Air sampling smoke detection system

Fire Detection

TITANUS *PRO·SENS*®/net

Technical Manual (UL)

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WAGNER Group GmbH
Schleswigstraße 1 - 5
D-30853 Langenhagen
Germany
Telephone +49 (0) 511 / 97383-0
Telefax +49 (0) 511 / 97383-140
E-Mail support@wagner.de

Internet www.wagner.de

Item Number 69-30-0366

Edition 12/13

Supersedes 08/12

Contents

Glossary

Technical Term	*Definition*
	A
Aerosol Also: smoke aerosol	An aerosol is a floating particle in the microscopic or submicroscopic particle size range. Consists of unburned parts of the fire load, intermediate products of the oxidation and finely divided carbon (soot).
Air flow sensor	Sensor for monitoring the total air flow in the pipe system, i.e. checking the pipe system for blockage and fracture.
Air sampling smoke detection system	An active system producing under-pressure for air sampling with a fan, integrated in the system. The air samples are then passed to a detection unit (smoke detector, detector head or detector module).
Alarm	a) Acoustic and/or optical signal activated through →smoke detectors to indicate a fire. b) Freely adjustable alarm threshold. The activation of the alarm indicates the detection of a fire.
Alarm condition	The condition of a fire alarm system or a part of it as a reaction to an existing danger.
Alarm current	An increased voltage in the →alarm condition (→quiescent current).
Automatic Fire Detector	A device designed to detect the presence of a fire signature and to initiate action. Automatic Fire Detectors are classified as follows: Fire-Gas Detector, Heat Detector, Smoke Detector, Air Sampling Smoke Detector etc.
	C
CMOS	**C**omplementary **M**etal **O**xide **S**emi-conductor, complementary MOS technology
Collective alarm	A non-differentiated, i.e. non-localisable →alarm, which reports to a superior system.
Collective detection system	Conventional line detection technology for which all detectors, connected to the same zone, have the same collective address (common indication and operation without identification of the individual detector).
Concentration of Values	The concentration of values is an important factor for the evaluation of the fire risk. It is calculated with the values to be protected. An added consideration is the replace ability of the endangered goods.

C	
Cumulative effect	A phenomenon common only to air sampling smoke detection systems. The sensitivity of the individual detection points (smoke sampling ports), in contrast to spot/point-type detectors, does not remain constant. The sensitivity of the individual air sampling ports depends on the → response sensitivity and the number of air sampling ports.
Collective fault	A non-differentiated, i.e. non-localisable →fault signal which reports to a superior system.
Contact load	Contact load describes the maximum load at which a relay contact can be switched.
Cross group zoning	System to verify alarm status. The fire alarm is activated after one detector of two related →detector groups has been activated. When the first detector has been activated an internal alarm or control function can be activated.
Cross zoning alarm verification	A second detector module with usually a lower sensitivity setting is used to verify an alarm made by a more sensitive detector module.
D	
Detection line	Monitored transmission line (→primary line) to which the smoke detectors are connected with the → fire alarm control panel.
Detection reliability	This is the measure of reliability with which phenomena's are detected and reported to the fire alarm control panel.
Detector group	Collection of smoke detectors in a →detection line for which a separate display is installed in the → fire alarm control panel.
Detector module	modular →scattered light smoke detector optimised for use in air sampling smoke detection systems and equipped with a special air feed, a Flow-Init button for initialisation of the integrated →air flow sensor, a diagnostic LED with flash code for indicating faults and a →DIL-switch
Detector module sensitivity *Also: sensitivity*	The detector module sensitivity is adjustable between the levels 1 to 4 and is the generic term for →response sensitivity.
DIL switch	**D**ual **I**n **L**ine **S**witch: used to set the response sensitivity, the air flow sensor, the delay period for →alarm and fault, to set the fault display to latched or non-latched and to activate or deactivate →*LOGIC · SENS*.
Drift compensation	Method of compensating detector soiling which could change the quiescent signal by moving the zero port.

E	
Electromagnetic compatibility (EMC)	This is the ability of an electrical or electronic system to operate correctly in its electromagnetic environment and have no adverse affect on this environment.
End-of-line resistor	Element at the end of a →detection or control line to check the line for broken wires and short circuits.
F	
Fault signal	Signal indicating a deviation from the desired value in the →smoke detection installation.
Fire alarm control panel (FACP)	Central part of a fire detection installation which supplies the detectors with power, displays received signals optically and acoustically and, if required, transmits them and checks the installation for faults.
Fire area	Isolated fire areas in a building (special construction) which avoids or slows down the spreading of a fire to a neighboring fire area.
Fire detector	A device, suitable for connection to a circuit that has a sensor that responds to a physical stimulus such as heat of smoke.
Fire load	The fire load corresponds to the amount of heat of all combustible materials of a fire area, depending on its surface area.
Fire-resistant colloar	Constructions which avoids flame/smoke spreading in cable ducts as well as in recesses and breakthroughs for wiring in walls and ceilings.
I	
Interactive detector	Using programmable algorithms, Detector series with a very high level of detection and nuisance alarm immunity. Using programmable algorithms, for signal evaluation and comparison to known phenomena's, allowing optimal settings for the application
Interference	Interferences in smoke detection installations are external values which can impair the proper functioning of a smoke detection installation.
L	
Line module	By means of line modules (AnalogPLUS® or interactive) TITANUS *TOP · SENS*® can be connected to the *AlgoRex*®-smoke detection system.
LOGIC·*SENS*	LOGIC·*SENS* can be activated via the LOGIC·*SENS* button. Intelligent signal processing that reduces false alarms by making a comparison of the measured smoke levels against known negative parameters.

L	
Loop line	→Detection line which forms a loop from the fire alarm control panel via the →smoke detectors and back to the fire alarm control panel to increase operation reliability.
M	
Monitoring area	Area which is monitored by an automatic fire detector.
Monitoring window	The normal air flow lies within an adjustment range between a defined upper and lower value. This range is the monitoring window.
N	
Nominal gap width	Maximum gap in the housing of the detonation prevention device without an ignition spark being flashed from the device to the potentially explosive area.
P	
Primary line	Primary lines are transmission lines permanently and automatically monitored for short circuit and interruption. They serve the transmission of important function signals of smoke detection systems.
Q	
Quiescent current	Current on the detection line in its normal operational state, →alarm current
R	
Response sensitivity	The response sensitivity describes the sensitivity at which an alarm is activated (→detector module sensitivity).
S	
Scattered light smoke detectors	Scattered light smoke detectors are optical smoke detectors. They use the phenomenon of scattered light through smoke particles which changes the signal at the light diode.
Secondary line	Non-monitored transmission lines.
Sensitivity	Detector module sensitivity
Single air sampling port monitoring	Detection of changes (e.g. blockages) of the diameter of each single air sampling port.
Smoke detector	Smoke detectors react to combustible particles and/or →aerosols (floating particles) in the air.

1 General

1.1 Introduction

This manual is designed for professional installers of air sampling smoke detection systems, namely, engineers, technicians and installers who have technical expertise in the field of smoke detection technology.

For damage and faults resulting from the non-observance of this manual, WAGNER Group GmbH, along with its affiliates, subsidiaries and representatives (collectively “Wagner”) does not assume liability.

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

Before using the device, read these instructions. If you do not read and understand these explanations, you will not be able to operate the device properly. The operating instructions do not eliminate the need for training by authorized personnel.

⚠WARNING

Install, operate, test and maintain this device according to this installation and operation guide, NFPA 72; NFPA 75, NFPA76, NFPA 101, any applicable local and state codes and your local authority having jurisdiction (AHJ).

The Installation and Operation Guide does not contain special information about local requirements and safety issues. Information on such issues is provided only to the extent that it is

needed for operation of the device. Ensure that you are familiar with all safety-related processes and regulations in your area. This also includes how to act in the event of an alarm and the initial steps to take if a fire breaks out.
The operating instructions must always be available on site. It is a required part of the system and must be given to the new owner if the system is ever sold.

1.2 Safety Information

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

⚠WARNING

This symbol warns against actions which might cause damage, personal injury, and/or operational breakdowns if not followed. Operational breakdowns may cause the system's failure to detect smoke or fire, resulting in damage, personal injury or death.

TIP

Operational improvements can be achieved if this symbol is observed.

1.3 Disclaimer

This manual makes no claim as to completeness and is subject to modification at any time without notice. Nothing in this manual supersedes or invalidates any portion of the “Terms and Conditions of the Supply and Assembly” agreement. The user agrees that Wagner is not liable for any claims of any kind for damage or injury resulting from any one or more of the following:

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

⚠WARNING

Failure to comply strictly with the terms and instructions in this manual may result in operational breakdown and/or malfunction, which in turn may hinder or prevent the product’s ability to detect smoke. Undetected smoke and fire may cause damage, personal injury or death.

The user must follow all instructions and warnings carefully and contact the manufacturer in the event of any breakdown or malfunction.

1.4 Copyright

The copyright in this Technical Manual remains with WAGNER. The manual is designed exclusively for the assembler and his colleagues.

Reproduction of the manual, including extracts, is not allowed. Copying or distribution of the manual in any form is only allowed with permission in writing from WAGNER.

1.5 Packaging

The individual air sampling smoke detection systems are packaged in accordance with the anticipated transport conditions. The packaging is intended to protect the air sampling smoke detection system from being damaged until it is installed. For that reason, it must only be removed from its packaging shortly before installation.

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

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

⚠WARNING

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

1.6 Disposal

If no return or disposal agreements have been made, disassembled components must be disposed and/or recycled in accordance with local ordinances and regulations. Wagner supports eco-friendly policies and encourages the user to recycle disassembled components where possible.

⚠WARNING

Improper disposal of disassembled components and packaging materials could also damage the environment

2 Product Description

2.1 Features of the TITANUS® air sampling smoke detection system

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

Sensitivity The device has a display sensitivity of 0.015%/ft (0.05%/m) to 0.0005%/ft 0.0015 %/m light obscuration. Depending on application requirements, sensitivities can be set. Thanks to the innovative High-Power-Light-Source technology a wide detection range is achieved for all types of fire.

By installing a second detector module in the TITANUS®, is the double of the monitoring area reachable. There are three alarm levels for each detector module – alert alarm, action alarm and fire alarm.

Graded alarm activation TITANUS® is deliverable with the following alarm thresholds:

TITANUS® type TP - 3	Fire alarm
TITANUS® type TP - 4	Fire alarm and action alarm
TITANUS® type TP - 5	Fire alarm, action alarm and alert alarm

These can be separately controlled via voltage-free contacts.

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

LOGIC·*SENS* Patented fire pattern algorithms to provide a very high level of false alarm immunity.

Safe airflow monitoring Like spot-type detectors, which are electronically monitored in order to detect line fractures and short circuits, air sampling systems require complex and safe air flow monitoring. The unique air flow sensor technology used in all WAGNER air sampling

smoke detection systems ensure the detection of faults such as pipe fractures or blockages of air sampling ports.
The low-level air flow threshold is equipped with a dynamic air flow sensor in order to detect small and quick changes.
Air flow monitoring is temperature compensated and can be adjusted depending on the air pressure.

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

Patented air sampling ports The air sampling ports have defined hole diameters in accordance with the pipe planning. Wagner´s patented pre measured aspiration-reducing film sheets and marking tape allow easy installation. This also reduces the secondary noise side effect.
For this exact air sampling points WAGNER has developed patented aspiration-reducing film sheets with marking tape and clips that permit an easy mounting and avoid secondary noise.
Another advantage is the quick and easy retrieval and check of the air sampling point diameters.

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

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

Choice of fan voltage The fan voltage can be set according to project planning by replugging the plug-in jumpers.
With TITANUS® devices, the fan voltage can be set between 6.9 V and 9 V by means of the plug-in jumpers on the main board.

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

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

2.2 Areas of Application

The TITANUS® Air Sampling Smoke Detection System is a technology used in Standard Fire Detection (SFD) Systems for rooms and equipment.

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

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

In particular these are areas:

- with high fire risk
- where a high detection sensibility is required
- with limited access and where spot-type detectors are difficult to install or service
- which are air conditioned
- which have a greater height than admissible for spot-type detectors
- where spot-type detectors are undesirable for aesthetic reasons
- where electromagnetic fields have an impact
- which are exposed to high or low temperatures

- where filters are required due to impurities in the atmosphere
- which must be protected from vandalism

TITANUS® is suitable for:

Room protection Rooms such as:

- raised floors, dropped ceilings
- tunnels, ducts, voids with difficult access
- storage areas, high-rack storage, elevator shafts
- museums, cultural centers
- cold storage

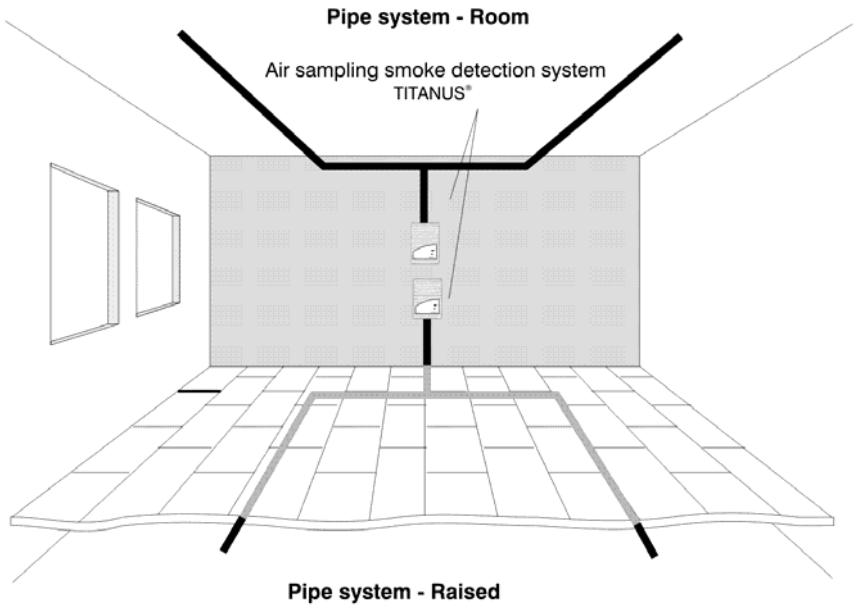


Figure 1: Principle of room monitoring with the TITANUS® air sampling smoke detection system

Room monitoring with air conditioning

Room monitoring takes place

- in air-conditioned rooms for servicing etc
- in ventilation ducts
- of raised floors, dropped ceilings
- in EDP rooms, E-distribution cabinets, transformer cells
- in climatic cabinets or
- in air conditioning ducts

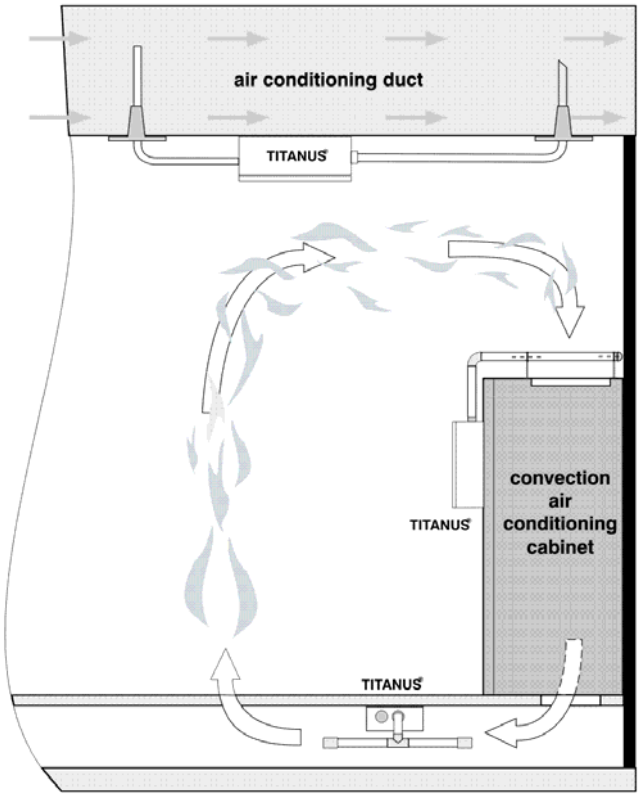


Figure 2: Monitoring possibilities of a convection air conditioning cabinet or air conditioning duct (Principle)

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

- distribution cabinets, switch cabinets
- telephone switching equipment
- measuring and control units

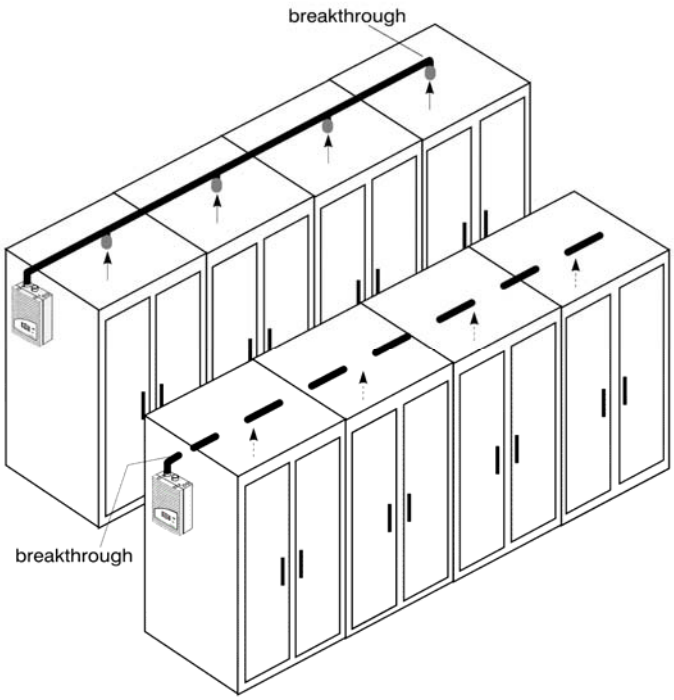


Figure 3: Principle Equipment monitoring with TITANUS® air-sampling smoke detection system

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

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

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

3 Technical Description

3.1 System Description

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

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

On the whole, the pipes and fittings are made of UL approved CPVC fire protection piping.

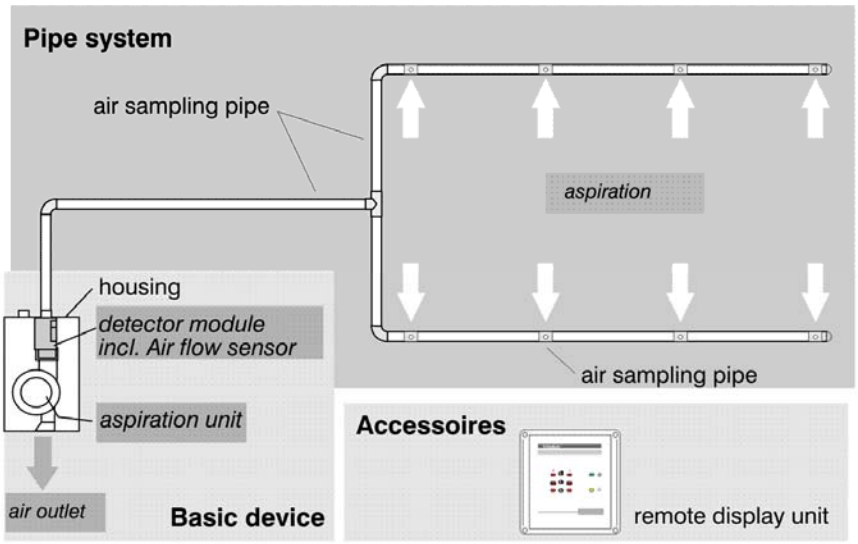


Figure 4: Air sampling system TITANUS®

To ensure safe operation even under the most difficult circumstances (e.g. recycling areas) a wide variety of accessories are available, e.g. different kinds of air filters or relay indicators.

During installation in areas difficult to oversee, the relay indicator serves as status indicator for the basic device.

During project planning, each air sampling point in the pipe system of TITANUS® represents a spot-type detector.

3.1.1 Function

The aspiration unit in the basic device takes air samples from the protected area via a pipe system with defined sampling points and carries them to the sensitive detector module (see figure: Air sampling system TITANUS®).

Detector module

Depending on the sensitivity of the detector module (levels of 0.015 %/ft (0.05 %/m), 0.003 %/ft (0.01 %/m) or 0.0005 %/ft (0.0015 %/m) light obscuration can be selected), TITANUS® activates the alarm when the corresponding light obscuration is achieved. Four different sensitivities can be set. Three alarm levels (alert alarm, action alarm and fire alarm, depends on the type of the TITANUS *PRO·SENS*®/net) are indicated on the device via the alarm LED and transmitted to a central fire detection unit (CFDU).

Different delay periods can be set for the alarm thresholds, fault indicator and fault transmission (see chapter Installation „Settings“).

Alarm reports are saved and the indicators have to be reset after eliminating cause of the alarm.

By using two detector modules, TITANUS® 2 can monitor two areas as described above.

Alternative sensitivity

Via the additional input “AltSens” on the connection board of TITANUS *TOP·SENS*® the adjusted detector modules can be set one step less sensitive (e.g. the sensor modules would thus be switched from a sensitivity of 0.122 %/ft (0.4 %/m) to 0.244 %/ft (0.8 %/m)).

By changing the sensitivity of the modules, it is possible to adjust the smoke detection to operational interferences such as

- increase of aerosol or dirt particles in the protected area depending on the time of day (day/night operation).

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

Graded alarm activation

TITANUS® is deliverable with the following alarm thresholds:

	TITANUS® type TP-3	TITANUS® type TP-4	TITANUS® type TP-5
Fire alarm	X	X	X
Action alarm 66 % of adjusted fire alarm threshold		X	X
Alert alarm 33 % of the adjusted fire alarm threshold			X

LOGIC·*SENS*

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

Monitoring the detector module

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

Air flow monitoring

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

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

After a delay period, which can be programmed by switches, the fault is indicated on the air sampling smoke detection system and, if required, the fault signal is passed to the CDFU via a

fault contact. The thresholds of the monitoring window can be adapted to the surrounding conditions. The dynamic air flow sensors are only activated when the air flow threshold is set to low.

Following figure shows the signal curve of the air flow sensor.

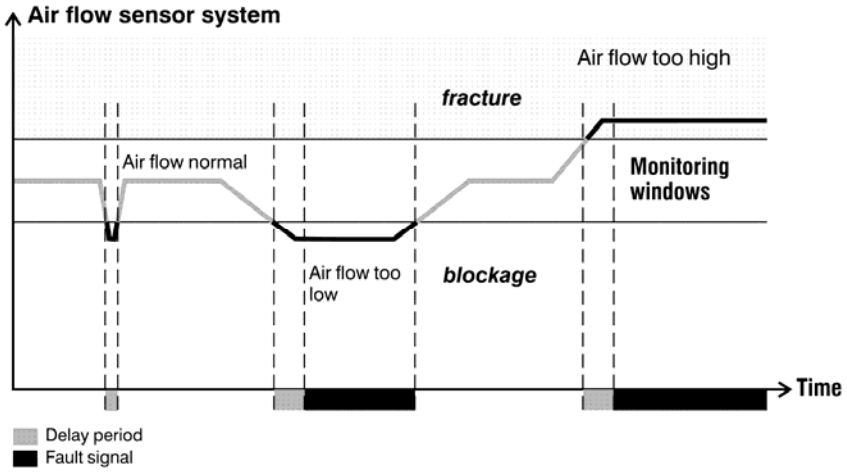


Figure 5: Signal curve of air flow sensor during fault

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

Flash code for fault detection In order to detect the cause of a possible fault of TITANUS®, the device is equipped with LED signals on the detector module and base board, giving information about the device's condition with different flash codes.

Resetting via central fire panel A fault signal is reset via a connected central fire panel.

Relay output Each TITANUS® is equipped with a voltage-free change-over contact for the three existing alarm thresholds and the collective fault. Thus, the air sampling smoke detection system can be connected to collective and addressable (Via addressable

modules of the relevant central fire panel) detection lines on any central fire panel.

Air flow adjustment The air flow within TITANUS® is automatically adjusted so that commissioning is made easier. Initialisation can be made dependent or independent of the air pressure.
In order to make adjustments to an air flow typical within the pipe network, a process called Air-Flow-Initialisation is used. This must be carried out for every device once after installation, after each modification to the pipe design and after any change of ventilator voltage. Thus, the device determines and memorises the air flow characteristics of the pipe network.

Pipe system A pipe system up to a total length of 984 ft (300 m) with a maximum number of 100 air sampling points can be connected. Each pipe inlet manifold up to two pipe systems can be connected to TITANUS®. The whole pipe system then measures maximum 2 x 984 ft (300 m) and has a maximum of 2 x 100 aspiration points.

Networkability To establish the status data of all the devices used in the network, it is also possible to connect Visu*LAN*® T to the information system. The operator of the control room can thus oversee the entire system and observe smoke level, air flow values etc. It is also possible to connect to Visu*LAN*® all TITANUS® systems operated within the network. Thus, all devices and operating conditions are immediately registered and any fault and alarm measures are displayed. Visu*LAN*® uses floor plans of the various buildings and levels to show the layout of the smoke detection system. To limit the incidence of fault reports, a diagnostic window with a help function is available. The smoke levels and air flow data from individual TITANUS® systems can be graphically displayed and printed-out. Also shown on this graph is the status of the alarm and fault relay.

3.2 TITANUS® and accessories

3.2.1 Overview

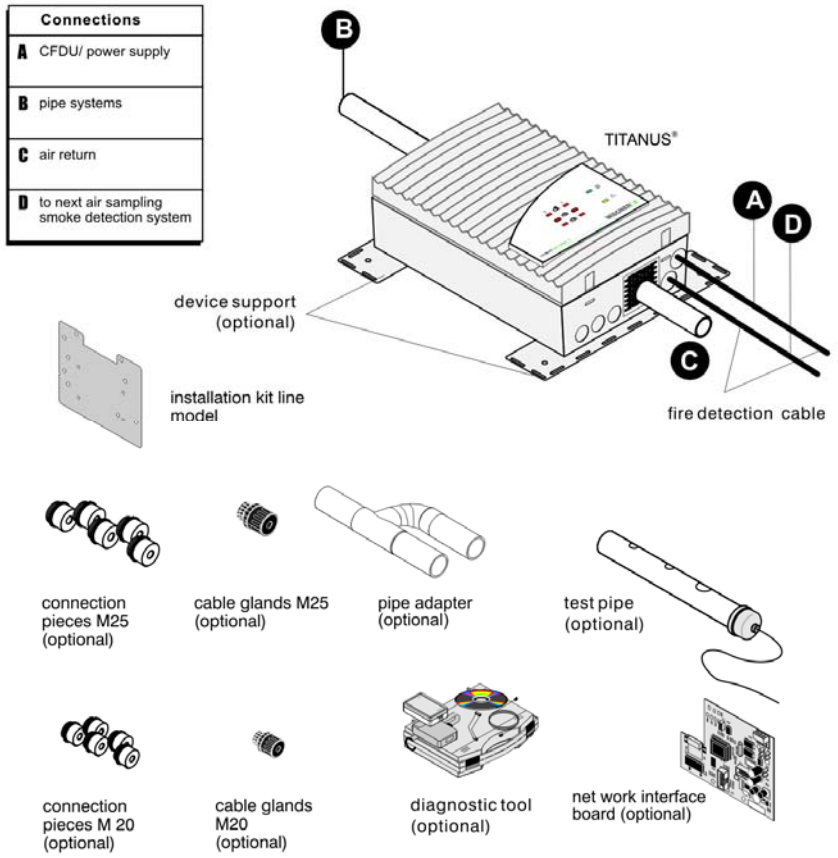


Figure 6: Overview TITANUS

3.2.2 Basic device TITANUS®

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

- plastic housing
  - plastic connection pieces
  - connector for pipes with an outer diameter of 63/64” (25 mm)
  - Integrated pipe return
- sensitive detector module with the latest technology using scattered light detectors with integrated air flow monitoring
- air sampling unit with optimised air supply
- optical display for smoke level, fire alarm, action alarm, alert alarm, fault and operation

  TITANUS® 2: 2x optical displays for fire alarm 1 and 2, action alarm 1 and 2, alert alarm 1 and 2 (depends on the type of the TITANUS *PRO·SENS*®/net)
- interface for diagnostic

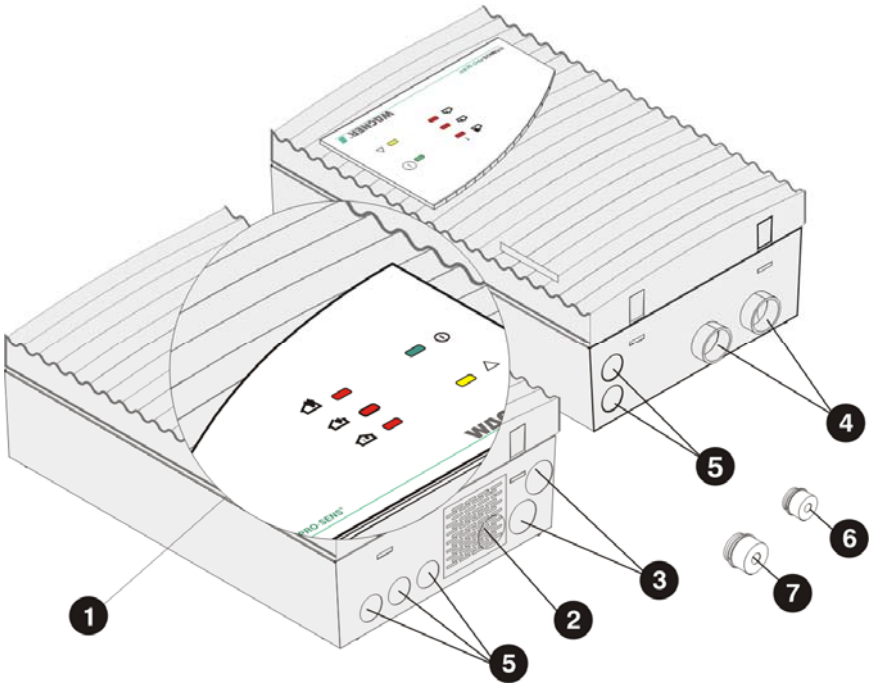


Figure 7: Displays and connections TITANUS®

Figure 8: Displays TITANUS®

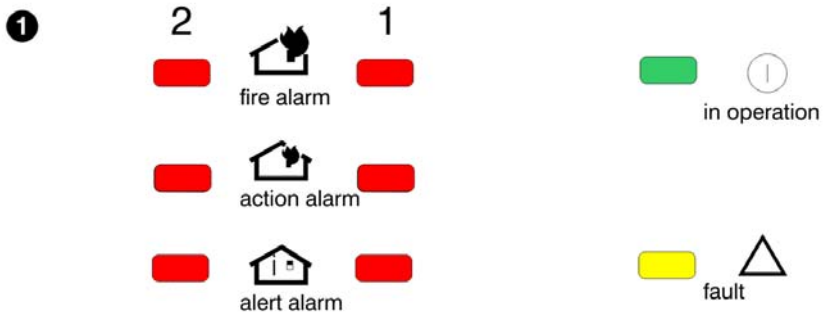


Figure 9: Displays TITANUS® 2

TITANUS *PRO·SENS*®

Numbers	Function	Explanation
	Displays	
1	in operation (green LED) fire alarm (red LED) action alarm (red LED) alert alarm (red LED) fault (yellow LED) (depends on the type of the TITANUS *PRO·SENS*®/net)	operation display 100% smoke level 66% smoke level 33% smoke level pipe system / detector module fault or ventilator failure
2	connection for air return pipe	to return the air
3	fire detection cable entry for connection to CFDU or power supply (input / output)	2 x M 25
4	air sampling pipe connectors second connector = only TITANUS *TOP·SENS*® 2	for Ø 63/64” (25 mm) -pipe system
5	cable entry for fire detection cable	5 x M 20
6	connection piece (small)	1 x M 20 for cable with Ø of 5/15” (8 mm) to 15/32” (12 mm)
7	connection piece (large)	2 x M 25 for cable with Ø of 11/32” (9 mm) to 35/64” (14 mm) (extendable to 45/64” (18 mm))

3.2.3 Diagnostics

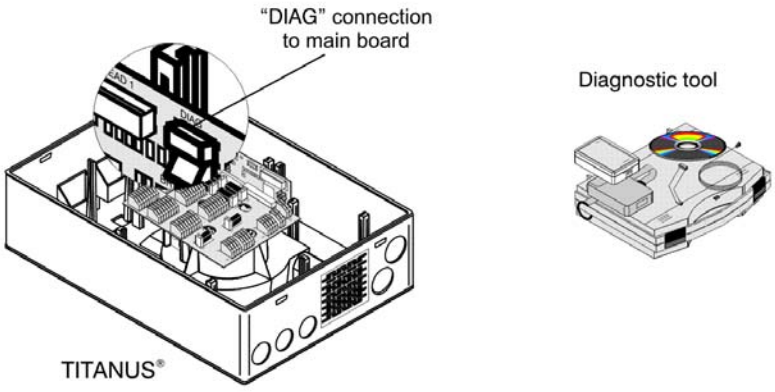


Figure 10: Diagnostic software to read the device condition

For maintenance and servicing purposes, the diagnostic software can display (PC or laptop) the saved and current device status as well as any fault signals from TITANUS®. The diagnostic cable transmits the data via the "DIAG" connector on the base board in TITANUS® (see figure: Diagnostic soft ware to read the device condition).
In order to assess short-lived sporadically occurring faults (e.g. changed operating conditions), diagnostic messages remain in the software for at least three days. The saved messages can be deleted with the diagnostic software.

TIP

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

TIP

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

3.2.4 Device supports

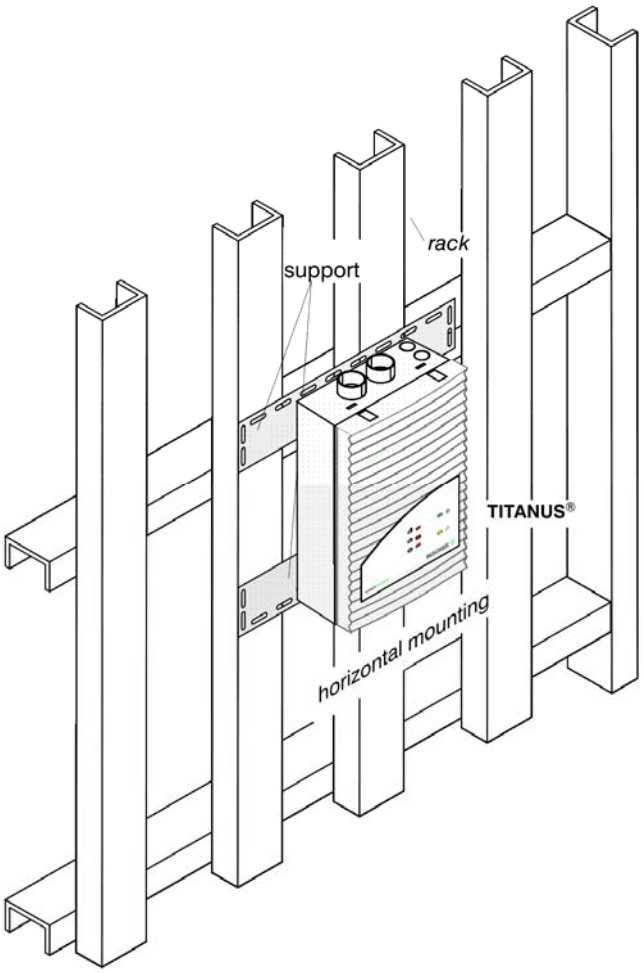


Figure 11: Support for the TITANUS®

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

3.3 Pipe system

3.3.1 Overview of available pipe components

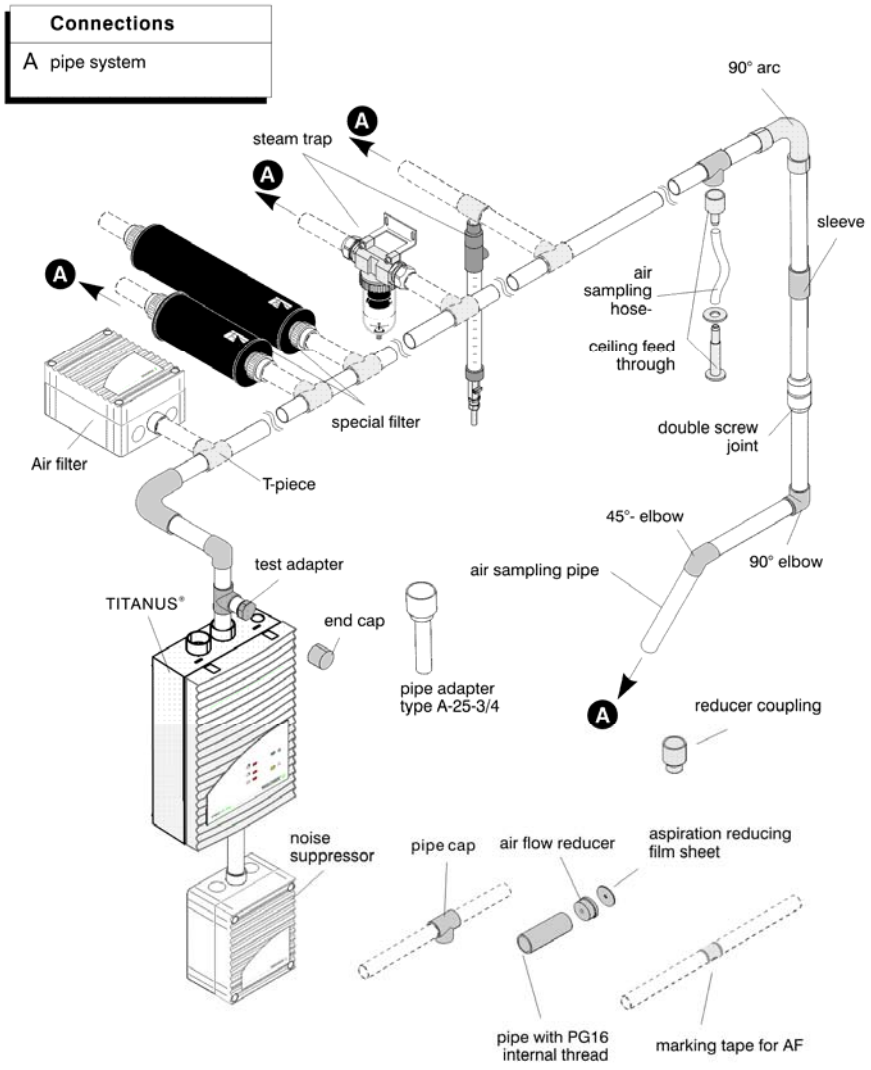


Figure 12: Components for the pipe system

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

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

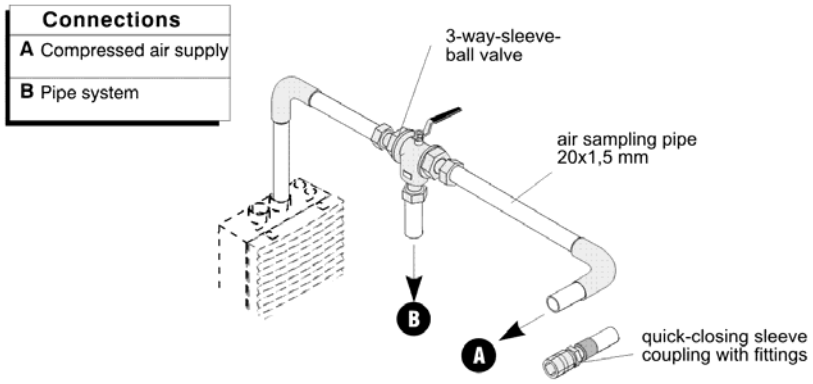


Figure 13: Components for manual purging

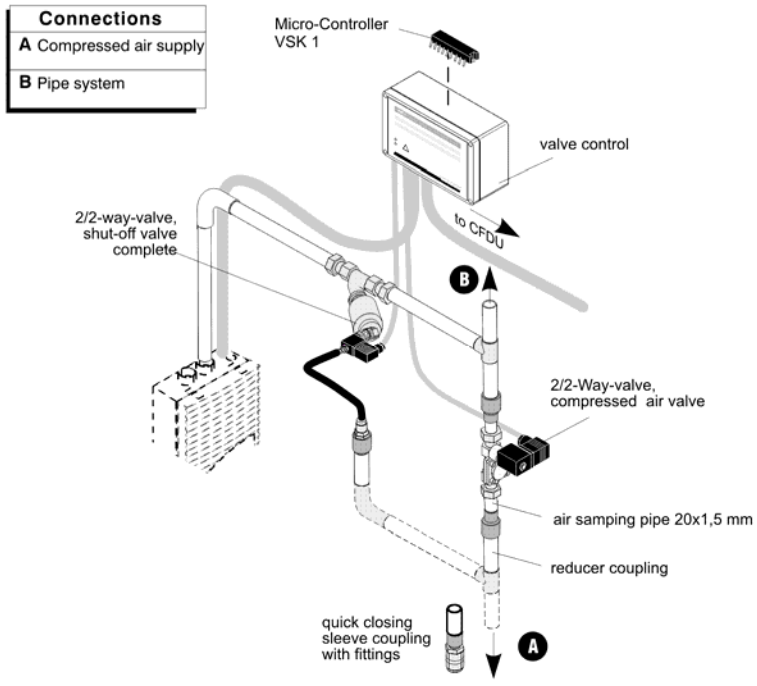


Figure 14: Components for automatic purging

3.3.2 Air sampling ports for room monitoring

3.3.2.1 Aspiration-reducing film sheets

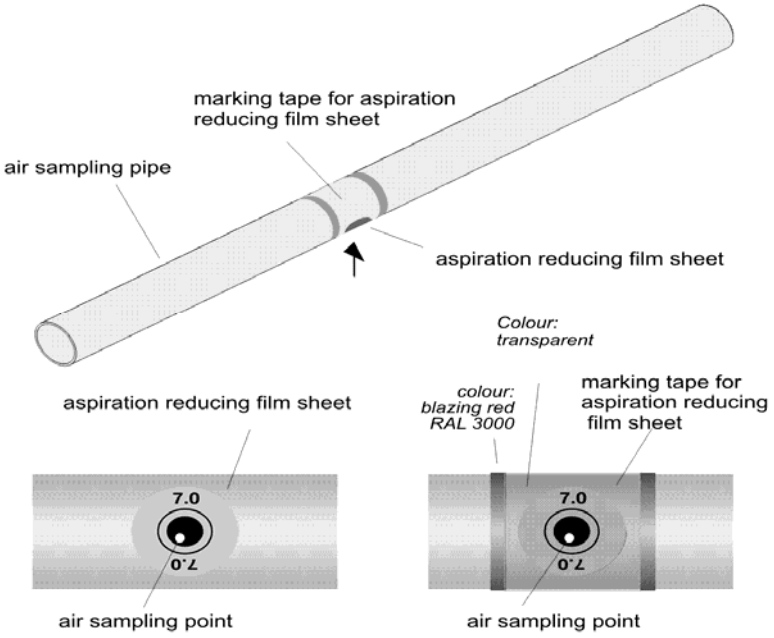


Figure 15: Air sampling port with aspiration-reducing film sheet and marking tape

An air sampling point is a 25/64” (10 mm) - hole in the air sampling pipe covered with a patented aspiration-reducing film sheet with the appropriate opening diameter. The size of the opening depends on the pipe design (see chapter Design, “Pipe Design”).

To prevent the film sheet from coming loose, it is fixed with transparent marking tape with red edges and a 25/64” (10 mm)-hole. The marking tape is fixed to the film sheet in such a way that the air sampling point is not covered and remains visible even at a distance.

3.3.2.2 Air flow reducer clips

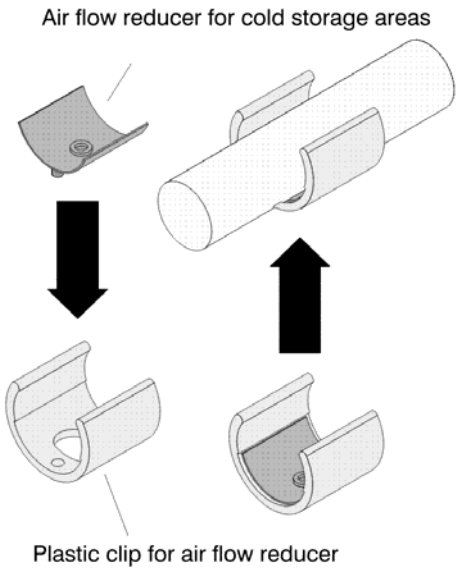


Figure 16: Air flow reducer for dirty and cold storage areas

The air sampling ports, when used in areas where blockages can occur, are equipped with a patented plastic clip, type AK-C, and a patented flexible air flow reducer, type AK-x.
When used in cold storage areas, the flexible air flow reducer near the air sampling ports expands and the ice is blasted off during purging. The special plastic clip ensures that the air flow reducer remains in place.
For designs in areas requiring a purging system (e.g. dusty), air flow reducers with plastic clips are used rather than aspiration-reducing film sheets with marking tapes, because the openings can be blown clear more easily. The plastic clips are more resistant at high pressures and can be cleaned more effectively due to the rubber core.

3.3.2.3 Ceiling feed-through for hidden installations

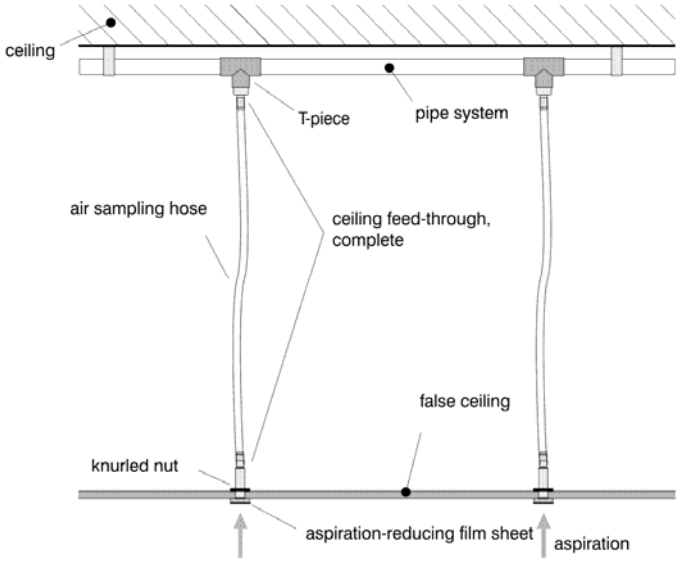


Figure 17: Ceiling feed-through for ceiling voids

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

If the maximum length of these hoses is 3’3” (1 m), refer to the pipe design described in chapter 4. If - due to construction - hose lengths of more than 3’3” (1 m) are required, the air sampling pipe system must be calculated separately (calculation is made by WAGNER).

The ceiling feed-through is applicable for false ceiling panels with a thickness of up to approximately 1 3/8“ (35 mm). The aspiration-reducing film sheets are available in two colours (pure white, RAL 9010 and papyrus white, RAL 9018) and come in special colours if required.

3.3.3 Air filter for dusty areas

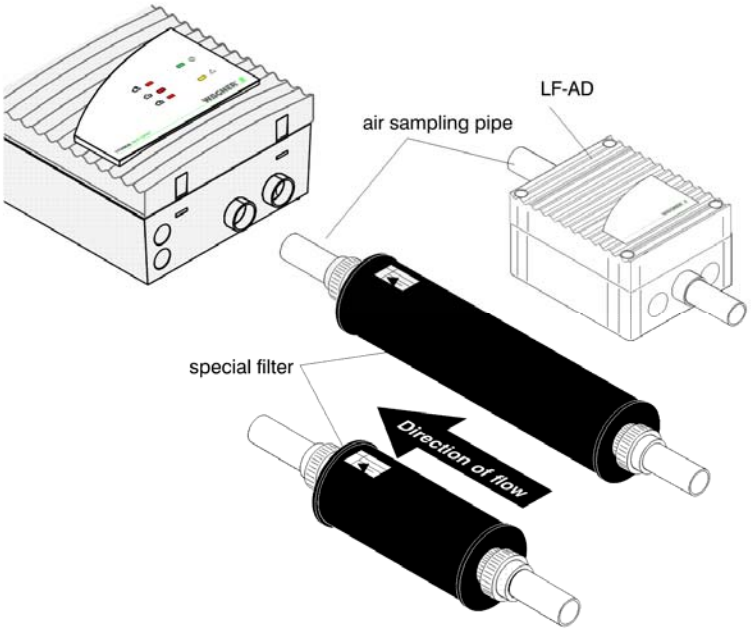


Figure 18: TITANUS® with air filter

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

Air filter, type LF-AD-x As a rule the air filter type LF-AD is used, consisting of a plastic housing and two PG29-screw joints. The multi-layer filter absorbs particles larger than about 0.6 mil (15 µm).
The air filter is automatically monitored for dirt (blockages) via the TITANUS® air flow monitoring system. If the air filters are blocked, the filter elements must be replaced after opening the filter housing.

Special Filter Type SF-x In case of a high amount of dust a special filter type SF-650 or type SF-400 with a larger surface is available. The special filter guarantees a safe filtration of dust and dirt. The particles are separated and permanently kept back from the filter medium.

Even if the filter is due to be changed a constant air quality is guaranteed.

3.3.4 Air return for pressurised and dusty areas

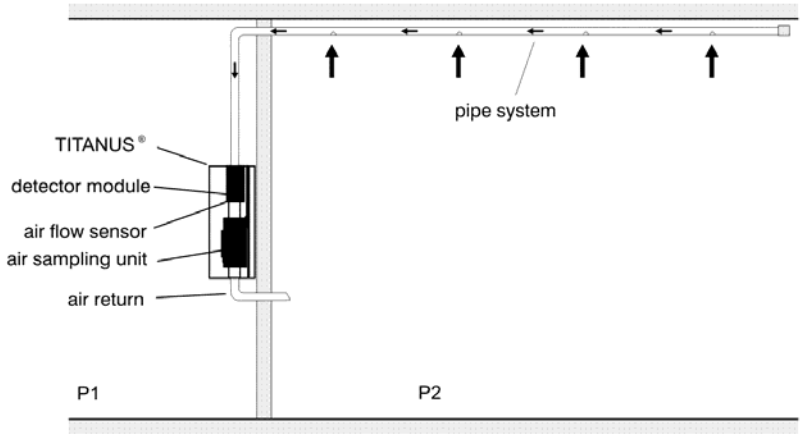


Figure 19: Sketch of TITANUS® air return

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

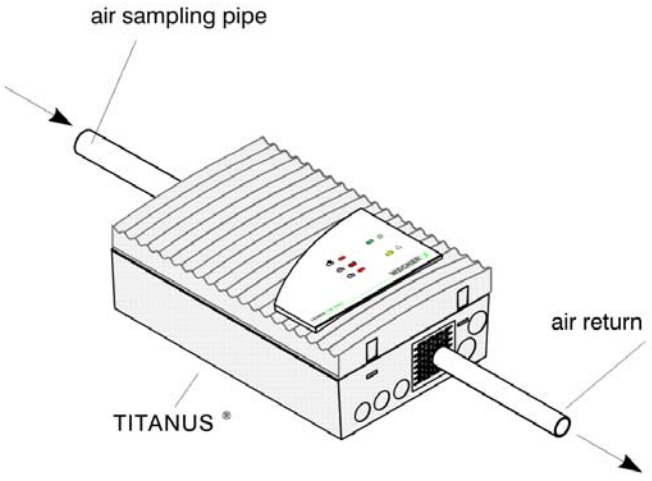


Figure 20: TITANUS® with air return

The air return pipe system is directly connected through the protection grid to the air outlet inside TITANUS®. For this, the pre-

punched opening in the protection grid must be used. As the air return pipe fits precisely into the air outlet a firm hold is ensured.

3.3.5 Noise suppressor

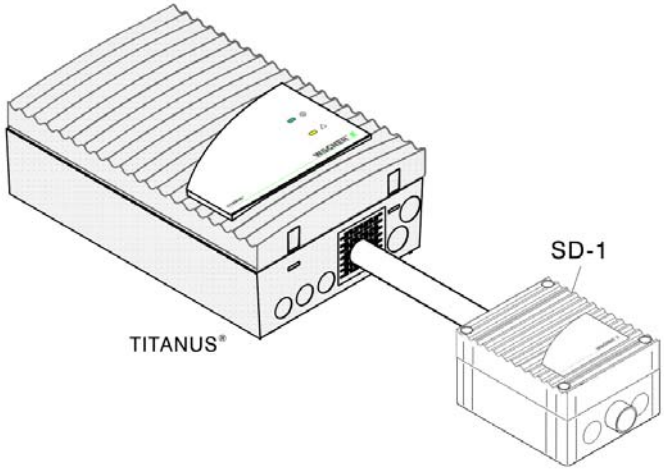


Figure 21: TITANUS® with noise suppressor

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

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

3.3.6 Steam trap for humid areas

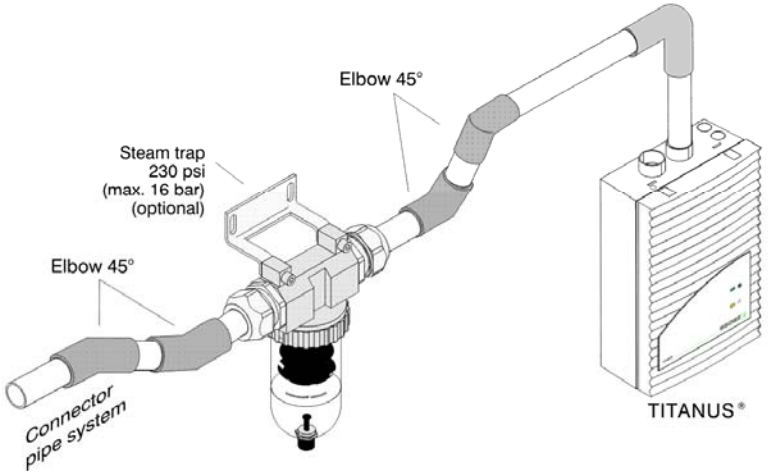


Figure 22: Type KA-DN25 Steam trap to eliminate water vapor from the pipe system and to collect the condensate from the pipe system

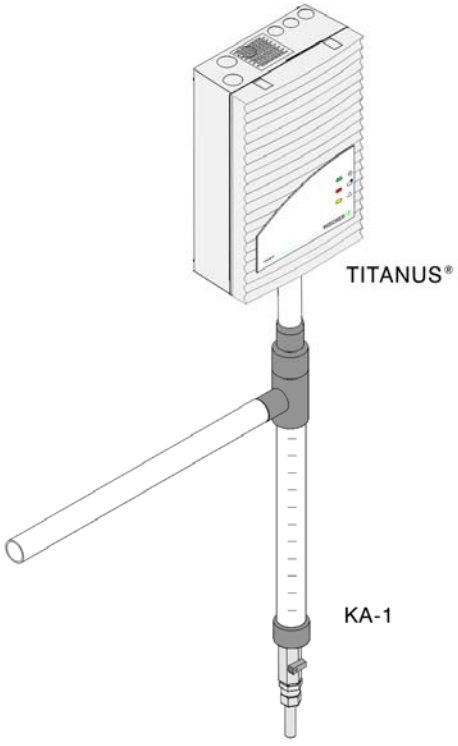


Figure 23: Type KA-1 steam trap to eliminate water vapor from the pipe system and to collect the condensate from the pipe system

If TITANUS® is used in environments with high humidity, condensation can occur. In order to collect this, a steam trap is installed at the lowest point in the pipe system and before the air filter and the air sampling smoke detection system. The 45°-elbows permit an optimum distance from the wall.

The steam trap can be operated in a temperature range between 32° F (0°C) and 122° F (+50°C). The sinter in the steam trap has a pore width of 2 mil (50 µm) and can also absorb coarse dirt particles.

The steam trap is used in the following areas:

Application

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

4 Technical Data

⚠WARNING

All listed power values relate to a surround temperature of 68° F (20ºC).

4.1 TITANUS *PRO·SENS*®/net

	TITANUS *PRO·SENS* ®/net 1 detector module	TITANUS *PRO·SENS* ®/net 2 2 detector modules
Voltage		
supply voltage (Ue) nominal supply voltage	14 - 30 V DC 24 V DC	

Current	U_L= 6,9 V	U_L= 9 V	U_L= 6,9 V	U_L= 9 V
starting current (at 24 V (without extra module)	300 mA		330 mA	
TP-3				
quiescent current consumption (at 24 V) (without extra module)	210 mA[1]	290 mA	240 mA	320 mA
current consumption alarm (at 24 V) (without extra module)	210 mA	290 mA	240 mA	320 mA
TP-4				
quiescent current consumption (at 24 V) (without extra module)	210 mA[1]	290 mA	240 mA	320 mA
current consumption alarm (at 24 V) (without extra module)	220 mA	300 mA	250 mA	330 mA
TP-5				
quiescent current consumption (at 24 V) (without extra module)	210 mA[1]	290 mA	240 mA	320 mA
current consumption alarm (at 24 V) (without extra module)	220 mA	300 mA	250 mA	330 mA

current consumption reset board	max. 20 mA
current consumption network module	max. 40 mA
current consumption shutdown module	max. 6 mA
contact load of alarm and fault relays switching power	30 V, 1 A max. 24 W

(1) The current values can vary U_L = fan voltage

depending on the type of pipe system

Dimensions

dimensions (h x b x d mm)	4.45 x 7.87 x 11.5 in (113 x 200 x 292 mm)

Weight

Weight	2.98 lbs (1.35 kg)	3.2 lbs (1.45 kg)

Noise level

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

Protection classification

Protection class (DIN IEC 34 part 5)	IP 20

Housing

material	plastic (ABS) UL-94V0
colour	papyrus white, RAL 9018

Temperature range

TITANUS® cold storage version	– 4° to 140°F (– 20° to +60°C) – 40° to 140°F (– 40° to +60°C)

Humidity

not condensed	10 to 95 % rf

Velocity range

Smoke detector for special application also suitable for open area protection	min. 0 fpm - max. 4000 fpm

Fan

type	radial
service life of fan (12 V)	43.500 h at 75.2° F (24°C)

Displays on the device

		TITANUS *PRO·SENS* ®/net	TITANUS *PRO·SENS* ®/net 2
TP-3, TP-4, TP-5	fire alarm	1 x red alarm indicators	2 x red alarm indicators
TP-4, TP-5	action alarm	1 x red alarm indicators	2 x red alarm indicators
TP-5	alert alarm	1 x red alarm indicators	2 x red alarm indicators
TP-3, TP-4, TP-5	fault	yellow common fault	
TP-3, TP-4, TP-5	ON	green operation display	

Connections

device connector	clamps for max. AWG No. 16 (1.5 mm²) strands	
cable	twisted in pairs, shielded and unshielded	
cable entries	5 x M 20 2 x M 25	
tapered pipe connectors	1 x for pipe Ø 63/64” (25 mm) for air return Ø 63/64” (25 mm)	2 x for pipe Ø 63/64” (25 mm) for air return Ø 63/64” (25 mm)

Response sensitivity

		TITANUS *PRO·SENS* ®/net	TITANUS *PRO·SENS* ®/net 2
detector module DM-TT-50	fire alarm	up to % 0.15 light obscuration/ ft (0.5 % light obscuration/m)	
	action alarm	up to % 0.10 light obscuration/ ft (0.35 % light obscuration/m)	
	alert alarm	up to % 0.045 light obscuration/ ft (0.15 % light obscuration/m)	
detector module DM-TT-10	fire alarm	up to % 0.0305 light obscuration/ ft (0.1 % light obscuration/m)	
	action alarm	up to % 0.021 light obscuration/ ft (0.07 % light obscuration/m)	
	alert alarm	up to % 0.0091 light obscuration/ ft (0.03 % light obscuration/m)	
detector module DM-TT-01	fire alarm	up to % 0.0046 light obscuration/ ft (0.015 % light obscuration/m)	
	action alarm	up to % 0.0032 light obscuration/ ft (0.0105 % light obscuration/m)	
	alert alarm	up to % 0.0014 light obscuration/ ft (0.0045 % light obscuration/m)	

UL sensitivity range

	0.005 % obsc./ft – 0.305 % obsc./ft (0.015 % LT/m – 1 % LT/m)
	Maximum light obscuration according to UL for 1 - 12 sampling ports: 1.542 % obsc./ft per port 13 - 100 sampling ports: 0.91 % obsc./ft per port For detailed information see chapter pipe design “Project planning according to UL”

	TITANUS *PRO·SENS* ®/net -SL	TITANUS *PRO·SENS* ®/net 2-SL

Voltage

supply voltage (Ue) nominal supply voltage	14 - 30 V DC 24 V DC

Current TP-3

Voltage with fan control board FC-2	U_L= 6. 5 V	U_L= 6.9 V	U_L= 9 V	U_L= 6.5 V	U_L= 6.9 V	U_L= 9 V
starting current (at 24 V) (without extra module)	230 mA			260 mA		
quiescent current consumption (at 24 V) (without extra module)	130 mA	140 mA	170 mA	160 mA	170 mA	200 mA
current consumption alarm (at 24 V) (without extra module)	max. 140 mA	max. 150 mA	max. 180 mA	max. 170 mA	max. 180 mA	max. 210 mA

Current TP-4

Voltage with fan control board FC-2	U_L= 6.5 V	U_L= 6.9 V	U_L= 9 V	U_L= 6.5 V	U_L= 6.9 V	U_L= 9 V
starting current (at 24 V) (without extra module)	230 mA			260 mA		
quiescent current consumption (at 24 V) (without extra module)	130 mA	140 mA	170 mA	160 mA	170 mA	200 mA
current consumption alarm (at 24 V) (without extra module)	max. 140 mA	max. 150 mA	max. 180 mA	max. 170 mA	max. 180 mA	max. 210 mA

Current TP-5

Voltage with fan control board FC-2	U_L= 6.5 V	U_L= 6.9 V	U_L= 9 V	U_L= 6.5 V	U_L= 6.9 V	U_L= 9 V
starting current (at 24 V) (without extra module)	230 mA			260 mA		
quiescent current consumption (at 24 V) (without extra module)	130 mA	140 mA	170 mA	160 mA	170 mA	200 mA
current consumption alarm (at 24 V) (without extra module)	max. 140 mA	max. 150 mA	max. 180 mA	max. 170 mA	max. 180 mA	max. 210 mA

	TITANUS *PRO·SENS* ®/net -SL	TITANUS *PRO·SENS* ®/net 2-SL

Current TP-3

Voltage with fan control board FC-3(2)	U_L= 10 V	U_L= 11 V	U_L= 12 V	U_L= 10 V	U_L= 11 V	U_L= 12 V
starting current (at 24 V) (without extra module)	270 mA			320 mA		
quiescent current consumption (at 24 V) (without extra module)	210 mA	230 mA	250 mA	260 mA	270 mA	280 mA
current consumption alarm (at 24 V) (without extra module)	max. 220 mA	max. 240 mA	max. 260 mA	max. 270 mA	max. 280 mA	max. 290 mA

Current TP-4

Voltage with fan control board FC-3(2)	U_L= 10 V	U_L= 11 V	U_L= 12 V	U_L= 10 V	U_L= 11 V	U_L= 12 V
starting current (at 24 V) (without extra module)	270 mA			320 mA		
quiescent current consumption (at 24 V) (without extra module)	210 mA	230 mA	250 mA	260 mA	270 mA	280 mA
current consumption alarm (at 24 V) (without extra module)	max. 220 mA	max. 240 mA	max. 260 mA	max. 270 mA	max. 280 mA	max. 290 mA

Current TP-5

Voltage with fan control board FC-3(2)	U_L= 10 V	U_L= 11 V	U_L= 12 V	U_L= 10 V	U_L= 11 V	U_L= 12 V
starting current (at 24 V) (without extra module)	270 mA			320 mA		
quiescent current consumption (at 24 V) (without extra module)	210 mA	230 mA	250 mA	260 mA	270 mA	280 mA
current consumption alarm (at 24 V) (without extra module)	max. 220 mA	max. 240 mA	max. 260 mA	max. 270 mA	max. 280 mA	max. 290 mA

current consumption network module	max. 40 mA
contact load of alarm and fault relays switching power	30 V, 1 A max. 24 W

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

Dimensions

dimensions (h x b x d mm)	4.45 x 7.87 x 11.5 in (113 x 200 x 292 mm)

Weight

weight without network board	2.98 lbs (1.35 kg)	3.2 lbs (1.45 kg)

Noise level

Lwa according to EN ISO 3744, 1995 without noise suppressor	at 31 dB(A) depending on the configuration and fan voltage
Lwa according to EN ISO 3744:, 1995 with noise suppressor	at 23 dB(A) depending on the configuration and fan voltage

Protection classification

protection class (DIN IEC 34 part 5)	IP 20

Housing

material	plastic (ABS) UL-94V0
colour	papyrus white, RAL 9018

Temperature range

	32° to 104° F (0° to +40°C)

Velocity range

Smoke detector for special application also suitable for open area protection	min. 0 fpm - max. 4000 fpm

Humidity

not condensed	10 to 95 % rf

Fan

type	radial
service life of fan (12 V)	43.500 h at 75.2° F (24°C)

Displays on the device

		TITANUS *PRO·SENS* ®/net	TITANUS *PRO·SENS* ®/net 2
TP-3, TP-4, TP-5	fire alarm	1 x red alarm indicators	2 x red alarm indicators
TP-4, TP-5	action alarm	1 x red alarm indicators	2 x red alarm indicators
TP-5	alert alarm	1 x red alarm indicators	2 x red alarm indicators
TP-3, TP-4, TP-5	fault	yellow common fault	
TP-3, TP-4, TP-5	ON	green operation display	

Connections

device connector	clamps for max. AWG No. 16 (1.5 mm²) strands	
cable	twisted in pairs, shielded and unshielded	
cable entries	5 x M 20 2 x M 25	
conical pipe connectors	1 x for pipe Ø 63/64” (25 mm) for air return Ø 63/64” (25 mm)	2 x for pipe Ø 63/64” (25 mm) for air return Ø 63/64” (25 mm)

Response sensitivity

detector module DM-TT-50	fire alarm	up to % 0.15 light obscuration/ ft (0.5 % light obscuration/m)
	action alarm	up to % 0.10 light obscuration/ ft (0.35 % light obscuration/m)
	alert alarm	up to % 0.045 light obscuration/ ft (0.15 % light obscuration/m)
detector module DM-TT-10	fire alarm	up to % 0.0305 light obscuration/ ft (0.1 % light obscuration/m)
	action alarm	up to % 0.021 light obscuration/ ft (0.07 % light obscuration/m)
	alert alarm	up to % 0.0091 light obscuration/ ft (0.03 % light obscuration/m)
detector module DM-TT-01	fire alarm	up to % 0.0046 light obscuration/ ft (0.015 % light obscuration/m)
	action alarm	up to % 0.0032 light obscuration/ ft (0.0105 % light obscuration/m)
	alert alarm	up to % 0.0014 light obscuration/ ft (0.0045 % light obscuration/m)

UL sensitivity range

	0.005 % obsc./ft – 0.305 % obsc./ft (0.015 % LT/m – 1 % LT/m)
	Maximum light obscuration according to UL for 1 - 12 sampling ports: 1.542 % obsc./ft per port 13 - 100 sampling ports: 0.91 % obsc./ft per port For detailed information see chapter pipe design “Project planning according to UL”

4.1.1 Accessories - TITANUS®

	Remote Indicators for TITANUS®

Remote Indicators

voltage nominal voltage	8 to 30 V= 24 V
current consumption (at 24 V) idle maximum	 10 mA 65 mA
electric connection lengths relay Indicators	 total length max. 3281 ft (1000 m)
protection classification	IP 65 model for wall housing

Displays on the device

TP-3, TP-4, TP-5	fire alarm	1 x red alarm indicators	2 x red alarm indicators
TP-4, TP-5	action alarm	1 x red alarm indicators	2 x red alarm indicators
TP-5	alert alarm	1 x red alarm indicators	2 x red alarm indicators
TP-3, TP-4, TP-5	fault	yellow common fault	
TP-3, TP-4, TP-5	ON	green operation display	

Connections

clip edging	clips for max. AWG No.12 (4 mm²) strands
cable feed through	2 x M16 model for wall housing

4.1.2 Pipe system TITANUS®

	Pipe system	
	TITANUS *PRO·SENS* ®/net	TITANUS *PRO·SENS* ®/net 2

Pipe system

max. pipe length max. number of air sampling ports	984 ft (300 m) 100	1968 ft (600 m) 200
max. length of air sampling hose per ceiling feed through	3'3" (1 m)	
Temperature range PVC-pipe ABS-pipe	32° to 150° F (-0°C..+65°C) – 40° to 176° F (-40°C..+80°C)	

5 Design

5.1 General

The following chapters are describing the design of the pipe-systems for the aspiration smoke detectors.

- **The first approach (chapter NFPA / UL design) relates to system planning according to UL268 /-A in respect of NFPA guidelines.**

Project planning options according to UL268 /-A and NFPA

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

Project planning criterion	Basic Principles	Limitations
Airflow Monitoring	Chapter 5.2.1	----
Project Planning Limits	Chapter 5.2.2	----
Pipe Accessories	Chapter 5.2.3	Chapter 5.2.2
Sensitivity Planning	Chapter 5.2.4	Chapter 5.2.2
Pipe Planning	Chapter 5.2.5	Chapter 5.2.2
NFPA Maximum smoke transport time	Chapter 5.2.6	Chapter 5.2.2
Project planning for air sampling port monitoring	Chapter 5.3.1	Chapter 5.3
Simplified pipe project planning	Chapter 5.3.2	Chapter 5.3

5.1.1 Regulations

The user must comply with current local and national regulations in each particular municipality, county, state, province, region and/or country. The user must also adjust installation as needed to comply with such regulations.

United States:

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

- NFPA 72 National fire alarm and signalling code
- NFPA 75 Standards for the Protection of Information Technology Equipment
- NFPA 76 Standard for the fire protection of telecommunications facilities

Canada:

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

- Standard for the Installation of Fire Alarm Systems, CAN/ULC-S524;
- National Building Code of Canada; and
- National Fire Code of Canada.

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

Symmetrical pipe system

To insure equal air intake for all air sampling ports the following rules must be obeyed:

- The length of the shortest and longest branch must not exceed a ratio of **1:2**.

- The number of air sampling ports of the corresponding branches must not exceed a ratio of **1:2.**
- The air sampling ports should be evenly distributed on the corresponding branches.

⚠WARNING

Each connected pipe system must comply with the design limits of TITANUS® for the selected pipe design (please refer to chapter “Project Planning Limits” NFPA/UL Design and EN/ISO Design).

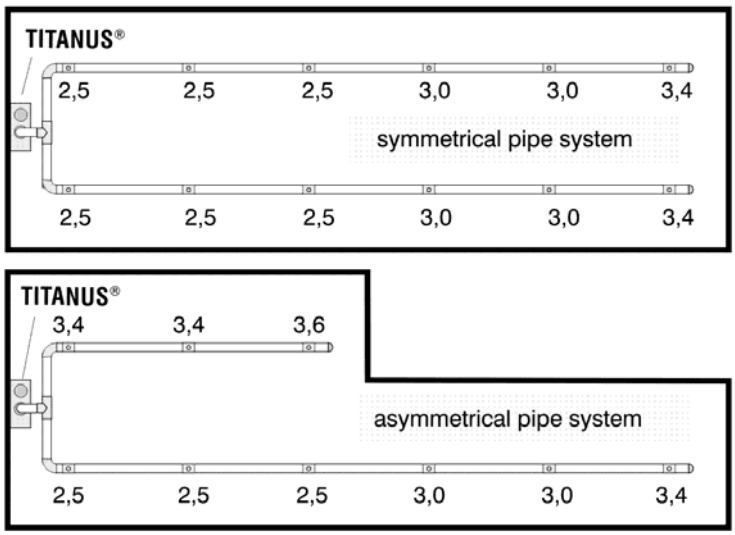


Figure 24: Example of a symmetrical and an asymmetrical U-pipe system

Figure „Example of a symmetrical and an asymmetrical U-pipe system” illustrates exemplary a U-shape pipe system with symmetrical and asymmetrical pipe designs and according to chapter ´Standard Design´ the calculated diameters of the air sampling ports.

The diameters of the aspiration holes are determined for each branch of the pipe system separately and are dependent on the total number of air sampling ports of the respective branch. Please refer to chapter “Hole diameters” for corresponding tables with hole diameters.

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

Pipe designs 4 types of pipe designs can be selected, depending on the cabinet geometry (see Figure „Project planning“).

I-pipe	An air sampling smoke detection pipe system without branches.
U-pipe	An air sampling smoke detection pipe system which branches into 2 air sampling branches after the connection to the TITANUS®.
M-pipe	An air sampling smoke detection pipe system which branches into 3 air sampling branches after the connection to the TITANUS®.
Double-U-pipe	An air sampling smoke detection pipe system which branches into 4 air sampling branches after the connection to the TITANUS®.

Pipe connections The TITANUS® has 2 pipe connections. One pipe system may be connected to each of these pipe connections, as long as two detector modules are being used.
If only one detector module is being used, it will only be possible to connect one sampling pipe.

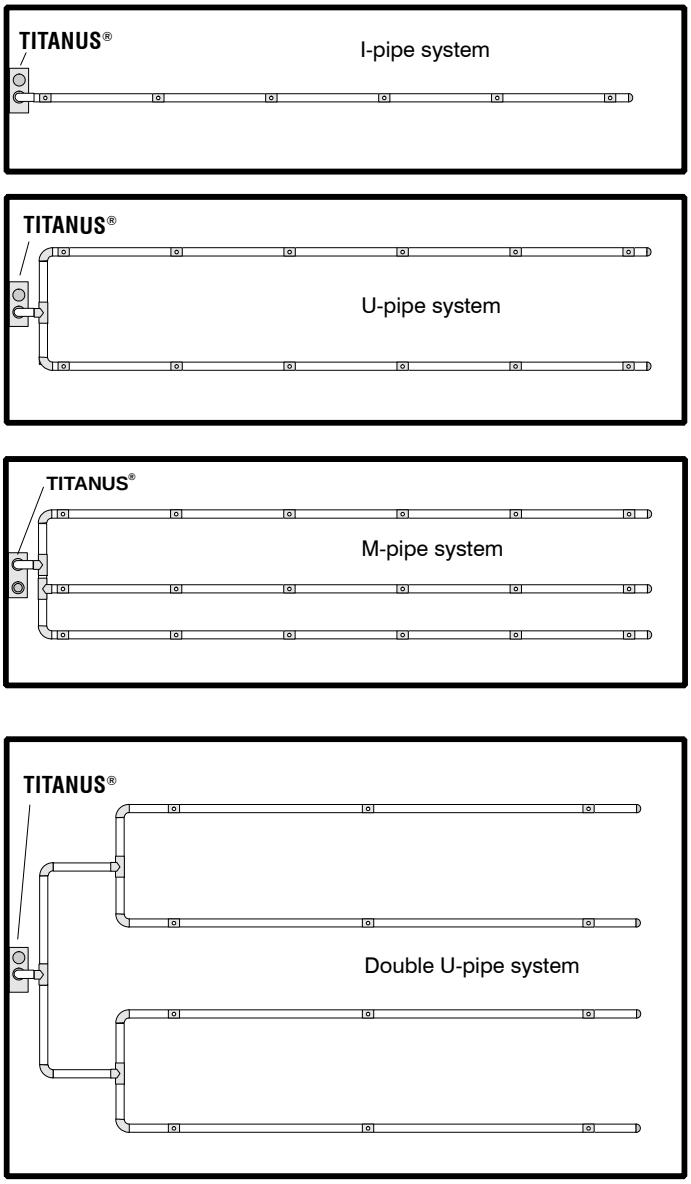


Figure 25: Pipe designs

Direction change Angles and bends in the pipe system increase flow resistance. For that reason, it is necessary to limit the number of them to the amount required.

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

	Corresponds to a straight pipe length of
Angle	4’11” (1.5 m)
Bend	12 in (0.3 m)

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

⚠WARNING

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

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

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

TIP

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

Double knock detection One intake line is to be allocated per detector module. The two detector modules of a device must be evaluated independently of one another. Only one extinguishing area may be monitored per air sampling smoke detection system.

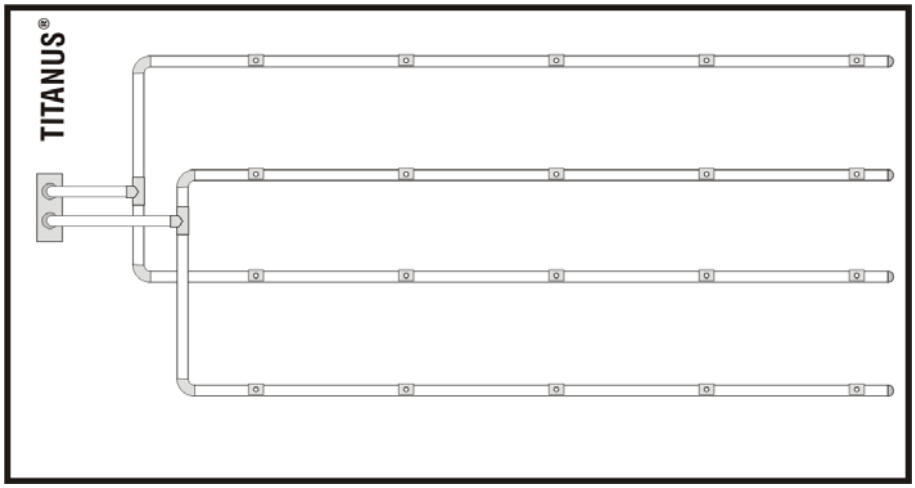


Figure 26: Pipe design for double knock detection

Due to double knock detection TITANUS® is on excellent choice for activation of fire extinguishing systems. For activation of fire extinguishing systems compliance with standards i.e. NFPA, FM or UL must be obeyed.

5.2 NFPA / UL Design

5.2.1 Air flow monitoring

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

Adjusting the air flow sensitivity

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

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

Level	I	II	III	IV
Triggering threshold	Small	Medium	Large	Very large
Sensitivity	Very high	High	Medium	Low

TIP

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

Dynamic air flow sensor system

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

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

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

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

⚠WARNING

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

5.2.2 Project planning limits

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

- The minimum pipe length between 2 air sampling ports is **13 ft (4 m)**.
- The maximum pipe length between 2 air sampling ports is **39 ft (12 m)**.
- The maximum UL/NFPA overall pipe length is 984 ft (300 m) (2 x 1968 ft (600 m) with 2 pipe systems connected).
- The maximum monitoring area per air sampling port corresponds to the monitoring area of point-shaped detectors in accordance with the applicable project planning guideline.

- For UL/NFPA maximum of **100** air sampling ports are possible per detector module.

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

TITANUS® is also suitable for open area protection.

5.2.3 Pipe accessories

Air filters

Type	Application	Examples
LF-AD	Coarse filter for separating particles > approx. 0.59 mil (15 µm)	Dust, insects, fibres, hair, cinders, pollen
LF-AD-1	Filter for separating particles > approx. 0.39 mil (10 µm)	As above. Additionally: Colour pigments and fine dust
LF-AD-2	Fine filter for separating particles > approx. 0.2 mil (5 µm)	As above. Additionally: Fine dust in low concentrations
SF-400	Fine filter for separating particles > approx. 0.04 mil (1 µm)	As above. Additionally: Fine dust in high concentrations
SF-650	Fine filter for separating particles > approx. 0.04 mil (1 µm)	As above, but with increased filter lifetime

Steam trap

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

Sound suppressor

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

5.2.4 Sensitivity planning

According to UL268 the sensitivity of an air sampling smoke detection has to be set according to results of the UL Fire Tests for each detector module.

TITANUS *TOP·SENS*® selectable sensitivity levels are as follows:

Activation sensitivity (fire alarm) TITANUS®		
UL/FM approved	UL/FM approved	UL/FM approved
Detector module Type DM-TT-50-L	Detector module Type DM-TT-10-L	Detector module Type DM-TT-01-L
	0.244 % light obscuration/ft (0.8 % light obscuration/m)	0.037 % light obscuration/ft (0.12 % light obscuration/m)
	0.122 % light obscuration/ft (0.4 % light obscuration/m) (Default)	0.018 % light obscuration/ft (0.06 % light obscuration/m) (Default)
0.305 % light obscuration/ft (1 % light obscuration/m)	0.061 % light obscuration/ft (0.2 % light obscuration/m)	0.009 % light obscuration/ft (0.03 % light obscuration/m)
0.152 % light obscuration/ft (0.5 % light obscuration/m) (Default)	0.03 % light obscuration/ft (0.1 % light obscuration/m)	0.005 % light obscuration/ft (0.015% light obscuration/m)

Project planning for the monitored surface is always carried out according to national specifications for spot type smoke detectors.

The following table shows the sensitivity settings of the detector modules in accordance to the amount of air sampling port.

Modul	Sensitivity % obsc./ft	Max. no. of sampling apertures plus acceleration aperture																							
		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
DM-Tx-01	0.005	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	0.009	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	0.018	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	0.037	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DM-Tx-10	0.031	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	0.061	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓										
	0.122	✓	✓	✓	✓	✓	✓	✓																		
	0.244	✓	✓	✓																						
DM-Tx-50	0.152	✓	✓	✓	✓	✓	✓																			
	0.305	✓	✓	✓																						

Modul	Sensitivity % obsc./ft	Max. no. of sampling apertures plus acceleration aperture																							
		26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
DM-Tx-01	0.005	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	0.009	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	0.018	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	0.037																									
DM-Tx-10	0.031	✓	✓	✓	✓	✓																				
	0.061																									
	0.122																									
	0.244																									
DM-Tx-50	0.152																									
	0.305																									

Modul	Sensitivity % obsc./ft	Max. no. of sampling apertures plus acceleration aperture																							
		51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
DM-Tx-01	0.005	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	0.009	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	0.018																									
	0.037																									
DM-Tx-10	0.031																									
	0.061																									
	0.122																									
	0.244																									
DM-Tx-50	0.152																									
	0.305																									

Modul	Sensitivity % obsc./ft	Max. no. of sampling apertures plus acceleration aperture																							
		76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
DM-Tx-01	0.005	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	0.009	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	0.018																									
	0.037																									
DM-Tx-10	0.031																									
	0.061																									
	0.122																									
	0.244																									
DM-Tx-50	0.152																									
	0.305																									

⚠WARNING

Only those settings which are ticked are allowed to use for the illustrated number of air sampling ports.

5.2.5 Pipe planning

5.2.5.1 Pipeline planning

The following project planning tables for pipeline project planning can be found in the appendix for each previously selected NFPA protection classification.

- NFPA 72– SFD - Standard Fire Detection (120 s)

Procedure The following example shows a project plan in accordance with NFPA 72 – SFD, (120 seconds) requirements with 21 air sampling ports and no air filter. The red arrows indicate the possible project plans with the required UL sensitivity settings per detector module, the varying pipe configurations and the fan voltages incl. the maximum pipe length.

1	**Selection** Selection of the corresponding project planning table based on the NFPA classification. **Result** The project planning table has been determined.
2	**Selection** Selection of the number of air sampling ports in the project planning table. **Result** The achievable sensitivity class for the selected number of air sampling ports has been determined.
3	**Selection** Determinations on the sensitivity necessary to achieve the UL sensitivity requirements. **Result** Determination of the detector module and sensitivity setting according to UL.
4	**Selection** Selection pipe accessories (incl. air filter or without air filter). **Result** The project planning table has been determined.
5	**Selection** Pipe length and pipe shape selection. **Result** Determination of the pipe shape, pipe length and necessary fan voltage.

1 UL / NFPA Pipe design table

TITANUS *TOP SENS*® & *PRO SENS*® /NET With Acceleration Air Sampling Ports /S NFPA 72 Standard Fire Detection (SFD) (120 s) (without filter)

M = Module S = Sensitivity (% obs/ft)

M	S	Number of points (max. plus acceleration air sampling ports) 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-Tx-01	0.005	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	0.009	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	0.018	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	0.037	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	-	-
DM-Tx-10	0.031	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	0.061	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	-	-	-	-	-	-	-	-	-	-	-
	0.122	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0.244	✔	✔	✔	✔	✔	✔	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DM-Tx-50	0.152	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0.305	✔	✔	✔	✔	✔	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

4 without filter

Pipe shape	U_{Fan}[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	permitted total pipe length [ft]
I	6.9	492	492	426	426	426	426	426	426	426	426	426	426	360	360	360	360	-	-	-	-	-	-	-	-	-	-	
	≥9	656	656	590	590	590	590	492	492	492	426	426	426	426	426	426	426	426	426	426	426	-	-	-	-	-	-	
U	6.9	-	787	787	787	787	721	721	721	721	721	656	656	656	656	656	656	656	656	656	656	656	-	-	-	-	-	
	≥9	-	918	918	918	918	918	918	918	918	918	918	918	918	918	918	918	787	787	787	787	787	787	787	787	656	656	
M	6.9	-	-	787	787	787	787	688	688	688	688	688	688	688	688	688	688	688	688	557	557	557	-	-	-	-	-	
	≥9	-	-	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	787	787	
Double U (1 DM)	6.9	-	-	-	984	984	984	984	984	787	787	787	787	656	656	656	656	656	656	656	656	656	656	656	656	-	-	
	9	-	-	-	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	
	12	-	-	-	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	
Double U (2 DM)	6.9	-	-	-	721	721	721	721	721	721	721	721	721	656	656	656	656	656	656	656	656	656	656	656	656	-	-	
	9	-	-	-	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	
	12	-	-	-	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	

with detector box and/or VSK 1)

Pipe shape	U_{Fan}[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	permitted total pipe length [ft]
I	6.9	452	391	391	391	391	391	391	391	391	391	391	331	331	331	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	603	542	542	542	542	452	452	452	391	391	391	391	391	391	391	391	391	391	-	-	-	-	-	-	-	-	
U	6.9	-	724	724	724	663	663	663	663	603	603	603	603	603	603	603	603	603	603	-	-	-	-	-	-	-	-	
	≥9	-	844	844	844	844	844	844	844	844	844	844	844	844	844	724	724	724	724	724	724	724	724	603	603	603	603	
M	6.9	-	-	724	724	724	724	632	632	632	632	632	632	632	632	632	512	512	512	-	-	-	-	-	-	-	-	
	≥9	-	-	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	724	724	724	724	724	
Double U (1 DM)	6.9	-	-	-	905	905	905	905	905	724	724	724	724	603	603	603	603	603	603	603	603	-	-	-	-	-	-	
	9	-	-	-	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	
	12	-	-	-	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	
Double U (2 DM)	6.9	-	-	-	721	721	721	721	721	721	721	721	721	603	603	603	603	603	603	603	603	-	-	-	-	-	-	
	9	-	-	-	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

with steam trap 2)

Pipe shape	U_{Fan}[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	permitted total pipe length [ft]
I	6.9	369	319	319	319	319	319	319	319	319	270	270	270	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	492	442	442	442	369	369	319	319	319	319	319	319	319	319	319	-	-	-	-	-	-	-	-	-	-	-	
U	6.9	-	590	540	540	540	540	492	492	492	492	492	492	492	492	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	-	688	688	688	688	688	688	688	688	688	688	688	590	590	590	590	590	590	492	492	492	492	393	393	393	393	
M	6.9	-	-	590	516	516	516	516	516	516	516	516	516	417	417	417	-	-	-	-	-	-	-	-	-	-	-	
	≥9	-	-	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	590	590	590	590	590	590	516	516	
Double U (1 DM)	6.9	-	-	-	738	590	590	590	590	492	492	492	492	492	492	492	492	-	-	-	-	-	-	-	-	-	-	
	9	-	-	-	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	540	540	
	12	-	-	-	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	
Double U (2 DM)	6.9	-	-	-	721	590	590	590	590	492	492	492	492	492	492	492	492	-	-	-	-	-	-	-	-	-	-	
	9	-	-	-	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	540	540	
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Results: The following modules may optionally be used with the corresponding settings according to the UL sensitivity requirements:

- Module DM-TT-01 – with a sensitivity of min. 0.037 % obs./ft (0.12 % LT/m)
- Module DM-TT-10 – with a sensitivity of min. 0.031 % obs./ft (0.1 % LT/m)

Possible system parameters:

≥ 9 V fan voltage, max. 656 ft (200 m) overall pipe length

M- pipe system

6.9 V fan voltage, max. 492 ft (150 m) overall pipe length

≥ 9 V fan voltage, max. 787 ft (240 m) overall pipe length

Double U-pipe system (1 detector module)

6.5 V fan voltage, max. 459 ft (140 m) overall pipe length

6.9 V fan voltage, max. 721 ft (220 m) overall pipe length

12 V fan voltage, max. 984 ft (300 m) overall pipe length

Double U-pipe system (2 detector module)

6.5 V fan voltage, max. 459 ft (140 m) overall pipe length

6.9 V fan voltage, max. 721 ft (220 m) overall pipe length

12 V fan voltage, max. 721 ft (220 m) overall pipe length

5.2.5.2 Air sampling port diameters

For the design of the individual air sampling ports within the pipe-branches please follow the design tables for the appropriate pipe-shape (I-pipe, U-pipe, M-pipe, double U-pipe or four-fold U-pipe).

I-pipe

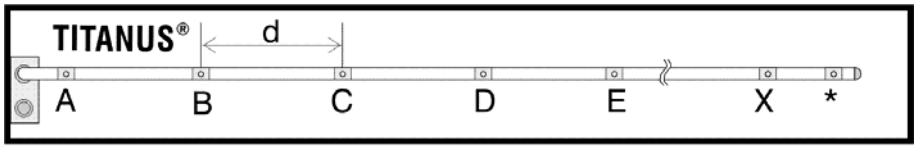


Figure 27: I-pipe system

Air sampling ports

Number of air sampling ports	1	2	3	4	5	6	7	8	9	10	11	12	13
Air sampling port type Ax-x.x (1)													
A	7,0	7,0	7,0	3,2	3,0	2,5	2,0	2,0	2,0	2,0	2,0	2,0	2,0
B	a	7,0	7,0	7,0	3,8	3,0	2,5	2,0	2,0	2,0	2,0	2,0	2,0
C	-	a	7,0	7,0	6,0	3,6	3,0	2,5	2,0	2,0	2,0	2,0	2,0
D	-	-	a	7,0	7,0	5,6	3,6	3,0	2,5	2,0	2,0	2,0	2,0
E	-	-	-	a	7,0	7,0	5,2	3,4	3,0	2,5	2,0	2,0	2,0
F	-	-	-	-	a	7,0	7,0	5,0	3,6	3,2	2,5	2,0	2,0
G	-	-	-	-	-	a	7,0	7,0	4,4	3,4	3,0	2,5	2,0
H	-	-	-	-	-	-	a	7,0	7,0	4,0	3,4	3,0	2,0
I	-	-	-	-	-	-	-	a	7,0	7,0	3,6	3,2	2,5
J	-	-	-	-	-	-	-	-	a	7,0	7,0	3,6	3,4
K	-	-	-	-	-	-	-	-	-	a	7,0	6,8	3,6
L	-	-	-	-	-	-	-	-	-	-	a	7,0	6,8
M	-	-	-	-	-	-	-	-	-	-	-	a	7,0
N	-	-	-	-	-	-	-	-	-	-	-	-	a
O	-	-	-	-	-	-	-	-	-	-	-	-	-
P	-	-	-	-	-	-	-	-	-	-	-	-	-
Q	-	-	-	-	-	-	-	-	-	-	-	-	-
R	-	-	-	-	-	-	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-	-	-	-	-	-	-
T	-	-	-	-	-	-	-	-	-	-	-	-	-
U	-	-	-	-	-	-	-	-	-	-	-	-	-
V	-	-	-	-	-	-	-	-	-	-	-	-	-
W	-	-	-	-	-	-	-	-	-	-	-	-	-
X	-	-	-	-	-	-	-	-	-	-	-	-	-
Y	-	-	-	-	-	-	-	-	-	-	-	-	-

(1) Aspiration-reducing film sheet type AF-x.x or AK-x.x
a = Acceleration air sampling port = 7.0 mm

Air sampling ports

Number of air sampling ports	14	15	16	17	18	19	20	21	22	23	24
Air sampling port type Ax-x.x (1)											
A	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
C	2,0	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	2,0

Number of air sampling ports	14	15	16	17	18	19	20	21	22	23	24
E	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
F	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
G	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
H	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
I	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
J	2,5	2,5	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
K	3,2	2,5	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
L	3,2	3,4	2,5	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
M	6,8	3,6	3,2	2,5	2,0	2,0	2,0	2,0	2,0	2,0	2,0
N	7,0	6,0	3,6	3,0	2,5	2,0	2,0	2,0	2,0	2,0	2,0
O	a	7,0	6,0	3,4	3,0	2,5	2,0	2,0	2,0	2,0	2,0
P	-	a	7,0	6,0	3,4	3,0	2,5	2,0	2,0	2,0	2,0
Q	-	-	a	7,0	5,6	3,4	2,5	2,5	2,0	2,0	2,0
R	-	-	-	a	7,0	5,2	3,4	2,5	2,5	2,0	2,0
S	-	-	-	-	a	7,0	5,0	3,4	2,5	2,0	2,0
T	-	-	-	-	-	a	7,0	4,6	3,2	2,5	2,5
U	-	-	-	-	-	-	a	7,0	4,4	3,2	3,0
V	-	-	-	-	-	-	-	a	7,0	4,2	3,4
W	-	-	-	-	-	-	-	-	a	7,0	4,6
X	-	-	-	-	-	-	-	-	-	a	6,0
Y	-	-	-	-	-	-	-	-	-	-	a

(1) Aspiration-reducing film sheet type AF-x.x or AK-x.x
a = Acceleration air sampling port = 7.0 mm

U-pipe

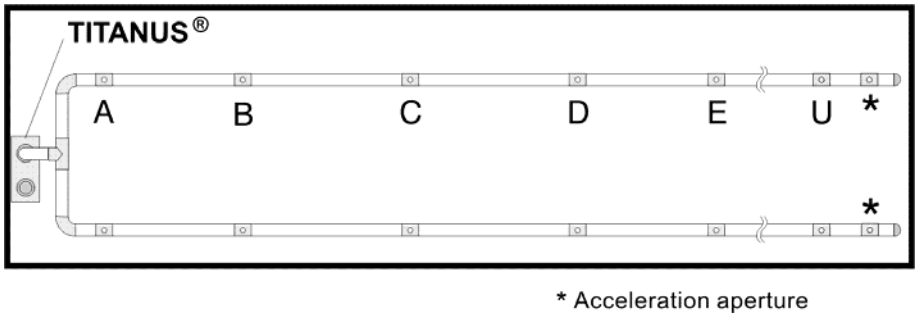


Figure 28: U-pipe system

Air sampling ports

Number of air sampling ports	2	4	6	8	10	12	14	16	18	20	22	24	26
Air sampling port type Ax-x.x (1)													
A	7,0	7,0	6,8	4,6	3,0	2,5	2,5	2,0	2,0	2,0	2,0	2,0	2,0
B	a	7,0	7,0	5,0	3,6	2,5	2,5	2,5	2,5	2,5	2,0	2,0	2,0
C	-	a	7,0	7,0	5,0	3,0	3,0	2,5	2,5	2,5	2,5	2,5	2,5
D	-	-	a	7,0	7,0	5,0	3,0	3,0	2,5	2,5	2,5	2,5	2,5
E	-	-	-	a	7,0	7,0	4,0	3,0	3,4	2,5	2,5	2,5	2,5
F	-	-	-	-	a	7,0	7,0	3,6	3,0	2,5	2,5	2,5	2,5
G	-	-	-	-	-	a	7,0	7,0	4,0	3,0	2,5	2,5	2,5
H	-	-	-	-	-	-	a	7,0	6,0	4,0	3,0	2,5	2,5
I	-	-	-	-	-	-	-	a	7,0	6,0	4,0	3,0	2,5
J	-	-	-	-	-	-	-	-	a	7,0	5,6	4,0	3,0
K	-	-	-	-	-	-	-	-	-	a	7,0	5,2	4,0
L	-	-	-	-	-	-	-	-	-	-	a	7,0	5,0
M	-	-	-	-	-	-	-	-	-	-	-	a	7,0
N	-	-	-	-	-	-	-	-	-	-	-	-	a
O	-	-	-	-	-	-	-	-	-	-	-	-	-
P	-	-	-	-	-	-	-	-	-	-	-	-	-
Q	-	-	-	-	-	-	-	-	-	-	-	-	-
R	-	-	-	-	-	-	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-	-	-	-	-	-	-
T	-	-	-	-	-	-	-	-	-	-	-	-	-
U	-	-	-	-	-	-	-	-	-	-	-	-	-
V	-	-	-	-	-	-	-	-	-	-	-	-	-

(1) Aspiration-reducing film sheet type AF-x.x or AK-x.x
a = Acceleration air sampling port = 7.0 mm

Air sampling ports

Number of air sampling ports	28	30	32	34	36	38	40	42
Air sampling port type Ax-x.x (1)								
A	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
C	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	2,0	2,0
E	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	2,0
G	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
I	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5
J	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5
K	3,0	2,5	2,5	2,5	2,5	2,5	2,5	2,5
L	4,0	3,0	2,5	2,5	2,5	2,5	2,5	2,5
M	5,0	4,0	3,0	2,5	2,5	2,5	2,5	2,5
N	7,0	5,0	4,0	3,0	2,5	2,5	2,5	2,5
O	a	7,0	5,0	4,0	3,0	2,5	2,5	2,5
P	-	a	7,0	5,0	4,0	3,2	2,5	2,5
Q	-	-	a	7,0	5,0	4,0	3,2	2,5
R	-	-	-	a	7,0	5,0	4,0	3,2
S	-	-	-	-	a	7,0	5,0	4,0
T	-	-	-	-	-	a	7,0	5,0
U	-	-	-	-	-	-	a	7,0
V	-	-		-	-	-	-	a

(1) Aspiration-reducing film sheet type AF-x.x or AK-x.x
a = Acceleration air sampling port = 7.0 mm

M-pipe

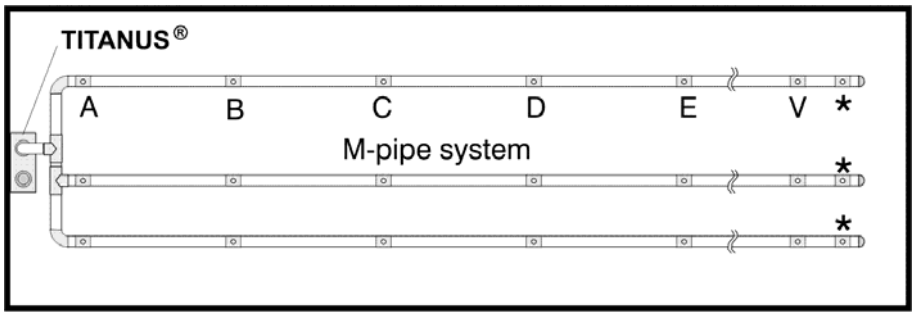


Figure 29: M-pipe system

Air sampling ports

Number of air sampling ports	3	6	9	12	15	18	21	24	27	30	33	36	39
Air sampling port type Ax-x.x (1)													
A	7,0	7,0	6,8	4,6	3,0	2,5	2,5	2,0	2,0	2,0	2,0	2,0	2,0
B	a	7,0	7,0	5,0	3,4	2,5	2,5	2,5	2,5	2,5	2,0	2,0	2,0
C	-	a	7,0	7,0	5,0	3,6	3,0	2,5	2,5	2,5	2,5	2,5	2,5
D	-	-	a	7,0	7,0	4,6	3,4	3,0	2,5	2,5	2,5	2,5	2,5
E	-	-	-	a	7,0	7,0	4,0	3,2	3,4	2,5	2,5	2,5	2,5
F	-	-	-	-	a	7,0	6,8	3,6	3,4	2,5	2,5	2,5	2,5
G	-	-	-	-	-	a	7,0	6,8	3,6	3,2	2,5	2,5	2,5
H	-	-	-	-	-	-	a	7,0	6,0	3,6	3,4	2,5	2,5
I	-	-	-	-	-	-	-	a	7,0	6,0	3,6	3,4	2,5
J	-	-	-	-	-	-	-	-	a	7,0	5,6	3,6	3,0

Number of air sampling ports	3	6	9	12	15	18	21	24	27	30	33	36	39
K	-	-	-	-	-	-	-	-	-	a	7,0	5,0	3,6
L	-	-	-	-	-	-	-	-	-	-	a	7,0	4,6
M	-	-	-	-	-	-	-	-	-	-	-	a	7,0
N	-	-	-	-	-	-	-	-	-	-	-	-	a
O	-	-	-	-	-	-	-	-	-	-	-	-	-
P	-	-	-	-	-	-	-	-	-	-	-	-	-
Q	-	-	-	-	-	-	-	-	-	-	-	-	-
R	-	-	-	-	-	-	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-	-	-	-	-	-	-
T	-	-	-	-	-	-	-	-	-	-	-	-	-
U	-	-	-	-	-	-	-	-	-	-	-	-	-
V	-	-	-	-	-	-	-	-	-		-	-	-
W													

(1) Aspiration-reducing film sheet type AF-x.x or AK-x.x
a = Acceleration air sampling port = 7.0 mm

Air sampling ports

Number of air sampling ports	42	45	48	51	54	57	60	63	66
Air sampling port type Ax-x.x (1)									
A	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
C	2,5	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
E	2,5	2,5	2,5	2,5	2,5	2,5	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
G	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0	2,0
H	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0
I	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0
J	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5
K	3,0	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5
L	3,6	3,0	2,5	2,5	2,5	2,5	2,5	2,5	2,5
M	4,0	3,6	2,5	2,5	2,5	2,5	2,5	2,5	2,5
N	7,0	3,6	3,0	3,0	2,5	2,5	2,5	2,5	2,5
O	a	7,0	3,6	3,6	2,5	2,5	2,5	2,5	2,5
P	-	a	7,0	3,6	3,0	2,5	2,5	2,5	2,5
Q	-	-	a	6,0	3,6	2,5	2,5	2,5	2,5
R	-	-	-	a	6,0	3,0	2,5	2,5	2,5
S	-	-	-	-	a	6,0	3,0	2,5	2,5
T	-	-	-	-	-	a	6,0	3,0	2,5
U	-	-	-	-	-	-	a	6,0	3,0
V	-	-		-	-	-	-	a	6,0
W	-	-	-	-	-	-	-	-	a

(1) Aspiration-reducing film sheet type AF-x.x or AK-x.x
a = Acceleration air sampling port = 7.0 mm

Double U-pipe

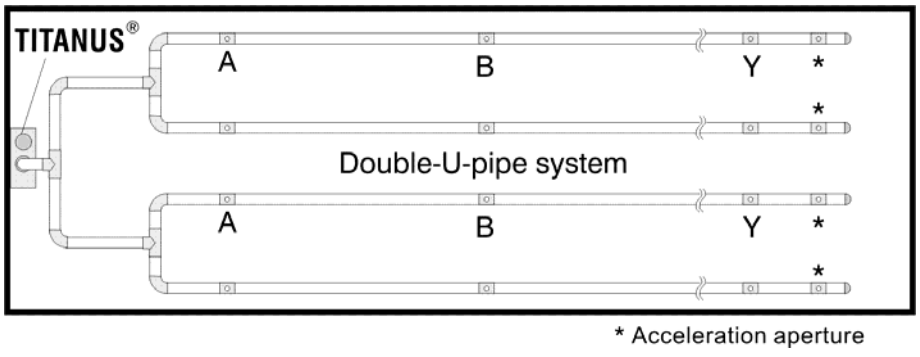


Figure 30: Double U-pipe system

Air sampling ports

Number of air sampling ports	4	8	12	16	20	24	28	32	36	40	44	48	52
Air sampling port type Ax-x.x (1)													
A	7,0	7,0	6,8	4,6	3,0	2,5	2,5	2,0	2,0	2,0	2,0	2,0	2,0
B	a	7,0	7,0	5,0	3,4	2,5	2,5	2,5	2,5	2,5	2,0	2,0	2,0
C	-	a	7,0	7,0	5,0	3,6	3,0	2,5	2,5	2,5	2,5	2,5	2,5
D	-	-	a	7,0	7,0	4,6	3,4	3,0	2,5	2,5	2,5	2,5	2,5
E	-	-	-	a	7,0	7,0	4,0	3,2	3,4	2,5	2,5	2,5	2,5
F	-	-	-	-	a	7,0	6,8	3,6	3,4	2,5	2,5	2,5	2,5
G	-	-	-	-	-	a	7,0	6,8	3,6	3,2	2,5	2,5	2,5
H	-	-	-	-	-	-	a	7,0	6,0	3,6	3,4	2,5	2,5
I	-	-	-	-	-	-	-	a	7,0	6,0	3,6	3,4	2,5
J	-	-	-	-	-	-	-	-	a	7,0	5,6	3,6	3,0
K	-	-	-	-	-	-	-	-	-	a	7,0	5,0	3,6
L	-	-	-	-	-	-	-	-	-	-	a	7,0	4,6
M	-	-	-	-	-	-	-	-	-	-	-	a	7,0
N	-	-	-	-	-	-	-	-	-	-	-	-	a
O	-	-	-	-	-	-	-	-	-	-	-	-	-
P	-	-	-	-	-	-	-	-	-	-	-	-	-
Q	-	-	-	-	-	-	-	-	-	-	-	-	-
R	-	-	-	-	-	-	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-	-	-	-	-	-	-
T	-	-	-	-	-	-	-	-	-	-	-	-	-
U	-	-	-	-	-	-	-	-	-	-	-	-	-
V	-	-	-	-	-	-	-	-	-	-	-	-	-
W	-	-	-	-	-	-	-	-	-	-	-	-	-
X	-	-	-	-	-	-	-	-	-	-	-	-	-
Y	-	-	-	-	-	-	-	-	-	-	-	-	-
Z	-	-	-	-	-	-	-	-	-	-	-	-	-

(1) Aspiration-reducing film sheet type AF-x.x or AK-x.x
a = Acceleration air sampling port = 7.0 mm

Air sampling ports

Number of air sampling ports	56	60	64	68	72	76	80	84	88	92	96	100
Air sampling port type Ax-x.x (1)												
A	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
B	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
C	2,5	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
D	2,5	2,5	2,5	2,5	2,5	2,5	2,0	2,0	2,0	2,0	2,0	2,0
E	2,5	2,5	2,5	2,5	2,5	2,5	2,0	2,0	2,0	2,0	2,0	2,0
F	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0	2,0	2,0	2,0	2,0
G	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0	2,0	2,0	2,0	2,0
H	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0	2,0	2,0	2,0
I	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0	2,0	2,0	2,0
J	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0	2,0	2,0
K	3,0	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0	2,0	2,0
L	3,6	3,0	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0	2,0
M	4,0	3,6	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0	2,0
N	7,0	3,6	3,0	3,0	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0
O	a	7,0	3,6	3,6	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,0
P	-	a	7,0	3,6	3,0	2,5	2,5	2,5	2,5	2,5	2,5	2,5
Q	-	-	a	6,0	3,6	2,5	2,5	2,5	2,5	2,5	2,5	2,5
R	-	-	-	a	6,0	3,0	2,5	2,5	2,5	2,5	2,5	2,5
S	-	-	-	-	a	6,0	3,0	2,5	2,5	2,5	2,5	2,5
T	-	-	-	-	-	a	6,0	3,0	2,5	2,5	2,5	2,5
U	-	-	-	-	-	-	a	6,0	3,0	2,5	2,5	2,5
V	-	-	-	-	-	-	-	a	6,0	3,0	2,5	2,5
W	-	-	-	-	-	-	-	-	a	6,0	3,0	2,5
X	-	-	-	-	-	-	-	-	-	a	6,0	3,0
Y	-	-	-	-	-	-	-	-	-	-	a	6,0
Z	-	-	-	-	-	-	-	-	-	-	-	a

(1) Aspiration-reducing film sheet type AF-x.x or AK-x.x
a = Acceleration air sampling port = 7.0 mm

5.2.6 NFPA - Maximum Smoke Transport Time

NFPA Standards 72 and 76 specify the maximum smoke transport time from the most remote port to the detection unit as follows.

- NFPA 72 National fire alarm and signalling code
  SFD: Standard Fire Detection Systems - transport time within 120 seconds

NFPA Please find corresponding pipe design tables in the appendix.

5.3 Special project planning

5.3.1 Project planning for individual air sampling port monitoring

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

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

5.3.1.1 I-pipe system

1 pipe system and 2 pipe systems

Pipe systems

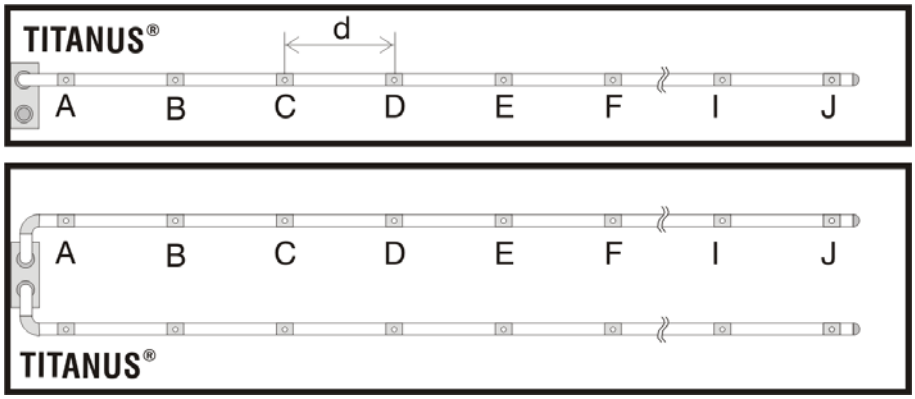


Figure 31: I-shape pipe system for area protection

Limit values

Min. distance from TITANUS® to 1st air sampling port	13 ft (4 m)
Max. distance from d TITANUS® to 1st air sampling port	66 ft (20 m)
Max. Distance from 1st air sampling port to last air sampling port with low fan voltage 6.5 V – 6.9 V with high fan voltage 9 V – 12V	131 ft (40 m) 197 ft (60 m)
Max. Overall pipe length per pipe system with low fan voltage 6.5 V – 6.9 V	197 ft (60 m)

with high fan voltage 9 V – 12 V	262 ft (80 m)
Min. distance between 2 air sampling ports (d)	13 ft (4 m)
Max. distance between 2 air sampling ports (d)	39 ft (12 m)
Max. number of air sampling ports (n) per pipe system	10 no.

Air sampling ports

Number of air sampling ports	2	3	4	5	6	7	8	9	10
Air sampling port type Ax-x.x *)									
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	3,00	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

*) Aspiration-reducing film sheet type AF-x.x or AK-x.x

I-pipe system triggering thresholds

Triggering threshold

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

— not possible

O not purposeful

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

5.3.1.2 U-shape pipe system

1 pipe system and 2 pipe systems

Pipe systems

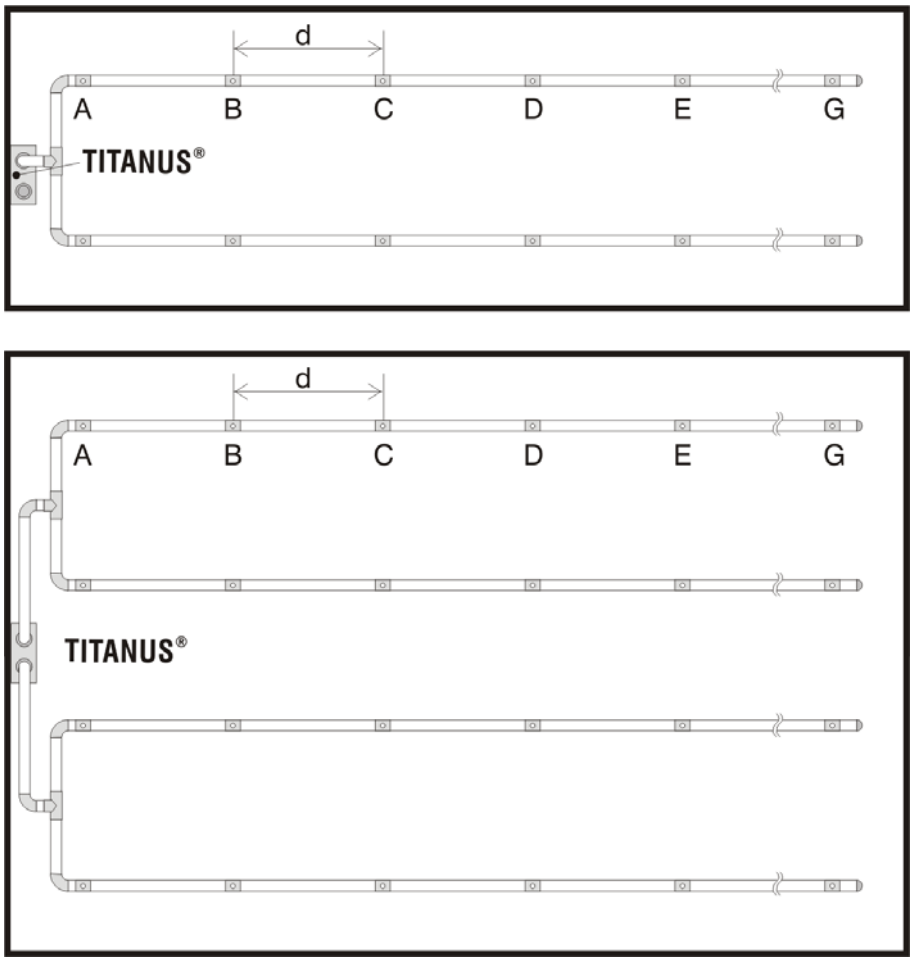


Figure 32: U-shape pipe system for area protection

Limit values

Min. distance from TITANUS® to T-piece	13 ft (4 m)
Max. distance from TITANUS® to T-piece	66 ft (20 m)
Max. Branch length with low fan voltage 6.5 V – 6.9 V with high fan voltage 9 V – 12 V	 131 ft (40 m) 164 ft (50 m)
Max. Overall pipe length per pipe system with low fan voltage 6.5 V – 6.9 V with high fan voltage 9 V – 12 V	 328 ft (100 m) 394 ft (120 m)
Min. Distance between 2 air sampling ports (d)	13 ft (4 m)
Max. Distance between 2 air sampling ports (d)	39 ft (12 m)
Max. number of air sampling ports (n) per pipe system	14 no.

Air sampling ports

Number of air sampling ports	2	4	6	8	10	12	14
Air sampling port type Ax-x.x *)							
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

*) Aspiration-reducing film sheet type AF-x.x or AK-x.x

U-pipe system triggering thresholds

Triggering threshold

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

— not possible

O not purposeful

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

5.3.1.3 M-pipe system

1 pipe system and 2 pipe systems

Pipe systems

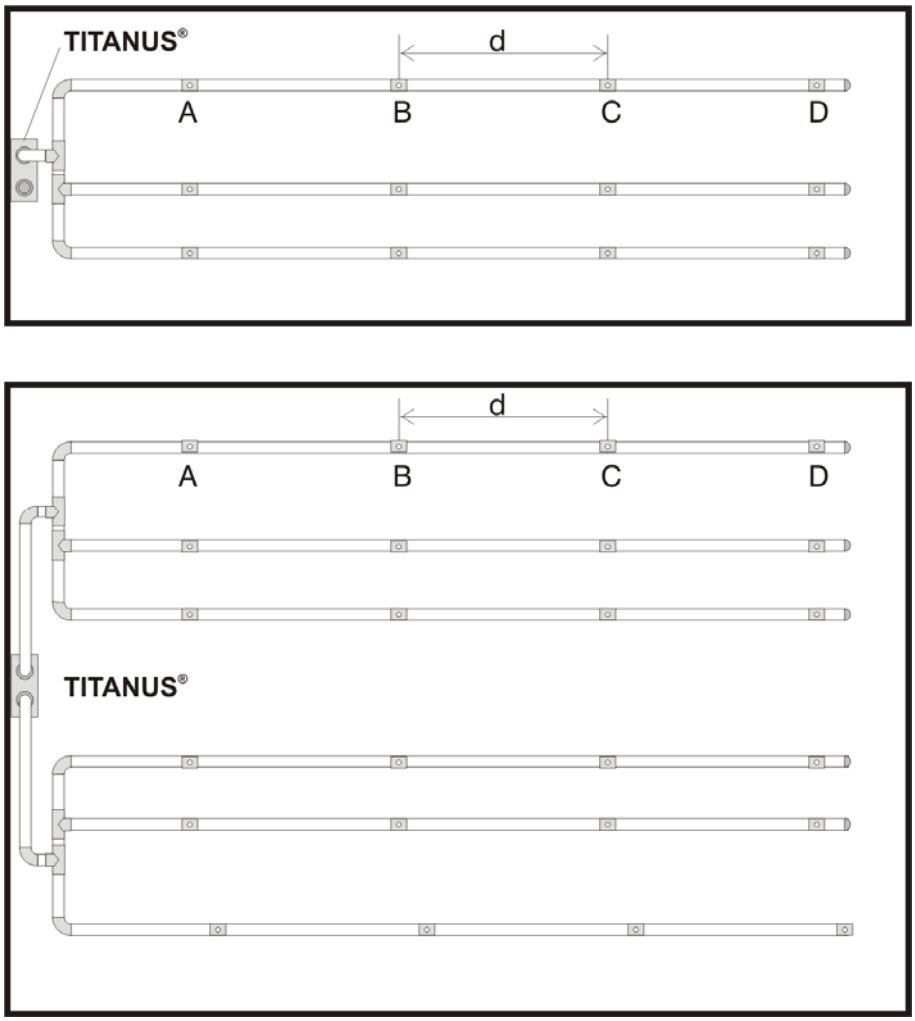


Figure 33: M-shape pipe system for area protection

Limit values

Min. distance from TITANUS® to T-piece	13 ft (4 m)
Max. distance from TITANUS® to T-piece	66 ft (20 m)
Max. Branch length with low fan voltage 6.5 V – 6.9 V with high fan voltage 9 V – 12 V	 98 ft (30 m) 131 ft (40 m)
Max. Overall pipe length per pipe system with low fan voltage 6.5 V – 6.9 V with high fan voltage 9 V – 12 V	 361 ft (110 m) 459 ft (140 m)
Min. Distance between 2 air sampling ports (d)	13 ft (4 m)
Max. Distance between 2 air sampling ports (d)	39 ft (12 m)
Max. number of air sampling ports (n) per pipe system	12 no.

Air sampling ports

Number of air sampling ports	2	6	9	12
Air sampling port type Ax-x.x *)				
A	4,4	3,4	3,0	2,5
B	-	3,6	3,0	2,5
C	-	-	3,2	3,2
D	-	-	-	3,2

*) Aspiration-reducing film sheet type AF-x.x or AK-x.x

M-pipe system triggering thresholds

Triggering threshold

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

— not possible

O not purposeful

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

5.3.1.4 Double U-pipe system

1 pipe system and 2 pipe systems

Pipe systems

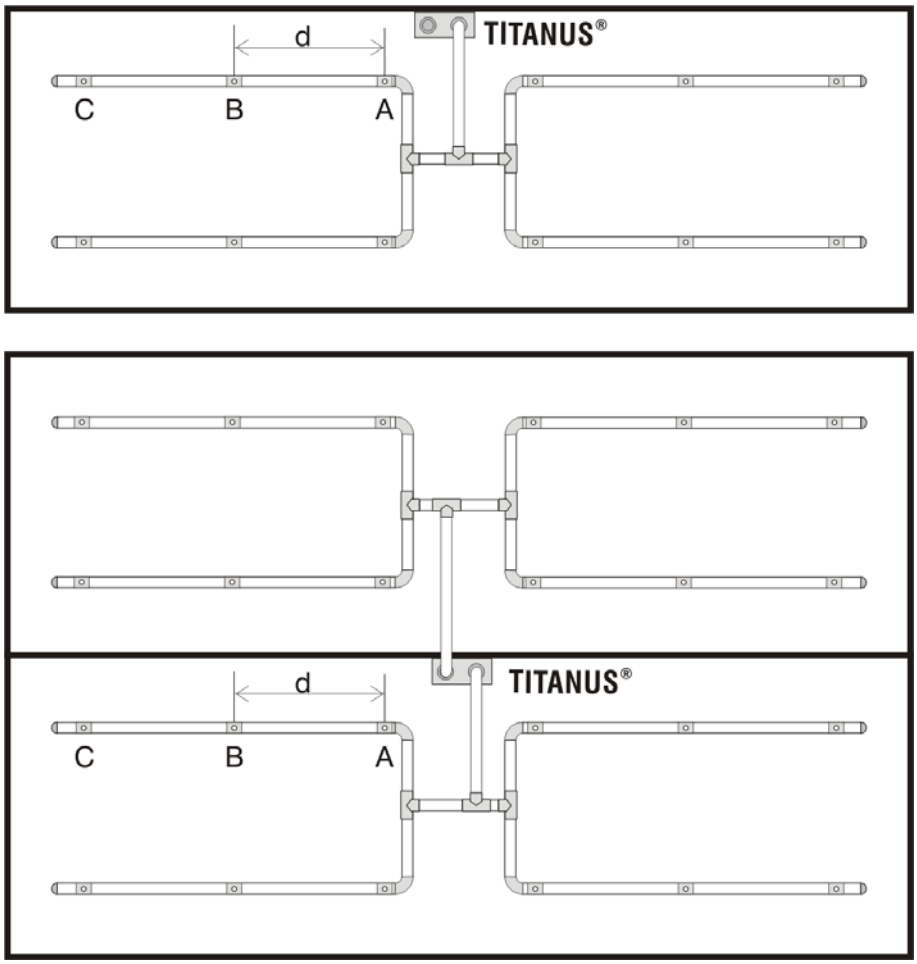


Figure 34: Double U pipe system for area protection

Limit values

Min. distance from TITANUS® to T-piece	13 ft (4 m)
Max. distance from TITANUS® to T-piece	66 ft (20 m)
Max. Branch length with low fan voltage 6.5 V – 6.9 V with high fan voltage 9 V – 12 V	 66 ft (20 m) 98 ft (30 m)
Max. Overall pipe length per pipe system with low fan voltage 6.5 V – 6.9 V with high fan voltage 9 V – 12 V	 328 ft (100 m) 459 ft (140 m)
Min. Distance between 2 air sampling ports (d)	13 ft (4 m)
Max. Distance between 2 air sampling ports (d)	39 ft (12 m)
Max. number of air sampling ports (n) per pipe system	12 no.

Air sampling ports

Number of air sampling ports	4	8	12
Air sampling port type Ax-x.x *)			
A	4,0	3,0	2,5
B	-	3,4	3,0
C	-	-	3,0

*) Aspiration-reducing film sheet type AF-x.x or AK-x.x

Double U-pipe system triggering thresholds

Triggering threshold

Number of air sampling ports	4	8	12
1 blocked air sampling port	**I**	—	—
2 blocked air sampling ports	**II**	**I**	—
3 blocked air sampling ports	O	**II**	**I**
4 blocked air sampling ports	O	**III**	**II**
5 blocked air sampling ports	O	O	**III**
6 blocked air sampling ports	O	O	**III**
… has/have been detected at setting level x			

— not possible

O not purposeful

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

5.3.2 Simplified pipe project planning

Simplified project planning is used for equipment protection and in rooms with small dimensions. The advantage in this project planning is the uniform diameters of the air sampling ports.
The specifications according to Chapter “Pipe planning” are still valid for the project planning. The following limit values and air sampling port diameters shall be used. Additional accessories (air filters, condensation separators, etc.) could influence the maximum pipe length.

5.3.2.1 I-pipe system

1 pipe system and 2 pipe systems

Pipe systems

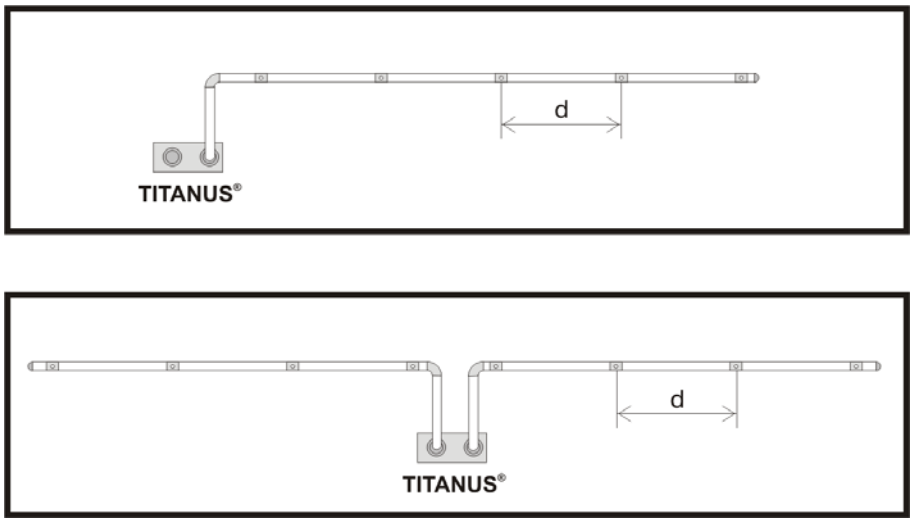


Figure 35: I-pipe system, such as for equipment protection

Limit values

Min. distance from TITANUS® to 1st air sampling port	6'7" (2 m)
Max. distance from TITANUS® to 1st air sampling port	66 ft (20 m)
Max. distance from the 1st air sampling port to the last air sampling port	66 ft (20 m)
Max. overall pipe length Ø 25 mm	131 ft (40 m)
Max. number of air sampling ports (n) per pipe system	18 no.
Minimum distance between air sampling ports (d)	4 in (0.1 m)
Maximum distance between air sampling ports (d)	13 ft (4 m)

Air sampling ports

Number of air sampling ports	2	3	4	5	6	7	8	9	10
Air sampling port type Ax-x.x *)	6,0	5,0	4,4	4,0	3,6	3,4	3,2	3,0	3,0

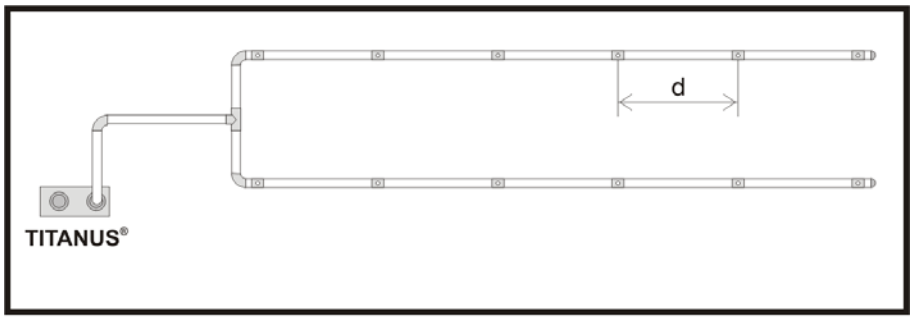
Number of air sampling ports	11	12	13	14	15	16	17	18
Air sampling port type Ax-x.x *)	3,0	3,0	2,5	2,5	2,5	2,5	2,5	2,5

*) Aspiration-reducing film sheet type AF-x.x or AK-x.x

5.3.2.2 U-pipe system

1 pipe system and 2 pipe systems

Pipe systems



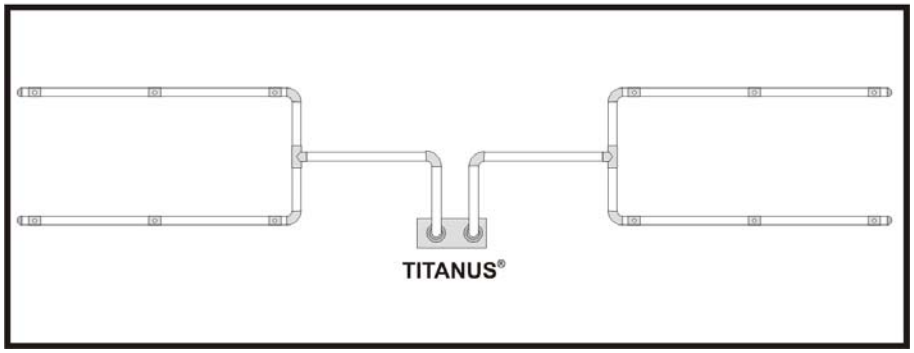


Figure 36: U-pipe system, e.g. for equipment protection

Limit values

Min. distance from TITANUS® to T-piece	6'7" (2 m)
Max. distance from TITANUS® to T-piece	66 ft (20 m)
Max. branch length	66 ft (20 m)
Max. overall pipe length Ø 25 mm	197 ft (60 m)
Max. number of air sampling ports (n) per pipe system	18 no.
Minimum distance between air sampling ports (d)	4 in (0.1 m)
Maximum gap between air sampling ports (d)	13 ft (4 m)

Air sampling ports

Number of air sampling ports	2	4	6	8	10	12	14	16	18
Air sampling port type Ax-x.x *)	6,0	4,4	3,6	3,2	3,0	3,0	2,5	2,5	2,5

*) Aspiration-reducing film sheet type AF-x.x or AK-x.x

5.3.2.3 M-pipe system

1 pipe system and 2 pipe systems

Pipe systems

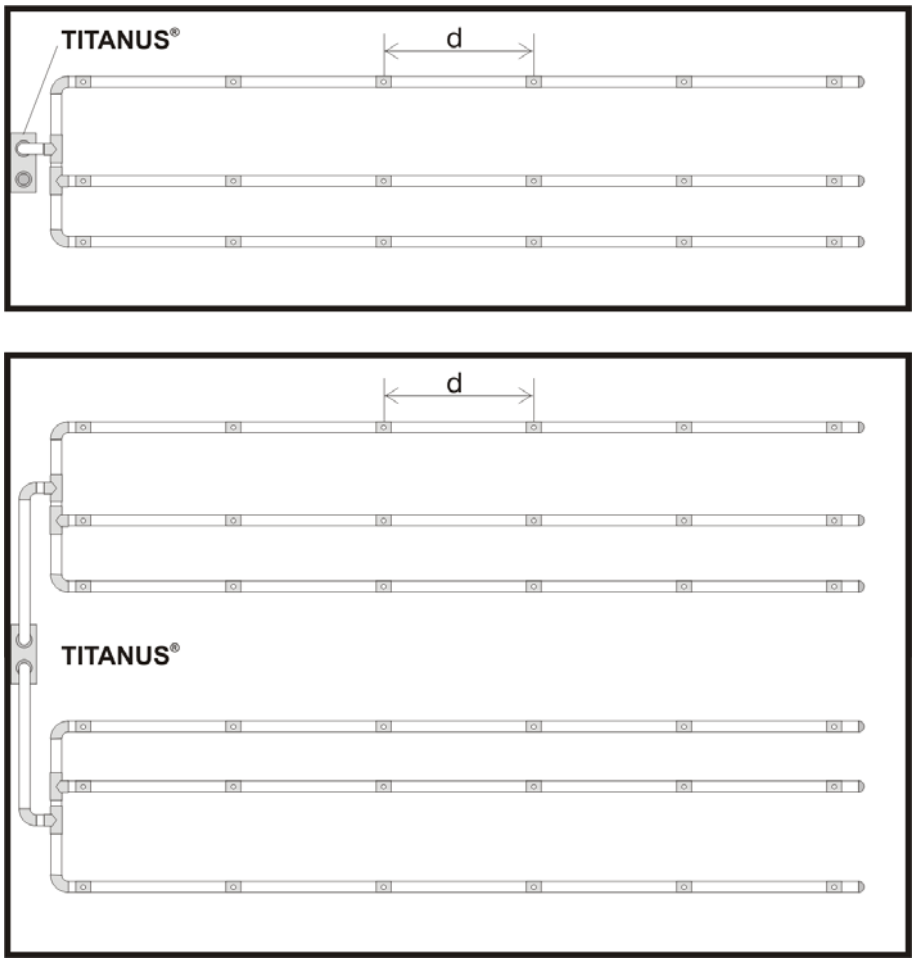


Figure 37: M-pipe system, such as for equipment protection

Limit values

Min. distance from TITANUS® to last T-piece	6'7" (2 m)
Max. distance from TITANUS® to last T-piece	66 ft (20 m)
Max. branch length	66 ft (20 m)
Max. overall pipe length Ø 25 mm	262 ft (80 m)
Max. number of air sampling ports (n) per pipe system	18 no.
Min. distance between 2 air sampling ports (d)	4 in (0.1 m)
Max. distance between 2 air sampling ports (d)	13 ft (4 m)

Air sampling ports

Number of air sampling ports	3	6	9	12	15	18
Air sampling port type Ax-x.x *)	5,0	3,6	3,0	3,0	2,5	2,5

*) Aspiration-reducing film sheet type AF-x.x or AK-x.x

5.3.2.4 Double U-pipe system

1 pipe system and 2 pipe systems

Pipe systems

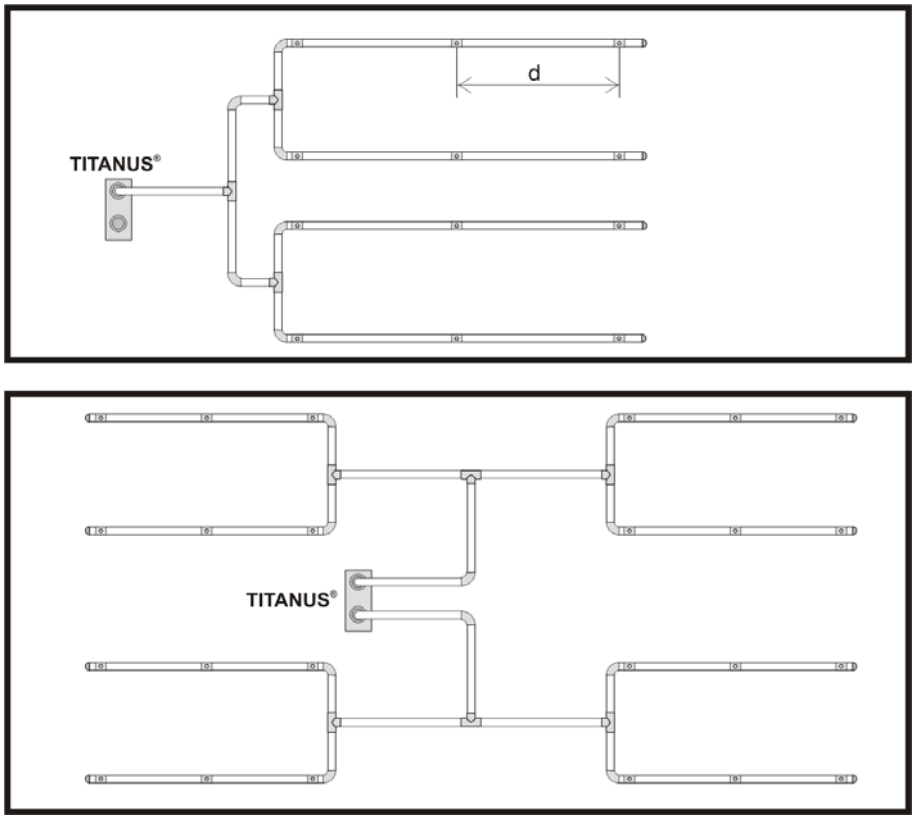


Figure 38: Double U-pipe system, e.g. for equipment protection

Limit values

Min. distance from TITANUS® to last T-piece	6'7" (2 m)
Max. distance from TITANUS® to last T-piece	66 ft (20 m)
Max. branch length	66 ft (20 m)
Max. overall pipe length Ø 25 mm	328 ft (100 m)
Max. number of air sampling ports (n) per pipe system	20 no.
Minimum distance between air sampling ports (d)	4 in (0.1 m)m
Maximum gap between air sampling ports (d)	13 ft (4 m)

Air sampling ports

Number of air sampling ports	4	8	12	16	20
Air sampling port type Ax-x.x *)	4,0	3,4	3,0	2,5	2,0

*) Aspiration-reducing film sheet type AF-x.x or AK-x.x

5.3.3 Project planning for forced air flow

Air conditioning duct monitoring

Air conditioners are distinguished between low-speed and high-speed systems (see table below). The specifications provided in this chapter apply **only to low-speed systems**. There are not enough empirical values available for high-speed systems. For that reason, smoke tests shall be conducted with air conditioning ducts having flow rates higher than 33 ft/s (10 m/s).

	Low-speed systems	High-speed systems
Flow rate	33 ft/s (10 m/s) maximum	> 33 ft/s (10 m/s)
Duct cross section	Large	Small
Pressure differential along the direction of flow	Low	High

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

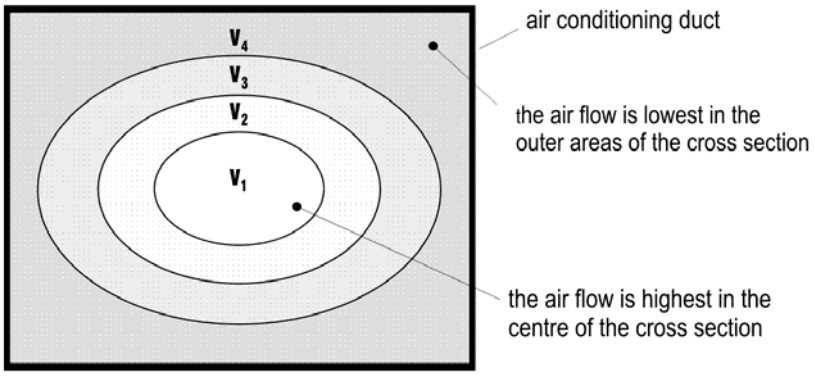


Figure 39: Rate distribution in an air conditioning duct with v1 > v2 > v3 > v4

Sampling

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

Installation location of the pipe system

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

If it is absolutely necessary to attach the pipe system directly behind baffles, sound suppressers or angles, the main flow speed areas will have to be monitored.

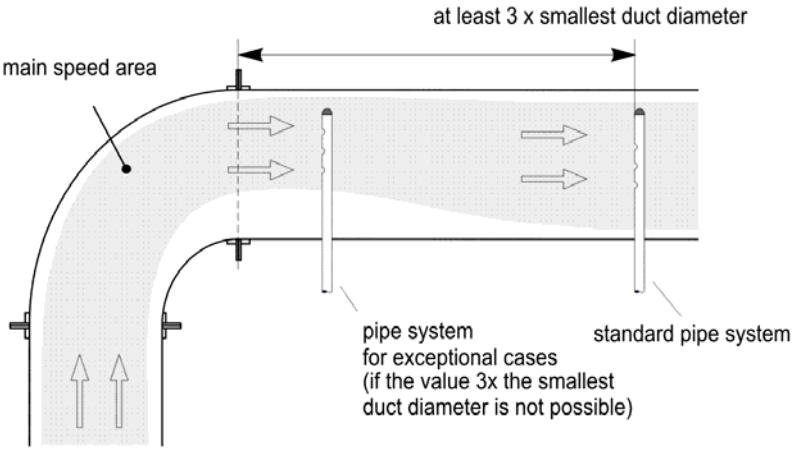


Figure 40: Change in direction of a duct without baffles

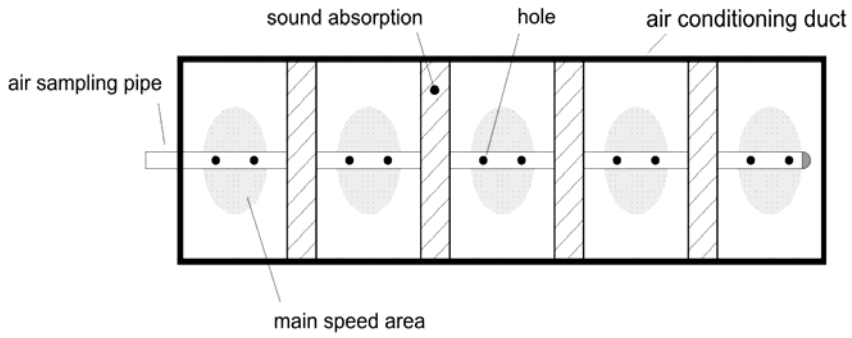


Figure 41: Sound suppressors in a duct

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

- Air recirculation (see following page) shall be planned for, if the TITANUS® 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.

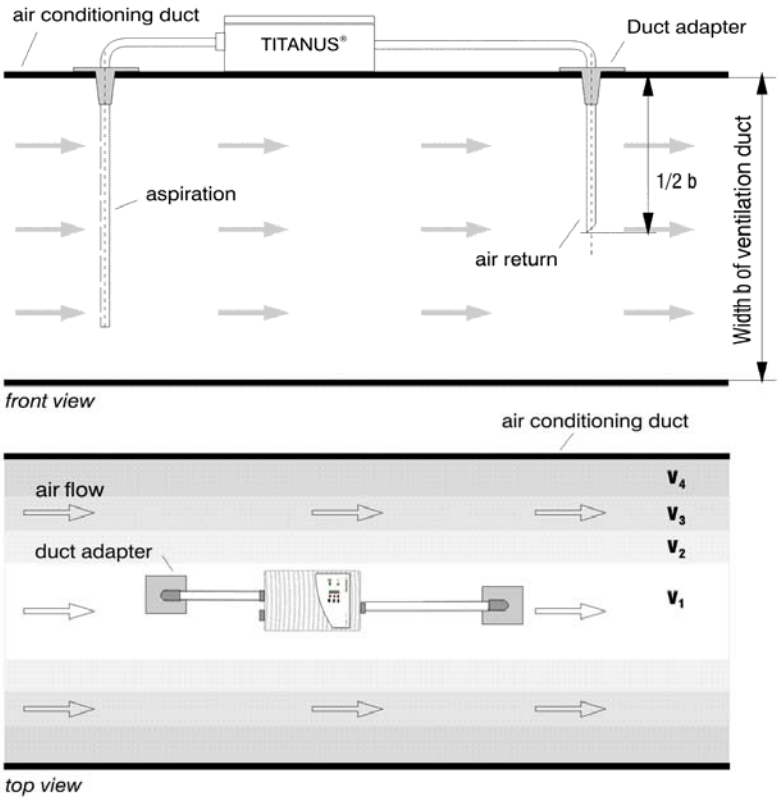


Figure 42: Air recirculation

Air recirculation The air recirculation must take place at a distance of at least 6’7” (2 m) from the sampling. The open end of the air recirculation shall be bevelled at a 45° angle.

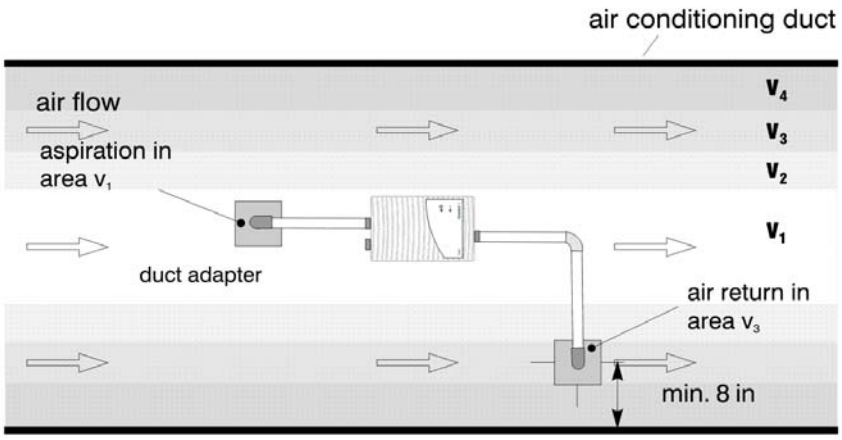


Figure 43: Offset air recirculation reengagement

If a distance of 6’7” (2 m) cannot be maintained, the pipes will have to be arranged in an offset manner. This make makes it possible to achieve a drop of pressure between the intake airs and exhaust air, since the pipes are located in different flow rate areas.

The distances of the air sampling ports to each other and to the wall of the duct are represented in the following table.

Bore distance

	Duct cross section < 5.38 ft² (0.5 m ²)	**Duct cross section > 5.38 ft² (0.5 m²)**
Distance from air sampling ports to wall	4 in to 8 in (100 to 200 mm)	8 in to 12 in (200 to 300 mm)
Distance of air sampling ports to one another	4 in (100 mm)	6 in (150 mm)

Air sampling port diameter

The diameter of the air sampling port results from the number of air sampling ports. The precise value can be found in Chapter "Simplified pipeline project planning”.

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

Arrangement

The air sampling ports shall be aligned against the air flow.

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

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

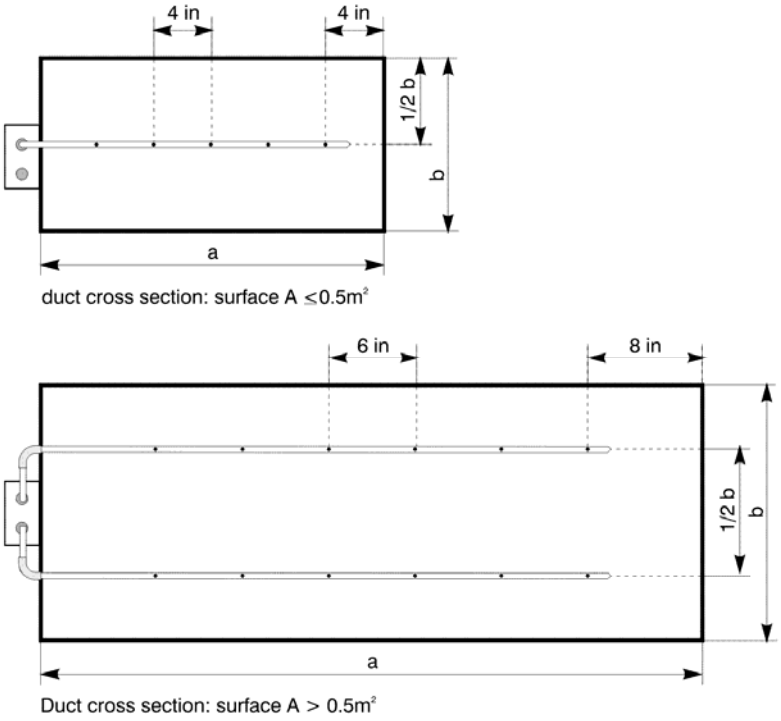


Figure 44: Ducts with small and large duct cross-section

5.4 Power supply

For dimensioning of the power supply the normal operation mode and the alarm mode needs to be considered. In addition the charging of the emergency power batteries has to be respected (80% load in 24 hours).

The following formulas apply in the event of an alarm:

Power calculation

The following formulae apply in case of alarm:

Room protection

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

Equipment protection

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

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

Charging current

$$I_{charging} \approx \frac{0{,}8 \cdot K_{nominal}}{24}$$

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

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

⚠WARNING

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

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

Line calculation

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

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

Lmax	=	*maximum length of line in [ft] ([m])*
A	=	*cable cross section in [in²] ([mm²])*
Itotal	=	*Total current of the aspiration smoke detection system in [A]*
γ	=	*conductivity: Cu= 120650 ft/Win²) (57m/Wmm²)*
ΔU	=	*Max. line drop on the feed*

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

- M 25 - cable feed through: ∅ 11/32” to 35/64” (9 to 14 mm)
- M 20 - cable feed through: ∅ 5/16” to 15/32” (8 to 12 mm)

Emergency Supply Calculation

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

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

$K_{nominal}$	=	*nominal capacity of the emergency supply accumulators [Ah]*
t	=	*required bridging time [h]*

The factor 1.25 of the equation is only relevant in case of a bridging time of 24 hours or less.

⚠WARNING

FM Approved Applications!

The product must be powered by FM approved power supplies only.

6 Installation

6.1 General

The user must comply with all regulations, guidelines and provisions described in Section "Design".

In addition, the user must note the following when installing the TITANUS®:

1. adjustments, changes, modifications and alterations may be undertaken only with the advance written consent of the manufacturer. Wagner bears no liability for injury or damage resulting from any adjustments, changes, modifications or alterations
2. any changes in the supply network (120 V/400 V supply) and external supply systems must be carried out by the system owner. This includes e.g.:
   - the primary connection of the supply units
   - any connections to external systems (e.g. central units)
   - planning of possible additional lightning protection and voltage surge protection, which conform to local standards

6.2 Opening the TITANUS® air sampling system

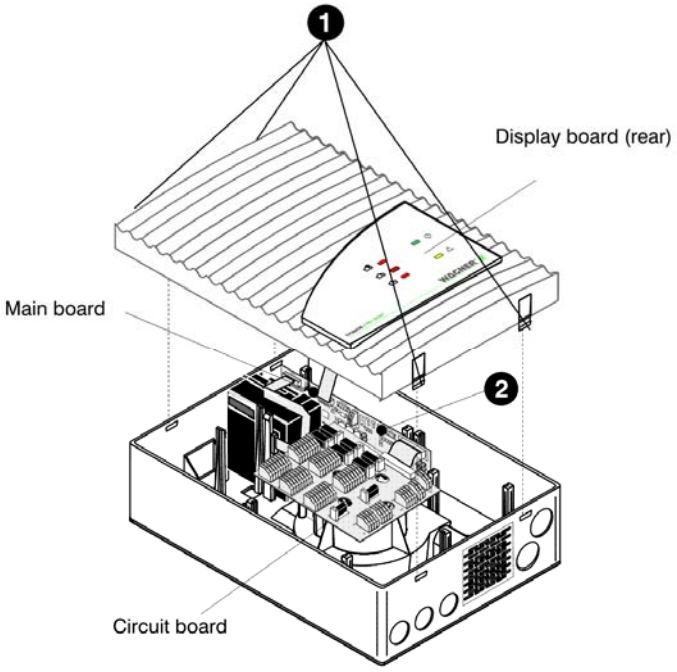


Figure 45: Opening the TITANUS® air sampling smoke detection system

⚠WARNING

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

To open TITANUS® follow the steps below:

1. Using a screwdriver carefully unlocks the snap-in closures of the housing by simultaneously pressing in both clips located on one side of the housing lid. Lift the lid carefully.
2. Pull the display board cable off the main board. Remove the lid.

6.3 Settings

6.3.1 Detector module

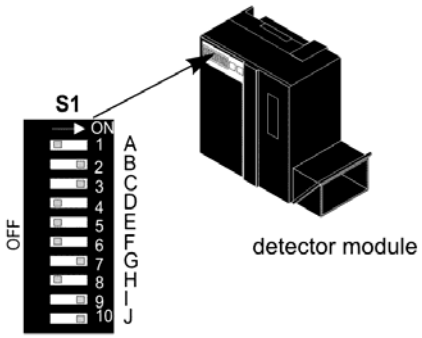


Figure 46: Default settings on the TITANUS® detector module

6.3.1.1 Setting of response sensitivity

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

Detector module DM-TT-50 L	Detector module DM-TT-10 L	Detector module DM-TT-01 L	Switch S1 Contact 1	Switch S1 Contact 2
	0.244 %/ft (0,8 %/m)	0.037 %/ft (0,12 %/m)	on	on
	0.122 %/ft (0,4 %/m) (default)	**0.018 %/ft (0,06 %/m) (default)**	off	on
0.305 %/ft (1 %/m)	0.061 %/ft (0,2 %/m)	0.009 %/ft (0,03 %/m)	on	off
0.152 %/ft (0,5 %/m) (default)	0.03 %/ft (0,1 %/m)	0.005 %/ft (0,015 %/m)	off	off

6.3.1.2 Delay period of alarm activation

The delay period for the alarm thresholds can be set via the switch S1 (3, 4). The default setting is 10 seconds. The delay period begins when the smoke level reaches the alarm threshold. The alarm signal is transmitted when the alarm signal remains activated after the 10 second delay. This procedure will help to eliminate false alarms from briefly occurring interferences.

Alarm Delay Period	Switch S1 Contact 3	Switch S1 Contact 3
0 seconds	off	off
10 seconds (default)	**on**	**off**
30 seconds	off	on
60 seconds	on	on

TIP

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

6.3.1.3 Activating threshold for air flow monitoring

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

Level	Activating threshold	Switch S1 Contact 5	Switch S1 Contact 6
I	low	on	off
II	**medium (default)**	**off**	**on**
III	high	off	off
IV	very high	on	on

Choose the activating threshold according to chapter "Air flow monitoring ".

6.3.1.4 Delay period for air flow fault

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

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

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

6.3.1.5 Fault signal

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

Fault Signal	Switch S1 Contact 9
latched (default)	**on**
no latched	off

6.3.1.6 LOGIC·*SENS*

The sophisticated signal processing LOGIC·*SENS*, is activated or deactivated via switch S1, contact 10. When signal processing is switched on, LOGIC·*SENS* recognises faults and thus helps to avoid false alarms.

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

6.3.1.7 Setting of fan voltage

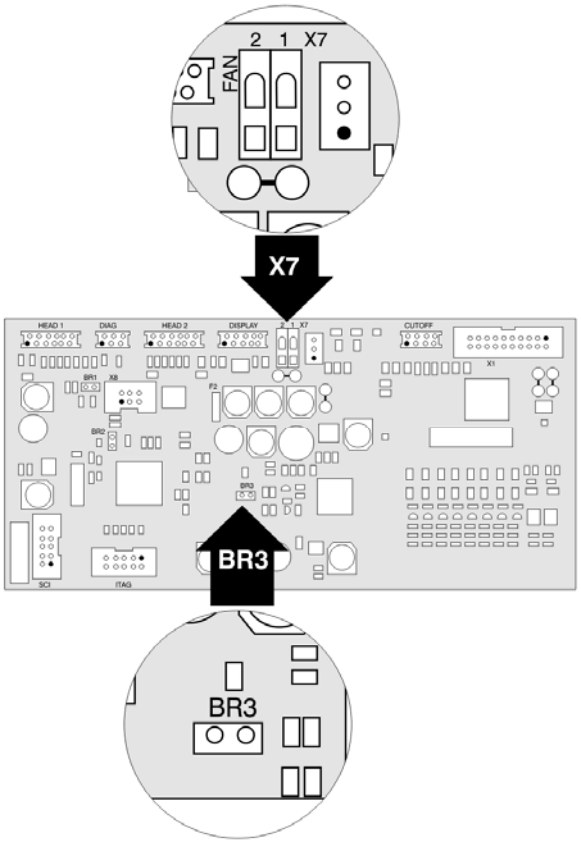


Figure 47: Changing fan voltage on the main board

The default setting of the fan voltage is 6.9 V. In critical areas the fan voltage can be switched from 6.9 V to 9 V by removing

the jumper BR3 – this increases the transport speed in the pipe system and ensures earlier detection in longer pipes.

⚠WARNING

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

6.3.1.8 Connecting the fan

The electrical connection of the fan is made via terminal block X7 (FAN) on the main board (see figure: Main board) of TITANUS®.

- Connect the red connecting lead of the fan with terminal block X7 / clip 1 (+).
- Connect the black connecting lead of the fan with terminal block X7 / clip 2 (-).

⚠WARNING

TITANUS® is delivered with the fan connected.

6.3.1.9 TITANUS®-SL: Fan voltage setting

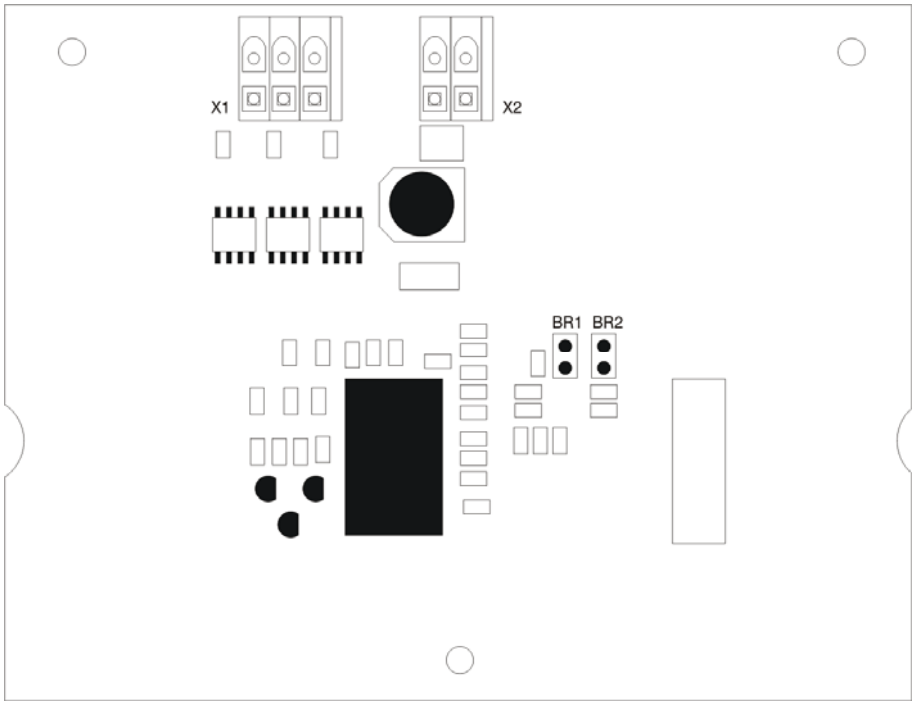


Figure 48: Changing the fan voltage and fan connection terminal board on the FC-2 or FC-3 fan control circuit board

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

The symbols used mean:

X = pin pair bridge O = pin pair open

The default settings have a grey background.

Setting of fan voltage FC-2	Bridge Pin-No. BR1, 1+2	Bridge Pin-No. BR2, 1+2
6,5 V	O	X
6,9 V (default)	X	O
9 V	O	O

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

⚠WARNING

When using a fan control “FC-x” for TITANUS®-SL devices, he BR 3 bridge on the main board must always be opened.

⚠WARNING

Re-initialise the air flow if you if you change the fan voltage. Only close or open the BR 1 and BR 2 bridges of the “FC-x” when the device is turned off.

6.3.1.10 Connecting the fan TITANUS® -SL

The electrical connection of the fan control circuit board is made via terminal block X7 (FAN) on the main board (see figure: Main board) TITANUS®.

- Connect terminal 1 of terminal board X7 on the main board to terminal 2 (+) of terminal board X2 on the fan control circuit board.
- Connect terminal 2 of terminal board X7 on the main board to terminal 1 (-) of terminal board X2 on the fan control circuit board.
- Connect the fan’s brown connection line to terminal board X1 / terminal 1 of the fan control circuit board.
- Connect the fan’s yellow connection line to terminal board X1 / terminal 2 of the fan control circuit board.

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

⚠WARNING

TITANUS® is delivered with the fan is connected.

6.4 Mounting Instructions

6.4.1 Installation of TITANUS® air sampling smoke detection system

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

⚠WARNING

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

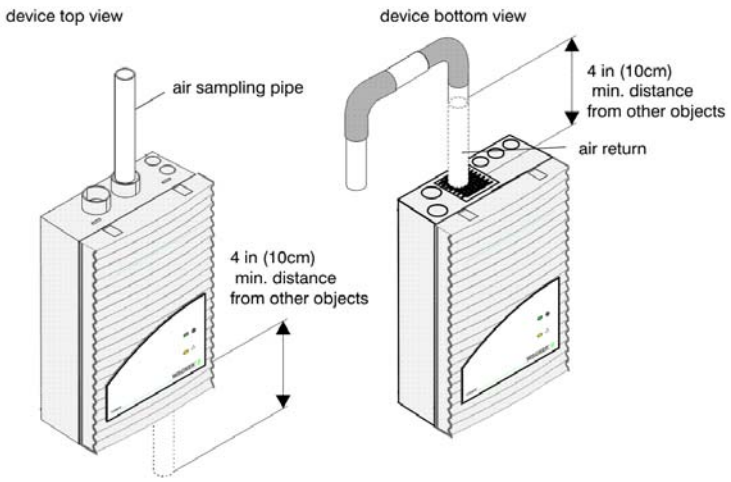


Figure 49: Installation of TITANUS®

Make sure the air outlet of the system is not blocked. The distance between the air outlet of TITANUS® and adjacent objects (e.g. wall) must be at least 4” (10 cm).

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

Aspiration downward

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

Installation Material

TITANUS®	Cylinder of flat head screws – thread diameter: max. 15/64” (6 mm) – head diameter: max. 25/64” (10 mm)
Support (Type MT-1)	Cylinder or flat head screws – thread diameter: 5/32” (4 mm) washer – diameter: : 23/64” (9 mm) – hole diameter: 11/64” (4.3 mm)

Spacing of boreholes

The spaces between boreholes are given below (all dimensions in inch (mm)).

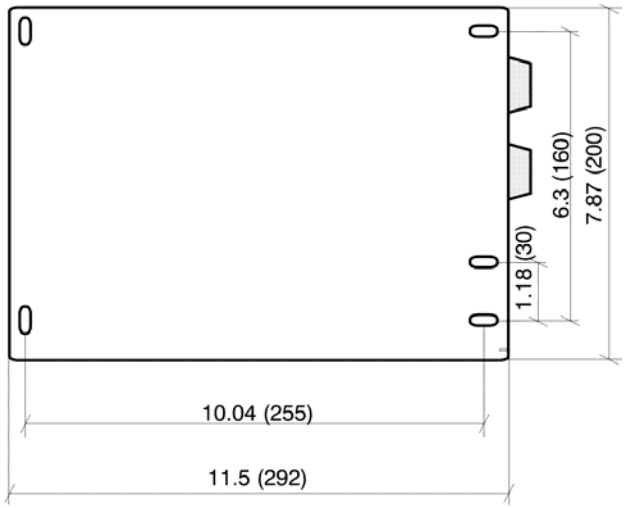


Figure 50: Borehole spaces of TITANUS® without support

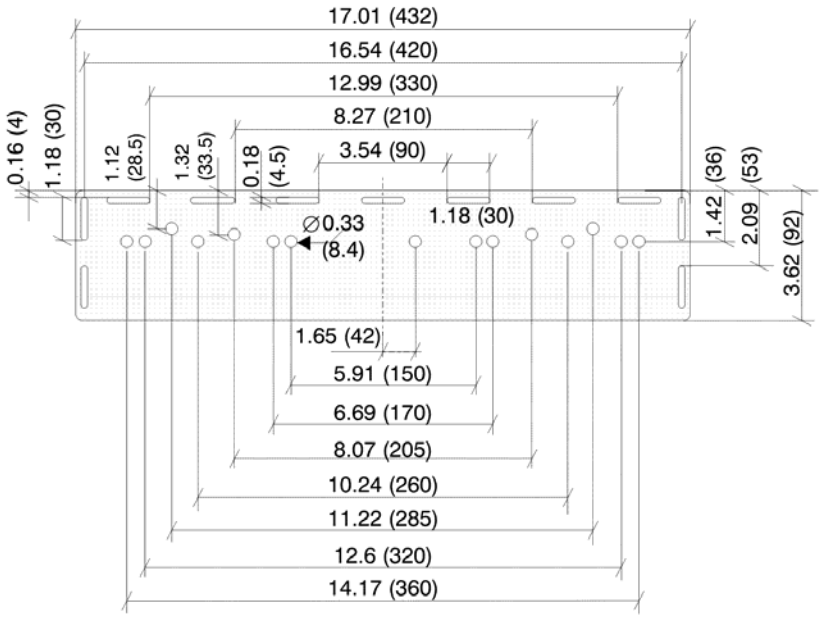


Figure 51: Borehole spaces of the support type MT-1

6.4.2 Connection of air sampling pipe

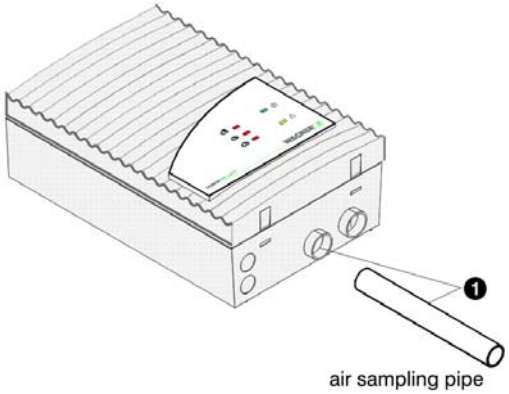


Figure 52: Connection of air sampling pipe to the TITANUS® system

Connection of air sampling pipe

1. To connect the air sampling pipe to TITANUS® attach the pipe to the corresponding connection (see figure: "Connection of air sampling pipe").
2. For connecting pipe accessories to 1” pipe systems please use the pipe adapter type A-25-3/4.

⚠WARNING

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

6.5 Electrical connection

To prepare the electrical connections follow the steps below:

1. Break through the required cable entries, e.g. with a screwdriver.
2. Attach the plastic connection pieces M 20 or M 25 to the cable entries.
3. Feed the cables through the corresponding cable entries.

⚠WARNING

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

The electrical connection is made via terminal blocks X1 to X6 and X8 to X12 on the circuit board of TITANUS®. Take into account the valid wire cross sections of the screw joints and wire cross sections of the terminals for max AWG No. 16 (1.5mm²-cores).

⚠WARNING

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

⚠WARNING

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

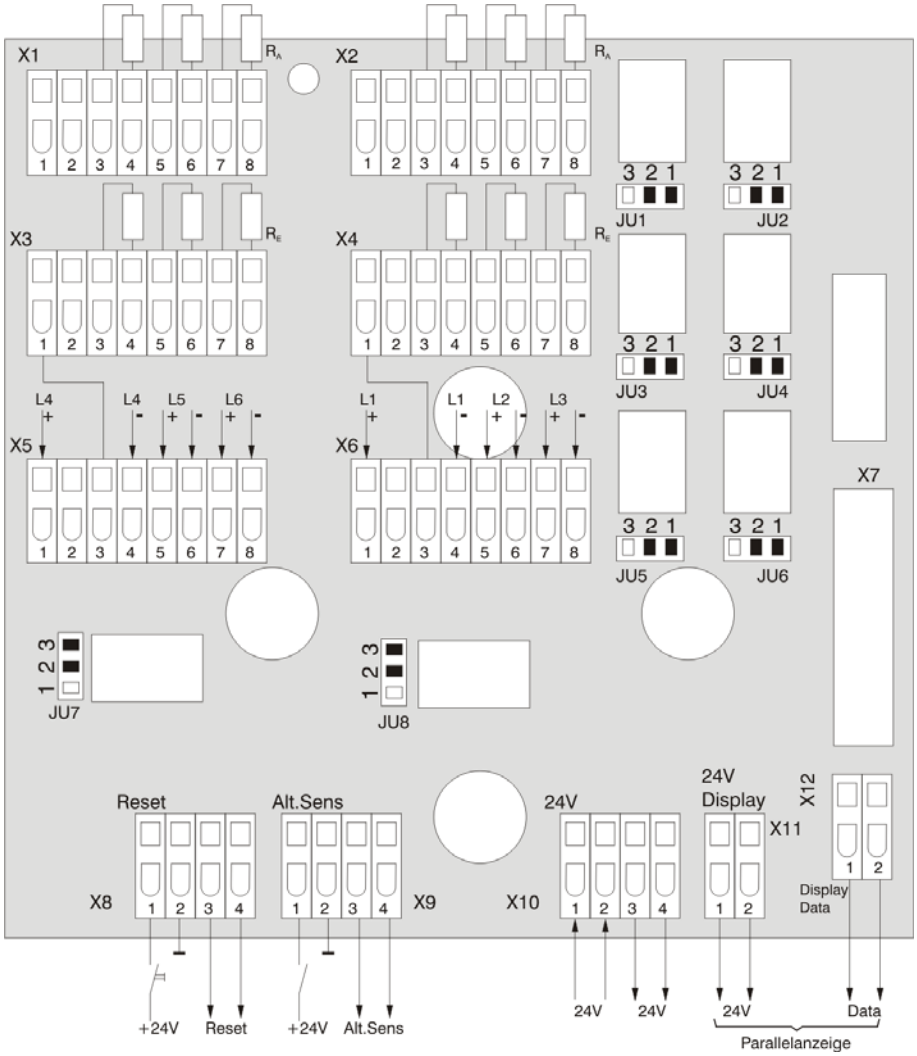


Figure 53: General layout of the circuit board terminal blocks

6.5.1 Connection to Fire Alarm Control Panel, with reset button

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

⚠WARNING

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

Connection to FACP with reset button

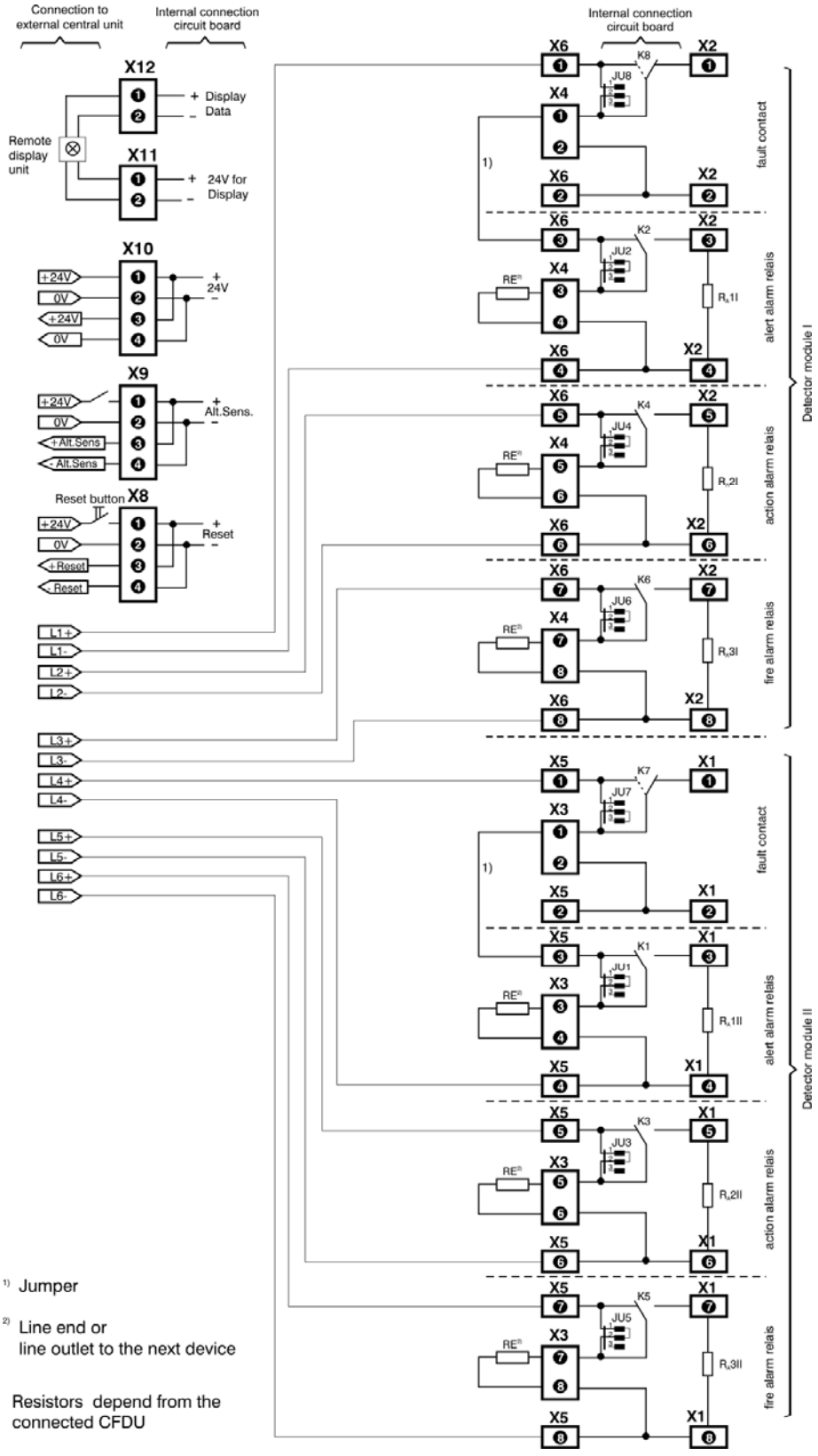


Figure 54: Example of TITANUS® connection to FACP and reset button

6.6 Networking TITANUS®

⚠WARNING

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

⚠WARNING

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

6.6.1 Installing the network module

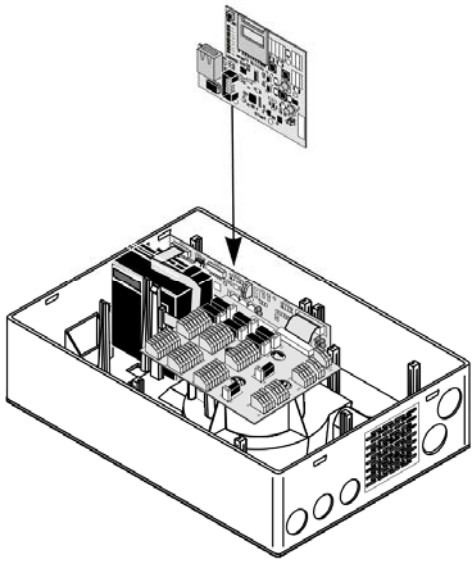


Figure 55: Installation of the TITANUS® network module

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

1. Carefully unlock the housing's quick-release locks with a slotted screwdriver by pressing down simultaneously on both

of the clips on the side of the housing. Then carefully lift up the housing cover. Disconnect the cable from the display board and remove the housing cover.

2. Open the required, pre-stamped cable feeds (max. 8 x M20 and 6 x M25) in the housing. If necessary, use a screwdriver to help.
3. Attach M20 or M25 cable guides to the opened cable feeds. Then press the cable guides into the corresponding opening.
4. For the cabling, route the connection cable(s) (AWG 16 (max. 1.5 mm^2)) through the housing's prepared cable guide(s).
5. Connect the battery and insert the memory card into the network module (only included with types NU-5-D, -DO,-D-F, -DO-F).
6. Connect the network module as indicated in the circuit diagram.

⚠WARNING

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

7. Mount the network module only in the designated position in the TITANUS® housing.
8. Once the network module is successfully installed, reconnect the display board to the main board.
9. Close the housing cover.
10. Reconnect the voltage supply.

6.6.2 Connecting the network module

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

⚠WARNING

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

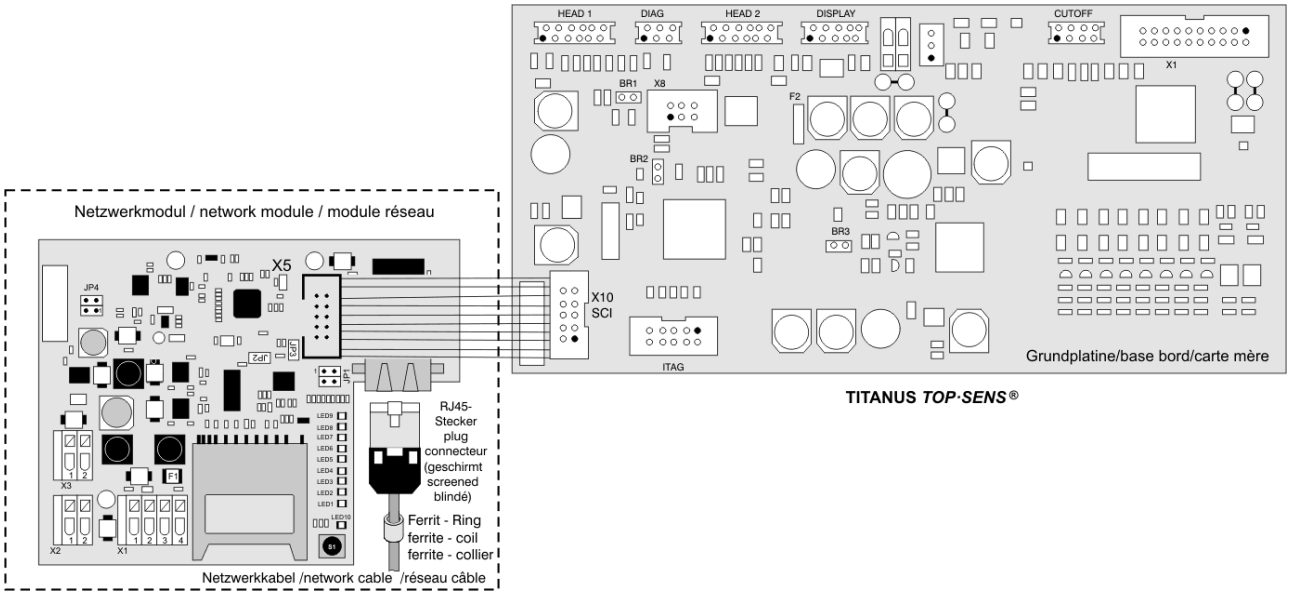


Figure 56: Connecting the TITANUS®

6.7 Installation of second detector module

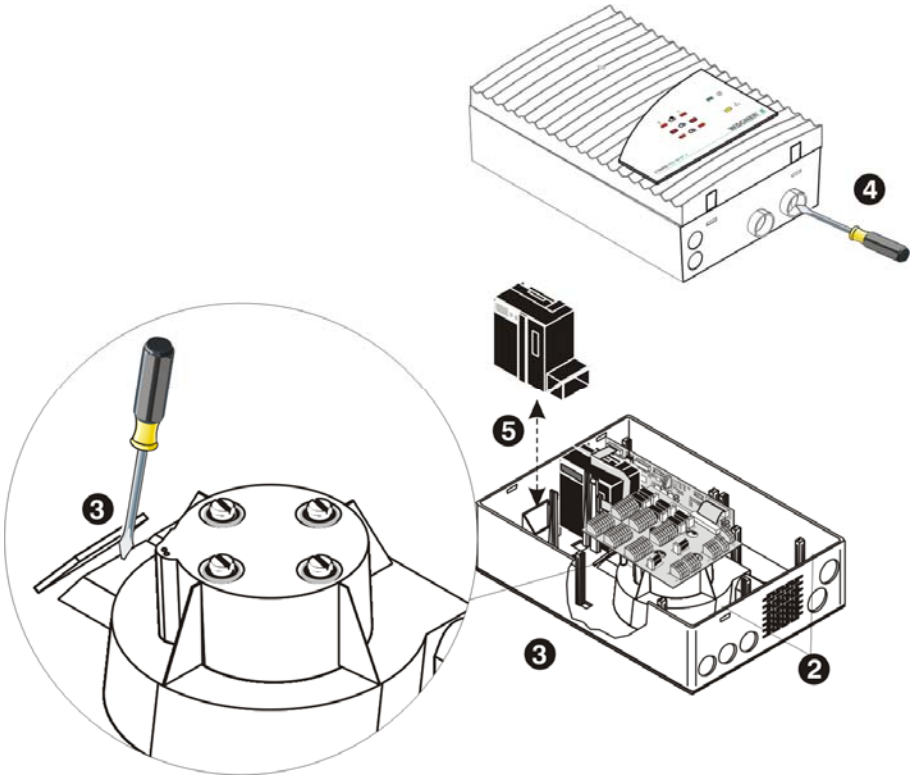


Figure 57: Installation of second detector module

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

the module and snap in audibly. Press both support clamps together.

6. Pull the jumper BR1 across to the base 1de1 board. (see figure below)
7. Connect the detector module to the main board via the ribbon cable. Connection: X2 HEAD 2 (see figure below)

⚠WARNING

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

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

⚠WARNING

When extending to TITANUS® 2 the overlay must be replaced.

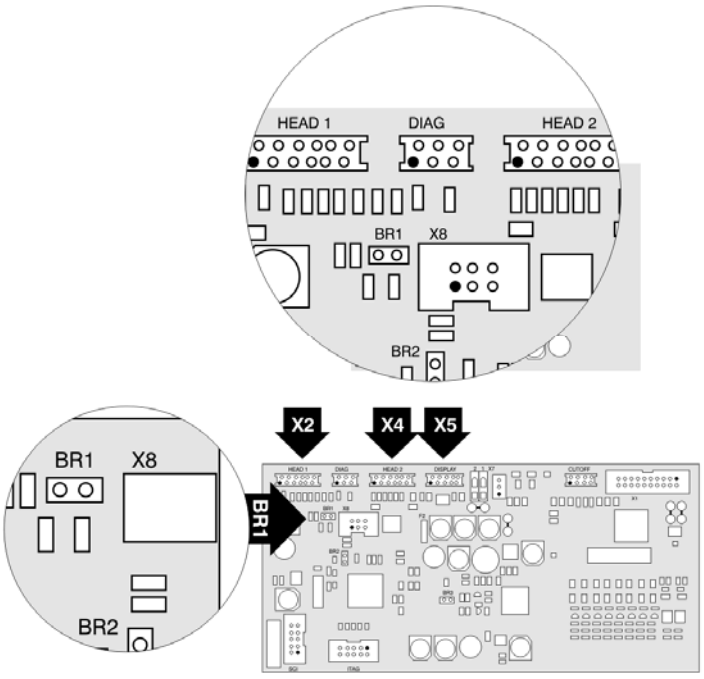


Figure 58: Connections for main board X2, X4, X5 and BR1

6.8 Data-Log

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

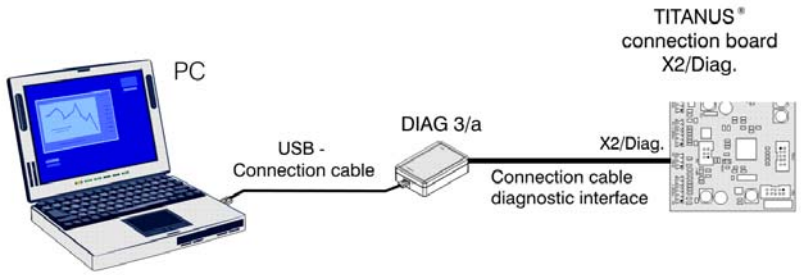


Figure 59: PC connection via the connection diagnostic interface connection cable

TIP

Save and archive the data after commissioning it can be used for later checks of the device settings.

7 Installation - Pipe System

The pipes and fittings used for the pipe system must always meet requirements according to UL1887.

Parameters and values specified in your local codes and standards have precedence over anything suggested in this documentation.

We recommend smooth pipe with 25 mm OD 21.2 m ID or 3/4 NPS schedule 40 system.

⚠WARNING

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

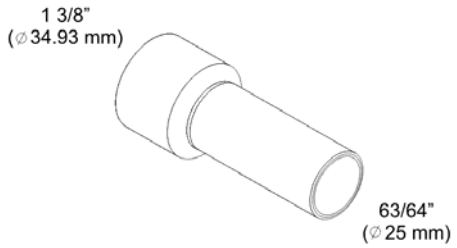


Figure 60: Pipe adapter Type A-25-3/4

Pipe Adapter The pipe adaptor is used to connect NPS pipes to the detectors pipe Inlet manifold. All detectors shipped to U.S.A. have pipe adapters.

7.1 Installation instructions

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

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

⚠WARNING

Use the pipe manufacturer is recommended adhesive for each type of pipe material.

⚠WARNING

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

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

- an arc equals a straight piece of pipe of 4 in (0.3 m)
- an elbow equals a straight piece of pipe of 4'11" (1.5 m)

⚠WARNING

Arcs should be used instead of elbows. If there are too many direction changes, an air flow fault can occur in TITANUS® and detection time can be affected.

4. The pipes must be installed in such a way that they do not sag or move. They are fixed with pipe clips **without** rubber core. The spaces between the pipe clips shall are not exceed 2'7" (80 cm). Reduce the space between clips to max. 12 in (30 cm) if there are high temperature variations.

⚠WARNING

Do not use pipe clips with rubber cores. These clips do not allow elongation and the pipes would sag or crack. Please see chapter "Linear expansion of the pipe system".

5. Close open pipe ends with end caps.

⚠WARNING

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

7.2 Linear expansion of the pipe system

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

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

ΔL	=	*linear expansion in (in (mm))*
L	=	*length of the pipe to be calculated in (ft (m))*
ΔT	=	*maximum temperature difference in (°F (°C))*
δ	=	*length change co-efficient in (in/ft°F (mm/m°C)* *δPVC = 0.000533 in/ft°F (0.08 mm/m°C)* *δABS = 0.000673 in/ft°F (0.101 mm/m°C)* *δCPVC = 0.00466 in/ft°F (0.07 mm/m°C)*

For example, a temperature variation of 5.5° F (10º C) applied to an ABS pipe with a length of 33 ft (10 m) results in an expansion of 1/64” (10.1 mm).

Pipe clips

The first pipe clip close the TITANUS® device shall be a type which does not allow linear movement.
The standard type clip NG23 is used for Ø 63/64” (25 mm) pipe system. This type does not allow linear movement.
For areas with high temperature differences the pipe clip type CLIC-PA should be used.

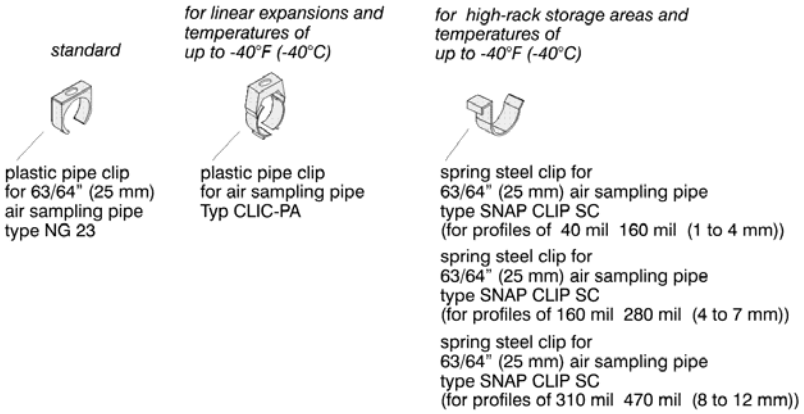


Figure 61: Pipe clips

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

Position 1 (first locking into place)

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

Position 2 (second locking into place)

Fixes the pipe and avoids linear expansions.

Pipe Clips for ø 63/64" (25 mm)	Type
standard pipe clips	pipe clip type NG 23 (ø 63/64" (25 mm))
pipe clips for areas with high temperature differences and cold storage areas	plastic pipe clip Type CLIC-PA (ø 63/64" – 1 3/32" (25 – 28 mm))
pipe clips for cold storage areas and high rack storage areas	spring steel clip, Type SNAP CLIP SC (for profiles (40 mil – 160 mil (1-4 mm)) spring steel clip, Type SNAP CLIP SC (for profiles 160 mil – 280 mil (4-7 mm)) spring steel clip, Type SNAP CLIP SC (for profiles 310 mil – 470 mil (8-12 mm))

7.3 Patented air sampling ports

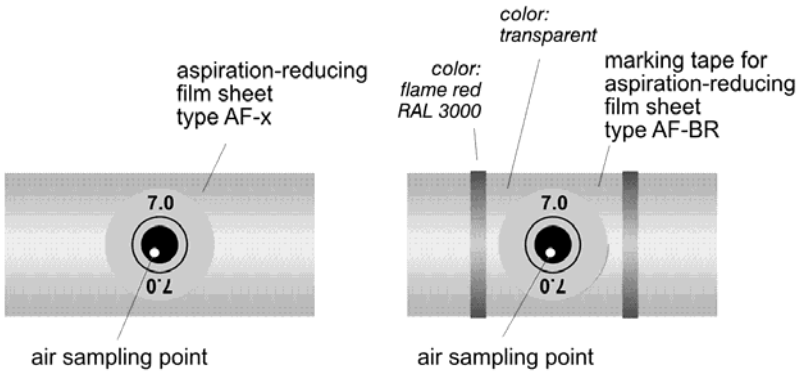


Figure 62: Example of an air sampling point with aspiration-reducing film sheet

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

Air sampling port

1. Bore a hole of 25/64 in (10 mm) at a right angle to the pipe.
2. Carefully deburr the holes.
3. Clean the area around the hole (around the whole pipe) from dirt and grease with cleaning agent.
4. Select the size of the aspiration-reducing film sheet according to the pipe design guidelines.
5. Stick the aspiration-reducing film sheet over the bore hole (see following figure point 1).
6. Prevent the film sheet from coming loose by sticking marking tape over it (see following figure point 2).

⚠WARNING

The perforations in the aspiration-reducing film sheet and the marking tape are to be placed exactly on the hole of the pipe. The diameter of the perforation in the aspiration-reducing film sheet must not be changed.

Avoid touching the adhesive in order to keep it free from dust and grease.

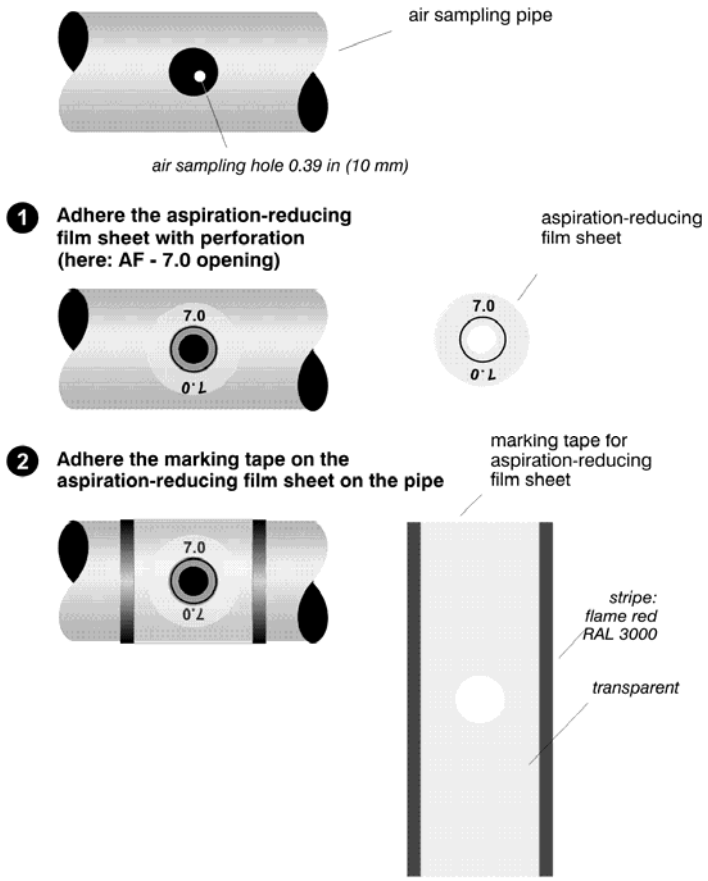


Figure 63: Attaching the aspiration-reducing film sheet

7.4 Ceiling lead through

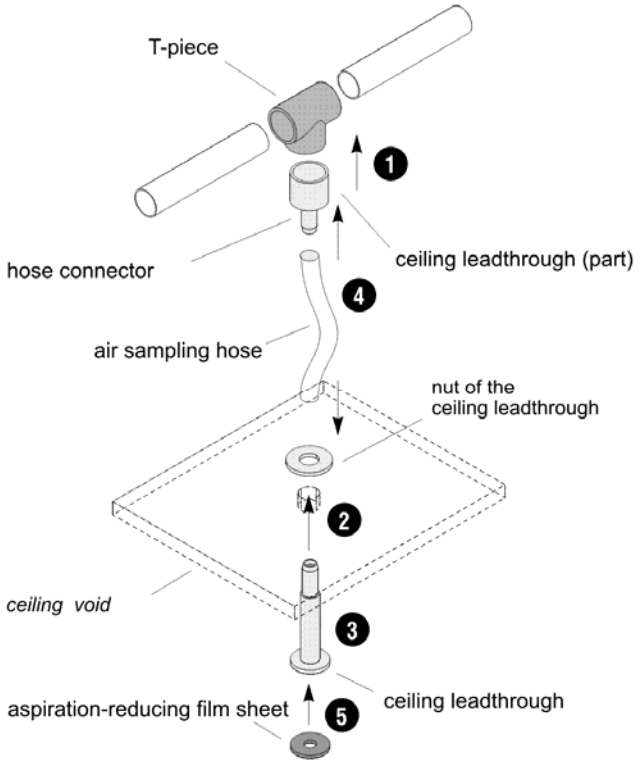


Figure 64: Installation of ceiling feed-through

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

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

the hose connector at the T-piece of the air sampling pipe. If necessary soften the hose ends with a hot air fan.

6. Stick the correct aspiration-reducing film sheet (according to pipe design guidelines) to the ceiling feed-through.
   The aspiration-reducing film sheets are available in two colours. Depending on the colour of the ceiling, either type AFW-x (pure white, RAL 9010) or type AF-x (papyrus white, RAL9018) are used. On request, film sheets in special colours are produced.

⚠WARNING

The perforation in the aspiration-reducing film sheet must be placed exactly over the opening of the ceiling lead-through and the diameter of the hole in the film sheet must not be altered. To keep the adhesive of the film sheet free of dust and grease, avoid any contact.

7.5 Monitoring in forced air areas (high speed ventilation / air conditioning)

7.5.1 Detection at air inlets/outlets

⚠WARNING

If aspiration takes place in a forced air flow system (fan, climatic systems), the air sampling ports must be positioned in the air flow. Place the air sampling ports as shown in following figure.

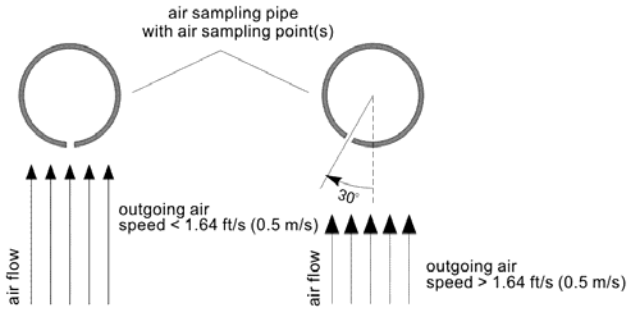


Figure 65: Positioning of air sampling port, depending on air speed

7.5.2 Air duct detection

For connection of air return refer to chapter ”Installation Pipe System / Air Return".

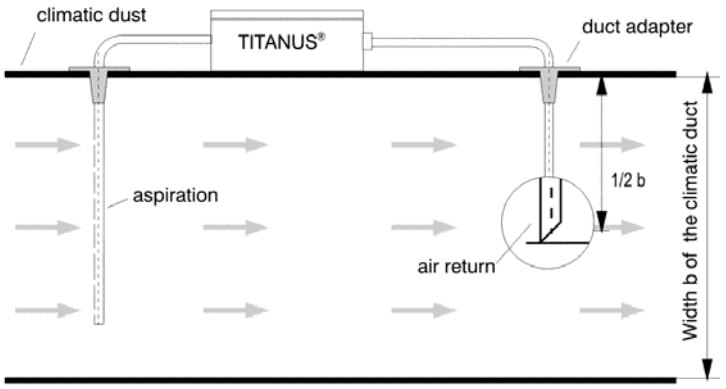


Figure 66: Positioning of air return in an air duct

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

7.6 Filter

7.6.1 Installation of air filter, type LF-AD-x

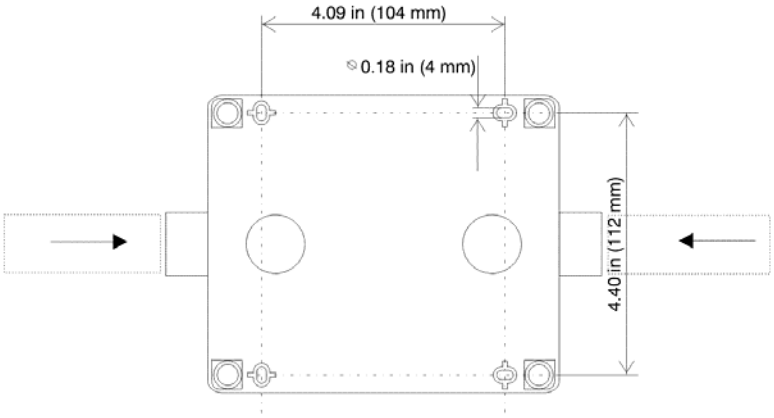


Figure 67: Spacing for bore holes on base of air filter housing

Air filter LF-AD-x

1. To connect to the air sampling pipe with the air filter, insert the air sampling pipe in the provided pipe connectors of the filter.
2. For connecting pipe accessories to 1” pipe systems please use the pipe adapter type A-25-3/4.
3. When installing the filter, ensure that the direction of air flow is shown at the side of the housing’s bottom part.
4. Screw the bottom part of the housing directly to the wall.

⚠WARNING

When severe variations in temperature are expected: never use glue to connect the air sampling pipe and pipe connectors to the detector. Firmly secure the pipe in the area between detector and air filter to avoid elongation. (see chapter Installation - Pipe System „Linear expansion of the pipe system“) of the pipe and therefore possible loss of pipe connectivity (pipe contraction).

Installation Material

Air filter	Cylinder or flat-head screws – thread diameter: max. 5/32” (4 mm) – head diameter: 13/64” to 9/32” (5 to 7 mm)
Adapter (optional)	Type A-25-3/4

7.6.2 Mounting of the special filter type SF-400/650

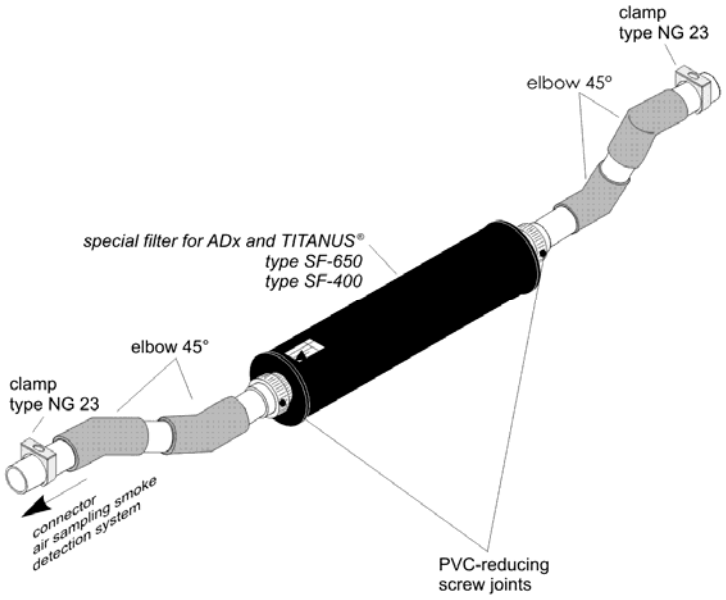


Figure 68: Mounting of the special filter into the pipe system

Special filter SF-x

1. To install or un-install the special filter use the two PVC reducer screw joints at both filter ends.
2. For connecting pipe accessories to 1” pipe systems please use the pipe adapter type A-25-3/4.
3. Glue the reducer couplings into the pipe system.
4. When installing the special filter, note the flow direction shown on the filter housing.
5. Clamp the special filter with a 45º elbow piece to the pipe system.

Installation material

Air filter	PVC or ABS pipe fittings – 45°-elbows
Adapter (optional)	Type A-25-3/4

When using a combination of special filter type SF-x and air filter type LF-AD please install the air filter behind the special filter, viewed from the aspiration system.

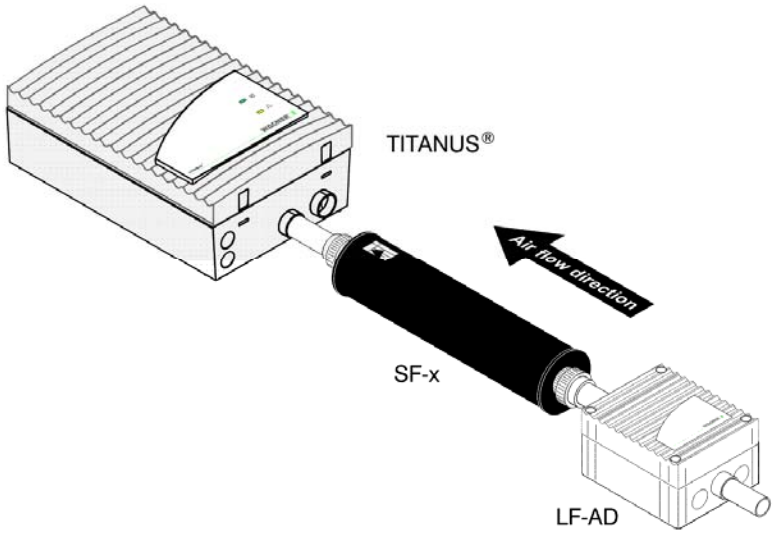


Figure 69: TITANUS® with special filter and LF-AD

To mount the air filter LF-AD, perform the steps of the assembly instructions (see chapter Installation - Pipe System „ Air filter installation, type LF-AD-x“).

7.7 Air return

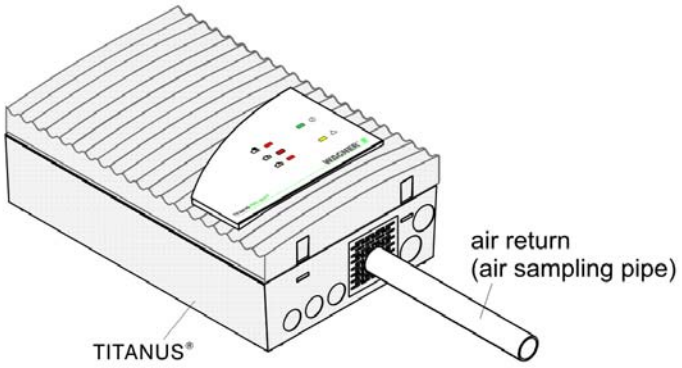


Figure 70: Mounting of the air return

1. Remove the pre-punched pipe lead-through in the protection grid of the air outlet (e.g. with a small side cutter).
2. Pass the air returns through the opened lead-through in the protection grid. Fix it in the pipe collar of the air outlet. As the air return pipe fits exactly into the exit air opening, a tight fit is ensured.
3. For connecting pipe accessories to 1” pipe systems please use the pipe adapter type A-25-3/4.

⚠WARNING

Wide temperature variations make it necessary to firmly secure the air return pipe so that the pipe is not pulled from the pipe connection due to linear expansion (see chapter „Linear expansion of the pipe system“).

7.8 Noise suppressor

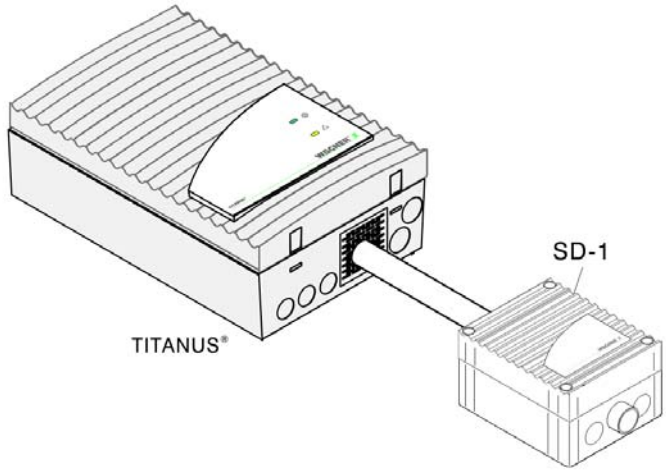


Figure 71: Mounting of noise suppressor

1. Remove the pre-punched pipe lead-through in the protection grid of the air outlet (e.g. with a small side cutter).
2. Pass the pipe (Ø 63/64” (25mm) through the opened lead-through in the protection grid. Fix it in the pipe collar of the air outlet. As the air return pipe fits exactly into the exit air opening, a tight fit is ensured.
3. For connecting pipe accessories to 1” pipe systems please use the pipe adapter type A-25-3/4.
4. In order to connect the aspiration pipe with the noise suppressor please insert the aspiration pipe into the designated pipe connectors of the noise suppressor.
5. For connecting pipe accessories to 1” pipe systems please use the pipe adapter type A-25-3/4.
6. While installing the noise suppressor, ensure that the direction of air flow is shown at the side of the housing’s bottom part.
7. Screw the bottom part of the housing directly to the wall.

⚠WARNING

When severe variations in temperature are expected: never use glue to connect the air sampling pipe and pipe connectors to the detector. Firmly secure the pipe in the area between detector and air filter to avoid elongation. (see chapter Installation - Pipe System „Linear expansion of the pipe system“) of the pipe and therefore possible loss of pipe connectivity (pipe contraction).

Installation material

Noise suppressor	Cylinder or flat-head screws – thread diameter: max. 5/32” (4 mm) – head diameter: 13/64” to 9/32” (5 to 7 mm)
Adapter (optional)	Type A-25-3/4

7.9 3-Way ball valve

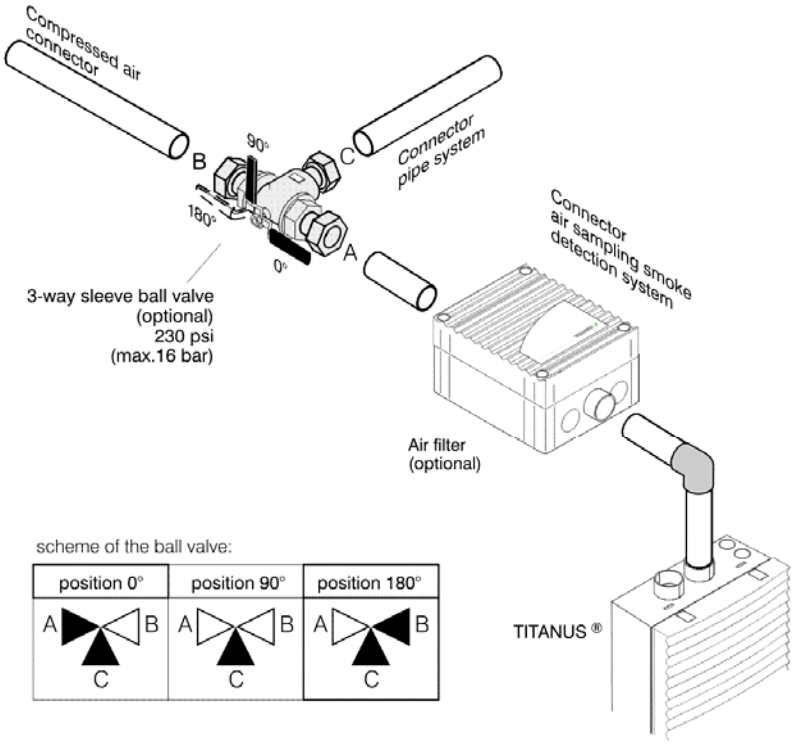


Figure 72: Installation of 3-way ball valve

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

⚠WARNING

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

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

- Connect the air sampling pipe system to C
- Connect device to A or B and the com-pressed/pressed air to the remaining connection
- For connecting pipe accessories to 1” pipe systems please use the pipe adapter type A-25-3/4

The following steps are to be taken for the purging process:

1. Connect the compressed air supply (compressor or mobile purging device) for the purging of the pipes to the 3-way sleeve ball valve via the quick-acting coupling sleeve.
2. Separate the pipes to be purged from the relevant device via the 3-way ball valve by re-setting the ball valve from operating position 0º to 180º (see figure: Installation of 3-way ball valve).
3. Manually purge the pipe system for 10 seconds.
4. Set the ball valve to 90°. In this position the device is neither connected to the pipe system nor the pressed or com-pressed air supply. Wait for about 20 seconds so that the dust and dirt disturbed in the pipe system can settle and not be aspirated by the smoke detection system.
5. Re-connect the purging pipes with the device within the next 10 second by re-positioning the ball valve to 0º.

⚠WARNING

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

7.10 Steam trap

7.10.1 Steam trap Type KA-DN-25

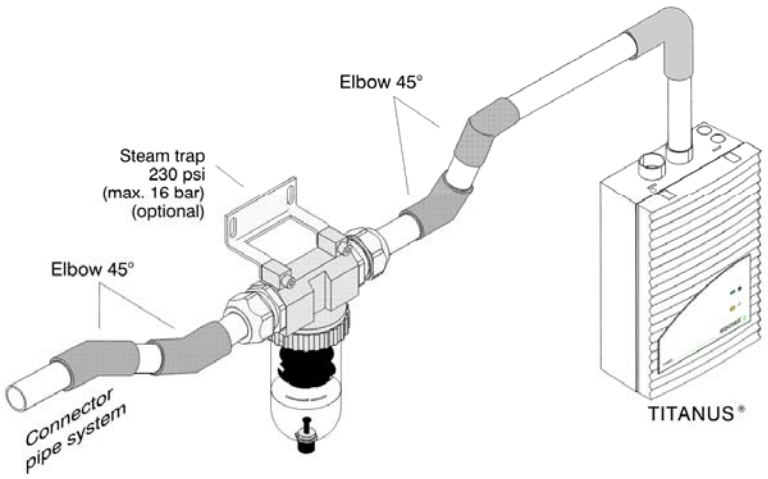


Figure 73: Installation of steam trap Type KA-DN-25 to pipe system

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

⚠WARNING

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

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

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

3. For connecting pipe accessories to 1” pipe systems please use the pipe adapter type A-25-3/4.

7.10.2 Steam trap Type KA-1

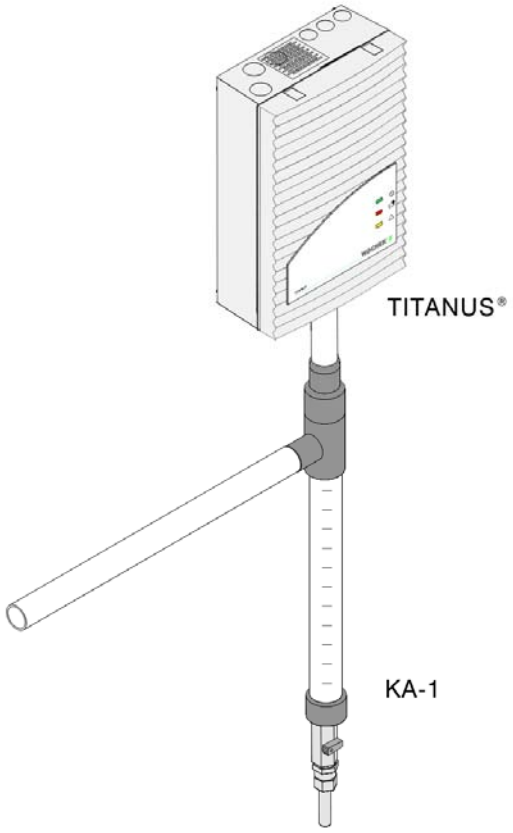


Figure 74: Installation of steam trap Type KA-1 to pipe system

Install the steam trap at the lowest point of the pipe system behind the air filter and TITANUS – device. Glue the pipe system with steam trap. The connection must be air tight.

Connection

1. Place the steam trap to the intended position and fasten the steam trap with two 1 37/64” (40 mm) pipe clamps.
2. Glue the pipe system with steam trap.
3. For connecting pipe accessories to 1” pipe systems please use the pipe adapter type A-25-3/4.

7.11 Test adapter

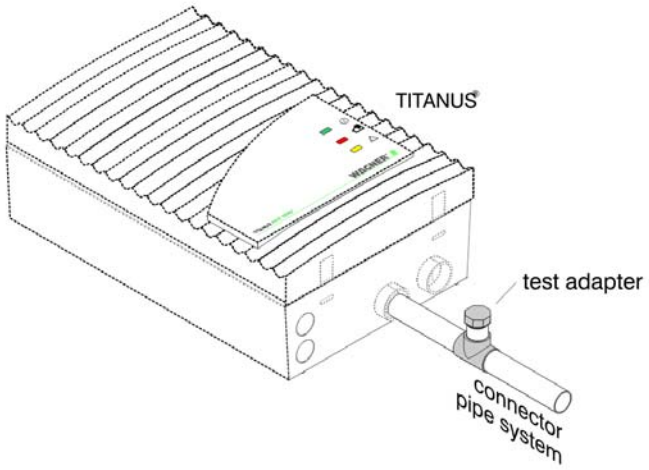


Figure 75: Mounting of the test adapter at the pipe system

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

⚠WARNING

After detection test at the air sampling smoke detection system and alarm forwarding, the test adapter must be closed again, otherwise there will be an air flow fault and no smoke detection via the connected pipe system!

8 Commissioning

⚠WARNING

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

Check Settings Before commissioning check the settings of TITANUS® (see chapter Installation “Settings"). Afterwards connect the device to the power supply.

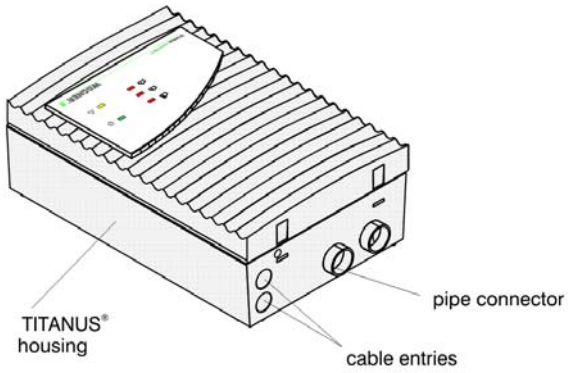


Figure 76: Check for air tightness

Complete installation and connection of the pipe system for commissioning of TITANUS®.

8.1 Adjustment Air Flow Sensor

⚠WARNING

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

Adjustment Types

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

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

8.1.1 Adjustment Independent of air pressure

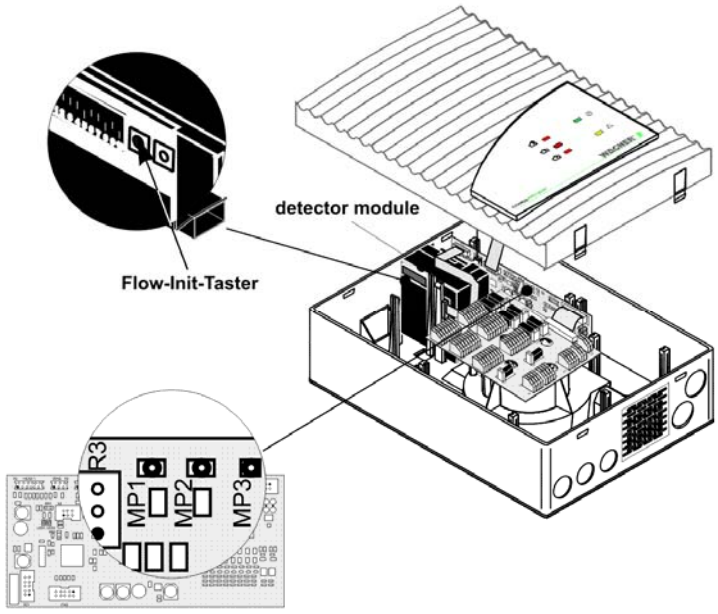


Figure 77: Adjustment independent of the air pressure of the airflow sensor in TITANUS®

1. Ensure that the device has been operating for at least 30 minutes.
2. Check the voltage on the measuring points MP2 (+) and MP3 (-). Note the polarity. Select the “V-DC” range of the measuring device. The standard voltage of the measuring points is 1.2 V.
3. If this is not the case, set the trimming potentiometer R5 to this value with a small screw driver.
4. Press the Flow-Init button S2 on the sensor module of TITANUS® (see figure: "Adjustment independent of the air pressure of the airflow sensor").
5. After pressing the S2 button close the TITANUS® housing.

The learning phase of TITANUS® is about 5 seconds. During this phase, the alarm detection is fully functional, the operating LED flashes and there must be no air flow interference. After

initialisation the operating LED stops flashing and the air flow sensor has determined the current value for the pipe system.

8.1.2 Adjustment dependent of air pressure

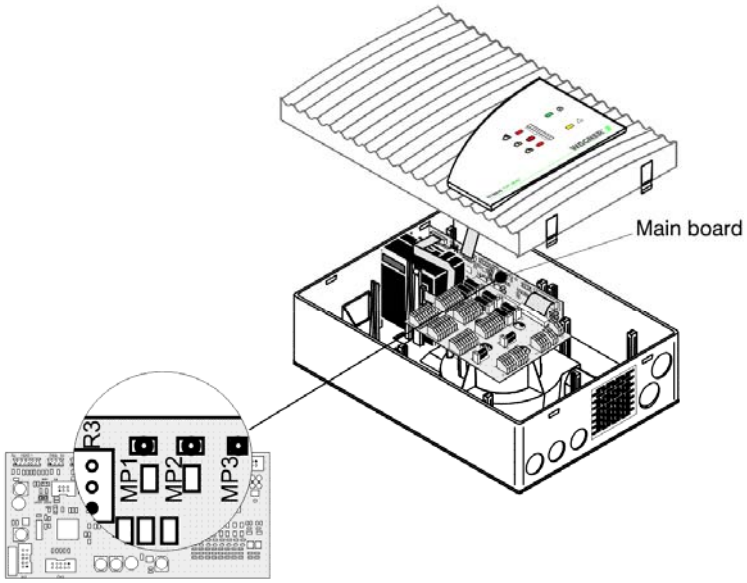


Figure 78: Adjustment dependent on the air pressure of the TITANUS® flow sensor

To carry out an adjustment dependent on the air pressure of the air flow sensor, a barometer (Recommendation: digital precision pocket barometer GPB 1300, Greisinger electronic GmbH) and a multimeter are required. Follow the steps below:

1. Ensure that the device has been operating for at least 30 minutes.
2. Determine the height above sea level of the mounting location for the air sampling system and enter this in the inspection protocol.
3. Measure the air pressure with the pocket barometer and the surround air with a thermometer and enter both values in the inspection protocol.

4. Determine the adjustment value for the air flow sensor by consulting the air pressure adjustment charts (see appendix) and enter this also in the inspection protocol. Ensure that the adjustment chart corresponds with the pipe design.
5. Connect the multimeter to the measuring points MP2 (+), MP3 (-) (see figure: "Adjustment dependent on the air pressure"). Note the polarity. Select the "V-DC" range of the measuring device. The standard voltage at the measuring points is 1.2 V.
6. With a screwdriver set the trimming potentiometer R5 to the determined value of the adjustment chart.

⚠WARNING

The standard voltage setting of the measuring points of 1.2 V equals the average yearly air pressure depending on altitude (ft above sea level).

8.2 Check alarm transmission

Activate the detector module and check the alarm signal to the Fire Alarm Control Panel as follows:

1. Spray test aerosol either into the first air sampling port or the test adapter of the TITANUS® pipe system.
2. Proceed as follows:

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

⚠WARNING

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

⚠WARNING

Record all tested data in the inspection protocol.

8.3 Check air flow monitoring

Pipe Fracture Verify the detection of a pipe fracture:

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

Blockage Verify the detection of a blockage:

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

⚠WARNING

A pipe fracture or blockage is indicated by a flashing LED on each detector module.

- fracture: 3 x flashing

- blockage: 2 x flashing

The relevant flash code is repeated every two seconds.

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

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

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

8.4 Check fault signal transmission

⚠WARNING

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

1. Check the fault signal transmission.

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

8.5 Operational check of TITANUS®

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

8.5.1 Preparations for the operational check

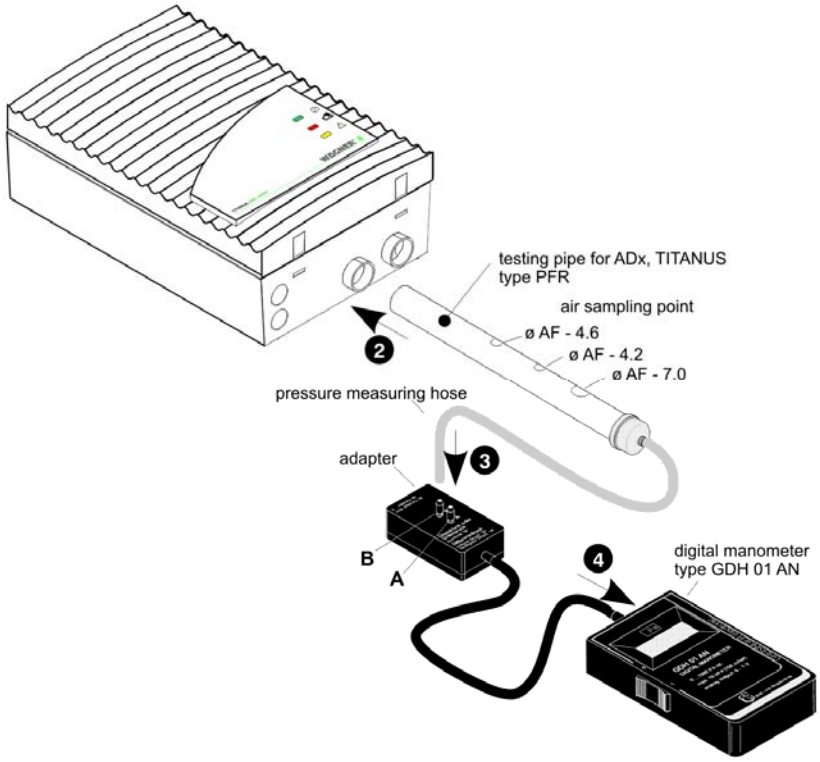


Figure 79: Operational check of TITANUS®

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

⚠WARNING

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

8.5.2 Carrying out operational check

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

1. After about 120 seconds activate the flow-init button on the detector module. The operating display flashes and the fault display lighting disappears (see INSTRUCTION).
2. Close all air sampling ports of the test pipe with adhesive tape.
   After a short initiation period the under pressure generated in the device is to be approx. 0.0336 psi (250 Pa) up to 0.045 psi (310 Pa) for a fan voltage of 6.9 V and 0.067 psi (460 Pa) up to 0.077 psi (530 Pa) for 9 V.
   The LED flash code on the detector module's electronics board must indicate „**Blockage**“ after a few seconds (see INSTRUCTION).
3. Re-open all air sampling ports of the test pipe. After a few seconds the LED flash code should disappear.
4. Remove the test pipe. After a few seconds the LED flash code on detector modules I and II must indicate „**Fracture**“.
5. Re-connect the test pipe to the device. After a few seconds the LED flash code should disappear.

⚠WARNING

A pipe fracture or blockage is indicated by a flashing LED on detector module I and II:

- fracture: 3 x flashing

- blockage: 2 x flashing

The relevant flash code is repeated every two seconds.

⚠WARNING

For TITANUS® 2 the operational check with steps 1 to 5 must be carried out for both pipe systems.

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

Connection check

Check that:

1. the pipe system is firmly connected to the pipe connection of TITANUS®.
2. all pipe fittings are glued and the pipe system is air tight. For this purpose, first seal all air sampling ports (e.g. with adhesive tape). Then measure the air flow at the opening for the air return.
3. the correct aspiration-reducing film sheets were taped over the air sampling ports.

⚠WARNING

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

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

Follow these steps:

1. Install the diagnostic software on a laptop or PC (PC with serial interface). Windows 95, 98, ME, 2000, NT, XP, Vista and 7 are suitable.
2. With the enclosed diagnostic cable TITANUS® is connected to the PC via “Diag.” on the main board.
3. Start the diagnostic software is started up.
4. The monitor of the PC displays the current data of TITANUS®.

⚠WARNING

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

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

⚠WARNING

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

9 Maintenance

9.1 Visual check

Check that

- the pipe system is easily accessible, undamaged and firmly installed.
- the air sampling ports on the pipe system are not blocked.
- air sampling pipe and connection cable are tight.
- the device support (if installed) is fastened properly.
- the air sampling smoke detection system is not damaged.

(see flash code table)

9.2 Flash code table

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

Flash Codes on the Detector Module	
Number	**Meaning**
1 x flashing	air flow initialising active
2 x flashing	air flow too low (blockage in the pipe system)
3 x flashing	air flow too high (fracture in the pipe system)
4 x flashing	software Init- Initialising after connection of supply voltage during initialising smoke detection is not possible
permanently lit	detector defective

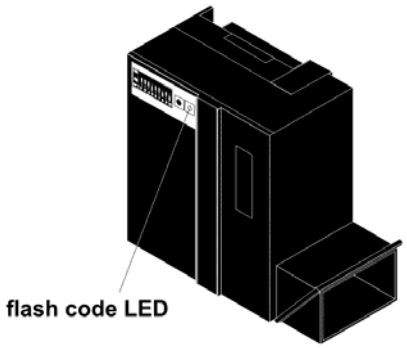


Figure 80: Position of flash code LED on the detector module

Flash Codes of LED1 and LED 2 on the Main Board	
Number	**Meaning**
1 x flashing	fault: internal voltage monitoring 1
2 x flashing	fault: internal voltage monitoring 2
3 x flashing	fault: monitoring of fan voltage
4 x flashing	fault: monitoring of air pressure adjustment voltage
5 x flashing	software fault
6 x flashing	internal fault 1
7 x flashing	internal fault 2
8 x flashing	device initialising

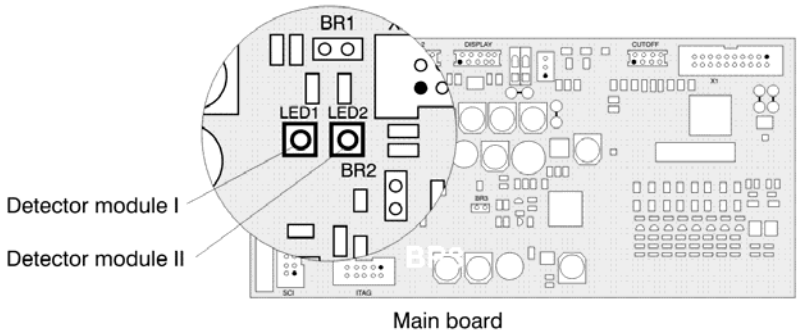


Figure 81: Position of flash code LED's for detector modules I and II on main board

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

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

Step	Possible Cause	Diagnosis	Measures
1	Operating voltage too low	Measure the operating voltage (DC) of TITANUS®with a multimeter. The measuring should be in the range of 14 V to 30 V.	Correct the supply voltage
2	Main board defective	For this diagnostic you will need a second main board. If this is not available, proceed with steps 3 - 5 for the time being. Switch off the device. Replace the main board with one of the same type. Switch power on and operate the device for a few minutes. If the main board was the cause of the fault, this failure should be corrected.	Replace defective main board
3	Display board defective	Switch off the device. Pull off the connection cable of the display board on the main board. Switch power on and operate the device for a few minutes. If the display board was the root cause, the failure should be not show now.	Replace defective display board
4	Network board defective (if present)	Switch off the device. Pull off the connection cable of the network board on the main board. Switch power on and operate the device for a few minutes. If the network board was the root cause, the failure should be not show now.	Replace defective network board
5	Shutdown board defective	Switch off the device. Pull off the connection cable of the shutdown board on the main board. Switch power on and operate the device for a few minutes. If the shutdown board was the root cause, the failure should be not show now.	Replace defective shutdown board
6	If a fault cannot be eliminated after following the above steps, contact **Wagner Group GmbH** and give a description of the fault together with the flash code readings.		

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

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

Step	Possible Cause	Diagnosis	Measures
1	Operating voltage too low	Measure the operating voltage (DC) of TITANUS®. with a multimeter: The measuring should be in the range of 14 V to 30 V.	Correct the supply voltage
2	Main board defective	For this diagnostic you will need a second main board. If this is not available, proceed with steps 3-4 for the time being. Switch off the device. Replace the main board with one of the same type. Switch power on and operate the device for a few minutes. If the main board is the cause of the fault, this failure should be corrected.	Replace defective main board
3	Detector module defective	Switch off the device Replace detector module with a new one of the same type (incl. connection cable) Switch power on and operate the device for a few minutes. If the detector module was the root cause, the failure should be not show now. If using two detector modules, repeat the process for the second module.	Replace defective detector module
4	Shutdown board defective (if present)	Switch off the device. Pull off the connection cable of the shutdown board on the main board. Switch power on and operate the device for a few minutes. If the shutdown board was the root cause, the failure should be not show now.	Replace defective shutdown board
5	If a fault cannot be eliminated after following the above steps, contact **Wagner Group GmbH** and give a description of the fault together with the flash code readings.		

9.2.3 3x Flashing (Fault: Monitoring Fan Voltage)

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

Step	Possible Cause	Diagnosis	Measures
1	operating voltage too low	measure the operating voltage (DC) of TITANUS®. with a multimeter the measuring value must lie between 14 V and 30 V	correct the supply voltage
2	Fan connection reverse	The fan is not operating. Switch off the device. Pull off the connection cable of fan on the main board. Switch on power and operate the device for a few minutes. If the failure is not show any longer, the connection to the fan could be defective.	Check fan connection to main board (red - cl. 1; black - cl. 2)
3	Fan defective or blocked	If the diagnosis from step 2 points to reverse connection of the fan but the connection is correct. Measure the fan voltage (DC) of the connected fan with a multimeter. If the voltage is outside the limits shown below, the fan is defective. - Fan voltage setting 6.9 V: max. 7.6 V min. 6 V - Fan voltage setting 9 V: max. 10 V min. 7.8 V	Because the fan cannot be removed from the housing, the complete unit must be exchanged
4	Main board defective	If not fault found in steps 1-4. Switch off the device and replace main board with a new one of the same type. Switch on power and operate the device for a few minutes. If the main board was the root cause, the failure should be not show now.	Replace defective main board
5	If a fault cannot be eliminated after following the above steps, contact **Wagner Group GmbH** and give a description of the fault together with the flash code readings.		

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

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

Step	Possible Cause	Diagnosis	Measures
1	Setting of potentiometer R3 for pressure-dependent air flow adjustment is incorrect	Measure the voltage (DC) on the measuring points MP2 (+) and MP3 (-) with a multimeter. The standard pressure is 1.2V; variations might occur due to an adjustment of the pressure-dependent air flow. If the measured voltage lies outside the range of 0.5 V and 1.9 V, the potentiometer R3 setting is incorrect. **Notice:** A fault occurs if voltage is lower than 0.2 V or higher than 2.3 V.	Re-adjust the voltage between measuring points MP2 (+) and MP3 (-) with the potentiometer. ▪ For air pressure- independent adjustment: 1.2 V ▪ For air pressure-dependent adjustment according to air pressure adjustment table in appendix Further Information in chapter “Commissioning / Adjustment Air Flow Sensor”:
2	Main board defective	The voltage cannot be adjusted in step 1. Switch off the device. Pull off the connection cable of the detector module on the main board. Switch on power and operate the device for a few minutes. The main board is defective if the voltage on MP2 and MP3 cannot be properly adjusted with the potentiometer. **Notice:** When operating without detector module, the diagnostic LED flashes 7x.	Replace main board
3	Detector module defective	Switch off the device. Connect cable of the 1st detector module with the main board and detector module. If there is still a fault, the detector module is defective. Switch on power and operate the device for a	Replace detector module

Step	Possible Cause	Diagnosis	Measures
		few minutes. When using two detector modules, the process must be repeated for the second module.	
4	If a fault cannot be eliminated after following the above steps, contact **Wagner Group GmbH** and give a description of the fault together with the flash code readings.		

9.2.5 5x Flashing (Fault: Programme Error)

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

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

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

Step	Possible Cause	Diagnosis	Measures
1	Wrong detector module installed	Make sure that detector module, suitable for TITANUS®, is installed.	Install a detector module, suitable for TITANUS®
2	Connection cable between main board and detector module is defective	Switch off the device. Replace connection cable. Switch on power and operate the device for a few minutes. If the fault does not recur, the connection cable is defective.	Replace defective connection cable

Step	Possible Cause	Diagnosis	Measures
3	Detector module defective	After replacing the connection cable in step 2, the fault persists. Switch off the device. Replace detector module with one of same type. Switch on power and operate the device for a few minutes. If the detector module was the root cause, the failure should be not show now.	Replace defective detector module
4	Main board defective	When using two detector modules, both diagnostic LEDs are flashing. Steps 1-3 could find no cause for the fault. Switch off the device. Replace main board with one of same type. Switch on power and operate the device for a few minutes. If the detector module was the root cause, the failure should be not show now.	Replace defective main board
5	If a fault cannot be eliminated after following the above steps, contact **Wagner Group GmbH** and give a description of the fault together with the flash code readings.		

9.2.7 8x Flashing (Device-Initialising)

This is not a fault. After connecting the operating power, the device is initialised. During that process the diagnostic LED flashes eight times. When using two detector modules both LED's flash. Smoke detection is not possible during this time.

9.3 Check detector module and alarm transmission

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

⚠WARNING

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

9.4 Check pipe system

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

⚠WARNING

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

9.5 Detector module exchange

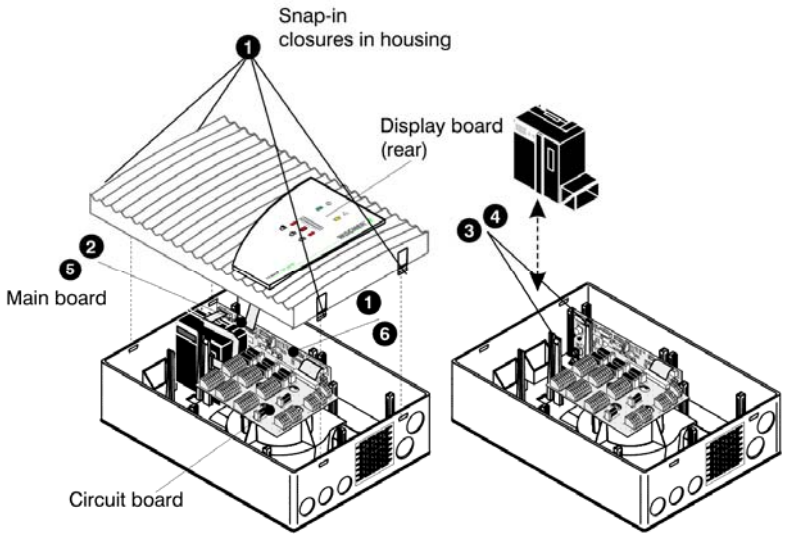


Figure 82: Detector module exchange

1. Carry out the following steps only when the device is switched off.
   Using a screwdriver, carefully unlock the snap-in closures of the housing by simultaneously pressing in both clips located at one side of the housing lid.
2. Carefully lift the lid. Pull the display board cable off and remove the lid.
3. Pull the connection cable of the detector module off the main board
4. Carefully spread both support clamps of the detector module and remove the module.
5. Spread both support clamps again and insert the new detector module between them. Both clamps must fit tightly and snap in audibly. Afterwards, press both support clamps together

6. Re-connect the sensor module via the ribbon cable to the main board. Connection: HEAD 1 or HEAD2
7. Connect the display board to the main board X5 DISPLAY
8. Before initialising, the operating voltage must be re-connected. Press the Flow-Init button on the detector module in order to initialise the pipe system (INSTRUCTION).
9. Close the housing lid.

⚠WARNING

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

9.6 Air filter insert LF-AD-x change

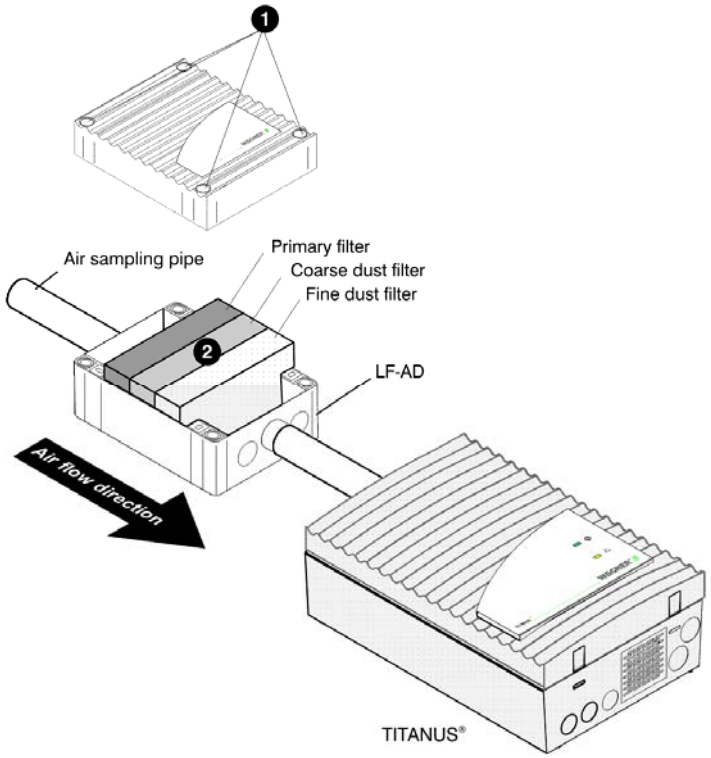


Figure 83: Air filter insert change

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

1. Loosen the four screws and remove the housing lid.
2. Remove the filter inserts and checks how soiled they are. The inserts can be cleaned if there is a small amount of soiling and must be replaced if soiling is heavy.
3. Carefully clean the inside of the housing from any dust. Replace the cleaned or replaced filter inserts in the correct sequence, which is shown on the instruction label of the housing floor.
4. Replace and screw down the housing lid.

TIP

Three optional fine dust filters are available for environments with a high level of fine-grade dust.

⚠WARNING

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

9.7 Changing special air filter SF- 400/650

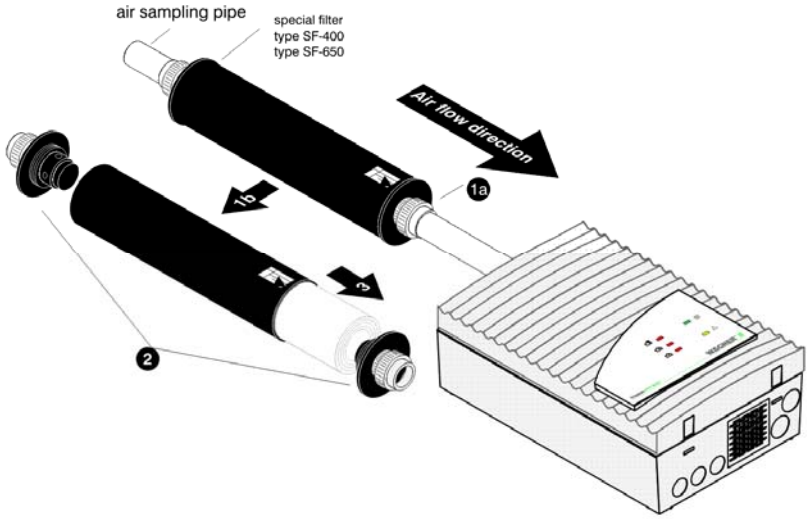


Figure 84: Exchange of filter element

To change the filter insert follow these steps:

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

⚠WARNING

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

⚠WARNING

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

9.8 Check the air flow sensor adjustment

Check the air flow adjustment using the diagnostic software.

Functioning Principle

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

Check of Current Value

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

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

⚠WARNING

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

Dependent on air pressure

To ensure fault-free long-term operation of the device, the air flow sensor must be adjusted to be air pressure-dependent (see chapter "Commissioning"). Only this type of adjustment allows

for small air pressure variations to be within the monitoring window and thus within the permissible tolerance range.

⚠WARNING

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

Independent of air pressure

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

⚠WARNING

The air flow-dependent adjustment must be carried out when it is not certain that there will not be any air pressure fluctuations in the immediate area.

Correction of an air flow fault

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

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

⚠WARNING

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

2. If this check is positive, check air flow monitoring by connecting the test pipe and carrying out the operational check described in chapter Commissioning "Carrying out operational check".
   If the test results do not vary from the given values, the air flow monitor has no defect.

⚠WARNING

If the air flow monitor is damaged, only authorised personnel may exchange the detector module!

Carry out a new adjustment for the connected pipe system.

⚠WARNING

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

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

TIP

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

4. If there is a similar variation from the rated value as before, interfering environmental influences are the cause. If these negative influences on air flow monitoring cannot be reme-

died, the threshold should be set to the next lower sensitivity level

9.9 Check air flow monitoring

A pipe fracture or blockage is indicated for each detector module via flash code LED.

Proceed according to chapter Commissioning “Air Flow Monitoring”.

9.10 Check fault signal transmission

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

Proceed according to chapter Commissioning “Fault Signal Transmission“.

9.11 Maintenance intervals

Regular maintenances are required for servicing. The air sampling smoke detection systems will be examined during initial operation first and afterwards once a year

Following inspections must be executed during each maintenance:

Type of Inspection	Measures	Further Information in Chapter
Maintenance	Visual check Detector module and alarm transmission Inspection of pipe system Air flow sensor adjustment Fault signal transmission Air flow monitoring	Maintenance Maintenance Maintenance Maintenance Commissioning Commissioning

In addition to the annual maintenance, national technical regulations and standards concerning the application must be regarded as well as particular requirements in application where necessary.

Appendix

Air Pressure Adjustment Tables

Pipe Design Tables

System Product List

Inspection Protocol

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

Equipment Protection

Height [ft 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
164	953	958	963	968	973	978	983	988	993	998	1003	1008	1013	1018	1023
328	933	938	943	948	953	958	963	968	973	978	983	988	993	998	1003
492	913	918	923	928	933	938	943	948	953	958	963	968	973	978	983
656	893	898	903	908	913	918	923	928	933	938	943	948	953	958	963
820	874	879	884	889	894	899	904	909	914	919	924	929	934	939	944
984	856	861	866	871	876	881	886	891	896	901	906	911	916	921	926
1148	838	843	848	853	858	863	868	873	878	883	888	893	898	903	908
1312	820	825	830	835	840	845	850	855	860	865	870	875	880	885	890
1476	802	807	812	817	822	827	832	837	842	847	852	857	862	867	872
1640	785	790	795	800	805	810	815	820	825	830	835	840	845	850	855
1804	768	773	778	783	788	793	798	803	808	813	818	823	828	833	838
1969	752	757	762	767	772	777	782	787	792	797	802	807	812	817	822
2133	736	741	746	751	756	761	766	771	776	781	786	791	796	801	806
2297	720	725	730	735	740	745	750	755	760	765	770	775	780	785	790
2461	705	710	715	720	725	730	735	740	745	750	755	760	765	770	775
2625	690	695	700	705	710	715	720	725	730	735	740	745	750	755	760
2789	675	680	685	690	695	700	705	710	715	720	725	730	735	740	745
2953	660	665	670	675	680	685	690	695	700	705	710	715	720	725	730
3117	646	651	656	661	666	671	676	681	686	691	696	701	706	711	716
3281	632	637	642	647	652	657	662	667	672	677	682	687	692	697	702
3445	618	623	628	633	638	643	648	653	658	663	668	673	678	683	688
3609	605	610	615	620	625	630	635	640	645	650	655	660	665	670	675
3773	592	597	602	607	612	617	622	627	632	637	642	647	652	657	662
3937	579	584	589	594	599	604	609	614	619	624	629	634	639	644	649
4101	567	572	577	582	587	592	597	602	607	612	617	622	627	632	637
4265	554	559	564	569	574	579	584	589	594	599	604	609	614	619	624
4429	542	547	552	557	562	567	572	577	582	587	592	597	602	607	612
4593	530	535	540	545	550	555	560	565	570	575	580	585	590	595	600
4757	519	524	529	534	539	544	549	554	559	564	569	574	579	584	589
4921	507	512	517	522	527	532	537	542	547	552	557	562	567	572	577
5085	496	501	506	511	516	521	526	531	536	541	546	551	556	561	566
5249	485	490	495	500	505	510	515	520	525	530	535	540	545	550	555
5413	475	480	485	490	495	500	505	510	515	520	525	530	535	540	545
5577	464	469	474	479	484	489	494	499	504	509	514	519	524	529	534
5741	454	459	464	469	474	479	484	489	494	499	504	509	514	519	524
5906	444	449	454	459	464	469	474	479	484	489	494	499	504	509	514
6070	434	439	444	449	454	459	464	469	474	479	484	489	494	499	504
6234	424	429	434	439	444	449	454	459	464	469	474	479	484	489	494
6398	415	420	425	430	435	440	445	450	455	460	465	470	475	480	485
6562	406	411	416	421	426	431	436	441	446	451	456	461	466	471	476
6726	397	402	407	412	417	422	427	432	437	442	447	452	457	462	467
6890	388	393	398	403	408	413	418	423	428	433	438	443	448	453	458
7054	379	384	389	394	399	404	409	414	419	424	429	434	439	444	449
7218	371	376	381	386	391	396	401	406	411	416	421	426	431	436	441
7382	362	367	372	377	382	387	392	397	402	407	412	417	422	427	432
7546	354	359	364	369	374	379	384	389	394	399	404	409	414	419	424
7710	346	351	356	361	366	371	376	381	386	391	396	401	406	411	416
7874	338	343	348	353	358	363	368	373	378	383	388	393	398	403	408
Titanus PS/PS 2 [V]	**0,50**	**0,60**	**0,70**	**0,80**	**0,90**	**1,00**	**1,10**	**1,20**	**1,30**	**1,40**	**1,50**	**1,60**	**1,70**	**1,80**	**1,90**

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

Room Protection (I-shaped pipe system)

Height [ft above sea level]	**Air Pressure [hPa] at a height of**														
0	973	978	983	988	993	998	1003		1013	1018	1023	1028	1033	1038	1043
164	953	958	963	968	973	978	983	988	993	998	1003	1008	1013	1018	1023
328	933	938	943	948	953	958	963	968	973	978	983	988	993	998	1003
492	913	918	923	928	933	938	943	948	953	958	963	968	973	978	983
656	893	898	903	908	913	918	923	928	933	938	943	948	953	958	963
820	874	879	884	889	894	899	904	909	914	919	924	929	934	939	944
984	856	861	866	871	876	881	886	891	896	901	906	911	916	921	926
1148	838	843	848	853	858	863	868	873	878	883	888	893	898	903	908
1312	820	825	830	835	840	845	850	855	860	865	870	875	880	885	890
1476	802	807	812	817	822	827	832	837	842	847	852	857	862	867	872
1640	785	790	795	800	805	810	815	820	825	830	835	840	845	850	855
1804	768	773	778	783	788	793	798	803	808	813	818	823	828	833	838
1969	752	757	762	767	772	777	782	787	792	797	802	807	812	817	822
2133	736	741	746	751	756	761	766	771	776	781	786	791	796	801	806
2297	720	725	730	735	740	745	750	755	760	765	770	775	780	785	790
2461	705	710	715	720	725	730	735	740	745	750	755	760	765	770	775
2625	690	695	700	705	710	715	720	725	730	735	740	745	750	755	760
2789	675	680	685	690	695	700	705	710	715	720	725	730	735	740	745
2953	660	665	670	675	680	685	690	695	700	705	710	715	720	725	730
3117	646	651	656	661	666	671	676	681	686	691	696	701	706	711	716
3281	632	637	642	647	652	657	662	667	672	677	682	687	692	697	702
3445	618	623	628	633	638	643	648	653	658	663	668	673	678	683	688
3609	605	610	615	620	625	630	635	640	645	650	655	660	665	670	675
3773	592	597	602	607	612	617	622	627	632	637	642	647	652	657	662
3937	579	584	589	594	599	604	609	614	619	624	629	634	639	644	649
4101	567	572	577	582	587	592	597	602	607	612	617	622	627	632	637
4265	554	559	564	569	574	579	584	589	594	599	604	609	614	619	624
4429	542	547	552	557	562	567	572	577	582	587	592	597	602	607	612
4593	530	535	540	545	550	555	560	565	570	575	580	585	590	595	600
4757	519	524	529	534	539	544	549	554	559	564	569	574	579	584	589
4921	507	512	517	522	527	532	537	542	547	552	557	562	567	572	577
5085	496	501	506	511	516	521	526	531	536	541	546	551	556	561	566
5249	485	490	495	500	505	510	515	520	525	530	535	540	545	550	555
5413	475	480	485	490	495	500	505	510	515	520	525	530	535	540	545
5577	464	469	474	479	484	489	494	499	504	509	514	519	524	529	534
5741	454	459	464	469	474	479	484	489	494	499	504	509	514	519	524
5906	444	449	454	459	464	469	474	479	484	489	494	499	504	509	514
6070	434	439	444	449	454	459	464	469	474	479	484	489	494	499	504
6234	424	429	434	439	444	449	454	459	464	469	474	479	484	489	494
6398	415	420	425	430	435	440	445	450	455	460	465	470	475	480	485
6562	406	411	416	421	426	431	436	441	446	451	456	461	466	471	476
6726	397	402	407	412	417	422	427	432	437	442	447	452	457	462	467
6890	388	393	398	403	408	413	418	423	428	433	438	443	448	453	458
7054	379	384	389	394	399	404	409	414	419	424	429	434	439	444	449
7218	371	376	381	386	391	396	401	406	411	416	421	426	431	436	441
7382	362	367	372	377	382	387	392	397	402	407	412	417	422	427	432
7546	354	359	364	369	374	379	384	389	394	399	404	409	414	419	424
7710	346	351	356	361	366	371	376	381	386	391	396	401	406	411	416
7874	338	343	348	353	358	363	368	373	378	383	388	393	398	403	408
Titanus PS/PS 2 [V]	**0,58**	**0,67**	**0,76**	**0,85**	**0,94**	**1,03**	**1,12**	**1,21**	**1,30**	**1,39**	**1,48**	**1,57**	**1,66**	**1,75**	**1,84**

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

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

Height [ft above sea level]	**Air Pressur [hPa] at a Heigt of**														
0	973	978	983	988	993	998	1003	1008	1013	1018	1023	1028	1033	1038	1043
164	953	958	963	968	973	978	983	988	993	998	1003	1008	1013	1018	1023
328	933	938	943	948	953	958	963	968	973	978	983	988	993	998	1003
492	913	918	923	928	933	938	943	948	953	958	963	968	973	978	983
656	893	898	903	908	913	918	923	928	933	938	943	948	953	958	963
820	874	879	884	889	894	899	904	909	914	919	924	929	934	939	944
984	856	861	866	871	876	881	886	891	896	901	906	911	916	921	926
1148	838	843	848	853	858	863	868	873	878	883	888	893	898	903	908
1312	820	825	830	835	840	845	850	855	860	865	870	875	880	885	890
1476	802	807	812	817	822	827	832	837	842	847	852	857	862	867	872
1640	785	790	795	800	805	810	815	820	825	830	835	840	845	850	855
1804	768	773	778	783	788	793	798	803	808	813	818	823	828	833	838
1969	752	757	762	767	772	777	782	787	792	797	802	807	812	817	822
2133	736	741	746	751	756	761	766	771	776	781	786	791	796	801	806
2297	720	725	730	735	740	745	750	755	760	765	770	775	780	785	790
2461	705	710	715	720	725	730	735	740	745	750	755	760	765	770	775
2625	690	695	700	705	710	715	720	725	730	735	740	745	750	755	760
2789	675	680	685	690	695	700	705	710	715	720	725	730	735	740	745
2953	660	665	670	675	680	685	690	695	700	705	710	715	720	725	730
3117	646	651	656	661	666	671	676	681	686	691	696	701	706	711	716
3281	632	637	642	647	652	657	662	667	672	677	682	687	692	697	702
3445	618	623	628	633	638	643	648	653	658	663	668	673	678	683	688
3609	605	610	615	620	625	630	635	640	645	650	655	660	665	670	675
3773	592	597	602	607	612	617	622	627	632	637	642	647	652	657	662
3937	579	584	589	594	599	604	609	614	619	624	629	634	639	644	649
4101	567	572	577	582	587	592	597	602	607	612	617	622	627	632	637
4265	554	559	564	569	574	579	584	589	594	599	604	609	614	619	624
4429	542	547	552	557	562	567	572	577	582	587	592	597	602	607	612
4593	530	535	540	545	550	555	560	565	570	575	580	585	590	595	600
4757	519	524	529	534	539	544	549	554	559	564	569	574	579	584	589
4921	507	512	517	522	527	532	537	542	547	552	557	562	567	572	577
5085	496	501	506	511	516	521	526	531	536	541	546	551	556	561	566
5249	485	490	495	500	505	510	515	520	525	530	535	540	545	550	555
5413	475	480	485	490	495	500	505	510	515	520	525	530	535	540	545
5577	464	469	474	479	484	489	494	499	504	509	514	519	524	529	534
5741	454	459	464	469	474	479	484	489	494	499	504	509	514	519	524
5906	444	449	454	459	464	469	474	479	484	489	494	499	504	509	514
6070	434	439	444	449	454	459	464	469	474	479	484	489	494	499	504
6234	424	429	434	439	444	449	454	459	464	469	474	479	484	489	494
6398	415	420	425	430	435	440	445	450	455	460	465	470	475	480	485
6562	406	411	416	421	426	431	436	441	446	451	456	461	466	471	476
6726	397	402	407	412	417	422	427	432	437	442	447	452	457	462	467
6890	388	393	398	403	408	413	418	423	428	433	438	443	448	453	458
7054	379	384	389	394	399	404	409	414	419	424	429	434	439	444	449
7218	371	376	381	386	391	396	401	406	411	416	421	426	431	436	441
7382	362	367	372	377	382	387	392	397	402	407	412	417	422	427	432
7546	354	359	364	369	374	379	384	389	394	399	404	409	414	419	424
7710	346	351	356	361	366	371	376	381	386	391	396	401	406	411	416
7874	338	343	348	353	358	363	368	373	378	383	388	393	398	403	408
Titanus PS/PS 2 [V]	**0,54**	**0,63**	**0,73**	**0,82**	**0,92**	**1,01**	**1,11**	**1,20**	**1,30**	**1,40**	**1,49**	**1,59**	**1,68**	**1,78**	**1,87**

UL / NFPA Pipe design table

TITANUS *TOP SENS*® & *PRO SENS*® /NET With Acceleration Air Sampling Ports /S NFPA 72 Standard Fire Detection (SFD) (120 s) (without filter)

M = Module S = Sensitivity (% obs/ft)

		Number of points (max. plus acceleration air sampling ports)																								
M	**S**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**
DM-Tx-01	0.005	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	0.009	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	0.018	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	0.037	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	–	-
DM-Tx-10	0.031	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	0.061	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	–	–	–	–	–	–	–	–	–	–	-
	0.122	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	–	–	–	–	–	–	–	–	–	–	–	–	–	-
	0.244	✔	✔	✔	✔	✔	✔	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-
DM-Tx-50	0,152	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-
	0.305	✔	✔	✔	✔	✔	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-

without filter

Pipe shape	**U_{Fan}[V]**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**permitted total pipe length [ft]**
I	6.9	492	492	426	426	426	426	426	426	426	426	426	426	360	360	360	360	-	-	-	-	-	-	-	-	-	-	
	≥9	656	656	590	590	590	590	492	492	492	426	426	426	426	426	426	426	426	426	426	426	-	-	-	-	-	-	
U	6.9	-	787	787	787	787	721	721	721	721	721	656	656	656	656	656	656	656	656	656	656	-	-	-	-	-	-	
	≥9	-	918	918	918	918	918	918	918	918	918	918	918	918	918	918	918	787	787	787	787	787	787	787	787	656	656	
M	6.9	-	-	787	787	787	787	688	688	688	688	688	688	688	688	688	688	688	688	557	557	557	-	-	-	-	-	
	≥9	-	-	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	787	787	
Double U (1 DM)	6.9	-	-	-	984	984	984	984	984	787	787	787	787	656	656	656	656	656	656	656	656	656	656	656	656	-	-	
	9	-	-	-	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	
	12	-	-	-	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	
Double U (2 DM)	6.9	-	-	-	721	721	721	721	721	721	721	721	721	656	656	656	656	656	656	656	656	656	656	656	656	-	-	
	9	-	-	-	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	
	12	-	-	-	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	

with detector box and/or VSK 1)

Pipe shape	**U_{Fan}[V]**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**permitted total pipe length [ft]**
I	6.9	452	391	391	391	391	391	391	391	391	391	391	331	331	331	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	603	542	542	542	542	452	452	452	391	391	391	391	391	391	391	391	391	391	-	-	-	-	-	-	-	-	
U	6.9	-	724	724	724	663	663	663	663	603	603	603	603	603	603	603	603	603	603	-	-	-	-	-	-	-	-	
	≥9	-	844	844	844	844	844	844	844	844	844	844	844	844	844	724	724	724	724	724	724	724	724	603	603	603	603	
M	6.9	-	-	724	724	724	724	632	632	632	632	632	632	632	632	632	512	512	512	-	-	-	-	-	-	-	-	
	≥9	-	-	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	724	724	724	724	724	
Double U (1 DM)	6.9	-	-	-	905	905	905	905	905	724	724	724	724	603	603	603	603	603	603	603	603	-	-	-	-	-	-	
	9	-	-	-	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	
	12	-	-	-	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	
Double U (2 DM)	6.9	-	-	-	721	721	721	721	721	721	721	721	721	603	603	603	603	603	603	603	603	-	-	-	-	-	-	
	9	-	-	-	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

with steam trap 2)

Pipe shape	**U_{Fan}[V]**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**permitted total pipe length [ft]**
I	6.9	369	319	319	319	319	319	319	319	319	270	270	270	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	492	442	442	442	369	369	319	319	319	319	319	319	319	319	319	-	-	-	-	-	-	-	-	-	-	-	
U	6.9	-	590	540	540	540	540	492	492	492	492	492	492	492	492	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	-	688	688	688	688	688	688	688	688	688	688	688	590	590	590	590	590	590	492	492	492	492	393	393	393	393	
M	6.9	-	-	590	516	516	516	516	516	516	516	516	516	417	417	417	-	-	-	-	-	-	-	-	-	-	-	
	≥9	-	-	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	590	590	590	590	590	590	516	516	
Double U (1 DM)	6.9	-	-	-	738	590	590	590	590	492	492	492	492	492	492	492	492	-	-	-	-	-	-	-	-	-	-	
	9	-	-	-	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	540	540	
	12	-	-	-	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	
Double U (2 DM)	6.9	-	-	-	721	590	590	590	590	492	492	492	492	492	492	492	492	-	-	-	-	-	-	-	-	-	-	
	9	-	-	-	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	540	540	
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

1) available for following pipe accessories:

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

2) available for following pipe accessories:

VSK (shut off valve)	and/or	DM-MB-TM-XX	and/or	MB2	and/or	KA-DN 25	and/or	KA-1

UL / NFPA Pipe design table

TITANUS *TOP SENS*® & *PRO SENS*® /NET With Acceleration Air Sampling Ports /S NFPA 72 Standard Fire Detection (SFD) (120 s) (without filter)

M = Module S = Sensitivity (% obs/ft)

		Number of points (max. plus acceleration air sampling ports)																									
M	**S**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**36**	**37**	**40**	**41**	**44**	**45**	**46**	**48**	**49**	**50**	**51**	**52**	**53**	**56**	**57**	**58**	**63**	**64**
DM-Tx-01	0.005	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	0.009	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	0.018	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	–	–	-	-	-	-	-	-	-	-
	0.037	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DM-Tx-10	0.031	✔	✔	✔	–	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0.061	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0.122	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0.244	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DM-Tx-50	0,152	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0.305	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

without filter

Pipe shape	**U_{Fan}[V]**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**36**	**37**	**40**	**41**	**44**	**45**	**46**	**48**	**49**	**50**	**51**	**52**	**53**	**56**	**57**	**58**	**63**	**64**	
I	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**permitted total pipe length [ft]**
	≥9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
U	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	656	656	656	656	524	524	524	524	524	524	524	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
M	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	787	787	787	787	787	787	787	688	688	688	688	688	688	688	688	688	688	688	688	590	590	590	590	590	590	-	
Double U (1 DM)	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	984	984	984	984	984	984	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	-	-	-	-	-	
	12	984	984	984	984	984	984	984	984	984	984	984	984	984	853	853	853	853	853	853	853	853	853	853	853	853	853	
Double U (2 DM)	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	-	-	-	-	-	
	12	721	721	721	721	721	721	721	721	721	721	721	721	721	590	590	590	590	590	590	590	590	590	590	590	590	590	

with detector box and/or VSK 1)

Pipe shape	**U_{Fan}[V]**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**36**	**37**	**40**	**41**	**44**	**45**	**46**	**48**	**49**	**50**	**51**	**52**	**53**	**56**	**57**	**58**	**63**	**64**	
I	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**permitted total pipe length [ft]**
	≥9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
U	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	482	482	482	482	482	482	482	482	482	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
M	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	724	724	724	724	632	632	632	632	632	632	632	632	632	632	542	542	542	542	542	542	542	542	542	-	-	-	
Double U (1 DM)	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	905	905	663	663	663	663	663	663	663	663	663	663	663	663	663	663	663	663	663	663	-	-	-	-	-	-	
	12	905	905	905	905	905	905	905	905	905	905	905	784	784	784	784	784	784	784	784	784	784	784	754	754	754	754	
Double U (2 DM)	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	721	721	663	663	663	663	663	663	663	663	663	663	663	663	663	663	663	663	663	663	-	-	-	-	-	-	
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

with steam trap 2)

Pipe shape	**U_{Fan}[V]**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**36**	**37**	**40**	**41**	**44**	**45**	**46**	**48**	**49**	**50**	**51**	**52**	**53**	**56**	**57**	**58**	**63**	**64**	
I	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**permitted total pipe length [ft]**
	≥9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
U	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	393	393	393	393	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
M	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	516	516	516	516	516	516	516	516	516	442	442	442	442	442	-	-	-	-	-	-	-	-	-	-	-	-	
Double U (1 DM)	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	540	540	540	540	540	540	540	540	540	540	540	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	12	738	738	738	738	738	738	639	639	639	639	639	639	639	639	639	639	615	615	615	615	615	615	615	615	615	615	
Double U (2 DM)	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	540	540	540	540	540	540	540	540	540	540	540	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

1) available for following pipe accessories:

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

2) available for following pipe accessories:

VSK (shut off valve)	and/or	DM-MB-TM-XX	and/or	MB2	and/or	KA-DN 25	and/or	KA-1

UL / NFPA Pipe design table

TITANUS *TOP SENS*® & *PRO SENS*® /NET With Acceleration Air Sampling Ports /S NFPA 72 Standard Fire Detection (SFD) (120 s) (without filter)

M = Module S = Sensitivity (% obs/ft)

		Number of points (max. plus acceleration air sampling ports)						
M	**S**	**65**	**72**	**73**	**88**	**89**	**97**	**100**
DM-Tx-01	0.005	✔	✔	✔	✔	✔	✔	✔
	0.009	✔	✔	✔	✔	✔	✔	-
	0.018	-	-	-	-	-	-	-
	0.037	-	-	-	-	-	-	-
DM-Tx-10	0.031	-	-	-	-	-	-	-
	0.061	-	-	-	-	-	-	-
	0.122	-	-	-	-	-	-	-
	0.244	-	-	-	-	-	-	-
DM-Tx-50	0,152	-	-	-	-	-	-	-
	0.305	-	-	-	-	-	-	-

without filter

Pipe shape	**U_{Fan}[V]**	**65**	**72**	**73**	**88**	**89**	**97**	**100**	**permitted total pipe length [ft]**
I	6.9	-	-	-	-	-	-	-	
	≥9	-	-	-	-	-	-	-	
U	6.9	-	-	-	-	-	-	-	
	≥9	-	-	-	-	-	-	-	
M	6.9	-	-	-	-	-	-	-	
	≥9	-	-	-	-	-	-	-	
Double U (1 DM)	6.9	-	-	-	-	-	-	-	
	9	-	-	-	-	-	-	-	
	12	820	820	820	820	820	820	820	
Double U (2 DM)	6.9	-	-	-	-	-	-	-	
	9	-	-	-	-	-	-	-	
	12	590	590	-	-	-	-	-	

with detector box and/or VSK

Pipe shape	**U_{Fan}[V]**	**65**	**72**	**73**	**88**	**89**	**97**	**100**	**permitted total pipe length [ft]**
I	6.9	-	-	-	-	-	-	-	
	≥9	-	-	-	-	-	-	-	
U	6.9	-	-	-	-	-	-	-	
	≥9	-	-	-	-	-	-	-	
M	6.9	-	-	-	-	-	-	-	
	≥9	-	-	-	-	-	-	-	
Double U (1 DM)	6.9	-	-	-	-	-	-	-	
	9	-	-	-	-	-	-	-	
	12	754	754	754	754	-	-	-	
Double U (2 DM)	6.9	-	-	-	-	-	-	-	
	9	-	-	-	-	-	-	-	
	12	-	-	-	-	-	-	-	

with steam trap 2)

Pipe shape	**U_{Fan}[V]**	**65**	**72**	**73**	**88**	**89**	**97**	**100**	**permitted total pipe length [ft]**
I	6.9	-	-	-	-	-	-	-	
	≥9	-	-	-	-	-	-	-	
U	6.9	-	-	-	-	-	-	-	
	≥9	-	-	-	-	-	-	-	
M	6.9	-	-	-	-	-	-	-	
	≥9	-	-	-	-	-	-	-	
Double U (1 DM)	6.9	-	-	-	-	-	-	-	
	9	-	-	-	-	-	-	-	
	12	615	615	-	-	-	-	-	
Double U (2 DM)	6.9	-	-	-	-	-	-	-	
	9	-	-	-	-	-	-	-	
	12	-	-	-	-	-	-	-	

1) available for following pipe accessories:

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

2) available for following pipe accessories:

VSK (shut off valve)	and/or	DM-MB-TM-XX	and/or	MB2	and/or	KA-DN 25	and/or	KA-1

UL / NFPA Pipe design table

TITANUS *TOP SENS*® & *PRO SENS*® /NET With Acceleration Air Sampling Ports /S NFPA 72 Standard Fire Detection (SFD) (120 s) (with filter LF-AD)

M = Module S = Sensitivity (% obs/ft)

		Number of points (max. plus acceleration air sampling ports)																									
M	**S**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**24**	**25**	**26**	**27**
DM-Tx-01	0.005	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	0.009	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	0.018	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	0.037	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	–	–	–	–	-
DM-Tx-10	0.031	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	-
	0.061	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	–	–	–	–	–	–	–	–	–	–	–	–	-
	0.122	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-
	0.244	✔	✔	✔	✔	✔	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-
DM-Tx-50	0,152	✔	✔	✔	✔	✔	✔	✔	✔	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-
	0.305	✔	✔	✔	✔	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-

without pipe accessories

Pipe shape	**U_{Fan}[V]**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**24**	**25**	**26**	**27**	
I	6.9	492	492	426	426	426	426	426	426	426	360	360	360	360	360	360	360	-	-	-	-	-	-	-	-	-	-	**permitted total pipe length [ft]**
	≥9	656	656	590	590	590	590	492	492	492	426	426	426	426	426	426	426	426	426	426	426	-	-	-	-	-	-	
U	6.9	-	787	787	787	787	656	656	656	656	656	656	656	656	656	656	656	524	524	524	524	-	-	-	-	-	-	
	≥9	-	918	918	918	918	918	918	918	918	918	918	918	918	918	918	918	787	787	787	787	656	656	656	656	656	656	
M	6.9	-	-	787	787	787	787	688	688	688	688	688	688	688	688	688	557	557	557	557	557	557	-	-	-	-	-	
	≥9	-	-	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	787	787	787	787	787	
Double U (1 DM)	6.9	-	-	-	984	984	984	984	984	721	721	721	721	656	656	656	656	656	656	656	656	656	656	656	-	-	-	
	9	-	-	-	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	
	12	-	-	-	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	
Double U (2 DM)	6.9	-	-	-	721	721	721	721	721	721	721	721	721	656	656	656	656	656	656	656	656	656	656	656	-	-	-	
	9	-	-	-	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

with detector box and/or VSK 1)

Pipe shape	**U_{Fan}[V]**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**24**	**25**	**26**	**27**	
I	6.9	452	391	391	391	391	391	391	391	331	331	331	331	331	331	-	-	-	-	-	-	-	-	-	-	-	-	**permitted total pipe length [ft]**
	≥9	603	542	542	542	542	452	452	452	391	391	391	391	391	391	391	391	391	391	-	-	-	-	-	-	-	-	
U	6.9	-	724	724	724	603	603	603	603	482	482	482	482	482	482	482	482	482	482	-	-	-	-	-	-	-	-	
	≥9	-	844	844	844	844	844	844	844	844	844	844	844	844	844	724	724	724	724	603	603	603	603	603	482	482	482	
M	6.9	-	-	724	724	724	724	632	632	632	632	632	632	512	512	512	512	512	512	-	-	-	-	-	-	-	-	
	≥9	-	-	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	724	724	724	724	724	724	724	724	
Double U (1 DM)	6.9	-	-	-	905	905	905	905	905	663	663	663	663	603	603	603	603	603	603	603	603	-	-	-	-	-	-	
	9	-	-	-	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	
	12	-	-	-	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	905	
Double U (2 DM)	6.9	-	-	-	721	721	721	721	721	663	663	663	663	603	603	603	603	603	603	603	603	-	-	-	-	-	-	
	9	-	-	-	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

with steam trap 2)

Pipe shape	**U_{Fan}[V]**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**24**	**25**	**26**	**27**	
I	6.9	369	319	319	319	319	319	270	270	270	270	270	270	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**permitted total pipe length [ft]**
	≥9	492	442	442	442	369	369	319	319	319	319	319	319	319	319	319	-	-	-	-	-	-	-	-	-	-	-	
U	6.9	-	590	590	492	492	492	393	393	393	393	393	393	393	393	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	-	688	688	688	688	688	688	688	688	688	688	688	590	590	492	492	492	492	492	492	393	393	393	393	393	393	
M	6.9	-	-	590	516	516	516	516	516	516	417	417	417	417	417	417	-	-	-	-	-	-	-	-	-	-	-	
	≥9	-	-	738	738	738	738	738	738	738	738	738	738	738	738	738	591	591	591	591	591	591	591	591	516	516	516	
Double U (1 DM)	6.9	-	-	-	738	540	540	540	540	492	492	492	492	492	492	492	492	-	-	-	-	-	-	-	-	-	-	
	9	-	-	-	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	540	540	540	
	12	-	-	-	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	738	
Double U (2 DM)	6.9	-	-	-	721	540	540	540	540	492	492	492	492	492	492	492	492	-	-	-	-	-	-	-	-	-	-	
	9	-	-	-	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	540	540	540	
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

1) available for following pipe accessories:

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

2) available for following pipe accessories:

VSK (shut off valve)	and/or	DM-MB-TM-XX	and/or	MB2	and/or	KA-DN 25	and/or	KA-1

UL / NFPA Pipe design table

TITANUS *TOP SENS*® & *PRO SENS*® /NET With Acceleration Air Sampling Ports /S NFPA 72 Standard Fire Detection (SFD) (120 s) (with filter LF-AD)

M = Module S = Sensitivity (% obs/ft)

		Number of points (max. plus acceleration air sampling ports)																									
M	**S**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**36**	**37**	**40**	**41**	**43**	**44**	**45**	**46**	**48**	**49**	**51**	**52**	**53**	**56**	**57**	**58**	**63**	**64**	**65**
DM-Tx-01	0.005	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	0.009	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	0.018	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0.037	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DM-Tx-10	0.031	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0.061	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0.122	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0.244	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DM-Tx-50	0,152	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0.305	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

without pipe accessories

Pipe shape	**U_{Fan}[V]**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**36**	**37**	**40**	**41**	**43**	**44**	**45**	**46**	**48**	**49**	**51**	**52**	**53**	**56**	**57**	**58**	**63**	**64**	**65**	
I	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**permitted total pipe length [ft]**
	≥9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
U	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	656	524	524	524	524	524	524	524	524	524	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
M	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	787	787	787	787	787	787	688	688	688	688	688	688	688	688	688	688	688	688	590	590	590	590	590	590	-	-	
Double U (1 DM)	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	984	984	984	984	984	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	-	-	-	-	-	
	12	984	984	984	984	984	984	984	984	984	984	984	984	984	853	853	853	853	853	853	853	853	853	853	853	853	787	
Double U (2 DM)	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	-	-	-	-	-	
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

with detector box and/or VSK 1)

Pipe shape	**U_{Fan}[V]**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**36**	**37**	**40**	**41**	**43**	**44**	**45**	**46**	**48**	**49**	**51**	**52**	**53**	**56**	**57**	**58**	**63**	**64**	**65**	
I	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**permitted total pipe length [ft]**
	≥9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
U	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	482	482	482	482	482	482	482	482	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
M	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	724	724	724	632	632	632	632	632	632	632	632	632	632	632	542	542	542	542	542	542	542	542	-	-	-	-	
Double U (1 DM)	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	905	663	663	663	663	663	663	663	663	663	663	663	663	663	663	663	-	-	-	-	-	-	-	-	-	-	
	12	905	905	905	905	905	905	905	905	784	784	784	784	784	784	784	784	784	784	784	724	724	724	724	724	724	724	
Double U (2 DM)	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	721	663	663	663	663	663	663	663	663	663	663	663	663	663	663	663	-	-	-	-	-	-	-	-	-	-	
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

with steam trap 2)

Pipe shape	**U_{Fan}[V]**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**36**	**37**	**40**	**41**	**43**	**44**	**45**	**46**	**48**	**49**	**51**	**52**	**53**	**56**	**57**	**58**	**63**	**64**	**65**	
I	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**permitted total pipe length [ft]**
	≥9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
U	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	393	393	393	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
M	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	516	516	516	516	516	516	516	516	442	442	442	442	442	442	-	-	-	-	-	-	-	-	-	-	-	-	
Double U (1 DM)	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	540	540	540	540	540	540	540	540	540	540	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	12	738	639	639	639	639	639	639	639	639	639	590	590	590	590	590	590	590	590	590	590	590	590	590	590	590	-	
Double U (2 DM)	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	540	540	540	540	540	540	540	540	540	540	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

1) available for following pipe accessories:

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

2) available for following pipe accessories:

VSK (shut off valve)	and/or	DM-MB-TM-XX	and/or	MB2	and/or	KA-DN 25	and/or	KA-1

UL / NFPA Pipe design table

TITANUS *TOP SENS*® & *PRO SENS*® /NET With Acceleration Air Sampling Ports /S NFPA 72 Standard Fire Detection (SFD) (120 s) (with filter LF-AD)

M = Module S = Sensitivity (% obs/ft)

		Number of points (max. plus acceleration air sampling ports)				
M	**S**	**80**	**81**	**86**	**87**	**88**
DM-Tx-01	0.005	✔	✔	✔	✔	✔
	0.009	✔	✔	✔	–	–
	0.018	-	–	–	–	–
	0.037	-	–	–	–	–
DM-Tx-10	0.031	-	–	–	–	–
	0.061	-	–	–	–	–
	0.122	-	–	–	–	–
	0.244	-	–	–	–	–
DM-Tx-50	0,152	-	–	–	–	–
	0.305	-	–	–	–	–

without pipe accessories

Pipe shape	U_{Fan}[V]	80	81	86	87	88	permitted total pipe length [ft]
I	6.9	-	-	-	-	-	
	≥9	-	-	-	-	-	
U	6.9	-	-	-	-	-	
	≥9	-	-	-	-	-	
M	6.9	-	-	-	-	-	
	≥9	-	-	-	-	-	
Double U (1 DM)	6.9	-	-	-	-	-	
	9	-	-	-	-	-	
	12	787	787	787	787	787	
Double U (2 DM)	6.9	-	-	-	-	-	
	9	-	-	-	-	-	
	12	-	-	-	-	-	

with detector box and/or VSK [1]

Pipe shape	U_{Fan}[V]	80	81	86	87	88	permitted total pipe length [ft]
I	6.9	-	-	-	-	-	
	≥9	-	-	-	-	-	
U	6.9	-	-	-	-	-	
	≥9	-	-	-	-	-	
M	6.9	-	-	-	-	-	
	≥9	-	-	-	-	-	
Double U (1 DM)	6.9	-	-	-	-	-	
	9	-	-	-	-	-	
	12	724	-	-	-	-	
Double U (2 DM)	6.9	-	-	-	-	-	
	9	-	-	-	-	-	
	12	-	-	-	-	-	

with steam trap 2)

Pipe shape	U_{Fan}[V]	80	81	86	87	88	permitted total pipe length [ft]
I	6.9	-	-	-	-	-	
	≥9	-	-	-	-	-	
U	6.9	-	-	-	-	-	
	≥9	-	-	-	-	-	
M	6.9	-	-	-	-	-	
	≥9	-	-	-	-	-	
Double U (1 DM)	6.9	-	-	-	-	-	
	9	-	-	-	-	-	
	12	-	-	-	-	-	
Double U (2 DM)	6.9	-	-	-	-	-	
	9	-	-	-	-	-	
	12	-	-	-	-	-	

1) available for following pipe accessories:

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

2) available for following pipe accessories:

VSK (shut off valve)	and/or	DM-MB-TM-XX	and/or	MB2	and/or	KA-DN 25	and/or	KA-1

UL / NFPA Pipe design table

TITANUS *TOP SENS*® & *PRO SENS*® /NET With Acceleration Air Sampling Ports /S NFPA 72 Standard Fire Detection (SFD) (120 s) (with filter LF-AD-1)

M = Module S = Sensitivity (% obs/ft)

		Number of points (max. plus acceleration air sampling ports)																									
M	**S**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**24**	**25**	**27**	**28**
DM-Tx-01	0.005	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	0.009	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	0.018	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	0.037	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	–	–	–	–	–	-
DM-Tx-10	0.031	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	–	–	-
	0.061	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	–	–	–	–	–	–	–	–	–	–	–	–	–	-
	0.122	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-
	0.244	✔	✔	✔	✔	✔	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-
DM-Tx-50	0,152	✔	✔	✔	✔	✔	✔	✔	✔	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-
	0.305	✔	✔	✔	✔	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-

without pipe accessories

Pipe shape	U_{Fan}[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	24	25	27	28	
I	6.9	482	417	417	417	417	417	417	417	417	352	352	352	352	352	352	-	-	-	-	-	-	-	-	-	-	-	permitted total pipe length [ft]
	≥9	642	578	578	578	578	482	482	482	417	417	417	417	417	417	417	417	417	417	417	-	-	-	-	-	-	-	
U	6.9	-	771	771	771	706	706	706	706	642	642	642	642	642	642	642	642	642	642	-	-	-	-	-	-	-	-	
	≥9	-	899	899	899	899	899	899	899	899	899	899	899	899	899	771	771	771	771	771	771	642	642	642	642	642	642	
M	6.9	-	-	771	771	771	771	674	674	674	674	674	674	674	674	674	545	545	545	-	-	-	-	-	-	-	-	
	≥9	-	-	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	771	771	771	771	771	
Double U (1 DM)	6.9	-	-	-	964	964	964	964	964	771	771	771	771	642	642	642	642	642	642	642	642	-	-	-	-	-	-	
	9	-	-	-	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	
	12	-	-	-	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	
Double U (2 DM)	6.9	-	-	-	721	721	721	721	721	721	721	721	721	642	642	642	642	642	642	642	642	-	-	-	-	-	-	
	9	-	-	-	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

with detector box and/or VSK 1)

Pipe shape	U_{Fan}[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	24	25	27	28	
I	6.9	383	383	383	383	383	383	383	383	323	323	323	323	323	-	-	-	-	-	-	-	-	-	-	-	-	-	permitted total pipe length [ft]
	≥9	531	531	531	531	443	443	443	383	383	383	383	383	383	383	383	383	383	-	-	-	-	-	-	-	-	-	
U	6.9	-	709	649	649	649	649	590	590	590	590	590	590	590	590	590	590	-	-	-	-	-	-	-	-	-	-	
	≥9	-	827	827	827	827	827	827	827	827	827	827	827	709	709	709	709	709	709	590	590	590	590	590	471	471	471	
M	6.9	-	-	709	620	620	620	620	620	620	620	620	620	501	501	501	-	-	-	-	-	-	-	-	-	-	-	
	≥9	-	-	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	709	709	709	709	709	709	709	620	
Double U (1 DM)	6.9	-	-	-	886	709	709	709	709	709	709	709	709	590	590	590	590	-	-	-	-	-	-	-	-	-	-	
	9	-	-	-	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	649	649	649	
	12	-	-	-	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	
Double U (2 DM)	6.9	-	-	-	721	709	709	709	709	709	709	709	709	590	590	590	590	-	-	-	-	-	-	-	-	-	-	
	9	-	-	-	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	649	649	649	
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

with steam trap 2)

Pipe shape	U_{Fan}[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	24	25	27	28	
I	6.9	312	312	312	312	312	312	264	264	264	264	264	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	permitted total pipe length [ft]
	≥9	433	433	433	361	361	361	312	312	312	312	312	312	312	312	-	-	-	-	-	-	-	-	-	-	-	-	
U	6.9	-	578	529	529	481	481	481	481	481	481	481	481	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	-	674	674	674	674	674	674	674	674	674	578	578	578	578	481	481	481	481	481	481	384	384	384	384	384	384	
M	6.9	-	-	578	505	505	505	505	505	505	408	408	408	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	-	-	723	723	723	723	723	723	723	723	723	723	723	723	723	578	578	578	578	578	578	505	505	505	505	505	
Double U (1 DM)	6.9	-	-	-	723	578	578	578	578	481	481	481	481	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	-	-	-	723	723	723	723	723	723	723	723	723	723	723	723	723	723	723	723	723	529	529	529	529	529	529	
	12	-	-	-	723	723	723	723	723	723	723	723	723	723	723	723	723	723	723	723	723	723	723	723	626	626	626	
Double U (2 DM)	6.9	-	-	-	721	578	578	578	578	481	481	481	481	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	-	-	-	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	529	529	529	529	529	529	
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

1) available for following pipe accessories:

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

2) available for following pipe accessories:

VSK (shut off valve)	and/or	DM-MB-TM-XX	and/or	MB2	and/or	KA-DN 25	and/or	KA-1

UL / NFPA Pipe design table

TITANUS *TOP SENS*® & *PRO SENS*® /NET With Acceleration Air Sampling Ports /S NFPA 72 Standard Fire Detection (SFD) (120 s) (with filter LF-AD-1)

M = Module S = Sensitivity (% obs/ft)

		Number of points (max. plus acceleration air sampling ports)																									
M	**S**	**29**	**31**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**44**	**45**	**46**	**49**	**50**	**52**	**53**	**54**	**55**	**56**	**57**	**60**	**61**	**72**	**73**	**80**
DM-Tx-01	0.005	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	0.009	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	0.018	✔	✔	✔	✔	✔	✔	✔	✔	✔	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-
	0.037	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-
DM-Tx-10	0.031	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-
	0.061	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-
	0.122	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-
	0.244	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-
DM-Tx-50	0,152	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-
	0.305	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

without pipe accessories

Pipe shape	U_{Fan}[V]	29	31	34	35	36	37	38	39	40	41	44	45	46	49	50	52	53	54	55	56	57	60	61	72	73	80	
I	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	permitted total pipe length [ft]
	≥9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
U	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	513	513	513	513	513	513	513	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
M	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	771	674	674	674	674	674	674	674	674	674	674	674	674	674	578	578	578	578	578	578	578	578	-	-	-	-	
Double U (1 DM)	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	706	706	706	706	706	706	706	706	706	706	706	706	706	706	706	706	-	-	-	-	-	-	-	-	-	-	
	12	964	964	964	964	964	964	964	964	964	835	835	835	835	835	835	835	835	835	835	835	835	835	803	803	803	803	
Double U (2 DM)	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	706	706	706	706	706	706	706	706	706	706	706	706	706	706	706	706	-	-	-	-	-	-	-	-	-	-	
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

with detector box and/or VSK 1)

Pipe shape	U_{Fan}[V]	29	31	34	35	36	37	38	39	40	41	44	45	46	49	50	52	53	54	55	56	57	60	61	72	73	80	
I	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	permitted total pipe length [ft]
	≥9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
U	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	471	471	471	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
M	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	620	620	620	620	620	620	620	620	620	620	620	620	531	531	531	531	531	531	-	-	-	-	-	-	-	-	
Double U (1 DM)	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	649	649	649	649	649	649	649	649	649	649	649	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	12	886	886	768	768	768	768	768	768	768	768	768	768	768	738	738	738	738	738	738	738	738	738	738	738	-	-	
Double U (2 DM)	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	649	649	649	649	649	649	649	649	649	649	649	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

with steam trap 2)

Pipe shape	U_{Fan}[V]	29	31	34	35	36	37	38	39	40	41	44	45	46	49	50	52	53	54	55	56	57	60	61	72	73	80	
I	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	permitted total pipe length [ft]
	≥9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
U	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
M	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	505	505	505	505	505	433	433	433	433	433	433	433	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Double U (1 DM)	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	529	529	529	529	529	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	12	626	626	626	626	626	602	602	602	602	602	602	602	602	602	602	602	602	602	602	602	-	-	-	-	-	-	
Double U (2 DM)	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	529	529	529	529	529	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

1) available for following pipe accessories:

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

2) available for following pipe accessories:

VSK (shut off valve)	and/or	DM-MB-TM-XX	and/or	MB2	and/or	KA-DN 25	and/or	KA-1

UL / NFPA Pipe design table

TITANUS *TOP SENS*® & *PRO SENS*® /NET With Acceleration Air Sampling Ports /S NFPA 72 Standard Fire Detection (SFD) (120 s) (with filter LF-AD-2)

M = Module S = Sensitivity (% obs/ft)

		Number of points (max. plus acceleration air sampling ports)																								
M	**S**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**27**
DM-Tx-01	0.005	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	0.009	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	0.018	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	0.037	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	–	–	–	–	–	–	–	-
DM-Tx-10	0.031	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	–	–	–	–	-
	0.061	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	–	–	–	–	–	–	–	–	–	–	–	–	–	-
	0.122	✔	✔	✔	✔	✔	✔	✔	✔	✔	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-
	0.244	✔	✔	✔	✔	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-
DM-Tx-50	0,152	✔	✔	✔	✔	✔	✔	✔	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-
	0.305	✔	✔	✔	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-

without pipe accessories

Pipe shape	U_{Fan}[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	27	
I	6.9	482	417	417	417	417	417	417	417	417	352	352	352	352	352	352	-	-	-	-	-	-	-	-	-	-	-	**permitted total pipe length [ft]**
	≥9	642	578	578	578	578	482	482	482	417	417	417	417	417	417	417	417	417	417	417	-	-	-	-	-	-	-	
U	6.9	-	771	771	771	706	706	706	706	642	642	642	642	642	642	642	642	642	642	-	-	-	-	-	-	-	-	
	≥9	-	899	899	899	899	899	899	899	899	899	899	899	899	899	771	771	771	771	771	771	642	642	642	642	642	642	
M	6.9	-	-	771	771	771	771	674	674	674	674	674	674	674	674	674	545	545	545	-	-	-	-	-	-	-	-	
	≥9	-	-	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	771	771	771	771	771	
Double U (1 DM)	6.9	-	-	-	964	964	964	964	964	771	771	771	771	642	642	642	642	642	642	642	642	-	-	-	-	-	-	
	9	-	-	-	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	
	12	-	-	-	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	964	
Double U (2 DM)	6.9	-	-	-	721	721	721	721	721	721	721	721	721	642	642	642	642	642	642	642	642	-	-	-	-	-	-	
	9	-	-	-	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

with detector box and/or VSK 1)

Pipe shape	U_{Fan}[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	27	
I	6.9	383	383	383	383	383	383	383	383	323	323	323	323	323	-	-	-	-	-	-	-	-	-	-	-	-	-	**permitted total pipe length [ft]**
	≥9	531	531	531	531	443	443	443	383	383	383	383	383	383	383	383	383	383	-	-	-	-	-	-	-	-	-	
U	6.9	-	709	649	649	649	649	590	590	590	590	590	590	590	590	590	590	-	-	-	-	-	-	-	-	-	-	
	≥9	-	827	827	827	827	827	827	827	827	827	827	827	709	709	709	709	709	709	590	590	590	590	590	590	471	471	
M	6.9	-	-	709	620	620	620	620	620	620	620	620	620	501	501	501	-	-	-	-	-	-	-	-	-	-	-	
	≥9	-	-	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	709	709	709	709	709	709	709	709	
Double U (1 DM)	6.9	-	-	-	886	709	709	709	709	709	709	709	709	590	590	590	590	-	-	-	-	-	-	-	-	-	-	
	9	-	-	-	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	649	649	
	12	-	-	-	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	886	
Double U (2 DM)	6.9	-	-	-	721	709	709	709	709	709	709	709	709	590	590	590	590	-	-	-	-	-	-	-	-	-	-	
	9	-	-	-	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	649	649	
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

with steam trap 2)

Pipe shape	U_{Fan}[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	27	
I	6.9	312	312	312	312	312	312	264	264	264	264	264	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**permitted total pipe length [ft]**
	≥9	433	433	433	361	361	361	312	312	312	312	312	312	312	312	-	-	-	-	-	-	-	-	-	-	-	-	
U	6.9	-	578	529	529	481	481	481	481	481	481	481	481	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	-	674	674	674	674	674	674	674	674	674	578	578	578	578	481	481	481	481	481	481	384	384	384	384	384	384	
M	6.9	-	-	578	505	505	505	505	505	505	408	408	408	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	-	-	723	723	723	723	723	723	723	723	723	723	723	723	723	578	578	578	578	578	578	505	505	505	505	505	
Double U (1 DM)	6.9	-	-	-	723	578	578	578	578	481	481	481	481	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	-	-	-	723	723	723	723	723	723	723	723	723	723	723	723	723	723	723	723	723	529	529	529	529	529	529	
	12	-	-	-	723	723	723	723	723	723	723	723	723	723	723	723	723	723	723	723	723	723	723	723	723	626	626	
Double U (2 DM)	6.9	-	-	-	721	578	578	578	578	481	481	481	481	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	-	-	-	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	529	529	529	529	529	529	
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

1) available for following pipe accessories:

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

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M = Module S = Sensitivity (% obs/ft)

		Number of points (max. plus acceleration air sampling ports)																									
M	**S**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**44**	**45**	**46**	**49**	**50**	**52**	**53**	**54**	**55**	**56**	**57**	**60**
DM-Tx-01	0.005	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	0.009	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	0.018	✔	✔	✔	✔	✔	✔	✔	✔	✔	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-
	0.037	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-
DM-Tx-10	0.031	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-
	0.061	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-
	0.122	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-
	0.244	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-
DM-Tx-50	0,152	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-
	0.305	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-

without pipe accessories

Pipe shape	**U_{Fan}[V]**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**44**	**45**	**46**	**49**	**50**	**52**	**53**	**54**	**55**	**56**	**57**	**60**	**permitted total pipe length [ft]**
I	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
U	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	642	513	513	513	513	513	513	513	513	513	513	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
M	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	771	771	771	674	674	674	674	674	674	674	674	674	674	674	674	674	674	674	578	578	578	578	578	578	578	578	
Double U (1 DM)	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	964	706	706	706	706	706	706	706	706	706	706	706	706	706	706	706	706	706	706	706	-	-	-	-	-	-	
	12	964	964	964	964	964	964	964	964	964	964	964	964	964	835	835	835	835	835	835	835	835	835	835	835	835	835	
Double U (2 DM)	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	721	706	706	706	706	706	706	706	706	706	706	706	706	706	706	706	706	706	706	706	-	-	-	-	-	-	
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

with detector box and/or VSK 1)

Pipe shape	**U_{Fan}[V]**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**44**	**45**	**46**	**49**	**50**	**52**	**53**	**54**	**55**	**56**	**57**	**60**	**permitted total pipe length [ft]**
I	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
U	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	471	471	471	471	471	471	471	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
M	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	620	531	531	531	531	531	531	-	-	-	-	
Double U (1 DM)	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	649	649	649	649	649	649	649	649	649	649	649	649	649	649	649	-	-	-	-	-	-	-	-	-	-	-	
	12	886	886	886	886	886	768	768	768	768	768	768	768	768	768	768	768	768	738	738	738	738	738	738	738	738	738	
Double U (2 DM)	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	649	649	649	649	649	649	649	649	649	649	649	649	649	649	649	-	-	-	-	-	-	-	-	-	-	-	
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

with steam trap 2)

Pipe shape	**U_{Fan}[V]**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**44**	**45**	**46**	**49**	**50**	**52**	**53**	**54**	**55**	**56**	**57**	**60**	**permitted total pipe length [ft]**
I	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
U	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	384	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
M	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	≥9	505	505	505	505	505	505	505	505	505	433	433	433	433	433	433	433	-	-	-	-	-	-	-	-	-	-	
Double U (1 DM)	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	529	529	529	529	529	529	529	529	529	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	12	626	626	626	626	626	626	626	626	626	602	602	602	602	602	602	602	602	602	602	602	602	602	602	602	-	-	
Double U (2 DM)	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	529	529	529	529	529	529	529	529	529	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

1) available for following pipe accessories:

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

2) available for following pipe accessories:

VSK (shut off valve)	and/or	DM-MB-TM-XX	and/or	MB2	and/or	KA-DN 25	and/or	KA-1

UL / NFPA Pipe design table

TITANUS *TOP SENS*® & *PRO SENS*® /NET With Acceleration Air Sampling Ports /S NFPA 72 Standard Fire Detection (SFD) (120 s) (with filter LF-AD-2)

M = Module S = Sensitivity (% obs/ft)

		Number of points (max. plus acceleration air sampling ports)			
M	**S**	**61**	**72**	**73**	**80**
DM-Tx-01	0.005	✔	✔	✔	✔
	0.009	✔	✔	-	-
	0.018	-	-	-	-
	0.037	-	-	-	-
DM-Tx-10	0.031	-	-	-	-
	0.061	-	-	-	-
	0.122	-	-	-	-
	0.244	-	-	-	-
DM-Tx-50	0,152	-	-	-	-
	0.305	-	-	-	-

without pipe accessories

Pipe shape	U_{Fan}[V]	61	72	73	80	permitted total pipe length [ft]
I	6.9	-	-	-	-	
	≥9	-	-	-	-	
U	6.9	-	-	-	-	
	≥9	-	-	-	-	
M	6.9	-	-	-	-	
	≥9	-	-	-	-	
Double U (1 DM)	6.9	-	-	-	-	
	9	-	-	-	-	
	12	803	803	803	803	
Double U (2 DM)	6.9	-	-	-	-	
	9	-	-	-	-	
	12	-	-	-	-	

with detector box and/or VSK [1]

Pipe shape	U_{Fan}[V]	61	72	73	80	permitted total pipe length [ft]
I	6.9	-	-	-	-	
	≥9	-	-	-	-	
U	6.9	-	-	-	-	
	≥9	-	-	-	-	
M	6.9	-	-	-	-	
	≥9	-	-	-	-	
Double U (1 DM)	6.9	-	-	-	-	
	9	-	-	-	-	
	12	738	738	-	-	
Double U (2 DM)	6.9	-	-	-	-	
	9	-	-	-	-	
	12	-	-	-	-	

with steam trap 2)

Pipe shape	U_{Fan}[V]	61	72	73	80	permitted total pipe length [ft]
I	6.9	-	-	-	-	
	≥9	-	-	-	-	
U	6.9	-	-	-	-	
	≥9	-	-	-	-	
M	6.9	-	-	-	-	
	≥9	-	-	-	-	
Double U (1 DM)	6.9	-	-	-	-	
	9	-	-	-	-	
	12	-	-	-	-	
Double U (2 DM)	6.9	-	-	-	-	
	9	-	-	-	-	
	12	-	-	-	-	

1) available for following pipe accessories:

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

2) available for following pipe accessories:

VSK (shut off valve)	and/or	DM-MB-TM-XX	and/or	MB2	and/or	KA-DN 25	and/or	KA-1

UL / NFPA Pipe design table

TITANUS *TOP SENS*® & *PRO SENS*® /NET With Acceleration Air Sampling Ports /S NFPA 72 Standard Fire Detection (SFD) (120 s) (with filter SF-xxx)

M = Module S = Sensitivity (% obs/ft)

		Number of points (max. plus acceleration air sampling ports)																				
M	**S**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
DM-Tx-01	0.005	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	0.009	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	–	–	–	–	–	–	–	–	–
	0.018	✔	✔	✔	✔	✔	✔	✔	✔	✔	–	–	–	–	–	–	–	–	–	–	–	–
	0.037	✔	✔	✔	✔	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
DM-Tx-10	0.031	✔	✔	✔	✔	✔	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	0.061	✔	✔	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	0.122	✔	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	0.244	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
DM-Tx-50	0,152	✔	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	0.305	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

without pipe accessories

Pipe shape	U_{Fan}[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
I	6.9	400	400	400	400	400	400	400	400	400	338	338	338	338	338	338	-	-	-	-	-	-	**permitted total pipe length [ft]**
	≥9	554	554	554	554	554	462	462	462	400	400	400	400	400	400	400	400	400	400	-	-	-	
U	6.9	-	739	739	739	677	677	677	677	616	616	616	616	616	616	616	616	616	616	-	-	-	
	≥9	-	862	862	862	862	862	862	862	862	862	862	862	862	862	739	739	739	739	739	739	616	
M	6.9	-	-	739	646	646	646	646	646	646	646	646	646	646	646	646	523	523	523	-	-	-	
	≥9	-	-	924	924	924	924	924	924	924	924	924	924	924	924	924	924	924	924	924	924	924	
Double U (1 DM)	6.9	-	-	-	924	739	739	739	739	616	616	616	616	616	616	616	616	616	616	616	616	-	
	9	-	-	-	924	924	924	924	924	924	924	924	924	924	924	924	924	924	924	924	924	924	
	12	-	-	-	924	924	924	924	924	924	924	924	924	924	924	924	924	924	924	924	924	924	
Double U (2 DM)	6.9	-	-	-	721	721	721	721	721	616	616	616	616	616	616	616	616	616	616	616	616	-	
	9	-	-	-	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

with detector box and/or VSK [1])

Pipe shape	U_{Fan}[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
I	6.9	368	368	368	368	368	368	368	368	310	310	310	310	310	-	-	-	-	-	-	-	-	**permitted total pipe length [ft]**
	≥9	509	509	509	509	425	425	425	368	368	368	368	368	368	368	368	368	-	-	-	-	-	
U	6.9	-	679	622	622	622	622	566	566	566	566	566	566	566	566	566	566	-	-	-	-	-	
	≥9	-	739	739	739	739	739	739	739	739	739	739	739	679	679	679	679	679	679	566	566	566	
M	6.9	-	-	594	594	594	594	594	594	594	594	594	594	481	481	481	-	-	-	-	-	-	
	≥9	-	-	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	679	679	679	
Double U (1 DM)	6.9	-	-	-	679	679	679	679	679	566	566	566	566	566	566	566	566	-	-	-	-	-	
	9	-	-	-	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	622	
	12	-	-	-	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	
Double U (2 DM)	6.9	-	-	-	679	679	679	679	679	566	566	566	566	566	566	566	566	-	-	-	-	-	
	9	-	-	-	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	721	
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

with *OXY·SENS*® or steam trap [2])

Pipe shape	U_{Fan}[V]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
I	6.9	300	300	300	300	300	300	253	253	253	253	253	-	-	-	-	-	-	-	-	-	-	**permitted total pipe length [ft]**
	≥9	415	415	415	346	346	346	300	300	300	300	300	300	300	-	-	-	-	-	-	-	-	
U	6.9	-	554	507	507	462	462	462	462	462	462	462	462	-	-	-	-	-	-	-	-	-	
	≥9	-	646	646	646	646	646	646	646	554	554	554	554	554	554	462	462	462	462	462	462	369	
M	6.9	-	-	484	484	484	484	484	484	484	392	392	392	-	-	-	-	-	-	-	-	-	
	≥9	-	-	693	693	693	693	693	693	693	693	693	693	554	554	554	554	554	554	484	484	484	
Double U (1 DM)	6.9	-	-	-	554	462	462	462	462	462	462	462	462	-	-	-	-	-	-	-	-	-	
	9	-	-	-	693	693	693	693	693	693	693	693	693	693	693	693	693	693	693	693	693	507	
	12	-	-	-	693	693	693	693	693	693	693	693	693	693	693	693	693	693	693	693	693	600	
Double U (2 DM)	6.9	-	-	-	554	462	462	462	462	462	462	462	462	-	-	-	-	-	-	-	-	-	
	9	-	-	-	693	693	693	693	693	693	693	693	693	693	693	693	693	693	693	693	693	507	
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

1) available for following pipe accessories:

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

2) available for following pipe accessories:

VSK (shut off valve)	and/or	DM-MB-TM-XX	and/or	MB2	and/or	KA-DN 25	and/or	KA-1

TITANUS PRO·SENS/net UL-

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order no.	description	unit

Air Sampling Smoke Detection Systems

AD-05-5415	basic device TITANUS PRO·SENS	pc.
<P> < >	type TP-3-U	
<2> <>		
AD-05-5420	basic device TITANUS PRO·SENS	pc.
<P> < >	type TP-3-F-U	
<2> <>		
AD-05-5425	basic device TITANUS PRO·SENS	pc.
<P> < >	type TP-3-SL-U	
<2> <>		
AD-05-5430	basic device TITANUS PRO·SENS	pc.
<P> < >	type TP-4-U	
<2> <>		
AD-05-5435	basic device TITANUS PRO·SENS	pc.
<P> < >	type TP-4-F-U	
<2> <>		
AD-05-5440	basic device TITANUS PRO·SENS	pc.
<P> < >	type TP-4-SL-U	
<2> <>		
AD-05-5445	basic device TITANUS PRO·SENS	pc.
<P> < >	type TP-5-U	
<2> <>		
AD-05-5450	basic device TITANUS PRO·SENS	pc.
<P> < >	type TP-5-F-U	
<2> <>		
AD-05-5455	basic device TITANUS PRO·SENS	pc.
<P> < >	type TP-5-SL-U	
<2> <>		

TITANUS PRO·SENS/net UL-

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order no.	description	unit

TITANUS detector modules

AD-10-5430	detector module TITANUS TOP·SENS	pc.
<P> < >	type DM-TT-10-L-U	
<2> <>		
AD-10-5435	detector module TITANUS TOP·SENS	pc.
<P> < >	type DM-TT-01-L-U	
<2> <>		
AD-10-5440	detector module TITANUS TOP·SENS	pc.
<P> < >	type DM-TT-50-L-U	
<2> <>		
AD-10-5445	detector module TITANUS TOP·SENS	pc.
<P> < >	type DM-TT-10-L-F-U	
<2> <>		
AD-10-5450	detector module TITANUS TOP·SENS	pc.
<P> < >	type DM-TT-01-L-F-U	
<2> <>		
AD-10-5455	detector module TITANUS TOP·SENS	pc.
<P> < >	type DM-TT-50-L-F-U	
<2> <>		

TITANUS PRO·SENS/net UL-

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order no.	description	unit

Front Film Sheets

AD-10-1035	front film sheet TITANUS PRO·SENS	pc.
<P> < >	type FW-TP-1	
<2> <>		
AD-10-1037	front film sheet TITANUS PRO·SENS 2	pc.
<P> < >	type FW-TP-2	
<2> <>		
AD-10-1065	front film sheet TITANUS PRO·SENS	pc.
<P> < >	type FW-TP-1p	
<2> <>		
AD-10-1075	front film sheet TITANUS PRO·SENS	pc.
<P> < >	type FW-TP-3	
<2> <>		
AD-10-1076	front film sheet TITANUS PRO·SENS	pc.
<P> < >	type FW-TP-4	
<2> <>		
AD-10-1077	front film sheet TITANUS PRO·SENS 2	pc.
<P> < >	type FW-TP-5	
<2> <>		
AD-10-1078	front film sheet TITANUS PRO·SENS	pc.
<P> < >	type FW-TP-6	
<2> <>		
AD-10-1165	front film sheet TITANUS PRO·SENS	pc.
<P> < >	type FW-TP-7	
<2> <>		
AD-10-1167	front film sheet TITANUS PRO·SENS	pc.
<P> < >	type FW-TP-8	
<2> <>		
AD-10-1169	front film sheet TITANUS PRO·SENS	pc.
<P> < >	type FW-TP-9	
<2> <>		

TITANUS PRO·SENS/net UL-

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order no.	description	unit

Pipe System, Halogen-free

01-10-8040	ABS Pipe-Adapter	pc.
<P> < >	type A-25-3/4	
<3> <>		

TITANUS PRO·SENS/net UL-

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order no.	description	unit

Accessories

01-10-9245	pipe adapter	pc.
<P> < >	type PA-Y-P	
<2> <>		
01-10-9255	pipe adapter	pc.
<P> < >	type PA-Y-A	
<2> <>		
09-20-6440	Network module TITANUS	pc.
<P> < >	type NU-5	
<2> <>		
09-20-6445	Network module TITANUS	pc.
<P> < >	type NU-5-D	
<2> <>		
09-20-6450	Record module TITANUS	pc.
<P> < >	type NU-5-DO	
<2> <>		
09-20-6455	Network module TITANUS	pc.
<P> < >	type NU-5-D-F	
<2> <>		
09-20-6460	Record module TITANUS	pc.
<P> < >	type NU-5-DO-F	
<2> <>		
AD-05-0492	installation kit for add. modules	pc.
<P> < >	type KT-HS-1	
<2> <>		
AD-05-0530	extension kit "IP52"	pc.
<P> < >	type KT-HS-2	
<2> <>		
AD-05-0540	extension kit "dust protection"	pc.
<P> < >	type KT-HS-3	
<2> <>		
AD-05-0563	diagnostic tool	pc.
<P> < >	type DIAG 3/a	
<2> <>		

TITANUS PRO·SENS/net UL-

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order no.	description	unit
AD-05-0930	cable glands	pc.
<P> < >	type M20-MS (PU=100 Pcs.)	
<0> <>		
AD-05-0940	cable glands	pc.
<P> < >	type M25-MS (PU=100 Pcs.)	
<0> <>		
AD-05-0950	cable glands	pc.
<P> < >	type M20 (PU=100 pcs.)	
<0> <>		
AD-05-0955	cable glands	pc.
<P> < >	type M25 (PU=100 pcs.)	
<0> <>		
AD-05-0960	screwable cable glands	pc.
<P> < >	type Snaptec M20 (PU=50 pcs.)	
<0> <>		
AD-05-0970	screwable cable glands	pc.
<P> < >	type Snaptec M25 (PU=50 pcs.)	
<0> <>		
AD-05-1305	remote display unit TITANUS PROSENS /net	pc.
<P> < >	type RD-TP	
<2> <>		
AD-05-1400	remote display unit TIANUS PRO·SENS /net	pc.
<P> < >	type RDW-TP-19"	
<2> <>		
AD-05-1405	remote display unit ITANUS PRO·SENS	pc.
<P> < >	type RDW-TP-4-19"	
<2> <>		
AD-05-1406	remote display unit ITANUS PRO·SENS	pc.
<P> < >	type RDW-TP-4-19"	
<2> <>		
AD-05-1410	remote display unit TITANUS PRO·SENS 2	pc.
<P> < >	type RDW-TP2-19"	
<2> <>		

TITANUS PRO·SENS/net UL-

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order no.	description	unit
AD-05-1415	remote display unit TITANUS PRO·SENS 2	pc.
<P> < >	type RDW-TP2-4-19"	
<2> <>		
AD-05-1416	remote display unit TITANUS PRO·SENS 2	pc.
<P> < >	type RDW-TP2-4-19"	
<2> <>		
AD-05-1420	front film sheet for remote display unit	pc.
<P> < >	type FW-RD-TP	
<2> <>		
AD-05-1430	front film sheet for remote display unit	pc.
<P> < >	type FW-RD-TP2	
<2> <>		
AD-05-1435	front film sheet for remote display unit	pc.
<P> < >	type FW-RD-TP-4	
<2> <>		
AD-05-1437	front film sheet for remote display unit	pc.
<P> < >	type FW-RD-TP-6	
<2> <>		
AD-05-1440	front film sheet for remote display unit	pc.
<P> < >	type FW-RD-TP-5	
<2> <>		
AD-05-1442	front film sheet for remote display unit	pc.
<P> < >	type FW-RD-TP-7	
<2> <>		
AD-05-1912	retrofit kit for smoke aspirators	pc.
<P> < >	type HS-SL	
<2> <>		
AD-10-0250	device support for air sampling systems	pair
<P> < >	type MT-1	
<2> <>		
AD-10-0305	blind plate for remote display unit	pc.
<P> < >	type BP-RD-2	
<2> <>		

TITANUS PRO·SENS/net UL-

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order no.	description	unit
AD-10-0550	test pipe for air sampling systems	pc.
<P> < >	type DIAG-Pipe	
<2> <>		
AD-10-4730	TITANUS Networktools	pc.
<P> < >	type CD-1	
<0> <>		

TITANUS PRO·SENS/net UL-

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order no.	description	unit

Spare Parts

09-20-1440	display board	pc.
<P> < >	type DB-TP-3	
<2> <>		
09-20-1450	display board	pc.
<P> < >	type DB-TT	
<2> <>		
09-20-5995	switch power supply for remote display	pc.
<P> < >	type E599.2	
<2> <>		
09-20-6180	display board	pc.
<P> < >	type DB-SU-2	
<2> <>		
09-20-6260	base board TITANUS PROSENS	pc.
<P> < >	type BB-TP-3	
<2> <>		
09-20-6270	base board TITANUS PROSENS	pc.
<P> < >	type BB-TP-3-F	
<2> <>		
09-20-6280	base board TITANUS PROSENS	pc.
<P> < >	type BB-TP-4	
<2> <>		
09-20-6281	base board TITANUS PROSENS	pc.
<P> < >	type BB-TP-4	
<2> <>		
09-20-6282	base board TITANUS PROSENS	pc.
<P> < >	type BB-TP-5	
<2> <>		
09-20-6290	base board TITANUS PROSENS	pc.
<P> < >	type BB-TP-4-F	
<2> <>		
09-20-6292	base board TITANUS PROSENS	pc.
<P> < >	type BB-TP-5-F	
<2> <>		

TITANUS PRO·SENS/net UL-

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order no.	description	unit
09-20-6300	connecting board	pc.
<P> < >	type CB-1	
<2> <>		
09-20-6302	connecting board	pc.
<P> < >	type CB-2	
<0> <>		
09-20-6825	fan control for air sampling devices	pc.
<P> < >	type FC-2	
<2> <>		
09-20-6830	fan control for air sampling devices	pc.
<P> < >	type FC-3	
<2> <>		
AD-05-0268	housing for remote display unit	pc.
<P> < >	type HS-RD	
<0> <>		
AD-05-0505	housing for air sampling systems	pc.
<P> < >	type HS-1/a	
<2> <>		
AD-05-0506	housing lid	pc.
<P> < >	type HS-1-GD	
<2> <>		
AD-05-0520	housing for air sampling systems	pc.
<P> < >	type HS-1-F/a	
<2> <>		
AD-05-0535	TITANUS-label	pc.
<P> < >	type ST-S1	
<2> <>		
AD-05-0570	transport case for diagnostic tool	pc.
<P> < >	type DIAG-Case	
<0> <>		
AD-05-0575	adapter cable for diagnostic interface	pc.
<P> < >	type AC-DIAG 3	
<0> <>		

TITANUS PRO·SENS/net UL-

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order no.	description	unit
AD-05-0578	connecting cable f. diagnostic interface	pc.
<P> < >	type CC-DIAG 3	
<0> <>		
AD-05-0628	diagnostic interface	pc.
<P> < >	type IF-DIAG 3	
<2> <>		
AD-05-0635	holding device for diagnostic interface	pc.
<P> < >	type DIAG 3-Clip/a	
<0> <>		
AD-05-0637	holding device for diagnostic interface	pc.
<P> < >	type DB-DIAG 3-TM	
<0> <>		
AD-05-0639	holding device for diagnostic interface	pc.
<P> < >	type DB-DIAG 3-TR	
<0> <>		
AD-05-1908	housing for air sampling systems	pc.
<P> < >	type HS-3	
<2> <>		
AD-10-4600	connecting cable	pc.
<P> < >	type CC-DM	
<2> <>		
AD-10-4620	sealing kit for detector module	set
<P> < >	type SL-DM (VE=10 Sets)	
<2> <>		
AD-10-4630	cover plate	pc.
<P> < >	type CP-HS-1 (VE=10 pc.)	
<2> <>		
AD-10-4660	Connecting cable	pc.
<P> < >	type CC-NU	
<2> <>		
AD-10-4720	Storage card	pc.
<P> < >	type SC-1	
<0> <>		

TITANUS PRO·SENS/net UL-

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order no.	description	unit
AD-10-4725	Storage card	pc.
<P> < >	type SC-1-F	
<0> <>		
AD-10-4740	Battery	pc.
<P> < >	type BT-1	
<0> <>		

Inspection Protocol for Air Sampling Smoke Detection System, type TITANUS *PRO·SENS*® /net

device number							
serial number basic device							
serial number detector module							
		measure/setting values	measure/setting values	measure/setting values	measure/setting values	measure/setting values	measure/setting values
Commissioning							
visual check	(✓/ –)						
under-pressure	[Pa]						
sensitivity	[%/ft]						
alarm delay	[s]						
fault transmission delay	[min]						
activating threshold	(lo/med/hi/v.hi)						
fault latched	(yes/no)						
LOGIC · SENS	(yes/no)						
air pressure-dependent adjustment	(yes/no)						
air pressure-independent adjustment	(yes/no)						
altitude	[ft above sea l]						
air pressure	[hPa]						
temperature	[°F]						
Fault: Blockage							
LED flashes	(✓/ –)						
relay drops out after delay period	(✓/ –)						
signal transmission to CFP	(✓/ –)						
cause removed, LED off	(✓/ –)						
relay active after dropping below threshhold	(✓/ –)						
cause removed, LED latched	(✓/ –)						
relay remains dropped out	(✓/ –)						
Fault: Fracture							
LED flashes	(✓/ –)						
relay drops out after delay period	(✓/ –)						
signal transmission to CFP	(✓/ –)						
cause removed, LED off	(✓/ –)						
relay active after droping below threshold	(✓/ –)						
cause removed, LED latched	(✓/ –)						
relay remains dropped out	(✓/ –)						
Infoalarm							
LED flashes	(✓/ –)						
relay activated after delay period	(✓/ –)						
signal transmission to CFP	(✓/ –)						
LED latched	(✓/ –)						
relay latched	(✓/ –)						
Pre Alarm							
LED flashes	(✓/ –)						
relay activated after delay period	(✓/ –)						
signal transmission to CFP	(✓/ –)						
LED latched	(✓/ –)						
relay latched	(✓/ –)						
Full Alarm							
LED flashes	(✓/ –)						
relay activated after delay period	(✓/ –)						
signal transmission to CFP	(✓/ –)						
LED latched	(✓/ –)						
relay latched	(✓/ –)						

Issued by: …… **Signed: ……**

Legend:	✓ O.K.
	– not O.K.

PREVENTION OxyReduct®

Actively prevents the development of fire.
OxyReduct® is the innovative way in fire protection.

DETECTION TITANUS®

Very early fire detection with TITANUS® provides critical additional time to assess the risk and take counter measures.

SUPPRESSION FirExting®

Fixed fire extinguishing systems with various gaseous extinguishing agents.

COORDINATION VisuLAN®

Visualisation and control of important system data combined with multiple diagnostic and messaging functions integrated into a powerful building management system.

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