



Drag coefficient c_w : relationship between air resistance and body shape - measuring the pressure with the precision manometer (P 1.8.6.2)

P 1.8.6

Measuring air resistance

- P 1.8.6.1 Air resistance as a function of wind speed – measuring pressure with the precision manometer
- P 1.8.6.2 Drag coefficient c_w : relationship between air resistance and body shape – measuring the pressure with the precision manometer
- P 1.8.6.3 Pressure curve on an airfoil profile – measuring the pressure with the precision manometer
- P 1.8.6.4 Air resistance as a function of wind speed – measuring the pressure with the pressure sensor and CASSY
- P 1.8.6.5 Drag coefficient c_w : relationship between air resistance and body shape – measuring the pressure with the pressure sensor and CASSY
- P 1.8.6.6 Pressure curve on an airfoil profile – measuring the pressure with the pressure sensor and CASSY

Cat. No.	Description	P 1.8.6.1-2	P 1.8.6.3	P 1.8.6.4-5	P 1.8.6.6
373 04	Suction and pressure fan	1	1	1	1
373 06	Open aerodynamics working section	1	1	1	1
373 071	Aerodynamics accessories 1	1		1	
373 075	Measurement trolley for wind tunnel	1		1	
373 14	Sector dynamometer	1		1	
373 13	Pressure head	1		1	1
373 10	Precision manometer	1	1		
373 70	Air foil model		1		1
524 010	Sensor CASSY			1	1
524 066	Pressure sensor S, ± 70 hPa			1	1
524 200	CASSY Lab			1	1
300 02	Stand base, V-shape, 20 cm	1	2	1	1
300 11	Saddle base	1		2	1
300 42	Stand rod, 47 cm	1	1	1	
301 01	Leybold multiclip	1	1		
	<i>additionally recommended:</i> 1 PC with Windows 95/NT or higher			1	1

A flow of air exercises a force F_w on a body in the flow which is parallel to the direction of the flow; this force is called the air resistance. This force depends on the flow speed v , the cross-section A of the body perpendicular to the flow direction and the shape of the body. The influence of the body shape is described using the so-called drag coefficient c_w , whereby the air resistance is determined as:

$$F_w = c_w \cdot \frac{\rho}{2} \cdot v^2 \cdot A$$

The first experiment examines the relationship between the air resistance and the flow speed using a circular disk, while the second experiment determines the drag coefficient c_w for various flow bodies with equal cross-sections. In both cases, the flow speed is measured using a pressure head sensor and the air resistance with a dynamometer.

The aim of the third experiment is to measure the static pressure p at various points on the underside of an airfoil profile. The measured curve not only illustrates the air resistance, but also explains the lift acting on the airfoil.

Note: In the first three experiments, the precision manometer is used to measure pressures. In addition to a pressure scale, it is provided with a further scale which indicates the flow speed directly when measuring with the pressure head sensor. In the last three experiments the pressure is measured with a pressure sensor and recorded and evaluated using the computer-assisted measuring system CASSY.