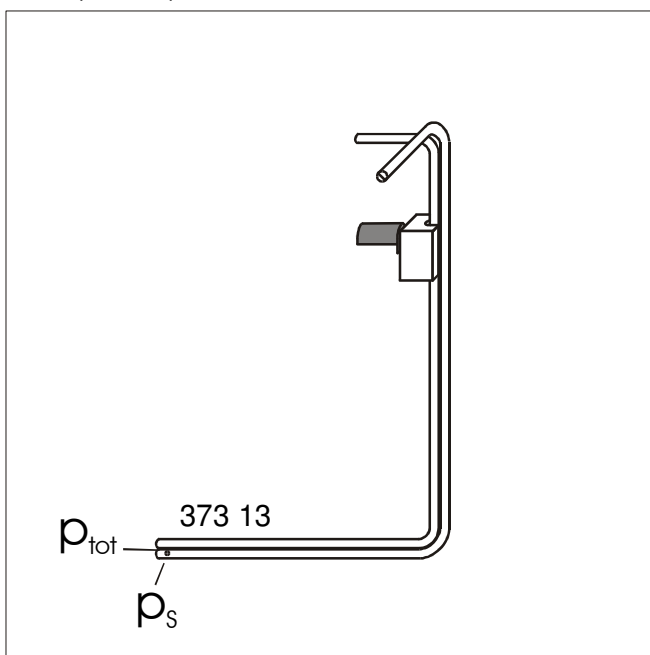


## Determining the wind speed with a pressure head sensor – Measuring the pressure with the precision manometer

### Objects of the experiment

- To measure the total pressure
- To measure the static pressure
- To determine the wind speed

Fig. 1: Pressure head for measuring the static pressure  $p_s$  and total pressure  $p_{tot}$ .



### Principles

The pressure head used in this experiment allows to measure:

$P_{tot}$ : total pressure  
(head opening positioned against the direction of flow)

and

$p_s$ : static pressure  
(head opening positioned across the direction of flow)

The pressure head can be used with the fine manometer (Fig. 2).

The wind velocity can be determined from a differential measuring method. The wind velocity can be read off directly from the upper scale of the fine manometer. To obtain more precise results it is recommended to calculate the wind velocity from the dynamic pressure  $\Delta p$  which is read off from the pressure scale.

$$v = \sqrt{\frac{2 \Delta p}{\rho}} \quad (I)$$

$\Delta p = P_{tot} - p_s$ : dynamic pressure

$\rho$ : density of the air

**Apparatus**

1 Suction and pressure fan.....	373 04
1 Precision manometer.....	373 10
1 Pressure head.....	373 13
1 Stand base, V-shape, 20 cm.....	300 02
1 Stand rod, 47 cm.....	300 42
1 Leybold multiclamp.....	301 01

**Measuring example**

Table 1: Dynamic pressure at a distance x from the nozzle (pressure profile). s corresponds to the lateral location.

$\frac{x}{\text{cm}}$	$\frac{s}{\text{mm}}$	-50	-25	0	+25	50
5	$\frac{p}{\text{hPa}}$	70	138	150	137	65
20	$\frac{p}{\text{hPa}}$	90	146	147	145	80

**Setup**

Assemble the fan with the nozzle and the precision manometer with the pressure head as shown in Fig 2. For further hints see also instruction sheets 373 04 and 373 10/13.

**Evaluation and results**

Table 2: Wind speed calculated with equation (I) for the pressure values of table 1. s corresponds to the lateral location.

$\frac{x}{\text{cm}}$	$\frac{s}{\text{mm}}$	-50	-25	0	+25	50
5	$\frac{v}{\text{m/s}}$	10.5	14.8	15.4	14.7	10.2
20	$\frac{v}{\text{m/s}}$	12.0	15.2	15.3	15.2	11.3

**Carrying out the experiment**

- Measure for example the pressure profile with the pressure head in front of the nozzle at a distance x, e.g. approximately 5 cm and 20 cm. The grid of the nozzle may serve as a guide for the lateral location s.

Fig. 2: Experimental setup for measuring the pressure with the fine manometer schematically.

