

# MODEL KS-501-F

**MICROPROCESSOR CONTROLLED  
AIR / GAS SAMPLER  
FOR IMMISSION, WORKPLACE MEASUREMENTS  
FOR MULTI-PURPOSE APPLICATIONS  
- IMPINGER AND / OR SORPTION, VOC AND / OR PUF PIPES -**



## FEATURES

- ✓ Sampler attested by the Institute for Environment Protection and the National Office of Measures.
- ✓ The in-draught air quality, volume flow:  $q=15-110$  [l/h].
- ✓ Conversion to two different air densities,  $R_o=1,293$  [ $\text{kg}/\text{m}^3$ ] and  $1,2$  [ $\text{kg}/\text{m}^3$ ].
- ✓ High-accuracy, long lifetime micro in-draught Venturi, volume flow rate meter. Volume flow rate measuring accuracy:  $\pm 2$  [%].
- ✓ Sampling volume flow rate stabilization, continuous regulation to the set value.
- ✓ Sealing between the channels is ensured by a channel selector structure built without any rotating part.
- ✓  $\varnothing 50$  [mm] airborne dust filter and reverse suction arresting channel system.
- ✓ 8 sampling channels, 8\*24-hour operation mode, automatic channel change at midnight.
- ✓ Teflon, inert air ducts. Three-stage protection, isolation units, per channel.
- ✓ Sampling with 8 gas wash bottles and / or GC sorption and / or PUF pipe.
- ✓ Microprocessor control, full-range LCD display, PC connection facility for data polling, RS232 port.
- ✓ Automatic or manual mode. Individual time and volume flow rate programming possibility, per channel.
- ✓ Portable, lightweight design and handling, data protection and storing in case of power supply failures. Password starting.

## 1. Designation, field of applications

The type **KS-501-F** microprocessor controlled immission air / gas sampling measuring circuit is of portable design and, with application of the built-in gas wash vessels and/or sorption pipes, it is suitable for 8\*24-hour sampling of practically all known gaseous air pollutants in automatic or manual operation modes. For determination of the gaseous pollutants found in the ambient air, adsorption and absorption sampling methods and measuring circuits serve. According to the known measuring principle, an air quantity measured with adequate accuracy and set to constant value is passed through a solution or sorbent adsorbing most efficiently the pollutant, then the samples are analysed by some analytical method. The type **KS-501-F** eight-channel automatic air sampler entirely eliminates the inaccuracies of the gas and air samplers known to date originating from the volume flow rate measurement, as well as the deficiencies of the channel selector coming from the leaks of the channel selector device (what often can not be located), meanwhile suitable for multi-purpose sampling. The type **KS-501-F** air samplers are equipped with **micro-intake Venturi meter individually calibrated in our laboratory with use of measuring devices attested by the National Office of Measures**, Ø 50 [mm] solid material collecting filter, eight absorbing vessels, eight high-pressure Bosch magnetic valves, furthermore, with a vacuum pump producing high -  $D_{pst}=500$  [mbar] – pressure difference.

By means of temperature, barometric pressure and differential pressure sensors connected to the control electronics the volume of the in-draught air, under normal conditions

**273,16 [°K], 1,013 [bar] and according to degree MK 2001/35 14/2001, 293,16 [°K], 1,013 [bar], is displayed on the LCD display.** Parameters of the sampling can be set on a foil-type keypad.

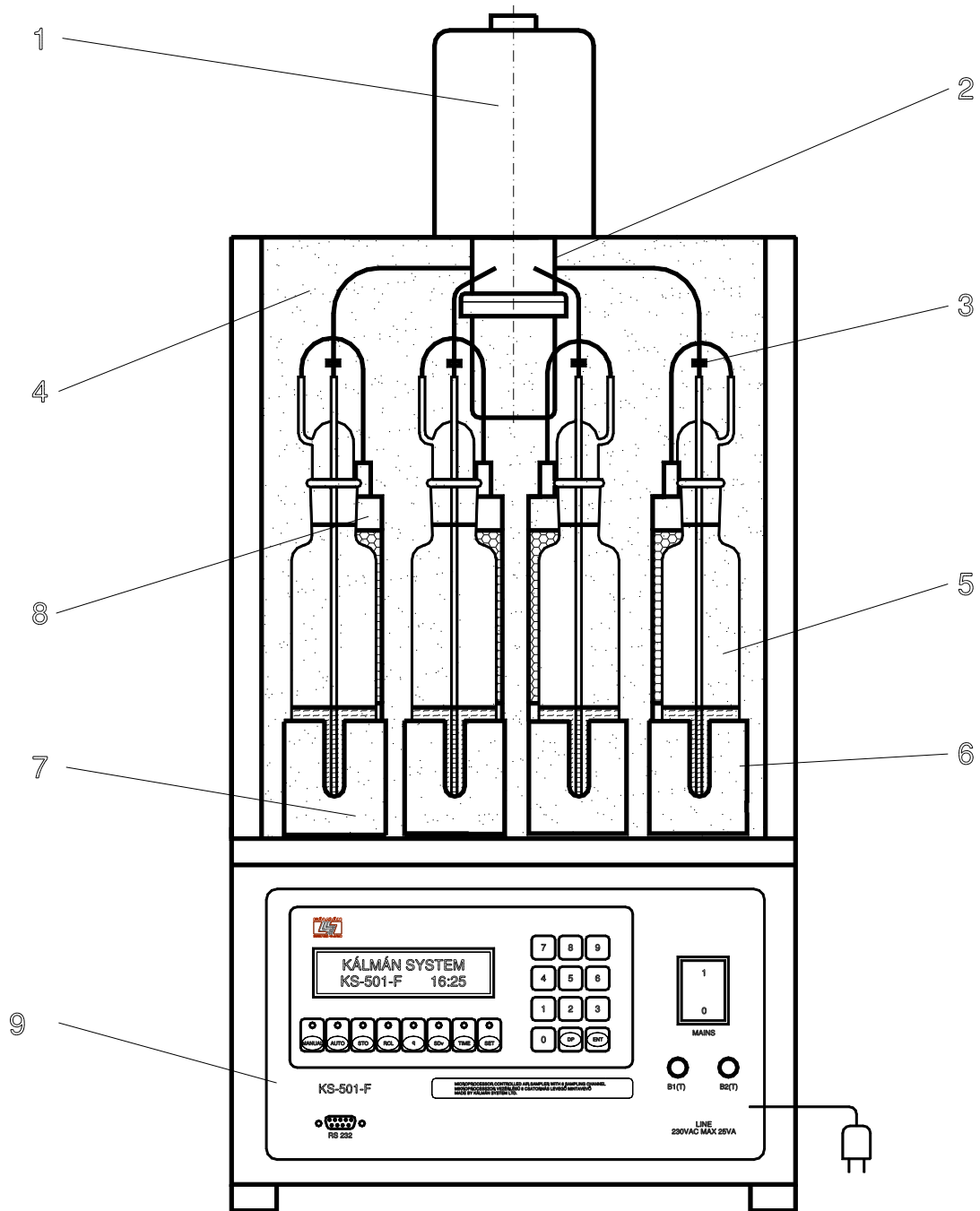
In the type **KS-501-F** instrument a ring-gauge micro in-draught Venturi serves for measurement of the mass flow.

## 2. Summarizing technical description, mass flow measurement

### 2.1. Application of gas-wash impinger

The air – gas sampler illustrated in **Figure 1.** consists of the following main sub-units:

- The in-draught structure, with micro Venturi, airborne dust filter with holder box.
- Air manifold, supporting structure.
- Exhaustion arrester device.
- Absorbing vessels, two-way magnetic valves with connections and air ducts, with cables and electric fittings.
- Vacuum pump integrated with motor, with outblow device, connection cables, measuring and control electronics with foil-type keypad.
- Two-level, corrosion-proof supporting frame structure.



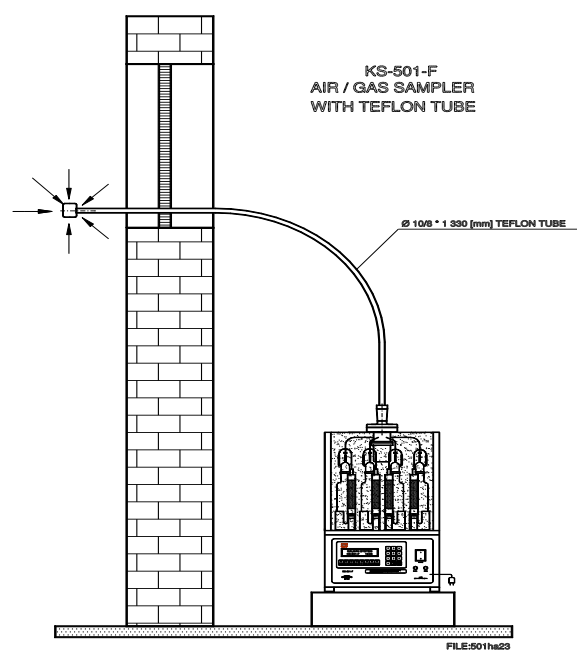
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1. MICROVENTURI AND FILTER HOUSE
2. SAFETY TANK
3. QUICK FITTINGS
4. IMPINGER HOUSE
5. IMPINGER
6. IMPINGER AND SORPTION TUBE HOLDER
7. DRYING TOWER HOLDER
8. DRYING TOWER
9. CONTROL UNIT

**Figure 1.**



**Figure 2.**



**Figure 3.**

From the air flowing from the outer atmosphere through an in-draught device (**Figure 1.**) and a short diffuser pipe section, the airborne dust is intercepted by an Ø 50 [mm] flat filter. The air purified from the solid particles is passed through the absorbing fluid existing on the sampler vessel, the magnetic valves and the vacuum pump, via the exhaust pipe, to the outer atmosphere. The volume flow measuring and evaluation unit, processing the electric signal proportional to the temperature and pressure of the in-draught air, the pressure signal of the in-draught Venturi meter as well as the loaded data, measures the quantity of the through-suctioned air [ lN/h ], the total volume [ l N ] through-suctioned during the sampling and, per channel, the duration of the sampling. In automatic mode of operation the instrument changes channel after every 24 hours, at midnight, and stores all of the measured data. The measured data can be printed in detailed breakdown – either per channel – with scrolling on the display, interconnected with a PC. In case of power supply failures no data loss occurs in the system. The magnetic valves prevent shorting of the channels and at the same time ensure the perfect and long-lasting tightness at the channel change. The detachable stuffing-box connections with input and output locking serve also for the perfect air-tightness. Stabilization of the mass flow at the set value is ensured by the microprocessor electronics. For the regular accuracy test a micro metering orifice attested by the National Office of Measures (OMH) and a digital pressure gauge are sufficient.

Each instrument produced by us is tested in our laboratory with use of attested measuring devices calibrated by the National Office of Measures and, the results are recorded in a protocol.

**The KS-501-F air sampler is marketed with a calibration certificate issued by the Environment Protection Reference Center.** The entire sampling surface, the in-draught head, the micro-Venture, the filter box and the manifold are made of inert materials. Protection of the system against dust pollution is ensured by an adapter filter, whilst the vacuum pump is provided with a separate protection filter. The in-draught device is also provided with hidden openings and for this reason the back-draught originating from improper usage is practically impossible. As ultimate protection, fluid trap, collecting container can be found under the channel manifold housing. By means of the measuring and regulating unit of the **KS-501-F** instrument the mass flow and the sampling time can be adjusted over a wide range and the instrument can be operated in either manual or automatic mode.

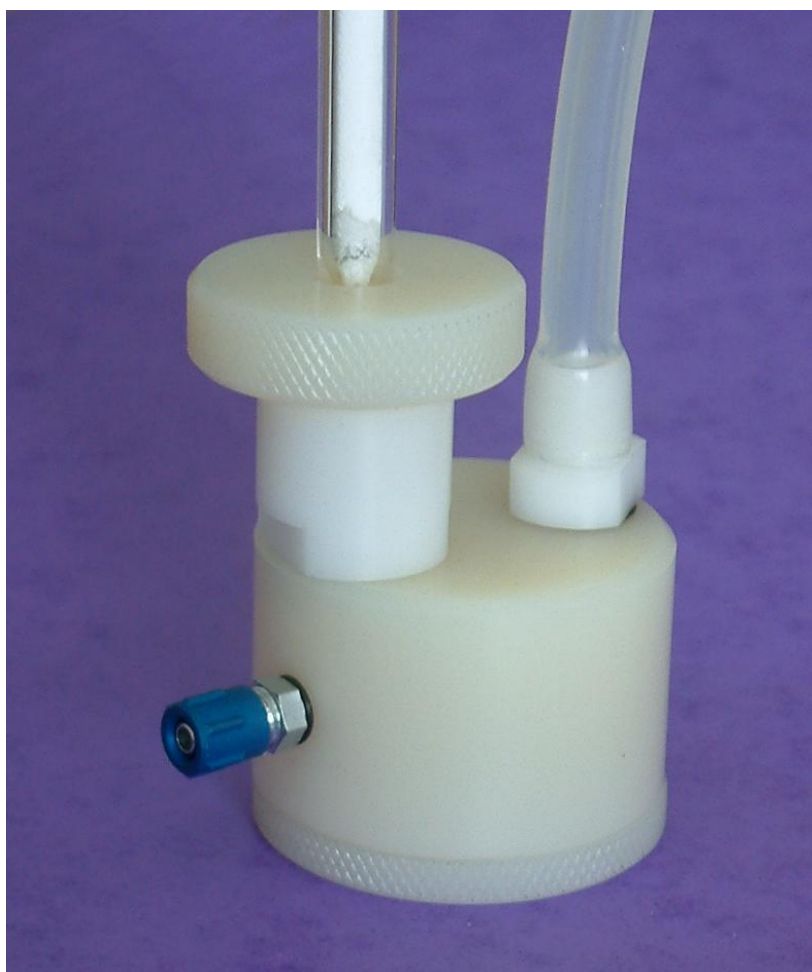
The instrument can be simply handled and the sample change is facilitated by quick coupling connectors ensuring rupture-free functioning. After the non-repeat programming the regular data polling can be accomplished without need for any special skill. The instrument can be operated without any technical attendance. The gas wash bottles are accommodated in a protected, key-locked compartment. The sampling is started with use of a keyword. The microprocessor control performs execution of the program, ensures the mass flow stability and, executes the calculations correlating with the mass flow measurement.



The instrument stores the data (daily, weekly) relating to the measurement and, on instruction, displays them. The **KS-501-F** instrument can be easily motioned. In case of fixed installation **Figure 3.**, in order to prevent interventions by unauthorized persons, the equipment can be locked and, if required, the 2000 [mm] long pumping pipe can also be interconnected with the sampler.

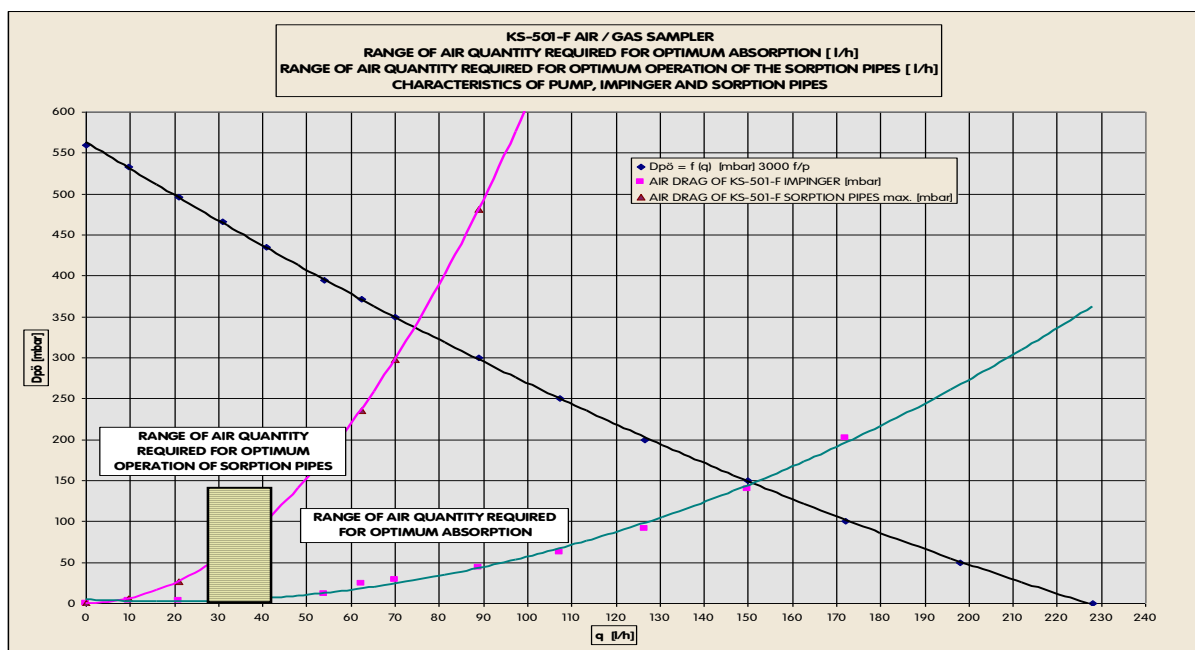
## 2.2. Application of sorption pipes for labour health preservation or catastrophe prevention tasks

The **KS-501-F** sampler shown in **Figure 2.** has been provided with a special adapter and quick coupling connectors, which facilitate – at perfect air tightness – application of high-pressure sorption pipes, too. It is known that the optimum utilization range of the 50 [ml] absorbing fluids is in the  $q=40-80$  [l/h] range and that of the sorption pipes is in the  $q=20-40$  [l/h] range. The sorption pipe illustrated in **Figure 4.** is provided with a clamp, a container and, for checking of the air drag, a static pressure outlet.



**Figure 4.**

**Figure 5.** illustrates that the vacuum pump of the KS-501-F sampler producing a high pressure difference is suitable for use of gas washers and various sorption pipes alike.



**Figure 5.**

### 3. Technical data

- The through-suctioned air quantity measured and displayed on the LCD display can be programmed by channel.
- Minimum volume flow rate  $q_{\min} = 15$  [l/h]
- Maximum volume flow rate  $q_{\max} = 110$  [l/h]
- Number of sampling channels 8
- Airborne dust filter  $\varnothing 50$  [mm]
- Gas wash bottles  $8 \times 100$  [cm<sup>3</sup>]
- Reagent  $8 \times 50$  [cm<sup>3</sup>]
- Sampling channel selection By Bosch magnetic valves
- Contour dimensions  $350 \times 300 \times 560$  [mm]
- Mass 12 [kg]
- Max. power consumption: 10 [W]
- Speed of the vacuum pump continuously variable, microprocessor controlled
- Measuring accuracy of the flow mass rate meter  $\pm 2$  [%]
- Sampling volume flow rate stabilization within  $\pm 3$  [%]
- In case of power supply failures automatic restart and data storing