

Application Note Series

Automotive Cabin Comfort and Airflow Performance Testing



Product Platform:	Airflow Research and Development Instrumentation
Product:	°C Grid with Datalogging Software
Purpose:	Multi-Point Velocity and Air Temperature Sensing Across Planar Regions of Space
Testing Range:	0.25 m/s to 40.0 m/s [50 fpm to 8000 fpm]

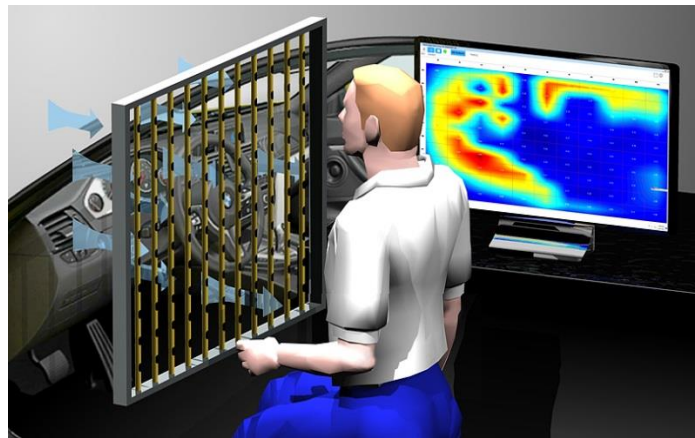
ABSTRACT:

Sophisticated automotive cabin comfort and real-time air flow performance are becoming more important to demanding consumers, with quick comfort recovery and passenger-based decision making among the key criteria for success. Airflow management is no longer only controlled by a driver; instead, zonal control is available to occupants, whose comfort demands are dynamic and individualized. While providing this level of autonomy to the driver and passengers, performance criteria for operational safety, such as defrost airflow uniformity and acoustic noise mitigation, cannot be compromised. These factors contribute to a need for more advanced airflow performance measurement and pass-fail criteria.



SOLUTION:

To quantify the performance of airflow systems in vehicles, from both the perspective of personal comfort and deployment-efficiency of heated and cooled air, a grid array of multiple airflow sensors is required. This is not feasible with single point measurement devices such as vein anemometers or hand-held probe style anemometers which are cumbersome, interfere with the airflow profile, and are generally non-repeatable due to the nature of the hand-held setup.



Using patented sensor technology, degreeC builds space-efficient multipoint airflow systems, which precisely measure the air velocity and the air temperature at hundreds of points, simultaneously, all recorded to a PC over a single USB connection.

This is called °C Grid, and it is revolutionizing automotive cabin comfort testing.

Using the °C Grid, clients are able to design acceptability criteria for air velocity and temperature, in the automotive cabin area, while changing blower speeds, vent angles, or open-vent configurations, in order to create performance-based test and measurement plans. These tests can be reused to baseline the performance of new automotive cabins or cabin designs changes, and determine effects upon airflow and heat energy profiles.

Each sensor location in the °C Grid provides real-time velocity and temperature of the airflow. Paired with the datalogging software, users can change the data polling rate, unit of measure, and enjoy multiple point readings acquired real-time by their PC with the simplicity of pressing a button. A real-time graphical interface toggles between velocity and air temperature across the planar region.

The sensor layout, quantity, and frame are built to client specification, and may have virtually any profile. The profile can match a seat, dashboard, or human-body profile, or span the width of the cabin.

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FEATURES AND BENEFITS:

Planar area airflow mapping:	The °C Grid is the only fully customizable and single wire interface tool, for measuring airflow distribution across a planar area, with simultaneous polling of multiple (up to 300) sensors.
Datalogging Software:	The °C Grid comes with datalogging software which allows the user to change polling intervals, and stores data in convenient format for instant importing into spreadsheet and mathematical tools.
Real-time display:	The °C Grid provides real-time, visual gradient mapping of both velocity and temperature. Users can see the effects of vent angle and heat/cool cycling in real time.
Flexible:	For use in cabin comfort, window-defrost, and engine compartment (radiator) testing.
Custom calibration ranges:	For increased accuracy, constrained calibration ranges available. Certificate of calibration included.
Manufacturing excellence:	Degree Controls has more than 25 years of airflow sensor experience and is used by many Fortune 500 companies. RoHS Compliant.

PERFORMANCE CHARACTERISTICS:

Operating Temperature:	0-85 °C [32 to 185 °F]
Total Velocity Range Available:	0.25 m/s to 40.0 m/s [50 fpm to 8000 fpm] Compensated Range 15 – 35°C
Temperature Accuracy:	± 1°C above 0.5 m/s, ± 2°C below 0.5 m/s,
Velocity Accuracy:	greater of 5% of reading or 0.05 m/s [10 fpm] in compensated range
PC requirements:	Windows 7 or higher, USB 2.0/3.0 Interface.

CONTACT:

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