

# 973-SF<sub>6</sub> Analyzer

*Laboratory Precision - Field Ready*



- SF<sub>6</sub> gas specific analyzer
- Measurement of humidity: Dew/Frost Point, ppm<sub>v</sub> and ppm<sub>w</sub>
- SF<sub>6</sub> purity: %Vol. SF<sub>6</sub>
- Optional SO<sub>2</sub> measurement: ppm<sub>v</sub> concentration
- Gas containment system with automatic pump back; No gas loss
- Fundamental measuring principle
- Dew/Frost Point results at SF<sub>6</sub> 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

*Reflecting Your Standards*

## Protect Your SF6 Equipment

*Prevent costly repairs*

Sulfur-hexafluoride (SF<sub>6</sub>) is used as a dielectric in high power Gas Insulated Equipment (GIE) such as breakers, switches, transformers and transmission lines. SF<sub>6</sub> 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 SF<sub>6</sub> alone is the preferred gas within the GIE, water vapor (H<sub>2</sub>O) always finds its way in through permeation and by desorption from the GIE's internal components. While water vapor and SF<sub>6</sub> 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 SF<sub>6</sub> to create hydrofluoric acid (HF), sulfuric acid (H<sub>2</sub>SO<sub>4</sub>) and sulfur dioxide (SO<sub>2</sub>), compounds corrosive to the internal workings of the GIE. Since SF<sub>6</sub> with low water vapor content (low humidity) significantly reduces the potential for creation of these corrosive compounds, the RH Systems 973-SF<sub>6</sub> gas analyzer is a critical component to any GIE preventative maintenance program.

## Total Solution for SF<sub>6</sub> Measurement

*One instrument for all your SF<sub>6</sub> measurements*

The 973-SF<sub>6</sub> is an advanced analyzer for measurement of humidity, purity, compartment pressure and SO<sub>2</sub> concentration (optional) in SF<sub>6</sub> gas insulated equipment. With its internal gas containment/recovery system, the 973-SF<sub>6</sub> provides the best measurement solution available within a single instrument.



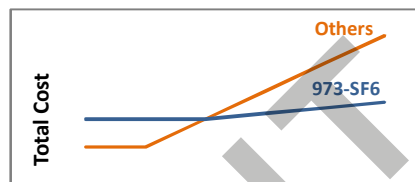
## Chilled Mirror Technology

*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-SF<sub>6</sub> the most accurate and reliable humidity measuring instrument in the industry.

## Lower Cost of Ownership

*No drift means less frequent calibration*



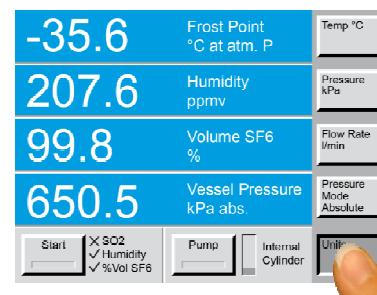
Unlike capacitive sensor-based systems that

rapidly and continually drift far out of specification, the 973-SF<sub>6</sub> 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-SF<sub>6</sub> 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



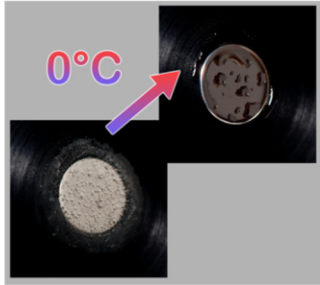
touch screen in the units of choice and held on the display for user notation. Results can easily be transferred directly to Microsoft Excel using the supplied software and cable. The 973-SF<sub>6</sub> data is compatible with all standard procedures issued by manufacturers and standards organizations including CIGRE and IEC.

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## **User Verifiable Calibration**

*Be confident in your measurement*

Field check the 973-SF<sub>6</sub> 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-SF<sub>6</sub> measures the actual mirror temperature at that very moment and provides a pass/fail indication.

## **Easy to Maintain**

*Minimal training, field serviceable*

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.



## **Containment System with Pump Back**

*Environmentally friendly, zero-loss system*

The 973-SF<sub>6</sub> includes an integrated gas collection cylinder, allowing all measurements to be made with zero loss of SF<sub>6</sub> gas.

During measurement, the 973-SF<sub>6</sub> 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-SF<sub>6</sub> for later pump back into a waste cylinder.

The 973-SF<sub>6</sub> incorporates a completely sealed, high-pressure pump and gas path for precise, zero-emission measurements.

## **SO<sub>2</sub> Concentration**

*An additional health check for your GIE*



As an option, the 973-SF<sub>6</sub> is now available with integrated, industry standard chemical-based SO<sub>2</sub> 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.

## **Robust and Transportable**

*Made especially for field use*

Highly compact, the 973-SF<sub>6</sub> 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 SF<sub>6</sub> installation.

## **Laboratory Precision! Field Ready!**

The 973-SF<sub>6</sub> is the gas analyzer of choice for all the major switch-gear manufacturers thanks to its precision, repeatability and long term stability.

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## Specifications

973-SF<sub>6</sub> Analyzer

<b>Measuring range:</b>		
Frost/Dew Point	-50...+20°C (-58...+68°F)	
Humidity content by volume	20...20,000 ppm <sub>v</sub>	
Humidity content by weight	2.5...2,500 ppm <sub>w</sub>	
Volume SF <sub>6</sub>	80...100%	
Inlet pressure	125...3,000 kPa abs usable range (18...435 PSIA usable range) 125...1,000 kPa abs calibrated range (18...145 PSIA calibrated range) (125...1,200 kPa abs calibrated range upgrade available) (18...174 PSIA)	
<b>Accuracy:</b>		
Frost/Dew Point	± 0.5 °C (± 0.9 °F)	
ppm <sub>v</sub> / ppm <sub>w</sub>	± 1 ppm +6% of reading	
Volume SF <sub>6</sub>	± 0.5%	
Pressure	± 3 kPa (± 0.4 PSIA)	
Reproducibility	± 0.1 °C Frost/Dew Point	
<b>Standard Features:</b>		
Digital I/O	RS-232	
Thermoelectric 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	<b>Optimum Response Injection System</b>	
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>	
<b>Optional:</b>		
Internal SO <sub>2</sub> -Module	Range:	0...100 ppm <sub>v</sub> or 0...500 ppm <sub>v</sub>
	Accuracy:	<2% of range <2% of range
	Drift:	≤5%/ year ≤5%/ year
<b>Additional Information:</b>		
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.)	
<b>Weights &amp; Dimensions:</b>		
	<b>Instrument</b>	<b>with Transport Case</b>
Width	420 mm (17in.)	650 mm (26in.)
Height	155 mm (6in.)	370 mm (15in.)
Depth	390 mm (15in.)	510 mm (20in.)
Weight	16.5 kg (37lbs.)	32 kg (71lbs.)

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

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