CHILLVENTA

International Exhibition
Refrigeration | AC & Ventilation | Heat Pumps

Nuremberg 11–13.10.2022

CONNECTING EXPERTS.

NÜRNBERG MESSE

Hall 4A

ep-e.com CHILLVENTA

EP Ehrler Prüftechnik Engineering GmbH

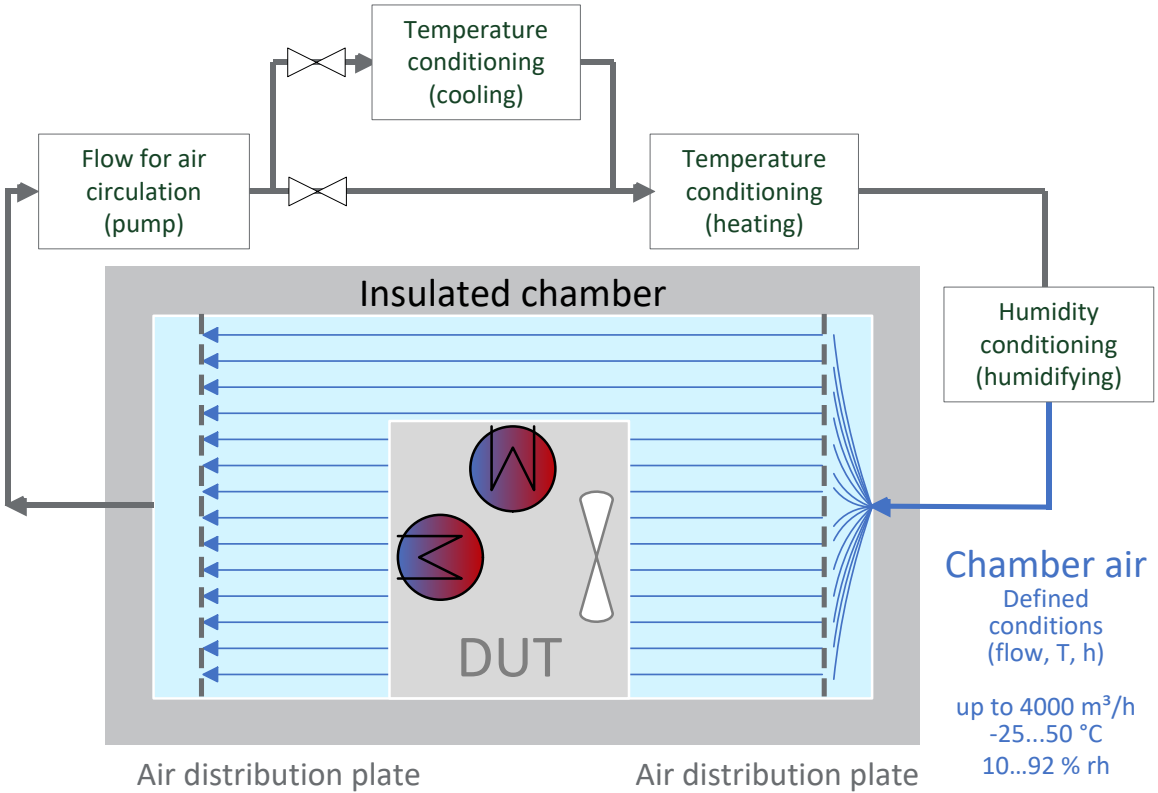
Measurement & testing technology

Optimized multi-chamber test bench for various testing options for heat pumps and air conditioning units

CONNECTING EXPERTS.

Ehrler Closed-Loop Design

Optimized test set-up for heat pump testing



Advantages of the closed-loop design

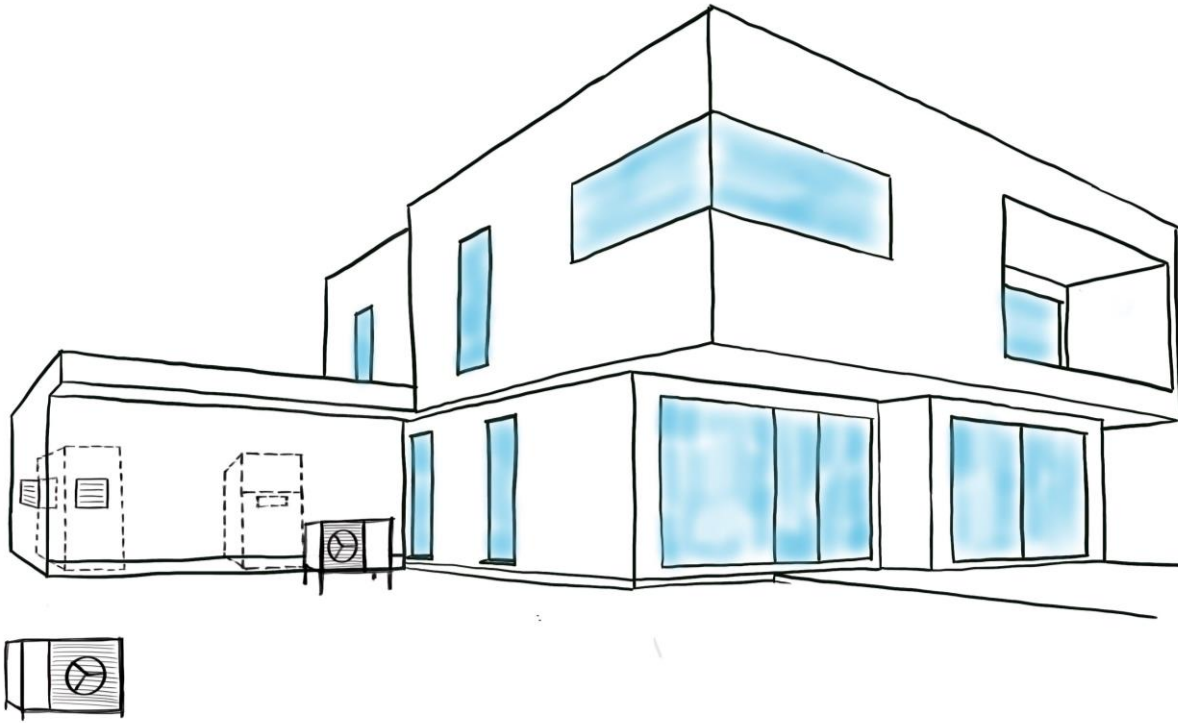
- Uniform air flow
- Accurate temperature and humidity control with fast and dynamic response to disturbances
- ATEX zone 2 security concept

Different types of heat pumps….

…different requirements on the test equipment!

- **Heat pumps as outside unit**
- **Heat pumps as inside unit**
- **Heat pumps as split units**

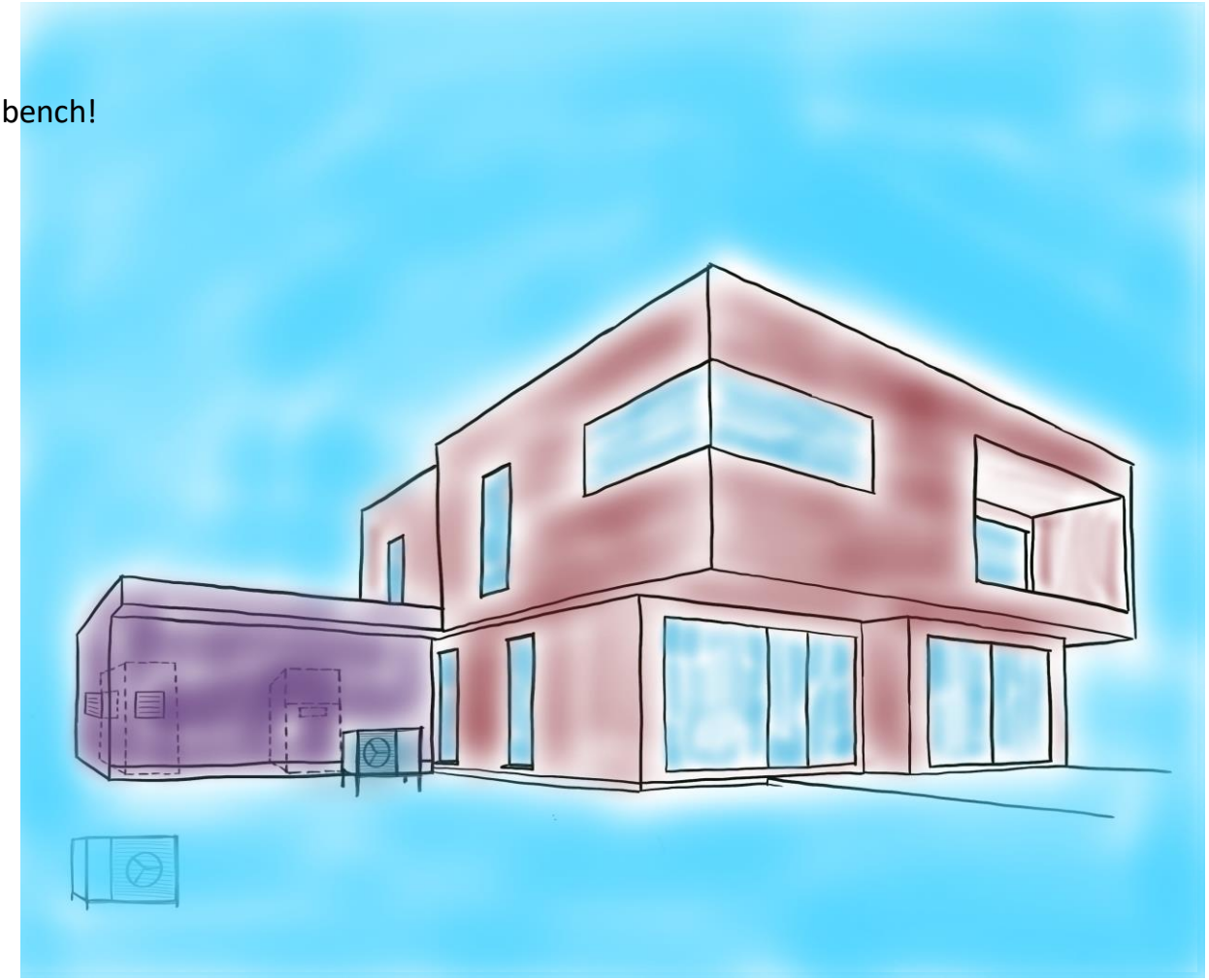
- **Each of the above with or w/o combination with a decentral ventilation system**



Environmental conditions….

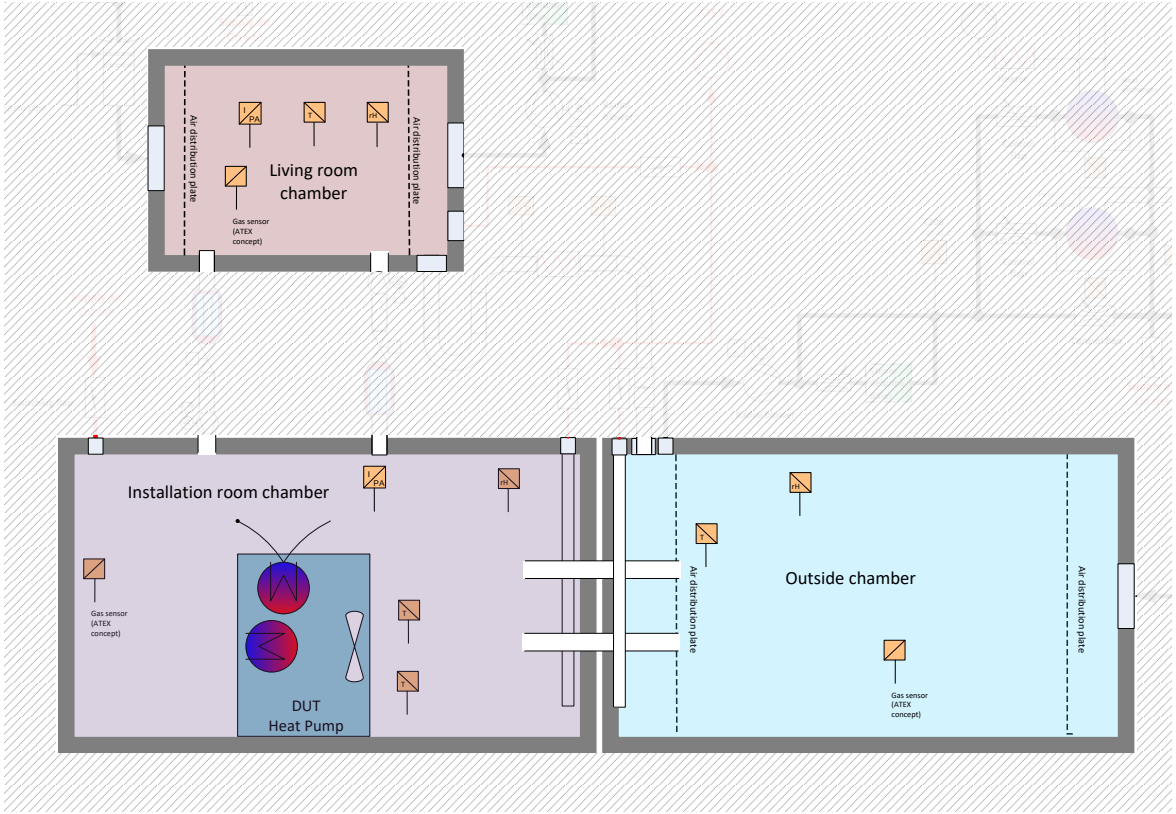
…that have to be simulated by the test bench!

- Outside area
- Installation room
- Living room



EP-E 3-Chamber Test bench

For various testing options for heat pumps and air conditioning units



Possible DUTs

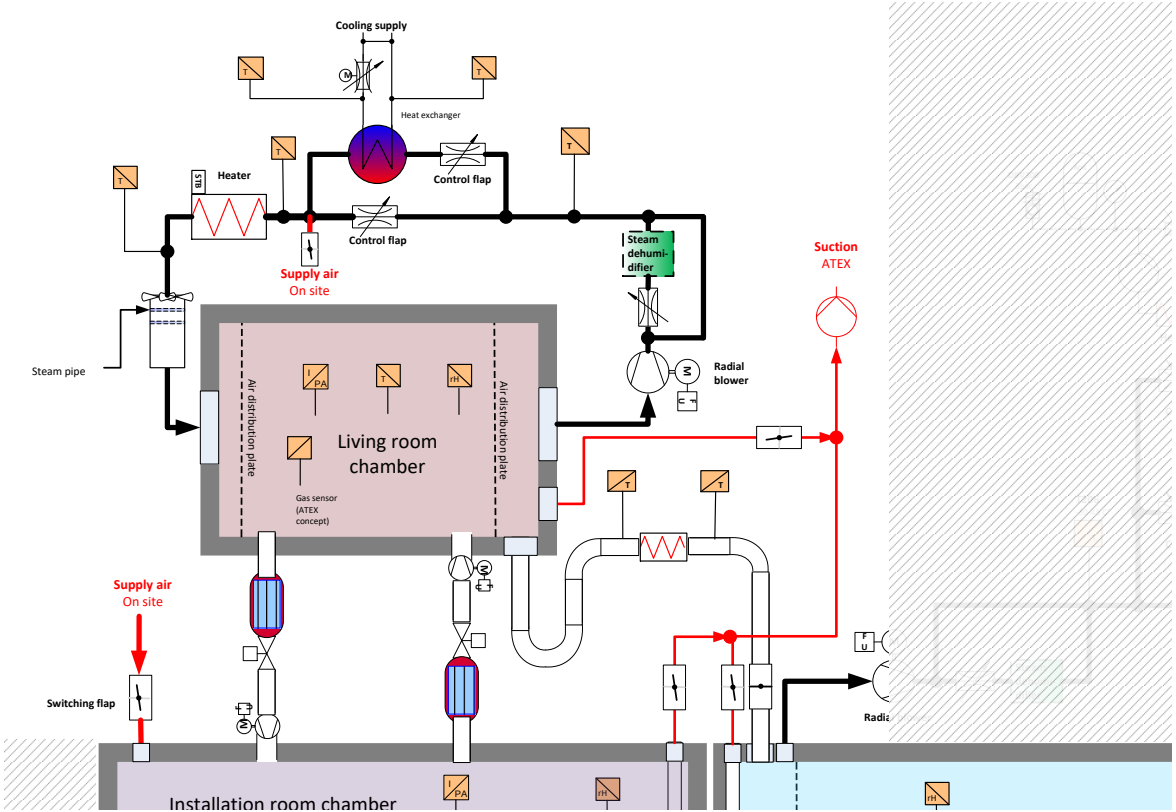
- Central ventilation units with heat recovery (exhaust and air supply)
- Decentralized ventilation units with and w/o heat recovery (with different air exhaust and supply options)
- Combination devices of heat pumps + ventilation + storage tanks
- Heat pumps with outside units

Living room chamber

The small one

Features & benefits

- Closed-Loop Design of the chamber
- Smallest chamber of the three
- Thermo siphon to the outside chamber to ensure a constant pressure during disbalanced operation

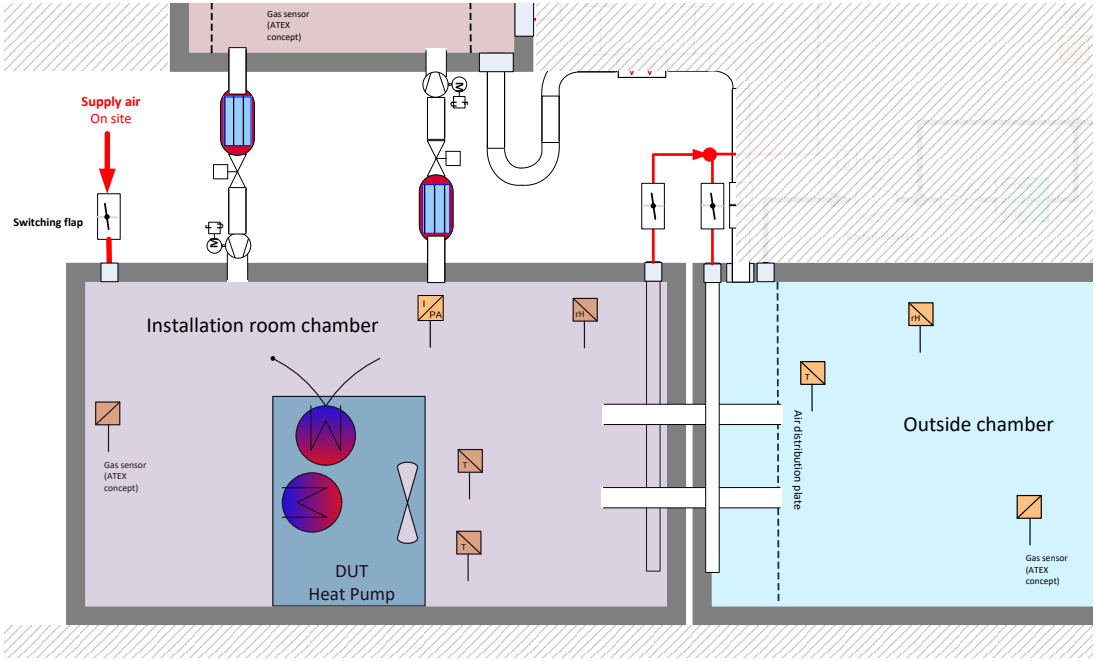


Installation room chamber

The simple one

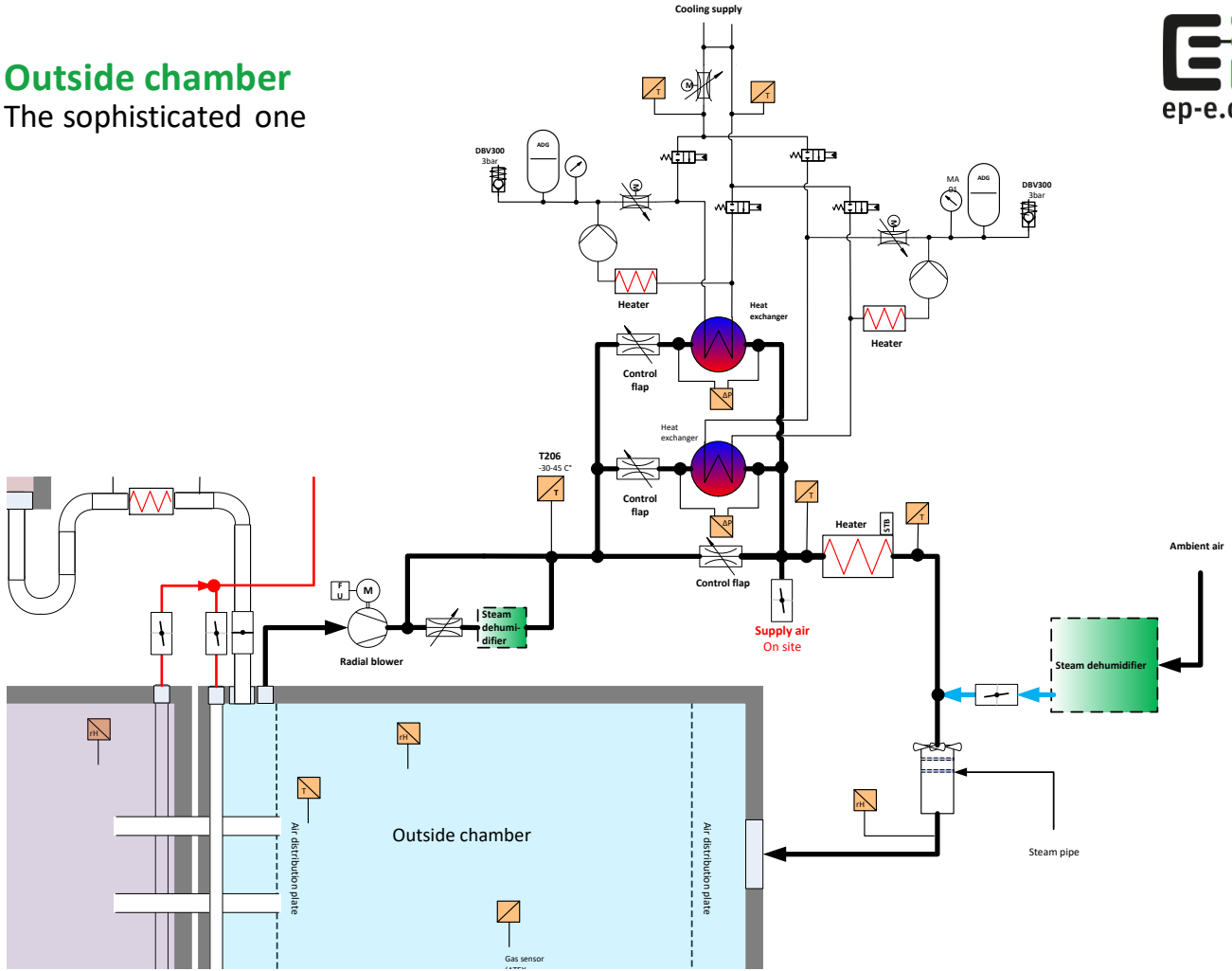
Features & benefits

- Standard climatic chamber (no Closed-Loop Design)
- Enough room for DUT installation
- Connecting door to outside chamber



Outside chamber

The sophisticated one

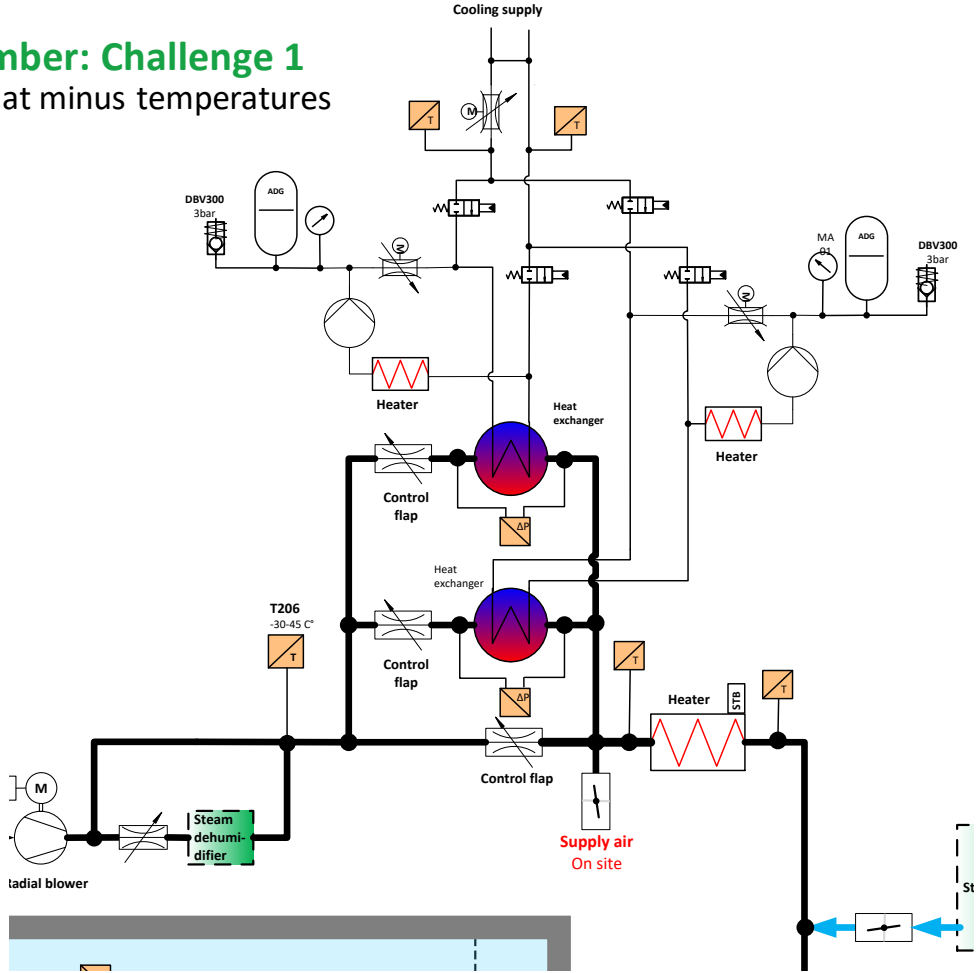


Features & benefits

- Closed-Loop Design of the chamber
- Temperatures down to -20 °C

Outside chamber: Challenge 1

Endurance test at minus temperatures



Challenge:

Endurance tests at minus temperatures lead to frosted heat exchanger

Solution:

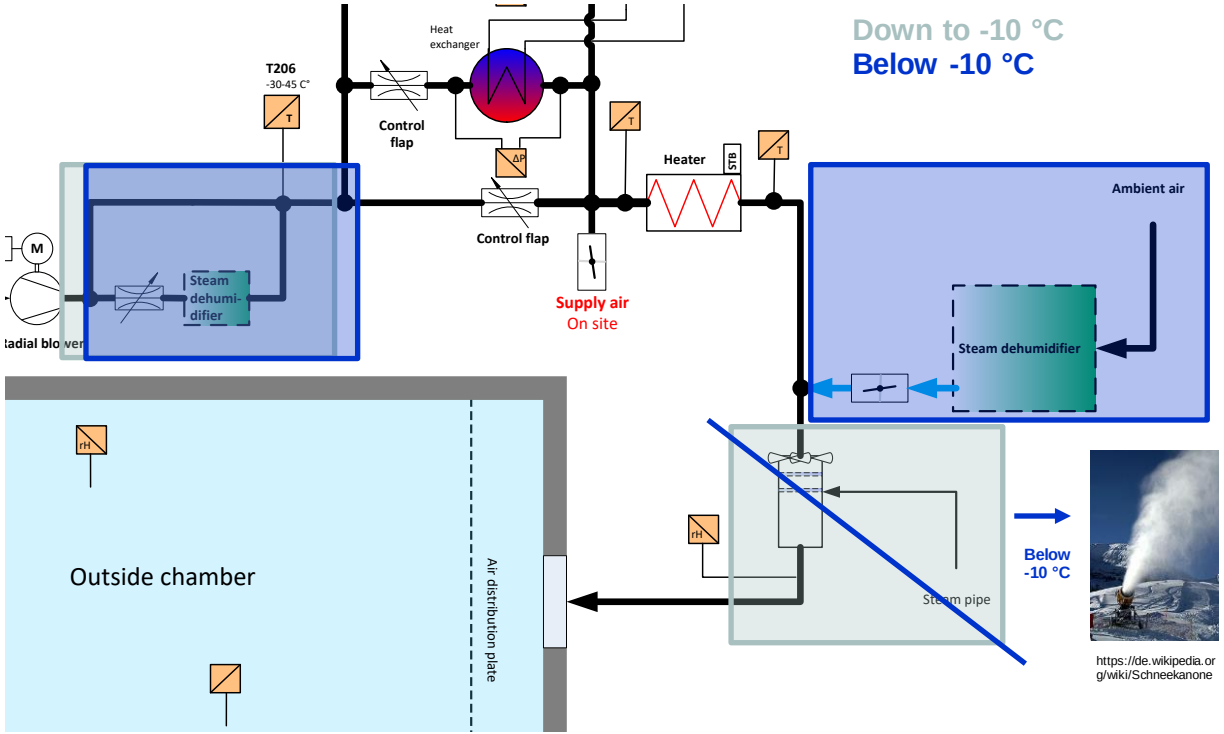
- Defrosting of heat exchanger via heater
- Redundant heat exchanger for alternate operation and defrosting of the two heat exchangers

Benefit:

- Continuous operation also at low temperatures

Outside chamber: Challenge 2

Humidity conditioning at low temperatures



Challenge:

Humidity conditioning at low temperatures

Solution:

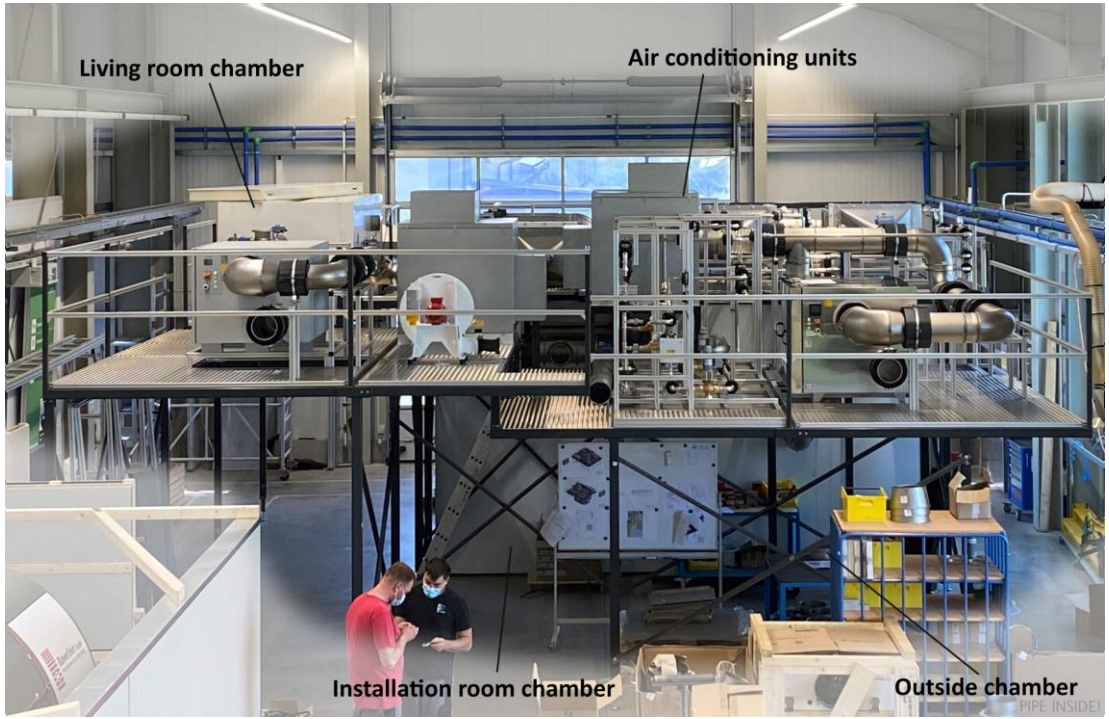
- Introduction of pre-dried ambient air to dose very small amounts of humidity at temperatures below – 10 °C

Benefit:

- Humidity budget for ventilation systems with humidity regulation

Realised project

EP 3-chamber Heat pump test bench



Technical specifications

Conditioning living room chamber

- Temperature: 1 … + 46 °C
- Rel. humidity (20 °C): 15 … 70 % rh

Conditioning installation room chamber

- Temperature: 10 … 46 °C
- Rel. humidity (15 °C): 30…90 % rh
- Flow: 500…2000 m³/h

Conditioning outside chamber

- Temperature: -20 … 46 °C
- Rel. humidity (5 °C): 20…90 % rh
- Flow: 1500…5000 m³/h

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EP-E Heat pump test benches are..

- … variable in the number of test chambers
  - living room, installation room and/or outside
- … excellent in temperature and humidity conditioning
  - Closed-Loop Design
- … able to test Heat Pumps that work with Low GWP refrigerants
  - ATEX zone 2 security concept

Outlook

- Integration of acoustic measurements
  - A2 acoustic room for development
- Integration of CO_2 and VOC conditioning
  - for optimum test of demand-driven ventilation systems
- Scale-up of the realized heat pump test benches
  - for large heat pumps up to 250 kW

EP Ehrler Prüftechnik Engineering

We are specialists in high-precision flow measurement technology

- **More than 3500 completed projects –**
  for customers in Automotive, Aviation, Gas and flow measurement, HVAC technology, etc.

- **High application competence in conditioning of air (T, rh, p) –**
  e.g. testing intercoolers for automotive customers

- **Expertise in test benches for Ex area –**
  e.g. endurance test benches for gas water heaters up to 1000 kW; HPPP High Pressure Piston Prover

- **High precision flow measurement –**
  own DAkkS calibration laboratory for air flow / primary standards for national metrological institutes (PTB Germany, NIM China, INM Colombia, etc.)

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Calibration pyramid

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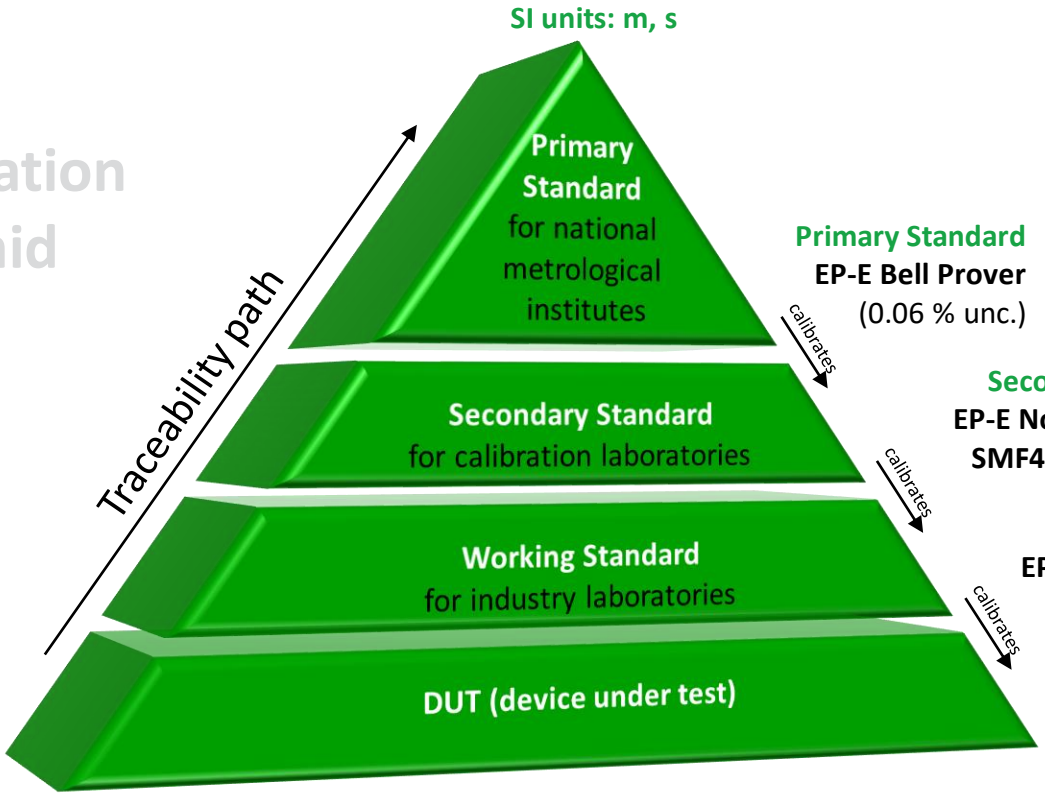
Calibration pyramid



Primary Standard
EP-E Bell Prover
(0.06 % unc.)

Secondary Standard
EP-E Nozzle test bench
SMF4000 (0.2 % unc.)

Working Standard
EP-E Blower test bench
(0.5 % unc.)

DUT
Blower
(1…x % acc.)

Thank you for your kind attention.

CONNECTING EXPERTS.

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