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

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.

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
- Lightning strikes
- Large changes in depth
- Narrow bore wells
- Very remote and hostile environments
- Vandalism
- Underwater debris
- Surface debris and foaming
- No line of sight
- Shallow water or dry river beds
- Independent power supply required
- Difficult to access areas for installation, repair and calibration
- Salt corrosion
- Silting
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 while many years of corrosion free service minimise expensive mechanisms, have been designed to make installation easy and ensure maximum life.

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 readings caused by surface debris or foaming that will cause errors in line of sight based devices like Ultrasonics or Radar.

Surface debris foaming
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.

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

Silicon sensing element
Large silicon sensing elements make it possible to measure depths as shallow as 0.7m accurately.

Piezo resistive sensing element
Analogue electronics enable pulsed operation to reduce power consumption.

Pressure port
The risk of silting is reduced by connecting the pressure sensing element to the media through a carefully designed pressure port.

Silicon element
Large silicon sensing elements in robust packaging ensure accurate and reliable performance over long periods.
Challenges in drinking water

- Compatibility with treatment chemicals
- Used across large surface areas
- Limited space in bore holes
- Difficult to access for repair or calibration
- Needed in remote, inaccessible locations
- Monitoring subtle changes over long periods of time
Drinking water

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.

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.

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

Typical stability performance for UNIK5000, DPS5000 and 1800 series
Challenges in waste water management

- Blocked line of sight and surface foaming
- Used in areas of low pressure
- Unknown chemicals
- May come into contact with violently moving debris
- Silting
- No power available
- Explosive atmospheres
Performance against all odds.

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

Waste water management challenges

- Debris
- Unknown chemicals
- Low power
- Shallow depths
- Explosive atmospheres

Options are available to address these challenges.

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

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).

- 1800 Series
- Waste water
- Debris
- Unknown chemicals
- Low power
- Shallow depths
- Explosive atmospheres
- 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
- Electronics
- Analog electronics enable pulsed operation to reduce power consumption
- Depth cable
- 1830 nose cone
- Designed to operate in high silting environments
- 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.
**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.

<table>
<thead>
<tr>
<th>Natural water monitoring challenges</th>
<th>1800 Series</th>
<th>UNIK5000</th>
<th>DPS5000</th>
<th>DPS8000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low power</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Long service interval</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Silting</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debris</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Extreme temperature</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Salt corrosion</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Lighting</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface debris foaming</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Narrow bore wells</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>No line of sight</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shallow water</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large changes in depth</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vandalism</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drinking water challenges</th>
<th>1800 Series</th>
<th>UNIK5000</th>
<th>DPS5000</th>
<th>DPS8000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narrow bore wells</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highest accuracy</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Low power</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long service interval</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small changes over a long time</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Media compatibility</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Differential measurements</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Waste water management challenges</th>
<th>1800 Series</th>
<th>UNIK5000</th>
<th>DPS5000</th>
<th>DPS8000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debris</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown chemicals</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Low power</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shallow depths</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explosive atmospheres</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

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
GE Oil and Gas

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