

TESTING CAMPAIGN ON THE ENERGETICAL AND ACOUSTICAL BEHAVIOUR OF A HEAT PUMP // PART2

IEA HPT Annex 51 “Acoustic Signatures of Heat Pumps”



Simon Braungardt, Thomas Gindre, Thore Oltersdorf,
Agostino Troll

Fraunhofer Institute for Solar Energy Systems ISE

Fraunhofer Institute for Building Physics IBP

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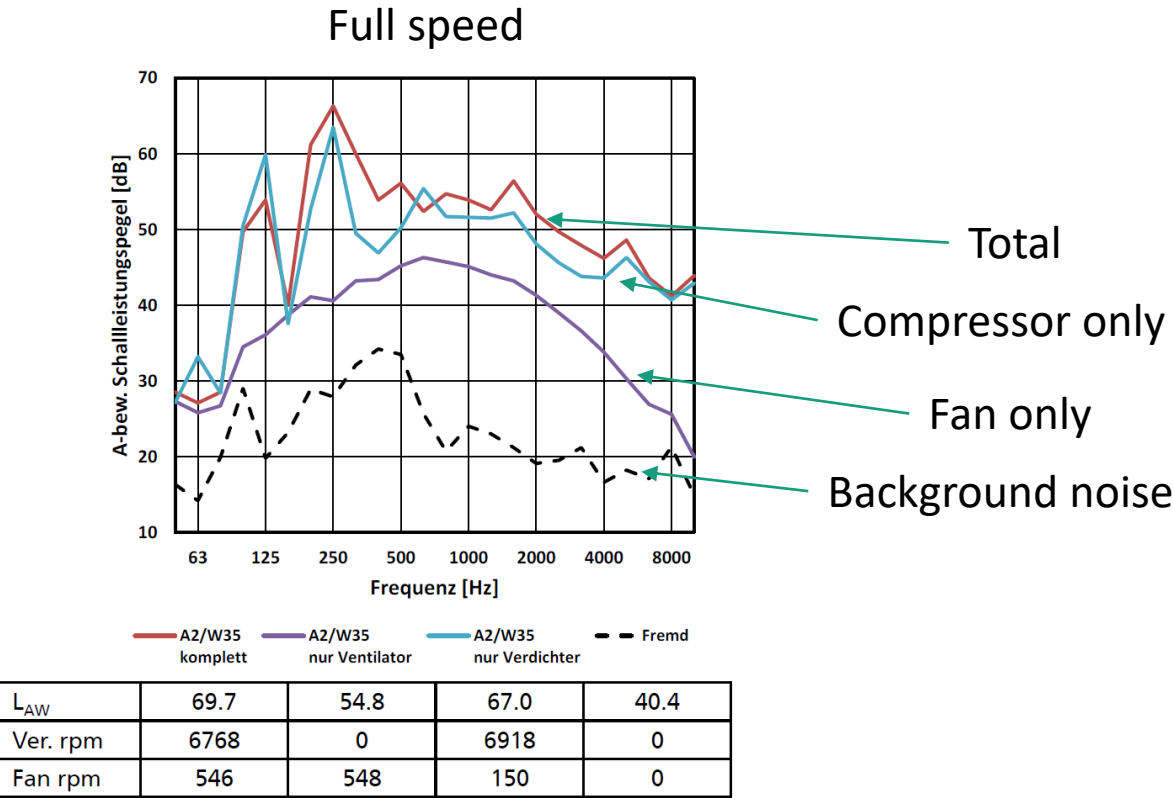
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AGENDA

- 1. Acoustic measurements: goals and suited devices
- 2. Deconstruction analysis: concept and experimental setup
- 3. Results

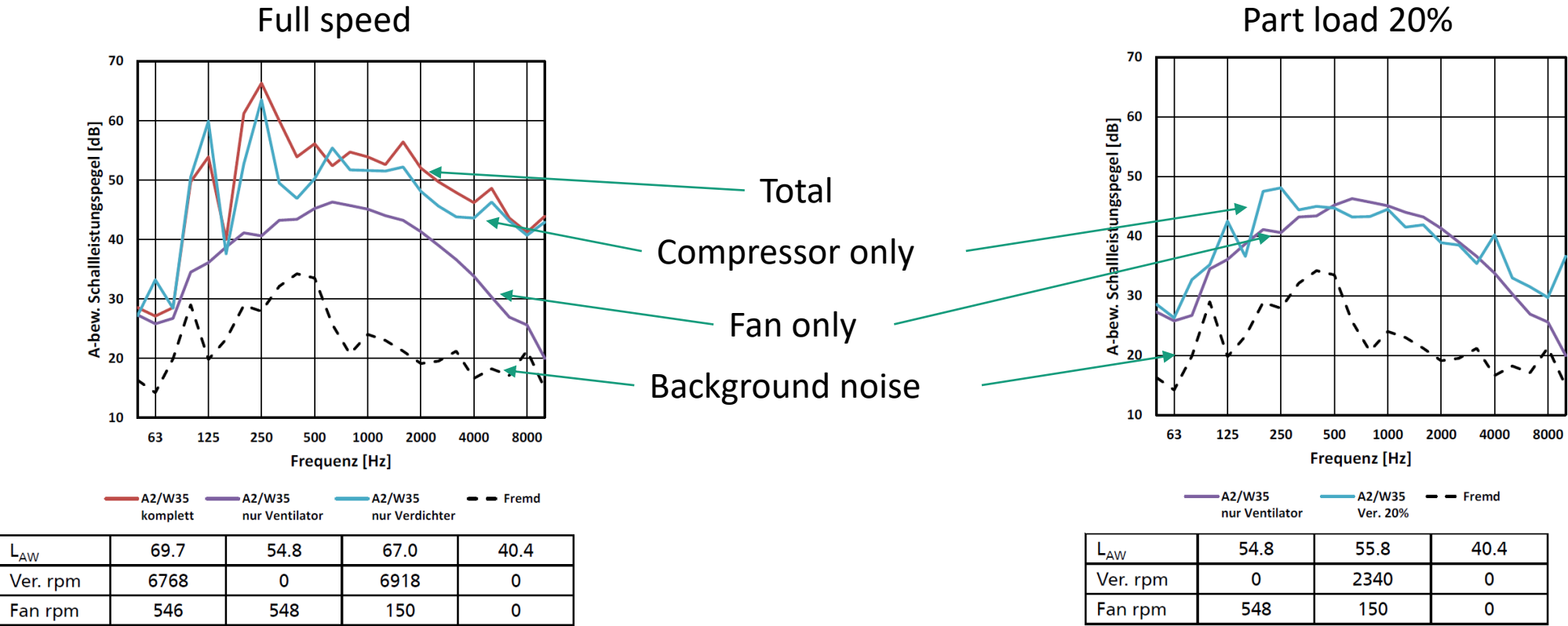
3. Results

■ Noise sources comparison: SPL [dBA] for A2/W35 with housing



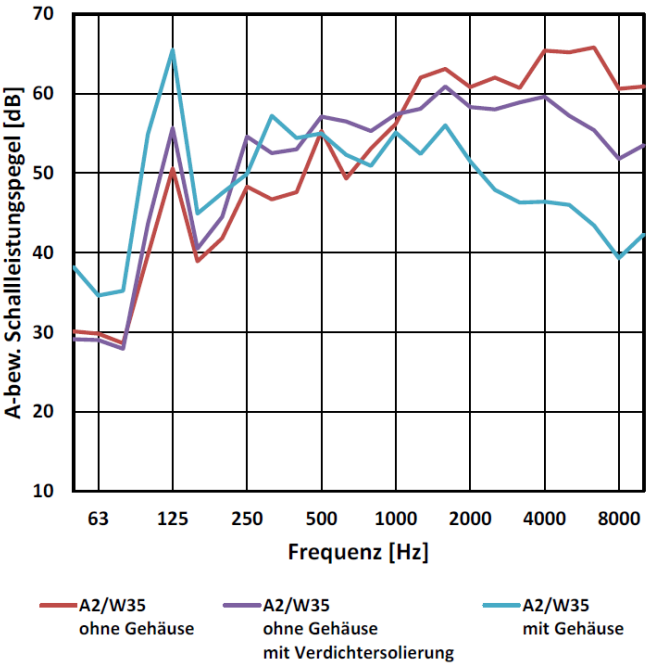
3. Results

■ Noise sources comparison: SPL [dBA] for A2/W35 with housing

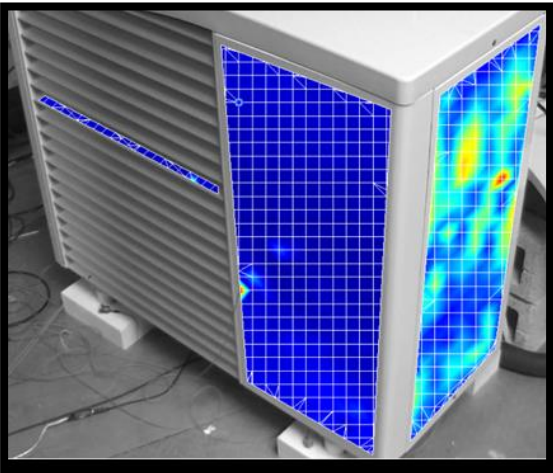
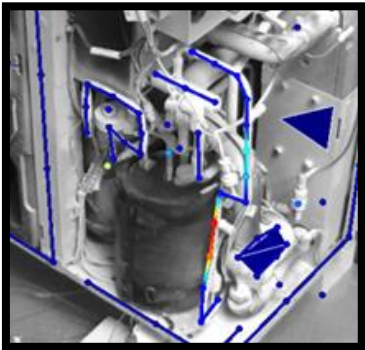


3. Results

■ Influence of compressor isolation and housing: SPL [dBA] for A2/W35



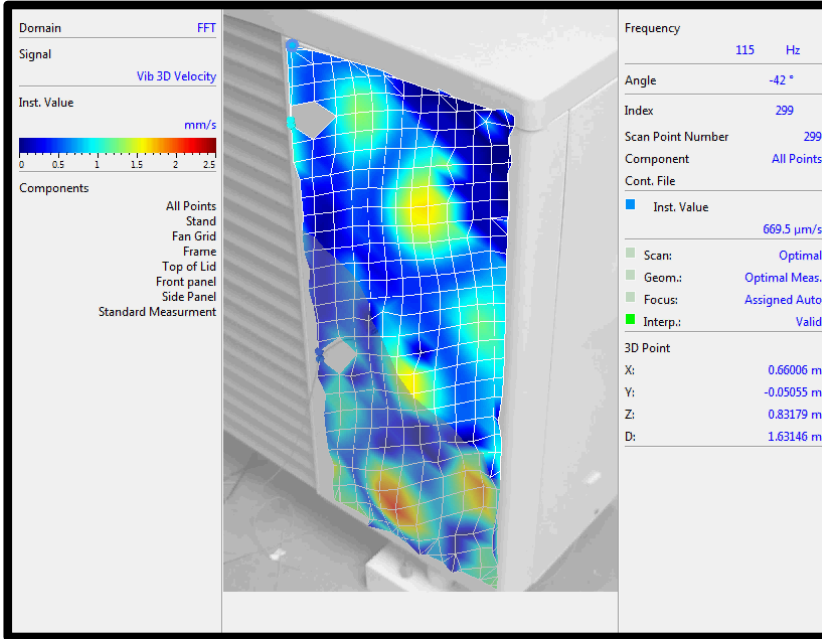
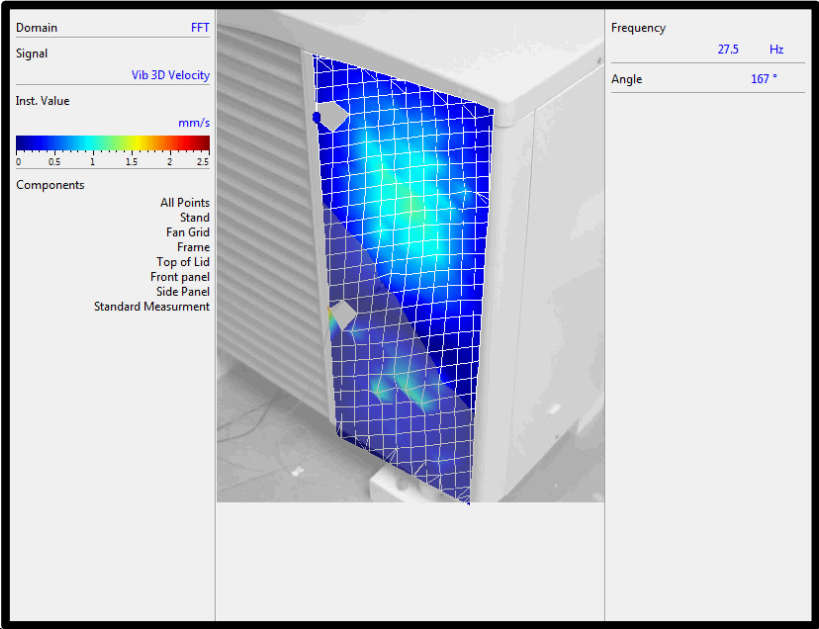
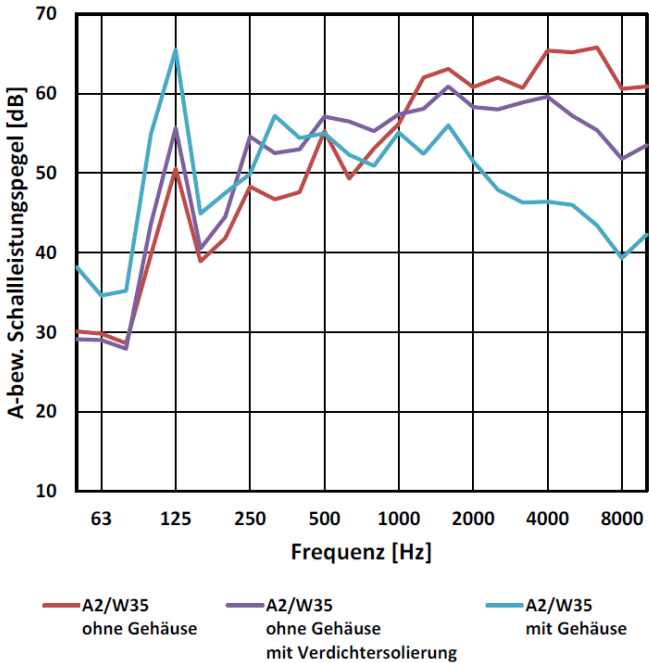
Without housing
Without housing, but with compressor jacket
Complete



L _{AW}	73.4	69.6	68.3
Ver. rpm	7020	7020	6936
Fan rpm	546	548	552

3. Results

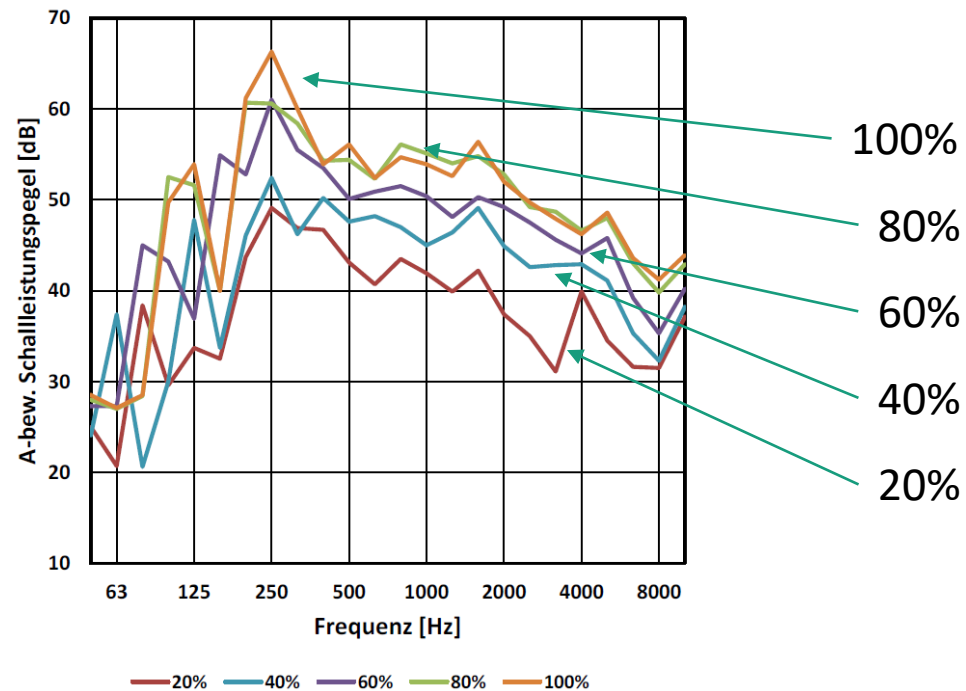
■ Influence of compressor isolation and housing: SPL [dBA] for A2/W35



L _{AW}	73.4	69.6	68.3
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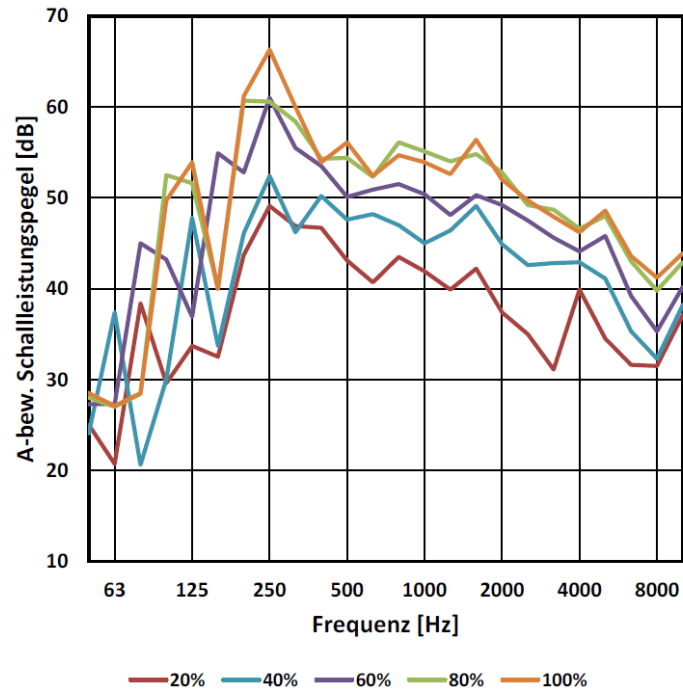
- Influence of compressor speed: SPL [dBA] for A2/W35 with housing



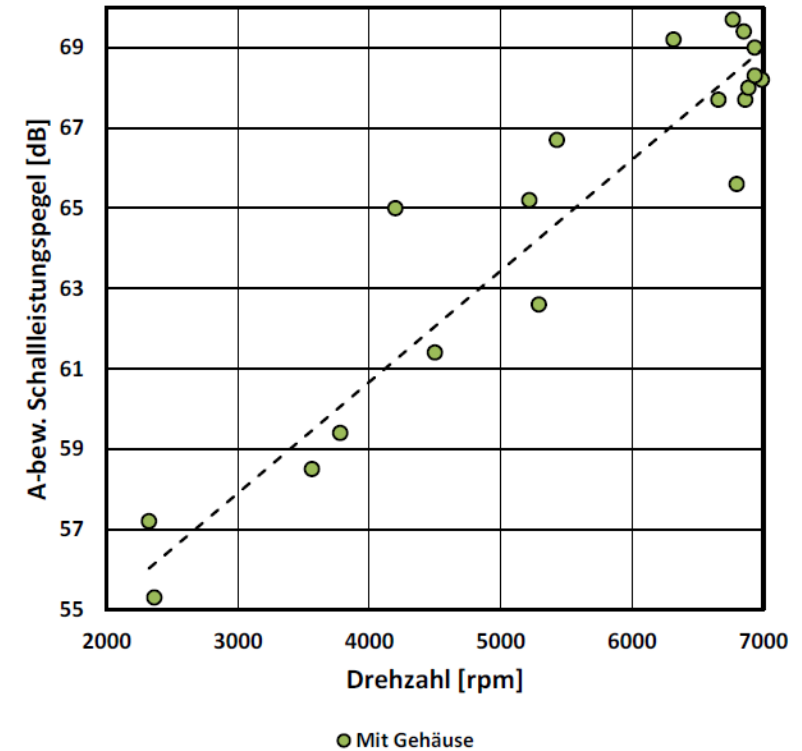
L_{AW}	55.3	59.4	65.2	69.7
Ver. rpm	2364	3780	5220	6768
Fan rpm	302	302	550	546

3. Results

- Influence of compressor speed: SPL [dBA] for A2/W35 with housing

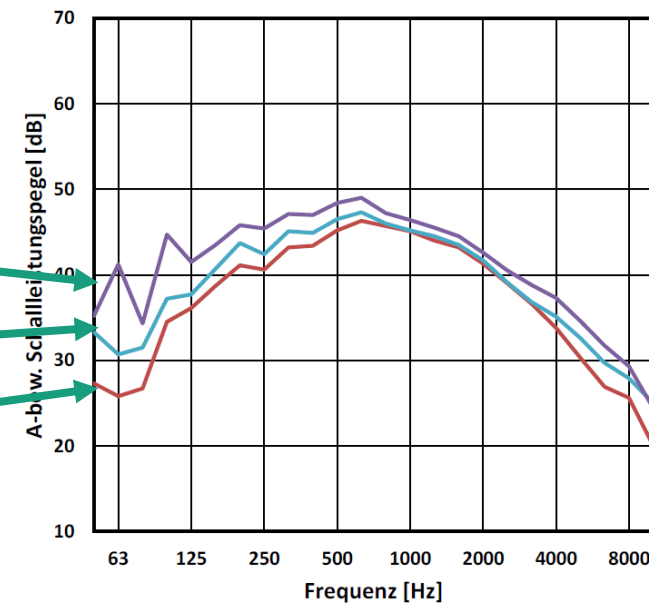


L_{AW}	55.3	59.4	65.2	69.7
Ver. rpm	2364	3780	5220	6768
Fan rpm	302	302	550	546



3. Results

- Influence of frost of the evaporator: SPL [dBA] for A2/W35 fan with housing

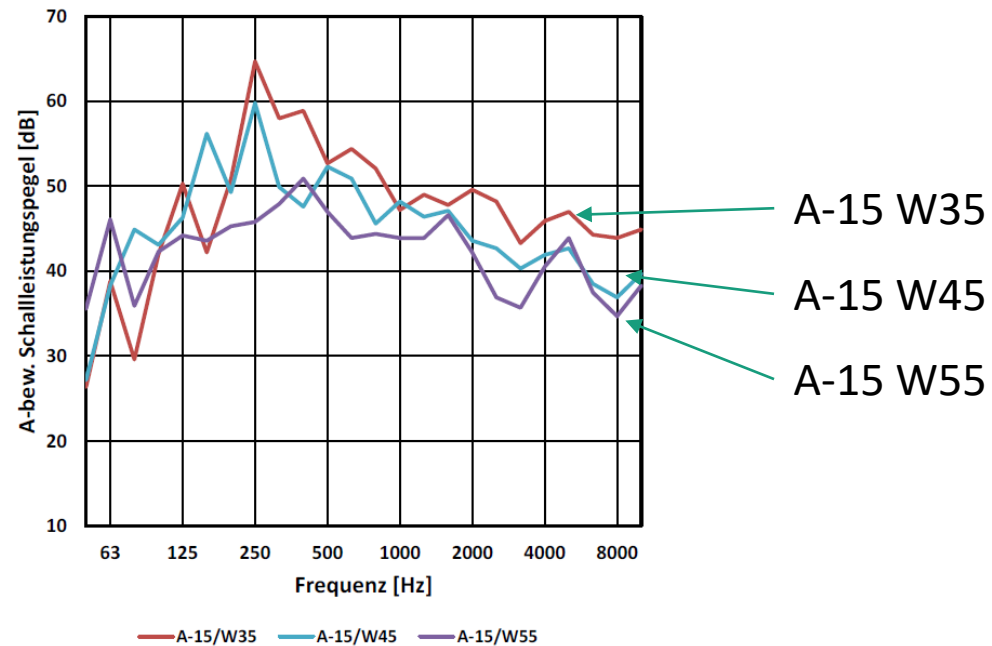


— Frostfrei — Halb vereist — Stark vereist

L_{AW}	54.8	55.9	57.9
Ver. rpm	0	0	0
Fan rpm	548	546	548

3. Results

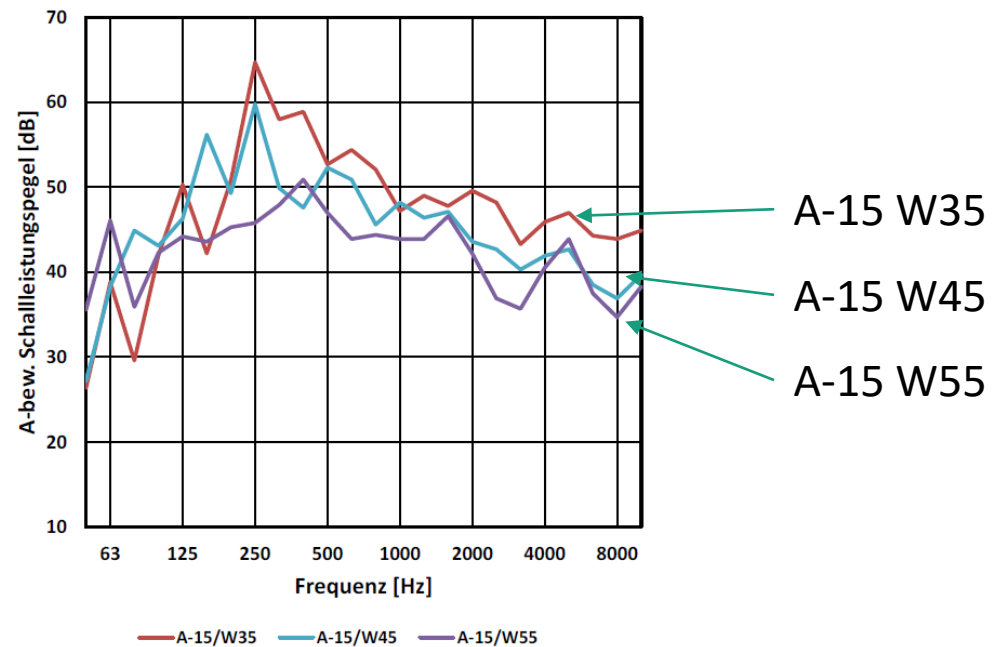
- Influence of requested water temperature: SPL [dBA] **compressor only** with housing



L _{AW}	67.6	63.6	58.1
Ver. rpm	7044	5040	4134
Fan rpm	150	150	150

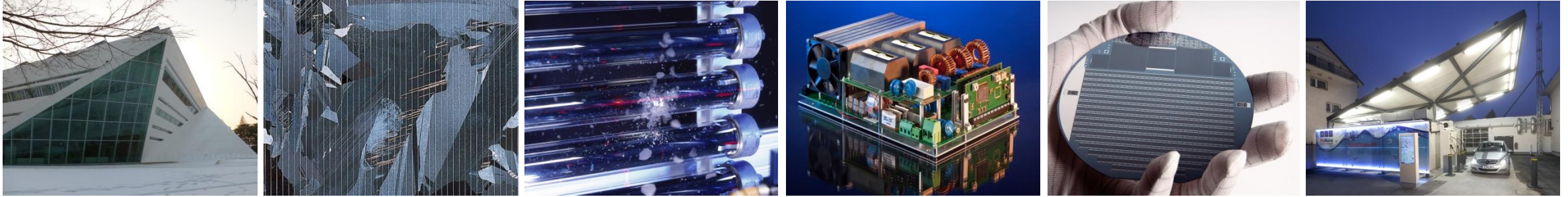
3. Results

- Influence of requested water temperature: SPL [dBA] **compressor only** with housing



L _{AW}	67.6	63.6	58.1
Ver. rpm	7044	5040	4134
Fan rpm	150	150	150

Thank you for your Attention!



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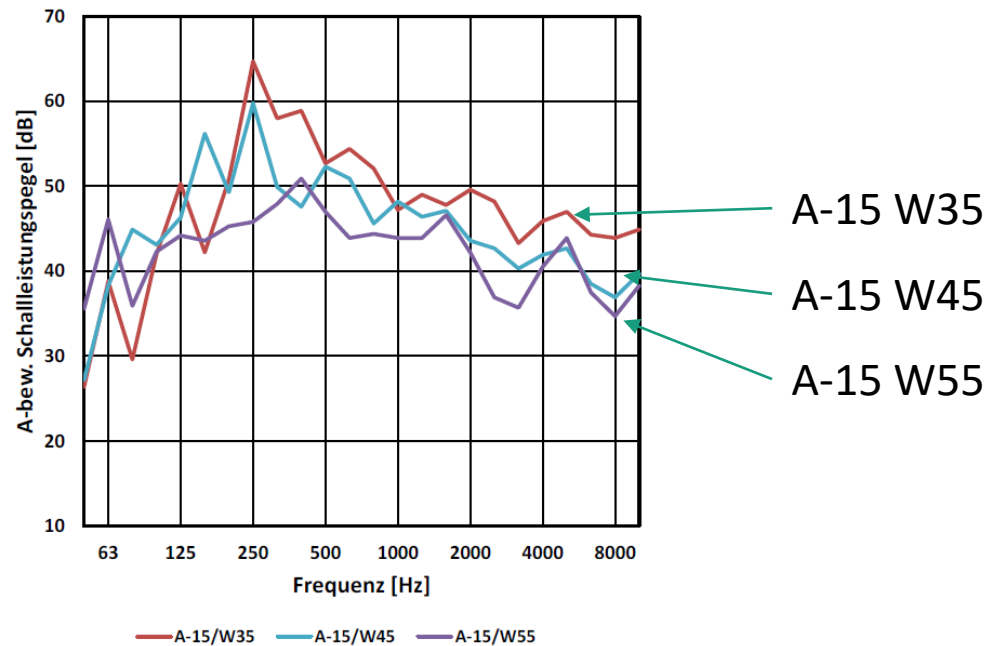
Simon Braungardt

www.ise.fraunhofer.de

simon.braungardt@ise.fraunhofer.de

3. Results

- Influence of requested water temperature: SPL [dBA] **compressor only** with housing

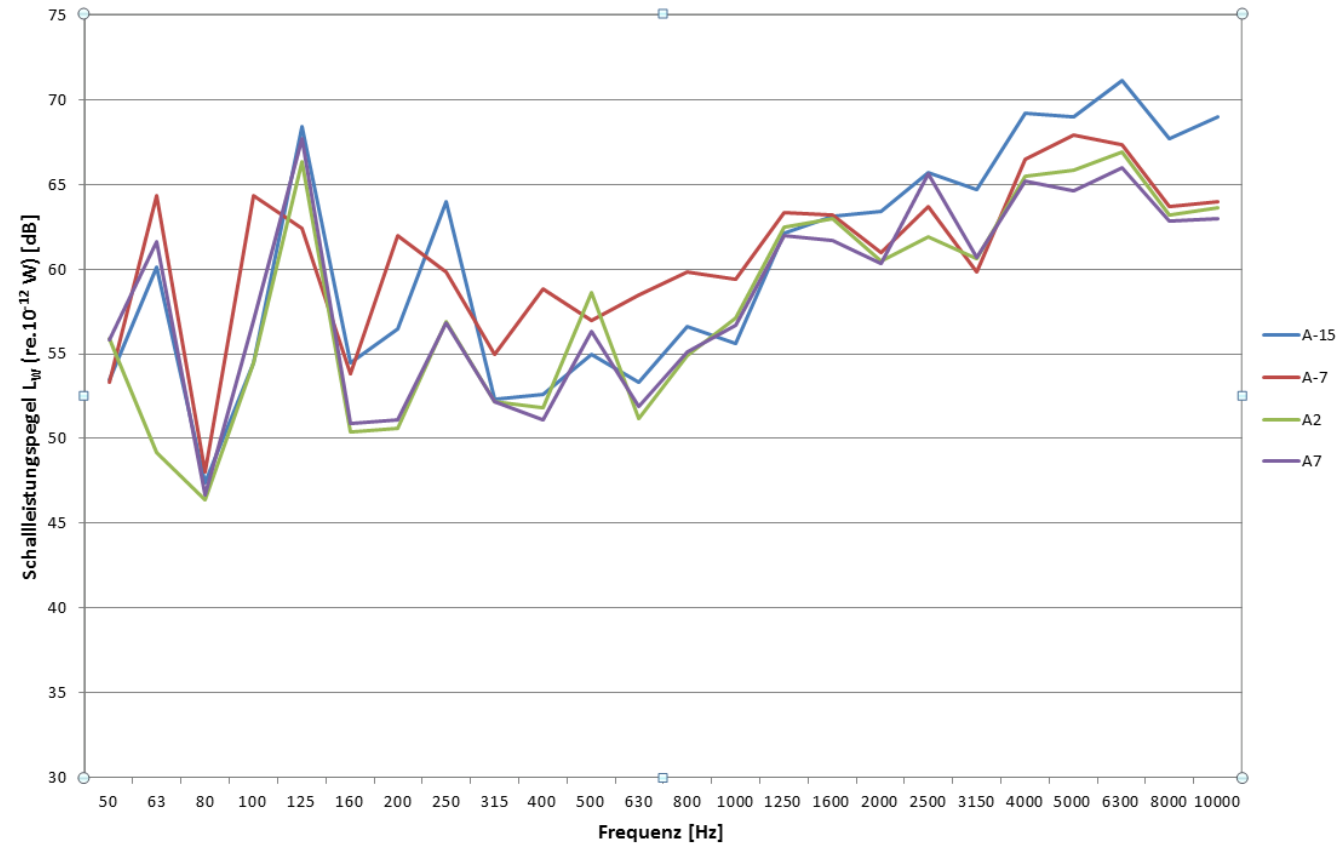


L _{AW}	67.6	63.6	58.1
Ver. rpm	7044	5040	4134
Fan rpm	150	150	150



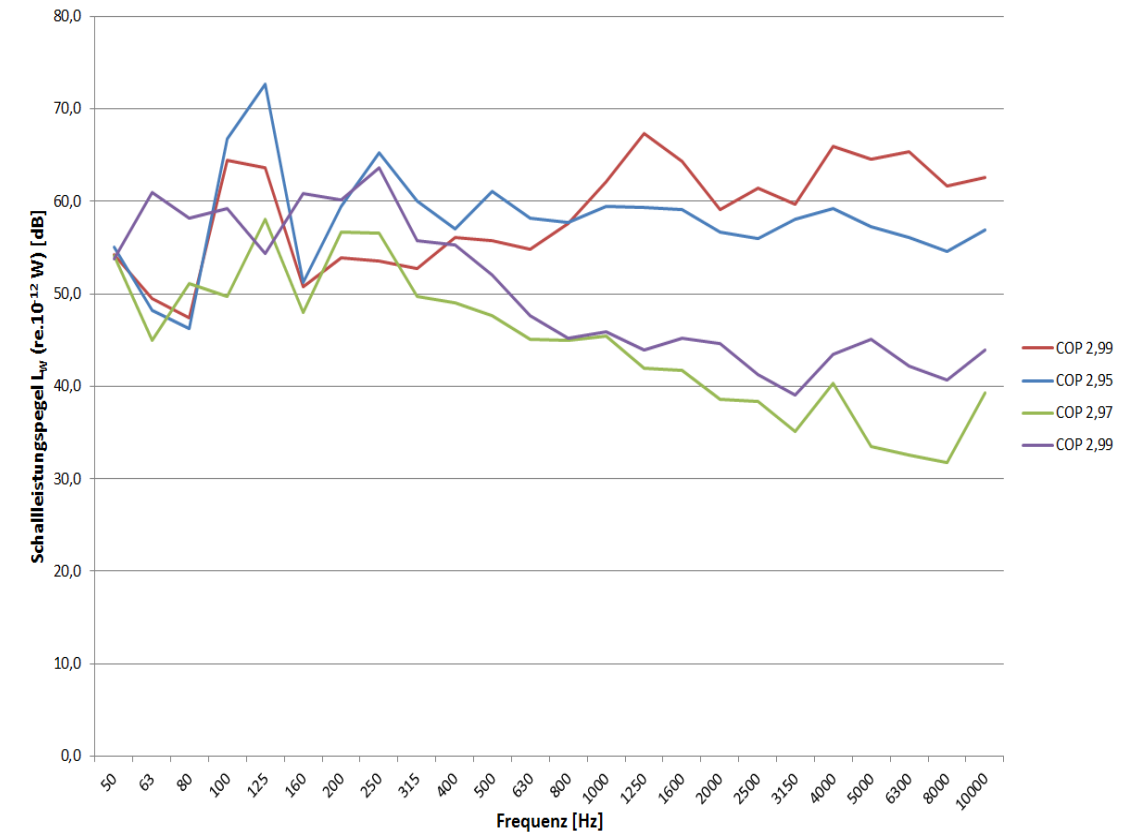
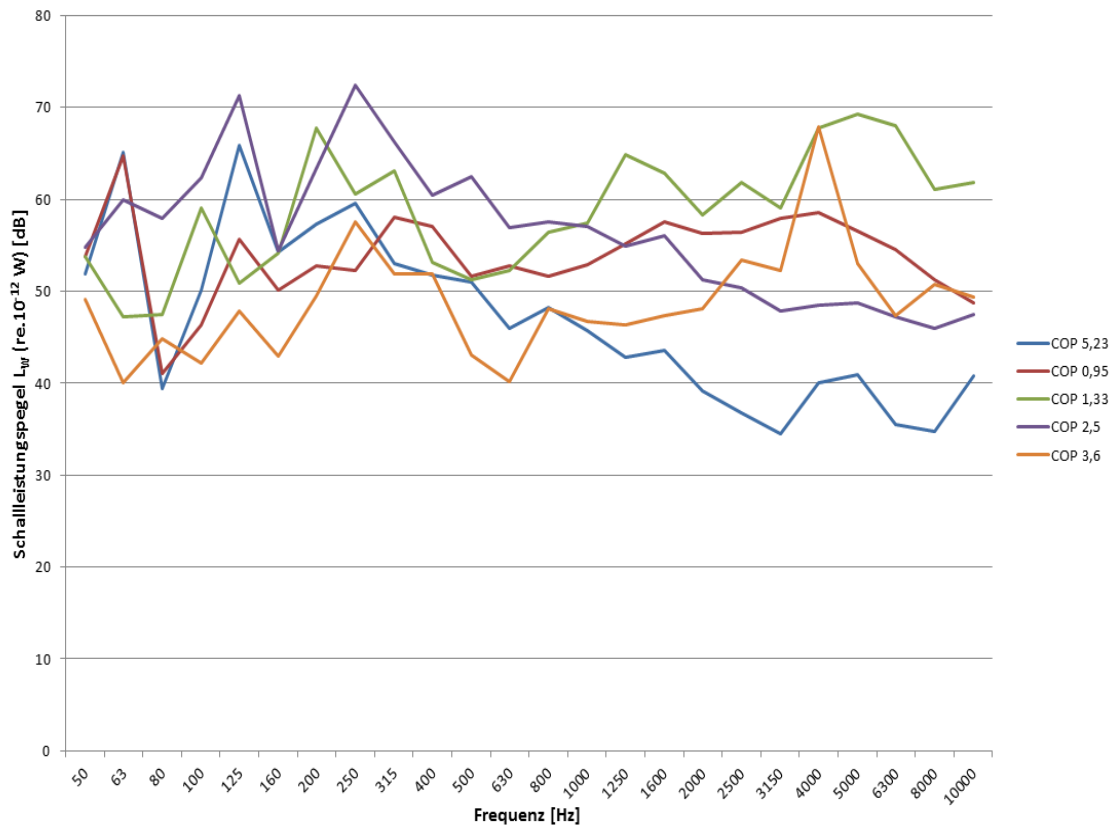
3. Results

■ Influence of ambient air temperature: SPL [%SPLmax [dBA]]



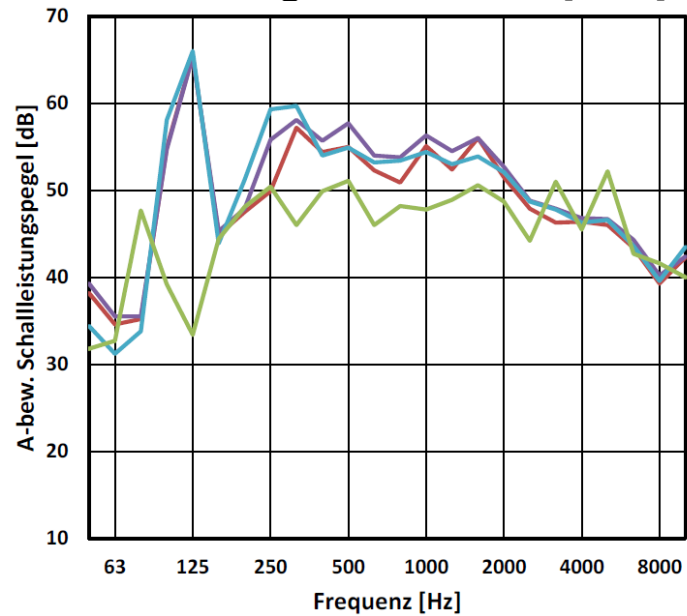
3. Results

■ Relationship between COP and SPL? SPL [%SPLmax [dBA]]



3. Results

- Assessment of defrosting noises: SPL [dBA] for A2/W35 with housing

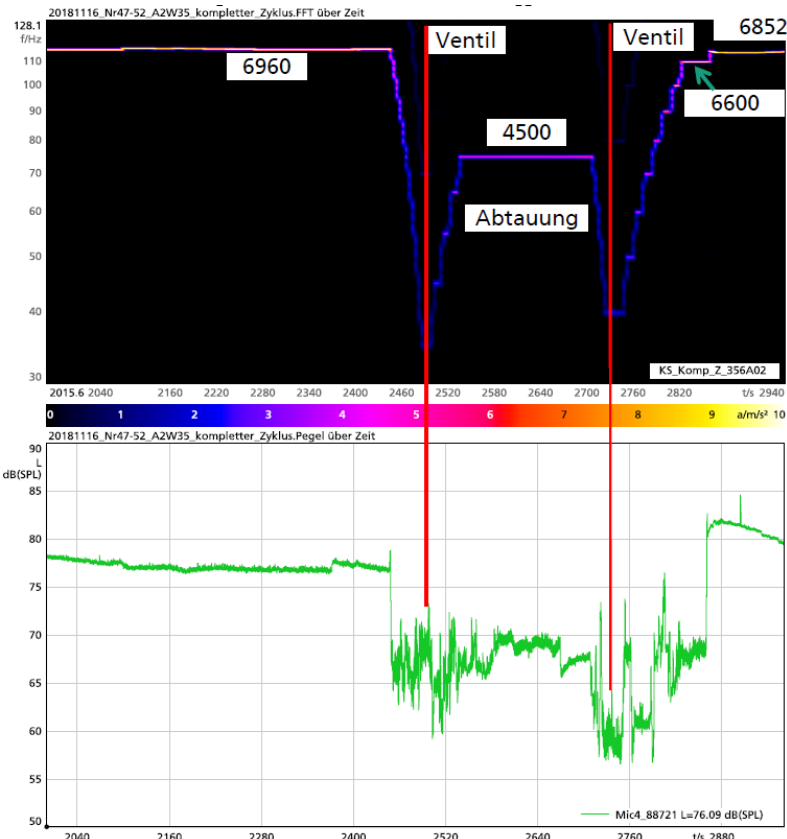
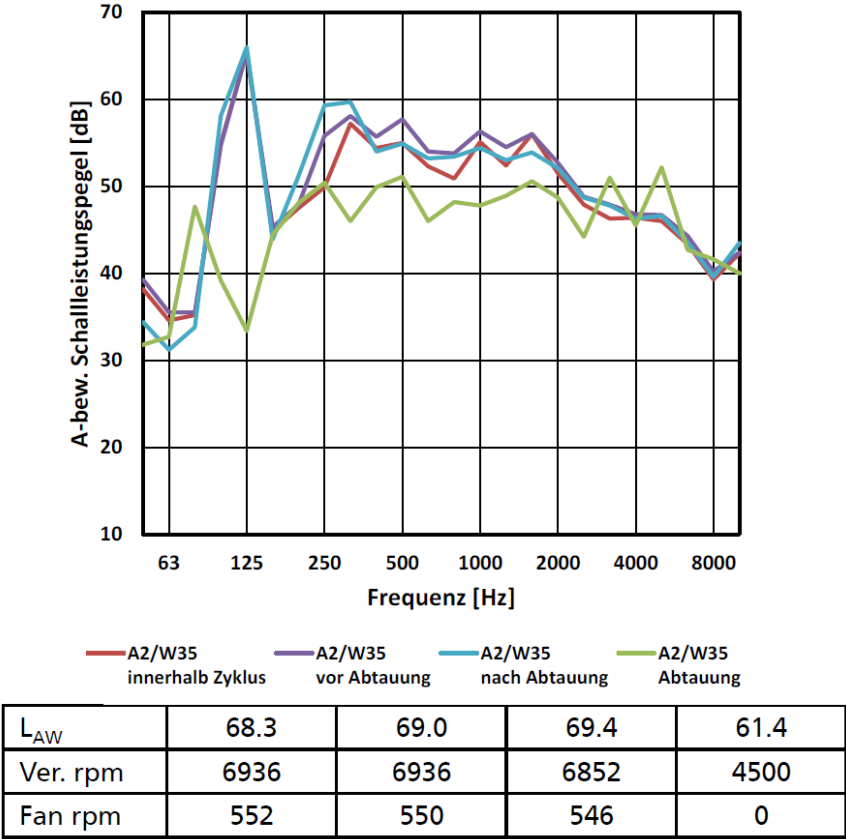


— A2/W35 innerhalb Zyklus
 — A2/W35 vor Abtauung
 — A2/W35 nach Abtauung
 — A2/W35 Abtauung

L_{AW}	68.3	69.0	69.4	61.4
Ver. rpm	6936	6936	6852	4500
Fan rpm	552	550	546	0

3. Results

■ Assessment of defrosting noises: SPL [dBA] for A2/W35 with housing



AGENDA

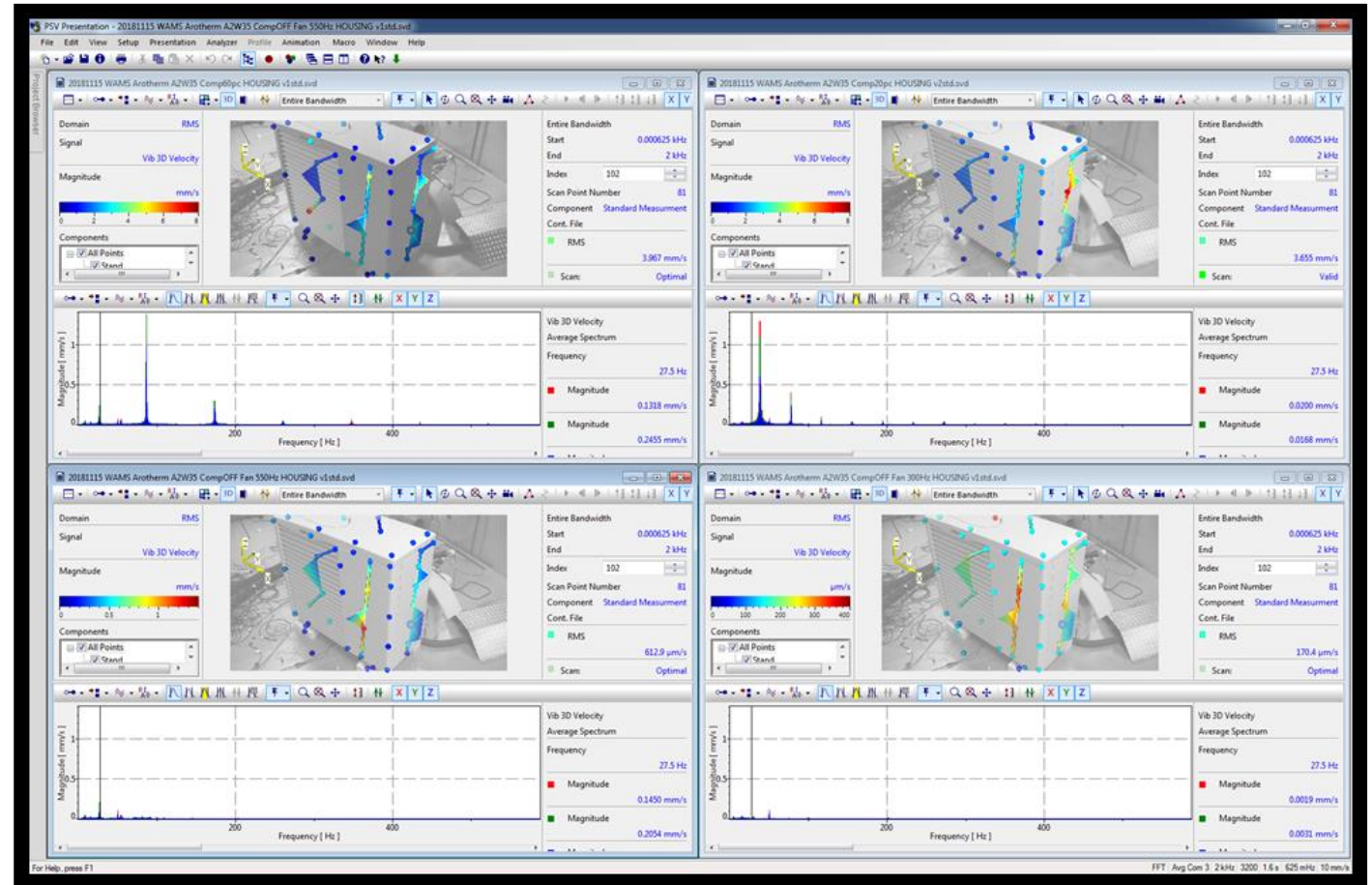
- 1. Acoustic measurements: goals and suited devices
 - measurements with microphones and acceleration sensors
 - Complement from laservibrometer (LVM)

- 2. Deconstruction analysis: concept and experimental setup
 - Bringing thermic and acoustical aspects together
 - Assessment under various operating conditions

- 3. Results
 - Sound power levels and thermic efficiency, eigenfrequencies
 - Eigenmodes and stress on the structure

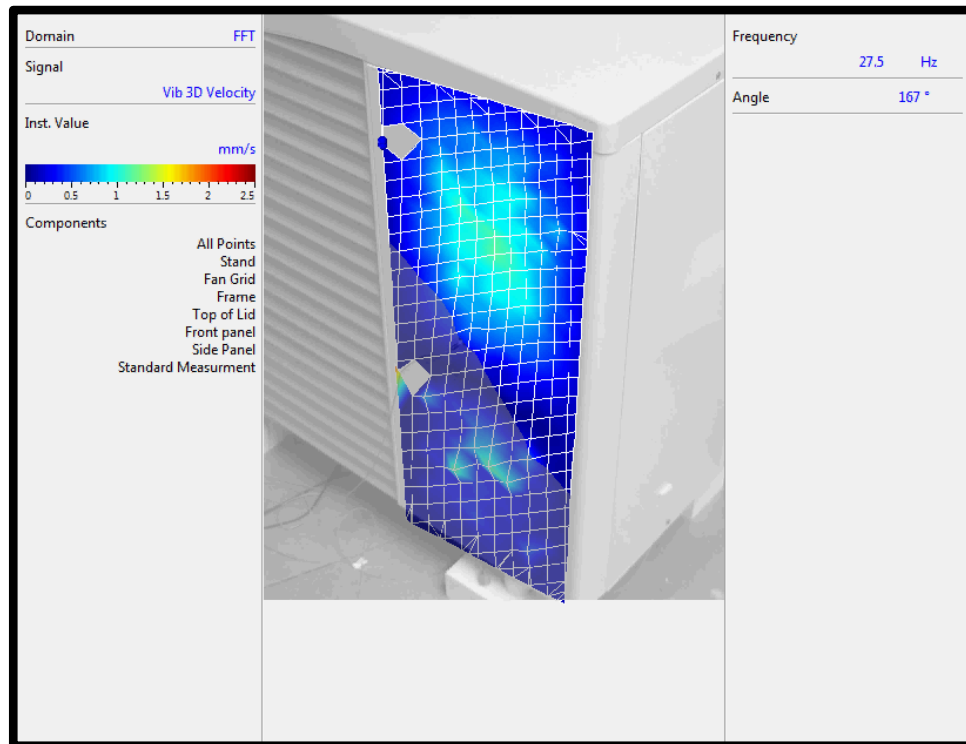
3. Results

- LVM: Easily identifying resonant frequencies of the components
- + Comparing points and operating states in terms of vibrational amplitudes

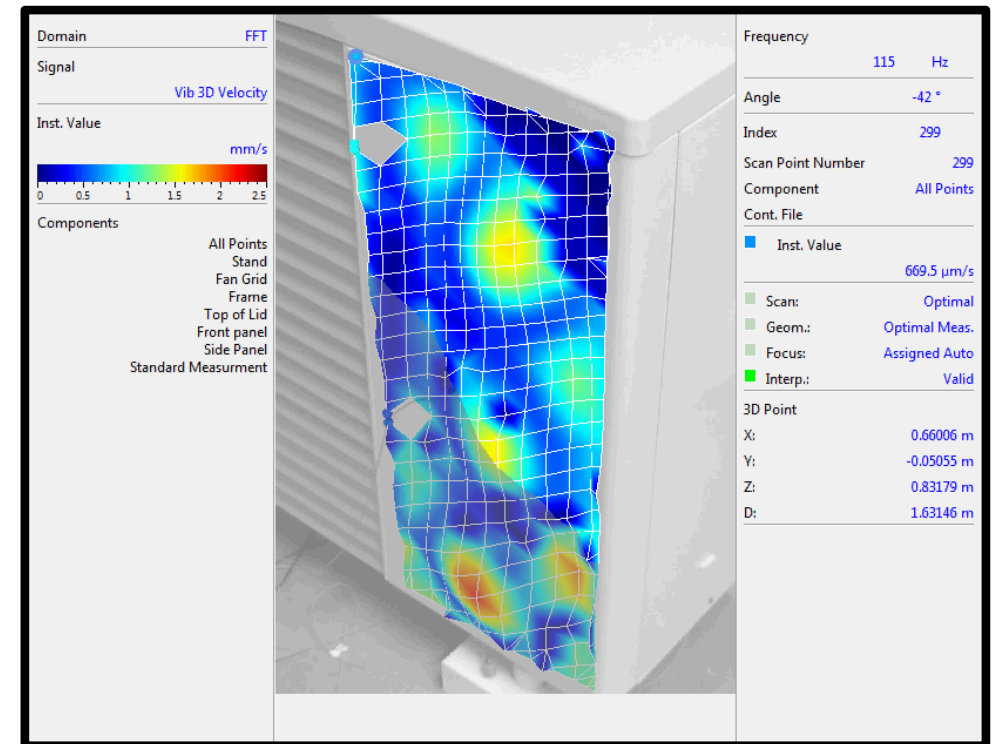


3. Results

- Description of the eigenmodes for eigenfrequencies close to the frequencies of excitation.



27.5 Hz



115 Hz