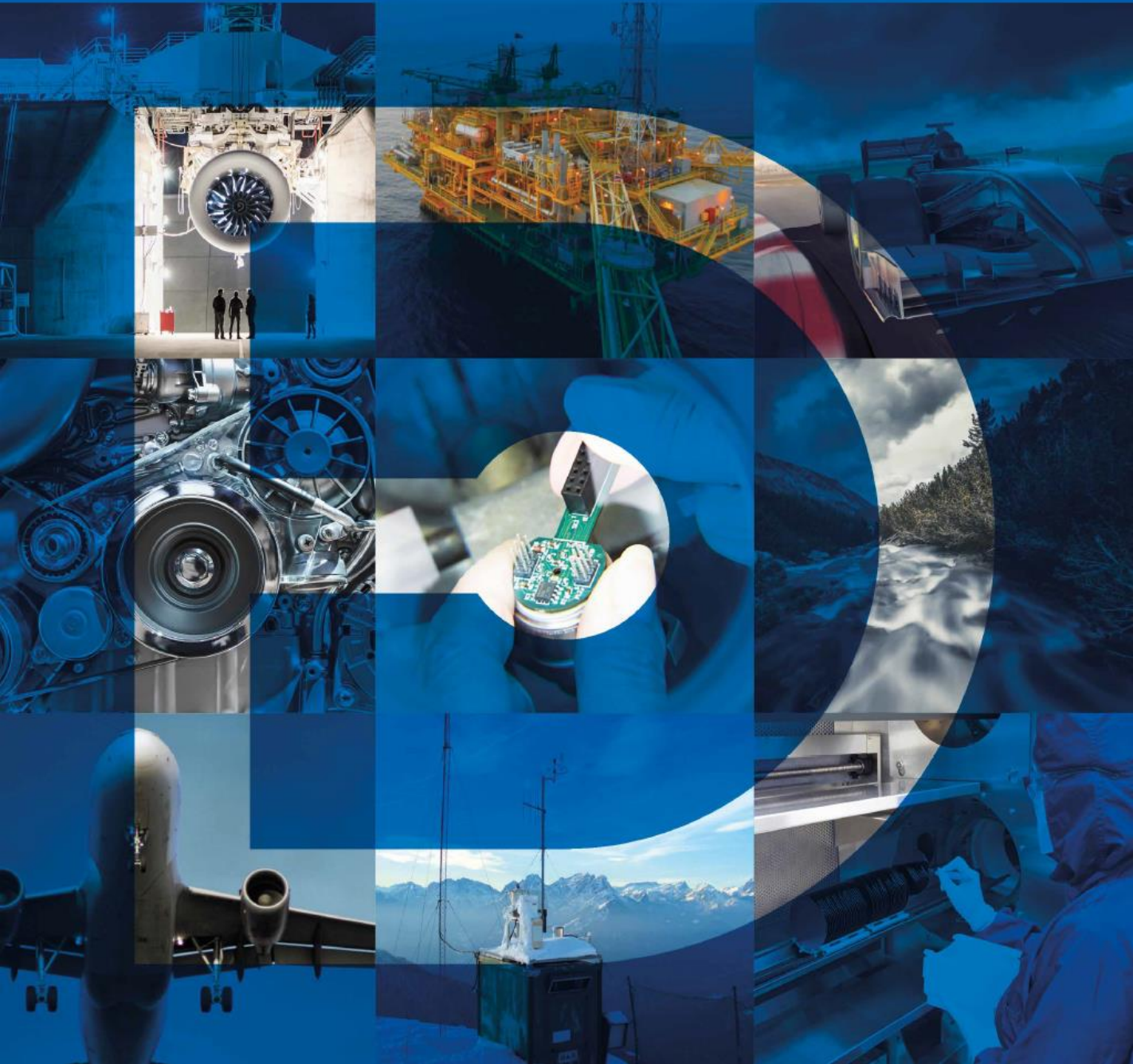


Druck

EXPERTISE
+
PARTNERSHIP





We are a global technology company that designs, develops and manufactures the highest quality, most accurate and reliable customized pressure sensing devices and instruments, software and services.

We leverage innovation, continuous improvement and unprecedented quality, to enable our Customers to successfully operate, produce systems, monitor and/or control mission-critical assets in tough environments across the world's most challenging applications.

We delight customers with tailored solutions that address their challenges; embodying our deep domain knowledge of customers' applications, the most innovative and high performance connected pressure sensing devices, instruments, software and services; produced with the highest standards of safety, quality and delivery.

We are Druck. We provide peace of mind in the toughest environments.

HISTORY + EXPERIENCE

Druck's product range embodies over 45 years of experience designing and manufacturing some of the most accurate and reliable pressure measurement solutions on the market.

Druck's pressure technologies provide peace of mind that you are getting the reliable data that you need to make the right decisions to keep your business and equipment running efficiently.

EXPERTISE + DEDICATION

Partnership

We understand that our products can have a significant impact upon our customers' business operations, performance and reputation. We believe that you should be able to use a pressure sensing product to suit the needs of your application. At Druck we are passionate about delighting our customers.

With a long history of working with Environmental Monitoring, Oil and Gas, Automotive, Aerospace and many other industries, we know what matters when developing pressure sensor solutions for OEMs (original equipment manufacturers) and build this expertise into every product we make. A partnership with us is more than creating a bespoke solution together, it is a dedicated team, the strength of our sophisticated supply chain and our customer-focused approach to product development to ensure the needs of your application are met.

Our philosophy is to align our capability with the requirements of our customers. Building long term partnerships with customers where we can provide productivity benefits and/or lower the total cost of ownership in a customer's process is pivotal to our mutually shared success.

TECHNOLOGY + INNOVATION

Applications

Since its formation in 1972, Druck have successfully applied technological innovation, expertise and a focus on customers' applications to the diverse and demanding world of pressure measurement. We are one of the few sensor manufacturers to make the silicon sensing element in-house at our own clean room facilities. As a result, we can ensure the highest quality and performance in delivering world class, highly accurate pressure sensors. Our sensor technology has been developed to support some of the most rigorous, challenging and precise applications whilst providing accurate and reliable data.

Accuracy

For over 20 years, Druck sensors have been trusted by the world's global aircraft manufacturers to measure pressure in critical on-aircraft applications such as landing gear, hydraulics, engine control and fuel-management. These sensors operate in demanding environments, which see extreme temperature, humidity and pressure changes and enable the aircraft to perform efficiently and safely.

Reliability

Whether deep on the seabed in the Gulf of Mexico measuring hydrocarbon pressures and temperatures flowing through the subsea trees and manifolds; or mounted on surface production equipment on an offshore-platform in the middle of the North Sea, it is in these restrictive operating conditions and tough environments that Druck sensors continue to provide reliable and trusted measurement year after year.

Quality

Leading motorsport teams, including those in Formula 1, Moto GP and Indycar, have used Druck's pressure sensors for many years due to the performance and reliability which our sensors provide. We are able to provide sensors which meet the demands of the size, weight and material constraints required by the teams for a variety of applications and fluids including fuels, oils, coolant and hydraulic system pressures, in demanding environments with high temperatures and vibration levels.

This same technology and expertise goes into the products we make for hundreds of other applications such as:

- + Hydrology
- + Meteorology
- + Oil and Gas
- + Automotive Test
- + Motorsport
- + Aerospace
- + Ground Flight Test
- + Industrial Process
- + Transportation
- + Depth and Level
- + Marine
- + Power Generation
- + Silicon Processing

ACCURACY + STABILITY

Environmental Monitoring

Environmental Monitoring is the activity of monitoring the quality of the natural environment. This includes many applications such as waste water management, drinking water and the forecasting of weather conditions. Gathering reliable data is vital within these applications and it is becoming increasingly important that these are carefully monitored. The Druck team have developed market leading pressure sensors highly suited for these applications.

Following challenges in collecting and monitoring data in shallow, moving water, the Druck team were approached by a major hydrology OEM customer to design and develop a suitable solution. Having analysed the situation in conjunction with our customer, we were able to modify our 1830 sensor to fit the requirements of this low-pressure application. Titanium offers excellent material compatibility and high stiffness which is optimal for measurements at low pressure. By designing a cable with a thick hard wearing outer sheath, we were able to offer a longer service life time and multiple deployments, reducing the cost of ownership for depth measurement and flow calculation in this challenging environment.

As an example of another application, the aviation industry need durable, high-performance weather stations at every airport. The requirements, commonly referred to as the AWOS specification, requires 2 or 3 sensors within each system. If there is a difference of reading, an alarm can be set. Traditional equipment can be expensive to maintain because if one sensor drifts out of specification, the whole unit needs to be sent back to the supplier to be recalibrated. However, using our DPS8100 TERPS, which are more accurate and more stable than is required by the specification, a system has been created where units can be replaced on site without expensive calibration equipment. Moreover excursions from the specified alarm levels are increasingly unlikely due to the high stability of TERPS. These result in a significant reduction in the cost of ownership for our customer.

COMMUNICATION + DATA

Oil and Gas

In Oil and Gas there are a multitude of applications in up, mid and downstream. Druck have a wide range of expertise and technology to support the wide variety of challenges faced by customers in these applications.

An example being that, fiscal transfer of gas requires measurements not just of the volume of gas, but also the temperature and the pressure. Such devices (generally called correctors) require accurate measurements of volume pressure and temperature. An error in the pressure reading is directly related to an error in the gas bill.

The European Union have a set standard of performance for gas correctors including a detailed performance specification for the pressure sensor. The Druck product range has been used in this application for many decades, with the most recent product designed for this application being our DPS5000. The DPS5000 exceeds the European Union requirements and carries certification for where the area of use is designated a hazardous area. Optimised for low power operations, the DPS5000 also extends the battery life of the gas corrector and by offering great accuracy over temperature and long term stability reduces the need for expensive site calibration visits.

An alternative example where Druck solved a challenge faced by a customer was where a supplier of instrumentation faced challenges when using sensors in an area where drilling mud was present. The drilling mud is highly corrosive and will destroy most standard cable material. The area also has explosive gases present and is designated a hazardous area. The Druck team were approached to tackle this mechanical and certification challenge. A suitable mud resistant material was selected and by working with a cable manufacture integrated into a cable. This was then tested and finally certified. As the success of this modification enabled our customer to expand sales across the world, we were requested to support them with extending the certifications to cover use in new regions and this has proven to be a mutually successful project for ourselves and our customer.

CHALLENGE + RESPONSE

Automotive Test

When it comes to data gathering in automotive applications, the Druck team know the key areas to consider and have developed sensor technology to support these challenges. With years of experience, we are readily able to assist you no matter how challenging your need is as an OEM.

The Druck team were approached by a globally renowned car manufacturer who was experiencing challenges in "on vehicle" testing due to the harsh environmental conditions. With pressure changing rapidly, the customer needed a sensor that was fast responding and with high set up costs and no service available during the testing, high reliability was essential to avoid any loss of data. Our team conducted a full analysis of this customer challenge and modified our silicon PMP317 sensor. The single crystal silicon element and fully welded stainless-steel construction gave the customer the robustness, reliability and stability required by the application. The modified product was marked and dedicated for this customer and was written into their specifications with their part numbers for ease of order placement and supply.

Many automotive companies have continuous programs of improving the performance of their engines. The engine is put in a test cell where fuel and air can be controlled and changed to see how the engine performs under different conditions. Our DPS5000 CANBus series is used regularly in this application. This product is built with a welded stainless steel package, potted electronics and uses a silicon sensing element which means it lasts for many years and is robust. The sensors in engine test cells are used repeatedly in order to provide a cycle and need to survive high temperature and high vibration environments whilst providing reliable data. Our DPS5000 CANBus series can be configured to suit various needs including high grade connectors to ensure accurate readings and the excellent long term stability eliminates the need to calibrate often.

INTEGRATED + MULTI-FUNCTIONAL

Aerospace

Our integrated, multi-functional aerospace team have hundreds of years of collective experience in delivering high quality designs to all areas of this market. Our Aerospace division has provided more than 300,000 pressure sensors in over 20 years. The Druck product range has a wide footprint covering the majority of the world's most produced airframes, therefore we know what matters when it comes to keeping your assets flying safely and efficiently.

A major global aircraft producer was experiencing challenges within their Environmental Control System, which required close control of the balanced low pressures within the system. As a result of this, the Druck team were approached to see whether a product could be offered to satisfy these stringent requirements. Following a full review of the technical requirements, the Druck team agreed to develop a bespoke product that would fulfil the customer's needs. Based on our 3000 series platform, the product design, qualification and test plans were then developed and executed by our highly skilled Aerospace Program team.

Following an in-service challenge, the Druck team were approached by a major Aerospace OEM to provide a bespoke solution to address the effects of 'force fight', associated with hydraulic rudder control. This proved to be a challenging requirement, however, following close collaboration and several iterations of a design concept, a proposal was accepted and a qualification program was initiated. This resulted in a complex package that contained four sensors in a single housing. The novel design was then successfully tested and qualified prior to introduction on one of the world's most produced airframes.

Please consult our 'Pressure Takes Flight' Aerospace brochure for further details.

RELIABILITY + PERFORMANCE

Industrial Applications

Our multi-functional and experienced engineers can not only satisfy OEM challenges in the Environmental Monitoring, Oil and Gas, Automotive Test and Aerospace industries, but can also meet the needs of a range of other industrial challenges. With hundreds of years of collective experience and market-leading sensor technologies, the Druck team are readily available to provide solutions for you to enhance the performance of your assets.

Following an in-service challenge, the Druck team were approached by a major OEM to provide a bespoke solution to address and solve issues in flow meters used in clean rooms. Highly reliable flow meters working in hard vacuum are critical during the clean room process, as any failures can jeopardize the product and can cost the clean room operator thousands of dollars. At our Leicester facility we have an ability to adapt our sensing elements to specific measuring conditions, whilst maintaining high stability and reliability. We were able to develop a solution based upon our PDCR 1000 product to meet the exacting specifications of the customer's machines and maintain accuracy at this particularly low pressure.

In a separate example, our sensors monitor the pressure over a wide operating temperature which is vital to taking accurate reading in a refrigerated marine environment. The Druck team were approached by a customer to provide a sensing solution that was highly accurate, robust to an aggressive media containing hydrogen sulphide and could interface using an existing digital protocol. Following a full review of the technical requirements, the Druck team designed and developed a digitally compensated solution using Hastelloy wetted parts and a bespoke communication protocol. This has resulted in a sensor solution for the client which maintained accuracy and stability in a tough environment for an extended period of time without the need for recalibration.

Module Capability

At Druck, we understand that sometimes you may not need a finished sensor product due to your specific application. That's why we offer modules with a large variety of changing variables which we can customise to suit your unique application. To adapt to the application environment, we offer different types of silicon, pressure ranges, temperature, size and material. Druck are here to provide you the component you need to ensure your assets are working effectively and efficiently. Please consult our Modules Capability Overview for further details.

BESPOKE + SOLUTIONS

Why partner with us?

The combination of our technical heritage, innovation and global reach enables us to create solutions to fit any customer's needs. With our illustrious history and proven track record in industry, we know what matters when developing pressure sensor solutions to suit the needs of our OEM customers.

Our dedicated teams of design, electrical and mechanical engineers are continuously developing and improving our pressure sensing solutions. Druck has one of the most comprehensive and technologically advanced silicon engineering and processing facilities in the world. It is one of only a few companies worldwide converting raw silicon into finished products, by employing techniques such as micromachining. Our multifunctional team's close interaction with the product at all stages of the production process, from raw silicon to finished product, ensures deep knowledge and understanding of how our products can aid a wide range of customers. Our centre of excellence team in Leicester and our global team of specialists and application engineers are able to support our worldwide customer base who have a wide range of complex needs. Through working closely with OEM customers, we are able to get a full understanding of their challenges and requirements to ensure we are offering them the best possible solution.

For many years we have designed new platforms using common component parts to allow interchangeability. This allows customisation while maintaining short turnaround time to design and build bespoke configurations. Our engineering teams continue to develop new platforms and solutions to meet the changing demands of applications from Aerospace to Motorsport and Oil and Gas to Semiconductors.

The pressure sensing solutions we can develop for you will have our silicon technology at their core which is robust and compact, providing excellent performance characteristics. Through partnering with us, you will have the support of a large production organisation with a sophisticated supply chain. Furthermore, the strength and depth of our stable parent company ensures a strong platform for mutual collaboration and growth of our respective businesses.

PLATFORMS + PRODUCTS

The Druck Product Range

We have a wide range of platforms that can be configured to meet the individual needs of your business, whether that be in Industrial or Aerospace applications. Our platforms are designed to be used directly or as the basis of a customised solution.

Find the ideal platform for your application with these icons



Hydrology



Meteorology



Oil and Gas



Automotive Test



Motorsport



Aerospace



Marine



General Industrial



UNIK5000 Series

High performance industrial grade product, designed to meet the needs of multiple markets on a short lead-time. Using Druck components our modular design process offers over 200 million configurations to meet your specific needs.

- **Pressure Range:** 70 mbar (1 psi) up to 700 bar (10,000 psi)
- **Operating Temperature Range:** -55°C to +125°C (-67°F to 257°F)
- **Voltage Outputs:** mV, mA, voltage and configurable voltage outputs
- **Accuracy:** to +0.04% Full Scale year (FS) Best Straight Line (BSL)
- **Pressure and Electrical Connections:** Multiple
- **Construction:** Stainless steel
- **Frequency response:** to 3.5 kHz
- **Hazardous Area certifications**
- **High over pressure capability**



DPS8000 TERPS

TERPS (Trench Etched Resonant Pressure Sensor) uses silicon sensing technology to give the highest performance available from a pressure sensor. Designed for applications where ultimate accuracy and stability are required in a robust industrial package.

- **Pressure Range:** 1 bar (15 psi) up to 70 bar (1,000 psi)
- **Operating Temperature Range:** from -55°C to +125°C (-67°F to 257°F)
- **Multiple Output configurations:** RS232, RS485, USB 2.0, CANBus, Frequency & Diode (TTL)
- **High Precision:** +0.01% FS over compensated temperature range
- **High Stability:** +50 ppm FS/year (typical)
- **Pressure and Electrical Connections:** Multiple



1800 Series

High performance level sensor designed to give long service in harsh submerged applications.

- **Pressure Range:** 0 to 600 mH₂O
- **Compensated Temperature Range:** from -2°C to 30°C (29°F to 86°F)
- **Multiple Output configurations:** mV or mA
- **High Precision:** accuracy: ±0.06%
- **Construction:** fully welded 17.5mm titanium





DPS5000

High performance digitally compensated product with a digital output.

- **Pressure Range:** 70 mbar up to 100 bar
- **Excellent long-term stability**
- **Voltage Outputs:** I²C digital output/CANBus
- **Accuracy:** to +0.1% FS
- **Construction:** Stainless steel
- **Hazardous Area certifications**
- **Low power:** on I²C
- **1KHz on CANBus**



4300 Series

High performance designed for motorsport applications.

- **Pressure Range:** 1.6 bar (25psi absolute) up to 250 bar absolute or sealed gauge (3,625psi)
- **Operating Temperature Range:** from -30°C to +175°C (-22°F to 347°F)
- **Voltage Outputs:** mV or voltage outputs
- **Accuracy:** to ±0.1% Full Scale (FS) Best Straight Line (BSL)
- **Construction:** 17.5mm diameter stainless steel or titanium construction
- **Frequency response:** : to 3.5 kHz
- **2x over pressure capability**



4400 Series

High performance designed for motorsport applications.

- **Pressure Range:** 1.7 bar (25 psi) up to 600 bar (8,700 psi) absolute
- **Operating Temperature Range:** from 0°C to +175°C (32°F to 347°F)
- **Voltage Outputs:** 0.5 - 4.5 V
- **Accuracy:** to ±0.25% Full Scale (FS) Best Straight Line (BSL)
- **Construction:** 12.5mm diameter stainless steel or titanium construction
- **Frequency response:** : to 3.5 kHz
- **2x over pressure capability**



Modules – Standard

- **Size/Pressure Range:** Diameter 25mm: 70 mbar to 100 bar; Diameter 17.5mm: 350 mbar to 70 bar; Diameter 12.5mm: 1 bar to 70 bar; High pressure options available up to 1,400 bar
- **Operating Temperature Range:** from -55°C to 175°C (-67°F to 347°F)
- **High Stability** – typically 0.05% FS/year
- **Material:** Stainless Steel 316L, Hastelloy C276, Titanium
- **Pressure connection if required**
- **Compensation options:** Raw modules, full data in a cloud or EEPROM
- **Performance:** Non-repeatable errors to less than 0.02% FS
- **Stability:** 0.05% FS/year
- **Output:** typically 10 mv/V
- **Pressure Range:** Gauge, Absolute Differential



Modules – Special

Offer all that is available in the standard units plus unique form factor: built to fit in your OEM application.

- **Material:** Inconel
- **Pressure Range:** Extensions up to 1,400 bar (1 to 20,000 psi)
- **Pressure reference:** Gauge, Absolute, differential in combined packages. Silicon choice to optimise for a particular feature

3000 Series

High level output pressure transducers for aerospace applications. The series uses proven technology within FAA/CAA flight certified hardware.

- **Pressure Range:** Gauge and absolute 350 mbar to 350 bar (5 psi to 5,076 psi) Differential 350 mbar to 35 bar (5 psi to 500 psi)
- **Operating Temperature Range:** -54°C to 135°C (-65°F to 275°F)
- **Accuracy:** ± 0.75% full scale (FS) over -40°C to 90°C. ±1.25% FS over -54°C to 125°C
- **Stability:** Typically less than ±0.05% FS/year
- **Construction:** Stainless Steel 316L
- **Output:** 4 to 20 mA (two-wire), 0 to 5 VDC (three and four wire), others available on request
- **Pressure Reference:** Gauge, Absolute and Differential Versions



DESIGN + DEVELOPMENT

Product Development Centre (PDC)

Druck is dedicated to product development and we understand that customers' products can have a significant impact to their business operations, reputation and profitability. Through testing, creating an MVP (minimum viable product), building prototypes and our customised sample building capability, the Druck Product Development Centre has been created to provide excellence to our OEM partners. Whether it be a subtle requirement from a non-standard pressure, electrical connection or private label to a complete novel bespoke product development encompassing an extensive qualification program, we can develop the solution you need.

Our Product Development Centres are located at our manufacturing sites in Leicester, UK and Changzhou, China, giving the advantage of localised production for many of our OEM partners. At both centres, the teams have the capability to design sensors, qualify them, validate, assemble and test within a dedicated cell alongside our regular production lines.

Through partnering with Druck, OEM customers are offered local expertise. Druck's in-country Field Application Engineers provide expert support to capture customer requirements to take back to the PDC for sample, design and manufacture. Alongside this, nothing excites our engineers at the factory more than visiting our customers to see the application of pressure sensors first hand. Equally, customers can visit the PDC and be directly involved in the design and development of their customised product. Our dedicated Product Design Engineers, Advanced Manufacturing Engineers and Project Managers are on hand, communicating through each step of the product development. Therefore a partnership with Druck means access to an entire team of experts in their fields, dedicated to meeting the needs of customers.

Another advantage of partnering with Druck is the leading technology and strong pedigree the brand has behind it. With over 45 years of experience developing and manufacturing OEM pressure sensors for the world's most demanding pressure applications, Druck understands the challenges faced by customers. Alongside this, Druck's piezo resistive and resonating silicon pressure technologies provide market leading performance of stability and accuracy in all products. As everything is made in house, there is complete ownership and control of the quality of our products, as well as offering maximum knowledge of our silicon sensing technology which transfers to product design and manufacture. Through building in-house, we are able to produce fast prototypes for all industrial applications and have a small batch size capability to accelerate product development towards full scale production.

SUPPORT + ASSISTANCE

Sensor Care Centre (SCC)

Druck understands the importance of being able to offer local support when evaluating products for customer applications or supporting customer issues.

With SCCs in the UK, China and the United States plus additional centres planned for Japan and Korea, Druck offers extended and local support to our customers. An extended capability and coverage to the PDC, the SCC is to support in-country customised testing. This could be for product evaluation to assist the customer with product selection from the extensive standard products or for supporting extended customised testing of a new design from our PDC.

They say the world is getting smaller with digital communication and improved transport links, but it still takes time to send products across the world. Time is money and unfortunately, on rare occasions things can go wrong with the pressure sensor. As an extension to the Druck Service team, the SCC is available to provide in-country support on validation of OEM customer returns to quickly establish the reason for the malfunction, determine the need to conduct a root cause analysis and most importantly to reassure the customer that their production will be maintained.



+ We offer local support when evaluating products for customer applications.