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ECC2

Environmentally Controlled Chamber System (Temperature and Humidity)

for use in

weighing particulate matter filters
and other sensitive micro samples

with

ultra micro balances

in automotive, electronics, chemical & pharmaceutical R&D and industrial production

The ECC2 Environmentally Controlled Chamber System

for the Weighing Accuracy Performance Level

1 µg

The picture shows:

- **The Weighing Chamber on the left hand side;**
- **The Technical Components Box on the right side;**
- **The Control Unit (including PC and Screen)**
- **For harsh testing and production environment**

Made in Switzerland

ECC2 Specifications and description

System objective and description

Clients require precision weighing at a level of accuracy of approximately **1 micro gram (1 µg).** This is usually carried out using either Mettler Toledo or Sartorius *ultra micro balances*, which typically offer a read-out accuracy of 0.1 µg, a reference repeatability of 0.25 µg and a sample weighing accuracy of about 0.5 µg – under nearly *ideal conditions,* implying practically no perturbations from any external factors such as vibration, temperature, humidity or pressure variability, and excluding drafts, electrostatic and other factors which might affect a specific sample-weighing operation. These also include major disturbances due to the operator's own presence and handling (heat and operational effects).

The ECC2 Chamber System aims to provide the **best technical and most cost-efficient environment** for ultra micro balance operations. The chamber-controlled environment, with a range of client-specific weighing support and efficiency improvement options is intended to ensure *optimal real conditions* for typical tasks and applications (10 – 150 or more weighing per day) in the following areas:

- **automotive industry:**
  particulate matter filter weighing (in compliance with new diesel engine emission regulations)
- **chemical, medical and pharmaceutical industry:**
  micro samples and drugs weighing (cleanliness and humidity-sensitive)
- **research and test centers:**
  for all types of sensitive micro samples (see above)

The design of the ECC2 modular system solution was based on 10 years of experience of environmentally controlled precision measurement in a US company (MTL Corp., Measurement Technology Laboratories, Minneapolis/Minnesota) and on the international product experience acquired by the Swiss company IKT (IKT AG, International Know-how Transfer and Trading, Winterthur/Zurich), in close cooperation with many European technology, research and production partners. Valuable input from reliable component suppliers was also incorporated. These included Mettler Toledo (Switzerland), Vaisala (Germany/Finland), Thermo Electron GmbH (Germany), CAS Clean Air Services AG, Sepp Oberholzer AG, Schiltknecht, AG (Switzerland) and the Zurich University of Applied Science.

The system comprises an environmentally controlled chamber (mainly temperature and humidity), a technical components box for treating circulating air and a control unit with data presentation facilities. Weighing support software and an automated weighing robotics option is also available. The system is easy to install and the minimal maintenance and servicing required can be undertaken by the clients themselves, whatever their location.

Technical - commercial system specifications

The ECC2 "Weighing Chamber System" aims to provide controlled environmental conditions for ultra-precision weighing (micro gram accuracy), representing a cost-efficient alternative to room-based systems. The Chamber System's technical design focuses on **smaller total volume, lower cost, higher flexibility and ease of operation in harsh industrial production environments.** In contrast to total weighing room solutions, the **Chamber System** is also easy to install, relocate and maintain, and includes an optional robotics upgrade enabling more than 150 weighing per day with a **filter weighing accuracy of ≤ 2.5 µg.**
Weighing rooms do have the advantage of more convenient operator balance and robotics handling. By contrast these have to be carried out in the chamber-based system through a relatively small weighing window. **However, we estimate the savings which might be achieved at the cost of this minor inconvenience at over 40%.**

Our approach in reaching this goal is focused on managing only a small chamber volume, thereby excluding as far as possible perturbations due to the physical presence of the operator whose involvement is limited to handling via the chamber weighing window.

The technical design and selection of subsystems and components was determined following successful application by **American, European and International industrial and research clients,** and in view of compliance with specific **emission regulations** (e.g. regarding diesel engine particulate matter).

Main technical systems specifications (more detailed specifications available on request)

1 Admissible ambient conditions

Temperature:	15 – 30 °C (288 – 303 K)
Humidity:	30 – 60 % RH
Pressure/Altitude:	0 – 3000 m.a.s.

2 Environmental chamber-controlled climate conditions

Temperature:	Set point range	20 - 26 °C
	Control accuracy	+/- 1.0 °C for max/min peaks
Humidity:	Set point range	8 -14 °C
(dew point)	Control accuracy	+/- 1.0 °C (max/min)
Humidity:	Set point range	40 - 50 % RH
(relative humidity)	Control accuracy	+/- 5 % RH (max/min).

3 Other environmental chamber characteristics

Airflow / draft around the micro balance:	≤ 0.05 m/s
Clean room class specification:	class 5 - 8 acc. with ISO 14644 (client specific)
Working area:	150 x 90 x 75 cm3
Dimensions:	180 x 110 x 180; 200 x 80 x 200 cm3
Required installation area / total weight:	25 m^2 / 1000 kg
Practical weighing accuracy	(e.g. with the Mettler UMX series)
- **Metal reference repeatability:**	≤ 0.5 µg std deviation (see note below)
- **Particulate reference filter repeatability:**	≤ 2.5 µg std deviation (see note below)

Applicable international / national standards

- **USA EPA, 40 CFR 1065** for the US market and diesel emission regulatory framework
- **EU/Intl Euro V stage regulation**, directive 2004/26/EC ff. of emission regulations
- **ISO 14644-1 for CR performance**

Electrical power supply:	400 VAC / 30 A / 50-60 Hz; P ~ 6 kW

Note: Micro balance supplier is repsonsible for guaranteeing weighing accuracy.

Recommended VWE analysis for financial project risk reduction (USD 100 – 500,000)

Prior to any weighing chamber or even room installation project we recommend an initial **analysis** be carried out **of current measurable vibrational perturbations and their effect on the micro balance** at the proposed site or location. IKT will assist you with our high-tech measurement experience and equipment, including any **geo-technical construction planning proposal** which might be required to ensure the long-term reliability and success of your micro balance environment project. (VWE = Vibrational Weighing Environment).

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for environmentally-controlled weighing chamber systems and measurement analysis