



INFORMATION
FOR SMARTER
LIVING



GEOsniff®
Sensor



INDUsniff
Sensor



ENOsuff®
Sensor



**YouFootprint®
Software**



**Hardware &
Components**



**Research &
Development**

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The image features a central graphic with a large olive-green circle containing the text 'enOware COMPANY PROFILE'. This central circle is surrounded by four smaller circles: one olive-green circle at the top right, one grey circle at the top left, one olive-green circle at the bottom left, and one grey circle at the bottom right. The entire composition is set against a background of fine, light-grey diagonal lines.

enOware
COMPANY
PROFILE

Information for smarter living

Smart, dynamic, innovative and always one step ahead.
enOware supplies products and solutions which help to make
environmental information readily available.

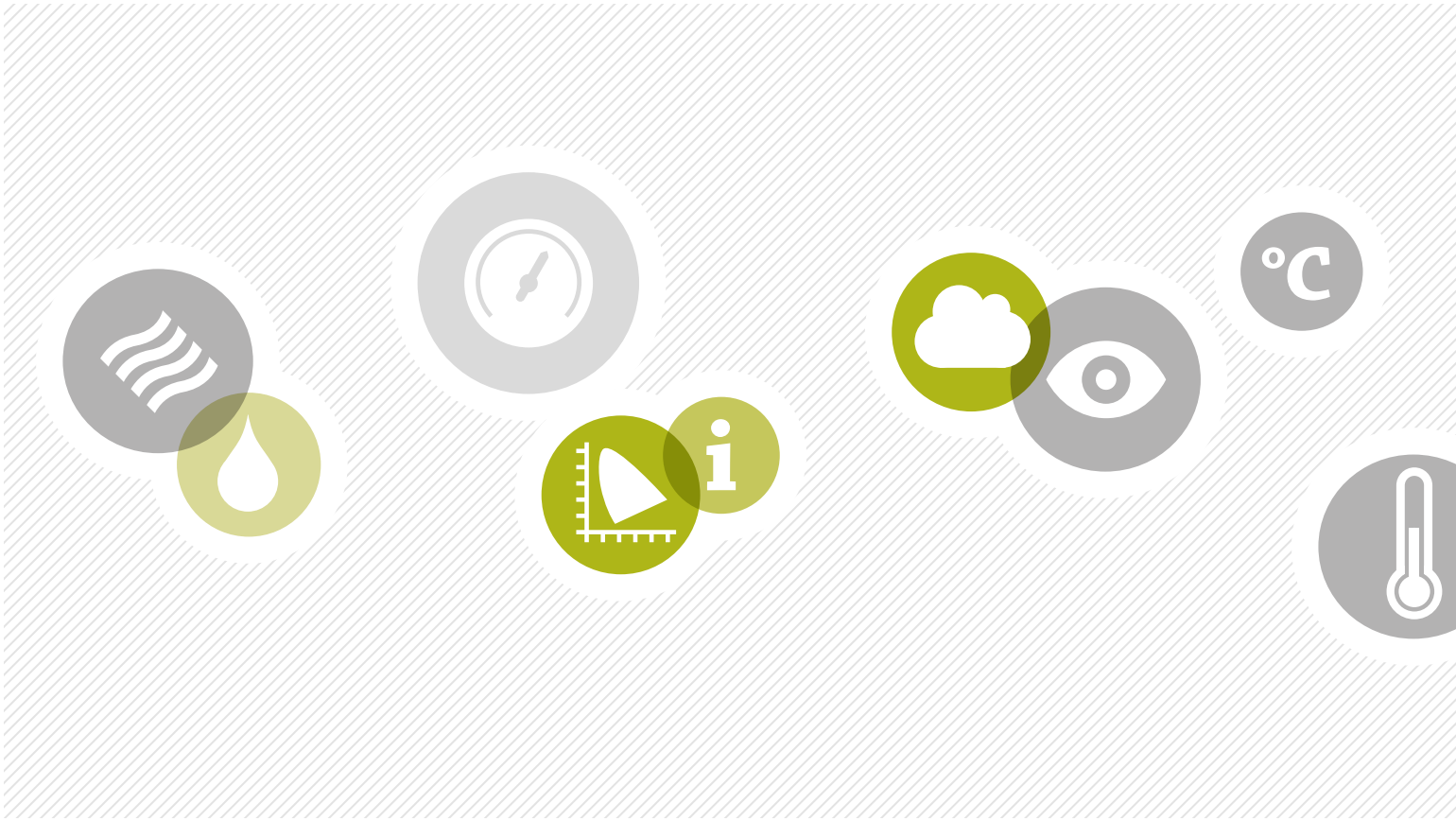
Based in Karlsruhe, enOware GmbH was founded in July 2014 by a young team from Systec & Services GmbH and specializes in sensor systems for fluid applications, energy monitoring and Research & Development services. Nomination of the YouFootprint energy portal for the NEO 2013 award in Karlsruhe and the Entrepreneurship Initiative of KIC InnoEnergy, located in the Technology Park Karlsruhe, helped create the foundation for the new company and its products.

The name enOware is made up of the terms Energy, Innovation, Hardware, Software and Engineering, which are the hallmarks of the smart, dynamic team at enOware GmbH.

Our products and services are presented in the following to illustrate the activities of enOware GmbH.

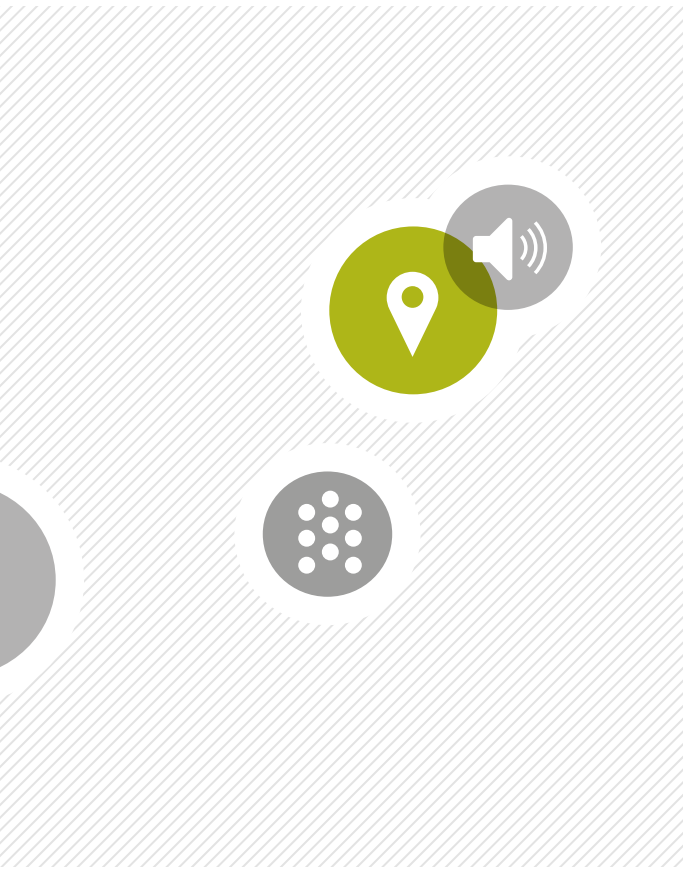
APPLICATIONS
Mobile sensor systems for fluid applications
Energy and environmental monitoring including geothermal energy, water, sewage etc.
Research & Development





sniff sensor platform – precise
measurement, no matter where

Safety, wellbeing and the secure knowledge that everything
is just right. sniff sensors measure all the important information
and put it online.



The sniff sensor range from enOware features innovative, miniaturized and easy to use sensor systems capable of wireless transmission of measurement data to a monitoring portal. The spherical GEOsniff measurement pig with a diameter of just 20 mm is designed to record measurement data inside geothermal probes. The ENOsniff system features wireless nodes with comprehensive sensing functions for environmental monitoring, with the fo-

cus on wellbeing both inside and outside buildings.

All sniff sensors are linked up to the You-Footprint online portal and form a broad-based network of data sources. A smart-phone alarm can be triggered if a defined deviation occurs in the sniff sensor data.

In an ongoing development process, the sniff series will be extended to include further innovative sensors in future. The main areas of use include the installation of new geothermal probes, probe dismantling, water-based systems and the overall improvement of the quality of life - information for smarter living.

APPLICATIONS

Monitoring of near-surface geothermal energy probes - initial and continuous

Liquid-based pipe systems, water wells, inaccessible measurement locations

Environmental monitoring - sensor nodes with a wide range of measurement options



GEOsniff®
GEOTHERMAL
MONITORING



Innovative and miniaturized

Quality assurance and monitoring of near-surface geothermal energy probes for drilling companies, well constructors, heating system suppliers, institutes, research facilities, inspectors and end users.



TECHNICAL DATA

Wireless data and energy transmission

Spherical shape with a diameter of just 20 mm - fits in most geothermal probes

Pre-calibrated pressure sensor up to 30 bar

Pre-calibrated temperature sensor -10 °C to +40 °C (option of additional ranges)

Density of measurement pig 1.7 kg/dm³, suspended measurement method

3200 individual measurements with one charge, adjustable measurement frequency

Optional integration of further sensors such as electrical conductivity, x/y/z orientation, camera etc.



Pressure



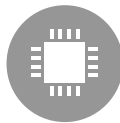
Temperature



Electrical conductivity



Energy harvesting



Data storage



Drive system



Position



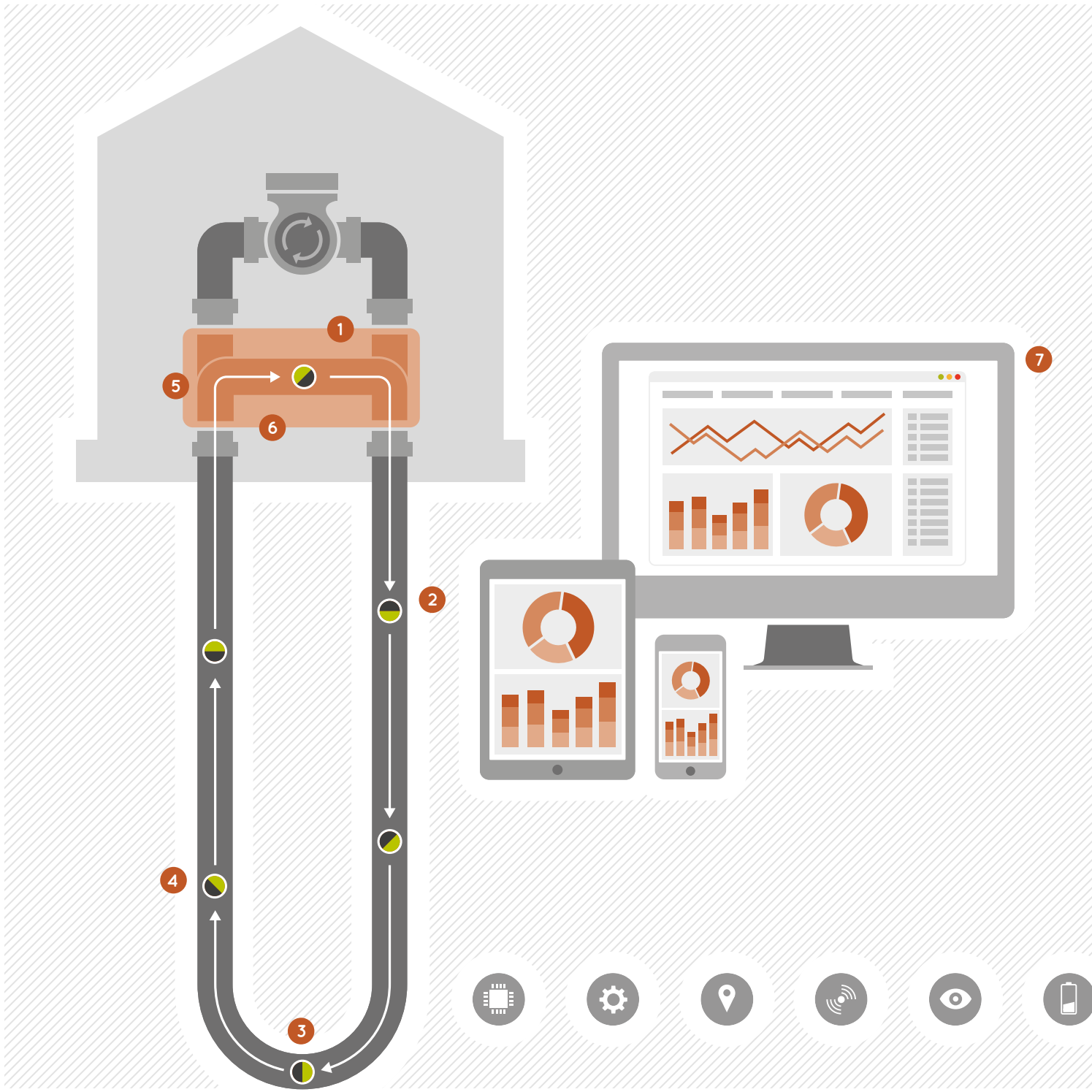
RFID



Camera



Low Power



How it works

- 1** The measurement operation is started and the data are immediately stored at a specified measurement frequency in the GEOsniff.
- 2** The GEOsniff measurement pig is inserted in the geothermal probe and its weight causes it to sink down through the liquid-filled geothermal probe. As it does so, the measured pressure and temperature data are constantly recorded.
- 3** On reaching the lowest point of the geothermal probe, the GEOsniff measurement pig stays where it is until it is brought back up again by a connected pump.
- 4** The pump pressure moves the measurement pig to the probe return side.
- 5** On reaching the highest point, the GEOsniff is removed by way of a manual bypass (for initial measurements with validation box) or an automatic bypass (in continuous operation or for TRT test).
- 6** Following wireless readout of the measurement data from the GEOsniff, the data memory is erased and then inductively charged. An exact depth-temperature profile can be generated from the measurement data.
- 7** If use is being made of the validation box, further analysis of the GEOsniff measurement pig data is performed with the GEOsniff software. Alternatively the data are sent directly to the YouFootprint online portal by the automatic bypass for the evaluation.





GEOsniff® MEASUREMENT PIG

In-situ measurement in geothermal probe

- ⊕ Precise measurement of pressure and temperature
- ⊕ Wireless energy and data transmission
- ⊕ Spherical, diameter just 20 mm
- ⊕ Wired with GEOsniff CORD CLIP (optionally)



GEOsniff® VALIDATION BOX

Professional measurement case for GEOsniff measurement pig with charging and readout station

- ⊕ Bluetooth connection to PC or smartphone app for Android and iOS
- ⊕ Sturdy water-proof case
- ⊕ Integration of up to four GEOsniffs
- ⊕ Charging by USB
- ⊕ Integrated power supply battery



GEOsniff® APP

GEOsniff control, data evaluation and visualization with measurement log

- ⊕ Professional Android/iOS app
- ⊕ Control of all GEOsniff functions
- ⊕ Visualization of measurement data in diagrams
- ⊕ Export function in CSV format
- ⊕ Evaluation of probe thermal conductivity measurement data by optional TRT module
- ⊕ Location management by GPS logging

GEOsniff® AUTO TRT KIT

System to auto create an Enhanced Geothermal Response Test (EGRT)

- ⊕ Compact and easily applicable measuring system
- ⊕ Automatic insertion and removal of GEOsniff measurement pig in defined intervals
- ⊕ 230 VAC / 16 A via Schuko plug
- ⊕ Heating a geothermal probe via heating cable
- ⊕ Online connection for status information



GEOsniff® AUTO BYPASS

Automatic insertion and removal of GEOsniff measurement pig for reliable continuous operation

- ⊕ For permanent installation on geothermal probe systems
- ⊕ Configuration of regular automatic measurement runs
- ⊕ Fully automatic energy and data transmission function
- ⊕ Alarm in the event of measurement data deviation or fault
- ⊕ Sturdy design for continuous operation
- ⊕ Easy to service - GEOsniff measurement pig can be removed without loss of liquid



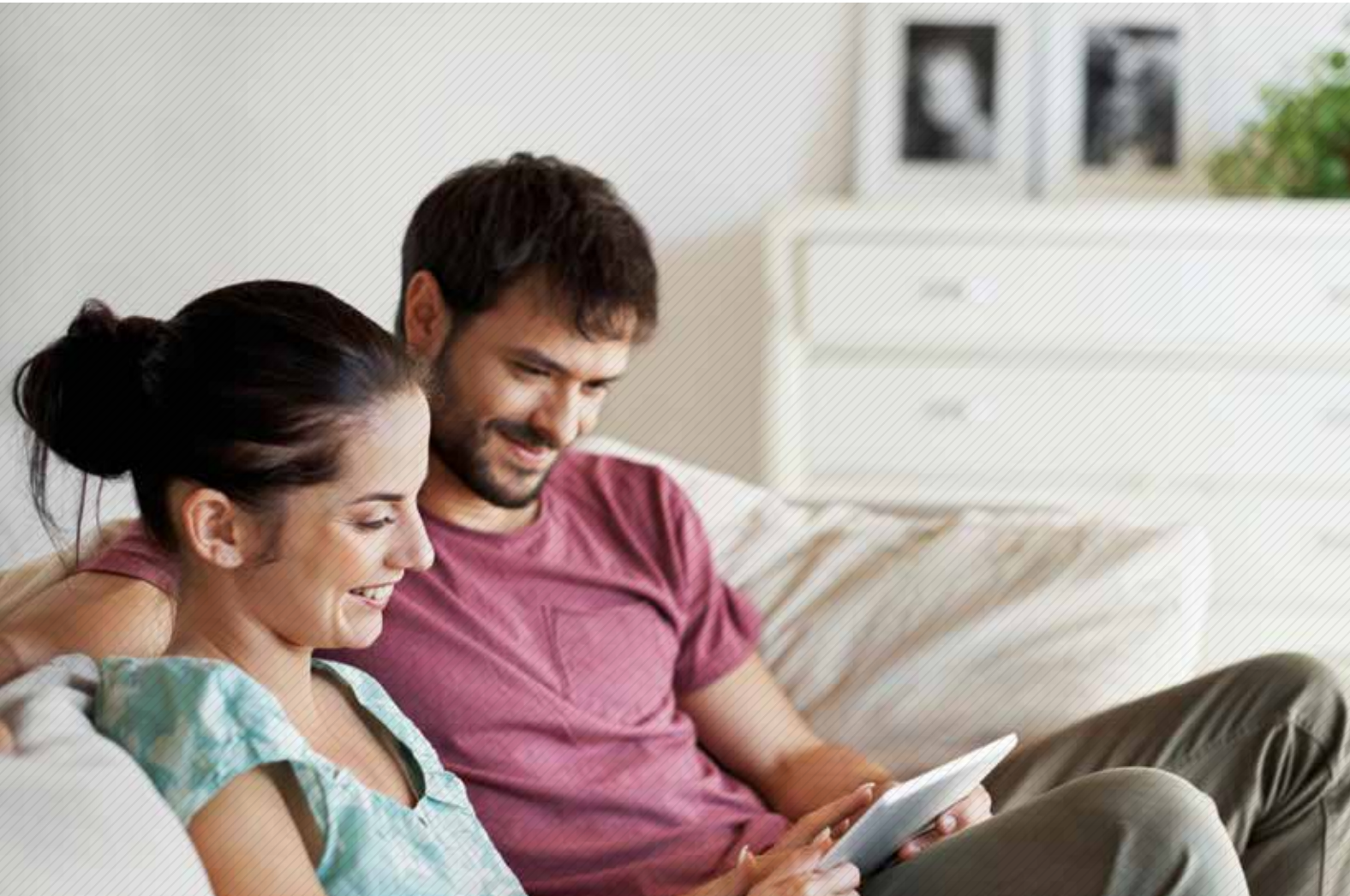
GEOsniff® LOC

In-situ deviation measurement in geothermal probes

- ⊕ Precise measurement of geothermal probe course profiles
- ⊕ Tethered or wireless
- ⊕ Direct evaluation by software
- ⊕ Pill-shaped, diameter 19 mm



Wide range of applications





POTENTIAL AREAS OF USE

Well constructors and heating system suppliers

- ⊕ Operators of YouFootprint online portal
- ⊕ Link-up of end users with GEOsniff systems. In the event of deviation in daily measurement for each installation notification via YouFootprint, data validation and on-site inspection if applicable.

Officially appointed experts, inspectors, engineering offices and research institutes

- ⊕ GEOsniff validation box or automatic bypass with GEOsniff measurement pig magazine for checking geothermal probes
- ⊕ Automatic, low-cost performance of TRT tests
- ⊕ All measurement data can be stored on YouFootprint online portal

End users

- ⊕ Permanently installed automatic GEOsniff bypass at geothermal probe
- ⊕ Current status of GEOthermal installation on smartphone
- ⊕ Alarm in the event of measurement data deviation
- ⊕ Continuous monitoring for reliable operation
- ⊕ System optimization in the event of deviation



INDUsniff
PIPE SYSTEM
MONITORING

Perfect for industrial fluid environment

Acquiring spatially resolved measurement data within medium-conducting pipe systems is essential for a reliable and efficient operation. The INDUsniff MEASUREMENT PIG measures parameter of the fluid medium directly within the plant and provides information about deviations.



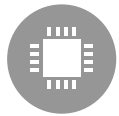
Pressure



Temperature



Position



Data storage



Auto Bypass
(optional)



Electrical
conductivity



RFID



Energy harvesting



Low power



Camera



Drive system

POTENTIAL AREAS OF USE

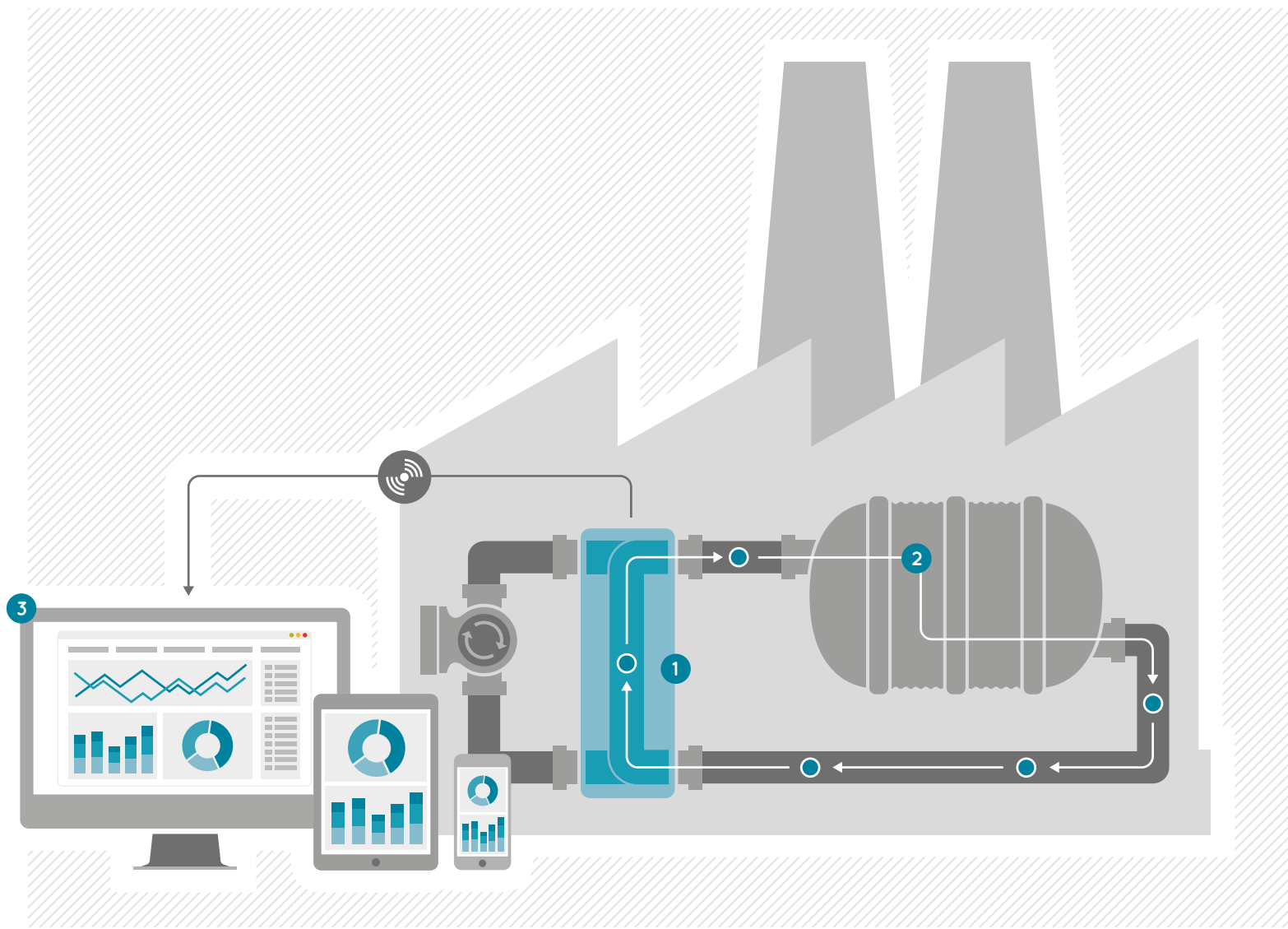
Precise pressure and temperature profile for process parameter monitoring

Leak detection via long-term monitoring

Measurement for subsequent analysis of the pipe run

Monitoring of process parameters within heat exchanger systems, cooling circuits etc.

Acquisition of long-term data in pipe systems (pH, p, t etc.)



How it works

- 1 Insertion of the INDUsniff MEASUREMENT PIG via manual Bypass system for initial measurement or the fully automatic for continuous in-situ monitoring.



- ⊕ Spherical, miniaturized Measurement Pig, metal/plastic
- ⊕ High-precision measurement of pressure and temperature
- ⊕ Diameter 15–30 mm (further optional)
- ⊕ Wireless, automatic reading and charging



- ⊕ Spherical, miniaturized Measurement Pig, plastic
- ⊕ Housing density 1.0 kg/m³, diameter from 15 mm
- ⊕ Integration of sensors for pressure, temperature, conductivity and pH (further optional)
- ⊕ Wireless, automatic reading and charging



- ⊕ Cylindrical, miniaturized Measurement Pig, metal housing
- ⊕ Integration of camera, sensor for pressure and temperature
- ⊕ Diameter from 20 mm (further optional)
- ⊕ Wireless function



- ⊕ Pill shaped, miniaturized Measurement Pig, plastic
- ⊕ Precise 3D-orientation measurement for pipe run measurement
- ⊕ Diameter 15 mm
- ⊕ Wireless function

2 INDUsniff MEASUREMENT PIG is flushed through the entire pipe system by the pump current and records measurement data continuously.

3 The Bypass reads out the data of the measurement pig and transmits them to the building management system or the online portal.



ENOsiff®
ENVIRONMENTAL
MONITORING



In harmony with your surroundings

With their wide range of sensing functions, ENOsniff environment sensors can monitor the feel-good factor in conference rooms, offices, residential buildings, neighborhoods etc. and trigger an alarm on reaching limit values.



Air quality



Humidity



Temperature



Air pressure



CO₂ level



Brightness



Light colour



Sound level



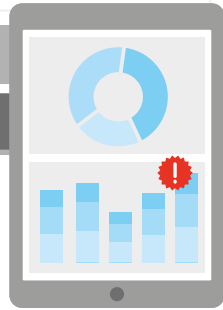
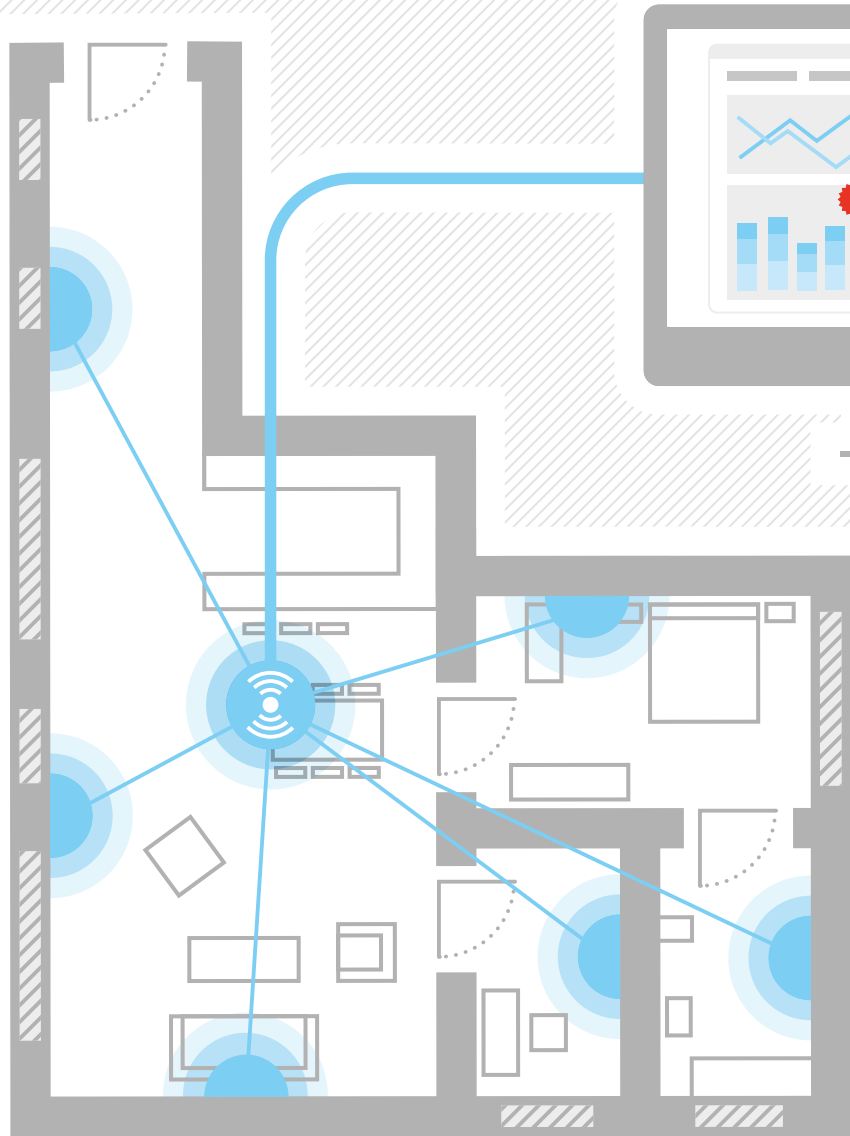
Vibration
(optional)



Gases
(optional)

The extremely compact ENOsniff sensor nodes permit quick and easy retrofitting of entire buildings. The sensors communicate with one another and build up their own long-range network. Each ENOsniff sensor node can light in various colors to indicate

air quality, brightness etc. All the information gathered by ENOsniff is transmitted to the YouFootprint online portal. Notification is given by email or directly to smartphones if specified limit values are exceeded. The perfect way to ensure wellbeing.



How it works

- ⊕ Simple retrofitting of ENOsiff nodes directly at any socket
- ⊕ Intelligent ceiling-mounting system for the ENOsiff nodes
- ⊕ Ideal for central installation in conference rooms
- ⊕ The ENOsiff desktop mount permits installation at any location
- ⊕ The ENOsiff box is the central node and creates the link between all ENOsiff nodes and the YouFootprint portal. The ENOsiff box can be connected to the internet by WLAN, Ethernet or UMTS.



POTENTIAL AREAS OF USE

Conference rooms

- ⊕ The ENOsiff node monitors the air quality and gives an alarm when it is best to open the windows.
- ⊕ The sound level sensor provides remote indication via YouFootprint of whether the conference room is occupied.

Offices

- ⊕ The ENOsiff node gives an early warning of insufficient ambient light to guard against fatigue.

Bedrooms

- ⊕ The YouFootprint portal permits evaluation of the air quality throughout the night to assess the airing time before going to bed.

Living rooms

- ⊕ On leaving a building, ENOsiff can be employed as a light and sound level alarm system. A smartphone alarm is given if previously specified values are exceeded.

The logo features a large central orange circle with a white border. Inside this circle, the text "YouFootprint®" is written in a bold, white, sans-serif font, with "MONITORING" and "PORTAL" stacked below it in a smaller, white, sans-serif font. Surrounding the central circle are several smaller circles of varying sizes and colors (orange, grey, and white) that overlap it. One of these smaller circles on the right contains a white bar chart icon with four bars of increasing height. The entire graphic is set against a background of fine, light grey diagonal lines.

YouFootprint[®]
MONITORING
PORTAL

A universal monitoring portal

Everybody knows the typical fuel consumption of their vehicle – but who has any idea about energy consumption in kWh/m³ or the amount of energy generated by a geothermal or photovoltaic installation? And who is familiar with CO₂ equivalents or their ecological footprint?

YouFootprint from enOware is a universal monitoring portal which records and provides a detailed analysis of measurable energy flows and data from many other sensors.

For ecological footprints

An ecological footprint can be calculated by gathering energy data from various different sources and determining key figures. Comparisons between different departments, buildings and locations provide a ranking and an indication of improvement potential.

Energy management in line with DIN EN ISO 50001

YouFootprint is an appropriate tool for certification as per DIN EN ISO 50001.

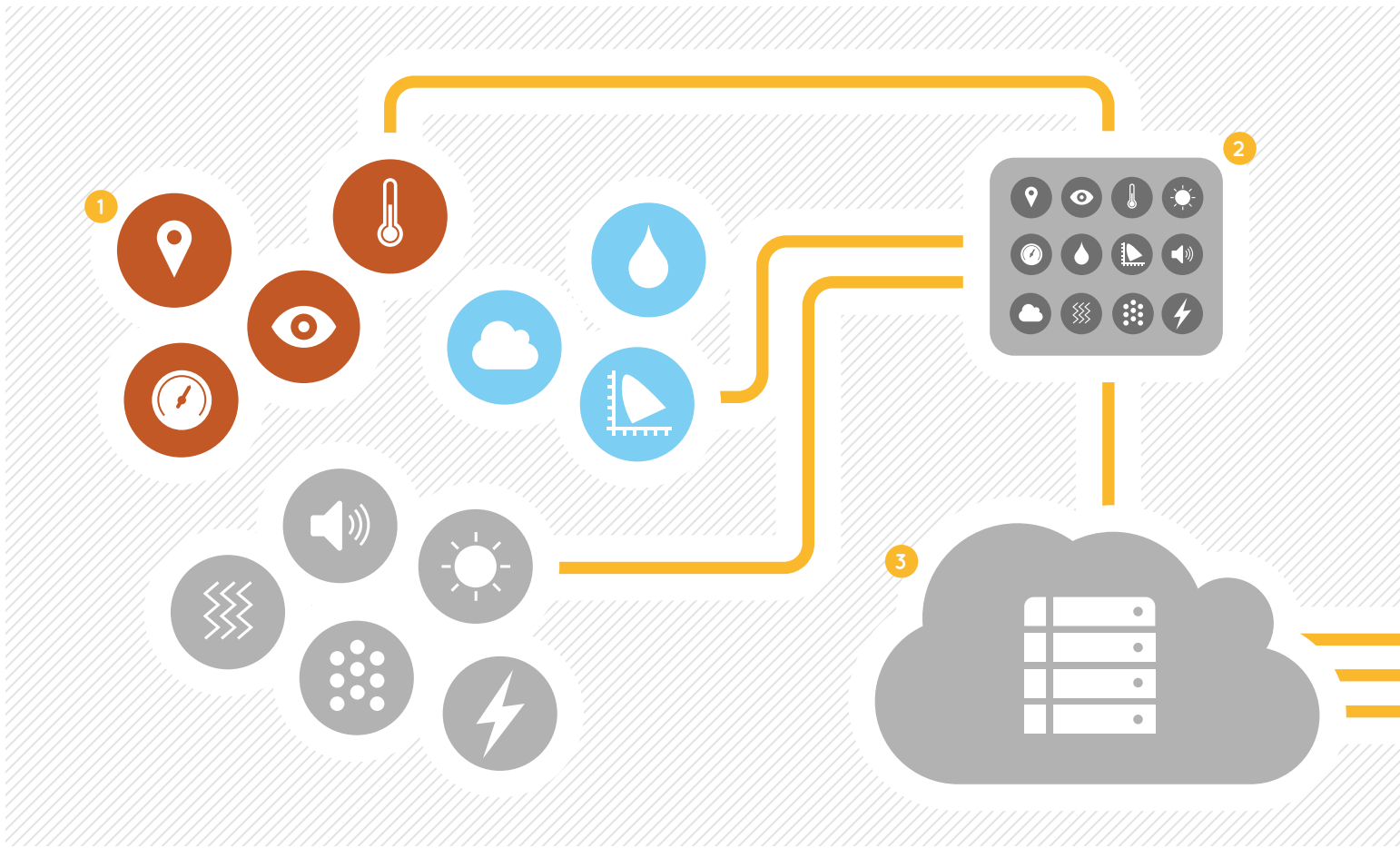
Measurement data can be universally and simply recorded and stored using any make of hardware and standardized software interfaces. Online visualization is possible using a browser or smartphone.

Cost savings

Energy costs can be reduced by up to 40% with YouFootprint. The continuous recording of consumption figures provides a basis for taking energy saving action.

And even more

With its open architecture, modular design and generic platform, YouFootprint is capable of recording all forms of sensor measurement data from GEOsniff, ENOsniff, electricity meters etc.



How it works

1 Measurement sensors

Various types of measurement sensor such as GEOsniff, ENOsniff, gas, water, electricity, photovoltaic can be connected up as required.

2 Data logger

The data logger is the gateway and data buffer between the sensors and the data server. Data transfer takes place by way of push and pull.



3 Data server

The measurement data are cyclically recorded, stored and aggregated. Connecting up new data sources is no problem.

4 Portal

The web-based dashboard for smartphones and desktop systems provides simple, individual presentation of measurement data and alarms.



HARDWARE & COMPONENTS

For larger measurement systems for GEOsniff or energy monitoring with YouFootprint, components such as data loggers, interface converters, gateways and network accessories are required.

enOware offers hardware solutions for data connection of various sensors to the YouFootprint Cloud. This includes data loggers for electricity meters, gas meters, water meters and other sensors for building technology.

In addition, the GEOsniff measurement technology such as the GEOsniff AUTO BY-PASS can also be connected directly to a building management system via interface converters.

FURTHER COMPONENTS

Universal data gateway for connecting measurement points to YouFootprint or building management system via Ethernet, WLAN and UMTS

Converter with BACnet, MBUS, PROFIBUS, OPC and other protocols are possible for this purpose



RESEARCH & DEVELOPMENT

We are the right address for tasks such as micro-controller software development, the development of electronics for prototypes and series products as well as the creation of entirely new concepts.

Our smart, flexible and dynamic team cuts down the time required to get to the first prototype stage. We involve our customers in the development process right from the start.

We see ourselves as a development and research team for companies with limited capacity and can offer solutions to complex problems in the fields of software and hardware.

OUR MAIN ACTIVITIES

Electronics development and layout

Sensor systems, RFID, NFC, 3D CAD design

Data acquisition components,
Meshed sensor network

Hardware and software prototyping



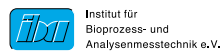
Backed-up by a strong network

enOware GmbH has links with numerous partners in industry, research and development and thus has access to an extensive pool of expertise. Many of our partners are

based in the Karlsruhe technology region – but our network also extends throughout Germany and other countries and is steadily growing.



GEOWATT AG



LB \equiv BW Venture





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