SF6 LeakCheck Detection User Manual

Contents

SF6 LeakCheck Detection

Specifications:

- Product Name: SF6 LeakCheck P1 XTL
- Manufacturer: ISM Deutschland GmbH
- Measuring Principle: Gas Sensing Technology
- Operating Modes: Search Mode, Measurement Mode, Concentration Rise Measurement

Product Usage Instructions

Precautions:
Use the instrument ONLY on voltage free and grounded equipment to avoid fatal injury or material damage. Ensure the surface to be checked is free of liquids and dirt before approaching with the sensor tip.

Setup Options:
This document focuses on essential operator-relevant options.

Measuring Principle:
The sensor is miniaturized and located directly in the measurement tip for excellent response and recovery timings.

Usage in Practice:
For Leak Detection:

- Switch the instrument to Search Mode. – Guide the sniffer probe close to suspected leaks. – Advance the sniffer probe at about 20 mm/s at a 45-degree angle to prevent ingress of grease and dirt.

For Leak Measurements:

- Switch to Measurement Mode. – Set desired units (cc/s or g/a).
- Guide the sniffer probe close to leaks and establish material contact. – Confirm stability of measured value within 2 seconds.

For Concentration Rise Measurements (Integral atm.):

- Select ppm as the unit of measurement. – Zero the leak detector in clean ambient air. – Push the sniffer probe into the chamber for initial and final measurements after a defined time.

FAQ:

1. **Q: What should I do if the instrument is not responding?**
   A: Check the battery, ensure proper grounding, and refer to the troubleshooting section of the manual.

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Precautions
Use the instrument ONLY on voltage free and grounded equipment. Failure to observe this rule may cause fatal injury and/or material damage. The surface you are going to check for leaks must be free of all liquids like oil or water, and coarse dirt. If necessary, wipe it with a cloth before approaching it with the sensor tip. The ingress of liquids will immediately destroy the SmartSensor, while grease and similar substances, even in small quantities, will obstruct the sample inlet.

Setup Options
This document restricts to very few options that may be significant to the operator.

Measuring principle

An advanced high-voltage ionization detector (NIC©- Negative Ion Capture) is used which has been optimised in consideration of the following:

- sensitivity
- precision
- service life
- reliability

Through miniaturisation it has been possible to accommodate the sensor directly in the measurement tip, thereby attaining excellent response and recovery timings.

Usage in practice
Owing to the practice-oriented design of the instruments, work with these is simple and reliable when observing the following:

For leak detection
Switch the instrument to Search Mode. Guide the sniffer probe as closely as possible to the suspected leaking locations. Establishing material contact with the sniffer probe will be useful.
The velocity at which the sniffer probe is advanced should be at about 20 mm/s. Please do not push the sniffer probe over the test specimen, instead draw at a 45 degree angle, so as to effectively prevent the ingress of grease and dirt, for example.

For leak measurements
Switch the instrument to Measurement Mode. Make sure it is set to the desired units of measurement (cc/s or g/a). Guide the sniffer probe as closely as possible to the suspected leaking locations. Establishing material contact with the sniffer probe will be useful. The magnitude of the leak can be considered as being correctly acquired when the measured value does not change within 2 seconds.

For concentration rise measurements (integral atm.)
In the set-up select the unit of measurement “ppm”. Place the test specimen within the chamber free of SF6, close the chamber. Zero the leak detector in clean ambient air by operating the “Zero” button. For the initial measurement with the P1 XTL leak detector, push the sniffer probe for approximately 10 to 20 seconds through a corresponding connection directly into the chamber. Check the measurement value V1. Remove the sniffer probe from the chamber. After the measurement time defined by the customer has elapsed, Zero the leak detector in clean air by operating the “Zero” button, introduce the sniffer probe into the chamber again and perform the final measurement for a duration of approximately 10 to 20 seconds.

Check the measurement value V2. Remove the sniffer probe from the chamber. The difference between the two measured values (V2-V1) gives the rise in concentration within the measurement time specified by the customer.

P1 XT menu system
From the main screen that is seen during measurement, the menu system is invoked by clicking the symbol in the upper right corner of the screen. This will bring up the the menu selection screen.

Available options are:

MEASUREMENT

This is home to all settings related to actual measurement. From here, the following menu items are available (greyed out options are disabled, and reserved for future use):

Display Units
By clicking on “cc/s”, “ppm”, or “gm/yr”, the corresponding units are selected for measurement. Please observe that concentration measurement (ppm) is calibrated independently, while leak rate modes (cc/s, gm/yr) share a common calibration. To exit, use “BACK” if you wish to continue with the menu system, “ESC” to return to measurement.

Set Alarm Value
Define your maximum allowable leak rate or concentration here. All alarm outputs (light signals, vibration alarm, audible alarm) are referenced to this value. Also the 0-100% scale on the available measurement screens is adjusted such that 100% equals the selected alarm value. To exit, use “BACK” if you wish to continue with the menu system, “ESC” to return to measurement.

Gas
Select the gas wich is used in your components

- SF6
- C4-FN

C4-FN allows to select the used concentration if desired. Displayed value is corrected to reflect concentrations lower than 100% so as to give a direct readout of the calculated leak rate.

Calibration
User Adjustable Zero Tracking The measurement of electron capturing substances is based on a very small current flowing through ionised air. In the presence of e.g. SF6, this current exhibits a minute drop, from which the quantity of the substance is derived. The current flowing in the absence of such substances is considered as a virtual zero line for measurement. Since it is subject to slow fluctuation in the SmartSensor, as well as to changes induced by the ambient air, it is necessary to constantly maintain and update this virtual zero. For leak detection in sniffing mode, which often takes place in an environment which might be contaminated with SF6, generally the medium setting “NORM” is suggested.

Try “HIGH” if you experience frequent false alarms through changing background levels of detectable gas. For lab environments, the setting “LOW” is suitable in most cases, and also recommended for concentration measurement if you are not looking for very small concentrations (< 2ppm). In the later case, or when you experience strange behaviour like slowly rising readout after a measurement, switch to “OFF”. This freezes the Zero Tracking entirely. On this setting, it is mandatory to manually zero the instrument immediately before taking a measurement. A minus sign leading the readout indicates that a manual zeroing is required when it is shown permanently. When it does not show up or flashes, this indicates that the virtual zero is right on spot. To set up the Zero Tracking Pioneering Gas Sensing Technology. mode, pull up the menu system, then select “Measurement” / “Zero Tracking”, and use the arrow keys to set the desired modes (OFF/LOW/NORM/HIGH) for leak rate and concentration measurement respectively. To exit, use “BACK” if you wish to continue with the menu system, “ESC” to return to measurement

How to conduct a calibration check
The response of your SF6 Leakcheck instrument can be tested using the CalCheck (p/n A-21500). Push the gas bottle into the top of the CalCheck. This will release the gas and the dial should move into the white. If it remains in the red then you need to replace/refill the gas bottle. Push your SF6 Leakcheck instrument into the CalCheck, as shown in the image below. The SF6 Leakcheck will detect the leak and display a reading. If this reading is incorrect, the SF6 Leakcheck will need to be recalibrated.

APPEARANCE
In the current firmware version, options other than “Volume” are disabled, and reserved for future use. Click “Volume”, and adjust the slider to the desired volume level. To exit, use “BACK” if you wish to continue with the menu system, “ESC” to return to measurement.

TECHNICAL

This menu comprises the following options:

Radio
Each P1 XT instrument comes with a dedicated USB Radio Stick. It will not connect to a different Radio Stick. This option is only ever used if you need to connect the instrument to a different USB Radio Stick by entering the Radio Stick’s MAC address. To change it, clear the entire entry field, and enter the MAC address of the new USB Radio Stick as per separate instructions. When done, turn the instrument off and on again to transfer the new address to its permanent memory, and it will from now on connect to the new USB Radio Stick.

Serial Number

Displays the instrument's serial number.

Standby
This sets up the desired idle time before the instrument enters standby. This saves battery power, and SmartSensor life time. The recommended time is 5 minutes, adjust the slider to the desired time. Setting it to the lextreme left position will deactivate the standby option entirely. The instrument will wake up from standby when it is being moved. To exit, use "BACK" if you wish to continue with the menu system, "ESC" to return to measurement.

Technical Data
Here you can read out the SmartSensor's, and instrument's hours of operation. Please observe that for the sake of reliable operation, SmartSensors are considered unusable when their run time exceeds 300 hours. When this limit is reached, the instrument will no longer work with this SmartSensor. To exit, use "BACK" if you wish to continue with the menu system, "ESC" to return to measurement. Open the Case.

Press firmly on the top of the P1 XT Handgun to release the docking station to the working position.

The instrument will slide out in the working position.

Wait for any action until working position. Take one P1 SmartSensor out of the storage bay.

Attach the P1 SmartSensor into the plug at the handgun before you switch the instrument on.

To switch the instrument ON press the left button on the Handgun shortly.

The P1 XT will start in „SEARCH MODE“ or “MEASUREMENT MODE” whatever was used before.

To change from „SEARCH MODE“ to „MEASUREMENT MODE“ and back again swipe your finger over the display from left to right.

To set the measured value to Zero press right button shortly.

Service life of the P1 SmartSensor

The service life to be expected of the SmartSensors is approximately 200 to 300 hours of continuous (!) operation under average conditions of the air in the room. On the basis of an active measurement time of approximately 2 hours per workday, this gives a utilisation duration of approximately 6 months. In the case of discontinuous measurement operation, the utilisation duration may be optimised by using the standby option. Through the use of the standby modes the SmartSensor is shut down during breaks and for this reason then not subjected to any wear.

The limiting factor regarding the service life of the SmartSensor is that of contaminating the SmartSensor

1. through small particles taken in with the sample flow air, capable of passing through the front filter (Part No. P1:P-100-0024) and entering into the ionization chamber and
2. by larger particles which block the filter element, thereby reducing its filtering capacity.

Thus the result is a strong dependence of the service life on the ambient conditions. Any contamination in the ionization chamber results in a more noisy output signal from the SmartSensor making itself felt through

fluctuations and sudden changes of the Zero line. The SmartSensor must be considered as worn out when these fluctuations compared to the set up limit become too great. However, measurement sensitivity is maintained at an unchanged level over the entire utilisation duration. In the case of an extreme contamination it can happen that the SmartSensor cannot be initialised any more when starting the system.

The decaying air permeability of the filter element is compensated for by increasing the operating vacuum within a wide range. However, in case of severe contamination, the vacuum increases to such a level that the discharge within the SmartSensor becomes unstable or is extinguished without any apparent reason. The filter element must be considered as worn out when this occurs frequently. From the 300th operating hour onwards, the operator is reminded upon starting the system that the SmartSensor must be replaced. Up to a maximum of 320 hours, the SmartSensor can still be operated after confirming the reminder. Thereafter, it must be replaced.

Exchanging the P1 SmartSensor
Before replacing the SmartSensor, the instrument must always be switched off first. To remove the SmartSensor simply take hold of it at the chequered section of the plugs movable section and pull the sensor straight out of the socket. When inserting the new SmartSensor, make sure that the marks at the plug and socket line up, and that the movable section of the plug engages in the locking position by resting flush against the outer collar of the socket.

Instrument Firmware Log

Instrument Firmware	Amendement	Manual Version	PC Software
1.0.08	Launch Version – P1 XTL First Edition	V1	n.a.
1.0.11	Display Units ppm and g/year added Technical Data Screen added	V2	n.a.
1.0.12	Battery drain Issue improved Calibration stabilisation time i mproved Passed calibration screen message improved Sm artSensor lifetime message The firmware update process vi a the radio has been stabilised	V3	n.a.
1.0.13	Option „C4-FN“ added Reworked parameters for HV generation Reworked Zero Tracking Reworked filter for sen sor noise Reworked signal cleardown Streaming selectable parameters added	V4	**1.0.01**

Technical Data

Detection principle	NIC (Negative Ion Capture)
Detects	SF6 and gasmixtures with C4-FN (option)
SF6 Sensitivity	Standard 1.0E-7 cc/s – 1,0 ppm – 0,01 g/a HIGHsens 1.0E-8 cc/s – 0,1 ppm – 0,001 g/a
Response time t90	approx. 0,5 s
Response time t10	approx. 0,5 s
Alarm	Selectable Handset Vibration Audio LED-Projection
Audio	Frequency / repeat rate coupled to leak rate condition signals
Display	2.8″ Touch Display on handset
Self diagnostics	Sample flow, sensor condition, battery condition, hardware fault
Battery fully	Handset Li-ion, inductive charge at docking station, shelf life 12 months if charged
Storage conditions	-10°C … + 60°C
Operating temperature	0°C … 50°C
Power supply	100 – 240V 50/60Hz
Dimension	Handset 300x105x90 mm (H,D,W) Console 420x240x470 mm (H,D,W)
Weight	Handset 750 g Console 9,8 kg

EU DECLARATION OF CONFORMITY

According to Decision No. 90/2016 Sb. of the European Parliament and of the Council

SF6 LEAKCHECK P1 XTL
The manufacturer stated below declares that the characteristics of the product meet the required technical standards, directives and specification and that it conforms to the respective European Union harmonisation standards. Furthermore the manufacturer declares the product to be safe whilst adhering to the conditions for its correct installation, maintenance and use. This declaration of conformity is issued under the sole responsibility of the manufacturer.

Manufacturer:
ISM Deutschland GmbH, Laubach 30, 40822 Mettmann, Germany – **www.ism-d.de** –

Notification of quality assurance:
DIN EN ISO 9001:2015 Certificate No.: DE011836-1

Product description:
SF6 Leak detector is sensitive instrument for determining SF6 or gasmixture with C4-FN leaks.

Conformity assessment procedure:
The product's conformity was assessed with respect to the following requirements:

- EMC Directive 2014/30/EU, LVD Directive 2014/35/EU.
- it was compared with the submitted documentation
- issued on fundamentals of declaration of conformity of the producer– it was tested according standards

List of standards:

EN 55011 ed. 4:2017 + A1:2017 +A11: 2020 +A2:2021	EN 61000-3-3 ed. 3:2014 + A 1:2019 +A2:2022	EN 61000-4-2 ed. 2:2009
EN 61000-4-4 ed. 3:2013	EN 61000-4-6 ed. 4:2014	EN IEC 61000-3-2 ed. 5:2019 +A1:20 21
EN IEC 61000-4-11 ed. 3:2020	EN IEC 61000-4-3 ed. 4:2021	EN IEC 62368-1 ed. 2+ A11:2021

- **Date and Place of Issue:** Mettmann 12.04.2024
- **Authorised representative:** Clemens A. VERLEY

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Documents / Resources

	ION SF6 LeakCheck Detection [pdf] User Manual SF6 LeakCheck Detection, SF6, LeakCheck Detection, Detection

References

- Pioneering Gas Sensing Technology - ION Science Inc
- Gasdetektion und Dichtheitsmessung von ISM - Messbar Besser
- User Manual