



ADVANCED WARNING

SYSTEMS

# TITANUS *PRO-SENS*<sup>®</sup>

Air Sampling Smoke Detection System



## Technical Manual MAN3046

Note: This manual must be used in conjunction with the requirements of local standards, codes and job specifications.

For *PRO-SENS*<sup>®</sup> APID and CLI interface information please see their Installation guides.

WORLD LEADER OF INNOVATIVE SOLUTIONS  
IN FIRE DETECTION AND ALARM SYSTEMS



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## 0 General

### 0.1 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 PRO·SENS® and TITANUS PRO·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 PRO·SENS® is described here. Specific technical designs of TITANUS PRO·SENS® 2 are described separately.

### 0.2 Safety Information

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



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



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



Operational improvements can be achieved if this symbol is observed.

### 0.3 Guarantee

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

### 0.4 Copyright

The copyright in this Technical Manual remains with WAGNER.

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.

## 0.5 Packaging

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

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

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

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



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

## 0.6 Disposal

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

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

# 1 Introduction

## 1.1 Features of the TITANUS PRO·SENS® ASD System

TITANUS PRO·SENS® is the latest generation of WAGNER air sampling smoke detection systems. Besides its use for room and equipment protection the variant can be used for monitoring climatic cabinets and climatic ducts.

**Sensitivity** The device has a response sensitivity of up to 0.5 %/m, 0.1 %/m or 0.015 %/m light obscuration. According to the application other sensitivities can be set. Thanks to the innovative High-Power-Light-Source (HPLS) technology a wide detection range over all rated fire types is guaranteed.

If two detector modules are inserted in the TITANUS PRO·SENS®, the monitoring area is doubled.

**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 air flow monitoring** Like point-type detectors, which are electronically monitored to detect line fractures and short circuits, air sampling systems require a 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 fracture or blockage of air sampling points.

The air flow monitoring is temperature compensated and can be independent of the air pressure.

**Patented air sampling points** Depending on the required pipe design the air sampling points have specified hole diameters. For these air sampling points WAGNER has developed patented **aspiration-reducing film sheets** with marking tape and clips that allow easy mounting and avoid secondary noise. The diameter of the air sampling point is clearly marked on the film sheets, allowing quick and easy checking of the air sampling point diameter.

**Point detector spacing** The air sampling points of the system can be compared to point-type detectors. The monitoring areas comply with the valid national regulations.

**Diagnostics software** The diagnostic software permits a quick and reliable fault localization for maintenance and service. The current and memorized device state can be read by a PC via a special cable.

**Choice of ventilator voltage** The fan voltage can be set according to project planning via plug-in jumpers.

With TITANUS PRO·SENS® devices, the fan voltage can be set between 6.9 V and 9 V by means of the jumpers on the base board.

The voltage with TITANUS PRO·SENS® 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 PRO·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 PRO·SENS® -SL devices.

## 1.2 Areas of Application

The air sampling smoke detection system TITANUS PRO·SENS® is a smoke detection system used for the early smoke detection and very early smoke detection in rooms and equipment.

**Principle** Air samples are drawn from the monitoring area via a pipe system with defined air sampling points and passed to the detector module.

It is particularly suitable for areas in which point-type detectors cannot be used or can only be used under certain conditions.

This applies in particular to areas: ...

- with difficult access and in which it is difficult to install or to maintain point-type detectors.
- which are air-conditioned.
- which are higher than allowed for point-type detectors.
- in which point-type detectors are not desired for aesthetic reasons.
- in which electromagnetic fields have an impact .
- which are exposed to high or low temperature.
- with pollution of the air, where filter elements are needed.
- which are jeopardized by vandalism.

**Room protection** TITANUS PRO·SENS® is suitable for the monitoring of rooms like

- floor voids, ceiling voids
- tunnels, ducts, voids difficult to access
- storage areas, high-rack storage areas, elevator shafts
- museums, cultural centre
- deep-freeze storage areas

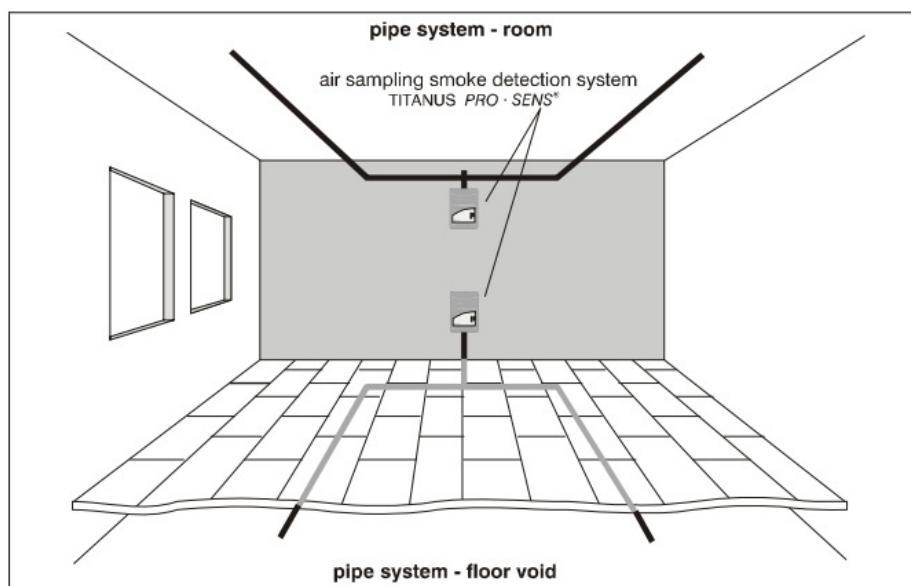
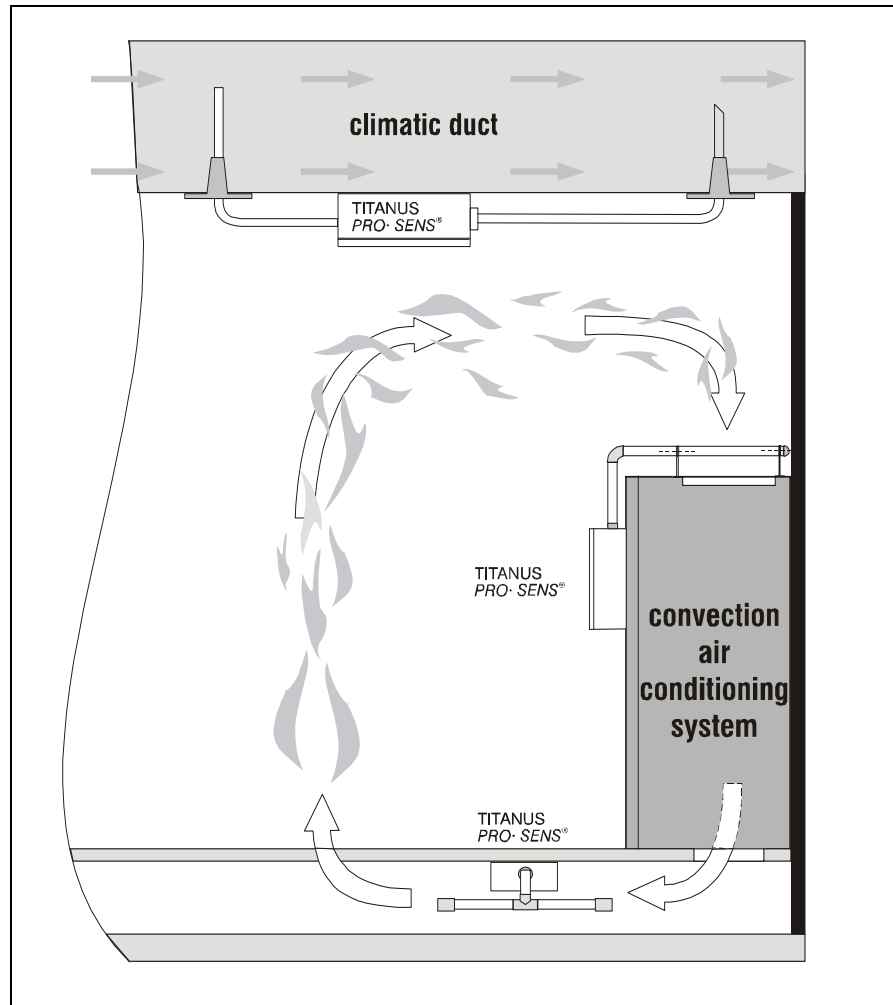


Fig. 1.1: Scheme - room monitoring with the air sampling smoke detection system TITANUS PRO·SENS®

**Room monitoring  
with air conditioning**

Room monitoring takes place

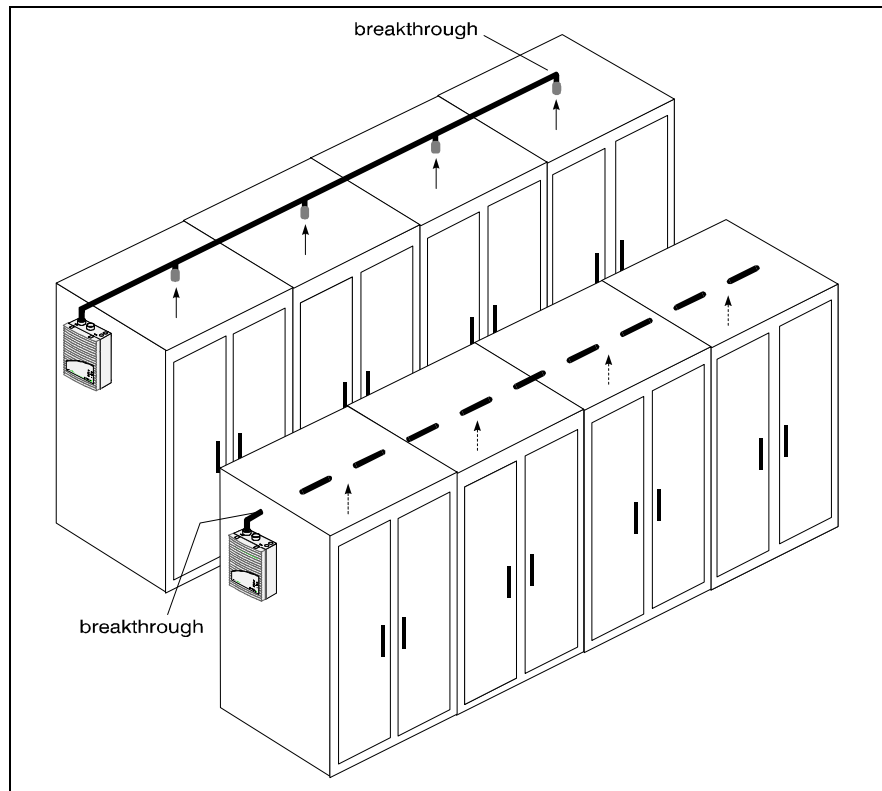
- in rooms with air conditioning for server rooms, etc.,
- in ventilation ducts,
- via floor voids, ceiling voids,
- in EDP rooms, distribution cabinets, transformer cells,
- at climatic cabinets (see Fig. 1.2) or
- at climatic ducts in the by-pass.



*Fig. 1.2: Monitoring possibilities of a convection air conditioning system or climatic duct (scheme)*

**Equipment Protection** non-ventilated and ventilated installations/cabinets like i. e.

- distribution cabinets, switch cabinets
- telephone switch boards
- measuring and control units



*Fig. 1.3: Scheme - equipment monitoring with the air sampling smoke detection system TITANUS PRO·SENS®*

The air sampling system TITANUS PRO·SENS® 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 PRO·SENS® 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

## 2 Technical Description

### 2.1 System Description

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

The most important components of the basic device are the range of optical detector modules to detect the smoke aerosols, the aspiration unit to pass the air samples to the detector module and the air flow sensor in order to monitor the pipe system for fracture and blockage. The air flow sensor is integrated into the detector module.

Only for TITANUS PRO·SENS® 2 one of the two detector modules can be equipped with or without air flow sensor and with or without LOGIC·SENS (refer to next page).

The pipe system consists of pipes and fittings made of PVC or ABS plastic.

For the pipe design each air sampling point in the pipe system of TITANUS PRO·SENS® represents a point type detector.

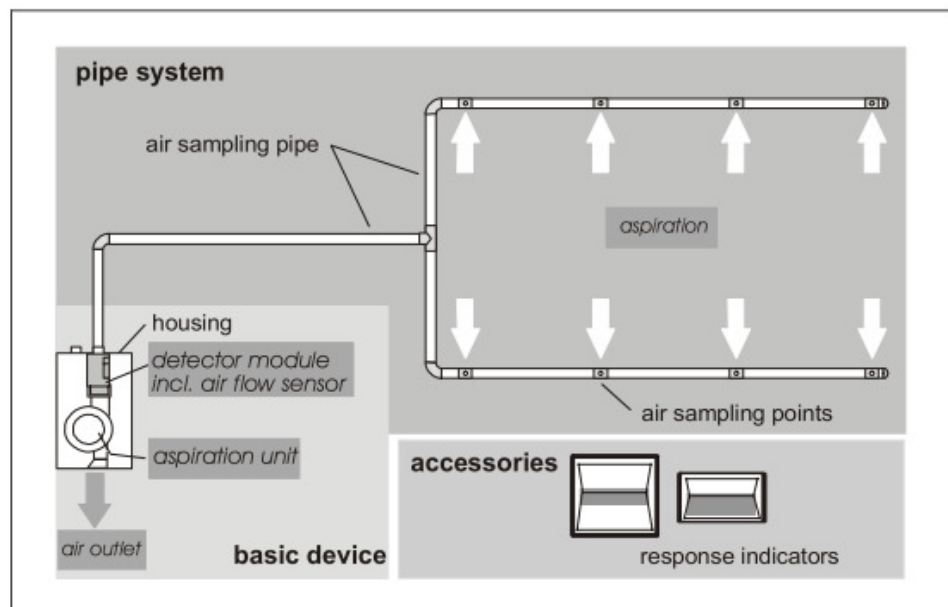


Fig. 2.1: Air sampling system TITANUS PRO·SENS®

A suite of accessories, like air filters and remote indicators are available.

### 2.1.1 Function

The aspiration unit in the basic device draws air samples from the area to be monitored via a pipe system with defined air sampling points. The air samples are then passed to the sensitive detector module (refer to 2.1)

#### Detector Module

Dependent on the response sensitivity of the used detector module (up to 0.5%/m, 0.1 %/m or 0.015 %/m light obscuration) TITANUS PRO·SENS® activates the alarm when the corresponding light obscuration is achieved. Four different alarm thresholds can be set. The alarm is indicated at the device via the alarm LED and can be transmitted to a connected fire detection control and indicating equipment (F.D.C.I.E.).

Different delay periods can be set for the alarm thresholds and the fault display and fault transmission (refer to chapter 5.3).

Alarm indications are stored and have to be reset after eliminating their cause.

For TITANUS PRO·SENS® 2 two detector modules allow to monitor two areas the way described above. If one area is to be monitored, a two-detector dependency and additionally through the choice of different response sensitivities an action alarm can be realized.

#### LOGIC·SENS

TITANUS PRO·SENS® 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 without false alarms.

#### Monitoring the Detector

##### Module

Each detector module is checked for soiling, signal faults and detaching. In the event of the detector module becoming soiled a drift is affected. A fault is indicated by the fault-LED at TITANUS PRO·SENS® and can be transmitted to a fire detection control and indicating equipment (F.D.C.I.E.) via a fault contact. In order to avoid false alarms faults are processed with a delay.

#### Air Flow Monitoring

An air flow sensor checks the connected pipe system for fracture and blockage. Dependent on the design of the pipe system (refer to chapter 4 "Pipe Design"—the air flow sensor can detect at least a blockage of 50% of the air sampling points up to the complete blockage and a fracture of the pipe system causing a loss of 50 % of the air sampling points. If the ventilator fails, the air flow in the pipe system is interrupted causing a blockage which is indicated. The air flow monitoring is temperature compensated and can be set to an air pressure independent mode.

After a delay period which can be programmed by switches the fault is indicated at the air sampling smoke detection system and, if required, the fault signal is passed to the fire detection control and indicating equipment (F.D.C.I.E.) via a fault contact. The thresholds of the monitoring window can be adapted to the ambient conditions (refer to chapter 4 "Pipe Design").

The signal curve of the air flow sensor is illustrated in Fig. 2.2

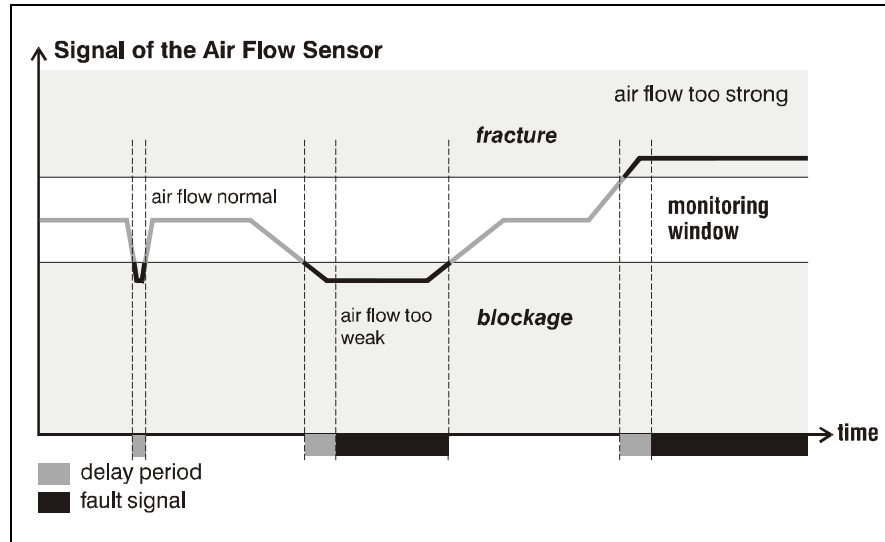


Fig. 2.2: Signal curve of the air flow sensor in case of faults

**Fault Display** A detector module or air flow fault causes a fault signal which is indicated at TITANUS PRO·SENS®. The fault display can be set to a latched (standard mode) or non-latched mode.

**Flash Code for Fault Detection** An indication of faults and certain device states is effected through 5 different flash codes of an LED on the (electronic circuit board) of the detector module. This allows the different types of faults caused by a defective detector module, a blocked or fractured pipe system to be readily identified.

**Resetting via F.D.C.I.E.** A fault signal can be reset via a connected fire detection control and indicating equipment (F.D.C.I.E.). If the TITANUS PRO·SENS® is connected to a fire detection control and indicating equipment (F.D.C.I.E.) and it is required to reset alarm and fault signals at the device together with the reset of the detection line a reset board<sup>1</sup> is mounted as an option. It automatically resets the alarm and fault signals at TITANUS PRO·SENS® in case of a temporary switch-off of the line voltage

<sup>1</sup> The reset board can only be used if the quiescent current of the line is at least 5 mA and 50 mA. The line has to be current less during reset.

- Relay output** TITANUS *PRO-SENS*<sup>®</sup> possesses a potential-free change-over contact for the existing alarm threshold and the collective fault . Thus, the air sampling smoke detection system can be connected to the addressable<sup>2</sup> detection lines of any fire detection control and indicating equipment (F.D.C.I.E.).
- Air flow adjustment** The air flow of TITANUS *PRO-SENS*<sup>®</sup> is automatically adjusted so that commissioning is much easier. The initialization is effected dependently on or independently of the air pressure.
- In order to adjust the TITANUS *PRO-SENS*<sup>®</sup> a characteristic air flow of the pipe network the air flow-init process is affected. For each device this process is necessary one time after the installation, after each modification of the pipe system design and after the modification of the ventilator voltage. Thus the device determines and memorizes the air flow characteristic 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 *PRO-SENS*<sup>®</sup>.
- Two pipe systems can be connected to TITANUS *PRO-SENS*<sup>®</sup> 2. The whole pipe system then measures 2 x 280 m and has a maximum of 2 x 32 aspiration points.

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<sup>2</sup> Only possible via addressable I/O modules of the fire detection control and indicating equipment (F.D.C.I.E.).

2.2 TITANUS PRO·SENS® and accessories  
 2.2.1 Overview

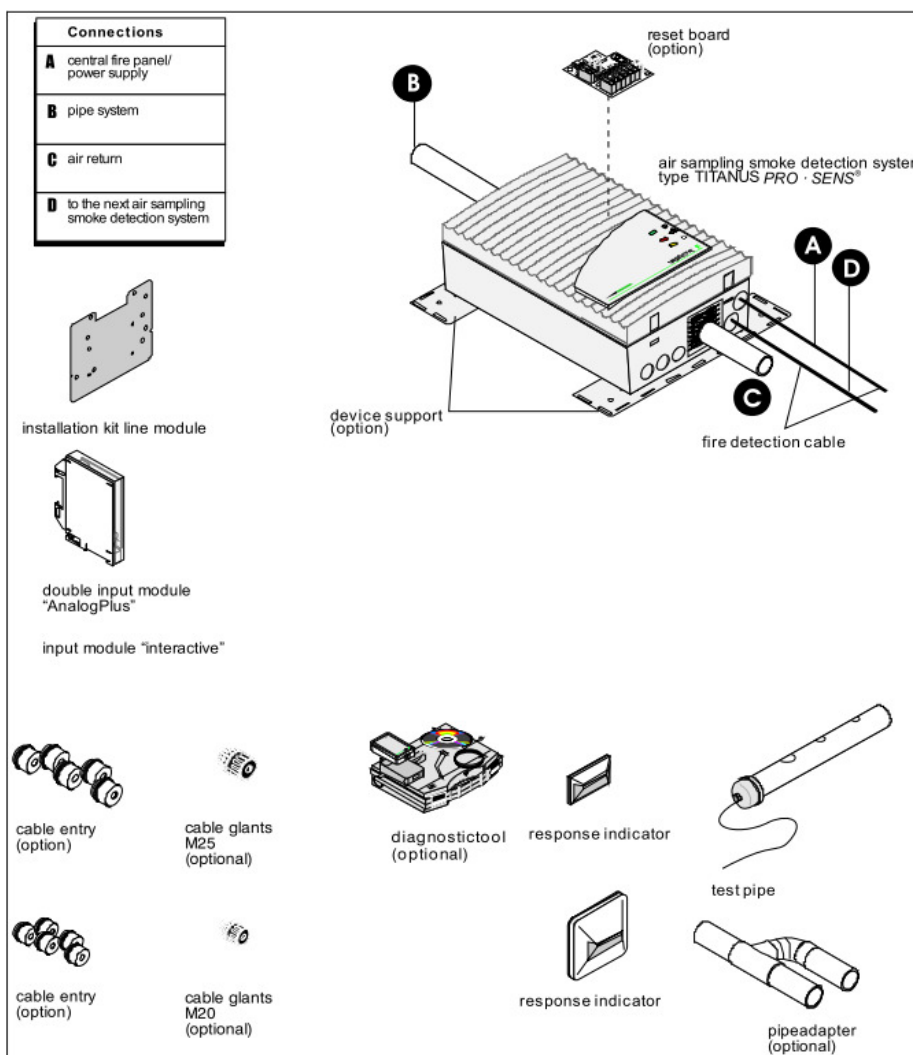


Fig. 2.3: Overview TITANUS PRO·SENS®

The components illustrated in Fig. 2. can be used as an option.



### 2.2.2 Basic device TITANUS PRO·SENS®

The basic device TITANUS PRO·SENS® consists of the following components:

- plastic housing
  - plastic connection piece
  - integrate pipe return
  - Connection for pipe with 25 mm outside diameter
- sensitive detector module with the latest technology according to optical scattered light detectors with integrated air flow monitoring
- air sampling unit with optimized air feeding
- optical displays for alarm<sup>3</sup>, fault and ON
- interface for diagnosis

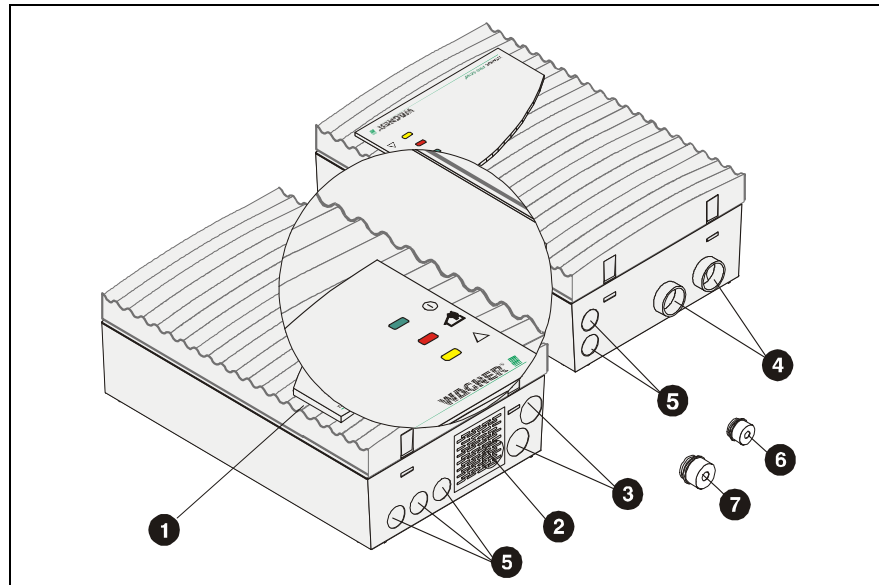


Fig. 2.4: Displays and connections of TITANUS PRO·SENS®  
(explanations refer to table next page)

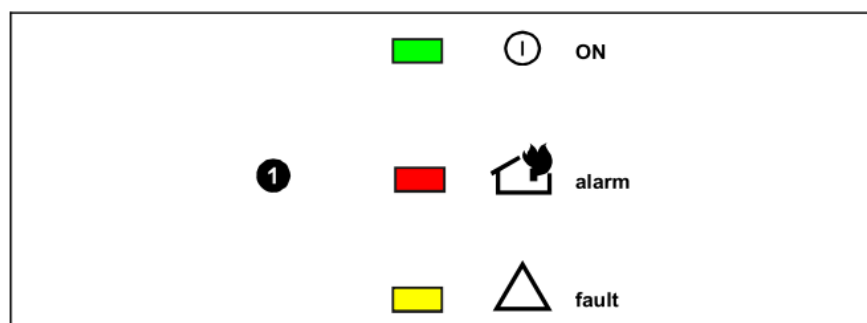


Fig. 2.5: Displays of TITANUS PRO·SENS®  
(explanations refer to number 1 in table next page)

<sup>3</sup> for TITANUS PRO · SENS® 2 : there is separate indication for alarm 1 and alarm 2

## TITANUS PRO·SENS®

Numbers in Fig. 2.	Function	Explanation
<b>1</b>	<b>displays</b> (refer to Fig. 2.5)	
	ON (green LED)	operation display
	alarm (red LED)	alarm display
	fault (yellow LED)	fault pipe system or failure ventilator or fault detector module
<b>2</b>	connection for air return pipe	to return the air
<b>3</b>	cable entry of fire detection cable for connection of central fire panel (CFP) or power supply (input/output)	2 x M 25
<b>4</b>	connector air sampling pipe second connector = no function <sup>4</sup>	for Ø 25 mm pipe system
<b>5</b>	cable entry of fire detection cable for connection of response indicator	5 x M 20
<b>6</b>	plastic connection piece (small)	1 x M 20 for cable with Ø of 8 to 12 mm
<b>7</b>	plastic connection piece (large)	2 x M 25 for cable with Ø of 9 to 14 mm (extendable to Ø 14 to 18 mm)

<sup>4</sup> in contrast to TITANUS PRO·SENS® 2 which offers the possibility to connect a second pipe system.

### 2.2.3 Diagnostics

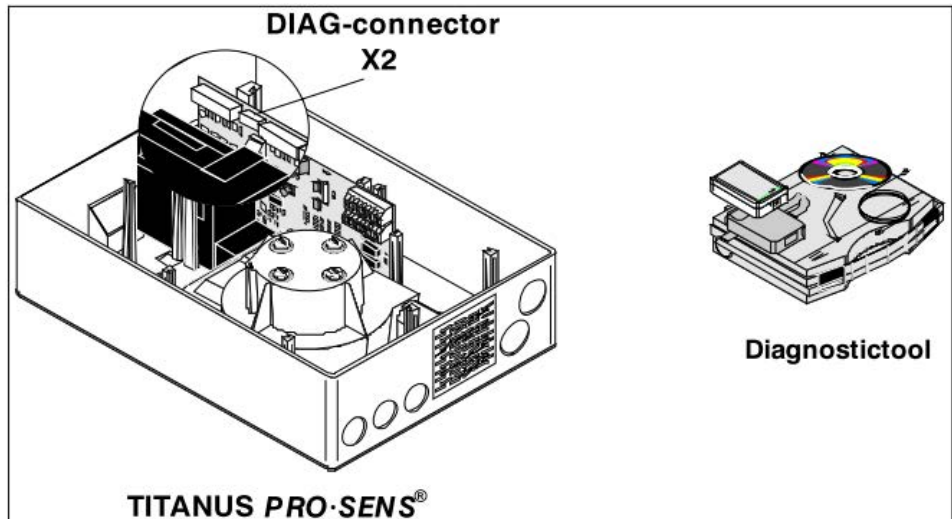


Fig. 2.6: Diagnostic software for reading out the device state

For maintenance and service the diagnostic software is able to display the memorized and current device state as well as fault signals of TITANUS PRO-SENS® on a PC or laptop. The diagnostic cable transmits the data via the X2 base board connector of TITANUS PRO-SENS® (refer to Fig. 2.6).

Diagnostic messages remain memorized for at least 3 days in the diagnostic software to allow an analysis of sporadically occurring environmental influences (e.g. changed operating conditions). Resetting the diagnostic software causes the deletion of any memorized diagnostic messages.

Additionally the software allows clearing fault signals and cleaning the air flow sensor.



TIP

The diagnostic software allows filing any memorized and current diagnostic data and the settings of the DIL switch. Rename this file to be able to compare these data with the newly read-out values during the next check.

### 2.2.4 Response Indicators

For a hidden installation of the air sampling smoke detection system it is necessary to mount an alarm display in a clearly visible place.

TITANUS PRO·SENS® offers the possibility to connect the response indicators DJ1191 and DJ1192.

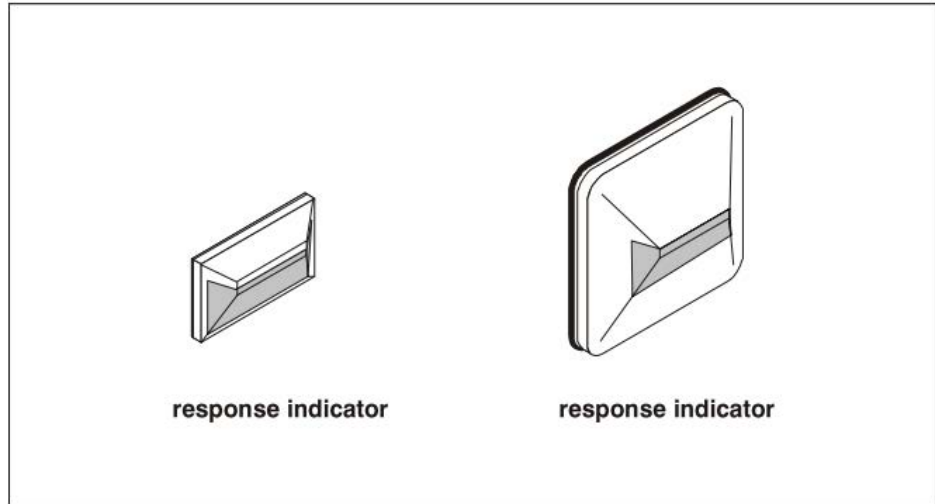


Fig. 2.7: Response indicators

## 2.2.5 Device Support

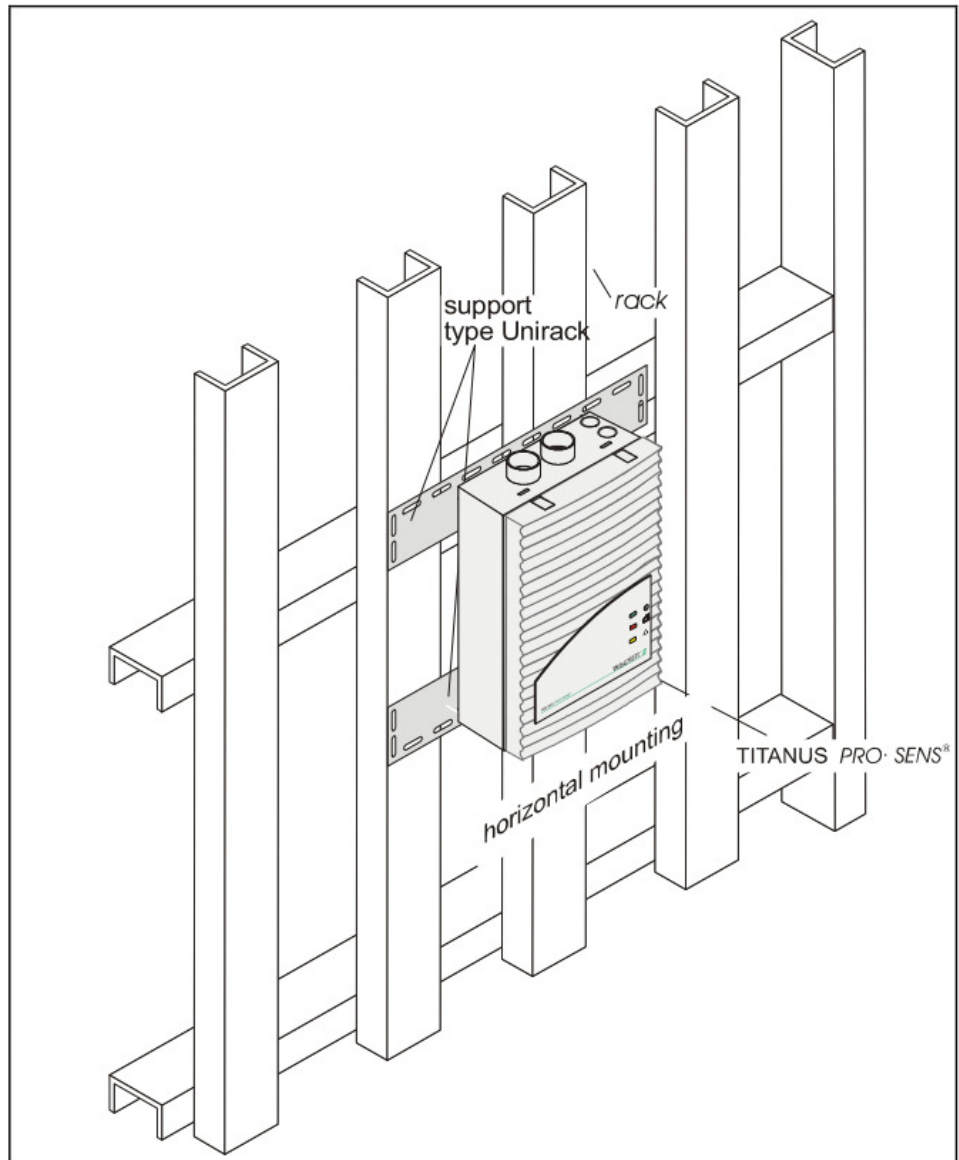


Fig. 2.8: Support for the air sampling smoke detection system TITANUS PRO·SENS®

TITANUS PRO·SENS® can be directly mounted to a wall. If required, additional supports are available e.g. for the fixing at racks.

## 2.3 Pipe system

### 2.3.1 Overview of available pipe components

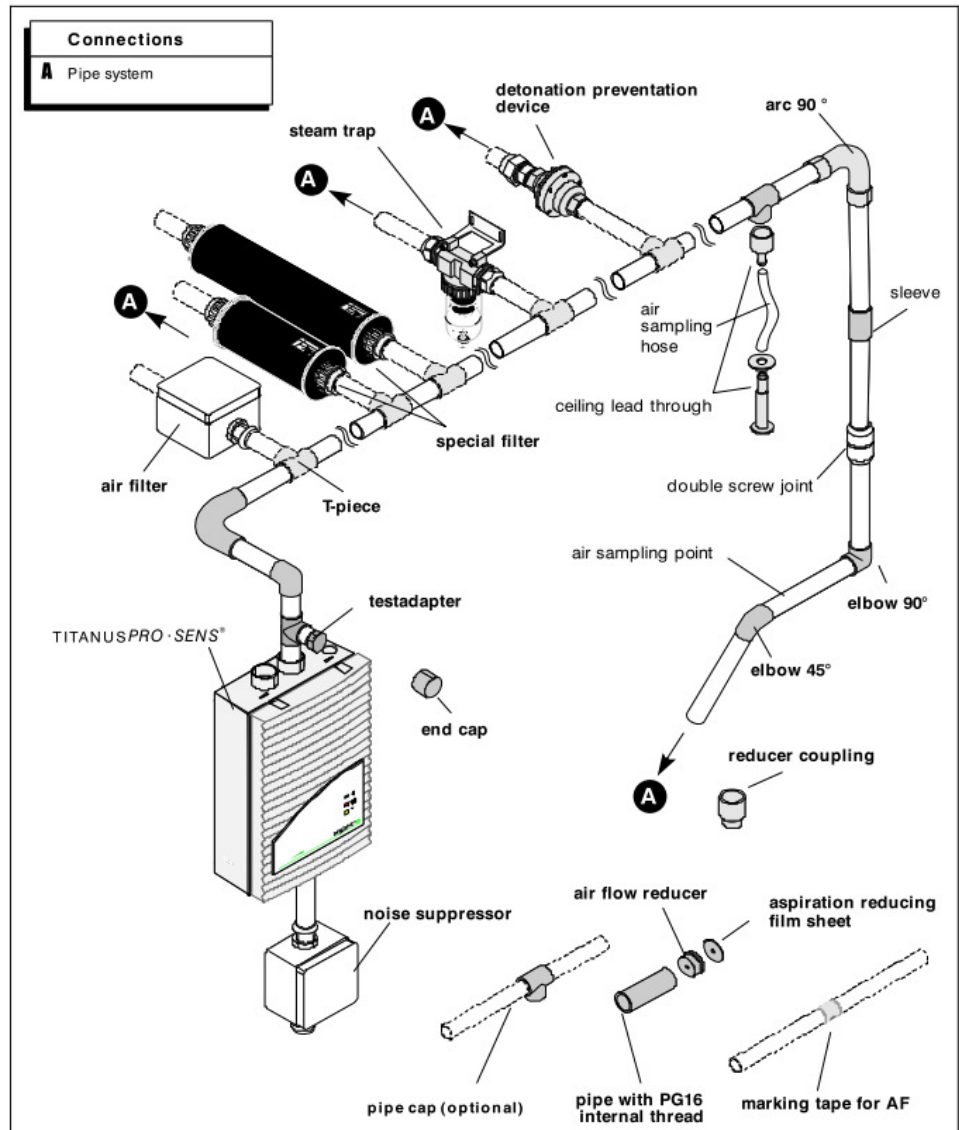


Fig. 2.9: Components for the TITANUS PRO·SENS® pipe system

The components illustrated in Fig. 2.9 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. Figs. 2.10 and 2.11 show the components of a manual and automatic blow-through system. Depending on the frequency of blockages this can be done manually or automatically.

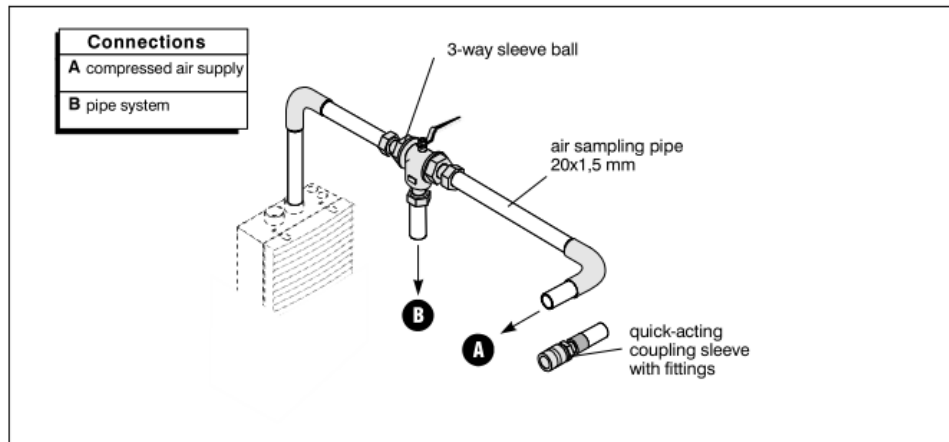


Fig. 2.10: Components for manual blow-through

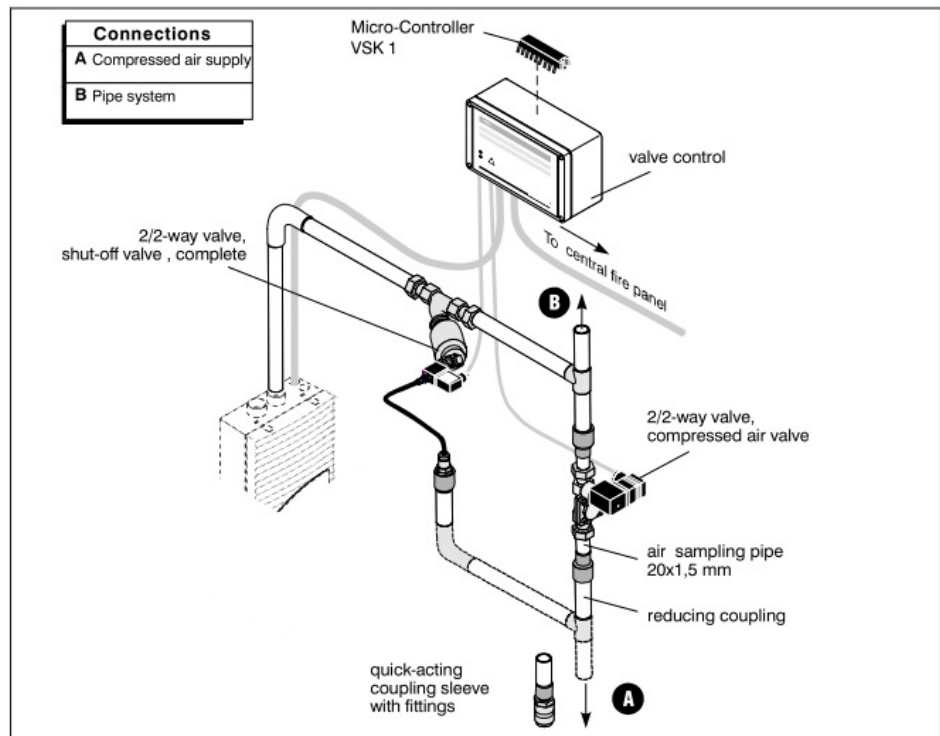


Fig. 2.11: Components for automatic blow-through

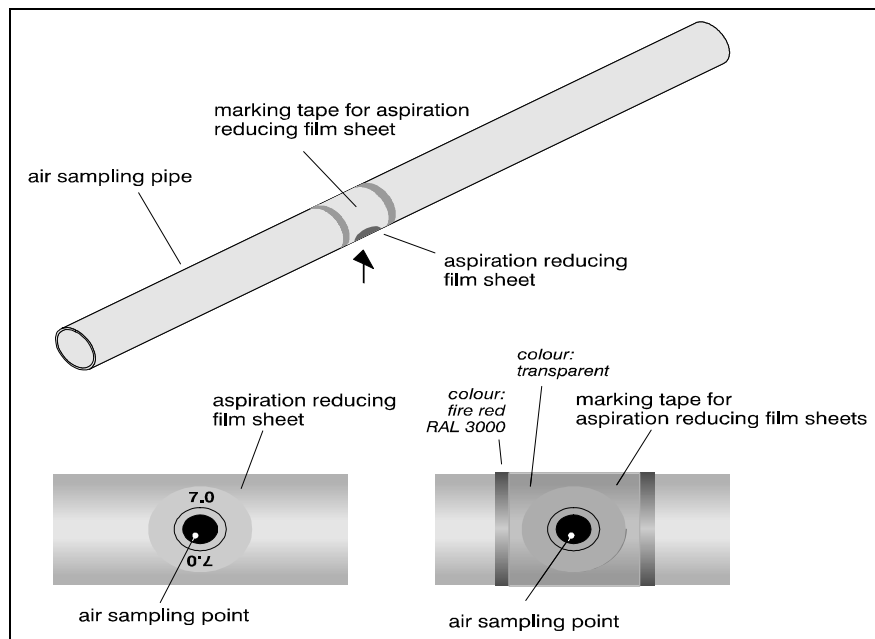
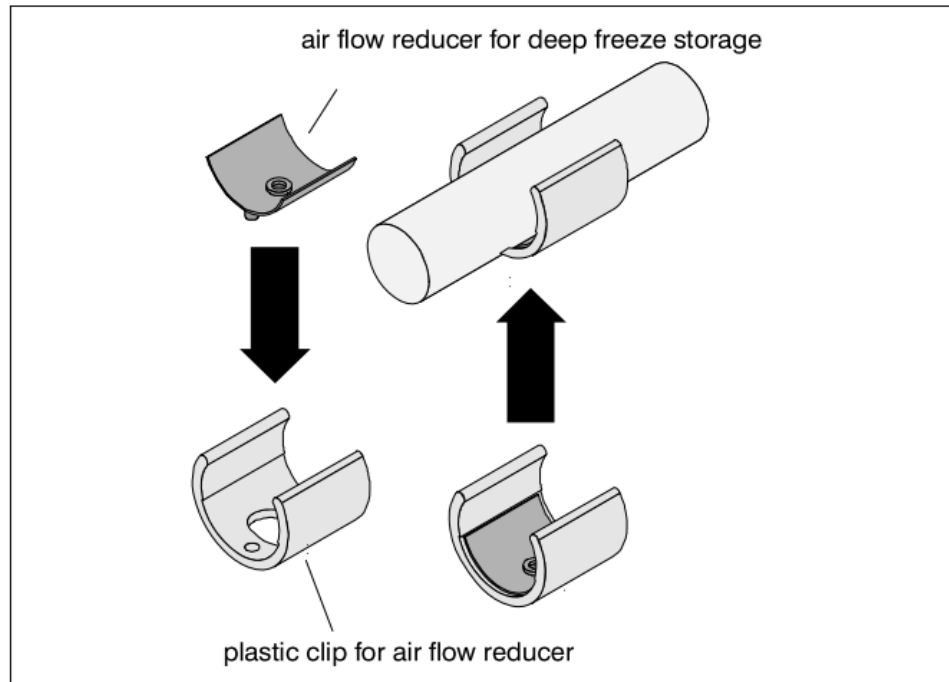
**2.3.2 Air sampling points for room monitoring****2.3.2.1 Aspiration-reducing film sheets**

Fig. 2.12: Air sampling point with aspiration-reducing film sheet and marking tape

An air sampling point is a 10mm-hole in the air sampling pipe. This hole is sealed by means of a patented aspiration-reducing film sheet which has an opening of the required diameter. The size of the opening depends on the design of the pipe system (refer to chapter 4, "Pipe Design").

In order to avoid the aspiration-reducing film sheet from loosening it is fixed with a marking tape which is transparent with red edges and a 10mm-hole. The marking tape is adhered onto the aspiration-reducing film sheet in such a way that the air sampling point will not be covered and remains visible even from far distances.



**2.3.2.2 Air flow reducer clips**

*Fig. 2.13: 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 (refer to Fig 2.13).

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.

The standard aspiration-reducing film sheets, type AF-x, and the marking tapes, type AF-BR, are not suitable for deep freeze storage areas.

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.

### 2.3.3 Ceiling feed-through for hidden installations

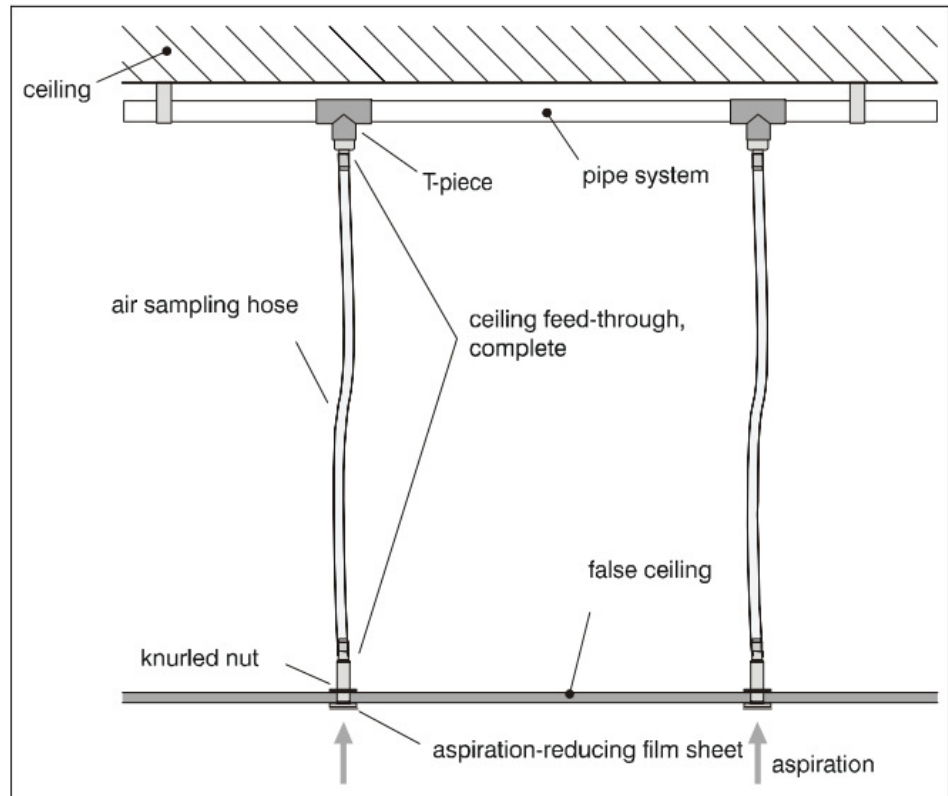


Fig. 2.14: Ceiling feed-through for ceiling voids

**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 4 "Pipe Design") and are connected to the pipe system with air sampling hoses (see fig. 2.14).

If the maximum length of these hoses is 1 m, refer to the pipe design described in chapter 4. If - due to construction - hose lengths of more than 1m are required, the air sampling pipe system must be calculated separately<sup>5</sup>.

The ceiling feed-through is applicable for false ceiling panels with a thickness of up to approximately 35mm. The aspiration-reducing film sheets are available in two colours (pure white, RAL9010 and papyrus white, RAL9018) and come in special colours if required.

<sup>5</sup> calculation is made by WAGNER

### 2.3.4 Air filter for dusty areas

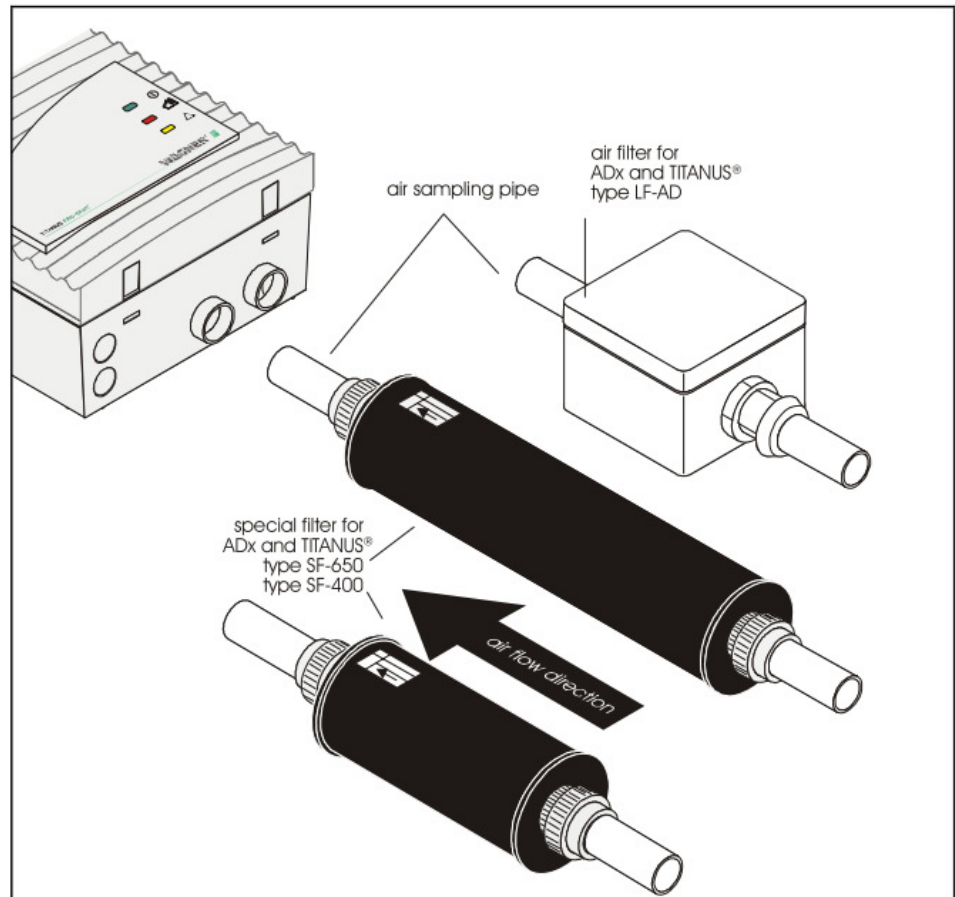


Fig. 2.15: TITANUS PRO-SENS® with air filter

In highly dusty areas air filters are to be used in order to protect the detector module of the device. These sailings can occur e.g. in clean rooms with fresh air supply.

#### Air Filter Type LF-AD-x

As standard air filter the air filter type LF-AD-x consisting of a plastic housing and two PG29-screw joints are used. The multi-layer filter absorbs particles larger than about 15µm.

The air filter is automatically monitored for dirt (blockage) through the air flow monitoring system of TITANUS PRO-SENS®. If the air filters are blocked they are blown-out together with the pipe system by means of compressed air. After having opened the filter housing it is easy to exchange the filter elements if necessary.

#### 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.

### 2.3.5 Air return for pressurised and dusty areas

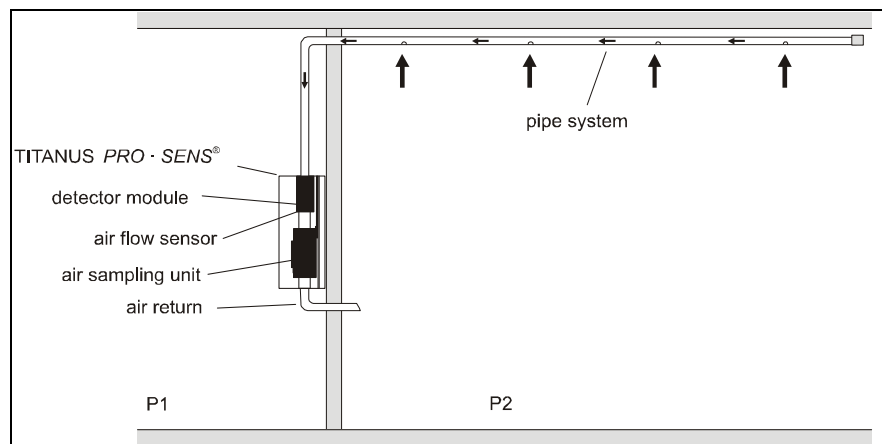


Fig.2.16: Principle of air return with TITANUS PRO·SENS®

If the air sampling smoke detection system TITANUS PRO·SENS® and the pipe system are installed in two areas P1 and P2 with different air pressures, the air is to be returned to the pressure area of the pipe system (refer to Fig. 2.16). The air return can be used for a pressure compensation or in order to keep the air clean (e.g. from odours) in neighbouring rooms.

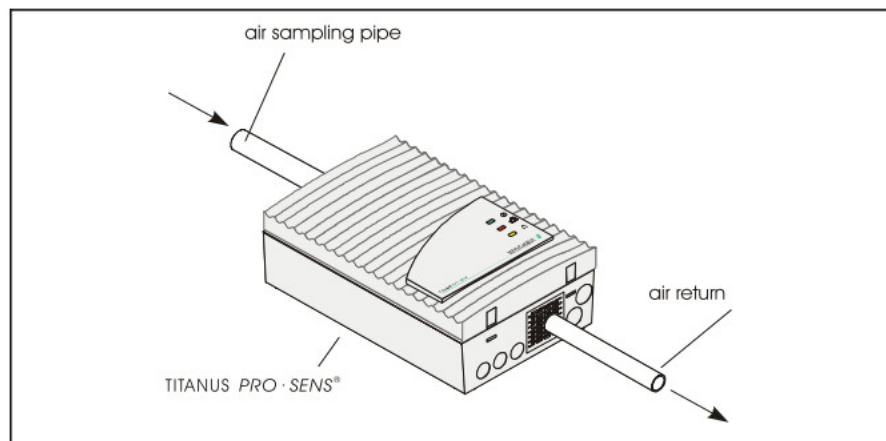
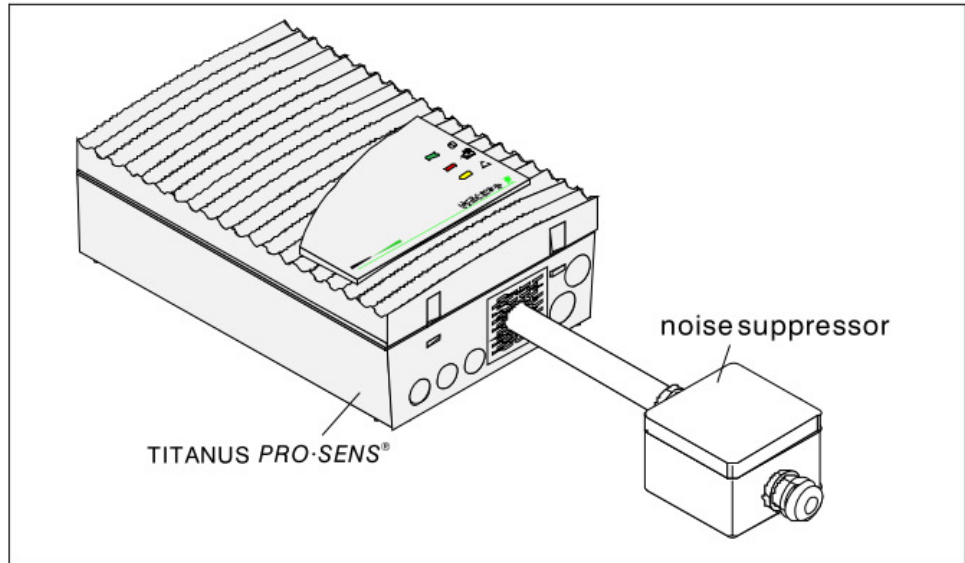


Fig. 2.17: TITANUS PRO·SENS® with air return

The return air pipe system is connected directly through the protection grid to the air outlet channel inside TITANUS PRO·SENS® (refer to Fig. 2.17). For doing so, the pre-punched opening in the protection grid must be broken out.

### 2.3.6 Noise suppressor



*Fig. 2.18: TITANUS PRO·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 PRO·SENS® (such as in offices or hospitals).

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

### 2.3.7 Steam trap for humid areas

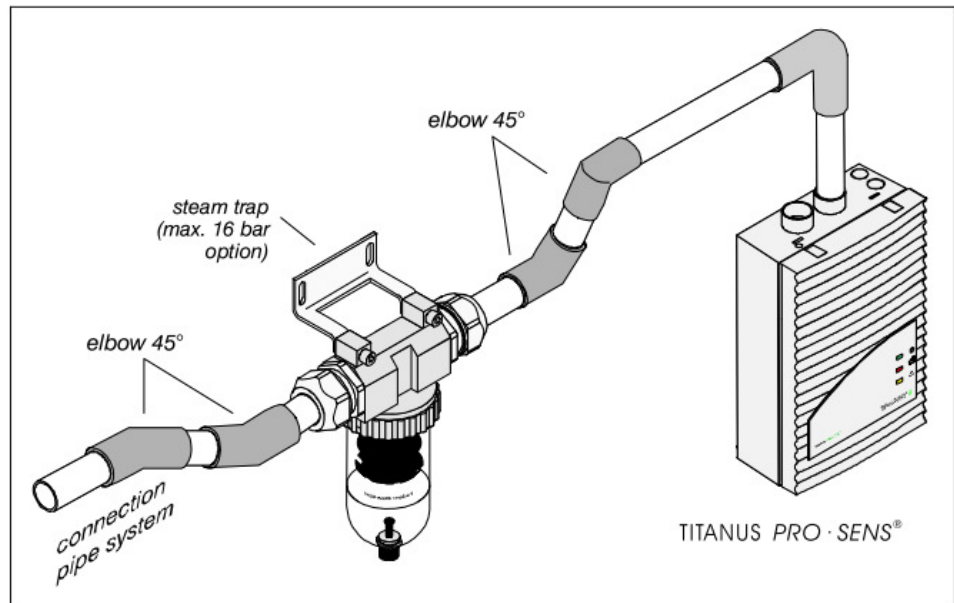


Fig. 2.19: Steam trap to eliminate water vapour from the pipe system and to collect the condensate from the pipe system

If TITANUS PRO·SENS® is used in environments with high humidity condensate can occur 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 optimum distance to the wall (refer to Fig. 2.19).

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 absorbs 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

### 2.3.8 Detonation prevention device for endangered areas

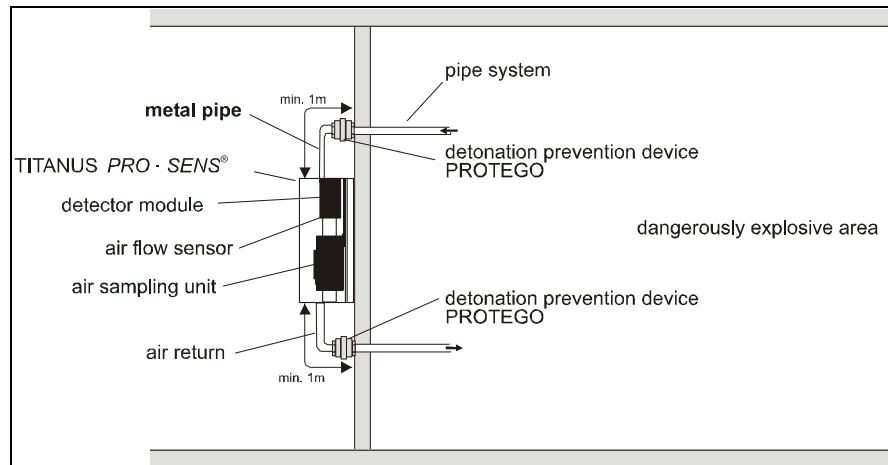


Fig. 2.20: Detonation prevention device in the air sampling smoke detection system and air return system

TITANUS PRO·SENS® 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 PRO·SENS® 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 PROTEGO EG xx, are flame breakthrough barriers, resistant to pipe explosions (deflagrations) as well as resistant to detonations (see fig. 2.20).

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, the minimum pipe length between the mounting location 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)



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



### 3 Technical Data



All listed power values relate to a surround temperature of 20°C.

#### 3.1 TITANUS PRO·SENS®

		TITANUS PRO·SENS®		TITANUS PRO·SENS® 2	
<b>Voltage</b>	supply voltage (U <sub>e</sub> )	14 to 30 V DC			
	nominal supply voltage	24 V DC			
<b>Current</b>		U <sub>L</sub> <sup>6</sup> = 6.9 V	U <sub>L</sub> = 9 V	U <sub>L</sub> = 6.9 V	U <sub>L</sub> = 9 V
	starting current (at 24 V) (without reset board)	300 mA		320 mA	
	current consumption quiescent (at 24 V) (without reset board)	200 mA <sup>7</sup>	275 mA	220 mA	295 mA
	current consumption alarm (at 24 V) (without reset board)	max. 210 mA	max. 285 mA	max. 240 mA	max. 315 mA
	current consumption reset board	max. 20 mA			
	load on contact of the alarm and fault relays switching power	30 V, 1 A max. 24 W			
<b>Dimensions</b>	dimensions (h x w x d mm)	113 x 200 x 292 mm			
<b>Weight</b>	weight	1.35 kg			
<b>Noise Level</b>	L <sub>wa</sub> according to EN ISO 3744, 1995 without noise suppressor	45 dB(A)			
<b>Protection Class</b>	protection class (DIN IEC 34 part 5)	IP 20			
<b>Housing</b>	material	plastic (ABS)			
	colour housing	papyrus white, RAL 9018			

<sup>6</sup> U<sub>v</sub> = ventilator voltage

<sup>7</sup> The current values may vary according to the pipe system.

	TITANUS PRO·SENS®	TITANUS PRO·SENS® 2	
<b>Temperature Range</b>	TITANUS PRO·SENS®	-20 ° to +60 °C	
	deep freeze variety	-40 ° to +60 °C	
<b>Humidity</b>	non-condensed	10 to 95 % rf	
<b>Ventilator</b>	construction type	radial	
	service life of the ventilator (12 V)	43.500 h at 24 °C	
<b>Displays at the Device</b>	alarm <sup>8</sup>	red alarm display	2 red alarm displays
	fault ON	yellow collective fault green operation display	
	connection for external alarm display	response indicator: type DJ 1191 / type DJ 1192	
<b>Connections</b>	device connector	terminals for wires of max. 1.5 mm <sup>2</sup>	
	cable	twisted in pairs, shielded or non-shielded	
	cable entries	5 x M 20 2 x M 25	
	tapered pipe connectors	1 x for ABS pipe Ø 25 mm for air return Ø 25 mm	2 x for ABS pipe Ø 25 mm for air return Ø 25 mm
<b>Response sensitivity</b>	detector module DM-TP-50 ...	up to 0.5 % light obscuration/m	
	detector module DM-TP-10 ...	up to 0.1 % light obscuration/m	
	detector module DM-TP-01 ...	up to 0.015 % light obscuration/m	

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<sup>8</sup> TITANUS PRO·SENS® 2: alarm 1 and alarm 2

	TITANUS PRO·SENS®-SL	TITANUS PRO·SENS®-2-SL					
<b>Voltage</b>	supply voltage (U <sub>e</sub> )	14 to 30 V DC					
	nominal supply voltage	24 V DC					
<b>Strom</b>	<b>Voltage with ventilator control board FC-2</b>	U <sub>L</sub> <sup>9</sup> = 6,5 V	U <sub>L</sub> = 6,9 V	U <sub>L</sub> = 9 V	U <sub>L</sub> = 6,5 V	U <sub>L</sub> = 6,9 V	U <sub>L</sub> = 9 V
	starting current (at 24V) (without additional module)	300 mA			330 mA		
	quiescent current consumption (at 24 V) (without additional module)	140 mA	150 mA	180 mA	170 mA	180 mA	210 mA
	current consumption alarm (at 24V) (without additional module)	max. 150 mA	max. 160 mA	max. 190 mA	max. 180 mA	max. 190 mA	max. 220 mA
	<b>Voltage with ventilator control board FC-3<sup>10</sup></b>	U <sub>L</sub> = 10 V	U <sub>L</sub> = 11V	U <sub>L</sub> = 12V	U <sub>L</sub> = 10 V	U <sub>L</sub> = 11 V	U <sub>L</sub> = 12 V
	starting current (at 24V) (without additional module)	300 mA			330 mA		
	quiescent current consumption (at 24 V) (without additional module)	180 mA	200 mA	230 mA	230 mA	240 mA	270 mA
	current consumption alarm (at 24V) (without additional module)	max. 200 mA	max. 210 mA	max. 240 mA	max. 260 mA	max. 260 mA	max. 290 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					
	<b>Dimensions</b>	dimensions (h x b x d mm)	113 x 200 x 292 mm				
	<b>Weight</b>	weight	1.35 kg				
<b>Noise level</b>	L <sub>wa</sub> according to EN ISO 3744, 1995 (without noise suppressor)	at 31 dB(A) according to ventilator voltage					
	L <sub>wa</sub> according to EN ISO 3744, 1995 (with noise suppressor)	at 23 dB(A) according to ventilator voltage					

<sup>9</sup> U<sub>v</sub> = ventilator voltage

<sup>10</sup> FC-3 =optional available

	TITANUS PRO·SENS®-SL	TITANUS PRO·SENS®2-SL	
<b>Protection classification</b>	protection class (DIN IEC 34 part 5)	IP 20	
<b>Housing</b>	Material	plastic (ABS)	
	Colour Housing	papyrus white, RAL 9018	
<b>Temperature range</b>		0° to +40°C	
<b>Humidity</b>	Not Condensed	10 to 95 % rf	
<b>Ventilator</b>	Type	radial	
	Service life of ventilator (12 V)	43.500 h at 24°C	
<b>Displays on the device</b>	alarm <sup>11</sup>	red alarm display	2 red alarm displays
	fault ON	yellow collective fault green operation display	
	connection for external alarm display	response indicator: type DJ 1191 / type DJ 1192	
<b>Connections</b>	device connector	terminals for wires of max. 1.5 mm <sup>2</sup>	
	cable	twisted in pairs, shielded or non-shielded	
	cable entries	5 x M 20 2 x M 25	
	tapered pipe connectors	1 x for ABS pipe Ø 25 mm for air return Ø 25 mm	2 x for ABS pipe Ø 25 mm for air return Ø 25 mm
<b>Response sensitivity</b>	detector module DM-TP-50 ...	up to 0.5 % light obscuration/m	
	detector module DM-TP-10 ...	up to 0.1 % light obscuration/m	
	detector module DM-TP-01 ...	up to 0.015 % light obscuration/m	

<sup>11</sup> TITANUS PRO·SENS® 2: alarm 1 and alarm 2

### 3.2 Pipe system – TITANUS PRO·SENS®

	Pipe system	
	TITANUS PRO·SENS® PRO·SENS®-SL	TITANUS PRO·SENS®2 PRO·SENS®2-SL
<b>Pipe system</b>		
max. pipe length	300 m	560 m
max. number of air sampling points	32	64
max. length of air sampling hose per ceiling feed through	1 m	
Temperature range		
PVC pipe	-0 °C..+60 °C	
ABS pipe	-40 °C..+80 °C	
max. monitoring area	2880 m <sup>2</sup>	5760 m <sup>2</sup>

## 4 Design

### 4.1 General

The following describes the project planning of the air sampling smoke detection system to EN54.20 (AS7240.20). The basic conditions are described in Chapter 4.1. The project planning is to be conducted in accordance with Chapter 4.2.

The limiting project planning instructions in accordance with Chapter 4.2 apply to special applications in addition to Chapter 4.3 These should be taken into consideration at the beginning of project planning for special projects.

#### Project planning options according to EN54.20 (AS7240.20):

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 4.2	---
Recognition of a failure at an individual aperture	Project planning for individual aperture monitoring	Chapter 4.2	Chapter 4.3.1
Device protection/cabinet monitoring	Simplified pipe project planning	Chapter 4.2	Chapter 4.3.2
Long intake lines	Project planning with long intake lines	Chapter 4.2	Chapter 4.3.3
Transport time reduction	Project planning with acceleration apertures	Chapter 4.2	Chapter 4.3.4
Ventilation conduits	Project planning for forced air flow	Chapter 4.2	Chapter 4.3.5

#### 4.1.1 Regulations

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

The Wagner Titanus *PRO·SENS*® is approved to:

- AS1603.8 – Automatic fire detection and alarm systems – part 8 Multi-point aspirated smoke detectors (Australian standard, recognised in New Zealand)
- EN54.20 – Fire detection and fire alarm systems – part 20 Aspirating smoke detectors (European standard, recognised in New Zealand)
- 

For Australian installations, the requirements of AS1670.1:2004 Fire detection, warning, control and intercom systems – System design, installation and commissioning – part 1. Fire must be followed, unless the system is being installed as part of an engineered solution.

For New Zealand installations, the requirements of NZS4512:2010 Fire detection and alarm systems in buildings must be followed, unless the system is being installed as part of an engineered solution.

Also additional regulations for installing fire alarm systems which are laid down by local fire authorities, local building supervisory boards or building regulation authorities must be followed as appropriate.

#### **AS7240.20 – Fire Detection and alarm systems – Part 20: Aspirating smoke detectors**

Australian Standards have published AS7240.20:2012 which is latest standard covering off Aspirating smoke detectors. This standard will replace AS1603.8.

This standard (AS7240.20) has been adopted from ISO7240.20, which in turn has been adopted from EN54.20.

The Wagner Titanus *PRO·SENS*® will be submitted to AS7240.20 for approval. Note the Wagner Titanus *PRO·SENS*® already has EN54.20 approval.

Throughout Chapter 4 of this manual there are references made to EN54.20 (AS7240.20). This is because:

- EN54.20 (AS7240.20) has a classification system for sensitivity and how the *PRO·SENS*® can be configured to meet the sensitivity classes
- EN54.20 (AS7240.20) has requirements for air flow monitoring and how the *PRO·SENS*® can be configured to meet these requirements.

#### 4.1.2 Pipe system

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. Fig. 4.21 depicts an example of a U-pipe system with symmetrical or asymmetrical design and the diameters of the aspiration apertures calculated according to Chapter 4.6.2 "Standard planning."

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:

- Symmetrical design** The pipe system should preferably have a symmetrical design, i.e.:
- equal number of aspiration apertures per pipeline branch
  - equal lengths of pipeline (must not exceed  $\pm 20\%$  deviation)
  - equal distance between neighbouring aspiration apertures on the smoke aspiration pipe (must not exceed  $\pm 20\%$  deviation)

**Asymmetrical design** The following specifications apply in the event that pipe system must be laid out asymmetrically due to structural conditions (see also Fig. 4.1):

- The number of aspiration apertures as well as the length of the shortest and longest pipeline branch in the pipe system must not exceed a quantity or length ratio of **1:2**.
- The distances between adjacent aspiration apertures in the sampling pipe must be identical (should not exceed deviation of  $\pm 20\%$ ).
- The diameters of the aspiration apertures are determined for each pipeline branch individually and depend on the number of aspiration apertures on the pipeline branch in question. The commensurate aperture diameters can be found in the tables in Chap. 4.2.4.

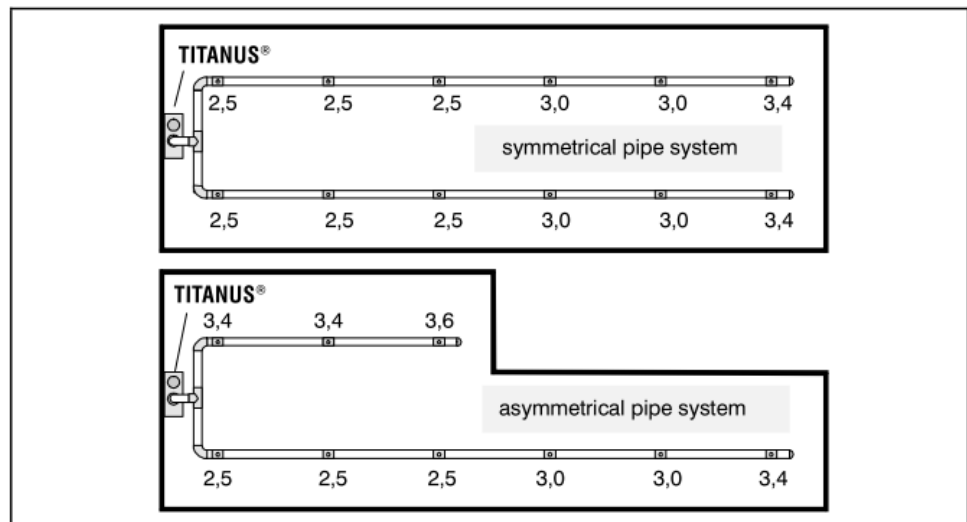


Fig. 4.21: Example of a symmetrical and an asymmetrical U-pipe system



**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 4.2).

**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 PRO·SENS®.

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

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

**Quadruple U-pipe** An air sampling smoke detection pipe system which branches into 8 air sampling branches after the connection to the TITANUS PRO·SENS®.

**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.

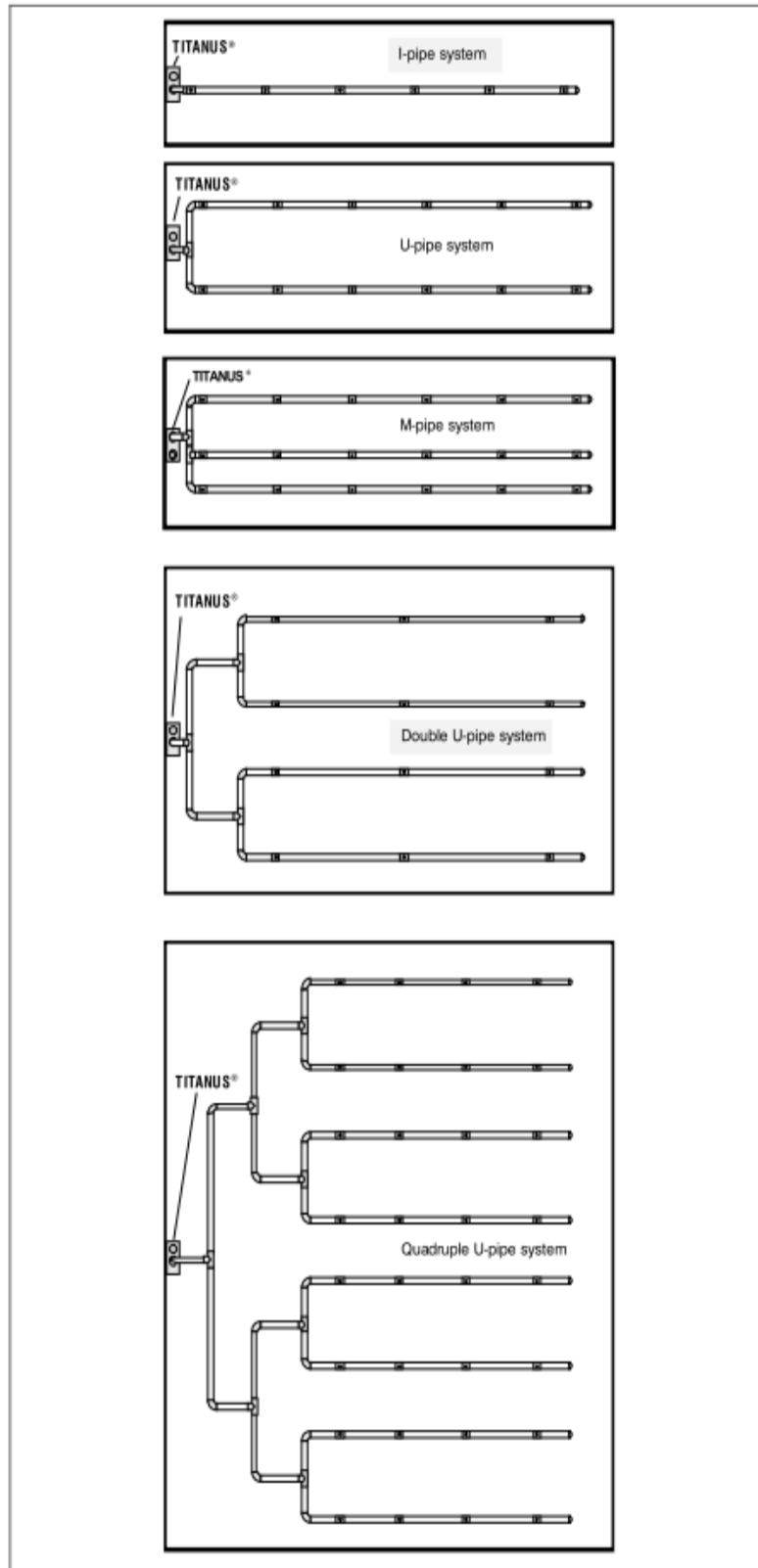


Fig. 4.22: Pipe designs

**Direction change** Angles and bends in the pipe system increase flow resistance. For that reason, the number of angles and bends should be kept to a minimum.

It is preferable to use bends, since angles have a higher flow resistance. Angles should therefore only be used where they are necessary due to structural constraints.

	Corresponds to a straight pipe length of
<b>Angle</b>	1.5m
<b>Bend</b>	0.3m

If the pipe system includes angles or bends, the maximum overall length of the pipe system will be reduced.



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 make the 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.



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

**Dual detector dependency** 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.

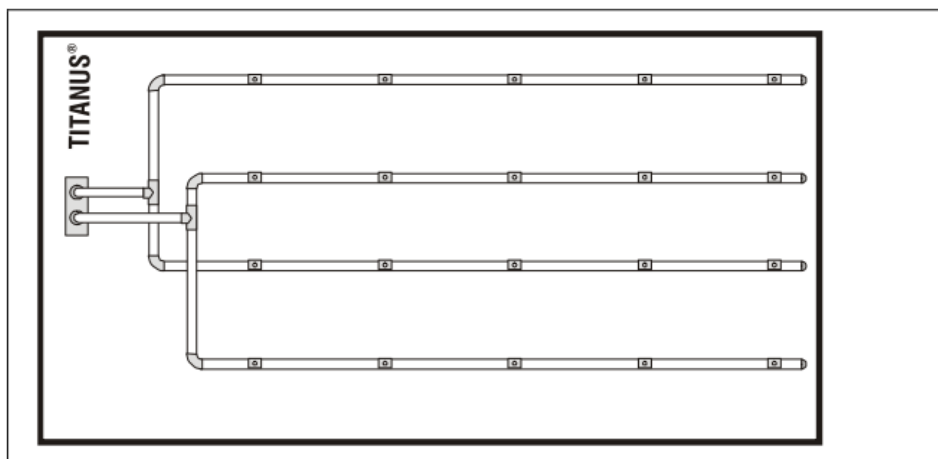


Fig. 4.23: Pipe design for dual detector dependency

### 4.1.3 Air flow monitoring

EN54.20 (AS 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 EN54.20 (AS 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 reliably 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
	<b>In conformity with EN54.20 (AS 7240.20)</b>			
Triggering threshold	Small	Medium	Large	Very large
Sensitivity	Very high	High	Medium	Low



TIP

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. 4.3.1 “Pipe project planning individual aperture monitoring”),
- the air flow sensor has been compensated depending on the air pressure (see Chap. 7.1.2 “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.



If the air sampling smoke detection system and pipe system are in areas with different air pressure, the air sampled by the TITANUS PRO·SENS® should be re-circulated in the pipe system pressure area (see Chapter 2.3.5 “Air recirculation”).

#### 4.1.4 Sensitivity

According to EN54.20 (AS 7240.20), the sensitivity of an air sampling smoke detection system can be divided into particular fire sensitivity classes. These sensitivity classes describe particular example applications in which the systems can be used. Permissible system project planning can be determined for each classification according to Chapter 4.2.

Air sampling smoke detection systems with a higher sensitivity class according to EN54.20 (AS 7240.20) also meet the requirements of the lower classes.

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



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 PRO-SENS®:

Activation sensitivity (fire alarm) TITANUS PRO-SENS®		
Detector module Type DM-TP-50-L	Detector module Type DM-TP-10-L	Detector module Type DM-TP-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.

#### 4.1.5 Project planning limits

The following limit values must be complied with at all times with the TITANUS PRO·SENS® per pipe system connected.

- 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)
- The maximum monitoring area per sampling aperture corresponds to the monitoring area of point-shaped detectors in accordance with the applicable project planning guideline.
- A maximum of **32** aspiration apertures are possible per detector module.

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.

## 4.2 Project planning

### 4.2.1 Project planning guidelines

In order to conduct project planning in accordance with the EN54.20 (AS7240.20) 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.

#### 4.2.1.1 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.



Components which have not been approved by WAGNER are used, CE conformity on the basis of EN54.20 (AS7240.20) 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.



#### 4.2.2 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

##### 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

### 4.2.3 Sensitivity and pipeline project planning

#### 4.2.3.1 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



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 requirements 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.	<p><b><u>Selection</u></b> Selection of the corresponding project planning table based on the air filter to be used (see Chap. 4.2.2 )</p> <p><b><u>Result</u></b> The project planning table has been determined</p>
2.	<p><b><u>Selection</u></b> Selection of the number of aspiration apertures in the project planning table</p> <p><b><u>Result</u></b> The achievable sensitivity class for the selected number of apertures has been determined</p>
3.	<p><b><u>Selection</u></b> Determinations on the sensitivity necessary to achieve the sensitivity class</p> <p><b><u>Result</u></b> Determination of the detector module and sensitivity setting</p>
4.	<p><b><u>Selection</u></b> Selection of other pipe components ( e.g. steam trap and detonation protection see Chap. 4.2.2 described components)</p> <p><b><u>Result</u></b> The project planning table has been determined</p>
5.	<p><b><u>Selection</u></b> Pipe length selection</p> <p><b><u>Result</u></b> Determination of the pipe shape and necessary fan voltage.</p>

**1 Projection without filter**

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

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
0,1	0,12 HA	A	A	A	A	A	A	A	A	B	B	B	...	C
	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
0,5	0,4 HA	A	A	B	B	B	B	C	C	C	C	C	...	
	0,8 HA	A	B	B	C	C	C	C	C	C	C	C	...	
	0,5 HA	A	A	A	B	B	B	B	C	C	C	C	...	
0,5	1 HA	A	B	B	C	C	C	C	C	C	C	C	...	
	1 HA	A	B	B	C	C	C	C	C	C	C	C	...	

without pipe accessories

Pipe shape	U <sub>Fan</sub> [V]	1	2	3	4	5	6	7	8	9	10	11	...	32	permitted total pipe length [m]
I	6,5	77	77	77	77	77	77	77	77	77	77	77	...	77	
	6,9	77	77	77	77	77	77	77	77	77	77	77	...	77	
	≥9	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	
	≥9	150	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	...	170	
	6,9	170	170	170	170	170	170	170	170	170	170	170	...	170	
	≥9	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	
	6,9	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	
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	

with detector box and/or VSK

Pipe shape	U <sub>Fan</sub> [V]	1	2	3	4	5	6	7	8	9	10	11	...	32	permitted total pipe length [m]
I	6,5	70	70	70	70	70	70	70	70	70	70	70	...	70	
	6,9	70	70	70	70	70	70	70	70	70	70	70	...	70	
	≥9	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	
	≥9	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	
	≥9	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	
	6,9	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	

with OXY·SENS® or steam trap

Pipe shape	U <sub>Fan</sub> [V]	1	2	3	4	5	6	7	8	9	10	11	...	32	permitted total pipe length [m]
I	6,5	60	60	60	60	60	60	60	60	60	60	60	...	60	
	6,9	60	60	60	60	60	60	60	60	60	60	60	...	60	
	≥9	80	80	80	80	80	80	80	80	80	80	80	...	80	
U	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	
	≥9	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	
	≥9	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	
	≥9	160	160	160	160	160	160	160	160	160	160	160	...	160	

**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

Possible system parameters:

- I-pipe system
  - $\geq 9$  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
  - $\geq 9$  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
  - $\geq 9$  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
  - $\geq 9$  V fan voltage, max. 160 m overall pipe length

**4.2.4 Aperture diameter**

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

**I- pipe**

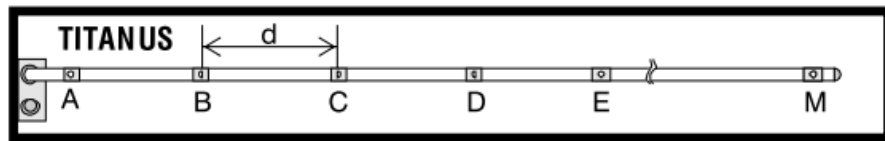


Fig. 4.24: I-pipe system

**Aspiration apertures**

Number of apertures	1	2	3	4	5	6	7	8	9	10	11	12	13
Sampling aperture $\varnothing$ in mm <sup>12)</sup>													
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

<sup>12)</sup> Press cut diameter in aspiration-reducing film sheet

U-pipe

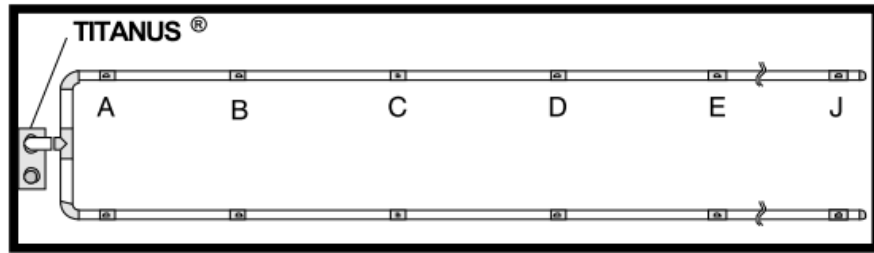


Fig. 4.25: U-pipe system

Aspiration apertures

Number of apertures	2	4	6	8	10	12	14	16	18	20
Sampling aperture Ø in mm <sup>13)</sup>										
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

M-pipe

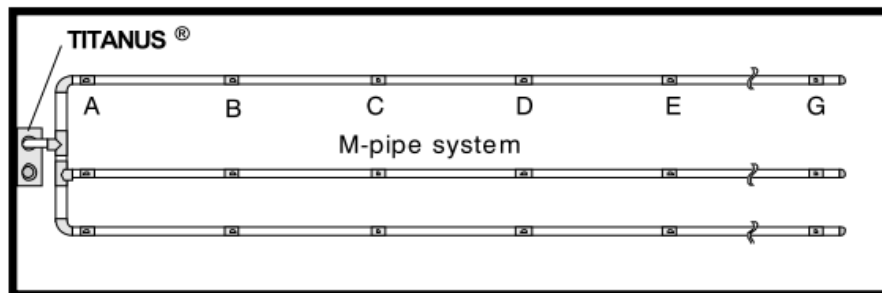


Fig. 4.26: M-pipe system

Aspiration apertures

Number of apertures	3	6	9	12	15	18	21
Sampling aperture Ø in mm <sup>2)</sup>							
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

13

Press cut diameter in aspiration-reducing film sheet

Double U-pipe

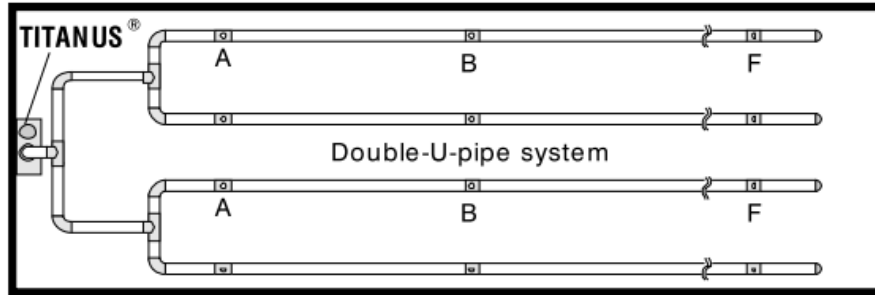


Fig. 4.27: Double U-pipe system

Aspiration apertures

Number of apertures	4	8	12	16	20	24
Sampling aperture $\varnothing$ in mm <sup>14)</sup>						
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

Quadruple U-pipe

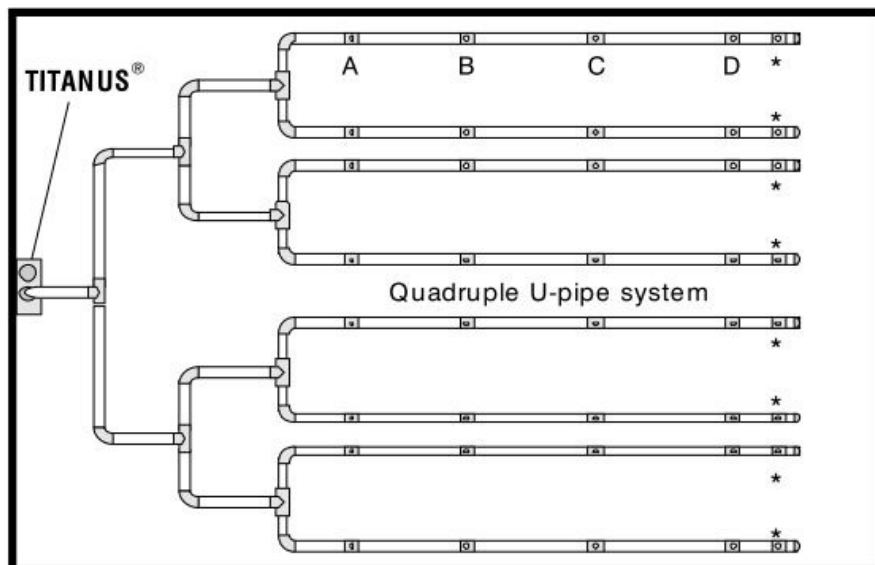


Fig. 4.28: Quadruple U-pipe

Aspiration apertures

Number of apertures	8	16	24	32
Sampling aperture $\varnothing$ in mm <sup>3)</sup>				
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 *

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

<sup>14)</sup> Press cut diameter in aspiration-reducing film sheet



### 4.3 Special project planning

#### 4.3.1 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 4.2 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.

##### 4.3.1.1 I-pipe system

1 pipe system

TITANUS PRO · SENS®

2 pipe systems

TITANUS PRO · SENS® 2

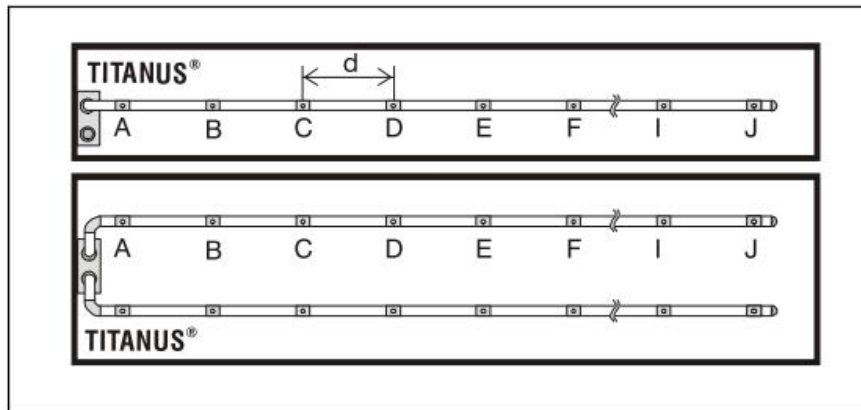


Fig. 4.29: I-shape pipe system for area protection

#### Limit values

Min. distance from TITANUS® to 1 <sup>st</sup> sampling aperture	4 m
Max. distance from TITANUS® to 1st sampling aperture	20 m
Max. Distance from 1 <sup>st</sup> sampling aperture to last sampling aperture with low fan voltage 6.5 V – 6.9 V with high fan voltage 9 V – 12 V	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 – 12 V	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 apertures	2	3	4	5	6	7	8	9	10
Sampling aperture Ø in mm <sup>15)</sup>									
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

**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	—	—	— <sup>16)</sup>	—
2 blocked apertures	○ <sup>17)</sup>	○	III	III	II	I	I	—	—
3 blocked apertures	○	○	○	○	III	III	II	I	I
4 blocked apertures	○	○	○	○	○	○	III	II	I
5 blocked apertures	○	○	○	○	○	○	○	○	II
... has/have been detected at setting level x									

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



Air flow monitoring level I or II should be set in any case for project planning in conformity with EN54.20 (AS 7240.20).

<sup>15)</sup> Press cut diameter in aspiration-reducing film sheet

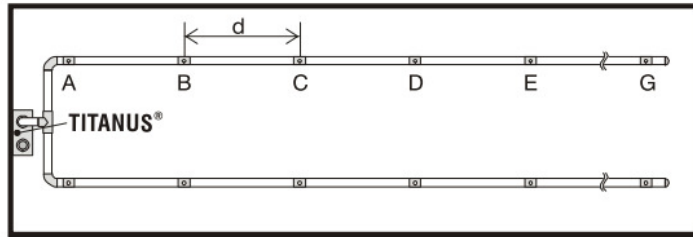
<sup>16)</sup> — not possible

<sup>17)</sup> ○ not purposeful

4.3.1.2 U-shape pipe system

1 pipe system

TITANUS PRO · SENS®



2 pipe systems

TITANUS PRO · SENS® 2

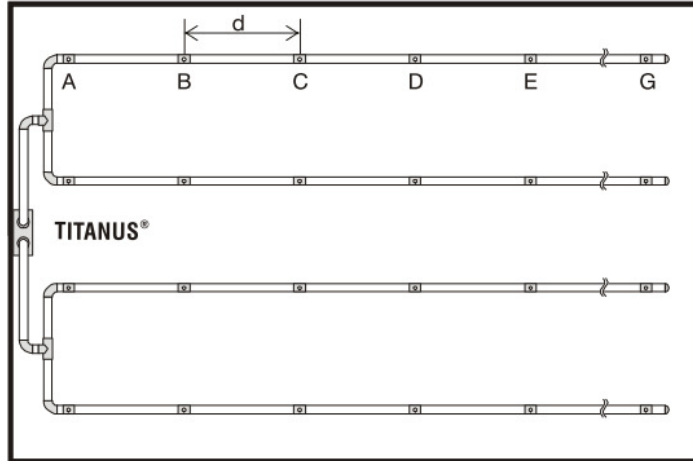


Fig. 4.30: U-shape pipe system for area protection

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	40 m
with high fan voltage 9 V – 12 V	50 m
Max. Overall pipe length per pipe system with low fan voltage 6.5 V – 6.9 V	100 m
with high fan voltage 9 V – 12 V	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 apertures per pipe system	2	4	6	8	10	12	14
Sampling aperture Ø in mm <sup>18)</sup>							
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

## per pipe system

## U-pipe system triggering thresholds

Number of apertures	2	4	6	8	10	12	14
1 blocked aperture	III	II	I	— <sup>19)</sup>	—	—	—
2 blocked apertures	○ <sup>20)</sup>	III	II	I	—	—	—
3 blocked apertures	○	○	III	II	I	—	—
4 blocked apertures	○	○	○	III	II	I	—
5 blocked apertures	○	○	○	○	III	II	I
6 blocked apertures	○	○	○	○	○	III	II
7 blocked apertures	○	○	○	○	○	○	III
... has/have been detected at setting level x							

**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.



Air flow monitoring level I or II should be set in any case for project planning in conformity with EN54.20 (AS7240.20).

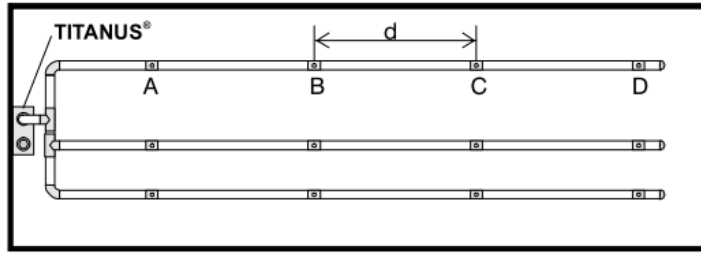
<sup>18</sup> Press cut diameter in aspiration-reducing film sheet

<sup>19</sup> — not possible

<sup>20</sup> ○ not purposeful

4.3.1.3 M-pipe system

1 pipe system  
TITANUS PRO-SENS®



2 pipe systems  
TITANUS PRO-SENS® 2

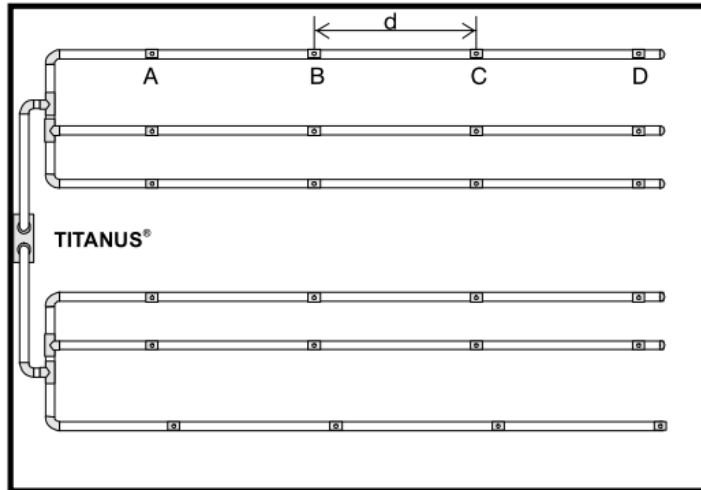


Fig. 4.31: M-shape pipe system for area protection

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 – 12 V	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 – 12 V	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 per pipe system	3	6	9	12
Sampling aperture $\varnothing$ in mm <sup>21)</sup>				
A	4.4	3.4	3.0	2.5
B	—	3.6	3.0	2.5
C	—	—	3.2	3.2
D	—	—	—	3.2

## per pipe system

## M-pipe system triggering thresholds

Number of apertures	3	6	9	12
1 blocked aperture	III	I	— <sup>22)</sup>	—
2 blocked apertures	○ <sup>23)</sup>	II	—	—
3 blocked apertures	○	III	I	—
4 blocked apertures	○	○	II	I
5 blocked apertures	○	○	○	II
6 blocked apertures	○	○	○	III
7 blocked apertures	○	○	○	○
... has/have been detected at setting level x				

**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.



Air flow monitoring level I or II should be set in any case for project planning in conformity with EN54.20 (AS 7240.20).

<sup>21</sup> Press cut diameter in aspiration-reducing film sheet

<sup>22</sup> — not possible

<sup>23</sup> ○ not purposeful

4.3.1.4 Double U-pipe system

1 pipe system  
TITANUS PRO-SENS®

2 pipe systems  
TITANUS PRO-SENS® 2

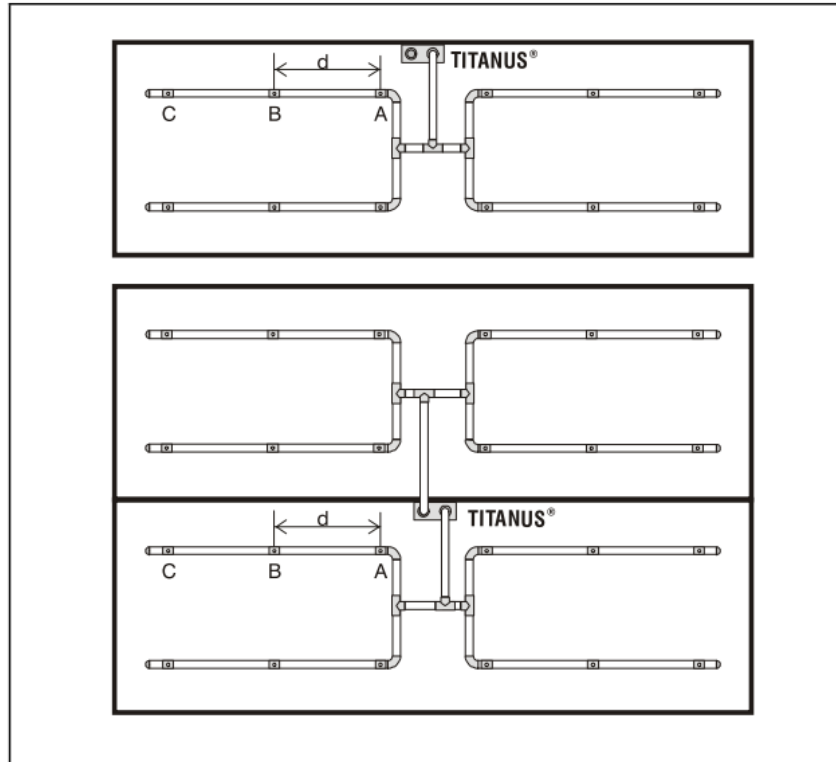


Fig. 4.12: Double U pipe system for area protection

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 – 12 V	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 – 12 V	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 aspiration apertures per pipe system	4	8	12
Sampling aperture $\varnothing$ in mm <sup>24)</sup>			
A	4.0	3.0	2.5
B	—	3.4	3.0
C	—	—	3.0

## Double U-pipe system triggering thresholds

## per pipe system

Number of apertures	4	8	12
1 blocked aperture	I	—	— <sup>25)</sup>
2 blocked apertures	II	I	—
3 blocked apertures	○ <sup>26)</sup>	II	I
4 blocked apertures	○	III	II
5 blocked apertures	○	○	III
6 blocked apertures	○	○	III

... has/have been detected at setting level x

## 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.



Air flow monitoring level I or II should be set in any case for project planning in conformity with EN54.20 (AS 7240.20).

<sup>24</sup> Press cut diameter in aspiration-reducing film sheet

<sup>25</sup> — not possible

<sup>26</sup> ○ not purposeful



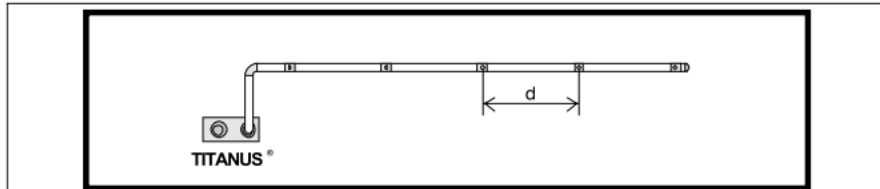
**4.3.2 Simplified pipe project planning**

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 4.2 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.

**4.3.2.1 I-pipe system**

**1 pipe system  
TITANUS PRO-SENS®**



**2 pipe systems  
TITANUS PRO-SENS® 2**

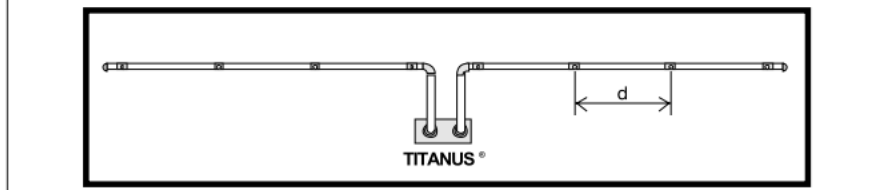


Fig. 4.13: I-pipe system, such as for equipment protection

**Limit values**

Min. distance from TITANUS® to 1st sampling aperture	2 m
Max. distance from TITANUS® to 1st sampling aperture	20 m
Max. distance from the 1 <sup>st</sup> sampling aperture to the last sampling aperture	20 m
Max. overall pipe length Ø 25 mm	40 m
Max. number of aspiration apertures (n) per pipe system	18 pcs.
Minimum distance between aspiration apertures (d)	0.1 m
Maximum distance between aspiration apertures (d)	4 m

**Aspiration apertures**

<b>Number of apertures</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
Ø of all aspiration apertures in mm <sup>27)</sup>	6.0	5.0	4.4	4.0	3.6	3.4	3.2	3.0	3.0

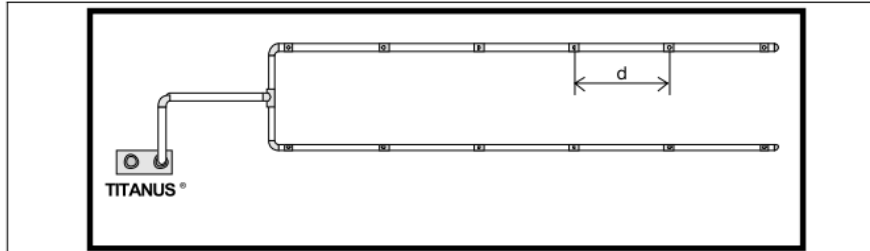
**Aspiration apertures**

<b>Number of apertures</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>
Ø of all aspiration apertures in mm <sup>27)</sup>	3.0	3.0	2.5	2.5	2.5	2.5	2.5	2.5

<sup>27)</sup> Press cut diameter in aspiration-reducing film sheet

4.3.2.2 U-pipe system

1 pipe system  
TITANUS PRO · SENS®



2 pipe systems  
TITANUS PRO · SENS® 2

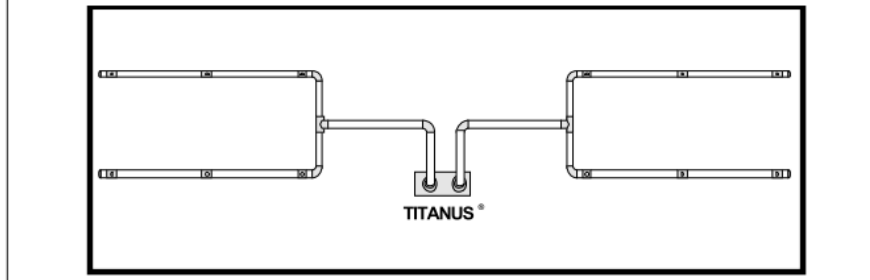


Fig. 4.14: U-pipe system, e.g. for equipment protection

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 pcs.
Minimum distance between aspiration apertures (d)	0.1 m
Maximum gap between aspiration apertures (d)	4 m

Aspiration apertures

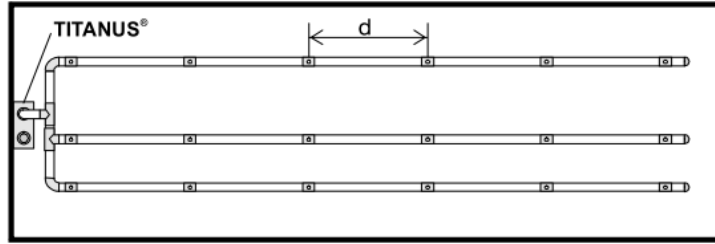
Number of apertures	2	4	6	8	10	12	14	16	18
Ø of all aspiration apertures in mm <sup>28)</sup>	6.0	4.4	3.6	3.2	3.0	3.0	2.5	2.5	2.5

28

Press cut diameter in aspiration-reducing film sheet

4.3.2.3 M-pipe system

1 pipe system  
TITANUS PRO·SENS®



2 pipe systems  
TITANUS PRO·SENS®

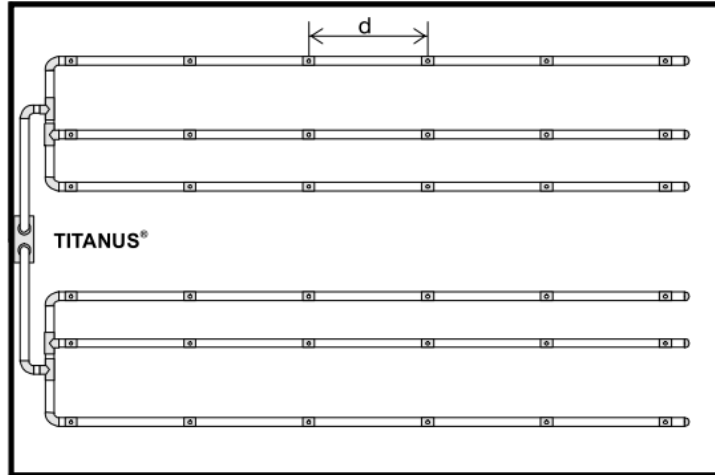


Fig. 4.15: M-pipe system for area protection

Limit values

Min. distance from TITANUS® to last T-piece	2 m
Max. distance from TITANUS® to T-piece	20 m
Max. branch length	20 m
Max. overall pipe length per pipe system	80 m
Max. number of aspiration apertures (n) per pipe system	18 pcs.
Min. distance between 2 aspiration apertures (d)	0.1 m
Max. distance between 2 aspiration apertures (d)	4 m

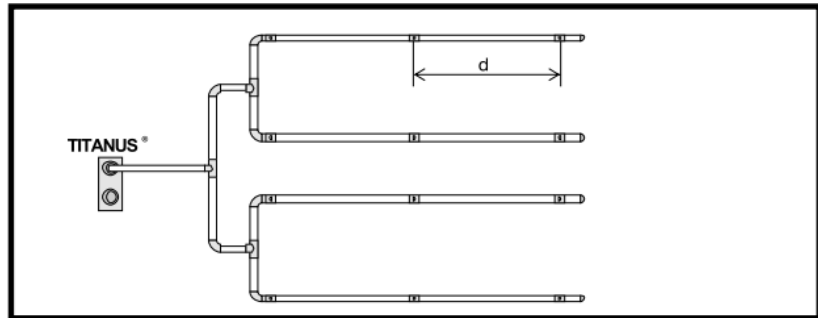
Aspiration apertures

Number of apertures	3	6	9	12	15	18
∅ of all aspiration apertures in mm <sup>29)</sup>	5.0	3.6	3.0	3.0	2.5	2.5

<sup>29)</sup> Press cut diameter in aspiration-reducing film sheet

4.3.2.4 Double U-pipe system

1 pipe system  
TITANUS PRO·SENS®



2 pipe systems  
TITANUS PRO·SENS® 2

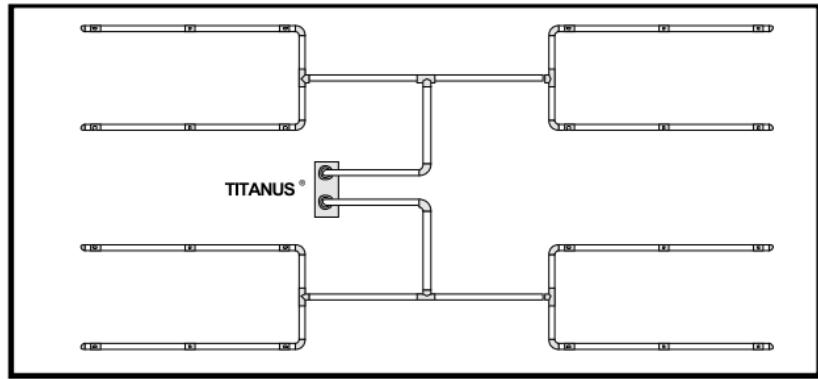


Fig. 4.16: Double U-pipe system, e.g. for equipment protection

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 pcs.
Minimum distance between aspiration apertures (d)	0.1 m
Maximum gap between aspiration apertures (d)	4 m

Aspiration apertures

Number of apertures per pipe system	4	8	12	16	20
Ø of all aspiration apertures in mm <sup>30)</sup>	4.0	3.4	3.0	2.5	2.0

<sup>30)</sup> Press cut diameter in aspiration-reducing film sheet

### 4.3.3 Project planning with long intake lines

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



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 1<sup>st</sup> 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  $\varnothing$  32 mm replaces 2 m pipe with  $\varnothing$  25 mm
- 1 m pipe with  $\varnothing$  40 mm replaces 3 m pipe with  $\varnothing$  25 mm

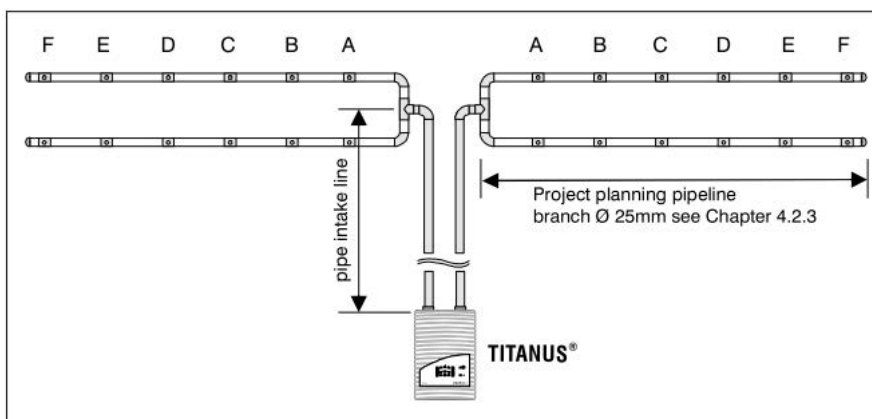


Fig. 4.17: Example of a pipe system for project planning with long pipe intake lines

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

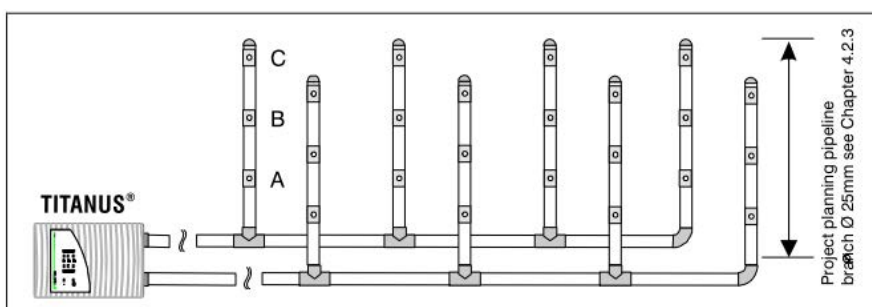


Fig. 4.18 Example of special project planning for high-bay storage shelves

**4.3.4 Project planning with acceleration apertures**

**Acceleration aperture**

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.

The dimensioning of an acceleration aperture with a simple or double diameter of the final sampling aperture of a pipe branch may be necessary depending on the transport time requirements. Exclusively tools approved by WAGNER are to be used for transport time calculations.

The acceleration apertures can also cause a reduction in the sensitivity of the sampling aperture due to additional air supply. This reduction is to be compensated for electively as follows:

	Solution approach	Primarily to be applied for
1	Increase in sensitivity of the detector module	Already installed systems
2	Reduction of the number of aspiration apertures	Systems in planning

**1st option:**

**Increase in sensitivity**

The reduction in sensitivity at the sampling aperture can be compensated for by using a more sensitive detection setting.

In doing so, one should distinguish whether the cross-section of the acceleration aperture is smaller than or identical to:

- the cross section of the final sampling aperture of a branch (Table A1)
- the double cross section of the final sampling aperture of a branch (Table A2)

		Aspiration apertures																				
Pipe shape		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	24	32
I		0.50	0.66	0.75	0.80	0.83	0.85	0.87	0.88	0.90	0.90	0.91	0.92	0.92								
U			0.50		0.66		0.75		0.80		0.83		0.85		0.87		0.88	0.90	0.90			
M				0.50			0.66			0.75			0.80			0.83		0.85		0.87		
Double U					0.50				0.66				0.75				0.80		0.83		0.85	
Quadruple U									0.50								0.66				0.75	0.80

Table A1: Factors in increasing the sensitivity (one acceleration aperture corresponds to one sampling aperture here)

		Aspiration apertures																				
Pipe shape		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	24	32
I		0.33	0.50	0.60	0.66	0.71	0.75	0.77	0.80	0.81	0.83	0.84	0.85	0.86								
U			0.33		0.50		0.60		0.66		0.71		0.75		0.77		0.80	0.81	0.83			
M				0.33			0.50			0.60			0.66			0.71		0.75		0.77		
Double U					0.33				0.50				0.60				0.66		0.71		0.75	
Quadruple U									0.33								0.50				0.60	0.66

Table A2: Factors in increasing the sensitivity (one acceleration aperture corresponds to two aspiration apertures)

**Example:** A double U-pipe system with 24 aspiration apertures is planned in order to meet requirements for class B. According to EN 54-20 (AS7240.20), 24 apertures at a

sensitivity of 0.1 % LT/m are approved to meet requirements for class B. An acceleration aperture in the same size as the final sampling aperture should be used to increase the transport time.

In accordance with Table A1, the necessary sensitivity of the detector module amounts to  $0.1 \% \text{ LT/m} * 0.85 = 0.085 \% \text{ LT/m}$  in this case.

**2nd option:**

**Reduction of the number of aspiration apertures**

The reduction in sensitivity at the sampling aperture can be compensated for by reducing the number of aspiration apertures.

In doing so, one should distinguish whether the cross-section of the acceleration aperture is smaller than or identical to:

- the cross section of the final sampling aperture of a branch (Table B1)
- the double cross section of the final sampling aperture of a branch (Table B2)

Pipe shape	Aspiration apertures																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	24	32			
I		1	2	3	4	5	6	7	8	9	10	11	12											
U				2		4		6		8		10		12		14	16	18						
M						3			6			9			12		15		18					
Double U								4				8				12		16		20				
Quadruple U																8					16	24		

Table B1: Reduction in the number of aspiration apertures (one acceleration aperture corresponds to one sampling aperture here)

Pipe shape	Aspiration apertures																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	24	32			
I		1	1	2	3	4	5	6	7	8	9	10	11											
U				2		2		4		6		8		10		12	14	16						
M						3			3			6			9		12		15					
Double U								4				4				8		12		16				
Quadruple U																8					8	16		

Table B2: Reduction in the number of aspiration apertures (one acceleration aperture corresponds to two aspiration apertures)

**Example:** A double U-pipe system with 24 aspiration apertures is planned in order to meet requirements for class B. According to EN 54-20 (AS7240.20), 24 apertures at a sensitivity of 0.1 % LT/m are approved to meet requirements for class B. An acceleration aperture double the size of the final sampling aperture should be used to increase the transport time.

In accordance with Table B2, 16 aspiration apertures are permissible at a sensitivity of 0.1% LT/m in this case.



The influence of the pipe accessory to be used on the maximum permissible project planning is to be taken into consideration in accordance with Chapter 4.2.

#### 4.3.5 Project planning for forced air flow

##### Air conditioning duct monitoring

Air conditioners are distinguished between low-speed and high-speed systems (see table below). The specifications provided in this chapter apply **only to low-speed systems**. There are not enough empirical values available for high-speed systems. For that reason, smoke tests should be conducted with air conditioning ducts having flow rates higher than 10 m/s and the optimum response characteristics should be determined.

	Low-speed systems	High-speed systems
Flow rate	10 m/s maximum	> 10 m/s
Duct cross section	Large	Small
Pressure differential along the direction of flow	Low	High

The rate distribution in an air conditioning duct looks like this:

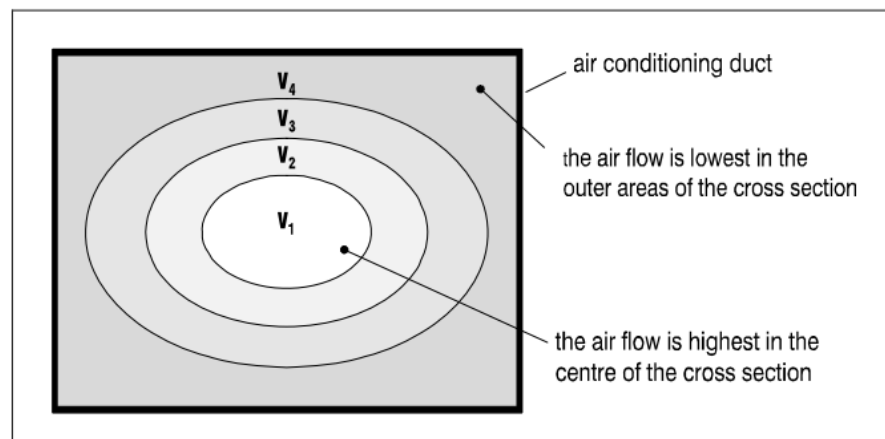


Fig. 4.19: Rate distribution in an air conditioning duct with  $v_1 > v_2 > v_3 > v_4$

##### Sampling

The pipe system should be arranged in area  $v_1$  to  $v_3$  in order to achieve optimum detection results.

##### Installation location of the pipe system

The air exhaust duct should be chosen as the installation location of the pipe system and should be as far away from sound suppressors, air baffles and bends as possible. The benchmark for the distance from such 'obstacles' is: At least 3x the smallest duct diameter.



If it is absolutely necessary to attach the pipe system directly behind baffles, sound suppressors or angles, the main flow speed areas will have to be monitored (see Fig. 4.19/20).

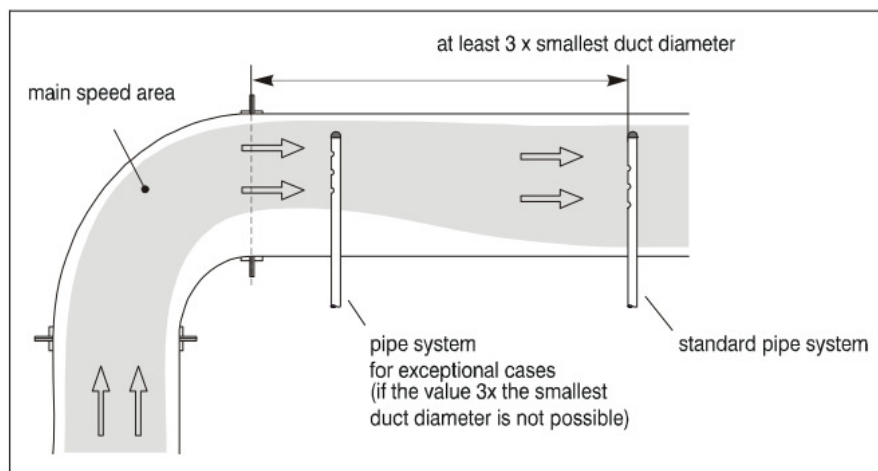


Fig. 4.20: Change in direction of a duct **without** baffles

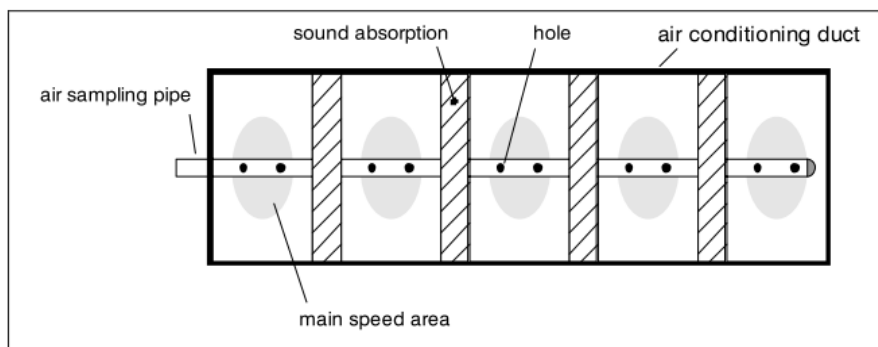


Fig. 4.21: Sound suppressors in a duct

The following must be taken into consideration when installing a pipe system in air conditioning ducts:

- Air recirculation (see following page) should be planned for, since the TITANUS PRO·SENS® and the pipe system are located in different pressure areas.
- The pipe inlets in the duct must be sealed so that they are air tight.
- The part of the pipe system located outside of the duct must be sealed so as to be air tight.

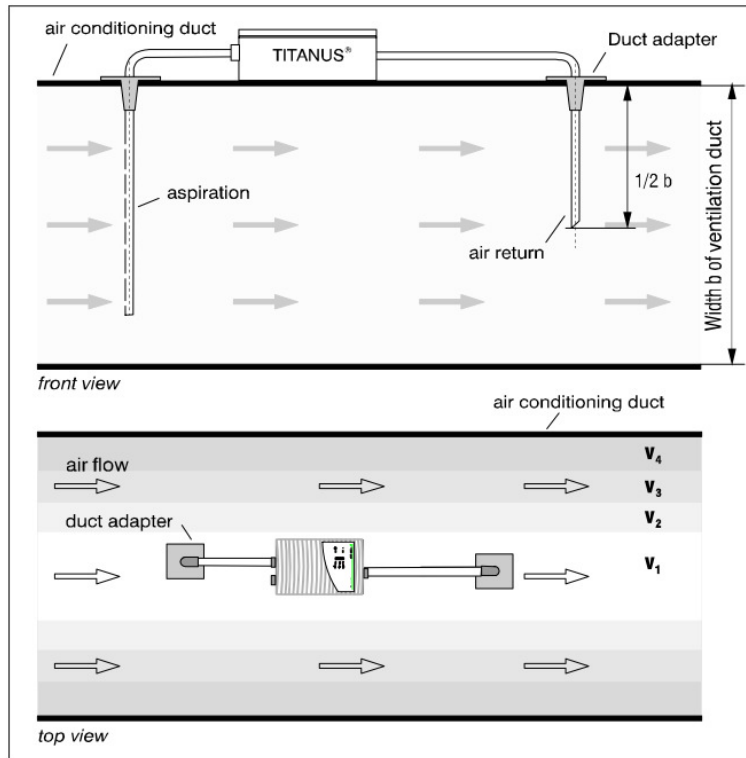


Fig. 4.22: Air recirculation

#### 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 (see Fig. 4.22).

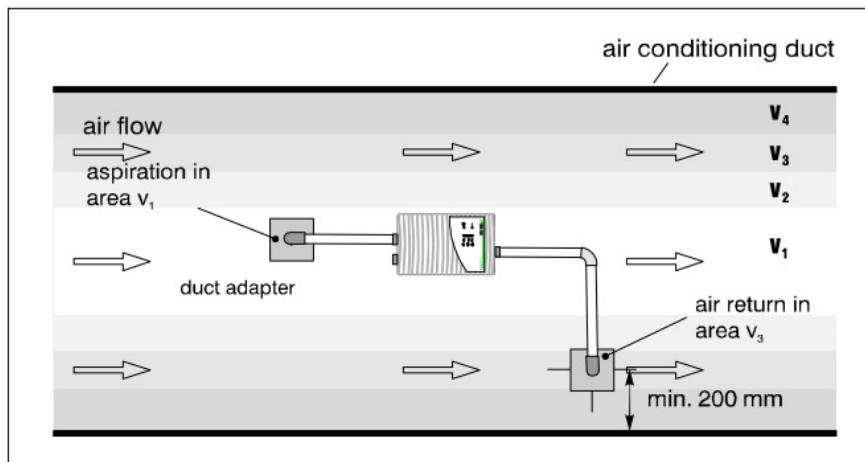


Fig. 4.23 Offset air recirculation reengagement

If a distance of 2 m cannot be maintained, the pipes will have to be arranged in an offset manner. This makes it possible to achieve a drop of pressure between the intake air 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 $\leq 0.5 \text{ m}^2$	Duct cross section $> 0.5 \text{ m}^2$
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 4.3.2 "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.

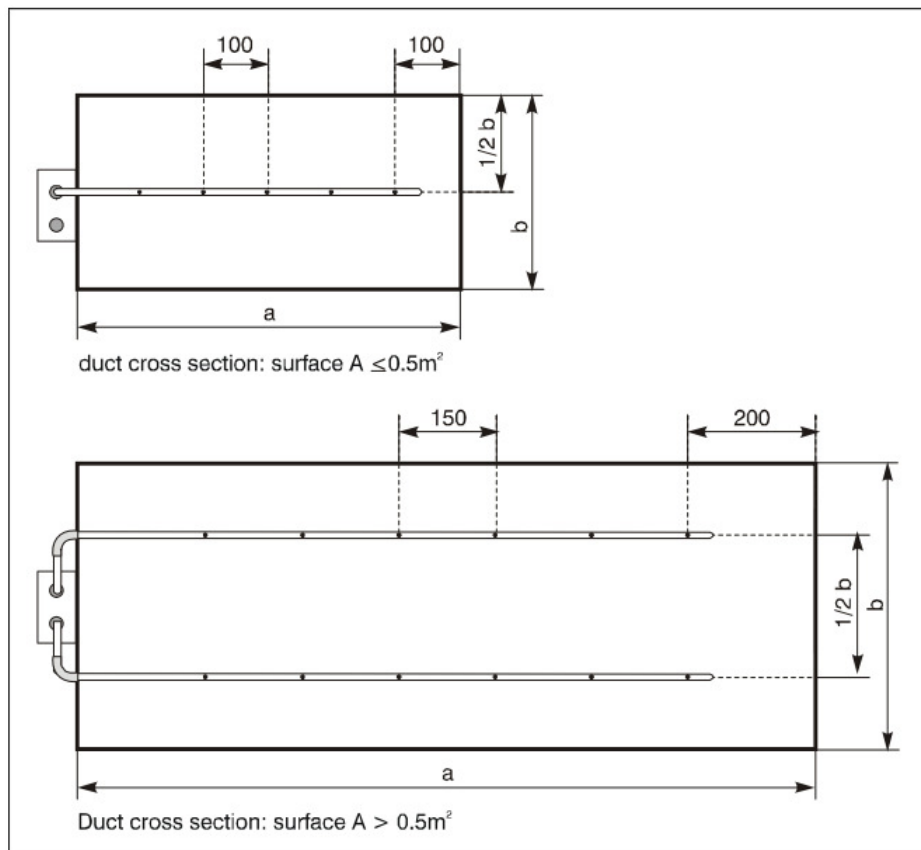


Fig. 4.24: Ducts with small and large duct cross-section

#### 4.4 Mains supply

The appropriate size power supply fitted with appropriate sized backup batteries must be used to power the Wagner Titanus *PRO·SENS*<sup>®</sup>.

Please consult the applicable installation standards.

For Australian installations, the requirements of AS1670.1:2004 Fire detection, warning, control and intercom systems – System design, installation and commissioning – part 1. Fire, clause 3.16 power sources.

For New Zealand installations, the requirements of NZS4512:2010 Fire detection and alarm systems in buildings must be followed, clause 211, 212 and 213.

## 5 Installation TITANUS PRO·SENS®

### 5.1 General

The regulations, guidelines and instructions given in chapter 4.1 apply.

The following is to be considered when mounting the air sampling smoke detection system TITANUS PRO·SENS®:

1. Any changes in the design of installations are to be avoided. If changes are inevitable the operator, manufacturer and/or supplier are to be informed (written approval).
2. Any changes in the supplying network (230V/400V supply) and external supply systems are to be carried out by the system owner. This includes e.g.:
  - the primary connection of the supply units
  - any connection to external systems (e.g. central units)
  - the design of possibly required lightning protection and over voltage protection systems which are in accordance with the standard

## 5.2 Opening the TITANUS PRO·SENS®

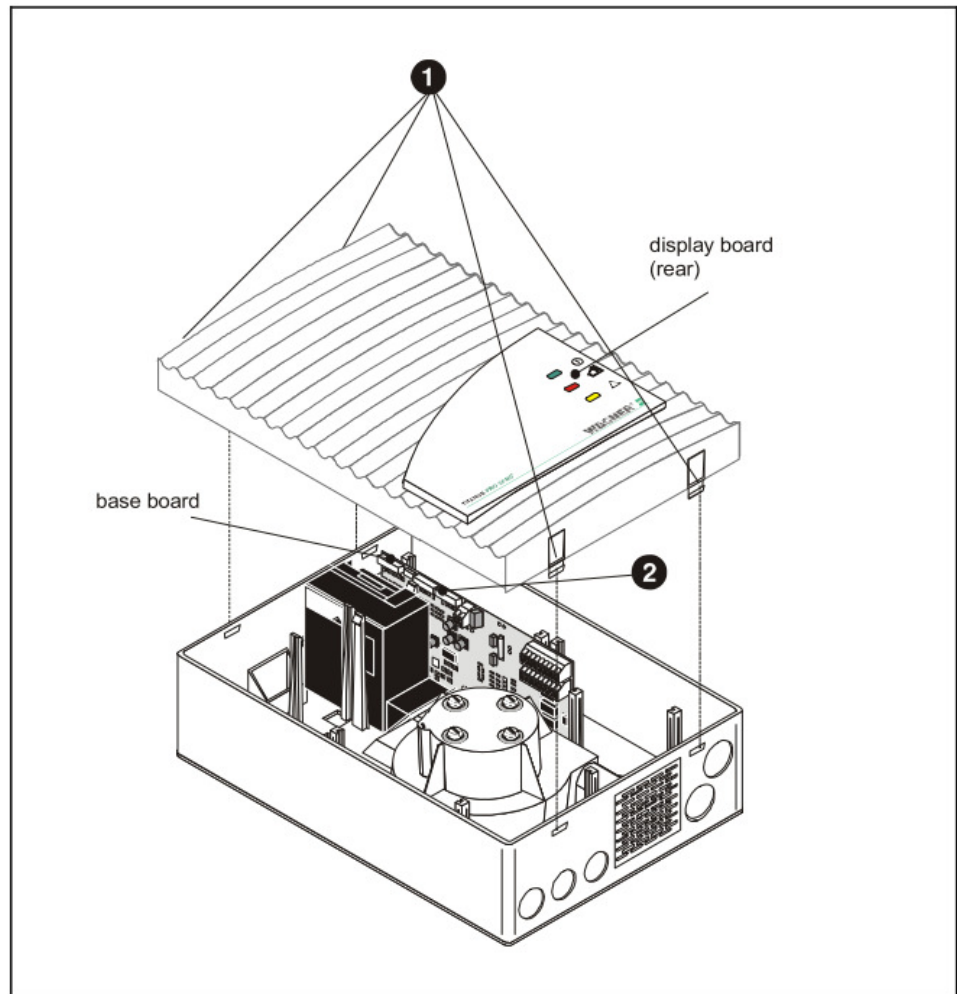


Fig. 5.1: Opening the TITANUS PRO·SENS® air sampling system



ATTENTION

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

To open TITANUS PRO·SENS® follow the steps below (see fig. 5.1):

- ➊ 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.
- ➋ Pull the display board cable off the base board. Remove the lid.

## 5.3 Settings

### 5.3.1 Detector module

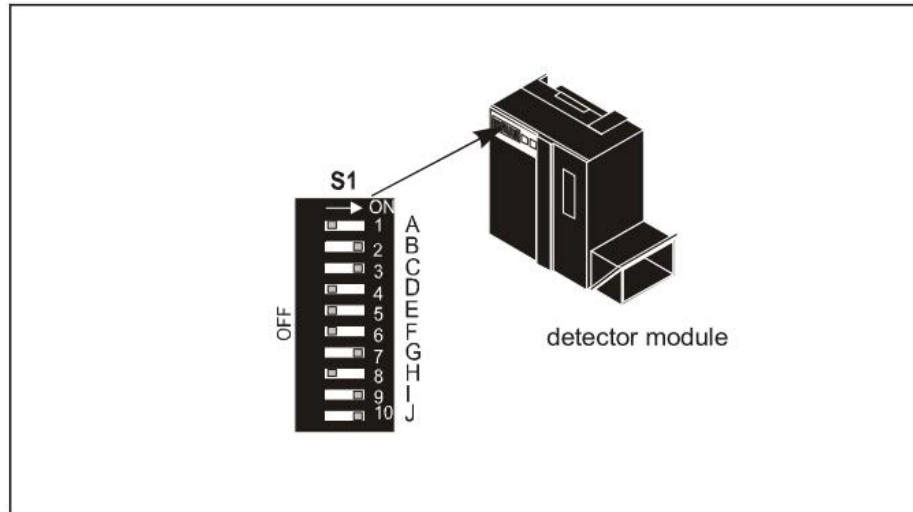


Fig. 5.2: Standard settings on the detector module of TITANUS PRO·SENS®

#### 5.3.1.1 Setting of the response sensitivity

The sensitivity of the detector module is set via the switch S1 (1, 2) on the detector module (see fig. 5.2) of TITANUS PRO·SENS®.

The following table shows the response sensitivity (alarm) of TITANUS PRO·SENS®:

detector module DM-TP-50 L	detector module DM-TP-10 L	detector module DM-TP-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

### 5.3.1.2 Delay period of the 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 4
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.

### 5.3.1.3 Activating threshold of the air flow monitoring

Set the activating threshold of the air flow fault via the switch S1 (5, 6) on the detector module (see fig. 5.2) of TITANUS PRO·SENS®.

Level	Activating Threshold	Switch S1 Contact 5	Switch S1 Contact 6
I	small	on	off
II	medium (standard)	off	on
III	large	off	off
IV	very large	on	on

Choose the activating threshold according to chapter 4, "Pipe Design".



#### 5.3.1.4 Delay period of the air flow fault

Set the delay period for the transmission of a fault signal via the switch S1 (7, 8) on the detector module (see fig. 5.2) of TITANUS PRO·SENS®.

Setting of the 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

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

#### 5.3.1.5 Fault display

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 of the detector module (see fig. 5.2) of TITANUS PRO·SENS®.

Fault Signal	Switch S1 Contact 9
latched (standard)	on
non-latched	off

#### 5.3.1.6 LOGIC·SENS

The sophisticated signal processing **LOGIC·SENS** is activated or deactivated via the switch S1 contact 10. When the signal processing is switched on the air sampling smoke detection system recognizes faults and can thus avoid a false alarm.

LOGIC·SENS	Switch S1 Contact 10
on (standard)	on
off	off

5.3.1.7 Function of the collective fault contact

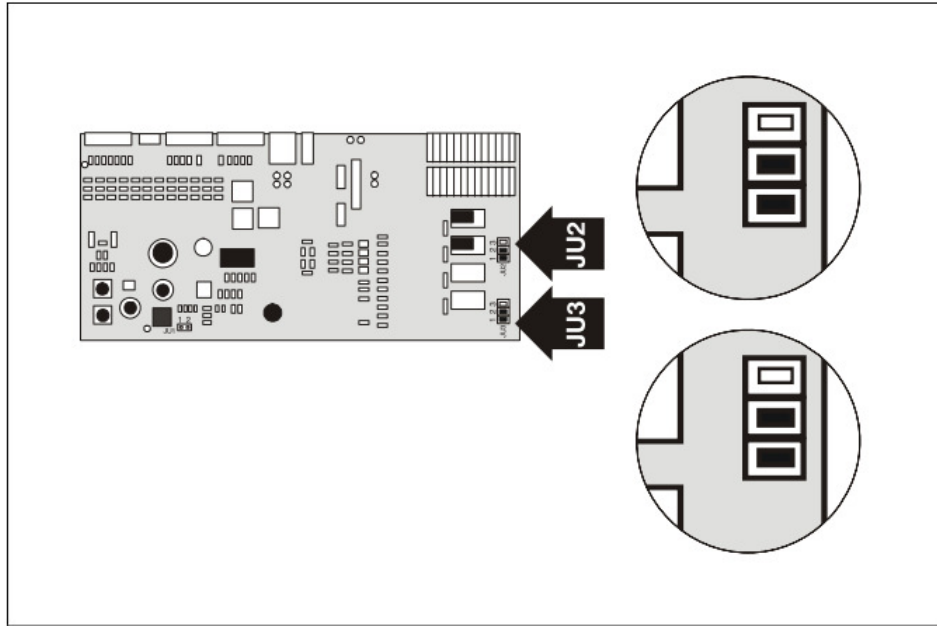


Fig. 5.3: Jumper settings on the collective fault contact

The contact type (break contact or make contact) of the collective fault is set using the jumper JU2 and JU3. Adjust with jumper JU2 the contact type of the 1. fault contact and with jumper JU3 the of the 2. fault contact.

The following table shows the positioning of the jumpers. The symbols used mean:

X = pin pair bridged                      O = pin pair open

The standard setting has a grey background.

Contact art	Jumper JU2 pin pair 1+2	Jumper JU2, pin pair 2+3	Jumper JU3, pin pair 1+2	Jumper JU3, pin pair 2+3
break contact (Standard)	X	O	X	O
make contact	O	X	O	X

### 5.3.1.8 Setting of the Ventilator Voltage

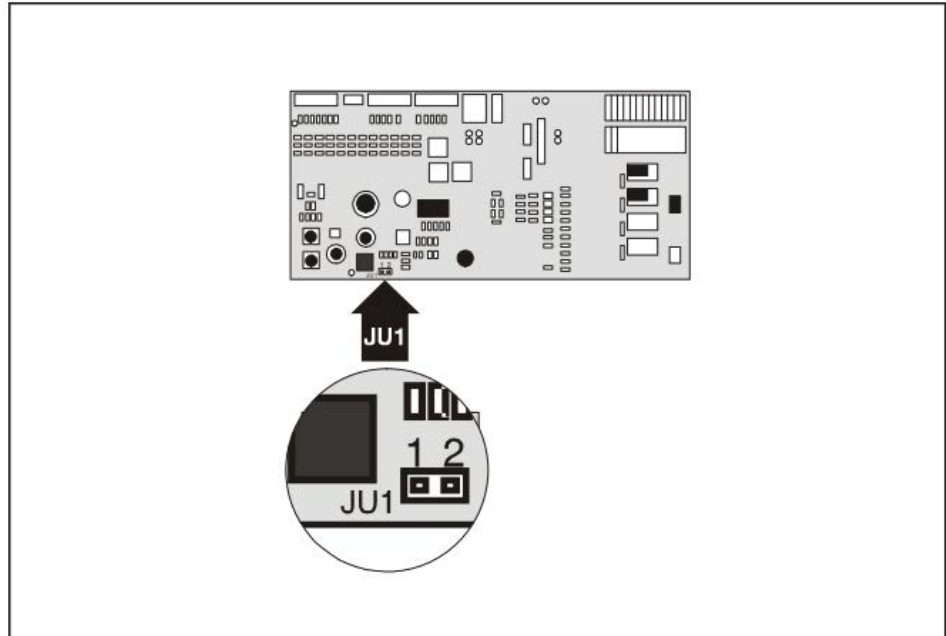


Fig. 5.4: Switching of the ventilator voltage on the base board

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 JU1 in order to increase the transport speed in the pipe system and thus to guarantee a quicker detection in case of greater pipe lengths.



ATTENTION

Re-initialise the air flow if you change the ventilator voltage. Close or open the jumper JU1 only when the device is switched off.

### 5.3.1.9 Connecting the ventilator

The electrical connection of the ventilator is made via terminal block X5 (FAN) on the base board of TITANUS PRO·SENS®.

- connect the red connecting lead of the ventilator with terminal block X5 / clip 1 (+)
- connect the black connecting lead of the ventilator with terminal block X7 / clip 2 (-)



When TITANUS PRO·SENS® is delivered, the ventilator is connected at the plant.

5.3.1.10 Setting of ventilator voltage at TITANUS PRO·SENS®-SL

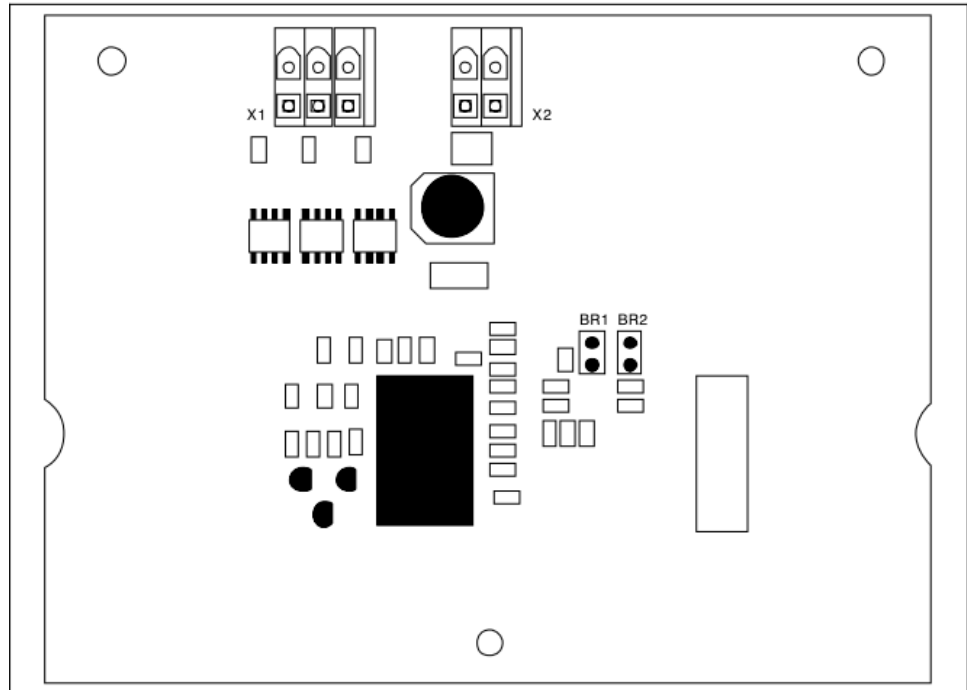


Fig. 5.5: Switching the fan voltage and fan connection terminal board on the FC-2 or FC-3 fan control circuit board

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	Brücke Pin-Nr. BR2, 1+2
10 V	O	X
11 V (standard)	X	O
12 V	O	O



The JU 1 bridge on the base board must always be removed.



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.

#### 5.3.1.11 Connecting the ventilator to the TITANUS PRO·SENS® -SL

The electrical connection of the fan control circuit board is made via terminal block X5 (FAN) on the base board (see fig. 5.3) of TITANUS PRO·SENS®.

The electrical connection of the ventilator is made via terminal block X1 (FAN) on the fan control circuit board (see fig. 5.4).

- Connect terminal 1 of terminal board X5 on the base board to terminal 2 (+) of terminal X2 on the fan control circuit board.
- Connect terminal 2 of terminal board X5 on the base 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.



When TITANUS PRO·SENS® is delivered, the ventilator is connected at the plant.

## 5.4 Installation of the reset board

The reset board can be installed into TITANUS PRO·SENS® as an option. If several TITANUS PRO·SENS® are connected to one detection line the reset board is only installed to the last TITANUS PRO·SENS® on the detection line. The electrical connection of the reset board is made according to the connection diagram in chapter 5.6.3.



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.

### Quiescent current of the line

The quiescent current  $I_R$  of the line is calculated as follows:

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

where  $R_E$  = original end-of-line resistor in  $\Omega$   
 $U_L$  = line voltage in V  
 $I_R$  = quiescent current of the line in [A]

The formulae to calculate the end-of-line resistor and the quiescent current of the detection line consider the ideal state of the signal evaluation.

If acknowledgement is not possible by means of the calculated end of line resistor of the reset board the value of the end-of-line resistor is 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 resistor  $R_{ER}$  is calculated as follows:

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

where  $R_{ER}$  = end-of-line resistor on the reset board in  $\Omega$   
 $U_L$  = line voltage in V  
 $I_R$  = quiescent current of the line in [A]



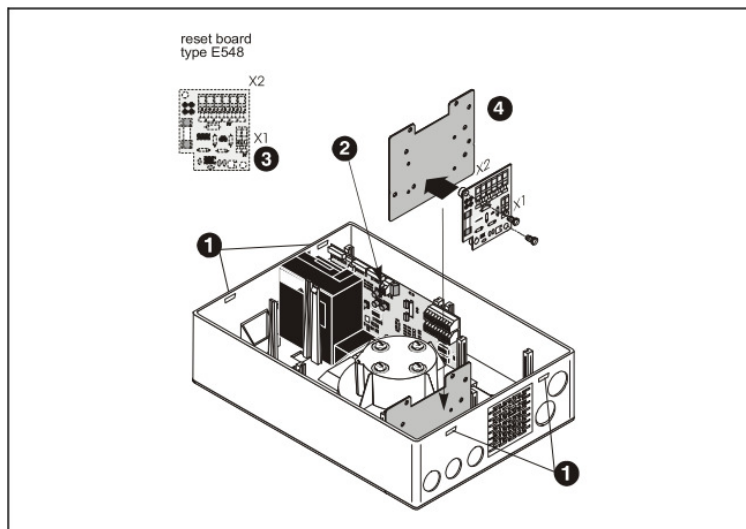


Fig. 5.6: Installation of the reset board in TITANUS PRO·SENS®

### Installation TITANUS®

In order to install the reset board in TITANUS PRO·SENS® the following steps are to be followed:

- ① Carefully unlock the snap-in closures of the housing using a screwdriver by simultaneously pressing in both clips located at one side of the housing lid. Then, lift the lid carefully.
- ② Pull the display board cable off the base board. Now remove the housing lid.
- ③ Place the calculated end-of-line resistor<sup>31</sup>  $R_{ER}$  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 Fig. 5.5 in the TITANUS PRO·SENS® housing.
- ⑥ The electrical connection (X2) is described in section 5.6.4.
- ⑦ Re-connect the cable to the display board of the base board and replace the housing lid.
- ⑧ Tighten the lid using the snap-in closures.



Due to its height, the reset board can only be installed in the position shown in fig. 5.6.

<sup>31</sup> end-of-line resistor not included, power 1/4W

## 5.5 Mounting Location

### 5.5.1 Fixing of the air sampling system TITANUS PRO·SENS®

Mount the air sampling system in such a way 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 by means of a special support (refer to 2.2.5 "Device Support").



Note that the mounting location is not within the opening range of doors.

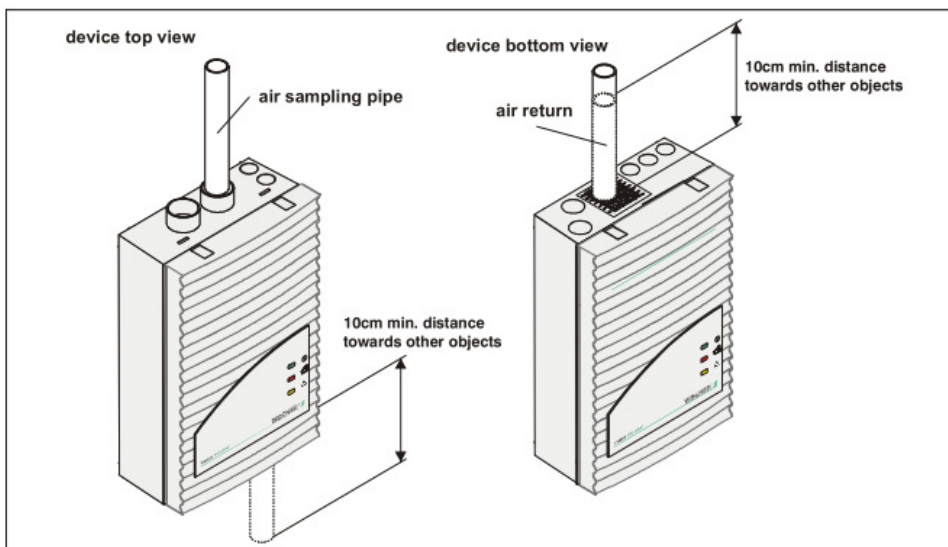


Fig. 5.7: Installation of TITANUS PRO·SENS®

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

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

#### Aspiration downwards

If TITANUS PRO·SENS® is mounted with the air sampling pipe connectors pointing downwards make sure no impurities or dripping water enter the air outlet which then points upwards. In this case, use a short pipe curving downwards.

#### Mounting Material

<b>TITANUS®</b>	cylinder or flat head screws – diameter of thread: max. 6 mm – diameter of head: 10 mm
<b>Support</b> (type MT-1)	cylinder or flat head screws – diameter of thread: max. 4 mm – diameter of head: 5 to 7 mm

**Distances of the holes** The distances of the holes are given in the following figures (all dimensions in mm).

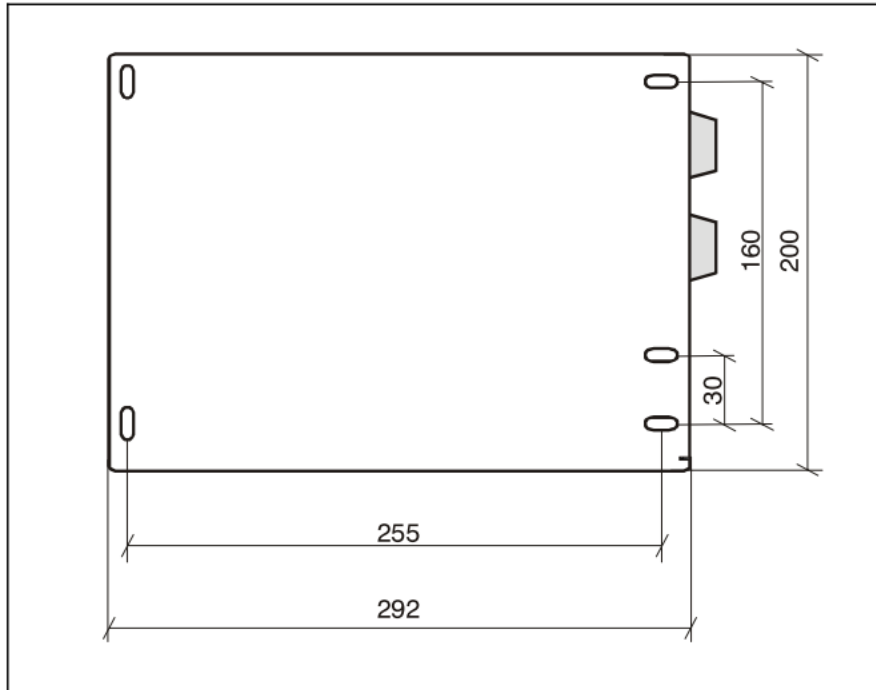


Fig. 5.8: TITANUS® hole-spacing *without* support

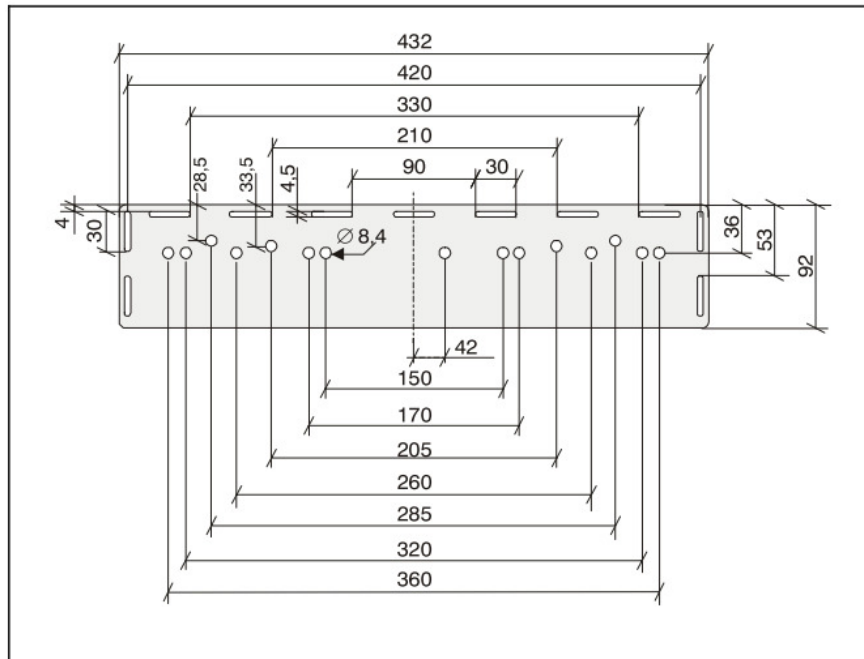


Fig. 5.9: Hole distances of the support type MT-1

### 5.5.2 Connection of the air sampling pipe

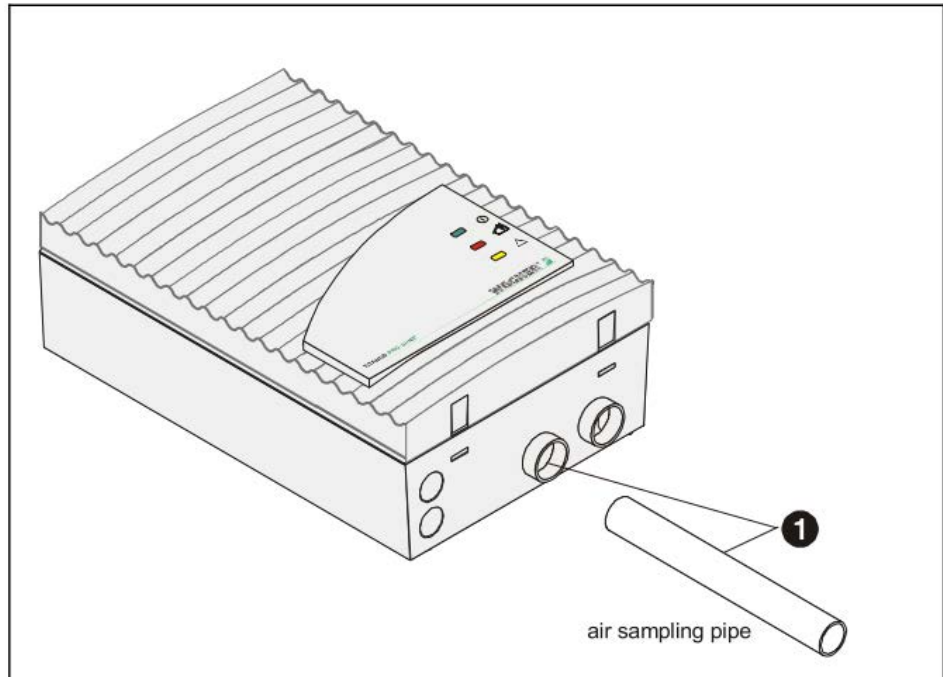


Fig. 5.10: Connection of the air sampling pipe to the air sampling smoke detection system TITANUS PRO·SENS®

#### Connection of air sampling pipe

**1**

In order to connect the air sampling pipe to TITANUS PRO·SENS®, attach the pipe to the corresponding connector. (refer to Fig. 5.10).



Do not use any adhesive to connect the air sampling pipe with the pipe connector.  
Wide variations in temperature require the air return to be firmly fixed just before the device so that the pipe is not pulled out of the pipe connection due to changes in length that occur (refer to chapter 6.1).

## 5.6 Electrical connection

In order to prepare the electrical connections follow the steps below:

1. Break through the required cable entries e.g. by means of a screwdriver.
2. Attach the plastic connection pieces M 20 or M 25 to the cable entries.
3. Pass the cables through the corresponding cable entries.



One plastic connection piece M 20 and 2x M 25 are supplied with the device.

The electrical connection is effected via the terminal blocks X6 and X7 on the base board of TITANUS PRO·SENS®. Pay attention to the allowed wire cross sections of the corresponding screw joint and to the allowed wire cross sections of the terminals for max 1.5mm<sup>2</sup> cores.



Connection works are only allowed if the device is powered down!



In order to maximise the fault safety, use shielded cables for the external wiring of the device(s).

5.6.1 Connection to F.D.C.I.E. , with reset button

The relay contacts on the base board can be used to e.g. connect TITANUS PRO·SENS® to a fire detection control and indicating equipment, to trigger signalling devices, security management systems etc. It is also possible to connect a response indicator.



The reset input must not be permanently connected to +24V. 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.

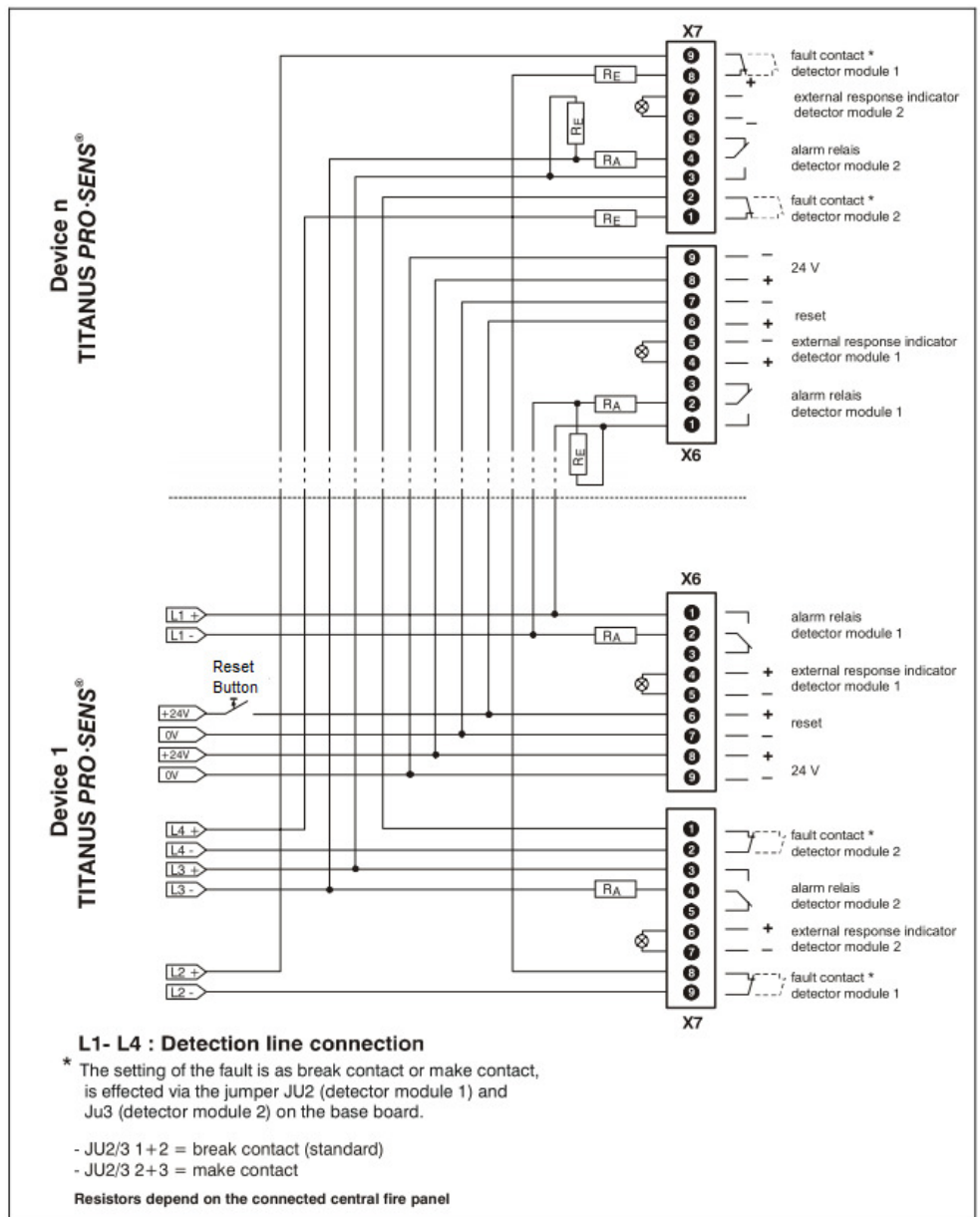


Fig. 5.11: Example of the connection of TITANUS PRO·SENS® with fire detection control and indicating equipment and reset button

5.6.2 Connection of several TITANUS PRO·SENS® with reset button

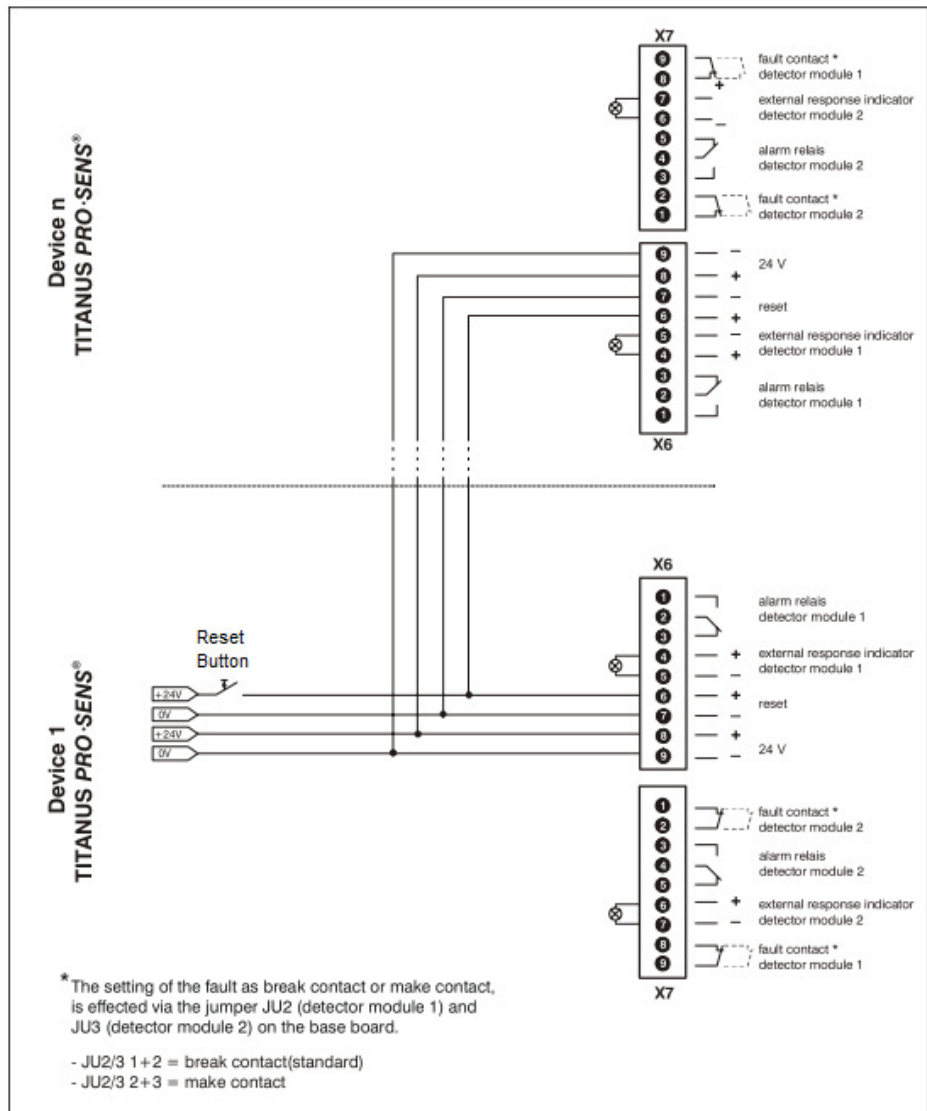


Fig. 5.12: Example of the connection of several TITANUS PRO · SENS® without fire detection control and indicating equipment, with reset button

5.6.3 Connection to F.D.C.I.E., with reset board

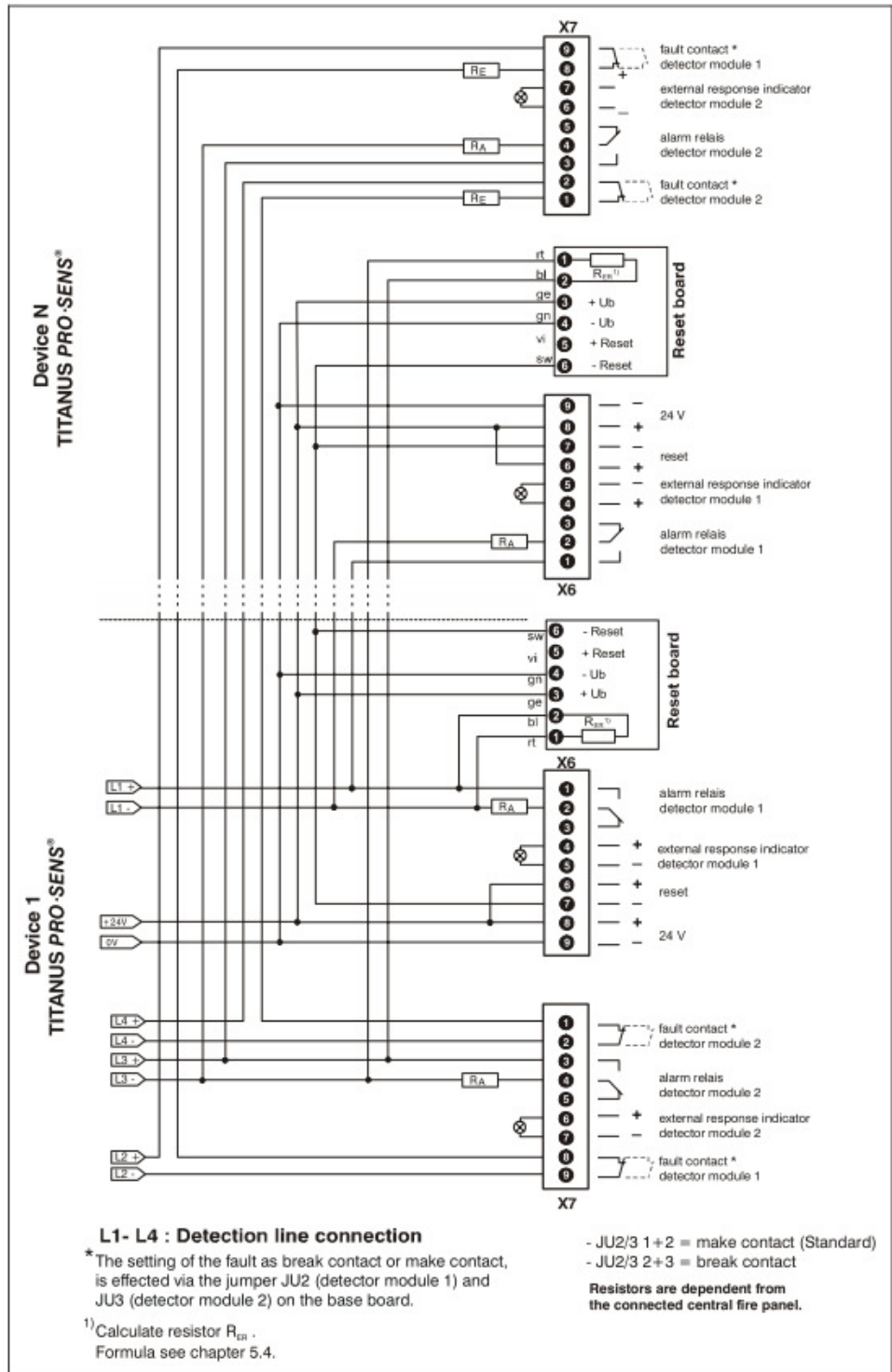


Fig. 5.13: Example of the connection of TITANUS PRO·SENS® with fire detection control and indicating equipment and reset board



The fault display is to be set to "non-latched" (refer to section 5.3.1.5).



## 5.7 Installation of the second detector module

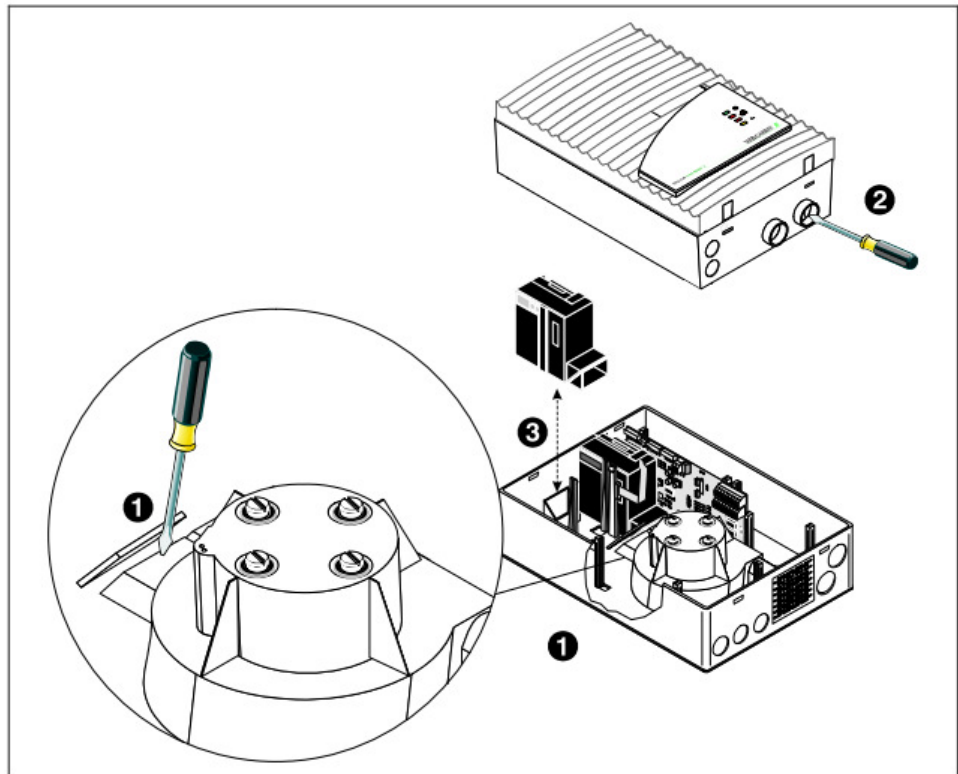


Fig 5.14: Installation of the second detector module

- ❶ **Only** carry out the following work if the device is current-free.
- ❷ With a slot screwdriver, carefully undo the snap-in closures of the housing by simultaneously pressing in the clips located on one side. Then carefully lift the housing lid. Pull the cable from the display board and remove the lid.
- ❸ Carefully remove the cover from the second air sampling pipe (plastic self-adhesive cover). If necessary use a screwdriver to assist.
- ❹ Carefully break the closure connecting the second pipe system and the housing (correct breaking point marked by "II"), again using a screwdriver if required.
- ❺ 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.
- ❻ Pull (remove) the jumper JU4 from the base board (see fig. 5.22).
- ❼ Connect the detector module to the base board via the ribbon cable. Connection: X3 HEAD 2 (see fig. 5.22)



Ensure that the position of the marker is correct before plugging the flat cable into the base board.

- 8 Connect the display board with the base board. Connection: X4 DISPLAY
- 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.



When extending to TITANUS PRO·SENS® 2 the front panel must be replaced.

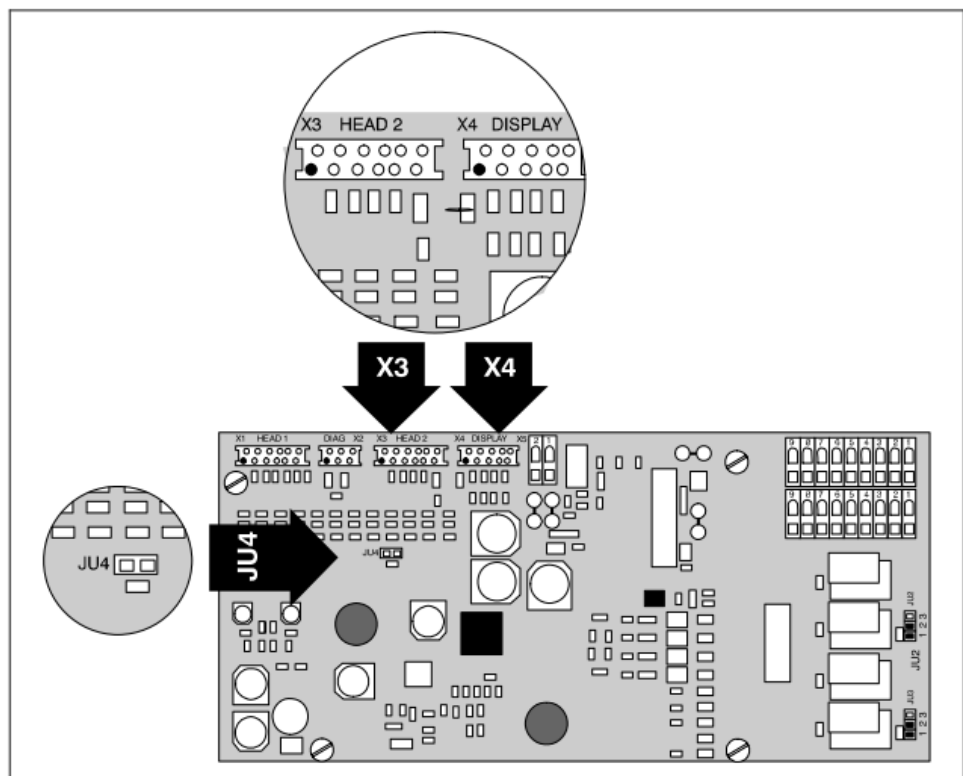


Fig.5.15: Connections for base board X3, X4 and JU4

## 5.8 Response indicator -electrical connection

Connect the response indicator via the terminal block X6 on the base board in TITANUS PRO·SENS®.

Note the permissible cable cross sections of the corresponding screw joints and the permissible wire cross sections of the terminals (refer to chapter 3 "Technical Data").

**Response indicator** Connect the response indicator to the current less TITANUS PRO·SENS® as follows:

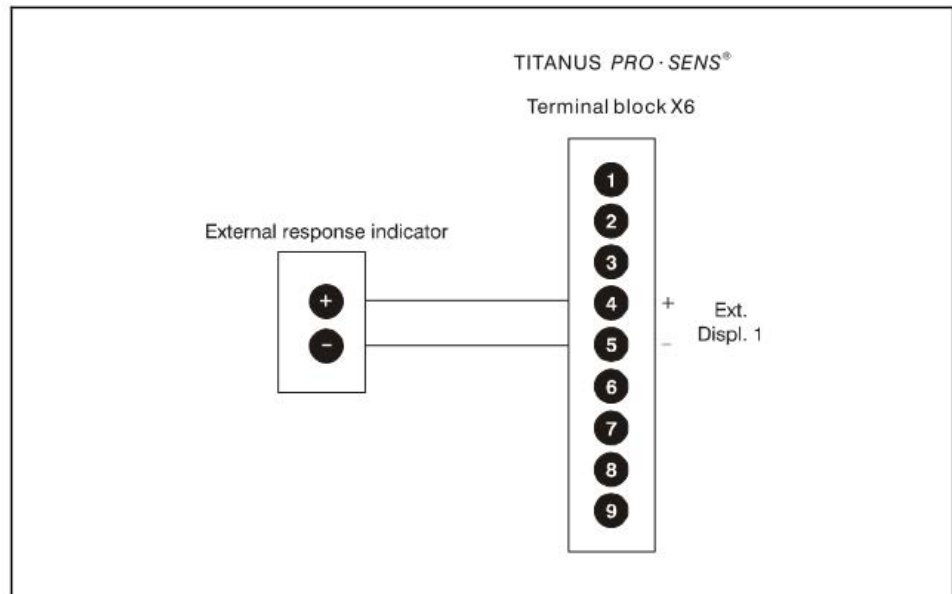
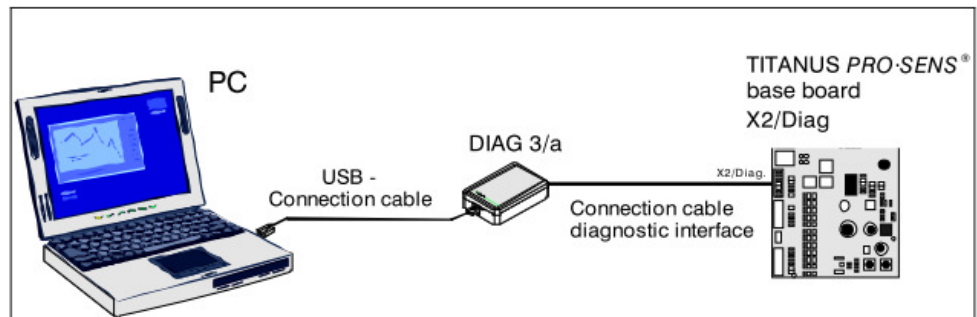


Fig.5.16: Connection of the response indicator at TITANUS PRO·SENS®

## 5.9 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 7.5.2 “Operational Check”, using diagnostic software.



*Fig. 5.17: Connection of a PC via the connection diagnostic interface connection cable*



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

## 6 Installation Pipe System

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

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

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

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

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

The following pipes and related fittings are to be used for pipe systems with long pipe intake line (see also Chapter 4.3.3 “Project planning with long pipe intake line”):

	external diameter	internal diameter	
		ABS	PVC
air sampling pipe	32 mm	28 mm	28,4 mm
air sampling pipe	40 mm	35 mm	36,2 mm



ATTENTION

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

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

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

Air Sampling Pipe, halogen-free	Air Sampling Pipe (PVC)	Cleaning Agent	Adhesive	Pipe Cutter
ABSR-2518, ABSR-3220, ABSR-4025	R-2519, R-3218, R-4019	Tangit cleaner	Tangit adhesive	pipe cutter or 38mm saw



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<sup>32</sup>.



Arcs should be used instead of elbows. If the number of changes of direction is too high an air flow fault can occur at TITANUS PRO·SENS® and the detection time can be changed..

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 pipe clips should be no more than 80cm. Reduce the space between clips to no more than 30cm if there are high temperature variations.

<sup>32</sup> An arc equals a straight piece of pipe of 0.3 m  
 an elbow equals a straight piece of pipe of 1.5m



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.



After pipe installation is complete, check for the following:

- air tightness (eg due to damage)
- any faulty connections
- correct projection of the air sampling points

## 6.1 Linear expansion of the pipe system

Linear expansions (lengthenings or shortenings) of the pipes are caused by variations in temperature. An increase in temperature results in a lengthening of the pipe and a decrease in temperature in a shortening of the pipe. This is especially important if the mounting temperature of the pipe system differs considerably in comparison to its operating temperature.

The change in length can be calculated by the following formula:

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

$\Delta L$  = linear expansion in (mm)

$L$  = length of the pipe to be calculated in (m)

$\Delta T$  = maximum temperature difference in (°C)

$\delta$  = coefficient of the change in length in mm/m °C

$\delta_{PVC} = 0,08 \text{ mm/m } ^\circ\text{C}$

$\delta_{ABS} = 0.101 \text{ mm/m } ^\circ\text{C}$

A variation in temperature of e.g. 10°C of the an ABS pipe with a length of 10 m results in a change in length of 10.1 mm.

**Pipe Clips** For the installation of the pipe system (ø 25 mm) the plastic pipe clips type NG 23 are used as a standard. They do not allow linear expansion so that the plastic pipe clip type CLIC-PA is to be used in areas with high variations in temperature (See fig. 6.1).

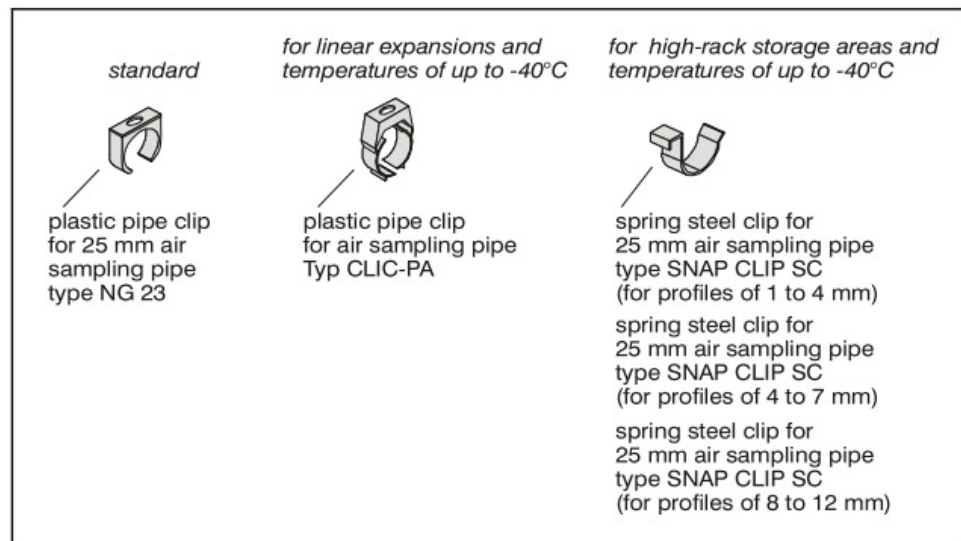


Fig. 6.1: Pipe clip types



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

1. **Position 1 (first locking into place):**  
Fixes the pipe so that a linear expansion is possible (used in deep freeze areas, if necessary).
2. **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)

## 6.2 Patented air sampling points

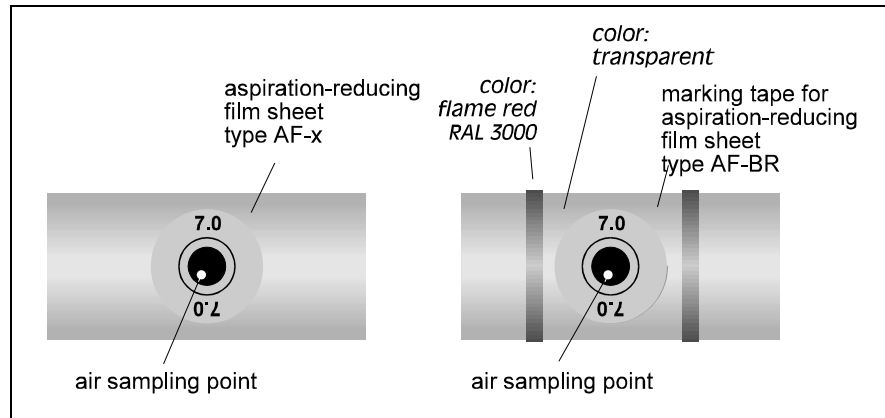


Fig. 6.2: Example of an air sampling hole with an aspiration-reducing film sheet

### Air Sampling Points

**The layout of the air sampling points (air sampling hole) is to be designed according to the requirements of the project and the guidelines of the pipe design.**

### Air Sampling Holes

1. Place a 10 mm-air sampling hole in a right angle towards the pipe.
2. Clean and trim the holes carefully.
3. Clean the area of the hole (throughout the whole pipe) from dirt and grease by means of an agent, e.g. Tangit cleaning agent.
4. Select the size of the aspiration-reducing film sheet according to the recommendations of the **pipe design**.
5. Place the aspiration-reducing film sheet on the hole (refer to Fig. 6.3 **1**).
6. Prevent the film sheet from falling off by sticking marking tape on the film sheet (refer to Fig. 6.3 **2**).



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 adhesive in order to keep it free from dust and oil.

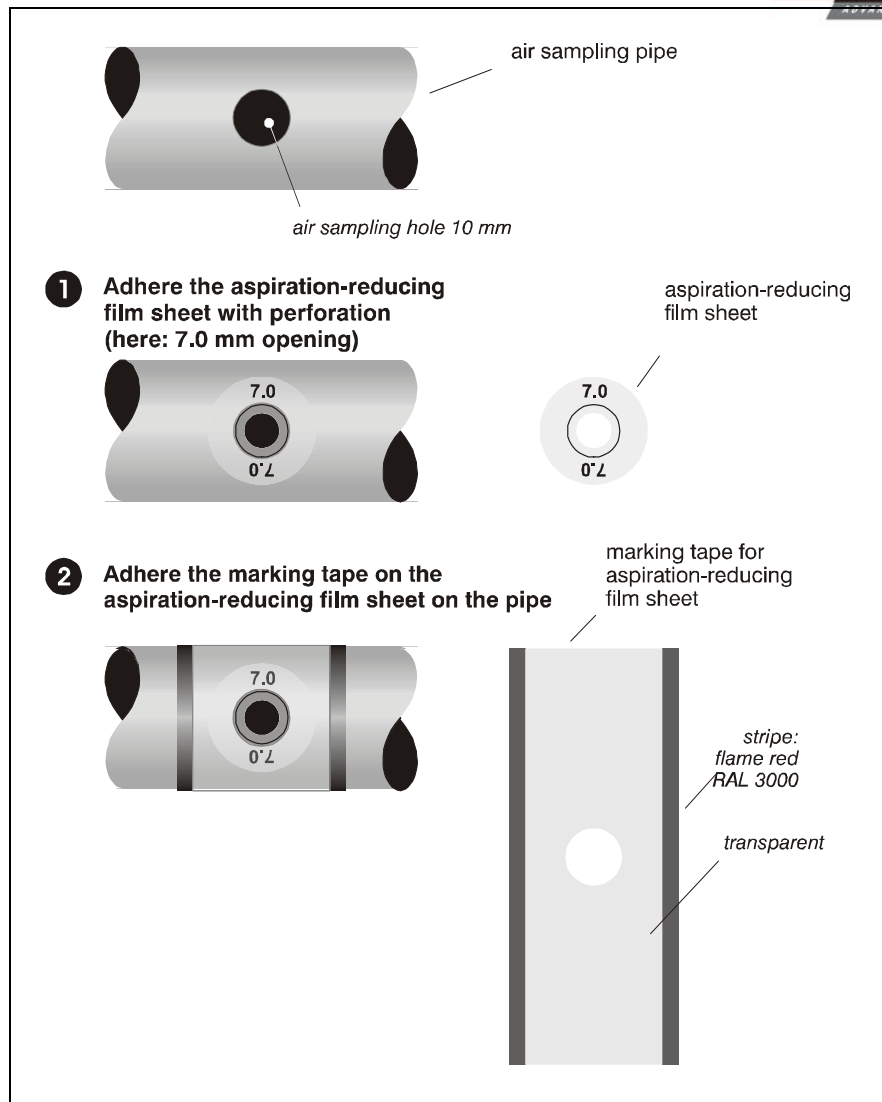


Fig. 6.3 Aspiration-reducing film sheet

### 6.3 Ceiling lead through

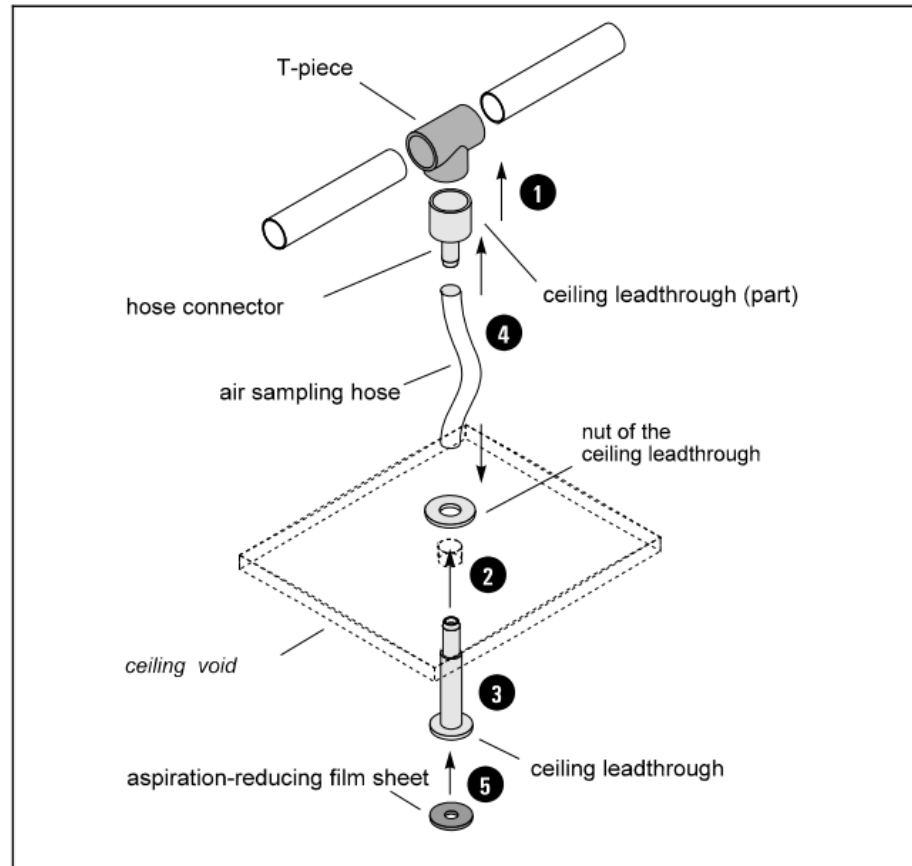


Fig. 6.4: Mounting of the ceiling lead through

The following steps are necessary for the mounting of the ceiling lead through:

- ① **Before** gluing remove dirt and grease from the pipe using an appropriate cleaning agent.
- ② Glue the hose connector to the corresponding T-piece of the air sampling pipe by means of Tangit-adhesive.
- ③ Drill a hole of  $\varnothing 13$  mm for each ceiling lead through in the ceiling void.
- ④ In order to mount the ceiling lead through remove the nut, pass the hose nozzle from below through the drill hole, replace the nut above the ceiling void and fix it.
- ⑤ Cut the air sampling hose so that it has the necessary length. Attach the hose on the hose nozzle of the ceiling lead through and on the hose connector of the pipe-T-piece. If necessary, soften the ends of the hoses with a hot air ventilator.
- ⑥ Adhere the correct aspiration-reducing film sheet onto the ceiling lead through (according to the pipe design guidelines).

The aspiration-reducing film sheets are available in two colours. According to the ceiling colour the aspiration-reducing film sheets of the type AFW-x (pure white, RAL 9010) or type AF-x (papyrus white, RAL 9018) can be used. If required specially colour film sheets are available.



The perforation of the aspiration-reducing film sheet is to be placed exactly on the opening of the ceiling lead through. The diameter of the aspiration-reducing film sheet must not be changed.  
Avoid touching the adhesive in order to keep it free from dust and oil.

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

### 6.4.1 Detection at air inlets/outlets



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 fig. 6.5.

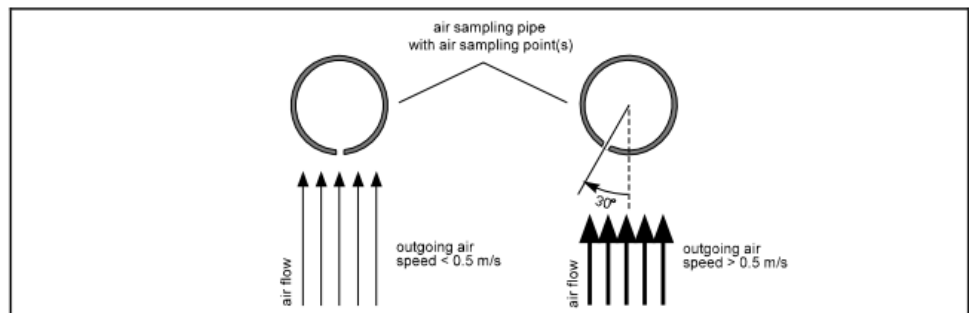


Fig. 6.5: Positioning of air sampling point, depending on air speed

### 6.4.2 Detection in bypass systems



In case of detection with air flows  $\geq 2 \text{ m/s}$  the outgoing air of the TITANUS PRO·SENS® is additionally to be returned to the air flow area. The end of the air return pipe is to be cut in an elbow of  $45^\circ$  (refer to Fig. 6.6)

For the air return connection please refer to chapter 6.6 "Air Return".

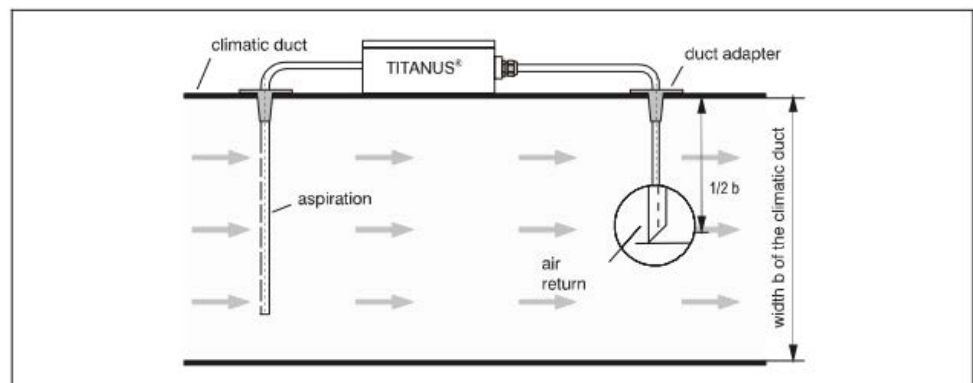


Fig. 6.6: Positioning of air return, example of a climatic duct (bypass)

For the pipe design of TITANUS PRO·SENS® in these areas refer to chapter 4.7 "Pipe Design for Forced Air Flow".

## 6.5 Filter

### 6.5.1 Installation of the air Filter type LF-AD-x

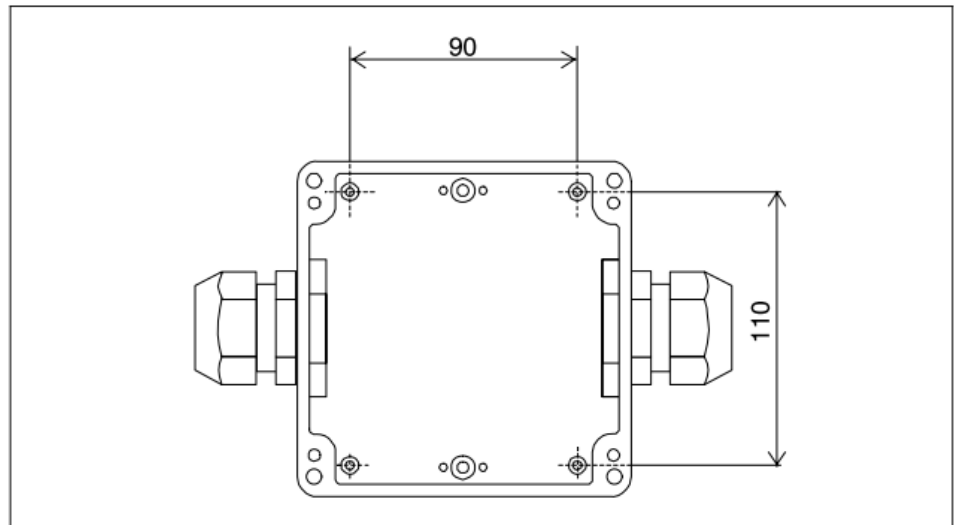


Fig. 6.7: Distances of the drill holes in the bottom of the air filter housing

- Air filter LF-AD-x**
1. To fit the filter into the pipe systems use the two PG29-screw joints of the filter.
  2. Mount these screw joints like e.g. at the pipe adapter.
  3. When mounting the filter pay attention to the direction of the air flow indicated on the type plate in the housing bottom.
  4. Screw the bottom side of the air filter housing directly to a wall.

#### Mounting Material

<b>Air Filter</b>	cylinder or flat head screws – thread diameter max. 4 mm – head diameter: 5 to 7 mm
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### 6.5.2 Mounting of the special filter type SF-400/650

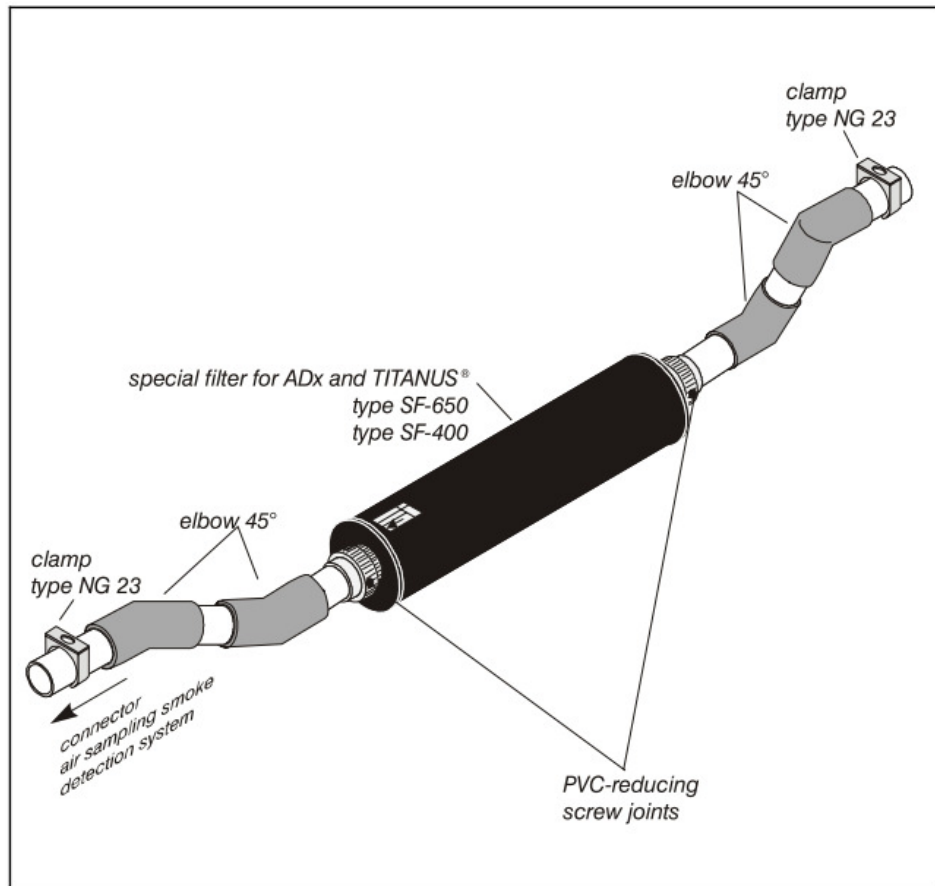


Fig. 6.8: Mounting of the special filter into the pipe system

#### Special Filter SF-x

1. In order to install or de-install the special filter use the two PVC reducing couplings at both filter ends.
2. Glue the reducing couplings into the pipe system.
3. When mounting the special filter pay attention to the air flow direction which is indicated on the type plate of the filter housing (refer to Fig. 6.10).
4. Mount the special filter by means of a 45°-elbow and via the installed pipe system through clamps.

#### Mounting Material

special filter	pipe fittings made of PVC or ABS – 45°-elbows
----------------	--



## 6.6 Air return

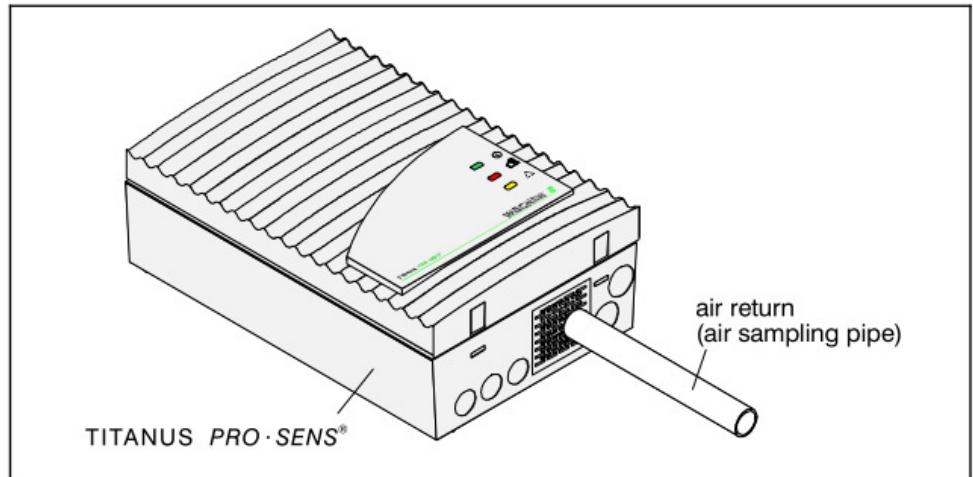


Fig. 6.9: Mounting of the air return

- 1 Remove the pre-punched pipe lead-through in the protection grid of the air outlet opening (e.g. by means of a small side cutter).
- 2 Pass the air return through the opened pipe lead-through in the protection grid and fix it through the air outlet opening of TITANUS PRO·SENS®. As the air return pipe fits exactly into the air exit opening, a tight fit is ensured.



Wide variations in temperature require the air return to be firmly fixed in place just in front of the device so that the pipe is not pulled out of the pipe connection due to any changes in length that may occur (refer to chapter 6.1).

## 6.7 Noise suppressor

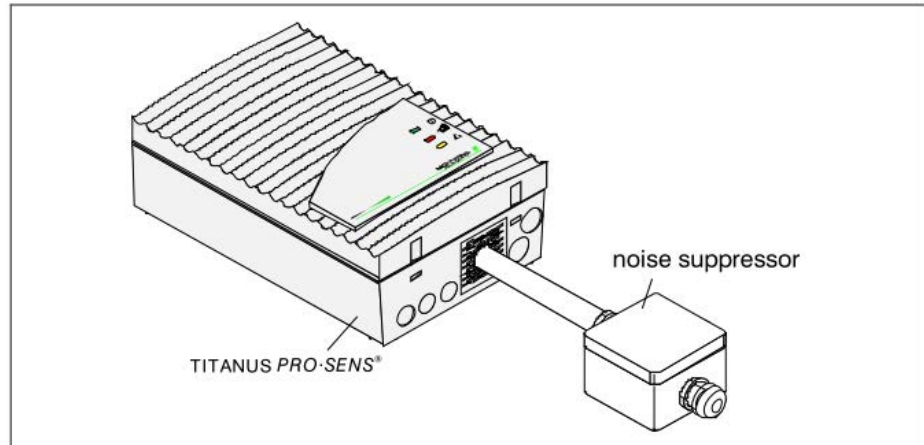


Fig. 6.10: Mounting of noise suppressor

- ❶ Remove the pre-punched pipe lead-through in the protection grid of the air outlet (e.g. with a small side cutter).
- ❷ Pass the pipe ( $\varnothing$  25mm) through the opened feed-through in the protection grid and fix it with the existing pipe collar in the air outlet of TITANUS PRO·SENS®. As the air return pipe fits exactly into the exit air opening, a tight fit is ensured.
- ❸ Use the sound suppressor's PG29 screw connection in order to connect the noise suppressor to the pipe.
- ❹ When installing the absorbing duct, ensure that the direction of air flow is shown at the side of the housing's bottom part.
- ❺ Screw the bottom part of the housing directly to the wall.

### Installation material

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

## 6.8 3-Way ball valve

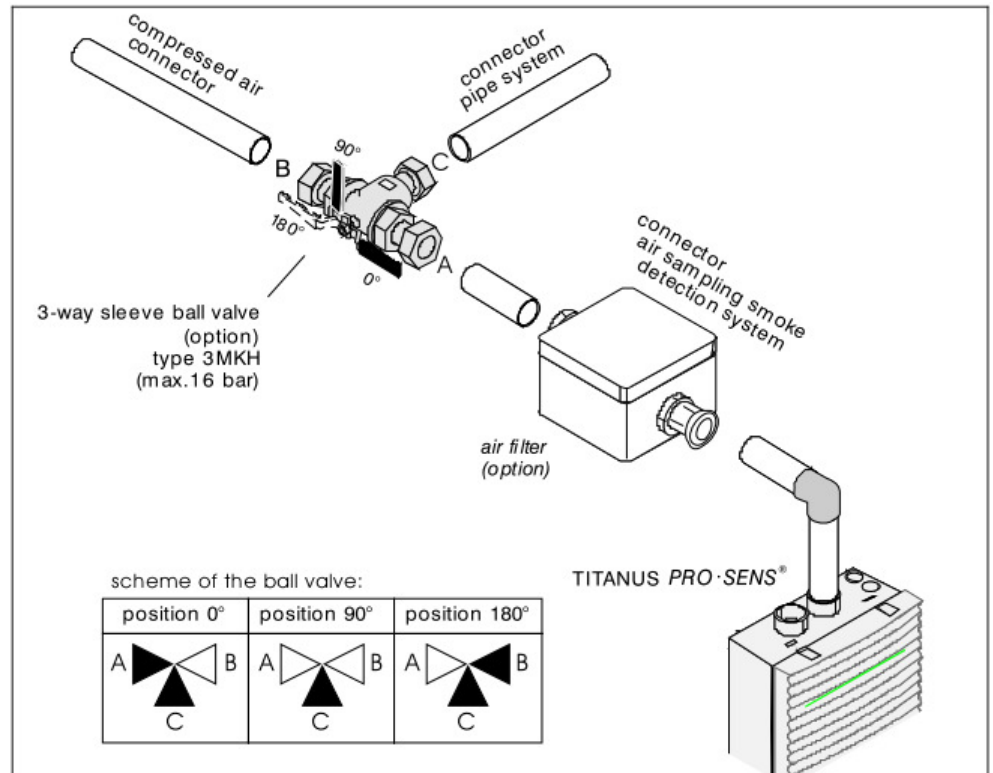


Fig. 6.11: Installation of 3-way ball valve

The ball valve is required for blowing-through with compressed air<sup>33</sup> (preferably).

The ball valve switches between fire detection (position 0°) and blowing-through (position 180°). Connect the ball valve to the pipe system by means of the screw joints.

**Connections** During installation pay attention to the correct connectors (refer to scheme in Fig. 6.11):

- Connect the pipe system to connector C.
- Mount TITANUS® to the connector A or B and the compressed air supply to the remaining connector.

<sup>33</sup> Depending on the temperature use either compressed, non-purified and humid ambient air or purified and dehumidified air. If the air sampling system and the pipe system are located in areas below the freezing point purified and dehumidified compressed air should be used.

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

1. Connect the compressed air supply (compressor or mobile blow-through device), which is necessary for the blow-through of the pipe system, to the 3-way socket ball valve via the quick-acting coupling sleeve of the blown-through pipe system.
2. Separate the pipe system to be blown-through via the 3-way socket ball valve from the relevant device by re-setting the ball valve from 0°- operating position to 180°(see fig. 6.11).
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 about 20 seconds so that 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 pipe system with the device within the next 10 seconds by again positioning the ball valve to 0°.



One single blow-through process must be completed in 50 seconds. If a blow-through process is carried out within this time and the device re-connected with the pipe system, the fault alarm “air-flow sensor module fault” is not activated. If another blow-through process is necessary, the above mentioned process must be repeated **at the earliest after 120 seconds**.

## 6.9 Steam trap

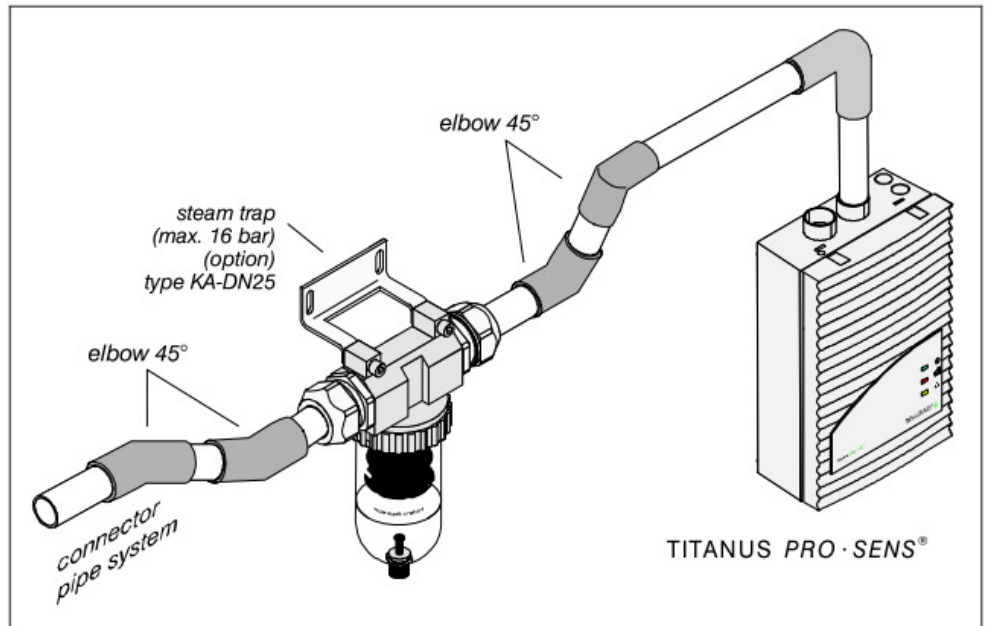


Fig. 6.12: Mounting of the steam trap to the pipe system

The steam trap is installed at the deepest point of the pipe system in front of the air filter and TITANUS PRO·SENS®. It is fixed to the pipe system by means of the PG-screw joints.



Two 45°-elbows are necessary on each connection side for the installation of the steam trap in the pipe system.

**Connection** When mounting the steam trap pay attention to the air flow direction (refer to the arrow on the steam trap housing).

1. Prepare the pipe system with two 45°-elbows on each side for the connection to the steam trap and connect it to the PG-screw joints.
2. Fix the steam trap additionally through two screws and the support.

## 6.10 Detonation prevention device

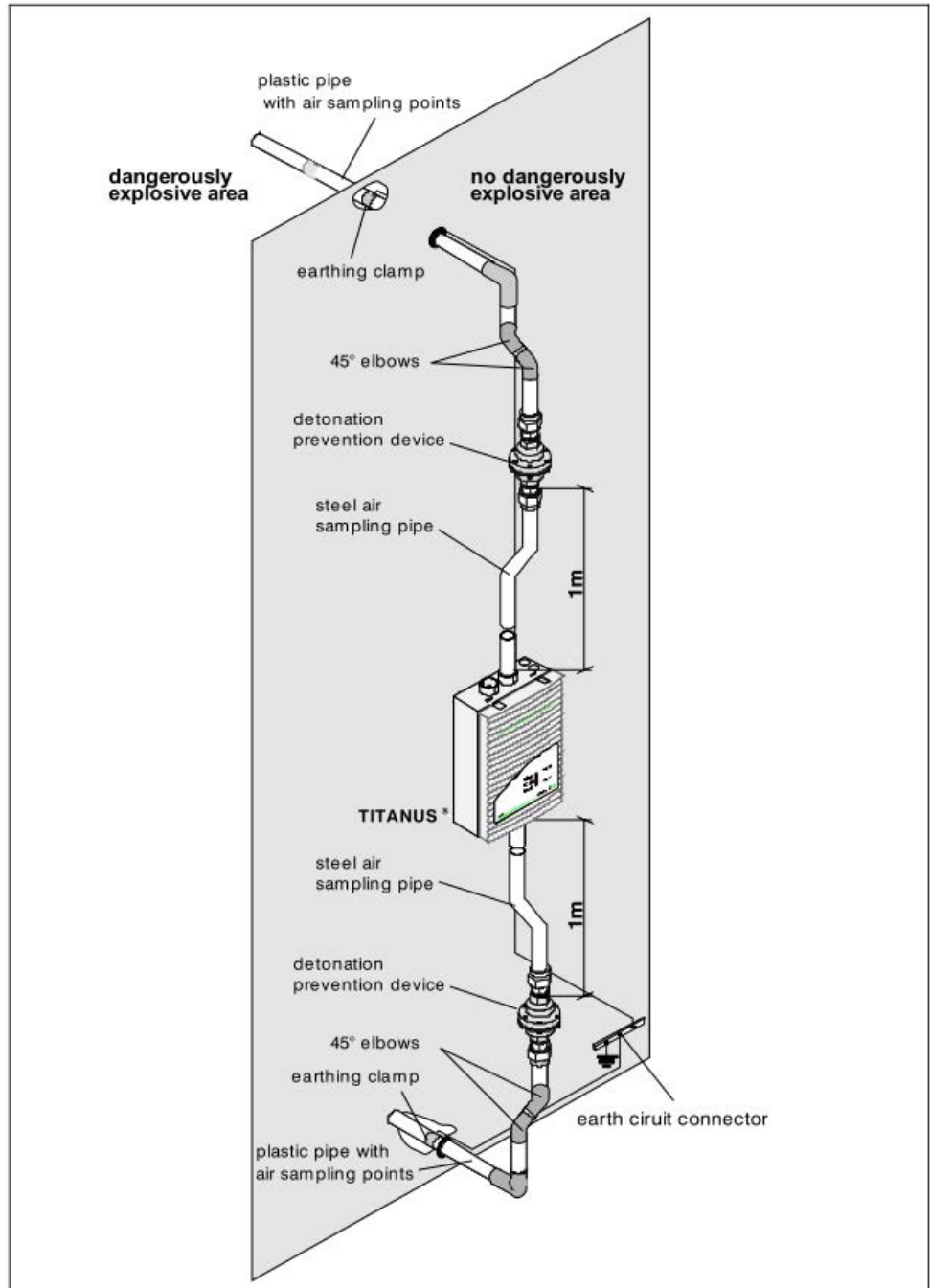


Fig. 6.13: Mounting of the detonation prevention device to the pipe system and to the air return

The detonation prevention devices are installed at a minimum distance of **1 m** from the air sampling smoke detection system into the pipe system and into the air return. The detonation prevention device is glued to the pipe system and the air return by means of the reducing screw joint at the pipe side and at the device side it is connected to the TITANUS PRO·SENS® by means of a steel pipe (refer to Fig. 6.13). The connection between the detonation prevention device and the steel pipe/reducing screw joint is made by a  $\frac{3}{4}$ -inch thread.



It is necessary to use thread sealing tape or thread sealing agent to make a gas-tight connection between the detonation prevention device and the steel pipe/reducing screw joint. During the installation of the detonation prevention device the air flow direction plays a secondary role.



The pipe system has to be grounded in order to avoid the ignition of potentially explosive mixtures via static discharge.

## 6.11 Test adapter

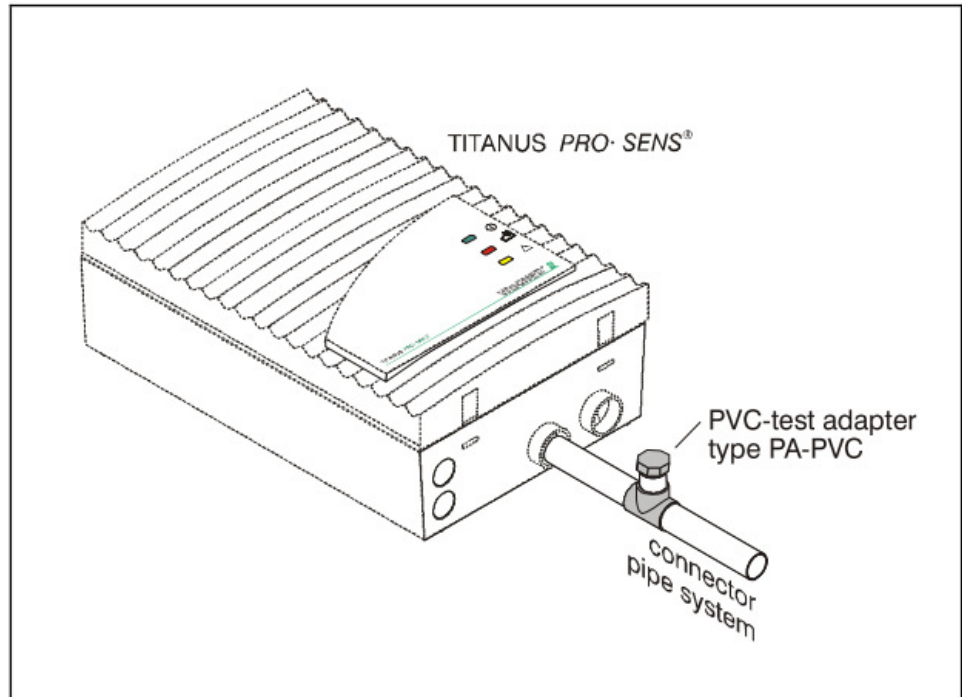


Fig. 6.14: Mounting of the test adapter at the pipe system

The test adapter is glued into the pipe system near the air sampling smoke detection system. For standard operation the test adapter has always to be closed. It is only opened for maintenance and service purposes to pass test gas or smoke into the system.



ATTENTION

After testing the detector module in the air sampling smoke detection system and transmitting the alarm close the test adapter; if not, an air flow fault occurs!



## 7 Commissioning



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 7.1), commissioning temperature, air pressure and height above sea level.

### Check of Settings

Before commissioning check the settings of TITANUS PRO·SENS® (chapter 5.3 "Settings"). Then, connect the device to the power supply.

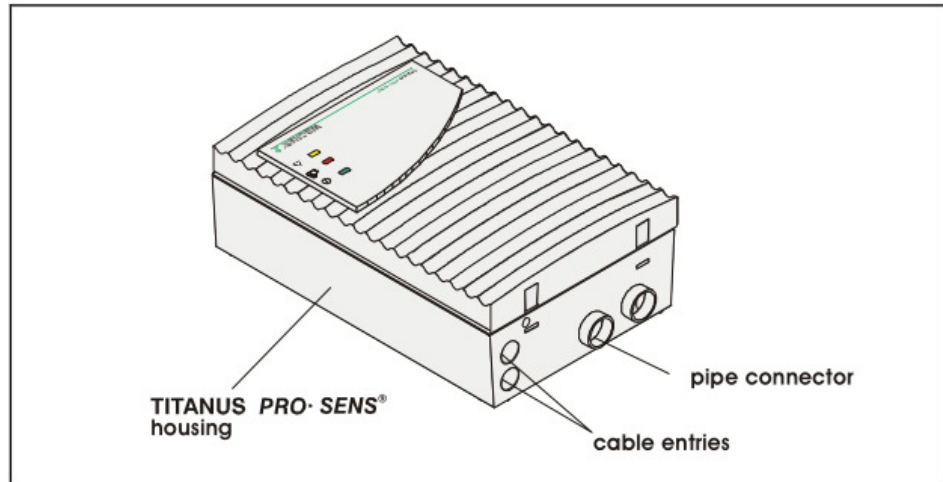


Fig. 7.1: Check for tightness

For the commissioning of TITANUS PRO·SENS® install the complete pipe system and connect it.

## 7.1 Air flow sensor adjustment



In order to adjust TITANUS PRO·SENS® correctly for the connected pipe system, the device must have been operating for at least 30 minutes.

### Adjustment types

- The air flow sensor adjustment can be independent of the current air pressure (refer to chapter 7.1.1 "Adjustment Independent of the Air Pressure"). For restrictions on this kind of adjustment refer to chapter 4.3 "Air Flow Monitoring".
- The adjustment can be made in dependence on the current air pressure (refer to chapter 7.1.2 "Adjustment Dependent on the Air Pressure"). Refer to the air pressure adjustment charts in the appendix.

In any case the adjustment type is to be written down in the commissioning protocol in order to judge the air flow sensor value correctly when the system is maintained.

### 7.1.1 Adjustment independent of the air pressure

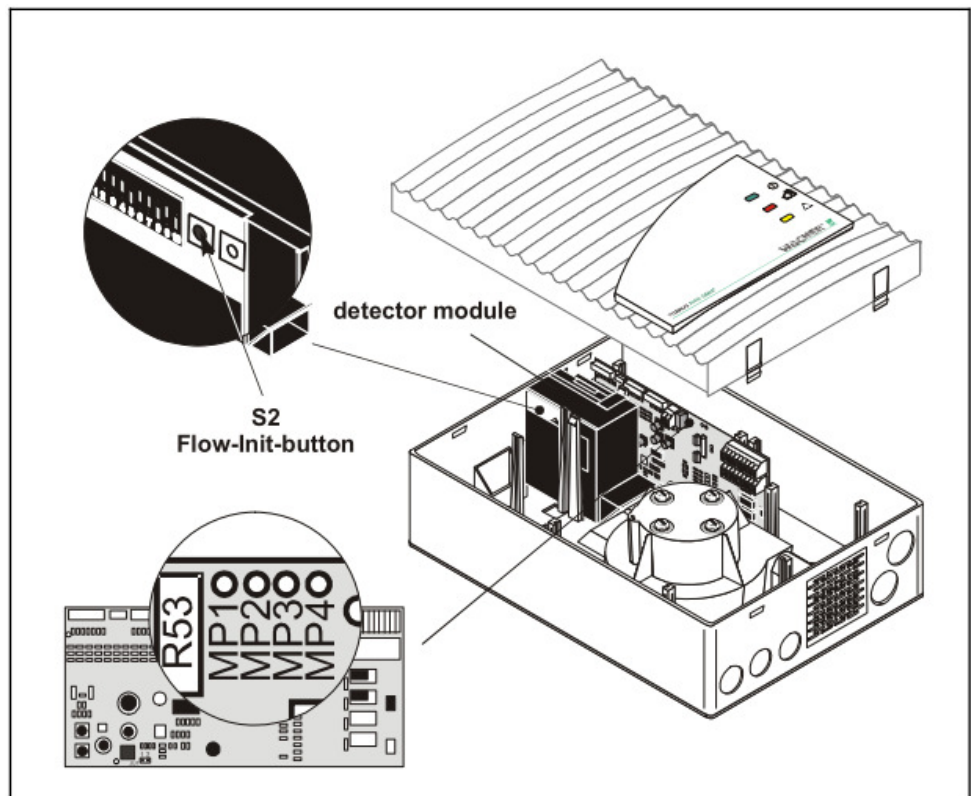


Fig. 7.2: Adjustment independent of the air pressure of the air flow sensor of TITANUS PRO·SENS®

1. Make sure the device has been in operation for at least 30 minutes.
2. Check the voltage at the measuring points MP1 (+) and MP4 (-). 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.
3. If this is not the case, set the trimming potentiometer R53 to this value by means of a small screwdriver.
4. Press the Flow-Init-button S2 on the detector module of TITANUS PRO·SENS® (refer to Fig. 7.).
5. After pressing button S2, close the housing of TITANUS PRO·SENS®.

The learning phase of TITANUS PRO·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.

### 7.1.2 Adjustment dependent on the air pressure

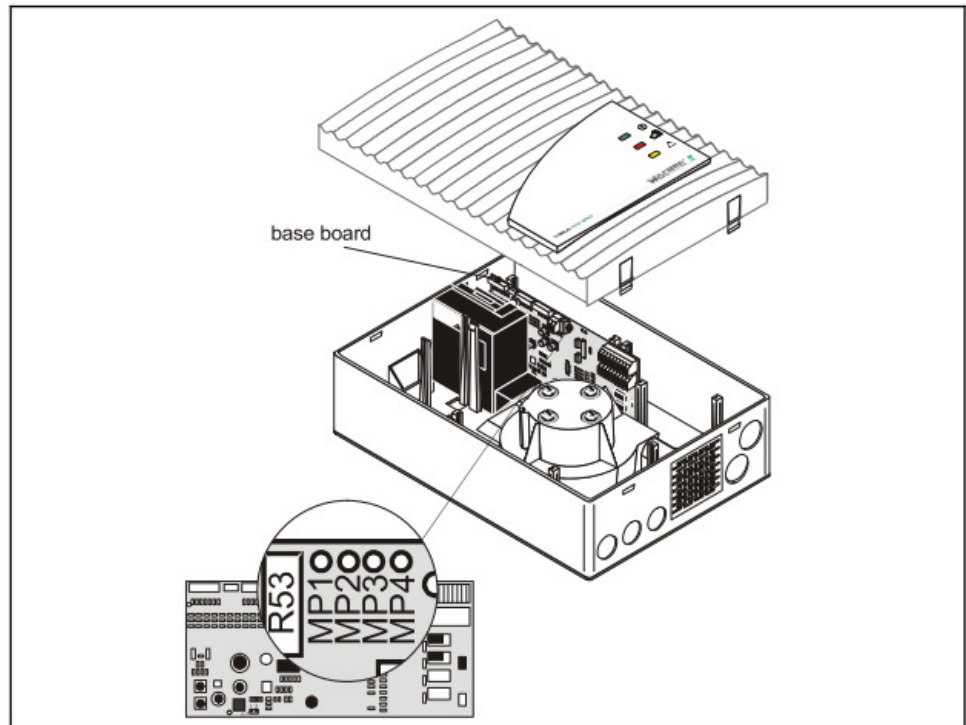


Fig. 7.3: Adjustment dependent on the air pressure of the air flow sensor of TITANUS PRO·SENS®

For the adjustment dependent on the air pressure of the air flow sensor a barometer<sup>34</sup> 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 MP1 (+), MP4 (-) (refer to Fig. 7.). 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.



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

6. With a small screwdriver set the trimming potentiometer R53 to the value established in the air pressure adjustment chart.

<sup>34</sup> Recommendation: digital precision pocket barometer GPB 1300, Greisinger Electronic GmbH, Germany

## 7.2 Detector module and alarm transmission

Trigger the alarm of the detector module and check the transmission to the central fire panel as follows:

1. Spray test aerosol either into the first air sampling point or into the test adapter of the pipe system of TITANUS PRO·SENS®.
2. Follow the steps in the table.

Check whether ...	If this is not the case ...
the air sampling smoke detection system displays an alarm.	<ol style="list-style-type: none"> <li>1. check whether the display board is connected.</li> <li>2. the air sampling system is damaged.</li> <li>3. exchange the detector module.</li> </ol>
the alarm signal is transmitted to the central fire panel and on the corresponding line.	<ol style="list-style-type: none"> <li>1. check the transmission cables.</li> </ol>



If the **LOGIC·SENS** switch S1-10 is set to "ON" (refer to chapter 5.3 "Settings"), it should be set to "OFF" for the alarm triggering test through test aerosol in order to accelerate the alarm processing.



Record all checked data in the inspection protocol.

### 7.3 Check air flow monitoring

**Pipe Fracture** Verify the detection of a pipe fracture:

1. Loosen the connection between the pipe and TITANUS PRO·SENS® or open the test adapter.
2. Verify whether the fault display of the air sampling smoke detection system is lit.
3. Check optionally the data of the air flow sensor using the diagnostic software DIAG 3 and a PC or laptop.
4. Register the result in the commissioning protocol.

**Blockage** Verify the detection of a blockage:

1. Close the necessary number of air sampling points by means of adhesive tape according to the chosen configuration of the air flow monitoring.
2. Check whether the fault display of the air sampling smoke detection system is lit.
3. Check optionally the data of the air flow sensor using the diagnostic software DIAG 3 and a PC or laptop.
4. Register the result in the commissioning protocol.



A pipe fracture or blockage is indicated by a flash code via the LED of the detector module.

- fracture: 3x flashing
- blockage: 2x flashing

The corresponding flash code is repeated every two seconds.

**Trouble Shooting** If faults in the air flow are not correctly detected by the device do the following:

Check whether ...

1. all air sampling points are free.
2. the pipe system has fractures or cracks.
3. all pipe connections are tight.
4. the ventilator is unblocked.
5. the correct aspiration-reducing film sheets have been used.

If no faults are detected the functionality of TITANUS PRO·SENS® or the air flow sensor is checked by means of the test pipe or through the diagnostic software (refer to chapter 7.5 "Operational Check TITANUS PRO·SENS®").

## 7.4 Check fault signal transmission



The following steps can only be effected after the air flow adjustment has been effected according to chapter 7.1 "Adjustment Air Flow Sensor".

1. Check the fault signal transmission.

Check the air flow monitoring (according to the following section) and verify whether the fault is still indicated at TITANUS PRO·SENS® and, if necessary, at the central fire panel.

## 7.5 Operational check of TITANUS PRO-SENS®

If it is not possible to adjust TITANUS PRO-SENS® check the functionality by means of the test pipe and a digital manometer or the diagnostic software. For this check TITANUS PRO-SENS® must have been in operation for at least 30 minutes.

### 7.5.1 Preparations for operational check

1. Remove the pipe system from TITANUS PRO-SENS®.

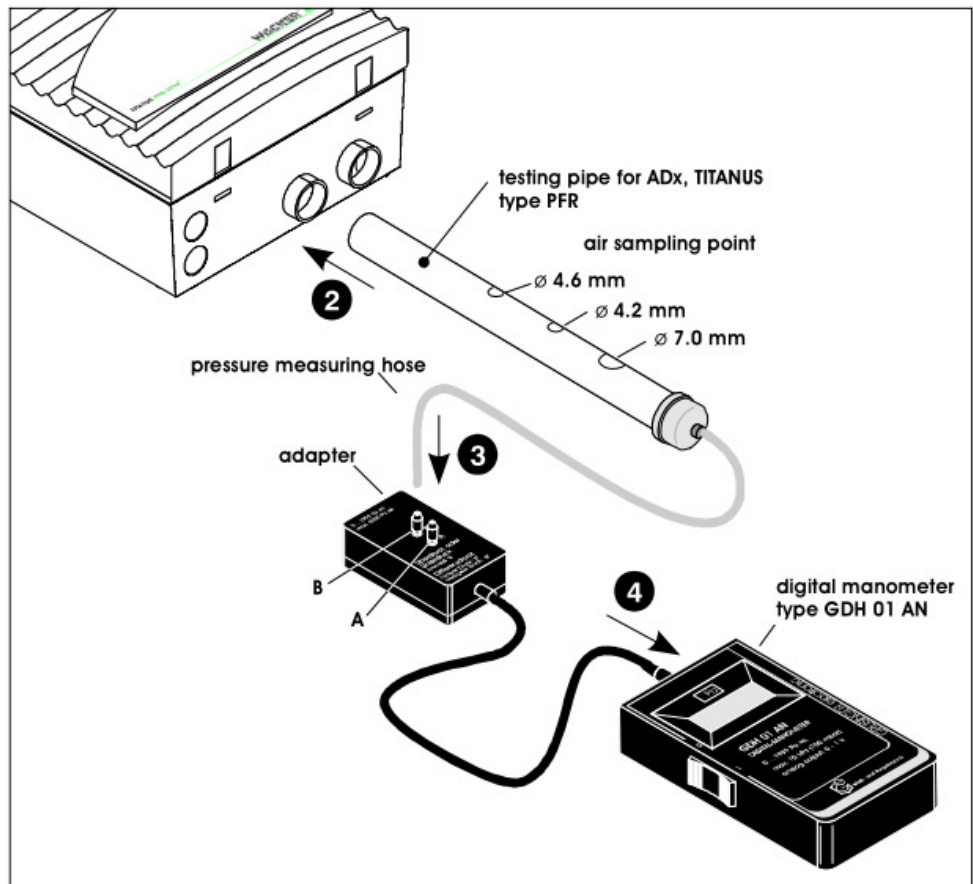


Fig. 7.4: Operational check of TITANUS PRO-SENS®

2. Connect the testing pipe.
3. Fasten the pressure measuring hose to adapter connection B.
4. Connect the 4-pole plug of the adapter to the digital manometer and switch it on.



Preparations for the operational check of TITANUS PRO-SENS® 2 must be carried out with steps 1 – 4 for both pipe systems.



### 7.5.2 Operational check

The operational check can be effected with or without a digital manometer. In the following the complete check is described. If during the operational check of TITANUS PRO·SENS® the values vary from those given in the following the device or its air flow sensor is damaged.

1. Make sure the device has been operating for at least 30 minutes.
2. Close all air sampling points of the test pipe by means of adhesive tape. After a short initiation period the depression generated in the device is to be approx. 250 up to 310 Pa for a set ventilator voltage of 6.9 V and 460 up to 530 Pa for 9 V.
3. Free the air sampling point at the test pipe again. After about 120 secs press the Init-button S2 on the detector module. The LED in operation flashes and the fault LED must go out (see INSTRUCTION).
4. Close the air sampling points of the test pipe with adhesive tape. After several seconds of “**blockage**”, the flash code of the LED on the detector module must flash.
5. Re-open all air sampling points of the test pipe. After a few seconds the flash code of the LED must go out.
6. Remove the test pipe. The LED flash code on the detector module must signal “**fracture**” for several seconds.
7. Re-connect the test pipe to the device. After a few seconds the LED flash code must go out.



A pipe fracture or blockage is indicated by a flash code via the LED of the detector module:

- fracture: 3x flashing
- blockage: 2x flashing

The corresponding flash code is repeated every two seconds.



The operational check for TITANUS PRO·SENS® 2 must be carried out with steps 1 – 7 for both pipe systems.

If no fault on the air sampling smoke detection system occurred during the operational check, the pipe system must be checked.

#### Connection check

Check that:

1. the pipe system is firmly connected to the pipe connection of TITANUS PRO·SENS®.
2. all pipe fittings are taped and the pipe system is air tight. For this purpose, first seal all air sampling points (eg with insulating tape). Then measure the air flow at the opening for the air return or with a test adapter (see chapter 2.3), which must be installed to the air sampling pipe directly in front of the device.

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



After adjusting the air flow sensors (chapter 7.1 "Air Flow Sensor Adjustment"), no further alterations on the pipe system must be made. If later alterations become necessary, the air flow sensor must again be adjusted.

For the operational check the diagnostic software DIAG 3 can be used as an option. The following steps are to be considered:

1. Install the diagnostic software on a laptop or PC<sup>35</sup>. Windows 95, 98, ME, 2000, NT and XP are suitable.
2. With the enclosed diagnostic cable TITANUS PRO-SENS® is connected to the PC via "Diag." on the base board.
3. Start the diagnostic software.
4. The current data of TITANUS PRO-SENS® is visualized on the screen of the PC.



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 7.1 "Adjustment of Air Flow Sensor".



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.

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<sup>35</sup> PC with serial interface

## 8 Maintenance

### 8.1 Visual Check

Check whether...

- the pipe system is easily accessible, undamaged and mounted tightly,
- the air sampling points of the pipe system are unblocked.
- the air sampling pipe and the connection cable are connected tightly.
- the device support is fastened properly – if installed.
- the air sampling smoke detection system is damaged (refer also to flash code table).

### 8.2 Flash Code Table

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

Flash Codes	
Number	Meaning
-/- (permanently lit)	hardware defect in the detector module
2 x flashing	air flow too small (blockage)
3 x flashing	air flow too large (fracture)
4 x flashing	stabilizing phase after turning on, etc. ventilator is turned off, etc. air flow sensor is being cleaned

### 8.3 Checking dector module and alarm transmission

Proceed according to chapter 7.2 "Detector Module and Alarm Transmission". In addition, check the detector module through visual check for external dirt and damage and, if necessary, exchange it.



A hardware defect of the detector module is displayed through the permanently lit detector module LED.

### 8.4 Checking the pipe system

In areas where dust particles or icing up are possible, check the pipe system and air sampling points for 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 installation on site.



Before blow-through, detach the pipe system from TITANUS PRO·SENS® in order to avoid damage to the air flow sensor.

## 8.5 Exchange of detector module

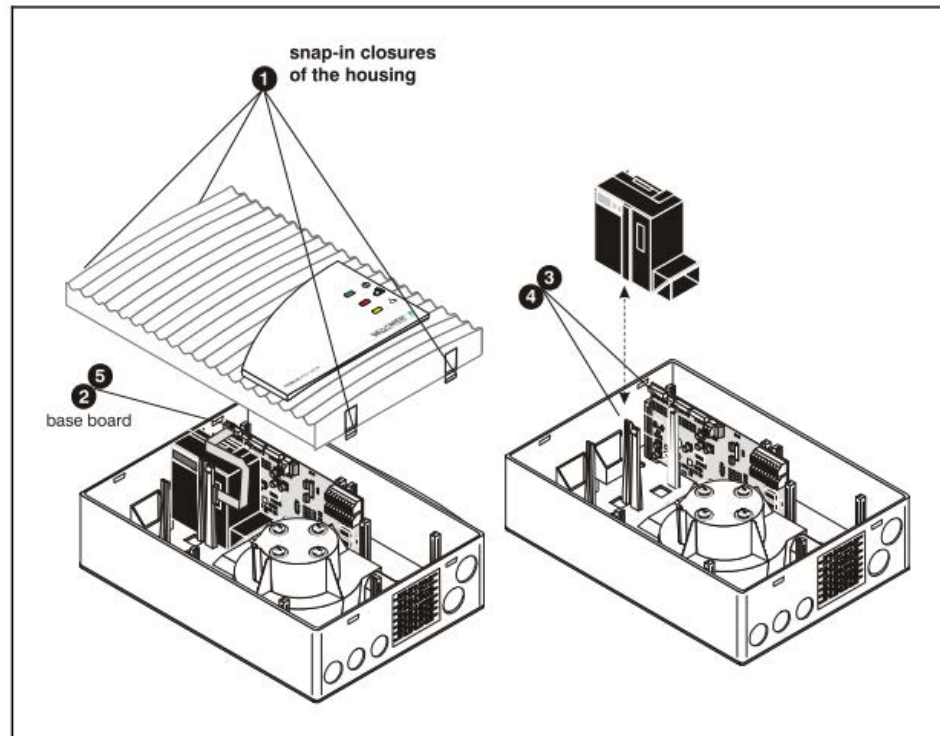


Fig. 8.1: Exchange of the detector module

- ❶ Carry out the following steps **only** if the device is powered down.
- ❷ Carefully unlock the snap-in closures of the housing using a screwdriver by simultaneously pressing in both clips located at one side of the housing lid. Then, lift the lid carefully. Pull the display board cable off and remove the lid.
- ❸ Pull the connection cable of the detector module off the base board.
- ❹ Carefully spread a bit both support clamps of the detector module and remove the detector module.
- ❺ Spread both support clamps again, and place the new detector module in between them so that it audibly snaps in. Afterwards press both support clamps together
- ❻ Reconnect the detector module via the ribbon cable to the base board. Connection: X1 (HEAD 1)
- ❼ Connect the display board to the base board X4 (DISPLAY).
- ❽ Before initialisation, operating power must be re-established.
- ❽ Press the Flow-Init button S2 at the detector module in order to initialize the pipe system.
- ❾ Close the housing lid.



A calibration of the detector module is not required.

## 8.6 Changing the air filter LF-AD -x

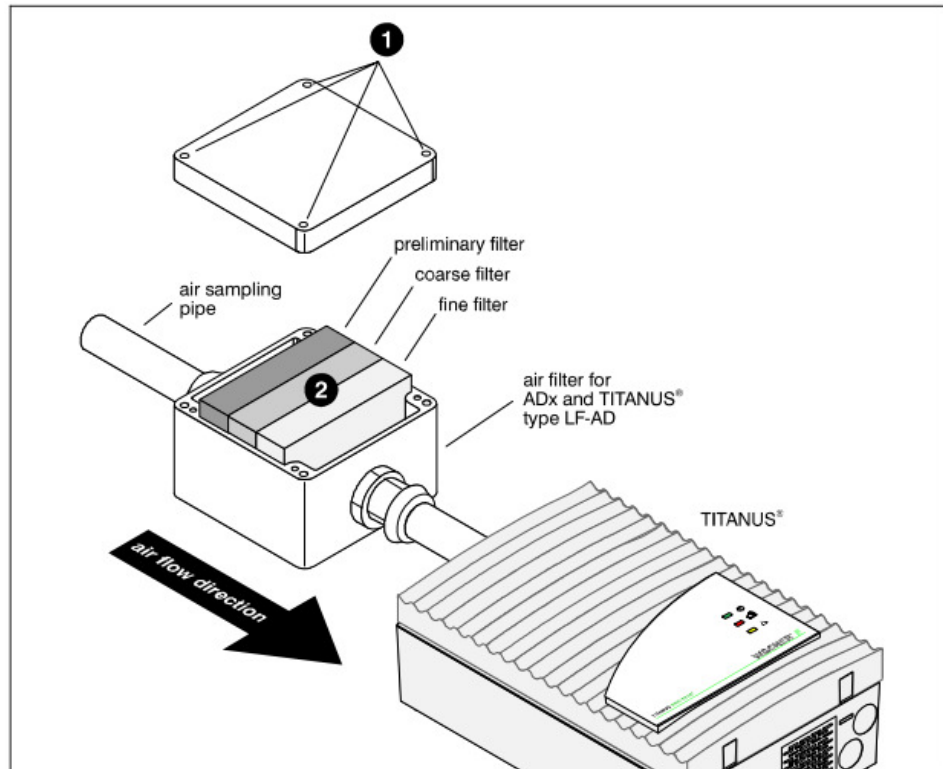


Fig. 8.2: change the filter inserts

To change the filter inserts, carry out the following steps (see fig. 8.2):

- ❶ Loosen the four screws and remove the housing lid.
- ❷ Remove the filter inserts and check 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
- ❸ Carefully clean the inside of the housing from dust deposits. Now replace the cleaned or new filter inserts in the correct sequence. This can be seen on the sign on the housing floor.
- ❹ Replace the housing lid and screw it shut.



TIP

In environments with a high level of fine-grade dust, three optional fine dust filters can be used in addition.



Opening the housing lid of the air filter LF-AD causes an air flow fault in TITANUS PRO·SENS®.

## 8.7 Changing special air filter SF-400/650

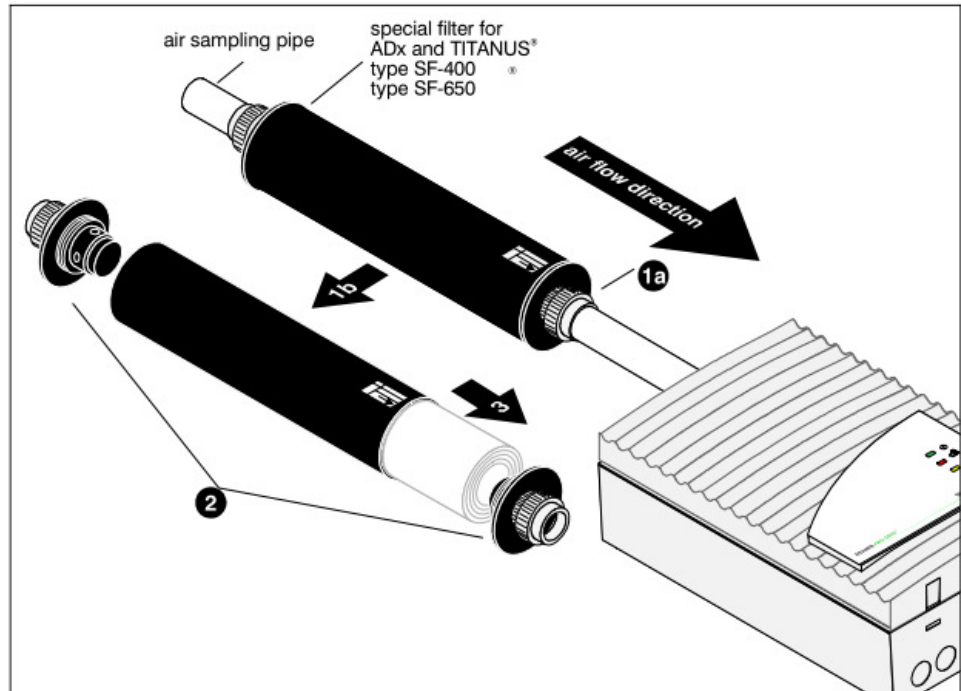


Fig. 8.3: Exchange of filter element

Follow these steps to change the filter elements: (see Fig 8.3):

- 1 Loosen the PVC screw joints on the special filter **1a** and remove it **1b**.
- 2 Remove the two screw-in plugs on the filter housing.
- 3 Remove the filter element. Place a new filter element in the housing.
- 4 Screw both screw-in plugs into the housing.
- 5 Re-insert the special filter back into the pipe system and fix it firmly in place with PVC screw joints.



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



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

## 8.8 Check of the air flow sensor adjustment

Check the air flow adjustment using the diagnostic software.

**Function Principle** During initialization of the connected pipe system the device stores first via the integrated air flow sensor technology the measured current value of the air flow as rated value. This rated value serves as reference value for further evaluation of a possible air flow fault. According to the selected air flow threshold (refer to chapter 4.3 section Adaptation of the Air Flow Sensitivity) the current air flow value is allowed to vary more or less from the rated value during operation without triggering an air flow fault. Only if the selected air flow threshold has been exceeded, the air flow fault is also indicated by the device and can therefore 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  $\pm 100\%$  from the set rated value. Check the variation of the current value from the rated value. If a variation of  $> \pm 70\%$  exists, as a preventive measure you should check the pipe system (refer to section "Clearance Air Flow Fault", next page).



The reason for a variation of the current air flow value from the rated value stored during initialization of the pipe system can either be a fault of the pipe system (fracture or blockage) or air pressure or temperature variations of the environment.

### Dependent on air pressure

To guarantee a faultless long-term operation of the device the air flow sensor adjustment should be dependent on the air pressure. Only this type of adjustment allows small air pressure variations to be within the monitoring window and thus within the permissible tolerance range.



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

### Independent of air pressure

If the sensor adjustment has been effected independently of the air pressure, air pressure variations can lead to undesired air flow faults. This type of air flow sensor adjustment is only allowed if it is guaranteed that there are no variations of the air pressure in the near environment.



If it is not guaranteed that no variations of the air pressure occur in the near environment, it is absolutely necessary to adjust the air flow sensor in dependence on the air pressure.



**Clearance  
air flow fault**

If the air flow sensor adjustment has been effected in dependence 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 at the device), another fault other than those caused by air pressure or temperature variations is present.

1. In this case check the pipe system for tightness and blockage (refer to chapter 7.3, section "Trouble Shooting").



If the pipe network has been modified during the trouble shooting, the original configuration of the pipe network is to be restored after the completed trouble-shooting and the air flow is to re-adjust.

2. If this check leads to no negative results, check the air flow monitoring by connecting the test pipe and carrying out the operational check described in chapter 7.5.2.



If the air flow monitoring is damaged only authorized personnel is allowed to exchange the detector module!

If the test results do not vary from the given values, it is obvious that the air flow monitoring has no defect.

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



Register the adjustment type (dependent on the air pressure or not) and, if required, the values of the air pressure, the height above sea level and the set voltage at MP1 / MP4 in the commissioning protocol.

4. Keep an eye on the current air flow value during maintenance or check it during the next inspection at the latest.



The diagnostic software allows filing any memorized and current diagnostic data and the settings of the DIL switch. Rename this file to be able to compare these data with the newly read-out values during the next check. For more information about the diagnosis software DIAG 3 refer to separated documentation.

5. If there is a similar variation from the rated value like before, interfering environmental influences are the cause for this variation. If these negative influences on the air flow monitoring cannot be stopped, the next less sensitive threshold is to be set.

## 8.9 Check air flow monitoring

A pipe fracture or pipe blockage shows for each detector module via a flash code LED on the base board. Proceed according to chapter 7.3 "Air Flow Monitoring".

## 8.10 Check fault signal transmission

A fault is shown on TITANUS PRO·SENS® and if necessary on the central fire panel.

Proceed according to chapter 7.4 "Fault Signal Transmission".

## 8.11 Maintenance intervals

Maintenance includes regular inspection. The air sampling smoke detection systems are checked during commissioning and then every three months (quarterly). Every fourth inspection includes additional checks which lead to the following distinction:

- quarterly check                      **inspection**
- annual check                         maintenance + 4<sup>th</sup> annual inspection

Type of Check	Measure	Further Information in Chapter
inspection	visual check	8.1
	check detector module and alarm transmission	8.3
	check pipe system	8.4
	check air flow sensor adjustment	8.8
	check fault signal transmission	7.4
maintenance + 4 <sup>th</sup> annual inspection	visual check	8.1
	check detector module and alarm transmission	8.3
	check pipe system	8.4
	check air flow sensor adjustment	8.8
	check fault signal transmission	7.4
	check air flow monitoring	7.3

## **9. Appendix**

**Air Pressure Adjustment Tables**

**Projection Tables**

**Commissioning Protocol**

**Air Pressure Correction Table**

**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
<b>Titanus PS/PS 2 [V]</b>	<b>0.50</b>	<b>0.60</b>	<b>0.70</b>	<b>0.80</b>	<b>0.90</b>	<b>1.00</b>	<b>1.10</b>	<b>1.20</b>	<b>1.30</b>	<b>1.40</b>	<b>1.50</b>	<b>1.60</b>	<b>1.70</b>	<b>1.80</b>	<b>1.90</b>

Height [m above sea level]	Air Pressure [hPa] at a Height of														
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
<b>Titanus PS/PS 2 [V]</b>	<b>0.50</b>	<b>0.60</b>	<b>0.70</b>	<b>0.80</b>	<b>0.90</b>	<b>1.00</b>	<b>1.10</b>	<b>1.20</b>	<b>1.30</b>	<b>1.40</b>	<b>1.50</b>	<b>1.60</b>	<b>1.70</b>	<b>1.80</b>	<b>1.90</b>

**Air Pressure Correction Table**

**For 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
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

Height [m above sea level]	Air Pressure [hPa] at a height of														
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
<b>Titanus PS/PS 2 [V]</b>	<b>0.58</b>	<b>0.67</b>	<b>0.76</b>	<b>0.85</b>	<b>0.94</b>	<b>1.03</b>	<b>1.12</b>	<b>1.21</b>	<b>1.30</b>	<b>1.39</b>	<b>1.48</b>	<b>1.57</b>	<b>1.66</b>	<b>1.75</b>	<b>1.84</b>

## Air Pressure Correction Table

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

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
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



Height [m above sea level]	Air Pressure [hPa] at a Height of														
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
<b>Titanus PS/PS 2 [V]</b>	<b>0.54</b>	<b>0.63</b>	<b>0.73</b>	<b>0.82</b>	<b>0.92</b>	<b>1.01</b>	<b>1.11</b>	<b>1.20</b>	<b>1.30</b>	<b>1.40</b>	<b>1.49</b>	<b>1.59</b>	<b>1.68</b>	<b>1.78</b>	<b>1.87</b>

### Projection Tables

Projection without filter

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

M	S	Number of points																					
		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	A
	0.03 HA	A	A	A	A	A	A	A	A	A	A	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	A	B	B	B	B	B	B	B	B	B	B
	0.12 HA	A	A	A	A	A	A	A	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	0.5 HA	A	A	A	B	B	B	B	C	C	C	C	C	C	C								
	1 HA	A	B	B	C	C	C	C															

without pipe accessories

Pipe shape	U <sub>Fan</sub> [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	150			
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	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	180	180			
	≥9	200	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

permitted total pipe length [m]

with detector box and/or VSK

Pipe shape	U <sub>Fan</sub> [V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	permitted total pipe length [m]	
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	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	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	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	150					
	≥9	180	180	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 <sub>Fan</sub> [V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	permitted total pipe length [m]	
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	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	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	140							
	≥9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160						

with detonation prevention device <sup>2)</sup>

Pipe shape	U <sub>Fan</sub> [V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	permitted total pipe length [m]	
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	60															
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	100															

<sup>1)</sup> available for following pipe accessories:

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

<sup>2)</sup> 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		
OXY-SENS®	and/or	VSK	and/or	DM-MB-TM-XX	and/or	KA-DN 25

Projection with air filter LF-AD

M = Module

S = Sensitivity (% Lt/m)

HA = Fire alarm

VA = Action alarm

M	S	Number of points																						
		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	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	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	0.5 HA	A	A	B	B	B	B	C	C	C	C	C	C	C										
	1 HA	A	B	B	C	C	C																	

without additional pipe accessories

Pipe shape	U <sub>Fan</sub> [V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	permitted total pipe length [m]	
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	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	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	180				
Double U	6.5	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	170					
	≥9	190	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 <sub>Fan</sub> [V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	permitted total pipe length [m]	
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	140	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	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	150					
	≥9	180	180	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 <sub>Fan</sub> [V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	permitted total pipe length [m]	
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	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	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	160							

with detonation prevention device <sup>2)</sup>

Pipe shape	U <sub>Fan</sub> [V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	permitted total pipe length [m]	
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	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	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	100															

<sup>1)</sup> available for following pipe accessories:

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

<sup>2)</sup> 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	
OXY·SENS®	and/or	VSK	and/or	DM-MB-TM-XX	and/or KA-DN 25

Projection with air filter LF-AD-1

M = Module

S = Sensitivity (% Lt/m)

HA = Fire alarm

VA = Action alarm

M	S	Number of points																						
		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	B	
	0.06 HA	A	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	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	0.5 HA	A	A	B	B	B	B	C	C	C	C	C	C											
	1 HA	A	B	B	C	C	C																	

without additional pipe accessories

Pipe shape	U <sub>Fan</sub> [V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	permitted total pipe length [m]			
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	100	90	90													
U	6.5	120	120	120	120	120	120	120	120	120	120	120	120													permitted total pipe length [m]	
	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	140							
M	6.5	160	160	160	160	160	160	160	160	160	160	160	160														permitted total pipe length [m]
	6.9	160	160	160	160	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	180	180	180				
Double U	6.5	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160						permitted total pipe length [m]			
	6.9	170	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	190				



with detector box and/or VSK

Pipe shape	U <sub>Fan</sub> [V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	permitted total pipe length [m]	
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	140	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	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	150					
	≥9	180	180	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 <sub>Fan</sub> [V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	permitted total pipe length [m]	
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	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	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	160							

with detonation prevention device<sup>2)</sup>

Pipe shape	U <sub>Fan</sub> [V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	permitted total pipe length [m]	
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	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	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	100															

<sup>1)</sup> available for following pipe accessories:

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

<sup>2)</sup> 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	
OXY·SENS®	and/or	VSK	and/or	DM-MB-TM-XX	and/or KA-DN 25

Projection with air filter LF-AD-2

M = Module

S = Sensitivity (% Lt/m)

HA = Fire alarm

VA = Action alarm

M	S	Number of points																						
		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	A	A	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	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	0.5 HA	A	A	B	B	B	C	C	C	C	C													
	1 HA	A	B	C	C	C																		

**without additional pipe accessories**

Pipe shape	U <sub>Fan</sub> [V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	permitted total pipe length [m]	
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	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	160								
	≥9	180	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	170					
	≥9	190	190	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	$U_{Fan}[V]_r$	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	permitted total pipe length [m]	
I	6.5	70	70	70	70	70	70	70																	
	6.9	70	70	70	70	70	70	70	70																
	$\geq 9$	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	120												
	6.9	120	120	120	120	120	120	120	120	120	120	120	120	120	120										
	$\geq 9$	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									
	$\geq 9$	180	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	150					
	$\geq 9$	180	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	permitted total pipe length [m]	
I	6.5	60	60	60	60	60	60																		
	6.9	60	60	60	60	60	60	60																	
	$\geq 9$	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												
	$\geq 9$	110	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									
	$\geq 9$	160	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								
	$\geq 9$	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160							

with detonation prevention device <sup>2)</sup>

Pipe shape	U <sub>Fan</sub> [V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	permitted total pipe length [m]	
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	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	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	100															

<sup>1)</sup> available for following pipe accessories:

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

<sup>2)</sup> 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		
OXY·SENS®	and/or	VSK	and/or	DM-MB-TM-XX	and/or	KA-DN 25

Projection with air filter SF-400 / SF-650

M = Module

S = Sensitivity (% Lt/m)

HA = Fire alarm

VA = Action alarm

M	S	Number of points																					
		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	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	0.5 HA	C																					
	1 HA																						

without additional pipe accessories

Pipe shape	U <sub>Fan</sub> [V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	permitted total pipe length [m]	
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	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	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	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	165					
	≥9	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	

with detector box

Pipe shape	U <sub>Fan</sub> [V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	permitted total pipe length [m]	
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	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	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	150					
	≥9	180	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 <sub>Fan</sub> [V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	permitted total pipe length [m]	
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	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	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	160							

with detonation prevention device <sup>2)</sup>

Pipe shape	U <sub>Fan</sub> [V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32	permitted total pipe length [m]	
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	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	100															

<sup>1)</sup> available for following pipe accessories:

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

<sup>2)</sup> available for following pipe accessories:

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



Commissioning protocol for TITANUS PRO·SENS®

device number				
serial number				
	measuring and adjustment values	measuring and adjustment values	measuring and adjustment values	
<b>Commissioning</b>				
visual check	(✓/ -)			
depression	[Pa]			
sensitivity	[%/m]			
alarm delay	[sec]			
fault delay	[min]			
activating threshold	(small/medium/ large/very large)			
fault latched	(yes/no)			
LOGIC · SENS	(yes/no)			
adjustment dependent on the air pressure	(yes/no)			
adjustment independent of the air pressure	(yes/no)			
height	[m above sea level]			
air pressure	[hPa]			
temperature	[°C]			
<b>Fault Blockage</b>				
LED flashes	(✓/ -)			
relay drops out after delay time	(✓/ -)			
signal transmission to central fire panel	(✓/ -)			
cause of the fault eliminated, LED off	(✓/ -)			
relay picks up when thresh. is not reached	(✓/ -)			
cause of fault eliminated, LED memorized	(✓/ -)			
relay stays dropped out	(✓/ -)			
<b>Fault Fracture</b>				
LED flashes	(✓/ -)			
relay drops out after delay time	(✓/ -)			
signal transmission to central fire panel	(✓/ -)			
cause of the fault eliminated, LED off	(✓/ -)			
relay picks up when thresh. is not reached	(✓/ -)			
cause of fault eliminated, LED memorized	(✓/ -)			
relay stays dropped out	(✓/ -)			
<b>Alarm</b>				
LED flashes	(✓/ -)			
relay drops out after delay time	(✓/ -)			
signal transmission to central fire panel	(✓/ -)			
LED memorized	(✓/ -)			
relay memorized	(✓/ -)			

issuer: .....

key:	✓ O.K. - not O.K.
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## 10. Glossary

Technical Term	Definition
<b>A</b>	
aerosol also: <i>smoke aerosol</i>	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; according to the requirements of the air flow monitoring →single-hole monitoring and the detection of a fracture at the end of the pipe system can be realized.
air sampling smoke detection system	Active system of which the underpressure to take air samples is produced by a ventilator fan belonging to 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 current	An increased current in the →alarm state (→quiescent current).
alarm state	The state of a fire detection installation or a part of it as a reaction to an existing danger.
automatic smoke detector	Automatic detectors are detectors which detect and analyze physical parameters which serve to create danger-warning signals. Automatic smoke detectors are e.g. → point-type detectors and →air sampling smoke detection systems.
<b>C</b>	
central fire panel	Central part of a fire detection installation which supplies the detectors with power, receives signals to display them optically and acoustically and, if required, transmits them and which checks the installation for faults.
CMOS	<b>C</b> omplementary <b>M</b> etal <b>O</b> xide <b>S</b> emiconductor, complementary MOS technology
collective alarm	A non-differentiated, i.e. non-localizable →alarm, which is indicated at a superior system.
collective detection system	Conventional detection line technology for which all detectors connected to the same detection line have the same collective address (common indication and operation without identification of the individual detector).
collective fault	A non-differentiated, i.e. non-localizable →fault signal which is indicated at a superior system.
<b>D</b>	
detection line	Monitored transmission line (→primary line) through which the smoke detectors are connected to the →central fire panel.
detection reliability	The detection reliability is the measure of reliability

	with which phenomena are detected and indicated for whose perception a detection system is used.
detector group	Collection of smoke detectors in a →detection line for which an own display in the →central fire panel is installed.
detector module	modular →scattered light smoke detector optimized for use in air sampling smoke detection systems and equipped with a special air feed, a Flow-Init button for initialization of the integrated →air flow sensor, a diagnostic LED with flash code for indicating faults and a →DIL-switch
detector module sensitivity <i>also: sensitivity</i>	The detector module sensitivity is a sensitivity adjustable between the levels 1 to 4 and makes up the generic term for →response sensitivity.
DIL switch	<b>d</b> ual in line; 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 → <b>LOGIC · SENS</b> .
Drift	Method of compensating detector soiling which could cause the quiescent signal to be changed by moving the zero point.
<b>E</b>	
electromagnetic compatibility (EMC)	The electromagnetic compatibility is the ability of an electrical or electronical system to operate correctly in its electromagnetic environment and to have no unallowed impact 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.
<b>F</b>	
fault signal	Signal indicating a deviation from the desired value in the →smoke detection installation.
fire load	The fire load corresponds to the quantity of heat of all combustible materials of a fire section referred to its area.
fire section	Isolated section in a building which avoids or slows down the spreading of a fire to a neighboring section through special constructions.
fire-resistant collar	Constructions that avoid a flame/smoke spread in cable ducts as well as in chases and break-throughs for wiring through walls and ceilings.
<b>H</b>	
head control	The head control is an electronic board in the detector module and contains the control electronics for the detector module. It provides the smoke signal for further processing.
<b>I</b>	
interactive detector	Detector series with highest detection reliability of the evaluation and decision logics with interactive signal processing based on programmable algorithms. The detectors are parameterizable; they can be programmed through a software in an optimum way for the conditions of the mounting location.
interference	Interferences in smoke detection installations are the totality of external parameters which can impair the proper functioning of a smoke detection installation.

<b>L</b>	
line module	By means of line modules (AnalogPLUS® or interactive) TITANUS PRO·SENS® can be connected to the AlgoRex®-smoke detection system.
LOGIC·SENS	Through the LOGIC·SENS switch the intelligent signal processing can be activated. It allows an analysis of the measured smoke level by comparing the smoke data with known parameters thus enabling to detect 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 the operation reliability.
<b>M</b>	
monitoring area	Area which is monitored by an automatic smoke detector.
monitoring window	The normal air flow is within an adjustment range between a defined upper and lower value. This range is the monitoring window.
<b>N</b>	
nominal gap width	Maximum allowed gap in the housing of the detonation prevention device without an ignition spark being flashed over from the device to the potentially explosive area.
<b>P</b>	
primary line	Primary lines are transmission lines permanently and automatically checked for short circuit and interruption. They serve for the transmission of signals of important functions of →smoke detection installations.
<b>Q</b>	
quiescent current	Current on the →detection line in its normal operational state, →alarm current
<b>R</b>	
response sensitivity	The response sensitivity describes the sensitivity at which an alarm is activated (→detector module sensitivity).
<b>S</b>	
scattered light smoke detectors	Scattered light smoke detectors are optical smoke detectors. They use the phenomenon of light scatter through smoke particles which causes the signal to change 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	Smoke detection systems are risk management systems which serve persons to make a direct emergency call in case of a fire and/or detect and indicate a fire in an early stage.
smoke detector	Smoke detectors react to the combustible particles and/or →aerosols (floating particles) in the air.
<b>T</b>	
temperature compensation	The air flow in the pipe system is not falsified by temperature variations.

two-detector dependency	System to verify alarm states. The fire alarm is activated after two detectors of a →detector group have been actuated. When the first detector has been actuated an internal alarm or a control function can be activated.
two-group dependency	System to verify alarm states. The fire alarm is activated after one detector each of two related →detector groups has been actuated. When the first detector has been actuated an internal alarm or a control function can be activated.
<b>V</b>	
value concentration	The value concentration is an important factor for the evaluation of the risk of fire. It is determined by the values to be protected. It is also to be considered if the values exposed to the risk of fire are recoverable which will be nearly impossible for cultural assets.



**UNCONTROLLED DOCUMENT**

*NOTE: Due to AMPAC's commitment to continuous improvement specifications may change without notice.  
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