HovaCAL® digital MF

Calibration Gas Generator 
with integrated Mass Flow Sensor

For the generation of span gases with defined concentration of H₂O, HCl, HF, NH₃ or HgCl₂ and the mixing of dry span gases like SO₂, NOₓ, CO, CO₂, O₂ and others.
HovaCAL® digital MF fulfills the desire for a compact calibration gas generator for all gaseous components of the emission measurement technology. Through an innovative mass flow technology made for liquids, there is no need for a gravimetric measurement through an external electric scale. Thereby, it is not supposed to replace the electric scale as a primary reference method, but to provide a supplement: Whenever the setting up of an external scale is not possible, the integrated mass flow sensor handles this task with the same precision.

Technical Advantages

- Liquid flow metering inside
- No need for an external electronic scale
- Self-adjusting on given values
- Direct indication of gas and vapor concentrations
- One unit for all gaseous components
- Remote operable
- Concentration traceable to primary standards
- Space saving, portable case

What is HovaCAL® digital MF?

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What can HovaCAL® digital MF do?

As with all the HovaCAL® devices, a peristaltic pump carries the reagent solution into the evaporator. Hereby, a gas-vapor-mixture of the respective component is being generated. Through the quick response time of the mass flow sensor, a self-regulated operation is possible. This means, that the desired concentration of water vapor or of a dissolved component, like e.g. hydrogen chloride, is regulated to the set point of the gas concentration. HovaCAL® digital MF has two to four gas channels for the dilution and mixing of dry span gases. Hence, the linearity check of emission measurement systems can take place also for dry components like SO₂, NOₓ, CO, CO₂ or O₂.

Moreover, the defined humidification of span gases is possible, in order to determine cross sensitivities of analyzers or test the effectiveness of gas coolers.

Operation

HovaCAL® digital MF can either be operated comfortably via the integrated touchscreen interface or via remote control from notebook/PC with the software viewCAL. viewCAL collects and saves all measurement data and enables an automatic operating. Moreover, viewCAL allows the checking of the gas and liquid measurement.
## Specification

### Flow ranges
- **Gas flow controller**: 0.1/1.0/10.0 l/min (air)
- **Liquid sensor**: 0.05 – 3.0 ml/min (Water or aqueous solution)
- Other flow ranges on request

### Typical concentration ranges
- **Humidity**: 1.0 Vol.-% – 50 Vol.-% (At total flow 300 l/h)
- **Hydrogen chloride**: 0.1 – 2000 mg/m³ (depending on reagent solution)
- **Ammonia**: 0.1 – 1000 mg/m³ (depending on reagent solution)
- **Hydrogen fluoride**: 0.1 – 1000 mg/m³ (depending on reagent solution)
- **Mercuric (II) chloride**: 1 – 100 μg/m³ (depending on reagent solution)
- Other concentration ranges on request

### Typical dilution range
- **Dry span gases**: 1:1 – 1:1000 (At total flow 300 l/h)
- Other dilution ranges on request

### Performance based on reading
- **Linearity**: ≤ 2 %
- **Accuracy**: ≤ 2 %
- **Range of variation**: ≤ 2 %
- **Reproducibility**: ≤ 2 %

### Time characteristics
- **Warming-up time**: 30 min
- **T-90%**: 30 s for wet, ≤ 10 s for dry components

### Adjustable parameter
- **Total flow**: 180 – 600 l/h wet, 30 – 600 l/h dry
- **Concentration inlet**: span gas
- **Concentration outlet**: span gas, reagent solution each related to dry or wet gas
- **Evaporator temperature**: up to 200°C

### Gas connection
- **Supply unit**: front side 6 mm press fitting
- **Evaporator**: entrance and exit 6 mm press fitting

### Applicable Media
- **Gases**: instrument air, nitrogen, span gas, each 2 – 6 bar
- **Liquids**: distilled Water, reagents (aqueous solutions)

### Power supply
- **Voltage**: 110 V oder 230 V, 48 – 62 Hz
- **Power**: max. 1000 W

### Portable case
- **Dimensions**: approx. 510 x 160 x 440 mm (W x H x D)
- **Weight**: approx. 15 kg

### Evaporator
- **Dimensions**: approx. 245 x 100 mm (H x B)
- **Weight**: approx. 3 kg