

Suction Fan

KS/ME/SUCFAN

For Rectangular Channel - Maintenance uniform fluid condition

The suction fan is intended for use in a test section with a rectangular channel configuration under controlled maintenance fluid conditions. The Mach number in the test section is required to be variable.

We shall Varying the RPM of the suction fan motor, method by which the required variation in Mach number will be achieved.

Varying the RPM of the suction fan motor

The test section shall have a two sided glass window of 12-15 mm thickness, providing sufficient optical access to do the imaging experiments. It shall have arrangements for measuring stagnation, static, and dynamic pressure measurements.



Cross-Section dimension of test section (mm)	RPM Modification	Mach Number Required	Velocity Required (m/s)	Compliance Yes or NO
200 X 200 mm	900	0.15	52	Yes
200 X 200 mm	1200	0.2	69	Yes
200 X 200 mm	1500	0.25	86	Yes
200 X 200 mm	1800	0.3	104	Yes

Note: The cross-sectional dimensions of the test section shall not be less than 150 mm x 150 mm under any circumstances.

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Dimensions

Total length of the flow channel: 18 ft

Working Test section length: 3.6 ft

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Blower and Drive System

Motor type: Three-phase squirrel cage Induction motor

Power rating: 10-12 HP (as per performance requirement)

Operating voltage: 415 V $\pm 10\%$, 50-60 Hz

Blower: High-efficiency axial or mixed-flow type with dynamically balance fan blades

Flow direction: Reversible (forward and reverse) airflow across the test section

Air Velocity Requirements

Required velocity range in the test section: 1 to 55 m/s (for airflow)

Airflow shall be uniform and stable across-section of the test area (Turbulence

Intensity preferably around 1% to 2%)

Install honeycomb flow straighteners and fine mesh screens upstream in the channel

Structural and Safety Features

Outer body of channel with appropriate reinforcement.

Safety guard on the front side.

Anti-vibration pads for the blower (suction Fan) and motor assembly for stability.

Variable Frequency Drive (VFD)

Capacity: 3 HP, 3-phase

Input voltage: 415V

Output frequency: 0-60 Hz

Suitable for smooth motor speed control and direction reversal

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Airflow Measurement

Airflow sensor with Pitot tube

Pressure difference of the test section

Flow measurement probe tube diameter (size) less than 2mm.

Measuring range: 0.5 to 110 m/s

Accuracy: $\pm 2\%$

Repeatability: 0.5%

Temperature Measurement

Sensor type: T-type thermocouple

Measuring range: 5°C to 120°C

Accuracy: $\pm 1\%$

Data Acquisition and Control System

For controlling motor speed, airflow direction, and real-time measurement test section parameters such as velocity and temperature (Digital display interface for all measured parameters)

All parameters shall be viewable on a digital display screen. Control system must be capable of handling and regulating a variable electric heater load of 50-60 kW

Inputs to Control System

type temperature sensors: 4 Nos.

Airflow sensor: 2 No. at the portion of the inlet and outlet of the test section

Heater input power measurement



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Outputs from Control System

0-10 V analog output: 1 channel
4-20 mA analog output: 1 channel
Solid State Relay (SSR): 3 channels
USB 2.0 interface



Software Requirements

LabVIEW-based software for complete parameter monitoring and control, including motor speed, airflow, direction, temperature and heater operation.

Functionality: Real-time data acquisition, Graphical display of parameters, control of airflow, direction, temperature and heater, data logging and export features



Delivery period: 16 weeks

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