

## Application Note Series

### Airflow Tools Series – Multipoint Sensing Arrays & Instrumentation

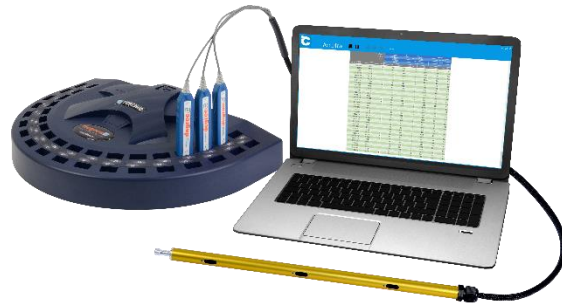
**Product Platform:** Instrumentation

**Products:**

- °C SPAR Sensor Pole Array System
- °C Grid Sensor Array System
- °C Port Data Acquisition Instrument
- AccuTrac™ Data Logging Software

**Purpose:** Multipoint Measurement Systems for Planar Airflow Analysis

**Testing Range:** 0.15 m/s to 20 m/s [30 fpm to 4000 fpm]



#### Part 1: MULTIPOINT AIRFLOW MEASUREMENT AND SENSING ARRAY SYSTEMS

Measurement of air velocity, temperature, and humidity are crucial steps in product design and development. When testing conditions require numerous, simultaneous measurement locations, product design teams turn to multipoint instrumentation from Degree Controls. Multipoint sensing systems streamline data logging and analytics, yielding accurate results with test setups that can be easily repeated.

Degree Controls offers one-dimensional (1D) and two-dimensional (2D) sensor array systems which enable rapid, complex measurements of air velocity, temperature, and humidity with unprecedented ease:

- 1D - [°C SPAR](#) Sensor Pole Array system
- 2D - [°C Grid](#) Sensor Array system



Figure 1 °C SPAR – Linear Array

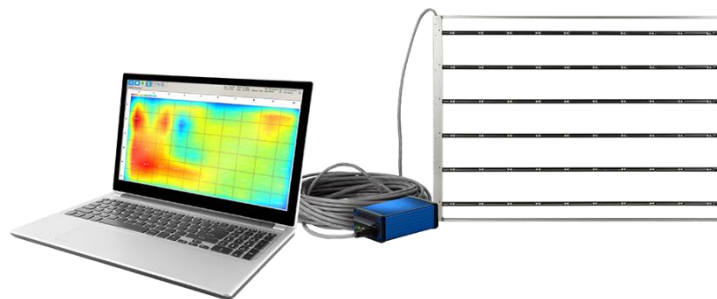


Figure 2 °C Grid Array System

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The °C SPAR sensor pole array system is fully configurable to meet user defined specifications including pole length, sensor quantity, sensor spacing, and calibration range. °C SPARs have convenient USB sensor outputs and are designed for use with our °C Port family of [data acquisition instruments](#) and AccuTrac™ [data logging software](#) (purchased separately). Multiple °C SPARs may be arranged together to create an adjustable two-dimensional sensing array.

The °C Grid system is a customized X-Y array, multi-point airflow sensing solution that allows users to measure air velocity, temperature, and humidity across a planar area. Designed for versatility in any application where airflow and temperature must be mapped across the area of flow, °C Grid measures, records, and maps up to 200 points in real time. °C Grid systems are built to client specifications and supplied with sensor array, interface box, cabling, and °C Grid data logging software.

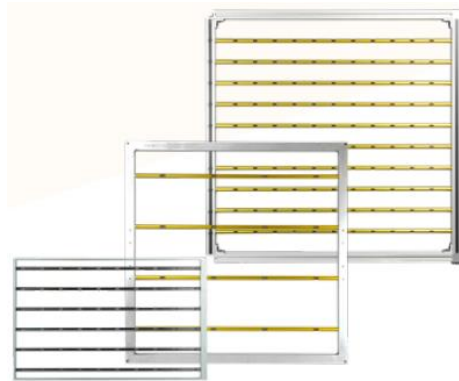


Figure 3 Configurable °C Grid

**Part 2** of our *Airflow Tools Series – MULTIPOINT MEASUREMENT SYSTEMS FOR CONSTANT AND CHANGING TEST LAYOUTS* explains which Degree Controls airflow sensing array system to use for test layouts that stay the same vs those that change.

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## Airflow Tools Series – Multipoint Arrays & Instrumentation

### Part 2: MULTIPOINT MEASUREMENT SYSTEMS FOR CONSTANT AND CHANGING TEST LAYOUTS

Note:

[Part 1](#) of our *Airflow Tools Series – MULTIPOINT AIRFLOW MEASUREMENT AND SENSING ARRAY SYSTEMS* describes the advantages of multipoint measurement and Degree Controls linear and grid sensing array systems.

Multipoint measurement allows many points of air velocity, temperature, and humidity data to be sensed and collected simultaneously, and in real time. Two-dimensional sensing arrays are used to measure air velocity and temperature in a planar cross section of a flow field. Airflow applications may require:

A single test layout where the number of sensors and sensor locations **stay the same** from test to test,

or

different test layouts where sensor locations **change** from test to test, and the number of sensors may change as well.

#### *°C Grid for Constant Test Layouts*

The Degree Controls [°C Grid](#) sensor array system is the best way to go for customers who will test the same thing *over and over* again. °C Grid instruments measure and record air velocity and temperature for up to 200 points in real time.

Custom-built to user-defined specifications for size, sensor quantity, sensor location, and velocity range, °C Grid is a comprehensive solution for measuring, mapping, and analyzing airflow conditions. °C Grid systems include sensor array, interface box, cables, and °C Grid data logging software. Humidity sensing may be added to provide dynamic humidity input for real time compensation of measured air velocity. A single USB plug connects the °C Grid system directly to your PC.

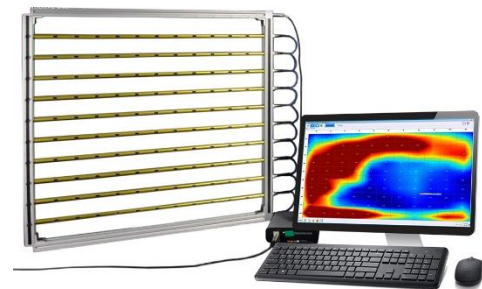


Figure 4 Complete °C Grid System Includes Interface Box, Cabling and Software

Typical applications include:

- IT rack airflow and inlet temperature measurement,
- CFD validation of heat exchangers,
- cabin comfort testing and defrost analysis, and
- quality assurance testing of room level comfort and purification devices.

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### *°C Grid System Application Example*

Automotive comfort engineers use the °C Grid system to test airflow patterns in different zones of a vehicle as they adjust airflow and vent configurations. The °C Grid can match a seat, dashboard, or human body profile, or span the entire width of the cabin.

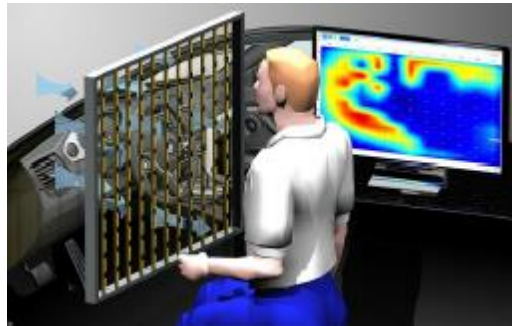


Figure 5 °C Grid System for Cabin Comfort Testing

### *°C SPAR for Changing Test Layouts*

The Degree Controls [°C SPAR](#) sensing array system is the best way to go for customers who will define *different* test layouts. For planar airflow analysis, Degree Controls offers an arrangement of °C SPAR linear arrays in a support frame, to create an adjustable two-dimensional sensing array system. The customized frame has provisions for the user to change the positions of °C SPAR wands within the frame. Orientation adjustments may be built in as well, to aim wands or point them in the direction of air flow. °C SPARs may be added to the frame at any time to increase the number of sensing locations.

°C SPAR sensor pole array systems measure multiple points of air velocity, temperature, and humidity simultaneously. Each °C SPAR is comprised of multiple airflow sensors with sensor quantity, location, and velocity range defined by the user. A convenient USB output connects sensors to a °C Port [data acquisition instrument](#) used with Windows®-based [AccuTrac™ software](#). One or more °C Ports may be connected to a single AccuTrac™ session, depending on the number of sensors required for an experiment.

This flexible system of °C SPARs and °C Ports with AccuTrac™ software allows users to easily change sensor placements for varying test layouts:

- °C SPARs can be moved within the frame, and
- °C SPARs can be added to the frame, at any time, to increase measurement points.

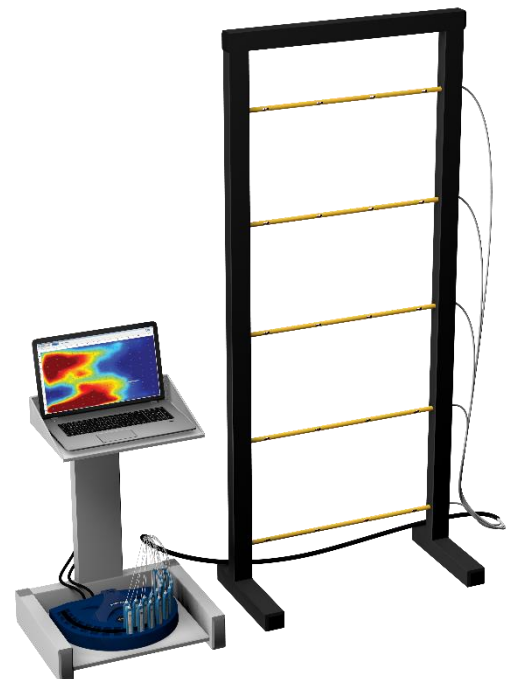


Figure 6 Flexible °C SPAR system with °C Port and AccuTrac™ Software

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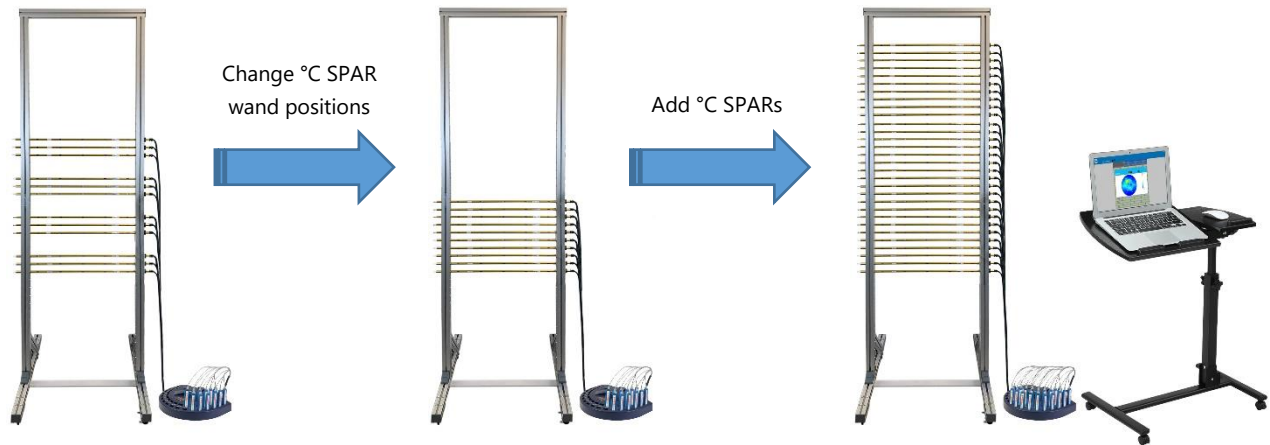


Figure 7 Change °C SPAR Positions &/or Add °C SPARs for Different Test Layouts

### °C SPAR System Application Example

The °C SPAR sensor array system is used in a data center environment where next-gen servers are being developed. Air velocity, temperature, and humidity measurements are analyzed for racks with different fitments of IT gear. Utilizing a °C SPAR sensor pole array system with °C Port data logging instruments and AccuTrac™ software, hardware engineers have the flexibility to move sensor wands to their preferred locations for airflow studies.

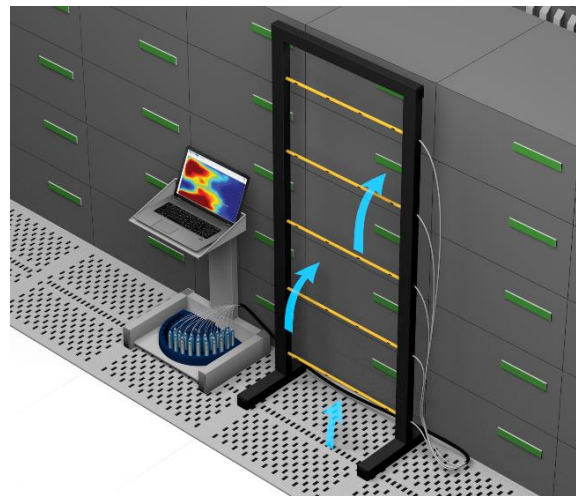


Figure 8 Functional Testing for Data Center Server Racks

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Consider the Degree Controls [Airflow Instrumentation Platform](#) for your multipoint sensing and data acquisition solution. Contact us to learn more.

### CONTACT:

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To find out more about Degree Controls' sensor products and solutions, contact us at 1-877-degreeC, or visit our website at [www.degreeC.com](http://www.degreeC.com). Email sales inquiries to [sales@degrec.com](mailto:sales@degrec.com).

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