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HPT - Heat Pump Tester

Closed-Loop test bench for heat pumps
according to DIN EN 14511

Brochure EPE-162444



📍 HPT Heat Pump Tester at STIEBEL ELTRON

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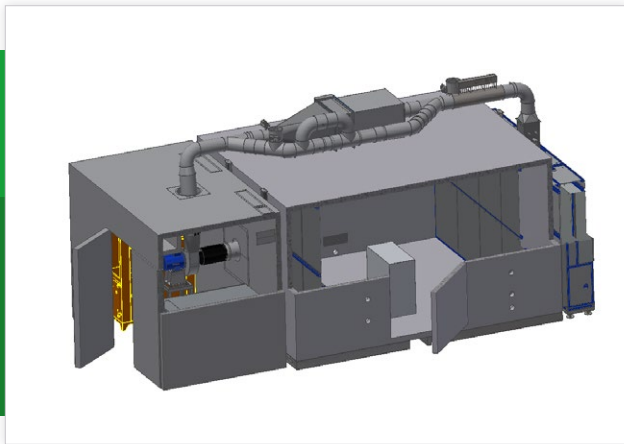


Illustration similar

Functional testing of heat pumps

Closed-Loop Design for best uniformity and dynamic temperature and humidity control

Performance test according to DIN EN 14511

ATEX zone 2 security concept

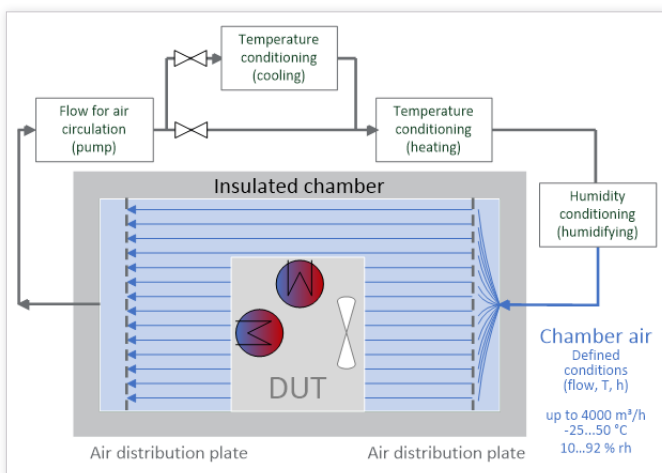
Description

The HPT Heat Pump Tester is a Closed-Loop test bench for functional testing of air-water-heat pumps according to DIN EN 14511. The beneficial Closed-Loop Design is using an insulated chamber with conditioning units for temperature and humidity outside the chamber. The conditioned air is running in a Closed-Loop.

This set-up realizes excellent uniform temperature and humidity conditions throughout the whole chamber. The temperature and humidity control of the different climatic test points according to DIN EN 14511 are accurate and dynamic. An optimized security concept allows safe tests with low GWP refrigerants.

Features & benefits

- ✓ **Performance test of heat pumps:**
According to DIN EN 14511
- ✓ **Exact and dynamic temperature and humidity control:**
For realistic simulation of real operating conditions
- ✓ **Laminar flow through the test chamber:**
For optimum temperature and humidity uniformity
- ✓ **ATEX zone 2 security concept:**
For safe tests with low GWP refrigerants
- ✓ **Option**
Heating water and process water conditioning:
To simulate a complete realistic test set-up
- ✓ **Option**
Multi-chamber test benches:
For the separate simulation of different rooms (outside, technical room and living space)



Functionality HPT Heat Pump Tester

The DUT (device under test) - the heat pump - is placed in the insulated chamber between two air distribution plates. The conditioning of temperature and humidity takes place outside the chamber. The temperature conditioning consists of a heating and a cooling unit, which are operated in parallel. By mixing these two temperatures through a by-pass with flow control valves, the temperature control is extremely precise, fast and dynamic.



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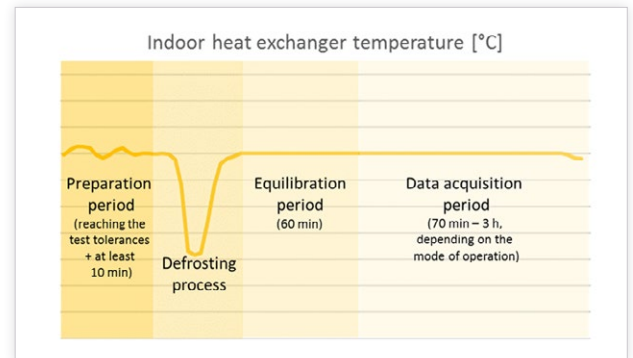
The standard - DIN EN 14511

- Defined measurement points
- Specific test procedure

Measurement points defined in DIN EN14511 reflect the different operating states of the heat pump at outside temperatures from -15 °C to 20 °C. Both temperatures and corresponding wet-bulb temperatures of the external heat exchanger are given in the standard.

Ensuring a good accuracy of the test bench and reflecting the inertia of the surrounding air is realized via definition of permissible deviations of the arithmetic mean and permissible deviations of the individual values.

The most crucial point in the temperature regulation is the defrosting process of the heat pump, that takes place regularly during operation to prevent freezing of the heat pump's evaporator. Therefore, a specific test procedure is defined in DIN EN 14511 containing always the following steps: Preparation phase, defrosting process, equilibration period and actual measurement and data acquisition.



Test procedure according to the standard

Beneficial Closed-Loop Design

- Best uniformity
- Dynamic temperature and humidity control
- ATEX zone 2 security concept

Two air distribution plates realize a laminar flow through the test chamber. This is leading to an optimum temperature and humidity uniformity. *Diagram 1* is showing this clearly with the temperature course of four individual temperature probes at stable operation, distributed at the air inlet of the DUT.

The dynamic temperature and humidity control can be monitored during the defrosting process, which results in a disturbance of the control circuits. *Diagram 2* starts with the end of a defrosting process indicated by the rising of the indoor heat exchanger temperature. Temperature and wet-bulb temperature of the chamber are set on 2 °C and 1 °C. The standard defines, that temperature and wet-bulb temperature must be back within tolerances after at least 10 minutes (DIN EN 14511-3, table 5). This is not a problem at all with the Ehrler Closed-Loop control.

Finally, integrated gas sensors report alarm and the chamber can be flushed with the external pump via an exhaust air flap. All necessary parts are design according to explosion protection. With this security concept low GWP refrigerants can be tested safely in the Heat Pump Tester.

Beneficial Closed-Loop Design

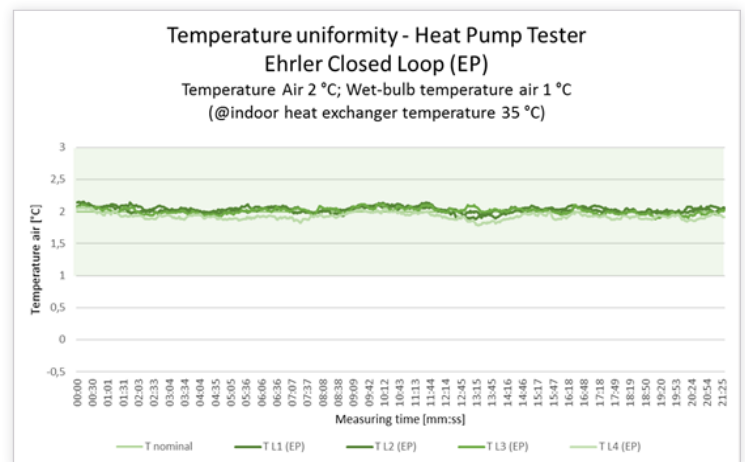


Diagram 1: Measurement values HPT

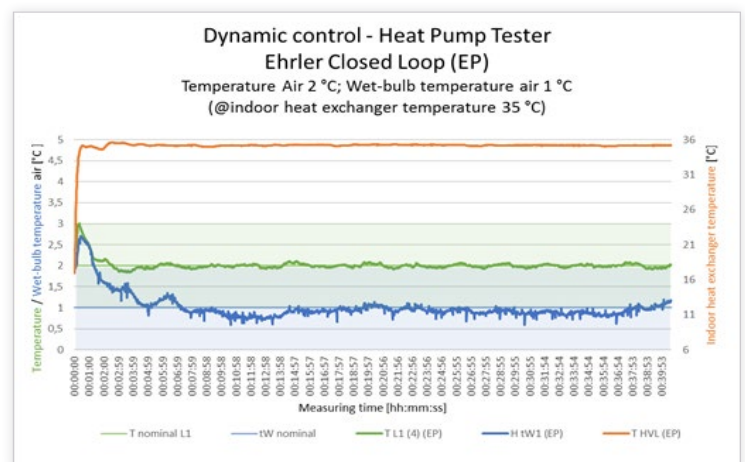


Diagram 2: Measurement values HPT



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Technical specifications & ordering information

Technical specifications

Conditioning measurement chamber:

Temperature:	- 25 ... +50 °C
Relative humidity:	10 ... 92 % r.h.
Wet-bulb temperature:	- 8 ... +48 °C
Air flow:	1000 ... 4000 m³/h

Conditioning heating water:

Temperature:	7 ... 70 °C
Water flow:	3 ... 55 l/min

Conditioning process water:

Temperature:	6 ... 10 °C
Water flow:	2 ... 48 l/min



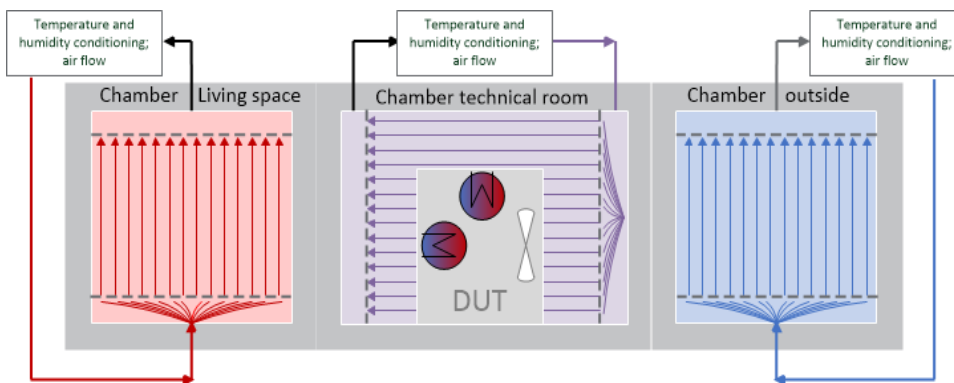
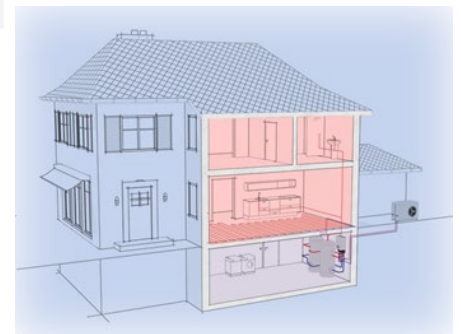
You need a test bench that is even more tailored to your needs? We can customize the design shown here for your application. Present us your requirements and request your individual, non-binding offer!

Ordering information

Item number	Description
156204-02	HPT - Heat Pump Tester, 1 measurement chamber, including heating and process water conditioning

Multi-chamber test rigs

For testing heat pumps with split set-up locations and/or combined air ventilation systems up to three conditioned measuring chambers can be combined in one test bench – representing outside, technical room and living space.



← Chamber air
Defined conditions (flow, T, H)
• up to 4000 m³ / h
• -25 ... 50 ° C
• 10 ... 92% rh
--- Distribution plate
DUT
Device under test / Prüfling, hier: Wärmepumpe



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