

GE Oil & Gas

Accuracy under pressure.

Hydrology data you can
rely on, time after time.



GE Pressure Sensors for
Hydrology applications:

UNIK5000 family
TERPS 8000 series
1800 series



GE has been manufacturing high performance piezo resistive pressure sensors since 1972. We are one of the only sensor manufacturers to make the silicon sensing element in-house at our multi-million dollar clean room facility in the UK. As a result, we are able to ensure the highest quality and performance in delivering world class, highly accurate pressure sensors.

Built for accuracy and precision, GE pressure sensors are one of the leading technologies in the world of hydrology.

Monitoring the quality and quantity of surface and ground water can be categorised into three key areas: natural water monitoring, drinking water and waste water management. Our market leading pressure sensors use designs based on over 40 years of experience, making them highly suited for these hydrology applications:

Natural water monitoring

The natural water environment is both hostile and remote. Reliability is critical to quality data collection, particularly when power is in short supply and service is expensive.

Drinking water

High quality drinking water is a valuable resource. Managing this essential asset requires precision instrumentation across the entirety of the drinking water network.

Waste water management

In waste water management you must have confidence in the durability of your instrumentation. When faced with unpredictable content and a challenging environment, robust construction is key for reliable data collection.



Challenges in natural water monitoring

Extreme temperatures

Very remote and hostile environments

Narrow bore wells

Difficult to access areas for installation, repair and calibration

Large changes in depth

Surface debris and foaming

Vandalism

No line of sight

Shallow water or dry river beds

Underwater debris

Lightning strikes

Salt corrosion

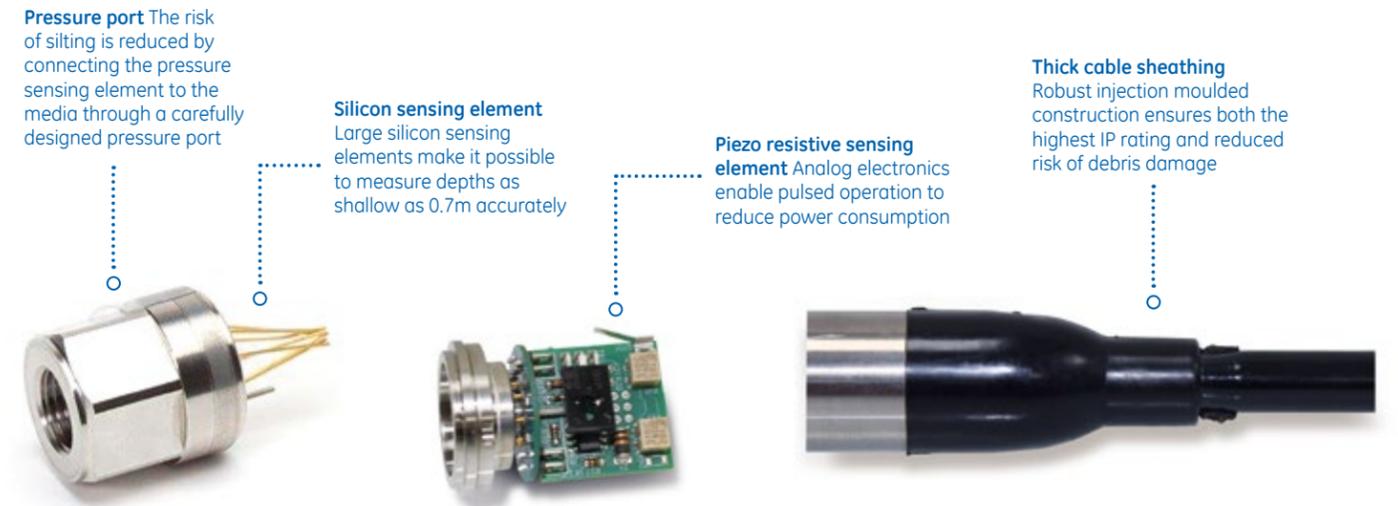
Independent power supply required

Silting

Natural water monitoring

Reliability when you need it most.

All our components are designed and built to perform in the most hostile of environments.



Remote applications

Independent power supply required

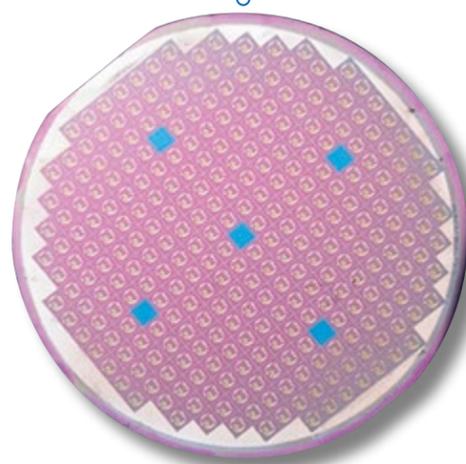
Piezo resistive sensing elements and analogue electronics enable pulse power operation with readings taken in as little as 10 ms. This significantly reduces energy consumption. Voltage outputs reduce current consumptions to a few mA and in short cable run applications, mV output sensors reduce the power on time and current consumption even more. This minimises the requirements for expensive batteries or solar chargers.

Difficult to access for repair or calibration

High stability silicon sensing elements in robust packaging ensures accurate and reliable performance over long periods. This minimises the need to visit sites for the repair of faulty components and extends the periods between routine visits for calibration.

Silicon sensing element

High stability silicon sensing elements in robust packaging ensure accurate and reliable performance over long periods



Hostile environments

Silting

The risk of silting is reduced by connecting the pressure sensing element to the media through a carefully designed pressure port. Soft nose cones both protect the sensing element from physical shock damage and are easily removed allowing access to the open face connectors, which enable gentle cleaning in extreme circumstances.

Debris

Fully welded construction in high quality materials, injection moulded to the thick cable sheathing, ensure both the highest IP rating and reduce the risk of damage from debris moving in turbulent and fast moving water.

Extreme temperatures

The use of high quality electronic components allow options to accurately measure temperature ranges from -40°C – +125°C.

Salt corrosion

Titanium construction can give you confidence in the long and reliable operation of our sensors in salt water environments, while many years of corrosion free service minimise expensive site visits.

Lightning strikes

By building lightning surge arrestors into the sensor (on the electronics end of the inductance and capacitance of the cable) the best protection in lightning affected areas can be offered. This helps to ensure the longest possible life in the field, thereby lowering the cost of ownership.

Difficult installation sites

Surface debris and foaming

By measuring the pressure at depth in order to calculate level, GE pressure based level sensors are immune from incorrect readings caused by surface debris or foaming that will cause errors in line of sight based devices like Ultrasonics or Radar.

Narrow bore wells

With a sensor diameter as small as 17.5mm, units can be deployed in narrow wells reducing drilling costs. Cable in all models incorporates a Kevlar core which provides strength to allow long cable drops and minimises cable extension under loading. Accessories, like sink weights and cable clamping mechanisms, have been designed to make installation easy and ensure maximum life.

No line of sight

Sloping banks and obstructions like trees make some sites very difficult for line of sight methods. Pressure sensors can be installed in the deepest part of a river with an unobtrusive cable to bring the level information back to instrumentation.

Shallow water or dry river beds

Large silicon sensing elements make it possible to measure depths as shallow as 0.7m accurately. This makes accurate level measurement in V notch flow meters possible, where small changes in the water level results in a large change in flow.

Large changes in depth

Large overpressure capability makes it possible to measure normal operating conditions accurately and survive flood conditions.

Vandalism

Using pressure to measure level is unobtrusive, with much of the equipment hidden underwater. This reduces the instances of installations being damaged by acts of vandalism.



Natural water monitoring challenges	1800 Series	UNIK5000	DPS5000	DPS8000
Low power	★	★	★	
Long service interval	✓	✓	✓	★
Silting	★	✓	✓	✓
Debris	✓	✓	✓	✓
Extreme temperature		★	★	★
Salt corrosion	★	✓	✓	✓
Lighting	★			
Surface debris foaming	✓	✓	✓	✓
Narrow bore wells	★			
No line of sight	✓	✓	✓	✓
Shallow water	✓	✓	✓	
Large changes in depth	✓	✓	✓	✓
Vandalism	✓	✓	✓	✓

✓ Options are available to address this challenge

★ This product has a feature specifically designed to address this challenge

Challenges in drinking water



Limited space in bore holes

Difficult to access for repair or calibration

Needed in remote, inaccessible locations

Compatibility with treatment chemicals

Used across large surface areas

Monitoring subtle changes over long periods of time

Precision with every drop.

Each one of our components is designed and built for reliability at every stage of the cycle.

Limited space in bore holes

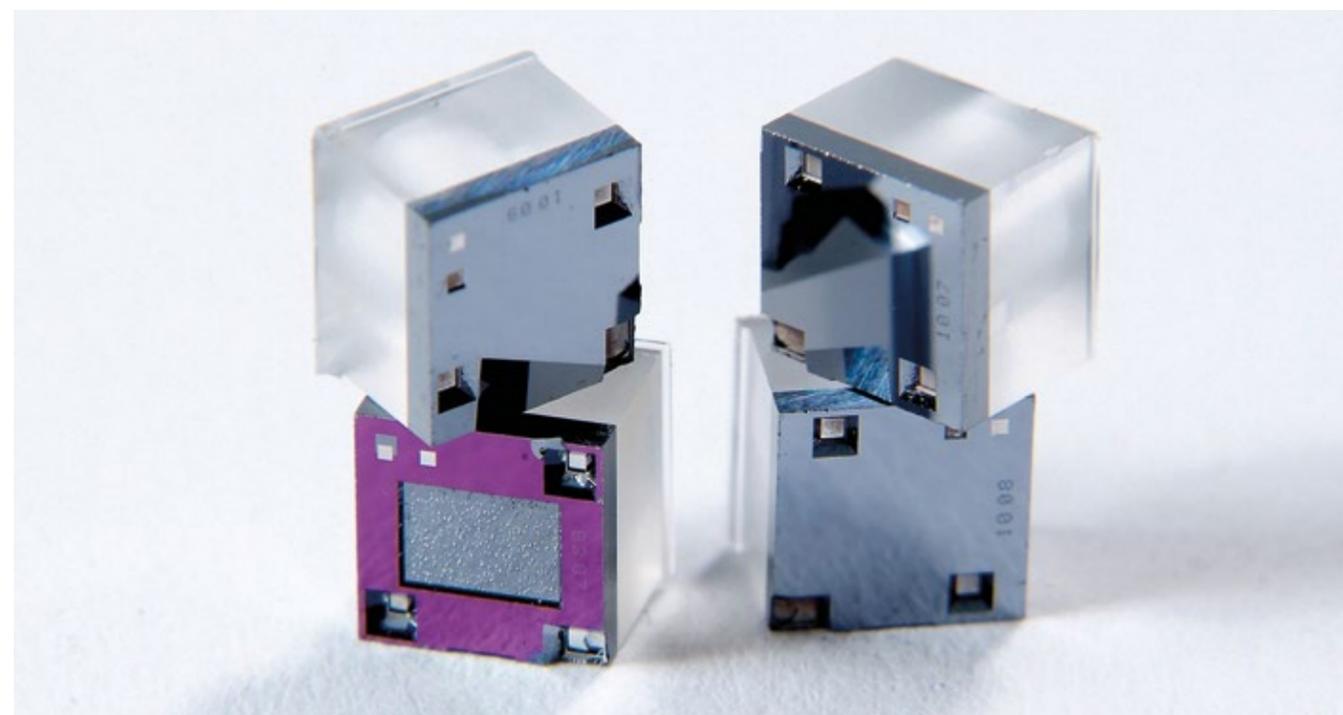
17.5mm diameter construction reduces the size of bore holes required minimising drilling costs for water extraction. The stiffness of titanium allows narrow body construction without compromising performance or stability. High quality screened cable and 4-20 mA signals are mechanically robust and immune from electro-magnetic interference from electric motors on pumps.

Large surface areas require the highest levels of accuracy

Many new dam constructions have shallow slopes making vertical line of sight technology very expensive to install. TERPS technology allows accurate measurements better than 0.01% (1mm in 10m depth) to allow the most efficient resource management of reservoirs.



1830 Series Druck High Performance Level Pressure Sensors
The latest generation of fully submersible titanium high performance sensors for measurement of hydrostatic liquid levels



Trench Etched Resonant Pressure Sensor: TERPS



Monitor subtle changes over long periods of time

Excellent long term stability allows drinking water systems to be accurately monitored. This enables small changes in pressure profiles, caused by leakage, to be quickly seen and located. This can be used to reduce leakage and repair costs.

Compatibility with treatment chemicals

Titanium and stainless steel construction married to cables made of polyurethane or Hytrel enable the best materials to be selected for compatibility with water treatment chemicals. This becomes particularly important in dosing stations or storage tanks where the concentrations can be high.

Difficult to access for repair or calibration

High stability silicon sensing elements in robust packaging ensures accurate and reliable performance over long periods. Accordingly, this minimises the need to visit sites for repair of faulty components and extends the periods between routine visits for calibration.

Inaccessible locations, inspection chambers

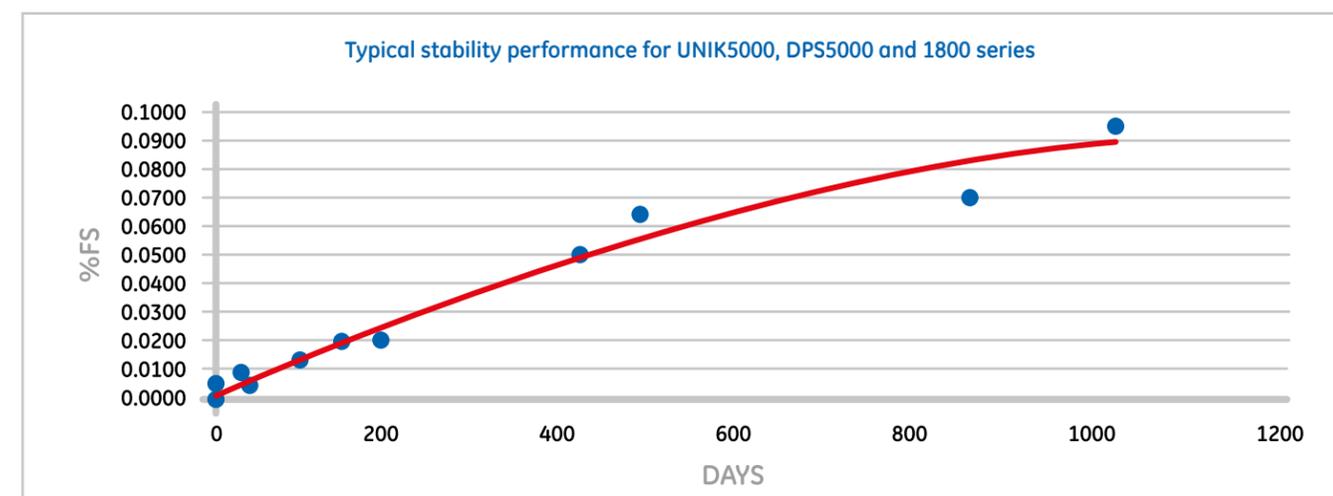
Small size, fully welded construction and IP68 to 700m cable connections mean that GE products give reliable operation in sub surface application that are prone to flooding. Particularly useful is this feature in differential sensors for use on filters or valves.

Natural water monitoring challenges	1800 Series	UNIK5000	DPS5000	DPS8000
Narrow bore wells	★			
Highest accuracy	✓	✓	✓	★
Low power	★	★	★	
Long service interval	✓	✓	✓	★
Small changes over long time	✓	✓	✓	★
Media compatibility	★	✓	✓	★
Differential measurements		★		

- ✓ Options are available to address this challenge
- ★ This product has a feature specifically designed to address this challenge



Differential UNIK5000 Series
IP68 versions available



Challenges in waste water management



Blocked line of sight and surface foaming

Silting

Used in areas of low pressure

No power available

Unknown chemicals

Explosive atmospheres

May come into contact with violently moving debris

Performance against all odds.

All our components are designed and built for stability, no matter what the conditions.



Contact with violently moving debris

Our products are designed to be robust in what can be a violent application where waste water can carry heavy objects which can damage level sensors.

Features to cope with this environment include:

- Fully welded construction in stiff titanium or tough stainless steel
- Injection moulding of the electrical cable to the sensor body ensures the IP68 rating is maintained, guaranteeing the integrity of the sensors
- Thick cable walls made of tough polyurethane or stiff chemically robust Hytrel
- Kevlar cable core supply strength – preventing cable stretching

Unknown chemicals

Titanium or stainless steel metal work with polyurethane or Hytrel cable can be chosen to reduce the risk of chemical corrosion damaging sensors.

Silting

The risk of silting is reduced by connecting the pressure sensing element to the media through a carefully designed pressure port. Soft nose cones both protect the sensing element from physical shock damage and are easily removed, allowing access to the open face connectors that enable gentle cleaning in extreme circumstances.

No power available

Piezo resistive sensing elements and analogue electronics enable pulse power operation, with readings taken in as little as 10 ms. This significantly reduces energy consumption. Voltage outputs reduce current consumptions to a few mA and in short cable run applications, mV output sensors reduce the power on time and current consumption even more, which, in turn, minimises the requirements for expensive batteries or solar chargers.



1830 nose cone
Designed to operate in high silting environments

Electronics
Analog electronics enable pulsed operation to reduce power consumption



Explosive Atmospheres

Waste water can release explosive methane. This means that many chambers are designated as hazardous areas. Products used in these areas need to be certified as safe for use. GE pressure sensor products carry an array of certifications for use in such areas allowing installation using different safety rules to suit the application and validity in most countries around the world.

Blocked line of sight and surface foaming

By measuring the pressure at depth in order to calculate level, GE Pressure based level sensors are immune from incorrect readings caused by obstruction in tanks or chambers as well as surface debris or foaming that will cause errors in line of sight based devices like ultrasonics or radar.

Used in areas of low pressure

Many waste water applications are in shallow drains where the level of water in normal conditions is very low. GE pressure sensors use silicon sensing elements made in our own clean room. In order to enable highly sensitive low pressure measurement, particularly in large surface areas, thin elements are used. This makes it possible to measure pressures with a full scale reading as low as 0.7 mH₂O (70 mbar, 1 psi).

Media compatibility
Choice of polyurethane or Hytrel cable



Depth cable
Moulded directly to the sensor body to give Type 6/IP68 rating for permanent immersion



Waste water management challenges	1800 Series	UNIK5000	DPS5000	DPS8000
Debris	✓	✓	✓	✓
Unknown chemicals	★	✓	✓	✓
Low power	★	★	★	
Shallow depths	✓	✓	✓	
Explosive atmospheres	✓	★	✓	

✓ Options are available to address this challenge
★ This product has a feature specifically designed to address this challenge

Product specifications

Built for accuracy and precision, GE pressure sensors are the leading technology in the world of hydrology.

1800 Series

- Ranges from 0.75 mH₂O to 600 mH₂O
- Accuracy to ±0.06%
- Fully welded 17.5mm titanium construction
- Integral lightning surge arrestor option
- Polyurethane and hydrocarbon resistant cables
- Full range of installation accessories



UNIK5000

- Ranges from 70 mbar (1 psi) to 700 bar (10000 psi)
- Accuracy to ±0.04% Full Scale (FS) Best Straight Line (BSL)
- Stainless Steel construction
- Frequency response to 3.5 kHz
- High over pressure capability
- Hazardous Area certifications
- mV, mA, voltage and configurable voltage outputs
- Multiple electrical & pressure connector options
- Operating temperature ranges from -55 to 125°C (-67 to 257°F)



DPS5000

- Ranges from 70 mbar to 100 bar
- Total accuracy to ±0.1% FS
- Stainless steel construction
- 3V Supply voltage
- Low power
- I²C digital bus output
- Sleep/Standby mode
- Hazardous area certifications
- Excellent long-term stability



DPS8000

- High precision, ±0.01% FS over compensated temperature range
- High stability, ±100 ppm FS/year
- Designed with brand new TERPS technology
- Welded 316L construction
- Pressure ranges, 2 bar (30 psi) up to 200 bar (3000 psi)



Product selection guide

To help you locate the ideal instrument for your application, please use the guide below.

Natural water monitoring challenges	1800 Series	UNIK5000	DPS5000	DPS8000
Low power	★	★	★	
Long service interval	✓	✓	✓	★
Silting	★	✓	✓	✓
Debris	✓	✓	✓	✓
Extreme temperature		★	★	★
Salt corrosion	★	✓	✓	✓
Lighting	★			
Surface debris foaming	✓	✓	✓	✓
Narrow bore wells	★			
No line of sight	✓	✓	✓	✓
Shallow water	✓	✓	✓	
Large changes in depth	✓	✓	✓	✓
Vandalism	✓	✓	✓	✓

Drinking water challenges	1800 Series	UNIK5000	DPS5000	DPS8000
Narrow bore wells	★			
Highest accuracy	✓	✓	✓	★
Low power	★	★	★	
Long service interval	✓	✓	✓	★
Small changes over a long time	✓	✓	✓	★
Media compatibility	★	✓	✓	★
Differential measurements		★		

Waste water management challenges	1800 Series	UNIK5000	DPS5000	DPS8000
Debris	✓	✓	✓	✓
Unknown chemicals	★	✓	✓	✓
Low power	★	★	★	
Shallow depths	✓	✓	✓	
Explosive atmospheres	✓	★	✓	

Full product datasheets are available from our website. For further information and detailed product selection please contact your local channel partner or sales office.

✓ Options are available to address this challenge

★ This product has a feature specifically designed to address this challenge

Unique silicon processing

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, silicon pressure sensors. We serve a wide range of applications from Aerospace to Subsea and process engineering to Hydrology with customers in over 70 different countries. Because we process the raw silicon right through to the final product, we have developed a world-class expertise in producing high-performance, high-stability, fast-responding and high-quality pressure sensors.



State-of-the-art silicon clean room

The heart of all 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 now operates as a second source of silicon, both ensuring we have the capacity to fully meet the demands of our customers and have a backup facility in place.



State-of-the-art silicon clean room, Leicester

For more information please contact
your local GE representative,
or visit www.gemeasurement.com



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