


# Pressure takes flight

Reliability you can trust,  
flight after flight







When it comes to pressure sensing, the Druck product range embodies over 40 years of experience designing and manufacturing some of the most accurate and reliable pressure measurement solutions on the market.

Druck's range of pressure technologies gives you peace of mind that you are getting the reliable data that you need, to make the right decisions to keep your assets flying safely.

## We operate with unyielding integrity and confidentiality

Our Aerospace division has provided in excess of 300,000 pressure sensors in over 20 years of serving the industry. We pride ourselves on our product quality, reliability and technical expertise. The Druck product range has a wide footprint, covering the majority of the world's most produced airframes and engines. We have achieved huge success by providing our customers with a first class service throughout the entire program life cycle.

Our integrated project teams partner with our customers to supply accurate and reliable flight-qualified pressure sensors. The manufacturing process of our pressure sensors begins with raw silicon in our state-of-the-art cleanroom, ensuring full end-to-end control through the production process of our products.

Our Aerospace division is proud that more than 300,000 of our pressure sensors are flying today. Our products are present on all major commercial airframes with our technologies being utilised over many different applications. We have up to 70% sensor content on a single widebody airframe.

Therefore, it is safe to say that you have flown on an aircraft that has the Druck product range as part of the aircraft's systems. These systems provide reliable control and safety to the pilot, crew and passengers on-board.



# Applications: What we do



## Hydraulics

Hydraulic systems are the life blood to the airframe, providing primary flight controls, whilst also ensuring safe landing, braking and thrust reverse.



## ECS

The Environmental Control System (ECS), provides air supply, thermal control and cabin pressurization for the crew and passengers. Maintaining a safe and comfortable cabin environment is a key function of our sensors.



## Fuel

Fuel consumption and fuel level is monitored by our pressure sensors, whilst also providing monitoring of the fuel inerting system.



## APU

The Auxiliary Power Unit (APU) provides essential functionality to the airframe, both when grounded and in-flight when called upon. Our sensors ensure routine ground safety checks can be completed, whilst also providing measurement data for safe and efficient operation.



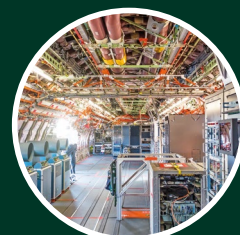
## Engine

Our sensors enable the power plants to function safely and efficiently, measuring key parameters, oil and fuel. They are also used for health monitoring and for critical engine control.



## ADC/ADM

The Air Data Computer (ADC/ADM) determines the calibrated airspeed, Mach number and altitude. Our sensors are an essential component in providing this data directly to the pilot.

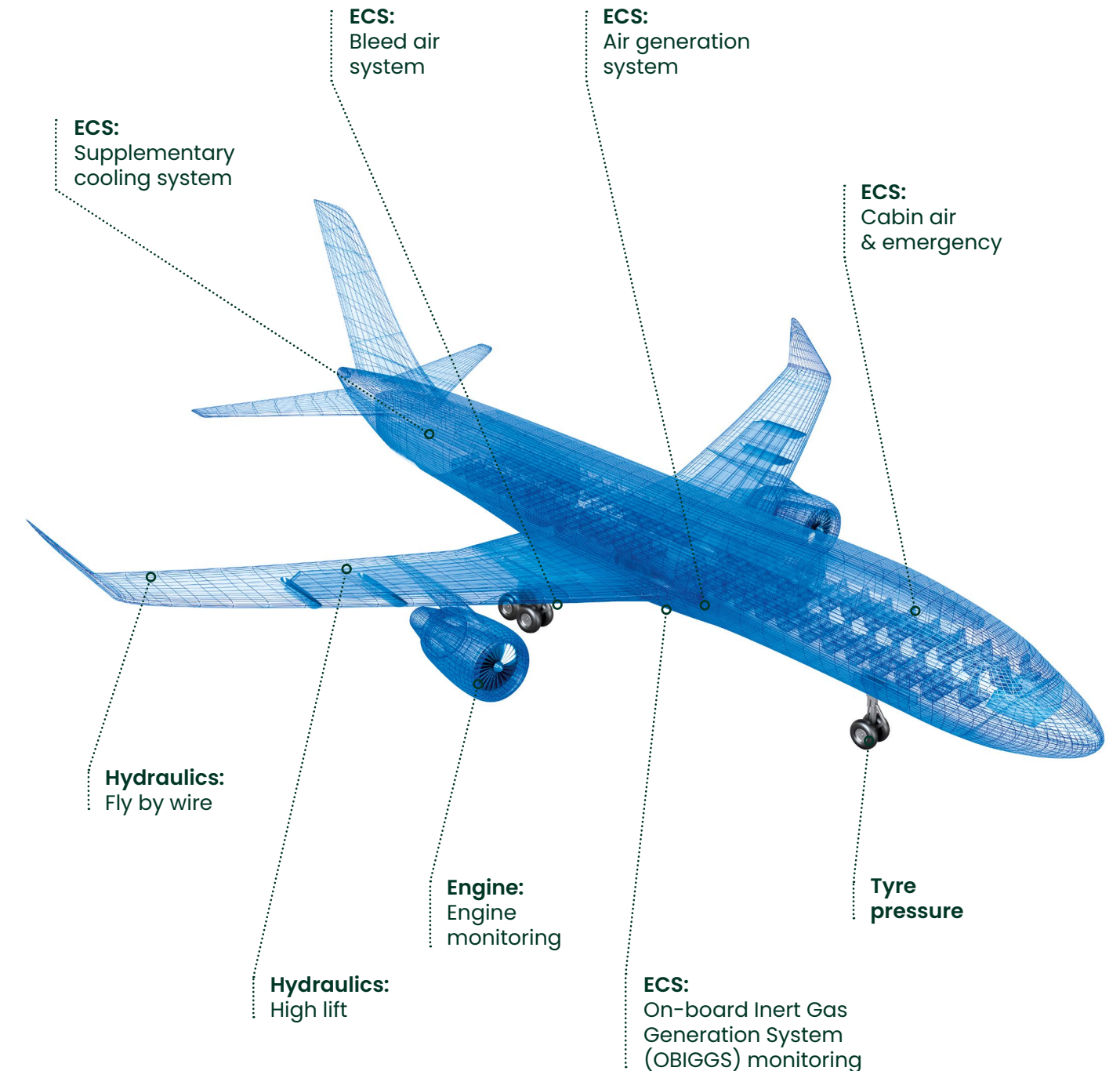


## Test

We provide test sensors to meet the needs of all OEM's. We provide solutions that are suitable for both ground and flight test, offering both catalogue and bespoke designs.

# Applications: Success on a single airframe

Application coverage map on a twin aisle commercial aircraft





# Hydraulics

Hydraulics are the life blood of any airframe, providing primary flight controls, as well as controls for safe landing combining braking and thrust reverse. Our sensors monitor the hydraulic lines making sure they are working effectively and safely.

## Challenges

The Hydraulic systems operate in extreme conditions, at altitudes generally up to 41,000 ft and temperatures of -70 degrees Fahrenheit. Therefore reliable sub-systems and components are of critical importance. Within this application we understand that qualifications can be arduous and therefore it is important to understand the requirements in detail. Failures in this application can cause aircraft on ground (AOG) conditions, which are hugely costly to airlines and overall air framer credibility. If a sensor fails, we understand that in-service removals are extremely costly and logistically challenging to the airline. This is why reliability is our number one priority when it comes to providing flight-qualified sensors.

## Solutions

We offer robust solutions, with field data supporting MTBUR of up to 1.2 million operating hours. With more than 80,000 units supplied, we provide confidence to our customers that their assets will operate reliably over the design life and beyond.

Our sensors are designed to meet the latest stringent EMC / Lightning protection requirements driven by adoption of composite aircraft. We provide bespoke solutions dependent on the needs of the customer, including redundancy and integrated temperature measurement as examples. Our brand is widely recognized as the world's leading supplier within this application due to our longevity and technical expertise in this field.



[ Our sensors are designed to meet the latest stringent EMC / Lightning protection requirements ]





## ECS

The Environmental Control System (ECS) provides clean air, thermal control and cabin pressure for the crew and passengers. Our sensors ensure that these systems operate efficiently and reliably, which ensure that passengers are able to fly safely and in comfort.

### Challenges

The ECS is an essential system within the airframe, providing cabin and emergency air supply, fire protection and anti-icing system. Therefore product reliability is paramount, especially in the sensor, which is providing the information to the control system. Often these sensors will be fitted for the whole life of the aircraft, so performance over the aircraft's lifetime is crucially important. Failures within this application can cause AOG conditions, which result in rising costs for airlines and a loss of overall airframe credibility. In service removals of failed sensors are particularly costly and challenging from a logistical perspective, thus affirming the importance of product reliability - a characteristic that our products embody from design through to qualification.

### Solutions

We provide accurate sensors for complex low pressure differential pressure ( $\Delta P$ ) applications, as well as designing sensors to provide a robust solution at a competitive price. Our sensors within this application are used on all of the world's most produced aircraft and we have experience of having supplied over 20,000 sensor units for ECS applications.



# Fuel

Fuel level and rate of consumption are vital parameters for the pilot, to assess whether there are any deviations to the calculated consumption rate or indeed whether unexpected flight path changes can be accommodated. Additionally, in-flight monitoring of the fuel inert gas is measured to ensure the On-Board Inert Gas Generating System (OBIGGS) is operating correctly, thus providing robust safety checks for the pilot.

## Challenges

Reliability is everything when it comes to fuel systems. The accurate  $\Delta P$  measurement, which combined with flow, enables fuel metering and specific fuel consumption to be calculated. The data provided has to be reliable and accurate due to the critical nature of how this information is being used. Also on another fuel application, where the inert gas level is monitored to ensure there is no risk of ignition, a complex O<sub>2</sub> and pressure sensor is required to provide confidence that the system is operating correctly.

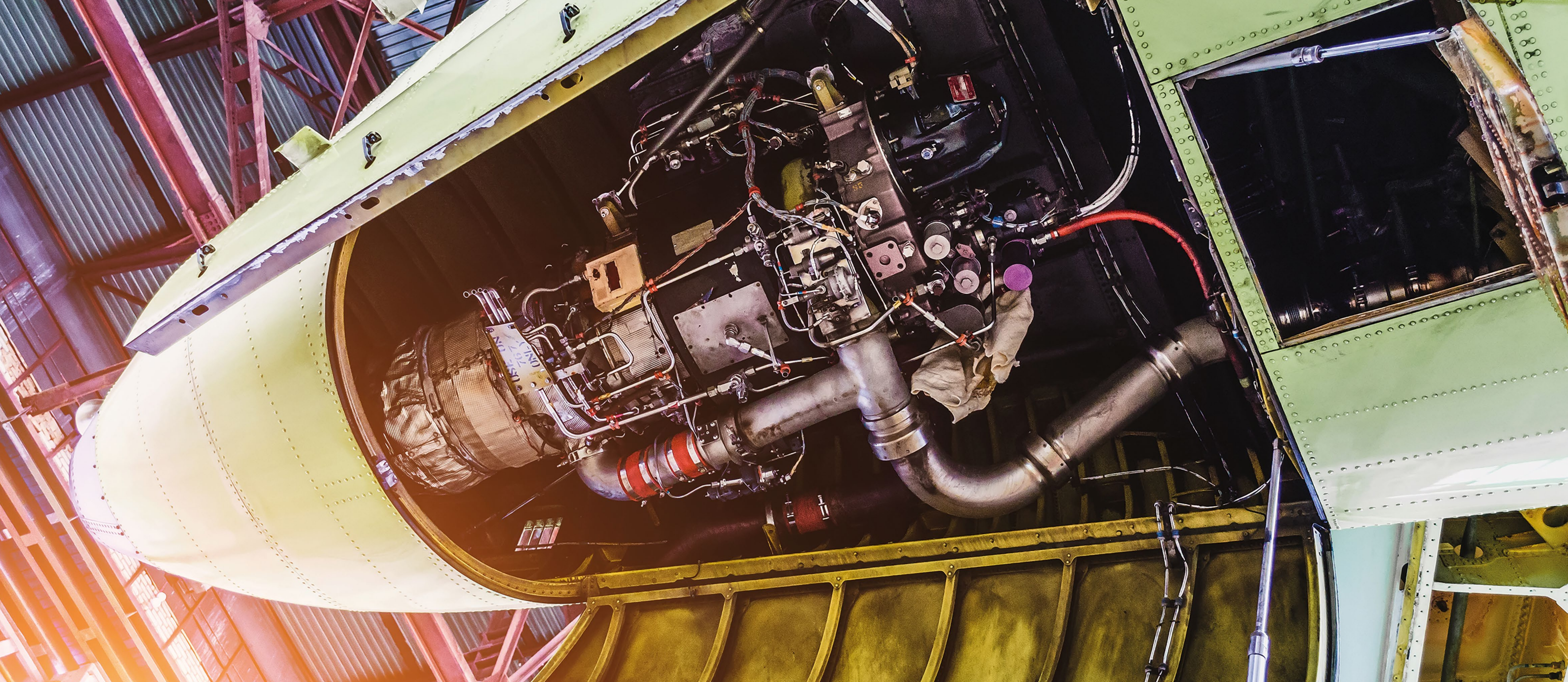
## Solutions

We are constantly challenging ourselves to reduce our production costs whilst providing world class quality sensors, because we understand that having a cost competitive solution is essential to the success of our own business and those of our customers. We have qualified our combined pressure and O<sub>2</sub> sensor to the most arduous EMC specification, providing our customers with a market leading product. We have our sensors installed on the world's most produced twin aisle aircraft, having supplied over 5,000 units for use in fuel measurement and gas monitoring.

[ We are constantly challenging ourselves to reduce our production costs whilst providing world class quality sensors ]







## APU

The Auxiliary Power Unit (APU) provides essential functionality to the aircraft, providing, electrical power, pneumatic or hydraulic to start the engines, whilst also providing lighting, air conditioning and water pressure to the main cabin crew and passengers, when grounded. It also plays a critical role in the event of an engine failure, by providing the power to restart the engine(s) during flight. The Druck pressure sensors measure the critical parameters to ensure these systems operate safely and efficiently, whilst also ensuring ground filtration checks can be completed to allow take off.

### Challenges

The APU needs to operate reliably when called upon, even in extreme temperature conditions. This could be when the aircraft is being boarded, in locations that regularly reach temperatures > 40 degrees celsius or indeed at extreme cold temperatures, as low as -56.5 degrees celsius, when in an unlikely event such as an engine failure has occurred and power is required to re-start the engine. These harsh environments, which cannot support human life, need to operate to sustain life when called upon.

Additionally, accurate pressure sensors are necessary at low pressures to ensure that filters are not blocked prior to take off, which would result in an AOG event, resulting in high costs and unplanned removals.

### Solutions

Our team offer many years of experience, ensuring that products undergo a robust qualification testing program. We have field proven reliability data from products in service today on the world's most produced commercial airframes. We have supplied more than 7,000 units of varying complexity, which included such solutions as a triple sensor configuration, which offered redundancy during operation, in turn providing a cost effective and reliable solution to our customer.



# Engine

Aircraft engines are extensively tested to prove reliability. Certification testing is extremely challenging and lengthy, due to the absolute reliance on this complex system to provide power to enable and to sustain flight. To provide this level of reliability all systems and components used within the engine need to be equally robust.

Our sensors allow the engine to operate, through reliable measurement of the fuel and oil pressure. Our sensors monitor the engine health, providing prognostic information and also critical engine control data to the pilot.

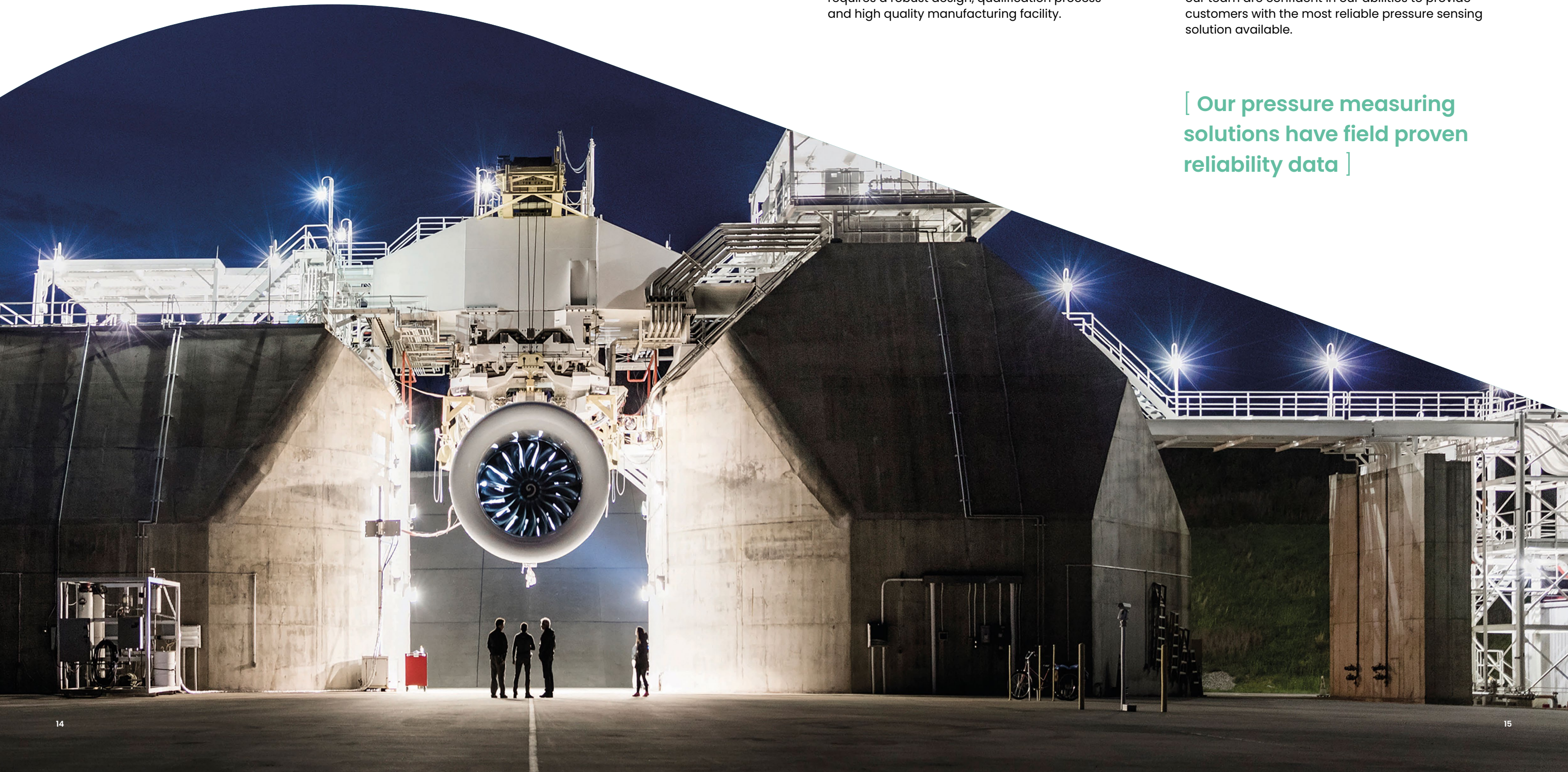
## Challenges

The engine environment is arguably the most hostile within the aircraft due to the extreme temperatures, rapidly changing environmental conditions and exposure to the elements. The demands for continued, reliable data from the products controlling the engine parameters is a given. Fulfilling these needs is extremely challenging as the function of the sensor ensures the engines operate safely and efficiently. Being exposed to the elements at 41,000 feet at temperatures close to = 70 degrees fahrenheit requires a robust design, qualification process and high quality manufacturing facility.

## Solutions

Our pressure measuring solutions have field proven reliability data, as well as having qualified products for installation on the world's most produced commercial engines. We have partnered with OEM's to design bespoke solutions such as providing high burst pressure, whilst maintaining high accuracy demands and helped overcome pump ripple challenges. We have gained the trust of our customers through our rigorous and robust qualification process. Having supplied more than 8,000 units for use on engines, our team are confident in our abilities to provide customers with the most reliable pressure sensing solution available.

[ Our pressure measuring solutions have field proven reliability data ]







## ADC/ADM

Air Data Pressure Measurement from Pitot and Static ports provides critical information to the Integrated Air Data Inertial Reference System (ADIRS) to enable the Captain and Flight Officer to understand key flight information such as Air Speed and Altitude, which is then computed and displayed on the Primary Flight Display.

### Challenges

This application provides flight critical information for the safe navigation and control of the aircraft, therefore product reliability and long term performance is of great importance. Accuracy over the life of the product, combined with the ability to consistently operate within harsh environments are extremely challenging.

### Solutions

Our team has developed, over a 10 year period, a unique MEMS pressure sensor that provides unprecedented levels of performance to meet the demands for this application. The MEMS device contains TERPS technology, which negates the effects of long-term stability concerns associated with traditional piezo resistive technologies. This technology has been subjected to harsh qualification testing to ensure it is ready to serve this market.



# Test

The Druck sensor product range offers a wide portfolio of test solutions, covering both ground and flight.

We have developed multi-pressure scanners used for flight test and engine ground test. These products offer 32 or 64 channels, enabling an accurate pressure profile to be established in harsh environments. Offering a digitally corrected, high accuracy sensor range that is available for flight test, qualified to meet DO160 environmental needs as well as a series of miniaturized analogue products, suitable for higher pressures and temperatures. These units are offered with cable or hermetic electrical connectors.

We also offer an Aerospace standard product range that is suitable for flight test. This product is known as the 3700 series and is a high accuracy product, qualified to DO160 environmental condition and is commercially available to all. Whilst this is a configured standard product, we also provide bespoke sensing solutions to meet the specific needs of our customers.

Finally we offer high quality industrial grade products that can meet many requirements during testing. ADROIT6000 is a new compact 19mm sensor with digital compensation and total accuracy over temperature of up to 0.1%. UNIK5000 is a true analogue sensor with multiple configurations in a 25mm package.



[ We also offer an Aerospace standard product range that is suitable for flight test ]



# Other applications

We provide unique custom design solutions to solve a range of customer challenges. Providing solutions across the whole spectrum of aircraft from light business jets and rotary wing to large twin aisle commercial airframes. We also support military aircraft systems and on-board equipment. We also operate within adjacent market spaces to the Aviation industry including Space, Marine and Industrial, leveraging relevant technological expertise from these markets.

We are able to satisfy smaller program opportunities through our generic 'flight qualified' 3000 series product range. We also offer a digitally corrected, high accuracy product range, known as the 3700 series, which is specifically tailored for test applications, including flight. Please visit our website for more details of these product ranges.

The expertise behind our Druck product ranges mean you can rely on us to keep your assets operating efficiently and reliably. In addition to our Aerospace sensor ranges we also produce the following:

## Industrial sensors for aerospace applications

High quality Industrial grade sensors offer great performance and design flexibility. They are a cost effective test solutions where flight approval is not required. The new digitally compensated ADROIT6000 offers high performance in a small robust package, coupled with easy to interface analogue outputs and down wire recalibration ADROIT is the right choice particularly in applications with wide operating temperatures. The totally analogue UNIK5000 offers multiple configurations for just about every application offering great performance on short lead-times. A number of other packages can be chosen for particularly unusual applications-bringing accuracy, productivity and safety to a wide range of applications.

## Ground support equipment for test and calibration

### Air Data Test Sets

Also referred to as Pitot Static testers, ADTS are used for testing calibrating airspeed and aircraft pitot static systems. Our Air Data Test Sets have TERPS technology at their heart, bringing best in class accuracy, resolution and drift performance. Our ADTS play a vital role when on-board instruments are manufactured, repaired, calibrated or integrated into an aircraft.

## Portable calibrators

To help you select the right process calibration tools we have categorised our products into three ranges. The Elite range provides a modular system offering state-of-the-art multifunction communication and calibration. Our Expert range introduces higher accuracy and more functionality, and the Essential range provides rugged, accurate and easy-to-use test and calibration tools. We have developed bespoke Aerospace versions of products within these ranges such as the DPI610/615 Aeronautical Series. The DPI610 offers 52 pressure ranges, accuracy of 0.025% F.S and use of up to 11 sensors per instrument. Our knowledge of customer needs, combined with our innovative design results in high performance, multi-functional calibrators which are easy to use.

Find out more about our test, calibration, measurement and sensing solutions and how they provide high accuracy and reliable data, whatever the needs of your application.

Visit [www.druck.com](http://www.druck.com) for more information.



# Examples of our products

## Hydraulic



### High pressure quad

**Pressure range:** 0 to 4000 psi a  
**Operating temp:** -54 to 71 C  
**Construction:** SS 316L, Hastelloy C276  
**Fully hermetic:** Yes  
**Output:** Vdc  
**Special feature:** Delta P / Delta P Pressure Switch



### General hydraulic applications

**Pressure range:** 0 to 4000 psi sg  
**Operating temp:** -55 to 125 C  
**Construction:** SS 316L  
**Fully hermetic:** Yes  
**Output:** mA  
**Special feature:** High overload capability



### High pressure differential

**Pressure range:** 0 to 4000 psi a  
**Operating temp:** -55 to 116 C  
**Construction:** SS 17-4PH, SS 316L  
**Fully hermetic:** Yes  
**Output:** mV  
**Special feature:** High pressure differential

## Engine



### Fuel differential

**Pressure range:** 0 to 60 psi d  
**Operating temp:** -54 to 191 C  
**Construction:** SS 316L  
**Fully hermetic:** Yes  
**Output:** mV  
**Special feature:** Wet / wet differential



### Engine monitoring

**Pressure range:** 0 to 70 psi a  
**Operating temp:** -55 to 105 C  
**Construction:** SS 316L  
**Fully hermetic:** Yes  
**Output:** mV  
**Special feature:** Digitally corrected



### Oil pressure differential

**Pressure range:** 0 to 140 psi d  
**Operating temp:** -54 to 125 C  
**Construction:** SS 316L  
**Fully hermetic:** Yes  
**Output:** mV  
**Special feature:** Process interface

## Test



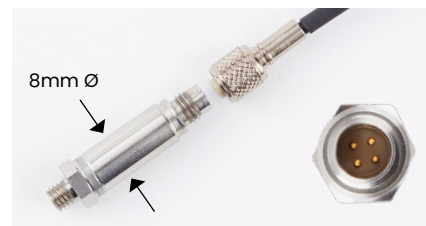
### 3700 Series

**Pressure range:** 0 to 350 bar a  
**Operating temp:** -55 to 121 C  
**Construction:** SS 316L  
**Fully hermetic:** Yes  
**Output:** Vdc  
**Special feature:** Fully configurable options



### D300 Test

**Pressure range:** 0 to 35 Mpa a  
**Operating temp:** -55 to 175 C  
**Construction:** SS 316L, SS17-4PH  
**Fully hermetic:** No  
**Output:** mV  
**Special feature:** Multiple pressure ranges



### D300 Miniature

**Pressure range:** 30 to 3000 psi a  
**Operating temp:** -55 to 155 C  
**Construction:** SS17-4PH, Inconel 625  
**Fully hermetic:** Yes  
**Output:** mV  
**Special feature:** 8 mm Ø

## ECS



### Emergency oxygen

**Pressure range:** 0 to 2500 psi sg  
**Operating temp:** -29 to 54 C  
**Construction:** SS 316L  
**Fully hermetic:** Yes  
**Output:** Vdc  
**Special feature:** Compatible with oxygen



### Air management

**Pressure range:** 0 to 5.5 bar a  
**Operating temp:** -55 to 150 C  
**Construction:** SS 316L  
**Fully hermetic:** Yes  
**Output:** Vdc  
**Special feature:** None

## Fuel



### Fuel metering

**Pressure range:** 0 to 20 psi d  
**Operating temp:** -55 to 99 C  
**Construction:** SS 316L, Hastelloy  
**Fully hermetic:** No  
**Output:** mV  
**Special feature:** Dual sensor with Temperature



### OBIGGS monitoring

**Pressure range:** 20 to 84 psi a  
**Operating temp:** -55 to 89 C  
**Construction:** SS 316L  
**Fully hermetic:** Yes  
**Output:** mA  
**Special feature:** Combined O2 and Pressure

## Auxiliary Power Unit



### Low pressure differential

**Pressure range:** 0 to 3.5 psi d  
**Operating temp:** -55 to 121 C  
**Construction:** SS 316L  
**Fully hermetic:** Yes  
**Output:** Vdc  
**Special feature:** Differential (wet / dry)



### Combined absolute and differential

**Pressure range:** 0 to 0.3 psi d  
**Operating temp:** -55 to 121 C  
**Construction:** SS 316L  
**Fully hermetic:** Yes  
**Output:** Vdc  
**Special feature:** Differential (wet / dry)

## ADC/ADM



### TERPS (with electronics)

**Pressure range:** 15 to 50 psi a  
**Operating temp:** -55 to +125°C  
**Construction:** Exposed silicon construction  
**Fully hermetic:** No  
**Output:** Multiple digital configurations  
**Special feature:** Stability and precision over temperature



### TERPS (in body tube)

**Pressure range:** 15 to 1000 psi a  
**Operating temp:** -55°C to +125°C  
**Construction:** SS 316L, Hastelloy  
**Fully hermetic:** Yes  
**Output:** Multiple digital configurations  
**Special feature:** Stability and precision over temperature



### MPS32

**Pressure range:** 1 to 15 psi d  
**Operating temp:** -55°C to +90°C  
**Construction:** Aluminium with protected finish  
**Fully hermetic:** No  
**Output:** Vdc  
**Special feature:** Flight qualified offering and ATEX approved



### PDCR300

**Pressure range:** 0 to 35MPa absolute  
**Operating temp:** -55°C to +150°C  
**Construction:** All Stainless Steel 316L, 17/4PH & INC 625  
**Fully hermetic:** No - all fusion welded  
**Output:** mV  
**Special feature:** Aerospace Test



### ADROIT6000

**Pressure range:** 70 mbar to 700 bar  
**Operating temp:** -40 to 125°C  
**Construction:** 316L Stainless Steel, Hastelloy C276  
**Fully hermetic:** Optional  
**Output:** Voltage mA  
**Special feature:** Up to 0.1% total accuracy



### UNIK5000

**Pressure range:** 70 mbar to 700 bar  
**Operating temp:** -40 to 125°C  
**Construction:** 316L Stainless Steel, Hastelloy C276  
**Fully hermetic:** Optional  
**Output:** mV, Volts, mA  
**Special feature:** Hazardous area certifications



# Future statement

Our company is steadfast in ensuring that we are at the forefront of our key customers' minds when considering future pressure measurement or multi-parameter measurement needs. As a business we value partnership and seek ways to share technology road maps to ensure we are aligned for future challenges. We understand the need for reliability, consistency and openness to harness trust and that this is the cornerstone for all long-term relationships.

We have our own New Technology Innovation (NTI) team that focusses on the industry trends and future expectations of the market. We understand the importance of data, but more importantly reliable and accurate data, which is what we pride ourselves on. We understand our world is changing and that one day mankind may well observe our own from another planet. Whether your needs are current or seeking ways to develop and improve for the future, please reach out to a member of our team.

# Our aerospace technical service offering



Our Aerospace team is an integrated, multi-functional team of talented mechanical, electrical and systems engineers, with hundreds of years of collective experience in delivering high quality designs to all areas of the market place. Our technical domain experience and customer offering includes:

- Strong Requirements Management Process
- Model-Based design
- Finite Element Analysis
- Circuit Simulation
- High Accelerated Life Testing (HALT)
- In-House Rapid Prototyping
- Additive Material Options
- High Vibration Design solutions
- Pressure Cycling and Rate Testing

We also support our customers with in-service investigations to help establish RCCA, with use of our non-destructive screening processes.





# Global manufacturing excellence

Our pressure solutions are manufactured in the UK, Norway and China to enable us to get closer to our customers. Each facility is ISO9001 accredited and AS9100 for our aerospace business and operates under Druck's strict quality-control procedures. We continue to invest in advanced manufacturing techniques and processes that keep us at the forefront of product quality and efficiency.

## Measurement & sensing

What started as a small business in Leicester, UK in 1972 has now grown into a global pressure-measurement business that is recognised as a world leader in manufacturing high-quality and high-accuracy piezo-resistive pressure sensors. We serve a wide range of applications from Aerospace, Subsea, Test and Calibration and Industrial Applications with customers in over 70 countries. This is due to the fact we process the raw silicon right through to the final product. Over the past 40+ years we have developed world-class expertise in producing high-performance, high-stability, fast-responding and high-quality pressure sensors.

## Brilliant factory

We are proud that our Leicester facility has been named as a Baker Hughes Brilliant Factory, linking data-sources across the factory to enable us to continually improve and control our manufacturing processes.



## State-of-the-art silicon clean room

The heart of all of our pressure sensing solutions is the sensing element, which is manufactured from silicon wafers in our state-of-the-art clean room facility in Leicester, UK. It was completely refurbished in 2015 and is now able to process over 260 versions of silicon 24/7. Advanced robotics have more than tripled the efficiency of the silicon processing, leading to better quality and higher yields. Our Global Research facility in Niskayuna, NY, USA operates as a second source of silicon, both ensuring that we have capacity to fully meet the demands of our customers and provide a strong reliable supply chain.

## Innovation

Druck are leading innovators in pressure sensing and calibration. We are constantly pushing new frontiers and setting new benchmarks in performance. Through our expertise in silicon processing we have developed our Trench Etched Resonant Pressure Sensor (TERPS) technology which delivers unprecedented accuracy and stability. Our customer-focused approach to product development, ensures that we drive to make your life easier and more productive.





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.**

## Contact us

For more information please contact your local Druck representative, or visit:

[druck.com](https://druck.com)

