

Teqwave F/I/T

The smart and flexible concentration measurement device

Liquid analysis in real time

- Cost-saving – a single sensor for simultaneous measurement of concentration, speed of sound, acoustic density and temperature
- Flexible range of application in pipes and vessels: Inline, insertion and portable device versions
- Efficient concentration measurement – over 180 hours saved per year for each measuring point compared to titrations
- Full transparency – constant monitoring of product quality without sampling
- Reliable – robust measurement with long-term stability
- Maintenance-free – no moving parts
- Dependable – constant concentration output thanks to integrated temperature compensation
- Highly accurate – thanks to precise factory calibration



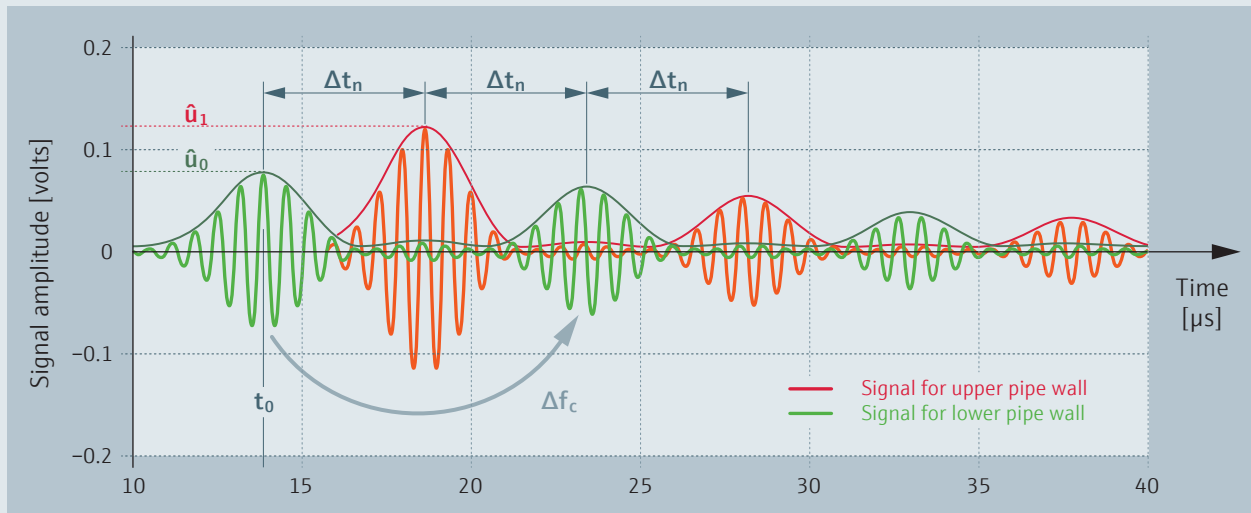
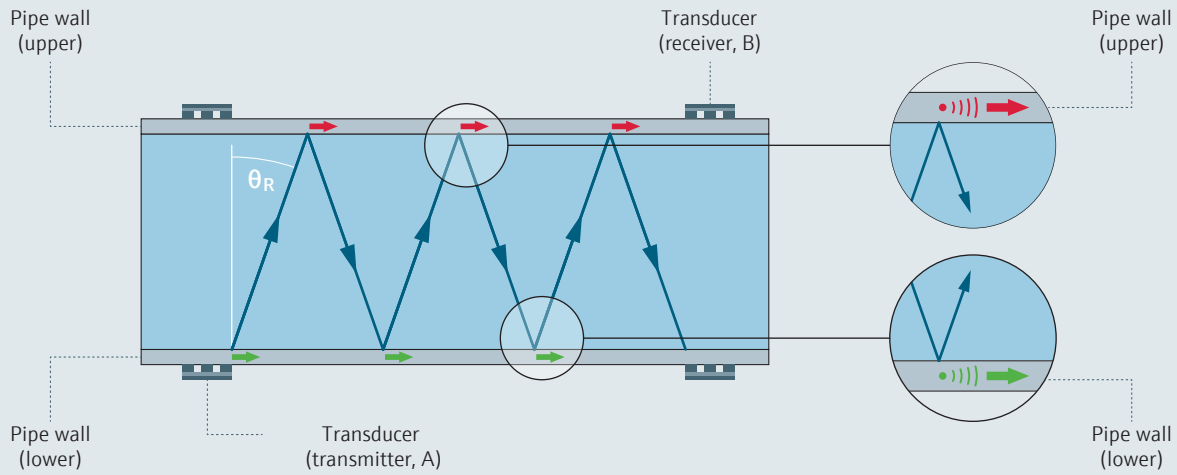
The measuring principle

Concentration measurement using ultrasound

The core of Teqwave is an acoustic waveguide that measures liquid concentrations extremely fast and accurate using ultrasound. When Teqwave is used, the ultrasonic waves are created by a piezoelectric transducer and then spread out in the waveguide. A double arrangement of transmitter and receiver allows for a highly precise evaluation of the transmission times and amplitudes of the measured sound waves.

This enables Teqwave to measure the speed of sound, density (using acoustic core impedance) and temperature at the same time within nanoseconds. The combination of all these characteristic values makes it possible to determine the composition and the material concentrations within a mixture of liquids reliably and exactly.

Spreading of ultrasonic waves in a tube



t_0 = transit time · Δt_n = transit time differential · $\hat{u}_1 / \hat{u}_0$ = amplitude ratio · Δf_c = frequency shift



Teqwave – The sensor that thinks right along with you

Comprehensive liquid analysis for maximum process reliability

No matter what industry you work in, you can use Teqwave for reliable liquid analysis in different application areas. Thanks to a single sensor, which simultaneously measures speed of sound, acoustic density, concentrations (2 varying components) and temperature, you always have your processes under control.

Whether you are in the chemical industry, the paint or dye production, the industrial parts cleaning, the automotive industry or process technology, Teqwave enables reliable and permanent in-line measurement of concentrations. Thus, there is no need anymore for manual measurements which must often be carried out by hand or even in the laboratory and are time-consuming and expensive:

- Industrial parts cleaning (cleaning baths)
- Solvents
- Hardening fluids, etc.

Four process variables using a single sensor

%

Concentration

Measuring range: 0 to 100%
Accuracy: down to $\pm 0.01\%$

m/s

Speed of sound

Measuring range: 600 to 2000 m/s
(1969 to 6562 ft/s)
Accuracy: ± 2 m/s (± 6.6 ft/s)

g/cm³

Acoustic density

Measuring range: 0.7 to 1.5 g/cm³
Accuracy: ± 0.01 g/cm³

°C

Temperature

Measuring range:
0 to 120 °C (32 to 248 °F)
Accuracy: ± 0.5 °K

Additional order option: Measurement of a second concentration in the carrier fluid

The application concept

Perfectly matched to your process fluid

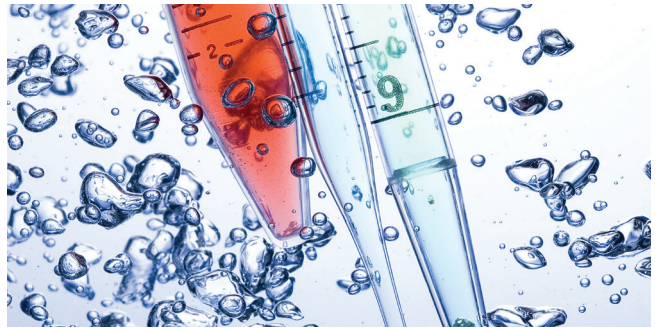
Using special sound waves, Tegwave generates an acoustic “fingerprint” of liquids and measures the concentration of your liquid precisely.

For any fluid that has not yet been added to our database, we will create a custom fingerprint for you in our calibration lab.

In addition, Tegwave can “learn” continuously. If you want to measure more fluids, new applications can be added to Tegwave at any time, broadening its spectrum of application. Simply add a new application and Tegwave will know exactly which parameters to take into account when carrying out your specific measurement.

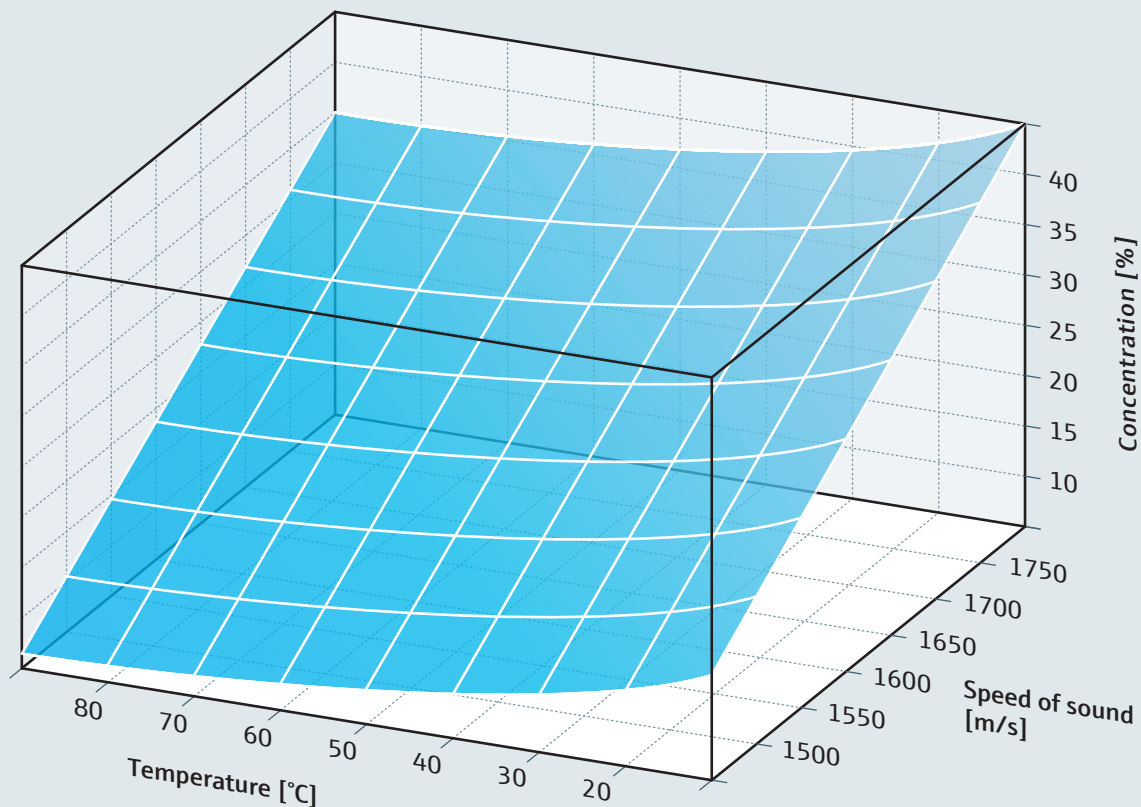


Industrial parts cleaning



Bath contamination

Liquid-specific dependency of various fluid properties (example)



Teqwave software

For the visualization of your measured data

You can use Teqwave's software packages not only to custom-configure your measuring points via personal computer but to visualize measured data and monitor your process optimally. These software packages are always included in the scope of supply of Teqwave F and I. Teqwave Mobile Viewer is specifically designed for mobile applications and therefore usable with Teqwave T.

Teqwave Viewer

- Display of current measured values
- Graphical depiction of two measuring variables
- Configuration of the analog interfaces
- Changing between multiple transmitters
- Language settings: German, English, French
- Application uploading

Teqwave Mobile Viewer

- Read out, display, delete and export measurement data stored in the transmitter
- Create a report of stored measurement data
- Read out and report results of a function test
- Set the operating language of the transmitter

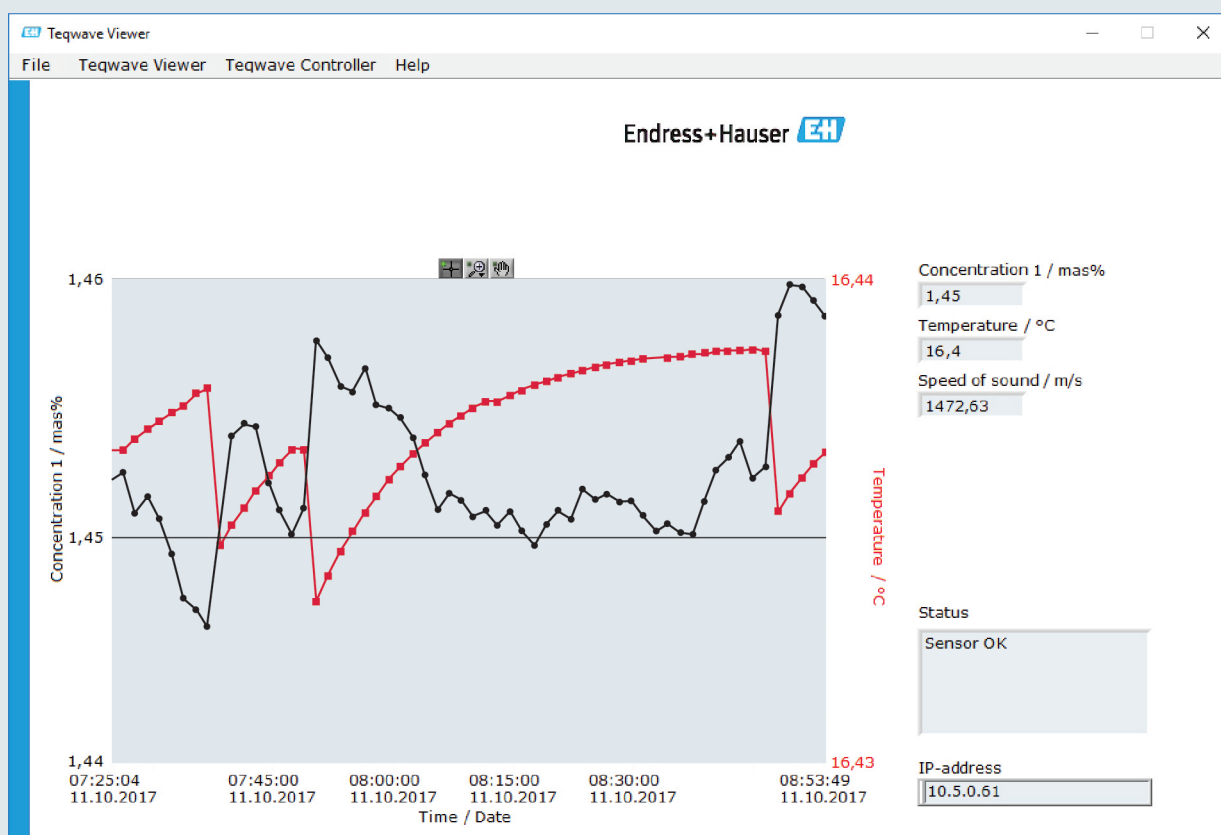
- Set new measuring points
- Set and save device configurations (configuration manager)

Teqwave Viewer (optionally with data download)

With the following additional functions compared to the Teqwave Viewer package:

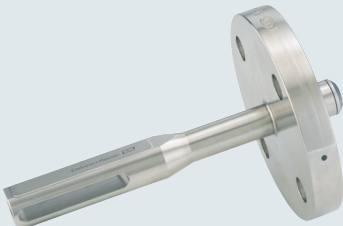
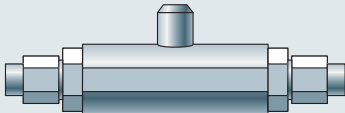
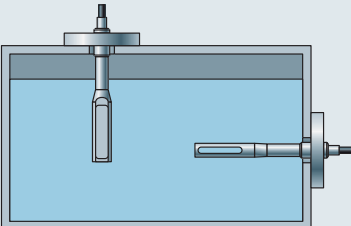
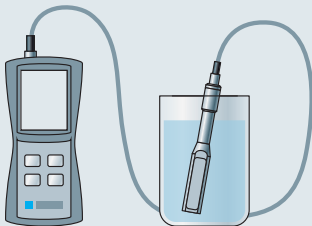
- Readout of the stored measured values on the internal memory in the transmitter with touch screen or LED status indication
- Visualization of the measured values from the memory
- Measured value recording: Documentation of all measured variables
- Export function as a CSV file

Visualization of concentration and temperature over time



Your custom measuring system

Sensors

Teqwave F	Teqwave I	Teqwave T
Inline sensor For continuous liquid monitoring directly in pipes	Insertion sensor For continuous liquid monitoring in vessels or large pipes	Mobile sensor Portable device for temporary liquid monitoring at various measuring points
		
		
Nominal diameters DN 8 ($\frac{3}{8}$ "), DN 15 ($\frac{1}{2}$ "), DN 25 (1")	Insertion length 180 mm, 500 mm	Housing material (sensor) Stainless steel V4A 1.4571
Process connection External thread, internal thread, flange	Process connection External thread, flange	Ambient temperature 0 to 50 °C (32 to 122 °F)
Housing material (sensor) Stainless steel V4A 1.4571 (316 Ti)	Housing material (sensor) Stainless steel V4A 1.4571 (316 Ti)	Housing material (sensor) Stainless steel V4A 1.4571 (316 Ti)
Process temperature 0 to 100 °C (32 to 212 °F)	Process temperature 0 to 100 °C (32 to 212 °F)	Process temperature 0 to 100 °C (32 to 212 °F)
Process pressure Max. 16 bar at 20 °C (232 psi at 68 °F)	Process pressure Max. 16 bar at 20 °C (232 psi at 68 °F)	–
Degree of protection IP68 (when cable is plugged in) IP66 (without cable connector)	Degree of protection IP68 (when cable is plugged in) IP66 (without cable connector)	Degree of protection IP68 (when cable is plugged in) IP66 (without cable connector)
Maximum measured error - Concentration: down to $\pm 0.01\%$ - Speed of sound: ± 2 m/s (± 6.6 ft/s) - Temperature: ± 0.5 °K	Maximum measured error - Concentration: down to $\pm 0.01\%$ - Speed of sound: ± 2 m/s (± 6.6 ft/s) - Temperature: ± 0.5 °K	Maximum measured error - Concentration: down to $\pm 0.01\%$ - Temperature: ± 0.5 °K
Transmitter - With touch screen - With LED status indication		Transmitter Portable transmitter

Transmitters

With touch screen



- With clear graphic-capable display (3.5" TFT)
- Touch control operation
- Interfaces: Current output 4 to 20 mA, voltage output (0 to 10 V), Ethernet (Modbus TCP)
- Switch output: Relay contact (max. AC/DC 50 V, 1 A)
- Memory: 2 GB (internal)
- Degree of protection: IP50
- Ambient temperature: 0 to 50 °C (32 to 122 °F)
- Energy supply: DC 24 V (18 to 36 V)
- Connecting cable length: 1 meter, 2 meters, 5 meters and 10 meters

With LED status indication



- Featuring LED status displays (supply, errors, sensor function)
- Interfaces: Current output 4 to 20 mA, voltage output (0 to 10 V), Ethernet (Modbus protocol)
- Switch output: Relay contact (max. AC/DC 50 V, 1 A)
- Memory: 2 GB (internal)
- Degree of protection: IP50
- Ambient temperature: 0 to 50 °C (32 to 122 °F)
- Energy supply: DC 24 V (18 to 36 V)
- Connecting cable length: 1 meter, 2 meters, 5 meters and 10 meters

Portable transmitter



- With clear graphic-capable display
- 4 operating buttons: Select measuring point, Start measurement, Save measurement, Back button
- Memory: max. 3000 measured values per measuring point (for max. 5 measuring points)
- Interfaces: USB B-connection, 8 poles (for connection to a laptop or PC)
- Degree of protection: IP65
- Ambient temperature: 0 to 40 °C (32 to 104 °F)
- Energy supply: Lithium ion battery (capacitance: 2300 mAh), chargeable using USB interface in accordance with the standard BCv1.2 (5 V, 1 A)
- Connecting cable length (to the sensor): 1.5 meters

Subject to modification

The Teqwave measuring system fulfills the EMC requirements according to IEC/EN 61326. It also conforms to the requirements of the EU directives and thus carries the **CE** mark. In addition, the sensor is designed and manufactured in accordance with Directive 2014/68/EU (PED) in line with current good engineering practice.

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