KATflow 150

Advanced Clamp-On Ultrasonic Flowmeter

FAST. FLEXIBLE. FUNCTIONAL.

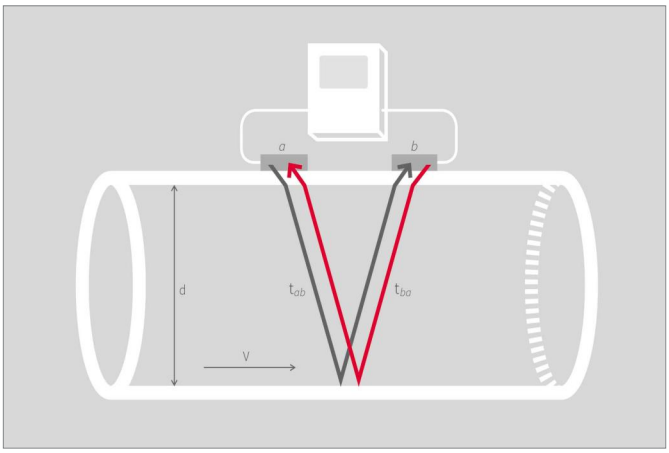
The KATflow 150 brings together versatility and top-notch performance, offering users a wide range of options for customization. Its remarkable single or dual-channel capabilities, coupled with a comprehensive specification, ensure optimal functionality. This user-friendly device boasts a practical modular design, allowing for perfect integration with a diverse selection of transducer types. Each KATflow 150 is tailored to meet the specific requirements of the application, whether it be a straightforward liquid flow measurement, energy monitoring, automated process control, or product recognition.

THE TECHNOLOGY BEHIND THE MEASUREMENT

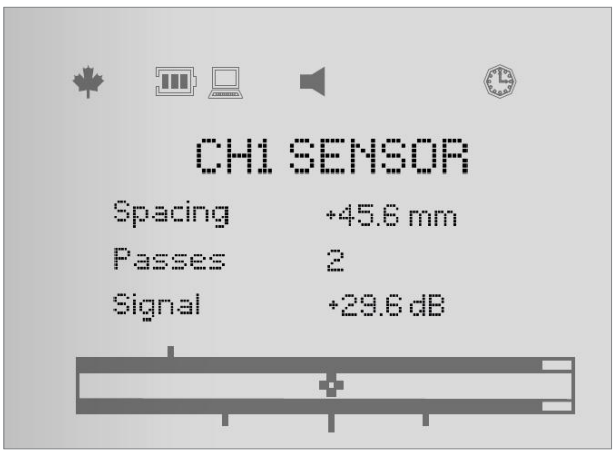
KATflow non-invasive flowmeters work on the transit time principle, utilising ultrasonic pulses transmitted and received by a compact transducer pair externally mounted on the pipe. These pulses travel through both the pipe wall and the medium. With the ability to measure on liquids and gases in pipes ranging from 0.4 in to 21 ft in diameter, clamp-on meters determine flow velocity by precisely measuring the difference between transit times of sound waves traveling in the same direction as the flow and those moving against it. This allows them to calculate the volumetric flow. Additionally, the instruments compensate for variables such as flow profile, pipe material, and fluid changes to ensure reliable results. Advanced signal processing means that KATflow meters work with an exceptional variety of liquid and gas media, and offer the user many advantages over inline measurement technologies. Katronic's reliable instruments have seen success in a vast array of applications from measurements on submarines, to installations on systems destined for use in space.

PERFECTLY PLACED: AUDIBLE SENSOR POSITIONING ASSISTANT

Katronic flowmeters include the *Audible Sensor Positioning Assistant*, a unique tool that ensures accurate sensor placement for quick and efficient measurements. By simply following the 'Quick Start' process and pressing 'Start Measurement', operators can easily fine-tune the installation to get the best possible results. The Assistant presents the recommended sensor spacing, number of pipe transits, and signal-to-noise ratio. Intuitive graphic bars displaying signal strength and signal confidence are augmented by a central cursor that makes it easy to precisely position the transducers. An audible signal means that the operator is not reliant on the display as the Assistant helps them place the sensors perfectly for optimal performance. This tool also serves as a first check for any setup errors, providing assurance for accurate measurements.



Sensors *a* and *b* work alternately to send and receive ultrasonic pulses. The sound waves *ab* traveling with the flow move faster than those traveling against it *ba*.



Katronic's unique *Audible Sensor Positioning Assistant* displays key information about the installation. The central cursor makes it easy to optimize sensor position.

Fixed Installation

-22 °F +482 °F

SPECIFICATION

- Pipe diameter range 0.4 in to 21 ft
- Temperature range for sensors -22 °F to +482 °F, higher temperatures available on request
- Lockable and sturdy IP66 polycarbonate flowmeter enclosure
- Selectable three-line LCD display and full keypad
- Up to ten different input or output slots available
- Measurement of two flows simultaneously

FEATURES

- Dual flow monitoring with *sum*, *average*, *difference* and *maximum* calculations
- Process output options including current, open-collector, relay
- Communication options RS 485, Modbus RTU, Profibus PA and HART* compatible output
- Current inputs for temperature, pressure and density compensation
- Large data logger and software for sampling and data transfer
- Optional heat quantity (thermal energy) measurement (BTU measurement)

ACCESSORIES

- Pt 100 transducers or analogue temperature inputs for BTU measurement and temperature compensation
- Optional sound velocity output function
- Additional secondary enclosure for ATEX applications
- KATdata+ Software for data evaluation

APPLICATIONS

- Heating, Ventilation and Air Conditioning (HVAC) measurements
- Large pipe measurement with two sensor pairs in 'X' configuration
- Product recognition and interface detection systems
- ATEX measurements with Ex-certified transducers
- Effluent and wastewater measurements
- Automated process control

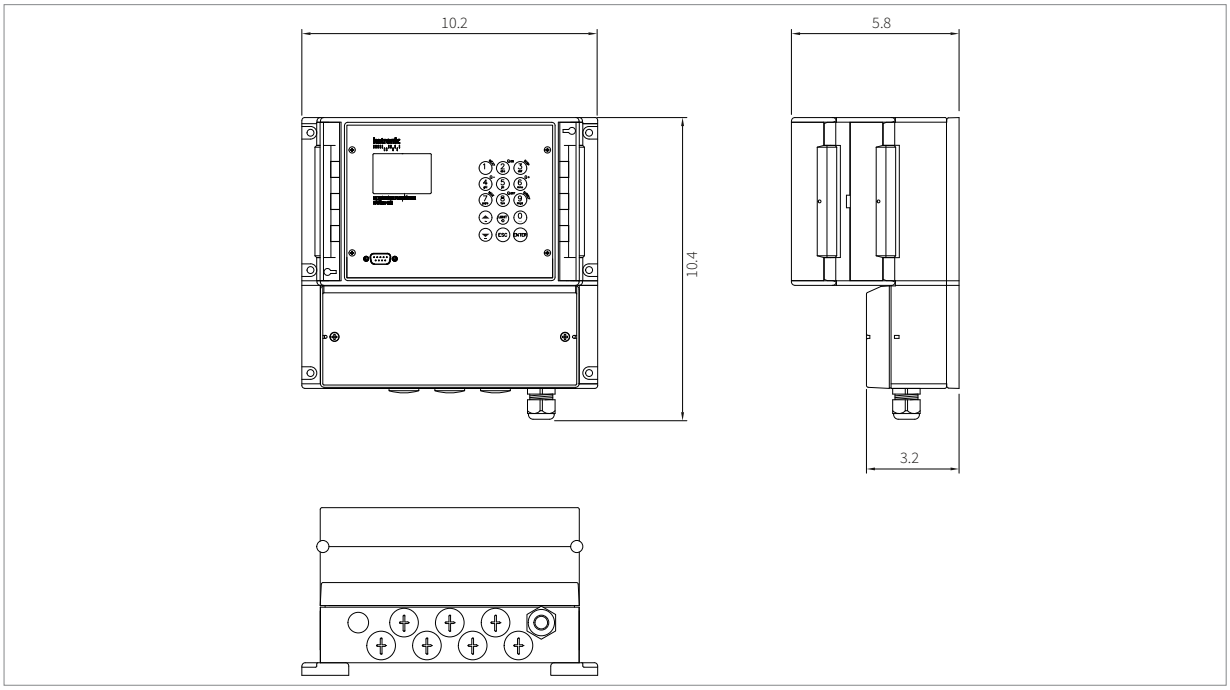
* HART® is a registered trademark of the *HART Communication Foundation*

FLOWMETER

Performance

Measurement principle	Ultrasonic transit-time difference
Flow velocity range	0.03 ... 82 ft/s
Resolution	0.01 in/s
Repeatability	0.15 % of measured value, ±0.6 in/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 (equivalent to 0.8 ... 82 ft/s)
Measurement rate	1 Hz (standard)
Response time	1 s (standard), 90 ms (optional)
Damping of displayed value	0 ... 99 s (selectable by user)
Gaseous and solid content of liquid media	< 10 % of volume

Images



KATflow 150 (dimensions in inches)

General

Enclosure type	Wall mounted
Degree of protection	IP66 according to EN 60529
Operating temperature	+14 ... +140 °F
Housing material	Polycarbonate (UL94 V-0)
Measurement channels	1 or 2
Calculation functions	*Average*, *difference*, *sum*, *maximum* (dual-channel use only)
Power supply	100 ... 240 V AC, 50/60 Hz 9 ... 36 V DC Special solutions (e.g. solar panel, battery) on request
Display	LCD graphic display, 128 x 64 dots, backlit
Dimensions	10.2 (l) x 10.4 (w) x 5.8 (h) in
Weight	Approx. 5 lb
Power consumption	< 10 W
Operating languages	English, French, German, Dutch, Spanish, Italian, Russian, Czech, Turkish, Romanian (others on request)

Communication

Type	RS 232, USB cable (optional), RS 485 (optional), Modbus RTU (optional), HART* compatible (optional), Profibus PA (optional)
Transmitted data	Measured and totalized value, parameter set and configuration, logged data

Internal data logger

Storage capacity	Approx. 30,000 measurements (each comprising up to 20 selectable measurement units), logger size 5 MB Approx. 100,000 measurements (each comprising up to 20 selectable measurement units), logger size 16 MB
Logged data	All measured and totalized values, parameter sets

Images

KATflow 150 in operation

KATflow 150 as a Heatmeter

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 11, 10, 8, 7 Linux

Quantity and 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, USgal, bbl
Mass	g, kg, t
Heat flow	W, kW, MW (with heat quantity measurement option)
Heat quantity	J, kJ, kW/h (with heat quantity measurement option)
Temperature	°F (with heat quantity measurement option)

Process inputs (galvanically isolated)

Temperature	Pt 100 (clamp-on sensors), three- or four-wire circuit, measurement range: -22 ... +482 °F, resolution: 0.1 K, accuracy: ±0.2 K
Current	0/4 ... 20 mA active or 0/4 ... 20 mA passive, U = 30 V, R_i = 50 Ω, accuracy: 0.1 % of measured value

Process outputs (galvanically isolated)

Current	0/4 ... 20 mA active/passive (R_{Load} < 500 Ω), 16 bit resolution, U = 30 V, accuracy: 0.1 %
Digital open-collector	Value: 0.01 ... 1000/unit, width: 1 ... 990 ms, U = 24 V, I_{max} = 4 mA
Digital relay	2 x Form A SPST (NO and NC), U = 48 V, I_{max} = 250 mA
Voltage	0 ... 10 V, R_{Load} = 1000 Ω
Frequency	2 Hz ... 10 kHz, 24 V/4 mA
HART* compatible	0/4 ... 20 mA, 24 V DC, R_{GND} = 220 Ω

HAZARDOUS AREA ENCLOSURE

General

Enclosure type	Wall mounted (additional to KATflow 150 flowmeter)
Degree of protection	IP66 according to EN 60529
Operating temperature	-4 ... +104 °F
Housing material	Grade LM6 cast alloy
Finish	RAL 7035 epoxy powder coated
Dimensions	14.1 (l) x 10.9 (d) x 8.6 (h) in
Weight	Approx. 44 lb (with KATflow 150 flowmeter)
Ex-certification code	III 2G EEx d IIB T6
Ex-certification number	CESI 01 ATEX 027

HAZARDOUS AREA TRANSDUCERS

K1Ex, K4Ex

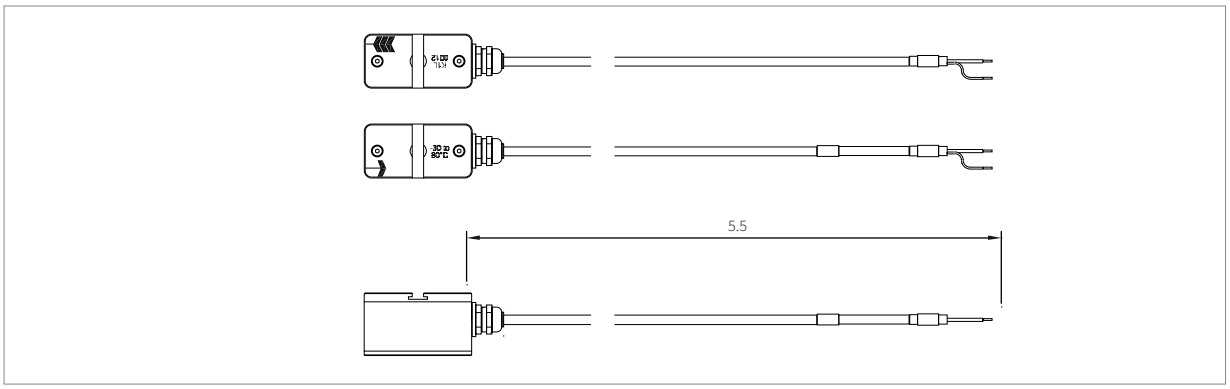
Pipe diameter range	0.4 ... 10 in for type K4Ex 2 ... 120 in for type K1Ex
Dimensions of sensor heads	2.4 (l) x 1.2 (w) x 1.4 (h) in
Material of sensor heads	Stainless steel
Material of cable conduits	PTFE
Temperature range	-58 ... +239 °F
Standard cable length	5.5 yd
Degree of protection	IP68 according to EN 60529
Ex-certification code	Ex mb IIC T6 – T4 Gb Ex mb IIIC T70 °C – T90 °C Db
Ex-certification number	IBExU 25 ATEX 1012 X IECEx IBE 24.0005 X AEx pending
Ex-protection method	Encapsulation (m), ignition source control (b)
Note	The transducers are approved for use in hazardous areas classified as Ex-Zone 1 and 2. They are connected to the flowmeter via extension cables and Ex-approved junc - tion boxes. The flowmeter can be installed in a safe area or, if equipped with the additional Ex-enclosure, together with the transducers in a hazardous environment.

TRANSDUCERS

K1L, K1N, K1E

Pipe diameter range	2 ... 120 in for type K1N/E 2 ... 260 in for type K1L
Dimensions of sensor heads	2.4 (l) x 1.2 (w) x 1.4 (h) in
Material of sensor heads	Stainless steel
Material of cable conduits	Type K1L: PVC Type K1N/E: Stainless steel
Temperature range	Type K1L: -22 ... +176 °F Type K1N: -22 ... +266 °F Type K1E: -22 ... +482 °F (for short periods up to +572 °F)
Degree of protection	IP66 according to EN 60529 (IP67 and IP68 on request)
Standard cable lengths	Type K1L: 5.5 yd Type K1N/E: 4.4 yd

Images



K1L transducers (dimensions in yd)

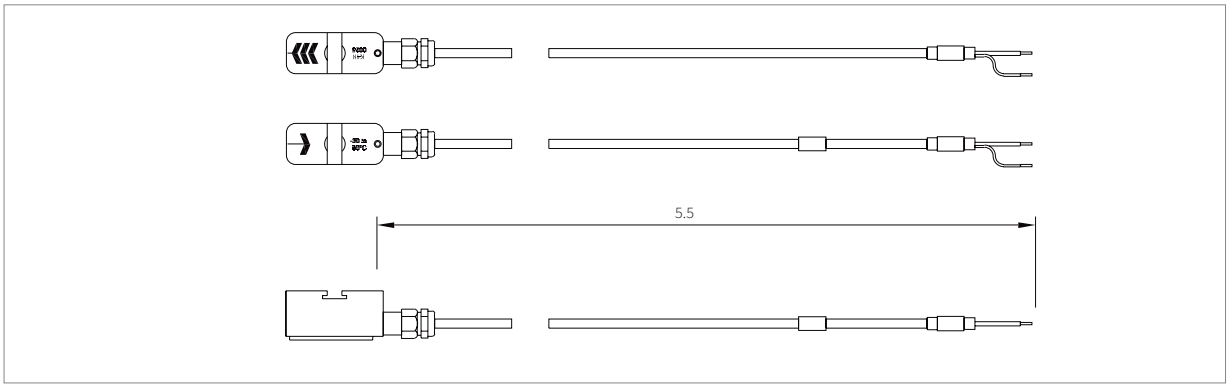
K1L transducers

K1N/E transducers

K4L, K4N, K4E

Pipe diameter range	0.4 ... 10 in for type K4N/E 0.4 ... 10 in for type K4L
Dimensions of sensor heads	1.7 (l) x 0.7 (w) x 0.9 (h) in
Material of sensor heads	Stainless steel
Material of cable conduits	Type K4L: PVC Type K4N/E: Stainless steel
Temperature range	Type K4L: -22 ... +176 °F Type K4N: -22 ... +266 °F Type K4E: -22 ... +482 °F (for short periods up to +572 °F)
Degree of protection	IP66 according to EN 60529 (IP67 and IP68 on request)
Standard cable lengths	Type K4L: 5.5 yd Type K4N/E: 2.7 yd

Images



K4N/E transducers (dimensions in yd)

K4L transducers

K4N/E transducers

Extension cable

Available lengths	5.5 ... 110 yd
Cable type	Coaxial
Material cable jacket	TPE
Operating temperature	-40 ... +176 °F
Minimum bend radius	2.6 in

Cable connection

Connection types	Junction box, Amphenol connectors (for transducer type N)
Termination into transmitter	SMB connector (SubMiniature version B) Direct cable connection (terminal block)

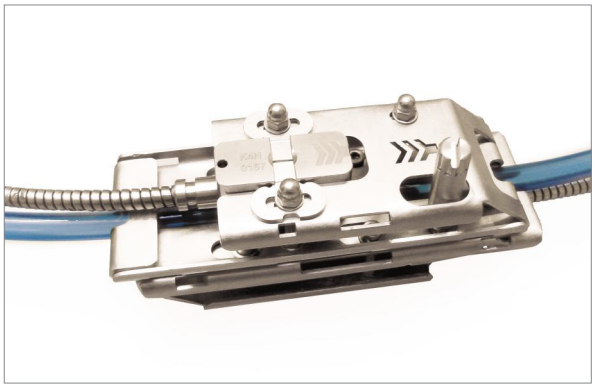
TRANSDUCER MOUNTING ACCESSORIES

General

Diameter range and mounting types	Clamping set (metal strap with screw), stainless steel: DN 0.4 ... 1.6 in Metallic straps and clamps: DN 1 ... 4 in Metallic straps and clamps: DN 4 ... 120 in Metallic mounting rail and straps (available on request): DN 2 ... 10 in or DN 2 ... 120 in
Mounting fixture for flexible hoses	Custom made mounting bracket, stainless steel (available on request)

Images

Metallic mounting rail with transducers



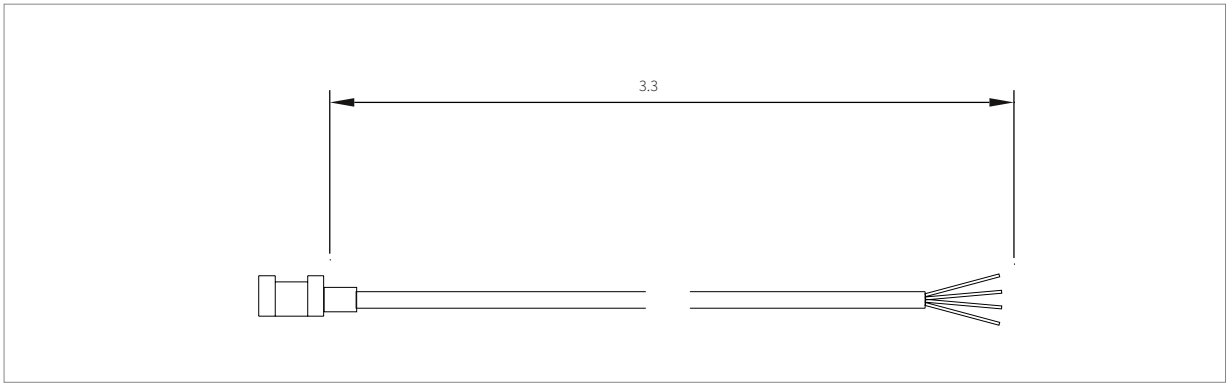
Example of mounting fixture for flexible hoses

PT 100 CLAMP-ON SENSORS

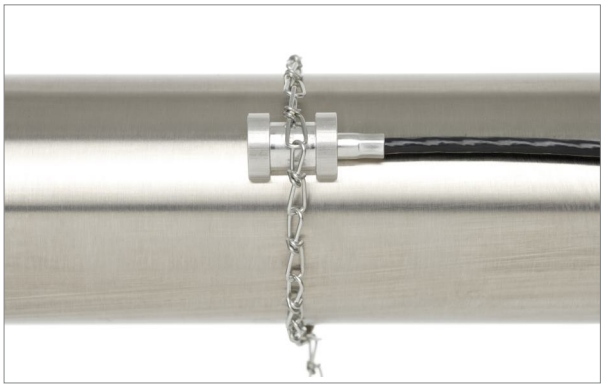
General

Type	Pt 100 (clamp-on sensors)
Measurement range	-22 ... +482 °F
Circuits	4-wire
Accuracy T	±(32 °F + 2 x 10^{-3} x T [°F]), class A
Accuracy ΔT	≤ 0.1 K (3 K < ΔT < 6 K), corresponding to EN 1434-1
Response time	50 s
Dimensions of sensor heads	0.8 (l) x 0.6 (w) x 0.6 (h) in
Material of sensor heads	Aluminum
Material of cable jacket	PTFE
Cable length	3.3 yd

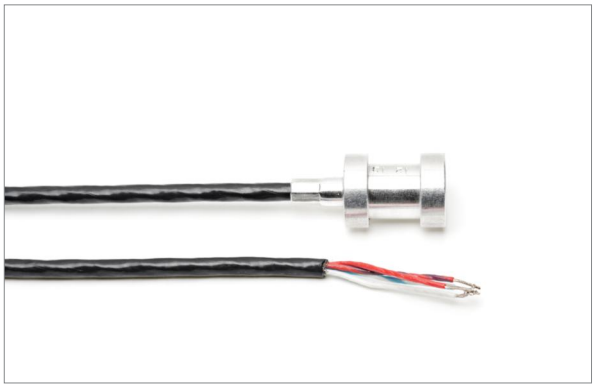
Images



Pt 100 transducer



Pt 100 transducer fixed to pipe



Pt 100 with wired cable connection

FLOWMETER AND ACCESSORIES

KF 150		Ultrasonic flowmeter KATflow 150, serial interface RS 232, operating instructions
		Number of measurement channels
	1	1 measurement channel
	2	2 measurement channels[1]
		Internal code
		03 Internal code
		Power supply
		1 100 … 240 V AC, 50/60 Hz
		2 9 … 36 V DC
		Z Special (please specify)
		Enclosure type
		1 Polycarbonate (UL94 V-0), wall mounted, IP66
		2 Hazardous area enclosure, powder-coated LM6 cast alloy, IP66
		Z Special (please specify)
		Communication
		0 Without
		1 RS 485 serial interface
		2 Modbus RTU protocol[2]
		Z Special (please specify)
		Process inputs/outputs (select a maximum of 8 slots)
		N Without
		C Current output, 0/4 ... 20 mA, active (source)
		P Current output, 0/4 ... 20 mA, passive (sink)
		D Digital output, open-collector
		R Digital output, relay
		H HART* compatible output, 0/4 ... 20 mA[2]
		V Voltage output, 0 ... 10 V
		F Frequency output, 2 Hz ... 10 kHz
		A 1 x Pt 100 input for temperature compensation (select TC function)[3]
		AA 2 x Pt 100 input for 1-channel heat quantity measurement (select HQM option no. 2)[4]
		AAAA 4 x Pt 100 input for 2-channel heat quantity measurement (select HQM option no. 3)[4]
		B Current input , 0/4 ... 20 mA, active or passive
		Z Special (please specify)
		Internal data logger
		0 Without
		1 30,000 measurements
		2 100,000 measurements
		Z Special (please specify)
		Temperature compensation (TC)/Heat quantity measurement (HQM)
		0 Without
		1 With TC incl. 1 x Pt 100 sensor, 3.3 yd cable[3]
		2 With 1-channel HQM incl. 2 x Pt 100 sensor, 3.3 yd cable[4]
		3 With 2-channel HQM incl. 4 x Pt 100 sensor, 3.3 yd cable[4]
		Z Special (please consult factory)
		Sound velocity output (SVO)[5]
		0 Without
		1 With SVO
		Pt 100 cable extension
		0 Without
		PTJ With 1 x junction box for Pt 100 sensor
		2PTJ With 2 x junction box for Pt 100 sensors
		3PTJ With 3 x junction box for Pt 100 sensors
		4PTJ With 4 x junction box for Pt 100 sensors
		Pt 100 extension cable (length in yd)
		000 Without
		___ With extension cable (specify length in yd)
		Optional items
		Without (leave space blank)
		Ex Suitable for connection with Ex-transducers
		SW KATdata+ download software and RS 232 cable
		SU KATdata+ download software and USB cable

KF 150 - 2 - 03 - 1 - 1 - 0 - CDR - 0 - 0 - 0 - 0 - 000 / (example configuration)

The configuration is customized by choosing from the above-listed options and is expressed by the resulting code at the bottom of the table.

1) For simultaneous measurement on two separate pipes or for measurement on one single pipe in a two-path sensor mounting configuration.
2) Modbus and HART* compatible outputs can not be used in conjunction with other output options. Please consult factory for more information.
3) For temperature compensation in cases of significant changes in medium temperature during measurement.
4) For contactless measurement of thermal energy consumption (for one circuit or two circuits).
5) For contactless product recognition and interface detection.

TRANSDUCERS AND ACCESSORIES

K1	Transducer pair, pipe diameter range 2 ... 120 in										
K4	Transducer pair, pipe diameter range 0.4 ... 10 in										
Z	Special (please consult factory)										
	Temperature range										
	L	Process temperature -22 ... +176 °F, including acoustic coupling paste									
	N	Process temperature -22 ... +266 °F, including acoustic coupling paste									
	E	Process temperature -22 ... +482 °F, including acoustic coupling paste									
	Ex	Process temperature -58 ... +239 °F including acoustic coupling paste (II 2G Ex mb IIC T4 - T6 X)									
	Z	Special (please consult factory)									
		Internal code									
		1	Internal code								
			Degree of protection								
			1	IP66 (standard)							
			2	IP67 (please consult factory)							
			3	IP68 (please consult factory)							
			Z	Special (please specify)							
				Transducer mounting accessories							
				0	Without						
				3	Clamping set DN 0.4 ... 1.6 in						
				4	Metallic straps and clamps DN 1 ... 4 in						
				5	Metallic straps and clamps DN 4 ... 120 in						
				7	Metallic mounting rail and straps DN 2 ... 10 in (transducer type K4)						
				8	Metallic mounting rail and straps DN 2 ... 120 in (transducer type K1)						
				Z	Special (please specify)						
					Stainless steel tag						
					0	Without					
					1	With stainless steel tag (please specify text to be engraved)					
						Transducer connection type and extension cable length					
						O	Without connector or junction box (transducer type L or Ex)				
							C000	Wired transducer connection to flowmeter			
						D	Without connector or junction box (transducer type N)				
							C000	Direct transducer connection to flowmeter			
						A	Extension via Amphenol type connector (transducer type N)				
							C 010	With extension cable, 11 yd length			
							C___	With extension cable (specify length in yd)			
						J	Extension via junction box (transducer type L or N)				
							C005	With extension cable, 5.5 yd length			
							C010	With extension cable, 11 yd length			
							C___	With extension cable (specify length in yd)			
						JX	Extension via ATEX-junction box (transducer type Ex)				
							C005	With extension cable, 5.5 yd length			
							C010	With extension cable, 11 yd length			
							C___	With extension cable (specify length in yd)			
						Z	Special (please specify)				
								Optional items			
									Without (leave space blank)		
								CA	5-point calibration with certificate		

K1 L - 1 - 1 - 5 - 0 - J - C010 / _____ (example configuration)

The configuration is customized by choosing from the above-listed options and is expressed by the resulting code at the bottom of the table.

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