

Calibration of SF-586a/b

1. Measuring of speed reference

Reference: Prandtl's pitot tube with PTE-1.

In the measuring section is measured the pressure p_b and the temperature t_b

$$w_b = \sqrt{\frac{200 \cdot \Delta p [\text{mbar}]}{1,293} \cdot \frac{1,01325 \cdot t_b [^{\circ}\text{K}]}{273,15 \cdot p_b [\text{bar}]}}$$

2. Calculate w_b to w_n (normal condition)

$$w_n = w_b \cdot \frac{273,15 \cdot p_b [\text{bar}]}{1,01325 \cdot t_b [^{\circ}\text{K}]}$$

3. Measuring the power consumption Pheiz of SF-586a/b

4. Building the calibration table

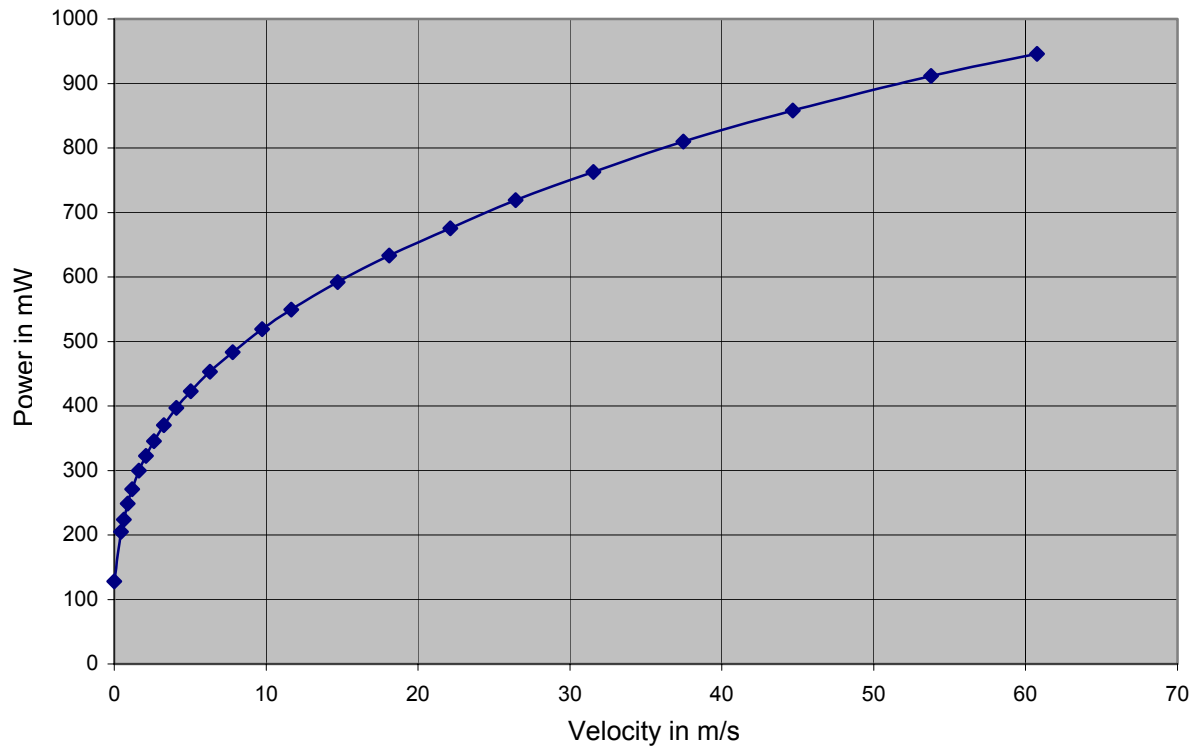
Based on w_n and Pheiz via Spline-Interpolation the values for the calibration table will be calculated.

$$w_k = w_n$$

Calibration table:

w_k in Ncm/s (integer)	Pheiz in μW (integer)
0	120000
...	...
6000	1000000

5. The calibration curve



6. Transfer of the calibration table into the NVRAM of SF-586a/b

The measured and calculated data's will be transferred into the NVRAM of the SF-586a/b and controlled.

At last starting the printing of the calibration protocol.

Controlling and printing the calibration protocol

1. Measuring of speed reference

Reference: Prandtl's pitot tube with PTE-1.

In the measuring section is measured the presser p_b and the temperature t_b

$$w_b = \sqrt{\frac{200 \cdot \Delta p [\text{mbar}] \cdot 1,01325 \cdot t_b [^{\circ}\text{K}]}{1,293 \cdot 273,15 \cdot p_b [\text{bar}]}}$$

2. Calculate w_b to w_n (normal condition)

$$w_n = w_b \cdot \frac{273,15 \cdot p_b [\text{bar}]}{1,01325 \cdot t_b [^{\circ}\text{K}]}$$

3. Calculating inside the SF-586a/b

$$w_n = c \cdot w_k \cdot \frac{\theta_b}{1,293} - \text{Offset}$$

$$V_n = 3600 \cdot \left(\frac{\pi}{4} \cdot d_i^2 - A_s \right) \cdot w_n$$

$$m = \theta_b \cdot V_n$$

4. Reading the norm volume flow Nm^3/h from SF-586a/b

Calculating the norm volume flow to norm velocity.

$$w_n = \frac{V_n}{3600 \cdot \left(\frac{\pi}{4} \cdot d_i^2 - A_s \right)}$$

Comparing of w_n from the pitot tube with w_n of the SF-586a/b.

5. Printing the calibration protocol

6. Legend

w_n	Velocity in m/s under norm conditions (0 °C; 1,01325 bar)
w_k	Velocity out of calibration table, influenced by Pheiz in m/s
w_b	Operating velocity in m/s
V_n	Norm volume flow in Nm ³ /h
V_b	Operating volume flow in m ³ /h
m	Mass flow in kg/h
d_i	Inner pipe diameter in m (see menu SF586a/b in mm !!)
A_s	Sensor surface in m ² (see menu SF586a/b in mm ² !!)
Δp	Pressure Prandtl's pitot tube in mbar
p_b	Operating pressure in bar
t_b	Operating temperature in °K
c	C-factor (normal c=1)
θ_b	Norm density (user defined) in kg /m ³
$conv_factor$	conversion factor for different medium
$Offset$	Offset velocity in m/s