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# Engineering Specification



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Aspirating Smoke Detector

**TITANUS MICRO-SENS<sup>®</sup>**

Standard Variant

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# SCOPE

This document contains details about the aspirating smoke detector **TITANUS *MICRO-SENS*<sup>®</sup> DM-TM(V)(-B)-XX**.

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## 1 TITANUS<sup>®</sup> Family – Introduction

The **TITANUS<sup>®</sup>** family of aspirating smoke detectors is uniquely designed to provide consistent performance and protection levels in medium to high-sensitivity ASD applications. It covers a wide range of extreme applications without compromising high levels of sensitivity and performance. Consistent performance is possible because of a combination of sophisticated technologies being brought together:

High-Power Light Source (**HPLS**) technology, patented **LOGIC-SENS<sup>®</sup>** fire pattern recognition algorithms and a wide range of custom accessories ensure **TITANUS<sup>®</sup>** will maintain high levels of sensitivity and false alarm immunity even in challenging environments such as heavy industry and recycling plants.

Simplified installation and maintenance result in reduced overall costs throughout the entire system life cycle. For instance, special **TITANUS<sup>®</sup>** variants can be installed entirely within cold storage facilities at temperatures as low as  $-40\text{ °C}$  eliminating the need to compromise integrity of the thermally insulated room by piping through walls in order to install the detection unit in warmer areas.

**PIPE-GUARD** advanced air flow monitoring technology measures all system air flow not only through the entire pipe system but also through the detection chamber, sensing changes of as little as  $\pm 10\%$ . Consistent system architecture together with common installation and service protocols throughout the entire **TITANUS<sup>®</sup>** product line round out the **TITANUS<sup>®</sup>** integrated family concept, resulting in substantial benefits for distributors, installers and end users.

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## 2 TITANUS *MICRO-SENS*<sup>®</sup> DM-TM(V)(-B)-XX – General Information

**TITANUS *MICRO-SENS*<sup>®</sup>** is WAGNER's aspirating smoke detector for monitoring equipment and areas of up to 400 m<sup>2</sup>.

**TITANUS *MICRO-SENS*<sup>®</sup> DM-TM(V)(-B)-XX** shows an operating temperature range from  $-20\text{ °C}$  to  $+60\text{ °C}$ , incorporates 1 or 2 alarm levels and comes with or without a bar graph smoke level display, depending on version. Dry contacts for connection to any fire alarm control panel are standard. A TCP/IP network module and/or data logger are optionally available.

Area of coverage (system limit) is up to 400 m<sup>2</sup>. National regulations need to be considered.

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### 3 Approvals

TITANUS *MICRO-SENS*<sup>®</sup> DM-TM(V)(-B)-XX shall be approved and/or listed by:

- EAC (Eurasian Conformity), Eurasia
- IBS (Institut für Brandschutztechnik und Brandschutzforschung GmbH), Austria
- LPCB (Loss Prevention Certification Board), UK
- UL (Underwriters Laboratories Inc.), US\*
- ULC (Underwriters Laboratories Canada), Canada\*
- VdS Schadenverhütung GmbH, Germany

\*) *approved version: DM-TM(V)(-B)-XX-U*

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### 4 Codes, Standards or Regulations

TITANUS *MICRO-SENS*<sup>®</sup> DM-TM(V)(-B)-XX shall comply with the following codes and standards regarding product conformity and/or installation:

- British Fire Protection Systems Association, Code of Practice for Category 1 Aspirating Detection Systems
- British Standards, BS 5839 Part 1 or BS 6266
- EN 50155 (Railway Standard)
- EN 54-20 (Classes A, B and C)
- ISO 7240-20 (Classes A, B and C)
- NFPA 76, US\*
- NEC Standards, US\*
- UL 268, 6<sup>th</sup> Edition\*
- Local codes and standards

\*) *fulfilled by version: DM-TM(V)(-B)-XX-U*

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## 5 System Description

### 5.1 General Requirements

1. The aspirating smoke detector shall incorporate latest LED sensor technology. Depending on the detection goal, sensors with appropriate sensitivity shall be used to provide very early smoke detection, early smoke detection or standard smoke detection according to EN 54-20 Classes A, B and C.
2. The aspirating smoke detector shall incorporate an internal air filter.
3. Appropriate external air filter technology and/or steam trap shall provide protection against dust, dirt and condensing humidity relating to the environmental conditions of the monitoring area. External air filter solution shall provide large surface for prolonged maintenance periods. The customer shall be able to change external filter media without assistance of installer and/or maintenance company. Filters must be approved according to EN 54-20.
4. Fire pattern recognition algorithms shall be implemented in order to enhance false alarm immunity and at the same time to maintain a high level of sensitivity even in challenging environments. This way, particles which due to their size cannot be separated by air filters nor be ignored by detection wavelength, shall be eliminated via their nuisance signature.
5. The aspirating smoke detector shall operate in a defined condition, without using features of automatic sensitivity reduction leading to an undefined signal-to-noise-ratio as this could compromise the detection goal and/or the level of safety.
6. State-of-the art algorithms for further enhancing false alarm immunity are a pre-requisite. Particularly drift compensation (relative alarm threshold) shall be incorporated as it is a well-proven technique in the field of fire detection for avoiding false alarms by keeping equal distance between background noise and alarm threshold under slowly changing environmental conditions.
7. A diagnostic tool shall allow fast and easy maintenance via PC.
8. The aspirating smoke detector shall incorporate a display featuring a fault LED as well as one or two alarm LEDs, depending on version. It shall come with or without a bar graph smoke level display, depending on version.
9. For transmission to the fire alarm control panel the aspirating smoke detector shall incorporate two dry contacts. An extension module with five additional dry contacts shall be available as an option.
10. To ensure safety of persons and assets also in case of a breakdown of the air conditioning or heating system the aspirating smoke detector shall operate within a temperature range from  $-20\text{ °C}$  to  $+60\text{ °C}$ .
11. The aspirating smoke detector shall be connectable to an optional balanced or unbalanced 25 mm pipe system.
12. Sampling points shall be provided by application of accurately bored self-adhesive labels or plastic clips with rubber inserts for ensuring silent air sampling without whistling noises. The removable labels shall be pre-printed with the opening diameter for later ease of verification.

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## 5.2 Performance Requirements

### The system:

- shall be capable of providing either 1 or 2 alarm levels, depending on version
- shall provide a bar graph smoke level display, depending on version
- shall provide 1 LED per alarm level as well as LEDs for fault and operation at the front side
- shall have adjustable smoke sensitivity to match on-site detection requirements
- shall have a main alarm sensitivity of up to 0.1% obs/m (models DM-TM(V)(-B)-10) respectively up to 0.5% obs/m (models DM-TM(V)(-B)-50)
- shall be tested and approved to support an air sampling pipe length of up to 50 m per system
- shall be tested and approved to support up to 8 sampling points
- shall allow coverage of up to 400 m<sup>2</sup> as a system limit
- shall be approved to provide Class A, Class B and/or Class C sensitivity according to EN 54-20 and ISO 7240-20
- shall be capable of being equipped with an optional remote display
- shall report the fault and the main alarm message by integrated output relays
- shall be able to be extended with a 5-relay module for transmitting alarm messages
- shall report messages, smoke level and air flow data as plain text information via diagnostics tool and/or with optional network module via web server (TCP/IP) or SNMP
- shall provide technology which allows monitoring of the condition of the detection chamber
- shall provide the ability to sense changes of air flow as little as +/-10% for monitoring filter contamination and/or pipe blockage
- shall be capable of operating within a temperature range from -20 °C to +60 °C
- shall provide drift compensation in accordance with existing standards in order to maintain both high sensitivity and high immunity to false alarms in case of changing background conditions (caused, e.g., by dust)
- shall allow adjusting time delay for alarm and fault per area of coverage

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## 5.3 System Design Requirements

1. Computer-based design software shall provide calculations for detector settings and pipe planning showing high reliability of calculation in case of deviation between planning phase and factual realization. Such deviations can be caused, for example, by subsequently planned ceiling beams or installations that prevent the originally expected pipe run.
2. The usage of any pipe accessory which might compromise transport time and/or sensitivity (e.g. air filter) is only allowed if computer-based design software takes this influence into account and if the software is approved to do so.

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## 5.4 Application Specific Requirements

1. An optional network module shall facilitate the integration of the detector into Ethernet TCP/IP networks. At a minimum, the following detector information shall be available via the network: Alarm status, fault status, fault specification, smoke density, condition of the detection chamber, air flow and settings.
2. For use in cold storage areas the following accessories shall be available: Plastic clips with rubber inserts for de-icing by means of air purging, automatic air purging system and appropriate accessories. The ASD shall be able to operate at temperatures as low as -20 °C. The ASD must be able to operate inside the cold storage area to avoid problems of condensation and/or icing that usually occur on the pipe routed to the outside and to avoid compromising the integrity of the thermally insulated room due to wall penetrations for the pipe routing.

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## 6 Quality Assurance

### 6.1 Qualifications

#### 1. Manufacturer

The manufacturer shall have at least 20 years of production experience in the manufacture and design of highly sensitive aspirating smoke detectors.

The manufacturer must be certified for production according to ISO 9001.

The manufacturer's production shall be audited by VdS and LPCB to ensure the highest production quality.

#### 2. Technology

High-power LED light source technology shall be used.

The air flow through the detection chamber shall be monitored to avoid blockage and thereby blindness of the aspirating smoke detector without notice.

An algorithm shall facilitate to keep equal distance between background noise and alarm threshold under slowly changing environmental conditions in order to enhance false alarm immunity while at the same time ensuring stable fire detection properties.

If the aspirating smoke detector provides a learning tool for desensitization and if a test fire is agreed to be performed in order to verify detection quality, then the test fire shall be conducted after the learning phase has been completed. The automatically adjusted sensitivity shall be documented and checked for conformity with the relevant standards.

Fire pattern recognition shall be used to distinguish deception scenarios from fire scenarios with the greatest possible certainty.

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