GWF

Just brilliant.

GWF 4D technology®

Innovative measurement solutions
for valuable resources

Intro

Welcome to GWF's 4D technology®. We appreciate your interest in our cutting-edge flow measurement. GWF's 4D technology® has been developed based on our extensive experience in the water flow measurement domain – and started on a blank sheet of paper…

When we began the development, we wanted to do things differently. Our R&D team analyzed a variety of basic technologies – from magnetic inductive to fluidic oscillator, from acoustic to optical principles. Finally, we discovered the ultrasonic principle of Time Reversed Acoustics (TRA).

This principle has not been used in flow measurement before – and we were thrilled. Our initial research concluded that a measurement system based on TRA is capable of providing an unprecedented dynamic range, is very robust to water turbulences, and offers many additional benefits. We knew that industrializing this technology would be a challenge – but we gladly took it on.

Over the past years our team of experts across the globe has developed physics a number of patents and patent applications leading to our unique GWF 4D technology®. What we now consider as GWF's 4D technology® is the combination of our innovative, 4-dimensional time reversed acoustic signal processing, a high-performance electronic implementation, highly robust mechanics, and a modular approach to data communication and systems integration.

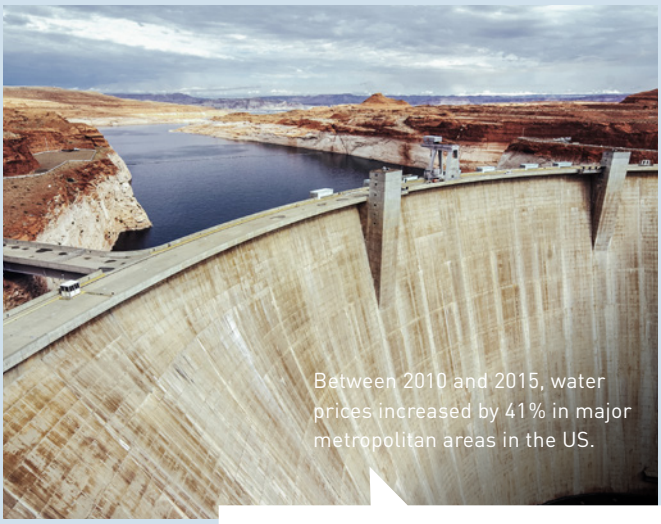
This brochure will give you a brief overview of our technology and two product series that build on our 4D technology®.

We look forward to engaging in discussions with you. Please do not hesitate to contact us.

Your GWF team

CONTENT

The water challenge



Between 2010 and 2015, water prices increased by 41% in major metropolitan areas in the US.

Water and waste water management will need to become more accurate.

Over 10 % of Europe's population is affected by water scarcity.

Water scarcity increases in many regions of the world.

33 countries will face extreme high water stress in 2040.

Water will be a source of conflict and unrest in the future.

Water treatment is becoming a larger topic.

Dubai is sourcing 98 % of its drinking water from desalination plants.

Urbanization will require infrastructure investments.

One quarter of the population in larger cities have stressed water supplies.

GWF's objectives

Great people.
We jointly develop a work environment for motivated team players who enjoy their roles and responsibilities, take an active part in creating the future of GWF and keep pushing their own development.

Winning with value.
We create long term value for our customers and partners with our leading products, systems and services; by doing so, we contribute to the responsible use of valuable resources.

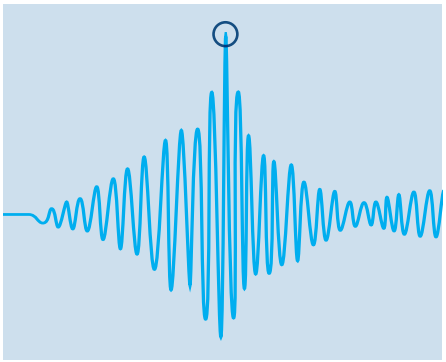
Future oriented.
We generate robust economic profit for further investments in innovation, the progressive development of our company and the preservation of our independence.

You can't preserve what you can't measure. That's why we are committed to deliver innovative measurement solutions for valuable resources.

Family owned and committed to the future.

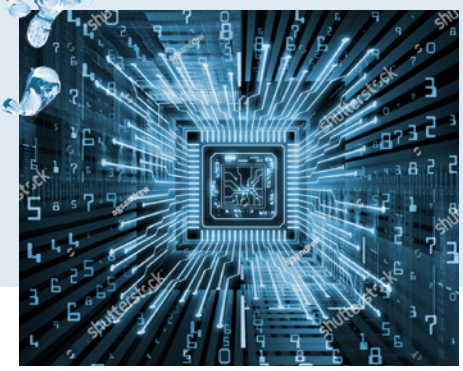
Founded in 1899 in Lucerne.

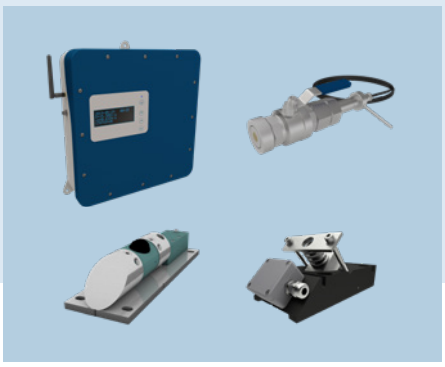
Rocket science

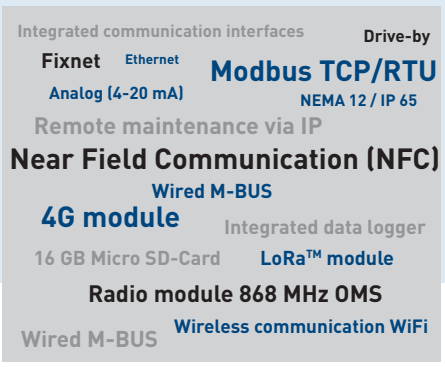


4D ultrasonic signal processing

Based on our patented Time Reversed Acoustics approach, we developed a unique methodology for ultrasound signal processing and correction. Our signal structure does not follow a 'path', instead we work in 'panes', capturing the entire flow channel. Also, instead of using cumbersome and sensitive correction tables, we use proprietary correction algorithms based on the physical flow profile. This enhances measuring stability and repeatability of results even in adverse conditions such as strong flow turbulences.







High-performance electronic implementation

The implementation of our 4D technology® results in optimized signal generation and post processing of the measured data. Additionally, the signal-to-noise ratio is maximized at the receiver's end due to the patented method applied, which leads to high performance.

Highly robust mechanical design

Our unique approach to transducer handling and product integration leads to long-term product stability. Also, our overall mechanical design in the Ductus S and sonico® product lines is cutting-edge: the unique transducer housings of our Ductus S systems allow for internal and external installation. The sonico® series is designed for 20+ years in the field. The straight and empty pipe design without any cavities and with its dry transducers has clear advantages for all water and installation conditions. Finally, our material selection for housings, coatings and other mechanical parts meets highest standards.

Modular approach to data communication and systems integration

We have extensive experience with data communication and integration of devices into systems for billing, grid management and process control. Communication of collected data into wired, wireless, fixnet, drive-by or other communication backbones is critical to success for any of our devices. The ever faster changing standards, protocols and modules require highest possible flexibility. Our products are set up completely modular and offer open and flexible interfaces for systems integration.

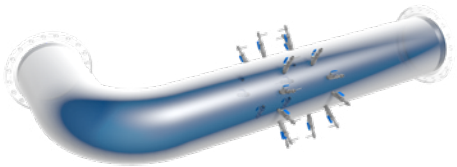
Transit Time Metering

Concept Innovation

Space constraints and application configurations lead to complex flows in pipes which contain elbows, tees or other disturbing and non-uniform elements. This leads to difficulties in installing flow meters at an optimum location; which is defined by a minimum distance upstream or downstream of known disturbances at which a fully developed velocity profile is present. Even with multiple flow sensors, significant errors may be present.

The Ductus S acoustic system provides detailed information on the flow velocity profile. An accurate measurement of the flow rate can be achieved by rebuilding the flow velocity profile across the pipe using predetermined conduit configuration parameters and correction factors.

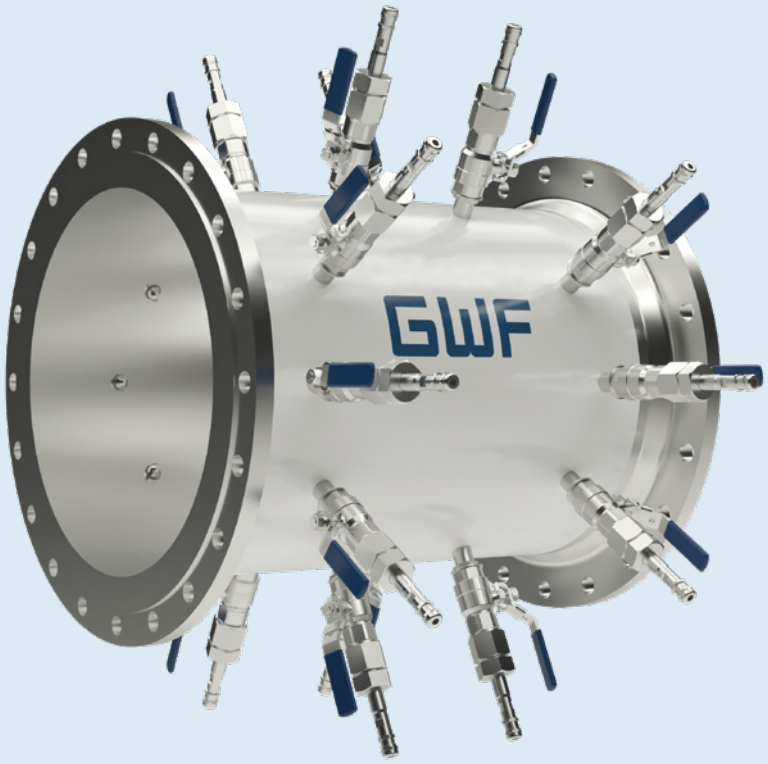
Flow meters are also sensitive to velocity profiles with a large rotational component (swirl). Swirl is generated by two or more out-of-plane changes in flow direction. It is present to some extent in almost every application and can generate significant transverse velocity components; and it takes a long distance to dissipate. If the swirl is not accounted for, it can cause significant errors. The Ductus S system keeps its measurement accuracy even when asymmetric profiles and swirls are present in the pipe.



Flow meter after a 90° elbow

Clamp-On Transducers

When combining the Ductus S with clamp-on transducers, the flow measurement becomes non-intrusive. The transducers are installed with little technical effort and without process interruption on the pipeline. Clamp-on transducers require no modification of the conduit or plant shutdown. The special construction of the transducer mounting allows for removal of the transducers without changing the position of the mounting itself.



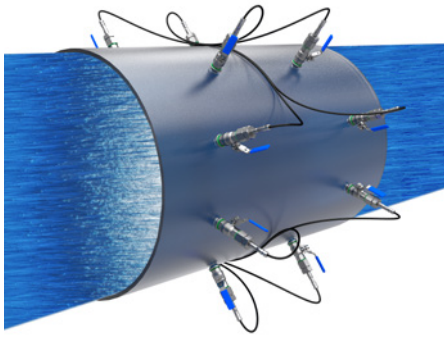
Application

Flow measurements are very often mandatory in the area of water supply and industry. Quite frequently the pipe systems are complex and contain valves and pumps. The Ductus S flow meter is a fully integrated Transit Time metering solution with up to 10 acoustic paths for liquid fluids. It increases your profitability with exceptional repeatability and linearity throughout the flow range. Due to the patented velocity profile compensation, no flow straighteners or on-site calibration are required.

Ductus S is used for highly accurate flow measurements in water distribution networks and hydropower plants. The system is based on the well-established acoustic Transit Time principle. The digital signal processing allows detection of even the smallest time differences, i.e. even the smallest amounts are being determined accurately. Common installation effects, e.g. after a 90° elbow, are taken into account by patented corrections of the disturbed velocity profiles. No more need for the long straight runs in front of and after the flow meter. Installation of a flow straightener is no longer necessary, saving you time and money.

Advantages

- Highly accurate flow measurements ±0.15 %
- Certified by independent test center
- No on-site calibration needed
- No flow straightener needed U0/D0
- Patented velocity profile correction
- Fully integrated metering solution



The sonico® advantage!

Robustness by design.

Robustness through well-selected materials and elaborate mechanical design to avoid tampering and influence from external factors such as temperature.

Longevity by design.

Clean and straight measuring pipe without cavities results in minimal pressure loss as well as long lifetime and measurement stability.

Accuracy by design.

Highest accuracy across the entire flow profile detecting flows of as low as 20 l/h and up to 90 m^3/h (DN50) leads to a cutting-edge dynamic range.

Plug-and-Play.

Future-proof connectivity with modular, field-exchangeable communication modules allows for integration in any communication backbone.

Highest Adaptivity.

Simple installation and reliable measurements across the entire flow range even in challenging conditions without any straight runs.

One-Tech-fits-all.

One technology fits all meter sizes from DN40 to DN300 and all measurement point requirements for simplified inventory management and installation procedures.

sonico® EDGE

Concept

Sonico® EDGE has been developed for highly challenging measurements of fresh water flow in pressurized pipes. The product concept is modular and flexible in terms of overall mechanical design and communication. Sonico® EDGE is equipped with the latest GWF 4D technology®.

Advantages

Besides the high turndown ratio that enables a dynamic measurement range between 0.02 m^3/h and 90 m^3/h (DN50) at highest precision, the devices are extremely flexible when it comes to installation conditions. GWF's 4D technology® allows for sonico® EDGE to be installed directly after or before 90° elbows, valves or pumps. Moreover, the turn down ratio R1000 is guaranteed over the entire measurement range, far beyond the very basic MID requirements.

Due to the clean and open 4D-shape pipe design, the measuring device has unparalleled low pressure loss. Furthermore, the utility-grade IP68 design and excellent material selection result in highest product robustness.

Applications

Sonico® EDGE is designed for flow measurement of water, e.g. drinking or utility water. Typical installation sites include reservoirs, water towers or pumping stations.

Sonico® EDGE is suitable for difficult installation conditions such as placement directly before or after 90° elbows.

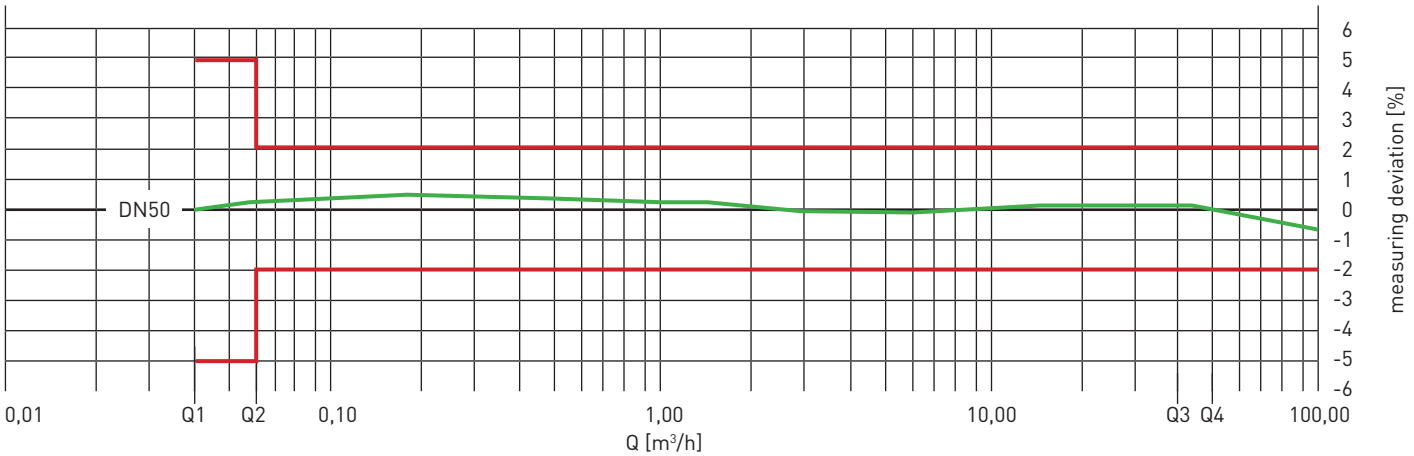
Further informations:

Sonico® EDGE data sheet
Sonico® Pulse Module data sheet

sonico® EDGE

4D technology® measuring accuracy

4D technology® offers a turndown ratio R1000 and is extremely robust against changes in the flow profile caused by bends, valves or pumps. The Time Reversed Acoustics principle enables a new level of measuring repeatability independent of flow conditions, electromagnetic or grounding interference and medium conductivity.



Production and quality system

sonico® EDGE DN50

sonico® EDGE DN80

sonico® EDGE DN100

GWF production

GWF has a legacy of efficient and high-quality production in Switzerland. Since 1899, we manufacture gas and water meters at our headquarter in Lucerne – in limited numbers, but highest quality. To manufacture the sonico® product line, GWF invested in a world-leading production test bench 'LUZ1'. The test bench was installed in early 2018 as one of the most accurate production equipments in the world. Currently, the overall production and quality system is put in place to manufacture the sonico® product line for applications in the commercial and industrial domain.

Technology partnerships

As a medium-sized company focused on niche markets and technology development, it is not part of GWF's strategy to invest further in production capacity. The scaling of GWF's 4D technology® will be done through technology partnerships. GWF has a long-standing reputation of working with world-leading meter manufacturers in product design, component delivery and production setup.

sonico® EDGE DN150

sonico® EDGE DN300

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