750	755	760	765	770	775	780	785
2400	710	715	720	725	730	735	740	745	750	755	760	765	770	775	780
Titanus PS/PS 2 [V]	0,58	0,67	0,76	0,85	0,94	1,03	1,12	1,21	1,30	1,39	1,48	1,57	1,66	1,75	1,84

Air Pressure Correction Table
for Adjustment of TITANUS *TOP · SENS®* a nd TITANUS *TOP · SENS®* 2

Room Protection (U-shaped, double U-shaped and H-shaped pipe system)

Height [m above sea level]	Air Pressur [hPa] at a Heigt of														
0	973	978	983	988	993	998	1003	1008	1013	1018	1023	1028	1033	1038	1043
50	967	972	977	982	987	992	997	1002	1007	1012	1017	1022	1027	1032	1037
100	961	966	971	976	981	986	991	996	1001	1006	1011	1016	1021	1026	1031
150	954	959	964	969	974	979	984	989	994	999	1004	1009	1014	1019	1024
200	948	953	958	963	968	973	978	983	988	993	998	1003	1008	1013	1018
250	942	947	952	957	962	967	972	977	982	987	992	997	1002	1007	1012
300	936	941	946	951	956	961	966	971	976	981	986	991	996	1001	1006
350	930	935	940	945	950	955	960	965	970	975	980	985	990	995	1000
400	924	929	934	939	944	949	954	959	964	969	974	979	984	989	994
450	918	923	928	933	938	943	948	953	958	963	968	973	978	983	988
500	912	917	922	927	932	937	942	947	952	957	962	967	972	977	982
550	906	911	916	921	926	931	936	941	946	951	956	961	966	971	976
600	900	905	910	915	920	925	930	935	940	945	950	955	960	965	970
650	894	899	904	909	914	919	924	929	934	939	944	949	954	959	964
700	888	893	898	903	908	913	918	923	928	933	938	943	948	953	958
750	882	887	892	897	902	907	912	917	922	927	932	937	942	947	952
800	877	882	887	892	897	902	907	912	917	922	927	932	937	942	947
850	871	876	881	886	891	896	901	906	911	916	921	926	931	936	941
900	865	870	875	880	885	890	895	900	905	910	915	920	925	930	935
950	860	865	870	875	880	885	890	895	900	905	910	915	920	925	930
1000	854	859	864	869	874	879	884	889	894	899	904	909	914	919	924
1050	848	853	858	863	868	873	878	883	888	893	898	903	908	913	918
1100	843	848	853	858	863	868	873	878	883	888	893	898	903	908	913
1150	837	842	847	852	857	862	867	872	877	882	887	892	897	902	907
1200	832	837	842	847	852	857	862	867	872	877	882	887	892	897	902
1250	827	832	837	842	847	852	857	862	867	872	877	882	887	892	897
1300	821	826	831	836	841	846	851	856	861	866	871	876	881	886	891
1350	816	821	826	831	836	841	846	851	856	861	866	871	876	881	886
1400	810	815	820	825	830	835	840	845	850	855	860	865	870	875	880
1450	805	810	815	820	825	830	835	840	845	850	855	860	865	870	875
1500	800	805	810	815	820	825	830	835	840	845	850	855	860	865	870
1550	795	800	805	810	815	820	825	830	835	840	845	850	855	860	865
1600	789	794	799	804	809	814	819	824	829	834	839	844	849	854	859
1650	784	789	794	799	804	809	814	819	824	829	834	839	844	849	854
1700	779	784	789	794	799	804	809	814	819	824	829	834	839	844	849
1750	774	779	784	789	794	799	804	809	814	819	824	829	834	839	844
1800	769	774	779	784	789	794	799	804	809	814	819	824	829	834	839
1850	764	769	774	779	784	789	794	799	804	809	814	819	824	829	834
1900	759	764	769	774	779	784	789	794	799	804	809	814	819	824	829
1950	754	759	764	769	774	779	784	789	794	799	804	809	814	819	824
2000	749	754	759	764	769	774	779	784	789	794	799	804	809	814	819
2050	744	749	754	759	764	769	774	779	784	789	794	799	804	809	814
2100	739	744	749	754	759	764	769	774	779	784	789	794	799	804	809
2150	734	739	744	749	754	759	764	769	774	779	784	789	794	799	804
2200	729	734	739	744	749	754	759	764	769	774	779	784	789	794	799
2250	725	730	735	740	745	750	755	760	765	770	775	780	785	790	795
2300	720	725	730	735	740	745	750	755	760	765	770	775	780	785	790
2350	715	720	725	730	735	740	745	750	755	760	765	770	775	780	785
2400	710	715	720	725	730	735	740	745	750	755	760	765	770	775	780
Titanus PS/PS 2 [V]	**0,54**	**0,63**	**0,73**	**0,82**	**0,92**	**1,01**	**1,11**	**1,20**	**1,30**	**1,40**	**1,49**	**1,59**	**1,68**	**1,78**	**1,87**

Classification TITANUS *TOP·SENS*®
Projection without filter

M = Module   S = Sensitivity (% Lt/m)   HA = Fire alarm   VA = Action alarm

M	S		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32
															Number of points									
0,015	0,015	HA	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
	0,03	HA	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B
	0,06	HA	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B
	0,12	HA	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C
0,1	0,1	HA	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B
	0,2	HA	A	A	A	A	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C
	0,4	HA	A	A	B	B	B	B	C	C	C	C	C	C										
	0,8	HA	A	B	B	C	C	C																
0,5	0,33	VA	A	A	A	A	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C
	0,5	HA	A	A	A	B	B	B	B	C	C	C	C	C	C	C	C							
	0,66	VA	A	A	B	B	B	C	C	C	C	C												
	1	HA	A	B	B	C	C	C	C															

without pipe accessories

Pipe shape	U_Fan[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	
I	6,5	77	77	77	77	77	77	77	77															
	6,9	77	77	77	77	77	77	77	77	76														
	≥9	100	100	100	100	100	100	100	100	100	100	100	100	100										
U	6,5	120	120	120	120	120	120	120	120	120	120	120	120											
	6,9	120	120	120	120	120	120	120	120	120	120	120	120	120	120									
	≥9	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150					permitted total pipe length [m]
M	6,5	170	170	170	170	170	170	170	170	170	170	170	170											
	6,9	170	170	170	170	170	170	170	170	170	170	170	170			160	160	160						
	≥9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180				
Double U	6,5	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180							
	6,9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180						
	≥9	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200		
Quad-U (1 DM)	6,5																							
	6,9																							
	≥9	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	
Quad-U (2 DM)	6,5																							
	6,9																							
	12	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	

with detector box and/or VSK

Pipe shape	U_Fan[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	
I	6,5	70	70	70	70	70	70	70																
	6,9	70	70	70	70	70	70	70	70															
	≥9	100	100	100	100	100	100	100	100	100	100													
U	6,5	120	120	120	120	120	120	120	120	120	120	120	120											
	6,9	120	120	120	120	120	120	120	120	120	120	120	120	120	120									
	≥9	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140						permitted total pipe length [m]
M	6,5	150	150	150	150	150	150	150	150	150	150	150	150	150										
	6,9	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150								
	≥9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180				
Double U	6,5	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140							
	6,9	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150						
	≥9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180					

with *OXY·SENS*® or steam trap [1]

Pipe shape	U_Fan[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	
I	6,5	60	60	60	60	60	60																	
	6,9	60	60	60	60	60	60	60																
	≥9	80	80	80	80	80	80	80	80	80	80													
U	6,5	100	100	100	100	100	100	100	100	100	100													
	6,9	110	110	110	110	110	110	110	110	110	110	110	110											
	≥9	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110							permitted total pipe length [m]
M	6,5	100	100	100	100	100	100	100	100	100	100	100	100											
	6,9	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110								
	≥9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160						
Double U	6,5	140	140	140	140	140	140	140	140	140	140	140	140											
	6,9	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140							
	≥9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160							

with detonation prevention device [2]

Pipe shape	U_Fan[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	
I	6,5	46	46	46	46																			
	6,9	46	46	46	46	38																		
	≥9	68	68	68	68	68	68																	
U	6,5	60	60	60	60	60	60																	
	6,9	60	60	60	60	60	60																	
	≥9	60	60	60	60	60	60	60	60															permitted total pipe length [m]
M	6,5	80	80	80	80	80	80																	
	80	80	80	80	80	80	80	70	70	70														
	≥9	120	120	120	120	120	120	120	120	120														
Double U	6,5	80	80	80	80																			
	6,9	80	80	80	80	80	80	80	80															
	≥9	100	100	100	100	100	100	100	100															

[1] available for following pipe accessories:

OXY·SENS®								
VSK	and/or	DM-MB-TM-XX	and/or	KA-DN 25	and/or	MB2		

[2] available for following pipe accessories:

Detonation prevention device EG IIx	and/or	KA-DN 25						
Detonation prevention device EG IIx	and/or	DM-MB-TM-XX	and/or	VSK	and/or	MB2		
OXY·SENS®	and/or	VSK	and/or	DM-MB-TM-XX	and/or	KA-DN 25	and/or	MB2

Classification TITANUS *TOP·SENS*®
Projection with air filter LF-AD
M = Module   S = Sensitivity (% Lt/m)   HA = Fire alarm   VA = Action alarm

M	S		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32
0,015	0,015	HA	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
	0,03	HA	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	
	0,06	HA	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	
	0,12	HA	A	A	A	A	A	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	
0,1	0,1	HA	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	C	C	C	
	0,2	HA	A	A	A	A	B	B	B	B	B	B	C	C	C	C	C	C	C	C				
	0,4	HA	A	A	B	B	B	C	C	C	C	C												
	0,8	HA	A	B	C	C	C																	
0,5	0,33	VA	A	A	A	A	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C			
	0,5	HA	A	A	B	B	B	B	C	C	C	C	C	C	C									
	0,66	VA	A	B	B	B	C	C	C	C	C													
	1	HA	A	B	B	C	C	C																

without additional pipe accessories

Pipe shape	U_Fan[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	
I	6,5	70	70	70	70	70	70	70																	permitted total pipe length [m]
	6,9	70	70	70	70	70	70	70	70																
	≥9	100	100	100	100	100	100	100	100	100	100	90	90												
U	6,5	120	120	120	120	120	120	120	120	120	120	120	120												
	6,9	120	120	120	120	120	120	120	120	120	120	120	120	120	120										
	≥9	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140						
M	6,5	160	160	160	160	160	160	160	160	160	160	160	160	160											
	6,9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160									
	≥9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180					
Double U	6,5	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160								
	6,9	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170						
	≥9	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190			

with detector box and/or VSK

Pipe shape	U_Fan[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	
I	6,5	70	70	70	70	70	70	70																	permitted total pipe length [m]
	6,9	70	70	70	70	70	70	70	70																
	≥9	100	100	100	100	100	100	100	100	100	100														
U	6,5	110	110	110	110	110	110	110	110	110	110	110	110												
	6,9	120	120	120	120	120	120	120	120	120	120	120	120	120	120										
	≥9	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140							
M	6,5	150	150	150	150	150	150	150	150	150	150	150	150												
	6,9	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150									
	≥9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180						
Double U	6,5	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140								
	6,9	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150						
	≥9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180						

with *OXY·SENS*® or steam trap [1]

Pipe shape	U_Fan[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	
I	6,5	60	60	60	60	60	60																		permitted total pipe length [m]
	6,9	60	60	60	60	60	60	60																	
	≥9	80	80	80	80	80	80	80	80	80	80														
U	6,5	100	100	100	100	100	100	100	100	100	100														
	6,9	110	110	110	110	110	110	110	110	110	110	110	110												
	≥9	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110								
M	6,5	100	100	100	100	100	100	100	100	100	100	100	100												
	6,9	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110									
	≥9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160							
Double U	6,5	140	140	140	140	140	140	140	140	140	140	140	140												
	6,9	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140								
	≥9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160								

with detonation prevention device [2]

Pipe shape	U_Fan[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	
I	6,5	46	46	46	46																				permitted total pipe length [m]
	6,9	46	46	46	46	38																			
	≥9	68	68	68	68	68	68																		
U	6,5	60	60	60	60	60	60																		
	6,9	60	60	60	60	60	60																		
	≥9	60	60	60	60	60	60	60	60																
M	6,5	80	80	80	80	80	80																		
	6,9	80	80	80	80	80	80	70	70	70															
	≥9	120	120	120	120	120	120	120	120	120															
Double U	6,5	80	80	80	80																				
	6,9	80	80	80	80	80	80	80	80																
	≥9	100	100	100	100	100	100	100	100																

[1] available for following pipe accessories:

OXY·SENS®	and/or	DM-MB-TM-XX				
OXY·SENS®	and/or	VSK	and/or	DM-MB-TM-XX	and/or	MB2
VSK	and/or	KA-DN 25	and/or	DM-MB-TM-XX	and/or	MB2

[2] available for following pipe accessories:

Detonation prevention device EG IIx	and/or	KA-DN 25						
Detonation prevention device EG IIx	and/or	DM-MB-TM-XX	and/or	VSK	and/or	MB2		
OXY·SENS®	and/or	VSK	and/or	DM-MB-TM-XX	and/or	KA-DN 25	and/or	MB2

Classification TITANUS *TOP·SENS*®
Projection with air filter LF-AD-1

M = Module   S = Sensitivity (% Lt/m)   HA = Fire alarm   VA = Action alarm

M	S		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32
0,015	0,015	HA	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
	0,03	HA	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B	
	0,06	HA	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	
	0,12	HA	A	A	A	A	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	
0,1	0,1	HA	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	C	C	C	C	
	0,2	HA	A	A	A	B	B	B	B	B	B	C	C	C	C	C	C	C	C					
	0,4	HA	A	B	B	B	C	C	C	C	C													
	0,8	HA	B	B	C	C																		
0,5	0,33	VA	A	A	A	B	B	B	B	B	B	C	C	C	C	C	C	C	C					
	0,5	HA	A	A	B	B	B	B	C	C	C	C	C	C										
	0,66	VA	A	B	B	B	C	C	C	C														
	1	HA	A	B	B	C	C	C																

without additional pipe accessories

Pipe shape	U_Fan[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	
I	6,5	70	70	70	70	70	70	70																
	6,9	70	70	70	70	70	70	70	70															
	≥9	100	100	100	100	100	100	100	100	100	100	90	90											
U	6,5	120	120	120	120	120	120	120	120	120	120	120	120											
	6,9	120	120	120	120	120	120	120	120	120	120	120	120	120	120									
	≥9	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140					
M	6,5	160	160	160	160	160	160	160	160	160	160	160	160	160										
	6,9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160								
	≥9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180				
Double U	6,5	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160							
	6,9	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170					
	≥9	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190		

(permitted total pipe length [m])

with detector box and/or VSK

Pipe shape	U_Fan[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	
I	6,5	70	70	70	70	70	70	70																
	6,9	70	70	70	70	70	70	70	70															
	≥9	100	100	100	100	100	100	100	100	100	100													
U	6,5	110	110	110	110	110	110	110	110	110	110	110	110											
	6,9	120	120	120	120	120	120	120	120	120	120	120	120	120	120									
	≥9	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140						
M	6,5	150	150	150	150	150	150	150	150	150	150	150	150											
	6,9	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150								
	≥9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180					
Double U	6,5	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140							
	6,9	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150					
	≥9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180					

(permitted total pipe length [m])

with *OXY·SENS*® or steam trap [1]

Pipe shape	U_Fan[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	
I	6,5	60	60	60	60	60	60																	
	6,9	60	60	60	60	60	60	60																
	≥9	80	80	80	80	80	80	80	80	80	80													
U	6,5	100	100	100	100	100	100	100	100	100	100													
	6,9	110	110	110	110	110	110	110	110	110	110	110	110											
	≥9	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110							
M	6,5	100	100	100	100	100	100	100	100	100	100	100	100											
	6,9	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110								
	≥9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160						
Double U	6,5	140	140	140	140	140	140	140	140	140	140	140	140											
	6,9	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140							
	≥9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160							

(permitted total pipe length [m])

with detonation prevention device [2]

Pipe shape	U_Fan[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	
I	6,5	46	46	46	46																			
	6,9	46	46	46	46	38																		
	≥9	68	68	68	68	68	68																	
U	6,5	60	60	60	60	60	60																	
	6,9	60	60	60	60	60	60																	
	≥9	60	60	60	60	60	60	60	60															
M	6,5	80	80	80	80	80	80																	
	6,9	80	80	80	80	80	80	70	70	70														
	≥9	120	120	120	120	120	120	120	120	120														
Double U	6,5	80	80	80	80																			
	6,9	80	80	80	80	80	80	80	80															
	≥9	100	100	100	100	100	100	100	100															

(permitted total pipe length [m])

[1] available for following pipe accessories:

OXY·SENS®	and/or	DM-MB-TM-XX				
OXY·SENS®	and/or	VSK	and/or	DM-MB-TM-XX	and/or	MB2
VSK	and/or	KA-DN 25	and/or	DM-MB-TM-XX	and/or	MB2

[2] available for following pipe accessories:

Detonation prevention device EG IIx	and/or	KA-DN 25						
Detonation prevention device EG IIx	and/or	DM-MB-TM-XX	and/or	VSK	and/or	MB2		
OXY·SENS®	and/or	VSK	and/or	DM-MB-TM-XX	and/or	KA-DN 25	and/or	MB2

Classification TITANUS *TOP·SENS*®
Projection with air filter LF-AD-2

M = Module   S = Sensitivity (% Lt/m)   HA = Fire alarm   VA = Action alarm

M	S		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32
0,015	0,015	HA	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
	0,03	HA	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	
	0,06	HA	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	C	C	
	0,12	HA	A	A	A	A	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C			
0,1	0,1	HA	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	C	C	C	C	C	
	0,2	HA	A	A	A	B	B	B	B	B	C	C	C	C	C	C	C	C						
	0,4	HA	A	B	B	B	C	C	C	C														
	0,8	HA	B	B	C	C																		
0,5	0,33	VA	A	A	A	B	B	B	B	B	B	C	C	C	C	C	C	C						
	0,5	HA	A	A	B	B	B	C	C	C	C	C												
	0,66	VA	A	B	B	C	C	C	C															
	1	HA	A	B	C	C	C																	

without additional pipe accessories

Pipe shape	U_Fan[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32
I	6,5	70	70	70	70	70	70	70															
	6,9	70	70	70	70	70	70	70	70														
	≥9	100	100	100	100	100	100	100	100	100	100	90	90										
U	6,5	120	120	120	120	120	120	120	120	120	120	120	120										
	6,9	120	120	120	120	120	120	120	120	120	120	120	120	120	120								
	≥9	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140				
M	6,5	160	160	160	160	160	160	160	160	160	160	160	160										
	6,9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160							
	≥9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180			
Double U	6,5	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160						
	6,9	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170				
	≥9	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	

permitted total pipe length [m]

with detector box and/or VSK

Pipe shape	U_Fan[V]_r	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32
I	6,5	70	70	70	70	70	70	70															
	6,9	70	70	70	70	70	70	70	70														
	≥9	100	100	100	100	100	100	100	100	100	100												
U	6,5	120	120	120	120	120	120	120	120	120	120	120	120										
	6,9	120	120	120	120	120	120	120	120	120	120	120	120	120	120								
	≥9	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140					
M	6,5	150	150	150	150	150	150	150	150	150	150	150	150										
	6,9	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150							
	≥9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180			
Double U	6,5	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140						
	6,9	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150				
	≥9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180		

permitted total pipe length [m]

with *OXY·SENS*® oder Or steam trap [1]

Pipe shape	U_Fan[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32
I	6,5	60	60	60	60	60	60																
	6,9	60	60	60	60	60	60	60															
	≥9	80	80	80	80	80	80	80	80	80	80												
U	6,5	100	100	100	100	100	100	100	100	100	100												
	6,9	110	110	110	110	110	110	110	110	110	110	110	110										
	≥9	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110						
M	6,5	100	100	100	100	100	100	100	100	100	100	100	100										
	6,9	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110							
	≥9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160					
Double U	6,5	140	140	140	140	140	140	140	140	140	140	140	140										
	6,9	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140						
	≥9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160						

permitted total pipe length [m]

with detonation prevention device [2]

Pipe shape	U_Fan[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32
I	6,5	46	46	46	46																		
	6,9	46	46	46	46	38																	
	≥9	68	68	68	68	68	68																
U	6,5	60	60	60	60	60	60																
	6,9	60	60	60	60	60	60																
	≥9	60	60	60	60	60	60	60	60														
M	6,5	80	80	80	80	80	80																
	6,9	80	80	80	80	80	80	70	70	70													
	≥9	120	120	120	120	120	120	120	120	120													
Double U	6,5	80	80	80	80																		
	6,9	80	80	80	80	80	80	80	80														
	≥9	100	100	100	100	100	100	100	100														

permitted total pipe length [m]

[1] available for following pipe accessories:

OXY·SENS®	and/or	DM-MB-TM-XX				
OXY·SENS®	and/or	VSK	and/or	DM-MB-TM-XX	and/or	MB2
VSK	and/or	KA-DN 25	and/or	DM-MB-TM-XX	and/or	MB2

[2] available for following pipe accessories:

Detonation prevention device EG IIx	and/or	KA-DN 25				
Detonation prevention device EG IIx	and/or	DM-MB-TM-XX	and/or	VSK	and/or	MB2
OXY·SENS®	and/or	VSK	and/or	DM-MB-TM-XX	and/or	KA-DN 25	and/or	MB2

Classification TITANUS *TOP·SENS*®
Projection with air filter SF-400 / SF-650

M = Module S = Sensitivity (% Lt/m) HA = Fire alarm VA = Action alarm

M	S		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32
																								Number of points
0,015	0,015	HA	A	A	A	A	A	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	
	0,03	HA	A	A	B	B	B	B	C	C	C	C	C	C										
	0,06	HA	A	B	B	C	C	C																
	0,12	HA	B	C	C																			
0,1	0,1	HA	A	B	C	C	C																	
	0,2	HA	B	C																				
	0,4	HA	C																					
	0,8	HA																						
0,5	0,33	VA	B	C																				
	0,5	HA	C																					
	0,66	VA	C																					
	1	HA																						

without additional pipe accessories

Pipe shape	U$_{Fan}$[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	
I	6,5	70	70	70	70	70	70	70																	
	6,9	70	70	70	70	70	70	70	70																
	≥9	100	100	100	100	100	100	100	100	100	100	90	90												
U	6,5	120	120	120	120	120	120	120	120	120	120	120	120												
	6,9	120	120	120	120	120	120	120	120	120	120	120	120	120	120										
	≥9	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140						
M	6,5	160	160	160	160	160	160	160	160	160	160	160	160												
	6,9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160									
	≥9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180					
Double U	6,5	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155								
	6,9	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165						
	≥9	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185			permitted total pipe length [m]

with detector box or air filter LF-AD

Pipe shape	U$_{Fan}$[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	
I	6,5	70	70	70	70	70	70	70																	
	6,9	70	70	70	70	70	70	70	70																
	≥9	100	100	100	100	100	100	100	100	100	100	100													
U	6,5	110	110	110	110	110	110	110	110	110	110	110	110												
	6,9	120	120	120	120	120	120	120	120	120	120	120	120	120	120										
	≥9	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135							
M	6,5	150	150	150	150	150	150	150	150	150	150	150	150												
	6,9	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150									
	≥9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180					
Double U	6,5	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140								
	6,9	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150						
	≥9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180						permitted total pipe length [m]

with *OXY·SENS*® or steam trap [1]

Pipe shape	U$_{Fan}$[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	
I	6,5	60	60	60	60	60	60																		
	6,9	60	60	60	60	60	60	60																	
	≥9	80	80	80	80	80	80	80	80	80	80														
U	6,5	100	100	100	100	100	100	100	100	100	100														
	6,9	110	110	110	110	110	110	110	110	110	110	110	110												
	≥9	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110								
M	6,5	100	100	100	100	100	100	100	100	100	100	100	100												
	6,9	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110									
	≥9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160							
Double U	6,5	140	140	140	140	140	140	140	140	140	140	140	140												
	6,9	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140								
	≥9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160								permitted total pipe length [m]

with Detonation prevention device [2]

Pipe shape	U$_{Fan}$[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	
I	6,5	46	46	46	46																				
	6,9	46	46	46	46	38																			
	≥9	68	68	68	68	68	68																		
U	6,5	60	60	60	60	60	60																		
	6,9	60	60	60	60	60	60																		
	≥9	60	60	60	60	60	60	60	60																
M	6,5	80	80	80	80	80	80																		
	6,9	80	80	80	80	80	80	70	70	70															
	≥9	120	120	120	120	120	120	120	120	120															
Double U	6,5	80	80	80	80																				
	6,9	80	80	80	80	80	80	80	80																
	≥9	100	100	100	100	100	100	100	100																permitted total pipe length [m]

[1] available for following pipe accessories:

OXY·SENS®										
KA-DN 25	and/or	VSK	and/or	DM-MB-TM-XX	and/or	LF-AD	and/or	MB2		

[2] available for following pipe accessories:

KA-DN 25	and/or	VSK	and/or	DM-MB-TM-XX	and/or	*OXY·SENS*®	and/or	LF-AD	and/or	MB2
Detonation prevention device EG IIx	and/or	KA-DN 25								
Detonation prevention device EG IIx	and/or	DM-MB-TM-XX	and/or	VSK	and/or	LF-AD	and/or	MB2		

Classification TITANUS *TOP·SENS*®
with acceleration points and without filter

M = Module   S = Sensitivity (% Lt/m)   HA = Fire alarm   VA = Action alarm

M	S		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
																			Number of points								
DM-Tx-05	0,015	HA	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
	0,03	HA	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B
	0,06	HA	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C
	0,12	HA	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C					
DM-Tx-10	0,1	HA	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C
	0,2	HA	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C									
	0,4	HA	C	C	C	C	C																					
	0,8	HA																										
DM-Tx-50	0,33	VA	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C									
	0,5	HA	B	C	C	C	C	C	C	C																		
	0,66	VA	C	C	C	C																						
	1	HA	C																									

without pipe accessories — permitted total pipe length [m]

Pipe shape	U$_{Fan}$[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
I	6,9	150	150	130	130	130	130	130	130	130	130	130	130	110	110	110	110										
	≥9	200	200	180	180	180	180	150	150	150	130	130	130	130	130	130	130	130	130	130	130						
U	6,9		240	240	240	240	220	220	220	220	220	200	200	200	200	200	200	200	200	200	200						
	≥9		280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	240	240	240	240	240	240	200	200
M	6,9		240	240	240	240	210	210	210	210	210	210	210	210	210	210	210	210	170	170	170						
	≥9		300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	240	240	
Double U (1 DM)	6,9				300	300	300	300	300	240	240	240	240	200	200	200	200	200	200	200	200	200	200	200			
	9				300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
	12				300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
Double U (2 DM)	6,9		220	220	220	220	220	220	220	220	220	200	200	200	200	200	200	200	200	200	200						
	9		220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220
	12		220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220

with detector box and/or VSK[1)] — permitted total pipe length [m]

Pipe shape	U$_{Fan}$[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
I	6,9	140	120	120	120	120	120	120	120	120	120	120	100	100	100												
	≥9	180	160	160	160	160	130	130	130	120	120	120	120	120	120	120	120	120	120								
U	6,9		220	220	220	200	200	200	200	180	180	180	180	180	180	180	180	180	180								
	≥9		250	250	250	250	250	250	250	250	250	250	250	250	220	220	220	220	220	220	180	180	180	180	180	180	
M	6,9		220	220	220	220	180	180	180	180	180	180	180	180	180	150	150	150									
	≥9		270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	220	220	220	220	220		
Double U (1 DM)	6,9				270	270	270	270	270	220	220	220	220	180	180	180	180	180	180	180	180						
	9				270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270
	12				270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270
Double U (2 DM)	6,9				220	220	220	220	220	220	220	220	180	180	180	180	180	180	180	180							
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	
	12																										

with *OXY·SENS*® or steam trap [2)] — permitted total pipe length [m]

Pipe shape	U$_{Fan}$[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
I	6,9	90	90	90	90	90	90	90	90	90	80	80	80														
	≥9	130	130	130	130	110	110	90	90	90	90	90	90	90	90	90											
U	6,9		180	180	180	160	160	160	160	150	150	150	150	150	150												
	≥9		210	210	210	210	210	210	210	210	210	210	180	180	180	180	180	180	150	150	120	120	120	120	120	120	
M	6,9		180	150	150	150	150	150	150	150	150	150	150	120	120	120											
	≥9		220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	180	180	180	180	180	180	150	150	
Double U (1 DM)	6,9				220	180	180	180	180	150	150	150	150	150	150	150	150	150									
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	160	160
	12				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	190	190
Double U (2 DM)	6,9				220	180	180	180	180	150	150	150	150	150	150	150	150	150									
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	160	160
	12																										

with detonation prevention device [3)] — permitted total pipe length [m]

Pipe shape	U$_{Fan}$[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
I	6,9	53	53	53	53	46	46																				
	≥9	64	64	64	53	53	53	53	53																		
U	6,9		100	90	90	80	80	80	80																		
	≥9		120	120	120	120	120	100	100	100	100	80	80	60	60	60	60										
M	6,9		90	90	90	90	70	70	70																		
	≥9		120	120	120	120	120	120	100	100	100	100	100	100	90	90	90	90	90	90	90	90	90	90	75	75	75
Double U (1 DM)	6,9				100	80	80	80	80																		
	9				120	120	120	120	120	120	120	120	120	90	90	90	90	90	90	90	90	90	90	90	90	90	90
	12				120	120	120	120	120	110	110	110	110	100	100	100	100	100	100	100	100						
Double U (2 DM)	6,9				100	80	80	80	80																		
	9				120	120	120	120	120	120	120	120	120	90	90	90	90	90	90	90	90	90	90	90	90	90	90
	12																										

[1)] available for following pipe accessories:

VSK (Shut-off valve)		and/or	DM-MB-TM-XX	and/or	MB2

[2)] available for following pipe accessories:

OXY·SENS®						
VSK (Shut-off valve)	and/or	DM-MB-TM-XX	and/or	KA-DN 25	and/or	MB2

[3)] available for following pipe accessories:

Detonation prevention device EG IIx	and/or	KA-DN 25				
Detonation prevention device EG IIx	and/or	DM-MB-TM-XX	and/or	VSK	and/or	MB2
OXY·SENS®	and/or	VSK	and/or	DM-MB-TM-XX	and/or	KA-DN 25	and/or	MB2

Classification   TITANUS *TOP·SENS*®

with acceleration points and without filter

M = Module   S = Sensitivity (% Lt/m)   HA = Fire alarm   VA = Action alarm

M	S		27	28	30	31	32	33	34	36	37	40	41	44	45	51	52	53	56	57	60	63	64	65	72	80	100
																												Number of points
DM-Tx-05	0,015	HA	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	0,03	HA	B	B	B			B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C
	0,06	HA	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C										
	0,12	HA																									
DM-Tx-10	0,1	HA	C	C	C	C	C	C	C	C	C	C															
	0,2	HA																									
	0,4	HA																									
	0,8	HA																									
DM-Tx-50	0,33	VA																									
	0,5	HA																									
	0,66	VA																									
	1	HA																									

without pipe accessories

Pipe shape	U_Fan[V]	27	28	30	31	32	33	34	36	37	40	41	44	45	51	52	53	56	57	60	63	64	65	72	80	100	
I	6,9																										permitted total pipe length [m]
	≥9																										
U	6,9																										
	≥9	200	200	200	160	160	160	160	160	160	160																
M	6,9																										
	≥9	240	240	240	240	240	240	210	210	210	210	210	210	210	210	180	180	180	180	180	180						
Double U (1 DM)	6,9																										
	9	300	300	300	300	300	220	220	220	220	220	220	220	220	220	220	220	220									
	12	300	300	300	300	300	300	300	300	300	300	300	300	260	260	260	260	260	260	260	260	260	260	250	250	250	250
Double U (2 DM)	6,9																										
	9	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220									
	12	220	220	220	220	220	220	220	220	220	220	220	220	180	180	180	180	180	180	180	180	180	180	180			

with detector box and/or VSK [1)]

Pipe shape	U_Fan[V]	27	28	30	31	32	33	34	36	37	40	41	44	45	51	52	53	56	57	60	63	64	65	72	80	100	
I	6,9																										permitted total pipe length [m]
	≥9																										
U	6,9																										
	≥9	150	150	150	150	150	150	150	150																		
M	6,9																										
	≥9	220	220	220	190	190	190	190	190	190	190	190	190	190	160	160	160	160	160								
Double U (1 DM)	6,9																										
	9	270	270	200	200	200	200	200	200	200	200	200	200	200	200	200											
	12	270	270	240	240	240	240	240	240	240	240	240	240	230	230	230	230	230	230	230	230	230	230	230			
Double U (2 DM)	6,9																										
	9	220	220	200	200	200	200	200	200	200	200	200	200	200	200	200											
	12																										

with *OXY·SENS*® or steam trap [2)]

Pipe shape	U_Fan[V]	27	28	30	31	32	33	34	36	37	40	41	44	45	51	52	53	56	57	60	63	64	65	72	80	100	
I	6,9																										permitted total pipe length [m]
	≥9																										
U	6,9																										
	≥9	120	120																								
M	6,9																										
	≥9	150	150	150	150	150	150	150	150	130	130	130	130	130													
Double U (1 DM)	6,9																										
	9	160	160	160	160	160	160	160	160	160	160																
	12	190	190	190	190	190	190	190	190	180	180	180	180	180	180	180	180	180	180								
Double U (2 DM)	6,9																										
	9	160	160	160	160	160	160	160	160	160	160																
	12																										

with detonation prevention device [3)]

Pipe shape	U_Fan[V]	27	28	30	31	32	33	34	36	37	40	41	44	45	51	52	53	56	57	60	63	64	65	72	80	100	
I	6,9																										permitted total pipe length [m]
	≥9																										
U	6,9																										
	≥9																										
M	6,9																										
	≥9																										
Double U (1 DM)	6,9																										
	9																										
	12																										
Double U (2 DM)	6,9																										
	9																										
	12																										

[1)] available for following pipe accessories:

VSK (Shut-off valve)	and/or	DM-MB-TM-XX	and/or	MB2

[2)] available for following pipe accessories:

OXY·SENS®						
VSK (Shut-off valve)	and/or	DM-MB-TM-XX	and/or	KA-DN 25	and/or	MB2

[3)] available for following pipe accessories:

Detonation prevention device EG IIx	and/or	KA-DN 25				
Detonation prevention device EG IIx	and/or	DM-MB-TM-XX	and/or	VSK	and/or	MB2
OXY·SENS®	and/or	VSK	and/or	DM-MB-TM-XX	and/or	KA-DN 25	and/or	MB2

Classification TITANUS *TOP·SENS*®
with acceleration points with LF-AD

M = Module   S = Sensitivity (% Lt/m)   HA = Fire alarm   VA = Action alarm

M	S		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	24	25	26	27
DM-Tx-05	0,015	HA	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
	0,03	HA	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B
	0,06	HA	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C
	0,12	HA	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C										
DM-Tx-10	0,1	HA	A	A	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C		C	C	C	C	C
	0,2	HA	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C										
	0,4	HA	C	C	C	C																						
	0,8	HA																										
DM-Tx-50	0,33	VA	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C										
	0,5	HA	C	C	C	C	C	C	C																			
	0,66	VA	C	C	C																							
	1	HA																										

without pipe accessories

permitted total pipe length [m]

Pipe shape	U_Fan[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	24	25	26	27
I	6,9	150	150	130	130	130	130	130	130	130	110	110	110	110	110	110	110										
	≥9	200	200	180	180	180	180	150	150	150	130	130	130	130	130	130	130	130	130	130	130						
U	6,9		240	240	240	240	200	200	200	200	200	200	200	200	200	200	200	200	160	160	160						
	≥9		280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	240	240	240	240	200	200	200	200	200	200
M	6,9		240	240	240	240	210	210	210	210	210	210	210	210	210	170	170	170	170	170	170						
	≥9			300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	240	240	240	240	240
Double U (1 DM)	6,9				300	300	300	300	300	240	240	240	240	200	200	200	200	200	200	200	200	200	200				
	9				300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
	12				300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
Double U (2 DM)	6,9				220	220	220	220	220	220	220	220	220	200	200	200	200	200	200	200	200	200	200				
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220
	12																										

with detector box and/or VSK [1]

permitted total pipe length [m]

Pipe shape	U_Fan[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	24	25	26	27
I	6,9	140	120	120	120	120	120	120	120	120	120	120	100	100	100												
	≥9	180	160	160	160	160	130	130	130	120	120	120	120	120	120	120	120	120									
U	6,9		220	220	220	200	200	200	200	180	180	180	180	180	180	180	180	180	180								
	≥9		250	250	250	250	250	250	250	250	250	250	250	250	250	220	220	220	220	220	220	180	180	180	180	180	150
M	6,9		220	220	220	220	180	180	180	180	180	180	180	150	150	150											
	≥9			270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	220	220	220	220
Double U (1 DM)	6,9				270	270	270	270	270	220	220	220	220	180	180	180	180	180	180	180	180						
	9				270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270
	12				270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270
Double U (2 DM)	6,9				220	220	220	220	220	220	220	220	220	180	180	180	180	180	180	180	180						
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220
	12																										

with *OXY·SENS*® or steam trap [2]

permitted total pipe length [m]

Pipe shape	U_Fan[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	24	25	26	27
I	6,9	90	90	90	90	90	90	90	90	90	90	80	80	80													
	≥9	130	130	130	130	110	110	90	90	90	90	90	90	90	90	90											
U	6,9		180	180	180	160	160	160	160	150	150	150	150	150	150												
	≥9		210	210	210	210	210	210	210	210	210	210	180	180	180	180	180	180	150	150	120	120	120	120	120	120	120
M	6,9		180	150	150	150	150	150	150	150	150	120	120	120													
	≥9			220	220	220	220	220	220	220	220	220	220	220	220	220	180	180	180	180	180	150	150	150			
Double U (1 DM)	6,9				220	180	180	180	180	150	150	150	150	150	150	150	150										
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	160	160	160
	12				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	190	190	190
Double U (2 DM)	6,9				220	180	180	180	180	150	150	150	150	150	150	150	150										
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	160	160	160
	12																										

with detonation prevention device [3]

permitted total pipe length [m]

Pipe shape	U_Fan[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	24	25	26	27
I	6,9	53	53	53	53	46	46																				
	≥9	64	64	64	53	53	53	53	53																		
U	6,9		100	90	90	80	80	80	80																		
	≥9		120	120	120	120	120	100	100	100	100	80	80	60	60	60	60										
M	6,9		90	90	90	90	70	70	70																		
	≥9			120	120	120	120	120	120	120	100	100	100	100	100	100	90	90	90	90	90	90	75	75			
Double U (1 DM)	6,9				100	80	80	80	80																		
	9				120	120	120	120	120	120	120	120	120	90	90	90	90	90	90	90	90	90	90	90			
	12				120	120	120	120	120	110	110	110	110	100	100	100	100	100	100	100	100						
Double U (2 DM)	6,9				100	80	80	80	80																		
	9				120	120	120	120	120	120	120	120	90	90	90	90	90	90	90	90	90	90	90				
	12																										

[1] available for following pipe accessories:

VSK (Shut-off valve)	and/or	DM-MB-TM-XX	and/or	MB2

[2] available for following pipe accessories:

OXY·SENS®						
VSK (Shut-off valve)	and/or	DM-MB-TM-XX	and/or	KA-DN 25	and/or	MB2

[3] available for following pipe accessories:

Detonation prevention device EG IIx	and/or	KA-DN 25				
Detonation prevention device EG IIx	and/or	DM-MB-TM-XX	and/or	VSK	and/or	MB2
OXY·SENS®	and/or	VSK	and/or	DM-MB-TM-XX	and/or	KA-DN 25	and/or	MB2

Classification TITANUS *TOP·SENS*®
with acceleration points with LF-AD

M = Module   S = Sensitivity (% Lt/m)   HA = Fire alarm   VA = Action alarm

M	S		28	29	30	31	32	33	34	35	36	37	40	44	45	46	47	51	52	56	57	60	63	64	65	80	88
	0,015	HA	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
DM-	0,03	HA	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C
Tx-05	0,06	HA	C	C	C	C	C	C	C	C	C	C	C	C	C	C											
	0,12	HA																									
	0,1	HA	C	C	C	C	C	C	C	C																	
DM-	0,2	HA																									
Tx-10	0,4	HA																									
	0,8	HA																									
	0,33	VA																									
DM-	0,5	HA																									
Tx-50	0,66	VA																									
	1	HA																									

without pipe accessories

Pipe shape	U_Fan[V]	28	29	30	31	32	33	34	35	36	37	40	44	45	46	47	51	52	56	57	60	63	64	65	80	88	
I	6,9																										
	≥9																										
U	6,9																										
	≥9	200	160	160	160	160	160	160	160	160	160	160															
M	6,9																										
	≥9	240	240	240	240	240	240	210	210	210	210	210	210	210	210	210	210	180	180	180	180	180					
Double U (1 DM)	6,9																										
	9	300	300	300	300	300	220	220	220	220	220	220	220	220	220	220	220	220	220								
	12	300	300	300	300	300	300	300	300	300	300	300	300	260	260	260	260	260	260	260	260	260	260	240	240	240	
Double U (2 DM)	6,9																										
	9	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220									permitted total pipe length [m]
	12																										

with detector box and/or VSK[1)]

Pipe shape	U_Fan[V]	28	29	30	31	32	33	34	35	36	37	40	44	45	46	47	51	52	56	57	60	63	64	65	80	88	
I	6,9																										
	≥9																										
U	6,9																										
	≥9	150	150	150	150	150	150	150	150	150																	
M	6,9																										
	≥9	220	220	220	190	190	190	190	190	190	190	190	190	190	160	160	160	160	160	160							
Double U (1 DM)	6,9																										
	9	270	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200									
	12	270	240	240	240	240	240	240	240	240	240	240	240	230	230	230	230	230	230	230	230	230	230	230	230		permitted total pipe length [m]
Double U (2 DM)	6,9																										
	9	220	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200									
	12																										

with *OXY·SENS*® or steam trap [2)]

Pipe shape	U_Fan[V]	28	29	30	31	32	33	34	35	36	37	40	44	45	46	47	51	52	56	57	60	63	64	65	80	88	
I	6,9																										
	≥9																										
U	6,9																										
	≥9	120																									
M	6,9																										
	≥9	150	150	150	150	150	150	150	150	150	130	130	130	130													
Double U (1 DM)	6,9																										
	9	160	160	160	160	160	160	160	160	160	160	160															
	12	190	190	190	190	190	190	190	190	190	180	180	180	180	180	180	180	180	180	180							permitted total pipe length [m]
Double U (2 DM)	6,9																										
	9	160	160	160	160	160	160	160	160	160	160	160															
	12																										

with detonation prevention device [3)]

Pipe shape	U_Fan[V]	28	29	30	31	32	33	34	35	36	37	40	44	45	46	47	51	52	56	57	60	63	64	65	80	88	
I	6,9																										
	≥9																										
U	6,9																										
	≥9																										
M	6,9																										
	≥9																										
Double U (1 DM)	6,9																										
	9																										
	12																										permitted total pipe length [m]
Double U (2 DM)	6,9																										
	9																										
	12																										

[1)] **available for following pipe accessories:**

VSK (Shut-off valve)		and/or	DM-MB-TM-XX	and/or	MB2

[2)] **available for following pipe accessories:**

OXY·SENS®							
VSK (Shut-off valve)		and/or	DM-MB-TM-XX	and/or	KA-DN 25	and/or	MB2

[3)] **available for following pipe accessories:**

Detonation prevention device EG IIx	and/or	KA-DN 25					
Detonation prevention device EG IIx	and/or	DM-MB-TM-XX	and/or	VSK	and/or	MB2	
OXY·SENS®	and/or	VSK	and/or	DM-MB-TM-XX	and/or	KA-DN 25	and/or	MB2

Classification TITANUS *TOP·SENS*®
with acceleration points and with LF-AD-1

M = Module   S = Sensitivity (% Lt/m)   HA = Fire alarm   VA = Action alarm

M	S		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	19	20	21	22	23	24	25
																Number of points										
DM-Tx-05	0,015	HA	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
	0,03	HA	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B
	0,06	HA	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C
	0,12	HA	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C							
DM-Tx-10	0,1	HA	A	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C
	0,2	HA	B	B	B	C	C	C	C	C	C	C	C	C	C											
	0,4	HA	C	C	C																					
	0,8	HA																								
DM-Tx-50	0,33	VA	B	B	B	C	C	C	C	C	C	C	C	C	C											
	0,5	HA	C	C	C	C	C	C																		
	0,66	VA	C	C																						
	1	HA																								

without pipe accessories

Pipe shape	U_Fan[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	19	20	21	22	23	24	25	
I	6,9	140	120	120	120	120	120	120	120	120	120	120	120	100	100	100	100									
	≥9	190	190	170	170	170	140	140	140	120	120	120	120	120	120	120	120	120	120	120						
U	6,9		230	230	230	210	210	210	210	190	190	190	190	190	190	190	190	190								
	≥9		270	270	270	270	270	270	270	270	270	270	270	270	270	230	230	230	230	230	230	230	190	190	190	
M	6,9			230	230	230	230	200	200	200	200	200	200	200	200	200	160	160								
	≥9			290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	230	230	230	230
Double U (1 DM)	6,9				290	290	290	290	290	230	230	230	230	190	190	190	190	190	190	190						
	9				290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	
	12				290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	
Double U (2 DM)	6,9				220	220	220	220	220	220	220	220	220	190	190	190	190	190	190	190						
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	
	12																									

permitted total pipe length [m]

with detector box and/or VSK[1]

Pipe shape	U_Fan[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	19	20	21	22	23	24	25	
I	6,9	140	120	120	120	120	120	120	120	120	120	120	100	100	100											
	≥9	180	160	160	160	160	130	130	130	120	120	120	120	120	120	120	120	120								
U	6,9		220	220	220	200	200	200	200	180	180	180	180	180	180	180	180	180								
	≥9		250	250	250	250	250	250	250	250	250	250	250	250	250	220	220	220	220	220	180	180	180	180	180	
M	6,9			220	220	220	220	180	180	180	180	180	180	180	180	180	150	150								
	≥9			270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	220	220	220	220	
Double U (1 DM)	6,9				270	270	270	270	270	220	220	220	220	180	180	180	180	180	180	180						
	9				270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	
	12				270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	
Double U (2 DM)	6,9				220	220	220	220	220	220	220	220	220	180	180	180	180	180	180	180						
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	
	12																									

permitted total pipe length [m]

with *OXY·SENS*® or steam trap [2]

Pipe shape	U_Fan[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	19	20	21	22	23	24	25	
I	6,9	90	90	90	90	90	90	90	90	90	80	80	80													
	≥9	130	130	130	130	110	110	90	90	90	90	90	90	90	90	90										
U	6,9		180	180	180	160	160	160	160	150	150	150	150	150	150											
	≥9		210	210	210	210	210	210	210	210	210	210	180	180	180	180	180	180	150	150	120	120	120	120	120	
M	6,9			180	150	150	150	150	150	150	150	150	120	120	120											
	≥9			220	220	220	220	220	220	220	220	220	220	220	220	220	220	180	180	180	180	180	180	180	150	
Double U (1 DM)	6,9				220	180	180	180	180	150	150	150	150	150	150	150	150									
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	160	
	12				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	190	
Double U (2 DM)	6,9				220	180	180	180	180	150	150	150	150	150	150	150	150									
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	160	
	12																									

permitted total pipe length [m]

with detonation prevention device [3]

Pipe shape	U_Fan[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	19	20	21	22	23	24	25	
I	6,9	53	53	53	53	46	46																			
	≥9	64	64	64	53	53	53	53	53																	
U	6,9		100	90	90	80	80	80	80																	
	≥9		120	120	120	120	120	100	100	100	100	80	80	60	60	60	60									
M	6,9			90	90	90	90	70	70	70																
	≥9			120	120	120	120	120	120	120	100	100	100	100	100	100	90	90	90	90	90	90	75	75	75	
Double U (1 DM)	6,9				100	80	80	80	80																	
	9				120	120	120	120	120	120	120	120	120	90	90	90	90	90	90	90	90	90	90	90		
	12				120	120	120	120	120	110	110	110	110	100	100	100	100	100	100	100						
Double U (2 DM)	6,9				100	80	80	80	80																	
	9				120	120	120	120	120	120	120	120	120	90	90	90	90	90	90	90	90	90	90	90		
	12																									

permitted total pipe length [m]

[1] **available for following pipe accessories:**

VSK (Shut-off valve)	and/or	DM-MB-TM-XX	and/or	MB2

[2] **available for following pipe accessories:**

OXY·SENS®						
VSK (Shut-off valve)	and/or	DM-MB-TM-XX	and/or	KA-DN 25	and/or	MB2

[3] **available for following pipe accessories:**

Detonation prevention device EG IIx	and/or	KA-DN 25				
Detonation prevention device EG IIx	and/or	DM-MB-TM-XX	and/or	VSK	and/or	MB2
OXY·SENS®	and/or	VSK	and/or	DM-MB-TM-XX	and/or	KA-DN 25	and/or	MB2

Classification TITANUS *TOP·SENS*®
with acceleration points and with LF-AD-1

M = Module   S = Sensitivity (% Lt/m)   HA = Fire alarm   VA = Action alarm

M	S		26	27	28	29	30	31	32	33	36	37	38	40	42	43	44	45	46	48	49	52	57	60	80
DM-Tx-05	0,015	HA	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	0,03	HA	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C
	0,06	HA	C	C	C	C	C	C	C	C	C	C	C	C	C										
	0,12	HA																							
DM-Tx-10	0,1	HA	C	C	C	C	C	C	C																
	0,2	HA																							
	0,4	HA																							
	0,8	HA																							
DM-Tx-50	0,33	VA																							
	0,5	HA																							
	0,66	VA																							
	1	HA																							

without pipe accessories

Pipe shape	U_{Fan}[V]	26	27	28	29	30	31	32	33	36	37	38	40	42	43	44	45	46	48	49	52	57	60	80	
I	6,9																								
	≥9																								
U	6,9																								
	≥9	190	190	190	150	150	150	150	150	150	150	150													permitted total pipe length [m]
M	6,9																								
	≥9	230	230	230	230	230	200	200	200	200	200	200	200	200	200	200	200	200	200	200	170	170	170	170	
Double U (1 DM)	6,9																								
	9	290	290	290	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210					
	12	290	290	290	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	240	240	240	240	
Double U (2 DM)	6,9																								
	9	220	220	220	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210					
	12																								

with detector box and/or VSK [1)]

Pipe shape	U_{Fan}[V]	26	27	28	29	30	31	32	33	36	37	38	40	42	43	44	45	46	48	49	52	57	60	80	
I	6,9																								
	≥9																								
U	6,9																								
	≥9	180	150	150	150	150	150	150	150	150															permitted total pipe length [m]
M	6,9																								
	≥9	220	220	220	220	220	190	190	190	190	190	190	190	190	190	190	190	160	160	160	160	160			
Double U (1 DM)	6,9																								
	9	270	270	270	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200					
	12	270	270	270	240	240	240	240	240	240	240	240	240	240	240	240	230	230	230	230	230	230	230	230	
Double U (2 DM)	6,9																								
	9	220	220	220	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200					
	12																								

with *OXY·SENS*® or steam trap [2)]

Pipe shape	U_{Fan}[V]	26	27	28	29	30	31	32	33	36	37	38	40	42	43	44	45	46	48	49	52	57	60	80	
I	6,9																								
	≥9																								
U	6,9																								
	≥9	120	120	120																					permitted total pipe length [m]
M	6,9																								
	≥9	150	150	150	150	150	150	150	150	150	130	130	130	130	130	130	130								
Double U (1 DM)	6,9																								
	9	160	160	160	160	160	160	160	160	160	160	160	160												
	12	190	190	190	190	190	190	190	190	190	180	180	180	180	180	180	180	180	180	180	180	180			
Double U (2 DM)	6,9																								
	9	160	160	160	160	160	160	160	160	160	160	160	160												
	12																								

with detonation prevention device [3)]

Pipe shape	U_{Fan}[V]	26	27	28	29	30	31	32	33	36	37	38	40	42	43	44	45	46	48	49	52	57	60	80	
I	6,9																								
	≥9																								
U	6,9																								
	≥9																								permitted total pipe length [m]
M	6,9																								
	≥9																								
Double U (1 DM)	6,9																								
	9																								
	12																								
Double U (2 DM)	6,9																								
	9																								
	12																								

[1)] available for following pipe accessories:

VSK (Shut-off valve)	and/or	DM-MB-TM-XX	and/or	MB2

[2)] available for following pipe accessories:

OXY·SENS®				
VSK (Shut-off valve)	and/or	DM-MB-TM-XX	and/or	KA-DN 25	and/or	MB2

[3)] available for following pipe accessories:

Detonation prevention device EG IIx	and/or	KA-DN 25				
Detonation prevention device EG IIx	and/or	DM-MB-TM-XX	and/or	VSK	and/or	MB2
OXY·SENS®	and/or	VSK	and/or	DM-MB-TM-XX	and/or	KA-DN 25	and/or	MB2

Classification TITANUS *TOP·SENS*®
with acceleration points and with LF-AD-2

M = Module   S = Sensitivity (% Lt/m)   HA = Fire alarm   VA = Action alarm

M	S		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	19	20	21	22	23	24	25
DM-Tx-05	0,015	HA	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
	0,03	HA	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B
	0,06	HA	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C
	0,12	HA	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C							
DM-Tx-10	0,1	HA	A	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C
	0,2	HA	B	B	C	C	C	C	C	C	C	C	C													
	0,4	HA	C	C																						
	0,8	HA																								
DM-Tx-50	0,33	VA	B	B	C	C	C	C	C	C	C	C	C													
	0,5	HA	C	C	C	C																				
	0,66	VA	C																							
	1	HA																								

without pipe accessories

permitted total pipe length [m]

Pipe shape	U_Fan[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	19	20	21	22	23	24	25
I	6,9	140	120	120	120	120	120	120	120	120	120	120	100	100	100	100									
I	≥9	190	190	170	170	170	140	140	140	120	120	120	120	120	120	120	120	120	120						
U	6,9		230	230	230	210	210	210	210	190	190	190	190	190	190	190	190	190							
U	≥9		270	270	270	270	270	270	270	270	270	270	270	270	270	230	230	230	230	230	230	230	190	190	190
M	6,9		230	230	230	230	200	200	200	200	200	200	200	200	200	200	160	160							
M	≥9		290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	230	230	230	230
Double U (1 DM)	6,9		290	290	290	290	290	290	230	230	230	230	190	190	190	190	190	190	190						
Double U (1 DM)	9		290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290
Double U (1 DM)	12		290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290
Double U (2 DM)	6,9		220	220	220	220	220	220	220	220	220	190	190	190	190	190	190	190							
Double U (2 DM)	9		220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220
Double U (2 DM)	12																									

with detector box and/or VSK[1]

permitted total pipe length [m]

Pipe shape	U_Fan[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	19	20	21	22	23	24	25
I	6,9	140	120	120	120	120	120	120	120	120	120	120	100	100	100										
I	≥9	180	160	160	160	160	130	130	130	120	120	120	120	120	120	120	120	120							
U	6,9		220	220	220	200	200	200	200	180	180	180	180	180	180	180	180	180							
U	≥9		250	250	250	250	250	250	250	250	250	250	250	250	250	220	220	220	220	220	180	180	180	180	180
M	6,9		220	220	220	220	180	180	180	180	180	180	180	180	180	150	150								
M	≥9		270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	220	220	220	220
Double U (1 DM)	6,9		270	270	270	270	270	220	220	220	220	180	180	180	180	180	180								
Double U (1 DM)	9		270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270
Double U (1 DM)	12		270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270
Double U (2 DM)	6,9		220	220	220	220	220	220	220	220	220	180	180	180	180	180	180	180							
Double U (2 DM)	9		220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220
Double U (2 DM)	12																									

with *OXY·SENS*® or steam trap[2]

permitted total pipe length [m]

Pipe shape	U_Fan[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	19	20	21	22	23	24	25
I	6,9	90	90	90	90	90	90	90	90	90	80	80	80												
I	≥9	130	130	130	130	110	110	90	90	90	90	90	90	90	90	90									
U	6,9		180	180	180	160	160	160	160	150	150	150	150	150	150										
U	≥9		210	210	210	210	210	210	210	210	210	210	180	180	180	180	180	150	150	120	120	120	120	120	120
M	6,9		180	150	150	150	150	150	150	150	150	150	120	120	120										
M	≥9		220	220	220	220	220	220	220	220	220	220	220	220	220	220	180	180	180	180	180	180	150	150	150
Double U (1 DM)	6,9		220	180	180	180	180	150	150	150	150	150	150	150	150										
Double U (1 DM)	9		220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	160
Double U (1 DM)	12		220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	190
Double U (2 DM)	6,9		220	180	180	180	180	150	150	150	150	150	150	150	150										
Double U (2 DM)	9		220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	160
Double U (2 DM)	12																									

with detonation prevention device[3]

permitted total pipe length [m]

Pipe shape	U_Fan[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	19	20	21	22	23	24	25
I	6,9	53	53	53	53	46	46																		
I	≥9	64	64	64	53	53	53	53	53																
U	6,9		100	90	90	80	80	80	80																
U	≥9		120	120	120	120	120	100	100	100	100	80	80	60	60	60	60								
M	6,9		90	90	90	90	70	70	70																
M	≥9		120	120	120	120	120	120	120	100	100	100	100	100	100	90	90	90	90	90	75	75	75		
Double U (1 DM)	6,9		100	80	80	80	80																		
Double U (1 DM)	9		120	120	120	120	120	120	120	120	90	90	90	90	90	90	90	90	90	90					
Double U (1 DM)	12		120	120	120	120	120	120	110	110	110	110	100	100	100	100	100	100	100						
Double U (2 DM)	6,9		100	80	80	80	80																		
Double U (2 DM)	9		120	120	120	120	120	120	120	120	90	90	90	90	90	90	90	90	90	90	90	90	90		
Double U (2 DM)	12																									

[1] **available for following pipe accessories:**

VSK (Shut-off valve)	and/or	DM-MB-TM-XX	and/or	MB2

[2] **available for following pipe accessories:**

OXY·SENS®						
VSK (Shut-off valve)	and/or	DM-MB-TM-XX	and/or	KA-DN 25	and/or	MB2

[3] **available for following pipe accessories:**

Detonation prevention device EG IIx	and/or	KA-DN 25						
Detonation prevention device EG IIx	and/or	DM-MB-TM-XX	and/or	VSK	and/or	MB2		
OXY·SENS®	and/or	VSK	and/or	DM-MB-TM-XX	and/or	KA-DN 25	and/or	MB2

Classification TITANUS TOP·SENS®
with acceleration points and with LF-AD-2

M = Module   S = Sensitivity (% Lt/m)   HA = Fire alarm   VA = Action alarm

M	S		26	27	28	29	30	31	36	37	38	40	44	45	46	48	49	52	57	60	80
											Number of points										
DM-Tx-05	0,015	HA	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	0,03	HA	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C
	0,06	HA	C	C	C	C	C	C	C	C											
	0,12	HA																			
DM-Tx-10	0,1	HA	C	C	C	C															
	0,2	HA																			
	0,4	HA																			
	0,8	HA																			
DM-Tx-50	0,33	VA																			
	0,5	HA																			
	0,66	VA																			
	1	HA																			

without pipe accessories

Pipe shape	U_Fan[V]	26	27	28	29	30	31	36	37	38	40	44	45	46	48	49	52	57	60	80	permitted total pipe length [m]
I	6,9																				
	≥9																				
U	6,9																				
	≥9	190	190	190	150	150	150	150	150	150											
M	6,9																				
	≥9	230	230	230	230	230	200	200	200	200	200	200	200	200	200	170	170	170	170		
Double U (1 DM)	6,9																				
	9	290	290	290	210	210	210	210	210	210	210	210	210	210	210	210	210				
	12	290	290	290	250	250	250	250	250	250	250	250	250	250	250	240	240	240	240	240	
Double U (2 DM)	6,9																				
	9	220	220	220	210	210	210	210	210	210	210	210	210	210	210	210	210				
	12																				

with detector box and/or VSK[1]

Pipe shape	U_Fan[V]	26	27	28	29	30	31	36	37	38	40	44	45	46	48	49	52	57	60	80	permitted total pipe length [m]
I	6,9																				
	≥9																				
U	6,9																				
	≥9	180	150	150	150	150	150	150													
M	6,9																				
	≥9	220	220	220	220	220	190	190	190	190	190	190	190	160	160	160	160	160			
Double U (1 DM)	6,9																				
	9	270	270	270	200	200	200	200	200	200	200	200	200	200	200	200	200				
	12	270	270	270	240	240	240	240	240	240	240	240	230	230	230	230	230	230	230	230	
Double U (2 DM)	6,9																				
	9	220	220	220	200	200	200	200	200	200	200	200	200	200	200	200	200				
	12																				

with OXY·SENS® or steam trap [2]

Pipe shape	U_Fan[V]	26	27	28	29	30	31	36	37	38	40	44	45	46	48	49	52	57	60	80	permitted total pipe length [m]
I	6,9																				
	≥9																				
U	6,9																				
	≥9	120	120	120																	
M	6,9																				
	≥9	150	150	150	150	150	150	150	130	130	130	130	130								
Double U (1 DM)	6,9																				
	9	160	160	160	160	160	160	160	160	160	160										
	12	190	190	190	190	190	190	190	180	180	180	180	180	180	180	180	180	180	180		
Double U (2 DM)	6,9																				
	9	160	160	160	160	160	160	160	160	160	160										
	12																				

with detonation prevention device [3]

Pipe shape	U_Fan[V]	26	27	28	29	30	31	36	37	38	40	44	45	46	48	49	52	57	60	80	permitted total pipe length [m]
I	6,9																				
	≥9																				
U	6,9																				
	≥9																				
M	6,9																				
	≥9																				
Double U (1 DM)	6,9																				
	9																				
	12																				
Double U (2 DM)	6,9																				
	9																				
	12																				

[1] available for following pipe accessories:

VSK (Shut-off valve)	and/or	DM-MB-TM-XX	and/or	MB2

[2] available for following pipe accessories:

OXY·SENS®						
VSK (Shut-off valve)	and/or	DM-MB-TM-XX	and/or	KA-DN 25	and/or	MB2

[3] available for following pipe accessories:

Detonation prevention device EG IIx	and/or	KA-DN 25				
Detonation prevention device EG IIx	and/or	DM-MB-TM-XX	and/or	VSK	and/or	MB2
OXY·SENS®	and/or	VSK	and/or	DM-MB-TM-XX	and/or	KA-DN 25	and/or	MB2

Classification TITANUS *TOP·SENS*®
with acceleration points and with SF-xx0

M = Module   S = Sensitivity (% Lt/m)   HA = Fire alarm   VA = Action alarm

M	S		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
															Number of points						
DM-Tx-05	0,015	HA	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C
	0,03	HA	C	C	C	C	C	C													
	0,06	HA																			
	0,12	HA																			
DM-Tx-10	0,1	HA																			
	0,2	HA																			
	0,4	HA																			
	0,8	HA																			
DM-Tx-50	0,33	VA																			
	0,5	HA																			
	0,66	VA																			
	1	HA																			

without pipe accessories

Pipe shape	U_{Fan}[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	permitted total pipe length [m]
I	6,9	140	120	120	120	120	120	120	120	120	120	120	100	100	100	100					
	≥9	180	160	160	160	160	140	140	140	120	120	120	120	120	20	120	120	120	120		
U	6,9		220	220	220	200	200	200	200	180	180	180	180	180	180	180	180	180	180		
	≥9		260	260	260	260	260	260	260	260	260	260	260	260	260	220	220	220	220	220	
M	6,9		220	220	220	220	190	190	190	190	190	190	190	190	190	150	150	150			
	≥9		280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	
Double U (1 DM)	6,9			280	280	280	280	280	220	220	220	220	180	180	180	180	180	180	180	180	
	9			280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	
	12			280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	
Double U (2 DM)	6,9			220	220	220	220	220	220	220	220	220	180	180	180	180	180	180	180	180	
	9			220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	
	12																				

with detector box and/or VSK[1)]

Pipe shape	U_{Fan}[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	permitted total pipe length [m]
I	6,9	140	120	120	120	120	120	120	120	120	120	120	120	100	100	100					
	≥9	180	160	160	160	160	120	120	120	120	120	120	120	120	120	120	120	120	120		
U	6,9		220	220	200	200	200	200	200	180	180	180	180	180	180	180	180	180	180		
	≥9		250	250	250	250	250	250	250	250	250	250	250	250	250	220	220	220	220	220	
M	6,9		220	220	220	220	180	180	180	180	180	180	180	180	180	150	150	150			
	≥9		270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	
Double U (1 DM)	6,9			270	270	270	270	270	220	220	220	220	180	180	180	180	180	180	180	180	
	9			270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	
	12			270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	
Double U (2 DM)	6,9			220	220	220	220	220	220	220	220	220	180	180	180	180	180	180	180	180	
	9			220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	
	12																				

with *OXY·SENS*® or steam trap [2)]

Pipe shape	U_{Fan}[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	permitted total pipe length [m]
I	6,9	90	90	90	90	90	90	90	90	90	80	80	80								
	≥9	130	130	130	130	110	110	90	90	90	90	90	90	90	90	90					
U	6,9		180	180	180	160	160	160	160	150	150	150	150	150	150						
	≥9		210	210	210	210	210	210	210	210	210	210	180	180	180	180	180	180	150		
M	6,9		180	150	150	150	150	150	150	150	150	150	120	120	120						
	≥9		220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	180		
Double U (1 DM)	6,9			220	180	180	180	180	150	150	150	150	150	150	150	150					
	9			220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	
	12			220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	
Double U (2 DM)	6,9			220	180	180	180	180	150	150	150	150	150	150	150	150					
	9			220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	
	12																				

with detonation prevention device [3)]

Pipe shape	U_{Fan}[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	permitted total pipe length [m]
I	6,9	53	53	53	53	46	46														
	≥9	64	64	64	53	53	53	53	53												
U	6,9		100	90	90	80	80	80	80												
	≥9		120	120	120	120	120	100	100	100	100	80	80	60	60	60	60				
M	6,9			90	90	90	90	70	70	70											
	≥9		120	120	120	120	120	120	120	100	100	100	100	100	100	90	90	90	90		
Double U (1 DM)	6,9			100	80	80	80	80													
	9			120	120	120	120	120	120	120	120	120	90	90	90	90	90	90	90		
	12			120	120	120	120	120	110	110	110	110	100	100	100	100	100	100	100		
Double U (2 DM)	6,9			100	80	80	80	80													
	9			120	120	120	120	120	120	120	120	120	90	90	90	90	90	90	90		
	12																				

[1)] **available for following pipe accessories:**

VSK (Shut-off valve)	and/or	DM-MB-TM-XX	and/or	MB2

[2)] **available for following pipe accessories:**

OXY·SENS®								
VSK (Shut-off valve)	and/or	DM-MB-TM-XX	and/or	KA-DN 25	and/or	LF-AD	and/or	MB2

[3)] **available for following pipe accessories:**

Detonation prevention device EG IIx	and/or	KA-DN 25								
Detonation prevention device EG IIx	and/or	DM-MB-TM-XX	and/or	VSK	and/or	LF-AD	and/or	MB2		
OXY·SENS®	and/or	VSK	and/or	DM-MB-TM-XX	and/or	KA-DN 25	and/or	LF-AD	and/or	MB2

TITANUS TOP·SENS/a, Subsidiary-Delivery Transaction

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order no.	description	unit

Air Sampling Smoke Detection Systems

AD-05-1220   basic device TITANUS TOP·SENS   pc.
<P>   <Z>   type TT-1/a   VdS-Nr.: G202064
<2>   <>

AD-05-1240   basic device TITANUS TOP·SENS   pc.
<P>   <Z>   type TT-1-SL
<2>   <>

AD-05-1350   basic device TITANUS TOP·SENS   pc.
<P>   <Z>   type TT-1/a-F
<2>   <>

AD-05-5460   basic device TITANUS TOP·SENS   pc.
<P>   < >   type TT-1-U
<2>   <>

AD-05-5465   basic device TITANUS TOP·SENS   pc.
<P>   < >   type TT-1-F-U
<2>   <>

AD-05-5470   basic device TITANUS TOP·SENS   pc.
<P>   < >   type TT-1-SL-U
<2>   <>

AD-10-1205   Front film sheet TITANUS TOP·SENS   pc.
<P>   <Z>   type FW-TT-1
<2>   <>

AD-10-1210   Front film sheet TITANUS TOP·SENS 2   pc.
<P>   <Z>   type FW-TT-2
<2>   <>

AD-10-1215   Front film sheet TITANUS TOP·SENS   pc.
<P>   <Z>   type FW-TT-1p
<2>   <>

AD-10-1225   front film sheet TITANUS TOP·SENS   pc.
<P>   <Z>   type FW-TT-3
<2>   <>

AD-10-1650   front film sheet TITANUS TOP·SENS   pc.
<P>   <Z>   type FS-TT-1
<2>   <>

<0>=Generic purch. item, <1>=Purch. item fixed vendor, <2>=Proprietary develop. (ANT/develop.), <3>=in-house prod. (ANT/develop./prod.), <4>=Compon. 140l Fl.

<AM>=discontinued model, <Z> = approved, <P>=compulsory purchase, purchase only via WAGNER head office, <L>=compulsory supplier, purchase via fixed supplier

TITANUS TOP·SENS/a, Subsidiary-Delivery Transaction

--

order no.	description	unit

AD-10-1660	front film sheet TITANUS TOP·SENS 2	pc.
<P> <Z>	type FS-TT-2	
<2> <>		

AD-10-5210	Detector module TITANUS TOP·SENS	pc.
<P> <Z>	type DM-TT-10-L	
<2> <>		

AD-10-5230	Detector module TITANUS TOP·SENS	pc.
<P> <Z>	type DM-TT-01-L	
<2> <>		

AD-10-5250	Detector module TITANUS TOP·SENS	pc.
<P> <Z>	type DM-TT-50-L	
<2> <>		

AD-10-5265	Detector module TITANUS TOP·SENS	pc.
<P> <Z>	type DM-TT-10-Lp	
<2> <>		

AD-10-5275	Detector module TITANUS TOP·SENS	pc.
<P> <Z>	type DM-TT-50-Lp	
<2> <>		

AD-10-5310	detector module TITANUS TOP·SENS	pc.
<P> <Z>	type DM-TT-10-L-F	
<2> <>		

AD-10-5315	detector module TITANUS TOP·SENS	pc.
<P> <Z>	type DM-TT-01-L-F	
<2> <>		

AD-10-5320	detector module TITANUS TOP·SENS	pc.
<P> <Z>	type DM-TT-50-L-F	
<2> <>		

AD-10-5430	detector module TITANUS TOP·SENS	pc.
<P> < >	type DM-TT-10-L-U	
<2> <>		

AD-10-5435	detector module TITANUS TOP·SENS	pc.
<P> < >	type DM-TT-01-L-U	
<2> <>		

<0>=Generic purch. item, <1>=Purch. item fixed vendor, <2>=Proprietary develop. (ANT/develop.), <3>=in-house prod. (ANT/develop./prod.), <4>=Compon. 140l Fl.

<AM>=discontinued model, <Z> = approved, <P>=compulsory purchase, purchase only via WAGNER head office, <L>=compulsory supplier, purchase via fixed supplier

TITANUS TOP·SENS/a, Subsidiary-Delivery Transaction

--

order no.	description	unit
AD-10-5440	detector module TITANUS TOP·SENS	pc.
<P> < >	type DM-TT-50-L-U	
<2> <>		
AD-10-5445	detector module TITANUS TOP·SENS	pc.
<P> < >	type DM-TT-10-L-F-U	
<2> <>		
AD-10-5450	detector module TITANUS TOP·SENS	pc.
<P> < >	type DM-TT-01-L-F-U	
<2> <>		
AD-10-5455	detector module TITANUS TOP·SENS	pc.
<P> < >	type DM-TT-50-L-F-U	
<2> <>		

<0>=Generic purch. item, <1>=Purch. item fixed vendor, <2>=Proprietary develop. (ANT/develop.), <3>=in-house prod. (ANT/develop./prod.), <4>=Compon. 140l Fl.

<AM>=discontinued model, <Z> = approved, <P>=compulsory purchase, purchase only via WAGNER head office, <L>=compulsory supplier, purchase via fixed supplier

TITANUS TOP·SENS/a, Subsidiary-Delivery Transaction

--

order no.	description	unit

Accessory

01-10-9245	Pipe adapter	pc.
<P> <Z>	type PA-Y-P	
<2> <>		

01-10-9255	Pipe adapter	pc.
<P> <Z>	type PA-Y-A	
<2> <>		

09-20-5481	reset board	pc.
<P> <Z>	type E548/c	
<2> <>		

09-20-6150	shut down unit TITANUS TOP·SENS	pc.
<P> <Z>	type SU-1	
<2> <>		

09-20-6440	Network module TITANUS	pc.
<P> < >	type NU-5	
<2> <>		

09-20-6445	Network module TITANUS	pc.
<P> < >	type NU-5-D	
<2> <>		

09-20-6450	Record module TITANUS	pc.
<P> < >	type NU-5-DO	
<2> <>		

09-20-6455	Network module TITANUS	pc.
<P> < >	type NU-5-D-F	
<2> <>		

09-20-6460	Record module TITANUS	pc.
<P> < >	type NU-5-DO-F	
<2> <>		

AD-05-0490	extension kit for SigmaSys	pc.
<P> <Z>	type KT-S11	
<0> <>		

AD-05-0492	installation kit for add. modules	pc.
<P> <Z>	type KT-HS-1	
<2> <>		

TITANUS TOP·SENS/a, Subsidiary-Delivery Transaction

--

order no.	description	unit

AD-05-0530	extension kit "IP52"	pc.
<P> <Z>	type KT-HS-2	
<2> <>		

AD-05-0540	extension kit "dust protection"	pc.
<P> <Z>	type KT-HS-3	
<2> <>		

AD-05-0563	Diagnostic tool	pc.
<P> <Z>	type DIAG 3/a	
<3> <>		

AD-05-0930	Cable glands	pc.
<P> <Z>	type M20-MS (PU=100 Pcs.)	
<0> <>		

AD-05-0940	Cable glands	pc.
<P> <Z>	type M25-MS (PU=100 Pcs.)	
<0> <>		

AD-05-0950	Cable glands	pc.
<P> <Z>	type M20 (PU=100 pcs.)	
<0> <>		

AD-05-0955	Cable glands	pc.
<P> <Z>	type M25 (PU=100 pcs.)	
<0> <>		

AD-05-0960	Screwable cable glands	pc.
<P> <Z>	type Snaptec M20 (PU=50 pcs.)	
<0> <>		

AD-05-0970	Screwable cable glands	pc.
<P> <Z>	type Snaptec M25 (PU=50 pcs.)	
<0> <>		

AD-05-1300	remote display unit	pc.
<P> <Z>	type RD-TT	
<2> <>		

AD-05-1310	remote display unit	pc.
<P> <Z>	type RDW-TT-19"	
<2> <>		

<0>=Generic purch. item, <1>=Purch. item fixed vendor, <2>=Proprietary develop. (ANT/develop.), <3>=in-house prod. (ANT/develop./prod.), <4>=Compon. 140l Fl.

<AM>=discontinued model, <Z> = approved, <P>=compulsory purchase, purchase only via WAGNER head office, <L>=compulsory supplier, purchase via fixed supplier

TITANUS TOP·SENS/a, Subsidiary-Delivery Transaction

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order no.	description	unit
AD-05-1315 <P> <Z> <2> <>	remote display unit type RDW-TT2-19"	pc.
AD-05-1320 <P> <Z> <2> <>	front film sheet for remote display unit type FW-RD-TT	pc.
AD-05-1325 <P> <Z> <2> <>	front film sheet for remote display unit type FW-RD-TT2	pc.
AD-05-1912 <P> < > <2> <>	retrofit kit for smoke aspirators type HS-SL	pc.
AD-10-0250 <P> <Z> <2> <>	Device support for air sampling systems type MT-1	pair
AD-10-0305 <P> <Z> <2> <>	blind plate for remote display unit type BP-RD-2	pc.
AD-10-0550 <P> <Z> <2> <>	Test pipe for air sampling systems type DIAG-Pipe	pc.
AD-10-4200 <P> <Z> <3> <>	reset and disconnecting button type RTT-1	pc.
AD-10-4730 <P> < > <0> <>	TITANUS Networktools type CD-1	pc.
BM-05-1700 <P> <Z> <1> <AM>	input module "AnalogPlus" type DC 1131-AA, VdS-no.: G 299 030	pc.
BM-05-1705 <P> <Z> <2> <AM>	double input module "AnalogPLUS" type DC 1131-31	pc.

<0>=Generic purch. item, <1>=Purch. item fixed vendor, <2>=Proprietary develop. (ANT/develop.), <3>=in-house prod. (ANT/develop./prod.), <4>=Compon. 140l Fl.

<AM>=discontinued model, <Z> = approved, <P>=compulsory purchase, purchase only via WAGNER head office, <L>=compulsory supplier, purchase via fixed supplier

TITANUS TOP·SENS/a, Subsidiary-Delivery Transaction

--

order no.	description	unit
BM-05-1750 <P> <Z> <1> <AM>	input module "Interactive" type DC 1157-AA, VdS-no.: G 299 031	pc.
LS-05-0500 <P> <Z> <1> <>	VisuLAN T type BS-VLT-1	pc.
LS-05-0700 <P> < > <1> <>	VisuLAN T - OPC-Server type OPC-VLT-1	pc.
LS-05-0710 <P> < > <1> <>	VisuLAN T - Communication-Module type ES-VLT-COM	pc.
LS-05-0720 <P> < > <1> <>	VisuLAN T - Interface GSM-Modem type ES-VLT-GSM-1	pc.
LS-05-0730 <P> < > <1> <>	VisuLAN T - Text-to-Speech module type ES-VLT-TTS	pc.
LS-05-0740 <P> < > <1> <>	VisuLAN T - Datapoint extension type ES-VLT-DP-1	pc.
LS-05-0750 <P> < > <1> <>	VisuLAN T - Extension License type EL-VLT-1	pc.
LS-05-0760 <P> < > <1> <>	VisuLAN T - Software Update type US-VLT-1	pc.

<0>=Generic purch. item, <1>=Purch. item fixed vendor, <2>=Proprietary develop. (ANT/develop.), <3>=in-house prod. (ANT/develop./prod.), <4>=Compon. 140l Fl.

<AM>=discontinued model, <Z> = approved, <P>=compulsory purchase, purchase only via WAGNER head office, <L>=compulsory supplier, purchase via fixed supplier

TITANUS TOP·SENS/a, Subsidiary-Delivery Transaction

--

order no.	description	unit

Spare parts

09-20-1450	display board	pc.
<P> <Z>	type DB-TT	
<2> <>		

09-20-5995	switch power supply for remote display	pc.
<P> <Z>	type E599.2	
<2> <>		

09-20-6190	display board	pc.
<P> <Z>	type DB-SU-1	
<2> <>		

09-20-6250	base board TITANUS TOP·SENS	pc.
<P> <Z>	type BB-TT-1/a	
<2> <>		

09-20-6255	base board TITANUS TOPSENS	pc.
<P> <Z>	type BB-TT-1-F/a	
<2> <>		

09-20-6300	connecting board	pc.
<P> <Z>	type CB-1	
<2> <>		

09-20-6302	connecting board	pc.
<P> <Z>	type CB-2	
<0> <>		

09-20-6825	fan control for air sampling devices	pc.
<P> <Z>	type FC-2	
<2> <>		

09-20-6830	fan control for air sampling devices	pc.
<P> <Z>	type FC-3	
<2> <>		

10-60-0695	operat.device reset and discon. button	pc.
<P> <Z>	type RTT-1	
<2> <>		

AD-05-0268	housing for remote display unit	pc.
<P> <Z>	type HS-RD	
<0> <>		

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TITANUS TOP·SENS/a, Subsidiary-Delivery Transaction

--

order no.	description	unit

AD-05-0505   Housing for air sampling systems   pc.
<P>   <Z>   type HS-1/a
<2>   <>

AD-05-0506   Housing lid   pc.
<P>   <Z>   type HS-1-GD
<2>   <>

AD-05-0520   housing for air sampling systems   pc.
<P>   <Z>   type HS-1-F/a
<2>   <>

AD-05-0535   TITANUS-label   pc.
<P>   <Z>   type ST-S1
<2>   <>

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
<2>   <>

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-05-0630   board for reset and disconnecting button   pc.
<P>   <Z>   type RTT-1
<2>   <>

AD-05-0635   Holding device for diagnostic interface   pc.
<P>   <Z>   type DIAG 3-Clip/a
<3>   <>

AD-05-0637   Holding device for diagnostic interface   pc.
<P>   <Z>   type DB-DIAG 3-TM
<3>   <>

TITANUS TOP·SENS/a, Subsidiary-Delivery Transaction

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order no.	description	unit
AD-05-0639 \<P> \<Z> \<3> \<>	Holding device for diagnostic interface type DB-DIAG 3-TR	pc.
AD-05-1908 \<P> \<Z> \<2> \<>	housing for air sampling systems type HS-3	pc.
AD-10-4600 \<P> \<Z> \<2> \<>	Connecting cable type CC-DM	pc.
AD-10-4620 \<P> \<Z> \<2> \<>	sealing kit for detector module type SL-DM (VE=10 Sets)	set
AD-10-4630 \<P> \<Z> \<2> \<>	cover plate type CP-HS-1 (VE=10 pc.)	pc.
AD-10-4640 \<P> \<Z> \<2> \<>	connecting cable type CC-SU	pc.
AD-10-4660 \<P> \<Z> \<2> \<>	Connecting cable type CC-NU	pc.
AD-10-4720 \<P> \< > \<0> \<>	Storage card type SC-1	pc.
AD-10-4725 \<P> \< > \<0> \<>	Storage card type SC-1-F	pc.
AD-10-4740 \<P> \< > \<0> \<>	Battery type BT-1	pc.

TITANUS TOP·SENS/a, Subsidiary-Delivery Transaction

--

order no.	description	unit

Phase-out

09-20-5990	switch power supply for remote display	pc.
<P> < >	type E599	
<2> <AM>		

09-20-6130	network unit	pc.
<P> <Z>	type NU-1	
<2> <AM>		

09-20-6820	TITANUS fan control	pc.
<P> < >	type FC-1	
<2> <AM>		

AD-05-0550	diagnostic tool	pc.
<P> < >	type DIAG 2	
<2> <AM>		

AD-05-0560	diagnostic tool	pc.
<P> < >	type DIAG 3	
<2> <AM>		

AD-10-4405	detector module TITANUS TOP·SENS	pc.
<P> < >	type DM-TT-25-L/a	
<2> <AM>		

AD-10-4412	detector module TITANUS TOP·SENS	pc.
<P> < >	type DM-TT-05-L/a	
<2> <AM>		

AD-10-4417	detector module TITANUS TOP·SENS	pc.
<P> < >	type DM-TT-80-L/a	
<2> <AM>		

AD-10-4420	detector module TITANUS TOP·SENS	pc.
<P> < >	type DM-TT-25-Lp/a	
<2> <AM>		

AD-10-4435	detector module TITANUS TOP·SENS	pc.
<P> < >	type DM-TT-80-Lp/a	
<2> <AM>		

AD-10-4480	detector module TITANUS TOP·SENS	pc.
<P> < >	type DM-TT-25-L-F/a	
<2> <AM>		

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TITANUS TOP·SENS/a, Subsidiary-Delivery Transaction

--

order no.	description	unit

AD-10-4490   detector module TITANUS TOP·SENS   pc.
<P>   < >   type DM-TT-05-L-F/a
<2>   <AM>

AD-10-4500   detector module TITANUS TOP·SENS   pc.
<P>   < >   type DM-TT-80-L-F/a
<2>   <AM>

<0>=Generic purch. item, <1>=Purch. item fixed vendor, <2>=Proprietary develop. (ANT/develop.), <3>=in-house prod. (ANT/develop./prod.), <4>=Compon. 140l Fl.

<AM>=discontinued model, <Z> = approved, <P>=compulsory purchase, purchase only via WAGNER head office, <L>=compulsory supplier, purchase via fixed supplier

Inspection Protocol for Air Sampling Smoke Detection System, type TITANUS *TOP · SENS®* /Rev.a

	measure/setting values	measure/setting values	measure/setting values	measure/setting values	measure/setting values	measure/setting values
device number						
serial number basic device						
serial number detector module						
Commissioning						
visual check (✓/ –)						
under-pressure [Pa]						
sensitivity [%/m]						
alarm delay [s]						
fault transmission delay [min]						
activating threshold (lo/med/hi/v.hi)						
fault latched (yes/no)						
LOGIC · SENS (yes/no)						
air pressure-dependent adjustment (yes/no)						
air pressure-independent adjustment (yes/no)						
altitude [m above sea l]						
air pressure [hPa]						
temperature [°C]						
Fault: Blockage						
LED flashes (✓/ –)						
relay drops out after delay period (✓/ –)						
signal transmission to CFP (✓/ –)						
cause removed, LED off (✓/ –)						
relay active after dropping below threshhold (✓/ –)						
cause removed, LED latched (✓/ –)						
relay remains dropped out (✓/ –)						
Fault: Fracture						
LED flashes (✓/ –)						
relay drops out after delay period (✓/ –)						
signal transmission to CFP (✓/ –)						
cause removed, LED off (✓/ –)						
relay active after droping below threshold (✓/ –)						
cause removed, LED latched (✓/ –)						
relay remains dropped out (✓/ –)						
Infoalarm						
LED flashes (✓/ –)						
relay activated after delay period (✓/ –)						
signal transmission to CFP (✓/ –)						
LED latched (✓/ –)						
relay latched (✓/ –)						
Pre Alarm						
LED flashes (✓/ –)						
relay activated after delay period (✓/ –)						
signal transmission to CFP (✓/ –)						
LED latched (✓/ –)						
relay latched (✓/ –)						
Full Alarm						
LED flashes (✓/ –)						
relay activated after delay period (✓/ –)						
signal transmission to CFP (✓/ –)						
LED latched (✓/ –)						
relay latched (✓/ –)						

Issued by: …………………………   **Signed: ………………………………**

Legend:	✓ O.K.
	– not O.K.

Glossary

Technical Term	*Definition*
A	
aerosol also: smoke aerosol	An aerosol is a floating particle in the microscopic or submicroscopic particle size range. They consist of unburned parts of the fire load, intermediate products of the oxidation and finely divided carbon (soot).
air flow sensor	Sensor for monitoring the total air flow in the pipe system, i.e. checking the pipe system for blockage and fracture; depending on the demands of the air flow monitor →single-hole monitoring and the detection of a fracture at the end of the pipe system are possible.
air sampling smoke detection system	An active system producing under-pressure for air sampling with a ventilator, integrated in the system. The air samples are then passed to a detection unit (smoke detector, detector head or detector module).
alarm	a) Acoustic and/or optical signal activated through →smoke detectors to indicate a fire. b) Freely adjustable alarm threshold. The activation of the alarm definitely means the detection of a fire. The fire department is informed.
alarm condition	The condition of a fire detection installation or a part of it as a reaction to an existing danger.
alarm current	An increased voltage in the →alarm condition (→quiescent current).
automatic smoke detectors	These detect and analyses physical parameters which lead to danger-warning signals. Automatic smoke detectors are e.g. point-type detectors and →air sampling smoke detection systems.
C	
central fire panel	Central part of a fire detection installation which supplies the detectors with power, displays received signals optically and acoustically and, if required, transmits them and checks the installation for faults.
CMOS	**C**omplementary **M**etal **O**xide **S**emi-conductor, complementary MOS technology
collective alarm	A non-differentiated, i.e. non-localisable →alarm, which reports to a superior system.
collective detection system	Conventional line detection technology for which all detectors, connected to the same line, have the same collective address (common indication and operation without identification of the individual detector).

C	
collective effect	A phenomenon common only to air sampling smoke detection systems. The sensitivity of the individual detection points (smoke sampling points), in contrast to point-type detectors, does not remain constant. The sensitivity of the individual air sampling points depends on the → response sensitivity and the number of air sampling points.
collective fault	A non-differentiated, i.e. non-localisable →fault signal which reports to a superior system.
contact load	Contact load describes the maximum load at which a relay contact can be switched.
D	
detection line	Monitored transmission line (→primary line) to which the smoke detectors are connected with the →central fire panel.
detection reliability	This is the measure of reliability with which phenomena are detected and reported and for which a detection system is used.
detector group	Collection of smoke detectors in a →detection line for which a separate display is installed in the →central fire panel.
detector module	modular →scattered light smoke detector optimised for use in air sampling smoke detection systems and equipped with a special air feed, a Flow-Init button for initialisation of the integrated →air flow sensor, a diagnostic LED with flash code for indicating faults and a →DIL-switch
detector module sensitivity *also: sensitivity*	The detector module sensitivity is adjustable between the levels 1 to 4 and is the generic term for →response sensitivity.
DIL switch	**D**ual **I**n **L**ine; e.g. to set the response sensitivity, the air flow sensor, the delay period for →alarm and fault, to set the fault display to latched or non-latched and to activate or deactivate →*LOGIC · SENS*.
drift	Method of compensating detector soiling which could change the quiescent signal by moving the zero point.
E	
electromagnetic compatibility (EMC)	This is the ability of an electrical or electronic system to operate correctly in its electromagnetic environment and have no adverse affect on this environment.
End-of-line resistor	Element at the end of a →detection or control line to check the line for broken wires and short circuits.

F	
fault signal	Signal indicating a deviation from the desired value in the →smoke detection installation.
fire load	The fire load corresponds to the amount of heat of all combustible materials of a fire section, depending on its surface area.
fire monitor	Part of a →central fire panel which is the ideal physical parameters to identify fire in the protected area. Protection can be either continual or at regulated time intervals.
fire section	Isolated section in a building (special construction) which avoids or slows down the spreading of a fire to a neighboring section.
fire-resistant collars	Constructions which avoids flame/smoke spreading in cable ducts as well as in recesses and break-through for wiring in walls and ceilings.
H	
head control	The head control is an electronic board in the detector module and contains its control electronics. It provides the smoke signal for further processing.
I	
Interactive detector	Detector series with highest detection reliability for evaluation and decision logistics with interactive signal processing, based on programmable algorithms. The detectors can be parameterised; they can be optimally programmed in software for the requirements of the installation location.
interference	Interferences in smoke detection installations are external values which can impair the proper functioning of a smoke detection installation.
L	
line module	By means of line modules (AnalogPLUS® or interactive) TITANUS *TOP · SENS*® can be connected to the *AlgoRex*®-smoke detection system.
LOGIC · *SENS*	Via the LOGIC · *SENS* switch the intelligent signal processing can be activated. It permits analysis of the measured smoke level by comparing the smoke data with known parameters, thus detecting interferences and avoiding false alarms.
loop line	→Detection line which forms a loop from the central fire panel via the →smoke detectors and back to the central fire panel to increase operation reliability.

M	
monitoring area	Area which is monitored by an automatic smoke detector.
monitoring window	The normal air flow lies within an adjustment range between a defined upper and lower value. This range is the monitoring window.
N	
nominal gap width	Maximum gap in the housing of the detonation prevention device without an ignition spark being flashed from the device to the potentially explosive area.
P	
primary line	Primary lines are transmission lines permanently and automatically checked for short circuit and interruption. They serve the transmission of important function signals of smoke detection systems.
Q	
quiescent current	Current on the detection line in its normal operational state, →alarm current
R	
response sensitivity	The response sensitivity describes the sensitivity at which an alarm is activated (→detector module sensitivity).
S	
scattered light smoke detectors	Scattered light smoke detectors are optical smoke detectors. They use the phenomenon of scattered light through smoke particles which changes the signal at the light diode.
secondary line	Non-monitored transmission lines.
sensitivity ↑ detector module sensitivity	
single hole monitoring	Detection of changes (e.g. blockages) of the diameter of each single air sampling point.
smoke detection system	Detection of changes (e.g. blockages) of the diameter of each single air sampling point.
smoke detector	Smoke detectors react to combustible particles and/or →aerosols (floating particles) in the air.

T	
temperature compensation	The air flow in the pipe system is not falsified by temperature variations.
two-detector dependency	A system to verify alarm states. The fire alarm is activated after two detectors of a →detector group have been introduced. When the first detector has been introduced an internal alarm or control function can be activated.
two-group dependency	System to verify alarm states. The fire alarm is activated after one detector of two related →detector groups has been introduced. When the first detector has been introduced an internal alarm or control function can be activated.
V	
Value concentration	The value concentration is an important factor for the evaluation of the risk of fire. It is calculated with the values to be protected. An added consideration is the replace ability of the endangered goods, which will be nearly impossible in the case or cultural assets.

WAGNER®

EG-KONFORMITÄTSERKLÄRUNG
EC-DECLARATION OF CONFORMITY

Der Unterzeichner, der den nachstehenden Hersteller vertritt,
The undersigned, representing the following manufacturer

WAGNER Group GmbH
Schleswigstraße 1 - 5
D-30853 Langenhagen
Germany

erklärt hiermit, dass folgende Ansaugrauchmelder für Brandmeldeanlagen ab Serien-Nr. 348 000:
hereby declare that the following aspirating smoke detectors for fire detection systems from serial no. 348 000:

Gerät / Device	Typ / Type
TITANUS *TOP·SENS*®	TT-1/s, TT-1-F/s, TT-1-SL/s, TT-1-B, TT-2-B, TT-1-E/a, TT-1-F-E/a, TT-1-SL-E, TT-2-E/a, TT-2-F-E/a, TT-2-SL-E, TT-1/a, TT-1-U, TT-1-F/a, TT-1-F-U, TT-1-SL, TT-1-SL-U, TT-1-AU, TT-1/a CN TT-xNF(-xx)(-xx)(-a)
TITANUS *TOP·SENS*® LSNi	TT-L1, TT-L1-SL-U, TT-L1-SL, TT-L1-B, TT-L1-SL-B, TT-L2-B, TT-L2-SL-B

in Übereinstimmung mit den Bestimmungen der nachstehenden EG-Richtlinien sind:
are in conformity with the regulations of the following EC-Directives:

EG-Richtlinie	EC-Directive
- EMV-Richtlinie 2004/108/EG	- EMC Directive 2004/108/EC

Ort, Datum: Langenhagen, 27.06.2013 / 2013-06-27
Place, Date:

Leiter Entwicklung:
Head of development:

_____
Torsten Wagner

68-20-1221
01.02.2012

Anhang: **EMV-Richtline 2004/108/EG** *(EG-Konformitätserklärung vom 27.06.2013)*

Appendix: **EMC Directive 2004/108/EC** *(EC-Declaration of Conformity 2013-06-27)*

Produktbezeichnung / Product Identification:

Gerät / Device	Typ / Type
TITANUS TOP·SENS®	TT-1/s, TT-1-F/s, TT-1-SL/s, TT-1-B, TT-2-B, TT-1-E/a, TT-1-F-E/a, TT-1-SL-E, TT-2-E/a, TT-2-F-E/a, TT-2-SL-E, TT-1/a, TT-1-U, TT-1-F/a, TT-1-F-U, TT-1-SL, TT-1-SL-U, TT-1-AU, TT-1/a CN TT-xNF(-xx)(-xx)(-a)
TITANUS TOP·SENS® LSNi	TT-L1, TT-L1-SL-U, TT-L1-SL, TT-L1-B, TT-L1-SL-B, TT-L2-B, TT-L2-SL-B

Die Übereinstimmung des (der) bezeichneten Produkte(s) mit den Vorschriften der **EMV-Richtlinie 2004/108/EG** wird nachgewiesen durch die vollständige Einhaltung folgender harmonisierter Europäischer Norm(en) und/oder Spezifikationen oder Teilen von diesen:

The conformity of the characterized product(s) with the regulation of **EMC Directive 2004/108/EC** is proved by the total compliance with the following harmonized EC-standard(s) and/or specifications or parts of them:

Harmonisierte EG-Norm / Harmonized EC-Standard
- EN 50130-4:1995 + A1:1998 + A2:2002 + Corr. 2003 (Elektromagnetische Störfestigkeit / Electromagnetic Immunity)
- EN 61000-6-3:2007 (Elektromagnetische Störausstrahlung / Electromagnetic Emission)

Zugehörige Dokumentation / Accompanying Documentation:

Prüfberichts-Nummer / Test Report Number	Datum / Date
- WAG030604-EPA (Obering. Berg & Lukowiak GmbH)	30.06.2003 / 2003-06-30
- 2006144 (RS Schwarze)	11.07.2006 / 2006-07-11
- 2010045 (RS Schwarze)	24.02.2010 / 2010-02-24
- 2010078 (RS Schwarze)	08.04.2010 / 2010-04-08
- 2010247 (RS Schwarze)	29.11.2010 / 2010-11-29

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PREVENTION **OxyReduct®**

Actively prevents the development of fire.
OxyReduct® is the innovative way in fire protection.

DETECTION **TITANUS®**

Very early fire detection with TITANUS® provides critical
additional time to assess the risk and take counter measures.

SUPPRESSION **FirExting®**

Fixed fire extinguishing systems with various gaseous
extinguishing agents.

COORDINATION **Visu*LAN*®**

Visualisation and control of important system data combined with multiple diagnostic
and messaging functions integrated into a powerful building management system.

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