DIGITEL

Technisches Büro für Digitalelektronik
Elektronischer Apparatebau
Messgeräte für Umweltschutz

Building high-precision samplers for dust, gas, and rain since 1970.

DH-77

High Volume Aerosol Sampler (HVS)

Product Information

EN12341: 2014, Annex B

DIGITEL
enviro-sense

Figure 1: Villum Research Station North Greenland

Digitel DH-77

DIGITEL High Volume Aerosol Samplers DH-77 are fully automatic systems to sample dust and aerosol particles for later assessment and analysis (gravimetric and analytical determination). The sampler operation range is 100 to 1'500 litres per minute (6 to 90 m³/h). The sampling can be programmed with starting time and duration but also for more complex applications using cycles for interrupted sampling or wind dependant sampling (with optional wind sensor). The field housing of the DIGITEL HVS DH-77 is suited for outdoor installation. It is easy to transport and because of a good sound insulation, very quiet. Superior workmanship in sampler mechanics backed by the latest electronic control guarantees a long lifetime and absolutely reliable operation.

Advantages

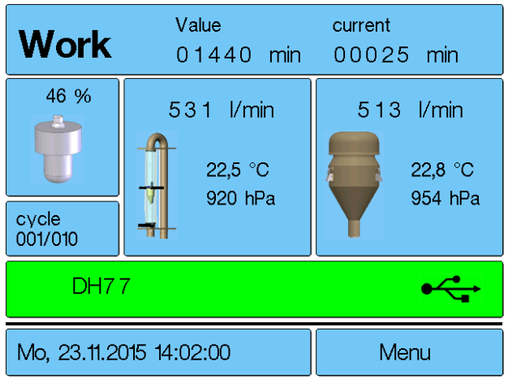
An integrated microprocessor unit collects all relevant data and events. The status "work" and "pause" (starting time) can be programmed with a resolution of one minute. The constant flow of sampled air through the filter is dynamically controlled. This value is kept at good reproducibility and at long-term stability which keeps to a minimum electrical power consumption. The blower unit is maintenance free and ensures a long life (MTBF > 36.000 hours). All mechanical components which come into contact with measuring air are coated with a highly corrosion-resistant and extremely smooth "Ematal" surface. A low surface velocity is obtained by the large filter surface. The uniform dust distribution on the filter allows cutting of the filter for different analyses. The DH-77 High Volume Sampler has different interfaces for data transmission and remote control. The systems are in operation in important monitoring networks and at scientific sites

KEY FEATURES

- Autonomous, continuous sampling
- For single filter sampling
- Constant and precise flow
- Flow range 100-1500 l / min
- Filter diameter 150 mm
- TSP, PM10, PM2.5 and PM1 inlets
- PM2.5 and PM10 measurements according to EN12341:2014 Annex B

Easy Programming

The touchscreen allows simple and user-friendly programming. The current state of the sampling courses (e.g. program status, status periods, failure indication messages) is shown on the display. In case of power failure, all settings are stored. The time program is then internally running in the standard presetting and continued once the power is back. Therefore, programmed sampling times are not postponed in case of meantime power interruptions.



State of the Art Electronics

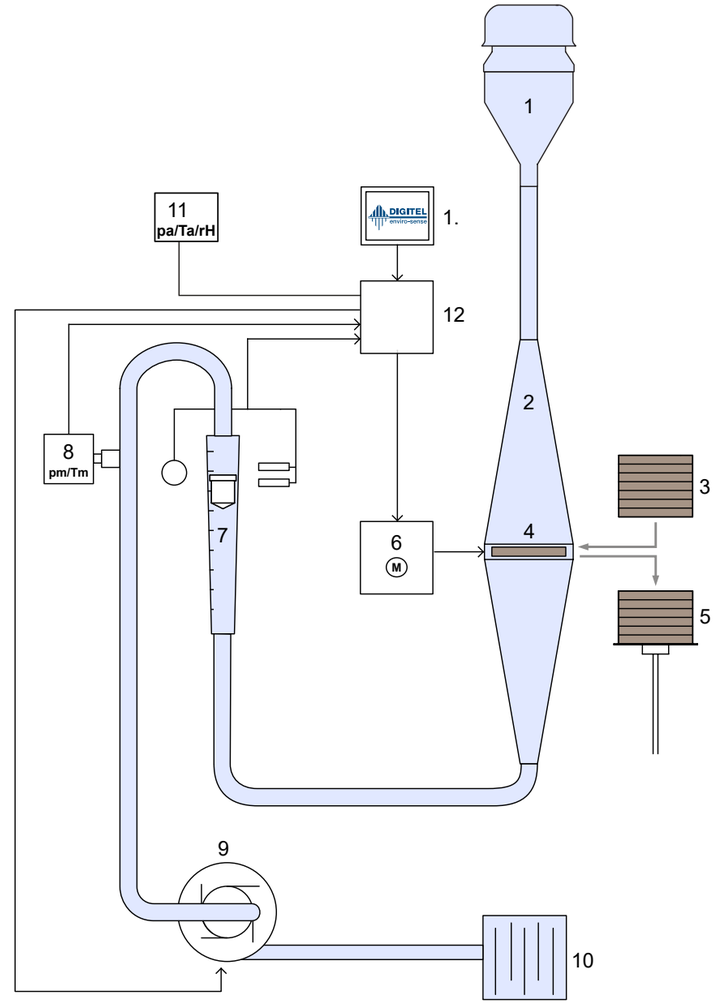
The Digitel HVS DH-77 has a RS232C interface which is used for data transmission with different protocols (DIGITEL, Bayern-Hessen-Protocol, AKprotocol...) and for the remote control. The internal memory has the ability to store data during two years of daily sampling. Additionally, the measuring data can be saved on a USB drive. The USB port can be used for software updates, which allows a simple in field update of the instrument. The DH-77 also has an Ethernet interface, which enables connections to any TCP/IP network. This allows data collection via FTP and remote control of the DH-77 (integrated HTTP- server) as well as software updates over Ethernet. An optional router allows direct remote access to the sampler.

Design and Operation

The air is sampled through a TSP / PM10 / PM2,5 / PM1 inlet (1), using a sampling tube, vertically from the top to the bottom through the filter (3) placed in the flow chamber (2). The upper part of the flow chamber works like a diffuser with regular cross section and ensures uniform loading of the exposed circular filter. Due to the relatively large filter diameter, the face velocity of the sampled air through the filter is only 0.5 m/s (at a flow rate of 500 l/min). The pressure drop across the filter is limited to 130 mbar, so that a rupture of damp or extremely loaded filters is prevented. Behind the filter, the air volume is measured by a flow meter with a float (5). Its double photo-sensor (5a) optically captures the float position. The control electronics (5b,c) adapt the capacity of the blower (6), so that the air quantity keeps the set-point value. Air pressure and temperature (8) are measured upstream of the flow meter and continuously averaged by the control.

A real-time protocol states sampling volumes with the sampling time and controlled volume flow as the core information. The air is released from the instrument with reduced noise through the noise baffle (7). The sampling protocol lists the effective and the standardized averaged values of pressure and temperature for that period and the operating as well as the failure status.

Design and Operation Flow Chart



1. Inlet
2. Flow chamber
3. Empty filters
4. Current filter
5. Sampled filter storage
6. Changing automatics
7. Flow meter
8. Internal T and p sensor
9. Blower
10. Noise baffle
11. Ambient T, p and rH sensor
12. Control unit
13. Touchscreen

Figure 1: Design and Operation Flow Chart DH-77

Part overview

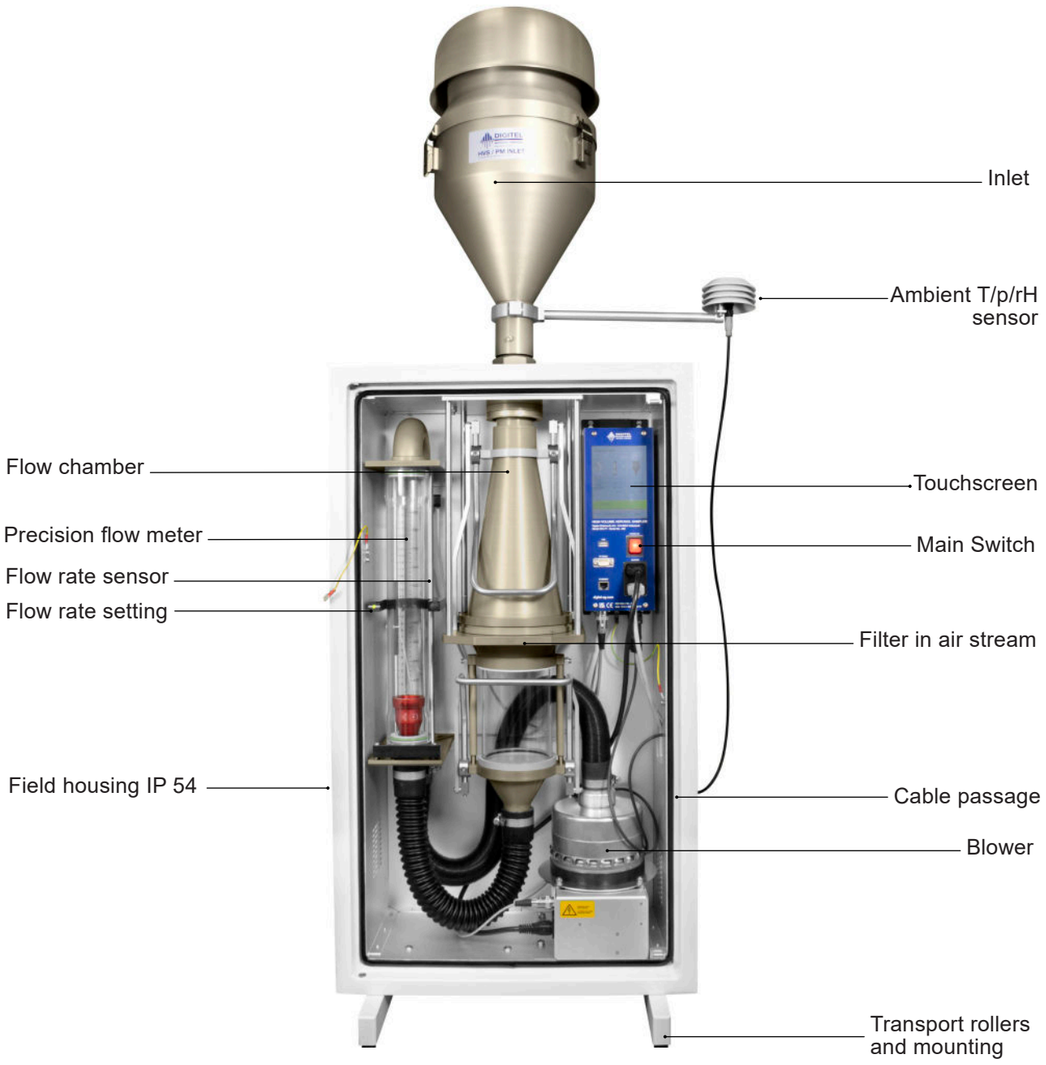


Figure 2: Part overview DH-77

Superior coating

All parts that come into contact with measuring air, including filter holders, are coated with a very corrosion-resistant and extremely smooth anodised surface (Ematal). The DIGITEL HVS DH-77 is equipped with a protection class IP54 field housing. It is suitable for direct open-air installation. The field housing is double-walled, which leads to a considerably improved interior thermal insulation. The extraordinary compact type of construction, especially the low depth, allows installation of the field housing space-savingly.

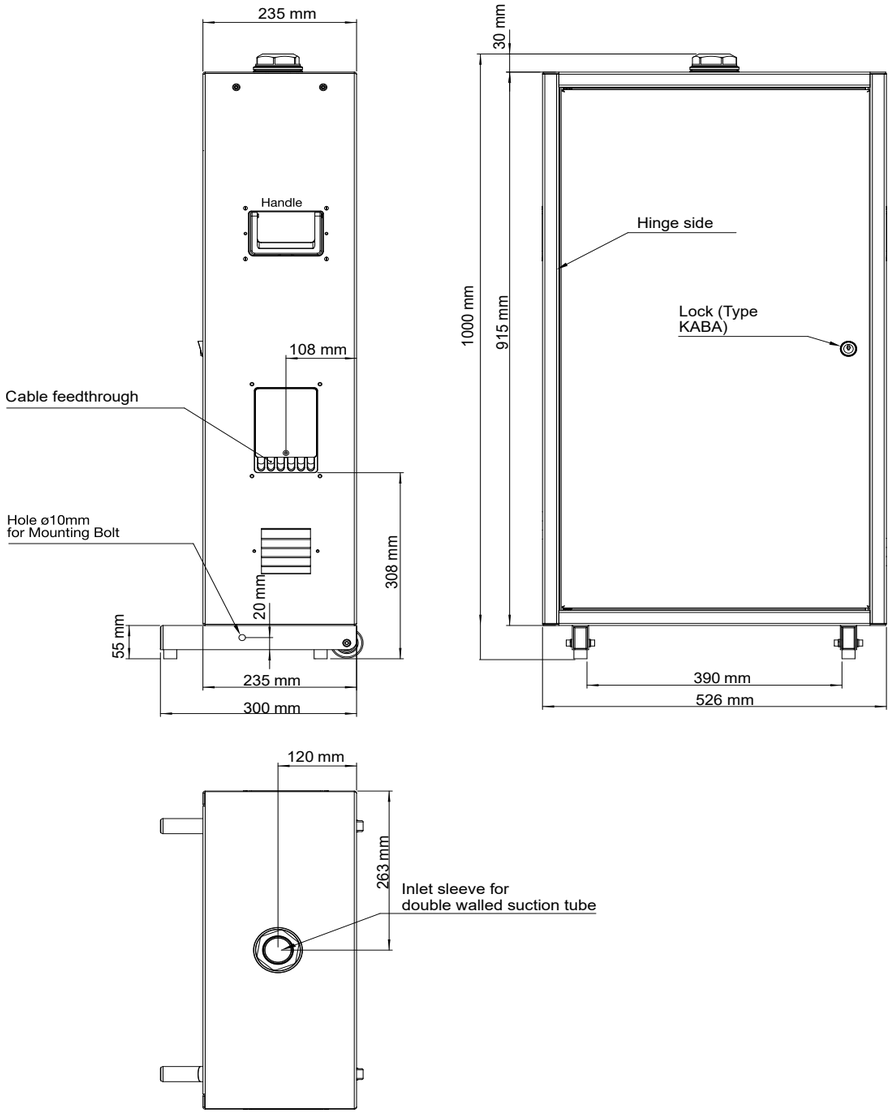
Excellent references

The device is in use in important monitoring networks worldwide as well as on scientific sites. This long term and varied field experiences have led to the efficiency and reliability of the instruments. The flow path of the DH-77 is equal to the flow path of the DHA-80. Both Systems are described in the EN12341:2014 annex B (PM10) and annex B 2.2 (PM 2.5). More information about options and applications can be found on our website.

GOOD TO KNOW

- Light weight but robust and weather proof (field housing)
- Low energy consumption, low energy cost
- Low maintenance cost
- Maintenance free blower
- Low noise
- Easy programming with touchscreen
- Easy filter handling
- Software for EN12341 tests

Field Housing Dimensions



Specifications

Sampling	• Flow rate: 100-1,500 l/min, delivered with 420-600 lpm glass tube as a standard • Filter: 1 round filter of d = 150 mm, flowing area d = 140 mm • Application range: -10° to 50° C; 0 % to 95 % RH with interior heating, 2000 amsl
Time programs	• Work, Pause (0 to 99'999 minutes each) • Start time adjustable, using date and time • Different sampling cycles programmable
Protocol files	• Data of filter, temperature, pressure, humidity, flow, blower load
Accuracy	• Constancy of sample flow: <2% with calibration at 20°C, operating at -20°C-+50°C • Reproductible tolerance of settings: +/- 0.45 % • Accuracy of measured flow volume: +/- 2 % • Volume flow control accuracy: < 5 % of MRAV (uncalibrated)
Operating data	• Power supply: 230V AC / 50-60 Hz; max. 1700 W • Mean life cycle suction unit: > 36'000 h • Sensors: Ambient and flow pressure, temperature, humidity, filter storage temperature
Interfaces	• RS232C, USB, Ethernet, RS485 • Interface protocols: DIGITEL, Bayern-Hessen, AK, TCP/IP, HTTP, FTP • Internal memory: 16 MB, ring buffer, filter data of two years of daily sampling
Inlets	• TSP, PM10, PM2.5 and PM1, customized inlets on request
Materials	• Coated aluminium, stainless steel, POM, PTFE, NBR • Material of sampling line: EMATAL coated aluminium
Dimensions & Weight	• Field housing (without inlet) 526x 235 x 1000 mm, 32 kg, protection class IP54 • Component layout 20 kg
Sensor specifications	• Ambient & internal pressure sensor range / accuracy (calibrated): 300 – 1100 hPa / ± 0.12 hPa • Ambient & internal temperature sensor range / accuracy (calibrated): -40 – +65°C / ± 0.5°C • Ambient & internal humidity sensor range / accuracy: 0 – 60°C; 0 –100 % / ± 3 % rH

Amazon Tall Tower Observatory, ATTO, Brazil

Features

- Touchscreen interface
- Overload cut-off
- Operating hours counter
- Internal data memory
- Ethernet port for remote control and data query
- Weather-proof field housing made of aluminium, protected with an extremely weather and seawater resistant powder coating
- Delivery of single components (component layout to build into an existing container) on request

Options

- PAH cartridges
- LTE Router for direct remote access
- Text message (SMS) module for status and alert messages
- Sampling controlled by external sensors (e.g.: wind sensor or particle counter)
- FollowFlow Option
- Heating for inlet
- External meteorological data collection (e.g.: wind direction and wind controlled measurement)
- Customer-specific functions

Accessories

- TSP Inlet (EMPA and VDI probe)
- PM10, PM2.5, PM1 inlets
- Inlet heating (regulated, ambient temperature controlled)
- Cartridges for PU foam and granulates
- Meteo sensors
- Calibration units

Customised Solutions

- Higher/lower flow rates
- PM inlets for customised flow rate
- Customer specific functions (e.g. humidity controlled sampling, wind controlled sampling, PM controlled sampling)
- Customer specific interface protocols
- Configuration avoiding certain materials (e.g. PFAs)

For more information about options and accessories, please follow the links or check our website **digitel-ag.com**!

Have a question? We'd love to help!

If you have questions about anything, please contact us and we will be glad to assist you.

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