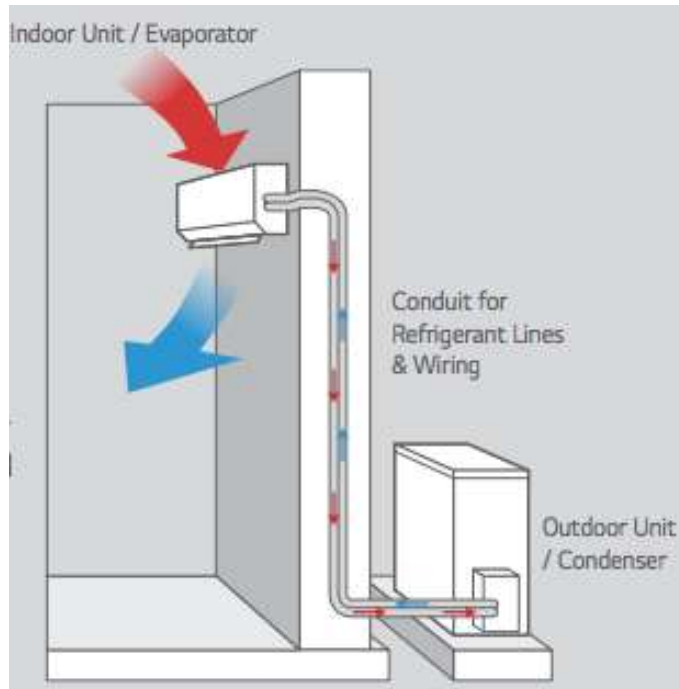




Messung von Luft-Luft Wärmepumpen unter realistischen Bedingungen und deren Einfluss auf Performanz

Tomas Mikeska, Phd
Passive House Institute

Luft-Luft Wärmepumpe



Warum Fokus
auf „Mini-Split-
Geräte“ ?

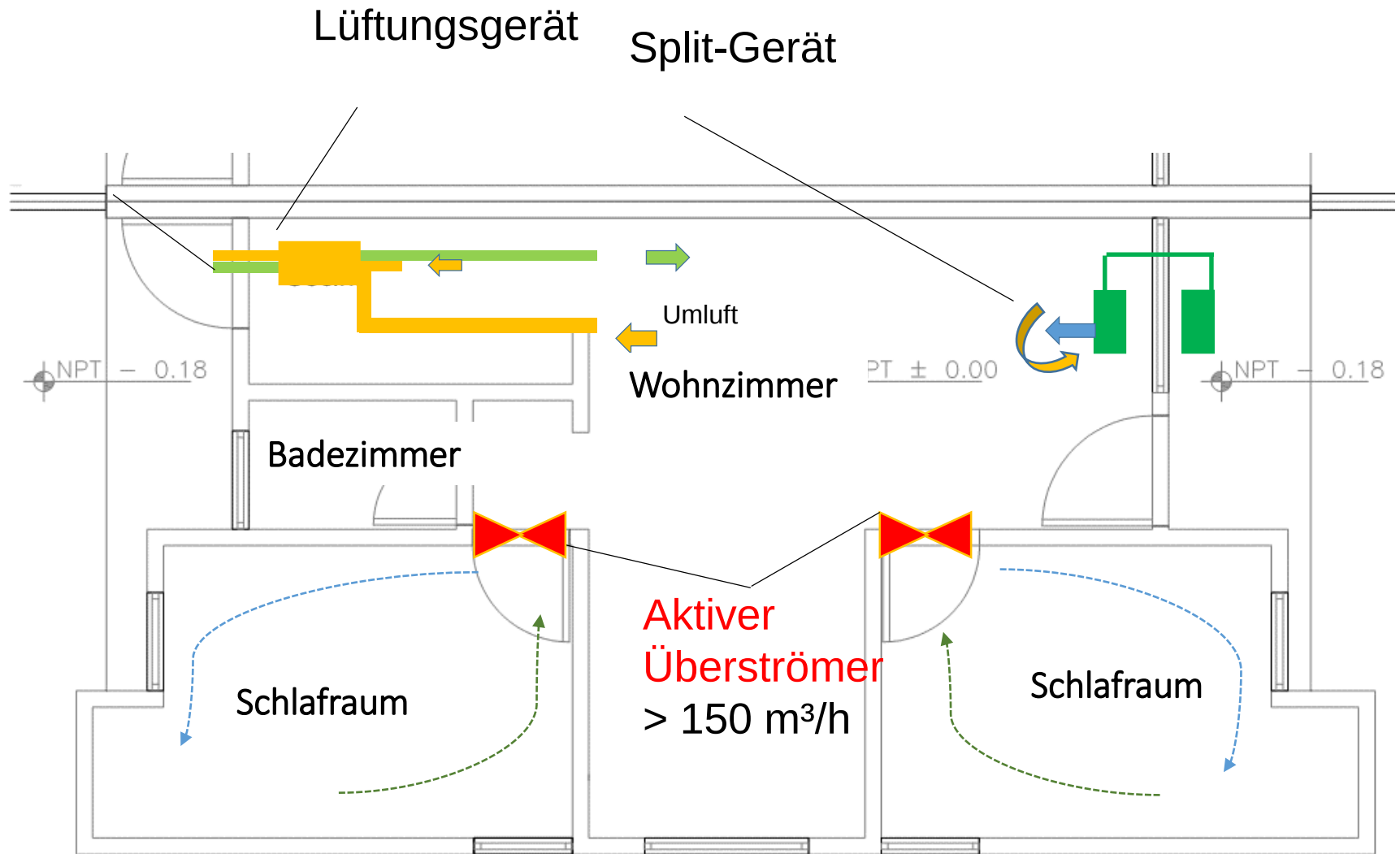


Passivhaus Definition

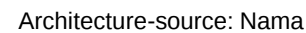
10 W/m^2

15 kWh/m/y

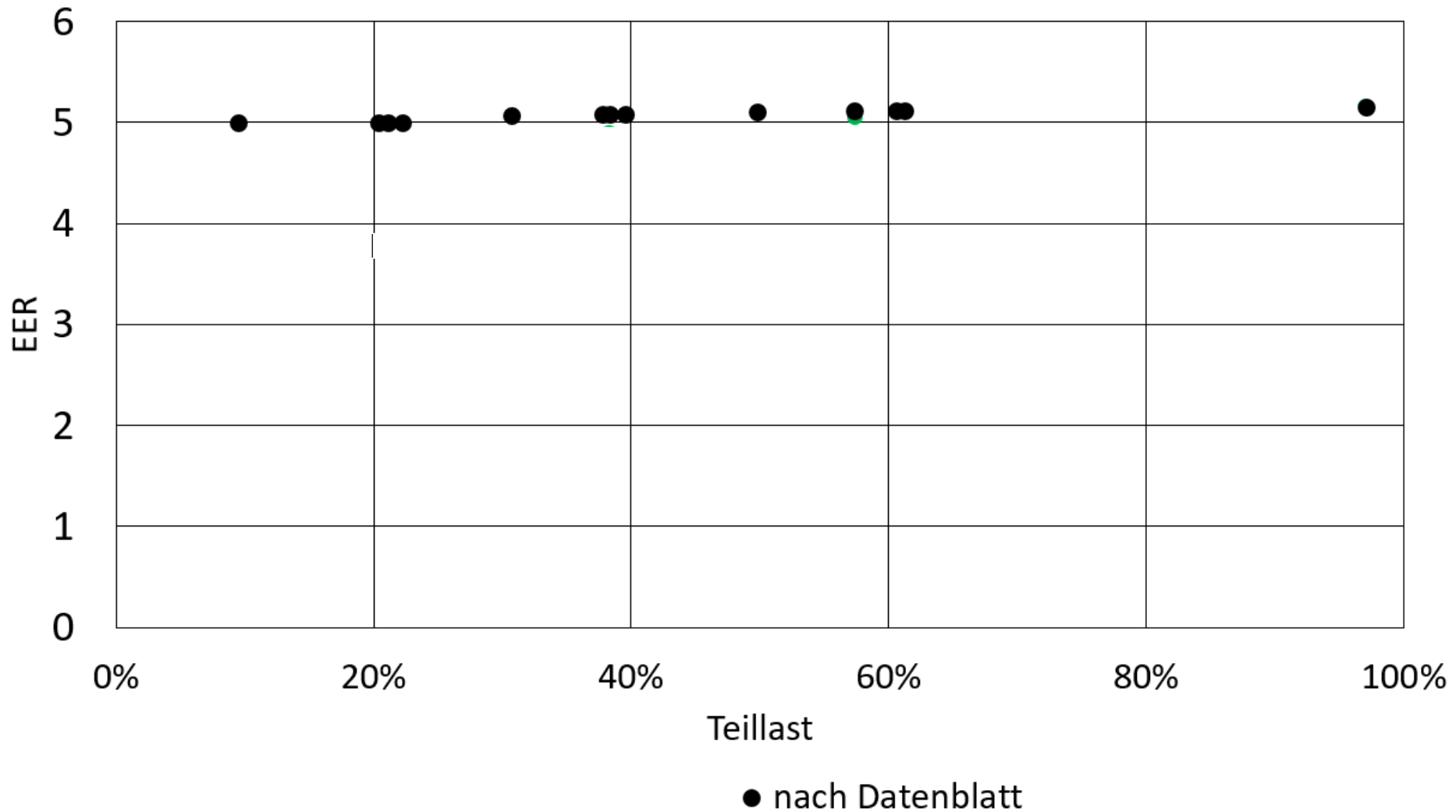
Distribution



Architecture-source: Nama



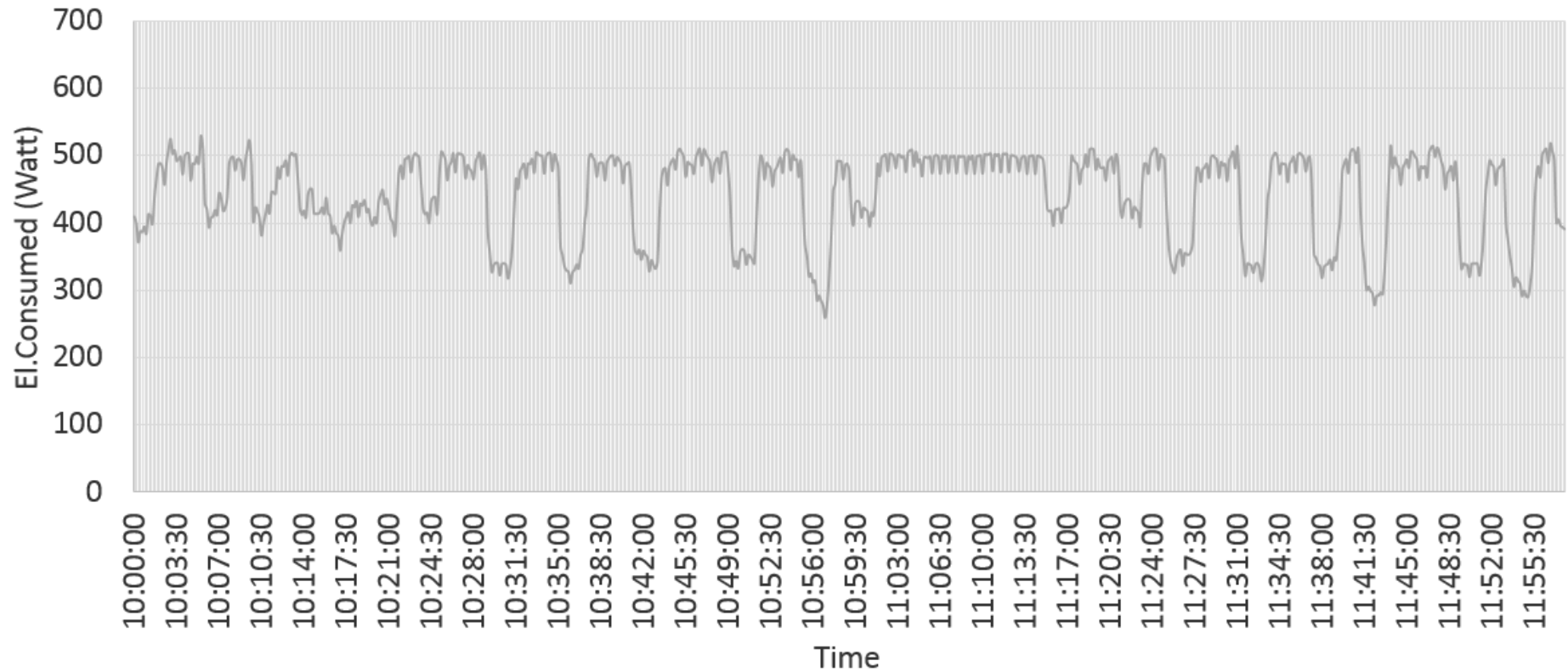
Ein beispielhaftes Gerät



Inverter

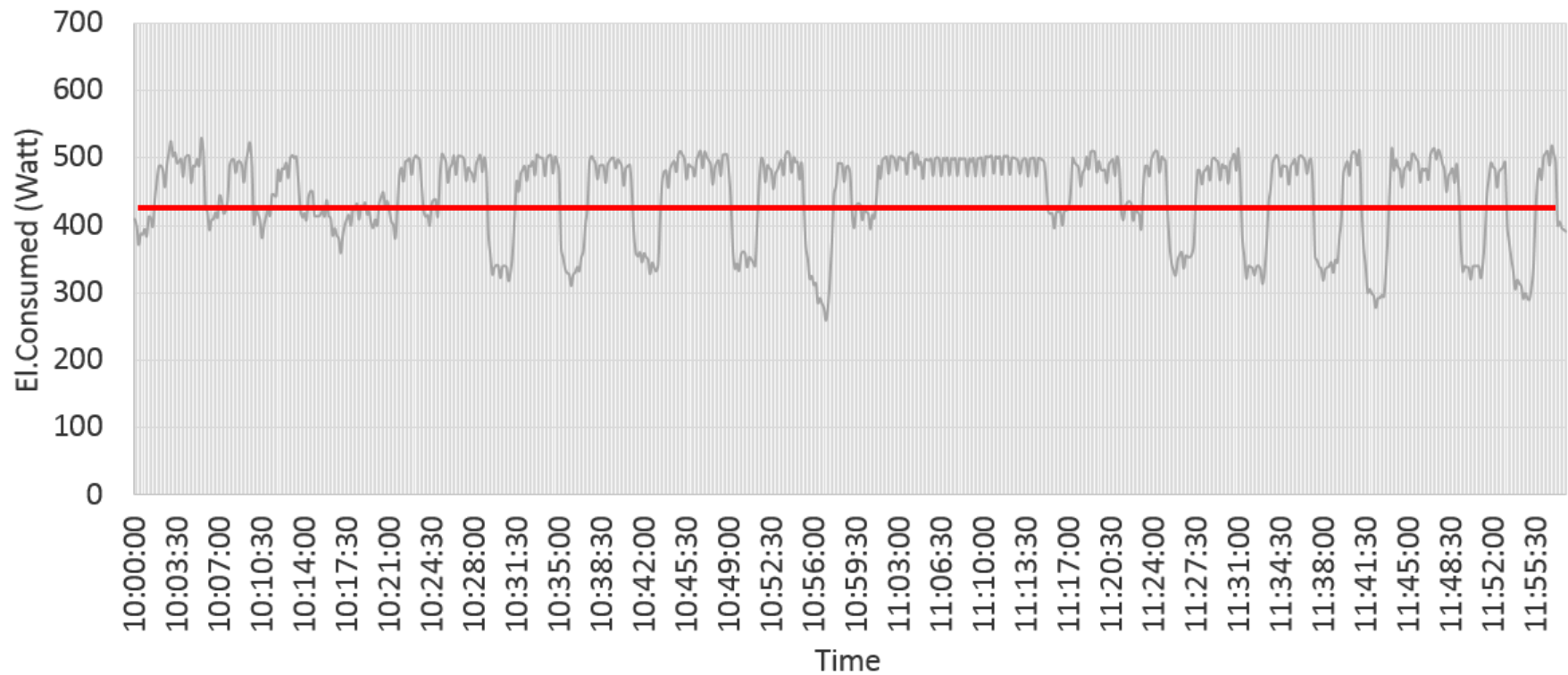
Mini-Split unit

— El.cons (W)



Mini-Split unit

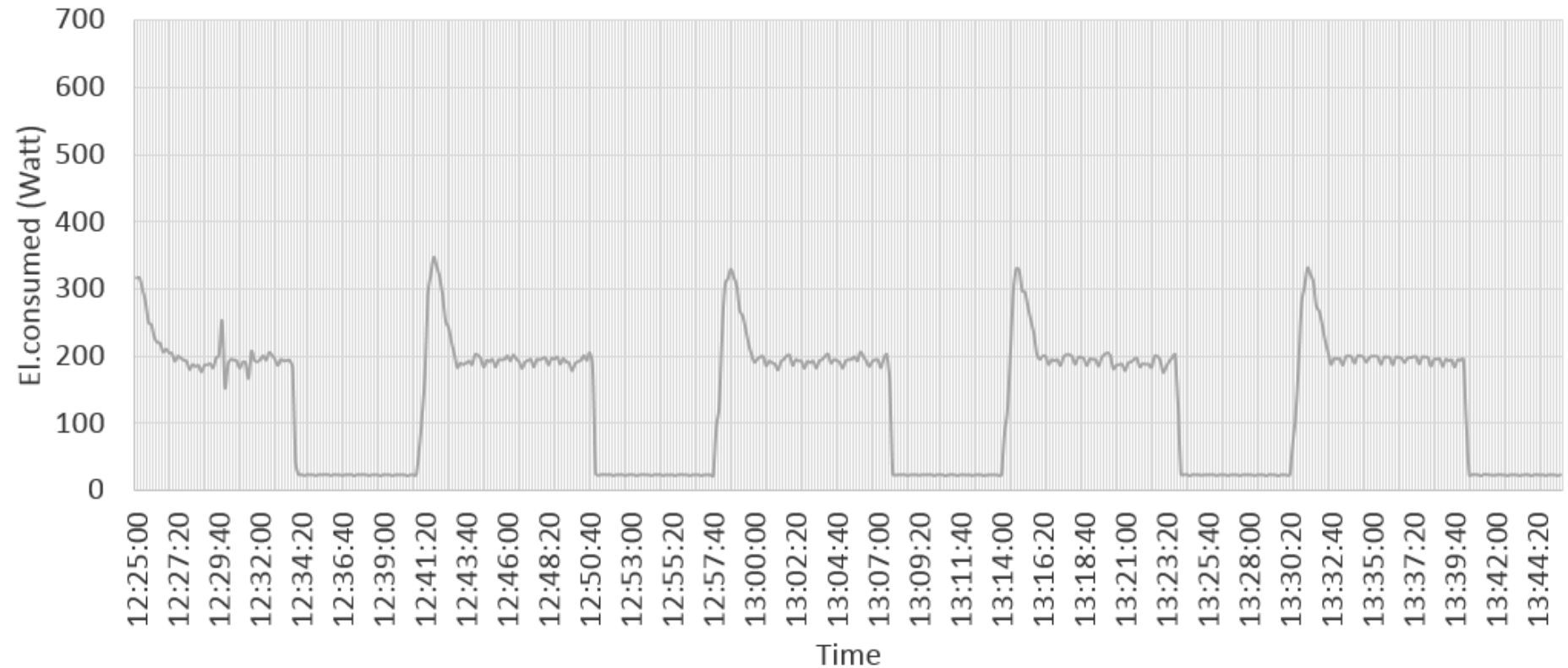
— El.cons (W)



Inverter vs. EIN/AUS

Mini-Split unit

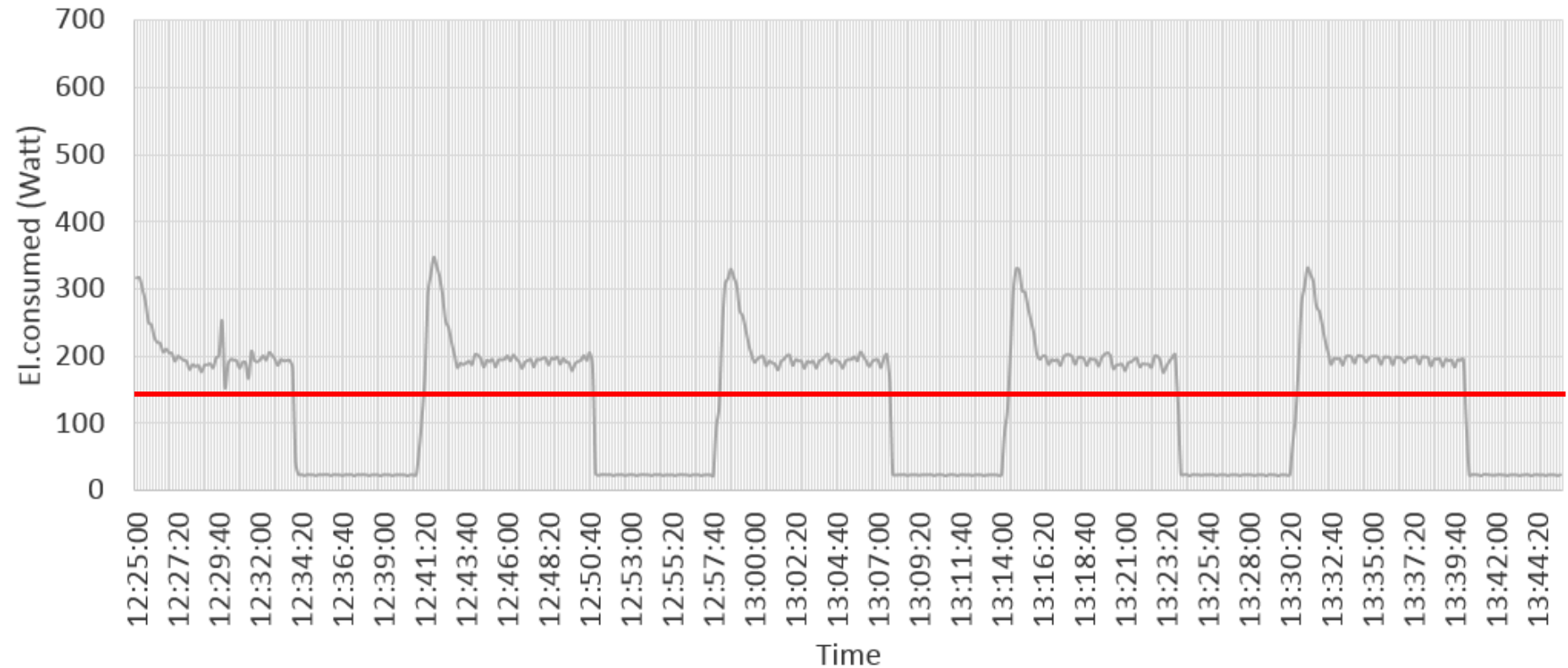
— El.cons (W)



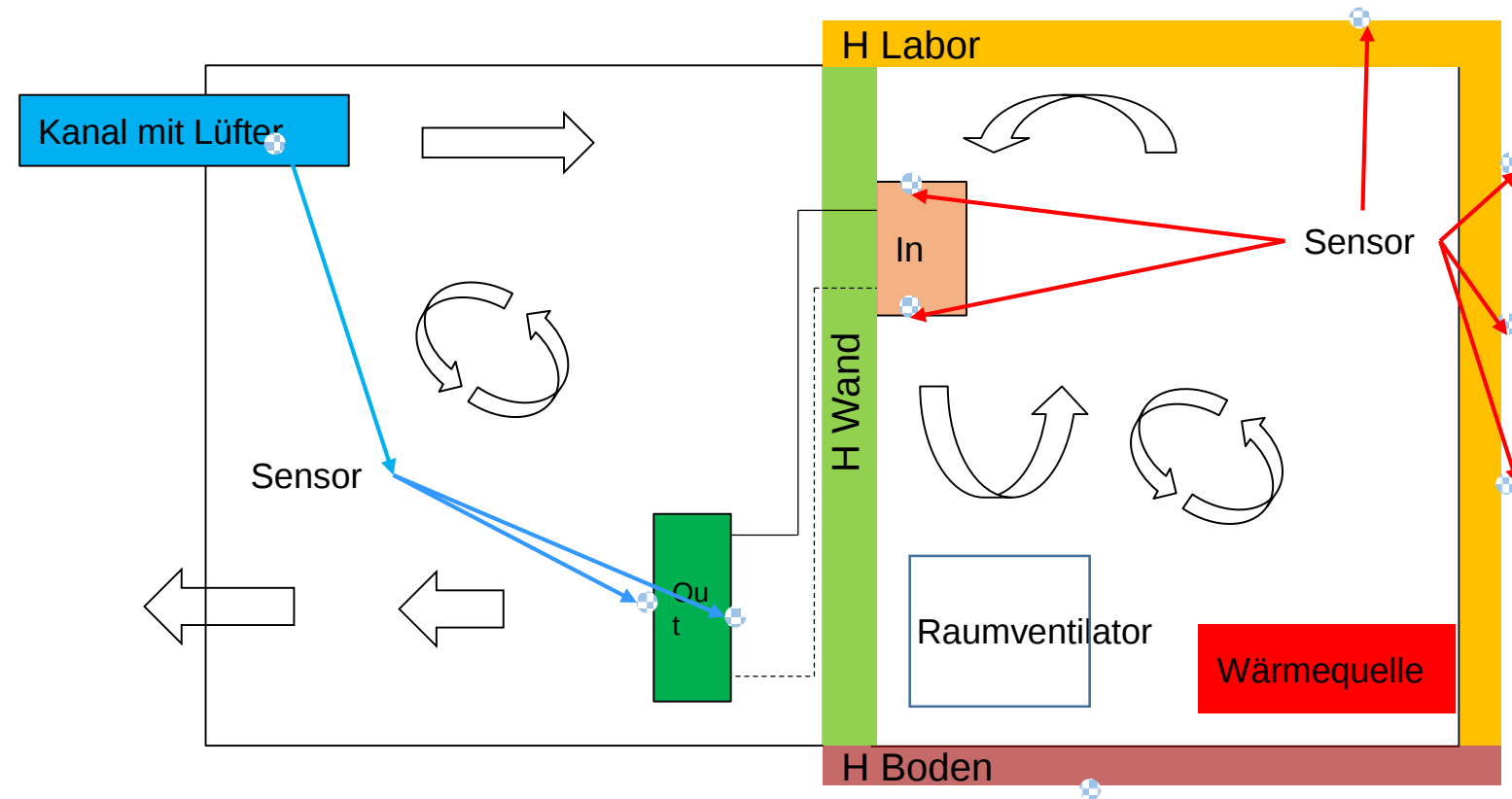
wurde gemessen

Mini-Split unit

— El.cons (W)

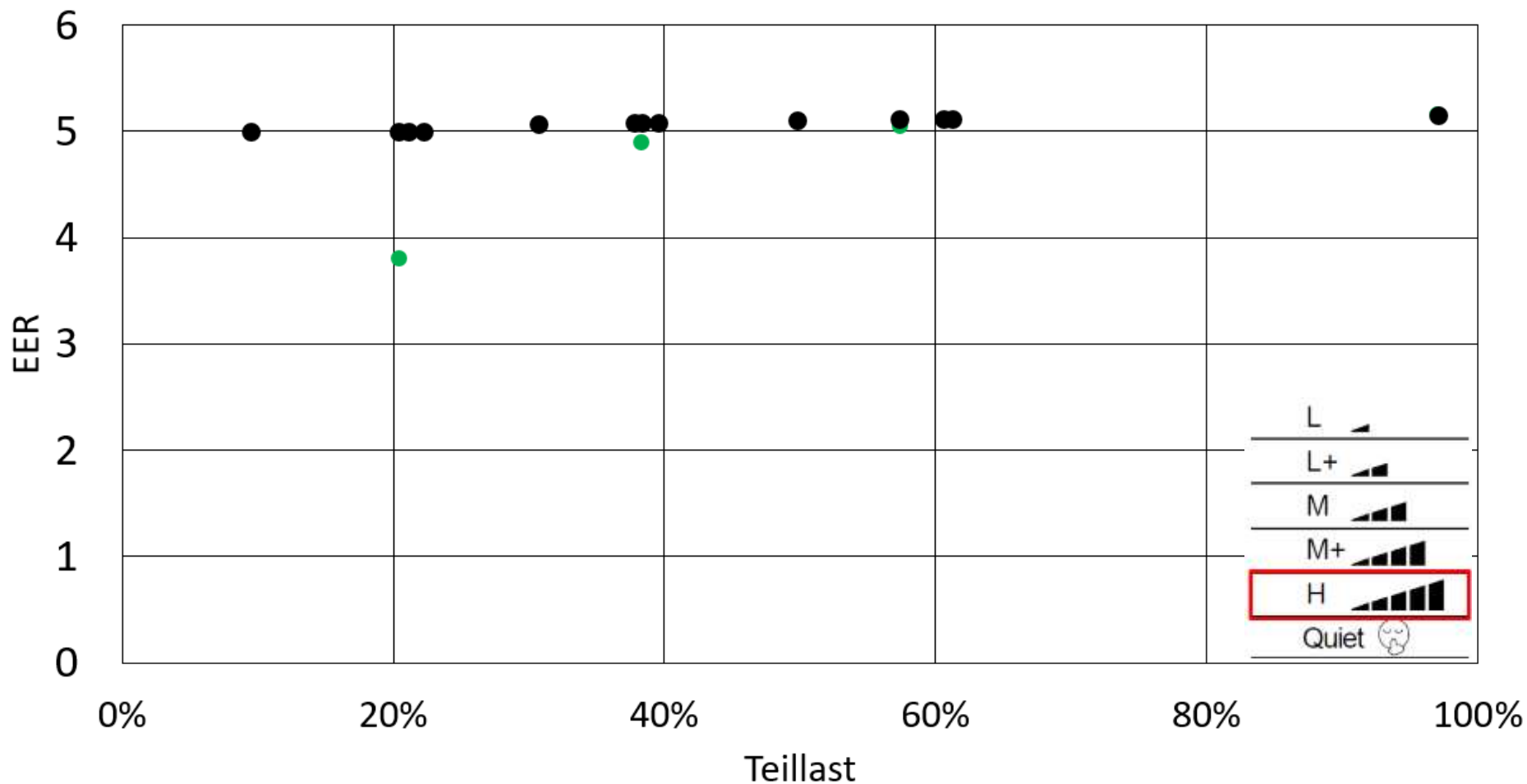


„korrigierte“ kalorimetrische Einstellung



EIN/AUS Bereich

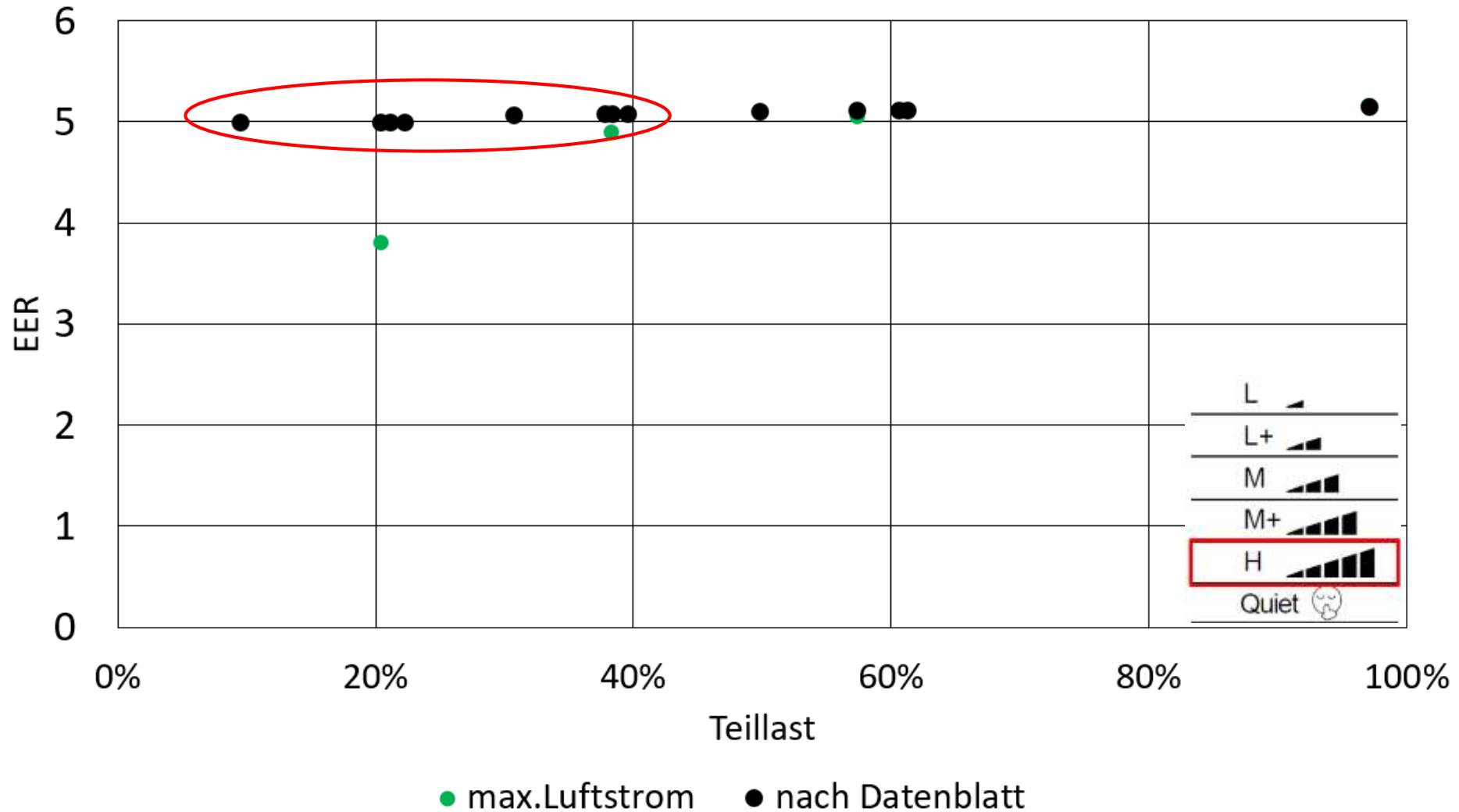
Dauerbetrieb



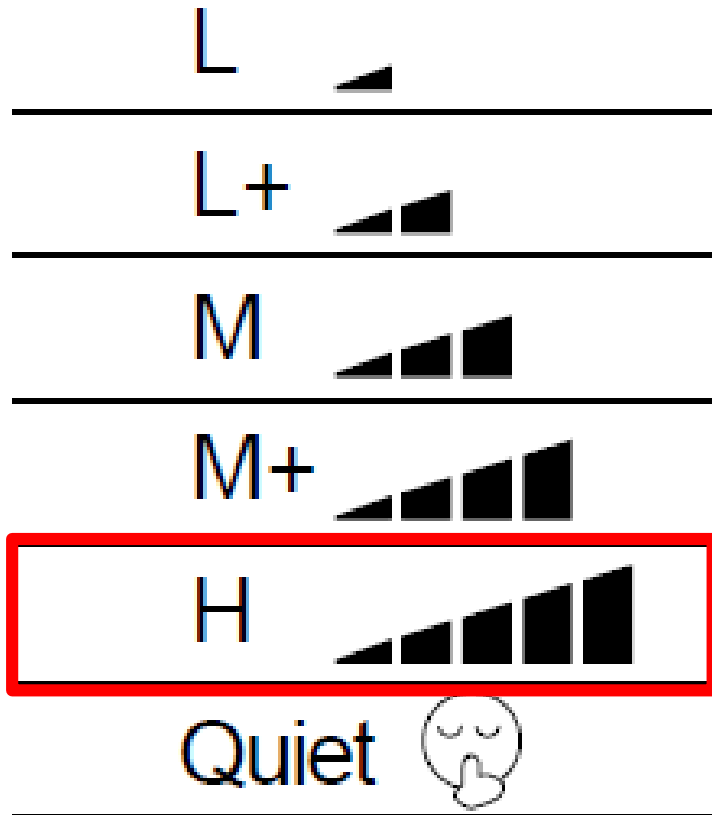
● max. Luftstrom ● nach Datenblatt

EIN/AUS Bereich

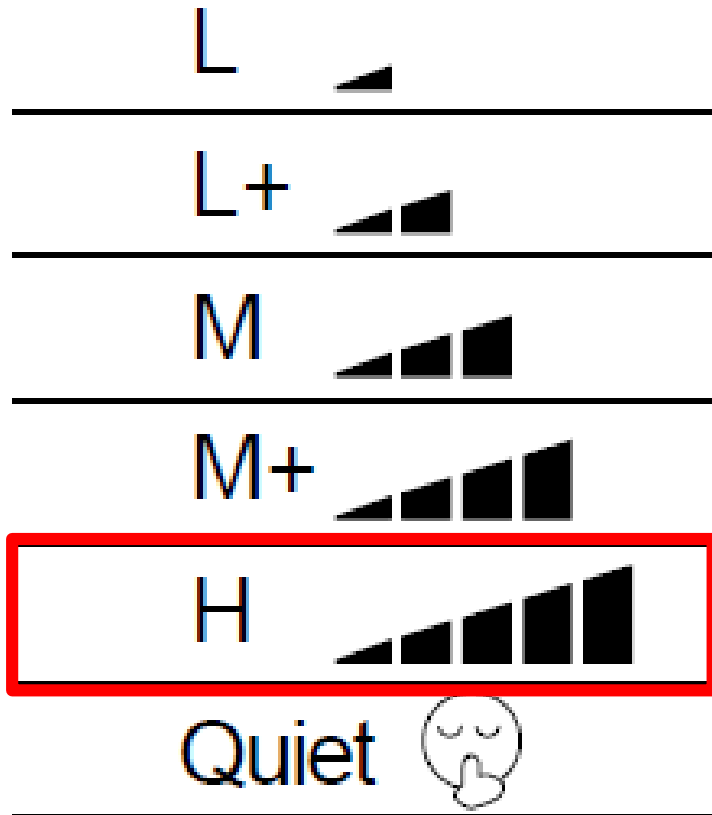
Dauerbetrieb



Schallpegel



50 dB

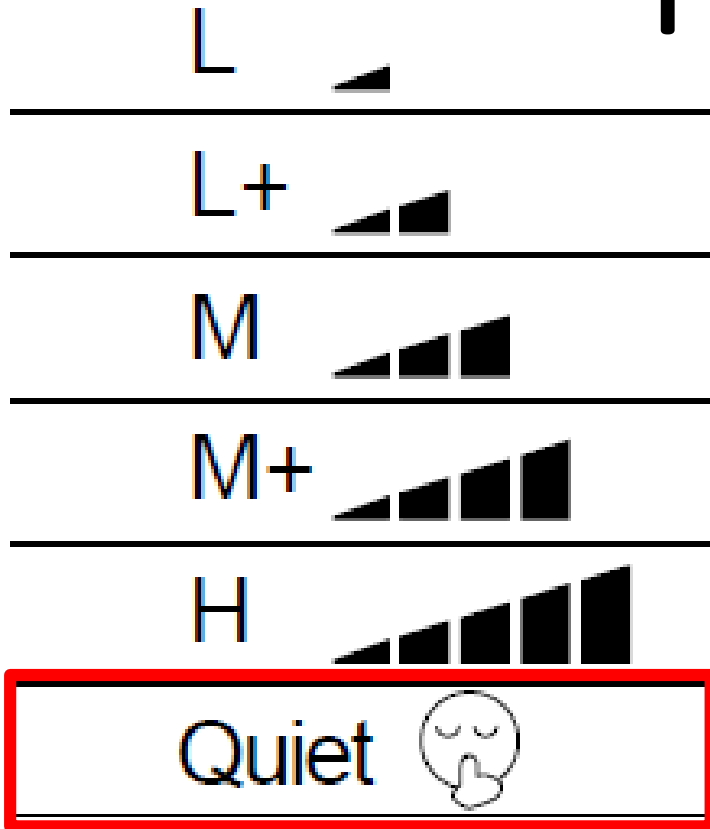


Gespräch –
50-60 dB



~~50 dB~~

PHI Limit = 25 dB(A)



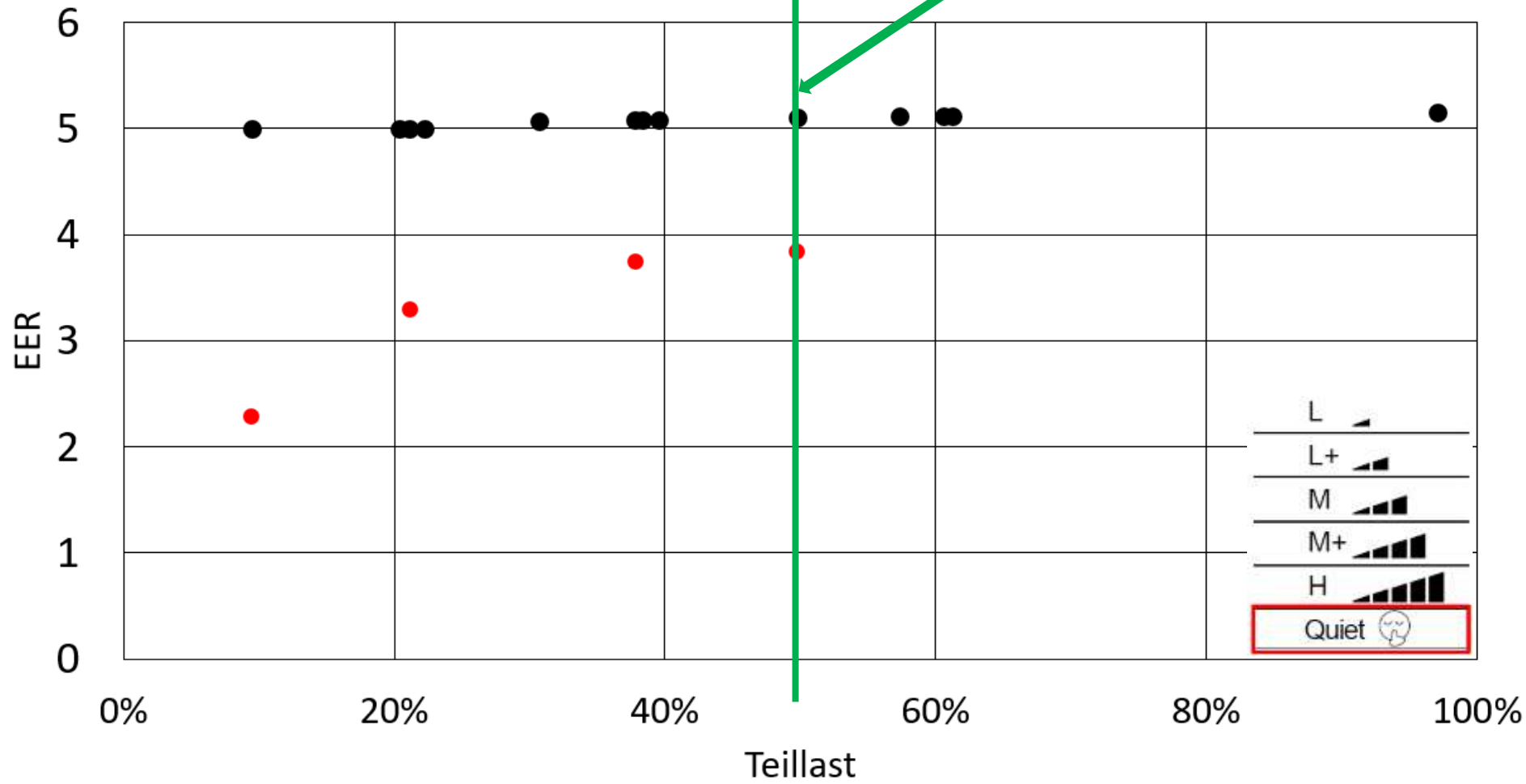
22 dB
accepted

Prüfling

EIN/AUS Bereich

Dauerbetrieb

max. verfügbare
Leistung



PHI Feldmessung



Außeneinheit



Inneneinheit



PHI Field Measurement



PHI Field Measurement



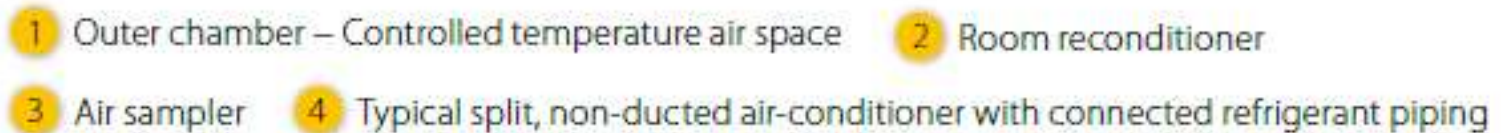
PHI Field Measurement



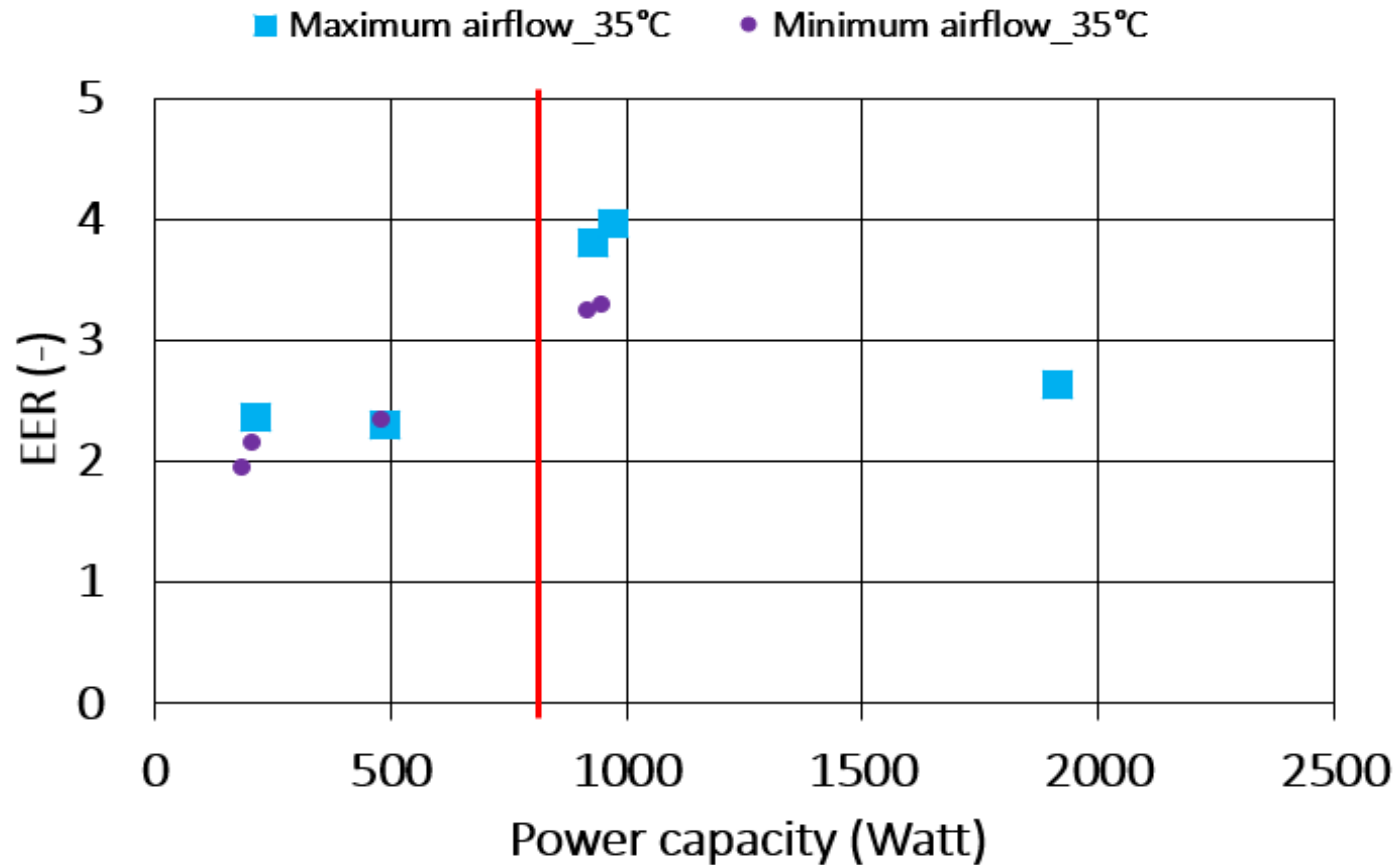
PHI Field Measurement



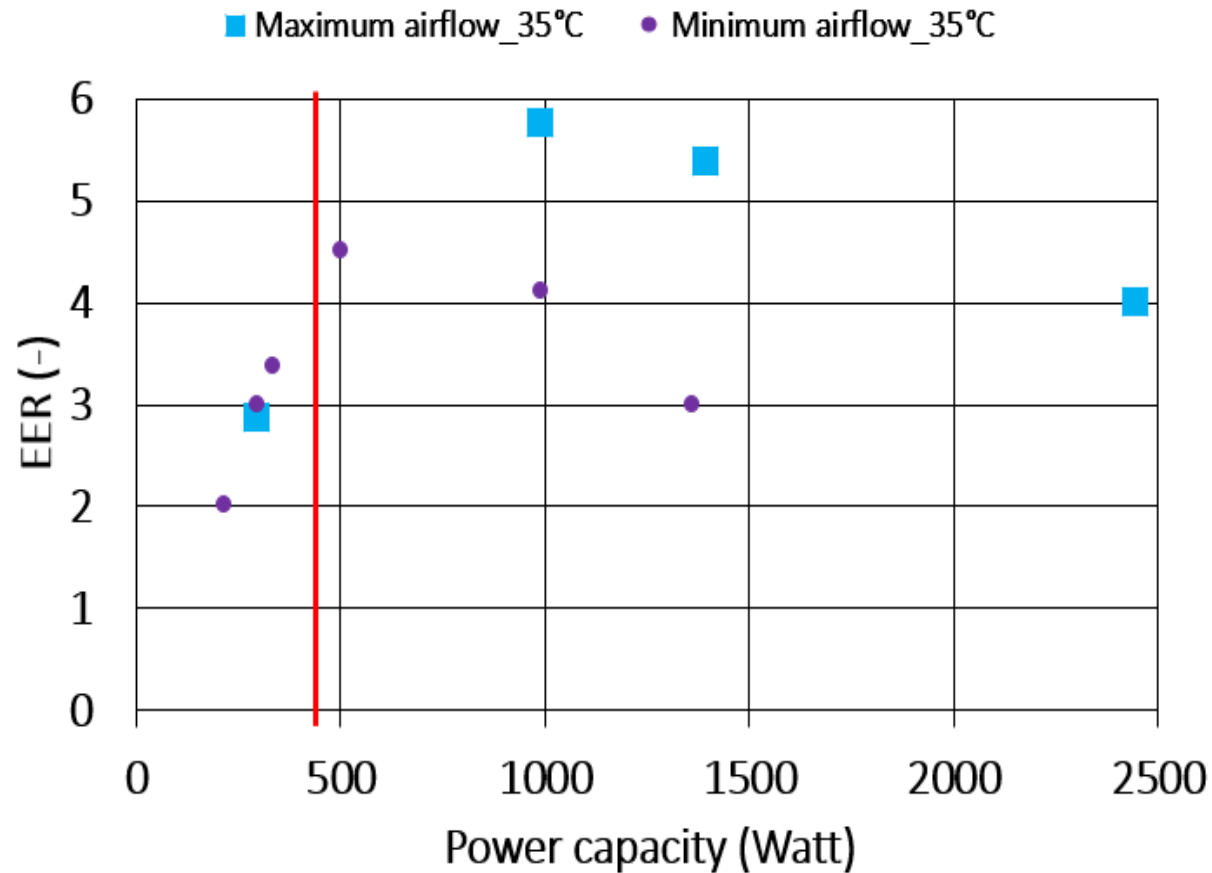




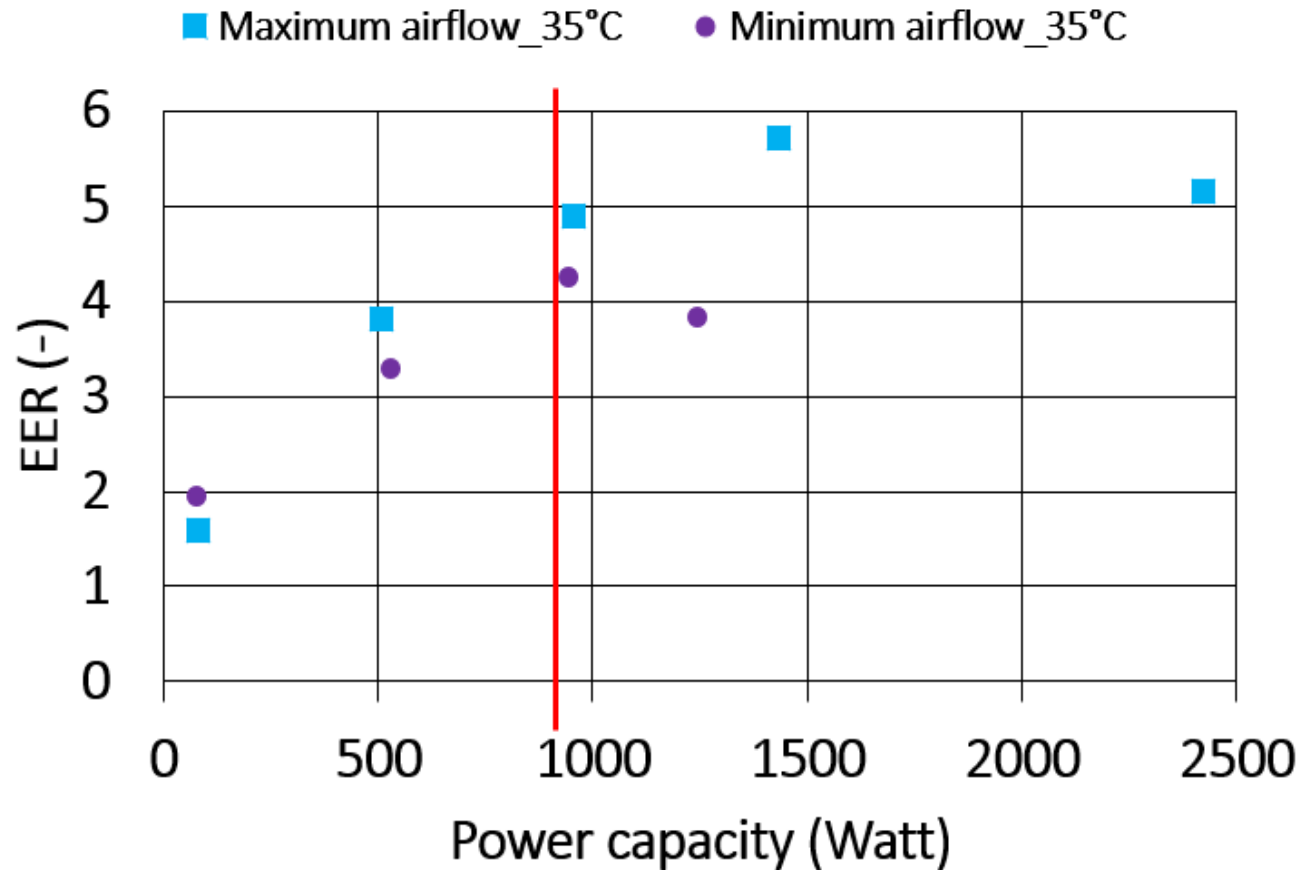
Results- Unit A



Results- Unit B



Results- Unit C



Certification Program for air-to-air Heat Pumps



Step 1

The **standard unit** which is to be tested is sent to the **independent laboratory** for testing (3rd party lab- independent from producer and PHI). The measurement should be done based on PHI certification criteria. The measurements will be done with maximum sound pressure in the room of **25 dB(A)** being generated as result of operation of unit. This is being considered as **comfortable operation**.

Testpoints

Cooling scenario ¹⁾				
Temperature [°C]		Operation (part-load)		
Outside	Inside	ON/OFF*	ON/OFF Limit**	Maximum***
40	25	optional	optional	required
35	25	required	required	required
30	25	optional	optional	required

- 1) All the measurements are to be carried out at room relative humidity of 60%. Sensible heat ratio (SHR) should be documented for all the test points.

Heating scenario				
Temperature [°C]		Operation (part-load)		
Outside	Inside	ON/OFF*	ON/OFF Limit**	Maximum***
-7	20	optional	optional	required
2	20	required	required	required
7	20	optional	optional	required

Step 2

When obtaining the measured data from laboratory, the unit will be modelled by PHI in **PHPP** using **reference building** on **3 different locations** to investigate **heating, cooling and dehumidification** functions. The unit will be evaluated over the whole year.