APSENSING.

DISTRIBUTED FIBER OPTIC SENSING

for Downhole Applications

THINKING AHEAD

APSENSING.

Your Trusted Partner

for Well and Reservoir Monitoring

AP Sensing is the **Distributed Temperature Sensing (DTS), Distributed Acoustic Sensing (DAS),** and **Distributed Temperature Strain Sensing (DTSS)** solution provider for your various downhole applications. We provide global sales and service through a network of local offices and highly qualified partners. For more than a decade, our systems have been successfully deployed across a wide range of markets and regions.

AP Sensing was founded on the **heritage of HP (Hewlett-Packard)**, the market leader in fiber optic testing and measurement for over 40 years. With thousands of installations, our Distributed Fiber Optic Sensing (DFOS) technologies are known for their **outstanding quality, reliability, and performance.**

- Quality
- Reliability
- Performance

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Solutions That Fit Your Needs

Our Expertise

AP Sensing's DFOS technology is a well-established technology for various downhole applications. It provides many benefits, such as the ability to perform **different measurement types (e.g., temperature, acoustic, strain) using a single cable with multiple fibers**.

Additionally, it enables simultaneous measurements along the entire length of the well and provides real-time data acquisition. Our solution enables **better reservoir understanding** and proactive responses to possible safety issues while **reducing environmental impact and operating time** at the same time.

We offer gapless, 24/7 monitoring.

Advantages

- Continuous and simultaneous measurements along the entire well length
- Ability to monitor properties in dynamics
- Passive and robust sensor cable immune to EMI
- Cost-effective solution
- Ideal for both temporary and permanent deployment
- Carbon footprint reduction

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Where to Use Our Solutions

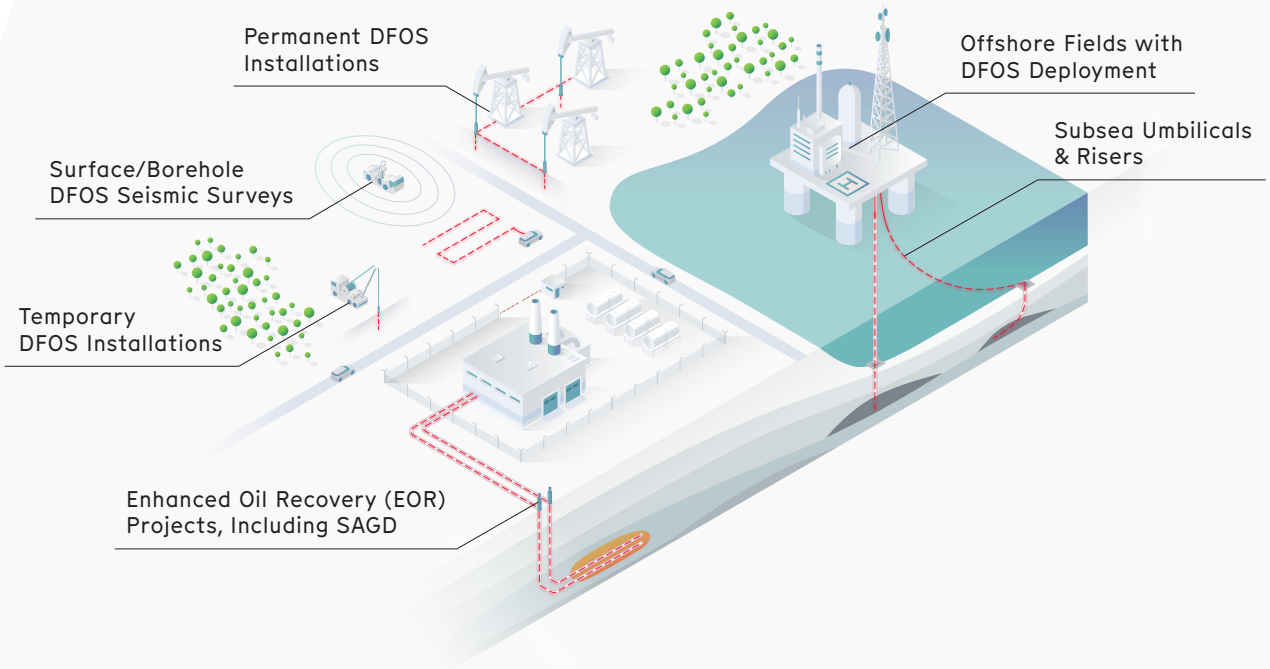
for Well and Reservoir Monitoring

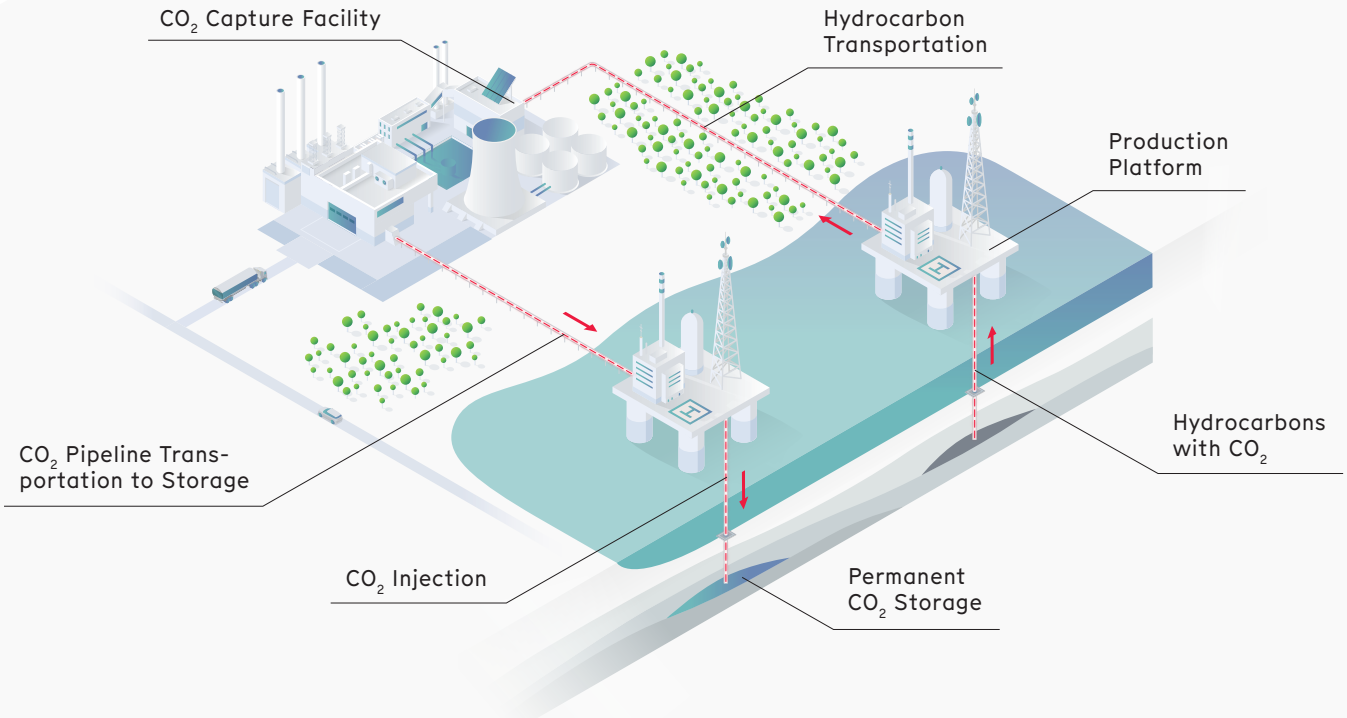
Oil and Gas Projects:

- Well integrity and equipment monitoring
- Production and injections monitoring
- Hydraulic fracture monitoring
- Borehole seismic and microseismic
- Subsea umbilicals and risers monitoring, and more

Carbon Capture and Storage (CCS) Projects:

- CO_2 injection monitoring
- Well integrity monitoring
- CO_2 plume migration monitoring
- Induced seismicity monitoring, and more





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Distributed Fiber Optic Sensing

for Downhole Applications

For well integrity and equipment monitoring, fiber optics detects early signs of issues such as casing deformation or equipment malfunctions, ensuring safe and efficient operations.

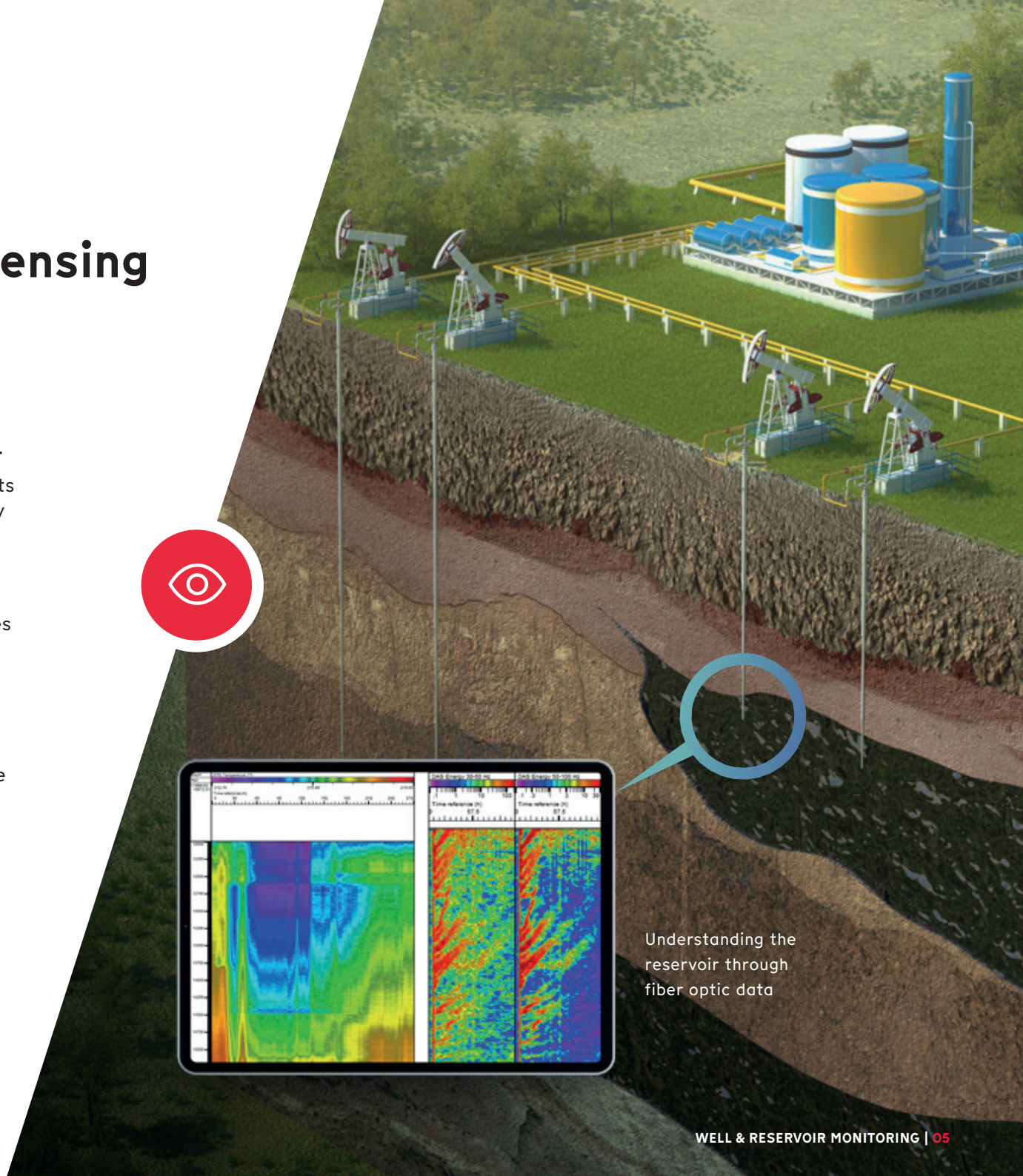
In production monitoring, it provides precise data that supports the optimization of production processes and enhances recovery effectiveness.

In injection monitoring, fiber optics enables continuous surveillance of injection rates and distribution, helping to identify anomalies such as out-of-zone injection, which improves process control.

For enhanced oil recovery (EOR) projects, it offers detailed insights into fluid injection and reservoir response, supporting more effective recovery strategies.

In borehole seismic applications, fiber optics provides valuable data for seismic monitoring, enabling accurate detection of subsurface geological changes and seismic events, which enhances the understanding of reservoir dynamics and optimizes exploration and production activities.

And these are just a few; DFOS continues to unlock new applications across the energy sector.



Understanding the reservoir through fiber optic data

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AP Sensing's Solutions

for Well and Reservoir Monitoring

Distributed Temperature Sensing: AP Sensing's DTS is based on the proven **Raman optical time domain reflectometry technology (R-OTDR)**. AP Sensing uses its **patented code correlation OTDR (CC-OTDR),** which allows the utilization of low optical power. It eliminates any problems with laser degradation and enables worry-free, long-term measurement stability.

Distributed Acoustic Sensing: The AP Sensing's phase-based DAS system measures the acoustic vibrations on the fiber based on the principles of **coherent optical time domain reflectometry (C-OTDR)**. The revolutionary **2P Squared technology** of DAS provides a true linear measurement of dynamic fiber length changes caused by strain from acoustic/vibration signals or temperature fluctuations.

Distributed Temperature Strain Sensing: AP Sensing's DTSS is based on the **Brillouin optical time domain reflectometry (BOTDR)** technology. BOTDR operates with a large optical budget on a single-ended fiber, being less affected by changes in fiber attenuation. BOTDR enables extensive and accurate measurements of both temperature and strain within the sensing range.

Temperature

Acoustic

Temperature and Strain

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Instrument Features

DTS:

- Multimode and singlemode instruments
- Single-/dual-ended configurations
- Longest measurement range of up to 70 km
- Spatial resolution of 0.5 m, measurement time down to 1 sec
- Modern, easy-to-use web interface for easy set-up and system configuration
- DTS traces export in *.csv, *.witsml, *.las formats

DAS:

- The true, phase-based system allows for quantitative data interpretation
- Configurable gauge length
- Leading performance with standard fiber without additional amplification
- Performance tests based on SEAFOM recommendations
- Modular edge computing for real-time process optimization
- PRODML data format output

DTSS:

- Single-ended design – no loop required
- High optical budget ensures outstanding measurement performance
- Resistant to hydrogen darkening of optical fibres in harsh downhole environments
- Laser Class 1M with low optical output for safe operations

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AP Sensing's Leadership

in Quality and Innovation

AP Sensing has the **industry's lowest failure rate.** Aside from over 40 years of HP's optical test leadership, we are passionate about continuously improving our fiber optic solutions to help you meet your day-to-day challenges.

Quality and performance are the drivers for our innovation. Unique technologies such as our single receiver design, Code Correlation Concept, and 2P Squared technology enable us to offer you Distributed Fiber Optic Sensing solutions with world-leading precision and range, as well as long-term measurement stability.

All instruments run on **proven operating systems**, which are extremely stable and secure.

We continuously develop our solutions to **maximize the real-time value of data and make the system configuration process easier.**

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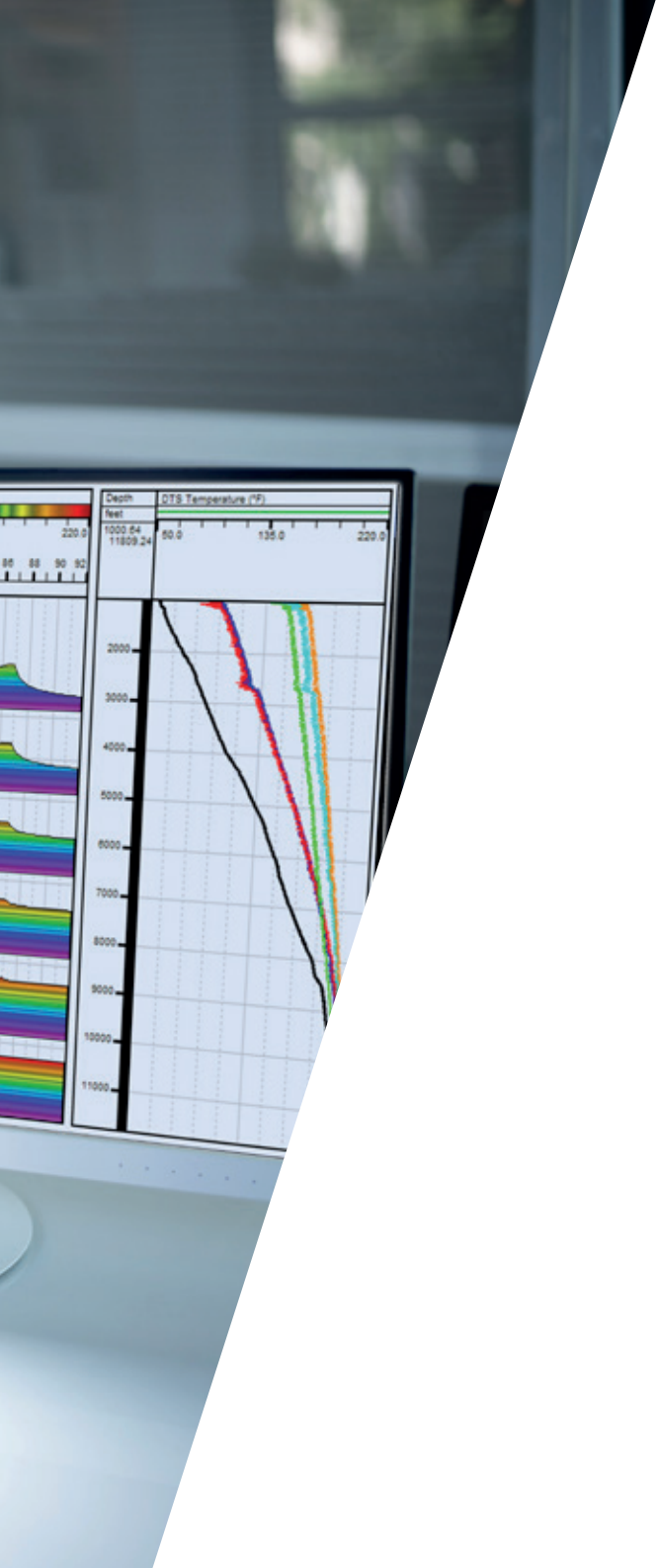


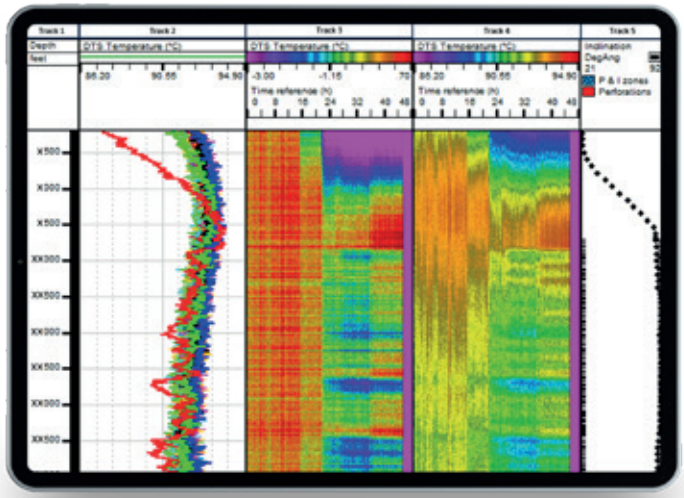
Your Reliable System Provider

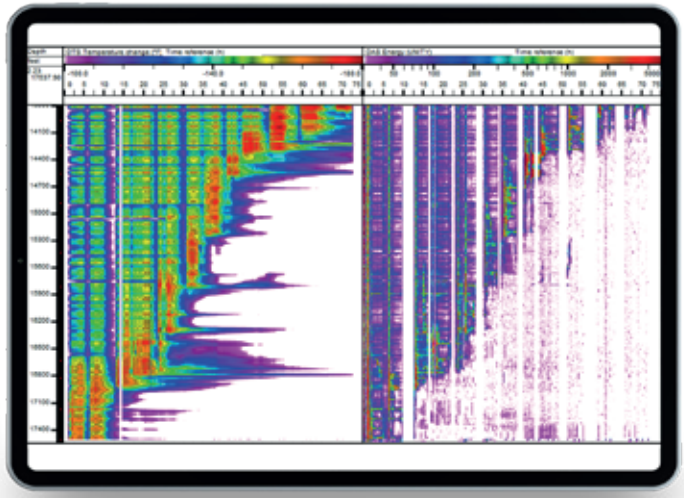
Your Best Choice

AP Sensing's DFOS solution for various downhole operations offers the c**ombination of DTS, DAS, and DTSS technologies**, utilizing fiber optic cables that can be temporarily or permanently deployed in the well.

Our DTS, DAS, and DTSS data formats **conform to the standard formats used in the O&G industry**. Thus, our data can be easily analyzed using any software that is available in the market.

We cooperate with independent O&G upstream market-leading DFOS interpretation software providers to ensure you receive all valuable information from the DFOS systems.





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Our Mission

To Ensure Your Success

Why Choose AP Sensing?

- Industry-leading DFOS technology and solution
- Experienced, dedicated team for engineering and project management
- Range of certified sensor cables to fit every need
- Intelligent alarm management software: SmartVision
- Easy integration through flexible protocols and interfaces
- Industry's most comprehensive list of certifications and product tests
- Highest quality and longest product life
- World-class service, support and training
- Global presence with expert regional partners

Supportive

Global

Competent

THINKING AHEAD

AP Sensing

Who We Are

Drawing on our HP (Hewlett-Packard) heritage in optical testing, we have established ourselves as **the leading solution provider for Distributed Fiber Optic Sensing (DFOS)**.

We are committed to delivering **well-designed, comprehensive solutions** to our customers. Our global team of **highly qualified employees and regional partners** are passionate about supporting our customers.

Our motto, '**Thinking Ahead**', expresses **our passion and willingness** to be prepared for **excellent project execution and smooth operation**.

At AP Sensing, we recognize that we can only be successful when our customers and partners are successful. Therefore, we take a **respectful and proactive role** in all our commitments.

With the industry's most complete set of tests and certifications, **AP Sensing helps you comply with relevant security standards** and ensures environmental and employee safety.

APSENSING.

The industry's most complete set of **tests & certifications**

Innovative & comprehensive **solutions**

Key enabler to protect lives & the environment

Notable **responsibility** & sustainable **approach**

Agile approach to customers' needs

Extensive expertise in DFOS

Dedicated & **passionate employees**

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HP (Hewlett-Packard) **heritage**

Numerous **successful projects** worldwide

Intelligent **alarm management software & AI**

Global leader with regional partners

Highest quality & longest product life

Asset protection in the most challenging environments

Contact Us!

EUROPE (HQ):
info@apsensing.com

MEA & INDIA:
mea@apsensing.com

CHINA:
china@apsensing.com

ASIA PACIFIC:
apac@apsensing.com

NORTH AMERICA:
northamerica@apsensing.com

LATAM:
cala@apsensing.com

www.apsensing.com

Partner

Passion for Plants.
For every unit sold, AP Sensing plants 100 trees.