



Ion Science

4th. International Conference on SF₆
and the Environment

Negative Ion Capture SF₆ Leak
Location and Detection

Ion Science Ltd

- ISO9001:2000 Accredited
- Manufactures of a wide range of revolutionary technology
- Own many world-wide patents
- Founded Ion Science Messtechnik in Germany in 1993 to service SF₆ instruments
- Full research facilities



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There is currently no suitable substitute for SF₆ as an arc suppressant in high and medium voltage electrical switchgear

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Why do we need to locate and detect SF₆ leaks?

- To protect our environment by reducing SF₆ emissions
 - With a global warming potential 23,900 times greater than CO₂ and an atmospheric life time of 3,200 years SF₆ is a potent greenhouse gas
- SF₆ is one of the 6 named gases in the Kyoto Protocol giving reduction targets for 2008 – 2012
- SF₆ is an expensive gas

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Why do we need to locate and detect **SMALL SF₆** leaks?

- New equipment is tested to 10-8 ml/sec
- As regulated limits get lower, testing at these lower levels becomes essential
- **Only point detectors can pinpoint small leaks**

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Pre 1999 methods for detecting SF₆ Leaks

- Corona discharge
- Thermal conductivity
- Infrared
- Radioactive ECD



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Historical Problems with ECD-based Equipment

- Radio active Ni-63 detector
- Vast consumption of high purity argon
- Long down-time after high exposure
- Licensing for the detector
- High service costs associated with sending the whole instrument back for detector repairs
- Unreliability of the detector

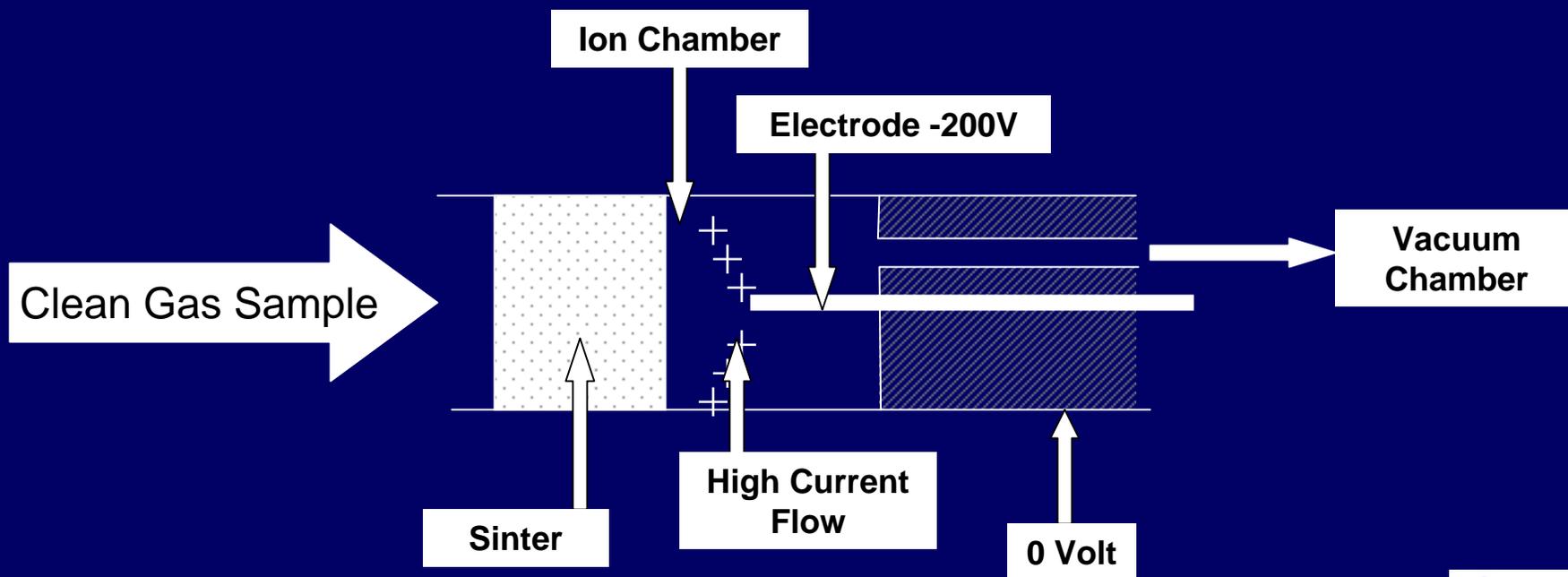


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These problems inspired Ion Science to develop a new detection principle called “Negative Ion Capture” (NIC)

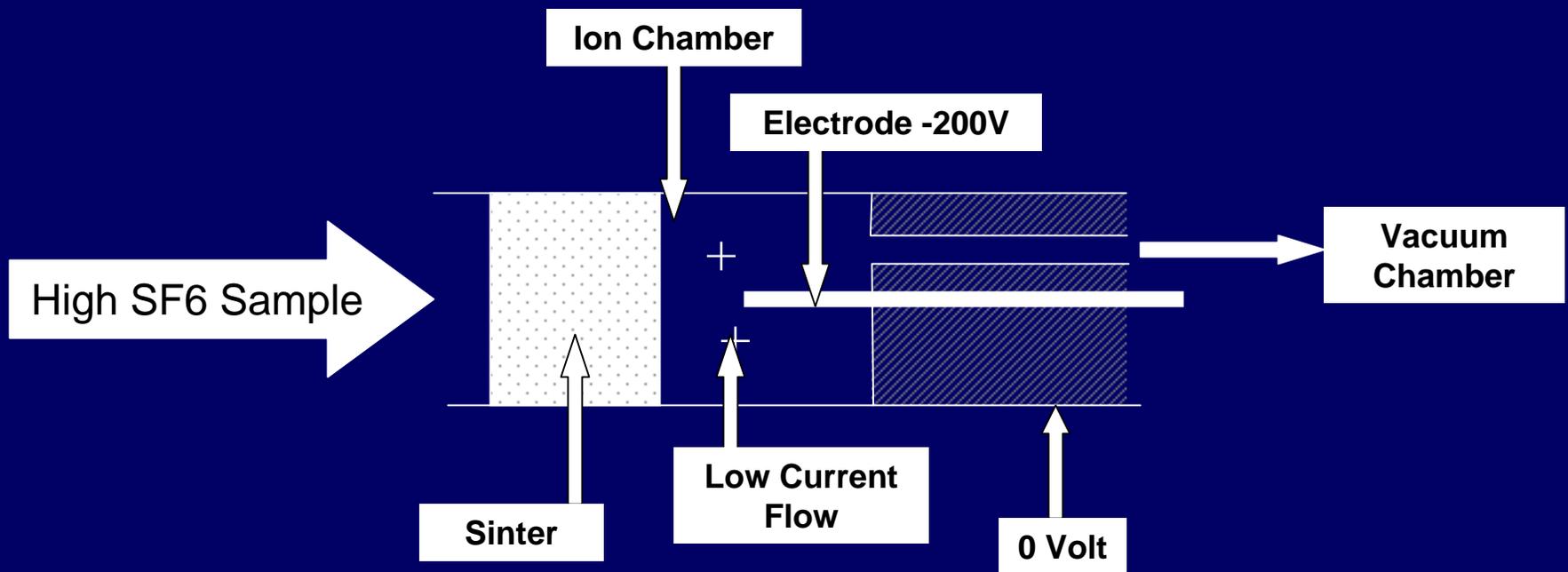
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Negative Ion Capture with no SF₆ gas applied



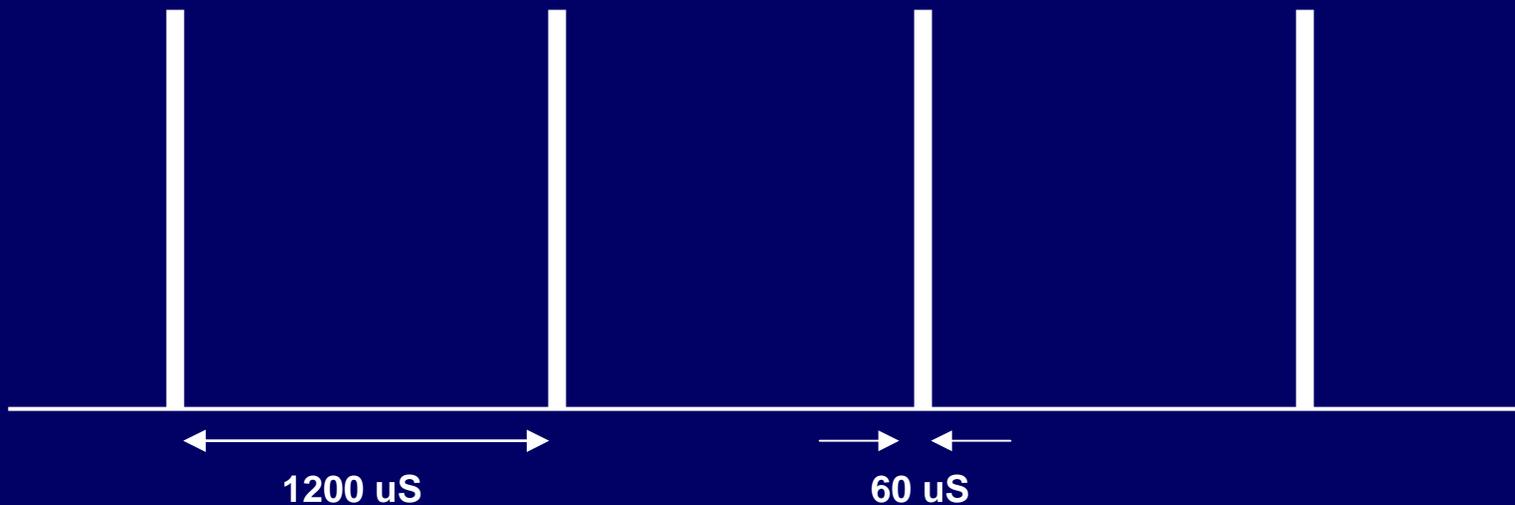
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Negative Ion Capture with High SF₆ Gas Applied



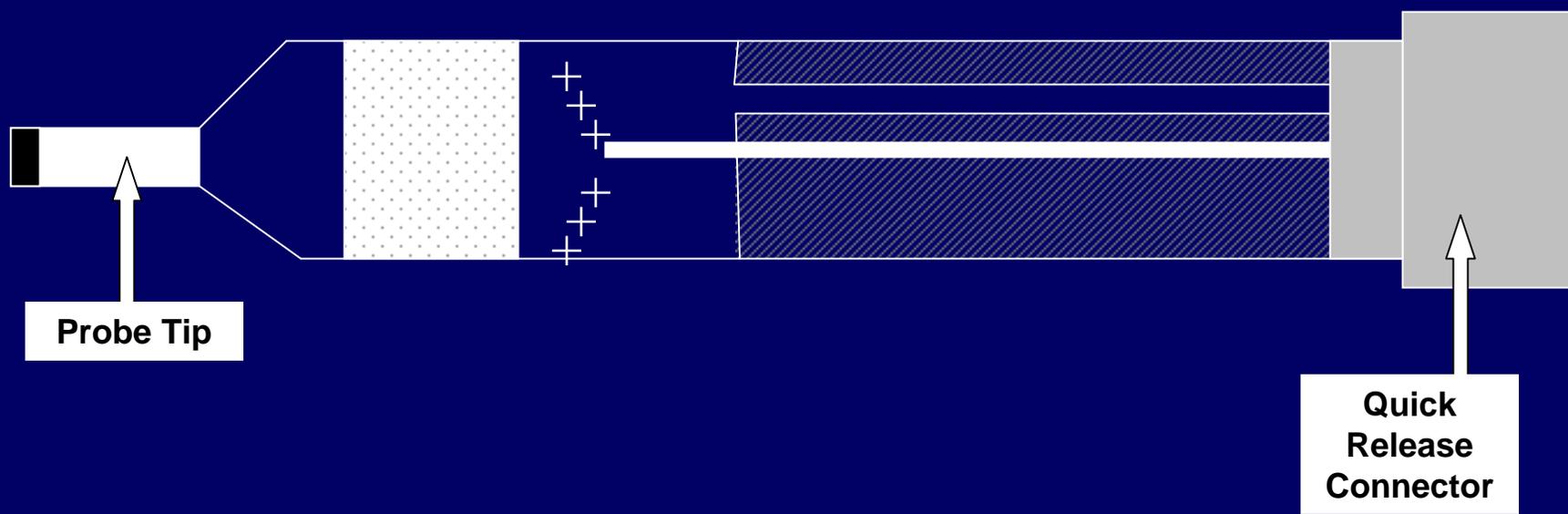
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Negative Ion Capture Including Pulse Mode Technology



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Negative Ion Capture In “Smart” Probe Design



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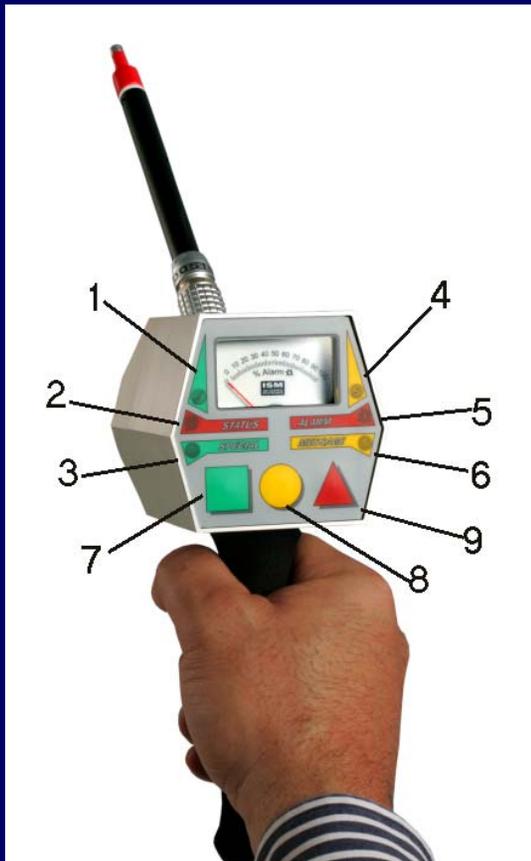
Smart Probe Design for Location and Detection

- Three probes supplied with every instrument
- Only need to return the probes not the instrument
- 200 hours use each
- Refurbished probes as good as new for another 200 hours of use



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Handgun Controls



1 – Ready for measuring

2 – Not ready for measuring

3 – Special

4 – Measured value above 20% of limit

5 – Alarm 100%

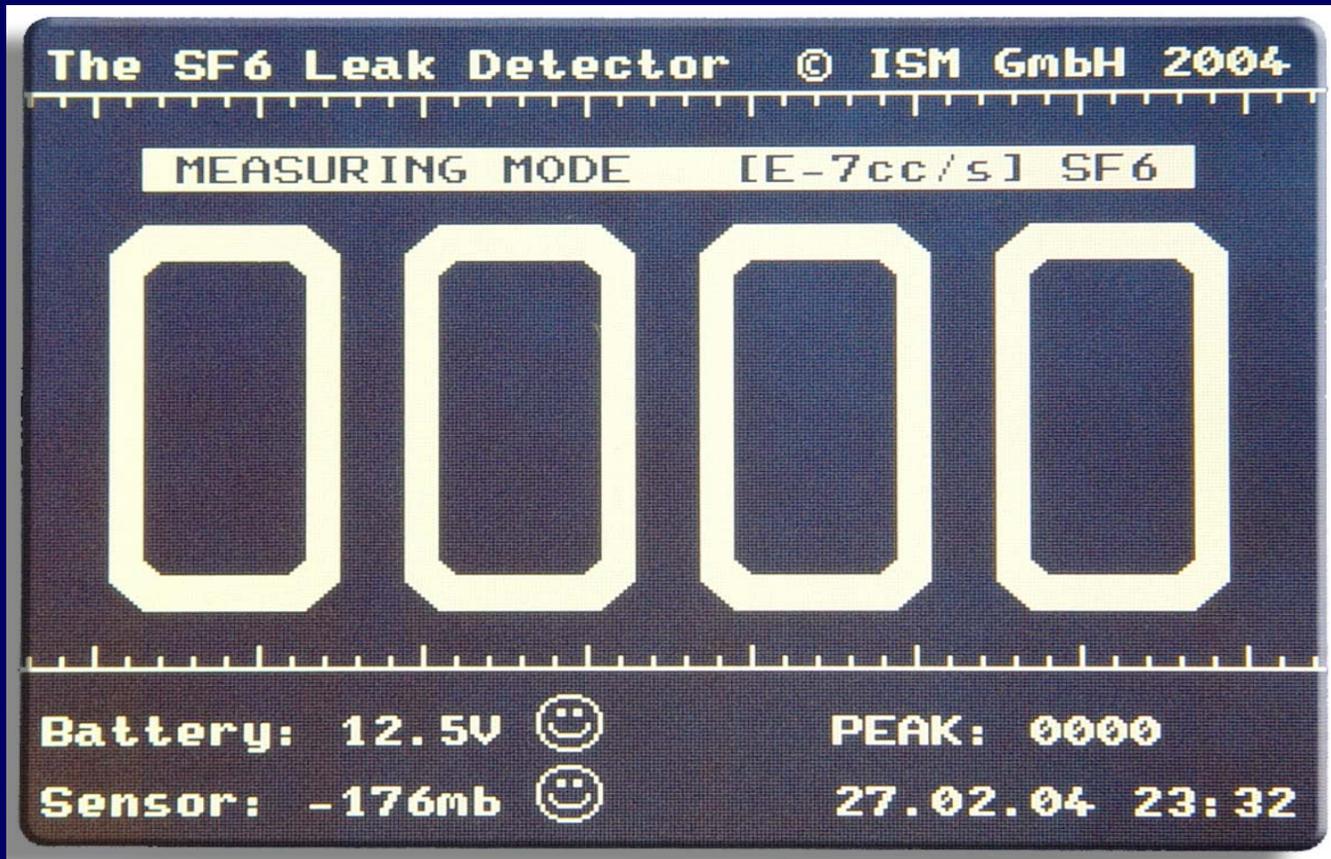
6 – Message on main display

7 – Switch between modes

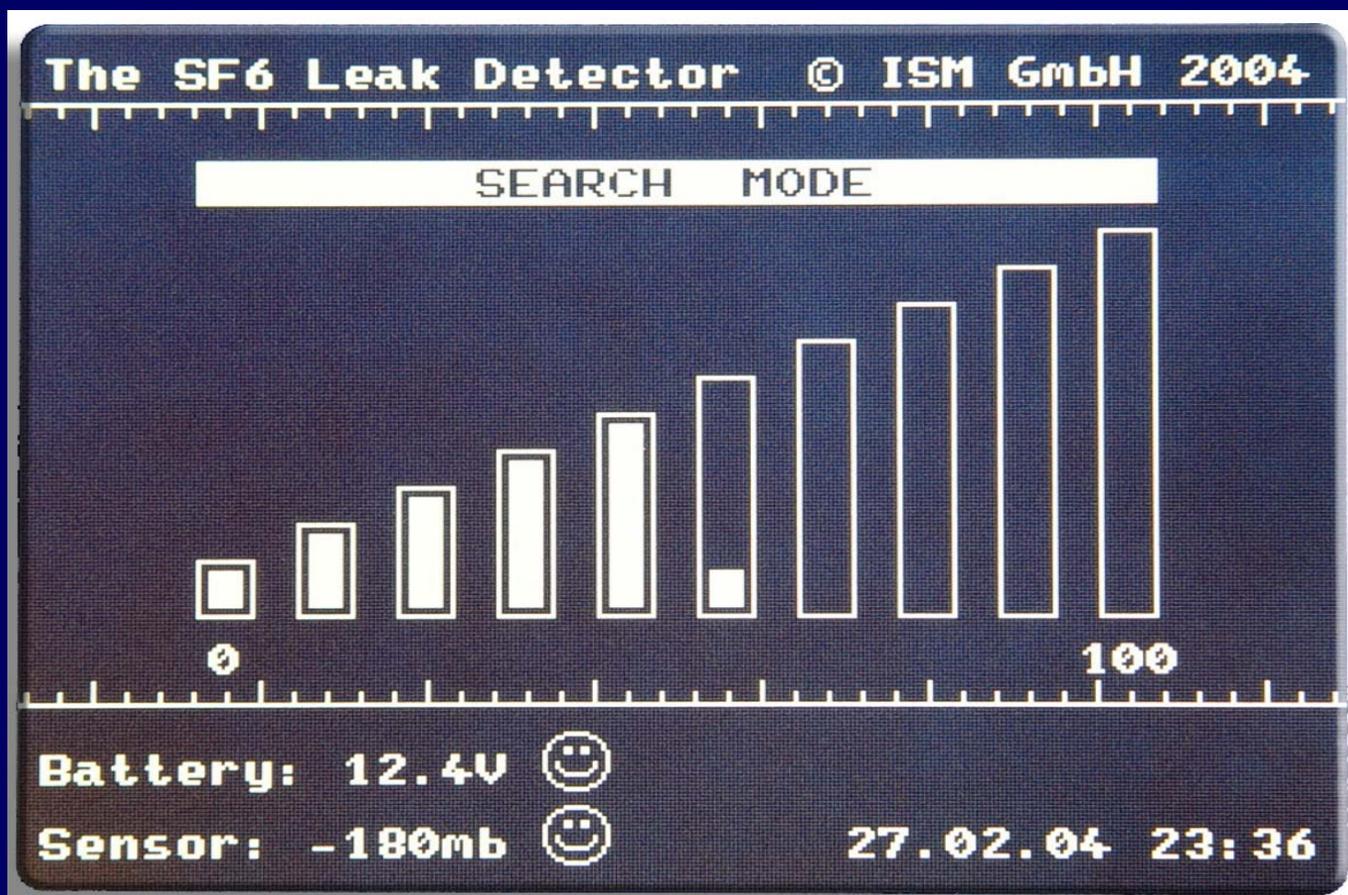
8 – Zero

9 – Store measurement

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The GasCheck P1 SF6



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SF₆ GasCheck P1

- Launched in 2002
- Dual speakers in the hand gun
- Vibration alarm as standard
- User programmable software
- Larger LCD display with improved graphics and larger numbers
- Zero tracking
- 1x 10⁻⁷ ml/sec

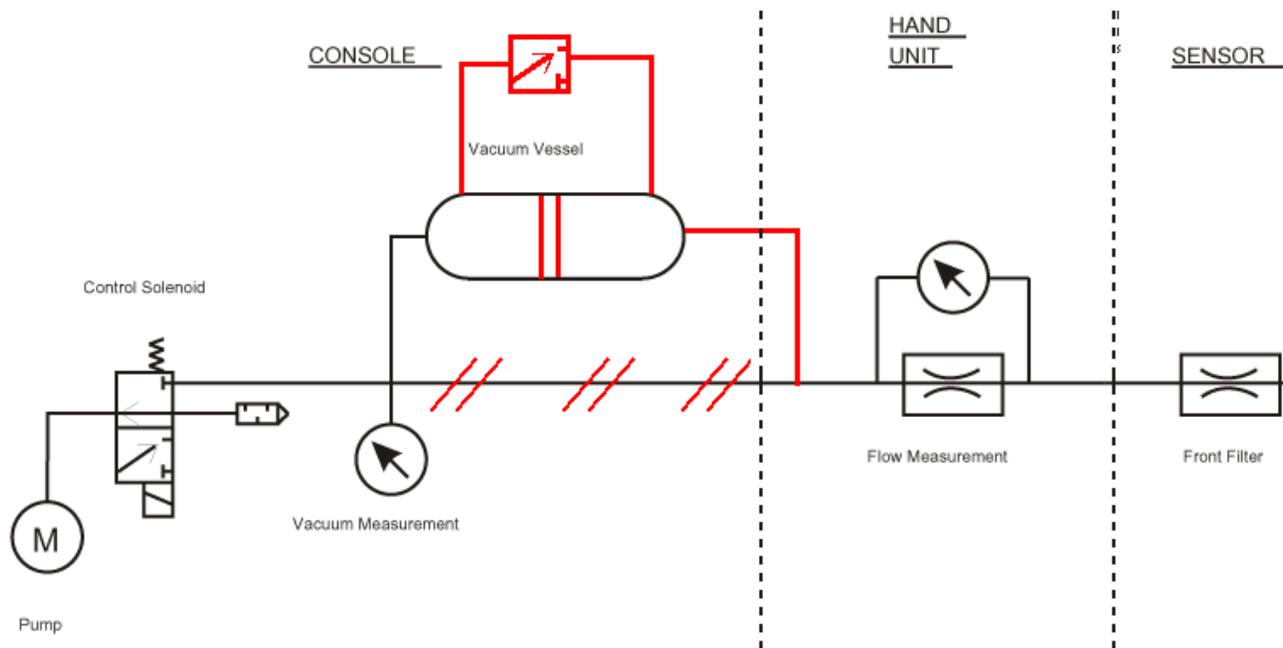
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SF₆ GasCheck P1 Highsense

- Launched in 2003 and improved in 2004 benefiting from those new features on the SF₆ GasCheck P1
- Increased sensitivity
 - 1 x 10⁻⁸ ml/sec
 - 0.1 ppm resolution
 - 0.001 gm/yr SF₆
- That's the equivalent of a grain of rice per year!

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GAS CHECK P1 & P1evo (Standard Version) Pneumatic Scheme
(Highsense Version)



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The New SF₆ LeakCheck P1:p



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The New SF₆ LeakCheck P1:p

- Launched 2004
- Designed for use in the field by service engineers
- Housed in a robust Peli Case
- Air transport much easier
- Decreased transportation costs
- Also benefits from the new improved features



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The New SF₆ LeakCheck P1:p Highsense

- Launched 2006
- Increased sensitivity
 - 1 x 10⁻⁸ ml/sec
 - 0.1 ppm resolution
 - 0.001 gm/yr SF₆

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Location and Detection

- High sensitivity
- No down time due to high exposure
- No argon at all
- No radioactivity
- Low running cost with smart probe design
- No need to service consul until 5 years old
- Ergonomic design



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Accessories

- CalCheck calibration check
- Extension hoses available up to 50 m
- 300 mm probe extender tip, with fine tip for finding leaks in awkward areas
- Printer
- Trolley for use with SF6 GasCheck range



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GasCheck SF₆

- Launched in 1999
- Hundreds of satisfied users including:
 - Siemens, BEP Bestobell, Alstrom, Lucy Switchgear, US Military, ABB, Pirelli Cables, Kidde Products, Crompton Greaves, Trafex, Mitsubishi, GW Electric, Joslyn, AZZ, TXU, Southern States
- Design awards in first year
- Long connection probes with no loss of sensitivity
- The leading SF₆ solution since its launch

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The New AreaCheck P2 SF6



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Available methods for Locating and Detecting SF₆ Leaks

- Laser Camera
- Infrared
- Radioactive ECD
- NIC

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Technology Review

- Laser Camera: x10-5, live, area
- Infrared: x10-5, pinpoint
- Radioactive ECD: x10-8, pinpoint
- NIC: x10-8, pinpoint



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Are there any questions?