Engineering Specification

Aspirating Smoke Detector

TITANUS *TOP·SENS*®
SILENT Variant

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TABLE OF CONTENTS

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SCOPE

This document contains details about the aspirating smoke detector **TITANUS** *TOP·SENS*® TT-1-SL.

1   TITANUS® Family – *Introduction*

The **TITANUS**® 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*® fire pattern recognition algorithms and a wide range of custom accessories ensure **TITANUS**® 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**® variants can be installed entirely within cold storage facilities at temperatures as low as −40 °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 +/−10%. Consistent system architecture together with common installation and service protocols throughout the entire **TITANUS**® product line round out the **TITANUS**® integrated family concept, resulting in substantial benefits for distributors, installers and end users.

2   TITANUS *TOP·SENS*® TT-1-SL – *General Information*

TITANUS *TOP·SENS*® is WAGNER's premier aspirating smoke detector. Its modular design facilitates cost-effective solutions for a wide range of specialized application requirements.

An optional second plug-in detector module allows one air sampling unit to economically monitor two separate areas or can alternatively be used for cross-zoning alarm verification (double knock).

TITANUS *TOP·SENS*® TT-1-SL shows a sound pressure level from 23 dB(A) and incorporates 3 alarm levels per detector module and includes a bar graph smoke level display. Dry contacts for connection to any fire alarm control panel as well as free slots for bus modules and/or the optional TCP/IP network module from WAGNER are standard.

Area of coverage (system limit) is up to 3,000 m² per detector module. National regulations need to be considered.

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3   Approvals

TITANUS *TOP·SENS*® TT-1-SL shall be approved and/or listed by:

- ActivFire, Australia
- FM (Factory Mutual), US*
- 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: TT-1-SL-U

4   Codes, Standards or Regulations

TITANUS *TOP·SENS*® TT-1-SL shall comply with the following codes and standards regarding product conformity and/or installation:

- AS 1670, AS 1603 NZ Part 2, 4, 8, AS/NZS 3000
- 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)
- FM 3230*
- ISO 7240-20 (Classes A, B and C)
- NFPA 76, US*
- NEC Standards, US*
- UL 268, 6th Edition*
- Local codes and standards

*) fulfilled by version: TT-1-SL-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. With a sound pressure level from 23 dB(A), the detector should be able to be used in noise-sensitive areas where, for example, a high level of concentration is required.

3. Plug-in detector modules of different base sensitivities shall be available for economically meeting the requirements according to the relevant EN 54-20 Class.

4. The aspirating smoke detector shall be able to be equipped with either one or two plug-in detector modules allowing to double the area of coverage or to perform cross-zoning alarm verification (double knock).

5. 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.

6. 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.

7. 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.

8. 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.

9. Commissioning of the aspirating smoke detector shall not necessarily require PC or programming unit. The aspirating smoke detector shall be designed modularly for enabling fast and easy maintenance.

10. The aspirating smoke detector shall optionally be able to provide cross-zoning alarm verification (double knock) in order to trigger an automatic fire extinguishing/suppression system.

11. The aspirating smoke detector shall incorporate a display featuring a fault LED as well as LEDs for info alarm, pre-alarm and main alarm and bar graph smoke level for each channel. In the case of cross-zoning alarm verification (double knock), a common alarm LED can be used for two channels.

12. The aspirating smoke detector shall be capable of operating within a temperature range from 0 °C to +40 °C.

13. The aspirating smoke detector shall be connectable to up to 2 optional balanced or unbalanced 25 mm pipe systems.

14. 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 able to be equipped with either one or two plug-in detector modules allowing to double the area of coverage or to perform cross-zoning alarm verification (double knock)
- shall be capable of providing up to 6 alarm levels per device
- shall provide 3 alarm LEDs and a smoke level display per channel at the front side
- shall provide LEDs for fault and operation at the front side
- shall be applicable in noise-sensitive areas: without sound absorber at a sound pressure level from 31 dB(A), with sound absorber type SD-1/a at a sound pressure level from 23 dB(A)
- shall have adjustable smoke sensitivity to match on-site detection requirements
- shall be capable of being equipped with detector modules having an info alarm sensitivity of up to 0.005% obs/m
- shall be tested and approved to support an air sampling pipe length of up to 300 m per detector module or 600 m per system
- shall be tested and approved to support up to 63 sampling points per detector module
- shall support up to 72 sampling points per detector module or 1 x 100 sampling points when using fan controller type FC-3
- shall allow coverage of up to 3,000 m² per detector module 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 parallel display
- shall report fault, info alarm, pre-alarm and main alarm messages by output relays
- 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 0 °C to +40 °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
- shall provide input for referencing to enhance false alarm immunity in case of external pollution

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.

5.4 Application Specific Requirements

1. An optional plug-in 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.

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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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