

TEMPERATURE-STABILIZED MICRO WIRE PIRANI

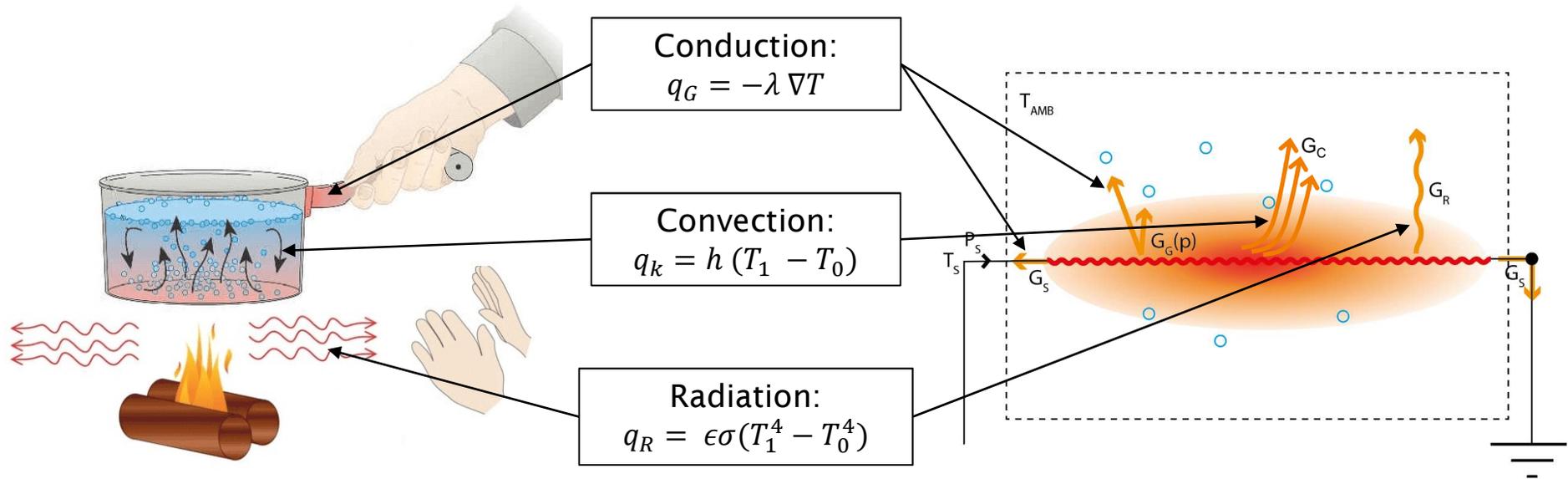
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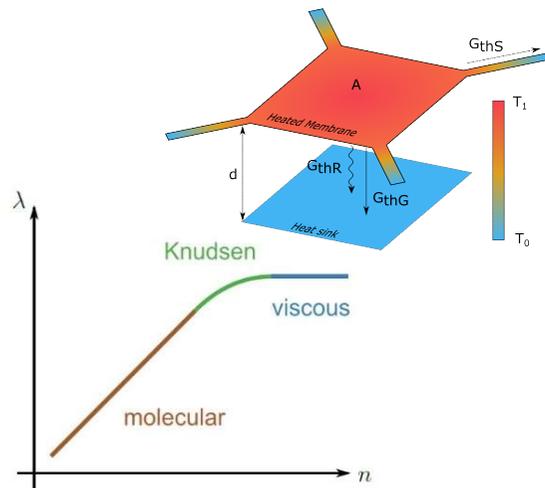
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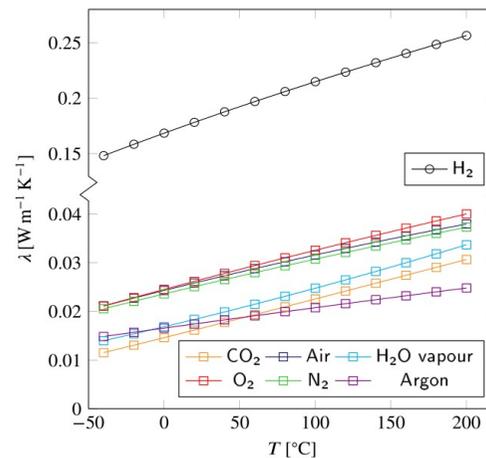
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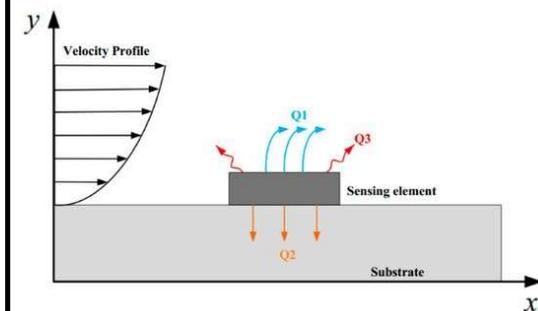
Pirani vacuum gauge: λ of diluted gases is pressure-dependent -> application for vacuum detection



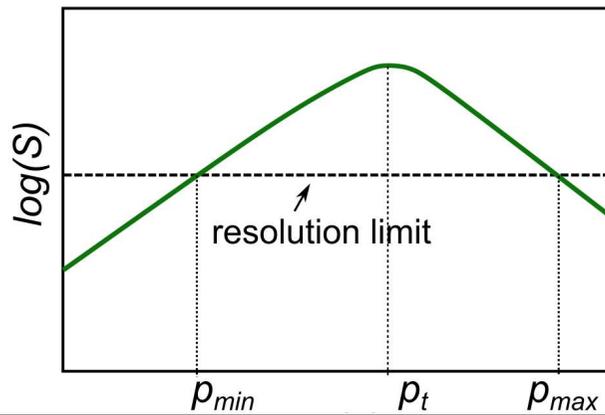
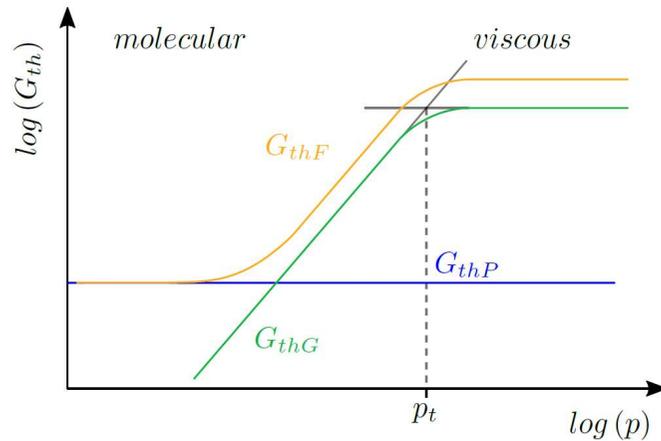
Gas sensor: Detection of gases with significantly different λ with respect to air (e.g. H_2 or CO_2)



Flow sensor: Heat loss via convection depends on flow velocity

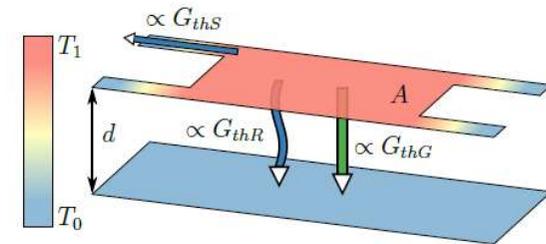
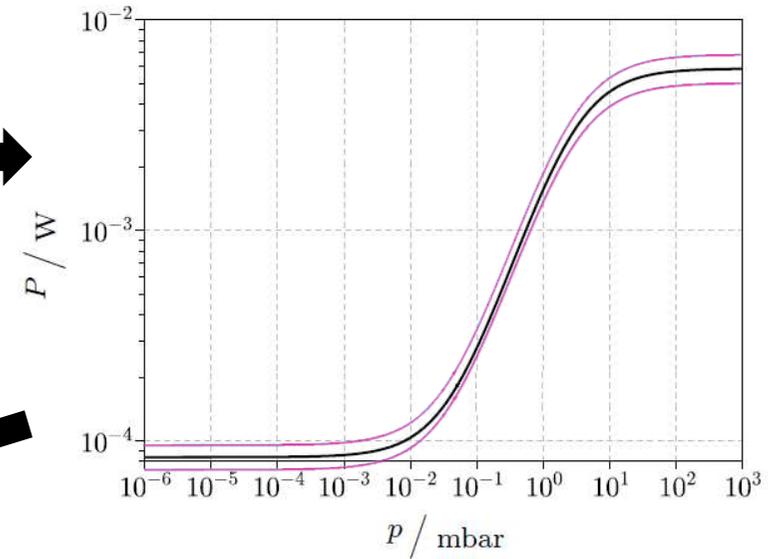


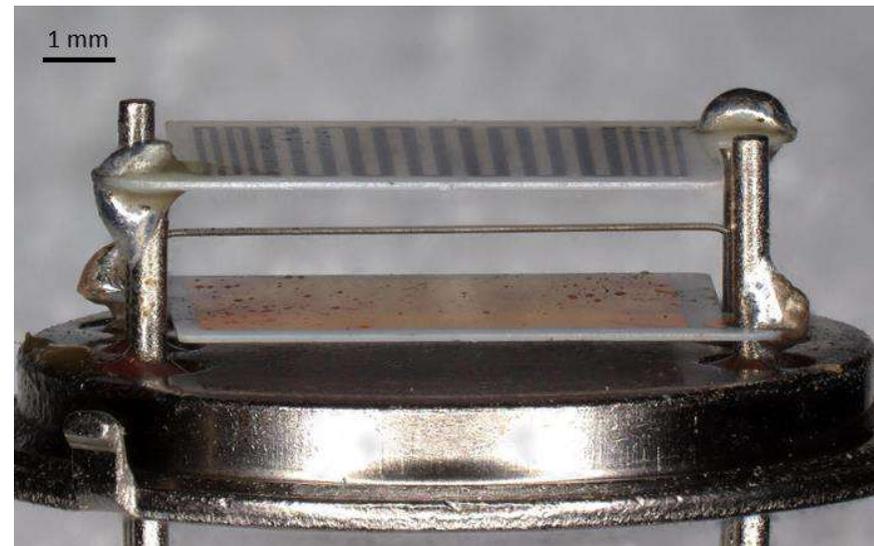
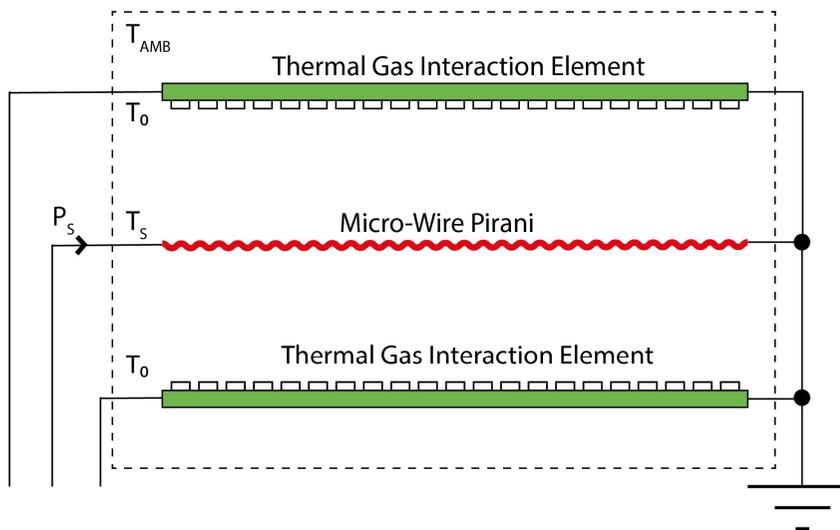
Influence of ambient temperature fluctuation



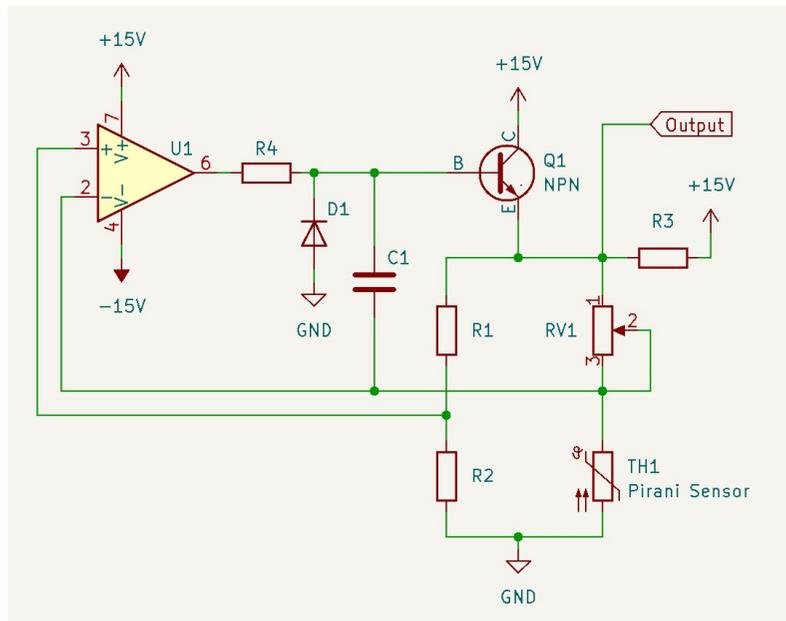
$$P_S = G_{TH} \cdot \overbrace{(T_S - T_{amb})}^{\Delta T}$$

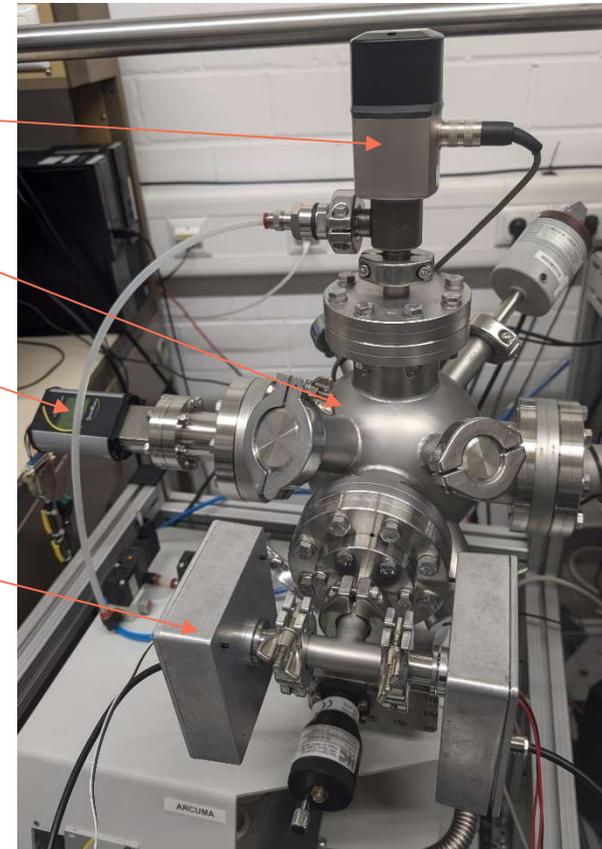
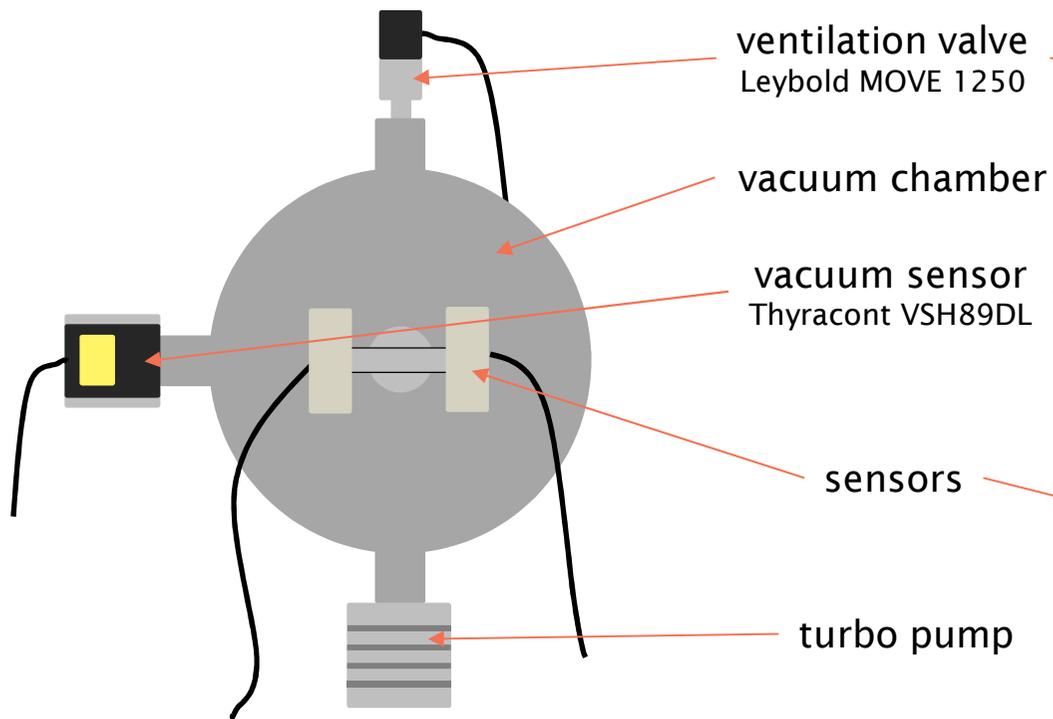
$$S = \frac{\partial V}{\partial(\log_{10} p)}$$

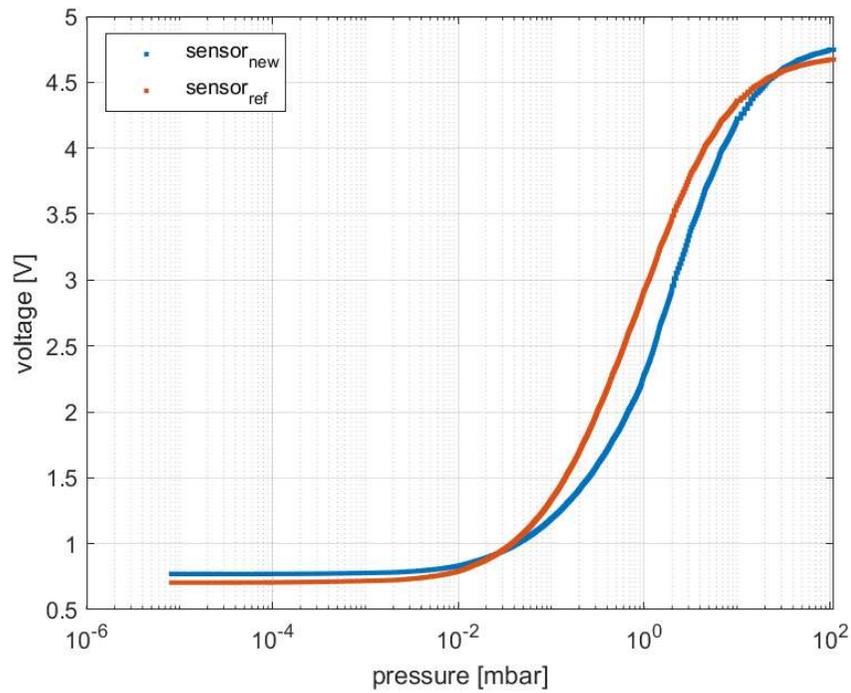




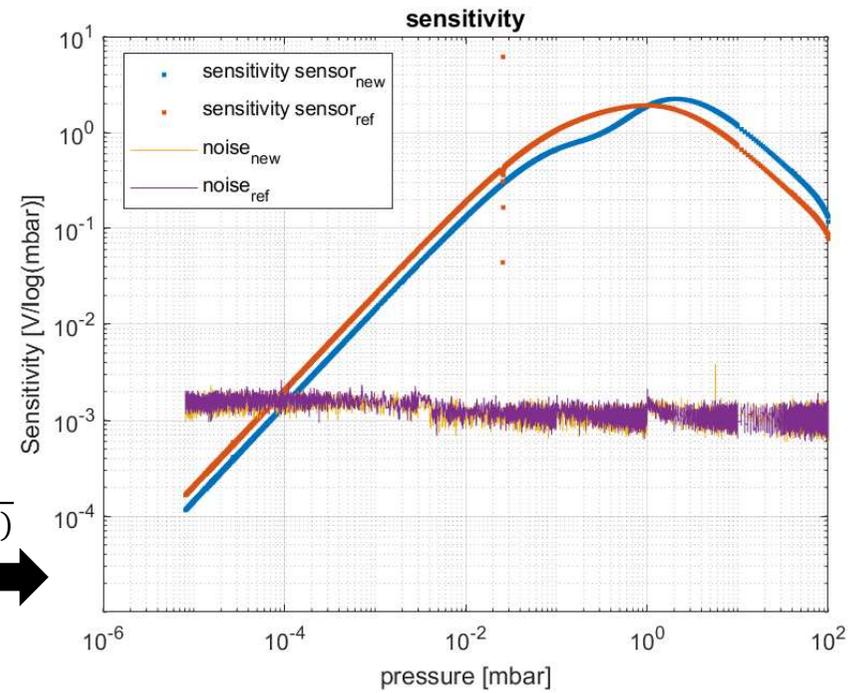
Constant temperature circuit

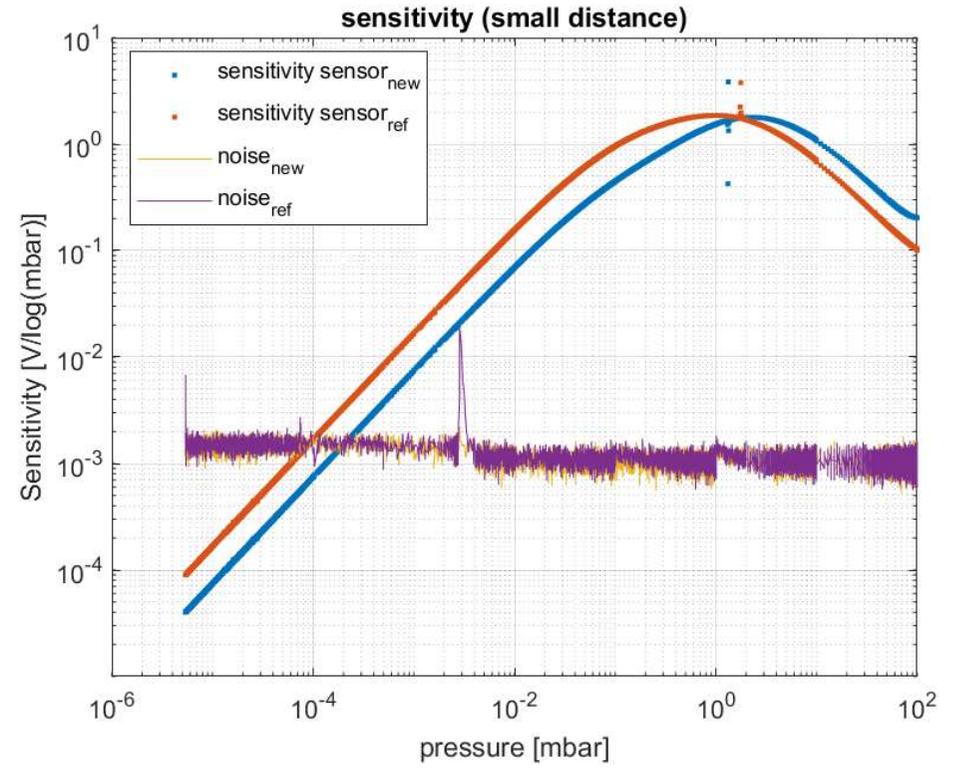
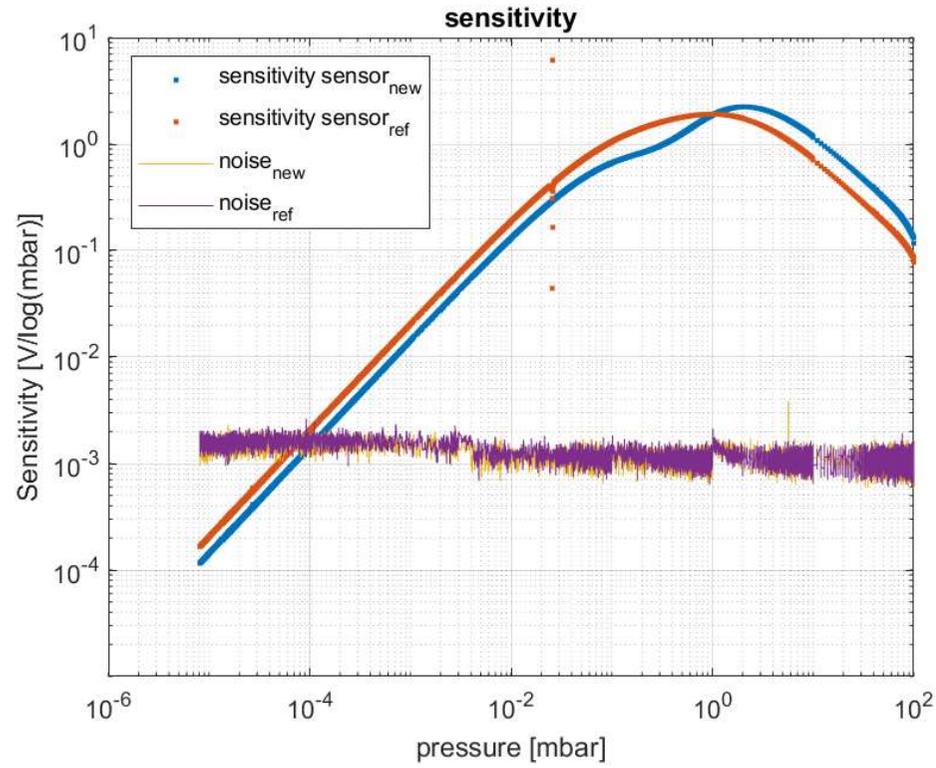


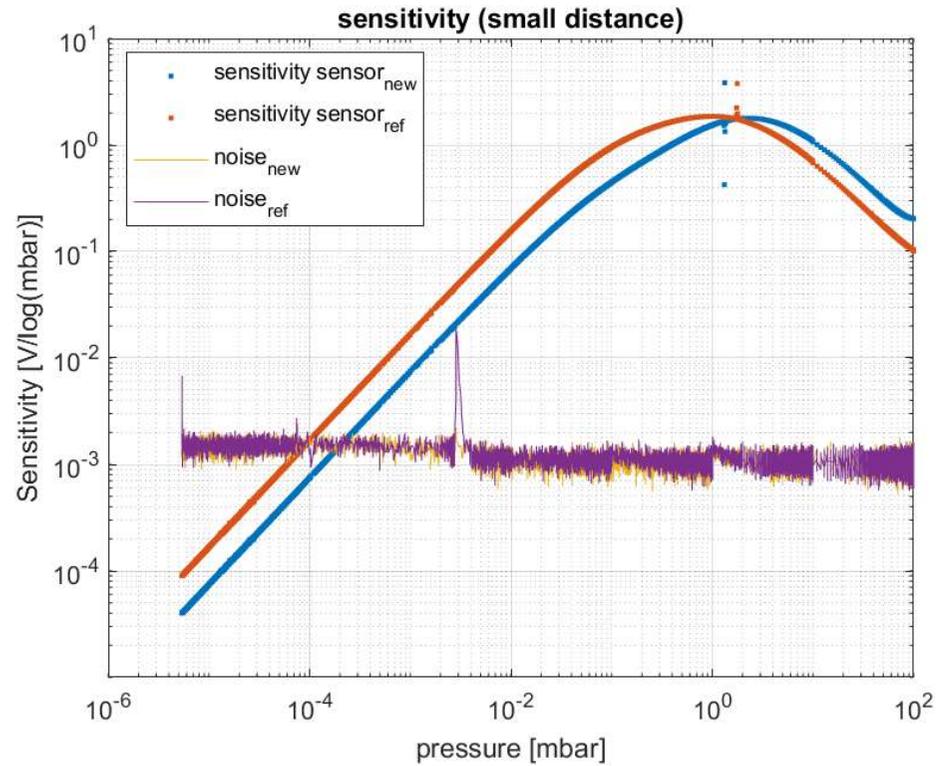




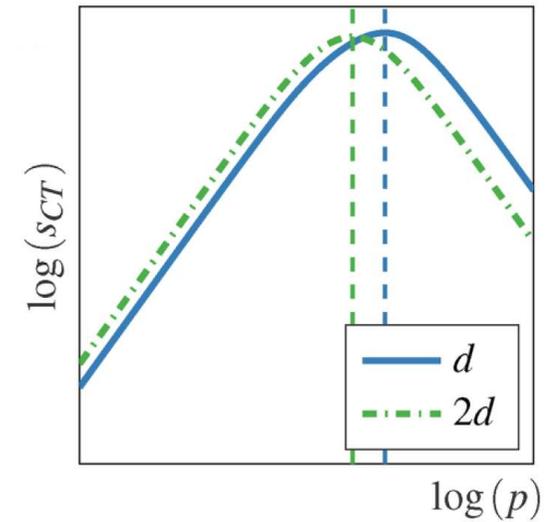
$$S = \frac{\partial V}{\partial(\log_{10} p)}$$



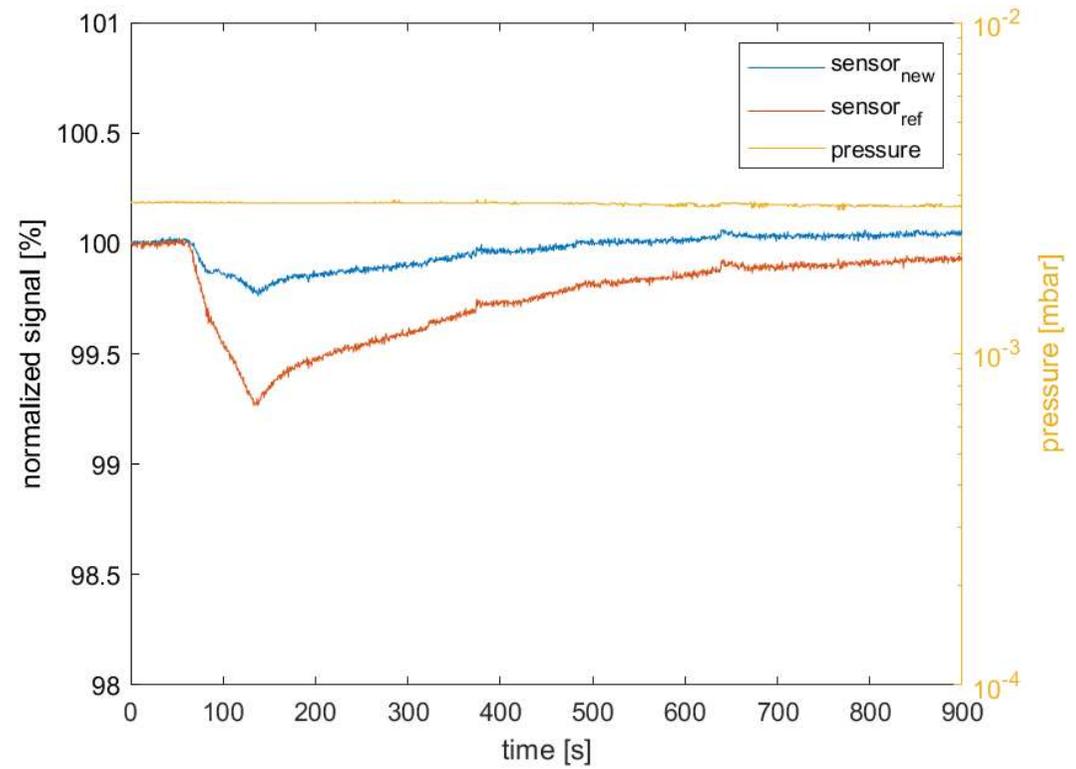
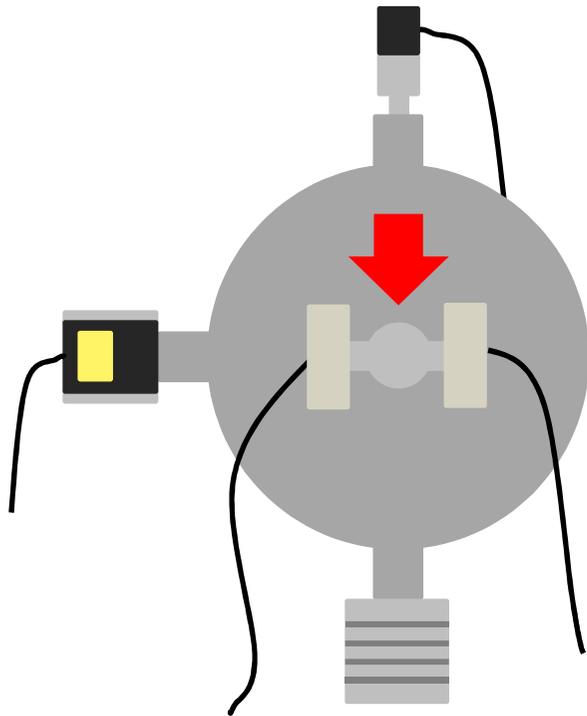




$$S_{norm} = \frac{\ln(10) \frac{\varepsilon A}{G_{thP}} p}{2(\gamma d p + 1)^2 \sqrt{\left(\frac{\varepsilon A}{G_{thP}} \frac{p}{1 + \gamma d p} + 1\right) \left(\frac{\varepsilon A}{G_{thP}} \frac{1}{\gamma d} + 1\right)}}$$



C. Langer, D. Berndt and R. Schreiner, J. Vac. Sci. Technol. B 40, 054203 (2022).



Conclusion

- Noise is approx. on the same level
- Sensitivity curve can be shifted to higher pressures with additional interaction elements
- Sensor drift caused by changes in the ambient temperature can be reduced

Outlook

- Improving distance between wire and interaction elements

Thank you for your attention!

THYRACONT
Vacuum Instruments



ACKNOWLEDGMENT

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