



The HM-1400 TR Total Mercury Analyser

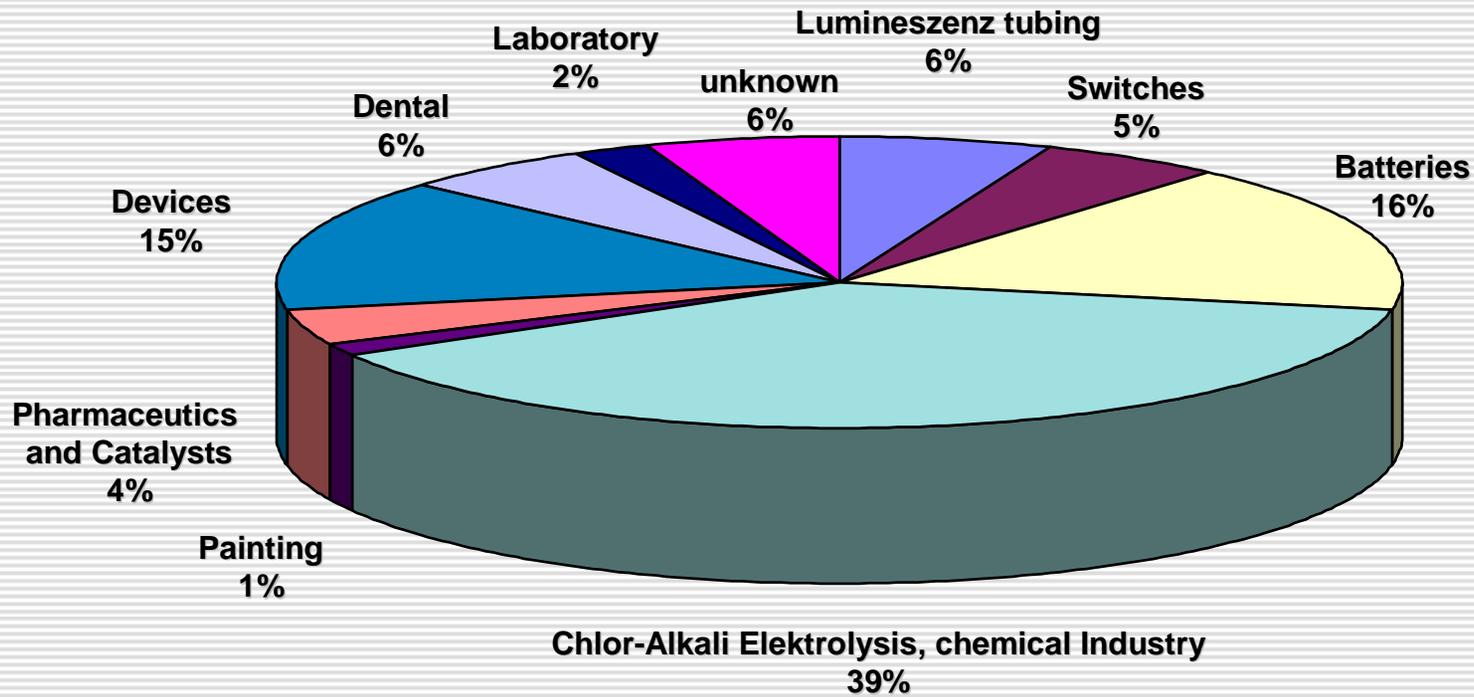
DURAG

Smart Solutions for **DURAG**
Combustion and Emission **GROUP**



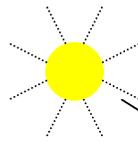
End use pattern of Mercury

Source : US EPA 1991

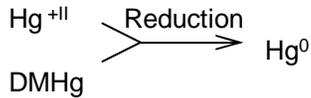
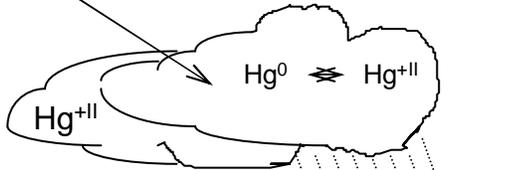


Total : 522 Tonnen

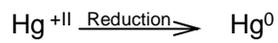
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$h \cdot \nu$, formation of ozone O_3
Bildung von Ozon



Dry Deposition Hg^{+II} Hg^0 DMHg



Wet Deposition



Legende/ Legend

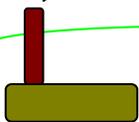
Hg: Chemisches Symbol für Quecksilber
chemical symbol for mercury

Hg^0 : elementares, metallisches Quecksilber
elemental, metallic mercury

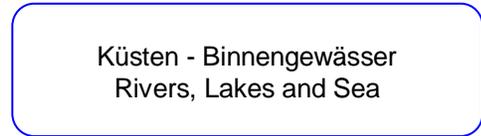
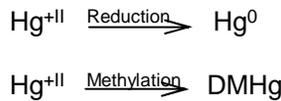
Hg^{+I} : ionisches Quecksilber, Oxidationsstufe +1
ionic mercury, oxidation state + 1

Hg^{+II} : ionisches Quecksilber, Oxidationsstufe +2
ionic mercury, oxidation state + 2

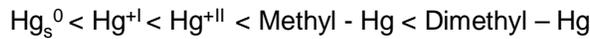
DMHg: Dimethylquecksilber, toxischste bekannte Quecksilberverbindung
dimethylmercury, most toxic known mercury compound



Chlor- Alkaly Industry
Wiring devices & switches
Dental Equipment
Batteries, Electric lightning
Coal burners
Waste & sludge incinerator
Laboratory, Chemicals,
Paintings, Goldmining,
Fungizides, Cement plant



Toxikological Sequence of Mercury Compounds, Toxizitätsabfolge von Hg - Verbindungen



Achtung : dampfförmiges Hg ist stark toxisch und kann zu schweren Vergiftungen (Nierenversagen) führen
Attention : vaporized Hg is extremely toxic, it could cause poisoning (kidney insufficiency)



Technical Data HM 1400 TR

- **Maintenance:** 6 Months
- **Measuring Range:** 0- 45 upto 0- 500 $\mu\text{g}/\text{Nm}^3$
- **Detection Limit:** 0,5 $\mu\text{g}/\text{Nm}^3$
- **Sample Treatment:** Thermocatalytic
- **Signal Output:** 4-20 mA, $\mu\text{g}/\text{Nm}^3$ dry basis
- **Controller:** Omron SPS
- **Remote Control:** via D-EMS 2000
- **Malfunction:** Displayed on Screen
- **Interference:** Not Known
- **Detector:** Dual beam UV detector
- **Sample Probe:** M & C, SP 2000



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Applicationlist HM1400-TR

CEM for Continuous Monitoring of Mercury in Stacks

Typical Application:

- Coal fired Power Plants
- Waste Incinerators
- Sewage Sludge and Hazardous Waste Incinerators
- Steel Plants
- Thermal Soil Converter
- Cement Plants
- Wood Incinerators
- Mercury Plants and - Refineries
- Luminescent Tubing Recycling



Advantages HM 1400 TR

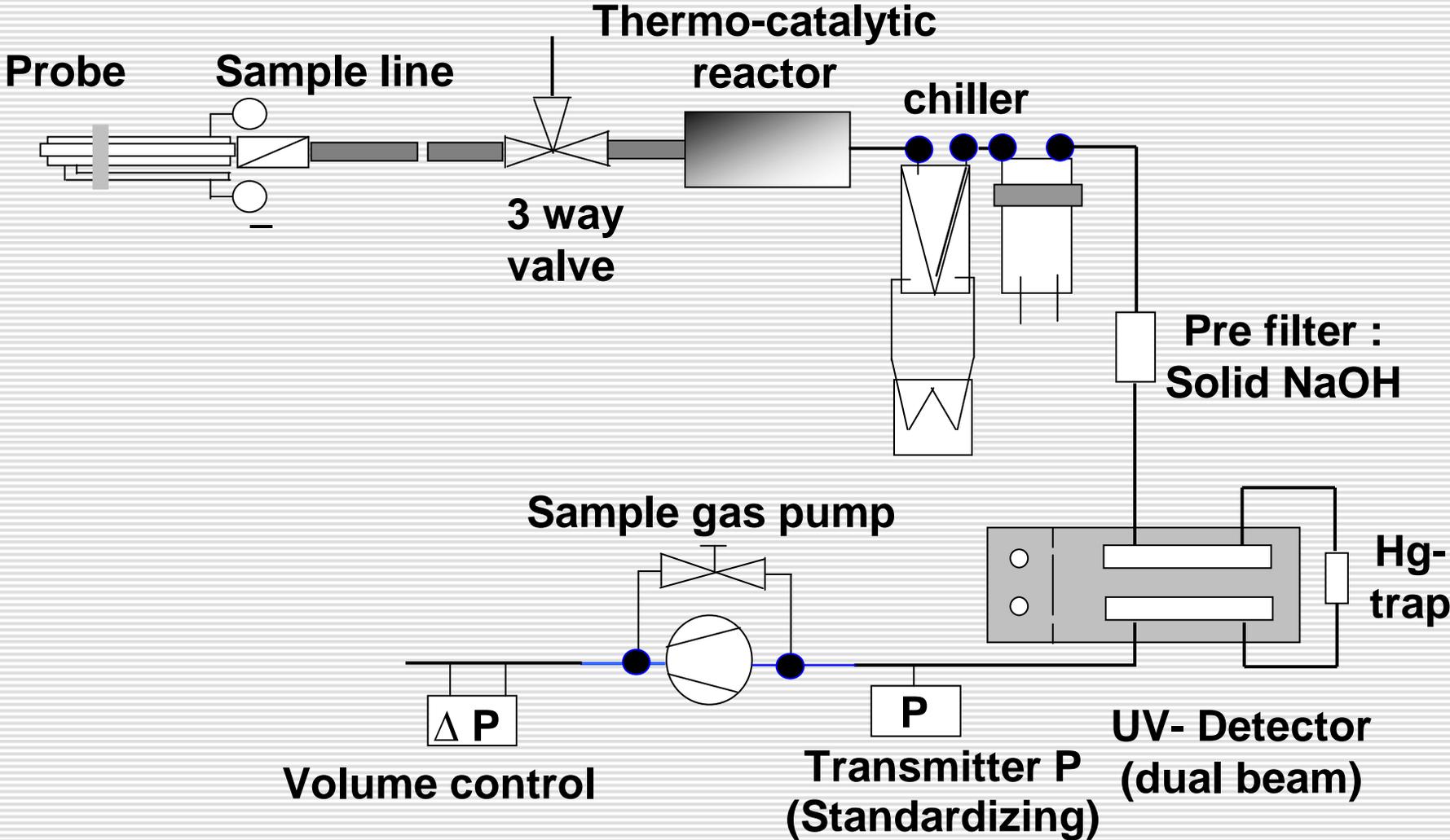
- Real continuous monitor
- No pre concentration on gold surfaces
- No additional carrier gas necessary
- No interferences
- Low costs of operation
- Easy maintainable
- No wet chemical module
- Internal calibration module
- Simple leak check
- Standard probe SP 2000 from M & C, particle filter included
- Remote Control via D-EMS 2000



Principal of Operation



Flow Chart Diagram HM-1400 TR



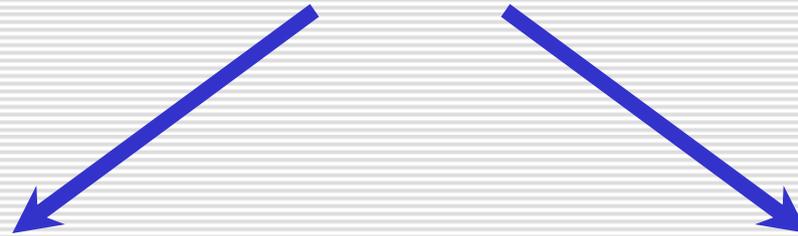
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Thermocatalytic Reactor



Functioning of the thermo catalytic reactor

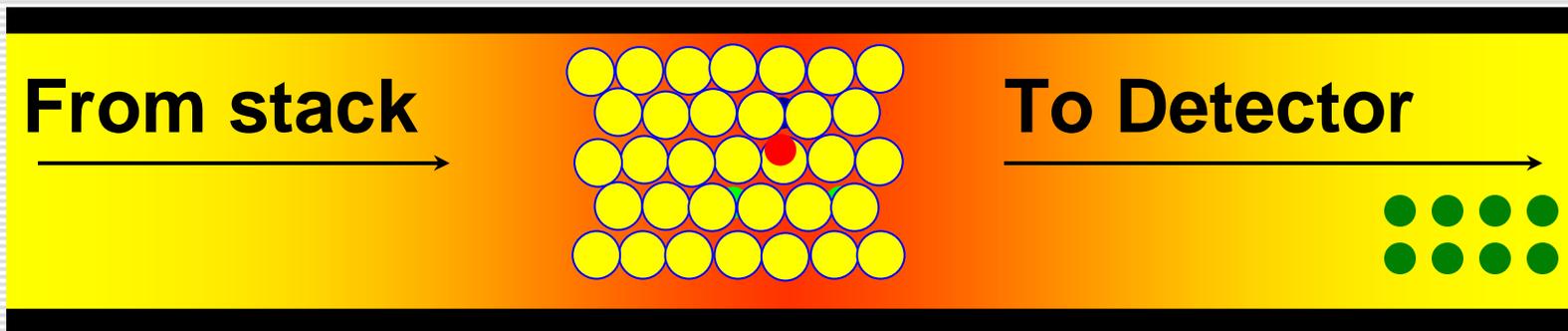


Adsorption of
HCl, NO_x, SO₂,

Reduction of ionic
Mercury

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The way the reactor works



- SO₂
- HCl
- NOx
- Hgⁿ⁺, ionic Mercury
- Hg⁰, elemental Mercury



Conversion of Hg^{n+} into Hg^0 inside the reactor

- Chemical conversion of ionic Hg^{n+} into Hg^0
- Fixing of acid stack compounds like Cl^-



↑ This compound escapes as a gas, therefore the reaction back is excluded

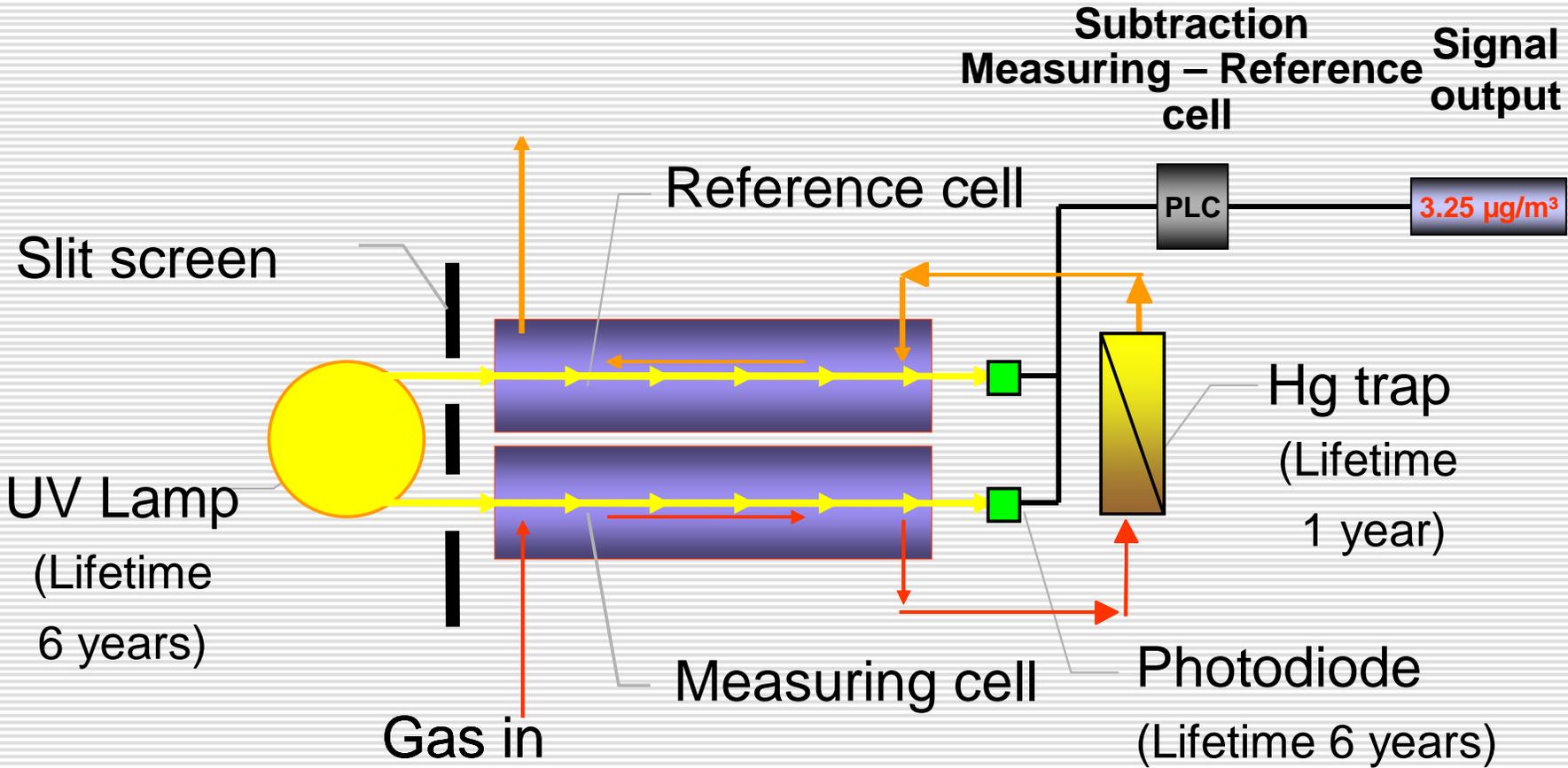
Me Metallic ion out of the reactor material

Lifetime 6 Months



Dual Beam – Detector

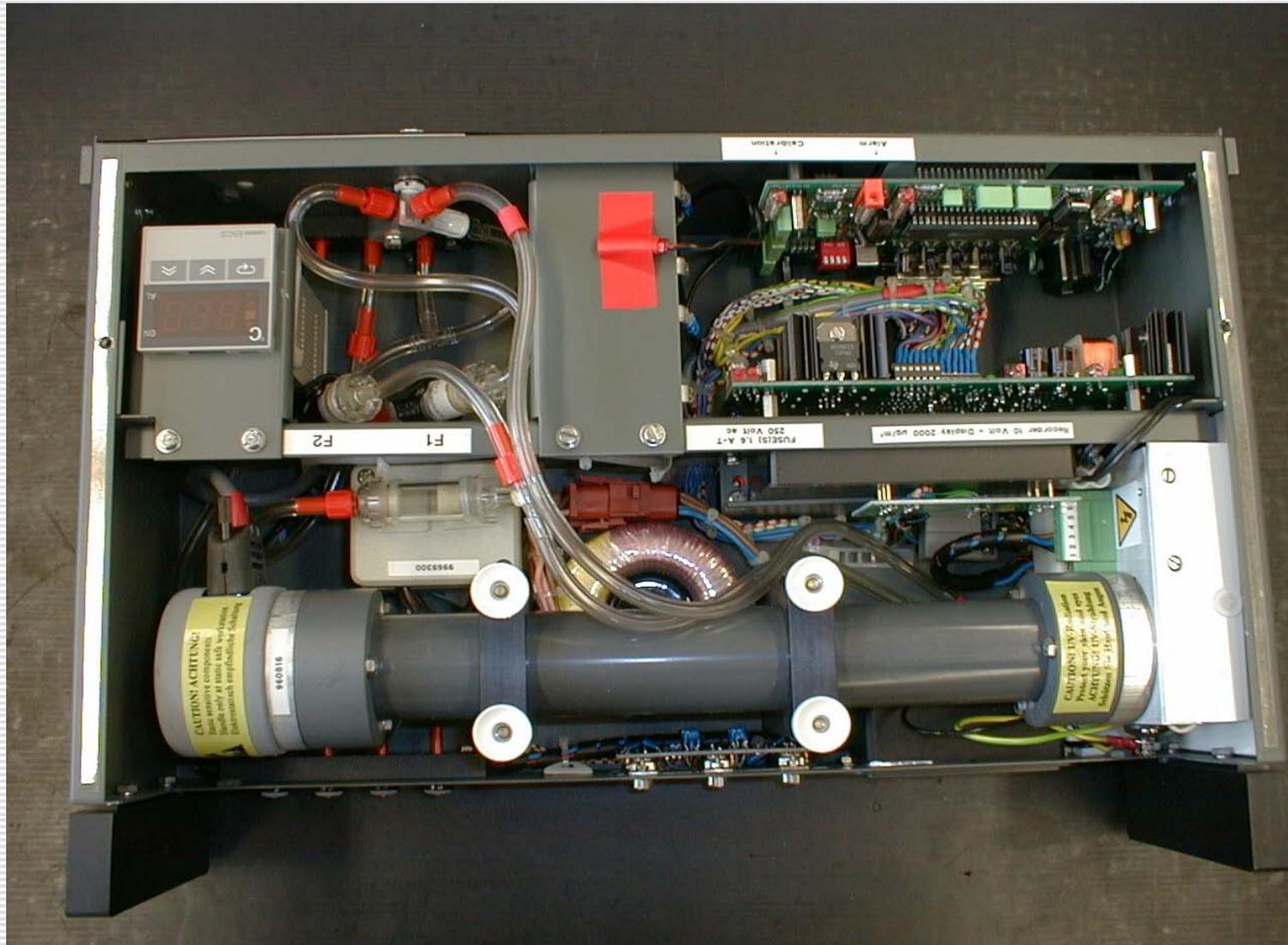
Dual beam UV Detector



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Top View Dual Beam Detector



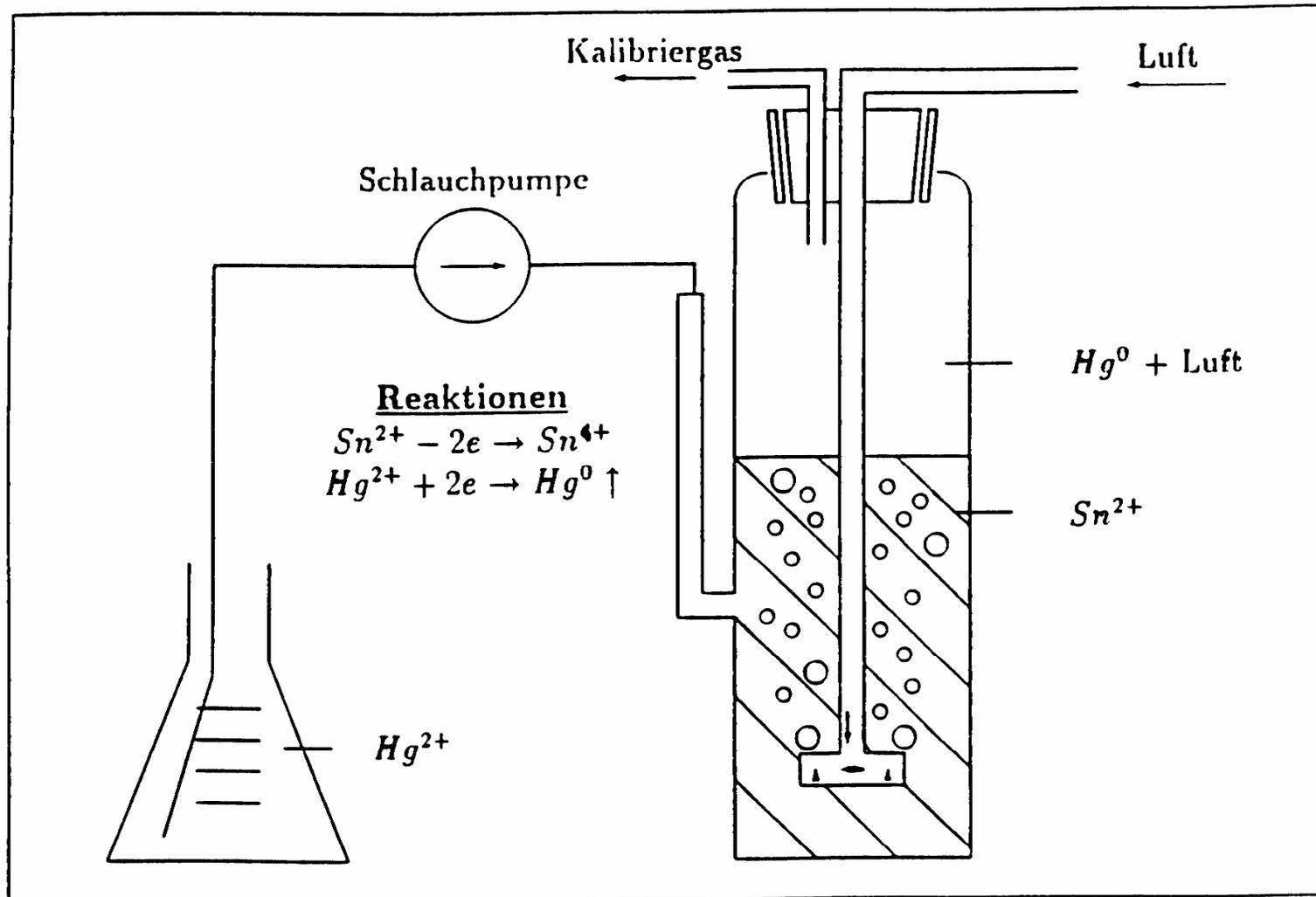
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Options

- Automatic backflushing for applications with PM concentrations higher than 20 mg/m^3 , compressed air at around 3-6 bar
- Dilution unit for applications with Mercury concentrations higher than $2000 \text{ } \mu\text{g/m}^3 \text{ Hg}$
- Heated gold trap for applications with SO_2 concentrations higher than 300 ppm
- 200 cm^3 iodine charcoal container, required for applications with CO-level at around 1 g/m^3 and higher
- Portable version available

Calibration device for elemental Mercury





The portable HM-1400 TR



Front view



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Rear view



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Thank you for your attention

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