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MESSTECHNIK

Gas detector
Based on infrared technology
Model GIR-10

Applications

- Locating and quantifying leakages at SF_6 gas filled equipment
- Determination of leak rate for final inspection of SF_6 gas filled equipment

Special features

- Smallest concentrations of up to 0.6 ppm_v can be detected
- Responds only to SF_6 gas and is therefore not sensitive to humidity and common volatile organic compounds (VOC)
- Easy to use
- Fast response time
- Calibration in the factory using certified test gases

Gas detector model GIR-10

Description

The gas detector model GIR-10 is used for the detection of the smallest SF_6 gas concentrations and is thus ideal for detecting the place and size of leakages.

Infrared technology
The GIR-10, which is based on the non-dispersive infrared technology (NDIR), offers fast response times and reliable measured values even in case of small leakages.

Simple operation
This instrument is characterised by simple handling and good readability. Both the hand-held instrument and the console case are equipped with a digital indicator which is easy to read. This allows reading the current SF_6 gas values from any position.

The leakage detection is carried out using a hand-held instrument which has a movable gooseneck with gas inlet on the front side. An exchangeable filter prevents particles from being sucked in, thus protecting the infrared sensor.

A pump in the console case provides continuous flow of the sucked-in gas mixture through the sample chamber of the infrared sensor.

If the SF_6 gas is already present in low concentrations in the measurement environment, this offset can be tared to 0 ppm_v at the instrument. It makes the leakage detection easier, as every measured value greater than 0 ppm_v represents leakage.

Depending on the version, model GIR-10 sends an acoustic alarm when a defined concentration is exceeded.

ICS Schneider Messtechnik GmbH
Briesestraße 59
D-16562 Hohen Neuendorf / OT Bergfelde

Tel.: 03303 / 504066
Fax: 03303 / 504068

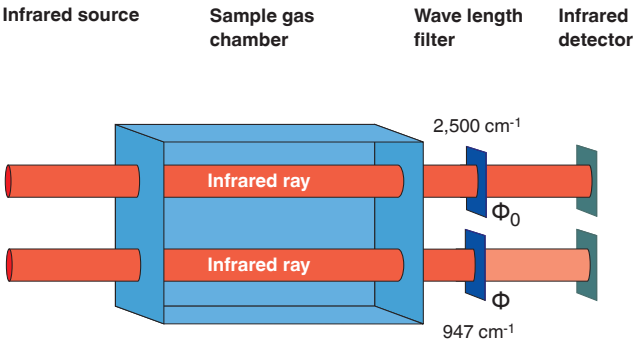
info@ics-schneider.de
www.ics-schneider.de

Measuring principle

Non-dispersive infrared technology (NDIR)
Non-dispersive infrared sensors are opticalsensors which are often used in the gas analysis.

The most important components are the infrared source, a sample gas chamber, a wave length filter and an infrared detector.

In the gas detector model GIR-10, the sucked-in air is pumped through the sample chamber. The concentration of SF_6 gas is determined electro-optically by means of absorption of SF_6 at 947cm^{-1}. The output signal of the detector is directly proportional to the absorption of the infrared light at the specific wave number. The GIR-10 does not need consumables and is maintenance-free within the calibration cycle.



The Lambert–Beer law

$$A = -\lg \frac{\Phi}{\Phi 0} = \varepsilon \cdot c \cdot l$$

A: Absorption
Φ: Light intensity after absorption of SF_6 gas
Φ0: Light intensity without absorption
ε: Extinction coefficient
c: Concentration
l: Length of the irradiated chamber (sample gas chamber)

Instrument construction

① Gas inlet with particle filter
② Digital indicator of the hand-held instrument
③ Connection of the connection hose to the hand-held
④ Connecting hose
⑤ On/Off switch, zero point setting
⑥ Digital indicator on the console case
⑦ Connection of the connection hose to the console case
⑧ Console case
⑨ Shoulder strap

Specifications

General specifications	
Measurement principle	Non-dispersive infrared technology (NDIR)
Voltage supply	■ Lithium-ion rechargeable battery for approx. 8 h operating time ■ Charger AC 100 ... 265 V, 50/60 Hz
Calibration sequence	After 1,200 hours of operation or every 2 years at the latest
Permissible temperature ranges	
Storage temperature	-10 ... +60 °C
Operating temperature	0 ... 50 °C
Dimensions	
Console	285 x 195 x 80 mm
Hand-held	210 x 110 x 90 mm
Weight	
Console	2.5 kg
Hand-held	0.5 kg

Sensor specifications (SF_6 gas version, 0 ... 2,000 ppm_v)	
Area of application	Leak detection
Medium to be measured	SF_6 gas
Measuring range	0 ... 2,000 ppm_v
Detection limit [1]	3 ppm_v
Detectable leak rate (calculated)	3 g/year (corresponds to 1.81 x 10^{-5} mbar x L/s)
Accuracy [2]	
≤ 100 ppmv	±3 ppm_v
≥ 100 ... ≤ 2,000 ppmv	±2 % of end value
Resolution	1 ppm_v
Measuring units	ppm_v, g/y, cc/s
Response time T90	< 1 second
Alarm signal	Visual and audible

1) No cross-sensitivity to typical volatile organic compounds (VOC).
No influence of air humidity between 0 ... 95 % r. h. (non-condensing).
2) max. drift of 0.05 % per month

Sensor specifications (SF_6 gas version, 0 ... 50 ppm_v)	
Area of application	Integral leak testing
Medium to be measured	SF_6 gas
Measuring range	0 ... 50 ppm_v
Detection limit [1]	0.6 ppm_v
Detectable leak rate (calculated)	0.34 g/year (corresponds to 1.81 x 10^{-6} mbar x L/s)
Accuracy	
≤ 10 ppm_v	±0.5 ppm_v
> 10 ppm_v	±2 %
Resolution	0.1 ppm_v
Measuring units	ppm_v, g/y, cc/s
Response time T90	< 12 seconds
Alarm signal	Visual and audible

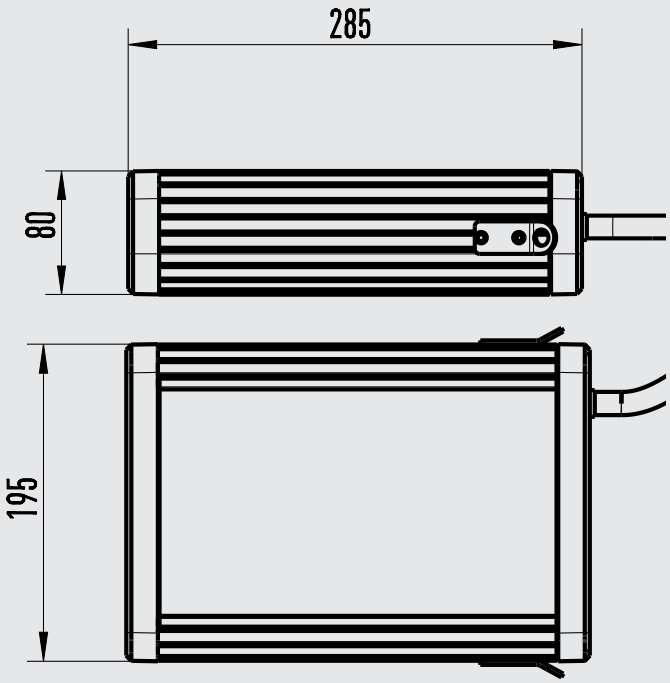
1) No cross-sensitivity to typical volatile organic compounds (VOC).
No influence of air humidity between 0 ... 95 % r. h. (non-condensing).

Sensor specifications (version CO_2, 0 ... 500 ppm_v (Clean Air / Dry Air))	
Area of application	Integral leak testing
Medium to be measured	Clean Air / Dry Air / CO_2
Measuring range	0 … 500 ppm_v
Detection limit [1)]	10 ppm_v
Detectable leak rate (calculated)	3.43 g/year (corresponds to 1.81 x 10^{-5} mbar x L/s)
Accuracy	400 ppm_v ±50 ppm_v
Resolution	1 ppm_v
Meauring unit	ppm_v
Response time T90	< 1 second
Alarm signal	Visual

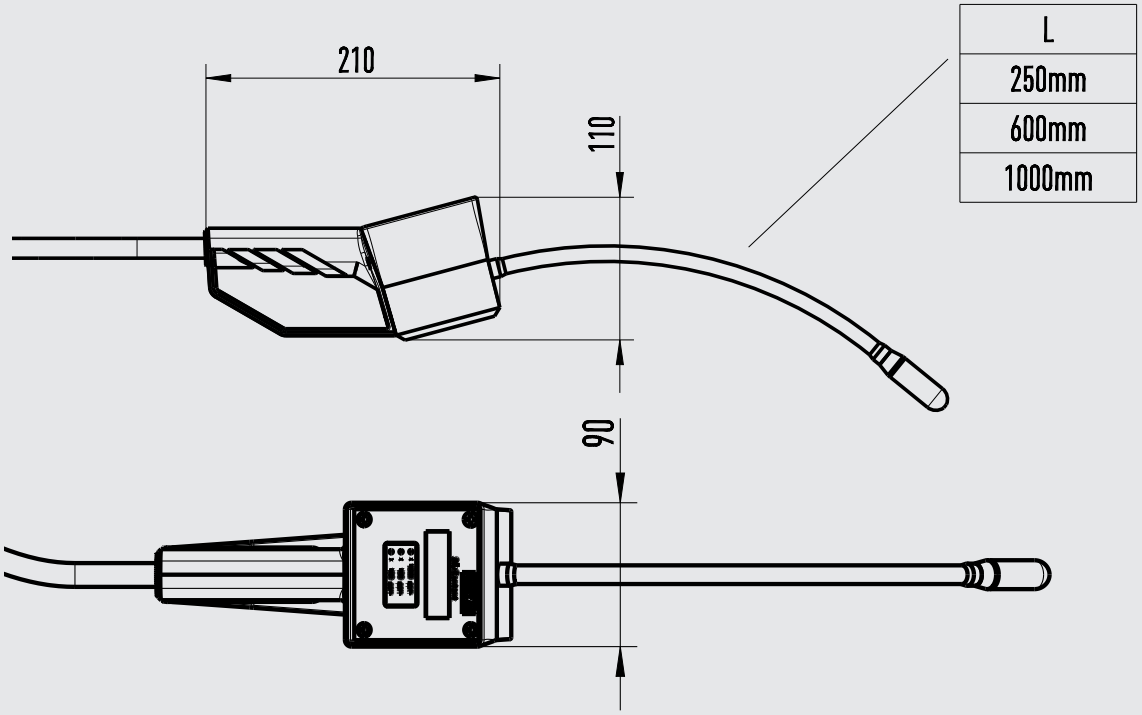
1) No cross-sensitivity to typical volatile organic compounds (VOC).
No influence of air humidity between 0 ... 95 % r. h. (non-condensing).

Dimensions in mm

Console



Hand-Held



Accessories and spare parts

Description	Order number
Particle filter	14005140
Transparent filter cap	14005999
O-ring	14004754
Measuring tip with injection needle	14093643
Sampling bag 5 litres	14029961

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