

# DIGITEL

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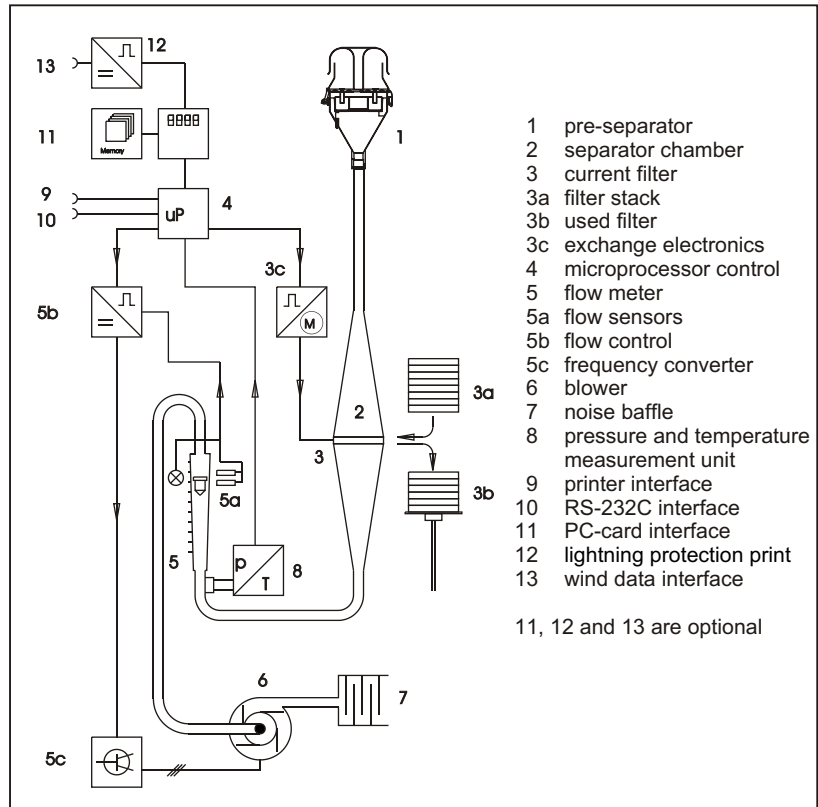


**DIGITEL** Made in Switzerland  
We have been established since 1070 developing and  
manufacturing high precision samplers for aerosol, gas  
and rain.

# Design and system description - DIGITEL HVS DHA-80

## Introduction:

DIGITEL High-Volume Samplers DHA-80 are fully automatic systems to sample dust and aerosol particles for later assessment and analysis (gravimetric and analytical determination). The sampler operation range in standard construction is 100 to 1.000 litres per minute (6 to 60 m<sup>3</sup>/h). DIGITEL HVS DHA-80 has a magazine of 15 filters clamped in filter holders. They rotate automatically to the flow position at the pre-set time. The devices can be integrated in automatic monitoring systems via various interfaces. The field housing of the DIGITEL HVS DHA-80 is suited for outdoor installation. The device is easy to transport and because of a good sound insulation very quiet. Superior workmanship in sampler mechanics backed by the latest technical and electronic control will guarantee a long lifetime and an absolute reliable operation.



Block diagram of DIGITEL Automatic High Volume Sampler DHA-80

## Features:

An integrated microprocessor unit controls the filter rotation at the exact pre-set time and collects all relevant data and events. The status "work" and "pause" (filter change) can be programmed with a resolution of one minute. The constant flow of sampled air through the filter is dynamically controlled, so that this value is kept at good reproducibility and at long-term stability which keeps to a minimum of electrical power consumption. The blower unit is maintenance free and ensures a long service life (MTBF > 36.000 hours). All mechanical components of the rotation automatics as well as the units needed for measurement are provided with a highly corrosion-resistant and extremely smooth "Ematal" coating. Due to the large surface filter a low flow velocity takes place. Furthermore, the homogeneously loading of dust and aerosol particles on the filter allows segmenting for different analyses. Different interfaces for data transmission and remote control are available. The systems are operating in important monitoring networks both at home and abroad.

## Design and operation:

The air is sampled via a pre-separator (1), using a sampling tube, vertically from the top to the bottom through the filter (3) placed in the separator chamber (2). The top part of the filter separator chamber operates as a diffuser with regular cross section and cares for homogeneous loading of the exposed circular filter. The velocity of the sampled air on the filter, 0.5 m/s at 500 l/min flow rate, is low because of the relatively large filter diameter. The pressure drop across the filter is limited to 130 mbar, so that a rupture of damp or extremely heavy loaded filters is prevented. The DIGITEL HVS DHA-80 changes the filters automatically. After the filter, the transported air quantity is measured by using a flow meter with a floater (5). Its double photo-sensor (5a) optically senses the floater position. In connection with the control electronics (5b, 5c), the capacity of the blower (6) is adapted to the rpm control, so that the air quantity keeps the set-point value. Air pressure and temperature are measured upstream (8) the flow meter and continuously averaged by the controller. A real-time

protocol states sampling volumes yielding from the sampling time and controlled volume flow as 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 standardised volume of each filter exposure, the averaged values of pressure and temperature

Mo 12.01.04	12:05:28
Start of program	
Mo 12.01.04	12:05:28
Work	
Mo 12.01.04	12:05:37
Blower on	
Mo 12.01.04	12:07:37
Motor load : 65 %	
Tu 13.01.04	12:05:28
Pause	
Tu 13.01.04	12:05:28
End of program	
Tu 13.01.04	12:05:30
Blower off	
Collecttime [min]:	1399,96
paM [mbar]:	929
TaM [°C]:	20,0
cM ( 20/ 929) :	1,054
cs ( 15/1013) :	0,949
cA ( 17/ 962) :	1,007
VM ( 20/ 929) [m3]:	755,146
Vs ( 15/1013) [m3]:	680,539
VA ( 17/ 962) [m3]:	721,591
at 512 l/min	

printer protocol

## Design and system description - DIGITEL HVS DHA-80



for that period and the operating as well as the failure status. The DIGITEL HVS DHA-80 has a magazine of 15 filters clamped in filter holders. They are changed automatically to the flow position at the pre-set time. The unit is construed strictly modular, so that all electrical and mechanical function blocks are easily replaceable. The DIGITEL HVS DHA-80 is examined and tested in practice in the monitoring networks of various European countries. These long-term and varied field experiences have led to the efficiency and reliability of the equipment. The DIGITEL HVS DHA-80 is described in the VDI/DIN guideline VDI 2463 page 11. In

connection with a DIGITEL PM10 pre-separator (DPM 10/30/00) the system is approved according to reference method EN12341. In connection with a DIGITEL PM01 (DPM 01/30/00) PM01 measurements can be made. On the illuminated LCD display the current state of the sampling course can be read out any time (e.g. program status, current status, failure indication messages). In case of power failure, all settings are kept stored. Then the time program is internally running in the standard pre-setting. Therefore, programmed filter rotation times are not postponed in case of meantime power interruptions. The DIGITEL HVS DHA-80 supplies a serie of

digital interfaces to connect the protocol printer, to activate the remote control and to manage data in- and output using different formats (eg. Bayern-Hessen, AK, TCP/IP, etc.). An analogue interface enables the easy external registration of the sampling course as well as for the remote control. The DIGITEL HVS DHA-80 is equipped with a protection class IP54 field housing. For that reason it is directly suitable for open-air installation under European standard weather conditions.

# Design and system description - DIGITEL HVS DHA-80

conditions. The field housing is double-walled so that a considerably improved thermal insulation of the sampler's internal space is ensured. The extraordinary compact type of construction, especially the low depth, allows that even the field equipment can be installed in a container economically.

## Accessories:

For total suspended particulates (TSP) sampling, two various designed pre-separators are available: a cylinder probe (EMPA/UBA probe) and a probe called „open circular slot“ according to VDI.

For the PM10 or PM2.5 sampling, pre-separators designed as single-stage impactors are available. They are construed for an operational volume flow of 30 m<sup>3</sup>/h according to the reference method En12341.

For PM1.0 sampling the pre-separators are designed as double-stage impactors. They are construed for an operation volume flow of 30 m<sup>3</sup>/h.

The protocol printer and memory card (PCMCIA) provide for the operating recording and error status in real time.

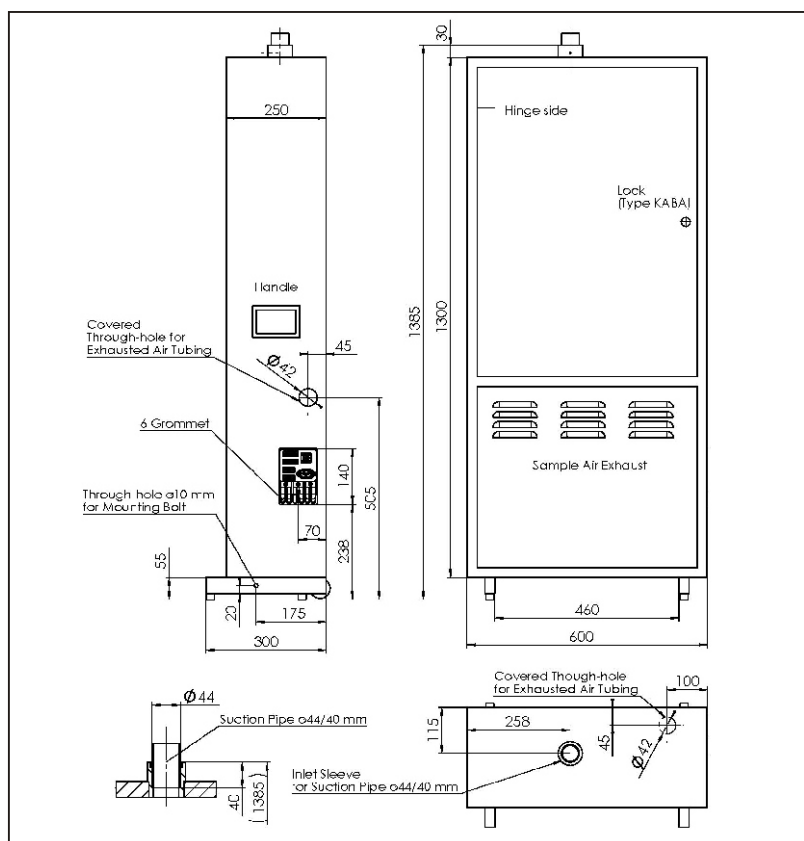
Interfaces RS-232C, RS-485, Ethernet, analogue, radio modem (via RS-232C) enable data logging and activate remote control.

Directional sampling, depending on meteorological data e.g. wind direction and wind speed, also counts to the options.

The PAH hand-changed cartridge holder or PAH cartridge changer offers the possibility for sampling aerosols and volatile substances with PU-foam or granulates in series to the current filter.

In addition to the standard housing the DHA-80 is also available in other housings as the container housing or the 19" housing for rack-mounting

Technical data	DIGITEL DHA-80
Flow rate	100 - 1.000 l/min (6 - 60 m <sup>3</sup> /h)
Time programs	Work, Pause (0 to 59.999 minutes each); start time adjustable using date and time
Filters	15 round filters of d = 150 mm (flowing area of d = 140 mm); filter material depends on the aim of analysis
Settings reproducible accuracy (according to UMEG report No. 6-08/00)	+/- 0.45%
Logged standard and measured volumes accuracy	<+/- 2%
"Volume flow" control accuracy	< 5 % of upper range value (uncalibrated)
Suction unit, mean life cycle	> 36.000 h
Underpressure at 1.000 l/min.	max. 130 mbar
Interfaces	RS-232C
Interface protocols	DIGITEL, Bayern-Hessen, AK
power supply	230 V +/-10 %; 50 Hz; max. 1.700 VA
Application range	5 to 40°C; 10 to 90 % RH or -20 to 40°C; 10 to 95 % RH with interior heating, maximum operation altitude of 2.000 m above the sea level
Type	field housing
Outer dimensions (H x W x D)	1.385 mm x 600 mm x 250 mm
Weight	60 kg
Protection class	IP54
Features	automatic filter exchange, changer failure indication identification, manual filter exchange, empty magazine identification, overloading switch-off, blower-load indication, battery-backed data memory
Pre-separator heater control	24,5 V; 50 Hz; 160 VA max.
Options	
Pre-separator	TSP, PM10, PM2.5, PM1
Pre-separator heating	regulated, max. 52 W; with built-in over-temperature protection available
PAH cartridge holder	available
Memory cards (PCMCIA) internal	available
Log printer	available
Interfaces	RS-485, Ethernet
Interface protocols	customer-specific
External meteorological data sensing	available



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## Technical Data:

DHA-80 field housing  
DHA-80 with compressor cooled  
sample storage  
DHA-80 in box housing  
DHA-80 in mounting rack 19"



Models, dimensions	<ul style="list-style-type: none"> <li>field housing: 1355 x 600 x 250 mm (H x W x D), 60kg</li> <li>compressor cooled sample storage: 1385 x 600 x 250 mm (H x W x D), 75 kg</li> <li>box housing: 1260 x 528 x 250 mm (H x W x D), 43 kg, IP50</li> <li>mounting rack 19": 960 x 483 x 500 mm (H x W x D), 45 kg, IP50</li> </ul>
Power supply; fusing	230V +/-10%, 50Hz, max.1700VA; 10A
Specification power cable	3 x 1,0 mm <sup>2</sup> , 10 A, 250 V
Installation	category II, (standard networks)
Application range	5... 40 °C; 10 ... 90 % rH or -.20 ... 40 °C; 10 ... 95 % rH with interior heating max. operation altitude: 2000m above sea level (over 2000m above sea level on request)
Flow rate (optional)	420 - 600 l/min (100-1000l/min)
Volume flow control accuracy	< 5% of MRAV (uncalibrated)
Suction blower, average life span	36.000h
Reproducible tolerance of settings (according to UMEG report No. 6-08/00)	+/- 0,45%
Accuracy of measured flow volume	<+/- 2%
Time programs	Work, Pause (0-59999 minutes each); start time adjustable by date and time
Protection class	IP54 (field housing)
Filters	15 round filters: d=150mm, (flowing area: d=140mm); filter material quartz fibre, glass fibre, membrane filters (depending on the aim of research)
Negative pressure at 1000 l/min	max. 130 mbar
Features	automatic filter change, changer failure recognition, manual filter change, empty magazine recognition, overload cut-off, blower capacity, operating hours counter, internal data memory, remote control
Communication/Ports	USB, RS232, Ethernet, RS485, GSM module (optional)
Interface protocols	DIGITEL, Bayern-Hessen-protocol, AK-protocol, customer specific
Languages	English, German, French, Spanish
Inlet heating control	30V / 50Hz, 160 VA max.

Article numbers	Description	Art. No.
<b>Models</b>		
Field housing	Outside application	13106
Compressor cooled sample storage	Outside application, compressor cooled sample storage, cooling capacity: 150W	13343
Box housing	Installation in measuring cabin	13135
Mounting rack 19"	Installation in 19" Rack	12506
<b>Options</b>		
PAH single filter cartridge holder	Manual change, 1 cartridge (d=100x140 mm)	10976
Cartridges (for manual cartridge changer)	Glass tubes for PUF (single filter cartridge), covers, screens	13019
PAH cartridge changer (for 4 cartridges)	Automatic cartridge changer, 4 cartridges (d=60x100mm) for PU-foams, granulates, etc.	13054
Cartridges (for automatic cartridge changer)	Glass tubes for PUF (automatic cartridge changer), boxes, screens	12711
Thermo printer DTD02	Protocol printer	12516
USB Backfitting set	USB data logger to serial interface for older instruments	13102
SMS alarm option	Automatic request/dispatch of instrument data by SMS	13151
GSM Module	Transmission of instrument data (flow rate, status..) to webpage	12845
Ambient temperature sensor	To record external pressure and temperature values (for SN >1499)	12829
Ambient temperature sensor	To record external pressure and temperature values (for SN <1500)	13163
Wind sensor	For wind controlled sampling	13125
<b>Accessories</b>		
Empa TSP inlet	TSP inlet to measure total dust	12069
Heating for Empa TSP inlet		10930
PM10 inlet	For PM10 measurements, selection size: 10µm, flow rate: 30m³/h	12517
PM2,5 inlet	For PM2,5 measurements, selection size: 2,5µm, flow rate: 30m³/h	12518
Heating for PM10 + PM2,5 inlet		10929
PM1 inlet	For PM1 measurements, selection size: 1µm, flow rate: 30m³/h	12519
Heating for PM1 inlet		12755
Fly screen	Insect protection, d=208 mm, h=54 mm	20726
Satz Filterhalter	For filter diameter 150 mm (140 mm effective filter diameter)	10992
Transportcase aluminum	To transport 15 filter holders (for filters d=150 mm)	13170
Transport case blue	To transport 15 filter holders (for filters d=150 mm) and 1 baffle pot	13174
Container roof pipe feed through	Container roof pipe feed through for extension tubes with d=44mm	10829
Extension tubes	Made of emataled aluminum, d=40/44, various sizes from 0,5-2,5m	misc.
Calibration unit	420-600l/min or 100-1000l/min, incl. test certificate	13055/12577

## Spare parts

Suction blower	3-stage suction blower, 200Hz, 1520W, MTBF 36'000h	10993
Frequency converter	1,5 kW, Type V1000, for instruments with HDI2 or DMCU control unit	10921
Frequency converter	1,5 kW, Type V1000, for instruments with HVS11 control unit	13124
Photo cell	Photo cell for flow meter	12777
Display	iLCD panel - CT6448	13119

## Consumables

Glass fiber filters	Glass fiber filters with binder, d=150 mm, box of 100 pcs	10913
Quartz fiber filters	Type: QM-A, d=150 mm, box of 100 pcs	10914
Sealing set for DHA-80	Sealing set for DHA-80, incl. sealing ring for inlet	13059

Please always mention the instrument's serial number in your spare parts order.

A list with more articles can be found in our High Volume Sampler brochure or requested from: [info@digitel-ag.com](mailto:info@digitel-ag.com)

Version control unit *	Serial numbers	Year
Rotary knob (HDI)	approx. 001 – 350	1980 - 1996
Keyboard (HDI)	351 – 1159 (conversions -N)	1996 - 2008
Keyboard (DMCU)	1160 - 1212	2008 - 2009
Touch screen (DMCU)	1500 - 1585	2009 - 2011
Touch screen (DMCU), compressor cooled sample storage	5000 – 5018	2009 - 2011
Touch screen (HVS11)	from 1586 (conversions -T)	from 2011
Touch screen (HVS11), compressor cooled sample storage	from 5019	from 2011

\* The list provided above is for reference purposes only, there can be individual deviations. Therefore it's important to mention the serial number on your spare parts order.