

Gas detector

Based on infrared technology

Model GIR-10

WIKA data sheet SP 62.02

Applications

- Locating and quantifying leakage at gas-filled equipment with SF₆ or alternative insulating gases (e.g. C₄-FN- or CO₂-based gas mixtures)
- Determination of leakage rates for final inspection of SF₆ gas-filled equipment

Special features

- Detectable concentrations of down to 0.6 ppm_v (depending on the instrument version)
- Sensor versions for SF₆, C₄-FN (C₄F₇N) and CO₂
- High selectivity for the respective medium, insensitive to moisture and the usual volatile organic compounds (VOC)
- Fast response time
- Calibration ex-works using certified test gases



Gas detector, model GIR-10

Description

The model GIR-10 gas detector is used to detect even the smallest concentrations of SF₆, C₄-FN (C₄F₇N) or CO₂, making it ideally suited for locating leakage and determining the size of it. Specific sensor versions are available for different media.

Infrared technology

Based on non-dispersive infrared technology (NDIR), model GIR-10 offers fast response times and reliable measured values – even with minor leakage.

Easy handling

This instrument is characterised by easy operation and good readability. Both the hand-held and the console case are equipped with an easy-to-read digital indicator. This allows reading the current gas concentrations of the respective medium from any position.

The leakage detection is carried out using a hand-held, which has a flexible 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 gas sample chamber of the infrared sensor.

If the gas to be detected is already present in low concentrations in the measurement environment, this offset can be tared to 0 ppm_v at the instrument. This makes 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.

Measurement principle

Non-dispersive infrared technology (NDIR)

Non-dispersive infrared sensors are optical sensors which are often used in gas analysis.

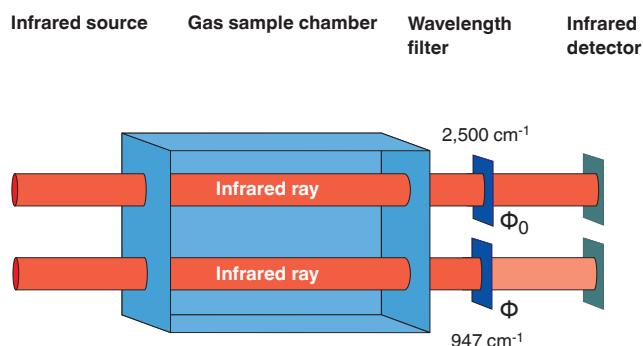
The most important components are the infrared source, a gas sample chamber, a wavelength filter and an infrared detector.

In the model GIR-10 gas detector, the sucked-in air is pumped through the gas sample chamber. The concentration of the respective medium is determined optically and electrically by means of the absorption of infrared radiation at a wavenumber characteristic of the gas. Taking SF_6 as an

example, it is determined using the absorption at 947 cm^{-1} .

The output signal of the detector is directly proportional to the absorption of the infrared light at the respective specific wavenumber. The measurement principle can therefore be used for various gases with characteristic absorption bands, such as SF_6 , C4-FN ($\text{C}_4\text{F}_7\text{N}$) oder CO_2 , with a sensor version specific to the medium being used in each case.

Model GIR-10 does not need any consumables and is maintenance-free within the calibration cycle.

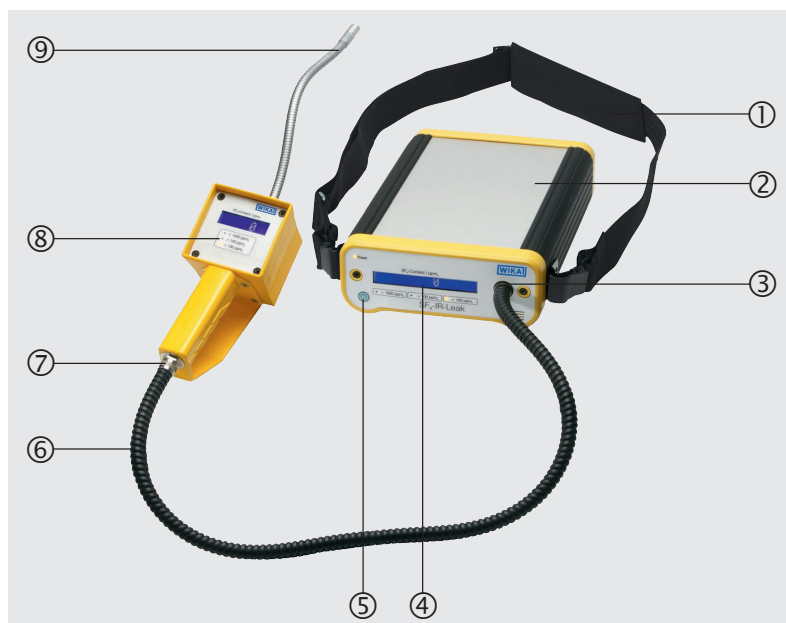


The Lambert–Beer law

$$A = -\lg \frac{\Phi}{\Phi_0} = \epsilon \cdot c \cdot l$$

- A: Absorption
- Φ : Light intensity after absorption of SF_6 gas
- Φ_0 : Light intensity without absorption
- ϵ : Extinction coefficient
- c: Concentration
- l: Length of the irradiated chamber (gas sample chamber)

Instrument construction



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

Specifications

Basic information	
Measurement principle	Non-dispersive infrared technology (NDIR)
Voltage supply	Lithium-ion rechargeable battery for approx. 8 hours operating time Battery charger AC 100 ... 265 V, 50/60 Hz
Calibration cycle	After 1,200 hours of operation or at least every 2 years
Storage temperature range	-10 ... +60 °C [14 ... 140 °F]
Operating temperature range	0 ... 50 °C [32 ... 122 °F]
Dimensions	
Console case	285 x 195 x 80 mm [11.22 x 7.67 x 3.14 in]
Hand-held	210 x 110 x 90 mm [8.26 x 4.33 x 3.54 in]
Weight	
Console case	2.5 kg [5.51 lb]
Hand-held	0.5 kg [1.1 lb]

Sensor (SF ₆ version, 0 ... 2,000 ppm _v)	
Application area	Leakage detection
Medium	SF ₆ gas
Measuring range	0 ... 2,000 ppm _v
Detection limit ¹⁾	3 ppm _v
Detectable leakage rate (calculated)	3 g/year (corresponds to $1.81 \cdot 10^{-5}$ mbar · l/s)
Accuracy ²⁾	
≤ 100 ppm _v	±3 ppm _v
≥ 100 ... ≤ 2,000 ppm _v	±2 % of full scale
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 % relative humidity, non-condensing.
- 2) Max. drift of 0.05 % per month

Sensor (SF ₆ version, 0 ... 50 ppm _v)	
Application area	Integral leakage testing
Medium	SF ₆ gas
Measuring range	0 ... 50 ppm _v
Detection limit ¹⁾	0.6 ppm _v
Detectable leakage rate (calculated)	0.34 g/year (corresponds to $1.81 \cdot 10^{-6}$ mbar · l/s)
Accuracy	
≤ 10 ppm _v	±0.5 ppm _v
> 10 ppm _v	±2 %
Resolution	0.1 ppm _v
Measuring units	ppm _v
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 % relative humidity, non-condensing.

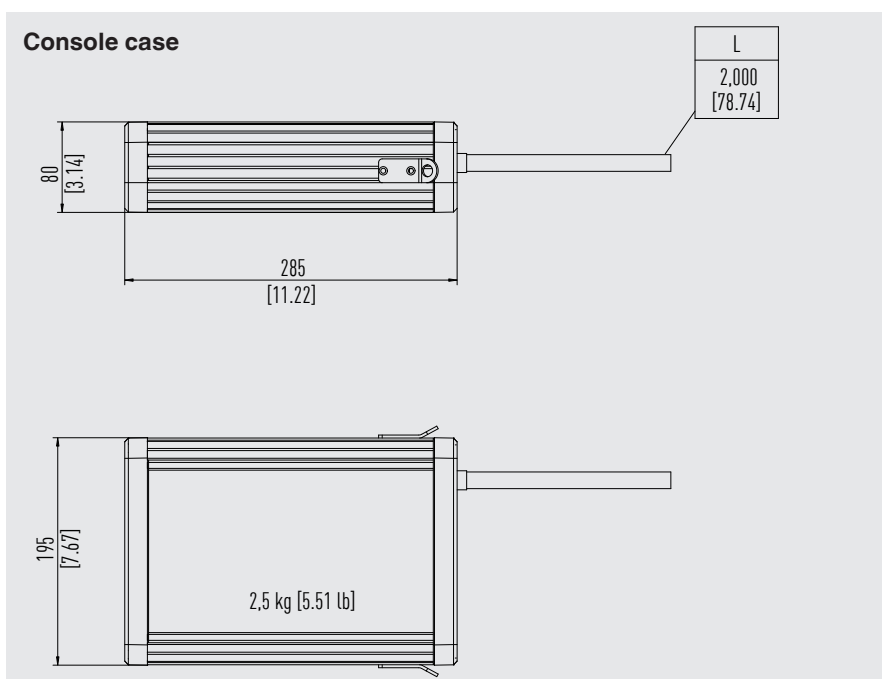
Sensor (CO ₂ version, 0 ... 1,000 ppm _v)	
Application area	Leakage detection
Medium	CO ₂
Measuring range	0 ... 1,000 ppm _v
Detection limit ¹⁾	10 ppm _v
Detectable leakage rate (calculated)	3.43 g/year (corresponds to $6.03 \cdot 10^{-5}$ mbar · l/s)
Accuracy	±50 ppm _v
Resolution	1 ppm _v
Measuring unit	ppm _v
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 % relative humidity, non-condensing.

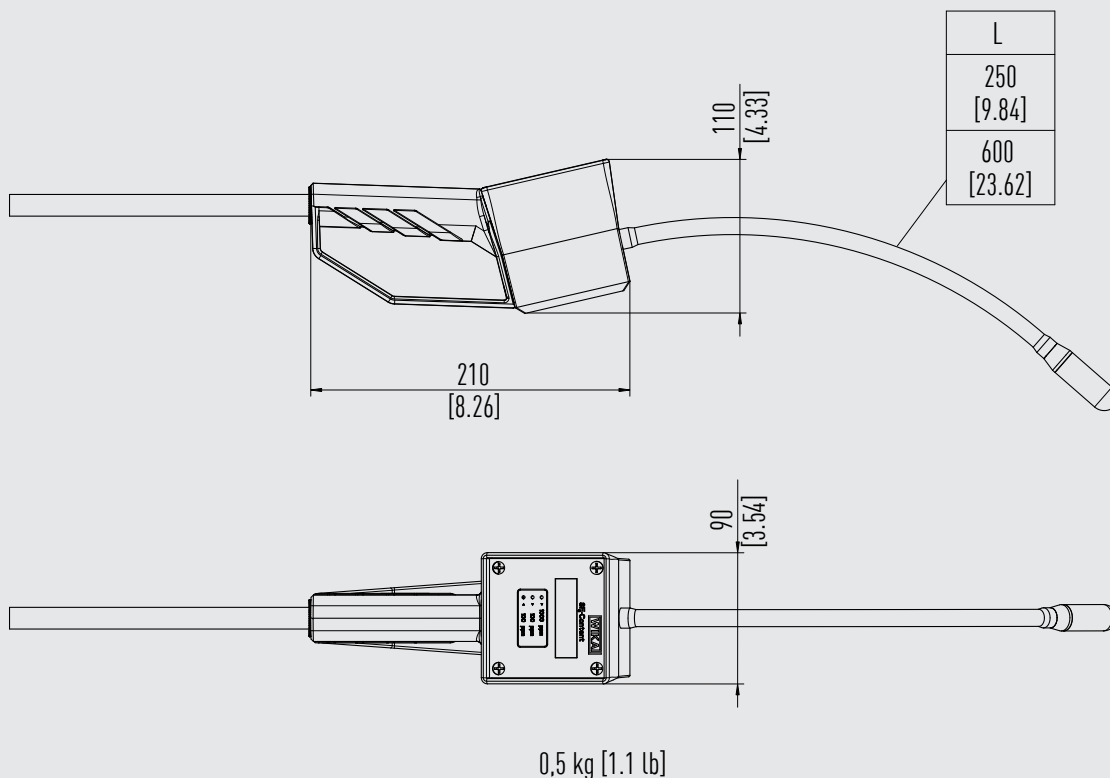
Sensor (C4-FN version, 0 ... 500 ppm _v)	
Application area	Leakage detection
Medium	C4-FN (C ₄ F ₇ N, Heptafluoroisobutyronitrile)
Measuring range	0 ... 500 ppm _v
Detection limit ¹⁾	5 ppm _v
Detectable leakage rate (calculated)	6.68 g/year (corresponds to $3.02 \cdot 10^{-5}$ mbar · l/s)
Accuracy	
≤ 65 ppm _v	±5 ppm _v
≥ 65 ppm _v ... ≤ 500 ppm _v	±25 ppm _v
Resolution	1 ppm _v
Measuring unit	ppm _v
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 % relative humidity, non-condensing.

Dimensions in mm [in]



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

Ordering information

Model / Measuring range / Option / Accessories and spare parts

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