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

**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

**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
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
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 ultrasonic 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

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

Prosonic Flow W
- DN 50 to 4000 (2" to 156")
- –20 to +130 °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 91
- Basic applications
- Push button operation
- 4–20 mA (HART), pulse
- Non-hazardous areas

Prosonic Flow 93
- Advanced functionality
- Multi-path/multi-channel
- Touch control
- 4-line display
- Flexible I/O
- Digital protocols

Prosonic Flow 93T
- Portable
- Temporary measurement
- Integrated data logger
- Simple operation

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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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