

HovaCAL Primer

What is the HovaCAL?

The HovaCAL is an instrument for generating accurate flow rates of reactive compounds like Mercuric Chloride (HgCl_2), Ammonia (NH_3), Hydrogen Chloride (HCl) and Hydrogen Fluoride (HF). The concentrations can be delivered at temperature as high as 375°F in controlled concentrations of moisture up to 40%.

How does it work?

Using a special vaporizer, an aqueous solution containing the compound of interest is vaporized. This stream is combined with a carrier gas (nitrogen or instrument quality air) to produce hot vapors. By precisely measuring the liquid reagent and carrier gas flow rates, and also knowing the concentration of the liquid reagent, it is possible to calculate the concentration of the vapors.

What is it used for?

The HovaCAL instruments have been used for pre-certification and post-certification operations associated with Mercury CEMS. Specifically, the HovaCAL is used for calibrating purposes and system QA/QC integrity checks of Mercury CEMS. The HovaCAL is also used in the Mercury CEMS Instrumental Reference Method (IRM) for dynamically spiking the flue gas stream.

Who uses it?

Several power utility organizations use the HovaCAL to verify the performance of their Mercury CEMS. Regulatory agencies have purchased the HovaCAL as part of their Mercury CEMS demonstration and rule-making process. Research and stack testing companies also use the HovaCAL for mercury measurement studies.


How do I find out more information?

Contact EcoChem Analytics

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Comparison between HovaCAL models

| <p style="text-align: center;">HovaCAL MFM</p>  <p style="text-align: center;">W x H x D: 20" x 6.5" x 17" Wt: 33lb</p> | <p style="text-align: center;">HovaCAL Quick</p>  <p style="text-align: center;">W x H x D: 13" x 8" x 16" Wt: 28lb</p> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>End-Use</p> <p>Flexible system for research and stack testing applications. System generates hot-wet vapors of reactive mixtures for HgCl₂, NH₃, HCl, HF etc.</p> | <p>End-Use</p> <p>Optimized system for Mercury CEMS operating in a plant environment. System generates hot-wet vapors of HgCl₂ only.</p> |
| <p>Liquid Flow Measurement</p> <p>Liquid flow rates can be measured with an external balance or an internal mass flow meter.</p> | <p>Liquid Flow Measurement</p> <p>Liquid flow rates are measured with an internal mass flow meter.</p> |
| <p>Flow Ranges – Standard</p> <p>Carrier Gas: Variable between 3 to 10 lit/min</p> <p>Liquid: Variable between 0.01 to 8 ml/min with external balance, 0.05 to 3 ml/min with internal mass flow meter</p> <p>Total Gas Mixture: Up to 16 lit/min</p> <p>Flow Ranges - Optional</p> <p>High total gas flow up to 25 lit/min</p> <p>Additional Feature</p> <p>Gas mixer function with 2, 3, 4 or 5 gas channels</p> | <p>Flow Ranges – Standard</p> <p>Carrier Gas: Fixed at one value between 3 to 10 lit/min</p> <p>Liquid: Fixed at one value between 0.05 to 3 ml/min with internal mass flow meter</p> <p>Total Gas Mixture: Up to 16 lit/min</p> <p>Flow Ranges - Optional</p> <p>Variable total gas flow 3 to 10 lit/min</p> <p>Variable total gas flow 8 to 25 lit/min</p> <p>Variable liquid flow rate 0.05 to 3 ml/min</p> |
| <p>Configuration</p> <p>Standard Restek Silicosteel or similar coating for evaporator, spare parts kit and short heated connecting tube using PFA Teflon</p> <p>Standard desktop housing, optional portable field case.</p> | <p>Configuration</p> <p>Standard Restek Silicosteel or similar coating for evaporator, spare parts kit and short heated connecting tube.</p> <p>Standard desktop housing, optional portable field case.</p> |
| <p>User Interface</p> <p>Standard touch-screen and Laptop or PC interface software with flow schematic graphics and enhanced interface</p> | <p>User Interface</p> <p>Standard touch-screen and PC interface software</p> |



CALIBRATION GAS GENERATOR WITH FLOWMETER INSIDE

SPAN GAS WITH HIGHLY ACCURATE CONCENTRATION OF
H₂O, HCl, HF, NH₃ AND HgCl₂
AND MIXTURE OF
SO₂, NO_x, CO, CO₂, O₂ AND OTHERS



TECHNICAL BENEFITS

- Flow metering inside
- no external electronic scale necessary
- self regulating
- space saving, easy portable case
- Gas and Vapor concentration on the display
- one unit for all gas components of CEM
- remote operable
- traceable on primary methods

WHAT IS HovaCAL digital MF?

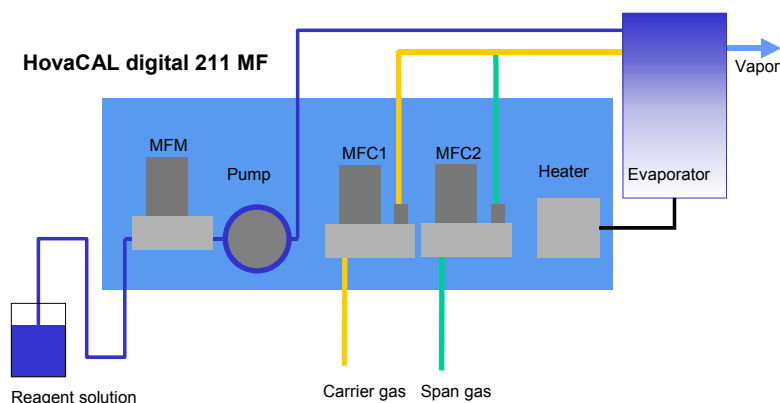
HovaCAL digital MF is the latest development from IAS, to fulfill the requirement of a compact calibration gas generator for all components of the continuous emission monitoring.

The built-in Mass Flow Meter enables to omit the gravimetric method with the electronic scale. As a reference method, the electronic scale can be furthermore used. The Mass Flow Meter is not a substitute for the electronic scale but will be used in the field work or for continuous operation.

THE FEATURES OF HovaCAL digital MF

The innovative Mass Flow Meter (MFM) is especially suitable for corrosive liquids like reagents containing HCl, HF, NH_3 or HgCl_2 .

The characteristic of the sensor can be proved by an internal calibration menu with an electronic scale as reference method.



A peristaltic pump is used for dosing the reagent solution or pure water in the evaporator. The quick response time of the sensor enables to operate the device self-regulating. I.e. the set point concentration of water vapor or a reagent component will be achieved automatically.

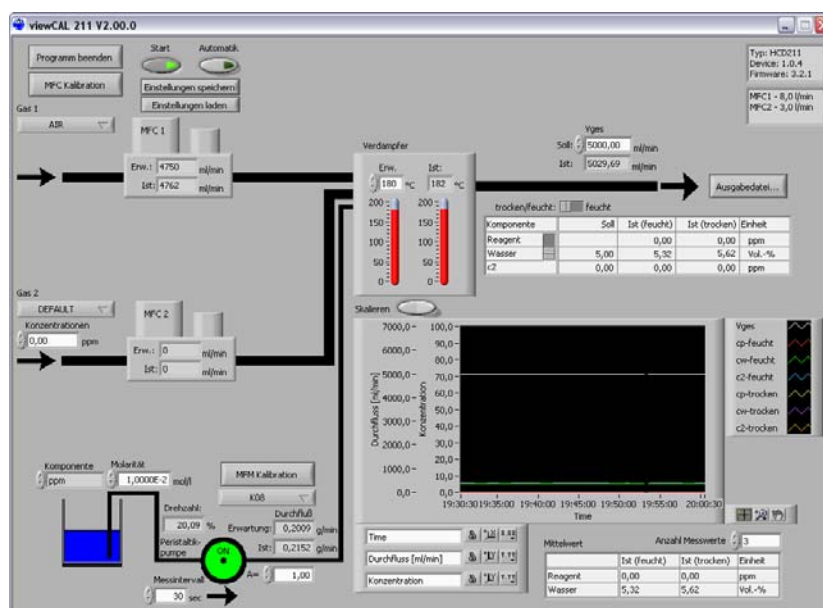
HovaCAL 211 MF is equipped with two gas channels to dilute dry span gas for linearity check of CEMs.

Further the device is able to humidify span gas to check cross sensitivity of analyzers or do efficiency test of gas coolers.

REMOTE CONTROL

HovaCAL 211 digital MF can be operated manual by the integrated touch screen or remote controlled by PC or notebook with the software viewCAL.

ViewCAL allows the data logging of concentrations and flow during the calibration procedure.



viewCAL enables the calibration of each gas flow controller and the liquid flow sensor. The characteristic of the flow controllers will be fitted by means of a polynomial (3rd order) function), which increases the accuracy enormously.

This can be done as a part of the internal quality assurance or to expand the internal gas library corresponding to the users demand.

TECHNICAL DATA

FLOW

| | |
|-----------------------|-------------------------------------------|
| Gas Flow Controller 1 | 3,0 – 10,0 l/min (Air, normal conditions) |
|-----------------------|-------------------------------------------|

| | |
|-----------------------|-------------------------------------------|
| Gas Flow Controller 2 | 0,25 – 5,0 l/min (Air, normal conditions) |
|-----------------------|-------------------------------------------|

| | |
|---------------|---------------------------|
| Liquid Sensor | 0,05 – 3,0 ml/min (Water) |
|---------------|---------------------------|

Other ranges on request

TYPICAL CONCENTRATION RANGES

| | |
|-------------|--------------------------------------------|
| Water Vapor | 1,0 %vol - 75 %vol (at total flow 300 l/h) |
|-------------|--------------------------------------------|

| | |
|-------------------|-------------------------------------------------------------------|
| Hydrogen Chloride | 0,1 – 2000 mg/m ³ (depending on reagent concentration) |
|-------------------|-------------------------------------------------------------------|

| | |
|---------|-------------------------------------------------------------------|
| Ammonia | 0,1 – 1000 mg/m ³ (depending on reagent concentration) |
|---------|-------------------------------------------------------------------|

| | |
|-------------------|-------------------------------------------------------------------|
| Hydrogen Fluoride | 0,1 – 1000 mg/m ³ (depending on reagent concentration) |
|-------------------|-------------------------------------------------------------------|

| | |
|------------------|----------------------------------------------------------------|
| Mercury Chloride | 1 – 100 µg/m ³ (depending on reagent concentration) |
|------------------|----------------------------------------------------------------|

Other components or concentrations on request

TYPICAL DILUTION RANGE

| | |
|----------|------------------------------|
| Span Gas | 1:20 (at total flow 300 l/h) |
|----------|------------------------------|

Other ranges or flow rates on request

PERFORMANCE BASED ON READING

| | |
|-----------|-------|
| Linearity | < 2 % |
|-----------|-------|

| | |
|------------------|-------|
| Setting Accuracy | < 2 % |
|------------------|-------|

| | |
|-------------------------|-------|
| Fluctuation / Stability | < 2 % |
|-------------------------|-------|

| | |
|-----------------|-------|
| Reproducibility | < 2 % |
|-----------------|-------|

TIME CHARACTERISTICS

| | |
|--------------|--------|
| Warm up Time | 30 min |
|--------------|--------|

| | |
|---------------------|----------------------------------------------|
| Response Time (90%) | 10 – 30 s for wet, < 10 s for dry components |
|---------------------|----------------------------------------------|

TECHNICAL DATA

ADJUSTABLE PARAMETER

| | |
|-------------------------|--------------------------------------------------------------------------------------|
| Total Flow | 180 – 600 l/h wet gas, 30 – 600 l/h dry gas |
| Input Concentration | span gas |
| Output Concentration | diluted span gas, water vapor and reagent concentration (Based on dry or wet gas) |
| Evaporation temperature | up to 200 °C |

GAS CONNECTIONS

| | |
|-------------|---------------|
| Supply Unit | 6 mm Swagelok |
| Evaporator | 6 mm Swagelok |

FLUIDS

| | |
|--------|-----------------------------------------------|
| Gas | instrument air, nitrogen, span gas, 2 – 6 bar |
| Liquid | distilled water, reagent solutions |

POWER SUPPLY

| | |
|---------|----------------------------|
| Voltage | 110 V or 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 Ø) |
| Weight | approx. 3 kg |

MERCURY CALIBRATION GAS GENERATOR FOR MERCURY CEMS

- Defined concentration of mercury chloride (HgCl_2)
- Hot wet span gas
- Evaporator based principle



Typical Applications

- Calibration at Start Up
- Automatic daily calibration
- Daily zero and span check
- Drift check

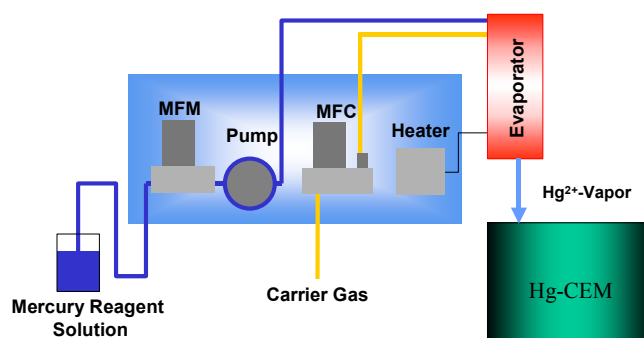
Technical Benefits

- Oxidized Mercury standard
- No cylinder gas
- Point-of-use generation
- Easy portable
- Wide concentration range
- Adjustable concentration
- Traceable on primary methods
- Temperature independent

DESCRIPTION

HovaQuick is based on the principle of the well established calibration gas generator HovaCAL. It is especially designed to fulfill the requirements for the automatic Mercury CEMs calibration.

Like HovaCAL, the mercury reagent solution is pumped into an evaporator and mixed with carrier gas. Liquid and gas flow are both controlled by high precision mass flow meters (MFM, MFC).



TECHNICAL DATA

TYPICAL CONCENTRATION RANGE

Mercury Chloride 0,1 – 100 µg/m³
(depending on reagent concentration)

Other components or concentrations on request

FLOW RANGES

Gas Flow Controller 3,0 – 10,0 l/min
(Air, Nitrogen, normal conditions)

Liquid Sensor 0,05 – 3,0 ml/min
(Water or aqueous reagent solutions)

Other ranges on request

PERFORMANCE BASED ON READING

Linearity < 2 %

Accuracy < 2 %

Fluctuation/Stability < 2 %

Reproducibility < 2 %

DIGITAL INTERFACE

Serial RS232

Other interface on request

TIME CHARACTERISTICS

Warm up Time 30 min

Response Time (90%) 10 – 30 s

POWER SUPPLY

Voltage 110 V or 230 V,
48 – 62 Hz

Power max. 1000 W

DIMENSIONS

Portable case approx.
325x200x400 mm
(W x H x D)

Evaporator approx.
245x100 mm
(H x Ø)