KATRONIC

KATflow 230

Portable Clamp-On Ultrasonic Flowmeter

- **Portable flowmeter with two measurement channels, optional process outputs and Heat Quantity Measurement capability**
- **For commonly used pipe materials and diameters from 10 mm to over 3.0 m**
- **Intuitive menu, Setup Wizard and *Audible Sensor Positioning Assistant* ™ for easy and quick setup and installation**
- **Transit-time correlation measurement using dual DSP-technology for better measurement accuracy**
- **Internal datalogger for up to 100,000 data items and download software**
- **Optional wall thickness gauge**

Features

- Optional Heat Quantity Measurement function turning flow meter into portable heat meter
- Powered by 8 x AA rechargeable internal batteries for up to 24 hours
- Auto-detected ultrasonic clamp-on sensors and optional intergrated wall thickness gauge
- Graphic LCD display, diagnostic and maths functions for dual-channel measurements
- Available with crush-proof IP 67 case or lightweight soft case holding all necessary accessories including clamp-on chains, clips and accoustic coupling paste
- KATdata+ software for offline/online data transfer to PC via RS 232 or USB cable
- Mains and internal battery power supply, optional external battery pack available for long-term measurements (up to 21 days)
- Bi-directional measurement with totalizer function

Description

The KATflow clamp-on ultrasonic flow meters work on the transit-time method. This is based on the principle that sound waves travelling with the flow will move faster than those travelling against it. The resulting difference in transit-time is directly proportional to the flow velocity of the liquid and consequently to the volumetric flow rate.

The ultrasonic transducers (sensors) of the flow meter are mounted on the external surface of the pipe and are used to generate and receive pulses. The flowing liquid within causes time differences in the ultrasonic signals, which are evaluated by the flow meter to produce an accurate flow measurement. The advanced electronics of the flow meter compensate for and adapt to changes in the flow profile and medium temperature to deliver reliable measurements.

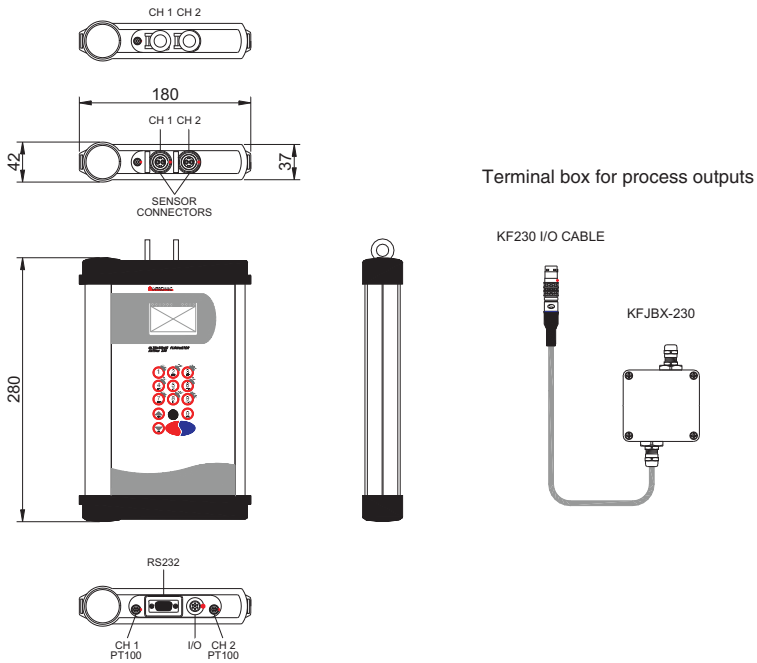
The KATflow 230 is a portable dual-channel ultrasonic flow meter for non-invasive and non-intrusive flow measurement of liquids and liquefied gases in fully filled pipes. It is supplied with an internal datalogger and software for the recording and download of measured values. Additionally, it can be equipped with an integrated wall thickness gauge. Thanks to its intuitive instrument menu, Setup Wizard and *Audible Sensor Positioning Assistant* ™, the flow meter can be set up and its sensors correctly installed in a matter of minutes. Its two flow channels enable the KATflow 230 to monitor the flow on two pipes simultaneously or alternatively on one single pipe in a multi-path sensor mounting configuration. Equipped with the optional Heat Quantity Measurement function and PT100 sensors, the instrument can further be employed as a portable heat meter. Measured values can also be transferred by optional process outputs.

Specification: Transmitter

Performance	Measurement principle	:	Ultrasonic transit-time difference correlation
	Flow velocity range	:	0.01 ... 25 m/s
	Resolution	:	0.25 mm/s
	Repeatability	:	0.15 % of measured value, ±0.015 m/s
	Accuracy	:	*Volume flow* ±1 ... 3 % of measured value depending on application ±0.5 % of measured value with process calibration *Flow velocity (mean)* ±0.5 % of measured value
	Turn down ratio	:	1/100
	Measurement rate:	:	10 ... 1000 s^{-1}
	Response time	:	1 s
	Damping of displayed value	:	0 ... 99 s
	Gaseous and solid content of liquid media	:	< 10 % of volume

General	Enclosure type	:	Portable
	Degree of protection	:	IP 65 according to EN 60529
	Operating temperature	:	-10 ... 60 °C (14 ... 140 °F)
	Housing material	:	Extruded aluminium, Al MG Si 0.5, lids die-cast zinc alloy GD-Zn AL 4 CU 1
	Measurement channels	:	2
	Calculation functions	:	Average, difference, sum, highest (dual-channel use only)
	Power supply	:	Internal rechargeable batteries, 8 x NiMH AA 2850 mAh External power supply, 9 V DC External battery pack, 12 V 105 Ah (optional)
	Operating time	:	Up to 24 h with fully charged internal batteries
	Display	:	LCD graphic display, 128 x 64 dots, backlit
	Dimensions	:	290 (h) x 180 (w) x 37 (d) mm
	Weight	:	Approx. 2.0 kg
	Power consumption	:	< 5 W
	Operating languages	:	English, German, French, Spanish, Russian

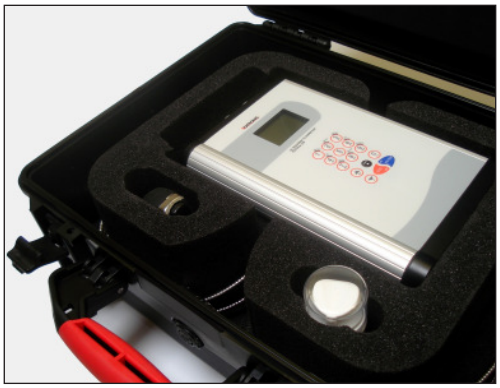
Drawings



Dimensions in mm

Specification: Transmitter (continued)

Images



KATflow 230 in crush-proof transport case

KATflow 230 in operation

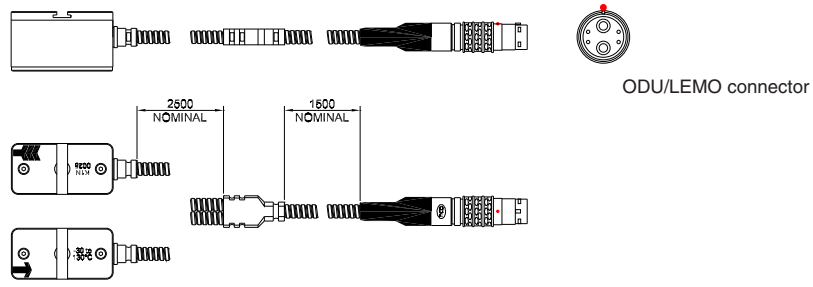
Communication	Type	:	RS 232, USB converter cable (optional)
	Transmitted data	:	Measured and totalized value, parameter set and configuration, logged data
Internal data logger	Storage capacity	:	Approx. 30,000 data items (128 kByte) Approx. 100,000 data items (512 kByte)
	Logged data	:	All measured and totalized values, parameter sets
KATdata+ software	Functionality	:	Download of measured values/parameter sets, graphical presentation, list format, export to third party software, online transfer of measured data
	Operating systems	:	Windows 7, Vista, XP, NT, 2000 Linux Mac (optional)
Quantity & units of measurement	Volumetric flow rate	:	m^3/h, m^3/min, m^3/s, l/h, l/min, l/s, USgal/h (US gallons per hour), USgal/min, USgal/s, bbl/d (barrels per day), bbl/h, bbl/min
	Flow velocity	:	m/s, ft/s, inch/s
	Mass flow rate	:	g/s, t/h, kg/h, kg/min
	Volume	:	m^3, l, gal (US gallons), bbl
	Mass	:	g, kg, t
	Heat flow	:	W, kW, MW (only with Heat Quantity Measurement option)
	Heat quantity	:	J, kJ, MJ (only with Heat Quantity Measurement option)
	Temperature	:	°C (only with Heat Quantity Measurement option)
Process inputs	Temperature	:	PT100 (clamp-on sensors), four-wire circuit, measurement range -50 ... 400 °C (-58 ... 752 °F), resolution 0.1 K, accuracy ±0.2 K
	Note	:	All process inputs galvanically isolated from main electronics and from other inputs and outputs.
Process outputs	Current	:	0/4 ... 20 mA active (R_{Load} < 500 Ω), 16 bit resolution, U = 30 V, accuracy = 0.1 %
	Digital Open-Collector	:	Totaliser, value 0.01 ... 1000/unit, width 30 ... 999 ms, U = 24 V, I_{max} = 4 mA
	Digital relay	:	Alarm, fault (programmable), Form C (SPDT-CO) contacts, U = 48 V, I_{max} = 250 mA
	Note	:	All process outputs galvanically isolated from main electronics and from other inputs and outputs. Access to outputs via terminal box.

Specification: Transducers

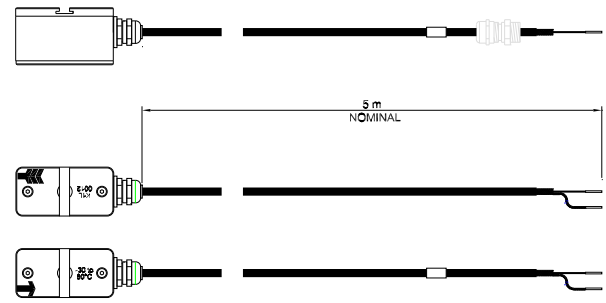
K1L, K1N, K1E

Pipe diameter range	:	50 ... 3000 mm for type K1N/E 50 ... 6500 mm for type K1L
Dimensions of sensor heads	:	60 (h) x 30 (w) x 34 (d) mm
Material of sensor heads	:	Stainless steel
Material of cable conduits	:	*Type K1L:* PVC *Type K1N/E:* Stainless steel
Temperature range	:	*Type K1L:* -30 ... 80 °C (-22 ... 176 °F) *Type K1N:* -30 ... 130 °C (-22 ... 266 °F) *Type K1E:* -30 ... 200 °C (-22 ... 392 °F) for short periods up to 300 °C (572 °F)
Degree of protection	:	IP 66 acc. EN 60529, (IP 67 and IP 68 upon request)
Standard cable lengths	:	*Type K1L:* 5.0 m *Type K1N/E:* 4.0 m

Drawings and images



K1N/E transducers



K1L transducers

K1N/E transducers

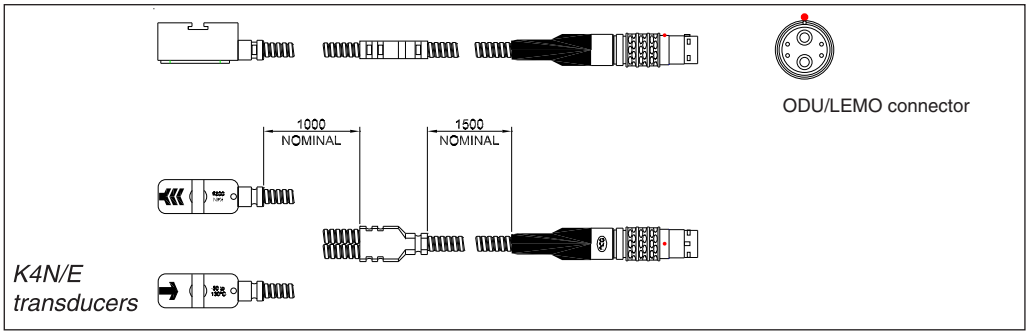
K1L transducers

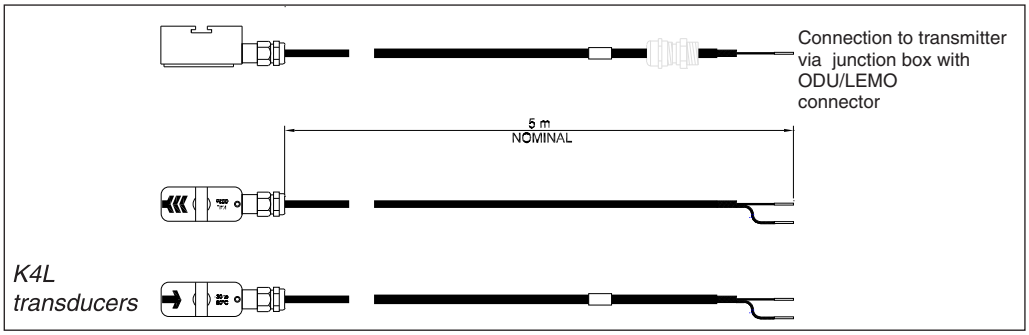
Specification: Transducers (continued)

K4L, K4N, K4E

Pipe diameter range	:	10 ... 250 mm for type K4N/E 10 ... 250 mm for type K4L
Dimensions of sensor heads	:	43 (h) x 18 (w) x 22 (d) mm
Material of sensor heads	:	Stainless steel
Material of cable conduits	:	*Type K4L:* PVC *Type K4N/E:* Stainless steel
Temperature range	:	*Type K4L:* -30 ... 80 °C (-22 ... 176 °F) *Type K4N:* -30 ... 130 °C (-22 ... 266 °F) *Type K4E:* -30 ... 200 °C (-22 ... 392 °F), for short periods up to 300 °C (572 °F)
Degree of protection	:	IP 66 acc. EN 60529, (IP 67 and IP 68 upon request)
Standard cable lengths	:	*Type K4L:* 5.0 m *Type K4N/E:* 2.5 m

Drawings and images





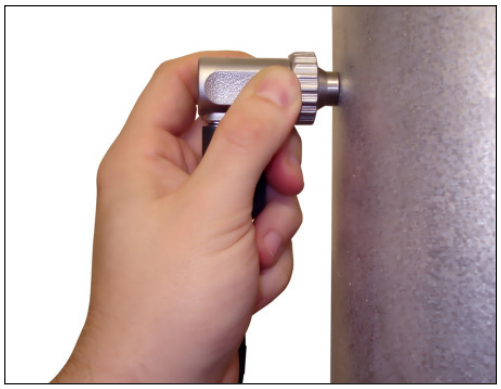
K4N/E transducers

K4L transducers

Specification: Wall thickness gauges, optional

Wall thickness gauge LT	Temperature range	:	-20 … 40 °C (-4 … 104 °F)
	Measuring range	:	1.0 … 100 mm
	Resolution	:	0.01 mm
	Linearity	:	0.2 mm
	Cable length	:	1.5 m
Wall thickness gauge NT	Temperature range	:	-20 … 60 °C (-4 … 140 °F)
	Measuring range	:	1.0 … 200 mm
	Resolution	:	0.01 mm
	Linearity	:	0.1 mm
	Cable length	:	1.5 m
Wall thickness gauge HT	Temperature range	:	0 … 500 °C (32 … 932 °F)
	Measuring range	:	1.0 … 200 mm
	Resolution	:	0.01 mm
	Linearity	:	0.1 mm
	Cable length	:	1.5 m

Images



Wall thickness gauge NT in use

Wall thickness gauge used with KATflow 230

Specification: PT100 sensors (for Heat Quantity Measurement function)

General	Type	:	PT100 (clamp-on)
	Measurement range	:	-30 ... 250 °C (-22 ... 482 °F)
	Design	:	4-wire
	Accuracy T	:	±(0.15 °C + 2 x 10-3 x T [°C]), class A
	Accuracy Δ T	:	≤ 0.1 K (3 K < Δ T < 6 K), corresponding to EN 1434-1
	Response time	:	50 s
	Dimensions of sensor head	:	20 (h) x 15 (w) x 15 (d) mm
	Material of sensor head	:	Aluminium
	Material cable jacket	:	PTFE
	Cable length	:	3 m

Images

PT100 sensor fixed to pipe

KATflow 230 used as portable heat meter

Specification: Transport accessories

Crush-proof transport case	Dimensions (external)	:	190 (h) x 480 (w) x 385 (d) mm
	Weight (empty)	:	3.71 kg
	Degree of protection	:	IP 67 acc. EN 60529
	Outside material	:	Polypropylene/resin compound
	Inside material	:	High-density polyurethane foam

Soft transport case	Dimensions (external)	:	175 (h) x 450 (w) x 320 (d) mm
	Weight (empty)	:	0.75 kg
	Degree of protection	:	No IP rating
	Outside material	:	Nylon
	Inside material	:	Nylon

Images

Crush-proof IP 67 case

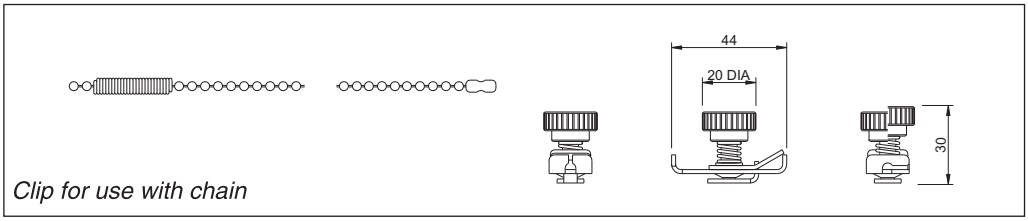
Soft case

Specification: Transducer mounting accessories

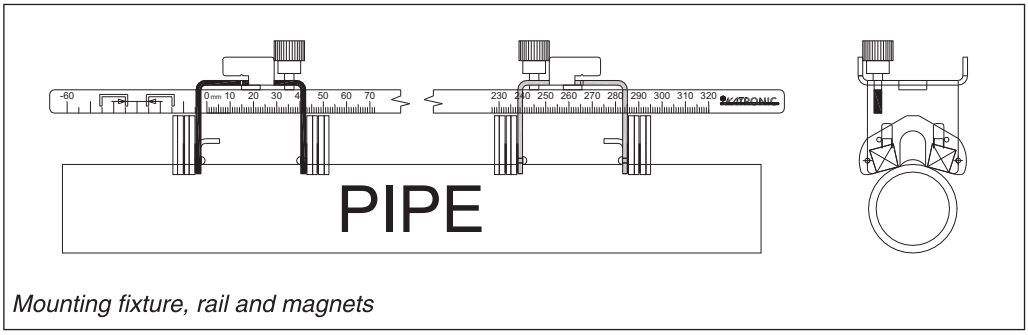
General

Diameter range and mounting types	:	*Clamping set (metal collar with screw), stainless steel* DN 10 ... DN 40 *Clips and chains, chain length 1 m, stainless steel* DN 15 ... DN 310 *Clips and chains, chain length 2 m, stainless steel* DN 25 ... DN 600 *Clips and chains, chain length 4 m, stainless steel* DN 25 ... DN 1200 *Textile tension straps, up to 15 m in length* DN 1000 ... DN 3000 (6500) *Mounting fixture, rail and magnets (for K4 type sensors)* DN 10 ... DN 250 *Mounting fixture, rail and magnets (for K1 type sensors)* DN 50 ... DN 3000
Mounting fixure for flexible hoses	:	Custom made mounting bracket, stainless steel (available upon request)

Drawings and images

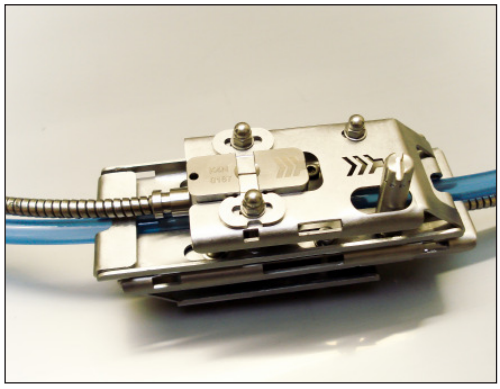


Clip for use with chain



Mounting fixture, rail and magnets

Transducers mounted using clips and chains



Mounting bracket for hoses (example)

Configuration code: Transmitter and accessories

KF230	Portable KATflow 230, two measurement channels, serial interface RS 232, operating instructions	
	Configuration	
0	Basic unit without accessories	
1	With crush-proof transport case IP 67, power adapter/battery charging unit, measuring tape	
2	With soft case, power adapter/battery charging unit, measuring tape	
Z	Special (please specify)	
	Internal code	
01	Version number (internal code)	
	Power adapter	
0	Without	
1	UK	
2	US	
3	Europe	
4	Australia	
Z	Special (please specify)	
	Degree of protection	
1	IP 65 (standard)	
2	IP 67 (transport case with external transducer connections)	
Z	Special (please specify)	
	Analogue output	
N	Without	
C1	1 x current 0/4 ... 20 mA, active	
	Digital Open-Collector output	
N	Without	
D1	1 x digital Open-Collector	
	Digital relay output	
N	Without	
R1	1 x digital relay	
	Temperature inputs [1]	
N	Without	
A2	2 x PT100 temperature inputs	
	Internal data logger	
0	Without	
1	30,000 data items, KATdata+ data download/terminal software, RS 232 cable	
2	100,000 data items, KATdata+ data download/terminal software, RS 232 cable	
Z	Special (please specify)	
	Wall thickness measurement	
0	Without	
1	Wall thickness gauge LT	
2	Wall thickness gauge NT	
3	Wall thickness gauge HT	
	Heat Quantity Measurement (HQM) [1]	
0	Without	
1	With HQM incl. 2 x PT100 clamp-on sensors	
	Sound Velocity Measurement (SVM) [2]	
0	Without	
1	With SVM	
	Optional items	
BA	Spare battery set and external battery charging unit	
BP	External battery pack for long-term power supply	
US	RS 232 to USB converter cable	
ZZ	Special (please specify)	

KF230 – 1 – 01 – 1 – 1 – C1 D1 N – A2 – 2 – 0 – 1 – 0 / (example configuration)

The configuration is customised by selecting the above-listed options and is expressed by the resulting code at the bottom of the table.

1) For contactless measurement of thermal energy consumption. Always select both options.
2) For contactless product recognition and interface detection.

Configuration code: Transducers and accessories

K1	Transducer pair, pipe diameter range 50 ... 3000 mm (K1L: 50 ... 6500 mm)							
K4	Transducer pair, pipe diameter range 10 ... 250 mm							
Z	Special (please consult factory)							
	Temperature range							
	L	Process temperature -30 ... 80 °C, including accoustic coupling paste						
	N	Process temperature -30 ... 130 °C, including accoustic coupling paste						
	E	Process temperature -30 ... 200 °C (300 °C), including accoustic coupling paste						
	Z	Special (please consult factory)						
		Internal code						
		x	Version number (internal code)					
			Degree of protection					
			1	IP 66 (standard)				
			2	IP 67 (please consult factory)				
			3	IP 68 (please consult factory)				
			Z	Special (please consult factory)				
				Transducer mounting accessories				
				00	Without			
				30	Clamping set DN 10 ... 40			
				40	Clips and chains DN 15 ... 310			
				50	Clips and chsins DN 25 ... 600			
				60	Clips and chains DN 25 ... 1200			
				70	Textile tension straps DN 1000 ... 6500			
				80	Mounting fixture, rail and magnets DN 10 ... 250 (for K4-type transducer)			
				90	Mounting fixture, rail and magnets DN 50 ... 3000 (for K1-type transducer)			
				ZZ	Special (please consult factory)			
					Transducer connection and extension cables			
					P		ODU/LEMO transducer plug	
					PJ		ODU/LEMO transducer plug with junction box (for K1L/K4L transducers)	
						E000	Without extension cable	
						E005	With extension cable, 5 m length	
						E010	With extension cable, 10 m length	
						E___	With extension cable, (please specify length in m)	
					Z		Special (please specify)	
							Optional items	
							CA	5-point calibration with certificate
							ZZ	Special (please specify)
K1	N	– x	– 1	– 50	– P	E000	/	(example configuration)

The configuration is customised by selecting the above-listed options and is expressed by the resulting code at the bottom of the table.

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