

Wireless Scanner Application Note

SCANIVALVE MPS4232 - A VERSATILE REMOTE PRESSURE SCANNER FOR WIND TUNNELS

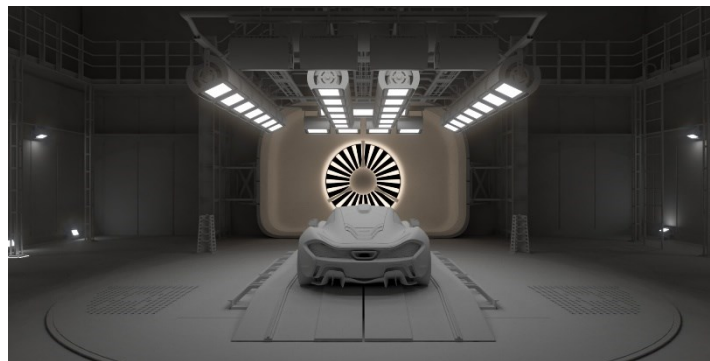
Results:

- ✓ Remote pressure scanning for models with no power source
- ✓ Delivers high accuracy measurement



THE CHALLENGE

REMOTE PRESSURE SCANNING



This application note discusses the Scanivalve MPS4232 and its versatility in being adapted to a remote pressure scanner in wind tunnel applications. We explore the key features of the MPS4232, its benefits in wind tunnel testing, and the steps involved in integrating it into wind tunnel test articles remotely. Additionally, we showcase its performance advantages over traditional pressure measurement techniques.

Wind tunnels are critical tools for aerodynamic research and testing in various industries, including aerospace, automotive and wind energy.

Accurate pressure measurements inside the wind tunnel are crucial for understanding the airflow and aerodynamic characteristics of models under test, but it is not always possible to supply power to the model, or to collect real-time data, if the model is not powered.



The Scanivalve MPS4232 offers a highly adaptable solution for remote pressure scanning in wind tunnel environments, providing precise and real-time pressure data.

Its small footprint, light weight and multitude of channels make it ideal for the application, but the integration into a remote system is essential for some applications.

THE SOLUTION

SCANIVALVE MPS4232 PRESSURE SCANNER

The MPS4232 is a robust, miniature, multi-channel pressure scanner offered by Scanivalve. It consists of multiple pressure sensors integrated into a single unit, which can be remotely mounted in wind tunnel models.



Key features of the MPS4232 include:

- **Multiple Pressure Ports:** The MPS4232 has 32 individual, integral pressure sensors, allowing truly synchronous measurements at multiple points in the wind tunnel model.
- **High-Frequency Response:** With fast response times, the MPS4232 can capture rapid pressure fluctuations, essential for dynamic studies.
- **24-bit A-D conversion:** Each channel includes 24-bit A to D conversion to facilitate the highest resolution and fully synchronous response.
- **Digital Data Output:** The MPS4232 provides direct digital output in temperature-corrected engineering units, making it compatible with modern data acquisition systems, reducing noise interference, and ensuring data integrity.
- **Compact and Lightweight:** Its small size and low weight minimize any aerodynamic interference with the model under test.

Advantages of MPS4232 in Wind Tunnel Testing

The adaptability of the MPS4232 to wind tunnel environments offers several significant advantages over conventional pressure measurement techniques:



- **Spatial Resolution:** The multiple pressure ports enable researchers to obtain high-resolution pressure data across various points on the model surface, improving understanding of flow behaviour.
- **Minimal Frequency Response Effect:** By eliminating the need for long pressure lines and fully localising the signal conditioning, the MPS4232 reduces measurement errors and provides more accurate results.
- **Real-Time Data Acquisition:** The MPS4232's high-speed data output allows for real-time monitoring of pressure changes, enabling researchers to analyse transient events and turbulence.
- **Cost-Effectiveness:** Despite its high performance, the MPS4232 can be more cost-effective than other pressure measurement arrays when considering its fully-integrated, multi-channel capabilities.

THE RESULT

INTEGRATION INTO WIND TUNNEL SYSTEMS

Integrating the MPS4232 into a wind tunnel system involves the following steps:

Mounting: Securely attach the MPS4232 within the model or wind tunnel surface using appropriate mounting hardware to ensure stable and reliable measurements.

Pressure tapings are laid into the surface of the model in the areas where pressures are to be measured

Data Acquisition System: Connect the MPS4232's digital output to a compatible data acquisition system to capture and record pressure data during wind tunnel testing.

Validation and Verification: Validate the data obtained by the MPS4232 against known pressure values and verify its accuracy under various flow conditions.

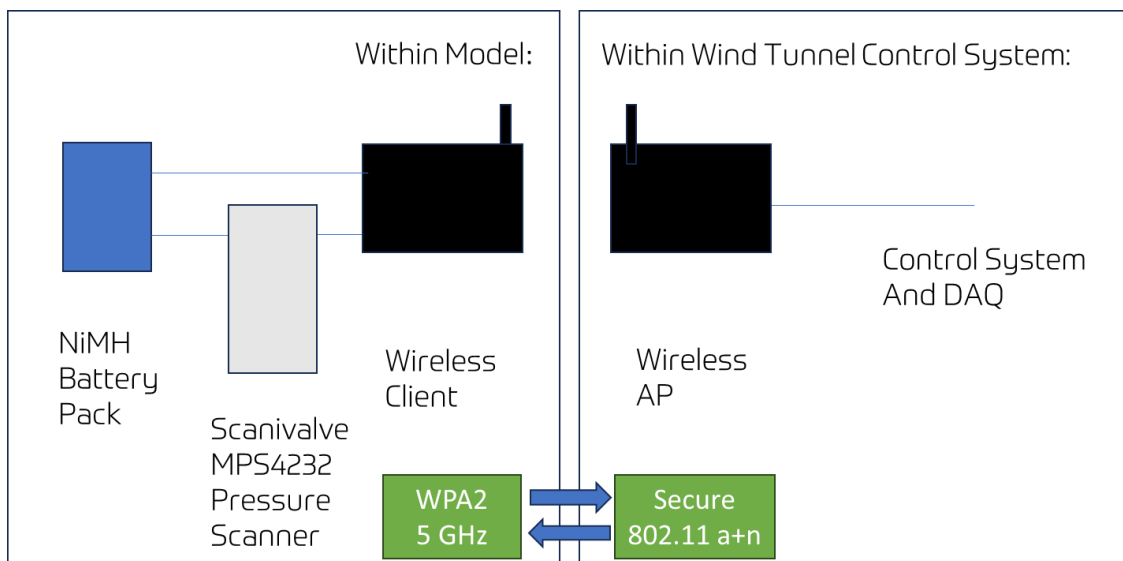
Remote measurement capability: In addition to being able to measure within the model or test article a recent application demanded that a locally powered, secure-solution pressure measurement system be built.

By integrating a stand-alone rechargeable battery power source with a wireless client, real-time data can be measured and transmitted from the model to the wind tunnel

control system, received by a wireless access point for processing by the wind tunnel data acquisition and control system.

This system is integrated into the model to allow the model to be completely stand alone.

In early tests, the remote battery source allowed running of the scanner and wireless solution for up to 8 continuous hours. A quick-change battery pack meant that data could be transmitted over the full period of the one-day test run. Additional or larger capacity batteries could be used if the user required a longer run-time for the system.





The Scanivalve MPS4232 offers exceptional versatility as a remote pressure scanner in wind tunnels, providing accurate, high-resolution, and real-time pressure data. Its ease of integration, cost-effectiveness, and ability to withstand harsh wind tunnel environments make it a preferred choice for researchers and engineers in the field of aerodynamics and wind tunnel testing.

By utilizing the MPS4232, researchers can enhance their understanding of aerodynamic phenomena, optimize designs, and improve the performance and efficiency of their wind tunnel experiments.

Remote interaction with the scanners means that aerodynamic data can be received from an unpowered, stand-alone model.

For more information:

Download the datasheet:

<https://www.evolutionmeasurement.com/product/mps4232-32-channel-miniature-pressure-scanner/>

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