973-SF$_6$ Analyzer

Laboratory Precision - Field Ready

- SF$_6$ gas specific analyzer
- Measurement of humidity: Dew/Frost Point, ppm$_v$ and ppm$_w$
- SF$_6$ purity: %Vol. SF$_6$
- Optional SO$_2$ measurement: ppm$_v$ concentration
- Gas containment system with automatic pump back; No gas loss
- Fundamental measuring principle
- Dew/Frost Point results at SF$_6$ compartment or standard pressure
- Full color touch screen user interface
- User verifiable calibration
- Simple to set up, use and maintain
- Easily transportable
- Supplied complete with robust transport case
Protect Your SF₆ Equipment
Prevent costly repairs

Sulfur-hexafluoride (SF₆) is used as a dielectric in high power Gas Insulated Equipment (GIE) such as breakers, switches, transformers and transmission lines. SF₆ is normally a highly stable, non-reactive gas, even in the presence of high energy discharge such as the make or break of a switch. While SF₆ alone is the preferred gas within the GIE, water vapor (H₂O) always finds its way in through permeation and by desorption from the GIE’s internal components. While water vapor and SF₆ are normally non-reactive with each other, in the presence of a high energy discharge, hydrogen and oxygen of the water vapor may react with the sulfur and fluorine of the SF₆ to create hydrofluoric acid (HF), sulfuric acid (H₂SO₄) and sulfur dioxide (SO₂), compounds corrosive to the internal workings of the GIE. Since SF₆ with low water vapor content (low humidity) significantly reduces the potential for creation of these corrosive compounds, the RH Systems 973-SF₆ gas analyzer is a critical component to any GIE preventative maintenance program.

Total Solution for SF₆ Measurement
One instrument for all your SF₆ measurements

The 973-SF₆ is an advanced analyzer for measurement of humidity, purity, compartment pressure and SO₂ concentration (optional) in SF₆ gas insulated equipment. With its internal gas containment/recovery system, the 973-SF₆ provides the best measurement solution available within a single instrument.

Chilled Mirror Technology
Based on physics for reliable measurement

A polished mirror surface is cooled to the point at which condensation forms on the mirror surface. The temperature is then measured. Since this condensation temperature is specific to water vapor concentration, highly precise results are achieved without the use of humidity sensors. Chilled mirror technology makes the 973-SF₆ the most accurate and reliable humidity measuring instrument in the industry.

Lower Cost of Ownership
No drift means less frequent calibration

Unlike capacitive sensor-based systems that rapidly and continually drift far out of specification, the 973-SF₆ chilled mirror technology relies on the drift-free physical principles of condensation. While sensor-based systems may have a lower initial acquisition cost, their ongoing costs for humidity sensor replacement, recalibration, and the lower reliability of their measurements, make the 973-SF₆ the most cost effective option.

Intuitive User Interface
Easy to use in the field

With the intuitive, interactive display, measurement results are clearly presented on the full color touch screen in the units of choice and held on the display for user notation. Results can easily be transferred directly to Microsoft Excel using the supplied software and cable. The 973-SF₆ data is compatible with all standard procedures issued by manufacturers and standards organizations including CIGRE and IEC.
User Verifiable Calibration

Field check the 973-SF₆ calibration at any time using the built-in Ice Test function. For this automatic test, the mirror cools to below 0°C, causing water vapor from the air to condense and freeze on the mirror surface. The mirror then begins to warm just above 0°C. While observing the mirror, simply press the on-screen button to indicate the precise moment at which the ice melts. The 973-SF₆ measures the actual mirror temperature at that very moment and provides a pass/fail indication.

SO₂ Concentration

As an option, the 973-SF₆ is now available with integrated, industry standard chemical-based SO₂ measurement – another indicator of potential problems within gas-insulated equipment. The measurement cell is conveniently located on the rear panel for easy user replacement when needed (about every two years). Low cost, pre-calibrated, interchangeable modules make this swap-out a simple, two minute field operation.

Easy to Maintain

Maintenance is limited to only occasional mirror cleaning and physical inspection of gas hoses. Automated tests for measurement integrity, pumping capability, and leaks allow the system to be easily verified in the field.

Robust and Transportable

Highly compact, the 973-SF₆ is supplied complete with a robust, shock-resistant case for use on site and for transportation. Sample lines and the most common DN8 and DN20 fittings are included. Alternative fittings are available to suit almost any SF₆ installation.

Containment System with Pump Back

The 973-SF₆ includes an integrated gas collection cylinder, allowing all measurements to be made with zero loss of SF₆ gas.

During measurement, the 973-SF₆ pumps the sample gas from the GIE, through the measuring head and into the internal storage cylinder. When finished, the gas is automatically pumped back into the original gas compartment. Optionally, it may be held within the 973-SF₆ for later pump back into a waste cylinder.

The 973-SF₆ incorporates a completely sealed, high-pressure pump and gas path for precise, zero-emission measurements.

Laboratory Precision! Field Ready!

The 973-SF₆ is the gas analyzer of choice for all the major switch-gear manufacturers thanks to its precision, repeatability and long term stability.
## Specifications

### Measuring range:

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frost/Dew Point</td>
<td>-50...+20°C (-58...+68°F)</td>
</tr>
<tr>
<td>Humidity content by volume</td>
<td>20...20,000 ppm_v</td>
</tr>
<tr>
<td>Humidity content by weight</td>
<td>2.5...2,500 ppm_w</td>
</tr>
<tr>
<td>Volume SF&lt;sub&gt;6&lt;/sub&gt;</td>
<td>80...100%</td>
</tr>
<tr>
<td>Inlet pressure</td>
<td>125...3,000 kPa abs usable range (18...435 PSIA usable range)</td>
</tr>
<tr>
<td></td>
<td>125...1,000 kPa abs calibrated range (18...145 PSIA calibrated range)</td>
</tr>
<tr>
<td></td>
<td>(125...1,200 kPa abs calibrated range upgrade available) (18...174 PSIA)</td>
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</tbody>
</table>

### Accuracy:

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frost/Dew Point</td>
<td>± 0.5 °C (± 0.9 °F)</td>
</tr>
<tr>
<td>ppm_v</td>
<td>± 1 ppm +6% of reading</td>
</tr>
<tr>
<td>Volume SF&lt;sub&gt;6&lt;/sub&gt;</td>
<td>± 0.5%</td>
</tr>
<tr>
<td>Pressure</td>
<td>± 3 kPa (± 0.4 PSIA)</td>
</tr>
</tbody>
</table>

### Reproducibility:

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Repeatability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frost/Dew Point</td>
<td>± 0.1°C</td>
</tr>
<tr>
<td>Volume SF&lt;sub&gt;6&lt;/sub&gt;</td>
<td>± 0.2%</td>
</tr>
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</table>

### Standard Features:

- Digital I/O
- Thermolectric mirror cooling 3-stage
- Mirror temperature sensor RTD (Pt-100)
- LCD display with touch screen 5.7""
- Internal gas tubes Stainless Steel 316L / FEP
- Gas connections Quick connect fitting (Swagelok® QM Series)
- Couplings Dilo DN8 (VK/F-02/8) and DN20 (VK/F-02/20)
- External sample gas tube 6 m stainless steel armored PTFE tubing
- ORIS Optimum Response Injection System
- Transport Case Custom fit foam lined Peli 1620
- Power Cable 2.5 m (8Ft.)
- Operating instructions English, French, Big5 Traditional Chinese, or German
- Calibration certificate Pressure calibration, 2-point dew/frost point, 3-point volume %SF<sub>6</sub>

### Optional:

- Internal SO<sub>2</sub>-Module Range: 0...100 ppm<sub>v</sub> or 0...500 ppm<sub>w</sub>
  - Accuracy: <2% of range <2% of range
  - Drift: ≤5%/ year ≤5%/ year

### Additional Information:

- Supply voltage 100-120 VAC / 200-240 VAC, 50/60 Hz (auto switching)
- Supply voltage fluctuations up to ± 10% of nominal voltage / Overvoltage category II
- Rated pollution degree 2
- Power consumption 200 Watt
- Pump back pressure max. 900 kPa (130 PSIA)
  - (1,200 kPa abs upgrade available) (174 PSIA)
- Cooling Air
- Operation Temperature -10 °C...+40 °C (14 °F...104 °F)
- Storage Temperature -20 °C...+50 °C (-4 °F...122 °F)
- Humidity Maximum relative humidity 98% RH, non-condensing
- Outdoor use Permissible, instrument must be protected against exposure to water.
- Altitude Up to 2,000 m (6,500Ft.)
<table>
<thead>
<tr>
<th>Weights &amp; Dimensions:</th>
<th>Instrument</th>
<th>with Transport Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>420 mm (17in.)</td>
<td>650 mm (26in.)</td>
</tr>
<tr>
<td>Height</td>
<td>155 mm (6in.)</td>
<td>370 mm (15in.)</td>
</tr>
<tr>
<td>Depth</td>
<td>390 mm (15in.)</td>
<td>510 mm (20in.)</td>
</tr>
<tr>
<td>Weight</td>
<td>16.5 kg (37lbs.)</td>
<td>32 kg (71lbs.)</td>
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</table>

We reserve the right to change design or technical data without notice.