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Air-Met Scientific
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SF6 LeakCheck P1 XTL

Product Manual V4.0



Pioneering Gas Sensing Technology.

ionscience.com

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:

1 **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):

1.1 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.

1.2 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.

1.3 Gas

Select the gas which 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.

1.4 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

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

1.5 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.

2 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.

3 TECHNICAL

This menu comprises the following options:

3.1 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.

3.2 Serial Number

Displays the instrument's serial number.

3.3 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.

3.4 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.





P1 XT handgun Part Position

Push down to lock the docking station and secure the instrument by closing the lid.

P1 SmartSensor Storage Area.

USB
No data, charge only
eg for mobile devices.

Mains Power
100... 240 V 50/60 Hz.

Storage Shelf
For accessories e.g.
power cable, user
manual.



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	Amendment	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 improved Passed calibration screen message improved SmartSensor lifetime message The firmware update process via 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 sensor noise Reworked signal clear-down 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	Handset Li-ion, inductive charge at docking station, shelf life 12 months if charged fully
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:

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 + A1:2019 +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 +A1:2021
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:

Authorised representative:

Mettmann 12.04.2024

Clemens A. VERLEY

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