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**
- **Data logger for up to 100,000 measurements and PC download software**
- **Optional wall thickness gauge**

Features

- Optional heat quantity measurement function turning flow meter into a portable heat meter
- Powered up to 24 hours by internal batteries or by mains power for unlimited period of time
- Auto-detected ultrasonic clamp-on sensors and optional dedicated wall thickness gauge
- Graphic LCD display, diagnostic and calculation 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 acoustic 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, site parameter storage capability

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.

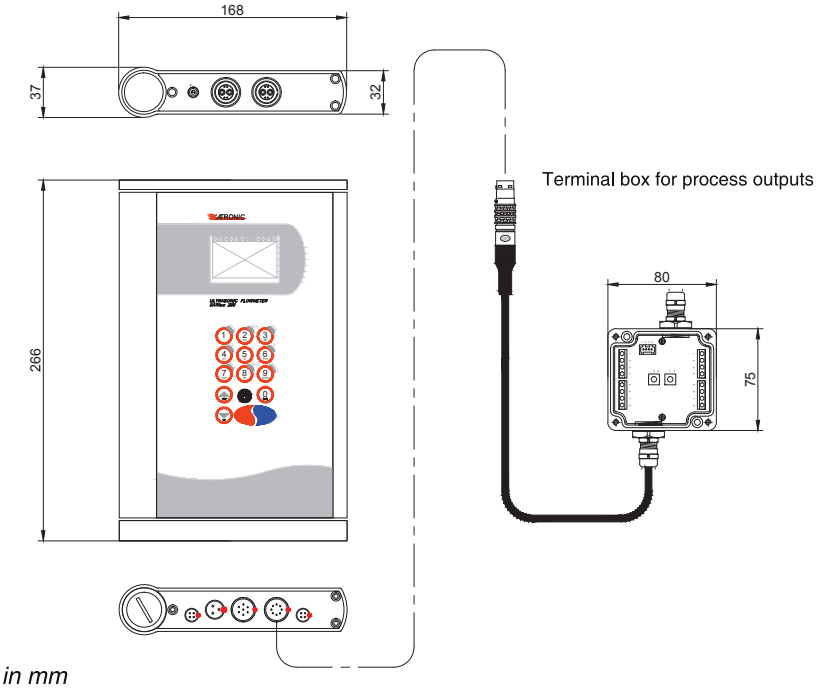
The KATflow 230 is a portable dual-channel ultrasonic flow meter for non-invasive and non-intrusive flow measurement of liquids and liquefied gases in fully filled pipes. It is supplied with an internal datalogger and software for the recording and download of measured values. Additionally, it can be equipped with a dedicated 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 measurement channels enable the KATflow 230 to monitor the flow on two pipes simultaneously or alternatively on one single pipe in a two-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:	:	1 Hz as standard, higher rates on application
	Response time	:	1 s
	Damping of displayed value	:	0 ... 99 s (selectable by user)
	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 Power adapter, 100 ... 240 V AC input, 9 V DC output External battery pack, 12 V 105 Ah, 25 kg (optional)
	Operating time	:	Up to 24 h with fully charged internal batteries
	Display	:	LCD graphic display, 128 x 64 dots, backlit
	Dimensions	:	266 (h) x 168 (w) x 37 (d) mm
	Weight	:	Approx. 2.0 kg
	Power consumption	:	< 5 W
	Operating languages	:	English, German, French, Spanish, Russian

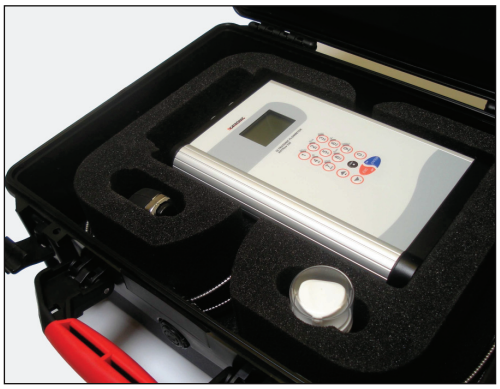
Drawings



Dimensions in mm

Specification: Transmitter (continued)

Images



KATflow 230 in crush-proof transport case

KATflow 230 in operation

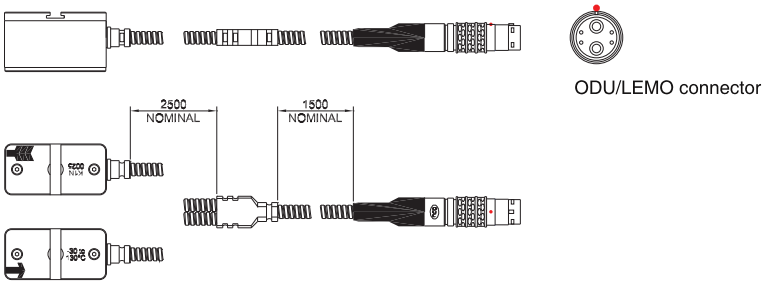
Communication	Type	:	RS 232, USB converter cable (optional)
	Transmitted data	:	Measured and totalized value, parameter set and configuration, logged data
Internal data logger	Storage capacity	:	Approx. 30,000 measurements (each comprising up to 10 selectable measurement units), logger size 5 MB Approx. 100,000 measurements (each comprising up to 10 selectable measurement units), logger size 16 MB
	Logged data	:	All measured and 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 *(galvanically isolated)*	Temperature	:	PT100 (clamp-on sensors), four-wire circuit, measurement range -50 ... 400 °C (-58 ... 752 °F), resolution 0.1 K, accuracy ±0.2 K (two or four inputs available)
Process outputs* *(galvanically isolated)*	Current	:	0/4 ... 20 mA active (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	:	Form C (SPDT-CO) contacts, U = 48 V, I_{max} = 250 mA

* Further process outputs available on application.

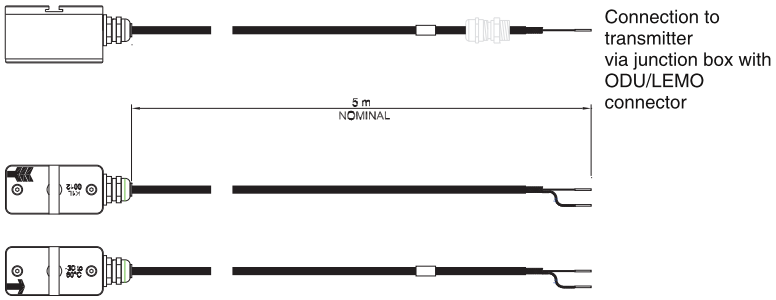
Specification: Transducers

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:* -40 ... 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

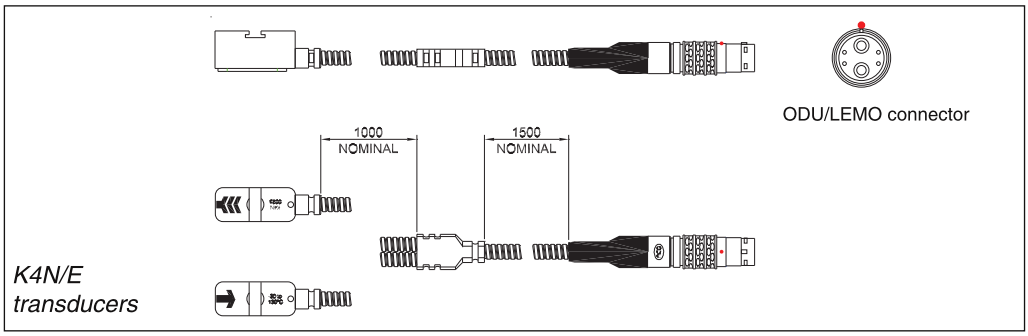
K1N/E transducers

K1L transducers

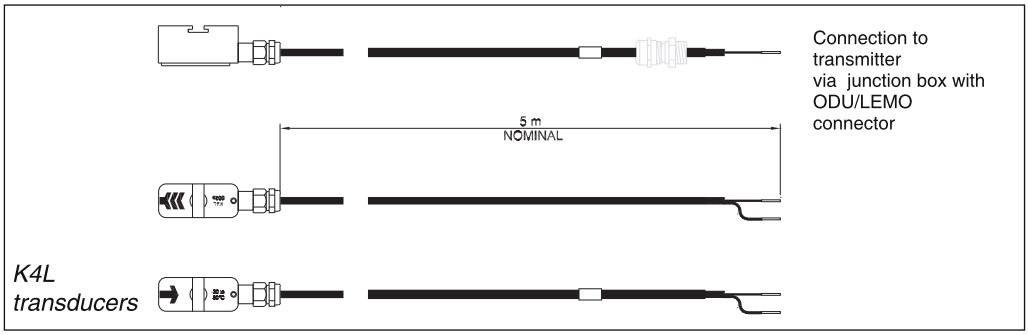
Specification: Transducers (continued)

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:* -40 ... 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

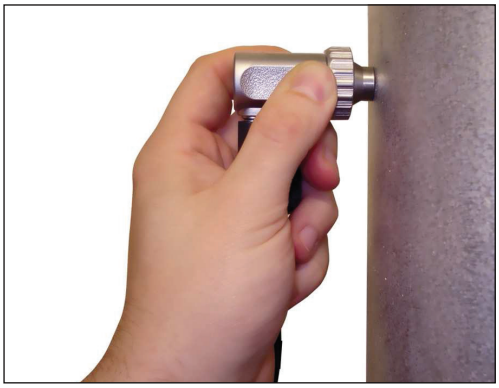
K4N/E transducers

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



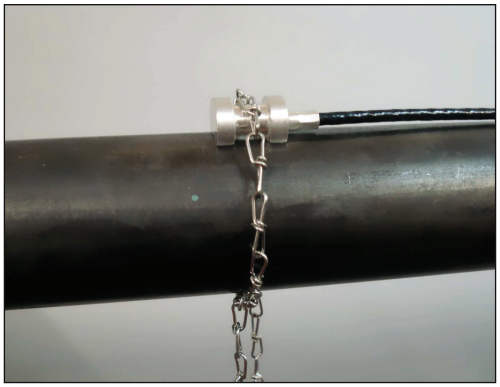
Wall thickness gauge NT in use

Wall thickness gauge used with KATflow 230

Specification: PT100 sensors

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

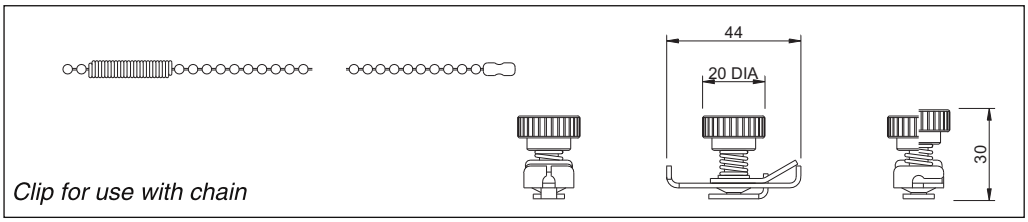
Soft case

Specification: Transducer mounting accessories

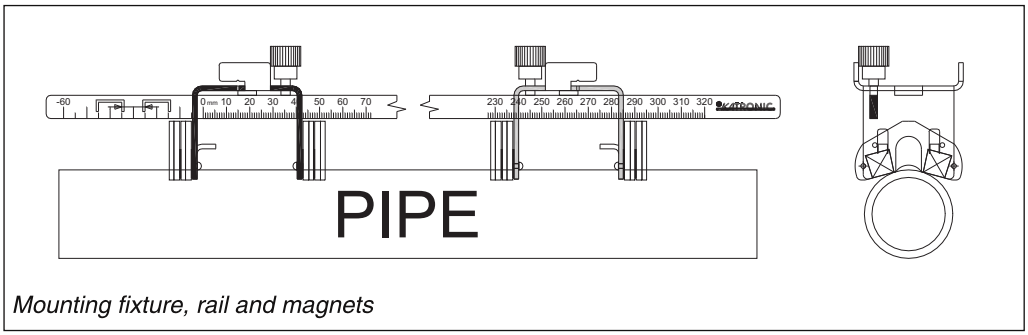
General

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)

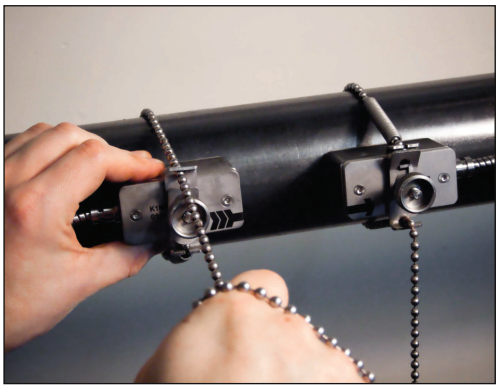
Drawings and images



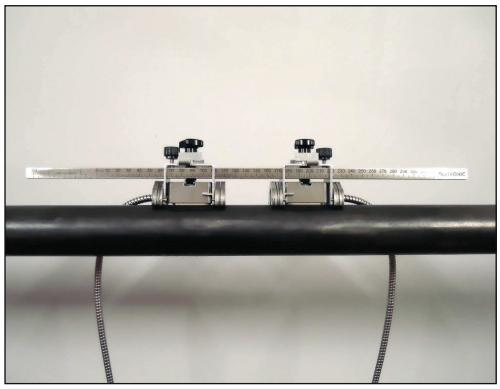
Clip for use with chain



Mounting fixture, rail and magnets



Transducers mounted using clips and chains



Mounting fixture, rail and magnets

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									
		Internal code									
		03	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)						
					Process inputs/outputs (select a maximum of 4 slots)						
					N	Without					
					C	Current output, 0/4 ... 20 mA, active (source)					
					D	Digital output, Open-Collector (pulse)					
					R	Digital output, relay					
					AA	2 x PT100 temperature input for 1-channel heat quantity measurement (select HQM option no. 1) [1]					
					AAAA	4 x PT100 temperature input for 2-channel heat quantity measurement (select HQM option no. 2) [1]					
						Internal data logger					
						0	Without				
						2	30,000 measurements, KATdata+ download software, USB cable				
						4	100,000 measurements, KATdata+ download software, USB cable				
							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 sensors		
								2	With HQM incl. 4 x PT100 sensors		
									Sound velocity output (SVO) [2]		
									0	Without	
									1	With SVO	
										Optional items	
											Without (leave space blank)
										BP	External battery pack for long-term power supply

KF230 – 1 – 03 – 1 – 1 – C – 2 – 1 – 0 – 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 (1-channel for one circuit, 2-channels for two circuits).
2) For contactless product recognition and interface detection.

Configuration code: Transducers and accessories

K1	Transducer pair, pipe diameter range 50 ... 3000 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 -40 ... 130 °C, including acoustic coupling paste					
	E	Process temperature -30 ... 200 °C, including acoustic coupling paste					
	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 consult factory)			
				Transducer mounting accessories			
				00	Without		
				30	Clamping set DN 10 ... 40		
				40	Clips and chains DN 15 ... 310		
				50	Clips and chains 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)		
				Z	Special (please consult factory)		
					Transducer connection and extension cables		
					P		ODU/LEMO transducer plug
					PJ		ODU/LEMO transducer plug with junction box (for L transducers)
						E000	Without extension cable
						E005	With extension cable, 5 m length
						E010	With extension cable, 10 m length
						E___	With extension cable, (specify length in m)
					Z		Special (please specify)
							Optional items
							Without (leave space blank)
						CA	5-point calibration with certificate

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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