INSTRUCTION MANUAL

MT948

THERMO ANEMOMETER

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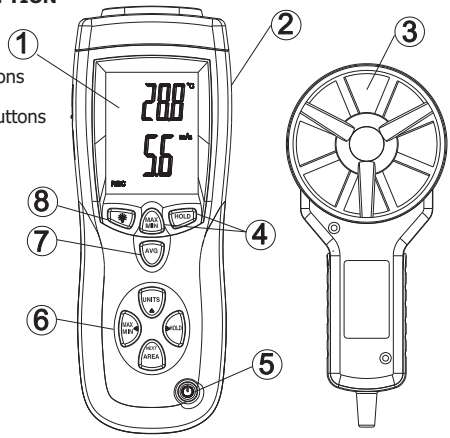
1. INTRODUCTION

The MT948 CFM/CMM Thermo Anemometer instrument measures Air Velocity, Air Flow (volume) and Temperature. The large, easy-to-read backlit LCD includes primary and secondary displays plus numerous status indicators. The meter is shipped fully tested and calibrated and with proper use will provide years of reliable service.

2. METER DESCRIPTION

1. LCD Display
2. Meter
3. Vane
4. Temperature Buttons
5. Power On/Off
6. Airflow Velocity Buttons
7. AVG Backlight



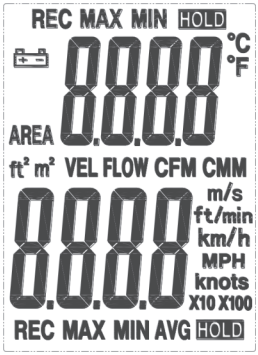
3. KEY PAD

- **POWER** ⏻ Press to turn the meter ON or OFF
- MAX/MIN Used to record and store the highest, lowest and average airflow or velocity readings.
  ◄ (LEFT) also serves as change decimal point button in AREA mode
- **UNITS** Press to select the mode of operation. In FLOW mode, the meter displays air *volume*. In VELOCITY mode, the meter displays air *speed*.
  ▲ (UP) also serves as increase number button in AREA mode.
- **AVG** Used to Average multiple readings in FLOW or VELOCITY mode. Up to 20 readings can be averaged.
- **HOLD** Press to freeze the displayed reading. Press again to unlock display. This button also functions as the ► RIGHT scroll button in AREA mode.
- **AREA / NEXT** Press and hold to manually enter the area of a duct in CFM or CMM mode. In AREA mode, used to select memory locations 1-8.

- ☼ Press to turn the backlight on/off
- **MAX/MIN (Temperature)** Used to record and store the highest, lowest readings for air temperature.
- **°C °F HOLD (Temperature)** Press to freeze the displayed temperature reading. Press again to unlock the display. Press and hold for 3 seconds to switch between °C and °F. Meter will beep twice to indicate change.

Battery compartment located on the back of the instrument. The rubber protective jacket must be removed from the meter to access the compartment.

4. DISPLAY LAYOUT



- **MAX** (top of LCD): Max Hold function engaged for the Air Temperature function
- **HOLD** (top of LCD): Data Hold function engaged for the Air Temperature function
- **VEL**: indicates that meter is in air velocity mode
- **FLOW**: indicates that meter is in air flow mode
- **MAX** (bottom of LCD): Max Hold for the Air Velocity and Air Flow function
- **HOLD** (bottom of LCD): Data Hold for the Air Velocity and Air Flow function
- **°C / °F**: Temperature units of measure
- **CFM/CMM**: airflow units of measure
- **AREA** (ft^2,m^2): units for area dimensions
- **M/s, ft/min, km/h, MPH, knots**: air velocity units of measure
- **X10, X100**: multipliers for air flow readings
- **AVG**: air averaging mode
- **REC**: indicates that min/max function is running (top for temp, bottom for air) Large LCD digits at bottom of display for Air Velocity and Air Flow. Smaller LCD digits at top, right of display for Probe Temperature
  : Low battery indicator

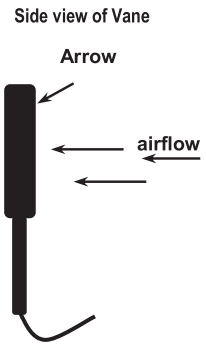
5.OPERATION

5.1. Connecting the Vane

1. The vane plug is inserted in the meter's sensor jack at the top of the meter. The plug and jack are keyed so that the plug can only fit in the jack one way.
2. Turn the plug carefully until it lines up with the jack and then firmly push the plug in place. Do not apply undue force or try to twist the plug side-to-side.
3. If the vane is not connected to the meter or if the sensor is defective, the LCD display will indicate **OL** in place of a Temperature reading.

5.2. Air Velocity Measurements (Single Point)

1. Turn on the meter using the ON/OFF ⏻ button.
2. Press **UNITS** button to select the desired unit of measure. **NOTE:** At power up the meter will display the last unit of measure previously entered.
3. Place the sensor in the air stream. Ensure that the air enters the vane as indicated by the arrow sticker placed inside the vane.
4. View the readings on the LCD Display. The large main LCD display shows the Air Velocity reading. The upper right LCD sub-display shows the temperature reading.

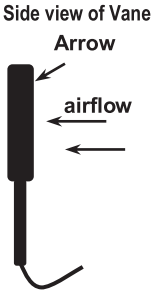


5.3. Air Velocity Averaging Mode

1. To enter 20 Point Averaging Mode, press and hold the AVG button until it beeps twice. The **AVG** icon will be displayed.
2. Take a measurement and press the **AVG** button. A single beep will sound and the **HOLD** icon will appear in the display.
3. The average reading will be displayed and number of readings measured will appear in the upper right hand corner of the display. After 5 seconds, the display will return to the current reading.
4. Repeat steps 2 - 3 until the desired number of points have been measured.
5. To return to standard velocity measuring mode press and hold AVG button until meter beeps twice.

   Note: In the standard velocity measuring mode, press the AVG button once to recall the previous average. The average will be cleared when you enter the Averaging Mode again.

5.4. Air Flow Measurements (CMM / CFM)



1. Turn on the meter using the ON/OFF ⏻ button.
2. Press the UNITS button to select the desired air flow units: CMM (cubic meters per minute) or CFM (cubic feet per minute). **NOTE:** At power up the meter will display the last unit of measure previously entered.
3. To begin entering the area in m² or ft², press and hold the **AREA** button until it beeps twice. The left most digit of the bottom display will begin to flash.
4. Use the ▲ (UP) button to change the flashing digit Use the ◀ (LEFT) button to move the decimal. Use ▶ (RIGHT) button to select the other digits. After all of the digits are entered, press and hold the **AREA** button (until meter beeps twice) to save the area into memory and return to CFM or CMM measuring mode.
5. Place the sensor in the air stream. Ensure that the air enters the vane as indicated by the arrow sticker placed inside the vane. Refer to the diagram. The large main LCD display shows the Air Velocity reading. The upper right LCD sub-display shows the temperature reading.

The meter has 16 memory locations (8 for CFM and 8 for CMM) that can be used to store commonly used area sizes that you can recall at anytime.

1. Press the **AREA** button until meter beeps twice. A memory location number will appear in the top right of the display indicating the memory location.
2. Push the NEXT button to scroll through and select the desired location. Once you have selected the desired memory location enter your dimension. Use the ▲ (UP) button to change the flashing digit. Use the ◀ (LEFT) button to move the decimal. Use ▶ (RIGHT) button to select the other digits. After all of the digits are entered, press and hold the AREA button (until it beeps twice) to save the area into memory and return to CFM or CMM measuring mode.

To select and use a previously stored dimension, press and hold the **AREA** button until it beeps twice.

Press **NEXT** to scroll through the 8 memory locations. Press and hold the **AREA** button until it beeps twice to return to CFM or CMM measuring mode.

5.5. Air Flow Averaging Mode

1. To enter 20 Point Averaging Mode, press and hold the **AVG** button until it beeps twice. The **AVG** icon will be displayed.
2. Take a measurement and press the **AVG** button. A single beep will sound and the **HOLD** icon will appear in the display.
3. The average reading will be displayed and number of readings measured will appear in the upper right hand corner of the display. After 5 seconds, the display will return to the current reading.
4. Repeat steps 2 - 3 until the desired number of points have been measured.
5. To return to standard airflow measuring mode press and hold AVG button until meter beeps twice.

   Note: In the standard velocity measuring mode, press the AVG button once to recall the previous average. The average will be cleared when you enter the Averaging Mode again.

5.6. Data Hold (Air Velocity/Air Flow)

1. While taking measurements, press the **HOLD** button to freeze the air velocity/air flow reading.
2. The **HOLD** indicator will appear in the bottom of the **LCD** display.
3. Press **HOLD** again to return to normal operation.

5.7. MAX/MIN/AVG Record (Air Velocity/Air Flow)

This allows the user to record and view the highest (MAX), lowest (MIN) and average (AVG) readings.

1. Press the button **MAX/MIN** button. The **MAX** indicator and **RECORD** indicator along with the Max reading will appear on the LCD display and the meter will begin keeping track of the MAX, MIN and Average values.
2. Press the **MAX/MIN** button again to view the minimum reading. The **MIN** indicator along with the minimum reading will appear on the LCD display.
3. Press the **MAX/MIN** button again to view the average reading. The AVG indicator along with the average reading will appear on the LCD display.

   NOTE: Average recording will stop automatically after 2 hours, and the upper LCD sub-display will show an OFF (only in the average mode).
4. Press the **MAX/MIN** button again to display current readings.
   NOTE: the meter will keep recording MAX/MIN/AVG readings.
5. To clear and stop MAX/MIN/AVG recording and return to normal operation, press and hold the **MAX/MIN** button until the meter beeps twice.

5.8. Automatic Power OFF

To conserve battery life, the meter automatically turns off after 20 minutes. To disable this feature:

1. Turn the meter OFF.
2. Press and hold the ☼ (Backlight) key while turning the meter ON.
3. "dis APO" will appear in the display. The AUTO POWER OFF feature will now be disabled.
4. Note that AUTO POWER OFF is re-enabled each time the meter is turned on.
5. Also note that AUTO POWER OFF is disabled in CFM/CMM or Average mode.

6. BATTERY REPLACEMENT

When  appears on the LCD, the 9V battery must be replaced.

1. Disconnect the sensor.
2. Remove the meter's rubber protective jacket
3. Use a Phillips screwdriver to open the rear battery compartment
4. Replace the 9V battery
5. Close the battery compartment and replace the meter's protective cover

7. SPECIFICATIONS

Air Velocity	Range	Resolution	Accuracy
mis (meters per sec)	0.40 - 30.00m/s	0.01M/s	±(3% + 0.20m/s)
km/h (kilometers/hour)	1.4 - 108.0km/h	0.1km/h	±(3% + 0.8km/hr)
ft/min (feet per minute)	80 - 5900ft/min	1ft/min	±(3% + 40ft/m)
mph (miles per hour)	0.9 - 67.0mph	0.1mph	±(3% + 0.4MPH)
knots (nautical MPH)	0.8 to 58.0knots	0.1knots	±(3% + 0.4knots)

Air Flow	Range	Resolution	Area
CMM (cubic meters/min)	0-999900m3/min	0.001 to 100	0 .000 to 999.9m2
CFM (cubic ft/min)	0-999900ft3/min	0.001 to 100	0.000 to 999.9ft2

Air Temperature	Range	Resolution	Accuracy
	-10°C - 60°C (14°F -140°F)	0.1°C/°F	2.0°C (4.0°F)

7.1. Gerenal Specifications

Function	Range
Circuit	Custom LSI microprocessor circuit
Display	Dual function 0.7" (16mm) 4-digit LCD
Sampling rate	1 reading per second approx.
Sensors	Air velocity/flow sensor: Conventional angled vane arms with low-friction ball bearing Temperature sensor: NTC-type precision thermistor
Automatic Power off	Auto shut off after 20 minutes to preserve battery life
Operating Temperature	0°C to 50°C (32°F to 122°F)
Storage Temperature	10°C to 60°C (14°F to 140°F)
Operating Humidity	<80% RH
Storage Humidity	<80% RH
Operating Altitude	2000 meters (7000ft) maximum
Battery	One 9 volt (NEDA 1604) battery
Battery life	80 hours approx. (if the Backlight is used continuously, battery life will be reduced significantly)
Battery Current	8.3 mA DC approx.
Weight	725g including battery & probe
Dimensions	Main instrument: 203 x 75 x 50mm Sensor Head: 2.75" (70mm) Diameter

8. USEFUL EQUATIONS AND CONVERSIONS

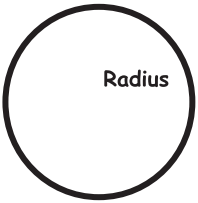
Area equation for rectangular or square ducts

Height (H)

Width (W)

Area (A) = Width (W) x Height (H)

Area equation for circular ducts



Area (A) = x r^2

Where = 3.14 and r^2 = radius x radius

Cubic equations

CFM (ft^3/min) = Air Velocity (ft/min) x Area (ft^2)
CMM (m^3/min) = Air Velocity (m/sec) x Area (m^2) x 60

NOTE: Measurements made in inches must be converted to *feet* or *meters* before using the above formulas.

Unit of Measure Conversion Table

	m/s	ft/min	knots	km/h	MPH
1 m/s	1	196.87	1.944	3.6	2.24
1 ft/min	0.00508	1	0.00987	0.01829	0.01138
1 knot	0.5144	101.27	1	1.8519	1.1523
1 km/h	0.2778	54.69	0.54	1	0.6222
1 MPH	0.4464	87.89	0.8679	1.6071	1

MAJOR TECH (PTY) LTD

South Africa

www.major-tech.com

sales@major-tech.com

Australia

www.majortech.com.au

info@majortech.com.au