

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.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

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 or calibration,
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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RS232 Communication

The wind tunnel controller has the ability to communicate to your PC via RS232 communication through the USB port.

Commands

Description: returns the firmware version number
Syntax: ENQ [CR/LF]

Description: changes the velocity of a specific fan
Syntax: PWM "fan#" "vel" [CF/LF]

Notes: "fan#" is a value between 0 and 3; each number representing one of the 4 fans to control. Fan 3 is the fan closest to the base of the wind tunnel. "vel" is a value between 0 and 2400. The fans will not start reliable below a value of 300, so do not command them to operate below this range.

Hot Wire Anemometer Correction Factors

When using Hot Wire Anemometers in conditions that are other than the standard condition – 29.92 inches of Hg and 70°F (22.2°C), correction factors must be used. The correction factor question for K1 is as follows:

$$K1 = (29.92/P) \times (460 + T)/530; \text{ where}$$

P = the Barometric pressure in inches of Hg

T = the ambient temperature in °F.

The second correction factor K2 is obtainable from the following table.

Model No.	Description	Half Velocity	Full Velocity
FMA-904	Hot Wire 0 -2000 FPM	1.04	1.00
FMA-905	Hot Wire 0 -5000 FPM	1.00	1.00
HHF42	Hot Wire 40-3940 FPM	1.04	1.00

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Specifications

Test Chamber:	17 x 3.25" Cross Section
Flow Rates:	0 to 5 m/s (1000 FPM)
Speed:	3800 RPM
DC Fan Motor:	12 Vdc @ 0.47A ea. (5.6W ea.)
Noise:	61 dBA from 1 meter away
Power Input:	90-264 Vac @ 47-63Hz
Fuse:	2A Fast Acting 5x20mm Cartridge Type
Operating Temperature:	5 to 45°C (41 to 113°F)
Operating Relative Humidity:	Less than 80% RH without condensation
Size:	
Wind Tunnel:	80.5 L x 18.4 W x 48.4 cm H (31.7 L x 7.3 W x 19.1" H)
Electrical Control Box:	16 L x 13.8 W x 6.7 cm H (6 ¼ L x 4 ⅞ W x 2 1/16" H)
Weight:	
Wind Tunnel:	12.48 kg (27.5 lb)
Electrical Control Box:	0.9 kg (2 lb)

NOTE:

All specifications measurements taken at an ambient room temperature of 22.3°C (70°F) with less than 80% relative humidity and 29.92 inches of Hg barometric pressure.

QUICK START

For complete product manual:
www.omega.com/manuals/manualpdf/M4634.pdf



WT-2000
Thermal Wind Tunnel

Ω OMEGA®

omega.com info@omega.com

Servicing North America:

U.S.A.: OMEGA Engineering, Inc., One Omega Dr.
P.O. Box 4047, Stamford, CT 06907-0047 USA
Toll-Free: 1-800-826-6342 (USA & Canada Only)
Customer Service: 1-800-622-2378 (USA & Canada Only)
Engineering Service: 1-800-872-9436 (USA & Canada Only)
Tel: (203) 359-1660 Fax: (203) 359-7700
e-mail: info@omega.com

For Other Locations Visit omega.com/worldwide

It is the policy of OMEGA Engineering, Inc. to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

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.

Using This Quick Start Manual

Use this Quick Start Manual with your WT-2000 thermal wind tunnel for quick installation and operation. For detailed information, please refer to the User's Guide (Manual Number M4634).

PRECAUTIONS:

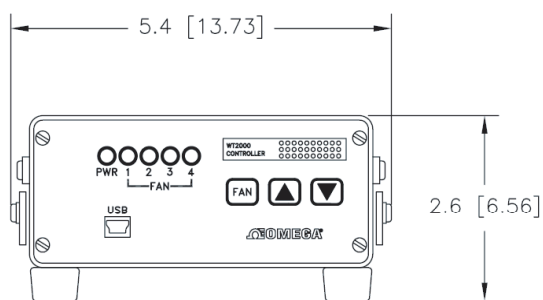
A wind tunnel's performance can be severely diminished if not used properly. Please follow the following tips:

- Do not use the wind tunnel in rooms with less than 1800 cubic feet. The air flow creates currents that undermine the wind tunnel's accuracy.
- There should be at least 1.5 m (5 feet) clear space in front of and behind the wind tunnel. No obstacles, moving objects, or open doors or windows.
- Locate the exhaust towards the largest open area of the room to minimize room air currents. The higher the flow rate, the greater the chance of creating currents.

General Information

The thermal wind tunnel model WT-2000 is designed to produce variable flow rates inside a rectangular 17 by 3 ¼" cross sectional area test chamber. The wind tunnel has an electronic control unit where it controls the four compact, high power density fans. Velocity can be controlled via simple push buttons user input, or by the free PC based software control via USB cable for optimum performance.

The thermal wind tunnel is recommended for the testing of circuit boards and heat sinks, as well as other temperature related products. The four fans can be controlled independently, in groups of two, or all together to produce a wide range of different air flows.



DIMENSIONS: IN. [CM.]

Front View Of Electrical Control Box

Operation

Before operating the wind tunnel, please follow all precautions then proceed as follows:

1. Make sure the power switch in the back of the electronic control unit is off, then connect the cable from the DC fans on the wind tunnel to the back of the electrical control box labeled 'fan control'.
2. Connect the AC input of the control unit to a line voltage (90 to 264 VAC @ 50/60 Hz) with the Power cord provided. Please refer to the accessory table for power cords for other countries.
3. Turn on the Power switch in the back. The power LED indicator on the front of the control box will turn on.
4. The four fan LEDs show which fan velocity is going to be modified using the up and down arrows. Once a fan velocity has been set using the arrow keys it will maintain the same velocity, even if the FAN button is pushed to control a different fan or combination of fans. Pushing the FAN button cycles through the possible fan selections: Fan1 only, Fan2 only, Fan3 only, Fan4 only, Fan1 & Fan3, Fan2 & Fan4, Fan2 & Fan3, Fan1 & Fan4, or all 4 Fans. For optimum performance use the supplied PC interface software to control the fans.
5. To change the fan speed, use the arrow up and arrow down keys. They may be pressed and released for small adjustments, or held for larger adjustments.

PC Interface Software (Optional)

After following the steps in the previous section for operating the wind tunnel, you can optionally connect the USB cable from a PC with the Omega wind tunnel control software to the wind tunnel electrical control box. This simple software allows for quick, precise open loop control of the DC fan velocities. Connecting the USB cable to the electrical control box will "lockout" the front panel buttons on the electrical control box. The user can verify that the front panel is "locked out" when the 4 fan LEDs are extinguished.

Software Installation

Insert the WT-2000 user software CD that was included with your unit into the CD-ROM drive on your PC. Your system should begin the installation process automatically. If it does not, go to my computer, and open the drive in which the user software CD is located. Find and open the Setup.exe installation file. Follow the step-by-step on-screen instructions to complete the installation.

USB Driver Installation

To install the USB software drivers that are required for your WT-2000 controller to work properly please follow the following procedure.

1. Make sure the WT-2000 controller power switch is in the off position before connecting it to the computer using the USB cable.
2. Connect the WT-2000 controller by connecting the supplied USB cable between an unused USB port and the WT-2000 controller.
3. Turn the power switch on the back of the WT-2000 controller to the on "I" position.
4. Your computer will then launch the Found New Hardware Wizard. Follow the step-by-step on-screen instructions.
5. After completing the installation, your system will ask that you repeat this process. This is normal. Repeat the steps outlined here twice. After the second driver is installed you should then get a notification "New Hardware Ready for Use".

Connecting and Controlling the Wind Tunnel

Before launching the program you have just installed, ensure that the line cord, fan control cable, and USB cable are connected to the WT-2000 controller. The available COM ports will load when the program is started. To refresh this list, click "File" on the menu bar and click "Refresh COM Ports". Select the COM port which has been assigned to the WT-2000 controller, and click connect. The rest of the controls will become accessible after a proper connection has been established.

There are two distinct ways to control the wind tunnel using the WT-2000 PC interface:

1. On the left of the window are the single fan controls. The user can enter a value between 0% and 100% by either typing a value in the text box, using the mouse to click the up or down buttons on the program, or by using the up and down arrows on the keyboard. When typing in a value, the user must press "Enter", "Return", or "Tab" on the keyboard to update the value and move to the next control; or use the mouse to navigate to another control.
2. On the right, there are fan selection boxes and groups present buttons. To use them, check off the fans for which you want to control, and use the

preset control, and use the buttons to change the velocity for each selected fan. The new velocities will be reflected in the Single Controls on the left side of the page, and fine tuning can be completed in the Single Controls box.

NOTE:

The value in the control represents a linear percentage of fan velocity within the reliable operation of the fan. The values are NOT a true percent of fan velocity, because the fans do not operate reliably below a certain threshold. Both the Controller alone and the Software interface establish the 1% value as slightly above that threshold so that the fans are always running within their reliable operation range.

Sensing

The WT-2000 wind tunnel has been built with the ability to accommodate for a wide variety of sensors, including temperature sensing devices (such as thermocouples, RTDs, and thermistors) and air velocity sensors (such as hot wire anemometers). There are several ports that can be used to allow for sensors to be inserted into the wind tunnel for measurement during operation. Compression fittings and port hole caps have been included for insertions into desired ports.

Sensor Considerations

Please consider the following points while using the WT-2000 with a sensor:

- Open ports may dramatically affect air flow. Please seal measurement ports and close the door tightly to ensure proper flow.
- Air flow will change with the size and the shape of the unit under test.
- Avoid the use of large temperature sensing probes on small devices. They may act as heat sinks; especially with high air velocity. It is suggested to use surface mounted types of temperature sensors for better accuracy.
- Avoid damage to the Honeycomb flow straightener.
- When using the compression fittings for holding probes in place, use the Teflon ferrule inserts to hold the probe by hand tightening the compression fitting. Do not use tools or wrenches.