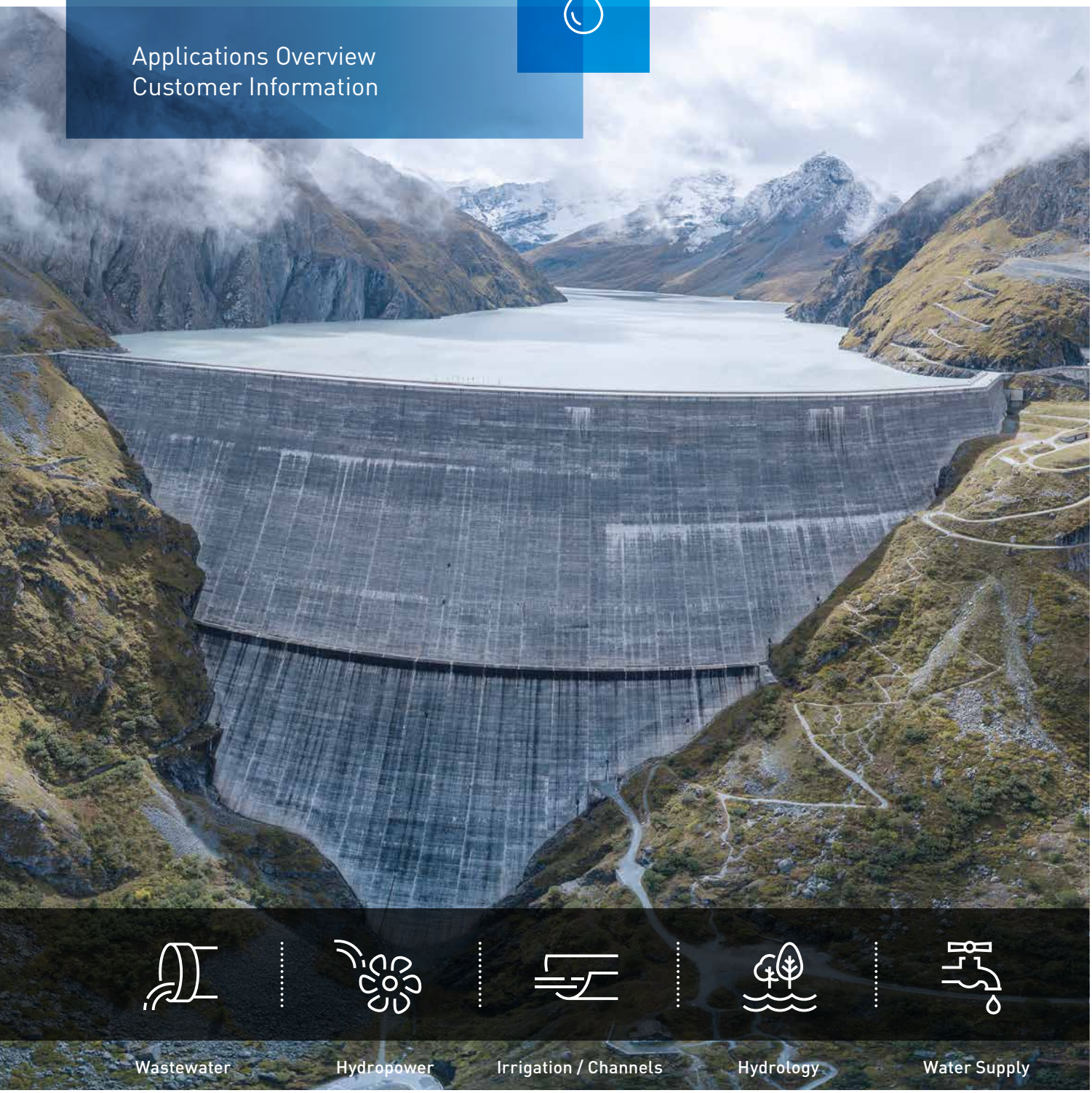
# Acoustic Flow Measurement

Applications Overview
Customer Information




Innovative measurement solutions
for valuable resources

# Introduction

Frontpage:
Grande Dixence, Val des Dix, Sion / VS, Switzerland

Water is the most precious resource on our planet and its disparate distribution makes managing water a real challenge. To tackle this challenge, investments in automation of wastewater, hydropower, irrigation, hydrology and water supply systems have increased significantly. Today, most predictions and actions are derived from collected data. This requires higher data quality and granularity. Hence, the precise measurement of flow rates and consumption as well as the communication of data are becoming increasingly important.

Dr. Jürgen Skripalle, GWF's Executive Vice President for Acoustic Flow Measurement (AFM), looks back on numerous successful installations of water measurement systems across the globe. "We see a strong growth in demand for our systems based on our technical advantages and deep knowledge of ultrasonic technologies." GWF's products stand out with their accuracy and reliability, as well as their exceptional level of manufacturing quality. Continuous investments in further developing the portfolio make GWF an innovative solution provider. Applications range from simple non-contact measurement for wastewater to complete systems for penstock rupture monitoring.

GWF is a Swiss family business with more than 200 employees and global reach. With over 120 years of experience in the field of gas and water measurement solutions, the company is the trusted partner of utilities, systems integrators, general contractors and hardware manufacturers. Florian Strasser, President of GWF, says: "GWF's mission is to build a future-oriented company that helps to reduce human's impact on the environment by using relevant data generated through highest quality measurement instruments. Our AFM portfolio and our successful projects in this field are prime examples on how we execute on this mission."

We encourage you to discover our products and services around Acoustic Flow Measurement on the following pages. Please contact us – we look forward to exchanging ideas on the challenges of water management, and to working with you to make your measurement a success.

GWF MessSysteme AG in Lucerne CH

Production facility Kaufbeuren with solar panel roof

Dr. Jürgen Skripalle (left) and Florian Strasser overlooking the Thornton Reservoir in Chicago, IL. In and outflow into this 7.9 billion US gallon reservoir is measured by the proprietary Ductus technology.

Swiss Quality

made in Germany

# Products

- Wastewater
- Hydropower
- Irrigation / Channels
- Hydrology
- Water Supply

## Q-Eye PSC
Page 7

## Q-Eye PSC Portable
Page 7

## Q-Eye Radar
Page 8

## Q-Eye Radar Portable
Page 8

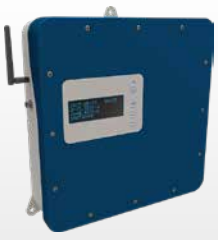
## Ductus M
Page 11

## Ductus Portable
Page 12

## Kanalis
Page 15

## Fluvius
Page 17

## Ductus S
Page 19

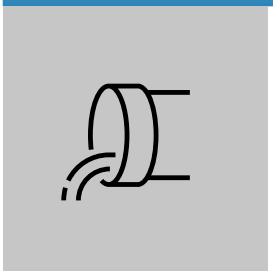


GWF is at the forefront of innovative flow technologies, products and solutions. In this brochure, we describe various applications for our portfolio. We measure anywhere: in rivers, channels, and partially filled or pressurized pipes.

Ultrasound propagates through fluid media as pressure waves. Our instruments are able to convert information gained from measuring the behaviour of these waves into flow speed. There are two main measurement principles on which our instruments are based.

Applying the Transit Time technique, we measure the time of flight with and against flow direction. When using the Pulse-Doppler effect, our instruments record the change of the signal frequency reflected by a particle in the flow.

Wastewater → p. 6



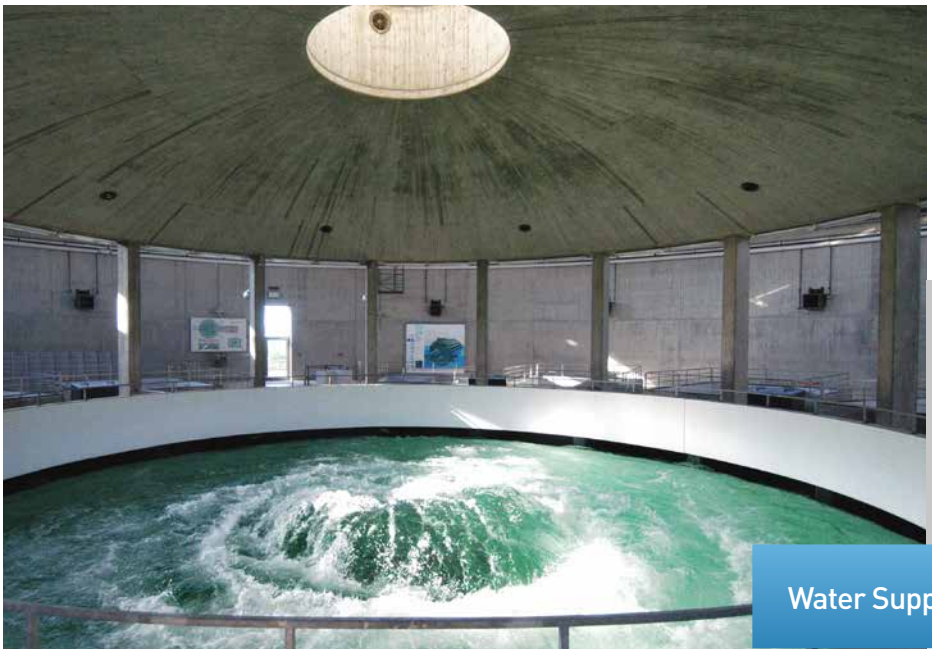
Irrigation / Channels → p. 14



# Fields of Application.

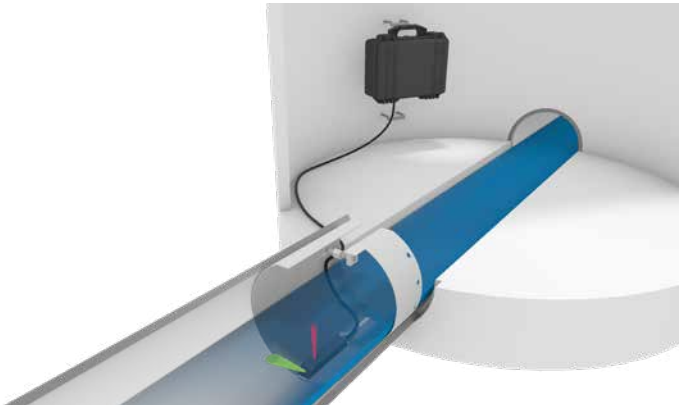
Hydropower → p. 10

Hydrology → p. 16



Water Supply → p. 18

The observation and control of wastewater is of highest importance. Today's civilization is unthinkable without functioning wastewater treatment plants. Wastewater contains a multitude of organic substances which are treated or removed and then discharged again into the environment. Advanced collection systems are required to transport wastewater to the right place at the right time in order to protect ecosystems. These collection systems are highly complex and consist of channels for wastewater flow, clarification plants and overflow basins. GWF solves flow measurement challenges in all of these areas globally.



Installation in manhole

# Wastewater

→ 6

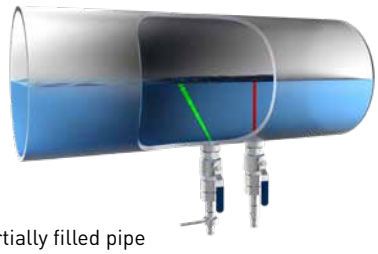
# Products

For sewage-treatment plants, flow measurements are primarily installed for internal reasons, for example to operate specific plant components depending on flow rate or for controlling additives. International regulations, such as the EU directive for handling municipal wastewater, require a continuous surveillance of wastewater flow. Defective flow measurements in sewage-treatment plants can therefore not only influence their operation, but also cause legal or environmental consequences.

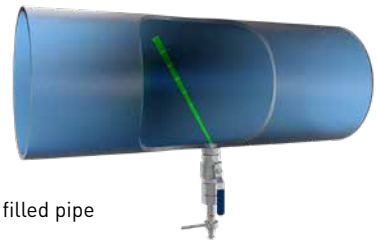
| Specifications | Q-Eye PSC<br>Stationary Pulse-Doppler system | Q-Eye PSC Portable<br>Portable Pulse-Doppler system |
|---|---|---|
| **Sensor** | 1 x velocity (up to 3 sensors)<br>1 x water level | 1 x velocity<br>1 x water level |
| **Pulse** | 1 MHz | 1 MHz |
| **Number of cells** | up to 18 cells | up to 18 cells |
| **Range** | velocity ± 5.3 m/s<br>water level 0.04-1.3 m<br>expandable via external 4-20 mA sensor | velocity ± 5.3 m/s<br>water level 0.04-1.3 m<br>expandable via external 4-20 mA sensor |
| **Accuracy** | velocity:<br>± 0.03 m/s from -1.5 m/s to +1.5 m/s<br>±1 % of reading from -5.2 to -1.5 m/s and +1.5 to +5.2 m/s<br>level: ± 0.5 % FS (1.5 m)<br>flow: typically ± 2 %, depending on site conditions | velocity:<br>± 0.03 m/s from -1.5 m/s to +1.5 m/s<br>±1 % of reading from -5.2 to -1.5 m/s and +1.5 to +5.2 m/s<br>level: ± 0.5 % FS (1.5 m)<br>flow: typically ± 2 %, depending on site conditions |
| **Display** | 4 lines, 20 characters | 4 lines, 20 characters |
| **Keyboard** | 4 keys | 4 keys |
| **Datalogger** | 16 GB MicroSD card | 16 GB MicroSD card |
| **Communication** | RS-485, Modbus (RS-232 or RS-485), Wireless LAN, 4G (LTE) / 3G (HSPA+) / 2G, Ethernet 10/100 Mbps | Wireless LAN, 4G (LTE) / 3G (HSPA+) / 2G |
| **Inputs** | max. 4 x 4-20 mA, 2 x digital | max. 2 x 4-20 mA |
| **Outputs** | max. 4 x 4-20 mA, 4 x Relay, 2 x Pulse | – |
| **Power supply** | 9-36 V DC or 100-240 V AC (50/60 Hz) | 2 x rechargeable batteries, hot swappable |
| **Protection class housing** | IP66 (NEMA 4) | IP67 |
| **Enclosure** | aluminum, wall mounted | HPX® Resin |

# Typical Applications

## Insertion type – only for stationary PSC

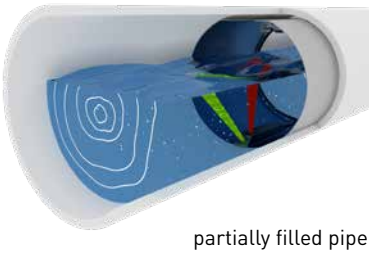


partially filled pipe

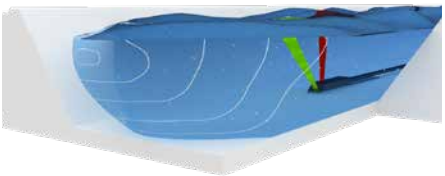


full filled pipe

## Mouse type – for both stationary and portable



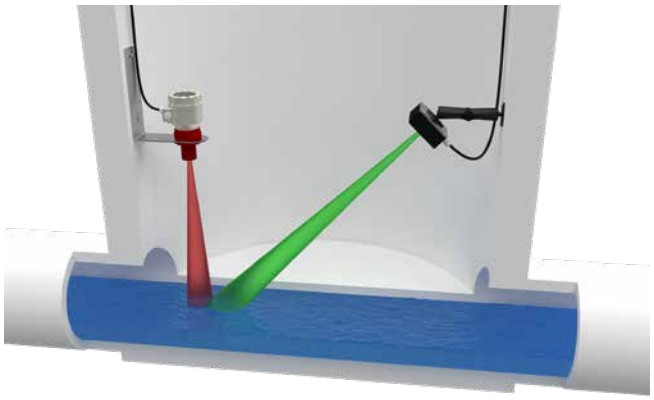
partially filled pipe



open channel

# Products

| Specifications | Q-Eye Radar<br>Stationary non-contact flow meter | Q-Eye Radar Portable<br>Mobile non-contact flow meter |
|---|---|---|
| **Sensor** | 1 x velocity (up to 3 sensors)<br>1 x water level (external 4-20 mA sensor) | 1 x velocity<br>1 x water level (external 4-20 mA sensor) |
| **Frequency** | 24 GHz | 24 GHz |
| **Beam width** | 11° at -3 dB | 11° at -3 dB |
| **Range** | ± 0.05 m/s to ± 15 m/s | ± 0.05 m/s to ± 15 m/s |
| **Resolution** | 1 mm/s; min. wave height 3 mm | 1 mm/s; min. wave height 3 mm |
| **Display** | 4 lines, 20 characters | 4 lines, 20 characters |
| **Keyboard** | 4 keys | 4 keys |
| **Datalogger** | 16 GB MicroSD card | 16 GB MicroSD card |
| **Communication** | RS-485, Modbus (RS-232 or RS-485), Wireless LAN, 4G (LTE) / 3G (HSPA+) / 2G, Ethernet 10/100 Mbps | Wireless LAN, 4G (LTE) / 3G (HSPA+) / 2G |
| **Inputs** | max. 4 x 4-20 mA, 2 x digital | max. 2 x 4-20 mA |
| **Outputs** | max. 4 x 4-20 mA, 4 x Relay, 2 x Pulse | – |
| **Power supply** | 9-36 V DC or 100-240 V AC (50/60 Hz) | 2 x rechargeable batteries, hot swappable |
| **Protection class housing** | IP66 (NEMA 4) | IP67 |
| **Enclosure** | aluminum, wall mounted | HPX® Resin |



## Application

Q-Eye Radar is an exceptionally versatile flow measurement system designed for continuous operation and suitable for application not only in open channels, but also in municipal wastewater and storm water sewers. Compact construction combined with the non-contact measurement principle enables an easy installation and use. The Q-Eye Radar is designed to accept any depth sensor (ultrasonic, radar and pressure) with an analog input (4-20 mA). Our Q-Eye Radar transmitter offers the best in waste-water measurement.

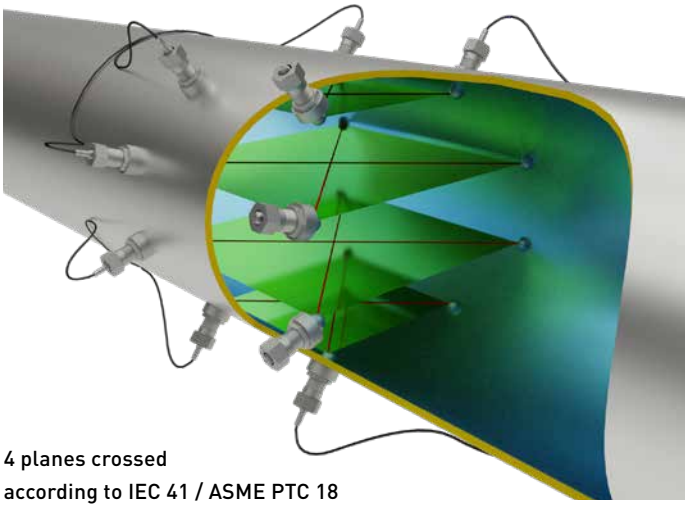
As the system is installed outside of the medium, your personnel will not get in contact with the polluted fluid during installation. Furthermore, the need for maintenance caused by sensor fouling or deposits is eliminated.


## Advantages of Non-Contact Measurement

In some applications it is an advantage to have a non-contact measurement. By combining both radar velocity and a water level sensor, we provide a revolutionary approach to open channel and wastewater flow monitoring.

Hydropower is an important source of energy which is able to cater to the increased need for power supply to the earth's population. Today, hydropower plants deliver approximately 3.5 per cent of electric energy generated worldwide. Their share in power generation from renewable resources comes to 18 per cent. This share is continuing to grow as resources of fossil fuels are depleted and investments in alternative energy sources grow.

Hydroelectric performance depends essentially on the usable altitude difference between upper reservoir and lower reservoir. In order to use the potential energy in an optimal way, flow should be accurately monitored over the long term.



4 planes crossed
according to IEC 41 / ASME PTC 18

# Hydropower

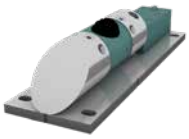
# Products

Acoustic flow measurement systems have long established themselves as a reliable and convenient method of determining turbine efficiency. Measurements in several planes according to international standards are recommended for this task. With this method, there is no need for calibration and a deterioration of turbine or hydraulic efficiency can be detected at an early stage. A further area of application is the detection of leaks, where at least two systems are permanently installed. Because of the accuracy of the Ductus system, even small leakages can be detected instantaneously.

| Specifications | Ductus M<br>Time of flight system with digital signal processing |
|---|---|
| Acoustic paths | 1 to 8 |
| Accuracy | up to ± 0.5 % (8 paths) |
| Range | ± 20 m/s |
| Pipe diameter | > 3000 mm |
| Display | 4 lines, 20 characters |
| Datalogger | internal, user-selectable sampling interval |
| Communication | 2 x RS-232, FTP, Modbus TCP (optional) |
| Inputs | max. 8 x 4-20 mA |
| Outputs | max. 4 x 4-20 mA, 2 x Relay, 2 x Pulse |
| Power supply | 24 V DC |
| Battery backup | integrated, 2 Ah |
| Protection Class | IP65 (NEMA 4) |
| Enclosure | powder-coated sheet steel, wall mounted |

## Transducers

**A variety of transducers is available – depending on your requirements**
Internal mount sensors can be fixed directly to the wall. The transducers are aligned by rotating them in their mounting into a predefined position and then fixed in place by tightening. Feedthrough sensors are employed for installation through exposed penstock walls with access to the interior and/or exterior of the penstock flow meter section.



| Specifications | TD-IM | FT-L120 |
|---|---|---|
| Frequency | 200 kHz | 120 kHz |
| Beam width | 18° (-3 dB) | 10° (-3 dB) |
| Configuration | IEC41 / ASME PTC 18 | IEC41 / ASME PTC 18 |
| Pipe diameter | 1.0 m to 10 m | 0.3 m to 15 m |
| Mounting | – | welding socket or thread |
| Pressure rate | 60 bar *) | 60 bar *) |
| Material | stainless steel / polyamide | stainless steel |
| Cable | twisted pair with shield | twisted pair with shield |
| Operating temperature | 0 °C to 40 °C | 0 °C to 40 °C |
| Dimensions | 320 x 100 x 70 mm (L x W x H) | Ø 1 1/2", length: 186 mm |
| Installation | from the inside | if pipe can be dewatered for installation. Removal of the transducer for repair, replacement or cleaning by means of a special jacking tool. |

*) other ranges upon request

# Products

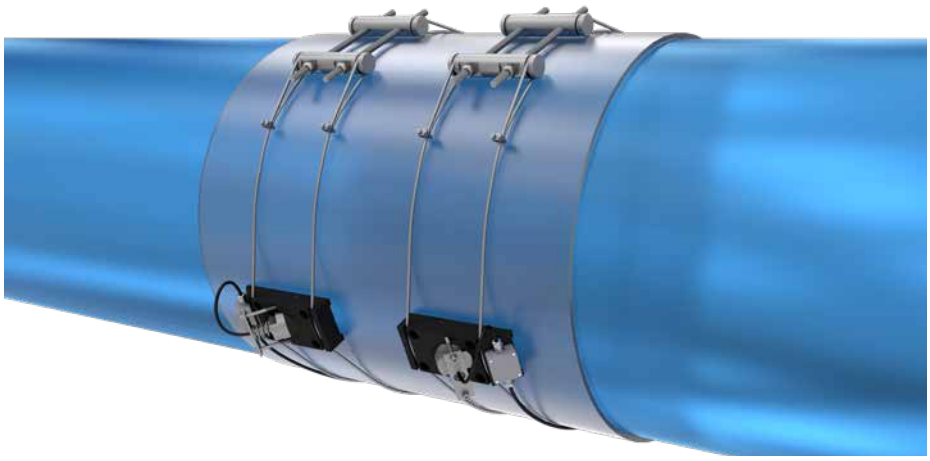
| Specifications | **Ductus Portable**<br>Mobile time of flight system with digital signal processing |
|---|---|
| Acoustic paths | 1 to 8 |
| Accuracy | up to ± 0.5 % (8 paths) |
| Range | ± 20 m/s |
| Power supply | 12 V DC |
| Display | 4 lines, 20 characters |
| Keyboard/LED's | 4 LED control lights, 2 keys |
| Housing material | aluminum |
| Communication | 2x RS232, 4x USB, 2x Ethernet (100 Mbit) |

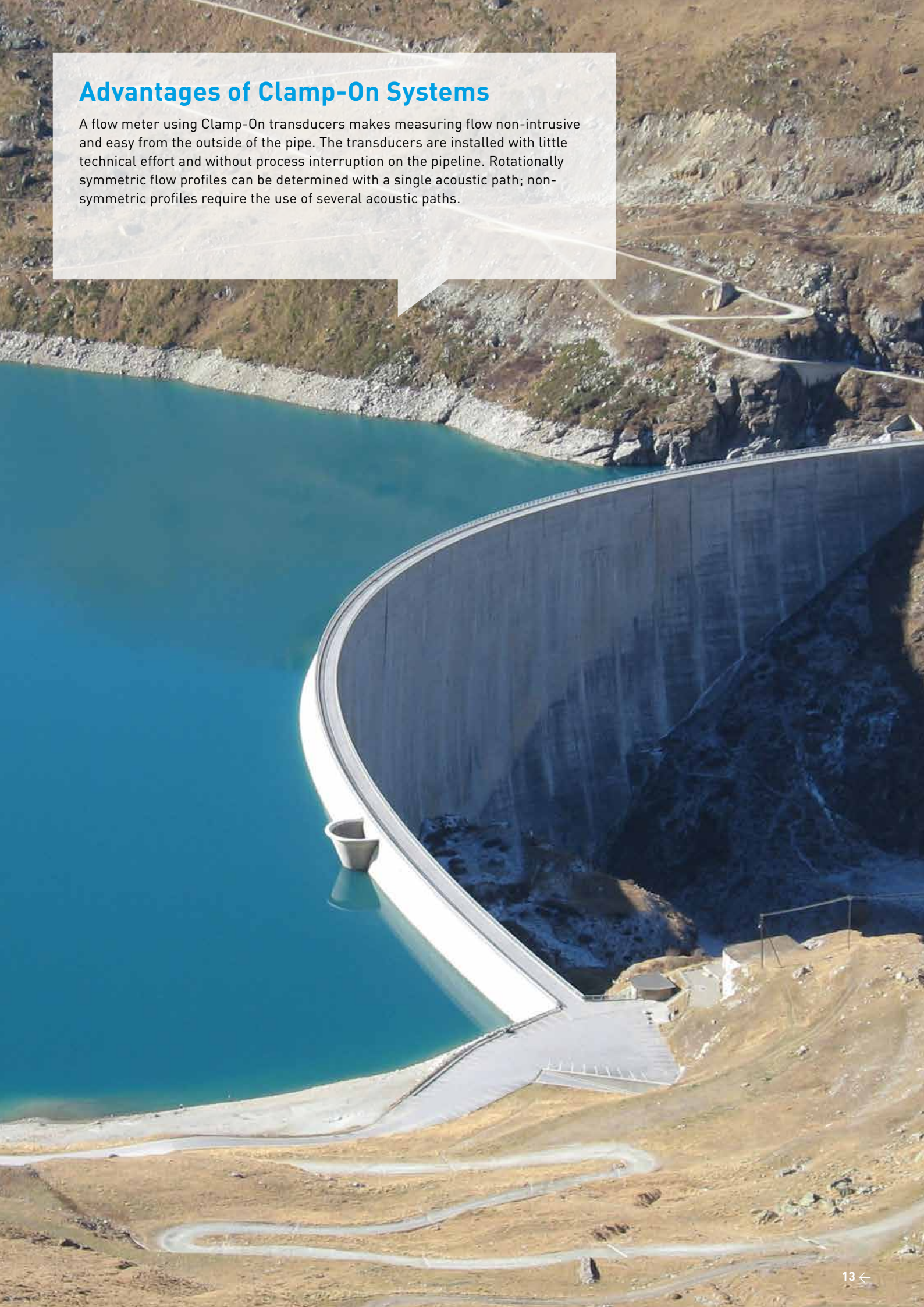
## Transducers

When combining the Ductus system 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.

| Specifications | **CO-L** (For Ductus M and Ductus Portable) |
|---|---|
| Pipe diameter | 0.4 m to 15 m |
| Pipe wall thickness | up to 100 mm (steel, plastic, glass fiber) |
| Frequency | 200 kHz |
| Beam width | 8° (-3 dB) |
| Material | stainless steel / polyamide |
| Operating temperature | -20 °C to 60 °C |
| Dimensions | 270 x 115 x 100 mm |
| Mounting | non-intrusive, from the outside of the pipe |

Clamp-On with 2 acoustic paths



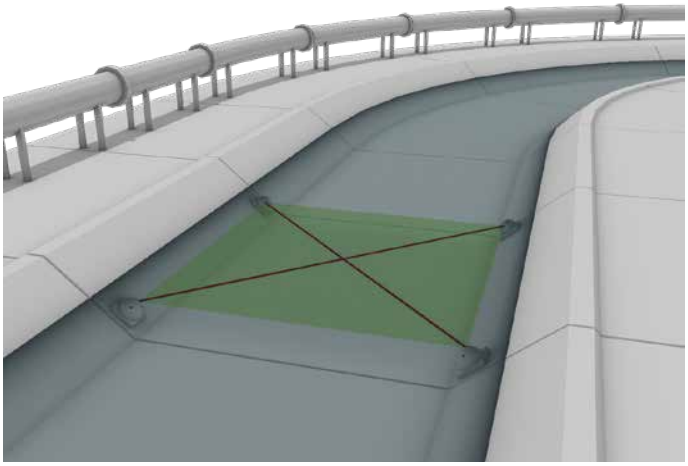


## Advantages of Clamp-On Systems

A flow meter using Clamp-On transducers makes measuring flow non-intrusive and easy from the outside of the pipe. The transducers are installed with little technical effort and without process interruption on the pipeline. Rotationally symmetric flow profiles can be determined with a single acoustic path; non-symmetric profiles require the use of several acoustic paths.

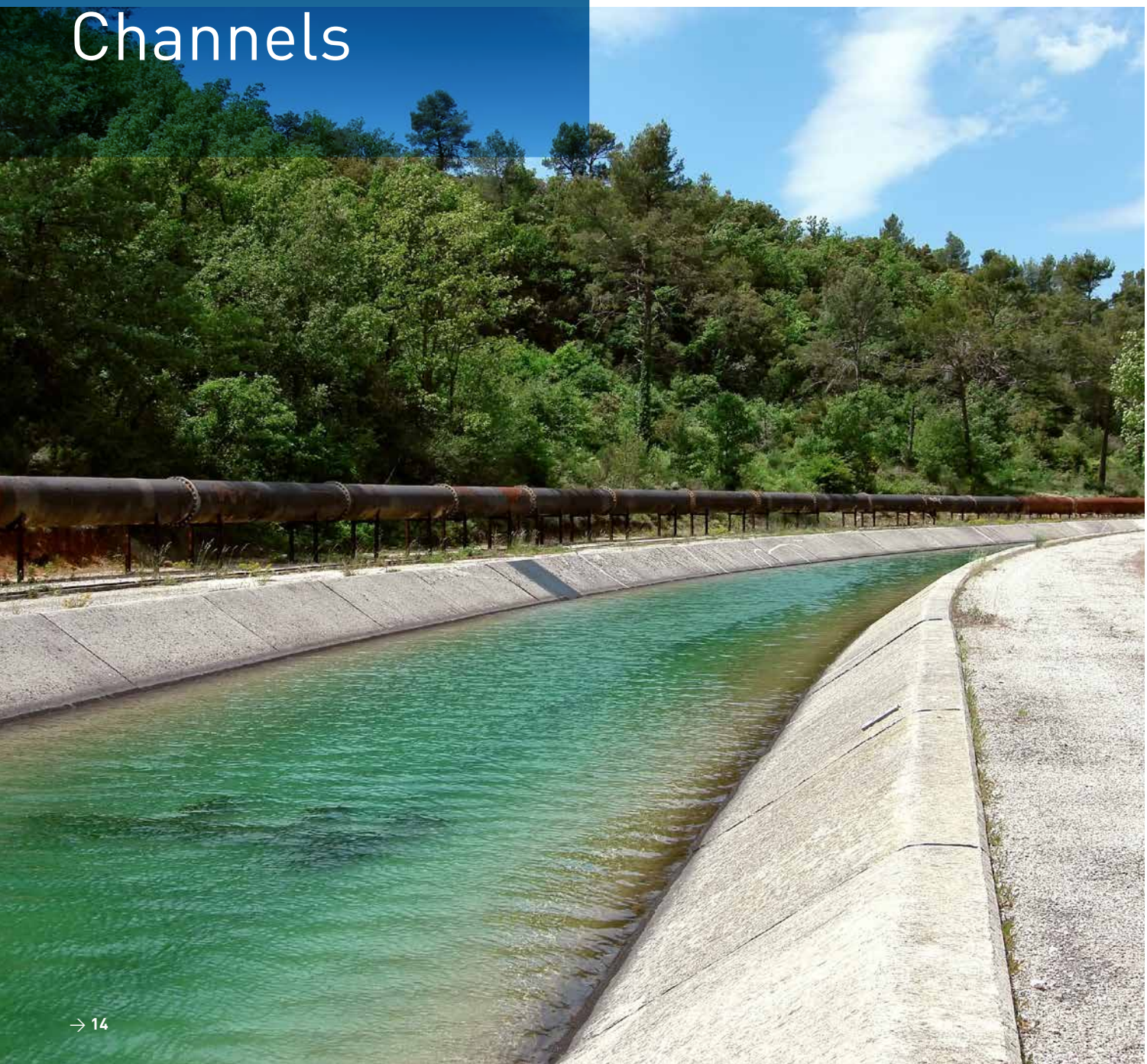
Channels are artificially created waterways used, among others, for transportation, irrigation, drainage, drinking water supply and water extraction for power.

Especially for applications in the supply of drinking water, it is crucial to detect leakages at an early stage. Our instruments measure man-made channels, tunnels and aqueducts precisely in order to prevent long term water losses and support process stability.

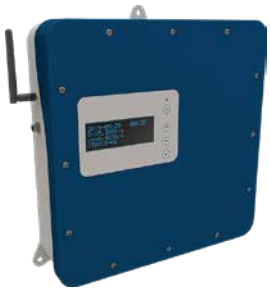


Crossed-path system, irrigation channel

# Irrigation / Channels



# Products



| Specifications | Kanalis<br>Time of flight system with digital signal processing |
|---|---|
| Acoustic paths | 1 to 10 (more upon request) |
| Channel width | 1 to 20 m |
| Accuracy | ± 2 % (typical, depending on number of installed paths) |
| Display | 4 lines, 20 characters |
| Datalogger | 16 GB MicroSD card |
| Communication | RS-485, Modbus RTU/TCP, Wireless LAN, Ethernet 10/100 Mbps, 4G (LTE) / 3G (HSPA+) / 2G |
| Inputs | max. 4 x 4-20 mA, 2 x digital |
| Outputs | max. 4 x 4-20 mA, 4 x Relay, 2 x Pulse |
| Power supply | 9-36 V DC or 85-260 V AC (50/60 Hz) |
| Protection class | IP65 (NEMA 4) |
| Enclosure | ABS, wall mounted |

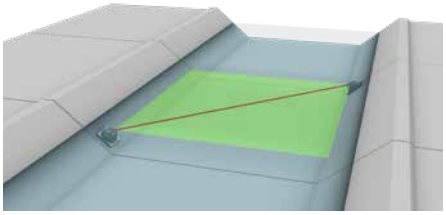
## Transducers

| Specifications | TD-200/8 | TD-200/18 |
|---|---|---|
| Frequency | 200 kHz | 200 kHz |
| Typical channel width | 20 m | 5 m |
| Dimensions | Ø 218 mm, height 109 mm | Ø 140 mm, height 70 mm |

**Mounting Assembly** Standardized mounting devices are available for any kind of channel geometry like rectangular, trapezoid or natural river banks. The flow optimized design protects the transducers against moving objects suspending in the flow stream. It also provides room for connections and protective conduits.

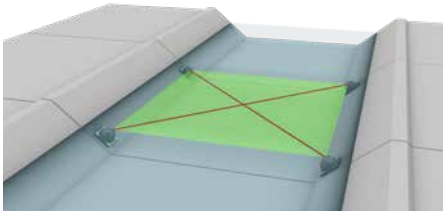
### Single-path system

In its most basic form, the system operates with a single pair of transducers. This measurement relies upon a stable velocity profile unaffected by changes in the relation between water level and flow. The main flow must be parallel to the bank. The relationship between measured velocity and flow is established by hydrometric calibration.



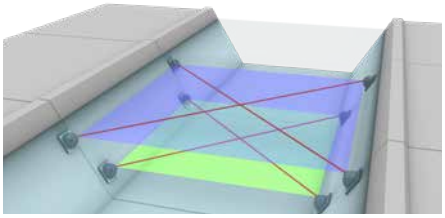
### Crossed-path system

Ideal for channels with cross-flow conditions. This depends mainly on the channel's geometry and whether there is an upstream bend in the conduit. Although cross-flows do not influence the total flow volume, they may affect the measurement accuracy. A second pair of transducers is required to capture these variances in velocity profiles. By crosswise arrangement of four transducers, effects of changing flow direction can be eliminated.



### Multi-path system

An even more accurate measurement can be obtained through systems using several planes. The measured result can be further improved by using a multi-path system layering each of the acoustic paths in parallel planes one above the other. This removes the need for an expensive hydrometric calibration. Such a system is suitable for applications with large water level fluctuations, reverse flow or a vertical velocity distribution outside the theoretical normal.



Numerous rivers intersect our landscape from small brooks up to huge river networks. Some of them form a natural border between two countries.

Since early times, man has preferred to live near rivers. Clean water, transportation, power generation and scenic beauty are amongst the reasons. However, our actions have more and more influence on water quantity and quality. In many regions, depletion of water for irrigation or human consumption are the reasons. More than half of all big rivers around the world have been polluted during the course of time and their stewardship is essential for the future survival of ecosystems.

Observations of water levels have been used since ancient times, systematic flow measurements go back to the middle of the 19th century. This historical data has been used as the basis for various applications, for example flood protection and flood forecasting. They also form the foundation for the design of hydro-engineering constructions.

In recent years, acoustic flow measurement has established itself as a standard method for measurement in many hydrological stations. With this technology, data can be recorded continuously, thus providing 24/7 monitoring.

# Hydrology

# Products

The range of application for Fluvius runs from small waterways to huge river systems with high suspended solids concentration. A coded acoustic signal is sent through the water and the transit time is calculated, which provides the speed of flow. When an acoustic wave propagates in water, part of the energy is damped by friction and suspended solids. This procedure is frequency-related. The higher the frequency, the bigger the damping. Therefore, low frequencies allow for a considerably better receiver signal for wide distances.

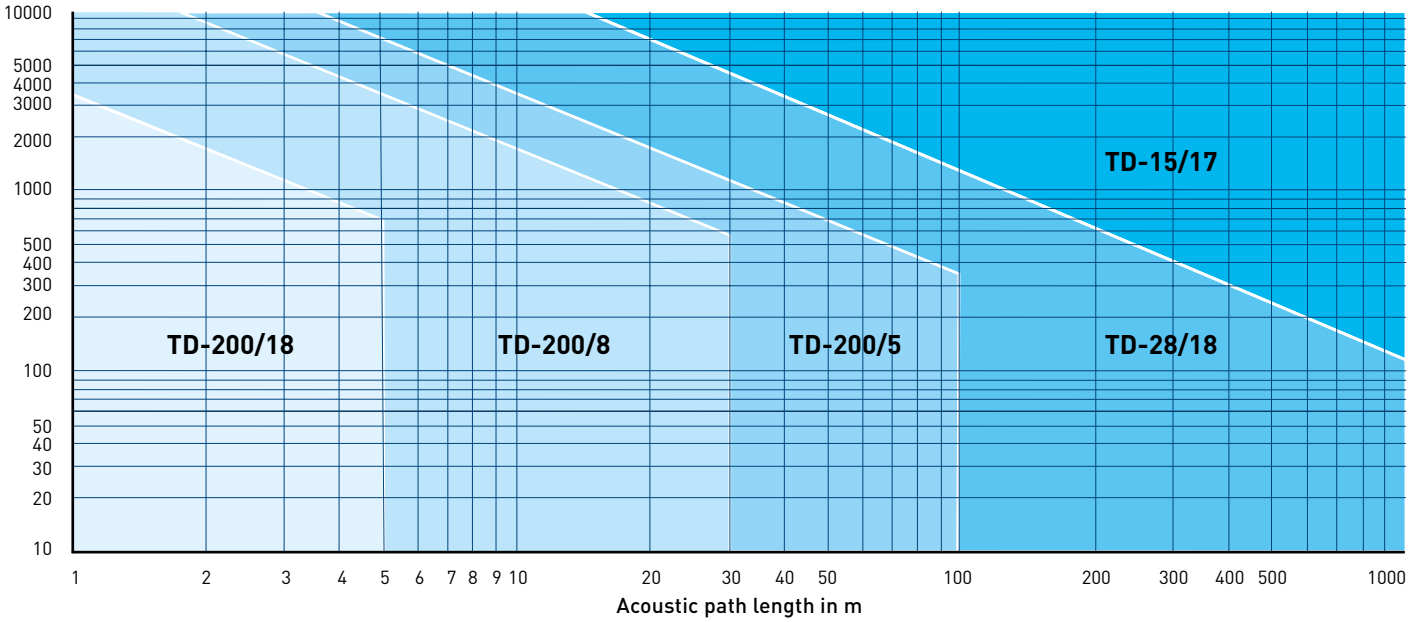
| Specifications | Fluvius<br>Time of flight system with digital signal processing |
|---|---|
| Acoustic paths | 1 to 8 |
| Channel width | 20 to 1000 m |
| Accuracy | ± 2 % (typical, depending on number of installed paths) |
| Display | 4 lines, 20 characters |
| Datalogger | internal, sampling interval user selectable |
| Communication | RS-232, Modbus, Ethernet, USB |
| Inputs | max. 8 x 4-20 mA |
| Outputs | max. 4 x 4-20 mA, 2 x Relay, 2 x Pulse |
| Power supply | 24 V DC |
| Battery backup | integrated 2 Ah |
| Protection class | IP65 (NEMA 4) |
| Enclosure | powder-coated sheet steel, wall mounted |

## Transducers

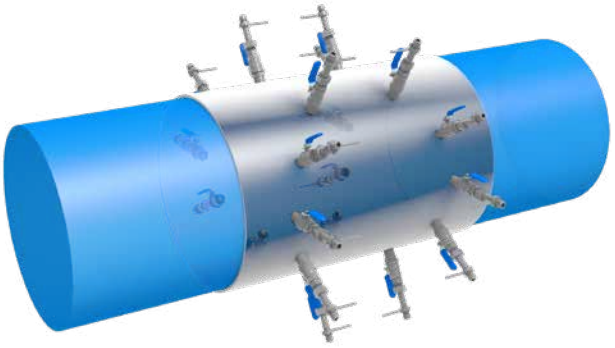
| Specifications | TD-15/17 | TD-28/18 | TD-200/5 | TD-200/8 |
|---|---|---|---|---|
| Frequency | 15 kHz | 28 kHz | 200 kHz | 200 kHz |
| Typical channel width | > 400 m | < 400 m | < 100 m | < 30 m |
| Dimensions | Ø 368 mm, height 121 mm | Ø 183 mm, height 142 mm | Ø 340 mm, height 170 mm | Ø 218 mm, height 109 mm |

**Commonly used transducer frequencies for various path lengths and sediment loads**

Sediment load in g/m³

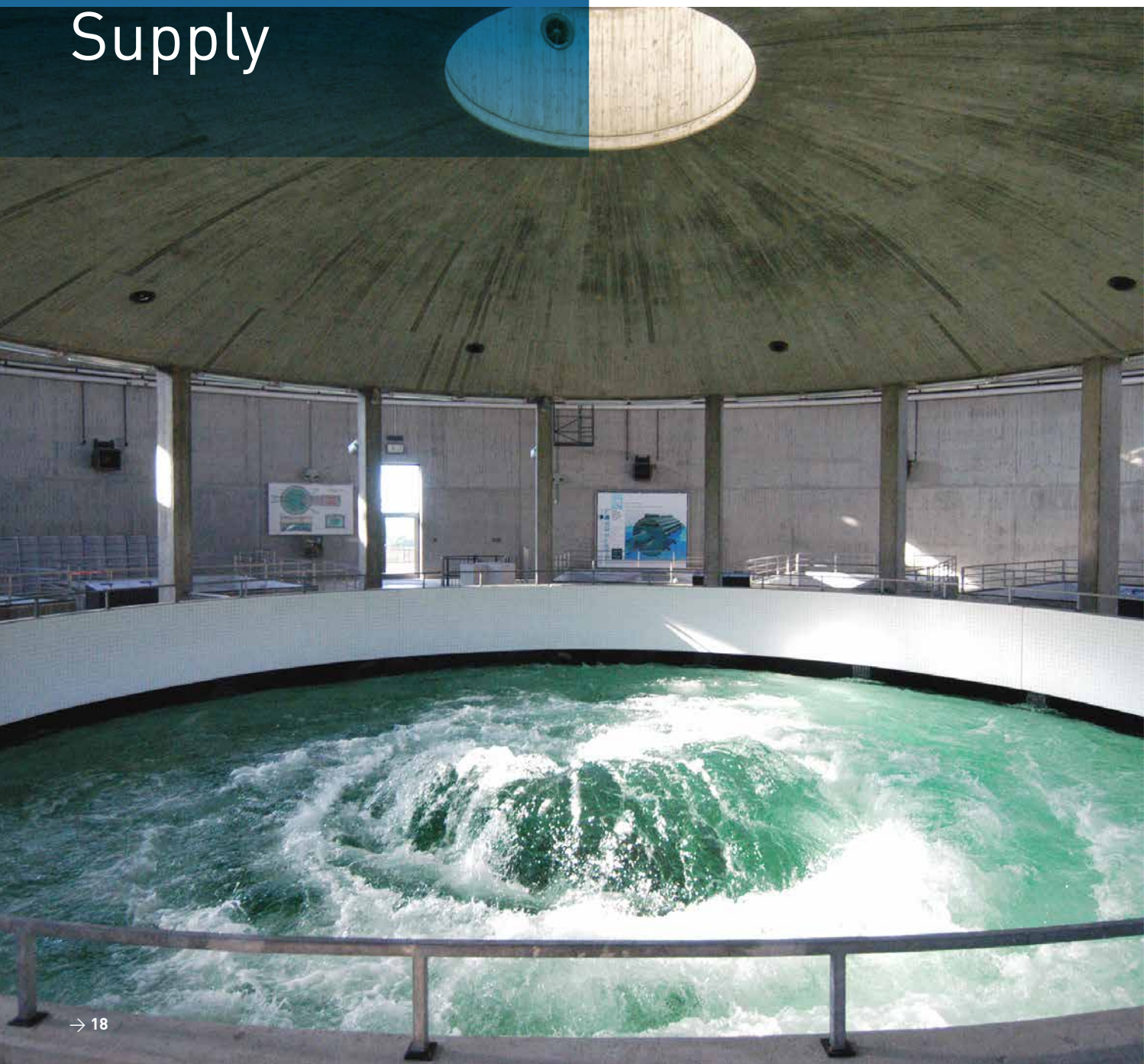


Although there is enough water on earth and it is not consumed but merely used, access to a reliable supply of clean, safe, potable water is becoming scarcer. Uneven distribution of water amongst regions and the planet's rising population lead to a global shortage of fresh potable water. More and more aqueducts for drinking water are being built all over the world. In order to operate large and complex piping networks efficiently, flow measurement is necessary for long term reliability and control.

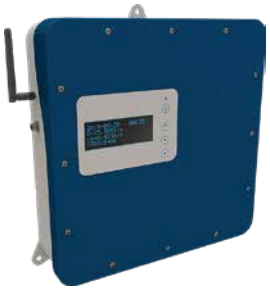


Ductus S with 5 layers
installed into existing pipeline

# Water Supply



# Products



## Specifications

| Specifications | Ductus S<br>Time of flight system with digital signal processing |
|---|---|
| Acoustic paths | 1 to 10 (more upon request) |
| Pipe diameter | up to 5000 mm |
| Accuracy | up to ± 0.15 % (10 paths) |
| Range | ± 20 m/s (bidirectional) |
| Repeatability | < ± 0.02 % |
| Zero stability | < 1 mm/s |
| Communication | RS-485, Modbus RTU/TCP, Wireless LAN, Ethernet 10/100 Mbps, 4G (LTE) / 3G (HSPA+) / 2G |
| Inputs | max. 4 x 4-20 mA, 2 x digital |
| Outputs | max. 4 x 4-20 mA, 4 x Relay, 2 x Pulse |
| Power supply | 9-36 V DC or 85-260 V AC (50/60 Hz) |
| Protection class | IP65 (NEMA 4) |
| Enclosure | ABS, wall mounted |

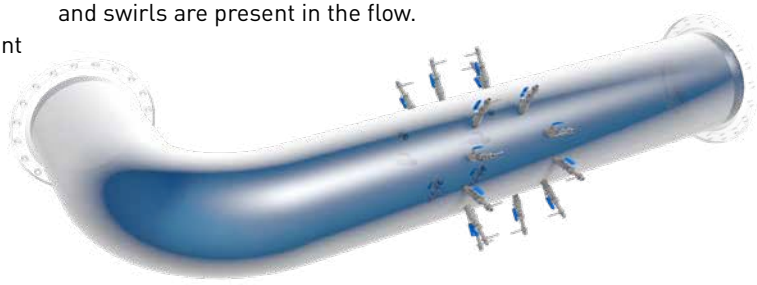
Ductus S flow meter is a fully integrated time of flight metering solution with up to 10 acoustic paths for liquid fluids. It increases your profitability with exceptional repeatability and linearity throughout the flow range. Due to the patented velocity profile compensation, no flow straighteners or on-site calibration are required. Ductus S can be used with either wetted or external Clamp-On sensors.

## 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. For traditional flow meters, significant errors may be caused by these adverse installation conditions.

In contrast to conventional systems, Ductus S provides detailed information on the flow velocity profile. An accurate measurement of the flow rate can be achieved by replicating the flow velocity profile across the pipe. Accuracy is maximized using predetermined conduit configuration parameters and correction factors, which incorporate the specific local installation conditions.

Conventional flow meters are also sensitive to velocity profiles with a large rotational component (swirl). Swirl can be caused by pumps or multiple 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. Ductus S can quantify and correct these disrupting factors without difficulty. The Ductus S system keeps its measurement accuracy even when asymmetric profiles and swirls are present in the flow.

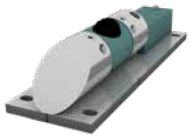


Measurement after a 90° elbow

# Products

## Transducers



| Specifications | FT-S | FT-M | FT-L1000 | TD-IM |
|---|---|---|---|---|
| Frequency | 1 MHz | 1 MHz | 1 MHz | 200 kHz |
| Beam width | 5° (-3 dB) | 10° (-3 dB) | 10° (-3 dB) | 18° (-3 dB) |
| Configuration | IEC41 / ASME PTC 18 | – | IEC41 / ASME PTC 18 | IEC41 / ASME PTC 18 |
| Pipe diameter | 0.1 m to 2 m | 0.1 m to 4 m | 0.3 m to 5 m | 1.0 m to 10 m |
| Mounting | welding socket or thread | welding socket or thread | welding socket or thread | – |
| Pressure rate | 20 bar *) | 20 bar *) | 60 bar *) | 60 bar *) |
| Material | stainless steel | stainless steel | stainless steel | stainless steel / polyamide |
| Cable | twisted pair with shield | twisted pair with shield | twisted pair with shield | twisted pair with shield |
| Operating temperature | 0 °C to 40 °C | 0 °C to 40 °C | 0 °C to 40 °C | 0 °C to 40 °C |
| Dimensions | Ø 1", length: 293 mm | Ø 1 1/2", length: 407 mm | Ø 1 1/2", length: 186 mm | 320 x 100 x 70 mm (L x W x H) |
| Installation | incl. fixing device, ball valve and welding socket | to be used in combination with 1 ½" ball valve and NPT inner thread | | from the inside |
| | pipe needs to be dewatered only for the time of initial installation. Designed to allow removal of the entire transducer for repair, replacement or cleaning without the need to dewater the pipe lation. | | removal of the transducer for repair, replacement or cleaning by means of a special jacking tool. | |

*) other ranges upon request

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.


| Specifications | CO-L | CO-S |
|---|---|---|
| Pipe diameter | 0.4 m to 15 m | 0.025 m to 1 m |
| Pipe wall thickness | up to 100 mm (steel, plastic, glass fiber) | up to 25 mm |
| Frequency | 200 kHz | 1 MHz |
| Beam width | 8° (-3 dB) | 5° |
| Material | stainless steel, polyamide | zinc alloy |
| Operating temperature | -20 °C to 60 °C | -20 °C to 60 °C |
| Dimensions | 270 x 115 x 100 mm (L x W x H) | 56 x 32 x 25 mm (L x W x H) |
| Installation | from the outside of the pipe | from the outside of the pipe |

## Transducer Replacement

In the unlikely event that a transducer should fail, Ductus S can be programmed to automatically compensate for the loss in path information with little reduced accuracy. Additionally, the operator is advised that an alarm is present. The feedthrough transducer housings are separate from the transducers, and are designed to allow removal of the entire transducer for repair, replacement or cleaning without the need to dewater the pipe or shut down the process.

Look at him! The short target deadline was met once again. The acoustic flow measurement system for a hydropower plant has passed its final test. Everything works fine – this is the best moment a project engineer can experience.

Our professional and competent service department manages projects all over the world. Skilled technicians, engineers, and training staff provide advice and support from project planning all the way to the turnkey installation.

Prior to project planning we review the site data with our clients in order to submit a customized solution. We provide excellent and rapid support as well as installation services. Contact your local representative to see what our engineering department can do for you.

For instant service, please contact our telephone support, or browse our website to find the suitable product for your application.

# Service

# In operation worldwide

## CANADA

**Location** > Wastewater Treatment Plant
**System** > Kanalis
**Transducer** > TD-200/8

## ICELAND

**Location** > Hydropower
**System** > Ductus M
**Transducer** > Clamp-On

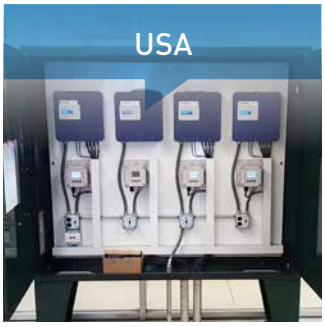
## SWITZERLAND

**Location** > Water Supply
**System** > Ductus S
**Transducer** > Feedthrough

## TURKEY

**Location** > Hydropower
**System** > Ductus M
**Transducer** > Feedthrough

## USA



**Location** > Wastewater Treatment Plant
**System** > Kanalis
**Transducer** > TD-200/8

## SOUTH AFRICA

**Location** > Hydropower
**System** > Ductus S
**Transducer** > Feedthrough

## POLAND

**Location** > Wastewater
**System** > Q-Eye Radar
**Transducer** > RV11

## JAPAN

**Location** > River
**System** > Fluvius
**Transducer** > TD-28/18

**Headquarter**
GWF MessSysteme AG
Obergrundstrasse 119
6005 Lucerne
Switzerland

T +41 41 319 50 50
F +41 41 310 60 87
info@gwf.ch

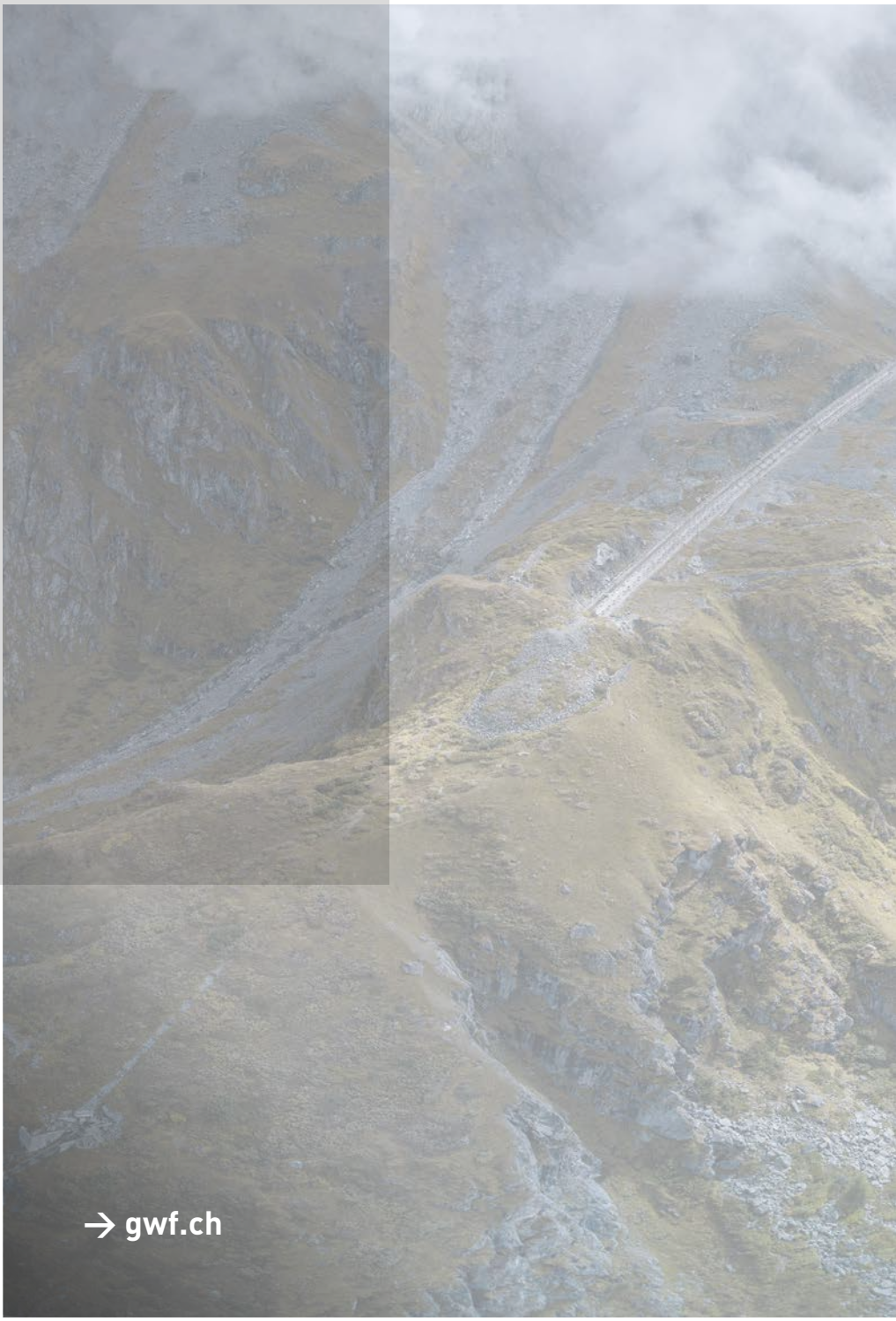
GWF Technologies GmbH
Gewerbestraße 46f
87600 Kaufbeuren
Germany

T +49-8341-959990
info@gwf-technologies.de

www.gwf-technologies.de

© GWF MessSysteme AG
Specifications are for instruments at the time the literature was printed. Due to continuous product testing and improvement, all specifications are subject to change without notice.

13.01.2020 – KIe60100




printed in switzerland