



Level



Pressure



Flow



Temperature



Liquid  
Analysis



Registration



Systems  
Components



Services

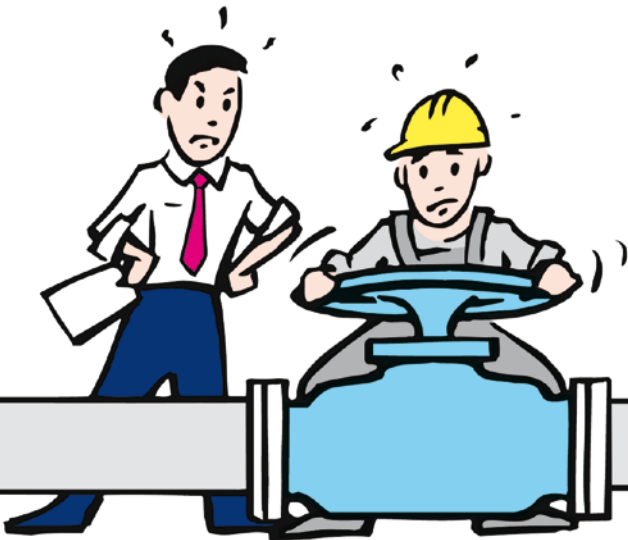


Solutions

## Ultrasonic clamp-on technology Flow measurement from outside the pipe

Cost-effective – flexible – robust

## Benefits of ultrasonic clamp-on



### No process shutdown

- Install quickly – whenever and wherever flow measurement is needed
- Completely safe non-invasive, non-contact technology
- No production losses during meter installation

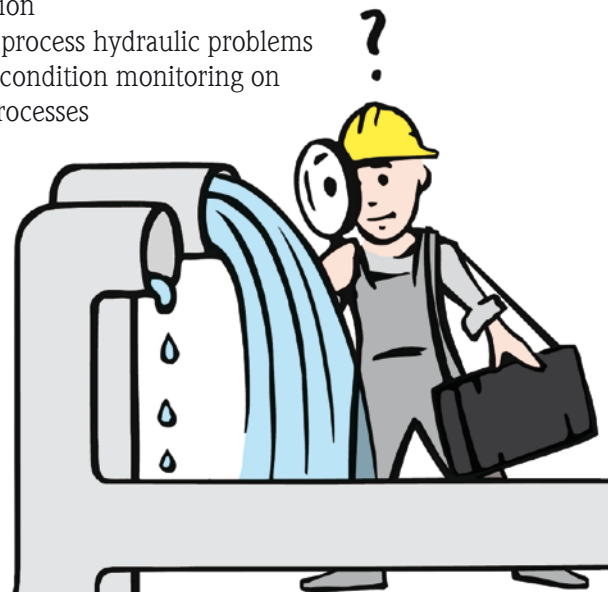
### Verification onsite

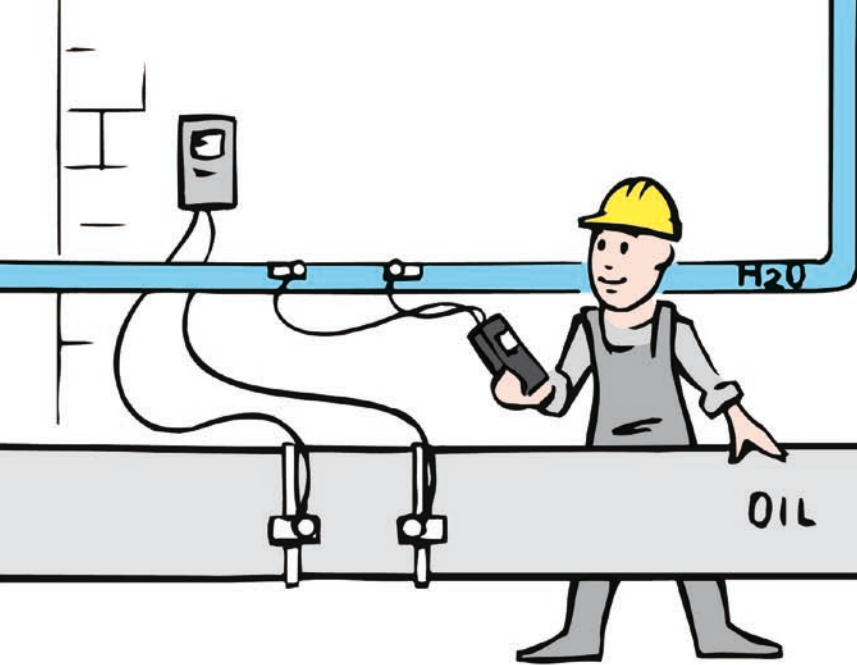
- Verify performance of installed meters
- Check pump efficiency and performance
- Temporary replacement for inline meters removed for service or recalibration
- Powerful tool for flow surveys and network balancing



### Process optimization

- Quickly retro-fit flow measurement at any point in the process
- Troubleshoot processes without interruption
- Pinpoint process hydraulic problems
- Retro-fit condition monitoring on critical processes





## Versatile

- Measure flow in pipes DN 15 to DN 4000
- Suitable for a wide range of pipe materials including metals and plastics and lined pipes
- Temporary or permanent measurement
- Wide range of fluids including water, wastewater, hydrocarbons, oils, solvents, chemicals, etc.
- Highly repeatable flow measurement

## Cost effective

- Minimal project management and work permits involved
- Lowest installation costs – no cutting, welding, inspection or pipe fitting required
- Low capital cost investment – cost effectiveness increases with pipe diameter
- No routine maintenance required



## Increased safety

- Measure hazardous fluids with ease and security
- Process piping integrity unaffected
- Eliminate leakage and corrosion concerns
- No process purity concerns (hygienic)



# Endress+Hauser benefits

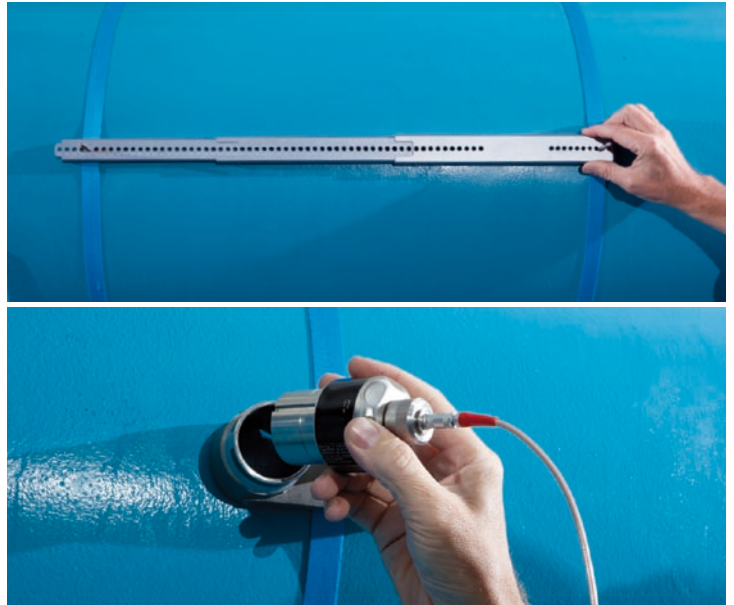


## Quick Setup

- “Quick Setup” function ensures fast and easy instrument commissioning
- Guided menu ensures all important process parameters are correctly registered
- Exact sensor locations are calculated and displayed from entered parameters

## Sensor mounting

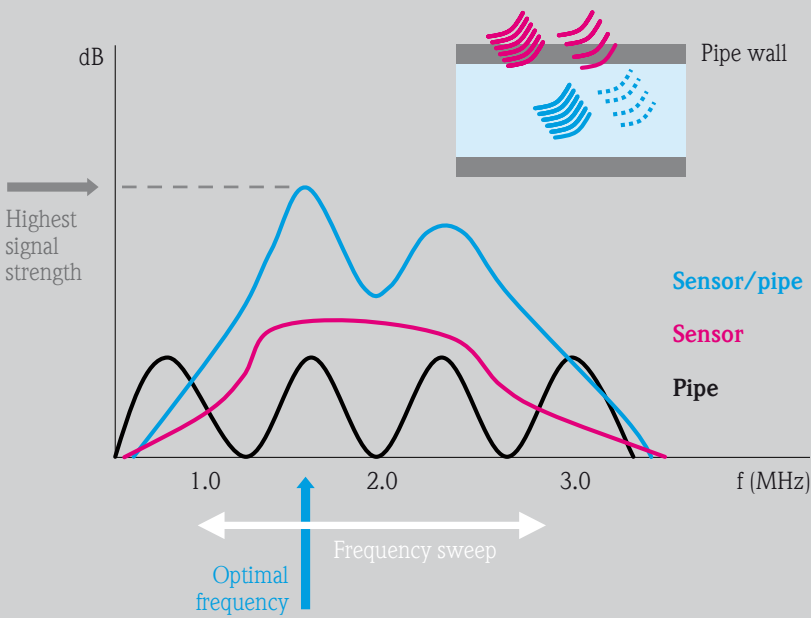
- Simple to use mechanical mounting aids ensure precise sensor holder locations
- Sensor holder design ensures long term, trouble free measurement for dedicated applications
- Spring-loaded sensors maintain optimal coupling to pipe under all process conditions



## Fast installation

- Accurate flow measurement made in minutes
- Industrial design precludes installation by specialist
- Guided installation ensures set up is fast and easy



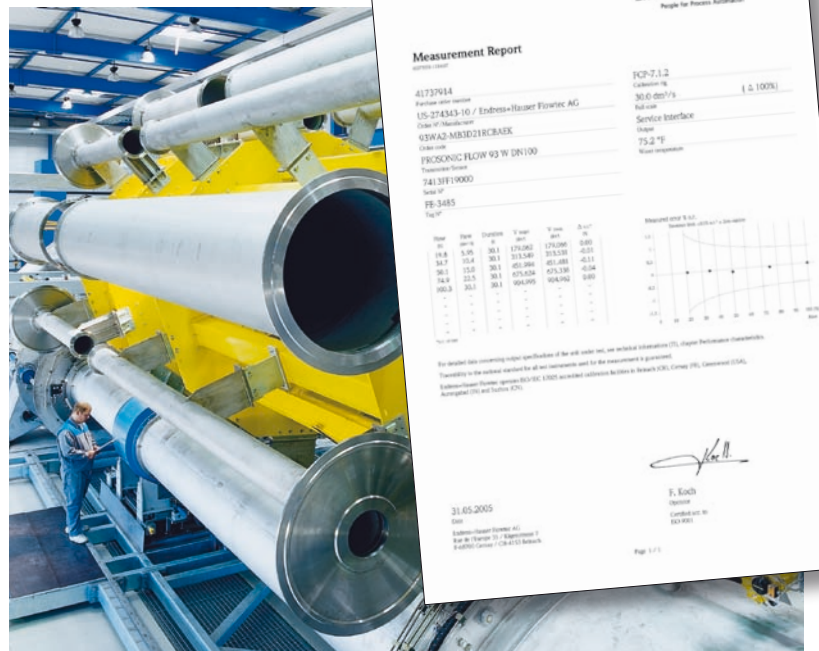


## Frequency sweep

- Frequency sweep function automatically optimizes the instrument operating frequency for highest possible signal strength
- Improved performance and reliability over fixed frequency devices
- Maximizes measurement stability

## Performance ensured

- Measurement confidence through simple to use on board instrument diagnostics
- Factory measurement reports available for all instruments
- Meters verified on internationally accredited and traceable facilities according to ISO/IEC 17025



## Proline device concept

- All ultrasonic instruments are part of the Endress+Hauser Proline family
- Proline concept provides a common HMI “look and feel” across all flow measurement technologies
- Seamless integration into any process control environment – including numerous digital protocols (HART, PROFIBUS, FOUNDATION Fieldbus)
- Easy selection, sizing and maintenance via Applicator, FieldCare and Fieldcheck
- Unified device and spare parts concept

# Product overview (clamp-on flowmeters)

We offer a wide range of high quality ultra-sonic flowmeters that are proven in use. They form part – as do all Proline meters from Endress+Hauser – of a standardized electronics, operating and equipment concept:

- Clear local display
- Flexible options of inputs/outputs

- Self-diagnostics
- Time saving quick setups for commissioning
- All device data securely stored on memory modules (DAT)
- Internationally recognized Ex approvals
- Digital communication
- World-wide service

## Typical clamp-on performance

Accuracy: ±2% of reading  
 Repeatability: ±0.3% of reading

## PROCESS

- Chemical
- Petrochemical
- Pharmaceutical
- Oil and gas
- Power



### Prosonic Flow 93

- Advanced functionality
- Hazardous area approvals
- Multi-path/multi-channel
- Touch control
- 4-line display
- Flexible I/O
- Digital protocols



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### Prosonic Flow 93T Portable



- Temporary measurement
- Integrated data logger
- Simple operation



### Prosonic Flow 91

- Basic applications
- Push button operation
- 4–20 mA (HART), pulse
- Non-hazardous areas



- DN 15 to 4000 (½" to 156")
- -20 to +170 °C
- IP 67/68



### Prosonic Flow P

- Ex approvals
- DN 15 to 65 (½" to 2½"): -40 to +150 °C
- DN 50 to 4000 (2" to 156"): -40 to +170 °C
- IP 67/68



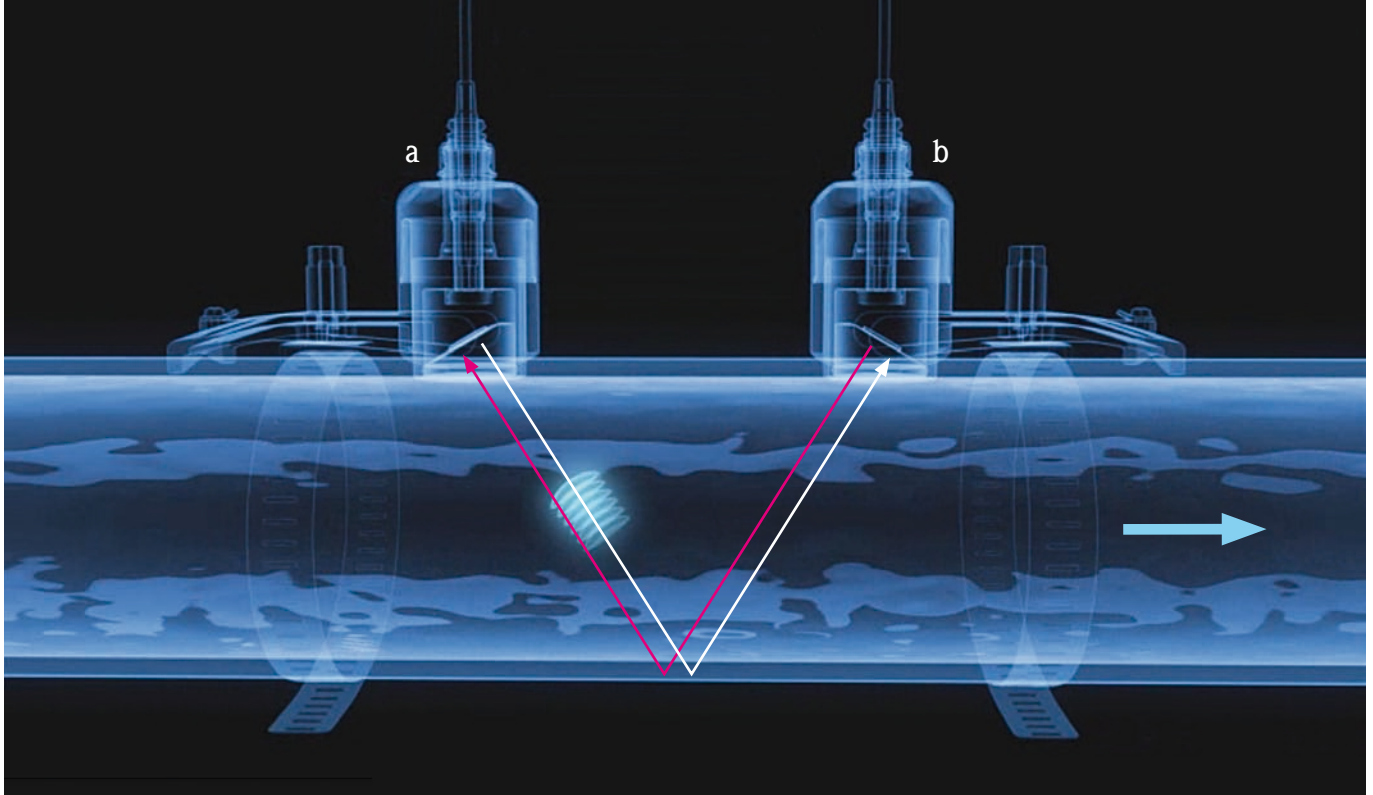
### Prosonic Flow W

- DN 50 to 4000 (2" to 156")
- -20 to +130 °C
- IP 67/68

## WATER

- Water supply
- Wastewater
- Utilities
- Hot and cold water





## The measuring principle

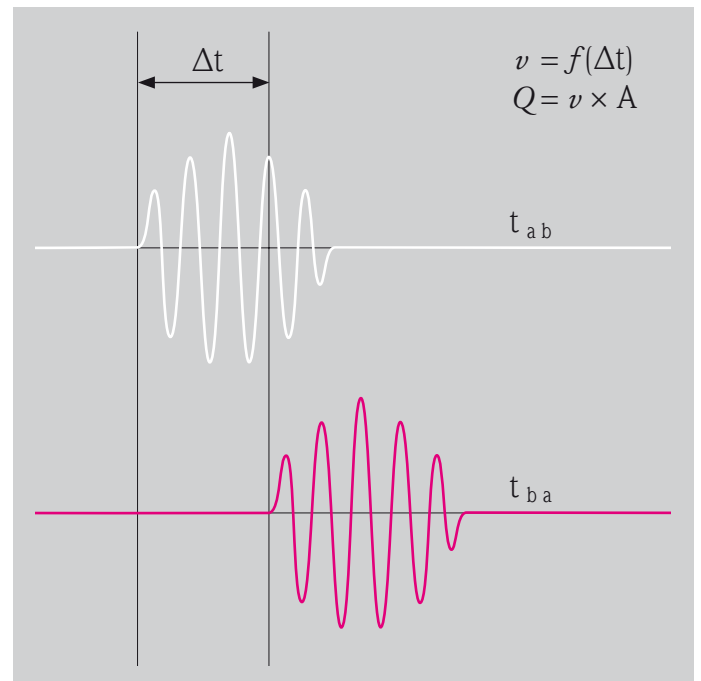
“Swimming” against the flow requires more power and more time than swimming with the flow. Ultrasonic transit-time flow measurement is based on this simple physical fact:

The sensors clamped onto the pipe can transmit and receive ultrasound signals alternately. Simultaneously, the transit times of these signals are measured.

During no flow condition, the signal transit times are the same – upstream and downstream. Once the fluid starts to flow in the measuring tube, the ultrasonic signals are accelerated in the direction of flow and decelerated against the flow. As a result, the ultrasonic signals now have different transit times – less time in the direction of flow and more time against the flow. Therefore, the differential transit time measured by the sensors is directly proportional to the flow velocity in the pipe and thus to the flow volume.

Flow measurement using ultrasound is independent of:

- Pressure
- Temperature
- Electrical conductivity



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