

## KATflow 210

### Integrated Clamp-On Ultrasonic Flowmeter

ROUGH. ROBUST. REMOTE.

The KATflow 210 is a portable flowmeter designed for situations which require a reliable flow measurement regardless of the conditions in which it needs to be operated. With its advanced battery technology and durable waterproof housing the instrument is intended for long-term installation in remote areas where access to power is limited and exposure to the worst of

elements is likely. This device has been further enhanced by the inclusion of a specially manufactured IP 68 version of the K1N stainless steel transducers which increases shock protection and ensures this ruggedised package provides the perfect balance of reliability, robustness and autonomy.



# Katronic

## Your Solution Starts With Our Product

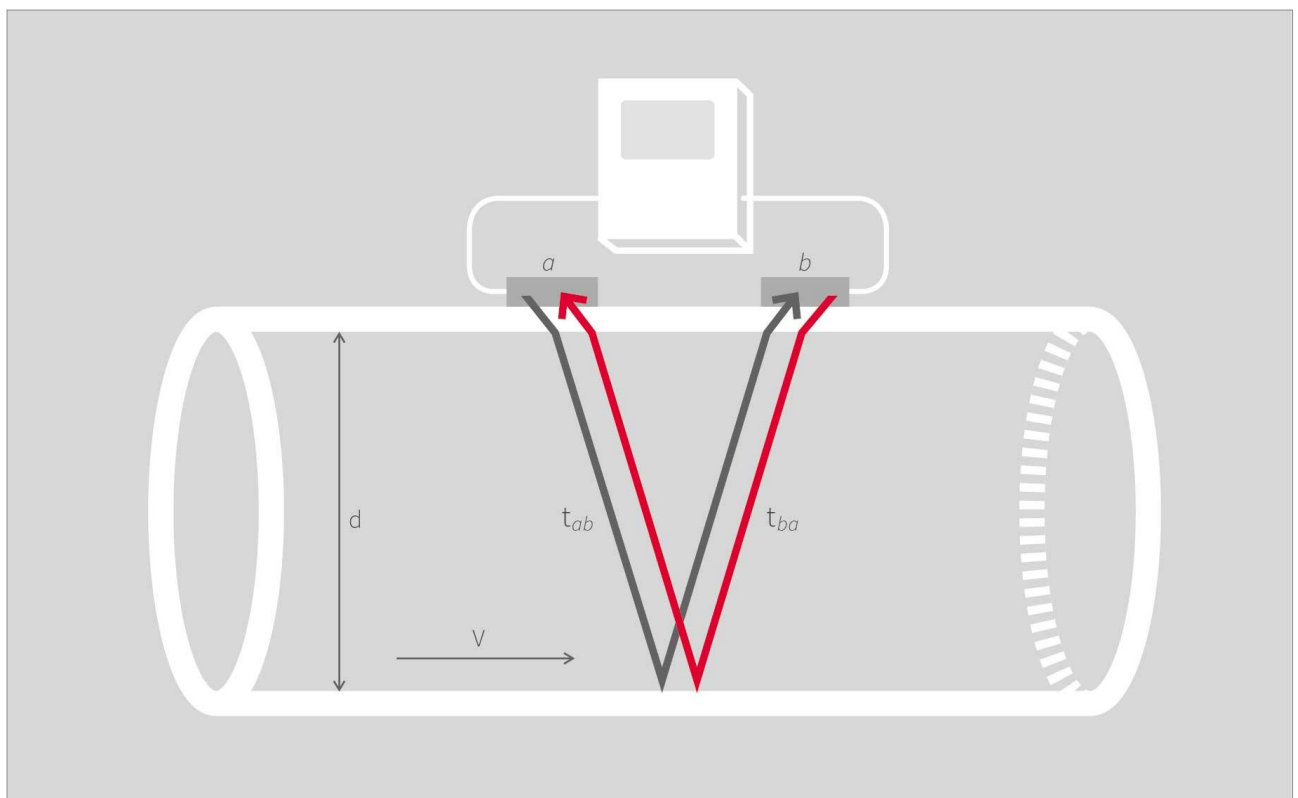
### THE TECHNOLOGY BEHIND THE MEASUREMENT

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*.

Portable

-30°C +130°C



## SPECIFICATION

- Pipe diameter range 25 mm to 2,500 mm
- Temperature range for sensors  
-30 °C to +130 °C (-22 °F to +266 °F)
- Rugged integrated IP 67 portable design
- Weight 6 kg
- Selectable three-line LCD display and full keypad
- Battery life up to 100 days with rapid charging

## FEATURES

- Three different operating modes to maximise battery life
- Process output options including current, open-collector, relay
- Compact housing 260 (h) x 280 (w) x 200 (d) mm
- IP 68 stainless steel sensors, cable and connectors as standard
- Large data logger and software for sampling and data transfer
- Innovative installation wizard for quick and intuitive programming

## ACCESSORIES

- Optional wireless data transmission
- KATdata+ software for data evaluation
- Optional pipe wall thickness gauge

## APPLICATIONS

- Long-term leakage surveys
- Metering in pits, wells and areas where flooding is likely
- In-line flowmeter inspection verification
- Metering of pipes in exposed locations
- Temporary replacement of conventional in-line flowmeters

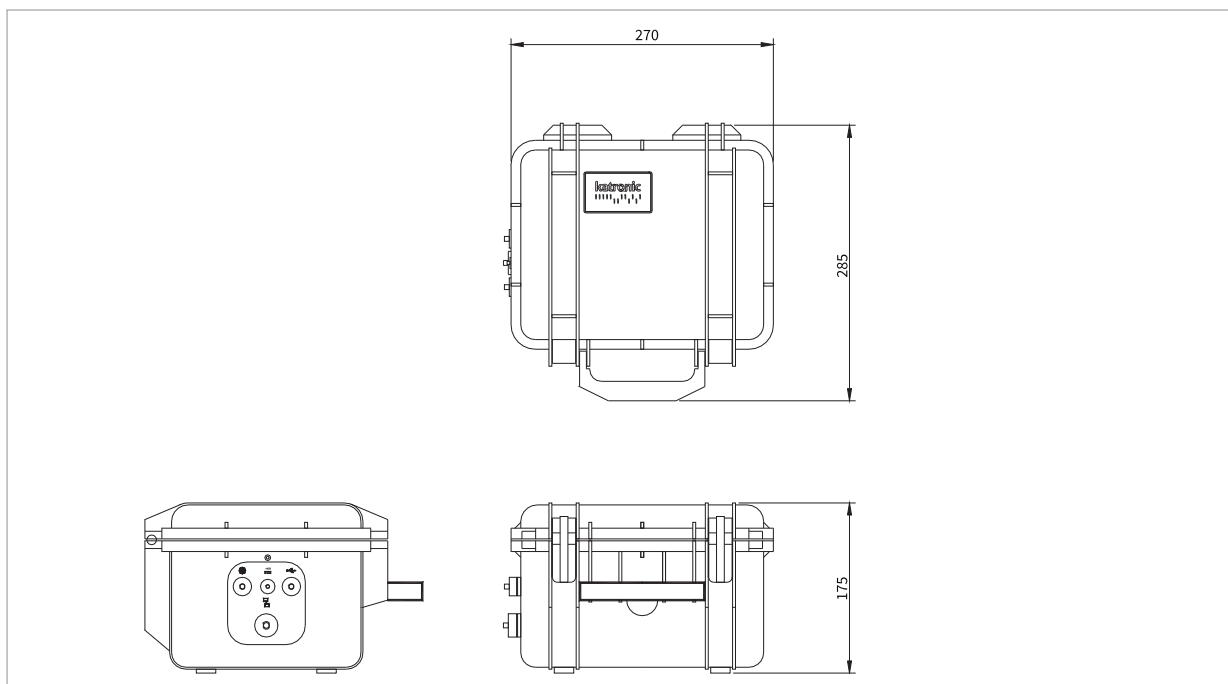


## FLOWMETER

### Performance

|                                           |                                                                                                                                                                                                     |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Measurement principle                     | Ultrasonic transit-time difference                                                                                                                                                                  |
| Flow velocity range                       | $\pm 0.01 \dots 25 \text{ m/s}$                                                                                                                                                                     |
| Resolution                                | $0.25 \text{ mm/s}$                                                                                                                                                                                 |
| Repeatability                             | $0.15 \%$ of measured value, $\pm 0.015 \text{ m/s}$                                                                                                                                                |
| Accuracy                                  | Volume flow:<br>$\pm 1 \dots 3 \%$ of measured value depending on application<br>$\pm 0.5 \%$ of measured value with process calibration<br>Flow velocity (mean):<br>$\pm 0.5 \%$ of measured value |
| Turn down ratio                           | $1/100$ (equivalent to $0.25 \dots 25 \text{ m/s}$ )                                                                                                                                                |
| Measurement rate                          | $100 \text{ Hz}$ (standard)                                                                                                                                                                         |
| Response time                             | $1 \text{ s}$                                                                                                                                                                                       |
| Damping of displayed value                | $0 \dots 99 \text{ s}$ (selectable by user)                                                                                                                                                         |
| Gaseous and solid content of liquid media | $< 10 \%$ of volume                                                                                                                                                                                 |

### Images



KATflow 210 (dimensions in mm)

### General

|                       |                                                                                                                                                                                                                                                      |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Enclosure type        | Portable                                                                                                                                                                                                                                             |
| Degree of protection  | IP 67 according to EN 60529                                                                                                                                                                                                                          |
| Operating temperature | -10 ... +60 °C (+14 ... +140 °F)                                                                                                                                                                                                                     |
| Housing material      | Polypropylene Copolymer                                                                                                                                                                                                                              |
| Measurement channels  | 1 standard (2 on request)                                                                                                                                                                                                                            |
| Calculation functions | <i>Average, difference, sum, maximum</i> (dual-channel use only)                                                                                                                                                                                     |
| Power supply          | 1, 2 or 3 x LiFePo4 12.4 Ah<br>Power adapter: 100 ... 240 V AC input, 9 V DC output                                                                                                                                                                  |
| Operating time        | 1 battery pack - up to 7 days continuous operation,<br>30 days in saver mode*<br>2 battery packs - up to 14 days continuous operation,<br>60 days in saver mode*<br>3 battery packs - up to 21 days continuous operation,<br>100 days in saver mode* |
| Display               | LCD graphic display, 128 x 64 dots, backlit                                                                                                                                                                                                          |
| Dimensions            | 260 (h) x 280 (w) x 200 (d) mm                                                                                                                                                                                                                       |
| Weight                | Approx. 6 kg                                                                                                                                                                                                                                         |
| Operating languages   | English, French, German, Dutch, Spanish, Italian,<br>Russian, Czech, Turkish, Romanian (others on request)                                                                                                                                           |

\* Based on normal operating conditions, with no process outputs enabled.

### Images



Integrated IP 67 KATflow 210



KATflow 210 in operation

### Communication

|                  |                                                                            |
|------------------|----------------------------------------------------------------------------|
| Type             | USB cable                                                                  |
| 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<br>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<br>Linux                                                                                                        |

### Quantity and units of measurement

|                      |                                                                                                                                                                            |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Volumetric flow rate | m <sup>3</sup> /h, m <sup>3</sup> /min, m <sup>3</sup> /s, l/h, l/min, l/s<br>USgal/h (US gallons per hour), USgal/min, USgal/s<br>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 <sup>3</sup> , l, gal (US gallons), bbl                                                                                                                                  |
| Mass                 | g, kg, t                                                                                                                                                                   |
| Heat flow            | W, kW, MW (with heat quantity measurement option)                                                                                                                          |
| Heat quantity        | J, kJ, kWh (with heat quantity measurement option)                                                                                                                         |
| Temperature          | °C (with heat quantity measurement option)                                                                                                                                 |

### Process outputs\* (galvanically isolated)

|                        |                                                                                                |
|------------------------|------------------------------------------------------------------------------------------------|
| Current                | 0/4 ... 20 mA active ( $R_{Load} < 500 \Omega$ ), 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 A SPST (NO), U = 48 V, $I_{max} = 250$ mA                                                 |

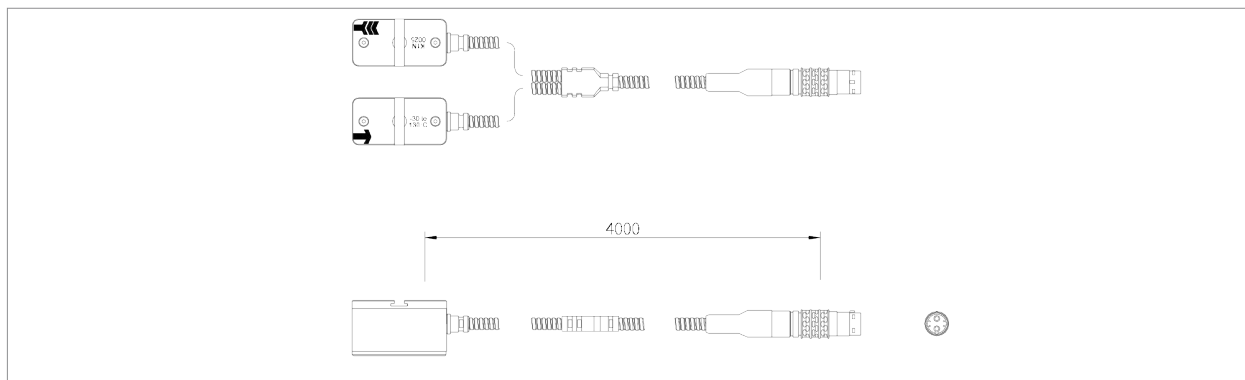
\* Further process outputs available on application.

## TRANSDUCERS

### K1N

|                            |                                     |
|----------------------------|-------------------------------------|
| Pipe diameter range        | 25 ... 2,500 mm                     |
| Dimensions of sensor heads | 60 (h) x 30 (w) x 34 (d) mm         |
| Material of sensor heads   | Stainless steel                     |
| Material of cable conduits | Stainless steel                     |
| Temperature range          | -30 ... +130 °C (-22 ... +266 °F)   |
| Degree of protection       | IP 68 (1.5 m) according to EN 60529 |
| Standard cable lengths     | 4.0 m                               |

### Images



K1N transducers



K1N transducers with ODU/LEMO connector



KATflow 210 output connectors

## TRANSDUCER MOUNTING ACCESSORIES

### General

Diameter range and mounting types

Clamping set (metal strap with screw),  
stainless steel: DN 10 ... 40

Clips and chains, chain length 1 m,  
stainless steel: DN 15 ... 310

Clips and chains, chain length 2 m,  
stainless steel: DN 25 ... 600

Clips and chains, chain length 4 m (2 x 2 m),  
stainless steel: DN 25 ... 1,200

Textile tension straps, up to 15 m in length:  
DN 1,000 ... 3,000 (6,500)

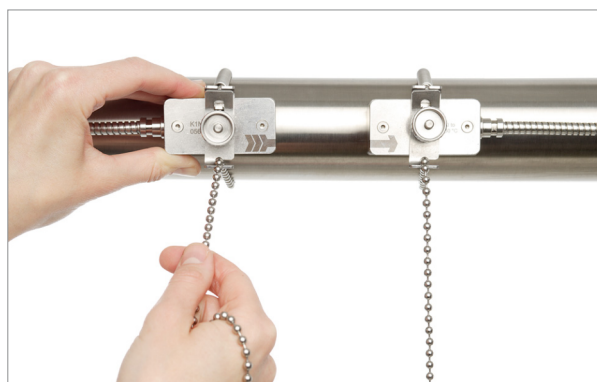
### Images



Mounting clip and chains for use with portable flowmeter



Mounting clip



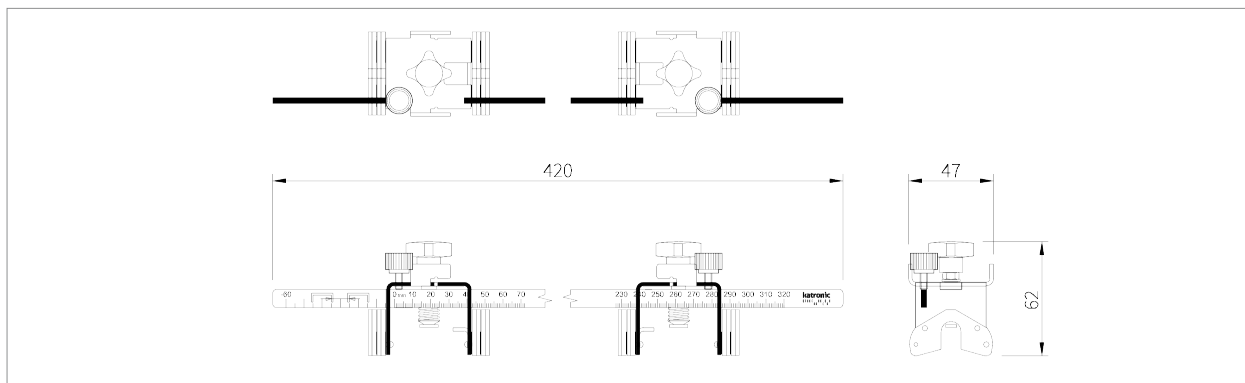
Transducers mounted using chains and clips

## General

Diameter range and mounting types

Mounting fixture, rail and magnets (for type K1)  
DN 50 ... 3,000

## Images



Mounting fixture, rail and magnets



Mounting fixture, rail and magnets



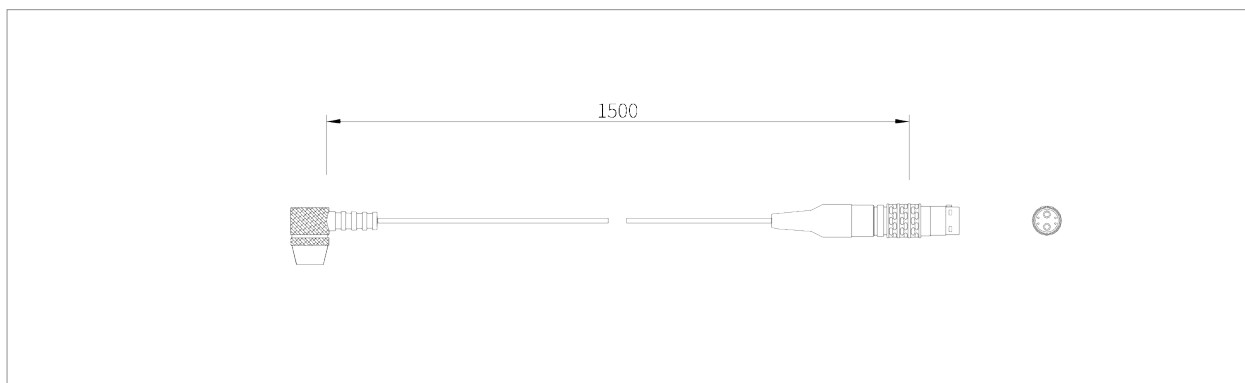
KATflow 210 with mounting rail and transducers

## WALL THICKNESS GAUGE (OPTIONAL)

### Wall thickness gauge NT

|                   |                                  |
|-------------------|----------------------------------|
| Temperature range | -20 ... +100 °C (-4 ... +212 °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



Wall thickness gauge NT with ODU/LEMO connector



Wall thickness gauge NT and KATflow 210 in use

## FLOWMETER AND ACCESSORIES

|                                                      |                                                                     |
|------------------------------------------------------|---------------------------------------------------------------------|
| KF 210                                               | KATflow 210, serial interface RS 232, operating instructions        |
| <b>Configuration</b>                                 |                                                                     |
| 0                                                    | Basic unit without accessories                                      |
| 1                                                    | With soft case, power adapter/battery charging unit, measuring tape |
| <b>Number of measurement channels</b>                |                                                                     |
| 1                                                    | 1 measurement channel                                               |
| 2                                                    | 2 measurement channels (please consult factory)                     |
| <b>Internal code</b>                                 |                                                                     |
| 03                                                   | Internal code                                                       |
| <b>Battery size</b>                                  |                                                                     |
| 1                                                    | 1 x 12.4 LiFePo4 cell 12.4 Ah                                       |
| 2                                                    | 2 x 12.4 LiFePo4 cell 24.8 Ah                                       |
| 3                                                    | 3 x 12.4 LiFePo4 cell 37.2 Ah                                       |
| <b>Power adapter</b>                                 |                                                                     |
| 0                                                    | Without                                                             |
| 1                                                    | UK                                                                  |
| 2                                                    | US                                                                  |
| 3                                                    | Europe                                                              |
| 4                                                    | Australia                                                           |
| <b>Degree of protection</b>                          |                                                                     |
| 1                                                    | IP 67 (standard)                                                    |
| <b>Process outputs (select a maximum of 5 slots)</b> |                                                                     |
| 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                              |
| V                                                    | Voltage output, 0 ... 10 V                                          |
| F                                                    | Frequency output, 2 Hz ... 10 kHz                                   |
| Z                                                    | Special (please specify)                                            |
| <b>Internal data logger</b>                          |                                                                     |
| 0                                                    | Without                                                             |
| 1                                                    | 30,000 measurements, KATdata+ download software, USB cable          |
| 2                                                    | 100,000 measurements, KATdata+ download software, USB cable         |
| <b>Wall thickness measurement</b>                    |                                                                     |
| 0                                                    | Without                                                             |
| 2                                                    | Wall thickness gauge NT                                             |

**KF 210** - **1** - **1** - **03** - **1** - **1** - **1** - **N** - **1** - **0** (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.



## TRANSDUCERS AND ACCESSORIES

|       |                                                                                             |
|-------|---------------------------------------------------------------------------------------------|
| K1    | Transducer pair, pipe diameter range 25 ... 2,500 mm                                        |
|       | <b>Temperature range</b>                                                                    |
| N     | Process temperature -30 ... +130 °C (-22 °F to +266 °F) , including acoustic coupling paste |
|       | <b>Internal code</b>                                                                        |
| 3     | Internal code                                                                               |
|       | <b>Degree of protection</b>                                                                 |
| 1     | IP 68                                                                                       |
|       | <b>Transducer mounting accessories</b>                                                      |
| 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 ... 1,200                                                            |
| 70    | Textile tension straps DN 1,000 ... 6,500                                                   |
| 90    | Mounting fixture, rail and magnets DN 50 ... 3,000 (optional for transducer type K1)        |
| Z     | Special (please consult factory)                                                            |
|       | <b>Transducer connection and extension cables</b>                                           |
| P     | ODU/LEMO transducer plug                                                                    |
|       | <b>Extension cables</b>                                                                     |
| E____ | With extension cable (specify length in m)                                                  |
|       | <b>Optional items</b>                                                                       |
|       | Without (leave space blank)                                                                 |
| CA    | 5-point calibration with certificate                                                        |
| K1    | N - 3 - 1 - 50 - P E010 / (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.

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