KATRONIC

Portable Ultrasonic Flowmeter
*KA*Tflow 220

- **Portable dual mode flowmeter**

- **Easy to install clamp-on sensors with no process interruption**

- **Non-invasive flow measurement of liquids, no pipeline disturbance, no pressure loss**

- **Suitable for all commonly used pipe materials with pipe diameters from 6 mm to 6.5 m (1/4" to 256")**

- **Integrated wall thickness measurement, 2 flow channels as standard**

Description

The *KA*Tflow range of non-invasive flowmeters utilises ultrasonic technology for the accurate flow measurement of liquids in full pipes.

The portable device has been designed to meet the needs of the Service/Maintenance and Commissioning Engineer wishing to check the flow rate of liquids at different locations in the plant. The set-up of the unit is simple and user friendly in order to obtain the required flow information in minutes.

The measurement of flow is based on the principle that sound waves are influenced by a flowing medium. Measurements are made by penetrating the pipe with ultrasound and subsequently time differences, frequency variations and phase shifts of the ultrasonic signals are evaluated.

The ultrasonic sensors are clamped onto the outside of the pipe, thus eliminating the need to dismantle the pipework and interrupt the process. The *KA*Tflow 220 can be applied to any type of standard pipe carrying clean or dirty liquids.

Advantages

- Low installation effort and costs
- Dual measuring mode (transit-time and Doppler-NoiseTrek™)
- Measurement is independent of fluid conductivity and pressure
- No pressure loss, no possibility of leakage
- Retrospective installation for existing plants possible
- No cutting of pipes necessary, no interruption of process, no plant shut down
- No additional fittings for maintenance required
- Hygienic measurement, no risk of contamination, suitable for ultra clean liquids
- No contact with medium, no risk of corrosion when used with aggressive media
- Cost advantages when used with large diameter pipes, high pressure systems, etc.

Specification

General

Measuring principle	:	Ultrasonic time difference correlation principle and Doppler-NoiseTrek™
Flow velocity range	:	0.01 ... 25 m/s
Resolution	:	0.25 mm/s
Repeatibility	:	0.15 % of measured value ± 0.01 m/s
Accuracy	:	*Volume flow* ± 1 ... 3 % of measured value depending on application, ± 0.5 % of measured value with process calibration *Flow velocity* ± 0.5 % of measured value
Rangeability	:	1/2500
Turn down ratio	:	1/100
Measurable liquids	:	All acoustically conductive liquids with a gas or solid content of < 10 % of volume

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Flowmeter

Enclosure	: Portable
Degree of protection	: IP 54 according EN 60529, IP 67 optional
Operating temperature	: -10 ... 60 °C (14 ... 140 °F)
Housing material	: Aluminium, powder coated
Flow channels	: 2
Power supply	: Internal rechargeable battery 6 V/4 Ah or external power supply 9 ... 15 V DC
Operating time	: > 14 h with fully charged battery
Display	: 2 x 16 digit LCD, dot matrix, backlit
Dimensions	: H 118 x W 276 x D 310 mm (with handle)
Weight	: 3.5 kg
Power consumption	: < 2.5 W in measurement mode
Signal damping	: 0 ... 60 s, configurable
Response time	: 1 s, 70 ms optional
Measuring cycle	: 100 ... 1000 Hz, single channel
Calculation functions	: Average/difference/sum
Operating languages	: Selectable between Danish, English, German, French, Dutch, Norwegian, Polish, Czech, Turkish, other languages on request

Quantity and units of measurement

Volumetric flow rate	: m^3/h, m^3/min, m^3/s, l/h, l/min, l/s, USgph (US gallons per hour), USgpm, USgps, bbl/d (barrels per day), bbl/min, bbl/s
Flow velocity	: m/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)

Internal data logger

Storage capacity	: approx. 27,000 (optional > 100,000) measuring values
Logging data	: All measured and totalised values, parameter sets

Communication

Serial interface	: RS 232
Data	: Instantaneous measured value, parameter set and configuration, logged data

Software *KA*Tdata

Functionality	: Downloading of measured values/parameter set, graphical presentation, list format, export to third party software, on-line transfer of measured data
Operating systems	: Windows™ 95, 98, ME, NT, 2000

Process inputs

	: Galvanically isolated from main electronics
Temperature	: PT 100, four-wire circuit, measuring range -50 ... 400 °C
Current	: 0/4 ... 20 mA, R_i = 50 Ω
Voltage	: 0 ... 1 V, R_i = 1 MΩ

Process outputs

	: Galvanically isolated from main electronics
Current	: 0/4 ... 20 mA, passive (U_{ext} < 24 V) or active (R_{ext} < 500 Ω)
Voltage	: 0 ... 1 V or 0 ... 10 V, R_i = 500 Ω
Frequency	: 0 ... 1 kHz or 0 ... 10 kHz (OC)
Digital (pulse, status)	: Totaliser value 0.01 ... 1000 / unit, width 80 ... 1000 ms (OC/Reed)
	Reed = Reed-NO contact (300 V / 0.5 A)
	OC = Open-Collector

Clamp-on sensors

Type M

Rated (possible) diameter range	: (50) 100 ... 2500 ... 6500 mm
Dimensions	: 60 x 30 x 34 mm
Material	: Stainless steel
Temperature range	: *MxN* -30 ... 130 °C (-22 ... 266 °F) *MxE* -30 ... 200 °C (-22 ... 392 °F) for short periods up to 300 °C (572 °F) Specials up to 500 °C
Degree of protection	: IP 65 acc. EN 60529, IP 67 or IP68 optional

Type Q

Rated diameter range	: 10 ... 400 mm
Dimensions	: 43 x 18 x 22 mm
Material	: Stainless steel
Temperature range	: *Q3N* -30 ... 130 °C (-22 ... 266 °F) *Q3E* -30 ... 200 °C (-22 ... 392 °F) for short periods up to 300 °C (572 °F) Specials up to 500 °C
Degree of protection	: IP 65 acc. EN 60529, IP 67 or IP 68 optional

Special clamp-on sensors

Type S	: For very small pipe diameters 6 ... 40 mm
Type K	: For very large pipe diameters 400 ... 6500 mm and liquids with very high solid/gas content
Other types	: Hazardous area sensors, specials on request

Wall thickness measurement

|	
Measuring range	: 1.0 ... 200 mm
Resolution	: 0.01 mm
Linearity	: 0.1 mm
Temperature range	: Standard version NT -20 ... 60 °C High temperature HT version 0 ... 200 °C, for short periods up to 540 °C

Accessories

- External power supply 230 V, 50Hz/12 V, 1.2 A; IP 30
- Car power adapter 12 V, 2 A
- Soft carying case
- Cable extension 5 m, 10 m or 20 m
- Sensor mounting fixtures
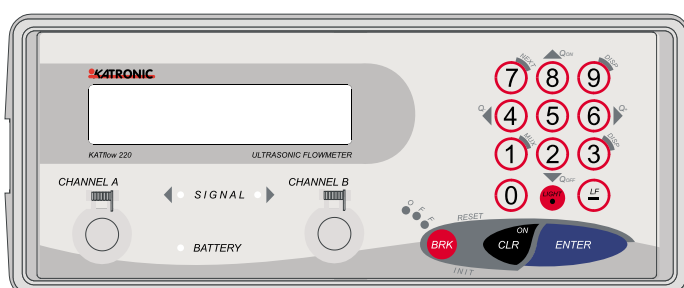- External printer, ink jet 192 dpi

Recommended spares

- Acoustic coupling component
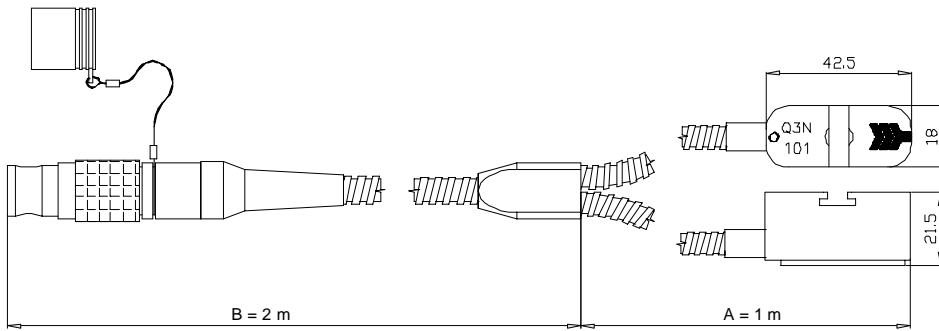- Transducer mounting clips and chains, chain repair set

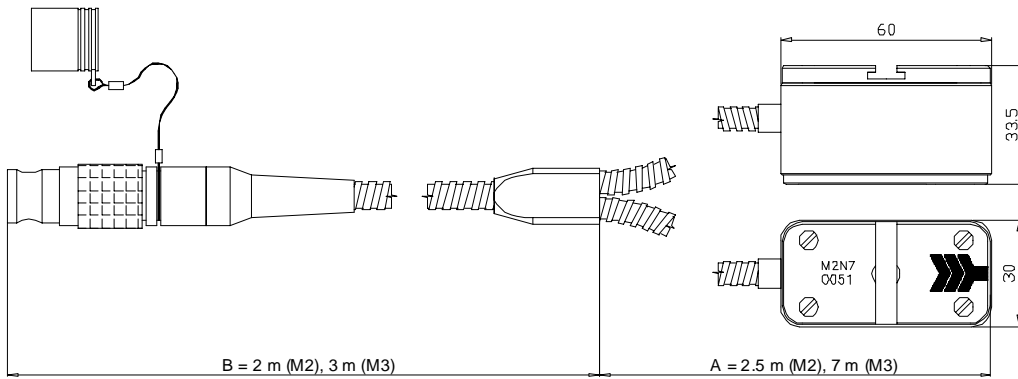## External dimensions

Portable flowmeter
*KA*Tflow 220
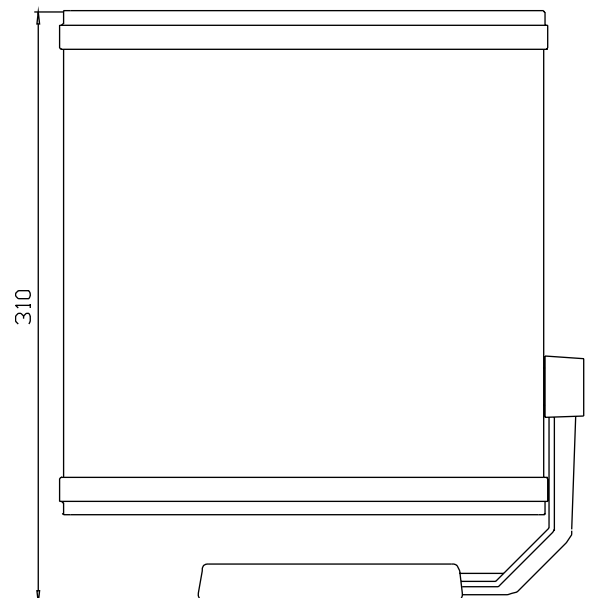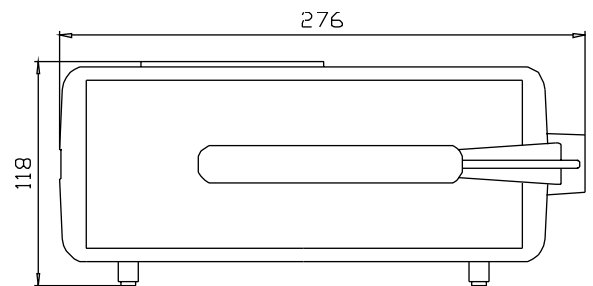
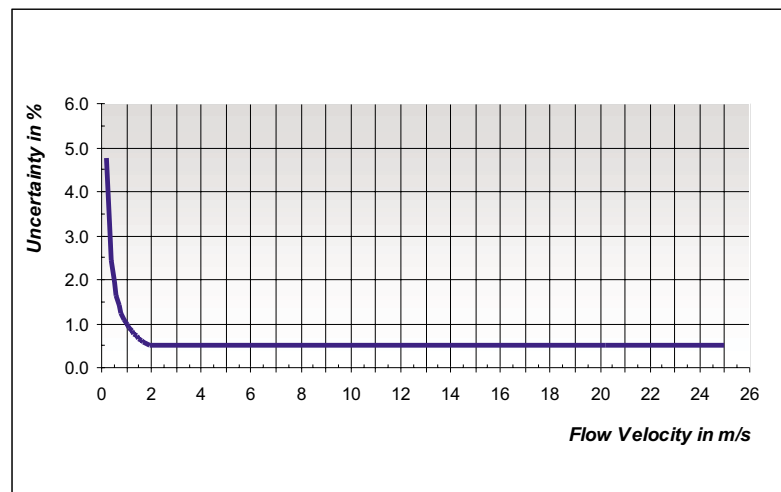Front panel - portable flowmeter
*KA*Tflow 220

Clamp-on sensors type Q3x-7-1-00-P-E000 for pipe
diameters DN 10 ... 400

Clamp-on sensors type Mxx-7-1-00-P-E000 for pipe
diameters DN (50) 100 ... 2500 ... 6500

Uncertainty specification _KA_Tflow ultrasonic flowmeters

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Order code	KF220 - x - x - x - x x x x - x x - x - x - x - x - x

Portable flowmeter

Notes:

*) Standard accessories include transport case, power adapter and battery charging unit, operating instructions and measuring tape

* Please select the required type of process output as per coding for slot 1.

** Please select the required type of process inputs as per coding for slot A.

*** For HQM functionality, selection of process inputs required.

Ordering example:
KF220-1-1-1-CNNN-A2N-1-1-0-1-0
Portable flowmeter *KA*Tflow 220 including standard accessories, UK power cord, degree of protection IP 54, 1 x 0/4 ... 20 mA current output (source), 2 x PT100 temperature inputs, standard data logger including software/cable, with heat quantity measurement, no sound velocity measurement, with wall thickness probe NT including cable, no options

Configuration:
Basic unit without accessories	0
With standard accessories *)	1
Special (please specify)	

Power cord:
Without	0
UK	1
US	2
Europe	3
Special (please specify)	Z

Degree of protection:
IP 54 (standard)	1
IP 67	2
Special (please specify)	Z

Process outputs:
Slot 1
Without	N
Current 0/4 ... 20 mA, active (source)	C
Current 0/4 ... 20 mA, passive (sink)	P
Voltage 0 ... 1 V	U
Voltage 0 ... 10 V	V
Frequency 0 ... 1 kHz	F
Frequency 0 ... 10 kHz	G
Digital (pulse/status), Open-Collector	D
Digital (pulse/status), relay	R
Special (please specify)	Z

Slot 2 *
Slot 3 *
Slot 4 *

Process inputs:
Slot A
Without	N
2 x PT100 temperature input	A2
2 x current 0/4 ... 20 mA, active (source)	B2
2 x current 0/4 ... 20 mA, passive (sink)	E2
2 x voltage 0 ... 1 V	H2
Special (please specify)	Z

Slot B **

Internal data logger:
Without	0
Standard 27,000 values incl. software/cable	1
Extended 100,000 values incl. software/cable	2
Special (please specify)	Z

Heat quantity measurement (HQM):
Without	0
With heat quantity measurement incl. *** 2 x PT100 clamp-on temperature sensors	1
Special (please specify)	Z

Sound velocity measurement (SVM):
Without	0
With sound velocity measurement C incl. current output (source)	1
Special (please specify)	Z

Wall thickness measurement (WTM):
Without	0
With wall thickness probe NT incl. cable	1
With wall thickness probe HT incl. cable	2

Options:
Without	0
Suitable for connection with hazardous area sensors	Ex
Special (please specify)	Z

Order code	**Clamp-on transducer**	**x x**	**x - x - x - x x - x - x xxx**
Pipe diameter range:			
6 ... 40 mm		S 2 N	
10 ... 400 mm		Q 3	
(50) 100 ... 2500 mm		M 2	
(50) 100 ... 6500 mm		M 3 N	
Special (please specify)		Z	
Temperature range:			
Standard -30 ... 130 °C		N	
Extended - 30 ... 200 (300) °C		E	
Special (please specify)			
Internal code:			
Always		7	
Degree of protection:			
IP 65 (standard)		1	
Special (please specify)		Z	
Transducer mounting accessories:			
No mounting accessories		0	
With clips and chains DN 15 ... 310		4	
With clips and chains DN 25 ... 600		5	
With clips and chains DN 25 ... 1200		6	
With mounting fixture, rail and chains DN 6 ... 40 (always for S2N)		7	
With mounting fixture, rail and magnet DN 10 ... 250 (optional for Q3)		8	
With mounting fixture, rail and magnets DN 50 .... 3000 (optional for M)		9	
Always		0	
Electrical connections:			
With LEMO connector (for portable units)		P	
Special (please specify)		Z	
Extension cable:			
Without		E 000	
5 m cable length		E 005	
10 m cable length		E 010	
Special (specify in meter)		E ___	

Clamp-on flow sensors

Ordering examples:

Q3N-7-1-40-P-E000
Clamp-on transducer for pipe diameter range 10 ... 400 m, standard temperature range -30 ... 130 °C, degree of protection IP 65, with mounting clips and chains DN 15 ... 310, with LEMO connector (for portable unit), no extension cable

M2E-7-1-90-P-E010
Clamp-on transducer for pipe diameter range (50) 100 ... 2500 mm, extended temperature range -30 ... 200 (300) °C, degree of protection IP 65, with mounting fixture, rail and magnets DN 50 ... 3000 with LEMO connector (for portable unit), with extension cable 10 m length