

# SF<sub>6</sub> Gas Excellence

## Analytics, Leak Location & Density



# SF<sub>6</sub> Gas Analytic Equipment

## SF<sub>6</sub> Gas to be Included in Mandatory Greenhouse Gas Reporting

The 2008 Consolidated Appropriations Amendment gave the United States Environmental Protection Agency (EPA) broad statutory authority for mandatory reporting of Greenhouse Gas emissions (including SF<sub>6</sub> gas). The rule for mandatory SF<sub>6</sub> gas reporting covers electric utilities with a total nameplate capacity greater than 17,820 lbs of SF<sub>6</sub> (7,838 kg, app. 25,000 metric tons CO<sub>2</sub>e). Measurement begins in 2011, with first reporting due at the EPA by March 31, 2012.

Over time, switching operations in SF<sub>6</sub>-insulated switchgear leads to an increasing amount of moisture as well as highly toxic and corrosive decomposition products in the tank, impeding the safe operation of switchgear. WIKA offers a complete line of analytic equipment and accessories to accurately access the SF<sub>6</sub> gas percentage as well as the moisture and other decomposition products present in SF<sub>6</sub> tanks.

### SF<sub>6</sub> Analytic Equipment

GA10 SF <sub>6</sub> -Breaker-Analyzer	Analysis of SF <sub>6</sub> purity, moisture content and decomposition products in SF <sub>6</sub> -filled equipment Modular sensor system
GA20 SF <sub>6</sub> -Humiditor	Analysis of SF <sub>6</sub> moisture level
GA25 SF <sub>6</sub> -Aciditor	Analysis of decomposition products in SF <sub>6</sub> -filled equipment
GA35 SF <sub>6</sub> -IR-Monitor	Indoor SF <sub>6</sub> level with alarm functions monitoring
GA40 SF <sub>6</sub> -Hygrometer	High precision (chilled dewpoint mirror) moisture testing
GA45 SF <sub>6</sub> -Recovery-Kit	Temporary and portable storage of SF <sub>6</sub> in gaseous forms
GA50 SF <sub>6</sub> -Purity-Meter	Measurement of SF <sub>6</sub> purity



Model GA35



Model GA40



Model GA10

### SF<sub>6</sub> Quality Standards

IEC and CIGRE elaborate specific criteria and limits for SF<sub>6</sub> gas contamination as well as the handling of SF<sub>6</sub> gas used in electrical switchgear applications. These criteria are found in IEC 60480 and the "SF<sub>6</sub> Recycling & Handling Guide". Over time, the combination of moisture with certain decomposition products (such as SO<sub>2</sub> or SOF<sub>2</sub>) produces acid, corroding the interior of switchgear tanks and creating a dangerous situation that must be avoided. The maximum acceptable impurity levels for used SF<sub>6</sub> gas (according to IEC 60480) are:

- SF<sub>6</sub> percentage: < 3%
- Decomposition products: < 50 ppmv
- Moisture: dewpoint temperature > -9.4°F (MV) or > -32.8°F (HV)

# SF<sub>6</sub> Gas Leak Location

As circuit breakers age, it is important to make sure that any leak paths for SF<sub>6</sub> are quickly pinpointed. The WIKA SF<sub>6</sub>-IR-Leak is the perfect tool to identify the location and magnitude of leaks so that appropriate repairs can be made. It achieves optimum price/functionality with infrared leak detection technology that is not cross-sensitive to moisture or typical volatile organic compounds.

## SF<sub>6</sub>-IR-Leak

- Leak location (for field use)
- Infrared leak detection technology
- Dual handgun and console display

## Key Features

- Dual display - handgun and console
- Offers 1 ppm<sub>v</sub> sensitivity (Model GA15) and 0.1 ppm<sub>v</sub> sensitivity (model GA18)
- Fast response time of 1 second
- Non-radioactive source
- Lightweight and easy to operate
- Low maintenance (no parts that wear out)
- No cross sensitivity to moisture
- Unaffected by background contamination
- No influence due to large leaks or 100% SF<sub>6</sub> concentrations



# SF<sub>6</sub> Gas Filling & Recovery Equipment

Filling and evacuation of SF<sub>6</sub> tanks must be done with proper recovery equipment. WIKA Gas Filling Units are designed for the wide spectrum of SF<sub>6</sub> gas filling and recovery operations needed in the Transmission & Distribution (T&D) Industry.

## Gas Filling & Recovery Units Model GFU

### GFU08 On-Cart Weighing

- Emission-free topping-up of SF<sub>6</sub> compartments
- Weight of SF<sub>6</sub> cylinders for simplified and precise emission reporting
- With optional vacuum pump

### GFU10 Compact-Size

- Purification by continuous recirculation of SF<sub>6</sub> gas
- 50-lb on-board storage tank
- Large tires for easy substation maneuvering

### GFU20 Full-Size

- Moisture & particle filtration
- With storage space for two 115-lb cylinders
- Large tires for easy substation maneuvering

### GFU30 High Voltage

- Customized SF<sub>6</sub> service plants
- Please inquire for specific details
- Custom vacuum & compressor flow rates

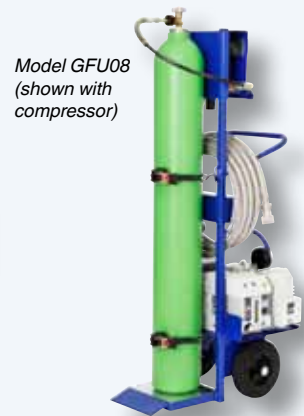
### GFU40 Transfer - Consolidate SF<sub>6</sub> gas cylinders

### GFU50 Full-Size Indoor Plus

- Moisture & particle filtration
- With storage space for three 115-lb cylinders



Model GFU10



Model GFU08  
(shown with  
compressor)



Model GFU20

# Gas Density Instrumentation - High Voltage

Globally, WIKA has an installed fleet of over 1,000,000 Gas Density Monitoring instruments and manufactures at a 5-Sigma quality level. Our temperature compensated and hermetically-sealed SF<sub>6</sub> instruments are trusted on switchgear in conditions from the scorching desert to the frozen tundra. The result is instrumentation of the highest accuracy without temperature or ambient influences so that “go”/“no go” decisions are seamless.

**Applications: Gas Insulated Switchgear, Live Tank Breakers, Dead Tank Breakers**

## Gas Density Monitors

### Model 233.52.100

#### Switching function with indication

- Accuracy: ±1% at 68°F, ±2.5% -20/60°C (linear interpolation in between)
- Mechanical magnetic snap-action contacts, secured with laser-welding spot
- Custom electrical and pressure connections
- Up to 3 contacts (max. 4 contacts possible with 2nd cable box)
- Custom dial

#### Options:

- Custom calibration for N<sub>2</sub>/SF<sub>6</sub> mixtures
- External tank temperature sensor (Model 233.52.100 GDM only)
- Large cable box housing (Model 233.58.100 GDM)



## Gas Density Indicators

### Model 233.52.100

#### Indication function

- Accuracy: ±1% at 68°F (±2.5% from -4/140°F, linearly interpolated)
- Custom dial

233.52.100  
Lower Mount



233.52.100  
Center Back Mount



## Gas Density Transmitters

### Model GD-10

#### Electrical output signal

- Output of 4... 20 mA density signal
- High accuracy (for details see data sheet SP 60.10)
- Electronic temperature compensation



## Gas Density Monitor/Transmitter Combos

### Model 233.52.100 TI Model 233.52.100 TA

#### Switching function, indication & electrical output signal

- Version TI (transmitter integrated into the back of the case)
- Version TA (transmitter attached to the pressure connection)
- Output: 4 ... 20 mA
- Up to 3 contacts
- Accuracy: same as Models 233.52.100 or GD-10, respectively



233.52.100 TA



233.52.100 TI

## Gas Density Switches

### Model 851.51.063 HV

#### Switching function

- High switching accuracy
- Up to 4 micro switches
- Accuracy: ±.9 psi at 68°F (±1.2 psi from -4/140°F, linearly interpolated)



# Gas Density Instrumentation - Medium Voltage

Applications: Ring Main Units, Pad Mount Applications

## Gas Density Switches

### Model 851.51.063 MV

#### Switching only

- High switching accuracy
- Up to 2 micro switches
- Accuracy:  $\pm 0.6$  psi at 68°F ( $\pm 0.9$  psi from -4/140°F, linearly interpolated)



## Gas Density Monitors

### Model 233.52.063

#### Switching function with indication

- Accuracy:  $\pm 1\%$  at 68°F ( $\pm 2.5\%$  from -4/140°F, linearly interpolated)
- Custom dial
- Up to 3 contacts



## Gas Density Indicators

### Model 233.52.063

#### Indication only

- Accuracy:  $\pm 1\%$  at 68°F ( $\pm 2.5\%$  from -4/140°F, linearly interpolated)
- Custom dial



Long-Term Advantages	Method Addressed	Applicable WIKA product	Trusted Quality
No pointer movement due to temperature fluctuations	Temperature compensation	Gas Density Monitors Gas Density Indicators Gas Density Transmitters Gas Density Switches	<ul style="list-style-type: none"> <li>■ Semi-automated, computer-aided calibration</li> <li>■ 100% stainless steel wetted parts and case</li> <li>■ Helium leak tested (<math>10^{-5}</math> mbar · l/s case; <math>10^{-8}</math> mbar · l/s measuring system)</li> <li>■ Hermetically-sealed cases</li> <li>■ Laser welded contacts</li> <li>■ Highly experienced team</li> <li>■ 5-Sigma quality level</li> <li>■ Continuous innovation via Kaizen process</li> <li>■ 100% end of line test</li> <li>■ High accuracy</li> </ul>
No water/humidity condensation on the window	Hermetically-sealed case	Gas Density Monitors Gas Density Indicators Gas Density Switches	
Without error from altitude and ambient pressure influences	Hermetically-sealed case	Gas Density Monitors Gas Density Indicators Gas Density Transmitters Gas Density Switches	
Measuring system is leak-free and without corrosion	Measuring system made of 316 stainless steel and helium leak tested to $< 1 \cdot 10^{-8}$ mbar · l/s	Gas Density Monitors Gas Density Indicators Gas Density Switches	
Reliable contact set points	Contacts laser-welded into position	Gas Density Monitors	
Tamper-resistant case	Case TIG welded closed at one spot	Gas Density Monitors Gas Density Indicators	

# Gas Connections

During the SF<sub>6</sub> tank filling process, as well as during maintenance, having robust leak-tight connections is essential to preventing unnecessary gas leaks. WIKA Gas Connections include valves, couplings and components that meet this strict industry requirement. Below is a sampling of our Gas Connection (GC) portfolio. Please inquire directly for your specific needs.

## What is a “Gas Connection”

- Valves & Couplings  
GC10



- Protection Caps  
GC20



- Union Nut & Screw-Fit Connections  
GC30

- Soldering & Welding Fittings  
GC40



Example of customized GC solution

### Valves Model GC10



### Couplings Model GC20



### Components Model GC30



#### Special features:

- Self-sealing
- Designed for repeated opening and closing
- Material: anodized aluminum, copper alloy, or stainless steel
- O-ring: EPDM rubber for high heat resistance
- Helium leak tested to  $\leq 1 \cdot 10^{-8}$  mbar · l / sec
- Variety of sizes: DN6, DN8, DN20, etc.

Having a solid understanding of the entire world of SF<sub>6</sub> gas is essential in formulating a strategy to maximize the value that can be added throughout the SF<sub>6</sub> gas life cycle. The SF<sub>6</sub> Academy exists to provide an environment of learning and best practice collaboration by assembling industry experts. Each session is customized according to the needs of the audience.



What if you could assemble experts from across the spectrum of SF<sub>6</sub> gas life cycle management and glean insights into best practices?



What if you could see and experience the equipment needed for lifecycle management of SF<sub>6</sub>-insulated switchgear?



This type of interactive exchange is exactly what the SF<sub>6</sub> Academy offers. The broad range of topics that can be covered include:

- SF<sub>6</sub> Gas Properties & Behavior
- SF<sub>6</sub> Gas Quality Analysis
- Infrared Leak Detection of SF<sub>6</sub> Gas
- Regulatory & Political Environment of SF<sub>6</sub> Gas
- SF<sub>6</sub> Gas Management Systems (Online Trending)
- SF<sub>6</sub> Emission Monitoring
- SF<sub>6</sub> Gas Density Measurement
- SF<sub>6</sub> Gas Connections
- SF<sub>6</sub> Gas Filling & Recovery Systems

Hands-on training and demonstrations are also possible to help increase knowledge transfer.

**Please contact us directly at [sf6@wika.com](mailto:sf6@wika.com) to inquire about setting up a session.**





**ISO 9001  
Certified**

For over 60 years, WIKI Instrument Corporation has continuously advanced pressure gauge, transmitter and temperature measurement instrumentation. As the global leader in lean manufacturing, WIKI offers a broad selection of stock and custom instrumentation solutions, which are often available for distribution within days. Producing over 43 million gauges, diaphragm seals, transmitters and thermometers worldwide annually, WIKI's extensive product line provides measurement solutions for any application. The WIKI sales team, along with its customer service and technical staff members, are ready to share their extensive product and industry knowledge to make your business experience with WIKI productive and progressive.



**SF<sub>6</sub>-Breaker-Analyser**

**Model GA10**



**Gas Connection**

**Model GC10**

WIKI provides distinctive service and support to our channel partners and customers:

- Award winning U.S.-based manufacturing, sales and ordering customer service and technical support
- Certified technical specialists who conduct Best Practice Instrument Reviews with performance improvement reports
- An in-house engineering team for product customization and innovation
- Proven capabilities to connect with customer business processes for ordering and inventory management
- Web-based customer service features, including RFQs, literature request and competitor product cross reference

**WIKI Instrument Corporation  
Pressure and Temperature Measurement**

1000 Wiegand Boulevard  
Lawrenceville, GA 30043

Toll Free (888) WIKI-USA (888-945-2872)

Tel (770) 513-8200 • Fax (770) 338-5118

SF6@wika.com • www.wika.com/SF6

