Environmental Monitoring Systems

COMDE DERENDA

Weighing Systems

Manual Weighing System

MWS-1

for Gravimetric Assessment
of Sampling Filters

Phone: +49 3329 69027-10
Fax: +49 3329 69027-19

Comde-Derenda GmbH
Kieler Strasse 9, 14532 Stahnsdorf/Germany

info@comde-derenda.com
comde-derenda.com

Manual Weighing System MWS-1

Climate-controlled manual weighing system with RFID technology for gravimetric evaluation of sampling filters

- Significant reduction of incorrect readings
- Capture and recording of weighing results
- Various microbalances integrable, e.g. models from Sartorius or Mettler-Toledo
- Dust-protected weighing chamber with FFU
- Temperature and humidity control
- Filter encoding and identification by RFID
- Filter magazine for storing filters (optional)
- Ionization system (optional)

The manual weighing system MWS-1 provides a contamination-free working environment for the manual weighing of sampling filters. Integrated RFID technology identifies and tracks the filters during the entire process. If a PC is connected, the weighing results are recorded in a database along with relevant ancillary data, such as temperature and relative humidity. A weighing chamber with a fan filter unit (FFU) and climate control unit maintains controlled, dust-protected conditions throughout the weighing operation. Its modular design makes the system easily adaptable to customer's specific requirements.

Design

- Dust-protected weighing chamber with:
  - Climate control unit for adjusting temperature and humidity
  - Fan filter unit (FFU) for contamination protection
  - Micro- or ultra-microbalance (optional, most existing balances can be integrated upon request)
  - Filter magazine for holding filters before and after weighing (optional)
  - RFID system for coding and identifying filters (optional)
  - Ionization system for the prevention of static charging (optional)
  - Iris diaphragms
  - Sliding windows left or right side (optional)
- Power supply cabinet underneath the weighing chamber

Operating Principle

Before the first weighing operation is performed, the unsampled filters are placed in filter trays by hand and introduced into the weighing chamber of the MWS-1. In order to identify the filters, they are held above the RFID station (optional) in their individual filter trays and coded in a contactless operation. They are then placed in the filter magazine and conditioned for the desired time.

The next step is the first weighing series, which consists of weighing the unsampled filters, usually in two weighing passes. The optional ionization system prevents static charging and thus enhances weighing accuracy. Once the unsampled filters have been weighed, they are removed from the system and prepared for sampling.

After sampling, the filters with their trays are reintroduced into the weighing chamber and conditioned again. The second weighing series (weighing the sampled filters) follows, once again with two, or possibly three, weighing passes. Previously coded filters can be identified by the RFID system, which allows the sampled reading to be compared directly with the preceding unsampled reading. The concentration of suspended particulate matter is calculated from the weight difference between the sampled and unsampled filters, taking into account the air flow rate during the sampling period.

Both before and during the weighing series, verification weighing operations can be performed with the reference filters in order to monitor the climatic conditions inside the weighing chamber.

During the weighing operation, all data (weighing values, mean values, weight difference between unsampled and sampled filters, and ancillary data, such as temperature and relative humidity) are saved in the database on the system PC. The saved data can subsequently be exported for analysis and processing.

Details on System Components (partly optional)

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Manual Weighing System MWS-1

Weighing chamber of the MWS-1 with filter magazine, RFID system, microbalance, keyboard and Monitor (components partly optional)

The climate control unit of the MWS-1 includes a convection unit with high operational reliability, which controls the required humidity very accurately. Safety features include an overheating sensor and an overflow sensor.
The filter magazine consists of 25 magazine discs with 15 filter positions each (total capacity 375 filters). The magazine can be rotated manually. To prevent static charging, magazine levels and placement positions are gold-plated.
The Comde-Derenda filter trays (patent pending) have a self-centering geometry and an integrated RFID transponder with data memory. The transponder allows data exchange with the RFID system and ensures the identifiability of the filters.
If possible, the sampling filters should remain in their filter trays during the entire process including sampling, to ensure the continuous identifiability of each filter and to rule out any possible confusions.
Individual components can be modified according to the customer‘s specific requirements upon request.

Benefits

Compared with lab weighing, the MWS-1 offers the benefits of a contamination-free and climate-conditioned workplace, designed specifically for weighing filters. The weighing system is significantly more cost-effective than a complete cleanroom and can be moved to a new installation site in case of relocation.

The connected system PC facilitates reliable recording of the weighing results, comparisons between individual weighing passes, and continuous monitoring of the climatic conditions. This functionality rules out inaccurate records, allowing the system to deliver reliable, precise results by manual weighing. The integrated filter magazine can accommodate a large number of filters in a protected environment. The climate control unit maintains the necessary climatic conditions throughout the entire process.

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Technical Data MWS-1

Filters and Filter Trays	
Filter material	Glass fiber, quartz fiber, cellulose nitrate, Teflon
Filter sizes	System modifiable for all common filter sizes
Filter encoding	Via RFID system and RFID transponders in the filter trays
Filter identification	Non-contact identification using RFID technology

Filter Magazine (optional)	
Maximum filter capacity	375 (1 magazine with 25 levels with 15 filter positions)
Potential equalization	Consistent conductive design

Balance (optional)	
Integrable models	Microbalances and ultra-microbalances manufactured by Sartorius or Mettler-Toledo (others upon request)
Readability (resolution), depending on balance model	0.001 mg or 0.0001 mg
Balance placement	On platform with a large mass (approx. 150 kg), decoupled from system structure
Calibration weights	Integrated in the balance
Weighing repeatability (reference weights)	1 σ ≤ 0.25 µg (when using the Sartorius Cubis® weighing cell)
Weighing repeatability (filters)	1 σ ≤ 1.5 µg (when using the Sartorius Cubis® weighing cell)

Additional Specifications	
Cleanroom class (within the weighing chamber)	6

Electronics	
Data output	LAN (RJ-45)
Data export TCP/IP (example)	Weight of unsampled filter (average), weight of sampled filter (average), difference of weight of sampled and unsampled filters (ave-age), temperature, rel. humidity, air pressure, filter number, date/ time, amount of weighings per filter

Power Supply	
Power source	230 V ± 10 %, 50 Hz
Power requirement (without chiller unit)	approx. 1800 VA
Power requirement chiller unit	approx. 1300 VA

Dimensions and Weight	
Width	approx. 1190 mm
Height with hood	approx. 1995 mm
Depth	approx. 930 mm
Working height	approx. 875 mm
Weight (including balance platform)	< 650 kg
Weight external chiller for climate control unit	< 75 kg

Climate Control	
Temperature regulation	Climate control unit (heating, cooling, humidification, dehumidification), with external water connection and external chiller
Humidifier unit	Evaporator as air cooler unit
Accuracy of temperature regulation	± 0.5 K (with set value 20 ... 22 °C)
Accuracy of humidity regulation	± 2.5 % RH (with set value 45 ... 50 % RH)
Accuracy of dew point regulation	± 1 K (with set value 7.7 ... 11.1 °C)
Operating conditions	16 ... 28 °C, 30 ... 60 % RH

Ed. 2018-06

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