# TWO-STAGE AXIAL FAN

# DL HC-TAF

## INTRODUCTION

Axial fans are commonly connected in series in industrial installations to increase the total pressure rise. From a theoretical standpoint, the series connection of two axial fans results in an approximately doubled pressure increase, the trainer is designed for the experimental investigation of a two-stage axial fan system. A dedicated measuring device is used to determine both pressure and velocity distributions within the flow.

The trainer incorporates a measuring section equipped with two identical axial fans. A precisely designed nozzle contour, together with a flow straightener at the air inlet, ensures a uniform velocity profile with minimal turbulence within the measuring section. Each rotor is fitted with individually adjustable blades, allowing the blade angle to be modified. The downstream section is equipped with outlet guide vane systems, which redirect the angular momentum of the outgoing flow into the axial direction, thereby enabling an increase in pressure.

An optional pipe bend can be installed at the outlet of the measuring section to induce flow deflection. One of the axial fans can be removed from the measuring section, allowing the remaining fan to be analyzed in single-stage operation, the volumetric flow rate is determined by means of an inlet nozzle.

With this equipment, the following practical activities can be performed (they are intended to provide hands-on experience, allowing users to apply concepts in a practical environment and become familiar with the operation and capabilities of the equipment).

- Investigation of a two-stage axial fan system.
- Two identical single-stage axial fans, configurable for series operation or individual operation.
- Individually adjustable rotor blades.

- Both fans operated at variable speed via frequency converters.
- Flow-optimized inlet nozzle and flow straightener for uniform, low-turbulence flow conditions.
- Airflow regulation in the pipe section via throttle valve.
- Pipe bend at the outlet for controlled flow deflection.
- Measuring device with three-hole probe for determining differential pressure across the rotor and guide vane system.
- Pressure and temperature sensors installed upstream and downstream of each fan.
- Volumetric flow rate measurement via inlet nozzle.

**Technical Data**

- Number of fans: 2.
- Rated motor power: 3.45 kW.
- Maximum pressure difference: 798 Pa.
- Speed range: 0 … 2850 $min^{-1}$.
- Blade angle adjustment: up to 39°.
- Measuring section inner diameter: 400 mm.

**Measuring Ranges**

- Temperature: 0 … 100 °C.
- Differential pressure: ±25 mbar.
- Radial probe position: 100 … 200 mm.

**Electrical Supply**

- Three-phase from the mains, 50/60 Hz.