



Application story

Unrivalled accuracy and reliability of Druck's Pressure Measurement Technology in extreme temperatures helps optimize air conditioning systems

Druck's customer

A China-based company predominantly engaged to test, research and determine the environmental adaptability of electrical products.

Druck's customer's challenge

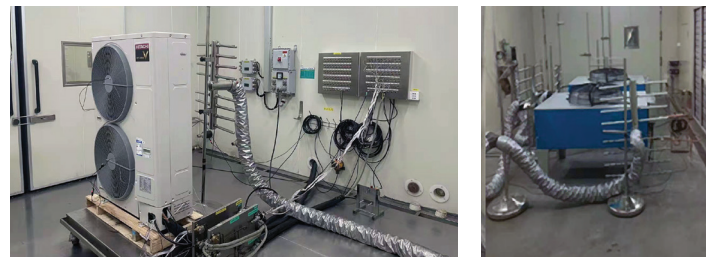
The customer was testing and calibrating the performance of air conditioning systems. Every aspect of an air conditioning system, including the heating, ventilation and air conditioning components, relies on pressure sensors to determine how much air needs to be moved through a particular space.

Performance and verification testing of air-conditioning units is important to ensure they meet the stringent requirements of the applications. This requires test equipment that can meet the challenges of testing the system to the operational limits and provide accurate reliable data in extremes of temperature. Testing is conducted on both complete systems and components (compressors, pumps etc); and end of line production and design verification. Pressure sensors provide critical data within the facility with measurements on multiple locations and media types.

The biggest challenge the customer faced was temperature. Generally, the performance of a pressure sensor can be affected by very high or very low temperatures, and in particular, any rapid significant change in temperature. This can affect the accuracy of the results and ultimately can impact on the performance of the product, in this case, air conditioning systems. Testing in an enthalpy laboratory with a temperature range from $-40 - 80\text{ }^{\circ}\text{C}$, the customer considered it essential to deploy pressure sensors that could provide supreme accuracy regardless of temperature.



Enthalpy laboratory, extreme temperature simulation, frost can be seen on the ground.



Central air conditioning, commercial air conditioning compressor test.

In addition, the customer required pressure measurement technology that was reliable, accurate and stable. Recognizing that the pressure sensors would form part of the air conditioning system production line, long term stability was key. They needed sensors that would provide unrivalled accuracy again and again and again – over the long term.

The pressure measurement challenge was further complicated by the need for pressure measure technology to be compliant with the complex EMC (electromagnetic compatibility) environment. Electrically driven compressors and pumps which create a strong Electro-Magnetic field that can disrupt the output on sensors if they are not adequately protected. Protection is achieved by designing to suit the EMC specifications.

The customer's expected the test sensors to operate reliably long after the duration of the test. Testing is mandatory for the industry to meet certification requirements and the testing is expensive and time consuming. System failures result in repeat testing and so reliable, durable sensors that provide accurate results over the long term were critical.

Druck's solution

Druck's UNIK5000 Configurable Pressure Sensor which offers a high performance and bespoke design was deployed across the standard air conditioning testing.

The flexible options offered by the UNIK5000 means that it can be deployed for a wide range of standard tests for multiple types of refrigeration or air conditioning systems. With so much variety within the systems being tested and the test being conducted, having multiple configurable options readily available on a short lead time meant that Druck's customer could effectively meet test requirements and support its customers' schedules.

Meanwhile, Druck's ADROIT6200 pressure sensing platform was used in the enthalpy all weather laboratory.

The ADROIT6200 is a high performance, robust pressure measurement device. It combines the best mechanical properties of micromachined silicon in a fully welded 316L stainless steel body with the latest digital processing capability to offer levels of accuracy, previously unavailable in a device of this type. It offers a full suite of pressure measurement including gauge, absolute and differential references and pressure ranges from 200 mbar to 350 bar. Small, robust and offering unrivalled levels of accuracy in extreme temperatures it was the perfect fit to test air conditioning systems.

The outdoor unit (compressor) of the air conditioner is in an outdoor environment where the temperature affects the refrigeration efficiency of the air conditioner. Knowing that temperature contributes to the largest error component within pressure sensor technology, the customer specified Adroit sensors as they provide the best accuracy over temperature for an analogue output sensor.

This was important as the Enthalpy lab provides performance testing of air conditioning systems and compressors across wide temperature conditions (-40 - 80 °C) in a single test process. The customer could not tolerate significant data errors due to the testing conditions.

Druck's added value

Druck's pressure measurement technology provided the customer with the high levels of reliability and accuracy it required, despite the harsh environment and extreme temperatures.

Based on years of collaboration with Druck, almost all the air conditioning systems tested by the customer are fitted with Druck's pressure measurement technologies, which has helped establish Druck as one of the leading pressure sensor providers in the air conditioner market.

If you're interested in learning more, click here to read our full **whitepaper**: <https://www.bakerhughes.com/adroit6000-comparative-performance-whitepaper>

Need more information?

Click on this link to contact us, we're happy to help: <https://www.bakerhughes.com/druck/contact>.



Efficiency development and testing of large commercial air conditioning chillers.



Home air conditioning production line, sensor used for compressor pressure calibration.