Environmental Monitoring Systems

COMDE DERENDA

SPM Sampling

Automatic Sampling System

PNS DMC

as Slide-In Module for 19“ Racks
for Sampling $PM_{10/2.5/1}$

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Automatic Sampling System PNS DMC

Automatic sampling system for continuous monitoring of particulate matter concentrations (PM_{10}, $PM_{2.5}$ or PM_1), as slide-in module for 19“ racks

The PNS DMC combines a low/medium volume sampler (LVS or MVS) and an automatic filter changer with double magazine in a slide-in module for 19” racks. It is used only in temperature-regulated measurement containers and is not equipped with a cooler. The system collects fine particulate matter on sampling filters according to EN 12341:2014 (PM_{10} and $PM_{2.5}$). For this purpose, a vacuum pump draws in ambient air, and the system fractionates the airborne particles in a sampling inlet. The air containing the desired fine particulate fraction then passes through the filter, where the particles are collected and made available for subsequent gravimetric assessment or analysis. The automatic filter changer with Geneva drive and two filter magazines facilitates sequential series of up to 29 sampling cycles. The volumetric flow rate is electronically adjusted with an accuracy of ≤ 2 % deviation.

Design

The system consists of the following principal components:

- Control unit with electronic modules, SD card reader and RS-232 interface
- Rotary-vane vacuum pump
- Orifice plate
- Connection socket for temperature and humidity sensor
- Filter changer unit with Geneva drive
- 3 filter magazines for 18 resp. 24 or 29 filters each
- Aluminum intake tube (anodized, diameter Ø 40 mm, length 800 mm, custom lengths available; optional)
- Sampling inlet (for particulate matter fractions PM_{10}, $PM_{2.5}$, PM_1 or TSP; optional)
- GPRS modem (optional)

Type 3.1 is equipped with a 4 m³/h pump. The volumetric flow rate for sampling PM_{10}or $PM_{2.5}$ fractions is 2.3 m³/h; the maximum negative pressure at the filter is 300 mbar. The maximum volumetric flow rate when using glass fiber filters is 3.5 m³/h.

Type 6.1 is equipped with an 8 m³/h pump and can be operated at a maximum volumetric flow rate of approx. 5.5 m³/h. It is especially suitable for measuring semi-volatile organic compounds (SVOCs) and for use in conjunction with special filter materials (e.g. cellulose nitrate or Nuclepore filters). The maximum negative pressure at the filter is configurable up to 500 mbar.

The connection between the sampling inlet and intake tube is gas-tight. Three magazines and 36 resp. 48 or 58 filter cartridges come with each unit. When magazines are changed, one filter cartridge remains in the sampling position. The last filter is usually not used for sampling but as a reference filter to collect any passive particle deposits. The magazines also serve as portable containers.
Intake tube and sampling inlet (for fine particulate matter fractions PM_{10}, $PM_{2.5}$, PM_1 or TSP) are available as an option according to customer requirements.

Operating Principle

Before sampling begins, the desired settings are entered in the control unit, and the filter magazines are placed in the filter changer. Once the operating cycle is activated, sampling takes place automatically according to the set parameters. During operation, the vacuum pump draws in air laden with fine particulate matter through the sampling inlet, and the desired fraction is separated. The particles of the desired fraction are then deposited on the sampling filter in the sampling position.
At the end of a sampling period, the changer automatically changes the filters. The filter changer uses two of the three cylindrical magazines. The left (holding) magazine contains the unsampled filters. The filter cartridges are arranged on top of each other in the magazine. In the filter change operation, the unit transfers the lowermost filter cartridge from the holding magazine to the sampling position. At the same time, the filter cartridge located in the sampling position, and containing the sampled filter, is transferred to the right (sampled) magazine. The Geneva drive allows the necessary complex movements to be performed simultaneously.
A locking mechanism on the bottom of the magazine and tight covers keep the filter cartridges from falling out and prevent contamination with foreign particles. The magazine retains the top cap even while in use in the sampling system.

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Automatic Sampling System PNS DMC

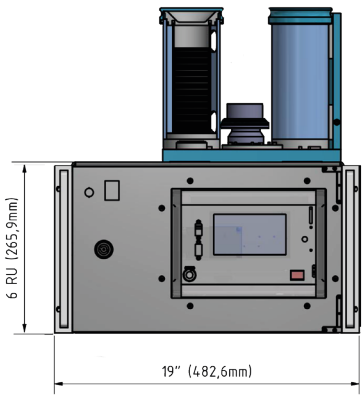
- **Equivalent to EN 12341:2014 (PM_{10} and $PM_{2.5}$)**
- **For Ø 47 mm filters**
- **Flow rate electronically adjusted**
- **Filter changer unit for two magazines (capacity 18, 24 or 29 filters)**
- **RS-232 interface**
- **Data storage on SD card**

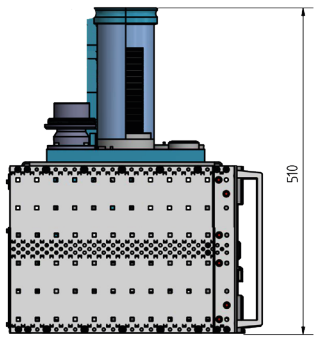
Accessories (Selection):

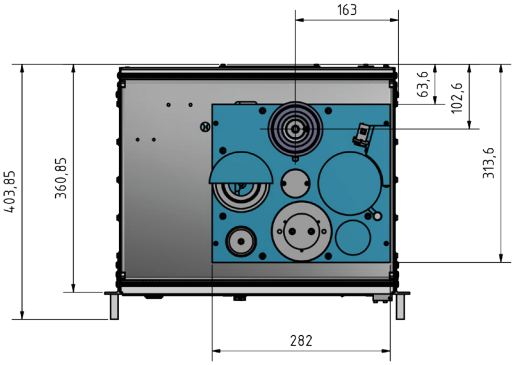
D100072	Intake tube 800 mm, Ø 40 mm, custom length optional
D100868	Sampling inlet PM_{10} (EN 12341:2014)
D100870	Sampling inlet $PM_{2.5}$ (EN 12341:2014)
D100871	Sampling inlet PM_1
D100287	Filter magazine type 18-DM
D110166	Filter cartridge for filters Ø 47 mm
D100930	Calibration adapter

The volumetric flow rate is measured with an orifice plate and is electronically adjusted with an accuracy of ≤ 2 % deviation. The ambient climatic conditions are continuously monitored by temperature and humidity sensors.
A function which sends SMS notifications in case of exceptional events is provided by the optional GPRS modem.

Various data captured during sampling is saved in the internal memory and on a SD card, and can be transferred to a PC via RS-232 interface or using the optional GPRS modem. This data includes serial number, filter number, sampling start/end / duration, mean volumetric flow rate, sampled volume, and filter storage temperature.







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Technical Data PNS DMC

Types: PNS 18/24/29 DMC – 3.1/6.1

Volumetric Flow Rate	
PNS DMC-3.1 (controlled)	1.0 ... 3.5 m³/h (Nm³/h)
PNS DMS-6.1 (controlled)	1.0 ... 5.5 m³/h (Nm³/h)
Accuracy	≤ 2 % deviation

Power Supply	
PNS DMC-3.1	approx. 300 VA
PNS DMC-6.1	approx. 350 VA

Sampling time	1 min ... 1000 h
Power supply	230 V, 50/60 Hz
Filter diameter	47 mm
Diameter of the sampled filter surface	41 mm
Negative filter pressure, configurable up to	300 mbar / 500 mbar*

Dimensions	
Width	483 mm (19“ rack)
Height (without changer unit)	266 mm (6 height units)
Height (with changer unit)	510 mm (≤ 12 height units) / 570 mm (≤ 13 height units)** / 630 mm (≤ 15 height units)***
Required minimum height for installation	550 mm (≤ 13 height units) / 610 mm (≤ 14 height units)** / 670 mm (approx. 15 HE)***
Depth	361 mm

Weight	
PNS DMC-3.1	approx. 25.5 kg
PNS DMC-6.1	approx. 27.5 kg

Interfaces	
RS-232	2x
SD card drive	1x
GPRS modem (optional)	1x

Sound pressure level acc. EN 3744:2010 in 8 m distance	< 36 dB(A)
Operating temperature range	–30 ... +50 °C
Operating humidity range	0 ... 100 % RH

* Types PNS DMC-6.1
** Types PNS 24DMC
*** Types PNS 29DMC

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