KATflow 150

Advanced Clamp-On Ultrasonic Flowmeter

FAST. FLEXIBLE. FUNCTIONAL.

The KATflow 150 is the premier product for flexibility and performance, providing the user with a comprehensive specification and a list of configuration options. The practical modular design and the wide variety of different transducer types available ensure this instrument is suitable for everything from simple water flow measurements to energy flow monitoring and automated process control.

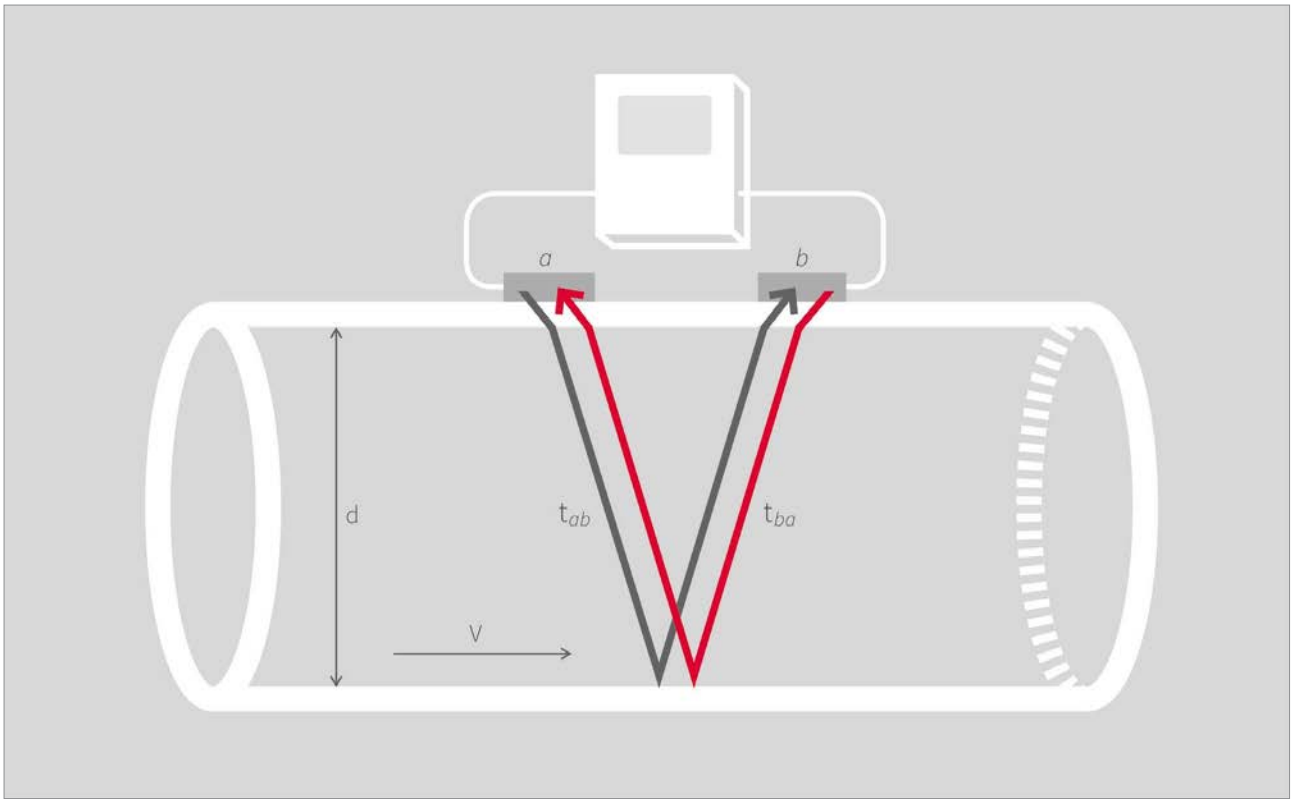
Katronic
Your Solution Starts With Our Product

THE TECHNOLOGY BEHIND THE MEASUREMENT

The KATflow non-invasive flowmeters work on the transit time ultrasonic principle. This involves sending and receiving ultrasonic pulses from a pair of sensors and examining the time difference in the signal. Katronic uses clamp-on transducers that are mounted externally on the surface of the pipe and which generate pulses that pass through the pipe wall. The flowing liquid within causes time differences in the ultrasonic signals, which are then evaluated by the flowmeter to produce an accurate flow measurement.

The key principle of the method applied is that sound waves travelling with the flow will move faster than those travelling against it. The difference in the transit time of these signals is proportional to the flow velocity of the liquid and consequently the flow rate.

Since elements such as flow profile, type of liquid and pipe material will have an effect on the measurement, the flowmeter compensates for and adapts to changes in the medium in order to provide reliable results. The instruments can be used in a variety of locations, from measurements on submarines to installations on systems destined for use in space, and on process fluids as different as purified water in the pharmaceutical sector and toxic chemical effluent. The flowmeters will operate on various pipe materials and diameters over a range of 10 mm to 6,500 mm.



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

Fixed Installation

-30 °C +250 °C

SPECIFICATION

- Pipe diameter range 10 mm to 6,500 mm
- Temperature range for sensors -30 °C to +250 °C (-22 °F to +482 °F), higher temperatures available on request
- Lockable and sturdy IP 66 polycarbonate flowmeter enclosure
- Selectable three-line LCD display and full keypad
- Up to ten 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 functionality

ACCESSORIES

- PT100 transducers or analogue temperature inputs for heat quantity measurement and temperature compensation
- Additional secondary enclosure for ATEX applications
- Optional sound velocity output function
- KATdata+ Software for data evaluation

APPLICATIONS

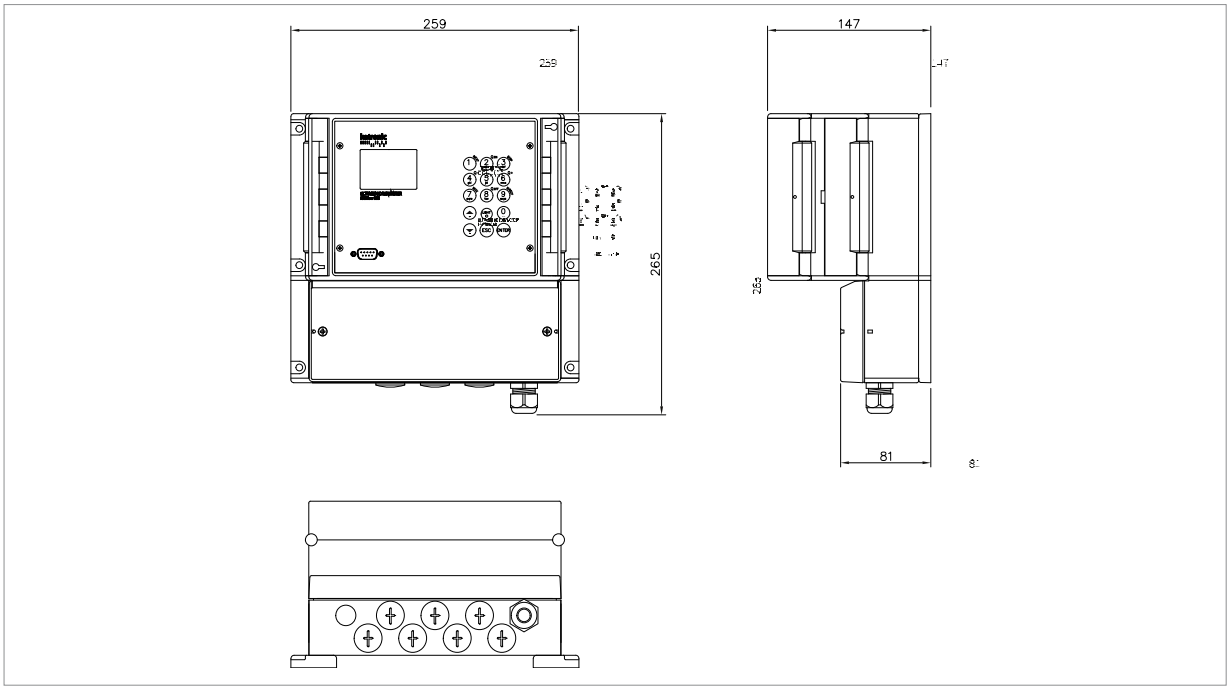
- Heating, Ventilation and Air Conditioning (HVAC) measurements
- Large pipe measurement with two sensor pairs in ‘X’ configuration
- Product recognition and interface detection systems
- ATEX measurements with Ex-certified transducers
- Effluent and wastewater measurements
- Automated process control

FLOWMETER

Performance

Measurement principle	Ultrasonic transit-time difference
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 (equivalent to 0.25 ... 25 m/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 mm)

General

Enclosure type	Wall mounted
Degree of protection	IP 66 according to EN 60529
Operating temperature	-10 ... +60 °C (+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	237 (h) x 258 (w) x 146 (d) mm
Weight	Approx. 2,3 kg
Power consumption	< 10 W
Operating languages	English, French, German, Dutch, Spanish, Italian, Russian, Czech, Turkish, Romanian (others on request)

Images

KATflow 150 in operation

KATflow 150 with transducer pair

Communication

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

Internal data logger

Storage capacity	Approx. 30,000 measurements (each comprising up to 10 selectable measurement units), logger size 5 MB Approx. 100,000 measurements (each comprising up to 10 selectable measurement units), logger size 16 MB
Logged data	All measured and totalised 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 8, 7, Vista, XP, NT, 2000 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, gal (US gallons), 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	°C (with heat quantity measurement option)

Process inputs (galvanically isolated)

Temperature	PT100 (clamp-on sensors), three- or four-wire circuit, measurement range: -30 ... +250 °C (-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

Abbildungen

KATflow 150 as heatmeter

KATflow 150 with open enclosure

HAZARDOUS AREA ENCLOSURE

General

Enclosure type	Wall mounted (additional to KATflow 150 flowmeter)
Degree of protection	IP 66 according to EN 60529
Operating temperature	-20 ... +40 °C (-4 ... +104 °F)
Housing material	Grade LM6 cast alloy
Finish	RAL 7035 epoxy powder coated
Dimensions	358 (h) x 278 (w) x 218 (d) mm
Weight	Approx. 20.0 kg (with KATflow 150 flowmeter)
Ex-certification code	II 2G/D Ex d IIB T4 - T6 IP67
Ex-certification number	CESI 01 ATEX 063

HAZARDOUS AREA TRANSDUCERS

K1Ex, K4Ex

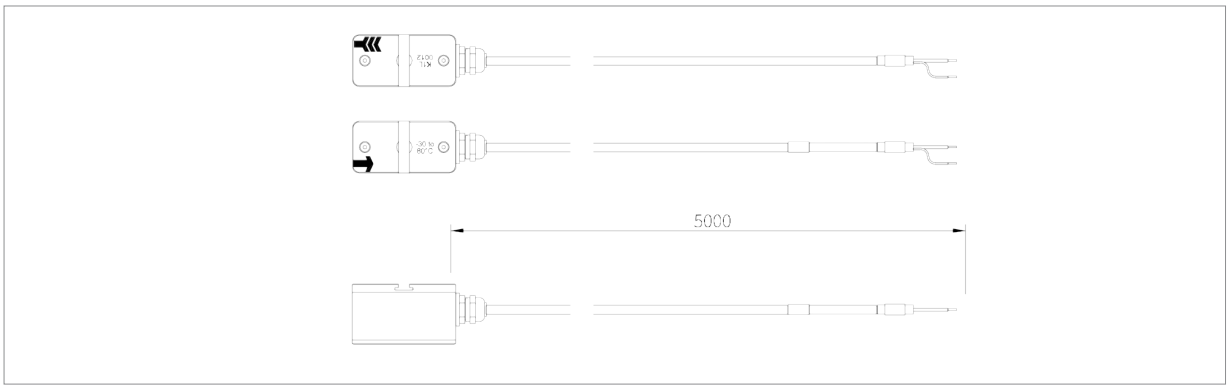
Pipe diameter range	10 ... 250 mm for type K4Ex 50 ... 3,000 mm for type K1Ex
Dimensions of sensor heads	60 (h) x 30 (w) x 34 (d) mm
Material of sensor heads	Stainless steel
Material of cable conduits	PTFE
Temperature range	-50 ... +115 °C (-58 ... +239 °F)
Standard cable length	5.0 m
Degree of protection	IP 68 according to EN 60529
Ex-certification code	II 2G Ex mb IIC T4 - T6 X II 2D Ex mbD 21 IP68 T80 °C - T120 °C X
Ex-certification number	TRAC 09 ATEX 21226 X
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 junction 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	50 ... 3,000 mm for type K1N/E 50 ... 6,500 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 ... +250 °C (-22 ... +482 °F) (for short periods up to +300 °C (+572 °F))
Degree of protection	IP 66 according to EN 60529 (IP 67 and IP 68 on request)
Standard cable lengths	Type K1L: 5.0 m Type K1N/E: 4.0 m

Images



K1L transducers

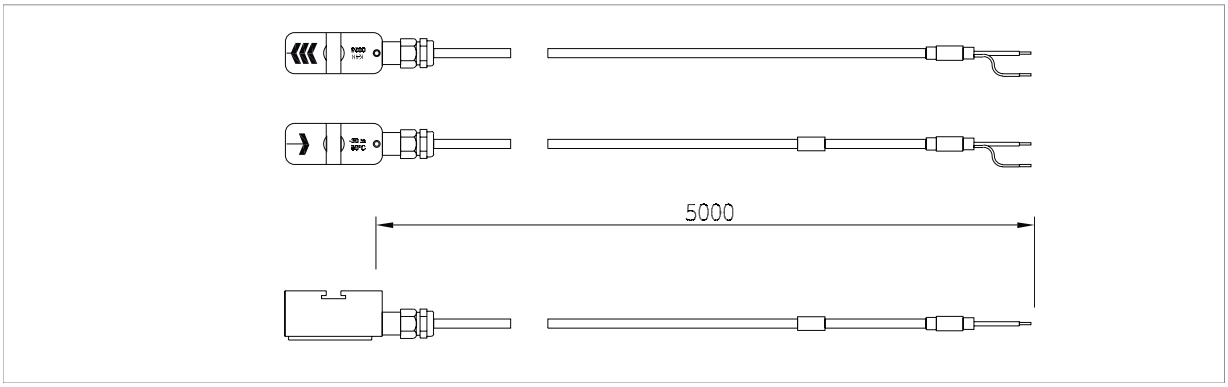
K1L transducers

K1N/E transducers

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 ... +250 °C (-22 ... +482 °F) (for short periods up to +300 °C (+572 °F))
Degree of protection	IP 66 according to EN 60529 (IP 67 and IP 68 on request)
Standard cable lengths	Type K4L: 5.0 m Type K4N/E: 2.5 m

Images



K4N/E transducers

K4L transducers

K4N/E transducers

Extension cable

Available lengths	5.0 ... 100 m
Cable type	Coaxial
Material cable jacket	TPE
Operating temperature	-40 ... +80 °C (-40 ... +176 °F)
Minimum bend radius	67 mm

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 10 ... 40 Metallic straps and clamps: DN 15 ... 310 Metallic straps and clamps: DN 25 ... 3,000 Metallic mounting rail and straps (available on request): DN 50 ... 250 or DN 50 ... 3,000
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

PT100 CLAMP-ON SENSORS

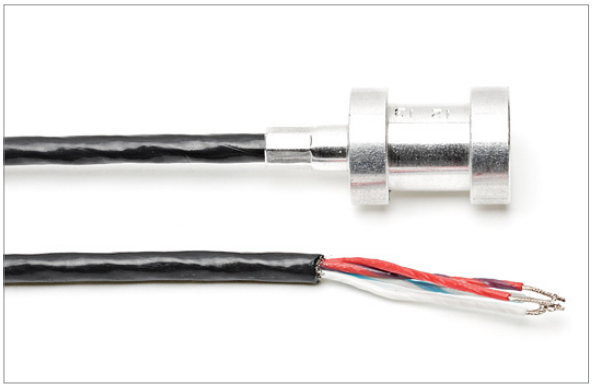
General

Type	PT100 (clamp-on sensors)
Measurement range	-30 ... +250 °C (-22 ... +482 °F)
Circuits	4-wire
Accuracy T	±(0.15 °C + 2 x 10^{-3} x T [°C]), 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	20 (h) x 15 (w) x 15 (d) mm
Material of sensor heads	Aluminium
Material of cable jacket	PTFE
Cable length	3.0 m

Images

PT100 transducer

PT100 transducer fixed to pipe



PT100 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, IP 66
	2	Hazardous area enclosure, powder-coated LM6 cast alloy, IP 66 (II 2G/D Ex d IIB T4 - T6 IP67)
	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 PT100 input for temperature compensation (select TC function)[3]
	AA	2 x PT100 input for 1-channel heat quantity measurement (select HQM option no. 2)[4]
	AAAA	4 x PT100 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 PT100 sensor, 3 m cable[3]
	2	With 1-channel HQM incl. 2 x PT100 sensor, 3 m cable[4]
	3	With 2-channel HQM incl. 4 x PT100 sensor, 3 m cable[4]
	Z	Special (please consult factory)
		Sound velocity output (SVO)[5]
	0	Without
	1	With SVO
		PT100 cable extension
	0	Without
	PTJ	With 1 x junction box for PT100 sensor
	2PTJ	With 2 x junction box for PT100 sensors
	3PTJ	With 3 x junction box for PT100 sensors
	4PTJ	With 4 x junction box for PT100 sensors
		PT100 extension cable (length in m)
	000	Without
	___	With extension cable (specify length in m)
		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 100 - 2 - 03 - 1 - 1 - 0 - CDR - 0 - 0 - 0 - 0 - 000 / (example configuration)

The configuration is customised 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 50 ... 3,000 mm											
K4	Transducer pair, pipe diameter range 10 ... 250 mm											
Z	Special (please consult factory)											
	Temperature range											
	L	Process temperature -30 ... +80 °C, including acoustic coupling paste										
	N	Process temperature -30 ... +130 °C, including acoustic coupling paste										
	E	Process temperature -30 ... +250 °C, including acoustic coupling paste										
	Ex	Process temperature -50 ... +115 °C, 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	IP 66 (standard)								
			2	IP 67 (please consult factory)								
			3	IP 68 (please consult factory)								
			Z	Special (please specify)								
				Transducer mounting accessories								
				0	Without							
				3	Clamping set DN 10 ... 40							
				4	Metallic straps and clamps DN 15 ... 310							
				5	Metallic straps and clamps DN 25 ... 3,000							
				7	Metallic mounting rail and straps DN 50 ... 250 (transducer type K4)							
				8	Metallic mounting rail and straps DN 50 ... 3,000 (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, 10 m length				
							C___	With extension cable (specify length in m)				
						J	Extension via junction box (transducer type L or N)					
							C005	With extension cable, 5 m length				
							C010	With extension cable, 10 m length				
							C___	With extension cable (specify length in m)				
						JX	Extension via ATEX-junction box (transducer type Ex)					
							C005	With extension cable, 5 m length				
							C010	With extension cable, 10 m length				
							C___	With extension cable (specify length in m)				
						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)

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