



# **SAFETY MANUAL**

## **IPES IR3 Multi-Spectral Infrared Flame Detector**

This manual describes the safety related information for the installation, operation, configuration, and maintenance of the Flame Detector IPES IR3. For complete information regarding performance, installation, operation, maintenance, and specifications of the IPES IR3, please refer to the corresponding Operation manuals.

JSC Electronstandart-pribor is providing safety solutions through the most up-to-date products, services, and systems that save lives and protect resources from the dangerous flames, gases, and vapors.

The safety product should be handled carefully, installed and maintained in accordance with the Operation manuals.

## **INTRODUCTION**

### **General Description**

The Flame Detector IPES IR3 is designed to detect typical fires such as those produced by alcohol, n-heptane, gasoline, jet fuels, and hydrocarbons and transfer alarm signals to receiving-and-control devices (RCD) of fire-alarm and burglar-fire alarm systems in case fire occurs in the detector's field of vision. The Flame Detectors IPES IR3 is highly immune to false alarms caused by lightning, sunlight reflection, arc-welding, hot objects, and other sources of radiation. IPES IR3 is regarded as a Type B field device per IEC 61508.

IPES IR3 are to be used in the zones where process facilities of pump stations of oil-trunk pipelines, tank farms, loading racks, and the like are installed (subgroup indices of the electric equipment are IIA, IIB, IIC, temperature classes are T1 – T4 according to IEC 60079-14).

IPES IR3 field of application is dangerously explosive areas of indoor and outdoor facilities complying with IEC 60079-10 and other normative documents regulating operation of electric equipment in dangerously explosive zones

The safety function of IPES IR3 does not include:

HART communication

RS-485 communication.

HART and RS-485 communication are typically used for field device setup, diagnostics, and troubleshooting. Carefully observe requirements for interfacing in hazardous locations. HART and RS-485 communication are non-interfering functions and do not interrupt the safety critical function of the detector.

## **INSTALLATION**

For complete information on the installation of IPES IR3 Flame Detector refer to the product operation manual.

### **Detector Location Considerations**

There is no one optimal manner to install a flame detector for all applications. Instead, several variables should be considered when selecting locations to install detectors, including the following:

Detector Field of View (FOV)

Optical sensitivity range

Environmental conditions

IPES IR3 should be mounted free from shock and vibration, and in a location convenient for visual inspection and cleaning. Furthermore, the detector(s) should be tilted downward so that dust or moisture does not accumulate on the sapphire windows. Finally, though IPES IR3 is Radio Frequency Interference (RFI) resistant, the detector should not be located near radio transmitters, high magnetic or electrical fields, or in areas with similar interference.

**NOTE:** Frequent inspection, cleaning, and sensitivity checking is suggested for detectors mounted in dirty environments.

No special or additional detector mounting, wiring, power, or tool requirements exist beyond the standard installation practices documented in the operation manual.

**WARNING:** Never operate IPES IR3 if its casing is mechanically damaged! Do not separate when energized! Equipment damaged in this manner is not covered under warranty.

## **OPERATION, MAINTENANCE, INSPECTION AND PROOF-TESTING**

For complete operation, configuration, and maintenance information for the IPES refer to the product operation manual.

Before connecting a unit, check to make sure power is switch off. Before power on check all wiring connections!

After switching on IPES IR3 electric current of 4 mA will arise at its output, and the indicating LEDs will start continuous green lighting during 10s and then green flashing till 35 s, then after initial test finish continuous green lighting again.

IPES IR3 maintenance consists of:

- visual examination (daily);
- cleaning (six months);
- checking the earthing and explosion-protection systems (if necessary);
- performance test.

Self-testing of IPES IR3 is performed one time for 20-30 min. It provides regular end-to-end self-checking of IPES IR3 serviceability. Therefore it is no necessary to use external test radiation sources or open flame for serviceability inspection.

The detector will respond with 2 mA for an internal fault and 2 mA for a Continuous Optical Path Monitor (COPM) fault.

Refer to the Troubleshooting Section in the IPES IR3 product operation manual in the case of a fault condition.

Once correctly installed, the unit requires very little maintenance other than regular sensitivity checks and cleaning of the external window.

Refer to the Troubleshooting Section in the corresponding product operation manuals in the event of a fault condition.

After normal installation and start-up have been completed as recommended within the IPES IR3 manual, Proof Tests must be performed for every Safety-Certified IPES IR3 detector installed.

Personnel performing Proof Test procedures shall be competent to perform it. All Proof Test results must be recorded and studied. The Proof-testing must be performed at a frequency shown below:

<b>Proof Test</b>	<b>Commissioning</b>	<b>Frequency per Year</b>
Detector response proof-testing	Yes	4

### ***Detector response proof-testing***

1. Flame Detector must be tested using the Test Radiation Source ITES (GSKF.425248.001) and inspected to ensure that they are capable of providing expected performance and protection. Tests are performed in accordance to the Operation manual for the Test Radiation Source (GSKF.425248.001). Red color of LEDs (constant light during 5-6 s) indicates the successful proof test. The Fire relay indicates alarm condition and the current output indicates 20 mA. These results should be verified on the control device.

2. Flame Detector must be tested using the Magnetic C-shape Test Tool (GSKF.301532.001). Yellow color of LEDs (constant light) indicates the successful proof test. The fault relay indicates fault condition and current output indicates 2 mA. These results should be verified on the control device.

## SPECIFICATIONS

Table 1 and Table 2 list specifications for IPES IR3 Flame Detector. For a complete list of specifications refer to corresponding operation manual.

Table 1.

### Environmental and electrical specifications

Detector	IPES-IR3
Operation temperature range	-40°C to 85°C
Storage temperature range	-40°C to 50°C
Humidity Range	0 to 95% RH, non-condensing
Supply voltage: Nominal Range	24 VDC 18-32 VDC

Table 2.

### Analog Output Specifications

Mode	IPES-IR3
Fault	2 mA
Service Mode	8 mA
COPM Fault	2 mA
Ready	4 mA
FIRE Signal	18 mA

## CERTIFICATIONS AND FAILURE RATE DATA

The reliability and functional safety assessments for IPES IR3 Flame Detector has been performed. The Flame Detector IPES IR3 has been certified to correspondence of IEC 61508 Parts 1, 2, and 3, by FM Approvals. It is assumed that IPES will be installed in a Safety Instrumented System (SIS) operating in a Low Demand environment per IEC 61508. Table 3 presents the Safety Integrity Level (SIL) parameters for IPES IR3.

Table 3.

### SIL parameters for IPES IR3

Device	IPES-IR3 Analog Output	IPES-IR3 Relay Output
FM Certificate	3036930-IPES	
Product life (years)	10	
$\lambda_{DD}$ (Fails per hour)	$288,7 \cdot 10^{-9}$	$237,6 \cdot 10^{-9}$
$\lambda_{DU}$ (Fails per hour)	$8,28 \cdot 10^{-9}$	$14,31 \cdot 10^{-9}$
Safety Failure Fraction (SFF)	99%	97%
Safety Integrity Level (SIL)	3	2
Diagnostic Test interval COPM test Functional test	one time per 2 s one time per 30 min	
Typical Response Time	< 10 s	
Average Probability on Failure on Demand $PFD_{avg1001}$	$3,86 \cdot 10^{-5}$ ( $1,03 \cdot 10^{-5}$ )	$6,47 \cdot 10^{-5}$ ( $1,67 \cdot 10^{-5}$ )

\* Hardware Fault Tolerance (HFT) = 0

\*\*  $PFD_{avg1001}$  assumes 4 hour repair time and 90 days proof test interval.

#### Agency Approvals

The IPES has the following approvals:

ATEX  
 FM Approvals US&C  
 IECEx  
 GOST R  
 ABS  
 IEC 61508 per FM Approvals  
 NEPSI  
 TÜV Rheinland - MEEI