arkon flow systems

Hand-Held Clamp-On Ultrasonic Flowmeter

USC X200

Technical datasheet

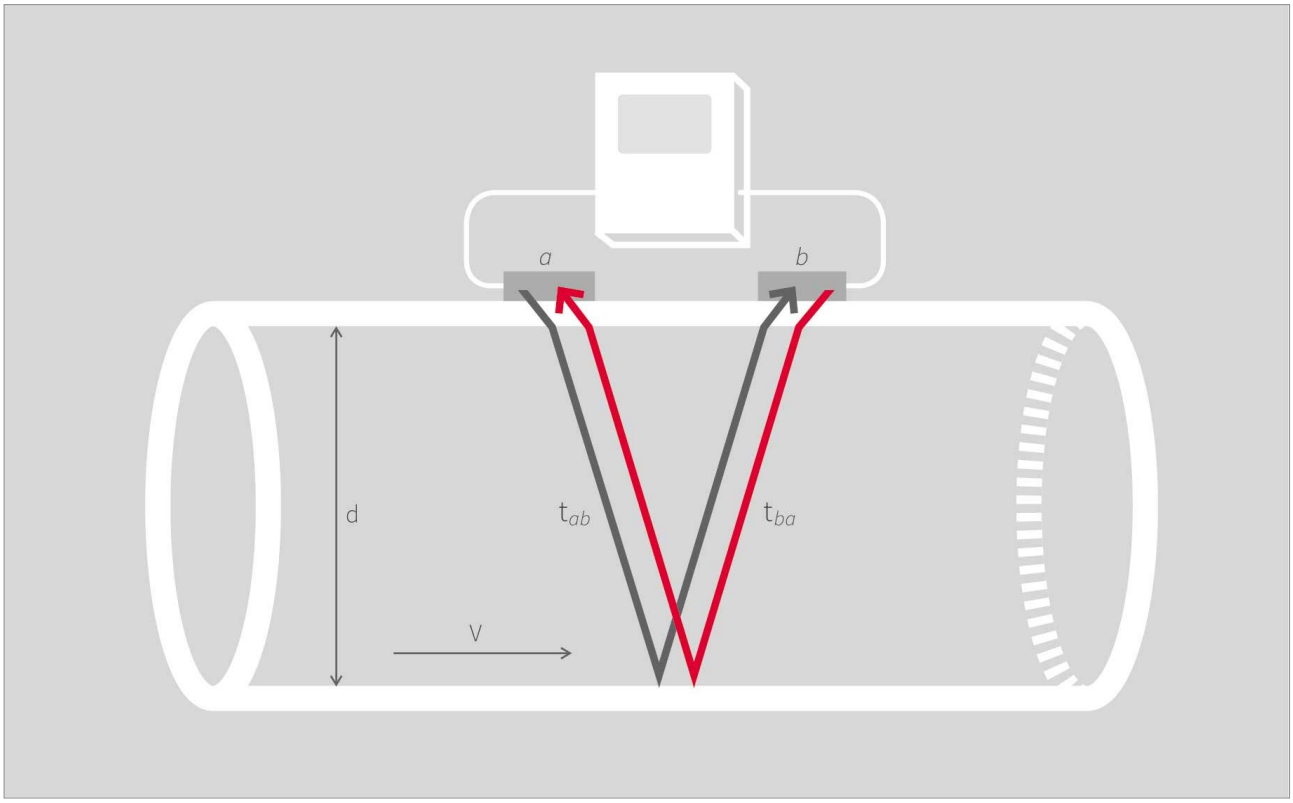
Flow Measurement & Control Specialists

THE TECHNOLOGY BEHIND THE MEASUREMENT

The USCX series 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. We use 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*.

SPECIFICATION

- Pipe diameter range 10 mm to 6,500 mm
- Temperature range for sensors
  -30 °C to +250 °C (-22 °F to +482 °F)
- Weight 650 g
- Robust IP 65 enclosure with added rubber shock protector
- Selectable three-line LCD display and full keypad
- Battery life up to 24 hours with standard NiMH AA batteries for simple replacement

FEATURES

- Lightweight and tactile for easy one-handed use
- Stainless steel sensors, cable and connectors as standard
- Innovative installation wizard for quick and intuitive programming
- Full instrument diagnostics and scope function
- Large data logger and software for sampling and data transfer

ACCESSORIES

- Optional pipe wall thickness gauge
- Crush-proof IP 67 transport case or lightweight soft case
- Special waterproof solution available for harsh environmental conditions
- Software for data evaluation
- Optional external battery pack available for long-term measurements

APPLICATIONS

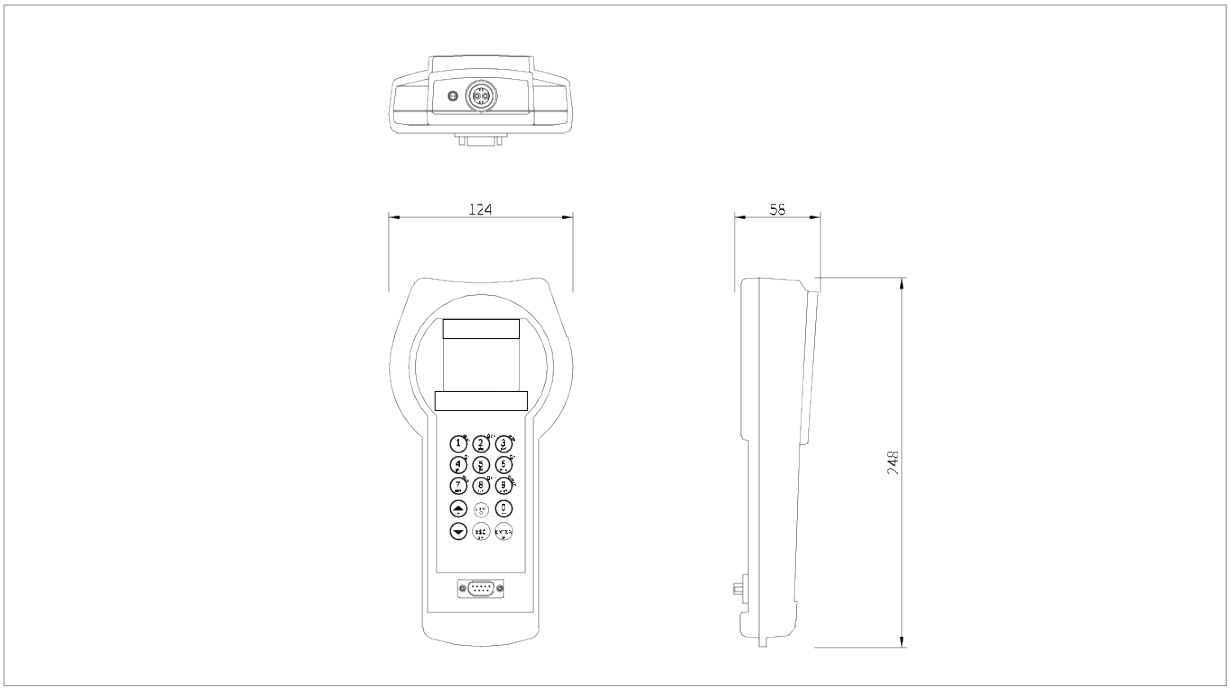
- Pump testing and inspection
- In-line flowmeter performance verification
- Leakage and blockage detection
- Clean in process system (CIP) testing
- Monitoring of hydraulic systems
- Clean room applications

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	100 Hz (standard)
Response time	1 s
Damping of displayed value	0 ... 99 s (selectable by user)
Gaseous and solid content of liquid media	< 10 % of volume

Images



USCX200 (dimensions in mm)

General

Enclosure type	Hand-held
Degree of protection	IP 65 according to EN 60529
Operating temperature	-10 ... +60 °C (+14 ... +140 °F)
Housing material	ABS (UL 94 HB)
Measurement channels	1
Power supply	Internal rechargeable batteries: 4 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	228 (h) x 72/124 (w) x 58 (d) mm (without cable glands)
Weight	Approx. 650 g
Power consumption	< 3 W
Operating languages	English, French, German, Dutch, Spanish, Italian, Russian, Czech, Turkish, Romanian (others on request)

Communication

Type	RS 232, USB cable (optional)
Transmitted data	Measured and totalised value, parameter set and configuration, logged data

Images

USCX200 in crush-proof IP 67 transport case

USCX200 in operation

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

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

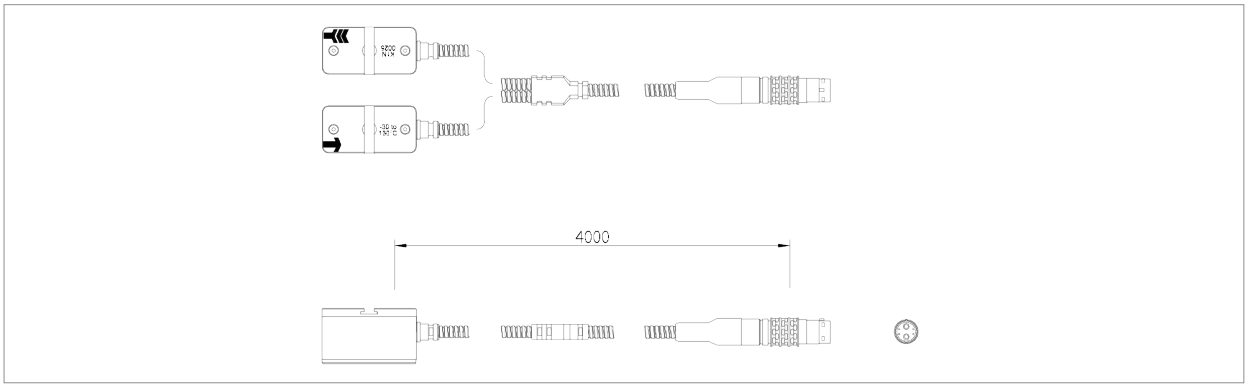
Volumetric flow rate	m^3/h, m^3/min, m^3/s, l/h, l/min, l/s USgal/h (US gallons per hour), USgal/min, USgal/s bbl/d (barrels per day), bbl/h, bbl/min
Flow velocity	m/s, ft/s, inch/s
Mass flow rate	g/s, t/h, kg/h, kg/min
Volume	m^3, l, gal (US gallons), bbl
Mass	g, kg, t

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 ... +392 °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



K1N/E transducers

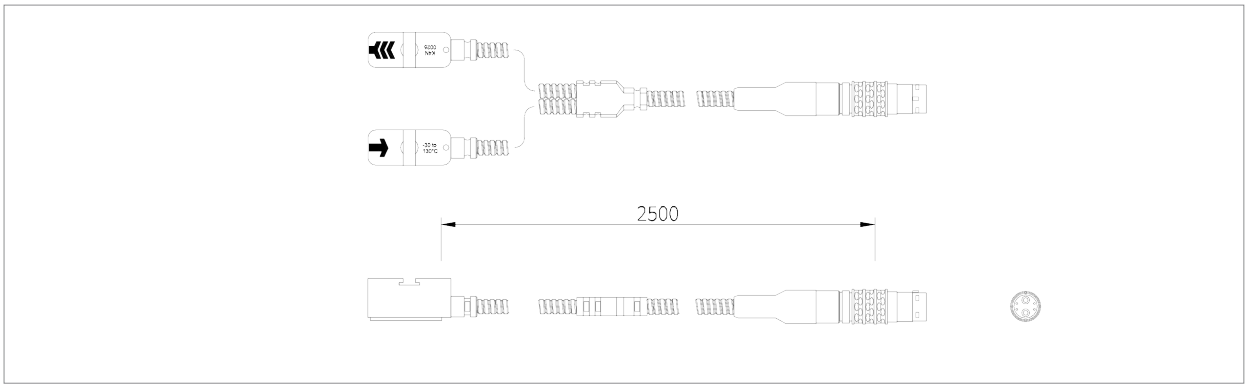
K1L transducers

K1N/E transducers with ODU/LEMO connector

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 ... +200 °C (-22 ... +392 °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 with ODU/LEMO connector

TRANSDUCER MOUNTING ACCESSORIES

General

Diameter range and mounting types

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

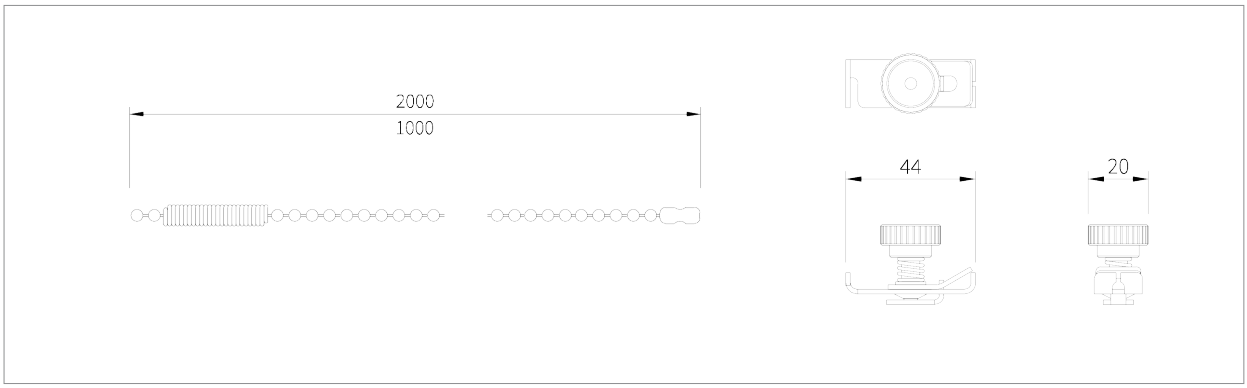
Clips and chains, chain length 1 m,
stainless steel: DN 15 ... 310

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

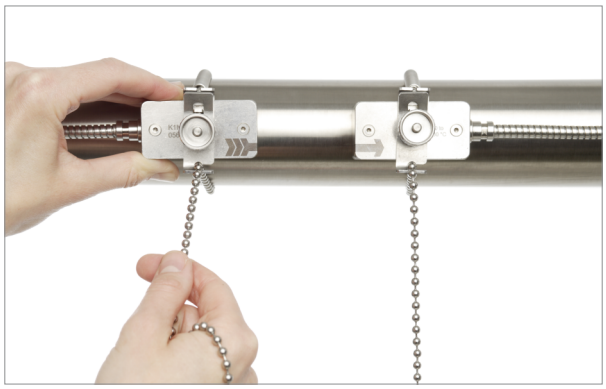
Textile tension straps, up to 15 m in length:
DN 1,000 ... 3,000 (6,500)

Images



Mounting clip and chains for use with portable flowmeter

Mounting clip

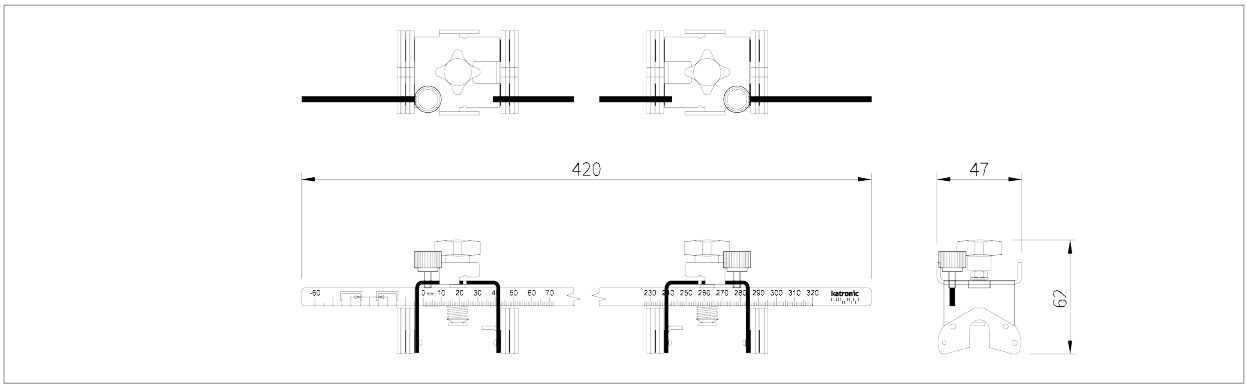


Transducers mounted using chains and clips

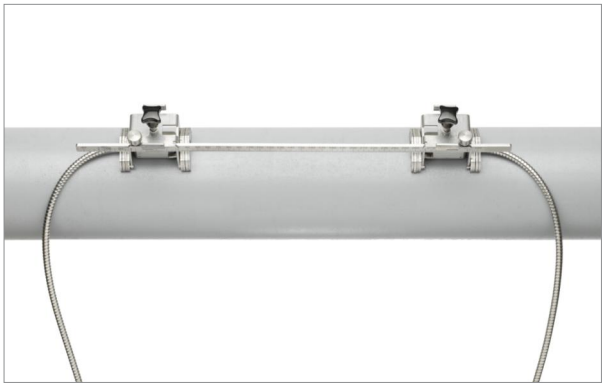
General

Diameter range and mounting types	Mounting fixture, rail and magnets (for type K4) DN 10 ... 250 Mounting fixture, rail and magnets (for type K1) DN 50 ... 3,000
Mounting fixture for flexible hoses	Custom made mounting bracket, stainless steel (available on request)

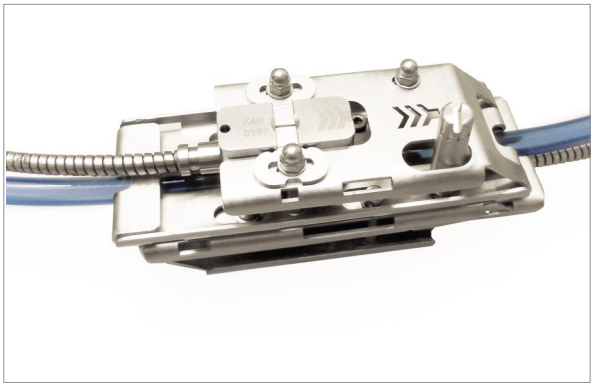
Images



Mounting fixture, rail and magnets



Mounting fixture, rail and magnets



Example of mounting fixture for flexible hoses

WALL THICKNESS GAUGES (OPTIONAL)

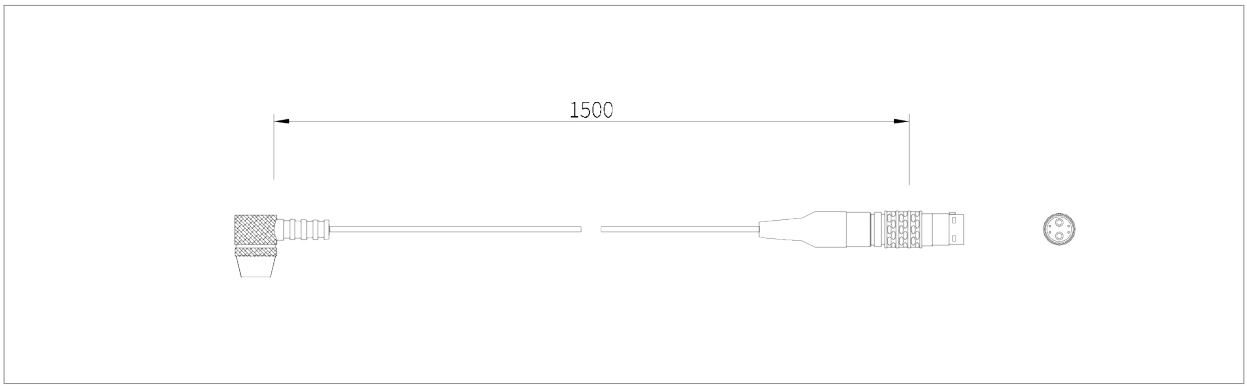
Wall thickness gauge NT

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

Wall thickness gauge HT

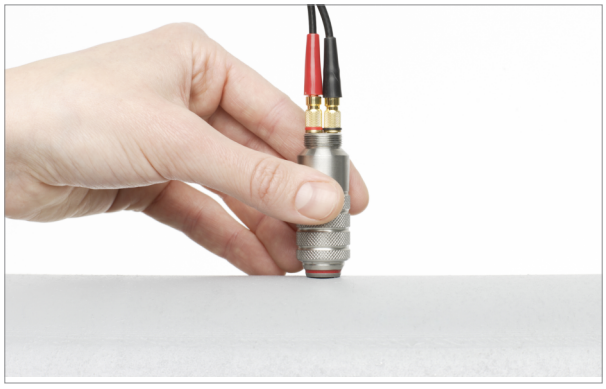
Temperature range	0 ... +500 °C (+32 ... +932 °F)
Measuring range	1.0 ... 200 mm
Resolution	0.01 mm
Linearity	0.1 mm
Cable length	1.5 m

Images



Wall thickness gauge NT

Wall thickness gauge NT with USCX200 in use



Wall thickness gauge HT in use

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 according to EN 60529
Outside material	Polypropylene/resin compound
Inside material	High-density polyurethane foam

Soft transport case

Dimensions (external)	240 (h) x 350 (w) x 180 (d) mm
Weight (empty)	500 g
Degree of protection	No IP rating
Outside material	Nylon
Inside material	Nylon

Images

Crush-proof IP 67 transport case


USCX200 soft transport case

FLOWMETER AND ACCESSORIES

USCX200		Hand-held USCX200, one measurement channel, 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)
	Internal data logger	
	0	Without
	1	30,000 measurements, download software, RS 232 cable
	2	30,000 measurements, download software, USB cable
	3	100,000 measurements, download software, RS 232 cable
	4	100,000 measurements, download software, USB cable
	Wall thickness measurement	
	0	Without
	2	Wall thickness gauge NT
	3	Wall thickness gauge HT
	Optional items	
		Without (leave space blank)
	BA	Spare battery set and external battery charging unit
	BP	External battery pack for long-term power supply
	Z	Special (please specify)

USCX200- 1 - 03-1- 1- 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 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 (for use with connection type PJ)
N	Process temperature -30 ... +130 °C, including acoustic coupling paste
E	Process temperature -30 ... +250 °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 specify)
	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 1,000 ... 6,500
80	Mounting fixture, rail and magnets DN 10 ... 250 (optional for transducer type K4)
90	Mounting fixture, rail and magnets DN 50 ... 3,000 (optional for transducer type K1)
Z	Special (please consult factory)
	Transducer connection and extension cables
P	ODU/LEMO transducer plug
PJ	ODU/LEMO transducer plug with junction box (transducer type L)
	Extension cables
E000	Without
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 - 1 - 1 - 50 - P E000 / (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.

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