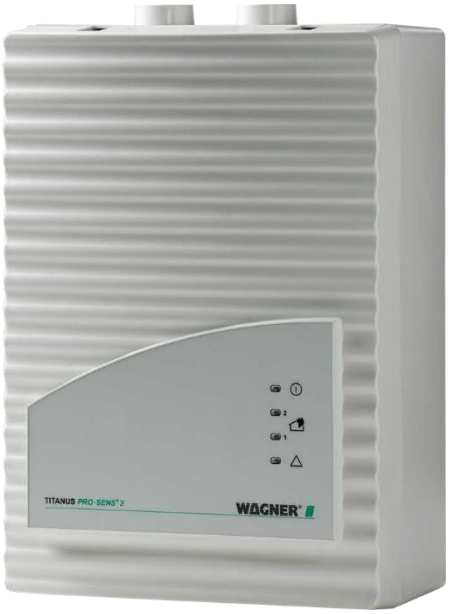
Ampac

Fire detection and evacuation solutions that save lives.



Aspirating smoke detector TITANUS PRO·SENS®

Technical Manual

MAN3184

A Halma company

Contents

1 General information

1.1 Introduction

This manual is intended for installers of fire alarm systems. It includes primarily engineers, service technicians, fitters etc. that have expertise in the field of fire alarm technology, but might be working with this device for the first time. WAGNER Group GmbH hereinafter referred to as WAGNER, accepts no liability for damages and faults which are caused through non-compliance with the contents of this manual.

This manual applies for aspirating smoke detector TITANUS PRO·SENS® and TITANUS PRO·SENS® 2, which may only be used for early fire and very early fire detection. As the aspirating smoke detectors are devices from a series, the TITANUS PRO·SENS® is described. Device-specific versions of the TITANUS PRO·SENS® 2 are pointed out separately.

1.2 Safety notices

The following pictorial symbols designate points in this manual which require special attention to be paid in order to avoid damage, and to assure smooth and problem-free operation of equipment.

⚠ ATTENTION

This symbol warns of practices.
Non-observance could result in damage to property.

NOTICE

This symbol warns of practices.
Non-observance could result in operational disruptions.

TIP

Observing the information provided with this pictogram may result in operational improvements.

1.3 Warranty

This manual may be subject to technical changes without prior notice and makes no claim to completeness.

The our “Delivery and installation conditions” apply as a matter of principle. Guarantee and liability claims in the case of personal injuries and damage to property cannot be asserted if they are based on one or more of the following causes:

- Inadequate compliance with instructions regarding project planning, installation of the aspirating smoke detector, installation of the pipe system, initial operation and maintenance
- Improper use of the aspirating smoke detector
- Insufficient monitoring of wear parts
- Improperly executed repairs
- Unauthorised constructional alterations to the aspirating smoke detector
- Force majeure.

1.4 Copyright

1.5 Packaging

The individual aspirating smoke detectors are packed in accordance with the transport conditions to be expected. 100% environmentally friendly materials were used for the packaging.

The packaging should protect the aspirating smoke detector from damage until the installation. For this reason, the packaging is to be removed only shortly before installation.

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

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

NOTICE
Packaging materials are valuable raw materials and can be re-used in many cases or treated and recycled. Incorrect disposal of the packaging materials may pose risks to the environment.

1.6 Environmental protection

If no return or disposal agreement was made, dismantled components must be recycled as follows:

- Take metal parts for scrapping.
- Take plastic parts to be recycled.
- Sort the remaining components by material quality and dispose of them.
- Return batteries to municipal collection points or send them back to WAGNER Group GmbH.

1.7 Instructions for the operating company

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

Any alterations to the facility being protected must be coordinated with the installer to ensure the system remains fully functional.

2 Product description

2.1 Characteristics

TITANUS PRO·SENS® is a tried-and-tested WAGNER aspirating smoke detector. In addition to monitoring rooms and equipment, the TITANUS PRO·SENS® can be used to monitor air conditioning units or ducts.

Sensitivity

The device has a response sensitivity of 0.5%/m light obscuration, 0.1%/m light obscuration or 0.015%/m light obscuration. Further sensitivity levels can be progressively adjusted depending on the application area. A wide detection range across all standard types of blaze is achieved thanks to the new High Power Light Source technology.

It is possible to double the monitoring area if 2 detector modules are used in the TITANUS PRO·SENS®.

LOGIC·SENS

The intelligent signal processor LOGIC·SENS distinguishes between deception variable and fire event to prevent false alarms.

PIPE·GUARD

In the same way as point-type smoke detectors, which are electronically monitored for cable breaks and short-circuiting, highly sensitive and operationally reliable airflow monitoring is required for aspirating smoke detectors. The unique airflow sensor system used in all WAGNER aspirating smoke detectors reliably detects faults such as pipe break or the blockage of aspiration apertures.

The low airflow level can also be equipped with a dynamic airflow sensor system in order to react to slight and rapid changes in the airflow.

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

Aspiration apertures

The pipe system aspiration apertures require a specifically defined drill hole diameter, depending on the project planning. In order to achieve these precise aspiration apertures, WAGNER Group GmbH has developed aspiration reducing film sheets with sleeves and clips, which not only allow convenient installation, but also prevent "whistling" background noises. A further advantage is the quick and simple checking and detection of the aspiration aperture diameter.

Point-type detector project planning

The aspiration apertures of the system are equivalent to point-type smoke detectors. The monitoring areas can therefore be planned in accordance with the currently valid national directives.

Diagnostics

A diagnostic software system is available for maintenance and servicing. This enables quick and convenient fault identification. Current and saved device states are transferred to the service PC via a cable, where they can then be read.

Selection of fan voltage

The fan voltage can be adjusted according to project planning by changing the plugging of jumpers.

On TITANUS PRO·SENS®, the fan voltage can be adjusted between 6.9 V and 9 V using the jumper on the basic board.

On TITANUS PRO·SENS®-SL, the voltage can be adjusted using the fan control circuit boards FC-2 and FC-3.

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

2.2 Areas of application

The TITANUS PRO·SENS® is an aspirating smoke detector used for early fire and very early fire detection in rooms and facilities.

Principle

Air samples are taken from the monitored area using a pipe system with defined aspiration apertures and supplied to the detector module. This is particularly suitable in areas where point detectors cannot be used or where their use is limited.

This especially applies to areas…

- …with high fire risks.
- …that require high detection sensitivity.
- …that are difficult to access and where point detectors are difficult to install or maintain.
- …that are air-conditioned.
- …whose height is greater than the permissible height for point detectors.
- …in which point detectors are not desired due to aesthetic reasons.
- …influenced by electromagnetic fields.
- …which are subjected to high or low temperatures.
- …where air contamination can be expected and filter elements are therefore required.
- …that must be protected against vandalism.

Room monitoring

The TITANUS PRO·SENS® is suitable e.g. for the monitoring of rooms with, e.g.:

- Raised floors, suspended ceilings
- Tunnels, channels, difficult-to-reach hollow spaces
- Warehouses, high-bay warehouses, lift shafts
- Museums, cultural facilities
- Deep freeze storages.

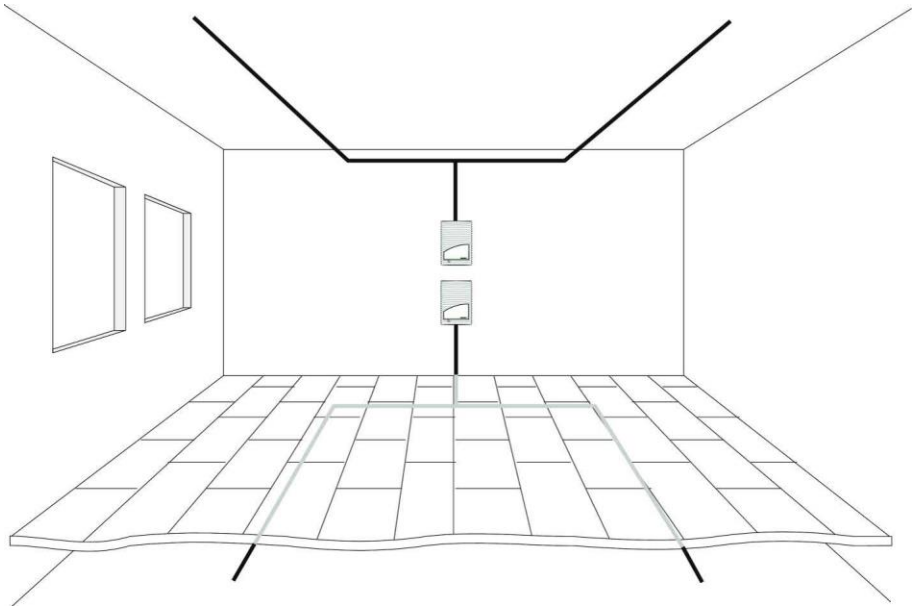


Figure 1: Principle of room monitoring

Room monitoring with air conditioning

Room monitoring is achieved:

- In rooms with air conditioning for server rooms etc.
- On ventilation ducts
- Over raised floors, suspended ceilings
- In IT rooms, e-distributor rooms, transformer cells
- On air conditioning units or
- On air conditioning ducts in the bypass.

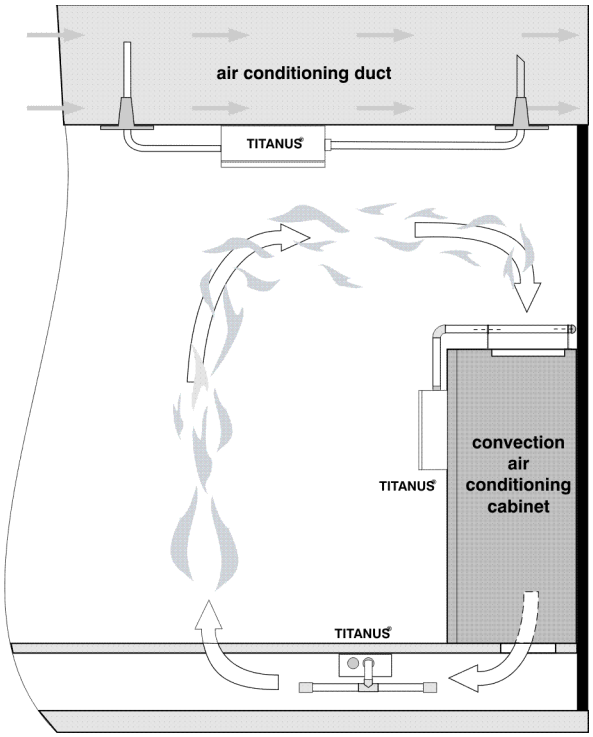


Figure 2: Monitoring options for a circulating air conditioning unit or duct (principle illustration)

System monitoring

The TITANUS PRO·SENS® is suitable e.g. for the monitoring of un-ventilated and forced-ventilated units/cabinets, for example:

- Distributor cabinets, control cabinets
- Telephone exchange installations
- Measuring and control systems.

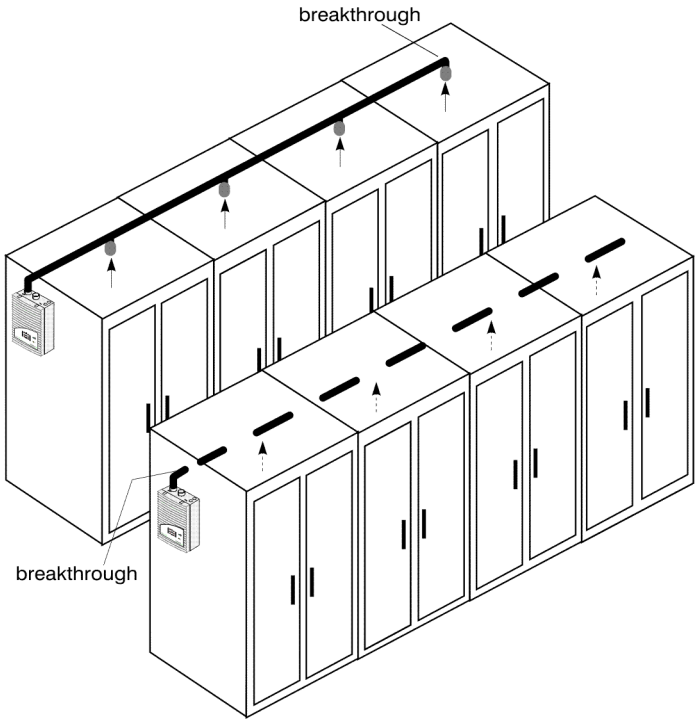


Figure 3: Principle of system monitoring

The TITANUS PRO·SENS® can also be used for very early fire detection in rooms with special air conditioning.

High-quality goods and systems can be reliably monitored thanks to the high sensitivity level. The TITANUS PRO·SENS® is therefore particularly suited for the following application areas in which…

- …early intervention is required due to high value concentration.
- …systems have to be permanently ready for operation.
- …highly sensitive detection is required (e.g. in areas that have a low level of smoke particles in the air due to installed filter elements).
- …high air exchange rates exist.

3 Technical description

3.1 System description

The TITANUS PRO·SENS® comprises a basic device and a pipe system.

As the most important component, the basic unit contains the sensitive detector module for identification of smoke aerosols and the aspiration unit for the transport of air samples to the detector module with integrated airflow sensor, in order to monitor the pipe system for break and blockage. The airflow sensor is integrated in the detector module.

On the TITANUS PRO·SENS® 2 only, one of the two detector modules can be optionally equipped with or without airflow sensor and with or without LOGIC·SENS.

The pipe system fundamentally consists of a pipe and fittings, optionally as an UPVC or ABS plastic version.

Each aspiration aperture in the TITANUS PRO·SENS® pipe system represents a ceiling detector in project planning.

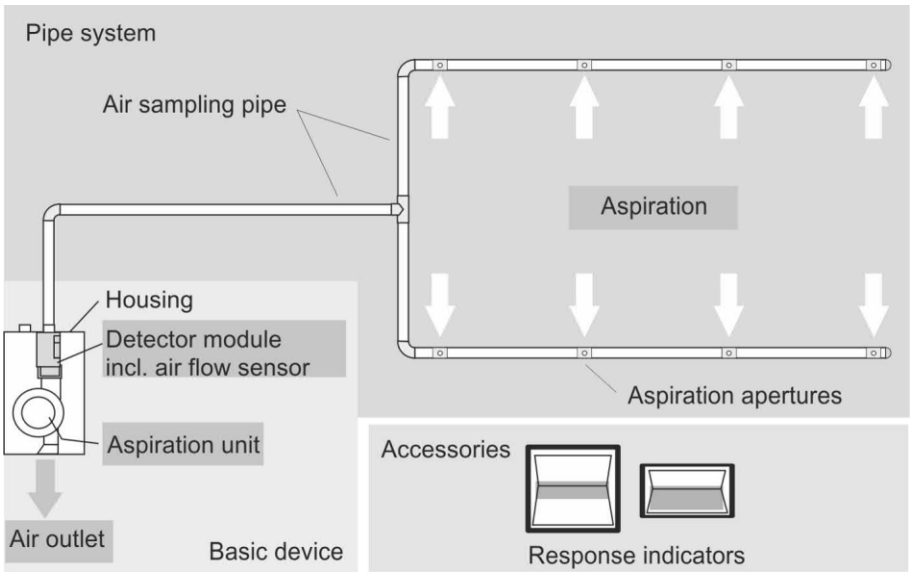


Figure 4: Overview TITANUS PRO·SENS®

Extensive accessories (e.g. various air filters, response indicators) are available in order to ensure safe operation even under the most difficult conditions (e.g. clean rooms, recycling areas).

3.1.1 Function

Air samples are taken from the monitored area using a aspiration unit in the basic unit via a pipe system with defined aspiration apertures, and supplied to the sensitive detector module.

Detector module

Depending on the response sensitivity of the detector module used (optionally up to 0.5%/m light obscuration, 0.1%/m light obscuration or 0.015%/m light obscuration), the main alarm is triggered on the TITANUS PRO·SENS® when the corresponding light obscuration is reached. Four sensitivities can be set per detector module. The alarm is displayed using the alarm LED on the device and can be transmitted to a connected fire detection control panel (FDCP).

The alarms as well as the display and transmission of faults can be subjected to different delay times (see chapter "Installation" ➔ "Settings").

Alarm messages are saved and are to be reset after rectifying the cause. With the TITANUS PRO·SENS® 2 two areas can be monitored with two detector modules in the above-mentioned way. Dual detection dependency and a pre-alarm can additionally be achieved by choosing different response sensitivities when monitoring an area.

LOGIC·SENS

A switch on the detector module of the TITANUS PRO·SENS® can be used to activate or deactivate the intelligent signal processor LOGIC·SENS. By means of the intelligent signal processing, LOGIC·SENS enables disturbance variables to be hidden and thus contributes to safe operation without false alarms.

Monitoring of detector module

Each detector module is monitored for dirt, signal faults and removal. Soiling of the detector module has no effect on the sensitivity. Pending faults are displayed via the fault LED on the TITANUS PRO·SENS® and can be transmitted to the FDCP via a fault contact. Faults caused by temporary ambient fluctuation can be hidden by adjusting a time-delayed setting.

Airflow monitoring

An airflow sensor checks the connected pipe system for break and blockage. An excessively low airflow indicates blockage, an excessively high airflow indicates a break. Blockages to individual aspiration apertures can also be identified depending on the pipe system design. Airflow monitoring is temperature-compensated and can be set in relation to air pressure.

After expiry of a delay time that can be programmed via a switch, the fault is shown on the aspirating smoke detector and the message is passed onto a connected fire detection control panel via a fault contact. The thresholds for the monitoring window can be adapted to the ambient conditions. The dynamic airflow sensors are only active at the low airflow level.

Basic signal process in the airflow sensor:

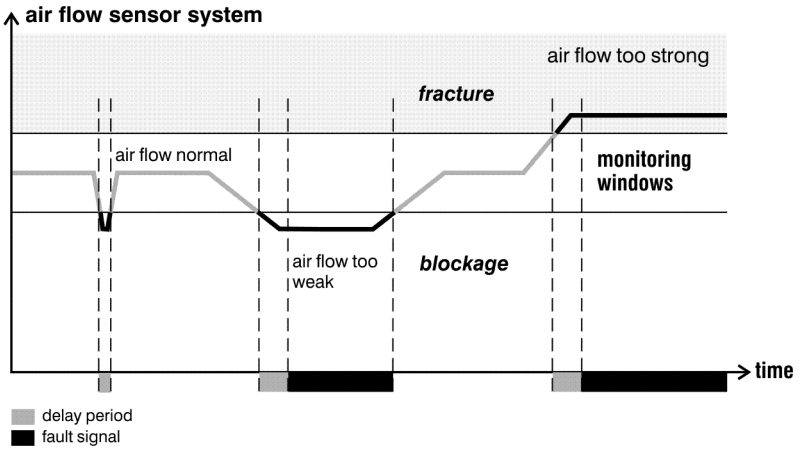


Figure 5: Example of the signal sequence of the airflow sensor in the event of faults

Fault indicator

A pending detector module or airflow fault generates a fault message, which is displayed on the TITANUS PRO·SENS®. The fault indicator can be set to "saving" (standard) or "non-saving" (see chapter "Installation" ➔ "Settings").

Flash codes for fault identification

Faults and certain device states are indicated by five different flash codes with an LED on the detector PCB. To be able to quickly differentiate between faults due to a defective detector module, a blocked or broken pipe system.

Resetting via FDCP

A fault message is reset via the connected FDCP. If the TITANUS PRO·SENS® is operated via a FACP and if alarm and fault messages are to be reset on the device simultaneously with the detector line, a reset circuit board (optional) must be inserted. This board causes the alarm and fault messages on the TITANUS PRO·SENS® to be reset automatically when the line voltage is switched off briefly.

The reset circuit board can only be used if the line standby current is between 5 mA and 50 mA. During reset, the line must be disconnected from the mains.

Relay output	The TITANUS PRO·SENS® has a potential-free switch contact per detector module for each alarm level and for the collective fault. This means that the aspirating smoke detector can be switched to collective and addressable detector lines of any FDCP (using the addressing modules of the respective FDCP).
Airflow calibration	The airflow calibration on the TITANUS PRO·SENS® is performed fully automatically, meaning that the commissioning is facilitated significantly. The initialisation phase is optionally performed dependent on or independent of air pressure. To adjust the TITANUS PRO·SENS® to the typical airflow of the pipe system, the airflow initialisation process needs to be performed. This has to be performed for each device once at the beginning after installation, after all changes to the pipe system planning and after changing the fan voltage so that the unit can determine and save the airflow characteristic to the pipe system.
Pipe system	A pipe system with a total length of 300 m and a maximum of 100 aspiration apertures can be connected to the TITANUS PRO·SENS® with a detector module. 2 pipe systems with 2 detector modules can be connected to the TITANUS PRO·SENS®. The overall pipe system has a total length of 2x 280 m and a maximum of 2x 72 aspiration apertures.

3.2 TITANUS PRO·SENS® and accessories

3.2.1 Overview

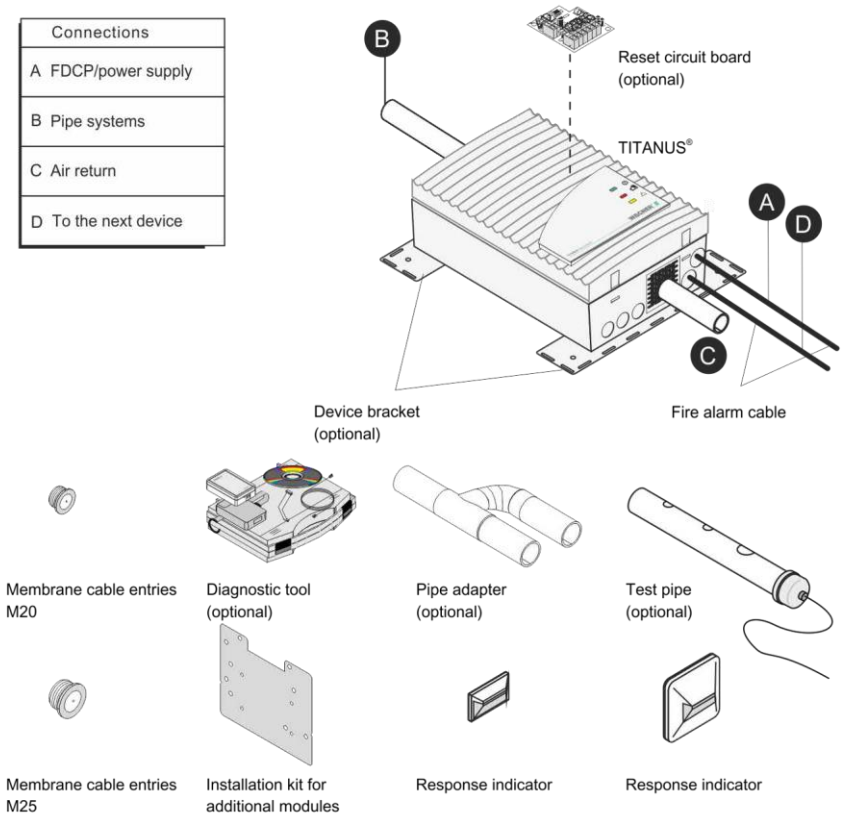


Figure 6: Structure and accessory components

The components illustrated in the overview can be used optionally.

3.2.2 TITANUS PRO·SENS® basic device

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

- Plastic housing
  - Plastic attachment nozzles
  - Connection for pipe with 25 mm outer diameter
  - Integrated pipe return
- Aspiration unit with optimised air supply
- Visual displays for alarm 1, fault and operation and for TITANUS PRO·SENS® 2: visual display for alarm 1 and 2
- Infrared interface for the diagnostic interface.

The following components must be ordered separately to complete the aspirating smoke detector:

- Sensitive detector module with the latest technology according to the principle of visual scattered light detectors with integrated airflow monitoring
- Front film sheet to display device information.

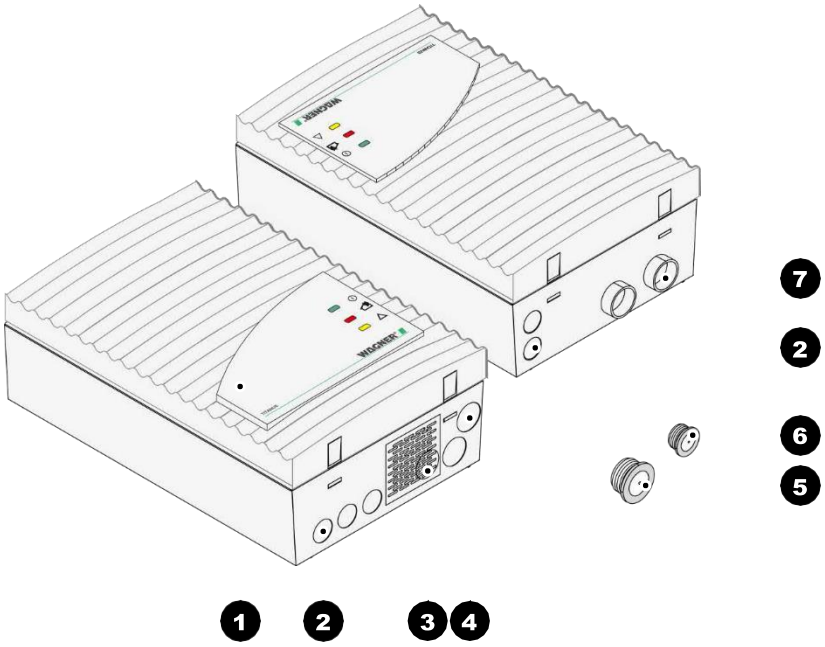


Figure 7: Displays and connections TITANUS PRO·SENS®

Item	Function	Explanation
1	Operation (green LED)	Operating indicator
	Alarm (red LED)	Alarm display
	Fault (yellow LED)	Failure of the fan or pipe system/detector module fault
2	Cable gland for fire alarm cable	5x M20
3	Connection for air return pipe	For air return
4	Cable gland for fire alarm cable	2x M25
5	Membrane cable entry	2x M25 for cable with ø 1 to 18 mm
6	Membrane cable entry	1x M20 for cable with ø 1 to 13 mm
7	Aspiration pipe connection Second connection = only TITANUS PRO·SENS® 2	For pipe system ø 25 mm

Figure 8: Display TITANUS PRO·SENS®

3.2.3 Detector box

External detector boxes can be placed in the pipe system in conjunction with the TITANUS PRO·SENS®.

The detector box is used for the following:

- Setting up dual detection dependency
- Localising the branch with smoke in a multi-branch pipe system
- Increasing the response sensitivity in a multi-branch pipe system.

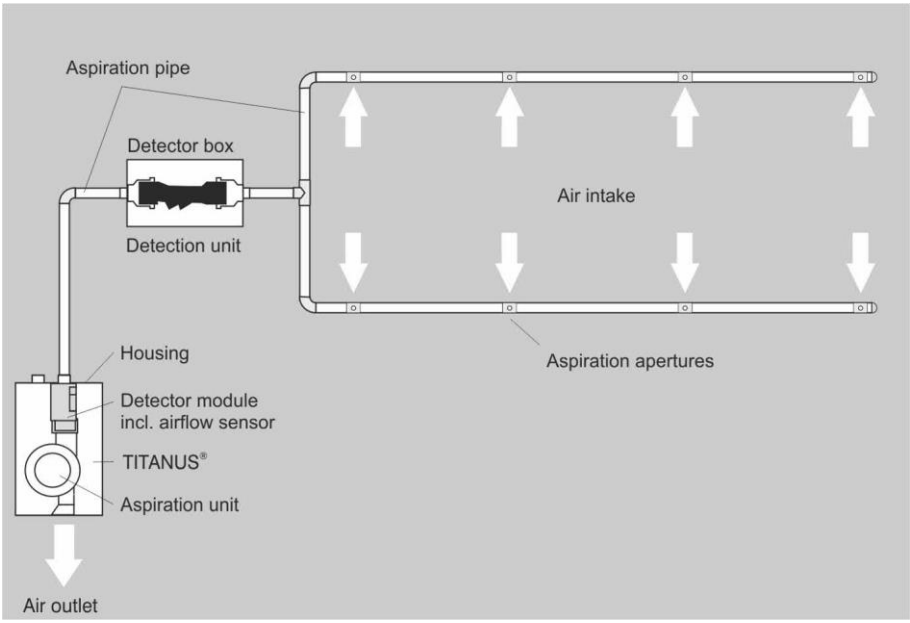


Figure 9: Function principle with detector box for dual detection dependency

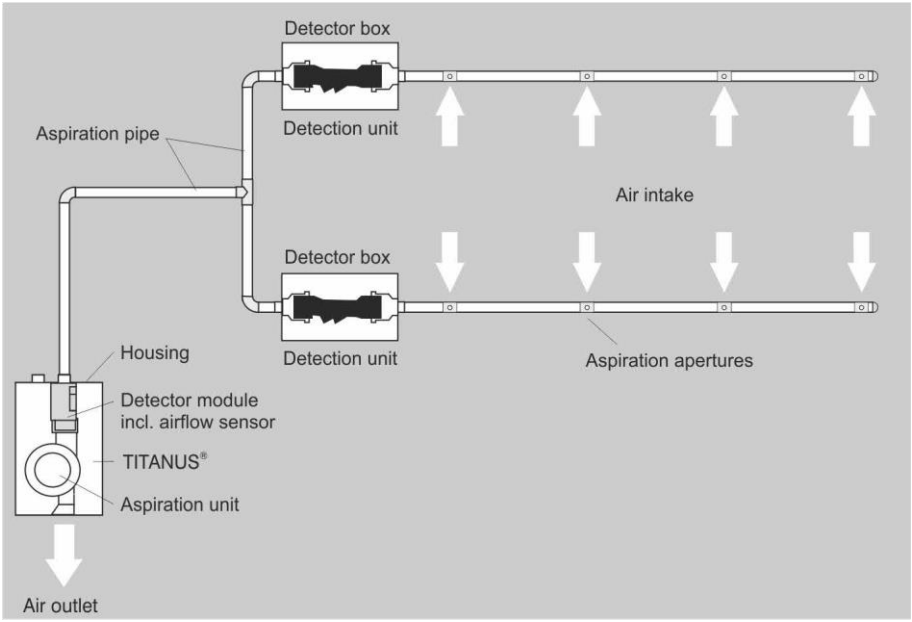


Figure 10: Function principle with detector boxes to localise and increase the response sensitivity

The detector box consists of the following components:

- Device base
  - Connections for 25-mm-aspiration pipe (air inlet and outlet with filter)
  - Cable glands
  - Connection terminals

- Detection unit (in the housing cover)
  - Sensitive detection according to the principle of visual scattered light smoke detectors
  - Potential-free contacts for connection to a FDCP
  - LEDs for main alarm, pre-alarm (optional), fault and operation
  - Bargraph for smoke level (optional)
  - Infrared interface for diagnostic tool.

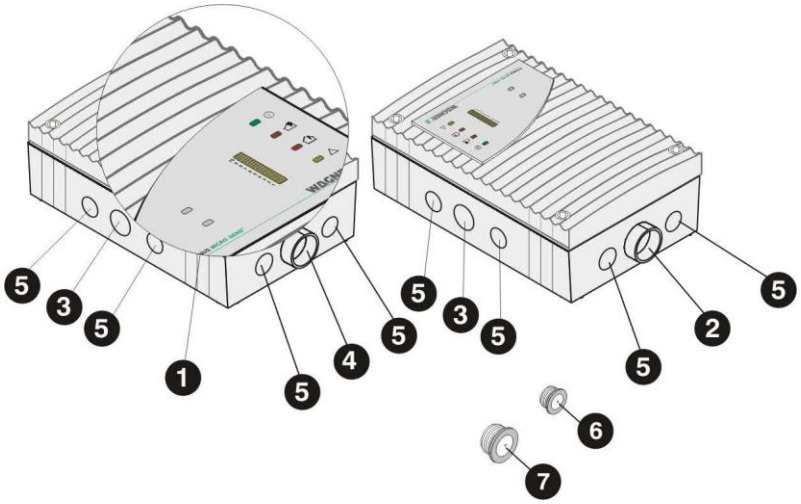


Figure 11: Displays and connections of the detector box

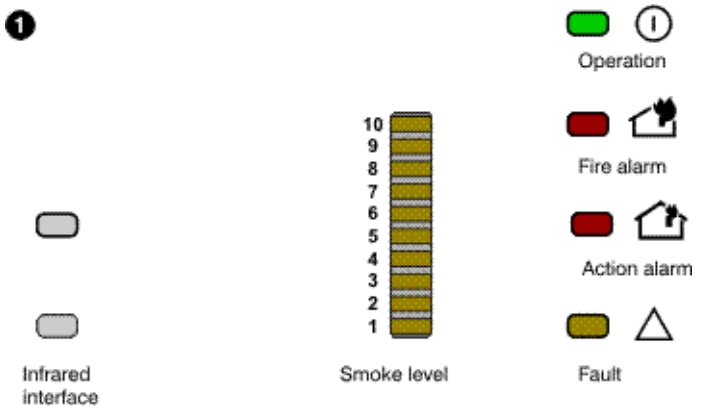


Figure 12: Detector box display variant with smoke level and pre-alarm

Item	Components	Description
1	Smoke level indicator 1 to 10 [1] (10 yellow LEDs)	Current smoke level [2]
	Operation (green LED)	Operating indicator
	Main alarm (red LED)	100% smoke level
	Pre-alarm 1) (red LED)	66% smoke level
	Fault (yellow LED)	Detection unit fault
	Infrared interface	Commissioning and fault diagnostics
2, 4	Aspiration pipe connection	For Ø 25 mm pipe system
3	Cable gland	6x M25
5	Cable gland	8x M20
6	Cable entries (small)	2x M20 for cable with Ø of 8 to 12 mm
7	Cable entries (large)	1x M25 for cable with Ø of 9 to 14 mm (extendable to Ø 14 to 18 mm)

[1] optional

[2] As a result of signal fluctuation with regard to the smoke level in the transmission range between two display LEDs, the top active LED can flicker.

3.2.4 Diagnostics

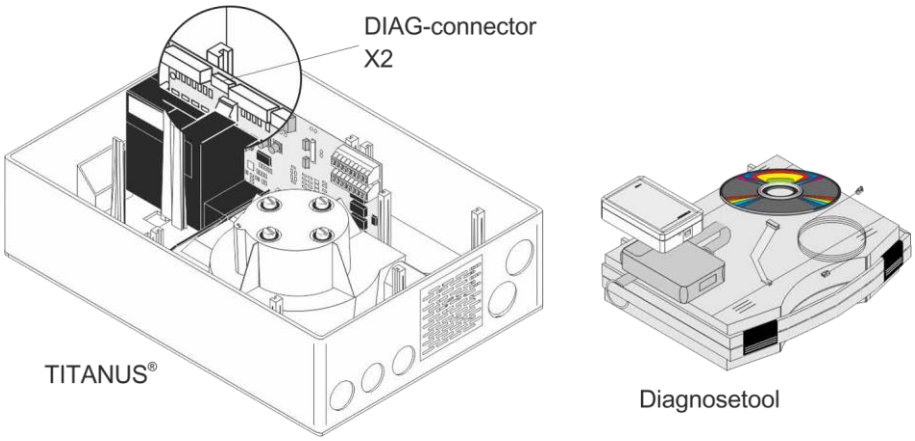


Figure 13: Diagnostic software for reading the device state.

For maintenance and service, the diagnostic software offers the option to display the stored and current device state as well as fault messages of the TITANUS PRO·SENS® on the PC or laptop. Data is transmitted via the diagnostic interface, which is connected to the X2 plug connector (DIAG) on the basic board of the TITANUS PRO·SENS® via an adapter cable.

Diagnostic messages are stored in the diagnostic software for at least three days in order to allow analysis of short, sporadic faults (e.g. changed operating conditions). Device reset using the diagnostic software results in all diagnostic messages being deleted.

Furthermore, the software allows fault messages to be deleted.

TIP
It is advisable to read out, check and archive the commissioning statuses.

TIP
All stored and current diagnostic data as well as settings made via the fire detection control panel can be saved as a file using the diagnostic software. Save each file under a different file name in order to be able to compare the read out data.

3.2.5 Response indicator

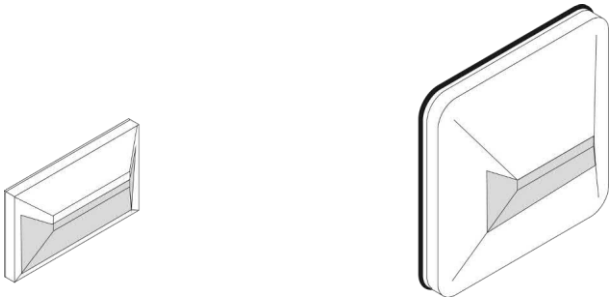


Figure 14: Response indicators FDAI 91 and FDAI 92

It is necessary to attach an alarm display in a clearly visible place in case of concealed fitting of the TITANUS PRO·SENS®.

The TITANUS PRO·SENS® offers the possibility of connecting the response indicators FDAI 91 and FDAI 92.

3.2.6 Device brackets

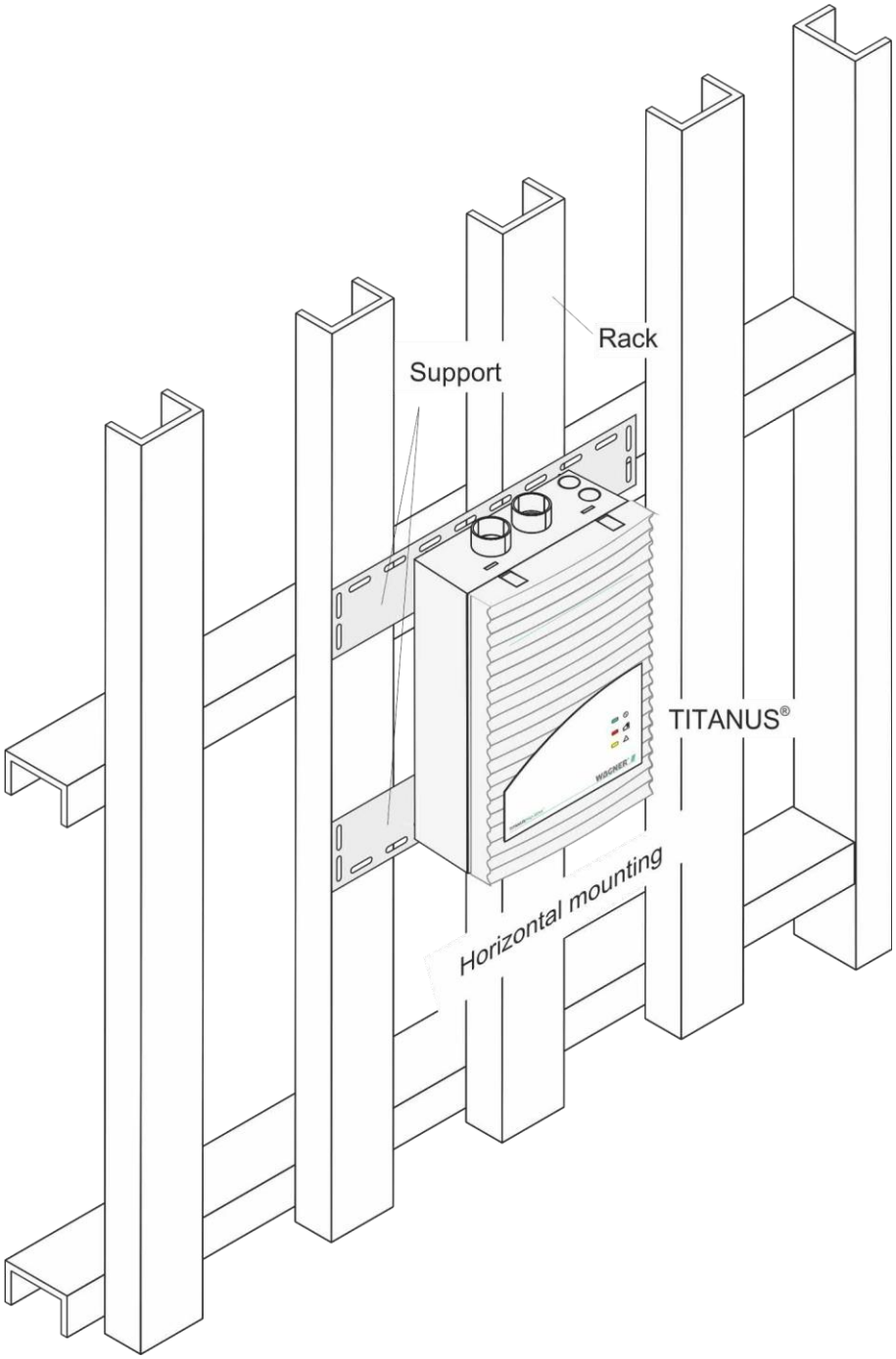


Figure 15: Bracket for the TITANUS PRO·SENS®

The TITANUS PRO·SENS® can be directly mounted on a wall. Additional brackets can be delivered if required e. g. for fixing to shelf racks.

3.3 Pipe system

3.3.1 Entire overview of available pipe components

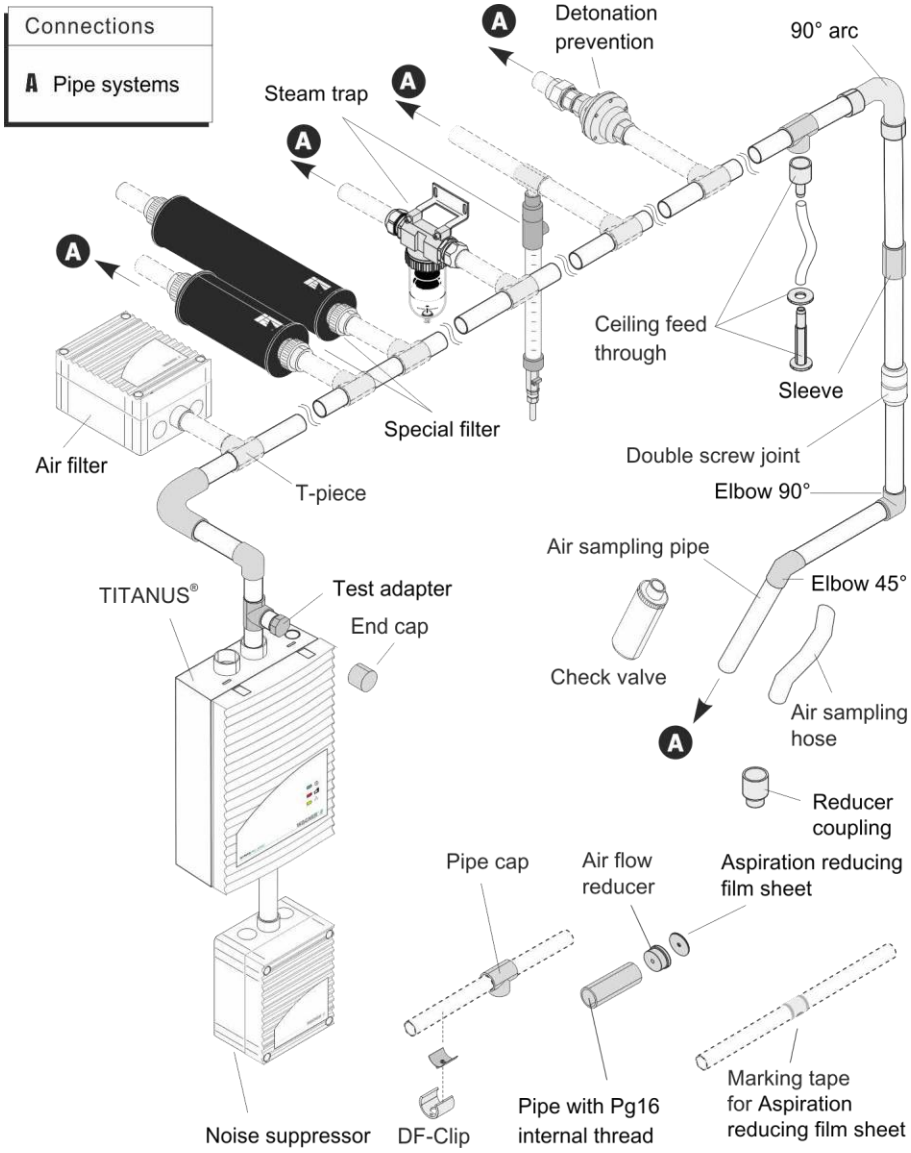


Figure 16: Pipe system components

The accessory components shown in the figure are to be selected for the corresponding individual application and can be used in combination.

3.3.2 Air jet equipment

In areas with an increased occurrence of dust particles or freezing conditions, it may be necessary to clear out the pipe system and its aspiration apertures. The figures show the components of each manual and automatic air jet equipment. Depending on the frequency of blockages, the pipe clearing process can be performed manually or automatically.

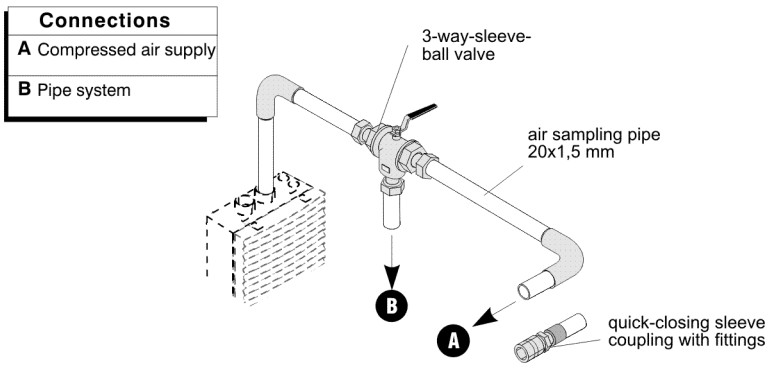


Figure 17: Manual air jet equipment components

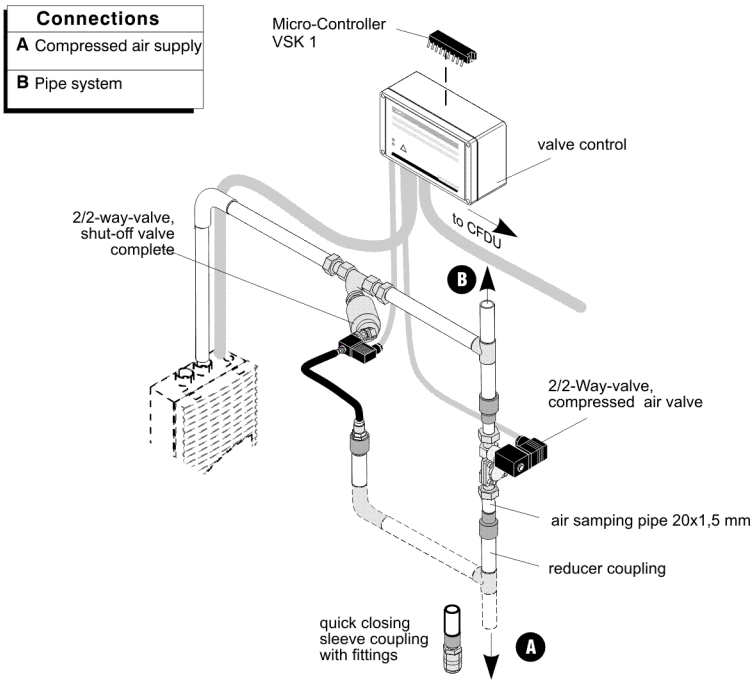


Figure 18: Automatic air jet equipment components

3.3.3 Aspiration apertures for room monitoring

3.3.3.1 Aspiration reducing film sheets

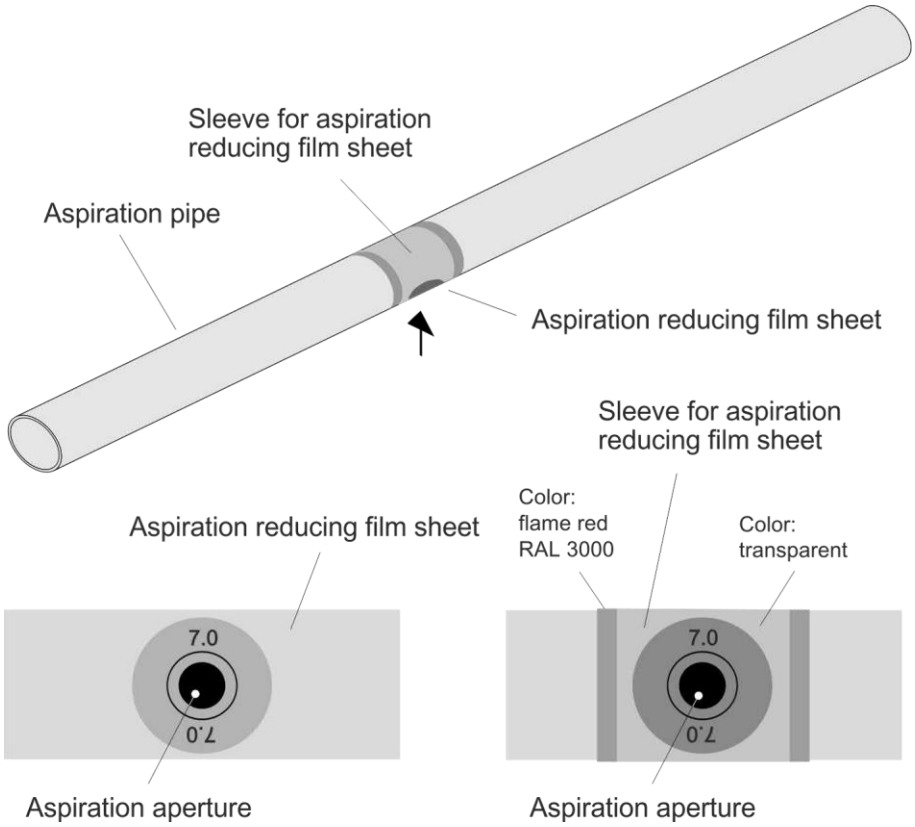


Figure 19: Aspiration apertures with aspiration reducing film sheet and sleeve

A aspiration aperture is a 10 mm drill hole in the aspiration pipe which is covered with an aspiration reducing film sheet with the required opening diameter. The size of the aspiration reducing film sheet depends on the pipe system installation (see chapter "Project planning").

The aspiration reducing film sheet is secured with a sleeve to prevent it from loosening. The sleeve is a transparent adhesive film with red edges and a 10-mm-hole. It is adhered on top of the aspiration reducing film sheet in such a way that the aspiration aperture is not covered and is also visible from greater distances.

The standard aspiration reducing film sheet type AF-x and sleeve type AF-BR are not suitable for application in low temperature areas.

Aspiration reducing clips must be used in such areas instead.

3.3.3.2 Aspiration reducing clips

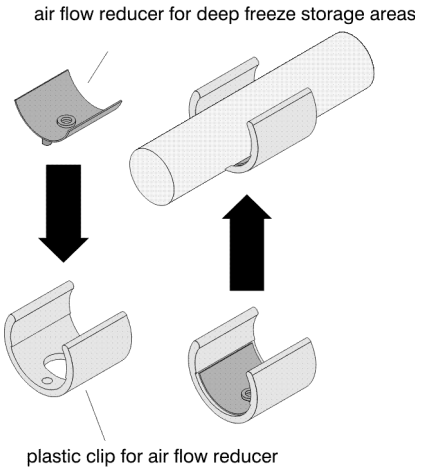


Figure 20: Aspiration reduction for areas with excessive dirt and deep freeze applications

The aspiration apertures in areas where blockages can be anticipated must be equipped with a plastic clip type AK-C and a flexible aspiration reducer type AK-x.

When used in deep freeze applications, the flexible aspiration reducer expands to the aspiration apertures during clearing and blasts off the ice. The special plastic clip ensures that the aspiration reducer remains in the predefined position.

The aspiration reducers with plastic clips are to be preferred to aspiration reducing film sheets with sleeves for project planning in areas with ambient impacts that require air jet equipment (e.g. dust). The plastic clips are more stable and the cleaning effect is significantly better for pressurisation due to the elastic rubber inserts.

3.3.4 Ceiling duct for concealed installation

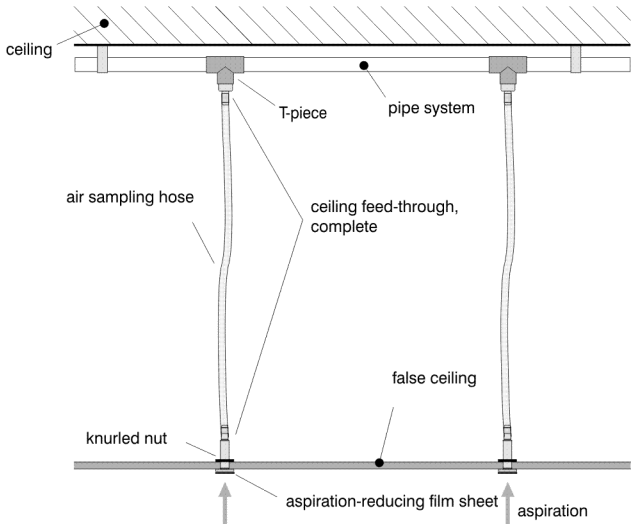


Figure 21: Ceiling duct for the suspended ceiling

Aesthetics

Fitting in suspended ceilings is possible if concealed installation of the pipe system is required for room monitoring. Ceiling ducts are placed in the suspended ceiling. According to the pipe project planning, the ceiling ducts are provided with aspiration reducing film sheets with defined aspiration apertures (see chapter "Project planning") and are connected with the pipe system via aspiration hoses. The length of these aspiration hoses is max. 1 m.

The ceiling duct can be used for suspended ceiling boards up to a thickness of approx. 35 mm. The aspiration reducing film sheets are available in two colours (pure white, RAL 9010 and papyrus white, RAL 9018) and in special colours on request.

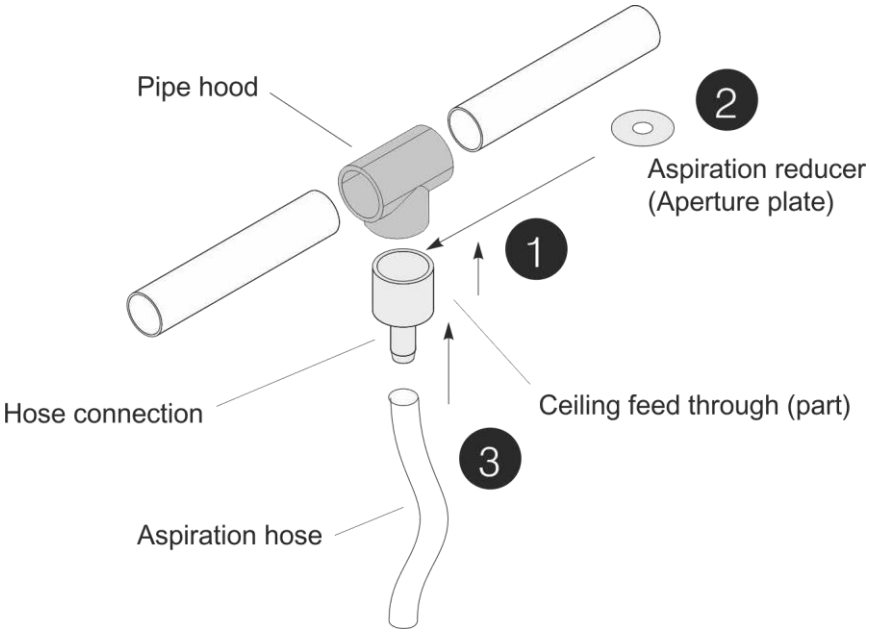


Figure 22: Capillary hose and upstream panel installation

The aspiration hoses with upstream aspiration reduction in T-pieces (pipe hoods) can be used for concealed installation in e.g. lamps or plastering.

3.3.5 Air filters for areas with excessive dirt

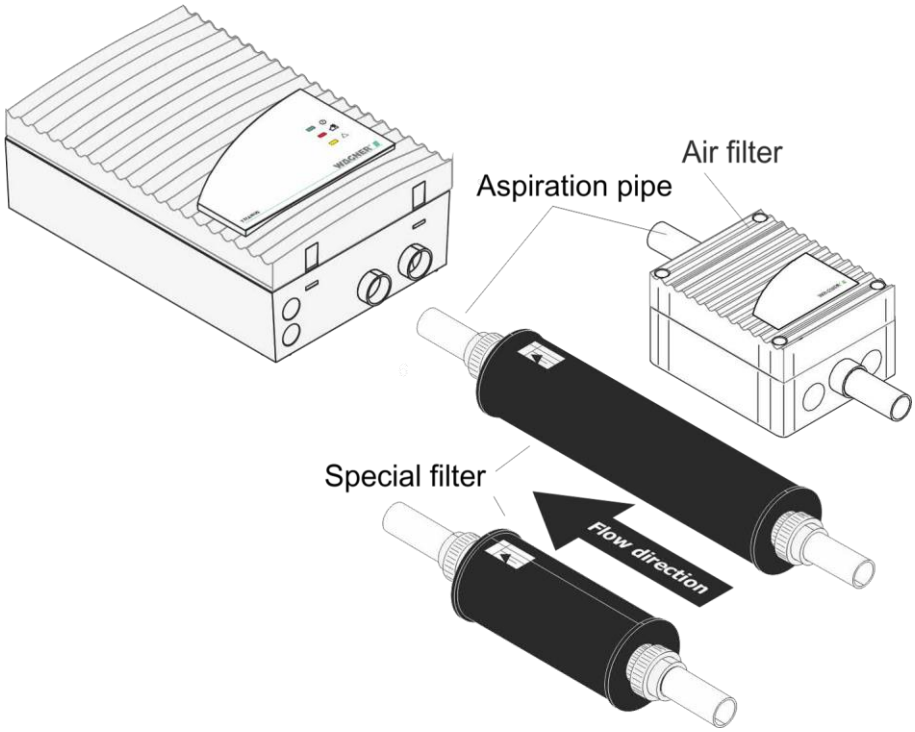


Figure 23: TITANUS PRO·SENS® with air filter

In areas with disturbing ambient influences, e.g. dust, an air filter can be used to protect the device's detector module.

Air filter type LF-AD-x

Air filter type LF-AD-x, consisting of a plastic housing with two pipe connections, is used as a standard air filter. The filter material absorbs the particles.

Type	Application	Examples
LF-AD-k	Coarse filter for separating particles > approx. 30 µm	Insects, fibres, hair
LF-AD	Coarse filter for separating particles > approx. 15 µm	Dust, insects, fibres, hairs, 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 lower concentrations

The air filter is automatically monitored for dirt (blockage) by the airflow monitoring of the TITANUS PRO·SENS®. If air filters are soiled, the filter inserts can simply be replaced after opening the filter housing.

Special filter type SF-x

In case of excessive dirt, special filter type SF-400 or type SF-650 with a larger surface is available. The special filter ensures reliable filtration of dust and dirt particles. The particles are reliably separated and permanently withheld from the filter medium. A consistent air quality is ensured up to the end of the filter's service life.

Type	Application	Examples
SF-400	Fine filter for separating particles > approx. 1 µm	As with LF-AD Additionally: fine dusts in high concentrations
SF-650	Fine filter for separating particles > approx. 1 µm	As above, but with a longer filter service life

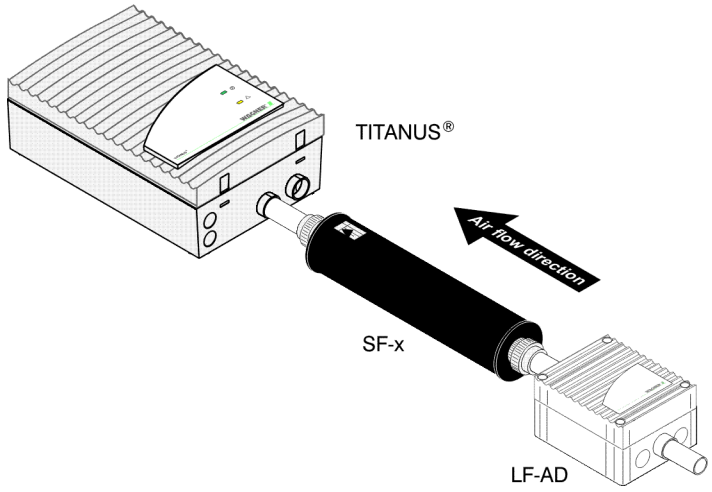


Figure 24: Special filter and LF-AD

The service life of the special filter can be extended by using a type LF-AD upstream filter.

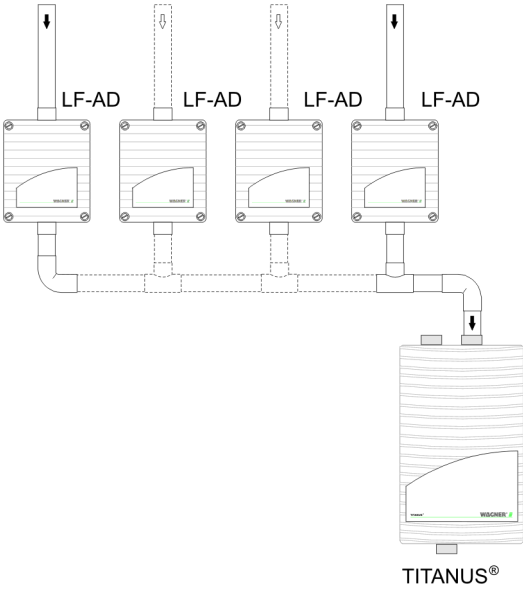


Figure 25: Filter type LF-AD in multiple aspiration branches

Instead of an air filter in the main aspiration branch, an air filter can be installed in each descending branch to extend the maintenance intervals. The same project planning specifications as defined in the annexed project planning table apply.

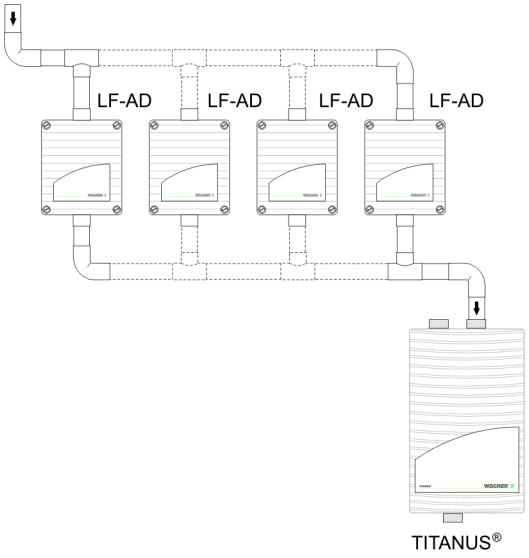


Figure 26: Filter type LF-AD in the main aspiration branch

Moreover, multiple air filters can be installed in parallel in the main aspiration branch to extend the maintenance intervals. For this purpose, the main aspiration branch must be partitioned into two or several branches and each equipped with the same air filter or air filter combination. The individual branches can then optionally be joined as a main aspiration branch or continued on separately into the monitored area(s). The same project planning specifications as for using a single air filter as defined in the annexed project planning table apply.

3.3.6 Air return for pressure areas and air pollution

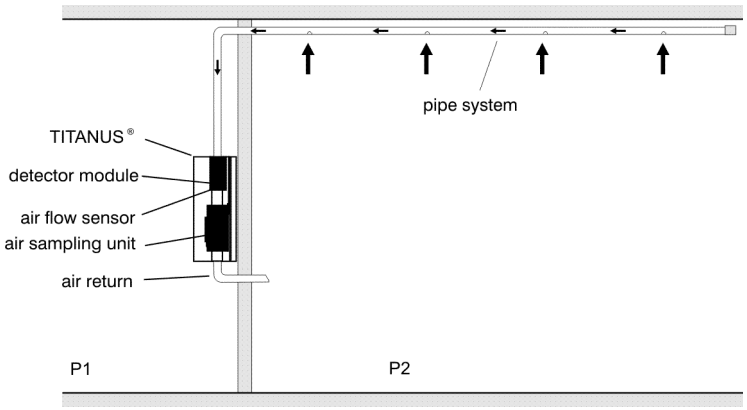


Figure 27: Principle of the air return

If the aspirating smoke detector and pipe system are located in areas P1 and P2 with different air pressures, return of the aspiration air into the pipe system pressure area is required. The air return can be used for pressure compensation or to prevent air pollution (e.g. odours) in adjoining rooms.

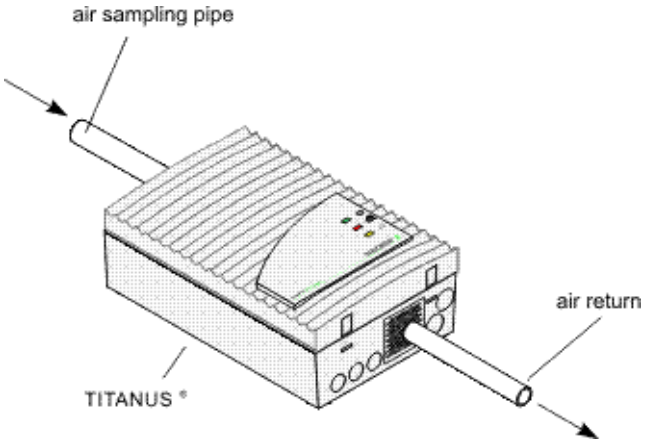


Figure 28: TITANUS PRO·SENS® with air return

The air return pipe is connected directly to the air outlet duct inside the TITANUS PRO·SENS® through the exhaust vent. The pre-stamped opening in the safety guard has to be broken away. A secure hold is achieved because the air return pipe fits precisely into the air outlet duct.

3.3.7 Silencer

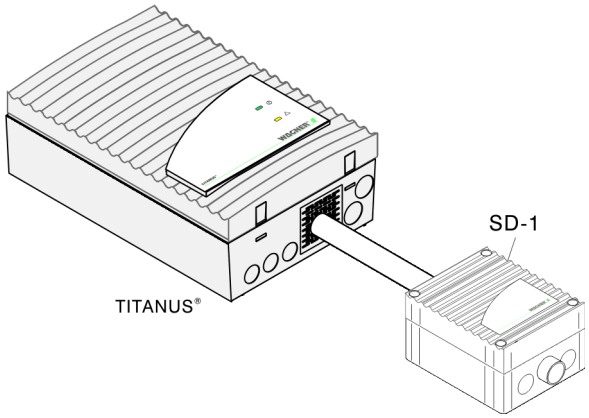


Figure 29: TITANUS PRO·SENS® with silencer

By using the SD-1 silencer, 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 silencer is directly mounted to the air return of the TITANUS PRO·SENS®.

3.3.8 Condensate separator for humid areas

If the TITANUS PRO·SENS® is operated in environments where condensate can form in the pipe system, a condensate separator is used. The condensate separator is placed at the lowest point of the pipe system between the air filter and aspirating smoke detector to collect the condensate.

Areas of application

The condensate separator is used in the following areas:

- Areas with heavily fluctuating temperatures (high air humidity)
- Areas with fresh air monitoring.

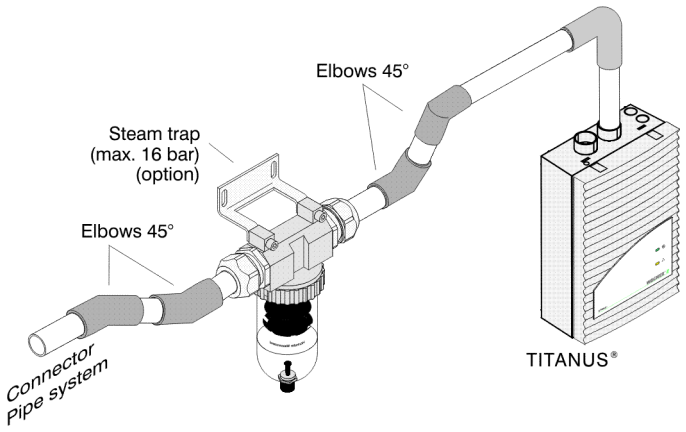


Figure 30: Condensate separator type KA-DN 25

The 45° angles allow for an optimum distance to the wall. The condensate separator can be operated within a temperature range of 0 °C … +50 °C. The sinter filter in the condensate separator has a pore width of 50 µm and provides additional coarse absorption of dirt particles.

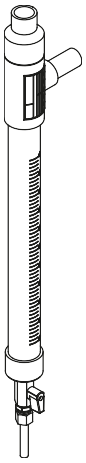


Figure 31: Condensate separator type KA-1

Automatic condensate separation is possible due to a capillary effect thanks to an integrated cotton wick. The condensate separator can be operated within a temperature range of 0 °C … +60 °C.

3.3.9 Detonation prevention device

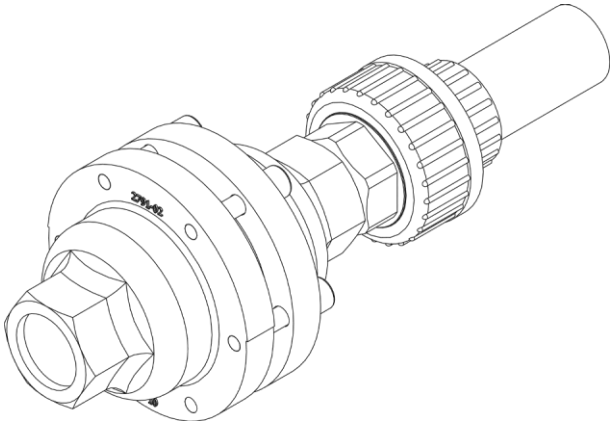


Figure 32: Detonation protector

Due to the additional installation of detonation protectors in the pipe system, the TITANUS PRO·SENS® can also be used for monitored areas with potentially explosive atmospheres (Ex areas). Detonation protectors are used as protection in Ex areas, as pipe deflagrations or detonations can occur in the event of ignition of vapour/air mixtures or gas/air mixtures. This depends on the type and concentration of the ignitable mixture, the initial pressure and temperature. The TITANUS PRO·SENS® as well as the detonation protectors must be installed outside of the Ex area.

The vapour/air or gas/air mixture flow through the detonation protector during normal operation. The flow can occur in any direction. If the existing mixture ignites in the TITANUS PRO·SENS®, the resulting detonation is stopped. Ignition (nominal gap width) is prevented by the flame filters. If the mixture is burnt off at the flame filters, it can result in a blowback of the detonation front. To prevent a blowback, the pipe system between the possible ignition source (TITANUS PRO·SENS®) and detonation protector must be at least 1 m. This indirectly achieves permanent fire protection.

Zones

Ex areas are divided into zones depending on the frequency and duration of occurrence of the hazardous, explosive atmosphere. The TITANUS PRO·SENS® is only permitted to monitor zone 2, where an explosive atmosphere can only occur for a maximum of 30 min per year. With an explosive atmosphere occurring so rarely, it is not expected for the zone to spread due to leaks in the TITANUS PRO·SENS®.

Explosion groups

Detonation protectors type EC xxx are flame arresters, which are flameproof against pipe deflagrations and detonations. They are intended to monitor Ex areas with explosive gas atmospheres, but not Ex areas with explosive dust atmospheres.

The explosion group is based on the fire load to be monitored:

- Group A, e.g. diesel, petrol, ethane, methane and carbon monoxide
- Group B, e.g. mains gas, hydrogen sulphide and ethylene
- Group C, e.g. hydrogen, acetylene and carbon disulphide.

Detonation protector	Nominal gap width [mm]	Explosion group	Approval
EC IIA	> 0.7	IIA	BAM*
EC IIB3	> 0.5	IIB1 - IIB3	
EC IIC	> 0.2	IIC	

Table 1: Explosion groups for detonation protectors

* Federal Institute for Material Testing

Pipe system and earthing

Design the pipe system between the TITANUS PRO·SENS® and the detonation protectors as steel pipes (type R-2525).

Aspiration and airflow pipe in the Ex area to be monitored can be either made of plastic or metal. There may be applications where metal pipes cannot be used (e.g. for chemical processes).

The following is to be discussed with an expert in advance:

- The occurrence of ignitable discharges (from experience)
- The pipe system configuration
- The aspiration aperture configuration
- The earthing concept.

The aspiration apertures can either have aspiration reducing film sheets and sleeves or aspiration reducing clips or be drilled directly into the pipe system in the corresponding size. If the expert insists that the aspiration apertures are drilled directly, notify the customer of any whistling aspiration noises.

If no ignitable discharges occur from experience, the pipe system can be made of plastic in the explosive area to be monitored. Plastic parts can be earthed (if necessary) via:

- Conductive paint
- Conductive wire mesh
- Conductive plastic pipes.

Conductive paint must be applied evenly to all parts of the pipe system at a later time on site. Specific thicknesses must not be exceeded. Wire mesh must be braided on site (e.g. criss-cross on the aspiration pipe). The resulting mesh must not exceed specific surface limits. Observe the threshold values specified in national laws, standards and directives. Conductive plastic pipes are earthed via grounding clamps on the pipe and a connected equipotential bonding rail.

4 Technical data

NOTICE

All current consumptions specified refer to an ambient temperature of 20 °C.

4.1 Device

		TITANUS PRO·SENS®		TITANUS PRO·SENS® 2	
Voltage	Supply voltage (Ue) [V]	14 … 30			
	Nominal supply voltage [V DC]	24			
Current	Fan voltage U_L [V]	6.9	9	6.9	9
	Starting current (at 24 V) [mA] (without reset circuit board)	300		320	
	Current consumption, standby (at 24 V) [mA] (without reset circuit board)	200[1)]	275	220	295
	Current consumption, alarm (at 24 V) [mA] (without reset circuit board)	Max. 210	Max. 285	Max. 240	Max. 315
	Current consumption, reset circuit board [mA]	Max. 20			
	Contact capacitance in alarm and fault relays Switching capacity [W]	30 V, 1 A Max. 24			

[1)] The current values can deviate depending on the pipe system used.

Dimensions	H x W x D [mm]	113 x 200 x 292
Weight	[kg]	1.35 / 1.45
Sound pressure level	LpA according to EN ISO 3744 without silencer	From 45dB(A) depending on project planning and fan voltage
Protection class	IP code in accordance with IEC/DIN EN 60529	IP20
Impact resistance	In accordance with IEC/EN 62262, EN 50102	IK04

	TITANUS PRO·SENS®	TITANUS PRO·SENS® 2
Housing		
Material	Plastic (ABS)	
Colour	Papyrus white, RAL 9018	
Temperature range		
[°C]	-20 … +60	
Deep freeze version [°C]	-40 … +60	
Humidity		
Non-condensing [% RH]	10 … 95	
Fan		
Design	Radial	
Fan service life (12 V)	43,500 h at 24 °C	
Displays on the device		
Alarm	Red LED	2x red LEDs
Fault	Yellow LED	
Operation	Green LED	
Connection for external alarm display	Response indicators: Type FDAI 91 / FDAI 92	
Connections		
Device connection	Terminals for max. 1.5 mm² wires	
Cable	Twisted in pairs, shielded or unshielded	
Cable glands	5x M20, 2x M25	
Pipe connections (conical)	Ø 25 mm 1x for aspiration pipe, 1x air return	Ø 25 mm 2x for aspiration pipe, 1x air return
Response sensitivity		
Detector module type		
DM-TP-50 [% light obscuration/m]	Up to 0.5	
DM-TP-10 [% light obscuration/m]	Up to 0.1	
DM-TP-01 [% light obscuration/m]	Up to 0.015	

		TITANUS PRO·SENS®-SL			TITANUS PRO·SENS® 2-SL		
Voltage	Supply voltage (Ue) [V]	14 … 30					
	Nominal supply voltage [V DC]	24					
Current	Fan voltage U_L [V] of fan control circuit board FC-2	6.5	6.9	9	6.5	6.9	9
	Starting current (at 24 V) [mA] (without reset circuit board)	300			330		
	Current consumption, standby (at 24 V) [mA] (without reset circuit board)	140	150	180	170	180	210
	Current consumption, alarm (at 24 V) [mA] (without reset circuit board)	Max. 150	Max. 160	Max. 190	Max. 180	Max. 190	Max. 220
	Fan voltage U_L [V] of fan control circuit board FC-3[2)]	10	11	12	10	11	12
	Starting current (at 24 V) [mA] (without reset circuit board)	300			330		
	Current consumption, standby (at 24 V) [mA] (without reset circuit board)	180	200	230	230	240	270
	Current consumption, alarm (at 24 V) [mA] (without reset circuit board)	Max. 200	Max. 210	Max. 240	Max. 260	Max. 260	Max. 290

[2)] FC-3 = optionally available

	Current consumption, reset circuit board [mA]	Max. 20
	Contact capacitance in alarm and fault relays Switching capacity [W]	30 V, 1 A Max. 24
Dimensions	H x W x D [mm]	113 x 200 x 292
Weight	[kg]	1.35 / 1.45

		TITANUS PRO·SENS®-SL	TITANUS PRO·SENS® 2-SL
Sound pressure level	LpA according to EN ISO 3744 without sound pressure level	From 31dB(A) depending on project planning and fan voltage	
	LpA according to EN ISO 3744 without sound pressure level	From 23dB(A) depending on project planning and fan voltage	

Protection class	IP code in accordance with IEC/DIN EN 60529	IP20	
Impact resistance	In accordance with IEC/EN 62262, EN 50102	IK04	
Housing	Material	Plastic (ABS)	
	Colour	Papyrus white, RAL 9018	
Temperature range	[°C]	0 … +40	
Humidity	Non-condensing [% RH]	10 … 95	
Fan	Design	Radial	
	Fan service life (12 V)	43,500 h at 24 °C	
Displays on the device	Alarm	Red LED	2x red LEDs
	Fault	Yellow LED	
	Operation	Green LED	
	Connection for external alarm display	Response indicators: Type FDAI 91 / FDAI 92	
Connections	Device connection	Terminals for max. 1.5 mm² wires	
	Cable	Twisted in pairs, shielded or unshielded	
	Cable glands	5x M20, 2x M25	
	Pipe connections (conical)	Ø 25 mm 1x for aspiration pipe, 1x air return	Ø 25 mm 2x for aspiration pipe, 1x air return
Response sensitivity	Detector module type		
	DM-TP-50 [% light obscuration/m]	Up to 0.5	
	DM-TP-10 [% light obscuration/m]	Up to 0.1	
	DM-TP-01 [% light obscuration/m]	Up to 0.015	

4.2 Pipe system

	TITANUS PRO·SENS® TITANUS PRO·SENS®-SL	TITANUS PRO·SENS® 2 TITANUS PRO·SENS® 2-SL
Max. pipe length [m]	300	560
Max. number of aspiration apertures [piece]	100	144
Max. monitoring area [m^2]	3000	5600
Max. length of aspiration hose per ceiling duct [m]	1	

Temperature range

UPVC pipe [°C]	0 … +60
ABS pipe [°C]	-40 … +80

5 Project planning

5.1 General information

Project planning of the aspirating smoke detector according to AS ISO 7240-20 is described below. The framework conditions are shown in this chapter. Project planning must be carried out according to the chapter "Pipe project planning".

The limiting project planning information according to the chapter "Special project planning" applies to special applications in addition to the chapter "Pipe project planning". This must be considered at the start of planning special project planning.

Project planning possibilities according to AS ISO 7240-20:

There are various technical solutions to be selected from, depending on the project planning criteria.

Project planning criterion	Technical solution See chapter	Basic Principles	Limitations
General room monitoring	Standard project planning	Chapter 5.2	-
Recognition of a failure at an individual aspiration aperture	Project planning with single hole monitoring	Chapter 5.2	Chapter 5.3.1
System monitoring/ cabinet monitoring	Simplified pipe project planning	Chapter 5.2	Chapter 5.3.2
Long intake lines	Project planning with pipe supply lines Ø > 25 mm	Chapter 5.2	Chapter 5.3.4
Transport time reduction	Project planning with acceleration apertures	Chapter 5.2	Chapter 5.3.5
Ventilation conduits	Project planning for forced airflow	Chapter 5.2	Chapter 5.3.6

5.1.1 Requirements

In the following project planning regulation, the corresponding national provisions of the countries must be observed in their respective valid version and project planning must be adapted to these specifications.

AS ISO 7240-20

In order to comply with AS ISO 7240-20, the aspirating smoke detectors must be planned in accordance with the chapter "Project planning guidelines".

Observe the national laws, standards, and guidance.

- For Australian installations, the requirements of AS 1670.1 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 NZS 4512 Fire detection and alarm systems in buildings must be followed, unless the system is being installed as part of an engineered solution.
- Additional regulations for the installation of fire detection systems issued by the fire service department, the building supervisory authorities or the legal board of construction that are only regionally valid.

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5.1.2 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.

The number of aspiration apertures and the setup of the pipe system complies with the size and geometry of the monitored area. The aspiration apertures are to be planned like point detectors. The pipe system is to be fitted in accordance with the project planning guidelines in this section while taking the following points into consideration:

Symmetry of the pipe system

The following conditions are applicable to extract consistent air samples via all aspiration apertures:

- The length of the shortest branch and the length of the longest branch may not exceed a ration of 1:2.
- The number of aspiration apertures of the respective branch may not exceed a ratio of 1:2.
- The aspiration apertures should be as evenly distributed as possible in the respective branches.

NOTICE
The threshold values of the TITANUS PRO·SENS® must always be adhered to for each connected pipe system for the selected pipe project planning (see chapter "Project planning limits").

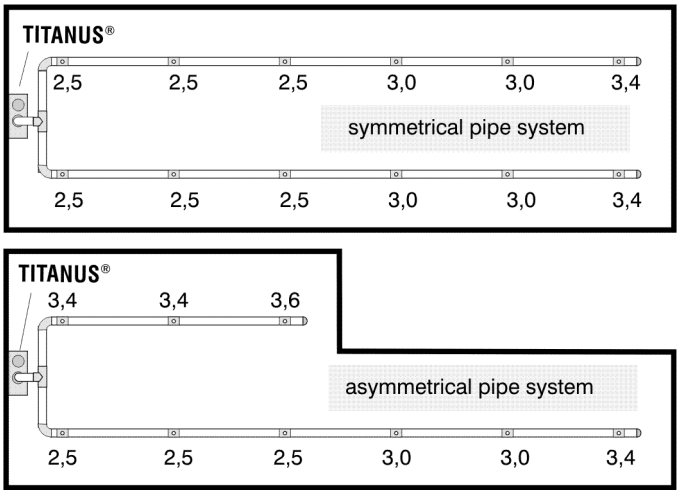


Figure 33: Example of a symmetrical and an asymmetrical U-pipe system

The previous figure shows an example of a U-pipe system with symmetrical or asymmetrical structure and with the diameters of the aspiration apertures calculated according to the chapter "Standard planning". 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 corresponding opening diameters can be found in the tables in the chapter "Opening diameter".

Pipe connections

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

This means that only one aspiration pipe can be connected if only one detector module is used.

Longer pipe supply lines

Pipes with Ø 32 mm or Ø 40 mm can be used for long pipe supply lines in accordance with the chapter "Special project planning".

This reduces the air resistance of the pipe supply line or makes it possible to achieve a greater equilibrium for aspiration via outgoing stubs (e.g. high-bay warehouses).

Branch length

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

Pipe configurations

Depending on the room geometry, 5 pipe configurations can be selected (see fig. "Pipe configurations"). An…

- I-pipe is a system without branches.
- U-pipe is a pipe system that separates into two branches after connection to the TITANUS PRO·SENS®.
- M-pipe is a pipe system that separates into three branches after connection to the TITANUS PRO·SENS®.
- Double U-pipe is a pipe system that separates into four branches after connection to the TITANUS PRO·SENS®.
- Quadruple U-pipe is a pipe system that separates into eight branches after connection to the TITANUS PRO·SENS®.

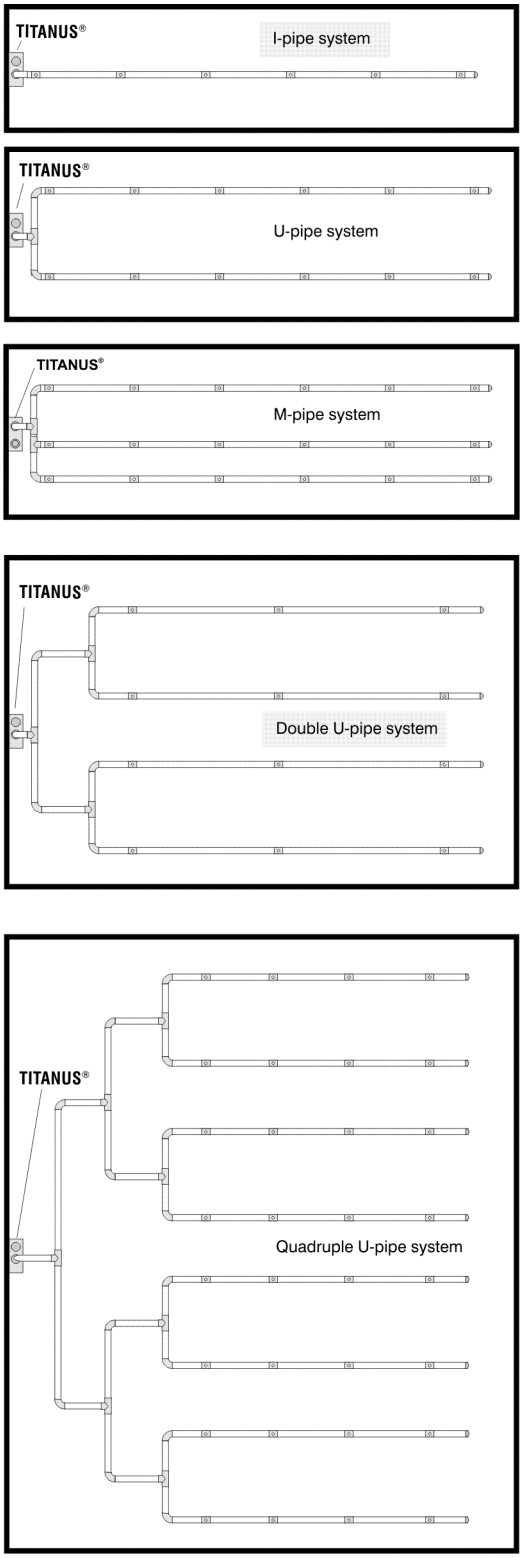


Figure 34: Pipe shapes

Change of direction

A change of direction in the pipe system can increase the flow resistance. A gentle change of direction (e.g. with 90° elbow or aspiration hose) is already permissible in the scope of project planning in accordance with AS ISO 7240-20 and need not be taken into further consideration.

The maximum total length of the pipe system is reduced if 90° pipe angles are used. A 90° pipe angle corresponds to a straight pipe length of approx. 1.5 m aspiration pipe.

NOTICE

Elbows must be given preference over angles. The detection time is impaired by a large number of direction changes.

Test

For critical applications, check the secure detection with activation attempts. Furthermore, check whether there is an airflow at the individual aspiration apertures.

TIP

The fan voltage can be increased to shorten the transport time. This, however, will increase the current consumption of the system.

One detector module must be allocated per branch. Both detector modules of a device must be analysed separately from each other. Only one extinguishing area may be monitored per TITANUS PRO·SENS®.

Figure 35: Example pipe configuration with dual detection dependency

5.1.3 Airflow monitoring

AS ISO 7240-20 requires the detection of a 20% change in the total airflow of the pipe system. In order to accomplish this, the airflow sensor system's triggering threshold must be set to level II. Level I may also be set as an alternative. We recommend performing an air pressure-dependent airflow calibration for both of these settings.

A freely selectable threshold can be set for systems that do not require AS ISO 7240-20 conformity.

The project planning for aspiration pipe airflow monitoring is then selected after taking the countries' relevant, national provisions into account.

Adjusting the airflow sensitivity

The airflow sensor sensitivity must be adjusted to the application in question. Breakage and blockage must be detected reliably with low susceptibility to malfunction.

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

	I	II	III	IV
	In conformity with AS ISO 7240-20			
Threshold value	Low	medium	High	Very high
Sensitivity	Very high	High	medium	Low

TIP

We recommend to always select the highest possible level that is permissible according to the national standards.

Dynamic airflow sensors

The device's airflow monitoring enables the system to detect both a breakage at the pipe end and sudden obstruction in individual aspiration apertures (e.g. in the event of sabotage to the pipe system). As the dynamic airflow sensors are only active if level I was selected for the airflow monitoring, the aspects described under "Level I limitation" are to be taken into account here.

Level I limitations

The airflow monitoring may only be set to level I in the following cases:

- Project planning according to "Single hole monitoring" was carried out (see chapter "Pipe project planning with single hole monitoring")

- The airflow sensor was calibrated depending on the air pressure (see chapter "Air pressure-dependent airflow calibration").
- No large airflow fluctuations can occur.

Air pressure differences

The same air pressure must be present throughout the aspiration pipe.

NOTICE

If the aspirating smoke detector and pipe system are located in areas with different air pressure, return of the air drawn in by the TITANUS PRO·SENS® into the pipe system pressure area must be planned (see chapter "Air return").

5.1.4 Sensitivity

The sensitivity of a TITANUS PRO·SENS® can be classified into specific fire sensitivity classes according to AS ISO 7240-20. These fire sensitivity classes describe specific example applications in which the systems can be used. Permissible system project planning can be determined for each classification according to the chapter "Pipe project planning".

Aspirating smoke detectors with a higher fire sensitivity according to AS ISO 7240-20 also meet the requirements of the lower classes.

Class	Description	Application example
A	Aspirating smoke detector with very high sensitivity	Very early detection: Heavy smoke dilution via air conditioning in IT areas
B	Aspirating smoke detector with increased sensitivity	Early detection: Saves a great deal of time with very early fire detection (without air conditioning)
C	Aspirating smoke detector with standard sensitivity	Normal detection: Fire detection with the advantages of aspirating smoke detectors

NOTICE

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

The table shows the selectable sensitivity levels of the TITANUS PRO·SENS®

Response sensitivity (main alarm) TITANUS PRO·SENS®		
Detector module Type DM-TT-50-L [% light obscuration/m]	Detector module Type DM-TT-10-L [% light obscuration/m]	Detector module Type DM-TT-01-L [% light obscuration/m]
-	0.8	0.12
-	0.4 (standard)	0.06 (standard)
1	0.2	0.03
0.5 (standard)	0.1	0.015

Project planning of the monitoring area always takes place according to the national provisions for point smoke detectors.

5.1.5 Project planning limits

The following threshold values must be observed for every connected pipe system:

Standard project planning

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

Simplified project planning

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

Project planning with acceleration openings

- The minimum pipe length between 2 aspiration apertures is 2.5 m.
- The maximum pipe length between 2 aspiration apertures is 12 m.
- The maximum overall pipe length is 300 m (2x 280 m with 2 connected pipe systems).
- The maximum number of aspiration apertures is 100 (2x 72 with 2 connected pipe systems).

The maximum monitoring area per aspiration aperture corresponds with the monitoring area of point detectors according to the project planning guideline to be applied.

The maximum total monitoring area, the maximum overall pipe length and the maximum number of aspiration apertures depend on the selected project planning, as well as restrictions imposed by national provisions.

5.2 Pipe project planning

5.2.1 Project planning guidelines

The knowledge of specific factors is essential in order to carry out project planning in accordance with AS ISO 7240-20. These are the requirements for the sensitivity of the TITANUS PRO·SENS®, the number of aspiration apertures and the accessories necessary for the corresponding application. The pipe system layout in conformity with the standard can be determined based on these factors using the following sections and with the help of the annexed project planning table.

5.2.1.1 Determining the necessary pipe accessories

Due to the fact that accessory components (such as filters for example) have a certain influence on the dimension of pipe project planning, the corresponding accessories for the corresponding application must be selected in advance. An upgrade (e.g. with a fine filter) is usually only possible if a detector module with higher sensitivity is used or a certain reserve is planned in advance.

NOTICE
CE conformity on the basis of AS ISO 7240-20 does not exist if components are used that are not approved by WAGNER Group GmbH.

The following pipe accessories may be used with no project planning restrictions:

- SD-1 silencer
- LF-AD-k air filter
- KA-1 condensate separator.

The following pipe accessories must be taken into account for the project planning of the pipe system:

- Air filter
- KA-DN 25 condensate separator
- VSK stop valve

- Detector box
- Detonation protector
- OXY·SENS® Aspiration detector.

5.2.2 Pipe accessories

Air filter

Type	Application	Examples
LF-AD-k	Coarse filter for separating particles > approx. 30 µm	Insects, fibres, hair
LF-AD	Coarse filter for separating particles > approx. 15 µm	Dust, insects, fibres, hairs, 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 lower 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 a longer filter service life

Condensate separator

Type	Application
KA-DN 25	Condensate separator for applications with moisture condensing in the pipe
KA-1	

Silencer

Type	Application
SD-1	Silencer for areas sensitive to noise

Stop valve

Type	Application
AVK-PV	Stop valve for VSK air jet equipment
AVK-PV-F	Stop valve for VSK air jet equipment for use in deep freeze applications

Detonation protector

Type	Application
EC IIA	Detonation protector for explosion group II A areas
EC IIB3	Detonation protector for explosion group II B 3 areas
EC IIC	Detonation protector for explosion group II C areas

Detector box

Type	Application
MB2	Additional detector for precise localisation of fire, staged alarming or dual detection dependency
DM-MB-TMx-x-10	
DM-MB-TMx-x-50	

5.2.3 Sensitivity and pipe project planning

5.2.3.1 Pipe project planning with pipe accessories

The following project planning tables are available in the appendix for project planning and for planning pipe systems for each previously selected pipe accessory:

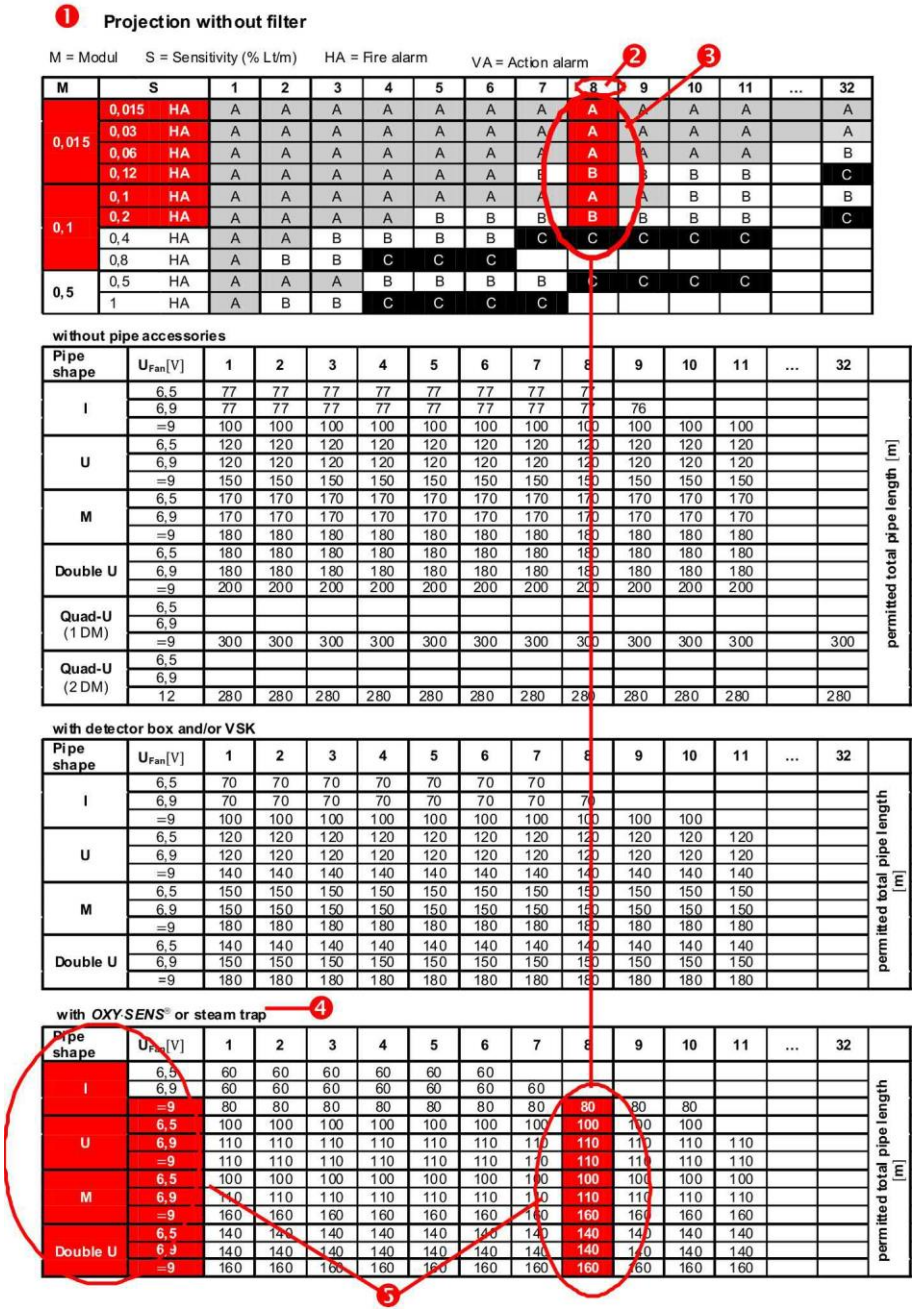
- Project planning without filter
- Project planning with LF-AD air filter
- Project planning with LF-AD-1 air filter
- Project planning with LF-AD-2 air filter
- Project planning with SF-400/SF-650 air filter.

NOTICE
In order to improve the detection quality of an aspirating smoke detector, a room can be monitored with more than the required number of aspiration apertures according to national directives. The number of aspiration apertures required by the standard must be used to calculate the necessary sensitivity of an aspirating smoke detector.

Procedure

In the following example, project planning without air filters with 8 aspiration apertures fulfills class B with additional use of a condensate separator. The red arrows show the possible project planning for different pipe shapes and fan voltage.

Action steps	Actions
1	Selection Selection of the corresponding project planning table based on the air filter to be used (see chapter "Detailed pipe accessories")
	Result The project planning table is determined
2	Selection Selection of the number of aspiration apertures in the project planning table
	Result The achievable sensitivity class for the selected number of aspiration apertures is determined
3	Selection Determine the necessary sensitivity to attain the fire sensitivity class
	Result Detection unit and sensitivity setting are determined
4	Selection Selection of further pipe components (e.g. condensate separator) based on the components described in the chapter "Pipe accessories"
	Result Pipe project planning table is determined
5	Selection Pipe length selection
	Result Pipe shape and the necessary fan voltage are determined



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
	0,12	HA	A	A	A	A	A	A	B	B	B	B	B		C
0,1	0,1	HA	A	A	A	A	A	A	A	A	A	B	B		B
	0,2	HA	A	A	A	A	B	B	B	B	B	B	B		C
	0,4	HA	A	A	B	B	B	B	C	C	C	C	C		
	0,8	HA	A	B	B	C	C	C							
0,5	0,5	HA	A	A	A	B	B	B	B	C	C	C	C		
	1	HA	A	B	B	C	C	C	C						

without pipe accessories

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

with detector box and/or VSK

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

with *OXY·SENS*® or steam trap 4

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

5

Figure 36: Example pipe project planning with pipe accessories

Results The following modules can be optionally 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

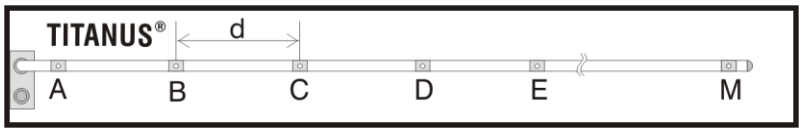
Possible system parameters:

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

5.2.4 Opening diameter

The opening diameter of the aspiration apertures are to be taken from the corresponding table for the respective pipe configuration:

I-pipe



	Number of aspiration apertures												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Item	Punching diameter of the aspiration reducing film sheets [mm]												
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

U-pipe

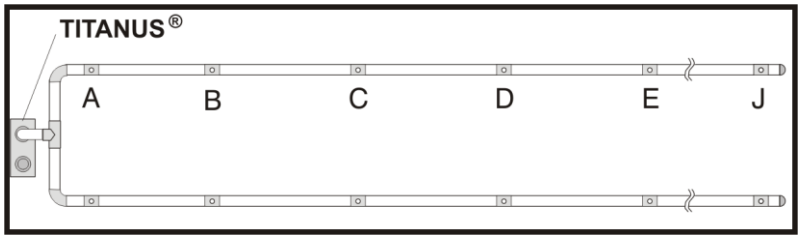


Figure 38: U-pipe system

	Number of aspiration apertures									
	2	4	6	8	10	12	14	16	18	20
Item	Punching diameter of the aspiration reducing film sheets [mm]									
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

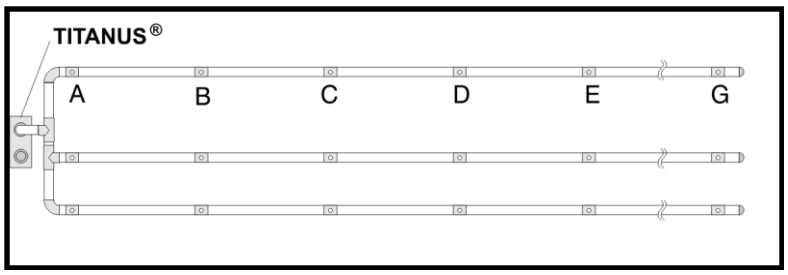


Figure 39: M-pipe system

	Number of aspiration apertures						
	3	6	9	12	15	18	21
Item	Punching diameter of the aspiration reducing film sheets [mm]						
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

Double U-pipe

Figure 40: Double U-pipe system

	Number of aspiration apertures					
	4	8	12	16	20	24
Item	Punching diameter of the aspiration reducing film sheets [mm]					
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

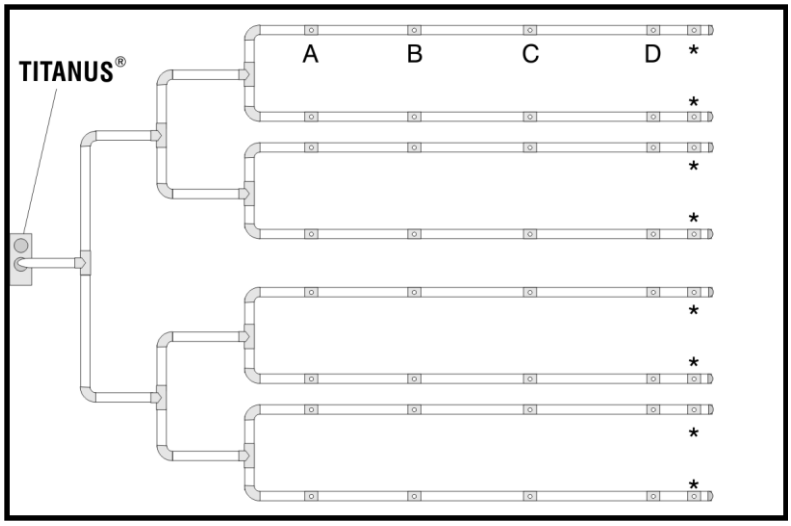


Figure 41: Quadruple U-pipe system

	Number of aspiration apertures			
	8	16	24	32
Item	Punching diameter of the aspiration reducing film sheets [mm]			
A	3.2	2.5	2.0	2.0
B	-	3.0	2.5	2.0
C	-	-	3.0	2.0
D	-	-	-	2.5
*	-	2.5	3.0	3.0

* = Distance of the acceleration openings, the distance to the last aspiration aperture can be freely selected.

5.3 Special project planning

5.3.1 Project planning with single hole monitoring

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

The specifications according to the chapter "Pipe project planning" apply for project planning. The following threshold values and opening diameters are also to be taken into account. Additional accessories (e.g. air filters, condensate separators) can influence the maximum pipe length.

5.3.1.1 I-pipe system

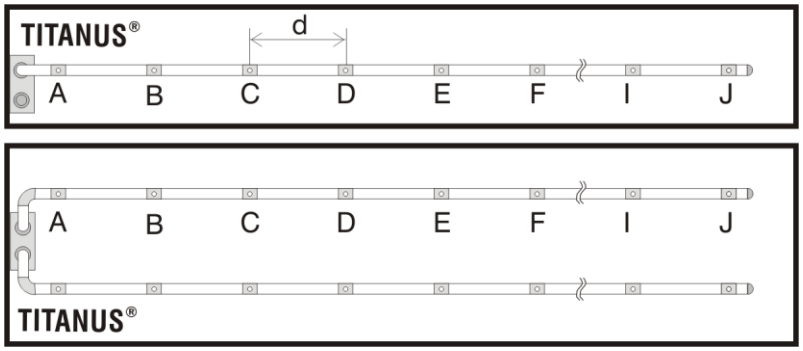


Figure 42: I-pipe system for single hole monitoring

Threshold values	
Min. clearance from device to first aspiration aperture	4 m
Max. clearance from device to first aspiration aperture	20 m
Max. distance: first aspiration aperture – last aspiration aperture With low fan voltage 6.5 … 6.9 V With high fan voltage 9 … 12 V	 40 m 60 m
Max. total pipe length per pipe system With low fan voltage 6.5 … 6.9 V With high fan voltage 9 … 12 V	 60 m 80 m
Min. distance between two aspiration aperture (d)	4 m
Max. distance between two aspiration aperture (d)	12 m
Max. number of aspiration apertures per pipe system	10 units

Diameter of aspiration apertures

	Number of aspiration apertures								
	2	3	4	5	6	7	8	9	10
Item	Punching diameter of the aspiration reducing film sheet [mm]								
A	6.0	5.0	4.2	3.8	3.2	3.0	2.5	2.5	2.0
B	6.8	5.2	4.4	3.8	3.2	3.0	2.5	2.5	2.0
C	-	5.2	4.6	4.0	3.6	3.0	3.0	2.5	2.5
D	-	-	4.6	4.0	3.6	3.4	3.0	3.0	2.5
E	-	-	-	4.4	4.0	3.4	3.4	3.0	3.0
F	-	-	-	-	4.0	3.8	3.4	3.4	3.0
G	-	-	-	-	-	3.8-	3.8	3.4	3.4
H	-	-	-	-	-	-	3.8-	3.8	3.4
I	-	-	-	-	-			3.8	3.6
J	-	-	-	-	-	-	-	-	3.6

Trigger thresholds

Number of aspiration apertures	2	3	4	5	6	7	8	9	10
1 blocked aspiration apertures…	III	III	II	I	I	-	-	-	-
2 blocked aspiration apertures…	O	O	III	III	II	I	I	-	-
3 blocked aspiration apertures…	O	O	O	O	III	III	II	I	I
4 blocked aspiration apertures…	O	O	O	O	O	O	III	II	I
5 blocked aspiration apertures…	O	O	O	O	O	O	O	O	II
… identified when setting level x.									

- not possible

O not feasible

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

NOTICE

For project planning in compliance with AS ISO 7240-20, level I or II airflow monitoring must be set.

5.3.1.2 U-pipe system

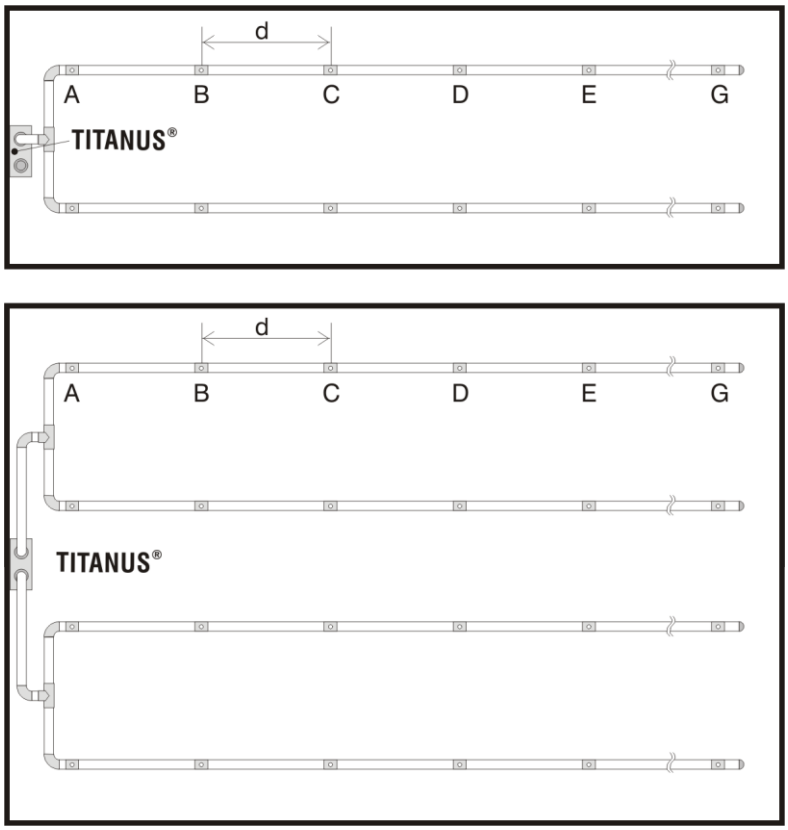


Figure 43: U-pipe system for single hole monitoring

Threshold values	
Min. distance between the device and the T-piece	4 m
Max. distance between the device and the T-piece	20 m
Max. branch lengths With low fan voltage 6.5 … 6.9 V With high fan voltage 9 … 12 V	 40 m 50 m
Max. total pipe length per pipe system With low fan voltage 6.5 … 6.9 V With high fan voltage 9 … 12 V	 100 m 120 m
Min. distance between two aspiration apertures (d)	4 m
Max. distance between two aspiration apertures (d)	12 m
Max. number of aspiration apertures per pipe system	14 units

Diameter of aspiration apertures

	Number of aspiration apertures						
	2	4	6	8	10	12	14
Item	Punching diameter of the aspiration reducing film sheet [mm]						
A	5.2	3.6	3.4	3.2	2.5	2.5	2.0
B	-	4.0	3.4	3.2	3.0	2.5	2.0
C	-	-	3.6	3.4	3.0	2.5	2.5
D	-	-	-	3.4	3.2	3.0	2.5
E	-	-	-	-	3.2	3.0	3.0
F	-	-	-	-	-	3.2	3.0
G	-	-	-	-	-	-	3.2

Trigger thresholds

Number of aspiration apertures	2	4	6	8	10	12	14
1 blocked aspiration aperture…	III	II	I	-	-	-	-
2 blocked aspiration aperture…	O	III	II	I	-	-	-
3 blocked aspiration aperture…	O	O	III	II	I	-	-
4 blocked aspiration aperture…	O	O	O	III	II	I	-
5 blocked aspiration aperture…	O	O	O	O	III	II	I
6 blocked aspiration aperture…	O	O	O	O	O	III	II
7 blocked aspiration aperture…	O	O	O	O	O	O	III
… identified when setting level x.							

- not possible

O not feasible

Example

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

NOTICE

For project planning in compliance with AS ISO 7240-20, level I or II airflow monitoring must be set.

5.3.1.3 M-pipe system

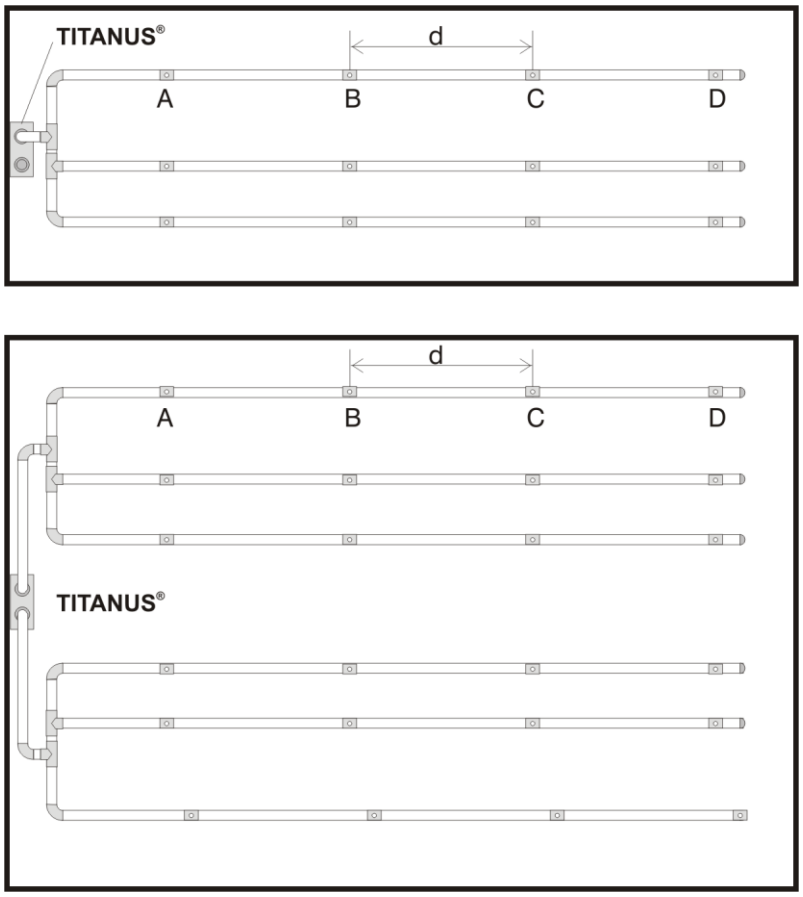


Figure 44: M-pipe system for single hole monitoring

Threshold values	
Min. distance between the device and the T-piece	4 m
Max. distance between the device and the T-piece	20 m
Max. branch lengths With low fan voltage 6.5 … 6.9 V With high fan voltage 9 … 12 V	 30 m 40 m
Max. total pipe length per pipe system With low fan voltage 6.5 … 6.9 V With high fan voltage 9 … 12 V	 110 m 140 m
Min. distance between two aspiration apertures (d)	4 m
Max. distance between two aspiration apertures (d)	12 m
Max. number of aspiration apertures per pipe system	12 units

Diameter of aspiration apertures

	Number of aspiration apertures			
	3	6	9	12
Item	Punching diameter of the aspiration reducing film sheet [mm]			
A	4.4	3.4	3.0	2.5
B	-	3.6	3.0	2.5
C	-	-	3.2	3.2
D	-	-	-	3.2

Trigger thresholds

Number of aspiration apertures	3	6	9	12
1 blocked aspiration aperture…	III	I	-	-
2 blocked aspiration aperture…	O	II	-	-
3 blocked aspiration aperture…	O	III	I	-
4 blocked aspiration aperture…	O	O	II	I
5 blocked aspiration aperture…	O	O	O	II
6 blocked aspiration aperture…	O	O	O	III
7 blocked aspiration aperture…	O	O	O	O
… identified when setting level x.				

- not possible

O not feasible

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

NOTICE

For project planning in compliance with AS ISO 7240-20, level I or II airflow monitoring must be set.

5.3.1.4 Double U-pipe system

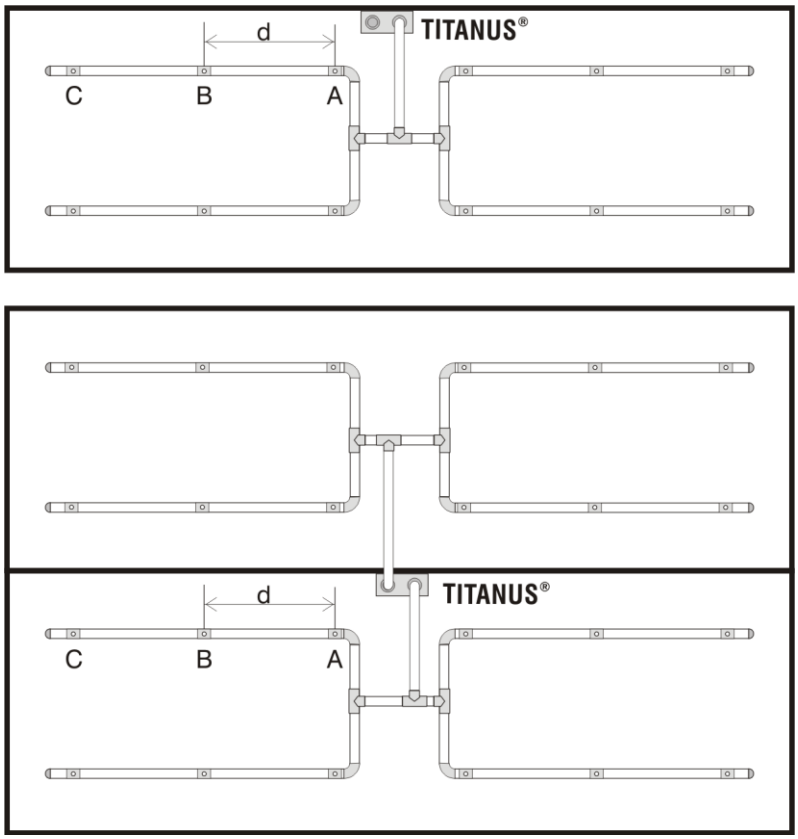


Figure 45: Double U-pipe system for single hole monitoring

Threshold values	
Min. distance between the device and the last T-piece	4 m
Max. distance between the device and the last T-piece	20 m
Max. branch lengths With low fan voltage 6.5 … 6.9 V With high fan voltage 9 … 12 V	 20 m 30 m
Max. total pipe length per pipe system With low fan voltage 6.5 … 6.9 V With high fan voltage 9 … 12 V	 100 m 140 m
Min. distance between two aspiration apertures (d)	4 m
Max. distance between two aspiration apertures (d)	12 m
Max. number of aspiration apertures per pipe system	12 units

Diameter of aspiration apertures

	Number of aspiration apertures		
	4	8	12
Item	Punching diameter of the aspiration reducing film sheet [mm]		
A	4.0	3.0	2.5

Trigger thresholds

Number of aspiration apertures	4	8	12
1 blocked aspiration aperture…	I	-	-
2 blocked aspiration aperture…	II	I	-
3 blocked aspiration aperture…	O	II	I
4 blocked aspiration aperture…	O	III	II
5 blocked aspiration aperture…	O	O	III
6 blocked aspiration aperture…	O	O	III
… identified when setting level x.			

- not possible

O not feasible

Example

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

NOTICE

For project planning in compliance with AS ISO 7240-20, level I or II airflow monitoring must be set.

5.3.2 Simplified pipe project planning

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

The specifications according to the chapter "Pipe project planning" apply for project planning. The following threshold values and opening diameters are also to be taken into account. Additional accessories (e.g. air filters, condensate separators) can influence the maximum pipe length.

5.3.2.1 I-pipe system

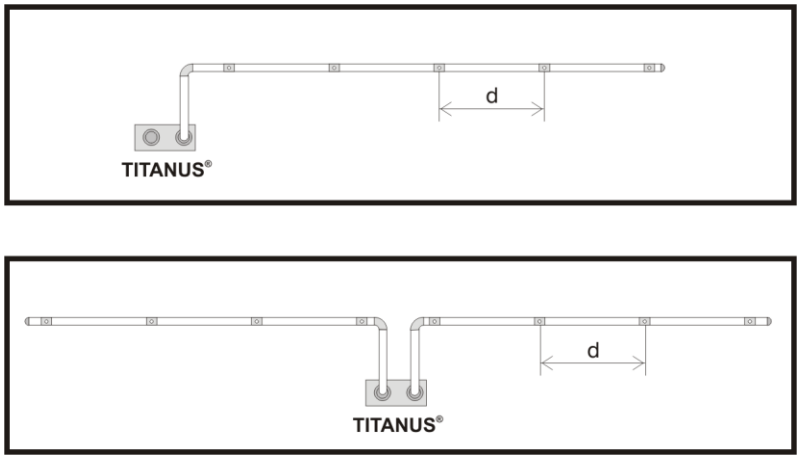


Figure 46: I-pipe system for simplified pipe project planning

Threshold values	
Min. clearance from device to first aspiration aperture	2 m
Max. clearance from device to first aspiration aperture	20 m
Max. distance: first aspiration aperture – last aspiration aperture	20 m
Max. overall pipe length Ø 25 mm	40 m
Min. distance between two aspiration apertures (d)	0.1 m
Max. distance between two aspiration apertures (d)	4 m
Max. number of aspiration apertures per pipe system	13 units

Diameter of aspiration apertures

Number of aspiration apertures											
2	3	4	5	6	7	8	9	10	11	12	13
Punching diameter of the aspiration reducing film sheet [mm]											
6.0	5.0	4.4	4.0	3.6	3.4	3.2	3.0	3.0	3.0	3.0	2.5

5.3.2.2 U-pipe system

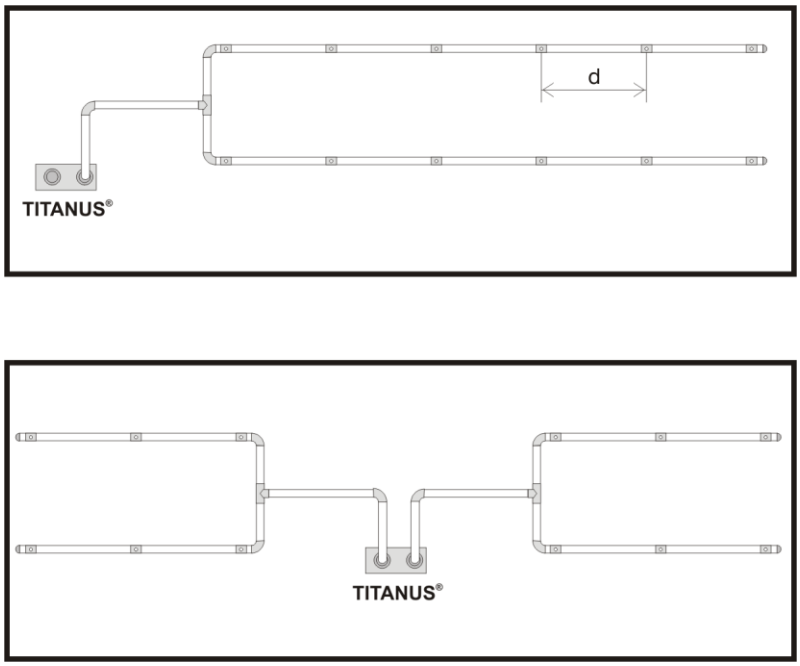


Figure 47: U-pipe system for simplified pipe project planning

Threshold values	
Min. distance between the device and the T-piece	2 m
Max. distance between the device and the T-piece	20 m
Max. branch lengths	20 m
Max. overall pipe length Ø 25 mm	60 m
Min. distance between two aspiration apertures (d)	0.1 m
Max. distance between two aspiration apertures (d)	4 m
Max. number of aspiration apertures per pipe system	18 units

Diameter of aspiration apertures

Number of aspiration apertures								
2	4	6	8	10	12	14	16	18
Punching diameter of the aspiration reducing film sheet [mm]								
6.0	4.4	3.6	3.2	3.0	3.0	2.5	2.5	2.5

5.3.2.3 M-pipe system

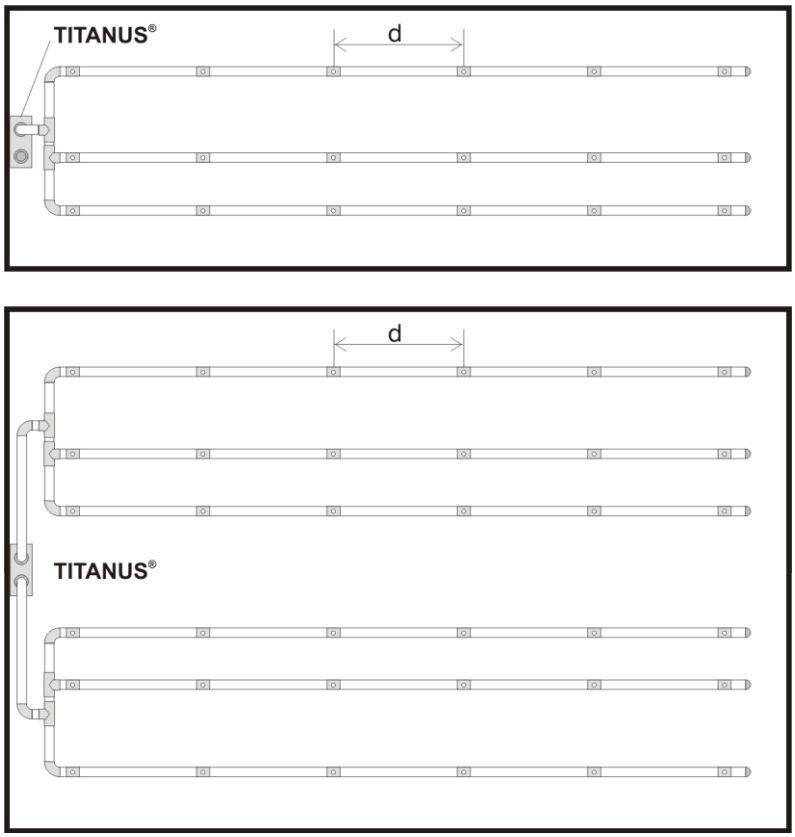


Figure 48: M-pipe system for simplified pipe project planning

Threshold values	
Min. distance between the device and the T-piece	2 m
Max. distance between the device and the T-piece	20 m
Max. branch lengths	20 m
Max. overall pipe length Ø 25 mm	80 m
Min. distance between two aspiration apertures (d)	0.1 m
Max. distance between two aspiration apertures (d)	4 m
Max. number of aspiration apertures per pipe system	18 units

Diameter of aspiration apertures

Number of aspiration apertures					
3	6	9	12	15	18
Punching diameter of the aspiration reducing film sheet [mm]					
5.0	3.6	3.0	3.0	2.5	2.5

5.3.2.4 Double U-pipe system

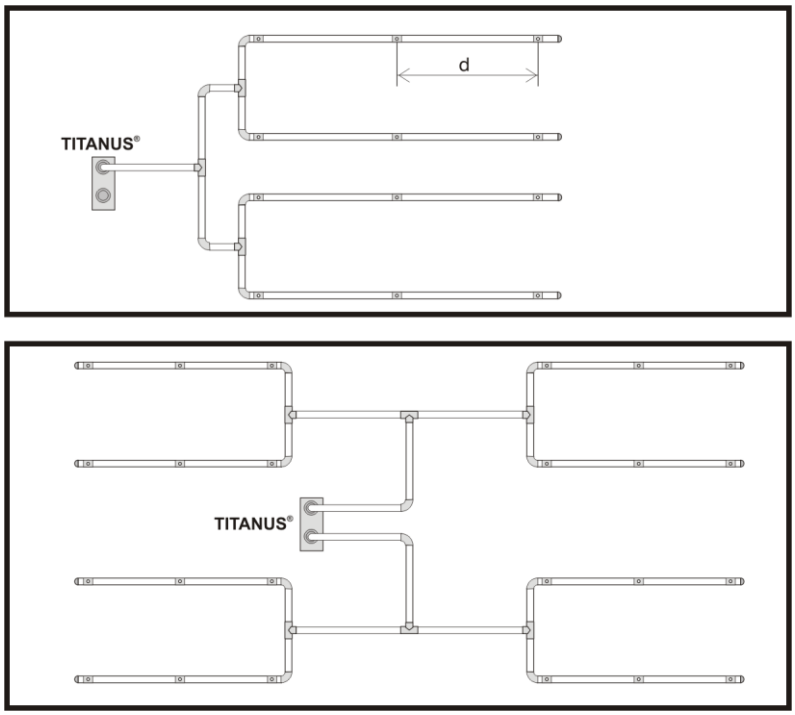


Figure 49: Double U-pipe system for simplified pipe project planning

Threshold values	
Min. distance between the device and the T-piece	2 m
Max. distance between the device and the T-piece	20 m
Max. branch lengths	20 m
Max. overall pipe length Ø 25 mm	100 m
Min. distance between two aspiration apertures (d)	0.1 m
Max. distance between two aspiration apertures (d)	4 m
Max. number of aspiration apertures per pipe system	20 units

Diameter of aspiration apertures

Number of aspiration apertures				
4	8	12	16	20
Punching diameter of the aspiration reducing film sheet [mm]				
4.0	3.4	3.0	2.5	2.0

5.3.3 Project planning with stubs

Project planning with stubs is suitable for aspiration apertures that are located away from the main path of the pipe system.

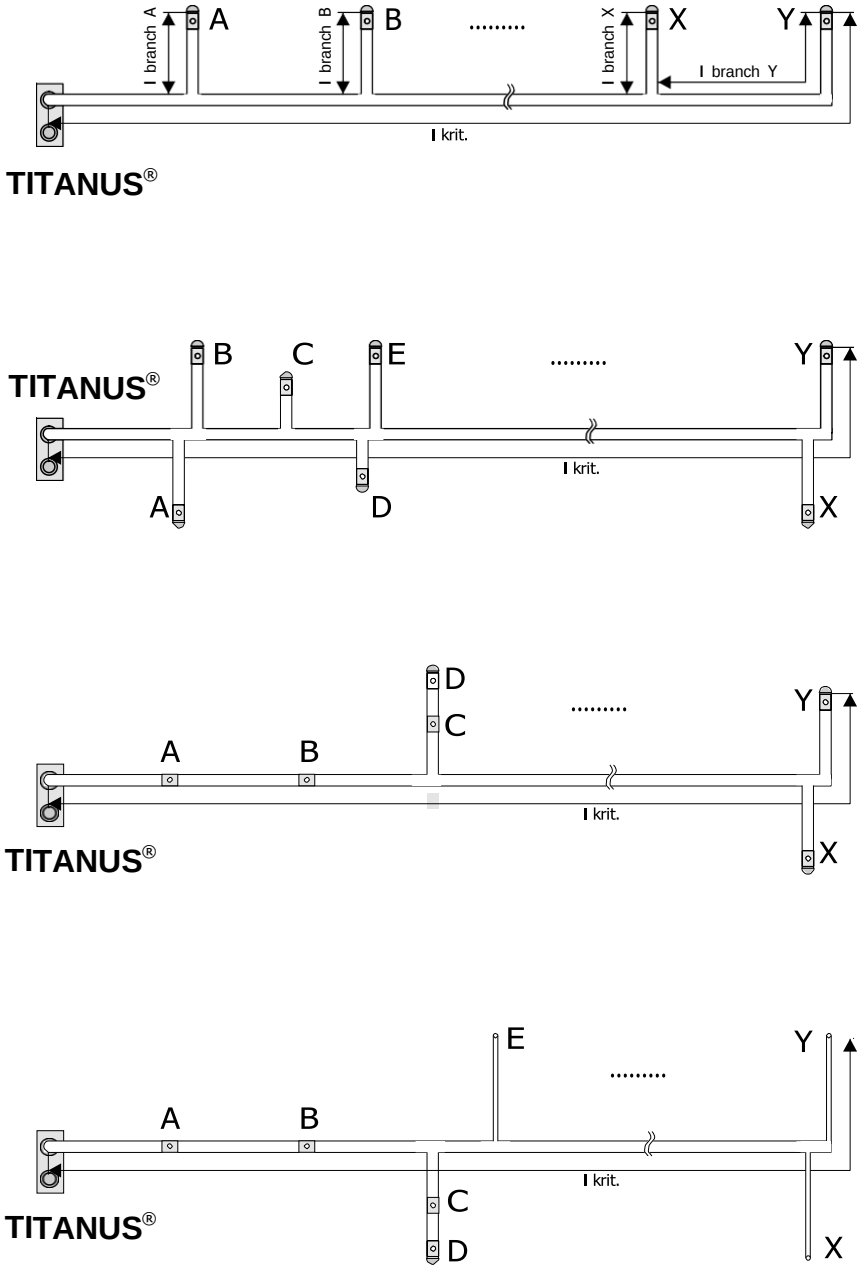


Figure 50: Project planning with stubs

The stubs must be planned based on the previous figure. The I-pipe project planning configurations shown in the diagram are to be transferred to the individual aspiration branches of other pipe shapes (U-, M-, double U- and quadruple U-pipe systems).

For project planning with stubs, it must be ensured that the "critical length" (lcrit.) of a stub does not exceed the permissible maximum overall pipe length or branch length (for U-, M-, double U-pipe systems). The aspiration aperture farthest from the TITANUS PRO·SENS® is referred to as the critical length. Stubs that are not part of the "critical length" are not added to the permissible overall pipe length.

A maximum of 2 aspiration apertures can be planned on each stub, whereby the minimum and maximum distance between the aspiration apertures must be considered.

Opening diameter

The opening diameters for the planned aspiration apertures according to the chapter "Opening diameter" apply.

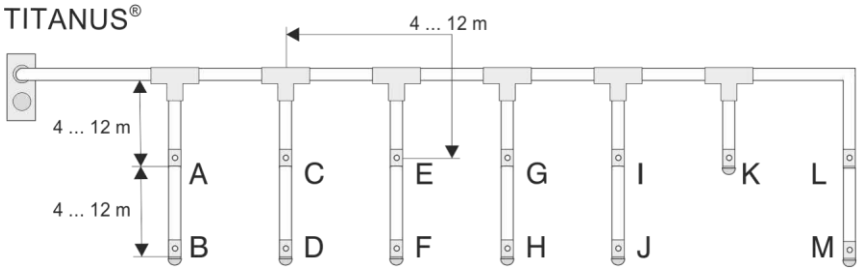


Figure 51: Opening distances for stubs

Opening distances

The distance between the T-piece and the following stubs as well as the pipe length between the aspiration apertures on the stubs must not exceed a maximum of 12 m.

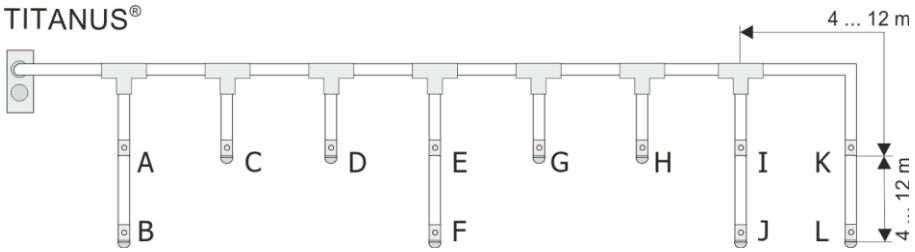


Figure 52: Maximum stub length

Maximum stub length

The maximum stub length is the pipe length from the last T-piece up to the last aspiration aperture. All other stubs have to be shorter. A maximum of 2 aspiration apertures may be planned on one stub.

TIP
If the maximum distance is exceeded, this can be rectified by an additional aspiration aperture on the stub. Note that a maximum of 2 aspiration apertures may be planned on one stub.

5.3.4 Project planning with pipe supply lines Ø > 25 mm

Projects with long pipe supply lines may only be planned using pipes of Ø 32 mm or Ø 40 mm.

NOTICE
The national provisions must be observed during project planning.

The pipe supply line is described as the pipe system between the aspirating smoke detector and the last T-piece (U-pipe and double U-pipe system) or the 1st aspiration aperture (I-pipe system).

General pipe project planning is limited by the use of long pipe supply lines as follows:

- 1 m pipe with ø 32 mm substitutes 2 m pipe with ø 25 mm
- 1 m pipe with ø 40 mm substitutes 3 m pipe with ø 25 mm

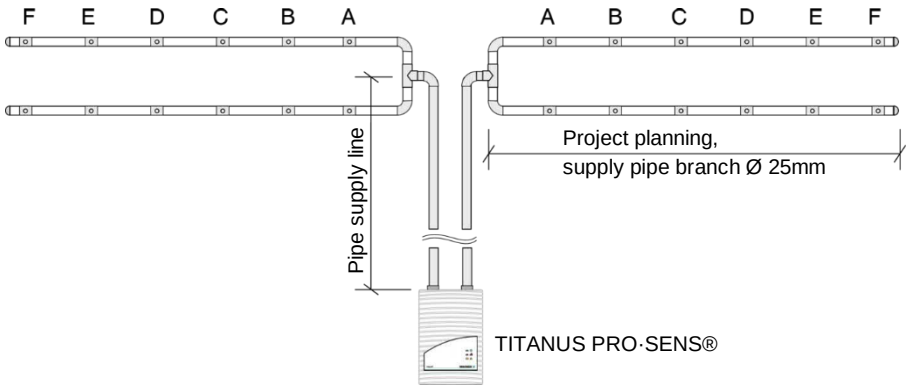


Figure 53: Example project planning for pipe supply lines with long pipe supply lines

5.3.5 Project planning with acceleration openings

The use of so-called acceleration openings is required to achieve the maximum pipe project planning. Acceleration openings are additional openings at the end of the pipe system, which aim to reduce the transport time of the smoke in the aspiration pipe.

When planning pipe systems with acceleration openings, the aspiration apertures for the respective pipe configuration is to be taken from the following table. Furthermore, the separate project planning tables for planning of aspirating smoke detectors with acceleration opening must be used (see chapter "Appendix").

NOTICE
Due to physical circumstances, the detection of a pipe break is reduced when using pipe systems with acceleration openings.

5.3.5.1 I-pipe system

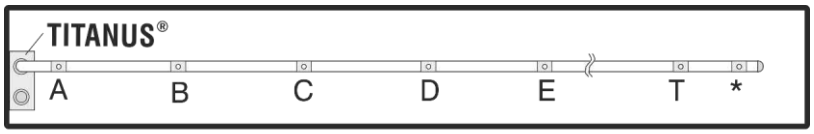


Figure 54: I-pipe system with acceleration opening

	Number of aspiration apertures									
	1	2	3	4	5	6	7	8	9	10
Item	Punching diameter of the aspiration reducing film sheets [mm]									
A	7.0	7.0	7.0	3.2	3.0	2.5	2.0	2.0	2.0	2.0
B	AO	7.0	7.0	7.0	3.8	3.0	2.5	2.0	2.0	2.0
C	-	AO	7.0	7.0	6.0	3.6	3.0	2.5	2.0	2.0
D	-	-	AO	7.0	7.0	5.6	3.6	3.0	2.5	2.0
E	-	-	-	AO	7.0	7.0	5.2	3.4	3.0	2.5
F	-	-	-	-	AO	7.0	7.0	5.0	3.6	3.2
G	-	-	-	-	-	AO	7.0	7.0	4.4	3.4
H	-	-	-	-	-	-	AO	7.0	7.0	4.0
I	-	-	-	-	-	-	-	AO	7.0	7.0
J	-	-	-	-	-	-	-	-	AO	7.0
K	-	-	-	-	-	-	-	-	-	AO
L	-	-	-	-	-	-	-	-	-	-
M	-	-	-	-	-	-	-	-	-	-
N	-	-	-	-	-	-	-	-	-	-
O	-	-	-	-	-	-	-	-	-	-
P	-	-	-	-	-	-	-	-	-	-
Q	-	-	-	-	-	-	-	-	-	-
R	-	-	-	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-	-	-	-
T	-	-	-	-	-	-	-	-	-	-
AO	-	-	-	-	-	-	-	-	-	-

AO = acceleration opening = 7.0 mm

	Number of aspiration apertures									
	11	12	13	14	15	16	17	18	19	20
Item	Punching diameter of the aspiration reducing film sheets [mm]									
A	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
B	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
C	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
D	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
E	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
F	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
G	3.0	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
H	3.4	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
I	3.6	3.2	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0
J	7.0	3.6	3.4	2.5	2.5	2.0	2.0	2.0	2.0	2.0
K	7.0	6.8	3.6	3.2	2.5	2.0	2.0	2.0	2.0	2.0
L	AO	7.0	6.8	3.2	3.4	2.5	2.0	2.0	2.0	2.0
M	-	AO	7.0	6.8	3.6	3.2	2.5	2.0	2.0	2.0
N	-	-	AO	7.0	6.0	3.6	3.0	2.5	2.0	2.0
O	-	-	-	AO	7.0	6.0	3.4	3.0	2.5	2.0
P	-	-	-	-	AO	7.0	6.0	3.4	3.0	2.5
Q	-	-	-	-	-	AO	7.0	5.6	3.4	2.5
R	-	-	-	-	-	-	AO	7.0	5.2	3.4
S	-	-	-	-	-	-	-	AO	7.0	5.0
T	-	-	-	-	-	-	-	-	AO	7.0
AO	-	-	-	-	-	-	-	-	-	AO

AO = acceleration opening = 7.0 mm

5.3.5.2 U-pipe system

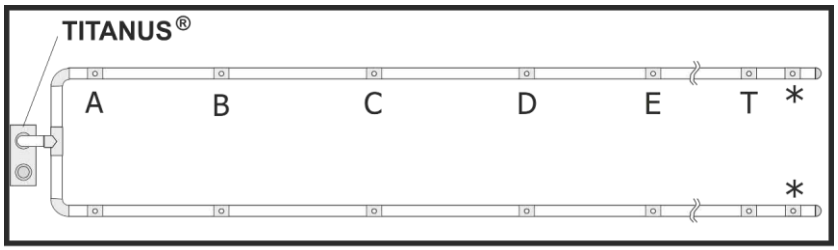


Figure 55: U-pipe with acceleration opening

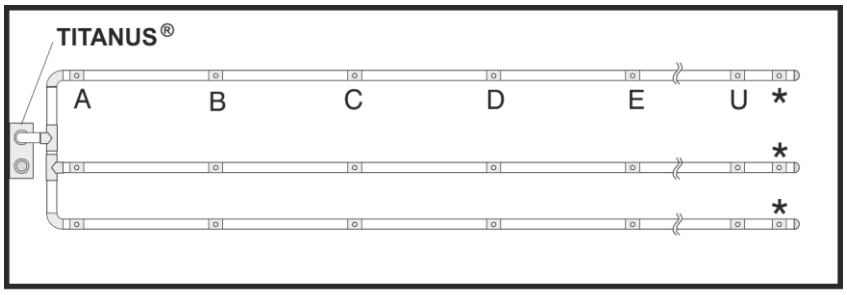
	Number of aspiration apertures									
	2	4	6	8	10	12	14	16	18	20
Item	Punching diameter of the aspiration reducing film sheets [mm]									
A	7.0	7.0	6.8	4.6	3.0	2.5	2.5	2.0	2.0	2.0
B	AO	7.0	7.0	5.0	3.6	2.5	2.5	2.5	2.5	2.5
C	-	AO	7.0	7.0	5.0	3.0	3.0	2.5	2.5	2.5
D	-	-	AO	7.0	7.0	5.0	3.0	3.0	2.5	2.5
E	-	-	-	AO	7.0	7.0	4.0	3.0	3.4	2.5
F	-	-	-	-	AO	7.0	7.0	3.6	3.4	2.5
G	-	-	-	-	-	AO	7.0	7.0	4.0	3.0
H	-	-	-	-	-	-	AO	7.0	6.0	4.0
I	-	-	-	-	-	-	-	AO	7.0	6.0
J	-	-	-	-	-	-	-	-	AO	7.0
K	-	-	-	-	-	-	-	-	-	AO
L	-	-	-	-	-	-	-	-	-	-
M	-	-	-	-	-	-	-	-	-	-
N	-	-	-	-	-	-	-	-	-	-
O	-	-	-	-	-	-	-	-	-	-
P	-	-	-	-	-	-	-	-	-	-
Q	-	-	-	-	-	-	-	-	-	-
R	-	-	-	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-	-	-	-
T	-	-	-	-	-	-	-	-	-	-
AO	-	-	--	-	-	-	-	-	-	-

AO = acceleration opening = 7.0 mm

	Number of aspiration apertures									
	22	24	26	28	30	32	34	36	38	40
Item	Punching diameter of the aspiration reducing film sheets [mm]									
A	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
B	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
C	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0	2.0	2.0
D	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.0
E	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.0
F	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
G	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
H	3.0	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
I	4.0	3.0	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
J	5.6	4.0	3.0	2.5	2.5	2.5	2.5	2.5	2.5	2.5
K	7.0	5.2	4.0	3.0	2.5	2.5	2.5	2.5	2.5	2.5
L	AO	7.0	5.0	4.0	3.0	2.5	2.5	2.5	2.5	2.5
M	-	AO	7.0	5.0	4.0	3.0	2.5	2.5	2.5	2.5
N	-	-	AO	7.0	5.0	4.0	3.0	2.5	2.5	2.5
O	-	-	-	AO	7.0	5.0	4.0	3.0	2.5	2.5
P	-	-	-	-	AO	7.0	5.0	4.0	3.2	2.5
Q	-	-	-	-	-	AO	7.0	5.0	4.0	3.2
R	-	-	-	-	-	-	AO	7.0	5.0	4.0
S	-	-	-	-	-	-	-	AO	7.0	5.0
T	-	-	-	-	-	-	-	-	AO	7.0
AO	-	-	-	-	-	-	-	-	-	AO

AO = acceleration opening = 7.0 mm

5.3.5.3 M-pipe system



* Acceleration apertures

Figure 56: M-pipe with acceleration opening

	Number of aspiration apertures										
	3	6	9	12	15	18	21	24	27	30	33
Item	Punching diameter of the aspiration reducing film sheets [mm]										
A	7.0	7.0	6.8	4.6	3.0	2.5	2.5	2.0	2.0	2.0	2.0
B	AO	7.0	7.0	5.0	3.4	2.5	2.5	2.5	2.5	2.5	2.0
C	-	AO	7.0	7.0	5.0	3.6	3.0	2.5	2.5	2.5	2.5
D	-	-	AO	7.0	7.0	4.6	3.4	3.0	2.5	2.5	2.5
E	-	-	-	AO	7.0	7.0	4.0	3.2	3.4	2.5	2.5
F	-	-	-	-	AO	7.0	6.8	3.6	3.4	2.5	2.5
G	-	-	-	-	-	AO	7.0	6.8	3.6	3.2	2.5
H	-	-	-	-	-	-	AO	7.0	6.0	3.6	3.4
I	-	-	-	-	-	-	-	AO	7.0	6.0	3.6
J	-	-	-	-	-	-	-	-	AO	7.0	5.6
K	-	-	-	-	-	-	-	-	-	AO	7.0
L	-	-	-	-	-	-	-	-	-	-	AO
M	-	-	-	-	-	-	-	-	-	-	-
N	-	-	-	-	-	-	-	-	-	-	-
O	-	-	-	-	-	-	-	-	-	-	-
P	-	-	-	-	-	-	-	-	-	-	-
Q	-	-	-	-	-	-	-	-	-	-	-
R	-	-	-	-	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-	-	-	-	-
T	-	-	-	-	-	-	-	-	-	-	-
U	-	-	-	-	-	-	-	-	-	-	-
AO	-	-	-	-	-	-	-	-	-	-	-

AO = acceleration opening = 7.0 mm

	Number of aspiration apertures									
	36	39	42	45	48	51	54	57	60	63
Item	Punching diameter of the aspiration reducing film sheets [mm]									
A	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
B	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
C	2.5	2.5	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0
D	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.0	2.0
E	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.0	2.0
F	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.0
G	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.0
H	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
I	3.4	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
J	3.6	3.0	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
K	5.0	3.6	3.0	2.5	2.5	2.5	2.5	2.5	2.5	2.5
L	7.0	4.6	3.6	3.0	2.5	2.5	2.5	2.5	2.5	2.5
M	AO	7.0	4.0	3.6	2.5	2.5	2.5	2.5	2.5	2.5
N	-	AO	7.0	3.6	3.0	3.0	2.5	2.5	2.5	2.5
O	-	-	AO	7.0	3.6	3.6	2.5	2.5	2.5	2.5
P	-	-	-	AO	7.0	3.6	3.0	2.5	2.5	2.5
Q	-	-	-	-	AO	6.0	3.6	2.5	2.5	2.5
R	-	-	-	-	-	AO	6.0	3.0	2.5	2.5
S	-	-	-	-	-	-	AO	6.0	3.0	2.5
T	-	-	-	-	-	-	-	AO	6.0	3.0
U	-	-	-	-	-	-	-	-	AO	6.0
AO	-	-	-	-	-	-	-	-	-	AO

AO = acceleration opening = 7.0 mm

5.3.5.4 Double U-pipe system

Figure 57: Double U-pipe with acceleration opening

	Number of aspiration apertures												
	4	8	12	16	20	24	28	32	36	40	44	48	52
Item	Punching diameter of the aspiration reducing film sheets [mm]												
A	7.0	7.0	6.8	4.6	3.0	2.5	2.5	2.0	2.0	2.0	2.0	2.0	2.0
B	AO	7.0	7.0	5.0	3.4	2.5	2.5	2.5	2.5	2.5	2.0	2.0	2.0
C	-	AO	7.0	7.0	5.0	3.6	3.0	2.5	2.5	2.5	2.5	2.5	2.5
D	-	-	AO	7.0	7.0	4.6	3.4	3.0	2.5	2.5	2.5	2.5	2.5
E	-	-	-	AO	7.0	7.0	4.0	3.2	3.4	2.5	2.5	2.5	2.5
F	-	-	-	-	AO	7.0	6.8	3.6	3.4	2.5	2.5	2.5	2.5
G	-	-	-	-	-	AO	7.0	6.8	3.6	3.2	2.5	2.5	2.5
H	-	-	-	-	-	-	AO	7.0	6.0	3.6	3.4	2.5	2.5
I	-	-	--	-	-	-	-	AO	7.0	6.0	3.6	3.4	2.5
J	-	-	-	-	-	-	-	-	AO	7.0	5.6	3.6	3.0
K	-	-	-	-	-	-	-	-	-	AO	7.0	5.0	3.6
L	-	-	-	-	-	-	-	-	-	-	AO	7.0	4.6
M	-	-	-	-	-	-	-	-	-	-	-	AO	7.0
N	-	-	-	-	-	-	-	-	-	-	-	-	AO
O	-	-	-	-	-	-	-	-	-	-	-	-	-
P	-	-	-	-	-	-	-	-	-	-	-	-	-
Q	-	-	-	-	-	-	-	-	-	-	-	-	-
R	-	-	-	-	-	-	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-	-	-	-	-	-	-
T	-	-	-	-	-	-	-	-	-	-	-	-	-
U	-	-	-	-	-	-	-	-	-	-	-	-	-
V	-	-	-	-	-	-	-	-	-	-	-	-	-
W	-	-	-	-	-	-	-	-	-	-	-	-	-
X	-	-	-	-	-	-	-	-	-	-	-	-	-
Y	-	-	-	-	-	-	-	-	-	-	-	-	-
AO	-	-	-	-	-	-	-	-	-	-	-	-	-

AO = acceleration opening = 7.0 mm

	Number of aspiration apertures											
	56	60	64	68	72	76	80	84	88	92	96	100
Item	Punching diameter of the aspiration reducing film sheets [mm]											
A	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
B	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
C	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
D	2.5	2.5	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0	2.0	2.0
E	2.5	2.5	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0	2.0	2.0
F	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0	2.0
G	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0	2.0
H	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0
I	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0
J	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.0	2.0	2.0
K	3.0	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.0	2.0	2.0
L	3.6	3.0	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.0	2.0
M	4.0	3.6	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.0	2.0
N	7.0	3.6	3.0	3.0	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.0
O	AO	7.0	3.6	3.6	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.0
P	-	AO	7.0	3.6	3.0	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Q	-	-	AO	6.0	3.6	2.5	2.5	2.5	2.5	2.5	2.5	2.5
R	-	-	-	AO	6.0	3.0	2.5	2.5	2.5	2.5	2.5	2.5
S	-	-	-	-	AO	6.0	3.0	2.5	2.5	2.5	2.5	2.5
T	-	-	-	-	-	AO	6.0	3.0	2.5	2.5	2.5	2.5
U	-	-	-	-	-	-	AO	6.0	3.0	2.5	2.5	2.5
V	-	-	-	-	-	-	-	AO	6.0	3.0	2.5	2.5
W	-	-	-	-	-	-	-	-	AO	6.0	3.0	2.5
X	-	-	-	-	-	-	-	-	-	AO	6.0	3.0
Y	-	-	-	-	-	-	-	-	-	-	AO	6.0
AO	-	-	-	-	-	-	-	-	-	-	-	AO

AO = acceleration opening = 7.0 mm

5.3.6 Project planning for forced airflow

Air conditioning duct monitoring

Air conditioning systems are distinguished between high-speed and low-speed systems. The information listed in this section only applies to low-speed systems. There are insufficient empirical values for high-speed systems. For that reason, smoke tests are to be conducted with air conditioning ducts having flow rates higher than 10 m/s and the optimum response characteristics are to be determined.

	Low-speed systems	High-speed systems
Flow speed [m/s]	Max. 6 to 10	> 10
Duct cross-section	High	Low
Pressure differential along the direction of flow	Low	High

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

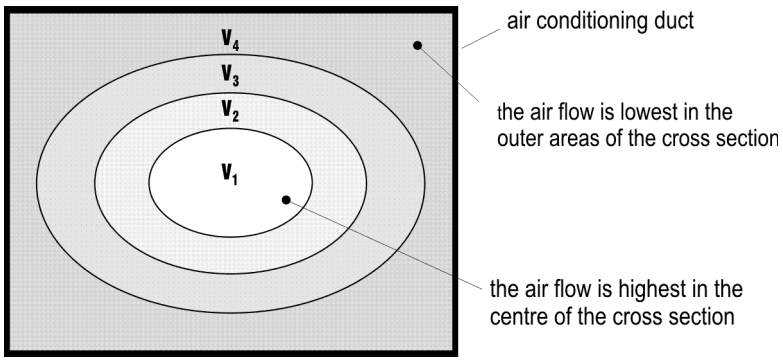


Figure 58: Speed distribution in an air conditioning duct

Aspiration

The pipe system must be arranged in area V_1 to V_3 to achieve optimum detection results.

Installation location of the pipe system

As installation location for the pipe system, the air exhaust duct is to be chosen. The installation location must be as far away as possible from silencers, air baffles and bends. The reference value for the distance from "obstacles" is: at least 3x minimum duct diameter.

If it is absolutely necessary to attach the pipe system directly behind baffles, silencers or elbows, the main flow speed areas are to be monitored.

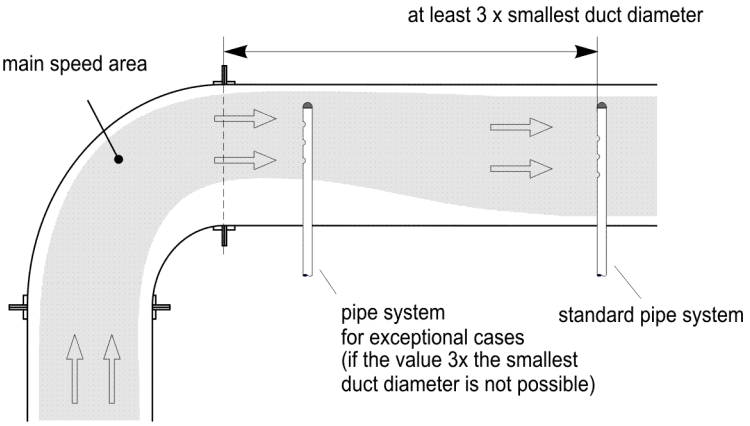


Figure 59: Change in direction of a duct without baffles

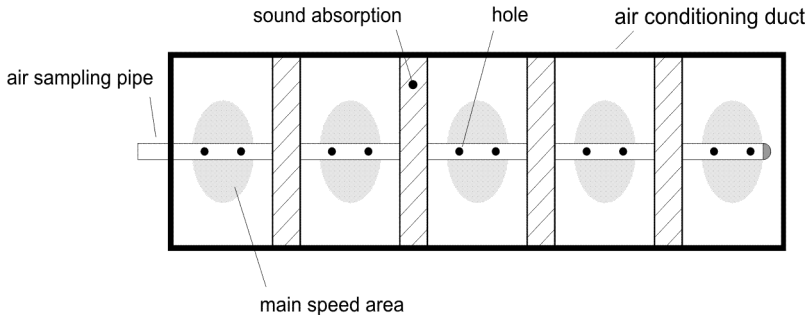


Figure 60: Silencer in a duct

The following must be observed when installing pipe systems in air conditioning ducts:

- Air return (see following page) is to 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.

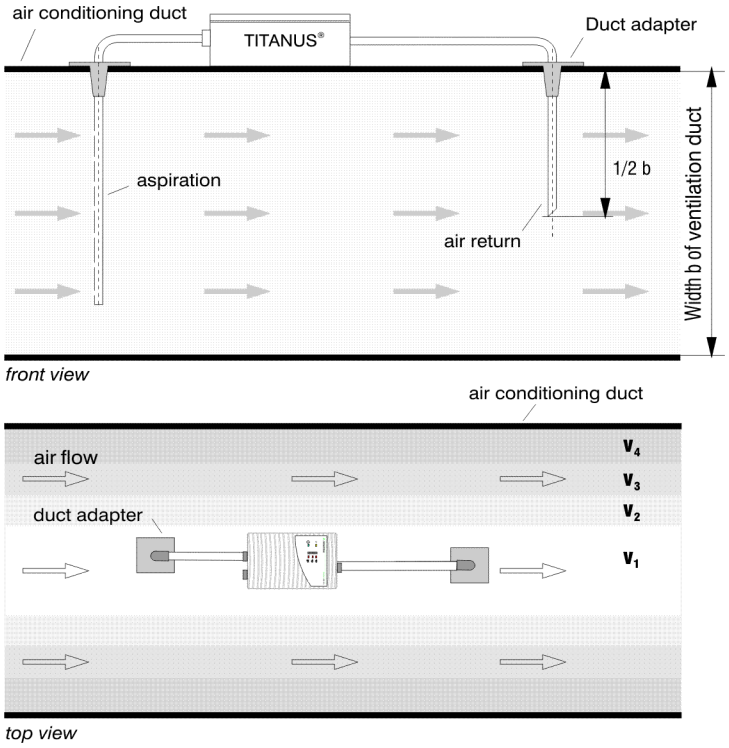


Figure 61: Air return

Air return

The air return must be positioned at a distance of at least 2 m from the aspiration. The open end of the air recirculation must be bevelled at a 45° angle.

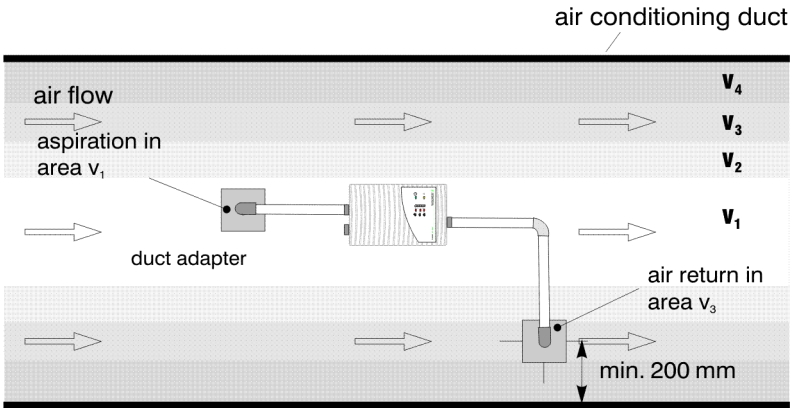


Figure 62: Offset arrangement of the air return line

The pipes must be offset if the distance of 2 m cannot be adhered to. In this way, a pressure drop between the supply air and the exhaust air is achieved as the pipes are located in different speed ranges.

Drill hole intervals

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

	Duct cross-section ≤ 0.5 m²	Duct cross-section > 0.5 m²
Distance of aspiration apertures from the wall	100 to 200 mm	200 to 300 mm
Mutual distance between aspiration apertures	100 mm	150 mm

Aspiration aperture diameter

The diameters of the aspiration apertures are obtained from the number of aspiration apertures. The precise value can be found in the chapter "Project planning" ➔ "Simplified pipe project planning".

The pipe connection is achieved with an end cap without drilling.

Arrangement

The aspiration apertures must be arranged against the airflow.

Note for the project planning that the air conditioning ducts for the installation of the pipe system are often only accessible from two sides.

Example

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

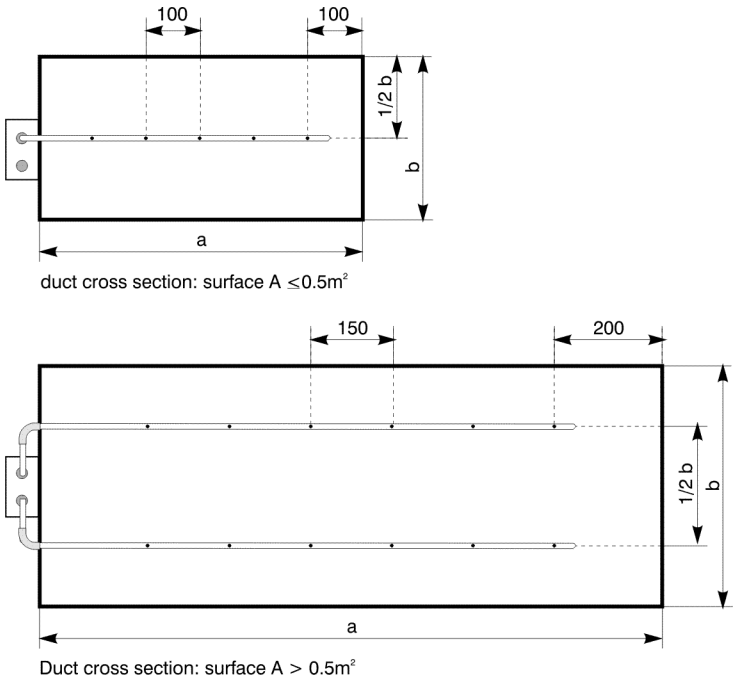


Figure 63: Ducts with small and large duct cross-section

5.3.7 Project planning with aspiration hose

The use of aspiration hoses can make sense if several changes of direction are required in a pipe system over short distances, e.g. to bypass obstacles such as ceiling beams.

As the use of aspiration hoses can have a negative impact on the transport time, the influence of the used aspiration hose on the permissible overall pipe length must be determined in advance.

Factors for calculation of lengths of aspiration hoses:

Aspiration hose Type SCH-PG16

Fan voltage [V]	Factor b
6.5	0.9
6.9	0.6

Aspiration hose Type SCH-P25

Fan voltage [V]	Factor b
6.5	0.3
6.9	0.3
≥9.0	No influence

Calculation

The length of the aspiration hose must be multiplied by the relevant factor b and subtracted from the permissible overall pipe length for the calculation of the maximum aspiration pipe length with aspiration hose.

Aspiration pipe length = overall pipe length – (length of aspiration hose * factor b)

Example 1

Overall, a type SCH-PG16 aspiration hose with a length of 22 m is connected to a TITANUS PRO·SENS® with a fan voltage of 6.9 V. The permissible overall pipe length for the entire pipe project planning is 120 m. This results in the following for the maximum aspiration pipe length including aspiration hose:

Aspiration pipe length = 120 m - (22 m * 0.6) = 106.8 m

Example 2 For the pipe project planning, a total of 100 m aspiration pipe and aspiration hose is connected to a TITANUS PRO·SENS® aspirating smoke detector with a fan voltage of 6.5 V. The permissible overall pipe length for the entire pipe project planning can be 120 m according to the project planning table. The following results for the maximum length of the overall aspiration hose type SCH-P25, which can be installed as part of the pipe project planning, after conversion of the formula:

Length of aspiration hose = (overall pipe length - aspiration pipe length) / factor b

Length of aspiration hose = (120 - 100 m) / 0.3 = 66.67 m

NOTICE

The overall aspiration pipe cannot consist of aspiration hose alone.

NOTICE

The aspiration hose must not be drilled (aspiration apertures) or glued (aspiration reducers).

5.3.8 Project planning with air return

In cases where there are air pressure differences between the area of the TITANUS PRO·SENS® and the area of the aspiration apertures, air return of the drawn-in sample air into the pressure area of the aspiration apertures may be necessary. For this, a correspondingly long aspiration pipe must be connected to the air outlet of the TITANUS PRO·SENS®.

As air return can have a negative effect on the transport time of the aspirating smoke detector, the effect of air return on the permissible overall pipe length must be considered.

Air return with a ø 40 mm pipe does not have any influence and can be planned and/or retrofitted without reducing the overall pipe length.

Consideration of air returns:

In order to calculate the maximum aspiration pipe length, the length of the air return must be multiplied with the respective factor a and subtracted from the permissible overall pipe length.

Aspiration pipe length = overall pipe length – (length of air return * factor a)

Factors for calculating the air return lengths (Ø 25 mm):

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

Factors for calculating the air return lengths (Ø 32 mm):

Length of the Air return	Fan voltage		
	6.5 V	6.9 V	≥9.0 V
0 to 5 m	0.0	0.3	0.0
>5 to 10 m	0.0	0.3	0.0
>10 to 25 m	0.2	0.3	0.0
>25 to 50 m	0.25	0.3	0.1

Example An air return (Ø 25 mm) of 22 m is connected to a TITANUS PRO·SENS® with a fan voltage of 6.9 V. The permissible overall pipe length for the pipe system is 120 m. The following results for the maximum aspiration pipe length:

Max. aspiration pipe length = 120 m – (22 m * 0.8) = 102.4 m

5.3.9 Energy supply

NOTICE

No standard conformity in case of wrong energy supply

The energy supply of the TITANUS PRO·SENS® must be approved in accordance with AS ISO 7240-4.

When configuring the external energy supply, the alarm-ready state and the alarm state of the connected units are taken into account. The state with the higher current consumption is decisive for selecting the energy supply.

Refer to the chapter "Technical data" for the current consumption values of the TITANUS PRO·SENS®.

Alarm state

Alarm current In the event of an alarm, the energy supply must supply the alarm current for:

- Connected devices
- Any connected accessories.

$$I_{Alarm} = n_1 \cdot I_{A1} + n_2 \cdot I_{A2} + \cdots + n_x \cdot I_{Ax}$$

I_{Alarm}	Alarm current [A]
n_1	Number of devices
I_{A1}	Alarm current of devices [A]
n_2	Number of accessories 2
I_{A2}	Alarm current/current consumption of accessories 2 [A]
n_x	Number of accessories x
I_{Ax}	Alarm current/current consumption of accessories x [A]

Alarm-ready state

In the alarm-ready state, the energy supply must ensure that the backup batteries are charged and supply the standby current for:

- Connected devices
- Any connected accessories

To be able to calculate the power supply current $I_{Netzteil}$ that is actually required for the alarm-ready state, the standby current I_{Ruhe} and the charging current have to be calculated first.

Standby current

$$I_{Ruhe} = n_1 \cdot I_{R1} + n_2 \cdot I_{R2} + \cdots + n_x \cdot I_{Rx}$$

I_{Ruhe}	Standby current [A]
n_1	Number of devices
I_{R1}	Standby current of device [A]
n_2	Number of accessories 2
I_{R2}	Standby current/current consumption of accessories 2
n_x	Standby current/current consumption of accessories x
I_{Rx}	Number of accessories x

To be able to calculate the charging current I_{Lade}, the required minimum capacity of the backup batteries $C_{min.}$ must be calculated first.

Minimum capacity of the backup batteries

Observe the relevant national laws, standards and directives. For Australia this is AS 1670.1 Fire detection, warning, control and intercom systems – System design, installation and commissioning – part 1 Fire. In accordance with these requirements, a hold-up time of 72 h (under certain conditions 24 h) with a subsequent alarm time of 30 min must generally be ensured by the backup power supply. Deviating hold-up times may be selected for applications that do not fall under these directives.

$$C_{min} = (I_{Alarm} \cdot t_1 + I_{Ruhe} \cdot t_2) \cdot 1{,}25$$

$C_{min.}$	Minimum required battery capacity [Ah]
I_{Alarm}	Alarm current [A]
t_1	Required alarm time (0.5 h)
I_{Ruhe}	Standby current [A]
t_2	Required hold-up time (30 h)
1.25	Safety factor, only consider for hold-up times <24 h

Nominal battery capacity

To select the required nominal battery capacity C_{Nenn}, consider the following criteria:

- Available nominal battery capacities > $C_{min.}$
- Possible nominal battery capacity according to the energy supply manufacturer
- Restrictions due to energy supply device approvals.

$$C_{min.} < C_{Nenn}$$

$C_{min.}$	Minimum required battery capacity [Ah]
C_{Nenn}	Actual nominal battery capacity [Ah]

Charging current

The following minimum charging current is required to charge the backup batteries to 80% of their nominal capacity within 24 h:

$$I_{Lade} = \frac{0{,}8 \cdot C_{Nenn}}{24\,h} \cdot 1{,}3$$

I_{Lade}	Required charging current [A]
$0{,}8$	80% in 24 h
C_{Nenn}	Nominal capacity of the backup batteries [Ah]
$1{,}3$	Charging factor due to thermal losses when charging the backup batteries

Power supply current

$$I_{Netzteil} \geq I_{Ruhe} + I_{Lade}$$

$I_{Netzteil}$	Power supply current for alarm-ready state [A]
I_{Ruhe}	Standby current [A]
I_{Lade}	Charging current [A]

Cable length and wire cross-section

The maximum cable length between the energy supply and the device is calculated based on the conductivity (cable material), the wire cross-section, the maximum current and the permissible drop in voltage on the device supply line.

To calculate the maximum cable length $L_{max.}$, the wire cross-section A has to be calculated first.

$$A = \frac{\pi \cdot d^2}{4}$$

A	Wire cross-section [mm²]
d	Wire diameter [mm]

The permissible drop in voltage on the device supply line is the difference between the end-point voltage of the backup batteries and the lower supply voltage of the TITANUS PRO·SENS®.

LITERATURE

You will find information on the end-point voltage in the technical data of the energy supply in use.

Refer to the chapter "Technical data" for the supply voltage of the TITANUS PRO·SENS®.

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

$L_{max.}$	Max. permissible cable length [m]
γ	Conductivity of the conductor used (e.g. Cu = 58 S · m/mm²)
ΔU	Max. permissible drop in voltage on the device supply line [V]
A	Wire cross-section [mm²]
I_{Ruhe}	Standby current of devices [A]

6 Installation

6.1 General information

The provisions, guidelines and terms listed in the chapter "Project planning" apply.

The following must be observed when installing the TITANUS PRO·SENS®:

1. Incursions, changes and modifications to equipment must be avoided. If adjustments are required, these must be arranged with the operating company, device manufacturer and/or supply company (written approval).
2. All incursions to the house mains (230 V/400 V supply) and third-party systems must be carried out on-site. This includes, for example:
   - The primary connections of the power supply units
   - Any connection to third-party systems (e.g. control panels)
   - Carrying out any potentially required lightning and surge protection measures according to the relevant standards.

6.2 Opening the TITANUS PRO·SENS®

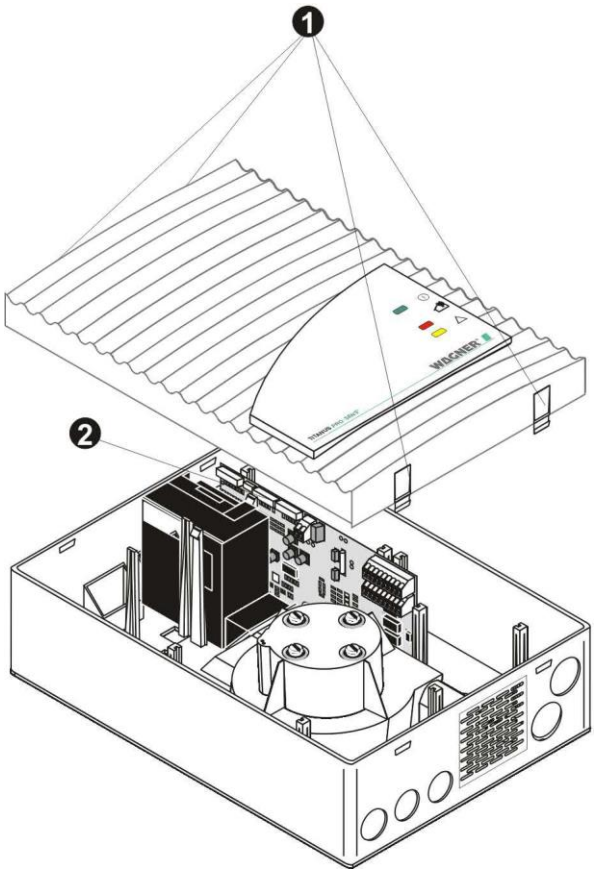


Figure 64: Opening the TITANUS PRO·SENS®

⚠ ATTENTION

The components on the basic board must be protected against damage due to static discharge.

To open the TITANUS PRO·SENS®, proceed as follows:

- ►Carefully unlock the clips on the housing using a flat-head screwdriver by simultaneously pressing in the closing flaps on one side. Then carefully lift the housing cover.
- ►Pull the display circuit board cable from the basic board. Now you can remove the housing cover.

6.3 Installing the first detector module

Only perform the following work with the device disconnected from the mains.

- ►Carefully unlock the clips on the housing using a flat-head screwdriver by simultaneously pressing in the closing flaps on one side. Then carefully lift the housing cover. Pull the cable from the display circuit board and remove the housing cover.
- ►Spread the two retaining clips (pipe connection I) apart and insert the new detector module. Both clips must be positioned against the detector module and audibly engage. Then press both retaining clips together again.
- ►Connect the detector module to the basic board using the ribbon cable. Connection: X1 (HEAD1)

NOTICE

Ensure the marking pen is positioned correctly before plugging the ribbon cable plug into the basic board.

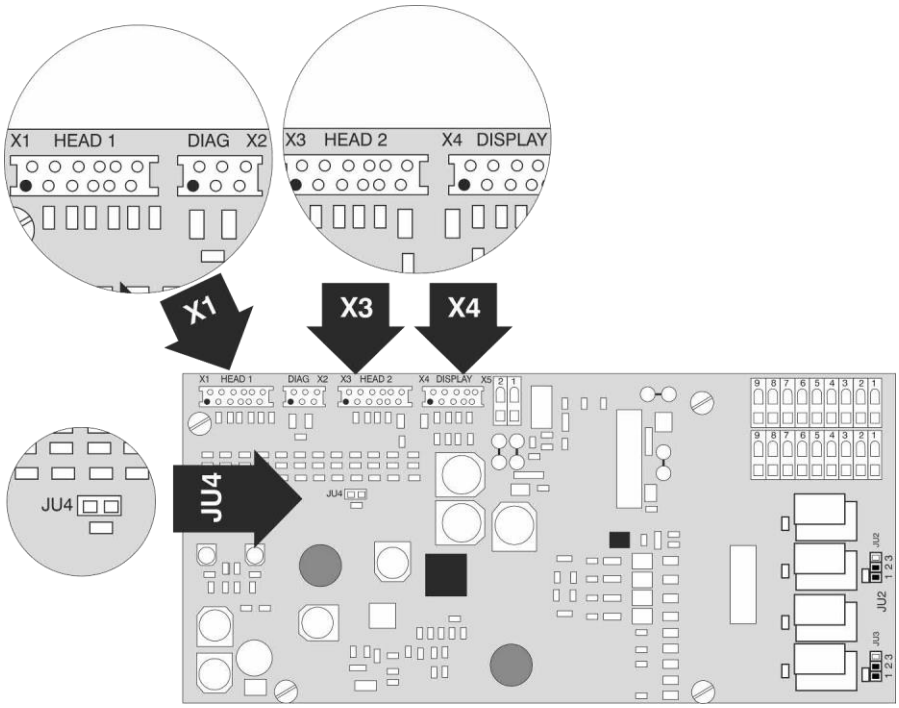


Figure 65: Connections, basic board X1, X3, X4 and JU4

- ▶Connect the display circuit board to the basic board.
  Connection: X4 (DISPLAY)
- ▶The operating voltage must be reconnected before initialisation. Press the flow init button on the detector module to initialise the pipe system.
- ▶Close the housing cover.

6.4 Settings

6.4.1 Detector module

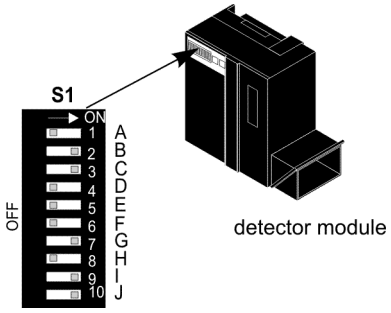


Figure 66: Standard settings on the detector module

6.4.1.1 Response sensitivity setting

The sensitivity of the detector module is generally set using switch S1 (1, 2) on the TITANUS PRO·SENS® detector module. The following table shows the response sensitivity (alarm) of the TITANUS PRO·SENS®.

Detector module type			DIL switch S1	
DM-TP-50 [% light obscuration/ m]	DM-TP-10 [% light obscuration/ m]	DM-TP-01 [% light obscuration/ m]	Contact 1	Contact 2
-	0.8	0.12	ON	ON
-	0.4 (Standard)	0.06 (Standard)	OFF	ON
1	0.2	0.03	ON	OFF
0.5 (Standard)	0.1	0.015	OFF	OFF

Table 2: Response sensitivity (main alarm)

6.4.1.2 Alarm trigger delay time

The delay time for alarm thresholds can be set using switch S1 (3, 4). The default setting for the alarm delay period is 10 s. If the smoke level rises during operation up to the alarm threshold, the delay time starts to run. The report is only transferred with the alarm still pending after expiry of the delay time. This means that an incorrect alarm can be prevented in case of short-term loads (e.g. dust).

Delay period [s]	DIL switch S1	
	Contact 3	Contact 4
0	OFF	OFF
10 (standard)	ON	OFF
30	OFF	ON
60	ON	ON

Table 3: Alarm trigger delay time

TIP
The alarm delay time is set to 0 s for test purposes only.

6.4.1.3 Trigger threshold for airflow monitoring

Set the trigger threshold for the airflow fault via the switch S1 (5, 6) on the TITANUS PRO·SENS® detector module.

Level	Trigger threshold	DIL switch S1	
		Contact 5	Contact 6
I	Low	ON	OFF
II	Medium (standard)	OFF	ON
III	High	OFF	OFF
IV	Very high	ON	ON

Table 4: Trigger threshold for airflow monitoring

Select the trigger threshold according to the chapter "Project planning".

6.4.1.4 Delay time for the airflow fault

Set the delay time for transmission of the fault message via switch S1 (7, 8) on the detector module of the TITANUS PRO·SENS®.

Delay period [min]	DIL switch S1	
	Contact 7	Contact 8
0.5	OFF	ON
2 (standard)	ON	OFF
15	ON	ON
60	OFF	OFF

Table 5: Delay time for the airflow fault

A delay time of 2 min is set as standard. In areas with brief disturbance variables (e.g. air pressure fluctuations), other delay times are set according to the duration of the disturbance variables.

6.4.1.5 Fault indicator

The display for collective faults (detector module and airflow fault) can be set to "saving" (default) or "non-saving". The setting is configured on the switch S1 (9) of the TITANUS PRO·SENS® detector modules.

Display setting	DIL switch S1 Contact 9
Saving (standard)	ON
Non-saving	OFF

Table 6: Fault indicator

6.4.1.6 LOGIC·SENS

The intelligent signal processor LOGIC·SENS is activated or deactivated using the switch S1 (10). When signal evaluation is switched on, LOGIC·SENS prevents false alarms by detecting disturbance variables which only occur for a brief period.

LOGIC·SENS	DIL switch S1 Contact 10
On (standard)	ON
Off	OFF

Table 7: LOGIC·SENS

6.4.1.7 Collective fault contact function

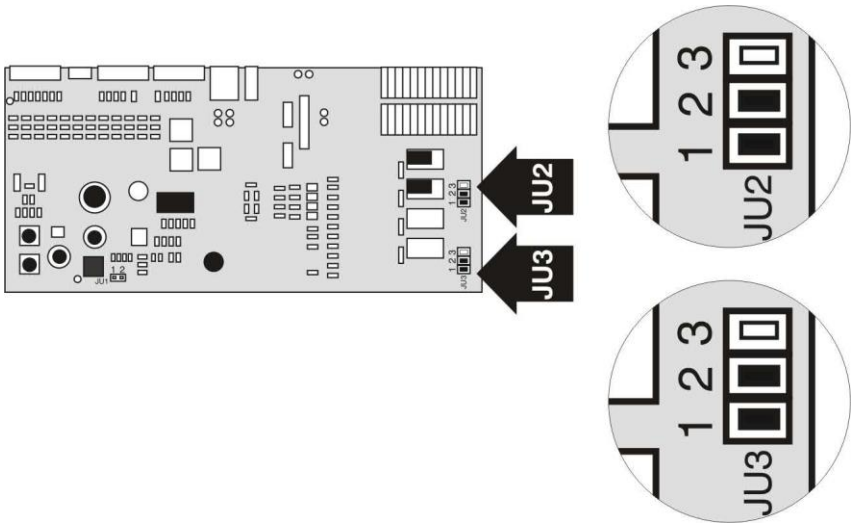


Figure 67: Jumper settings of the collective fault contact

The contact type (N/C or N/O contact) of the collective fault is set with jumpers JU2 and JU3. The contact type of the 1st fault contact is adjusted with jumper JU2 while the 2nd fault contact is adjusted with jumper JU3. The following table indicates the position of the jumpers.

Contact type	Jumper JU2		Jumper JU3	
	Pin pair 1+2	Pin pair 2+3	Pin pair 1+2	Pin pair 2+3
N/C contact (standard)	X	O	X	O
N/O contact	O	X	O	X

Table 8: Collective fault contact

X = pin pair jumped

O = pin pair open

6.4.1.8 Setting the fan voltage of TITANUS PRO·SENS®

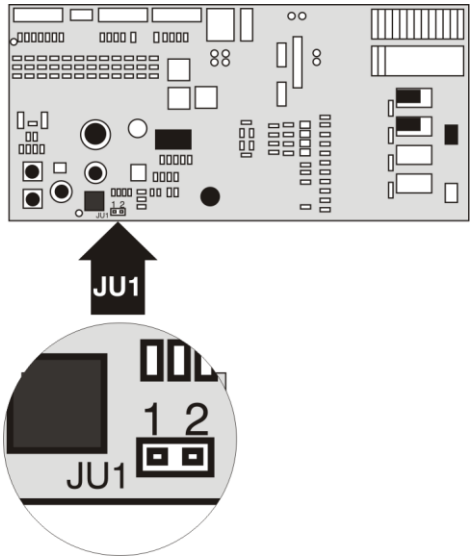


Figure 68: Switching the fan voltage on the basic board

The standard setting for the fan voltage is 6.9 V. In critical areas, the fan voltage can be switched from 6.9 V to 9 V by unplugging jumper JU1 in order to increase the transport speed in the pipe system and therefore to guarantee faster detection in case of greater pipe lengths.

⚠ ATTENTION

When changing the fan voltage, perform airflow initialisation again. Only close or open jumper JU1 when the device is switched off.

6.4.1.9 connection of the fan for TITANUS PRO·SENS®

The electrical connection of the fan is made using terminal strip X5 (FAN) on the TITANUS PRO·SENS® basic board.

- Connect the red fan connection cable to terminal strip X5 / terminal 1 (+).
- Connect the black fan connection cable to terminal strip X5 / terminal 2 (-).

NOTICE
Upon delivery of the TITANUS PRO·SENS®, the fan was connected in the factory.

6.4.1.10 Setting the fan voltage of TITANUS PRO·SENS®-SL

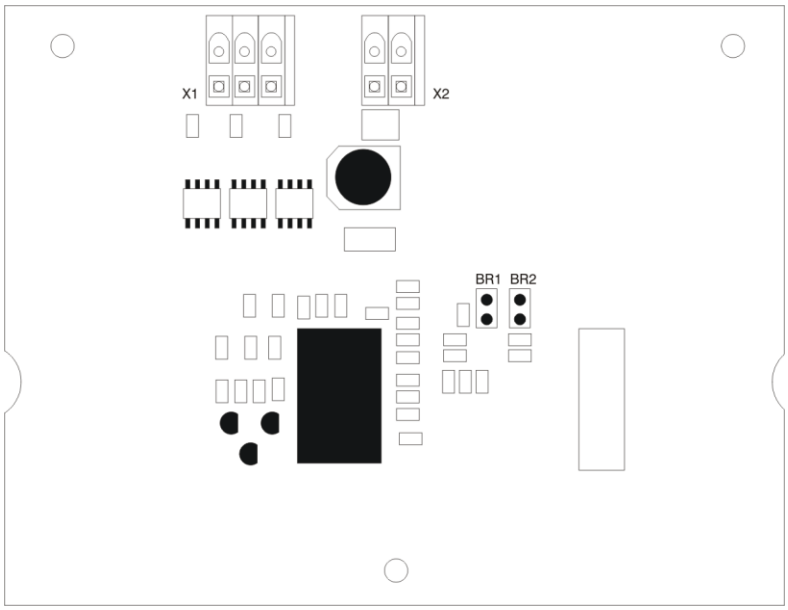


Figure 69: Switching the fan voltage and fan connection terminal strip on the FC-2 or FC-3 fan control circuit board

The standard setting for the fan voltage is 6.9 V. The fan voltage can be adjusted according to project planning by plugging or removing the BR1 and/ or BR2 bridges. The symbols used mean:

X = pin pair jumped

O = pin pair open

Fan voltage setting with FC-2 [V]	Bridge BR1 Pin. no 1+2	Bridge BR2 Pin. no 1+2
6.5	O	X
6.9 (standard)	X	O
9	O	O

Fan voltage setting with FC-3 [V]	Bridge BR1 Pin. no 1+2	Bridge BR2 Pin. no 1+2
10	O	X
11 (standard)	X	O
12	O	O

⚠ ATTENTION

Jumper JU1 on the basic board must always be unplugged.

⚠ ATTENTION

When changing the fan voltage, perform airflow initialisation again. Only close or open bridge BR1 and BR2 when the device is switched off.

6.4.1.11 Connection of the fan on TITANUS PRO·SENS®-SL

The electrical connection of the fan control circuit board is made using terminal strip X5 (FAN) on the TITANUS PRO·SENS® basic board.

The electrical connection of the fan is made using terminal strip X1 (FAN) on the fan control circuit board.

- Connect terminal 1 of terminal strip X5 on the basic board to terminal 2 (+) of terminal strip X2 on the fan control circuit board.
- Connect terminal 2 of terminal strip X5 on the basic board to terminal 1 (-) of terminal strip X2 on the fan control circuit board.
- Connect the brown fan connection cable to terminal strip X1 / terminal 1 of the fan control circuit board.
- Connect the yellow fan connection cable to terminal strip X1 / terminal 2 of the fan control circuit board.
- Connect the purple fan connection cable to terminal strip X1 / terminal 3 of the fan control circuit board.

NOTICE

Upon delivery of the TITANUS PRO·SENS®, the fan was connected in the factory.

6.5 Installing the reset circuit board

The reset circuit board can be optionally used in the TITANUS PRO·SENS®. The installation of reset circuit board in the housing is carried out using a mounting plate (see installation kit for additional modules type KT-HS-1). If several TITANUS PRO·SENS® are connected to a detector line, the reset circuit board is only installed in the last TITANUS PRO·SENS® of the detector line. The electrical connection of the reset circuit board is made according to the circuit diagram in the chapter "Electrical connection".

NOTICE

The reset circuit board can only be used when the standby current of the detector line is between 5 mA and 50 mA and the detector line end is formed by an Ohm resistance. The reset impulse is triggered if the line voltage falls below 3 V when resetting the control panel.

Line standby current

The standby current I_R of the detector line must be calculated as shown below:

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

I_R	Standby current of the detector line in [A]
U_L	Detector line voltage in [V]
R_E	Original termination resistor of the detector line in [Ω]

The shown formulas for calculation of the termination resistor and the standby current of the detector line take the ideal state of signal evaluation into consideration. If no acknowledgement is achieved by means of the calculated termination resistor of the reset circuit board, the value of the termination resistor must be reduced by approx. 20%.

Termination resistor

The reset circuit board emulates the detector line termination resistor. It is recalculated and installed on the reset circuit board (connection X1). The value of the termination resistor R_{ER} is calculated as shown below:

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

R_{ER}	Termination resistor in the reset circuit board in [Ω]
U_L	Detector line voltage in [V]
I_R	Standby current of the detector line in [A]

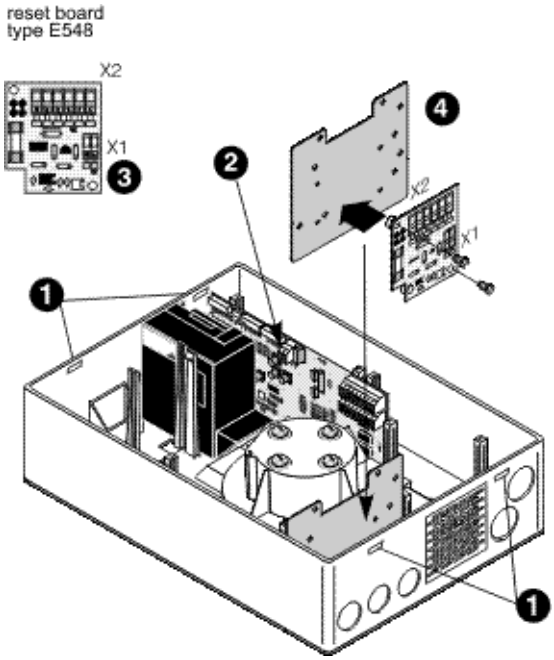


Figure 70: Installing the reset circuit board in the TITANUS PRO·SENS®

Installation

The following work steps must be performed for installation of the reset circuit board in the TITANUS PRO·SENS®:

- ▶Carefully unlock the clips on the housing using a flat-head screwdriver by simultaneously pressing in the closing flaps on one side. Then carefully lift the housing cover.
- ▶Pull the display circuit board cable from the connection circuit board and remove the housing cover.
- ▶Insert the calculated termination resistor (termination resistor is not supplied, power ¼ W) R_{ER} into connection terminal X1.
- ▶Fixing the reset circuit board to the mounting plate (installation kit for additional module type KT-HS-1) with 2 plastic spacers (enclosed with the reset circuit board).
- ▶Fit the mounting plate equipped with the reset circuit board in the TITANUS PRO·SENS® housing at the position marked in the figure.
- ▶Perform electrical connection of the reset circuit board according to the circuit diagram, see chapter "Electrical connection" (connection X2).
- ▶Reconnect the display circuit board cable to the connection circuit board and reattach the housing cover.
- ▶Fasten the cover again by letting the clips click in.

NOTICE
The reset circuit board can only be fitted at the above-described position due to its height.

6.6 Installation location

6.6.1 Installation

When choosing the installation location, make sure that…

- …the displays are clearly visible.
- …it is not within the opening range of doors.

Screw the aspirating smoke detector either directly to a wall using the base shell or install it using a special bracket (see chapters "Technical description" and "Device brackets").

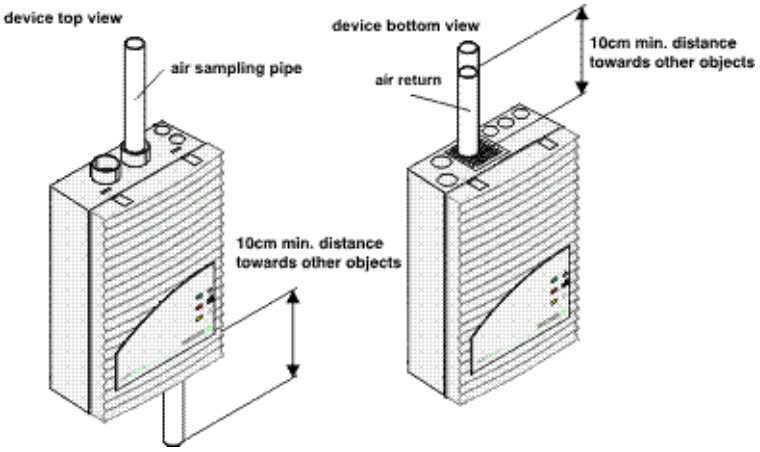


Figure 71: Installing the TITANUS PRO·SENS®

Make sure that air outlet from the aspirating smoke detector is not obstructed. Maintain a distance of at least 10 cm between the air outlet of the TITANUS PRO·SENS® and surrounding components (e.g. wall projection).

The TITANUS PRO·SENS® can be installed with the air inlet pointing up or down. Rotate the cover accordingly by 180°.

Aspiration downwards

If the TITANUS PRO·SENS® is fitted with the air inlet pointing downwards, make sure that no foreign particles and no dripping water can enter the air outlet opening, which is then pointing up. Use a short pipe angled down for this.

Installation materials

TITANUS PRO·SENS®	Cylinder or flat-head screws - Thread diameter: max. 6 mm - Head diameter: max. 10 mm
Bracket (Type MT-1)	4x cylinder or flat-head screws – Thread diameter: 4 mm 4x washers – Diameter: 9 mm – Drill hole diameter: 4.3 mm 4x hexagon nuts

Drill hole intervals

The distances of the drill holes are shown in the following figures (all dimensions in mm).

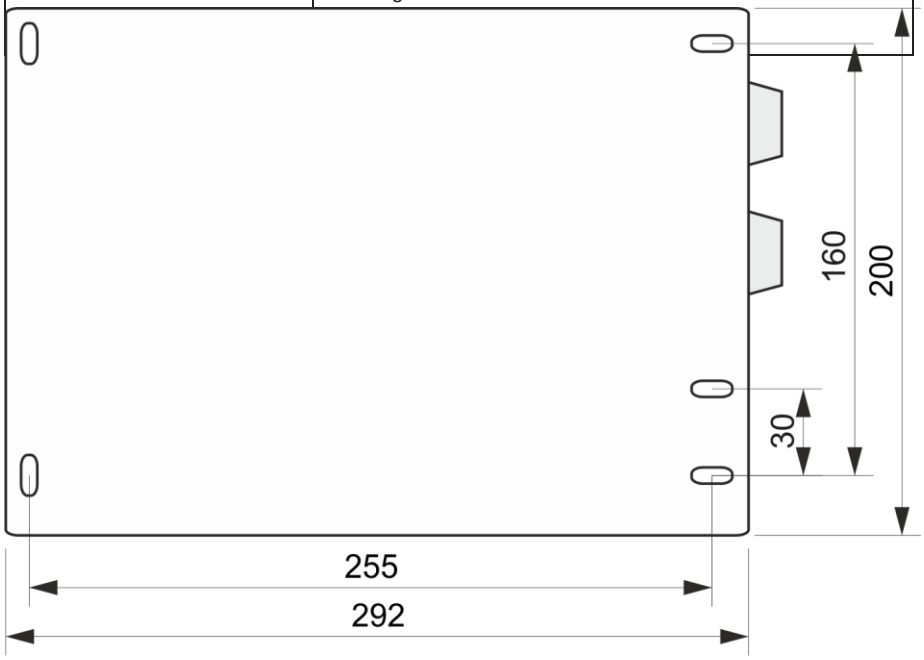


Figure 72: Drill hole intervals TITANUS PRO·SENS® without bracket

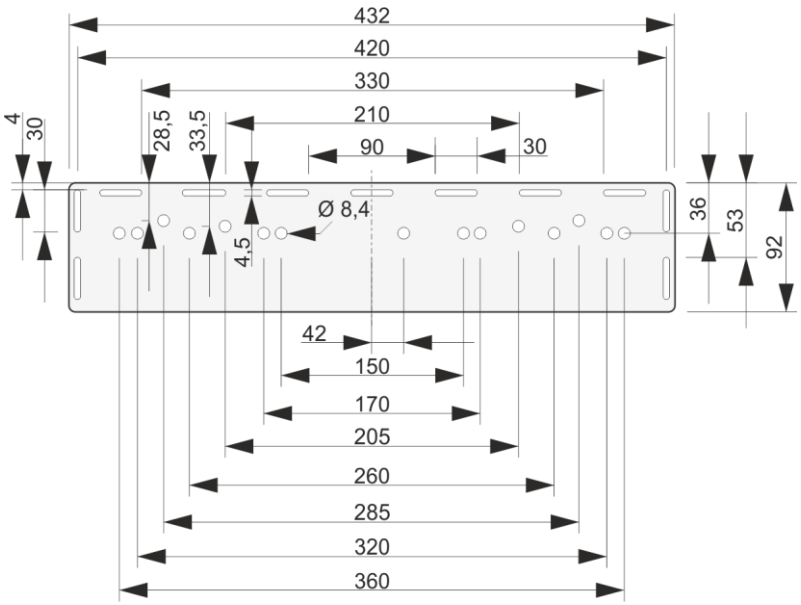


Figure 73: Drill hole intervals for bracket type MT-1 [mm]

6.6.2 Aspiration pipe connection

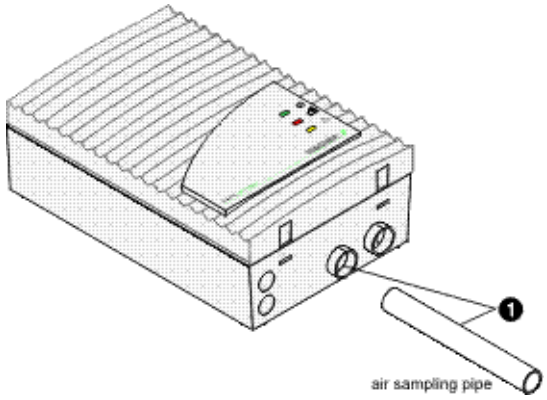


Figure 74: Connecting the aspiration pipe to the TITANUS PRO·SENS®

► Insert the aspiration pipe into the pipe connection provided in order to connect the aspiration pipe to the TITANUS PRO·SENS® (see figure "Aspiration pipe connection").

NOTICE
Never use glue to join the aspiration pipe and the pipe connections. If there are great variations in temperature, the pipe must be attached very close to the air filter, so that the pipe does not come out of the pipe connections due to fluctuations in length which may occur (see chapter "Installing the pipe system" ➔"Length alterations on the pipe system").

6.7 Electrical connection

The following steps must be initially performed to prepare the electrical connections:

- ►Break through the necessary number of cable glands (e.g. with a screwdriver).
- ►Insert the M20/M25 membrane cable entries (device accessories kit) into the corresponding cable glands.
- ►Feed the cables through the corresponding cable entries.

NOTICE

The device comes with one M20 and two M25 membrane cable entries.

The electrical connection is made via terminal strips X6 – X7 on the TITANUS PRO·SENS® basic board. Observe the permissible cable diameters of the cable entries and the permissible wire cross-sections of the terminals (max. 1.5 mm² wires).

⚠ ATTENTION

Perform all connection work with the device disconnected from the mains.

NOTICE

In order to maximise fault protection, use shielded cables for the external cabling of the device.

6.7.1 Connecting a FDCP, with reset button

The relay contacts on the basic board can be used e.g. to connect a FDCP or activate signal devices and control systems. A response indicator can also be connected here.

NOTICE

The reset input must not be permanently switched with +24 V, as otherwise all messages, including alarms, are reset automatically as soon as the cause for the message was fixed. In this case, the alarm is "non-saving".

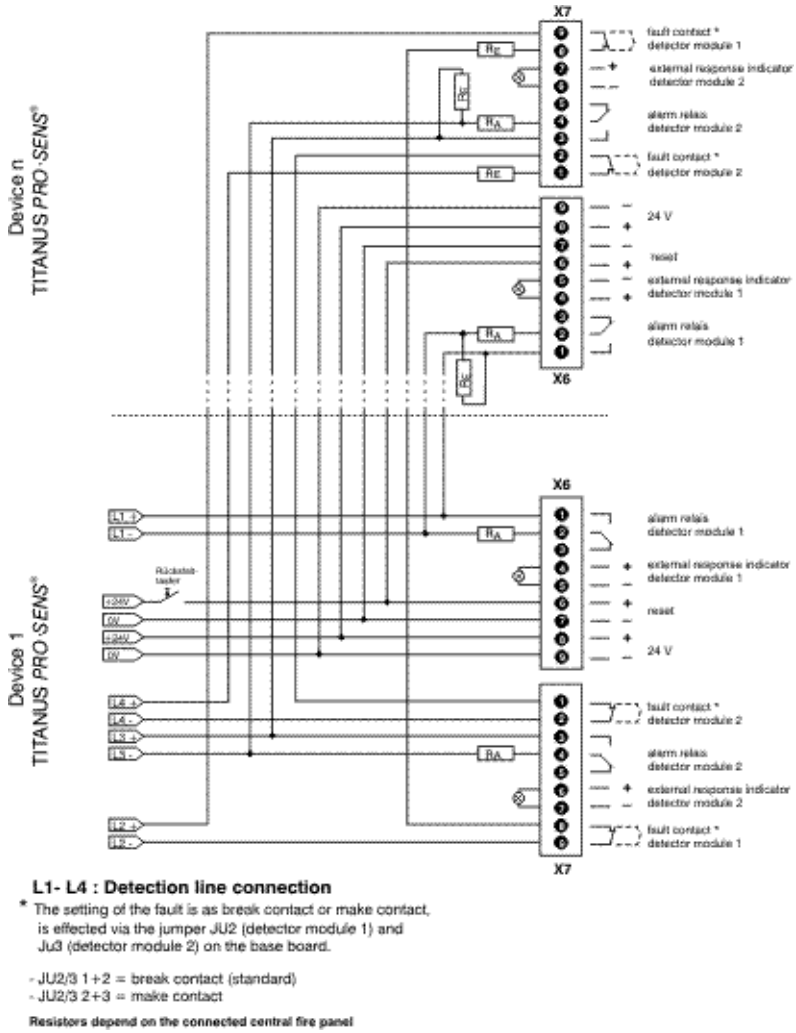


Figure 75: Example connection with FDCP and reset button

6.7.2 Connecting several TITANUS PRO·SENS® without FDCP, with reset button

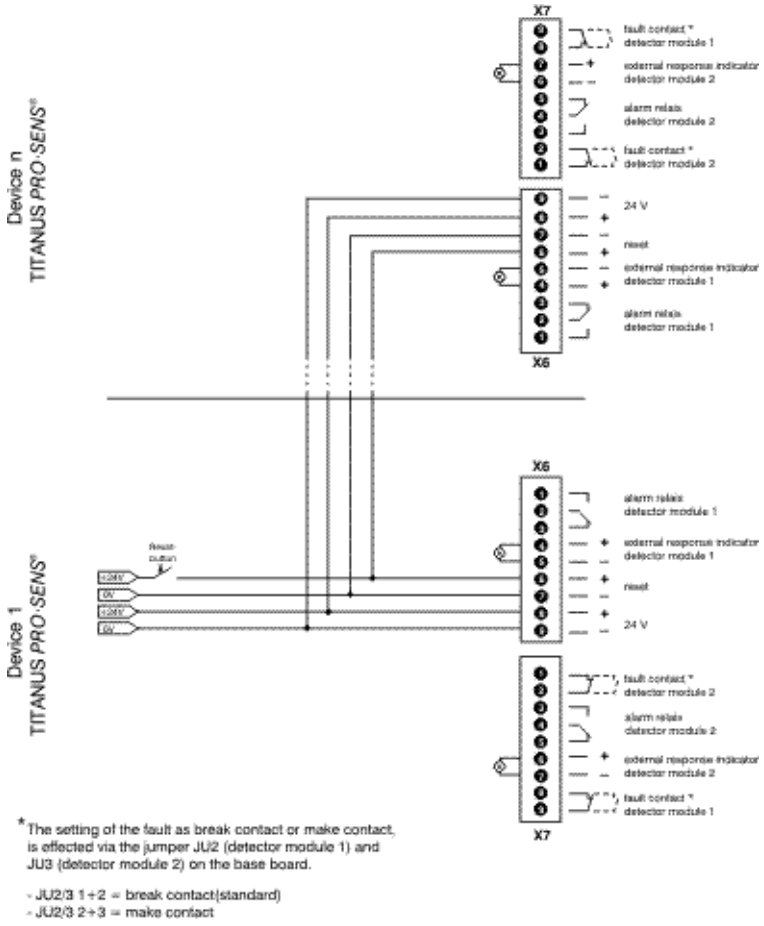


Figure 76: Example connection of several devices without FDCP, with reset button

6.7.3 Connecting a FDCP, with reset circuit board

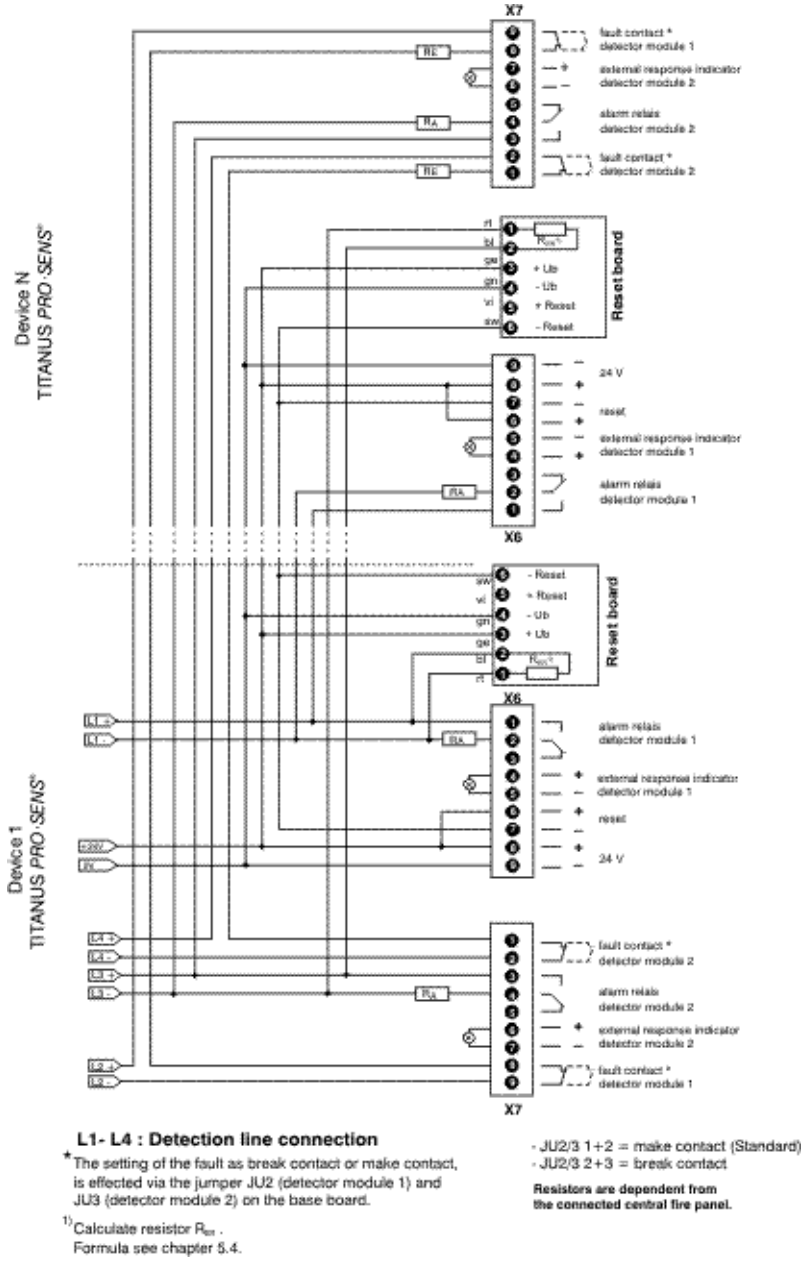


Figure 77: Example connection to FDCP with reset circuit board

⚠ ATTENTION

The fault indicator must be set to "non-saving" (see section "Fault display settings").

6.8 Installing the second detector module

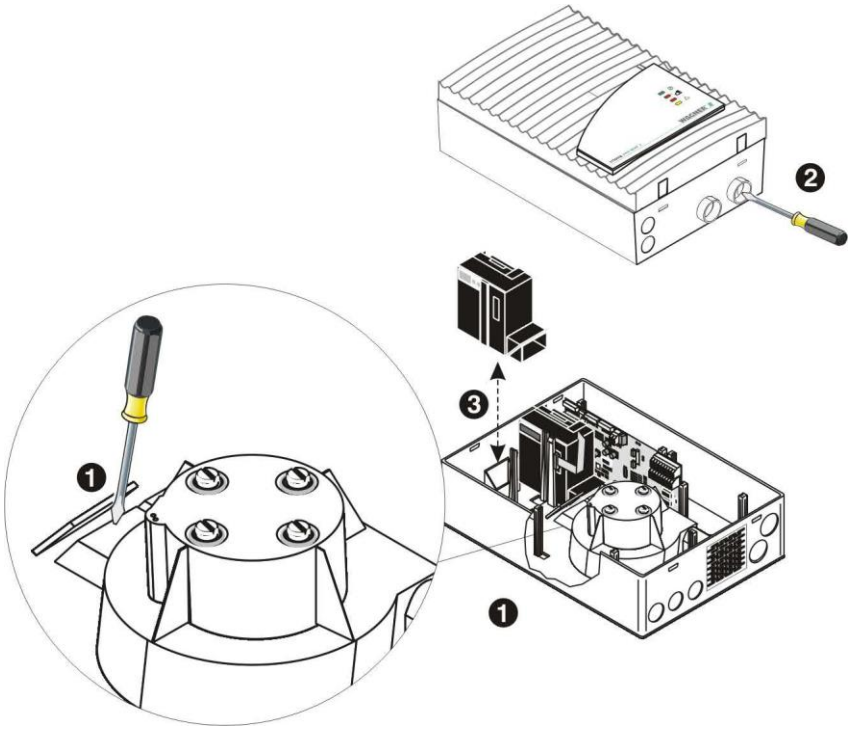


Figure 78: Installing detector module II

- ►Only perform the following work with the device disconnected from the mains.
- ►Carefully unlock the clips on the housing using a flat-head screwdriver by simultaneously pressing in the closing flaps on one side. Then carefully lift the housing cover. Pull the cable from the display basic board and remove the housing cover.
- ►Carefully remove the fan cover for the aspiration duct (self-adhesive plastic cover). Use a screwdriver if required.
- ►Carefully break the seal on the housing for connection of the second pipe system (predetermined breaking point marked with "II") using a screwdriver.
- ►Spread the two retaining clips and insert the new detector module. Both clips must be positioned against the detector module and audibly engage. Then press both retaining clips together again.
- ►Unplug the jumper JU4 from the basic board.

►Connect the detector module to the basic board using the ribbon cable.
Connection: X3 (HEAD 2)

NOTICE

Ensure the marking pen is positioned correctly before plugging the ribbon cable plug into the basic board.

►Connect the display circuit board to the basic board.
Connection: X4 (DISPLAY)

►The operating voltage must be reconnected before initialisation. Press the flow init button on the detector module to initialise the pipe system.

►Close the housing cover.

►Replace the front film sheet.

NOTICE

The front film sheet must be replaced when upgrading to the TITANUS PRO·SENS®.

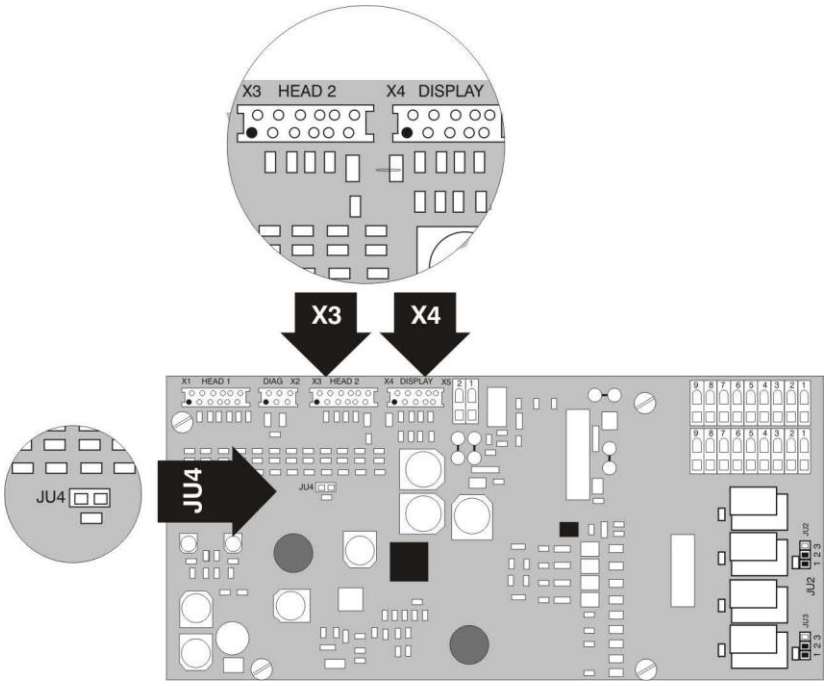


Figure 79: Connections, basic board X3, X4 and JU4

6.9 Response indicator – electrical connection

Connect the response indicator using terminal strip X6 on the basic board in the TITANUS PRO·SENS®. Observe the permissible cable diameters of the respective screw connection and the permissible wire cross-sections of the terminals (see chapter ➔ "Technical data").

Connect the response indicator to the TITANUS PRO·SENS® with the device disconnected from the mains as follows:

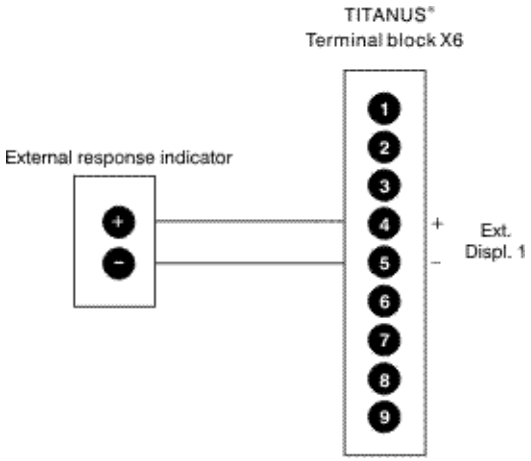


Figure 80: Connection of the response indicator to the TITANUS PRO·SENS®

6.10 Data logging

A device test can be performed using the diagnostic software. Various status values can be read out for the current airflow sensor data, which facilitates the detection of changed operating conditions in a service case. The airflow and smoke level readings can be read out directly on-site using a laptop. The data is read out via the PC's USB port after starting the software. For more details, refer to the diagnostic software documentation (see chapter "Commissioning" and "Performing a function test" using diagnostic software).

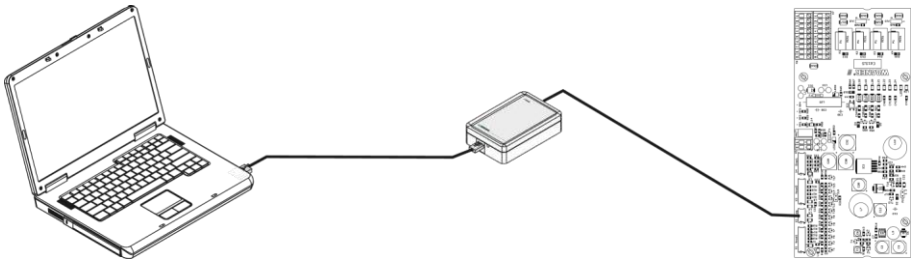


Figure 81: Connection of a diagnostic interface

TIP
Save and archive these records after commissioning was performed for subsequent reviews of the device settings.

7 Installing the pipe system

7.1 General installation

The pipes, hoses and fittings used for the pipe system must at least fulfil the requirements of class 1131 in accordance with EN 61386-1, 2004.

Class 1131 defines the following requirements for the pipe system used:

Characteristics	Severity
Compression resistance [N]	125
Impact resistance [kg]	0.5 Drop height of 100 mm
Temperature range [°C]	-15 … +60

The following pipes as well as the related fittings are to be used to configure the pipe system:

	Outside diameter [mm]	Inner diameter ABS [mm]	Inner diameter UPVC [mm]
Aspiration pipe	25	21.4	21.2
Aspiration hose (SCH-P-25)	25	-	18.5
Aspiration hose (SCH-PG16)	21.1	16.4	-

The following pipes and related fittings are to be used for pipe systems with long pipe supply lines (see also chapter "Project planning" ➔ "Project planning with pipe supply lines Ø > 25 mm"):

	Outside diameter [mm]	Inner diameter ABS [mm]	Inner diameter UPVC [mm]
Aspiration pipe	32	28	28.4
Aspiration pipe	40	35	36.2

⚠ ATTENTION

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

7.1.1 Installing the pipe system

The pipe system must be installed according to project specifications and taking into account the project planning guidelines (see chapter "Project planning").

- ▶ Cut the pipes with a pipe cutter or a metal saw. Deburr the cut edges and remove any shavings.
- ▶ Rid the bonding surfaces of dirt and grease with the stipulated cleaning agent before gluing. Then, glue the pipe joints so they are airtight with the fittings.

Aspiration pipe halogen-free	Aspiration pipe (UPVC)	Cleaner	Adhesive	Pipe cutter
ABSR-2518 ABSR-3220 ABSR-4025	R-2519 R-3218 R-4019	Tangit cleaner	Tangit glue	Pipe shears or cutter (38 mm)

⚠ ATTENTION

Adhesives and cleaning products contain solvents and are flammable. The safety notes of the supplier must be observed prior to use.

- ▶ Minimise the pipe lengths and changes of direction. Angles have extremely high flow resistance. Therefore, they are only to be used where they cannot be avoided due to structural constraints. If necessary, the pipe length must be reduced in relation to the angles used (an angle corresponds to a straight pipe length of 1.5 m).

NOTICE

Elbows are to be given absolute priority over angles. Too many angles and elbows reduce the air speed in the aspiration pipe and thus increase the detection period.

- ▶ Mount the pipe system firmly so that it will neither bend nor become distorted. Fasten the pipe with pipe clips without rubber inserts. The intervals between the pipe clips should not exceed 80 cm. In case of high temperature fluctuations, reduce the intervals between the pipe clips to maximum 30 cm.

NOTICE

Do not use pipe clips with rubber inserts as they do not permit length extensions, meaning that the pipe system would bend or even break.

► Close open pipe ends with end caps.

NOTICE

After completing the pipe system, check for the following:

- Leaks (e.g. due to damage)
- Incorrect connections
- Correct aspiration aperture project planning.

7.1.2 Installing the aspiration hose

The aspiration hose must be used taking into account the project planning guidelines (see chapter "Project planning").

► Cut the aspiration hose with a pipe cutter or a metal saw.

► Deburr the cut edges and remove any shavings.

► Before gluing into place, free the cut edges from dirt and grease with the stipulated cleaning agent.

► Glue the pipe joints so they are airtight with the fittings.

Aspiration hose halogen-free	Aspiration hose (UPVC)	Cleaner	Adhesive	Pipe cutter
SCH-PG16	SCH-P-25	Tangit cleaner	Tangit glue	Pipe shears or cutter (38 mm)

⚠ ATTENTION

Adhesives and cleaning products contain solvents and are flammable. The safety notes of the supplier must be observed prior to use.

Type SCH-PG16

Insert the aspiration hose into the hose screw connection type SCH-PG16-VO. Twist the hose screw connection into the relevant pipe with inner thread type ABSR-2518-PG16.

Type SCH-P-25 Glue the aspiration hose with UPVC adhesive in fittings/sleeves of a pipe system with a 25 mm outer diameter.

NOTICE

After completing the pipe system, check for the following:

- Leaks (e.g. due to damage)
- Incorrect connections
- Correct aspiration aperture project planning.

NOTICE

The overall aspiration pipe cannot consist of aspiration hose alone.

NOTICE

The aspiration hose must not be drilled (aspiration apertures) or glued (aspiration reducers).

7.2 Length alterations on the pipe system

Length alterations (extensions and reductions) of the pipes are caused by temperature changes. Temperature increase leads to extension of the pipe, temperature reduction leads to shortening of the pipe. The change in length must be considered all the more the further the temperature of the pipe system deviates from the standard operating temperature at the time of installation.

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

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

ΔL	=	*Length alteration in [mm]*
L	=	*Length of the pipe to be calculated in [m]*
ΔT	=	*Maximum temperature difference in [°C]*
δ	=	*Coefficient of length alteration in [mm/m°C]* *δUPVC = 0.08 mm/m°C* *δABS = 0.101 mm/m°C*

For example, a temperature change of 10 °C on an ABS pipe with a length of 10 m causes a length change of 10.1 mm.

Pipe clips

As the first clip in the pipe system after the pipe connection to the TITANUS PRO·SENS®, use a type that does not allow length extension. Type NG23 plastic pipe clips are used as standard to install the pipe system (Ø 25 mm). They do not allow length extension.

Plastic pipe clips type CLIC-PA are used for areas with great variations in temperature.

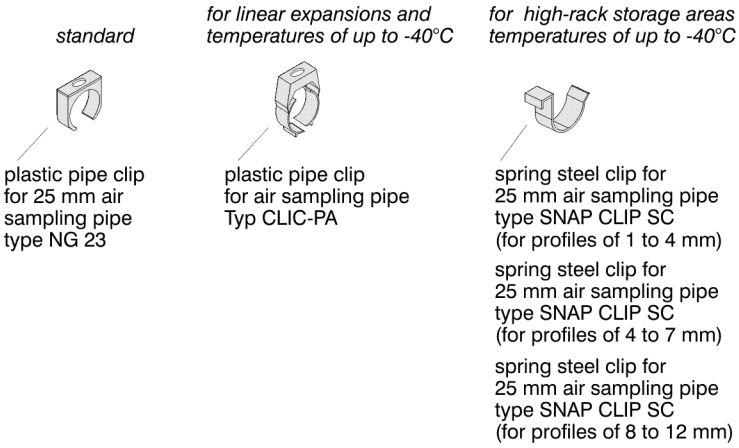


Figure 82: Pipe clip types

Type CLIC-PA plastic pipe clips have two fastening points for fixing the pipe:

- Position 1 (first engaging)
  Locks the pipe, allowing length extension (used in deep freeze applications).
- Position 2 (second engaging)
  Fixes the pipe and does not allow pipe extension.

Pipe clips for Ø 25 mm	Type designation
Standard pipe clips	Clamp Type NG 23 (Ø 25 mm)
Pipe clips for areas with high temperature differences and for deep freeze applications	Plastic pipe clip Type CLIC-PA (Ø 25 – 28 mm)
Pipe clips for deep freeze applications and high-bay warehouses	Spring steel clip Type SNAP CLIP SC (for profiles 1 to 4 mm) Spring steel clip Type SNAP CLIP SC (for profiles 4 to 7 mm) Spring steel clip Type SNAP CLIP SC (for profiles 8 to 12 mm)

7.3 Aspiration apertures

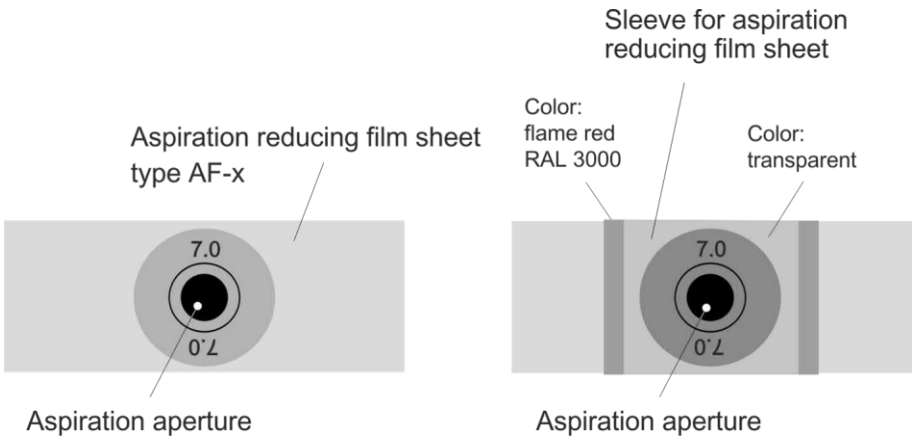


Figure 83: Example of a drill hole with aspiration reducing film sheet

Aspiration apertures

Select the type of aspiration aperture and its position in the pipe system according to project specifications while taking the project planning guidelines into account.

- ▶ Drill a hole with a 10 mm drill at right angles to the pipe.
- ▶ Deburr the drill hole carefully and remove any shavings.
- ▶ Clean the area around the drill hole (around the whole pipe) from grease and dust with Tangit cleaner, for instance.
- ▶ Select the size of the aspiration reducing film sheet according to the project planning guidelines.
- ▶ Adhere the aspiration reducing film sheet to the drill hole (see the following figure point "1").
- ▶ Ensure the film sheet will not come away. Adhere the sleeve over the aspiration reducing film sheet (following figure point 2)

NOTICE

The holes in the aspiration reducing film sheet and the sleeve must fit over the drill hole exactly. The diameter of the opening in the aspiration reducing film sheet must not be changed.

Carefully avoid touching the film sheet's adhesive surface to ensure it is kept free of dust and grease.

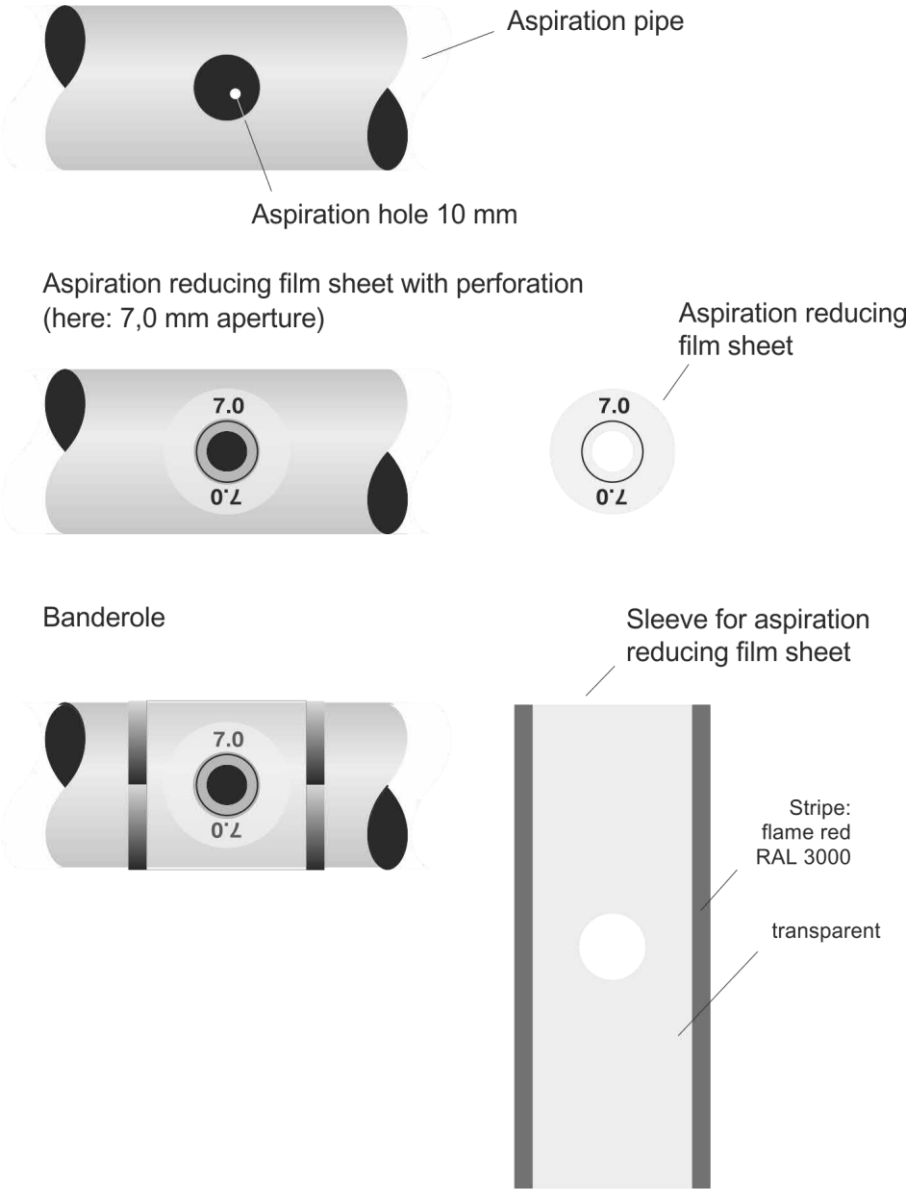


Figure 84: Attaching the aspiration reducing film sheet

7.4 Ceiling duct

7.4.1 Ceiling duct for suspended ceilings

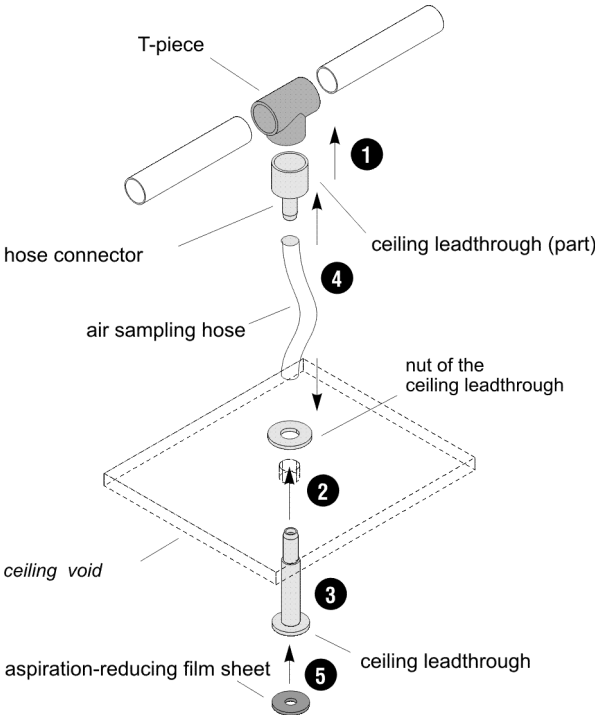


Figure 85: Installing the ceiling duct

The following work steps are required to install a ceiling duct:

- ▶Rid the bonding surfaces of dirt and grease with the stipulated cleaning agent before gluing.
- ▶Glue the hose connection with the respective T-piece to the aspiration pipe using Tangit glue.
- ▶Drill a Ø 13 mm hole in the suspended ceiling for each ceiling duct.
- ▶Install the ceiling duct by removing the nuts, sliding the part with the hose nozzle out through the bottom of the drill hole, then re-placing the nut on top of the suspended ceiling and tightening.
- ▶Determine the required length for the aspiration hose and cut it to size. Attach the cut hose to the hose nozzle of the ceiling duct and the hose connection on the T-piece of the aspiration pipe. Heat the hose with a hot air blower if necessary.

► Adhere the necessary aspiration reducing film sheet to the ceiling duct (according to project planning guidelines). Two versions of aspiration reducing film sheets are available. According to the colour of the ceiling on which the ducts are mounted, use either type AFW-x (pure white, RAL 9010) or type AF-x (papyrus white, RAL 9018) aspiration reducing film sheets. The film sheets can be produced in special colours on request.

NOTICE

The hole in the aspiration reducing film sheet must fit over the opening in the ceiling duct; the diameter of the opening in the aspiration reducing film sheet must not be changed.

Carefully avoid touching the film sheet's adhesive surface to ensure it is kept free of dust and grease.

7.4.2 Other ceiling ducts

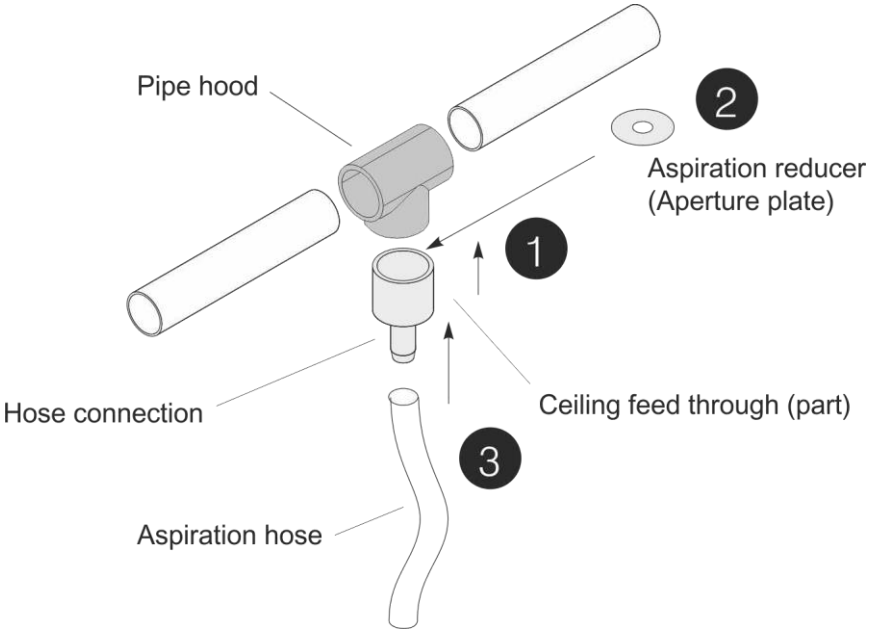


Figure 86: Capillary hose and upstream panel installation

The following work steps are required to install a ceiling duct:

- ►Rid the bonding surfaces of dirt and grease with the stipulated cleaning agent before gluing.
- ►Adhere the necessary aspiration reducing film sheet in the pipe hood (according to project planning guidelines).
- ►Glue the hose connection with the respective pipe hood to the aspiration pipe using Tangit glue.
- ►Drill a Ø 12 mm hole in the suspended ceiling for each ceiling duct.
- ►Determine the required length for the aspiration hose and cut it to size. Insert the cut hose through the suspended ceiling and attach it to the hose connection on the pipe hood of the aspiration pipe. Heat the hose with a hot air blower if necessary.
- ►Glue the capillary hose into the drill hole of the suspended ceiling using Tangit glue.

NOTICE

The hole in the aspiration reducing film sheet must fit over the opening in the pipe hood exactly. The diameter of the opening in the aspiration reducing film sheet must not be changed.

Carefully avoid touching the film sheet's adhesive surface to ensure it is kept free of dust and grease.

⚠ ATTENTION

In case of ceiling ducts in which the aspiration reducers are upstream in the T-pieces (pipe hoods), the aspiration hose cannot be monitored for break.

7.5 Forced airflow monitoring

Special project planning must be observed for the monitoring of the ventilation or air conditioning ducts.

7.5.1 Detection in supply and exhaust air openings

NOTICE

If smoke is aspirated in forced airflows (e.g. fans, air conditioners), align the aspiration apertures with the airflow. Position the aspiration apertures as shown in the following figure.

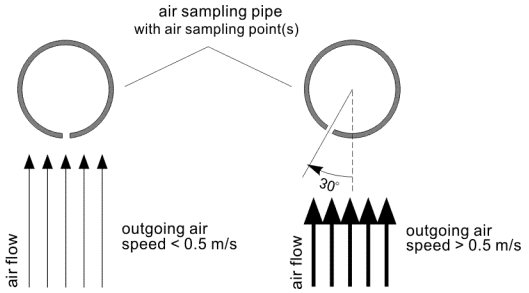


Figure 87: Position of the aspiration aperture according to air speed

7.5.2 Detection in the bypass

NOTICE

In case of detection in airflows ≥ 2 m/s, additionally return the exhaust air from the TITANUS PRO·SENS® back into the airflow area. Cut off the end of the air return pipe at an angle of 45°.

Refer to the chapter "Installing the pipe system" ➔ "Air return" for information on connecting the air return.

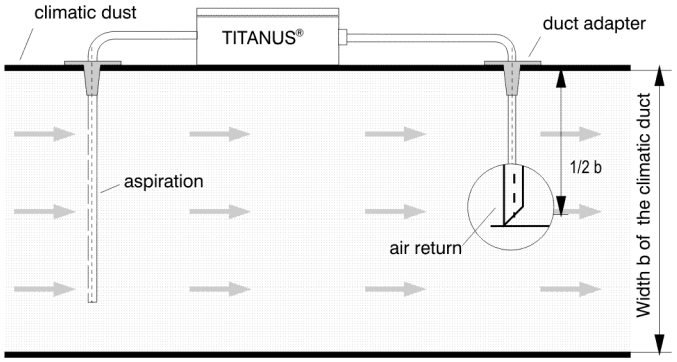


Figure 88: Positioning the air return using the air conditioning duct (bypass) as an example

To plan aspirating smoke detectors in these areas, see chapter "Project planning" ➔ "Project planning for forced airflow".

7.6 Filter

7.6.1 Installing the air filter type LF-AD-x

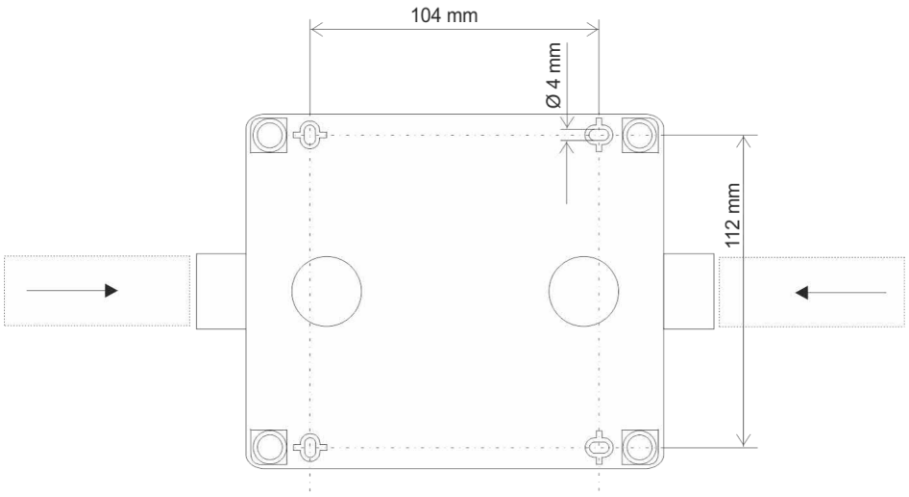


Figure 89: Drill hole intervals for the holes in the bottom of the air filter housing

- ▶ Insert the aspiration pipe in the provided pipe connection of the bottom part of the housing. Note that the aspiration pipe must not be glued together with the pipe connection for service purposes or the replacement of the device. Also observe the flow direction that is specified on the rating plate on the bottom part of the housing.
- ▶ Mark the drill hole intervals on a wall.
- ▶ Drill the holes according to the size of the installation material.
- ▶ Tighten the four screws by hand. Ensure that the device is installed with zero voltage.
- ▶ In case of strong temperature fluctuations, fix the aspiration pipe immediately before the device so that the pipe does not detach itself from the pipe connection as a result of length changes.

NOTICE

Never use glue to join the aspiration pipe and the pipe connections.

If there are great variations in temperature, the pipe must be attached very close to the air filter, so that the pipe does not come out of the pipe connections due to fluctuations in length which may occur (see chapter "Installing the pipe system" ➔"Length alterations on the pipe system").

Installation materials

Air filter	Cylinder or flat-head screws – Thread diameter: max. 4 mm – Head diameter: 5 to 7 mm

7.6.2 Installing the special filter type SF-400/650

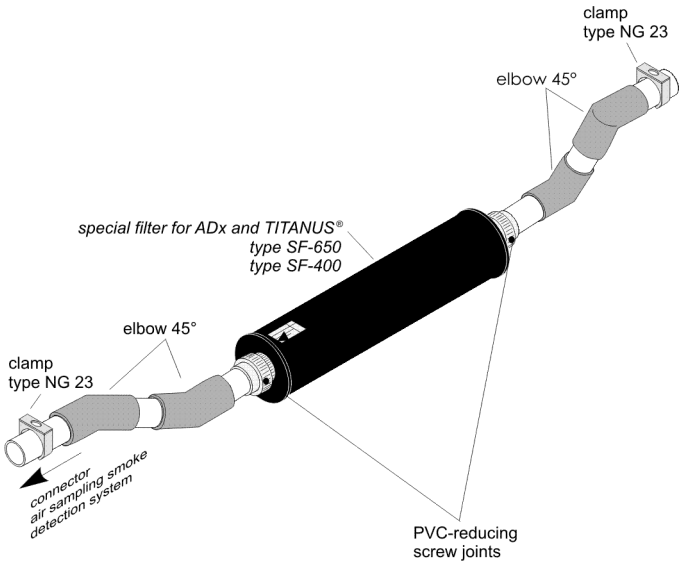


Figure 90: Installing the special filter in the pipe system

To install or uninstall the special filter, use the two UPVC transition screw connections on the two ends of the filters.

- ►Glue the transition screw connections into the pipe system.
- ►When installing the special filter, observe the flow direction that is specified on the rating plate on the filter housing.
- ►Fix the special filter using 45° angles and the clamps via the installed pipe system.

Installation materials

Air filter	Pipe fittings made of UPVC or ABS: - 45° angle

When using the combination of the special filter type SF-x and air filter type LF-AD, the air filter must be installed behind the special filter viewed from the TITANUS PRO·SENS®.

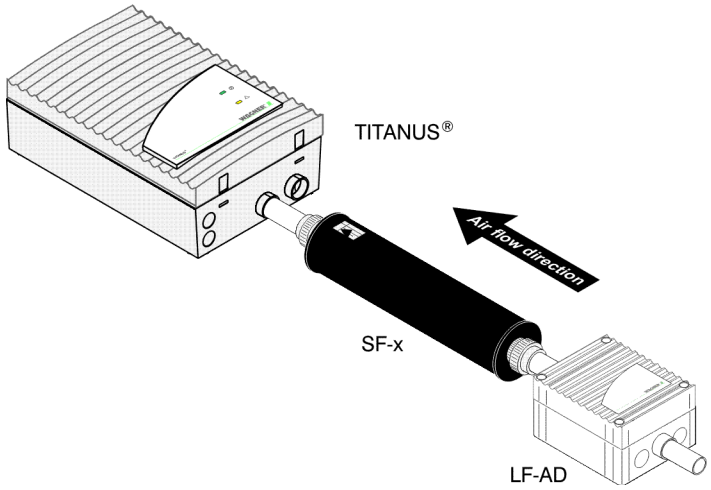


Figure 91: TITANUS PRO·SENS® with special filter and LF-AD

7.7 Air return

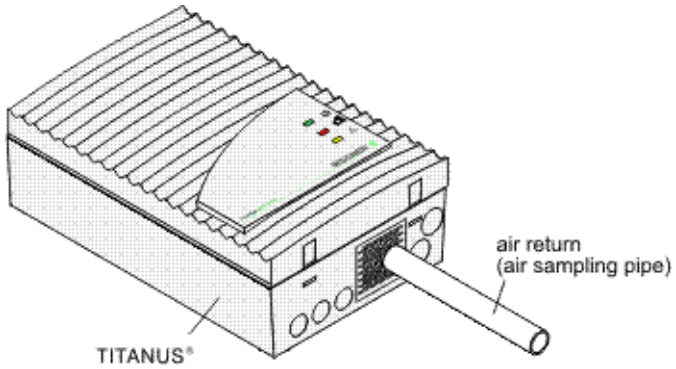


Figure 92: Installing the air return

- ►Remove the pre-stamped pipe opening in the safety guard of the air outlet opening (e.g. using a small cutter).
- ►Feed the air return through the pipe opening in the safety guard and fix it in the air outlet opening in the device. A secure hold is achieved because the air return pipe fits precisely into the air outlet duct.

NOTICE
In case of strong temperature fluctuations, fix the aspiration pipe immediately before the device so that the pipe does not detach itself from the pipe connection as a result of length changes (see chapter "Pipe installation, length alteration").

7.8 Silencer

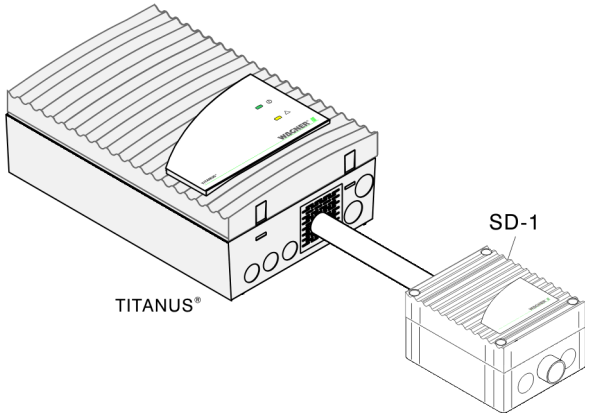


Figure 93: TITANUS PRO·SENS® with silencer

- ▶ Remove the pre-stamped pipe opening in the safety guard of the air outlet opening (e.g. using a small cutter).
- ▶ Feed a bit of the pipe (Ø 25 mm) through the pipe opening in the safety guard and fix it through the air opening in the TITANUS PRO·SENS®. A secure hold is achieved because the pipe fits precisely into the air outlet duct.
- ▶ Insert the aspiration pipe in the provided pipe connection of the bottom part of the housing. Note that the aspiration pipe must not be glued together with the pipe connection for service purposes or the replacement of the device. Also observe the flow direction that is specified on the rating plate on the bottom part of the housing.
- ▶ Mark the drill hole intervals on a wall.
- ▶ Drill the holes according to the size of the installation material.
- ▶ Tighten the four screws by hand. Ensure that the device is installed with zero voltage.
- ▶ In case of strong temperature fluctuations, fix the aspiration pipe immediately before the device so that the pipe does not detach itself from the pipe connection as a result of length changes.

NOTICE

Never use glue to join the aspiration pipe and the pipe connections.

If there are great variations in temperature, the pipe must be attached very close to the air filter, so that the pipe does not come out of the pipe connections due to fluctuations in length which may occur (see chapter "Installing the pipe system" ➔"Length alterations on the pipe system").

Installation materials

Silencer	Cylinder or flat-head screws – Thread diameter: max. 4 mm – Head diameter: 5 to 7 mm

7.9 3-way ball valve

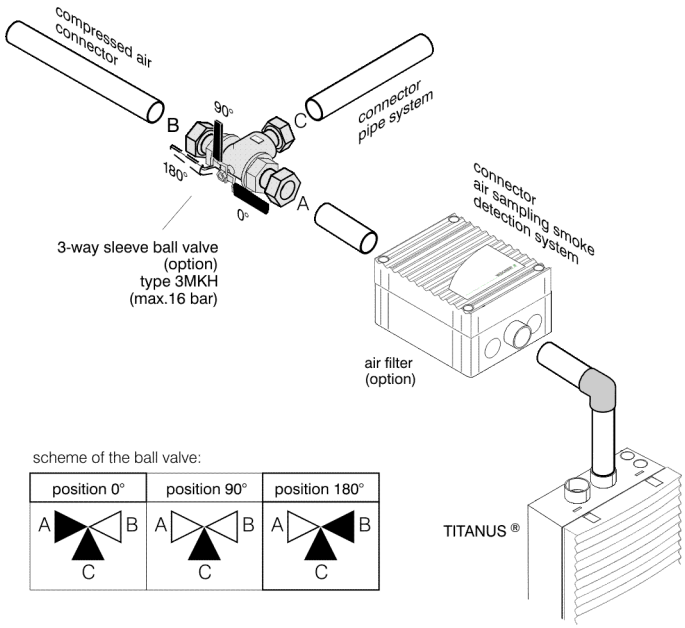


Figure 94: Installing the 3-way ball valve

The ball valve is required for clearing with compressed air (preferably) or pressurised air. It switches between fire detection (0° position) and clearing (180° position). Fix it into the pipe system using the transitional screw connections.

NOTICE

Pressurised air is compressed, unfiltered ambient air containing moisture. By contrast, compressed air is purified and dehumidified. Compressed air must be used for clearing if the device and pipe system are positioned in an area with temperatures below the freezing point.

Connections

Observe the assignment of connections (see diagram in the figure) during installation:

- ►Install the pipe system on connection C.
- ►Install the device on connection A or B and the compressed or pressurised air supply on the remaining connection.

7.10 Condensate separator

7.10.1 Condensate separator type KA-DN-25

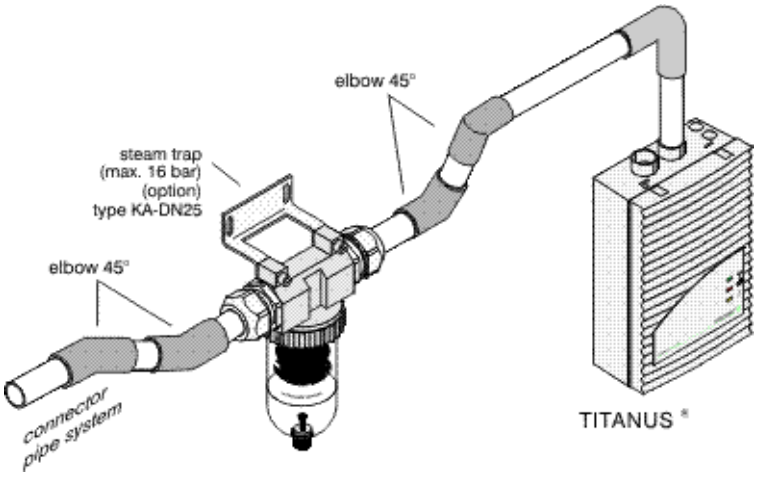


Figure 95: Installing the condensate separator type KA-DN 25 in the pipe system

Install the condensate separator at the lowest point of the pipe system behind the air filter and the TITANUS PRO·SENS®. Fix the condensate separator to the pipe system using the PG screw connections.

NOTICE
You will need two 45° angles on each connection side to install the condensate separator in the pipe system.

Connection

During installation, observe the flow direction (see direction arrow on the housing of the condensate separator).

- ►Prepare the pipe system with two 45° angles for connection to the condensate separator and then connect it to the PG screw connections.
- ►Fix the condensate separator to the pipe system with two screws and the bracket as well.

7.10.2 Condensate separator type KA-1

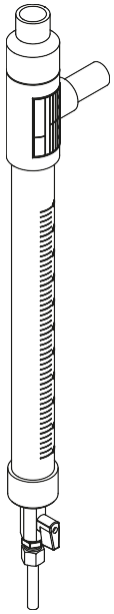


Figure 96: Installing the condensate separator type KA-1

Install the condensate separator at the lowest point of the pipe system in front of the air filter and the TITANUS PRO·SENS®. Glue the pipe system to be airtight with the condensate separator.

Connection

► Place the condensate separator in the intended position and fix the condensate separator using two 40 mm pipe clips.

►Glue the pipe system to be airtight with the condensate separator.

7.11 Installation of detonation prevention device

⚠ WARNING

Danger of pipe deflagration or detonation

The TITANUS PRO·SENS® must not be mounted in areas with a potentially explosive atmosphere. Non-observance could lead to an ignition of the explosive atmosphere due to static discharge.

The following is to be discussed with an expert in advance:

- Whether ignitable discharges can occur (from experience)
- The pipe system configuration
- The aspiration aperture configuration
- The earthing concept.

The pipes used in the Ex area are installed on the detonation protector via a transition screw connection. The steel aspiration pipes used between the TITANUS PRO·SENS® and the detonation protectors are mounted to the detonation protectors via screw-in connections. The connections must be established by means of a ¾“ or 1“ thread.

If from experience you expect ignitable discharges, execute the pipe system laid in the Ex area to be electrically conductive (metal pipe or electrically conductive plastic pipe). The pipe system is earthed via grounding clamps on the pipe and a connected equipotential bonding rail.

The aspiration pipe can be plastic in Ex areas if no ignitable discharges can occur from experience.

The aspiration apertures can either have aspiration reducing film sheets with sleeves or aspiration reducer clips or be drilled directly into the pipe system. In case of drilled aspiration apertures, whistling aspiration noises may occur.

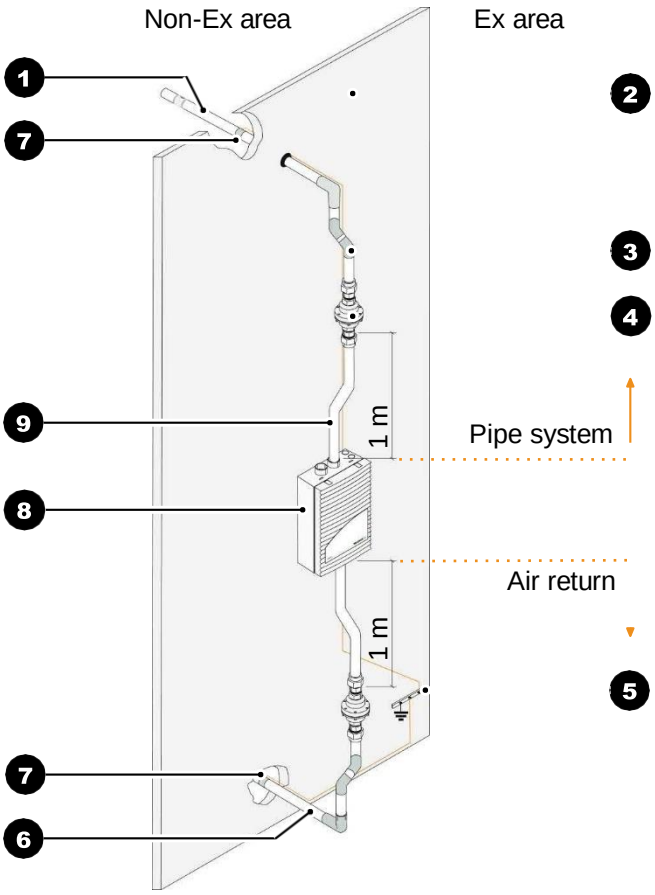


Figure 97: Installing the detonation protector

1	Aspiration pipe with transition screw connection and aspiration apertures
2	Grounding clamp (if necessary)
3	Steel aspiration pipe with screw-in connection (type R-2525)
4	Air return
5	Wall (segregates Ex area from non-Ex area)
6	45° angle
7	Detonation protector
8	TITANUS PRO·SENS®
9	Equipotential bonding rail (if necessary)

- ►Install the detonation protectors with a minimum distance of 1 m from the TITANUS PRO·SENS® in the aspiration and air return pipe.
- ►Connect the TITANUS PRO·SENS® and the detonation protectors via the screw-in connections on the steel aspiration pipe (type R-2525).
- ►Seal the threaded connections with Synthesol or sealing tape.
- ►Earth the pipe system depending on its material.

7.12 Test adapter

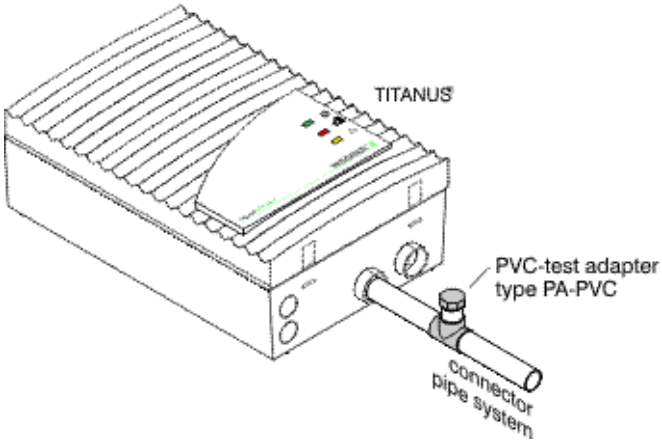


Figure 98: Installing the test adapter in the pipe system

The test adapter is glued into the pipe system in the immediate proximity of the aspirating smoke detector. The test adapter must always be closed in normal operation and is only opened for maintenance and service purposes, to introduce test gas or smoke.

⚠ ATTENTION

After checking the detection in the aspirating smoke detector and alarm transmission, the test adapter must be closed again, otherwise there will be an airflow fault.

8 Commissioning

NOTICE

The test record must generally be completed during commissioning (see chapter "Appendix"). This is required for subsequent assessment of the data such as the airflow value, type of calibration (see chapter "Airflow sensor calibration"), commissioning temperature, air pressure and height above mean sea level.

- ►Check the settings of the TITANUS PRO·SENS® (see chapters "Installation" and "Settings") before commissioning.
- ►Install the pipe system fully for commissioning of the TITANUS PRO·SENS® and connect it.
- ►Connect the device to the energy supply.

8.1 Airflow sensor calibration

NOTICE

The device must have been in operation for at least 30 min before the TITANUS PRO·SENS® can be correctly calibrated to the connected pipe system.

Types of calibration

- Calibration can be performed regardless of the current air pressure (see section "Air pressure-independent calibration"). For restrictions presented by this type of calibration, see chapter "Project planning" ➔ "Airflow monitoring".
- The airflow sensor can be calibrated depending on the current air pressure (see section "Air pressure-dependent calibration"). Use the annexed air pressure correction tables for this purpose.

Record the type of calibration in the test record in each case so that the airflow value can be correctly evaluated in case of servicing measures.

The teach-in phase of the TITANUS PRO·SENS® is approximately 10 s. Alarm detection is fully functional during the teach-in phase. During this time, the operating LED flashes and the airflow must not be influenced. Once

initialisation has finished, the operating LED is permanently illuminated and the airflow sensor has determined its actual value for the connected pipe system.

8.1.1 Air pressure-independent calibration

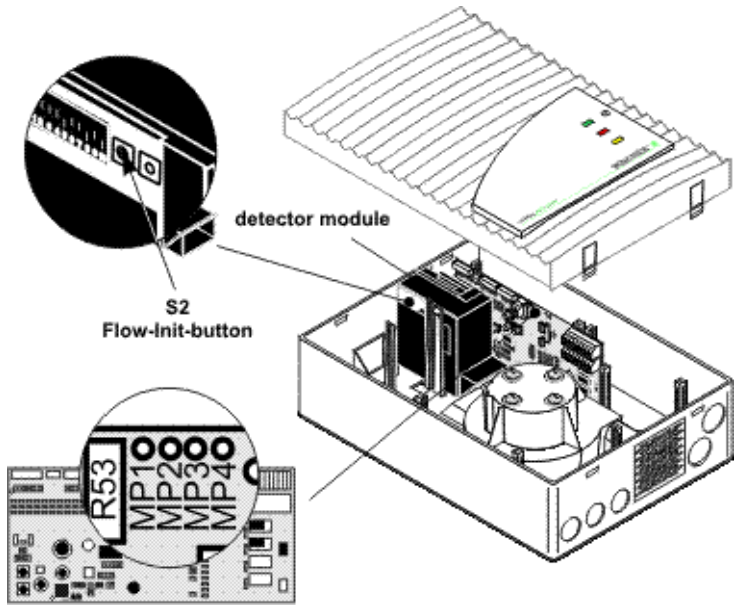


Figure 99: Calibration of the airflow sensor independent of air pressure

- ▶Make sure that the device is in operation for at least 30 min.
- ▶Check the voltage on measuring points MP1 (+) and MP4 (-). Pay attention to polarity. Select the "V-DC" range on the measuring device. The voltage at the measuring points is 1.2 V as standard.
- ▶If this is not the case, set the value using trimmer potentiometer R53 with a small screwdriver.
- ▶Press the Flow Init button S2 on the TITANUS PRO·SENS® detector module.
- ▶Make sure that the display circuit board is connected.
- ▶Close the housing.

NOTICE

No changes may be made to the pipe system after the calibration of the airflow sensor (section "Airflow sensor calibration"). The airflow sensor must be recalibrated if subsequent changes are required.

8.1.2 Air pressure-dependent calibration

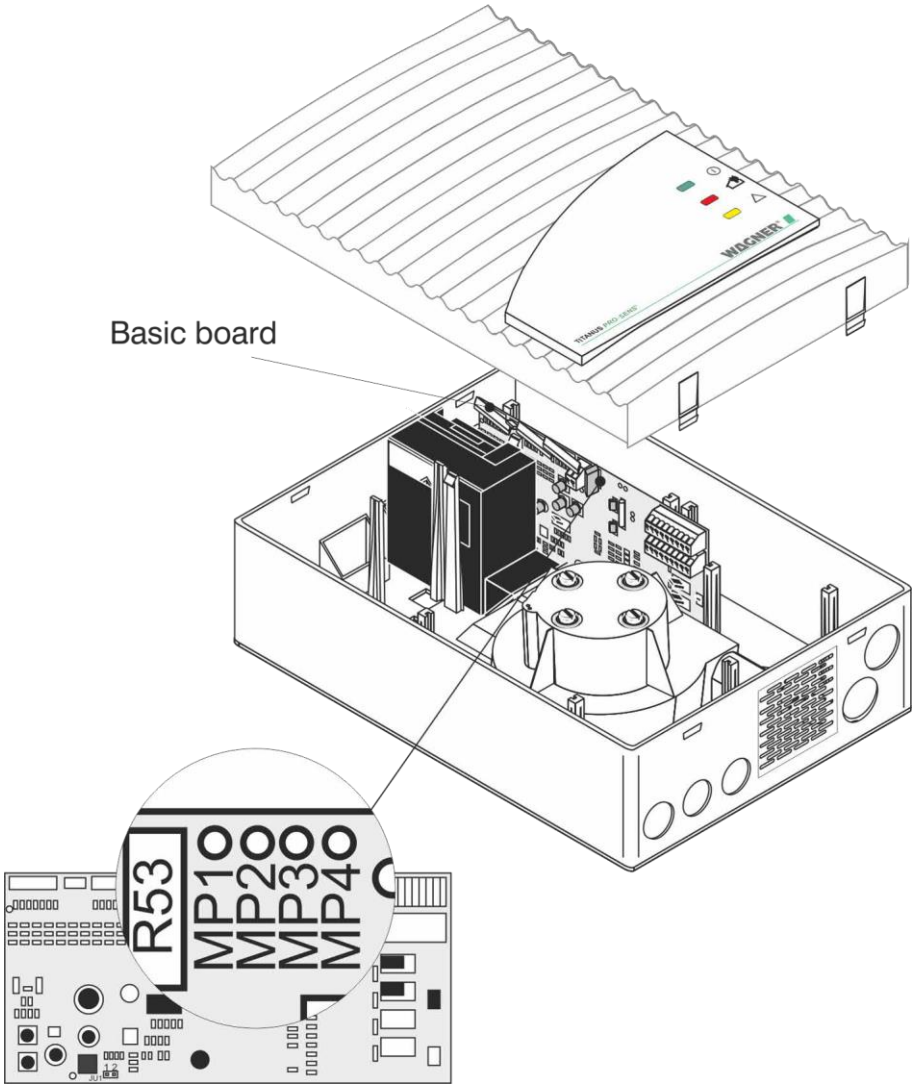


Figure 100: Calibration of the airflow sensor, depending on air pressure

A barometer (recommendation: digital precision pocket barometer GPB 1300, Greisinger electronic GmbH) and a multimeter are required for air pressure-dependent calibration of the airflow sensor. The following work steps are required:

- ►Make sure that the device is in operation for at least 30 min.
- ►Establish the height of the installation location above mean sea level and enter it in the test record.
- ►Use the manual barometer to measure the air pressure and a temperature measuring device to measure the ambient temperature, and enter both in the test record.

- ▶Determine the calibration value to which the airflow sensor must be set using the air pressure correction tables (see chapter "Appendix") and enter it in the test record. Observe the pipe project planning when selecting the air pressure correction table.
- ▶Connect the multimeter to measuring points MP1 (+) and MP4 (-). Pay attention to polarity. Select the "V-DC" range on the measuring device. The voltage at the measuring points is 1.2 V as standard.

NOTICE

The voltage of 1.2 V set as standard on the measuring points corresponds with the average annual air pressure of the corresponding height (w. above mean sea level).

- ▶Set the calibration value determined from the air pressure correction table using the trimmer potentiometer R53 with a small screwdriver.
- ▶Press the Flow Init button on the TITANUS PRO·SENS® detector module.
- ▶Make sure that the display circuit board is connected.
- ▶Close the housing.

NOTICE

No changes may be made to the pipe system after the calibration of the airflow sensor (section "Airflow sensor calibration"). The airflow sensor must be recalibrated if subsequent changes are required.

8.2 Checking the detector module and alarm transmission

Trigger the detector module and check the transmission path to the FDCP as follows:

- ►Make sure that the LOGIC·SENS switch S1 (10) is set to "OFF" (see chapters "Installation" and "Settings") to accelerate alarm evaluation.
- ►Spray test aerosol either into the first aspiration aperture or into the test adapter of the pipe system.
- ►Proceed according to the following table.

Check whether the alarm…	If this is not the case …
…is displayed on the aspirating smoke detector.	► …check whether the display circuit board is connected. ► …there is a defect on the aspirating smoke detector. ► …replace the detector module.
…is transmitted to the FDCP and reported on the corresponding line.	…check the transmission paths.

NOTICE
Note all checked data in the test record.

8.3 Checking the airflow monitoring and fault signal transmission

A break or blockage in the pipe system is displayed on the FDCP or by a flash code on each detector module. The flash code is repeated every 2 s.

- Break: LED flashes 3x
- Blockage: LED flashes 2x

Pipe break

Check the detection of a pipe break:

►Loosen the pipe at the connection to the TITANUS PRO·SENS® or open the test adapter.

►Check whether the fault indicator on the aspirating smoke detector illuminates and the fault is shown on the fire detection control panel.

►Optionally check the airflow sensor data using the diagnostic software and a PC or laptop.

►Enter the result in the test record.

Blockage

Check the detection of a blockage:

►Depending on the project planning airflow monitoring, close off the corresponding number of aspiration apertures with a bit of adhesive tape.

►Check whether the fault indicator on the aspirating smoke detector illuminates and the fault is shown on the fire detection control panel.

►Optionally check the airflow sensor data using the diagnostic software and a PC or laptop.

►Enter the result in the test record.

Troubleshooting

If airflow faults are not correctly identified by the device, check whether…

- …all aspiration apertures are free.
- …the pipe system is free.
- …the pipe system displays breaks or cracks.
- …all pipe connections are tight.
- …the fan is able to blow freely.
- …the correct aspiration reducing film sheets were used.

- …any test adapters and air filters are connected.
- …any filter inserts are clean.
- …any ball valves and clearing valves are in "operating position".

If no defects are established, the TITANUS PRO·SENS® or airflow sensor is checked for functionality using a test pipe or diagnostic software (see section "Function test").

Checking the fault signal transmission

NOTICE

The following steps can only be carried out after airflow calibration is completed in accordance with section "Airflow sensor calibration".

►Check the fault signal transmission.

8.4 Function test

If the TITANUS PRO·SENS® cannot be calibrated, check its functionality using the test pipe and a digital pressure gauge or the diagnostic software. The TITANUS PRO·SENS® must be in operation for at least 30 min.

8.4.1 Function test preparations

NOTICE

For a TITANUS PRO·SENS® with 2 pipe systems, preparation for the function test must be carried out with work steps 1 to 4 for both pipe systems.

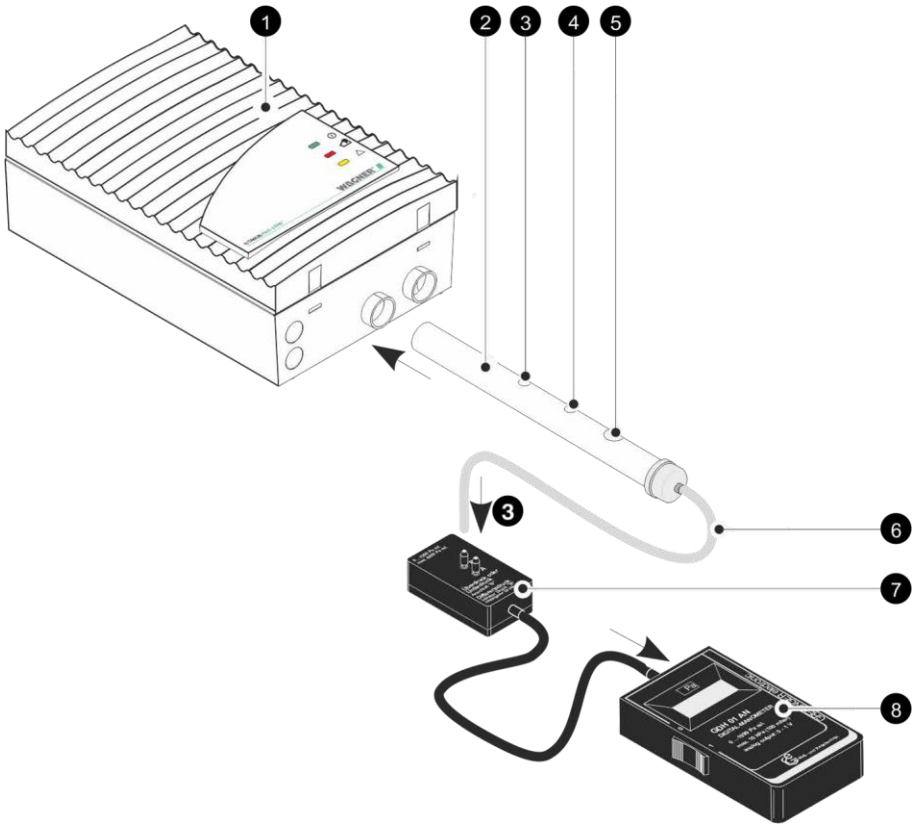


Figure 101: Check the functionality of the TITANUS PRO·SENS®

1	Device
2	Test pipe
3	Aspiration aperture Ø 4.6 mm
4	Aspiration aperture Ø 4.2 mm
5	Aspiration aperture Ø 7.0 mm
6	Pressure measurement hose
7	Adapter
8	Digital fine pressure gauge (example)

- ►Disconnect the pipe system from the TITANUS PRO·SENS®.
- ►Connect the test pipe.
- ►Connect the pressure measurement hose to the adapter connection B.
- ►Connect the 4-pin plug of the adapter to the digital pressure gauge and turn it on.

8.4.2 Performing the function test

The function test can be performed with or without a digital manometer. The complete test is described in the following. If any deviations from the described procedure occur when checking the TITANUS PRO·SENS®, the device or its airflow sensor is defective.

NOTICE

For a TITANUS PRO·SENS® with 2 pipe systems, preparation for the function test must be carried out with work steps 1 to 5 for both pipe systems.

- ►Make sure that the device is in operation for at least 30 min.
- ►Close all the test pipe aspiration apertures with adhesive tape. The vacuum produced in the device must reach the following value after a short start-up time:

Fan voltage [V]	Negative pressure [Pa]
6.5	approx. 235
6.9	approx. 290
9	approx. 475
10	approx. 575
11	approx. 675
12	approx. 710

NOTICE

A pipe break or pipe blockage is displayed by a flash code via LEDs on detector module I and detector module II:

- Break: LED flashes 3x
- Blockage: LED flashes 2x

The flash code is repeated every two seconds.

The flash code of the LED on detector module I and detector module II must signalise "Blockage" after several seconds.

- ►Open up the aspiration apertures on the test pipe again. Press the Init button S2 on the detector module after approx. 120 s. The operating LED flashes and the fault LED must go out.

- ▶Close the test pipe aspiration apertures with a bit of adhesive tape. The flash code of the LED on the detector module must signalise "Blockage" after several seconds.
- ▶Open all test pipe aspiration apertures again. The flash code of the LED must go out after a few seconds.
- ▶Remove the test pipe. The flash code of the LED on detector module I and detector module II must signalise "Break" after several seconds.
- ▶Reconnect the test pipe to the device. The flash code of the LED must go out after a few seconds.

The pipe system must be checked if no faults occur when performing the function test on the aspirating smoke detector.

Connection test

Check whether…

- ▶…the pipe system is tightly connected to the TITANUS PRO·SENS® pipe connection.
- ▶…all pipe fittings are glued together and the pipe system is sealed. First, close all aspiration apertures (e.g. with insulating tape). Then, measure the airflow to the opening for air return.
- ▶…the correct aspiration reducing film sheets were glued to the aspiration apertures.

NOTICE

No changes may be made to the pipe system after the calibration of the airflow sensor (section "Airflow sensor calibration"). The airflow sensor must be recalibrated if subsequent changes are required.

The diagnostic software can be optionally used to perform the function test.

The following steps must be observed:

- ▶Install the diagnostic software on a laptop or PC (PC with USB interface). WINDOWS 7 or higher can be used as the operating system.
- ▶The TITANUS PRO·SENS® is connected to the PC using the enclosed diagnostic cable via the X2 (DIAG) connection on the basic board.
- ▶Start the diagnostic software.
- ▶The current data from the TITANUS PRO·SENS® is visualised on the PC screen.

After completing the function test, the commissioning of the device with the pipe system must be repeated starting with the "Airflow sensor calibration" section .

NOTICE

After completing the commissioning, the setting values must be established and stored using the diagnostic tool. A printout of the setting values must be kept in the project folder for future reference.

9 Maintenance

The test record must be completed during the maintenance (see chapter "Appendix"). The test record is required for the subsequent evaluation of the data (e.g. airflow value, air pressure and temperature during maintenance).

9.1 Visual inspection

Check whether…

- …the pipe system is tightly fitted and undamaged whilst being freely accessible.
- …the aspiration apertures of the pipe system are clear.
- …the aspiration pipe and connecting leads are securely connected.
- …the device bracket – if applicable – is attached properly.
- …the aspirating smoke detector is intact.

(see also "Flash code table")

9.2 Flash code table

The detector modules are equipped with an LED that displays different faults and device statuses using a flash code.

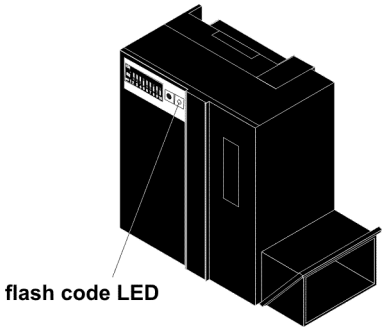


Figure 102: Flash code LED on the detector module

Number of flashes	Meaning
2x	Airflow too low (pipe system blockage)
3x	Airflow too high (pipe system break)
4x	Stabilisation phase after switch-on or fan is switched off
Continuous light	Detector module defective

9.3 Checking the detector module and alarm transmission

Proceed in accordance with the chapters "Commissioning" and "Detector module and alarm transmission". Also perform a visual inspection of the detector module for external contamination or damage and replace if necessary.

NOTICE
If there is a hardware defect in the detector module, the LED on the detector module lights up continuously.

9.4 Checking the pipe system

Check the aspiration apertures of the pipe system for blockage in areas where dust particles are possible. Clear the pipe system and aspiration apertures with compressed air if necessary. Use a transportable compressed air bottle (air jet equipment) or activate the manual air jet unit installed on site for this purpose.

⚠ ATTENTION

Disconnect the TITANUS PRO·SENS® from the pipe system before clearing it or the airflow sensor may be damaged.

The following steps must be carried out to execute the manual clearing process on the pipe system:

- ▶ Connect the compressed air supply (compressor or mobile air jet equipment) required for clearing the pipe system via the quick-acting coupling sleeve to the 3-way ball valve of the pipe system to be cleared.
- ▶ Disconnect the pipe system to be cleared from the corresponding device using the 3-way ball valve by changing the ball valve lever from the 0° operating position to the 180° position (see chapters "Installation" and "3-way ball valve").
- ▶ Clear the pipe system manually for approx. 10 s.
- ▶ Position the ball valve lever in the 90° position. In this position, the device is not connected to the pipe system or the connection for compressed or pressurised air supply. Wait approx. 20 s so that the dust and dirt swirled up in the pipe system can settle and is not drawn up by the aspirating smoke detector.
- ▶ Reconnect the cleared pipe system to the corresponding device within a further 10 s by setting the ball valve back to the 0° position.

NOTICE

A single clearing process must be fully completed within 50 s. If another clearing process is required, the above procedure is to be repeated after 120 s at the earliest.

9.5 Replacing the detector module

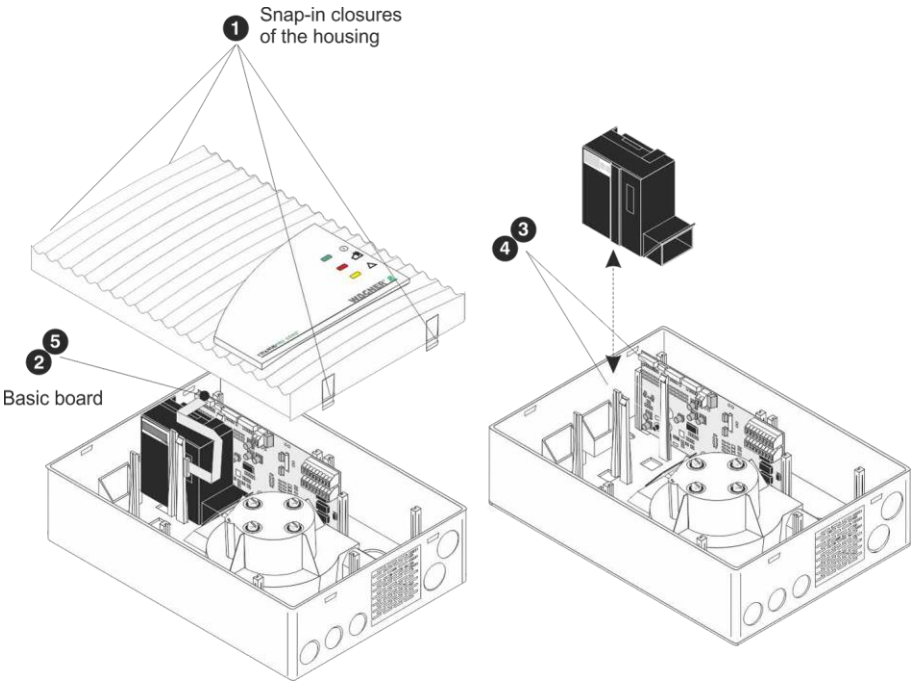


Figure 103: Replacing the detector module

Only perform the following work with the device disconnected from the mains.

- ►Carefully unlock the clips on the housing using a flat-head screwdriver by simultaneously pressing in the closing flaps on one side. Then carefully lift the housing cover.
- ►Pull the display circuit board cable from the basic board and remove the housing cover.
- ►Remove the detector module connection cable from the basic board.
- ►Carefully spread the two retaining clips on the detector module apart and take the module out.

⚠ ATTENTION

Only type DM-TP-xx detector modules (yellow rating plate) may be used.

- ►Transfer the settings of the old detector module onto the new detector module.

- ▶Spread the two retaining clips apart again and insert the new detector module. Both clips must be positioned against the detector module and audibly engage. Then press both retaining clips together again.
- ▶Reconnect the detector module to the basic board using the ribbon cable.
  Connection: X1 (HEAD1) or X3 (HEAD2)
- ▶Reconnect the display circuit board to the basic board.
  Connection: X4 (DISPLAY)
- ▶Check the pipe system for tightness and blockage before initialising the pipe system.
- ▶Reconnect the operating voltage.

NOTICE

The device must have been in operation for at least 30 min before the TITANUS PRO·SENS® can be correctly calibrated to the connected pipe system.

- ▶Press the flow init button S2 on the detector module to initialise the pipe system.
- ▶Close the housing cover.

9.6 Replacing the filter on air filter LF-AD-x

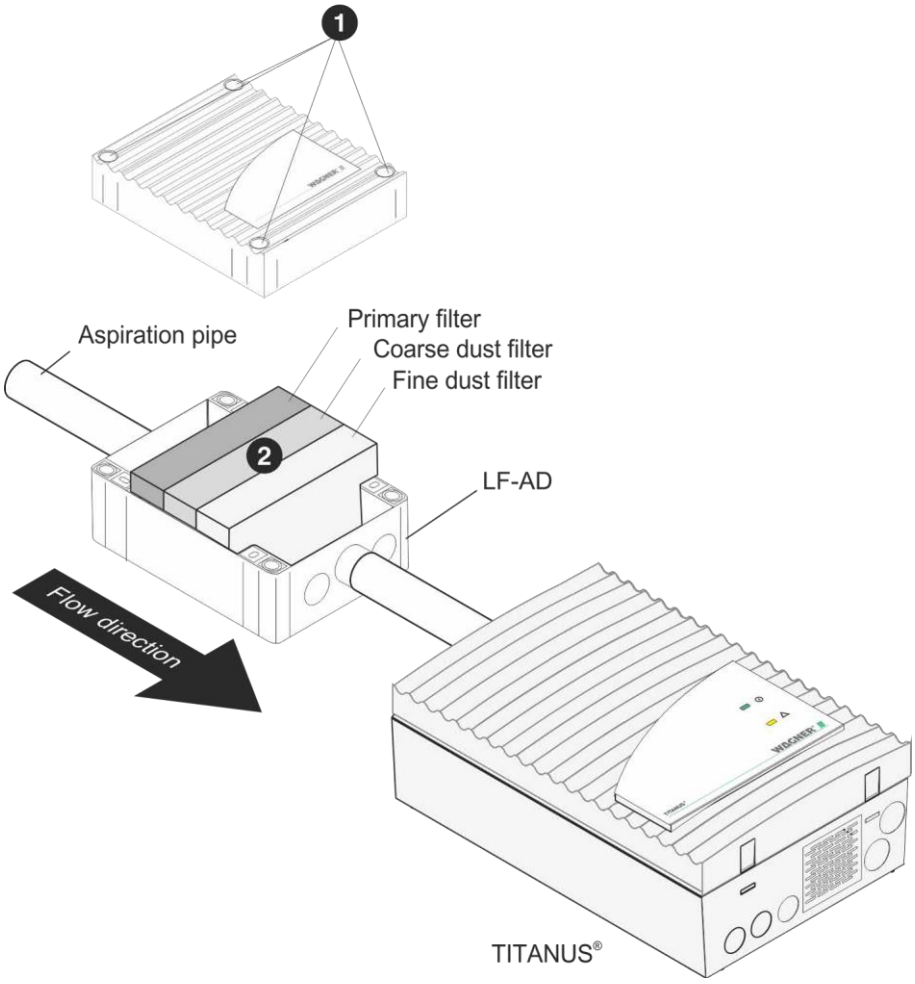


Figure 104: Replacing the LF-AD filter inserts

Perform the following work steps to clean or replace the filter inserts:

- ►Only perform the following work with the device disconnected from the mains.
- ►Loosen the four screws and remove the housing cover.
- ►Remove the filter inserts and visually check for dirt. The filter inserts can be cleaned if the dirt level is low. The filter inserts must be replaced in case of a high level of dirt.
- ►Carefully clean off any dust deposits from the inside of the housing. Now insert the cleaned or new filter inserts in the correct order. The correct order can be found on the information sign on the housing base.
- ►Put the housing cover back on and tighten the screws.

NOTICE

Opening the device cover on the LF-AD-x air filter leads to an airflow fault on the TITANUS PRO·SENS®.

9.7 Replacing the filter on special filter SF-400/650

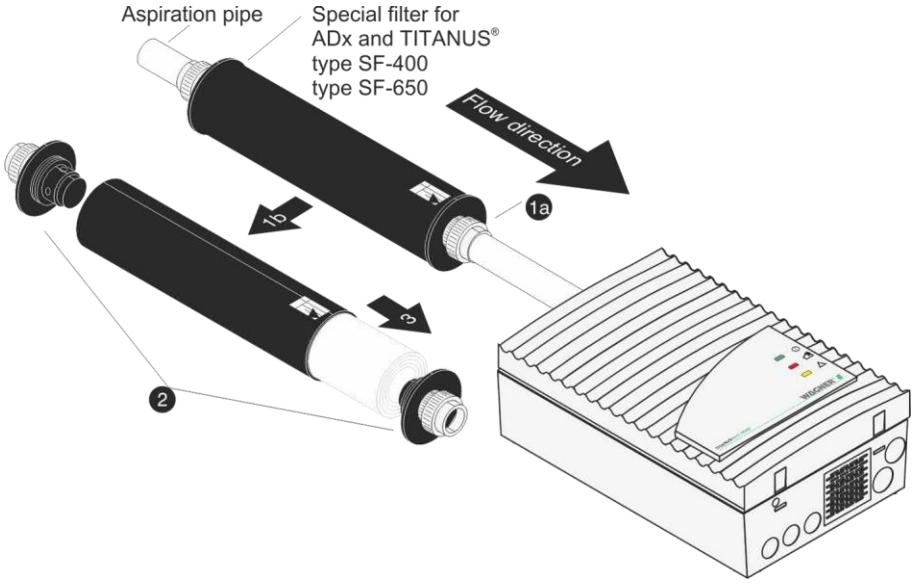


Figure 105: Replacing the filter element on the special filter

Perform the following work steps to change the filter element:

- ►Only perform the following work with the device disconnected from the mains.
- ►Loosen the two UPVC transition screw connections 1a on the special filter and remove.
- ►Remove the two screw-in plugs on the filter housing.
- ►Remove the old filter element. Insert the new filter element into the filter housing.
- ►Screw the two screw-in plugs into the filter housing.
- ►Re-place the special filter into the pipe system and fasten it with the UPVC transition screw connections.

NOTICE

When installing the special filter, observe the direction of flow.

NOTICE

Opening the special filter leads to an airflow fault on the TITANUS PRO·SENS®.

9.8 Checking the airflow sensor calibration

►Check the airflow sensor value with the diagnostic software.

Functional principle

During the initialisation of the connected pipe system, the device initially saves the measured actual value of the airflow as a target value via the integrated airflow monitoring. This target value serves as reference value for the further evaluation of a potential airflow fault. Depending on the selected airflow threshold (see chapter "Project planning", section "Adjusting airflow sensitivity"), the current airflow value may fluctuate around this target value during operation without triggering an airflow fault. The device only indicates an airflow fault when the set airflow threshold is exceeded. Thus, the fault is transmitted.

Checking the actual value

The tolerance range for the set airflow threshold (min./max.) as well as the actual value (blue diamond) and target value of the airflow are displayed in the diagnostic software. Depending on the selected airflow threshold, the limits of the tolerance range correspond to a deviation of ±10% (threshold I), ±20% (threshold II), ±30% (threshold III) or ±50% (threshold IV).

►Check the deviation of the actual value from the target value. If there is a deviation of > ±70%, the pipe system is to be checked as a preventative measure (see the following section "Rectifying an airflow fault").

NOTICE

The current airflow value may deviate from the target value not only due to a fault in the pipe system (break or blockage), but also due to air pressure fluctuations in the surrounding area.

Air pressure dependency

In order to ensure fault-free long-term operation of the device, the airflow sensor must be calibrated depending on air pressure (see chapter "Commissioning"). Only with this type of calibration are slight air pressure fluctuations still within the monitoring window and therefore in the permissible tolerance range.

⚠ ATTENTION

In case of a low and medium airflow threshold, an air pressure-dependent calibration must be performed.

Air pressure independency

If the sensor calibration is performed independently of the air pressure, fluctuation of the air pressure can lead to undesirable airflow faults. In case of a large airflow threshold, the airflow sensor may be calibrated independent of the air pressure. Make sure that no air pressure fluctuations can occur in the immediate vicinity.

⚠ ATTENTION

If you are unable to ensure that no air pressure fluctuation can occur in the immediate vicinity, the airflow sensor must be calibrated depending on the air pressure.

Rectifying an airflow fault

If the airflow calibration was performed depending on air pressure but the actual value is not within the tolerance range of the selected airflow threshold (airflow fault is displayed by the device), another disturbance variable exists in addition to air pressure or temperature fluctuations.

► Check the pipe system for tightness and blockages (see chapter "Commissioning" ➔ section "Troubleshooting").

NOTICE

If the pipe system was changed during troubleshooting, the original configuration of the pipe system must be restored after completing troubleshooting and the airflow must be recalibrated.

► If no defect is located during the inspection, check the airflow monitoring by attaching the test pipe and carrying out the function test described in the chapter "Commissioning".

⚠ ATTENTION

Only authorized personnel is permitted to replace the detector module in case of an airflow monitoring defect.

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

►Perform another calibration with the pipe system connected.

NOTICE

Always record the type of calibration (air pressure-dependent or air pressure-independent) and the readings of air pressure, height above mean sea level and the set voltage on MP1 / MP4 in the test record, as applicable.

►Observe the current airflow value during ongoing maintenance or check it during the next inspection at the latest.

TIP

All stored and current device data as well as settings made via the DIL switch can be saved as a file using the diagnostic software. For further information on the diagnostic software, refer to the separate documentation.

►If a similar target value deviation results as before, disturbing ambient influences are the cause of this deviation. If these negative influences on airflow monitoring cannot be addressed, the next sensitivity threshold must be set.

9.9 Checking the airflow monitoring system

A pipe break or pipe blockage is displayed by a flash code via an LED on each detector module.

Check the airflow monitoring system in accordance with the specifications described in the chapter "Commissioning" ➔ "Airflow monitoring".

9.10 Checking the fault signal transmission

A fault is displayed on the TITANUS PRO·SENS® device and, if applicable, on the FDCP. Proceed in accordance with the chapter "Commissioning" ➔ "Fault signal transmission".

9.11 Maintenance intervals

Maintenance includes regular inspections. The aspirating smoke detectors are initially inspected during commissioning and then annually.

The following checks must be performed during each maintenance:

Action	More information
Visual inspection	"Maintenance"
Detector module and alarm transmission	"Maintenance"
Pipe system check	"Maintenance"
Airflow sensor calibration	"Maintenance"
Airflow monitoring	"Commissioning"
Fault signal transmission	"Commissioning"

In additional to annual maintenance, the national provisions or standards regarding the purpose of use as well as any requirements specific to the application must be considered.

Glossary

Aerosol

Airborne particles in microscopic or sub-microscopic grain size range. They exist of unburned parts of the burning material, intermediate products of oxidative conversion and finely distributed carbon (soot).

Airflow sensor

For monitoring the entire airflow in the pipe system, i.e. controlling the pipe system for ruptures and blockage. According to the air monitoring requirement, single hole monitoring and rupture detection can be achieved at the end of the pipe system.

Alarm

- Acoustic signal triggered via fire detector to report a fire. - Variably adjustable alarm level. The triggering of the alarm means the definite detection of a fire. The fire brigade is alarmed.

Alarm current

Increased current in alarm status. See also "Standby current"

Alternative sensitivity (alt. sens.)

The second detector sensitivity to be set; if connecting 24 V to the input, the set detector sensitivity is decreased by one level.

Area with potentially explosive atmosphere

A potentially explosive area where a potentially explosive atmosphere exists.

Aspirating smoke detector

Active system, in which the vacuum that is required for the aspiration of the air samples is generated by a system-integrated fan. The air samples are then conveyed to a evaluation unit (detector module, detector head or detection unit).

Collective fault

An non-differentiated, i.e. non-localisable disturbance alarm that is reported to a main control centre.

Contact load

Maximum capacity with which a relay contact can be switched.

Deflagration

A deflagration (derived from Latin deflagrare = to burn) is a rapid burning process in which the explosion pressure is solely created by the , generated and expanding gases. The propagation occurs as a result of the heat released by the reaction. The combustion proceeds at a speed which is lower than the sound velocity in the burning medium. See "Detonation"

Detector group

Summary of fire alarms in a detector line for which a separate display in the fire detector control panel is intended.

Detector line

Monitored transmission path through which the fire alarm can be connected to the fire detector control panel. See also "Primary line"

Detector module

Modular scattered light smoke detectors, optimised for use in aspirating smoke detectors with special air supply; with Flow Init button for initialising the integrated airflow sensor, diagnostic LED with flash code for indicating fault states and DIL switches. See also "Scattered light smoke detectors", "Airflow sensor" and "DIL switch"

Detonation

We speak of a detonation if the speeds are higher than the sound velocity in the burning medium. In this case, the burning mechanism changes from the heating of the unburned mixture to shock wave-induced combustion. Detonations in pipe systems can result in pressures that exceed the explosion pressures in case of deflagration many times over. With the detonation, the pressure wave is superimposed with the temperature-affected volume expansion caused by the explosion reaction. See "Deflagration"

DIL switch

Dual in line for setting e.g. the addressing and display type of response indicators.

Disturbance alarm

Message that there is a deviation from a target value in the fire alarm centre.

Disturbance variable

All exogenous variables which impair the intended function of a fire alarm system.

Fire alarm system

Hazard alarm systems which serve people as a direct call for help in case of fire hazards and/ or to detect and report fires at an early stage.

fire detection control panel

See "Fire detector control panel"

Fire detector control panel

Central part of a fire alarm system that monitors the system for faults, supplies the detector with power and records messages, displaying them optically, acoustically and transmitting them if necessary.

LOGIC·SENS

The intelligent signal processor can be activated or deactivated via a DIL switch, FDCP and/or diagnostic software. This signal processor permits an analysis of the measured smoke level by comparison with the known parameters, whereby a disturbance variable is detected, thus preventing false alarm.

Monitoring area

Entire area that is monitored by automatic fire alarms.

Monitoring window

Adjustment area where the normal airflow is between a defined top and bottom value.

Nominal gap width

Maximum gap of the flame filter in the housing of the detonation protection that may be existent without the hazard of an ignition spark from the device entering the area with potentially explosive atmosphere.

Point-type smoke detectors

Respond to burning materials contained in the air and/or aerosols (airborne particles).

Primary line

Transmission paths automatically and permanently monitored for wire breakage and short circuit. These serve the signal transmission of important functions of a fire alarm system.

Scattered light smoke detectors

Optical smoke detectors which utilise the physical phenomena of light scattering due to smoke particles, which causes a signal change on the LED.

Sensitivity

A measure of the fire sensitivity. It is measured in the percentage of light obscuration per metre. The sensitivity (main alarm) is the triggering level which triggers the main alarm when the corresponding light obscuration is reached.

Single hole monitoring

Detection of changes in the diameter (e.g. blockage) of every single aspiration aperture.

Smoke aerosol

See "Aerosol"

Standby current

Current on the detection line in the normal operating status. See also "Alarm current"

Terminal resistor

See "Detector line end"

Termination resistor

Termination element at the end of a detector or control line for the monitoring of the detector or control line, even including wire breakage and short circuit.

Test aerosol

An aerosol, whose relevant characteristics for the respective intended use are known. See "Aerosol"

Annex

See also

- "Air pressure correction tables" [➔ 187]
- "Project planning tables with air filters" [➔ 190]
- "Project planning tables with acceleration openings and air filters" [➔ 195]
- "Test record" [➔ 204]

Air pressure correction table for

Equipment protection

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

Air pressure correction table for adjustment

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

Air pressure correction table for

Room protection (U-shaped, M-shaped, double U-shaped and quadruple U-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
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
Voltage [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**

Air pressure correction table for

Module		Sensitivity [% light obs./m]	Number of aspiration apertures 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32
DM-TP-	01	0,015	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
		0,03	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
		0,06	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B
		0,12	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C
	10	0,1	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B
		0,2	A	A	A	A	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C
		0,4	A	A	B	B	B	B	C	C	C	C	C	C										
		0,8	A	B	B	C	C	C																
	50	0,5	A	A	A	B	B	B	B	C	C	C	C	C	C	C	C							
		1	A	B	B																			

Pipe shape	Fan voltage [V]	Number of aspiration apertures 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32
Without pipe accessories																							
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				
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				
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				
	≥ 9	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	
Quad U (1 DM)	6,5																						
	6,9																						
	≥ 9	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
Quad U (2 DM)	6,5																						
	6,9																						
	12	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
With detector box and/or VSK																							
I	6,5	70	70	70	70	70	70	70															
	6,9	70	70	70	70	70	70	70	70														
	≥ 9	100	100	100	100	100	100	100	100	100	100												
U	6,5	120	120	120	120	120	120	120	120	120	120	120	120										
	6,9	120	120	120	120	120	120	120	120	120	120	120	120	120	120								
	≥ 9	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140					
M	6,5	150	150	150	150	150	150	150	150	150	150	150	150										
	6,9	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150							
	≥ 9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180				
Double U	6,5	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140						
	6,9	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150				
	≥ 9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180				
With *OXY·SENS*® or condensate separator [1]																							
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	100											
	6,9	110	110	110	110	110	110	110	110	110	110	110	110										
	≥ 9	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110						
M	6,5	100	100	100	100	100	100	100	100	100	100	100	100										
	6,9	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110							
	≥ 9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160					
Double U	6,5	140	140	140	140	140	140	140	140	140	140	140	140										
	6,9	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140						
	≥ 9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160						
With detonation prevention device [2]																							
I	6,5	46	46	46	46																		
	6,9	46	46	46	46	38																	
	≥ 9	68	68	68	68	68	68																
U	6,5	60	60	60	60	60	60																
	6,9	60	60	60	60	60	60																
	≥ 9	60	60	60	60	60	60	60	60														
M	6,5	80	80	80	80	80	80																
	6,9	80	80	80	80	80	80	70	70	70													
	≥ 9	120	120	120	120	120	120	120	120	120													
Double U	6,5	80	80	80	80																		
	6,9	80	80	80	80	80	80	80	80														
	≥ 9	100	100	100	100	100	100	100	100														

Permitted total pipe length [m]

[1] **Available for following pipe accessories:**
OXY·SENS®
VSK and/or DM-MB-TM-xx and/or KA-DN 25 and/or MB2

[2] **Available for following pipe accessories:**
Detonation prevention device EG IIx and/or KA-DN 25
Detonation prevention device EG IIx and/or DM-MB-TM-xx and/or VSK and/or MB2
OXY·SENS® and/or VSK and/or DM-MB-TM-xx and/or KA-DN 25

Classification TITANUS *PRO·SENS* ® and *PRO·SENS* ® 2
Project planning with air filters type LF-AD

Module		Sensitivity [% light obs./m]	Number of aspiration apertures 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32
DM-TP-	01	0,015	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
		0,03	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	
		0,06	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	
		0,12	A	A	A	A	A	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	
	10	0,1	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B				
		0,2	A	A	A	A	B	B	B	B	B	B	C	C	C	C	C	C	C	C				
		0,4	A	A	B	B	B																	
		0,8	A	B																				
	50	0,5	A	A	B	B	B	B	C	C	C	C	C	C	C									
		1	A	B	B																			

Pipe shape	Fan voltage [V]	Number of aspiration apertures 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32
Without pipe accessories																							
I	6,5	70	70	70	70	70	70	70															
	6,9	70	70	70	70	70	70	70	70														
	≥ 9	100	100	100	100	100	100	100	100	100	100	90	90										
U	6,5	120	120	120	120	120	120	120	120	120	120	120	120										
	6,9	120	120	120	120	120	120	120	120	120	120	120	120	120	120								
	≥ 9	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140				
M	6,5	160	160	160	160	160	160	160	160	160	160	160	160										
	6,9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160							
	≥ 9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180			
Double U	6,5	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160						
	6,9	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170				
	≥ 9	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	
With detector box and/or VSK																							
I	6,5	70	70	70	70	70	70	70															
	6,9	70	70	70	70	70	70	70	70														
	≥ 9	100	100	100	100	100	100	100	100	100	100												
U	6,5	110	110	110	110	110	110	110	110	110	110	110	110										
	6,9	120	120	120	120	120	120	120	120	120	120	120	120	120	120								
	≥ 9	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140					
M	6,5	150	150	150	150	150	150	150	150	150	150	150	150										
	6,9	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150						
	≥ 9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180			
Double U	6,5	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140						
	6,9	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150				
	≥ 9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180				
With *OXY·SENS* ® or condensate separator [1]																							
I	6,5	60	60	60	60	60	60																
	6,9	60	60	60	60	60	60	60															
	≥ 9	80	80	80	80	80	80	80	80	80	80												
U	6,5	100	100	100	100	100	100	100	100	100	100												
	6,9	110	110	110	110	110	110	110	110	110	110	110	110										
	≥ 9	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110						
M	6,5	100	100	100	100	100	100	100	100	100	100	100	100										
	6,9	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110							
	≥ 9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160					
Double U	6,5	140	140	140	140	140	140	140	140	140	140	140	140	140									
	6,9	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140						
	≥ 9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160						
With detonation prevention device [2]																							
I	6,5	46	46	46	46																		
	6,9	46	46	46	46	38																	
	≥ 9	68	68	68	68	68	68																
U	6,5	60	60	60	60	60	60																
	6,9	60	60	60	60	60	60																
	≥ 9	60	60	60	60	60	60	60	60														
M	6,5	80	80	80	80	80	80																
	6,9	80	80	80	80	80	80	70	70	70													
	≥ 9	120	120	120	120	120	120	120	120	120													
Double U	6,5	80	80	80	80																		
	6,9	80	80	80	80	80	80	80	80														
	≥ 9	100	100	100	100	100	100	100	100														

Permitted total pipe length [m]

[1] **Available for following pipe accessories:**

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

[2] **Available for following pipe accessories:**

Detonation prevention device EG IIx and/or KA-DN 25

Detonation prevention device EG IIx and/or DM-MB-TM-xx and/or VSK and/or MB2

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

Classification TITANUS *PRO·SENS* ® and *PRO·SENS* ® 2
Project planning with air filters type LF-AD

Module		Sensitivity [% light obs./m]	Number of aspiration apertures 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32
DM-TP-	01	0,015	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
		0,03	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B
		0,06	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B
		0,12	A	A	A	A	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C
	10	0,1	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B					
		0,2	A	A	A	B	B	B	B	B	B	C	C	C	C	C	C	C	C					
		0,4	A	B	B	B																		
		0,8	B	B																				
	50	0,5	A	A	B	B	B	B	C	C	C	C	C	C										
		1	A	B	B																			

Pipe shape	Fan voltage [V]	Number of aspiration apertures 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32
Without pipe accessories																							
I	6,5	70	70	70	70	70	70	70															
	6,9	70	70	70	70	70	70	70	70														
	≥ 9	100	100	100	100	100	100	100	100	100	100	90	90										
U	6,5	120	120	120	120	120	120	120	120	120	120	120	120										
	6,9	120	120	120	120	120	120	120	120	120	120	120	120	120	120								
	≥ 9	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140				
M	6,5	160	160	160	160	160	160	160	160	160	160	160	160										
	6,9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160							
	≥ 9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180				
Double U	6,5	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160						
	6,9	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170				
	≥ 9	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	
With detector box and/or VSK																							
I	6,5	70	70	70	70	70	70	70															
	6,9	70	70	70	70	70	70	70	70														
	≥ 9	100	100	100	100	100	100	100	100	100	100												
U	6,5	110	110	110	110	110	110	110	110	110	110	110	110										
	6,9	120	120	120	120	120	120	120	120	120	120	120	120	120	120								
	≥ 9	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140					
M	6,5	150	150	150	150	150	150	150	150	150	150	150	150										
	6,9	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150							
	≥ 9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180				
Double U	6,5	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140						
	6,9	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150				
	≥ 9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180				
With *OXY·SENS* ® or condensate separator [1]																							
I	6,5	60	60	60	60	60	60																
	6,9	60	60	60	60	60	60	60															
	≥ 9	80	80	80	80	80	80	80	80	80	80												
U	6,5	100	100	100	100	100	100	100	100	100	100												
	6,9	110	110	110	110	110	110	110	110	110	110	110	110										
	≥ 9	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110						
M	6,5	100	100	100	100	100	100	100	100	100	100	100	100										
	6,9	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110							
	≥ 9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160					
Double U	6,5	140	140	140	140	140	140	140	140	140	140	140	140										
	6,9	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140						
	≥ 9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160						
With detonation prevention device [2]																							
I	6,5	46	46	46	46																		
	6,9	46	46	46	46	38																	
	≥ 9	68	68	68	68	68	68																
U	6,5	60	60	60	60	60	60																
	6,9	60	60	60	60	60	60																
	≥ 9	60	60	60	60	60	60	60	60														
M	6,5	80	80	80	80	80	80																
	6,9	80	80	80	80	80	80	70	70	70													
	≥ 9	120	120	120	120	120	120	120	120	120													
Double U	6,5	80	80	80	80																		
	6,9	80	80	80	80	80	80	80	80														
	≥ 9	100	100	100	100	100	100	100	100														

Permitted total pipe length [m]

[1] **Available for following pipe accessories:**

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

[2] **Available for following pipe accessories:**

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

Classification TITANUS *PRO·SENS* ® and *PRO·SENS* ® 2
Project planning with air filters type LF-AD-2

Module		Sensitivity [% light obs./m]	Number of aspiration apertures 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32
DM-TP-	01	0,015	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
		0,03	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	
		0,06	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	C	C	
		0,12	A	A	A	A	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C			
	10	0,1	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B						
		0,2	A	A	A	B	B	B	B	B	C	C	C	C	C	C	C	C						
		0,4	A	B	B	B																		
		0,8	B	B																				
	50	0,5	A	A	B	B	B																	
		1	A	B																				

Pipe shape	Fan voltage [V]	Number of aspiration apertures 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32
Without pipe accessories																							
I	6,5	70	70	70	70	70	70	70															
	6,9	70	70	70	70	70	70	70	70														
	≥ 9	100	100	100	100	100	100	100	100	100	100	90	90										
U	6,5	120	120	120	120	120	120	120	120	120	120	120	120										
	6,9	120	120	120	120	120	120	120	120	120	120	120	120	120	120								
	≥ 9	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140				
M	6,5	160	160	160	160	160	160	160	160	160	160	160	160										
	6,9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160							
	≥ 9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180			
Double U	6,5	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160						
	6,9	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170				
	≥ 9	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	
With detector box and/or VSK																							
I	6,5	70	70	70	70	70	70	70															
	6,9	70	70	70	70	70	70	70	70														
	≥ 9	100	100	100	100	100	100	100	100	100	100												
U	6,5	120	120	120	120	120	120	120	120	120	120	120	120										
	6,9	120	120	120	120	120	120	120	120	120	120	120	120	120	120								
	≥ 9	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140					
M	6,5	150	150	150	150	150	150	150	150	150	150	150	150										
	6,9	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150							
	≥ 9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180			
Double U	6,5	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140						
	6,9	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150				
	≥ 9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180				
With *OXY·SENS* ® or condensate separator [1]																							
I	6,5	60	60	60	60	60	60																
	6,9	60	60	60	60	60	60	60															
	≥ 9	80	80	80	80	80	80	80	80	80	80												
U	6,5	100	100	100	100	100	100	100	100	100	100												
	6,9	110	110	110	110	110	110	110	110	110	110	110	110										
	≥ 9	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110						
M	6,5	100	100	100	100	100	100	100	100	100	100	100	100										
	6,9	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110							
	≥ 9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160					
Double U	6,5	140	140	140	140	140	140	140	140	140	140	140	140										
	6,9	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140						
	≥ 9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160						
With detonation prevention device [2]																							
I	6,5	46	46	46	46																		
	6,9	46	46	46	46	38																	
	≥ 9	68	68	68	68	68	68																
U	6,5	60	60	60	60	60	60																
	6,9	60	60	60	60	60	60																
	≥ 9	60	60	60	60	60	60	60	60														
M	6,5	80	80	80	80	80	80																
	6,9	80	80	80	80	80	80	70	70	70													
	≥ 9	120	120	120	120	120	120	120	120	120													
Double U	6,5	80	80	80	80																		
	6,9	80	80	80	80	80	80	80	80														
	≥ 9	100	100	100	100	100	100	100	100														

Permitted total pipe length [m]

[1] **Available for following pipe accessories:**

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

[2] **Available for following pipe accessories:**

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

Classification TITANUS *PRO·SENS* ® and *PRO·SENS* ® 2
Project planning with air filters type LF-AD-2

Module		Sensitivity [% light obs./m]	Number of aspiration apertures 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32
DM-TP-	01	0,015	A	A	A	A	A	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	
		0,03	A	A	B	B	B	B	C	C	C	C	C	C										
		0,06	A	B	B	C	C	C																
		0,12	B	C	C																			
	10	0,1	A	B	C	C	C																	
		0,2	B	C																				
		0,4	C																					
		0,8																						
	50	0,5	C																					
		1																						

Pipe shape	Fan voltage [V]	Number of aspiration apertures 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22	24	32
Without pipe accessories																							
I	6,5	70	70	70	70	70	70	70															
	6,9	70	70	70	70	70	70	70	70														
	≥ 9	100	100	100	100	100	100	100	100	100	100	90	90										
U	6,5	120	120	120	120	120	120	120	120	120	120	120	120										
	6,9	120	120	120	120	120	120	120	120	120	120	120	120	120	120								
	≥ 9	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140				
M	6,5	160	160	160	160	160	160	160	160	160	160	160	160										
	6,9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160							
	≥ 9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180			
Double U	6,5	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155						
	6,9	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165				
	≥ 9	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	
With detector box or air filter type LF-AD																							
I	6,5	70	70	70	70	70	70	70															
	6,9	70	70	70	70	70	70	70	70														
	≥ 9	100	100	100	100	100	100	100	100	100	100												
U	6,5	110	110	110	110	110	110	110	110	110	110	110	110										
	6,9	120	120	120	120	120	120	120	120	120	120	120	120	120	120								
	≥ 9	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135					
M	6,5	150	150	150	150	150	150	150	150	150	150	150	150										
	6,9	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150							
	≥ 9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180			
Double U	6,5	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140						
	6,9	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150				
	≥ 9	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180				
With *OXY·SENS* ® or condensate separator [1]																							
I	6,5	60	60	60	60	60	60																
	6,9	60	60	60	60	60	60	60															
	≥ 9	80	80	80	80	80	80	80	80	80	80												
U	6,5	100	100	100	100	100	100	100	100	100	100												
	6,9	110	110	110	110	110	110	110	110	110	110	110	110										
	≥ 9	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110						
M	6,5	100	100	100	100	100	100	100	100	100	100	100	100										
	6,9	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110							
	≥ 9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160					
Double U	6,5	140	140	140	140	140	140	140	140	140	140	140	140	140									
	6,9	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140						
	≥ 9	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160						
With detonation prevention device [2]																							
I	6,5	46	46	46	46																		
	6,9	46	46	46	46	38																	
	≥ 9	68	68	68	68	68	68																
U	6,5	60	60	60	60	60	60																
	6,9	60	60	60	60	60	60																
	≥ 9	60	60	60	60	60	60	60	60														
M	6,5	80	80	80	80	80	80																
	6,9	80	80	80	80	80	80	70	70	70													
	≥ 9	120	120	120	120	120	120	120	120	120													
Double U	6,5	80	80	80	80																		
	6,9	80	80	80	80	80	80	80	80														
	≥ 9	100	100	100	100	100	100	100	100														

Permitted total pipe length [m]

[1] **Available for following pipe accessories:**

OXY·SENS ®

KA-DN 25 and/or VSK and/or DM-MB-TM-xx and/or LF-AD and/or MB2

[2] **Available for following pipe accessories:**

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

Detonation prevention device EG IIx and/or DM-MB-TM-xx and/or VSK and/or LF-AD and/or MB2

Classification TITANUS *PRO·SENS* ® and *PRO·SENS* ® 2
With acceleration openings and without air filters

Module		Sensitivity [% light obs./ft]	Number of aspiration apertures 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
DM-TP-	01	0,015	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
		0,03	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B
		0,06	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C
		0,12	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C			
	10	0,1	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C
		0,2	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C									
		0,4	C	C	C	C	C																					
		0,8																										
	50	0,5	B	C	C	C	C	C	C	C																		
		1	C																									

Pipe shape	Fan voltage [V]	Number of aspiration apertures 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Without additional pipe accessories																											
I	6,9	150	150	130	130	130	130	130	130	130	130	130	130	110	110	110	110										
	≥ 9	200	200	180	180	180	180	150	150	150	130	130	130	130	130	130	130	130	130	130	130						
U	6,9		240	240	240	240	220	220	220	220	220	200	200	200	200	200	200	200	200	200	200						
	≥ 9		280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	240	240	240	240	240	240	200	200
M	6,9			240	240	240	240	210	210	210	210	210	210	210	210	210	210	210	210	170	170	170					
	≥ 9			300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	240	240
Double U (1 DM)	6,9				300	300	300	300	300	240	240	240	240	200	200	200	200	200	200	200	200	200	200	200	200		
	9				300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
	12				300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
Double U (2 DM)	6,9				220	220	220	220	220	220	220	220	220	200	200	200	200	200	200	200	200	200	200	200	200		
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220
	12				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220
With detector box and VSK [1]																											
I	6,9	140	120	120	120	120	120	120	120	120	120	120	100	100	100												
	≥ 9	180	160	160	160	160	130	130	130	120	120	120	120	120	120	120	120	120	120								
U	6,9		220	220	220	200	200	200	200	180	180	180	180	180	180	180	180	180	180								
	≥ 9		250	250	250	250	250	250	250	250	250	250	250	250	250	220	220	220	220	220	220	180	180	180	180	180	180
M	6,9			220	220	220	220	180	180	180	180	180	180	180	180	180	150	150	150								
	≥ 9			270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	220	220	220	220	220
Double U (1 DM)	6,9				270	270	270	270	270	220	220	220	220	180	180	180	180	180	180	180	180						
	9				270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270
	12				270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270
Double U (2 DM)	6,9				220	220	220	220	220	220	220	220	220	180	180	180	180	180	180	180	180						
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220
	12																										
With *OXY·SENS* ® or condensate separator [2]																											
I	6,9	90	90	90	90	90	90	90	90	90	80	80	80														
	≥ 9	130	130	130	130	110	110	90	90	90	90	90	90	90	90	90											
U	6,9		180	180	180	160	160	160	160	150	150	150	150	150	150												
	≥ 9		210	210	210	210	210	210	210	210	210	210	210	180	180	180	180	180	180	150	150	120	120	120	120	120	120
M	6,9			180	150	150	150	150	150	150	150	150	150	120	120	120											
	≥ 9			220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	180	180	180	180	180	180	150	150
Double U (1 DM)	6,9				220	180	180	180	180	150	150	150	150	150	150	150	150										
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	160	160
	12				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	190	190
Double U (2 DM)	6,9				220	180	180	180	180	150	150	150	150	150	150	150	150										
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	160	160
	12																										
With detonation prevention device [3]																											
I	6,9	53	53	53	53	46	46																				
	≥ 9	64	64	64	53	53	53	53	53																		
U	6,9		100	90	90	80	80	80	80																		
	≥ 9		120	120	120	120	120	100	100	100	100	80	80	60	60	60	60										
M	6,9			90	90	90	90	70	70	70																	
	≥ 9			120	120	120	120	120	120	120	100	100	100	100	100	100	90	90	90	90	90	90	75	75	75		
Double U (1 DM)	6,9				100	80	80	80	80																		
	9				120	120	120	120	120	120	120	120	120	90	90	90	90	90	90	90	90	90	90	90	90		
	12				120	120	120	120	120	110	110	110	110	100	100	100	100	100	100	100	100						
Double U (2 DM)	6,9				100	80	80	80	80																		
	9				120	120	120	120	120	120	120	120	120	90	90	90	90	90	90	90	90	90	90	90	90		
	12																										

Permitted total pipe length [m]

[1] **Available for following pipe accessories:**
DM-MB-TM-xx and/or VSK and/or MB2

[2] **Available for following pipe accessories:**
OXY·SEN S®
VSK and/or DM-MB-TM-xx and/or KA-DN 25 and/or MB2

[3] **Available for following pipe accessories:**
Detonation prevention device EG IIx and/or KA-DN 25
Detonation prevention device EG IIx and/or DM-MB-TM-xx and/or VSK and/or MB2
OXY·SENS ® and/or VSK and/or DM-MB-TM-xx and/or KA-DN 25 and/or MB2

Classification TITANUS *PRO·SENS* ® and *PRO·SENS* ® 2
With acceleration openings and without air filters

Module		Sensitivity [% light obs./ft]	Number of aspiration apertures 27	28	30	31	32	33	34	36	37	40	41	44	45	51	52	53	56	57	60	63	64	65	72	80	100
DM-TP-	01	0,015	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
		0,03	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C
		0,06	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C										
		0,12																									
	10	0,1	C	C	C	C	C	C	C	C	C	C															
		0,2																									
		0,4																									
		0,8																									
	50	0,5																									
		1																									

Pipe shape	Fan voltage [V]	Number of aspiration apertures 27	28	30	31	32	33	34	36	37	40	41	44	45	51	52	53	56	57	60	63	64	65	72	80	100
Without additional pipe accessories																										
I	6,9																									
	≥ 9																									
U	6,9																									
	≥ 9	200	200	200	160	160	160	160	160	160	160															
M	6,9																									
	≥ 9	240	240	240	240	240	240	210	210	210	210	210	210	210	210	180	180	180	180	180	180					
Double U (1 DM)	6,9																									
	9	300	300	300	300	300	220	220	220	220	220	220	220	220	220	220	220	220								
	12	300	300	300	300	300	300	300	300	300	300	300	300	260	260	260	260	260	260	260	260	260	250	250	250	250
Double U (2 DM)	6,9																									
	9	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220								
	12	220	220	220	220	220	220	220	220	220	220	220	220	180	180	180	180	180	180	180	180	180	180	180		
With detector box and VSK [1]																										
I	6,9																									
	≥ 9																									
U	6,9																									
	≥ 9	150	150	150	150	150	150	150	150																	
M	6,9																									
	≥ 9	220	220	220	190	190	190	190	190	190	190	190	190	190	160	160	160	160	160							
Double U (1 DM)	6,9																									
	9	270	270	200	200	200	200	200	200	200	200	200	200	200	200	200										
	12	270	270	240	240	240	240	240	240	240	240	240	240	230	230	230	230	230	230	230	230	230	230	230	230	
Double U (2 DM)	6,9																									
	9	220	220	200	200	200	200	200	200	200	200	200	200	200	200	200										
	12																									
With *OXY·SENS* ® or condensate separator [2]																										
I	6,9																									
	≥ 9																									
U	6,9																									
	≥ 9	120	120																							
M	6,9																									
	≥ 9	150	150	150	150	150	150	150	150	130	130	130	130	130												
Double U (1 DM)	6,9																									
	9	160	160	160	160	160	160	160	160	160	160															
	12	190	190	190	190	190	190	190	190	180	180	180	180	180	180	180	180	180	180	180						
Double U (2 DM)	6,9																									
	9	160	160	160	160	160	160	160	160	160	160															
	12																									
With detonation prevention device [3]																										
I	6,9																									
	≥ 9																									
U	6,9																									
	≥ 9																									
M	6,9																									
	≥ 9																									
Double U (1 DM)	6,9																									
	9																									
	12																									
Double U (2 DM)	6,9																									
	9																									
	12																									

Permitted total pipe length [m]

[1] **Available for following pipe accessories:**
DM-MB-TM-xx and/or VSK and/or MB2

[2] **Available for following pipe accessories:**
OXY·SEN S®
VSK and/or DM-MB-TM-xx and/or KA-DN 25 and/or MB2

[3] **Available for following pipe accessories:**
Detonation prevention device EG IIx and/or KA-DN 25
Detonation prevention device EG IIx and/or DM-MB-TM-xx and/or VSK and/or MB2
OXY·SENS ® and/or VSK and/or DM-MB-TM-xx and/or KA-DN 25 and/or MB2

Classification TITANUS *PRO·SENS* ® and *PRO·SENS* ® 2
With acceleration openings and with air filters type LF-AD

Module		Sensitivity [% light obs./ft]	Number of aspiration apertures 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	24	25	26	27
DM-TP-	01	0,015	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
		0,03	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B
		0,06	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C
		0,12	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C						
	10	0,1	A	A	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C
		0,2	B	B	B	B	C	C	C	C	C	C	C	C	C	C												
		0,4	C	C	C	C																						
		0,8																										
	50	0,5	C	C	C	C	C	C	C																			
		1																										

Pipe shape	Fan voltage [V]	Number of aspiration apertures 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	24	25	26	27
Without additional pipe accessories																											
I	6,9	150	150	130	130	130	130	130	130	130	110	110	110	110	110	110	110										
	≥ 9	200	200	180	180	180	180	150	150	150	130	130	130	130	130	130	130	130	130	130	130						
U	6,9		240	240	240	240	200	200	200	200	200	200	200	200	200	200	200	160	160	160	160						
	≥ 9		280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	240	240	240	240	200	200	200	200	200	200
M	6,9			240	240	240	240	210	210	210	210	210	210	210	210	210	170	170	170	170	170	170						
	≥ 9			300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	240	240	240	240	240
Double U (1 DM)	6,9				300	300	300	300	300	240	240	240	240	200	200	200	200	200	200	200	200	200	200	200	200		
	9				300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
	12				300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
Double U (2 DM)	6,9				220	220	220	220	220	220	220	220	220	200	200	200	200	200	200	200	200	200	200	200	200		
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220
	12																										
With detector box and VSK [1]																											
I	6,9	140	120	120	120	120	120	120	120	120	120	120	100	100	100												
	≥ 9	180	160	160	160	160	130	130	130	120	120	120	120	120	120	120	120	120	120								
U	6,9		220	220	220	200	200	200	200	180	180	180	180	180	180	180	180	180	180								
	≥ 9		250	250	250	250	250	250	250	250	250	250	250	250	250	220	220	220	220	220	220	180	180	180	180	180	150
M	6,9			220	220	220	220	180	180	180	180	180	180	180	180	180	150	150	150								
	≥ 9			270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	220	220	220	220	220
Double U (1 DM)	6,9				270	270	270	270	270	220	220	220	220	180	180	180	180	180	180	180	180						
	9				270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270
	12				270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270
Double U (2 DM)	6,9				220	220	220	220	220	220	220	220	220	180	180	180	180	180	180	180	180						
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220
	12																										
With *OXY·SENS* ® or condensate separator [2]																											
I	6,9	90	90	90	90	90	90	90	90	90	80	80	80														
	≥ 9	130	130	130	130	110	110	90	90	90	90	90	90	90	90	90											
U	6,9		180	180	180	160	160	160	160	150	150	150	150	150	150												
	≥ 9		210	210	210	210	210	210	210	210	210	210	210	180	180	180	180	180	180	150	150	120	120	120	120	120	120
M	6,9			180	150	150	150	150	150	150	150	150	150	120	120	120											
	≥ 9			220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	180	180	180	180	180	150	150	150
Double U (1 DM)	6,9				220	180	180	180	180	150	150	150	150	150	150	150	150										
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	160	160	160
	12				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	190	190	190	
Double U (2 DM)	6,9				220	180	180	180	180	150	150	150	150	150	150	150	150										
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	160	160	160
	12																										
With detonation prevention device [3]																											
I	6,9	53	53	53	53	46	46																				
	≥ 9	64	64	64	53	53	53	53	53																		
U	6,9		100	90	90	80	80	80	80																		
	≥ 9		120	120	120	120	120	100	100	100	100	80	80	60	60	60	60										
M	6,9			90	90	90	90	70	70	70																	
	≥ 9			120	120	120	120	120	120	120	100	100	100	100	100	100	90	90	90	90	90	90	75	75			
Double U (1 DM)	6,9				100	80	80	80	80																		
	9				120	120	120	120	120	120	120	120	120	90	90	90	90	90	90	90	90	90	90	90			
	12				120	120	120	120	120	110	110	110	110	100	100	100	100	100	100	100	100						
Double U (2 DM)	6,9				100	80	80	80	80																		
	9				120	120	120	120	120	120	120	120	120	90	90	90	90	90	90	90	90	90	90	90			
	12																										

Permitted total pipe length [m]

[1] **Available for following pipe accessories:**
DM-MB-TM-xx and/or VSK and/or MB2

[2] **Available for following pipe accessories:**
OXY·SEN S®
VSK and/or DM-MB-TM-xx and/or KA-DN 25 and/or MB2

[3] **Available for following pipe accessories:**
Detonation prevention device EG IIx and/or KA-DN 25
Detonation prevention device EG IIx and/or DM-MB-TM-xx and/or VSK and/or MB2
OXY·SENS ® and/or VSK and/or DM-MB-TM-xx and/or KA-DN 25 and/or MB2

Classification TITANUS *PRO·SENS* ® and *PRO·SENS* ® 2
With acceleration openings and with air filters type LF-AD

Module		Sensitivity [% light obs./ft]	Number of aspiration apertures 28	29	30	31	32	33	34	35	36	37	40	44	45	46	47	51	52	56	57	60	63	64	65	80	88
DM-TP-	01	0,015	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
		0,03	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C
		0,06	C	C	C	C	C	C	C	C	C	C	C	C	C	C											
		0,12																									
	10	0,1	C	C	C	C	C	C	C	C																	
		0,2																									
		0,4																									
		0,8																									
	50	0,5																									
		1																									

Pipe shape	Fan voltage [V]	Number of aspiration apertures 28	29	30	31	32	33	34	35	36	37	40	44	45	46	47	51	52	56	57	60	63	64	65	80	88
Without additional pipe accessories																										
I	6,9																									
	≥ 9																									
U	6,9																									
	≥ 9	200	160	160	160	160	160	160	160	160	160	160														
M	6,9																									
	≥ 9	240	240	240	240	240	240	210	210	210	210	210	210	210	210	210	210	180	180	180	180	180				
Double U (1 DM)	6,9																									
	9	300	300	300	300	300	220	220	220	220	220	220	220	220	220	220	220	220	220							
	12	300	300	300	300	300	300	300	300	300	300	300	300	260	260	260	260	260	260	260	260	260	260	240	240	240
Double U (2 DM)	6,9																									
	9	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220							
	12																									
With detector box and VSK [1]																										
I	6,9																									
	≥ 9																									
U	6,9																									
	≥ 9	150	150	150	150	150	150	150	150	150																
M	6,9																									
	≥ 9	220	220	220	190	190	190	190	190	190	190	190	190	190	160	160	160	160	160	160						
Double U (1 DM)	6,9																									
	9	270	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200								
	12	270	240	240	240	240	240	240	240	240	240	240	240	230	230	230	230	230	230	230	230	230	230	230		
Double U (2 DM)	6,9																									
	9	220	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200								
	12																									
With *OXY·SENS* ® or condensate separator [2]																										
I	6,9																									
	≥ 9																									
U	6,9																									
	≥ 9	120																								
M	6,9																									
	≥ 9	150	150	150	150	150	150	150	150	150	130	130	130	130												
Double U (1 DM)	6,9																									
	9	160	160	160	160	160	160	160	160	160	160	160														
	12	190	190	190	190	190	190	190	190	190	180	180	180	180	180	180	180	180	180	180	180					
Double U (2 DM)	6,9																									
	9	160	160	160	160	160	160	160	160	160	160	160														
	12																									
With detonation prevention device [3]																										
I	6,9																									
	≥ 9																									
U	6,9																									
	≥ 9																									
M	6,9																									
	≥ 9																									
Double U (1 DM)	6,9																									
	9																									
	12																									
Double U (2 DM)	6,9																									
	9																									
	12																									

Permitted total pipe length [m]

[1] **Available for following pipe accessories:**
DM-MB-TM-xx and/or VSK and/or MB2

[2] **Available for following pipe accessories:**
OXY·SEN S®
VSK and/or DM-MB-TM-xx and/or KA-DN 25 and/or MB2

[3] **Available for following pipe accessories:**
Detonation prevention device EG IIx and/or KA-DN 25
Detonation prevention device EG IIx and/or DM-MB-TM-xx and/or VSK and/or MB2
OXY·SENS ® and/or VSK and/or DM-MB-TM-xx and/or KA-DN 25 and/or MB2

Classification TITANUS *PRO·SENS* ® and *PRO·SENS* ® 2
With acceleration openings and with air filters type LF-AD-1

Module		Sensitivity [% light obs./ft]	Number of aspiration apertures 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	19	20	21	22	23	24	25
DM-TP-	01	0,015	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
		0,03	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B
		0,06	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C
		0,12	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C							
	10	0,1	A	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C
		0,2	B	B	B	C	C	C	C	C	C	C	C	C	C											
		0,4	C	C	C																					
		0,8																								
	50	0,5	C	C	C	C	C	C																		
		1																								

Pipe shape	Fan voltage [V]	Number of aspiration apertures 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	19	20	21	22	23	24	25
Without additional pipe accessories																									
I	6,9	140	120	120	120	120	120	120	120	120	120	120	100	100	100	100									
	≥ 9	190	190	170	170	170	140	140	140	120	120	120	120	120	120	120	120	120	120						
U	6,9		230	230	230	210	210	210	210	190	190	190	190	190	190	190	190	190							
	≥ 9		270	270	270	270	270	270	270	270	270	270	270	270	270	230	230	230	230	230	230	230	190	190	190
M	6,9			230	230	230	230	200	200	200	200	200	200	200	200	200	160	160							
	≥ 9			290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	230	230	230	230
Double U (1 DM)	6,9				290	290	290	290	290	230	230	230	230	190	190	190	190	190	190	190						
	9				290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290
	12				290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290
Double U (2 DM)	6,9				220	220	220	220	220	220	220	220	220	190	190	190	190	190	190	190						
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220
	12																								
With detector box and VSK [1]																									
I	6,9	140	120	120	120	120	120	120	120	120	120	120	100	100	100										
	≥ 9	180	160	160	160	160	130	130	130	120	120	120	120	120	120	120	120	120							
U	6,9		220	220	220	200	200	200	200	180	180	180	180	180	180	180	180	180							
	≥ 9		250	250	250	250	250	250	250	250	250	250	250	250	250	220	220	220	220	220	180	180	180	180	180
M	6,9			220	220	220	220	180	180	180	180	180	180	180	180	180	150	150							
	≥ 9			270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	220	220	220	220	
Double U (1 DM)	6,9				270	270	270	270	270	220	220	220	220	180	180	180	180	180	180	180						
	9				270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270
	12				270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270
Double U (2 DM)	6,9				220	220	220	220	220	220	220	220	220	180	180	180	180	180	180	180						
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220
	12																								
With *OXY·SENS* ® or condensate separator [2]																									
I	6,9	90	90	90	90	90	90	90	90	90	80	80	80												
	≥ 9	130	130	130	130	110	110	90	90	90	90	90	90	90	90	90									
U	6,9		180	180	180	160	160	160	160	150	150	150	150	150	150										
	≥ 9		210	210	210	210	210	210	210	210	210	210	210	180	180	180	180	180	150	150	120	120	120	120	120
M	6,9			180	150	150	150	150	150	150	150	150	150	120	120	120									
	≥ 9			220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	180	180	180	180	180	180	150
Double U (1 DM)	6,9				220	180	180	180	180	150	150	150	150	150	150	150	150								
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	160
	12				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	190
Double U (2 DM)	6,9				220	180	180	180	180	150	150	150	150	150	150	150	150								
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	160
	12																								
With detonation prevention device [3]																									
I	6,9	53	53	53	53	46	46																		
	≥ 9	64	64	64	53	53	53	53	53																
U	6,9		100	90	90	80	80	80	80																
	≥ 9		120	120	120	120	120	100	100	100	100	80	80	60	60	60	60								
M	6,9			90	90	90	90	70	70	70															
	≥ 9			120	120	120	120	120	120	120	100	100	100	100	100	100	90	90	90	90	90	75	75	75	
Double U (1 DM)	6,9				100	80	80	80	80																
	9				120	120	120	120	120	120	120	120	120	90	90	90	90	90	90	90	90	90	90	90	
	12				120	120	120	120	120	110	110	110	110	100	100	100	100	100	100	100					
Double U (2 DM)	6,9				100	80	80	80	80																
	9				120	120	120	120	120	120	120	120	120	90	90	90	90	90	90	90	90	90	90	90	
	12																								

Permitted total pipe length [m]

[1] **Available for following pipe accessories:**
DM-MB-TM-xx and/or VSK and/or MB2

[2] **Available for following pipe accessories:**
OXY·SEN S®
VSK and/or DM-MB-TM-xx and/or KA-DN 25 and/or MB2

[3] **Available for following pipe accessories:**
Detonation prevention device EG IIx and/or KA-DN 25
Detonation prevention device EG IIx and/or DM-MB-TM-xx and/or VSK and/or MB2
OXY·SENS ® and/or VSK and/or DM-MB-TM-xx and/or KA-DN 25 and/or MB2

Classification TITANUS *PRO·SENS* ® and *PRO·SENS* ® 2
With acceleration openings and with air filters type LF-AD-1

Module		Sensitivity [% light obs./ft]	Number of aspiration apertures 26	27	28	29	30	31	32	33	36	37	38	40	42	43	44	45	46	48	49	52	57	60	80
DM-TP-	01	0,015	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
		0,03	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C
		0,06	C	C	C	C	C	C	C	C	C	C	C	C	C										
		0,12																							
	10	0,1	C	C	C	C	C	C	C																
		0,2																							
		0,4																							
		0,8																							
	50	0,5																							
		1																							

Pipe shape	Fan voltage [V]	Number of aspiration apertures 26	27	28	29	30	31	32	33	36	37	38	40	42	43	44	45	46	48	49	52	57	60	80	Permitted total pipe length [m]
Without additional pipe accessories																									
I	6,9																								
	≥ 9																								
U	6,9																								
	≥ 9	190	190	190	150	150	150	150	150	150	150	150													
M	6,9																								
	≥ 9	230	230	230	230	230	200	200	200	200	200	200	200	200	200	200	200	200	200	170	170	170	170		
Double U (1 DM)	6,9																								
	9	290	290	290	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210				
	12	290	290	290	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	240	240	240	240	240	
Double U (2 DM)	6,9																								
	9	220	220	220	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210				
	12																								
With detector box and VSK [1]																									
I	6,9																								
	≥ 9																								
U	6,9																								
	≥ 9	180	150	150	150	150	150	150	150	150															
M	6,9																								
	≥ 9	220	220	220	220	220	190	190	190	190	190	190	190	190	190	190	190	160	160	160	160	160			
Double U (1 DM)	6,9																								
	9	270	270	270	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200				
	12	270	270	270	240	240	240	240	240	240	240	240	240	240	240	240	230	230	230	230	230	230	230	230	
Double U (2 DM)	6,9																								
	9	220	220	220	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200				
	12																								
With *OXY·SENS* ® or condensate separator [2]																									
I	6,9																								
	≥ 9																								
U	6,9																								
	≥ 9	120	120	120																					
M	6,9																								
	≥ 9	150	150	150	150	150	150	150	150	150	130	130	130	130	130	130	130								
Double U (1 DM)	6,9																								
	9	160	160	160	160	160	160	160	160	160	160	160	160												
	12	190	190	190	190	190	190	190	190	190	180	180	180	180	180	180	180	180	180	180	180	180	180		
Double U (2 DM)	6,9																								
	9	160	160	160	160	160	160	160	160	160	160	160	160												
	12																								
With detonation prevention device [3]																									
I	6,9																								
	≥ 9																								
U	6,9																								
	≥ 9																								
M	6,9																								
	≥ 9																								
Double U (1 DM)	6,9																								
	9																								
	12																								
Double U (2 DM)	6,9																								
	9																								
	12																								

[1] **Available for following pipe accessories:**
DM-MB-TM-xx and/or VSK and/or MB2

[2] **Available for following pipe accessories:**
OXY·SEN S®
VSK and/or DM-MB-TM-xx and/or KA-DN 25 and/or MB2

[3] **Available for following pipe accessories:**
Detonation prevention device EG IIx and/or KA-DN 25
Detonation prevention device EG IIx and/or DM-MB-TM-xx and/or VSK and/or MB2
OXY·SENS ® and/or VSK and/or DM-MB-TM-xx and/or KA-DN 25 and/or MB2

Classification TITANUS *PRO·SENS* ® and *PRO·SENS* ® 2
With acceleration openings and with air filters type LF-AD-2

Module		Sensitivity [% light obs./ft]	Number of aspiration apertures 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	19	20	21	22	23	24	25
DM-TP-	01	0,015	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
		0,03	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B
		0,06	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C
		0,12	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C							
	10	0,1	A	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C
		0,2	B	B	C	C	C	C	C	C	C	C	C													
		0,4	C	C																						
		0,8																								
	50	0,5	C	C	C	C																				
		1																								

Pipe shape	Fan voltage [V]	Number of aspiration apertures 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	19	20	21	22	23	24	25
Without additional pipe accessories																									
I	6,9	140	120	120	120	120	120	120	120	120	120	120	100	100	100	100									
	≥ 9	190	190	170	170	170	140	140	140	120	120	120	120	120	120	120	120	120	120						
U	6,9		230	230	230	210	210	210	210	190	190	190	190	190	190	190	190	190							
	≥ 9		270	270	270	270	270	270	270	270	270	270	270	270	270	230	230	230	230	230	230	230	190	190	190
M	6,9			230	230	230	230	200	200	200	200	200	200	200	200	200	160	160							
	≥ 9			290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	230	230	230	230
Double U (1 DM)	6,9				290	290	290	290	290	230	230	230	230	190	190	190	190	190	190	190						
	9				290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290
	12				290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290
Double U (2 DM)	6,9				220	220	220	220	220	220	220	220	220	190	190	190	190	190	190	190					
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220
	12																								
With detector box and VSK [1]																									
I	6,9	140	120	120	120	120	120	120	120	120	120	120	100	100	100										
	≥ 9	180	160	160	160	160	130	130	130	120	120	120	120	120	120	120	120	120							
U	6,9		220	220	220	200	200	200	200	180	180	180	180	180	180	180	180	180							
	≥ 9		250	250	250	250	250	250	250	250	250	250	250	250	250	220	220	220	220	220	180	180	180	180	180
M	6,9			220	220	220	220	180	180	180	180	180	180	180	180	180	150	150							
	≥ 9			270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	220	220	220	220	
Double U (1 DM)	6,9				270	270	270	270	270	220	220	220	220	180	180	180	180	180	180	180					
	9				270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270
	12				270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270
Double U (2 DM)	6,9				220	220	220	220	220	220	220	220	220	180	180	180	180	180	180	180					
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220
	12																								
With *OXY·SENS* ® or condensate separator [2]																									
I	6,9	90	90	90	90	90	90	90	90	90	80	80	80												
	≥ 9	130	130	130	130	110	110	90	90	90	90	90	90	90	90	90									
U	6,9		180	180	180	160	160	160	160	150	150	150	150	150	150										
	≥ 9		210	210	210	210	210	210	210	210	210	210	210	180	180	180	180	180	150	150	120	120	120	120	120
M	6,9			180	150	150	150	150	150	150	150	150	150	120	120	120									
	≥ 9			220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	180	180	180	180	180	180	150
Double U (1 DM)	6,9				220	180	180	180	180	150	150	150	150	150	150	150	150								
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	160
	12				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	190
Double U (2 DM)	6,9				220	180	180	180	180	150	150	150	150	150	150	150	150								
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	160
	12																								
With detonation prevention device [3]																									
I	6,9	53	53	53	53	46	46																		
	≥ 9	64	64	64	53	53	53	53	53																
U	6,9		100	90	90	80	80	80	80																
	≥ 9		120	120	120	120	120	100	100	100	100	80	80	60	60	60	60								
M	6,9			90	90	90	90	70	70	70															
	≥ 9			120	120	120	120	120	120	120	100	100	100	100	100	100	90	90	90	90	90	75	75	75	
Double U (1 DM)	6,9				100	80	80	80	80																
	9				120	120	120	120	120	120	120	120	120	90	90	90	90	90	90	90	90	90	90	90	
	12				120	120	120	120	120	110	110	110	110	100	100	100	100	100	100	100					
Double U (2 DM)	6,9				100	80	80	80	80																
	9				120	120	120	120	120	120	120	120	120	90	90	90	90	90	90	90	90	90	90	90	
	12																								

Permitted total pipe length [m]

[1] **Available for following pipe accessories:**
DM-MB-TM-xx and/or VSK and/or MB2

[2] **Available for following pipe accessories:**
OXY·SEN S®
VSK and/or DM-MB-TM-xx and/or KA-DN 25 and/or MB2

[3] **Available for following pipe accessories:**
Detonation prevention device EG IIx and/or KA-DN 25
Detonation prevention device EG IIx and/or DM-MB-TM-xx and/or VSK and/or MB2
OXY·SENS ® and/or VSK and/or DM-MB-TM-xx and/or KA-DN 25 and/or MB2

Classification TITANUS *PRO·SENS* ® and *PRO·SENS* ® 2
With acceleration openings and with air filters type LF-AD-2

Module		Sensitivity [% light obs./ft]	Number of aspiration apertures 26	27	28	29	30	31	36	37	38	40	44	45	46	48	49	52	57	60	80
DM-TP-	01	0,015	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
		0,03	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C
		0,06	C	C	C	C	C	C	C	C												
		0,12																				
	10	0,1	C	C	C	C																
		0,2																				
		0,4																				
		0,8																				
	50	0,5																				
		1																				

Pipe shape	Fan voltage [V]	Number of aspiration apertures 26	27	28	29	30	31	36	37	38	40	44	45	46	48	49	52	57	60	80
Without additional pipe accessories																				
I	6,9																			
	≥ 9																			
U	6,9																			
	≥ 9	190	190	190	150	150	150	150	150	150										
M	6,9																			
	≥ 9	230	230	230	230	230	200	200	200	200	200	200	200	200	200	170	170	170	170	
Double U (1 DM)	6,9																			
	9	290	290	290	210	210	210	210	210	210	210	210	210	210	210	210	210			
	12	290	290	290	250	250	250	250	250	250	250	250	250	250	250	240	240	240	240	240
Double U (2 DM)	6,9																			
	9	220	220	220	210	210	210	210	210	210	210	210	210	210	210	210	210			
	12																			
With detector box and VSK [1]																				
I	6,9																			
	≥ 9																			
U	6,9																			
	≥ 9	180	150	150	150	150	150	150												
M	6,9																			
	≥ 9	220	220	220	220	220	190	190	190	190	190	190	190	160	160	160	160	160		
Double U (1 DM)	6,9																			
	9	270	270	270	200	200	200	200	200	200	200	200	200	200	200	200	200			
	12	270	270	270	240	240	240	240	240	240	240	240	230	230	230	230	230	230	230	230
Double U (2 DM)	6,9																			
	9	220	220	220	200	200	200	200	200	200	200	200	200	200	200	200	200			
	12																			
With *OXY·SENS* ® or condensate separator [2]																				
I	6,9																			
	≥ 9																			
U	6,9																			
	≥ 9	120	120	120																
M	6,9																			
	≥ 9	150	150	150	150	150	150	150	130	130	130	130	130							
Double U (1 DM)	6,9																			
	9	160	160	160	160	160	160	160	160	160	160									
	12	190	190	190	190	190	190	190	180	180	180	180	180	180	180	180	180	180	180	
Double U (2 DM)	6,9																			
	9	160	160	160	160	160	160	160	160	160	160									
	12																			
With detonation prevention device [3]																				
I	6,9																			
	≥ 9																			
U	6,9																			
	≥ 9																			
M	6,9																			
	≥ 9																			
Double U (1 DM)	6,9																			
	9																			
	12																			
Double U (2 DM)	6,9																			
	9																			
	12																			

Permitted total pipe length [m]

[1] **Available for following pipe accessories:**
DM-MB-TM-xx and/or VSK and/or MB2

[2] **Available for following pipe accessories:**
OXY·SEN S®
VSK and/or DM-MB-TM-xx and/or KA-DN 25 and/or MB2

[3] **Available for following pipe accessories:**
Detonation prevention device EG IIx and/or KA-DN 25
Detonation prevention device EG IIx and/or DM-MB-TM-xx and/or VSK and/or MB2
OXY·SENS ® and/or VSK and/or DM-MB-TM-xx and/or KA-DN 25 and/or MB2

Classification TITANUS *PRO·SENS* ® and *PRO·SENS* ® 2

With acceleration openings and with air filters type SF-400/SF-650

Module		Sensitivity [% light obs./ft]	Number of aspiration apertures 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
DM-TP-	01	0,015	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C
		0,03	C	C	C	C	C	C													
		0,06																			
		0,12																			
	10	0,1																			
		0,2																			
		0,4																			
		0,8																			
	50	0,5																			
		1																			

Pipe shape	Fan voltage [V]	Number of aspiration apertures 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Without additional pipe accessories																				
I	6,9	140	120	120	120	120	120	120	120	120	120	120	100	100	100	100				
	≥ 9	180	160	160	160	160	140	140	140	120	120	120	120	120	120	120	120	120	120	
U	6,9		220	220	220	200	200	200	200	180	180	180	180	180	180	180	180	180	180	
	≥ 9		260	260	260	260	260	260	260	260	260	260	260	260	260	220	220	220	220	220
M	6,9			220	220	220	220	190	190	190	190	190	190	190	190	190	150	150	150	
	≥ 9			280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
Double U (1 DM)	6,9				280	280	280	280	280	220	220	220	220	180	180	180	180	180	180	180
	9				280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
	12				280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
Double U (2 DM)	6,9				220	220	220	220	220	220	220	220	220	180	180	180	180	180	180	180
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220
	12																			
With detector box and VSK [1]																				
I	6,9	140	120	120	120	120	120	120	120	120	120	120	100	100	100					
	≥ 9	180	160	160	160	160	120	120	120	120	120	120	120	120	120	120	120	120	120	
U	6,9		220	220	200	200	200	200	200	180	180	180	180	180	180	180	180	180	180	
	≥ 9		250	250	250	250	250	250	250	250	250	250	250	250	250	220	220	220	220	220
M	6,9			220	220	220	220	180	180	180	180	180	180	180	180	180	150	150	150	
	≥ 9			270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270
Double U (1 DM)	6,9				270	270	270	270	270	220	220	220	220	180	180	180	180	180	180	180
	9				270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270
	12				270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270
Double U (2 DM)	6,9				220	220	220	220	220	220	220	220	220	180	180	180	180	180	180	180
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220
	12																			
With *OXY·SENS* ® or condensate separator [2]																				
I	6,9	90	90	90	90	90	90	90	90	90	80	80	80							
	≥ 9	130	130	130	130	110	110	90	90	90	90	90	90	90	90	90				
U	6,9		180	180	180	160	160	160	160	150	150	150	150	150	150					
	≥ 9		210	210	210	210	210	210	210	210	210	210	210	180	180	180	180	180	180	150
M	6,9			180	150	150	150	150	150	150	150	150	150	120	120	120				
	≥ 9			220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	180
Double U (1 DM)	6,9				220	180	180	180	180	150	150	150	150	150	150	150	150			
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220
	12				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220
Double U (2 DM)	6,9				220	180	180	180	180	150	150	150	150	150	150	150	150			
	9				220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220
	12																			
With detonation prevention device [3]																				
I	6,9	53	53	53	53	46	46													
	≥ 9	64	64	64	53	53	53	53	53											
U	6,9		100	90	90	80	80	80	80											
	≥ 9		120	120	120	120	120	100	100	100	100	80	80	60	60	60	60			
M	6,9			90	90	90	90	70	70	70										
	≥ 9			120	120	120	120	120	120	120	100	100	100	100	100	100	90	90	90	90
Double U (1 DM)	6,9				100	80	80	80	80											
	9				120	120	120	120	120	120	120	120	120	90	90	90	90	90	90	90
	12				120	120	120	120	120	110	110	110	110	100	100	100	100	100	100	100
Double U (2 DM)	6,9				100	80	80	80	80											
	9				120	120	120	120	120	120	120	120	120	90	90	90	90	90	90	90
	12																			

Permitted total pipe length [m]

[1] **Available for following pipe accessories:**
DM-MB-TM-xx and/or VSK and/or MB2

[2] **Available for following pipe accessories:**
OXY·SEN S®
VSK and/or DM-MB-TM-xx and/or KA-DN 25 and/or LF-AD and/or MB2

[3] **Available for following pipe accessories:**
Detonation prevention device EG IIx and/or KA-DN 25
Detonation prevention device EG IIx and/or DM-MB-TM-xx and/or VSK and/or LF-AD and/or MB2
OXY·SENS ® and/or VSK and/or DM-MB-TM-xx and/or KA-DN 25 and/or LF-AD and/or MB2

Test record TITANUS *PRO·SENS* ® and *PRO·SENS* ® 2

		Device identification					
Device number							
Serial number basic device							
Serial number detector module							
		Measuring an adjustment values					
Commissioning							
Visual check	(✓/–)						
Depression	[Pa]						
Sensitivity (main alarm)	[% light obs./m]						
Alarm delay	[s]						
Activating treshold (airflow)	(small/medium/ large/very large)						
Fault delay	[min, s]						
Fault indicator stored	(yes/no)						
LOGIC·SENS	(yes/no)						
Fan voltage	[V]						
Adjustmet dependent on the air pressure	(yes/no)						
Adjustmet independent on the air pressure	(yes/no)						
Height above sea level	[m]						
Air pressure	[hPa]						
Temperature	[°C]						
Fault blockage							
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 tresh, is not reached	(✓/–)						
Cause of the fault eliminated, LED stored	(✓/–)						
Relay stays dropped out	(✓/–)						
Fault fracture							
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 tresh, is not reached	(✓/–)						
Cause of the fault eliminated, LED stored	(✓/–)						
Relay stays dropped out	(✓/–)						
Main alarm							
LED flashes	(✓/–)						
Relay picks up after delay time	(✓/–)						
Signal transmission to central fire panel	(✓/–)						
LED stored	(✓/–)						
Relay stored	(✓/–)						

Key

OK ✓

not OK –

Issuer: ……..……

Signature: ……..……..