

MODEL KS-408

AUTOMATIC, ISOKINETIC SAMPLING AND MEASUREMENT CIRCUIT FOR THE DETERMINATION OF THE MASS CONCENTRATIONS OF THE POLYCHLORINATED DIBENZO- DIOXINES AND POLYCHLORINATED DIBENZO-FURANS

IN – STACK VERSION



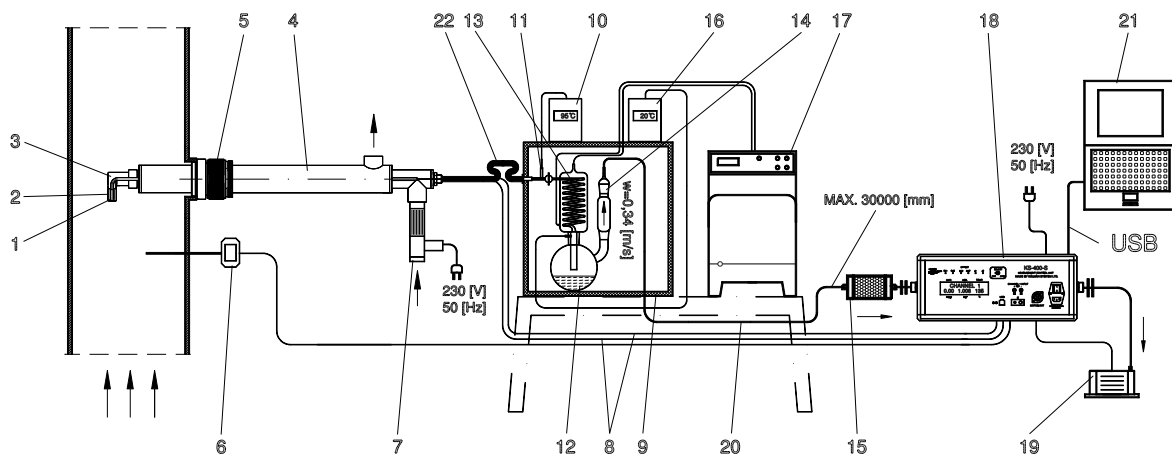
SPECIAL ADVANTAGES OF THE MEASUREMENT CIRCUIT

- ✓ Titanium inner-space filter housing and exhaust pipe; easily removable from the probe shank.
- ✓ Heated / cooled probe shank.
- ✓ Lightweight and small-sized heat insulated separator housing made of stainless sheet.
- ✓ High dust storage capacity quartz woolsack filter.
- ✓ Possibility of controlling the measurement from a distance of 30-50 [m] from the place of sampling.
- ✓ Velocity measurement of the main gas flow simultaneously with the sampling.
- ✓ Probe shank integrated with static and total pressure probes.
- ✓ The measurement and the method confirm with the EN ISO 9096 standard and meet many international specifications.
- ✓ Automatic, isokinetic measurement control by Windows-based AR-IZO 408 software.
- ✓ The system is built up of modules; capable of sampling other pollutants – like hydrochloric acid and other volatile metals – if implemented with additional units.

1. Purpose

The **KS-408** type automatic, isokinetic emission type sampling and measurement circuit – **Figure 1.** - is suitable for the determination of the mass concentrations of the polychlorinated dibenzo dioxin – further on **PCDD** - and of the polychlorinated dibenzo furan - further on **PCDF**.

KS-408
AUTOMATIC, ISOKINETIC SAMPLING AND MEASUREMENT
CIRCUIT FOR THE DETERMINATION OF THE MASS
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| 1. GAS FLOW RATE MEASURING PROBE, L PITOT PRANDTL TUBE | 14. ADSORBENT CONTAINER |
| 2. SUCTION NOZZLES | 15. DRYING TOWER |
| 3. KS-407-H HEATED PROBE HEAD | 16. DIGITAL THERMOMETER (t2.2) |
| 4. HEATED/COOLED PROBE, SAMPLING PIPE | 17. PORTABLE COOLER |
| 5. PROBE HOLDER | 18. KS-400-S CONTROLL UNIT AND DIGITAL THERMOMETER (t2) WITH VENTURI METER |
| 6. DIGITAL THERMOMETER (t1) | 19. VACUUM PUMP |
| 7. HOT AIR GUN | 20. EXHAUST HOSE |
| 8. PRESSURE RELEASE PIPES (Dp1) | 21. NOTE BOOK |
| 9. PORTABLE THERMAL INSOLATED METAL BOX | 22. EXHAUST HOSE |
| 10. DIGITAL THERMOMETER (t2.1) | |
| 11. DIGITAL THERMOMETER CONNECTION | |
| 12. CONDENSER COLLECTOR | |
| 13. SPIRAL COOLING | |

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Figure 1.

Method of sampling and separation: isokinetic, **filter/cooler method without gas sample dividing**. The applied method and the separator devices fully comply with the specifications of the **EN 1948-1** and the **ISO 9096** standards.

2. Comprehensive technical description

In addition to the separation of **PCDD/PCDF** (**Figure 2.**) in flowing gases and air the **KS-408** type measurement circuit is suitable for the gravimetric determination of concentration of solid particles and dust in flowing gases and air, with simultaneous velocity measurement of the main gas flow and the sampled medium - gas or air.

The solid particle filter probe head integrated into the air heated/cooled probe shank– **Figure 5.** - is characterised by high dust storage capacity, wide measuring range and **uniquely small - face-side - contour dimensions**. This makes the device capable of the isokinetic sampling of high and of low dust concentration mediums as well.



Figure 2.



Figure 3.

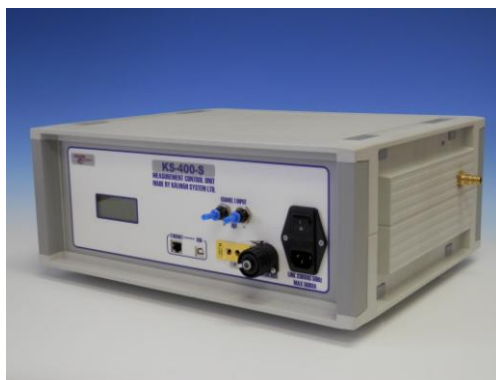


Figure 4.



Figure 5.

The **KS-408** type sampling circuit guarantees completely automated, isokinetic sampling.

The **KS-400-S** – **Figure 4.** - type measuring and control circuit continuously measures the static and dynamic pressure (**Dp1**, **pst1**) and the temperature (**t1**) of the main gas flow as well as the measuring pressure (**Dp2**), the static pressure (**pst2**) and temperature (**t2**) of the partial gas flow flowing through the Venturi flow rate meter installed in the electronics, plus the barometric pressure (pb) in an unloaded state.

The **KS-400-S** type electronics regulates the average velocity of the partial gas flow (**w₂**) drawn through the effective section of the sampler to the velocity of the main gas flow (**w₁**); (**w₁ ≈ w₂**)

The control of the isokinetic sampling and the documentation of the measured data is performed by a laptop computer applying the **AR-IZO 408** Windows based software which operates in a graphical environment – **Figure 6.**

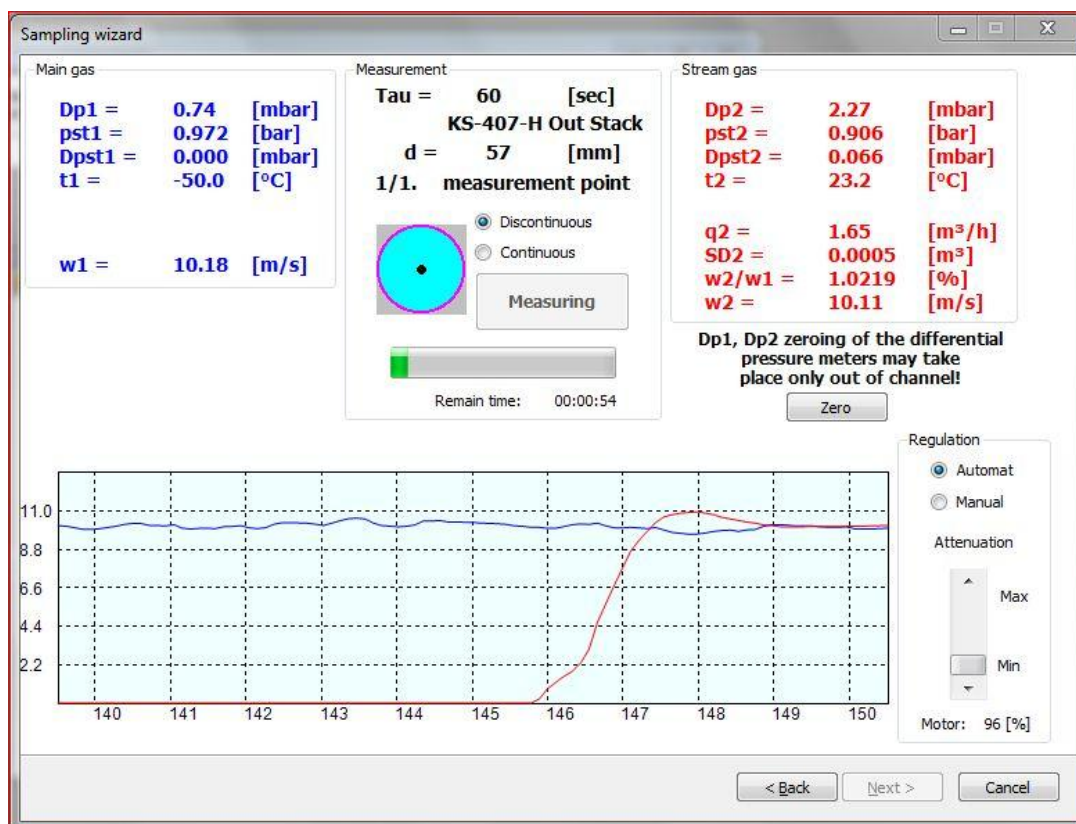


Figure 6.

This software compares the velocity of the main gas flow with the velocity of the partial gas flow which can be continuously monitored on the screen.

With the software all measuring data can be saved and earlier measurements can be loaded in. After finishing the measurement the values measured by the sensors and the velocity distribution in the measuring tunnel can be represented in diagrams. From all this a report can be generated.

As an option the **KS-400-S** type measurement and control unit installed with pressure sensors capable of measuring low velocity – 1,0 to 14,0 [m/s] – can be ordered.

Calibration of the sampling probe was – according to ISO 9096 (D) - carried out in the laboratory of the Fluid Mechanics Department of the Budapest University of Technology and Economics with the help of the vertical, recirculation type, open test section, GÖTTINGEN type wind tunnel which is used exactly for such calibration processes.

Picture of the facility is shown in **Figure 7.**



Figure 7.

3. Technical data

3.1. Sampling probe

- Measuring range(Vol.): 0,8 to 4,5 [m³/h]
- Measuring range(Vel.): 4 to 38 [m/s]
- Max. temperature: 400 [°C]
- Nozzle diameters: ø4,5; 5,6; 7,6; 10,7; 14; 17 [mm]
- Thimble filter: ø 10*110 [mm],
- Material: titanium; 1.4301

3.2. Air heated/cooled probe shank

- Diameter: ø 63,5 [mm]
- Length: 1 000 - 2 000 [mm]
- Material: titanium; 1.4301

3.3. Condensate collector tank, spiral cooler, adsorber unit

- Capacity collecting flask: 2 000 [ml]
- Adsorbed units: 180 [ml]
- Material quality: borosilicate glass

3.4. Cooler device (Figure 3.)

- Temperature range: -20 to +40 [°C]
- Accuracy of temp. stability: ± 1 [°C]
- Mass: 18 [kg]

3.5. Measuring and control electronics (main branch)

- Type: KS-400-S
- Power supply: 230 [V], 50 [Hz]
- Flow rate accuracy: ± 2 [%]
- Dimensions: 440 x 350 x 180 [mm]
- Mass: 8 [kg]