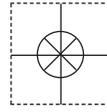


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User's Guide



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WT-3100

Controlled Open Loop Wind Tunnel



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The information contained in this document is believed to be correct, but OMEGA accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, human applications.

SYSTEM UTILITY

The WT-3100 is a unique open loop wind tunnel for thermal characterization of components, boards and heat sinks. The unit is made of Aluminum, stainless steel and Plexi-glass™ and produces flows up to 2000 ft/min (10 m/s) with the appropriate fans. Its unique polynomial shape nozzle creates uniform flow in the test section. The general characteristics of the WT-3100 are shown in the table below.

ITEM	SPECIFICATION	EXPLANATION
Length	71" (180cm)	
Width	18" (45.7 cm)	
Weight	130 lbs. (60 Kg.)	
Flow range	Up to 2000 ft/min (10 m/s)	Can be changed to higher speeds with selection of the appropriate fans.
Wall-to-wall spacing	3.00" (7.6 cm)	Can be custom designed for a specific application

The WT-3100 test section can be accessed from the front door for mounting of the boards. A unique internal rail guides provide mechanisms for installation of test specimen of different sizes (e.g., PCB, heat sink). Installation of different fan trays can be provided with the system to accommodate a broad range of velocities that maybe required for different testing applications. The fan trays are equipped with 24 volt-DC fans, which are individually controlled to generate the flow inside the WT-3100. Instrument ports are provided throughout the test section (on the front and side-walls) for placement of temperature, velocity and pressure sensors. The electric control box is provided to turn the fans on/off for the purpose of controlling the airflow inside the tunnel. Sensors to measure the flow parameters are also supplied by Omega as optional accessories. A wind tunnel controller can also be supplied by Omega for controlling the flow automatically.

The WT-3100 can be used for the following applications:

- **Heat Sink Testing-** Characterize a variety of heat sink sizes for natural and forced convection cooling.
- **Heat Sink Comparison-** Test two heat sinks side by side and compare their thermal performance in the same environment.
- **Component Testing-** Test vehicle for component characterization.
- **PCB Testing-** Test actual or simulated PCBs for thermal and flow distribution.
- **Flow Visualization-** Observe flow distribution when a PCB or test object is placed in the tunnel by smoke or buoyant bubbles through the all Plexi-glass™ test section.
- **Variable Speed-** Change the flow rate by controlling the fan RPM.
- **Flow Direction-** Test the effect of flow direction (fan failure simulation) by controlling the fans (either variable RPM or on/off).
- **Quick Access-** Quickly change the test specimen through the side panel.
- **Sensor Port-** Measure pressure, velocity and temperature through the ports at the entrance and exhaust of the test section.
- **Data Center-** View data and monitor events at the data center (optional accessory)

SYSTEM COMPONENTS

The part numbers identified in Figure 1 show the system components of the WT-3100. These part numbers are described below:

1. Test Section
2. Instrument ports
3. Fan tray
4. Diffuser section
5. Fan box (on/off)
6. Nozzle section
7. Controller
8. Fan connector
9. Test door
10. Stands
11. Honeycomb
12. Screens



Figure 1: The WT-3100 System Components

SYSTEM OPERATION

General Testing:

1. Release the clamps on front door to have access to the test section.
2. Mount your specimen (e.g., component, PCB or heat sink) in the test section.
3. Clamp the door back on the WT-3100.
4. Place flow measurement instrument in the instrument port.
5. Connect the fan cable to the controller box (5).
6. Connect the fan controller box (5) to a DC power supply or wind tunnel controller.
Important Note: Voltage to the fans cannot exceed 26 Volts-DC.
7. Adjust voltage until desired flow rate is attained.

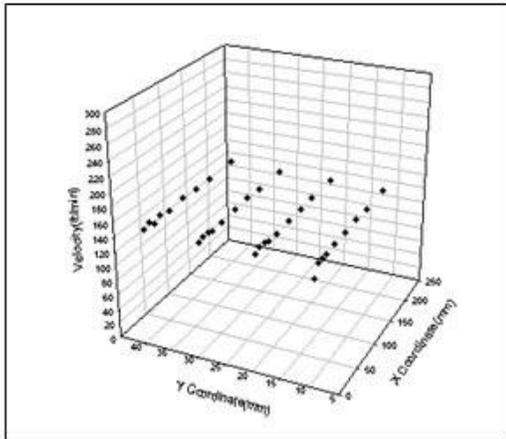
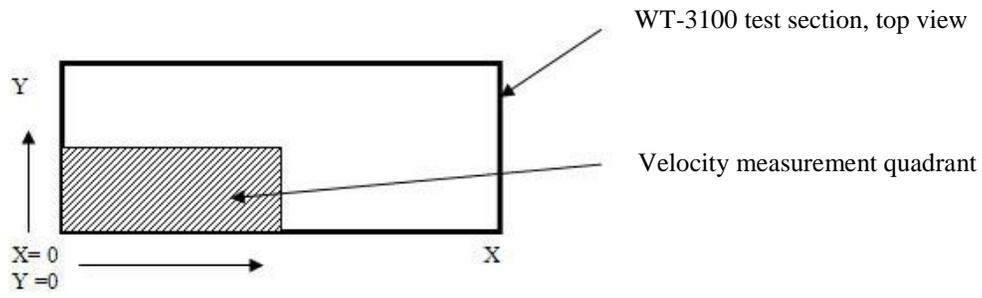
Component and Heat Sink Testing:

1. Release the clamps on front door to have access to the test section.
2. Mount your component(s) in the test section.
3. Clamp the door back on the WT-3100.
4. Connect the fans to a variable DC power supply. Voltage to the fans cannot exceed 26 Volts-DC. Adjust voltage until desired flow level is attained.
5. Insert the velocity and temperature probes into the instrument ports provisioned in upstream of the test section.
6. Turn on the power supplies and start the experiment.

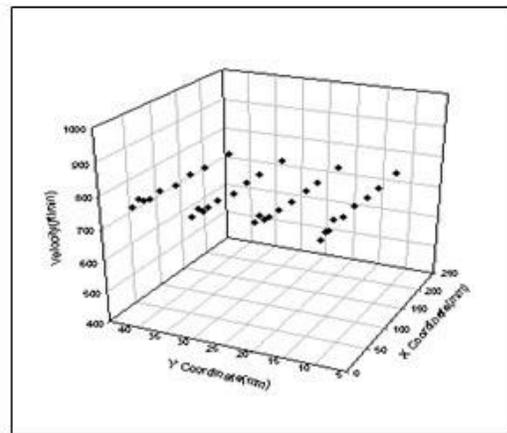
Note: If the wind tunnel is provided with a heat slug, please apply a coating of thermal grease to the cylindrical heater and place it inside the hole in the Delrin housing behind the test plate. Measure the resistance of the heater with a Multimeter. Connect the the heater to an external power supply and adjust the voltage for the desired power dissipation. Please make sure that the temperature of the heater does not become excessive, otherwise it will damage the Delrin hosing. Depending on the heat sink that is mounted on the slug, always start with a low Watt to get a feeling for the temperature.

VELOCITY PROFILE

Measurement method- TVS-1100 (a hot wire anemometer) system was used to map out the velocity profile at the inlet of the test section. The velocity was measured at 36 points in one quadrant of the test section for two different velocity levels, 0.75 m/s and 4 m/s (150 and 800 ft/min, respectively).



Velocity Distribution for one quadrant of the WT-3100 Wind Tunnel Cross Section at 150 ft/min



Velocity Distribution for one quadrant of the WT-3100 Wind Tunnel Cross Section at 800 ft/min

X (mm)	Y(mm)	Velocity – nominal velocity, 150 (ft/min)	Velocity – nominal velocity, 800 (ft/min)
10	10	138	770
10	20	154	788
10	30	153	775
10	40	153	772
20	10	153	783
20	20	157	800
20	30	155	790
20	40	158	790
30	10	153	776
30	20	158	775
30	30	155	771
30	40	151	773
40	10	153	796
40	20	153	773
40	30	152	775
40	40	158	771
60	10	154	785
60	20	152	775
60	30	153	775
60	40	152	776
90	10	154	784
90	20	153	768
90	30	154	766
90	40	155	766
120	10	155	780
120	20	153	774
120	30	155	772
120	40	153	769
150	10	154	781
150	20	154	770
150	30	153	769
150	40	154	767
202	10	154	781
202	20	154	770
202	30	153	769
202	40	154	767

**Velocity distribution at the inlet of the test section for
WT-3100 Wind Tunnel**



WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

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1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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