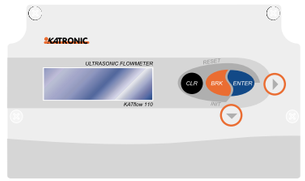
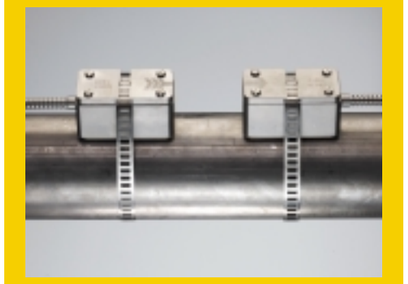
KATRONIC

Ultrasonic Flow Measurement

External Measurement of Internal Flow

measuring





The company

Katronic Technologies Ltd. is a company dedicated to the supply of highly advanced ultrasonic flowmeters and flow measurement systems. The company has based its success on focussing on the development of its KATflow range of clamp-on flowmeters, building confidence in the ultrasonic flow technologies and offering unprecedented customer service.

The KATflow-series clamp-on ultrasonic flowmeters are produced under ISO 9001 quality control using the latest developments in digital sensor technology. They are one of the most robust, reliable and technically advanced meters of their type available today. Whilst our flowmeters feature high performance characteristics, yet the instruments are very easy to operate. Ultrasonic sensors are mounted on to the external surface of the pipe meaning there is no need to break into the pipework or interrupt the process. Considerable cost savings can be achieved through a minimum of installation effort. Our flowmeters can be applied to any type of standard pipe carrying clean or dirty liquids.

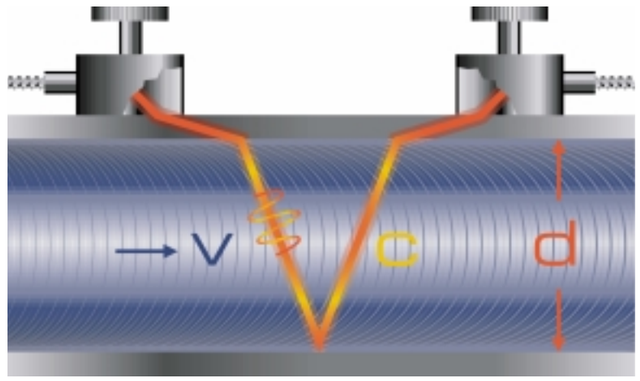
The KATflow series comprises both portable and fixed flowmeters including ATEX certified meters for the use in hazardous areas Zone 1 and 2.

Measuring principle

Flow measurements are made by penetrating the pipeline with ultrasonic waves. The flowing liquid causes time differences, frequency variations and phase shifts in the ultrasonic signals, which are subsequently digitally evaluated by the flowmeter electronics.

The principle behind the measurement is that sound waves travelling with the flow of liquid will travel faster than those travelling against it. The difference in the transit time of the signals is an indication for the flow rate of the fluid.

The fast digital signal processors and sophisticated signal analysis used in the KATflow flowmeters guarantee reliable results, even for applications where in the past the use of a clamp-on flowmeter would not have been possible.



Advantages of clamp-on ultrasonic flowmeters

- Minimal installation effort and costs
- No process interruption, no plant shutdown required
- Measurement is independent of fluid conductivity, temperature and pressure
- Retrospective installation on existing pipelines possible
- Hygienic measurements, no risk of contamination
- No contact with medium required, no corrosion when used with aggressive media
- Cost benefits when used with large diameter pipes, high pressure systems, etc.
- Excellent signal response characteristics, monitoring of dynamic flow events

Applications and references

...in use worldwide

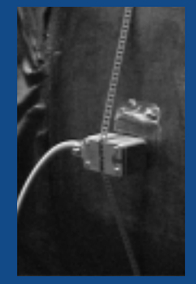
Our instruments can be found in all the process industries – in British chemical plants, semiconductor manufacturers in Asia or water companies in the Middle East. Our technology is being used anywhere, where velocity, flow or thermal energy measurements of liquid media are required.

Chemical industry
Non-invasive measurement of aggressive/toxic media, operational measurements of non-conductive media, mobile flow checks during plant start-up and inspection
Reference: Akzo Nobel
Meter type: Dual-channel fixed unit
Application: Measurement of polymer production system, hazardous area sensors, high solid content application, varying density and viscosity

Petro-chemical industry
Monitoring of leakages on pipelines with medium interface detection
Reference: Shell UK
Meter type: Single-channel fixed unit
Application: Diesel flow transfer measurements, hazardous area sensors

Power stations
Measurements of cooling water, boiler feed water, condensate and thermal energy
Reference: Powergen
Meter type: Portable flowmeter
Application: Temporary cooling water flow measurements, fault-finding

Manufacturing and process industries
Measurement of process flows, detection of leakages on hydraulic plants, machine cooling and lubrication systems, monitoring of cooling and heating circuits and of pumps
Reference: BMW/Mini
Meter type: Portable flowmeter
Application: Spray-booth paint flow measurements, maintenance and fault finding



Oil exploration
Measurements on high-pressure systems, crude oil flow measurements on oilrigs
Reference: BP
Meter type: Four-channel fixed unit
Application: Continuous monitoring of produced water flows, large diameter pipes > 500 mm, demanding offshore environment, hazardous area sensors, substitution of originally installed electro-magnetic flowmeter

Pharmaceutical industry
Non-contact measurements on clear sterile liquids
Reference: Unilever
Meter type: Portable flowmeter
Application: System design & verification for pilot plants, very small pipe diameters

Food and drink industry
Hygienic measurements during CIP and sterilisation
Reference: Coors
Meter type: Portable flowmeter
Application: Mobile multi-point measurements, verification of production systems, CIP flow checks

Building services
Water consumption measurements, back-up measurements of in-line heat meters, optimisation and balancing of heating systems, thermal energy measurements, chiller performance tests
Reference: Building Services Research Association
Meter type: Portable flowmeter
Application: Various temporary flow measurements

Water supply - Wastewater services
Measurements on large diameter pipes, consumption and distribution measurements, leakage control, inspection of water meters
Reference: Thames Water
Meter type: Multi-channel fixed unit
Application: Activated sewage flow measurements, large pipe diameters (> 1 m)

Aerospace
Test measurements with high sampling rate
Reference: Airbus
Meter type: Fixed 19"-rack mounted flowmeter
Application: Dynamic event capturing for hydraulic flow test rig, substitution of turbine flowmeters

Shipbuilding
Monitoring of coolant and lubricant circuits, measurement of fuel consumption
Reference: Rolls Royce
Meter type: Fixed single-channel flowmeter
Application: Ship diesel flow measurements

Power generation
Cooling flow measurement for nuclear reactors
Reference: British Energy
Meter type: Single-channel fixed flowmeter
Application: Cooling circuit discharge flow measurements

Semiconductor industry
Non-invasive measurement on ultra-pure process liquids
Reference: Seagate
Meter type: Portable flowmeter
Application: System verification and flow surveys

applications

Portable flowmeter

A battery operated portable flowmeter is the ideal tool for the measurement at several locations on the same site. The model KATflow 220 has an in-build datalogger for capturing process data and is supplied with a PC software for the transfer and analysis of the measured data.

The flowmeter has as standard two measurement channels which allows to measure flows in two pipelines at the same time. Furthermore, the meter is equipped with two "virtual" calculation channels that simultaneously measure and log total, differential or average flows across the two measurement points.

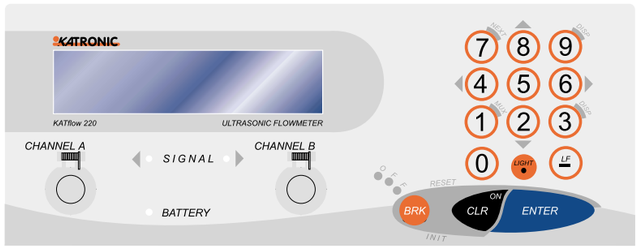
The unit features a backlit digital display for clear definition in low visibility areas and has a time-programmable totaliser included with each of the measurement channels.

The KATflow 220 can be fitted with a variety of options to meet the demands of a multitude of different applications. It can be supplied with an integrated wall thickness gauge for flow surveys on pipelines with unknown wall thickness. The meter can be equipped with up to four temperature inputs for the measurement of energy flows and the automatic calculation of total heat quantity consumption. Additionally, there are a variety of process outputs available to allow communication with a control system should the meter be used as a temporary replacement for a fixed installation flowmeter.

The flowmeter can be supplied with sensors to cover pipe ranges with outside diameters from 6 mm to 6.5 m. Process liquids ranging from ultraclean water and hydraulic oils through to paints and sludge can be measured.

Applications

- Flow surveys of large facilities
- Verification of existing flowmeters and pumps
- CIP measurements
- Energy flow measurement for climate change levy surveys
- Raw water/sewage flow measurement
- Monitoring radioactive flows in power stations
- Measurement of hydraulic oil flows in small bore pipes
- Caustic and chemical flow checks in un-metered pipelines
- Chiller performance testing on HVAC systems
- Production and effluent verification in dairies and creameries



portable

Ultrasonic flowmeters for permanent installation

The KATflow family of fixed installation ultrasonic flowmeters provide solutions to a huge scope of measurement requirements, capabilities and budgets.

The flowmeters can be either wall or pipe mounted within the plant or can be installed in a panel or enclosure in the control room. Furthermore, the meters can be operated using a variety of power supplies in the AC and DC range ensuring easy compatibility.

In order to provide the most cost effective solution, the flowmeters can be supplied with in-build multiplexers and the capability to measure more than one pipeline simultaneously or for multi-path metering. By integrating up to 4 measurement points in one transmitter it is possible to minimise the equipment cost, maximise efficiency and reduce installation time.

The meters can be supplied with several process outputs including 0/4 ... 20 mA (active or passive), voltage, frequency, digital (relay or Open-Collector) and multi-drop communication capable RS 485 interface.

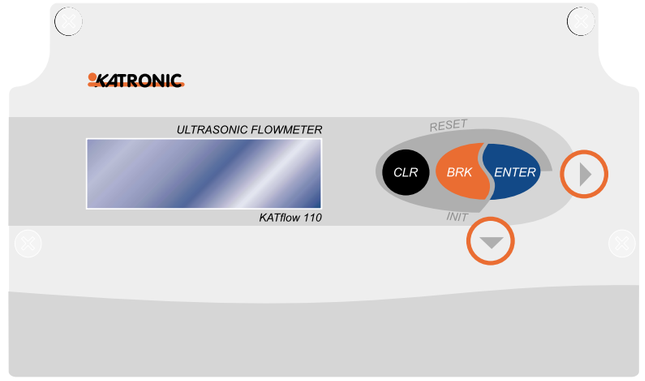
The flowmeters are quick and easy to install and as the sensors are mounted on the external surface of the pipe there is no pressure drop, loss of production or risk of contamination. Due to the fact that the sensors are not in contact with the flowing medium there is no wear or clogging that would be associated with a standard in-line meter. This ensures that the flowmeters do not require servicing thereby removing the issue of down-time and labour costs making the long term cost of ownership effectively zero.

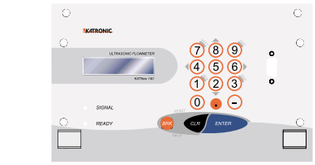
All the field-mounted flowmeters are supplied in rugged watertight and dustproof enclosures with special solutions available on request. The sensors are constructed of robust stainless steel in order to ensure that the complete system is protected from even the most harsh environmental and process conditions.

Applications

- Water consumption measurement
- Process effluent discharge monitoring
- Raw water/sewage measurement
- Activated sludge monitoring
- Low flow pump protection
- Measurement of highly reactive acids and bases
- Beer and spirit measurements in breweries and distilleries
- Cooling tower feed water in large bore pipes
- Sterile water measurement in pharmaceutical and semiconductor plants
- Circulation water measurement in paper mills
- CIP monitoring
- Cooling water system monitoring in power stations

permanent





hazardous

Ultrasonic flowmeter suitable for hazardous areas

The KATflow 160 is designed for use in Zone 1 hazardous areas and is fully certified to the requirements of the new ATEX directive.

The flowmeter can be supplied as either a single or dual channel device to be able to offer maximum cost effectiveness. As with the other flowmeters in the KATflow-series, the unit can be programmed with "virtual" calculation channels for total, differential and average flow readings.

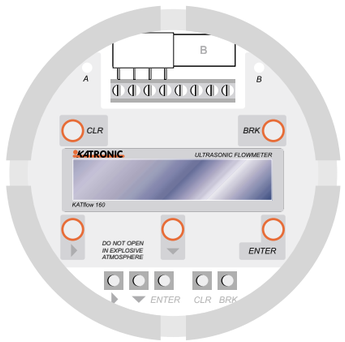
The unit is ideally suited to the chemical, petro-chemical and oil exploration industries as it can be retro-fitted to virtually any flow system. All flow measurements are independent of the pressure level in the pipeline. Furthermore, tests have shown that the meter can perform well on a variety of pipe materials, even the thick-walled high pressure piping used in many offshore applications.

The flowmeter is available as either an AC or a DC powered unit and can be tailored to meet special requirements such as for inclusion on remote platforms where energy consumption is critical.

The KATflow 160 can also be integrated into more complicated systems such as product recognition packages for measurement on multi-liquid pipelines and can be easily combined with pressure and temperature transmitters for a full measurement solution.

Applications

- Crude oil flow measurement
- Chemical measurement in polymer production systems
- Measurement of chemical waste products
- Produced water measurement on offshore platforms
- Methanol measurement in high pressure systems
- Multi-product flow measurement in transfer pipelines or on remote platforms
- Monitoring diesel fuel supplies on ships
- Discharge measurements from gas separator units
- Refinery water supply flows in very large diameter pipes
- Flow measurements on coiled tubing systems



Services and system solutions

Whilst striving to offer the best quality ultrasonic flowmeters possible, the company has expanded in order to offer an integrated approach to customer satisfaction. We are committed to providing complete system solutions for our customers ranging from simple single meter installations to complete metering systems.

Hire

For customers who only have a temporary requirement for the use of a flowmeter or who do not have the budget for the purchase of a meter it is possible to hire either a portable or fixed meter directly from Katronic. The hire period is based on a weekly rate and the meters are supplied with all the components required for successful flow measurement including professional customer support.

Training

For those customers who have portable and fixed equipment that is to be used by a large number of staff, we offer full training in the use of the meters either on site or at our offices.

System integration

To meet customer specifications on a broader level, we can offer full engineering solutions to measurement problems. This can include the integration of other measurement systems such as temperature and pressure transmitters that could be used for petrochemical product differentiation systems. Alternatively, our engineering team can integrate all elements of a system to provide full turnkey projects including master metering stations and remote communication systems.

Special measurement solutions

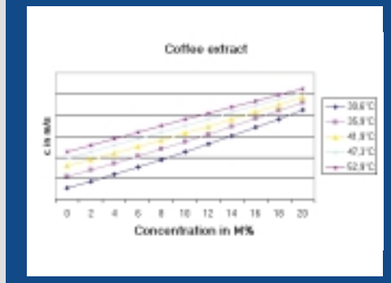
For applications with non-standard requirements, we can provide the resources to engineer a tailor-made solution, in particular

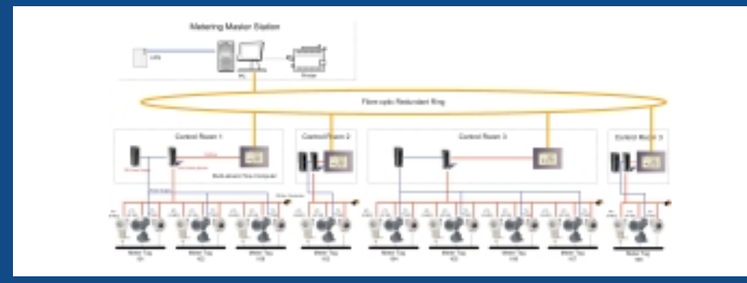
- Multi-drop Fieldbus instrument communication
- Leak detection systems
- Solar powered measuring stations
- Remote telemetry systems
- System integration with third party equipment
- Special engineering software development
- Data logging and management information systems
- Adaptation of standard measuring instruments for specific tasks (interface detection, concentration/density measurement, flow velocity measurement in open water, rivers, streams and open channels)
- Process control and supervisory systems

Service and Commissioning

We have a team of engineers available to assist with all elements of the commissioning and servicing process. Furthermore, as our company specialises in non-invasive measuring techniques, there is always a knowledgeable member of staff available to offer technical assistance.

systems





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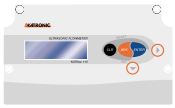
Specification

Model	KF 220	KF 110	KF 140	KF 160
				
Housing	Portable	Wall mounted	Wall, 19" rack or panel mounted	EEx de field transmitter
Pipe diameter range	6 ... 6,500 mm	10 ... 2,500 mm	6 ... 6,500 mm	10 ... 3,000 mm
Process temperature	-30 ... 200 (300) °C	-30 ... 80 ...130 °C	-30 ... 200 (280) °C	-30 ... 120 °C
Media	All sonically conductive liquids			
Pipe materials	All commonly used pipe materials			
Flow channels	2	1	1 ... 4	1 ... 2
Flow velocity range	0.01 ... 25 m/s			
Repeatability	0.15 % of measured value ± 0.01 m/s			
Accuracy	± 1 ... 3 % of measured value depending on application, ± 0.5 % of measured value with process calibration			
Turndown	1 : 100			
Power supply	Battery or 9 ... 15 V DC	100 ... 240 V AC or 18 ... 36 V DC		
Process inputs	PT100 temperature, current or voltage	None	PT100 temperature, current or voltage	None
Process outputs	Current (0/4 ... 20 mA), voltage, frequency, digital	1 x current 0/4 ... 20 mA, 2 x digital	Current (0/4 ... 20 mA), voltage, frequency, pulse, relay	Current (0/4 ... 20 mA), digital
Communication	RS 232	RS 485	RS 232/485	RS 485
Internal data logger	Yes	No	Yes	Yes
Heat quantity measurement	Yes	No	Yes	No
Wall thickness measurement	Yes	-	-	-
Sound velocity measurement	Yes	Yes	Yes	Yes
Concentration measurement	Yes	No	Yes	No
Hazardous area sensors	Yes	No	Yes	Yes

Specification subject to change without notice

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