Measurement of Flow and Heat Quantity in Liquid-Carrying Pipes
- precise
- simple
- non-intrusive and maintenance-free

deltawaveC

deltawaveC-F stationary
deltawaveC-P portable
deltawaveC devices are available in two different series: the deltawaveC-P for mobile sampling measurements and for measuring tasks over an extended period of time, and the deltawaveC-F for continuous measurements in fixed installations.

Both units use the proven and highly precise ultrasonic transit time difference method. By employing the latest digital signal processors, these robust measurement devices are extremely accurate and drift-free.

With the new Quick Setup option parameterization takes less than one minute. And online help makes the manual unnecessary for most tasks.

The single user interface shared by both device versions eliminates the learning curve for anyone already familiar with one of the deltawaveC devices. You’ll find all menu items and displays in plain text on the large backlit display. Cryptic abbreviations are unnecessary on the graphics-capable QVGA display. The clear menu structure and easy and quick operation via eight keys makes for added user-friendliness.

Saves installation and operating costs
Thanks to clamp-on technology, the ultrasonic transducers used can be installed in a matter of minutes. No need exists to cut or penetrate your pipes. This possibility, together with the elimination of process interruptions, means that deltawaveC devices are the key to optimizing operating costs. The contactless measurement is virtually

- 100% leak-proof
- 100% pressure-resistant
- 100% drift-free
- 100% wear-free and thus maintenance-free
- 100% free of pressure loss and thus energy-saving

The display and usage concept are identical for both the portable and permanently mounted deltawaveC. This not only simplifies the operation of both devices – it also gives the user a complete overview of his measuring point.
Precise and reliable flow measurement

The deltawaveC measures the transit time difference of the ultrasonic signals $t_1$ and $t_2$ that run with and against the direction of flow. These signals are accelerated ($t_2$) or delayed ($t_1$) by the flow of medium. The resulting difference in the two signal transit times is proportional to the pipe geometry, is used to precisely calculate the flow. The use of multiple processors working in parallel means that deltawaveC achieves an extremely high measurement rate. Signal processing takes place in high-performance DSPs which are extremely precise and operate at very high resolution. This enables the device to achieve internal resolution of under 0.001 m/s flow velocity. And since the transit time measurement is purely digital, the measurement electronics are virtually drift and calibration-free.

High-performance measurement and evaluation process – even for difficult applications

Stable and reliable measurement under extremely difficult conditions

Ultrasonic signals are disturbed by a variety of variables, including electromagnetic radiation, the presence of gas or solids, machine noise, etc. In conventional devices, in order to detect the ultrasonic signals to be evaluated within this “ambient noise” the signal amplitude must be several times that of the noise. An intelligent analysis method was developed for deltawaveC that detects the ultrasonic signals when the amplitude of the noise is several times more than that of the signal amplitude. The advantage for deltawaveC users: absolutely reliable and stable measurements, even in extremely unfavorable conditions.

This enables measurements even under conditions where high particle and gas loads are present – an impossible task for conventional devices.

Verified signal quality ensures reliable measurement

deltawaveC’s integrated oscilloscope function checks and verifies signal quality. The use of multiple processors working in parallel means that deltawaveC achieves an extremely high measurement rate. Signal processing takes place in high-performance DSPs which are extremely precise and operate at very high resolution. This enables the device to achieve internal resolution of under 0.001 m/s flow velocity. And since the transit time measurement is purely digital, the measurement electronics are virtually drift and calibration-free.

Modern cross-correlation process tackles the toughest measurement tasks

To ensure reliable measuring results even under the most difficult conditions the deltawaveC incorporates bespoke powerful signal processing algorithms. For reliable detection, deltawaveC employs - similar to the GPS satellite navigation system – encoded signal packets (bursts). Via the built-in phase shifts and clearly defined number of oscillations, prior to being sent the bursts receive a unique identity - just like a fingerprint. On the receiving end, the digital signal processor (DSP) then employs a cross-correlation method to uniquely determine the time (maximum correlation) at which the transmission signal matches a stored reference signal. This allows the signal reception times required to determine the transit time to be determined very precisely. This also permits the clear identification of the desired signals in the event of high noise levels and/or low signal amplitude (e.g. high particle content in the medium) by means of cross-correlation. Your advantage: reliable and accurate measurement results even under difficult measurement conditions.

AFC technology for high accuracy under changing process conditions

AFC Automatic Fluid Control

Ultrasonic meters are dependent on the acoustic velocity of the relevant medium, which varies with the composition and temperature. This is well-known and with proper parameterization is not a problem. However, many conventional devices are programmed for water with a temperature of 20° Celsius, for example. If the temperature changes to 50° C the transducers would basically have to be repositioned. In everyday measurement practice this would be impractical, and is rarely done. The result is a loss of accuracy.

deltawaveC compensates for this effect by means of AFC technology and by newly developed, high-performance algorithms. The advantage is that the transducers need not be repositioned, and accuracy is virtually unaffected by typical process fluctuations. This also results in high measurement accuracy even under changing medium conditions, e.g. due to changes in temperature or composition.
Another advantage of the clamp-on ultrasonic flow metering: since the ultrasonic transducer does not come into contact with the medium, the measurement is:

- 100% contamination-free
- 100% hygienically safe

This is particularly interesting for quantity measurement of food and pharmaceutical products, and simplifies volume measurement of toxic or environmentally harmful liquids. Flow metering with the deltawaveC means no additional sealing surfaces or dead volumes!

### deltawaveC

**Integrated Heat Quantity Measurement**

A single device for multiple metering applications

deltawaveC-P is compatible with the most common pipe sizes (DN10 - DN6000) and cross-sector applications. deltawaveC is not only a flowmeter, but also includes an integrated heat quantity measuring function. Together with the optionally available clamp-on temperature and ultrasonic transducers, heat and cooling quantities can be recorded and documented with reliability and accuracy.

Rising energy prices and legal requirements regarding environmental protection and plant efficiency necessitate the ongoing optimization of energy flows. Whether monitoring the district heating networks that span from power stations to the consumer, process heat in the chemicals industry or in building services engineering – assessing the energy performance of heat flows is tremendously important in many application areas. The integrated thermal energy measuring function of the deltawaveC enables rapid and convenient recording of heat flows. External, optionally available temperature sensors placed in the feed and return flow are used to measure the temperature difference. In parallel, deltawaveC-P measures the volume flow and, from this, calculates the heat flow, taking into account the specific heat coefficient of the medium. The temperature sensors can be matched in pairs on the device in order to increase measurement accuracy. All this takes place without penetrating the piping system – temperature and flow sensors are simply clamped onto the pipe from the outside.

**Broad Application Spectrum**

deltawaveC is compatible with the most common pipe sizes (DN10 - DN6000) and applications across all sectors. deltawaveC is not only a flowmeter, but also includes an integrated heat quantity measuring function. Together with the optionally available clamp-on temperature and ultrasonic transducers, heat and cooling quantities can be recorded and documented with reliability and accuracy.

Typical applications include:

**Power Stations**
- Circulating water/service water
- District heating networks
- Pump protection
- Condensate and feed water measurement
- Heavy and light oil

**Water and wastewater management**
- Sewage treatment plant inflow/effluent
- Drinking water networks, verification of water meters
- Pump protection
- Distribution and consumption metering
- Leakage detection

**Chemicals and Petrochemicals**
- Crude and light oil
- Industrial and waste water
- Aggressive and toxic media
- Measurement of heat carriers, e.g. thermal oils

**Food and Beverage Industry**
- Hygienic, reliable measurement of media
- Dosage measurements
- Cleaning solutions
- Water
- Beverages

**Building Services Engineering**
- Hot and cold water
- Cooling systems & air-conditioning units
- Hydraulic compensation
- Pump control and set-up
- Optimization of heating systems

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**Integrated Heat Quantity Measurement**

Thermal energy metering at Stadtwerke München

**Feed temperature**
**Consumed Thermal Output / Heat quantity**
**Return temperature**
**Thermal Input / Heat quantity**
**Temperature Sensor T1**
**Temperature Sensor T2**
**Ultrasonic Transducers**
**Volume Flow / Quantity**

**Thermal Output / Heat quantity**

**Q Flow Rate**

**Another advantage of the clamp-on ultrasonic flow metering: since the ultrasonic transducer does not come into contact with the medium, the measurement is:**

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This is particularly interesting for quantity measurement of food and pharmaceutical products, and simplifies volume measurement of toxic or environmentally harmful liquids. Flow metering with the deltawaveC means no additional sealing surfaces or dead volumes!
Thanks to high-performance plastic housing, the ultrasonic transducers are suitable for applications up to 150°C. This enables many high-temperature applications to be realized cost-effectively without special transducers, e.g. in district heating networks.

Mounting with the mounting rail is simple: using the pre-defined hole matrix makes positioning the ultrasonic transducers on pipes a quick, secure and precise affair. This also avoids failed installation.

Ultrasonic transducers for permanent installation, degree of protection: IP68.

**Selection of Ultrasonic Transducers for Transit Time Measurement**

<table>
<thead>
<tr>
<th>Type</th>
<th>Temperature</th>
<th>Inner Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>deltawaveC-P portable: XUC-PW-F20</td>
<td>-40...150°C</td>
<td>DN10...DN100</td>
</tr>
<tr>
<td>deltawaveC-F permanently installed: XUC-FW-F20</td>
<td>-40...150°C</td>
<td>DN32...DN400</td>
</tr>
<tr>
<td>deltawaveC-P portable: XUC-PW-F10</td>
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<td>deltawaveC-F permanently installed: XUC-FW-F10</td>
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<td>DN200...DN6000</td>
</tr>
<tr>
<td>deltawaveC-P portable: XUC-PW-F05</td>
<td>-40...150°C</td>
<td>DN10...DN100</td>
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<td>DN200...DN6000</td>
</tr>
</tbody>
</table>
deltawaveC units are for hire

You only need an ultrasonic flow metering unit temporarily, or you'd like to extensively test the deltawaveC-P? Simple: our deltawaveC-P units are for hire.

The thickness measurement is possible for all conventional piping materials like steel, copper and plastics.

Simply power on, input the pipe material and place the ultrasonic sensor on the pipe. The deltawaveC-WD shows the exact wall thickness.

Accessories
deltawaveC-WD, the new wall thickness gauge for precise and easy measurements of the thickness of pipes and components, not only performs well as an accessory to the deltawaveC. Like the deltawaveC flowmeter, the device operates on the ultrasonic transit time method.

The thickness measurement is possible for all conventional piping materials like steel, copper and plastics.

The mobile deltawaveC-P measuring device comes in a robust practical carrying case complete with flow transmitters, ultrasonic transducers, installation material, signal cable and coupling grease, SD memory card and power supply.

Online Enquiries
Email sales@pctflow.com or use the chat line at www.pctflow.com
Flow metering technology

deltawave flow meter for channels, pipes and rivers
Deltawave measures the flow of water and wastewater according to the multiple-path ultrasonic transit time difference method. This – as well as thanks to the use of modern digital signal processing – enables accuracies of better than 0.5%. A single deltawave electronic unit can serve up to 4 independent measurement points. Precise, reliable and virtually maintenance-free, deltawave is ideal for monitoring, control and accounting measurements in conformance with ISO 6416, ISO 60041 and ASME_PTC_18.

deltaflow for flow metering of gas, steam and liquids
The deltaflow pitot tube has proven its effectiveness a thousand times over for measuring the flow and volume measurement of gas, steam and liquids in pipes. Pitot tubes induce the lowest pressure loss of all differential pressure elements, which means that many applications can look forward to energy savings of several thousand Euros per year. With an accuracy of up to 0.4% of the measured value as tested by the Physikalisch-Technische Bundesanstalt (PTB), the deltaflow probe can also be reliably used in the most adverse conditions. Deltaflow is extremely robust and has passed a number of tests, including the challenging approval test pursuant to 13th and 17th BImSchV (German Federal Immission Control Ordinance) for use in condensing, aggressive and dirty flue gases. Deltaflow is available for pipe diameters from 1 mm – 15 m and a pressure level of up to 690 bar and can thus be used for the vast majority of flow applications.

deltawaveC
The deltawaveC measures the mass flow of gases in pipes and channels. Thanks to the integrated differential pressure, pressure and temperature sensors and patented microprocessor technology, measurement accuracies of greater than 2% can be achieved. The deltawaveC is particularly impressive on the strength of its high dynamic performance, zero-point stability and ease of operation. Practical, maintenance-free and available at good value for money, deltawaveC enables you to keep your process costs under control.

For more information and technical support contact:

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