

# Automotive HVAC Manikin

- Complete turn-key system for measuring the impact of car/truck heating and air conditioning designs on passenger comfort.
- Integrated external sensor matrix measures air velocity, temperature, radiant heat flux, and relative humidity,
- 50th percentile Western or Asian Male body form (carbon-fiber/epoxy shell).
- Manikin jointed at the shoulders, hips, knees, elbows, and ankles.
- Manikin separates into two parts (at the waist) for easy placement into driver or passenger seats
- Mitten-shaped hands feature a curved, gripping shape for positioning onto the vehicle steering wheel
- Flattened thigh surface (backside and buttock) closely approximates human thigh compression when seated.
- Control electronics with wireless communication.



Developed for high-accuracy measurements of environmental conditions and passenger comfort in automobile/truck/transit cabins, the Automotive HVAC Manikin is an unheated "Newton" carbon-fiber/epoxy body form with surface-mounted sensors that measure air velocity (omnidirectional), temperature, radiant heat flux, and relative humidity. Sensors are protected to ensure no damage occurs during manikin loading and positioning.

The Automotive HVAC Manikin separates into upper and lower halves at the waist for easy insertion into any vehicle. Hands are mitten-shaped, with a curved, gripping design to allow for proper positioning onto the vehicle steering wheel. Their shape does not impact air movement, but permits airflow similar to that of a human grip/fist. Thigh backs are flattened to simulate compression for realistic airflow patterns. System includes manikin, Dell PC computer, sensors, control electronics with wireless communication capability, and data logging software.



Instruments for Textile  
and Biophysical Testing

# Automotive HVAC Manikin System

## Standard Specifications

Lightweight carbon-fiber/epoxy shell (unheated)  
Jointed at shoulders, hips, knees, elbows, and ankles  
Shoulder joints allow arms to move in or out from the torso, reflecting a range of typical driver positions  
Body separates at the waist into two parts for loading into test vehicles  
Surface-mounted sensors measure air temperature, velocity, radiant heat flux, and relative humidity  
Sensor covers protect temperature/airflow elements during transport and positioning  
Mitten shaped hands and flattened thighs (backside and buttock) for improved airflow patterns  
Control electronics include wireless communication via IEEE802.11 network devices  
Power and data cables attach at the manikin side  
CAD model graphics can be provided for integration into vehicle simulation programs  
Multiple manikins can be linked into one data system  
Laptop PC computer and control software included  
Operators manual  
One year warranty

## Environmental

-20°C to +70°C operating range  
0 to 100% R.H. including condensation

## Sensor Performance and Quantity

### Air temperature (60):

-20°C to +70°C measuring range  
+/- 1.0°C calibrated accuracy  
+/- 0.1°C resolution

### Air Velocity (60):

0.1-5.0 m/sec measuring range  
Temperature compensated from -20°C to +70°C

### Radiation (30):

Near zero to >3,000 W/m<sup>2</sup> measuring range  
1-20 um wavelength

### Relative Humidity (5):

0 to 95% RH, non-condensing

*Other sensor combinations can be accommodated*

## "HVAC" Manikin Size

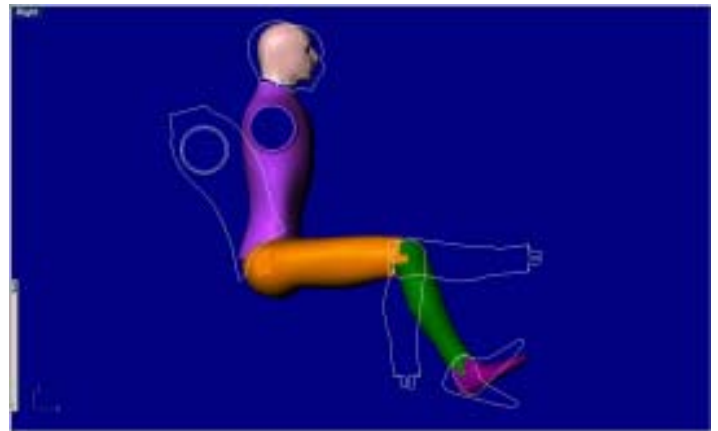
50th percentile Western or Asian Male body form  
Height: 178.5 cm (70.3 inches) - Western  
168.5 cm (66.3 inches) - Asian  
Surface area: 1.8 sq/m (19 sq/ft)  
Weight: 22 kg (55 lbs)

*Call for a quote on custom sizes*

## ThermDAC (HVAC) Control Software

ThermDAC was developed by Measurement Technology Northwest specifically for manikin test data collection and analysis. It is a user-friendly, intuitive, Windows-based application providing full device control, fault detection, and data logging capabilities. Sensor calibration tests can also be carried out within ThermDAC.

## "HVAC" Manikin Range of Motion



Joint	Rotary motion	Lateral motion
shoulders	-45 to 180 degrees	none
elbows	0 to 90 degrees	+/- 8 degrees
hips	-30 to 90 degrees	none
knees	0 to 90 degrees	+/- 8 degrees
ankles	+/- 30 degrees	+/- 8 degrees
wrists	+/- 180 degrees at axis	none



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