SIL 2-Certified AutroFlame X33AF

Multispectrum Infrared Flame Detector
Safety Instructions

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Safety-certified model AutroFlame X33AF Multispectrum Infrared Flame Detector

This safety instruction addresses the specific requirements and recommendations applicable to the proper installation, operation, and maintenance of all Safety-certified (SIL 2-certified) X33AF AutroFlame Multispectrum Infrared Flame Detectors. For complete information regarding performance, installation, operation, maintenance and specifications of the X33AF, refer to instruction manual 95-8625.

Safety Messages

Procedures and instructions in this section may require special precautions to ensure the safety of personnel performing the operations. Information that raises potential safety issues is indicated by the word “Warning”. Always read and understand these safety messages.

Warning

The AutroFlame X33AF Multispectrum IR Flame Detector is intended for use in hazardous environments that may include explosive levels of flammable gases and vapors. This product must be properly installed, operated and maintained. Improper installation or use could result in an explosion or fire resulting in death or serious injury.

- Do not remove the detector cover in explosive environments when device power is on and circuits are live.
- Detector must be properly installed, and wiring compartment cover must be fully engaged to meet hazardous area explosion-proof/ nonincendive requirements.

Design

The AutroFlame X33AF Multispectrum IR Flame Detector is an infrared flame detector that is classified as a Type B smart device according to IEC61508. The standard model provides an isolated 4-wire, 0-20 mA output, together with on-board Alarm and Fault relay contacts.

These outputs serve to indicate normal operating condition of the detector, fault, or the presence of a flame alarm. The X33AF contains extensive self-diagnostics and is programmed to send the current output to a specified state (1 mA, 2 mA or 3 mA) upon internal detection of a failure or fault condition.

HART communication is available as an option. The HART option allows the operator to monitor the status of the detector, determine factory settings, adjust field settings, and initiate field tests. Refer to Addendum 95-8624 for details.

When using the 0-20 mA output with HART as a safety output, it is required that Write Protect be set to “on” to ensure that the HART is non-interfering.

The X33AF is designed for operation with a supply voltage from 18-30 volts DC. Proper operation outside this range cannot be assumed.
The standard relay with analog output version and the HART model are included within the Safety Certification for the X33AF Multispectrum IR Flame Detector.

Valid Input Range

X33AF fault annunciation is provided on the 0-20 mA signal output loop by signaling to a 1 mA, 2 mA, or 3 mA current output level. The receiving device must be programmed to indicate a fault condition when current levels go below 3.7 mA.

Diagnostic Response Time

AutroFlame X33AF Multispectrum IR Flame Detector will perform all critical diagnostic functions within 58 minutes, worst case diagnostic detection time.

Certification

The X33AF Safety-Certified version is certified by IEC61508 for single input use in low demand SIL 2 Safety Instrumented Systems.

Safety-certified Product Identification

All Safety Certified X33AF models are identified on the product label. In addition, the model number printed on the label will include the character suffix "T" in the model number string, indicating approval. Example: Model X33AFA4N13T1.

Installation

Note:
For complete information regarding performance, installation, operation, maintenance and specifications of the X33AF, refer to instruction manual 95-8625.

Tools Required:
• 14 mm hexagonal wrench

No special installation requirements exist above and beyond the standard installation practices documented in the X33AF instruction manual (95-8625).

Environmental specification limits are also as published in the general specifications section in the X33AF instruction manual.

The X33AF operating power distribution system must be designed and installed so the terminal voltage does not drop below 18 VDC when measured at any specific location. The maximum current limit must be less than 2 amperes. The over-voltage protection must be set for 33 VDC.

Start-up and Commissioning

The Safety Certified AutroFlame X33AF Multispectrum IR Flame Detector can be commissioned by any qualified person with knowledge of flame detection instruments and the configuration device being used.
Refer to the Start-Up and Commissioning section provided in the X33AF instruction manual.

Operation, Maintenance, Inspection and Proof Testing

Tools Required:
- 3 mm hexagonal wrench
- Magnetic oi test tool (part number 116-102740-002)
- Window cleaner (part number 116-001680-001 or isopropanol)
- Lens tissue and cotton swabs
- 4 mm flat blade screwdriver

After normal installation and start-up have been completed as recommended within the X33AF manual, Proof Tests must be performed for every Safety-Certified X33AF detector installed.

Personnel performing Proof Test procedures shall be competent to perform the task. All Proof Test results must be recorded and analyzed. Any corrective actions taken must be documented in the event that an error is found in the safety functionality. The Proof Tests must be performed at a frequency as shown in the table below.

Proof Test Name	Commissioning	Frequency per Year
Visual Field Inspection Proof Test	Yes	52
Detector Response Mag Oi Proof Test	Yes	1

Visual Field Inspection Proof test

Visual inspection of all Safety-Certified AutroFlame X33AF Multispectrum IR Flame Detectors shall be conducted weekly to confirm that there are no obstructions in the optical field of view. Corrective action will include removal of such impediments should they exist. Completion of Visual Field Inspection Proof test will be recorded and documented in the SIS logbook.

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Detector Response Mag Oi Proof Test

Warning:
Any external alarm equipment, systems or signaling devices that could be automatically initiated by performing this test must be disabled or bypassed before performing this test!

Tools Required:
- Magnetic oi test tool (part number 116-102740-002)

All flame detectors must be performance tested using the Mag oi Procedure and inspected to ensure that they are capable of providing expected performance and protection. Note that the Mag oi Procedure and Manual oi Tests are not interference free. During these tests the unit is not performing normal flame detection functions. Model X33AF provides an onboard status LED, which indicates Green color when internal operational parameters are normal. The LED changes to a Red color to indicate a successful proof test. The Alarm and Auxiliary relays indicate alarm condition and the current output indicates 20 mA. These results should be verified on the control device. In the event the proof test is unsuccessful, the LED remains Green*, the Alarm and Auxiliary relays remain in their non-alarm condition, and the current output is 4 mA.

* The HART version LED will change to yellow, the fault relay will de-energize, and the current output will change to 2 mA.
The fault indication can be reset by momentarily applying the magnet or manual oi switch.

Fault /Failure Action Plan

In the event of a non-alarm condition result with the Mag oi test, the standard Maintenance and Troubleshooting procedures listed in the X33AF instruction manual must be followed. In the event that the condition cannot be resolved, the standard Device Repair and Return procedures listed in the X33AF instruction manual must be followed.
Any and all failures to successfully complete the alarm test must be recorded and documented in the SIS logbook.

Product Repair

The X33AF is not field-repairable, and any internal device repairs must be conducted at the factory. No firmware changes are permitted or authorized. All failures indicated by internal diagnostics or Proof Tests that cannot be resolved through the troubleshooting and maintenance procedures described in the X33AF manual must be reported to the manufacturer.

Operating, Environmental and Performance Specifications

The Safety-Certified X33AF product versions fully comply with, and must be operated in accordance with the functional and performance specifications provided in the instruction manual. A 24 hour mean time to repair should be assumed for safety availability calculations. All X33AF diagnostics have a maximum 2 hour test interval.

Spare Parts

Refer to the spare parts section of the X33AF manual. Safety certification is based on a sufficient number of spares to achieve a 24 hour mean time to repair.

Certification and Failure Rate Data

All Safety-Certified X33AF models are certified compliant to:

IEC61508: 2000
SIL 2 certified
Safety Accuracy: Not applicable.
Product Life: 13-22 years, based on manufacturer data.

Product Certifications

FM, CSA, ATEX, CE , TÜV and/or *exida*®.
Refer to the X33AF Instruction Manual for details.
FMEDA Report available.

For complete information regarding performance, installation, operation, maintenance and specifications of the X33AF, refer to instruction manual 95-8625.

IEC 61508 Failure Rates in FIT*

Failure Category	λsd	λsu	λdd	λdu	SFF
X33AF IR Flame Detector, Analog Output	128 FIT	661 FIT	2343 FIT	217 FIT	93.2%
X33AF IR Flame Detector, Relay Output	0 FIT	814 FIT	2034 FIT	127 FIT	95.9%
X33AF IR Flame Detector, Analog Output with HART	0 FIT	367 FIT	2818 FIT	153 FIT	95.4%

*FIT = 1 Failure / 10^9 Hours

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