Physikalisch-Technische Bundesanstalt
Braunschweig and Berlin
National Metrology Institute

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The EMPIR initiative is co-funded by the European Union's Horizon 2020 research and innovation programme and the EMPIR Participating States

Reference setup for evaluating LMS voltage channels

Physikalisch-Technische Bundesanstalt
AG 2.31 „Instrument Transformers and Sensors“
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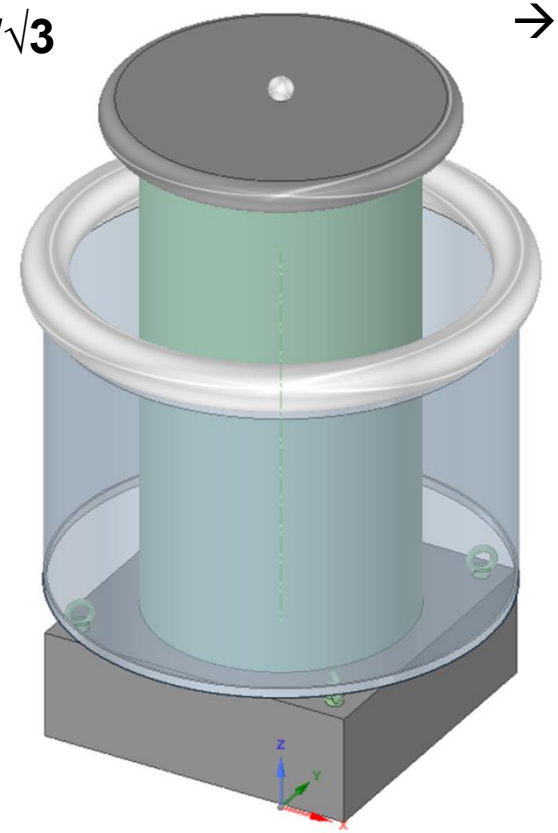
Braunschweig, Germany

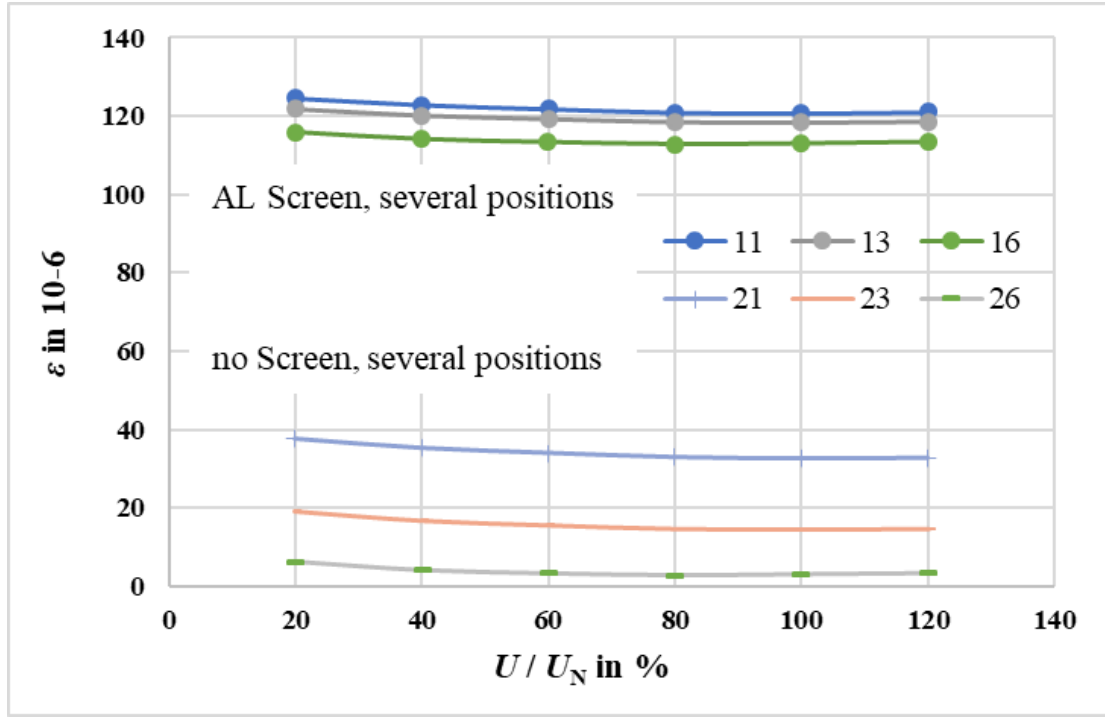
PTB Standard Voltage Transformer improvement

Standard Voltage Transformer for 220kV/√3



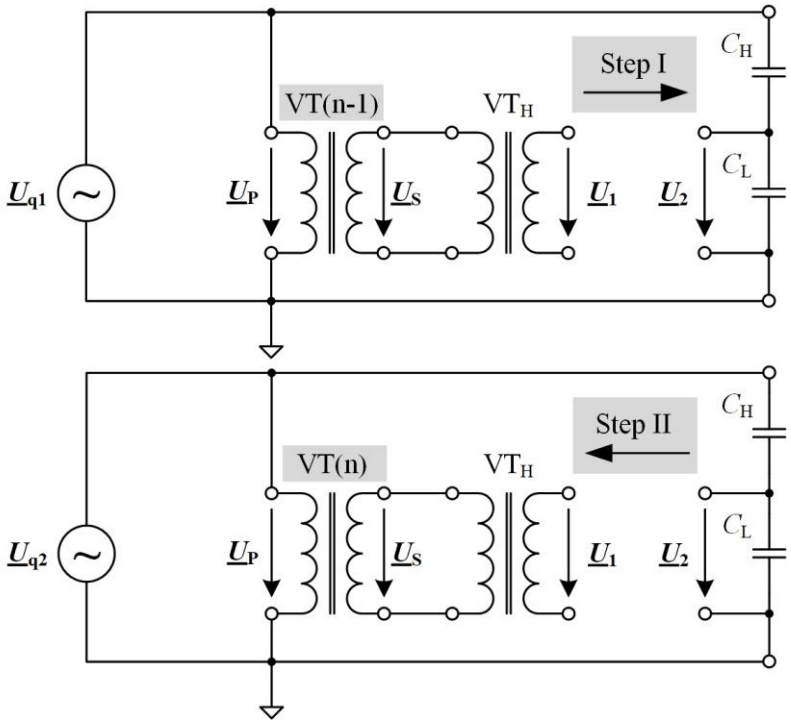
→ **Finding:** Ratio and phase error are depending on the position in the cage

→ **Idea:** A screen to fix the electrical and magnetical field will improve the situation and the uncertainties



→ **Result with AL screen:** variation of the ratio error in different positions is reduced by a factor of 4 (uncertainty can be reduced)

PTB Fundamental step-up method for VT



Standard VTs (cl. 0,02)

- 1000V IVD → 6 different standard VTs
- Voltage range of VTs (5 kV - 800 kV / √3)

Required components

- Two-Stage Voltage Transformer with IVD (VT_H) for scaling (e.g. 100 V to 5 V)
- 2-Channel Ratio Sampling Bridge
- Capacitive Voltage Divider (5… 600kV) as transfer divider

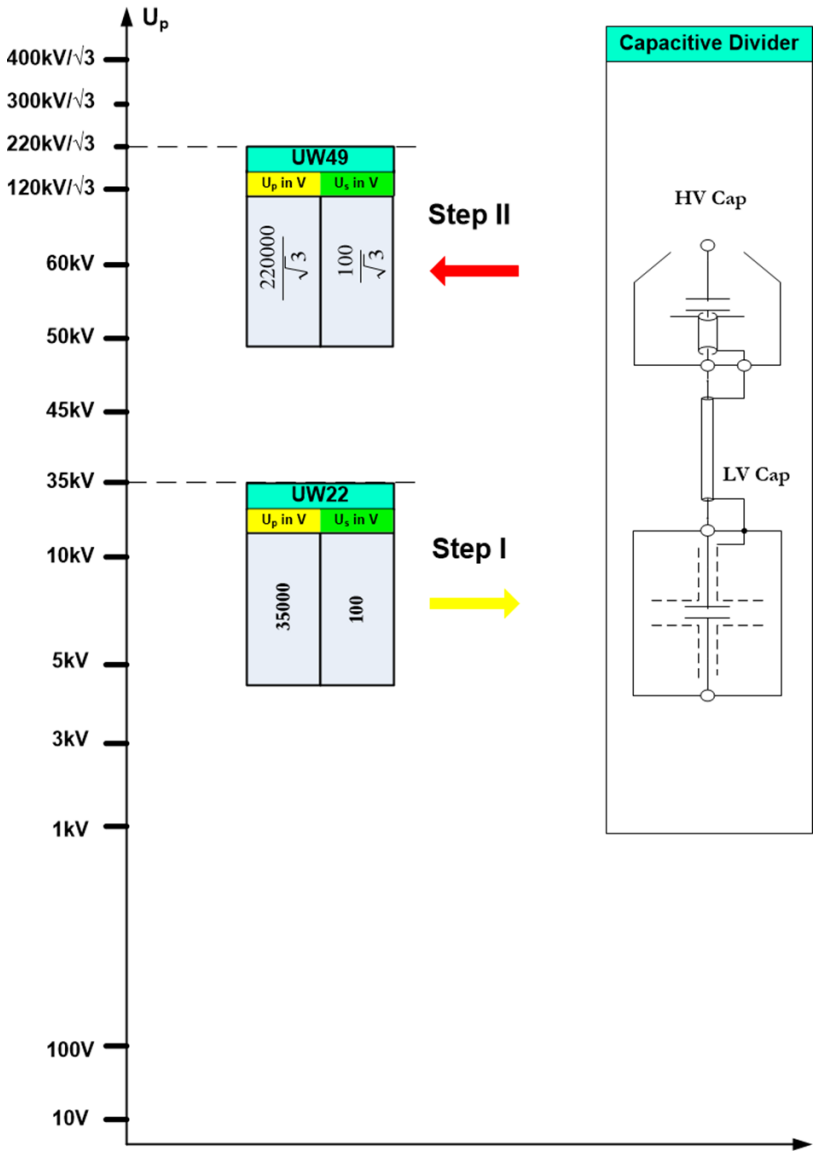
HV capacitors available

- high-voltage capacitors (C_H): 50 pF … 70 pF

LV capacitors active rebuilding

- low-voltage capacitors (C_L): 100 nF … 7 µF

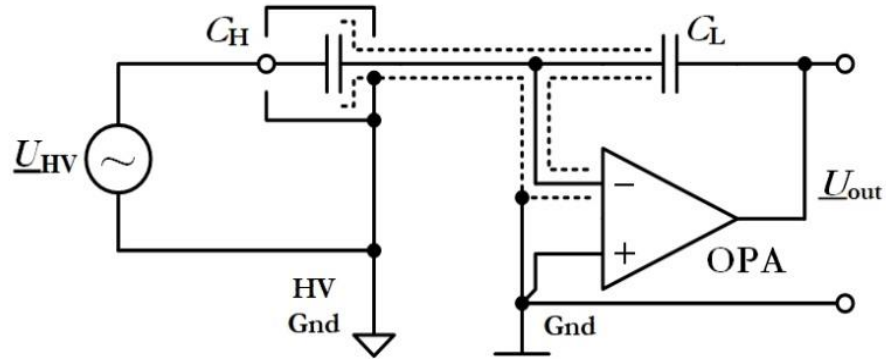
PTB Fundamental step-up method for VT



Calculated expanded uncertainty for UW49 (Step II)

LP	$U(\varepsilon_x)$	$U(\delta_x)$
2,5%... <10%	**13,0 µV / V**	**13,2 µrad**
10%... <20%	**4,0 µV / V**	**4,3 µrad**
≥ 20%	**2,7 µV / V**	**3,3 µrad**

Active low voltage capacitor (principle)



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Thanks for your attention !

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