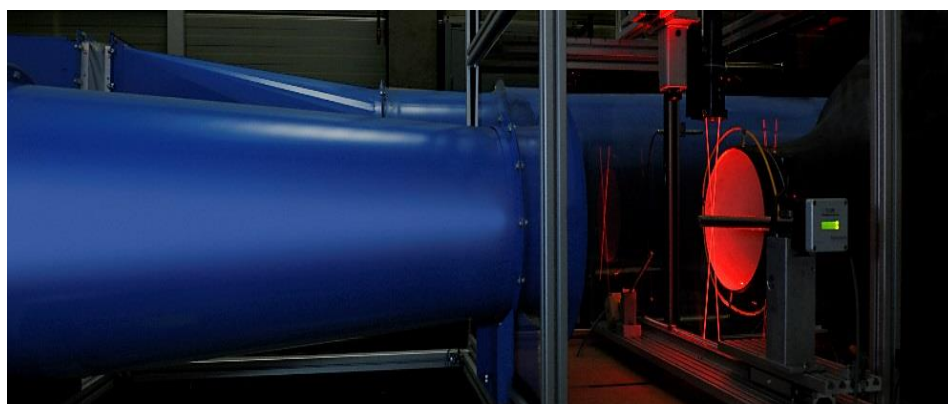
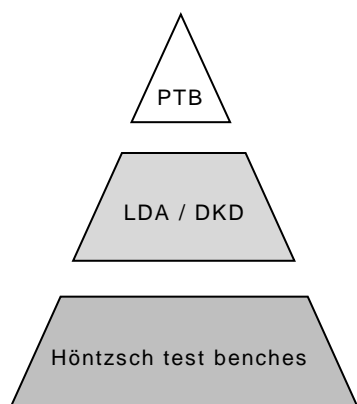


Calibration of flow velocity and flow rate



Free jet wind tunnel WK320 with Laser Doppler Anemometer (LDA)

The Höntzsch calibration system

The Höntzsch calibration process is subject to the Quality Management Systems QMS according to DIN EN ISO/IEC 17025. The DAkkS accreditation of our calibration laboratory for the field of gas flow velocity and gas flow rate is a confirmation by the German Accreditation Body (DAkkS) about the traceability to national standards of the Physikalisch-Technische Bundesanstalt (PTB) and the accuracy of the references used. Naturally the calibration of all sensors and flow meters outside of the scope of accreditation is also based on references traced to national standards of the Physikalisch-Technische Bundesanstalt (PTB).

Ensuring global uniformity of dimensions, Höntzsch GmbH & Co. KG works closely together with other national and international metrological institutes. Exchange of research findings and extensive international comparisons have proved successful. Höntzsch works resolutely and in close collaboration with national and international accredited laboratories to further develop calibration methods and reduce measurement uncertainties.

DAkkS-calibrations according to DIN EN ISO/IEC 17025:

Measuring unit	Calibration medium	Measuring range	Best measurement uncertainty in relation to the measured value
Flow velocity	air	0.1 m/s to 70 m/s	0.5 % but not less than 0.01 m/s
Flow rate	air at atmospheric conditions	5 m ³ /h to 400 m ³ /h	0.30 %
		400 m ³ /h to 5500 m ³ /h	0.25 %
Mass flow	air	6 kg/h to 500 kg/h	0.30 %
		500 kg/h to 6600 kg/h	0.25 %

ISO-Calibrations:

Measuring unit	Calibration medium	Measuring range	Best measurement uncertainty in relation to the measured value
Flow velocity	air at atmospheric conditions	0.1 m/s to 70 m/s	0.5 % but not less than 0.01 m/s
Flow velocity at high temperatures (HTP)	air in temperature range: up to 400 °C	0.5 m/s to 70 m/s	2-3 % but no less than 0.02 m/s
Flow rate	air at atmospheric conditions	0.022 m ³ /h to 58 m ³ /h	0.40 %
		1.5 m ³ /h to 400 m ³ /h	0.30 %
		400 m ³ /h to 5500 m ³ /h	0.25 %
Flow rate	up to 10 bar absolute pressure for air and other inert gases	0.2 m ³ /h to 4000 m ³ /h	up to 1.0 %
Flow rate	various gases: argon, propane, hydrogen, natural gas, landfill gas, helium, air, butane, oxygen, noble gases, non-aggressive gases	0.06 m ³ /h to 100 m ³ /h	0.8 %
Flow velocity	water	0.02 m/s to 3.5 m/s (in DN100-pipe)	0.7 % + 0.002 m/s
Flow rate	water	0.5 m ³ /h to 100 m ³ /h	0.7 % + 0.057 m ³ /h
Flow rate	numerous liquids	0.02 l/min to 9 l/min	1.0 %
Temperature	water	20 °C to 100 °C	0.1 K



AVP



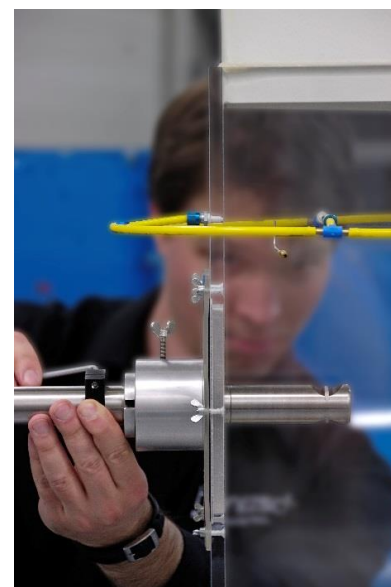
HDVP

WK320	Göttinger free jet wind tunnel
Reference	Laser-Doppler-Anemometer (LDA)
Calibration range	0.1 m/s to 70 m/s
Calibration medium	air at atmospheric conditions

WK180	Free jet wind tunnel
Reference	differential pressure system with DAkkS-calibrated transfer measurement standards
Calibration range	0.1 m/s to 70 m/s
Calibration medium	air at atmospheric conditions

NWK	Low velocity wind tunnel with closed test section
Reference	DAkkS-calibrated transfer measurement standards
Calibration range	0.25 m/s to 5.0 m/s
Calibration medium	air at atmospheric conditions

HTP	High temperature flow test bench in closed construction 'University of Stuttgart'
Reference	LDA-calibrated transfer measurement standards
Calibration range	0.5 m/s to 70 m/s
Temperature range	+20 °C to 400 °C
Calibration medium	air



High temperature flow test bench HTP in closed construction 'University of Stuttgart'

NWK

AVP	Atmospheric flow rate test bench
Reference	PTB-calibrated transfer measurement standards
Calibration range	1.5 m ³ /h to 5500 m ³ /h
Calibration medium	air at atmospheric conditions

DVP	Nozzle flow rate test bench
Reference	critical venturi nozzles / laval nozzles, DAkkS-calibrated
Calibration range	0.022 m ³ /h to 58 m ³ /h (0.367 l/min to 964.5 l/min)
Calibration medium	air at atmospheric conditions

HDVP	High pressure flow rate test bench in closed construction
Reference	PTB-calibrated transfer measurement standards
Calibration range	0.2 m ³ /h to 4000 m ³ /h (0.02 Norm-m/s to 350 Norm-m/s)*
Pressure range	1000 hPa to 10000 hPa
Temperature range	+20 °C to +45 °C
Calibration medium	air at atmospheric conditions

* calculated from flow rate and average flow velocity with the respective profile factor in DN200 pipe

RVP	Real gas flow rate test bench
Reference	DAkkS-calibrated transfer measurement standards
Calibration range	0.06 m ³ /h to 100 m ³ /h (0.08 Norm-m/s to 150 Norm-m/s)*
Calibration medium	various gases

* calculated from flow rate and average flow velocity in DN16 pipe

WVP	Water flow rate test bench
Reference	electromagnetic flow rate meter
Calibration range	0.5 m ³ /h to 100 m ³ /h (0.02 m/s to 3.5 m/s)*
Calibration medium	water

*calculated from flow rate and average flow velocity in DN100 pipe

Calibration / Measurement uncertainty / Recalibration

Höntzsch calibration is able to carry out an optimally tailored calibration for every type of operation. As close an approximation as possible to the real conditions is achieved using a variation of pressure, temperature and type of calibration medium.

This ideal choice of calibration conditions means that measurement uncertainties in practical applications are reduced to a minimum. Höntzsch calibration certificates document the set value and actual value and provide the user with proof and reliability that faultless and accurate measuring equipment is in use for solving measuring problems.

The measurement uncertainties shown on the calibration certificate are determined according to the "GUIDE OF EXPRESSION OF UNCERTAINTY IN MEASUREMENT". The expanded measurement uncertainties result from the standard measurement uncertainties being multiplied with the coverage factor $k = 2$. The value of the measurable variable lies as a rule with a probability of approx. 95 % within the respective value interval.

It must be pointed out that additional measurement uncertainties can arise from modified application conditions. Influencing factors are, for example, pressure, temperature, flow profile and the degree of turbulence of the flow to be measured. Details regarding measurement uncertainty of each measuring system can be found in the relevant data specification.

It is the responsibility of the user to determine the recalibration interval. The intervals should be chosen so that the re-calibration takes place before a significant change in the medium for the measurement problem. Please take into account the specific application conditions, environmental influences and the extent of potential secondary damage caused by values outside the specified tolerance.

Standards, directives or legal requirements can also determine the right time for a recalibration.