

Ultrasonic Flowmeter

KATflow 150

- Transit-time correlation measurement
- Dual DSP-technology, coded signals for better measurement accuracy
- Wall mounted unit with graphic display
- Easy to install clamp-on sensors with no process interruption
- Non-invasive flow measurement of liquids or liquified gases
- Suitable for all commonly used pipe materials with pipe diameters from 10 mm (4/10") to 6.5 m (256")
- Two types of clamp-on sensors to cover complete pipe range, optional insertion sensors



Description

The KATflow range of non-invasive flowmeters utilises ultrasonic technology for the accurate flow measurement of liquids and liquified gases in full pipes.

The KATflow 150 is designed for permanent installation on applications where advanced options and configurations are required.

The measurement of flow is based on the principle that sound waves are influenced by a flowing medium. Measurements are made by penetrating the pipe with ultrasound and subsequently time differences, frequency variations and phase shifts of the ultrasonic signals are evaluated. This measuring technique has no effect on the flowing medium. There is no pressure loss in the pipe and no wear on components of the measuring device.

The ultrasonic sensors are clamped onto the outside of the pipe, thus eliminating the need to dismantle the pipework and interrupt the process. The KATflow 150 can be applied to any type of standard pipe carrying clean or dirty liquids and liquified gases. Where clamp-on sensors cannot be used, there are insertion type sensors available as an alternative.

Advantages

- Low installation effort and costs
- Measurement is independent of fluid conductivity
- No pressure loss, no possibility of leakage
- Retrospective installation for existing plants possible
- No cutting of pipes necessary, no interruption of process, no plant shut down
- No additional fittings for maintenance required
- Hygienic measurement, no risk of contamination, suitable for ultra clean liquids
- No contact with medium, no risk of corrosion when used with aggressive media
- Cost advantages when used with large diameter pipes, high pressure systems, etc.

Specification

General

Measuring principle :	Ultrasonic time difference correlation principle
Flow velocity range :	0.01 ... 25 m/s
Resolution :	0.25 mm/s
Repeatability :	0.15 % of measured value \pm 0.015 m/s
Accuracy :	<i>Volume flow</i> $\pm 1 \dots 3$ % of measured value depending on application, ± 0.5 % of measured value with process calibration <i>Flow velocity</i> ± 0.5 % of measured value
Turn down ratio :	1/100
Gaseous and solid content of liquid media :	< 10 % of volume

Flow transmitter

Enclosure :	Wall mounted housing
Degree of protection :	IP 66 according EN 60529
Operating temperature :	-10 ... 60 °C (14 ... 140 °F)
Housing material :	Plastic, ABS, Polycarbonate (transparent front door only)
Flow channels :	1 or 2
Power supply :	100 ... 240 V AC 50/60 Hz, 9 ... 36 V DC, specials upon request
Display :	LCD graphic display, 128 x 64 dots, backlit
Dimensions :	H 237 x W 258 x D 146 mm without cable glands
Weight :	Approx. 2.3 kg

Flow transmitter (cont.)

Power consumption	: < 5 W
Signal damping	: 0 ... 99 s
Measurement rate	: 10 ... 1000 s ⁻¹
Operating languages	: English, German, French, Spanish, Russian
Response time	: 1 s, faster rates upon request
Channel maths functions	: Average/difference/sum

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 (only with heat quantity measurement option)
Heat quantity	: J, kJ, MJ (only with heat quantity measurement option)

Internal data logger

Storage capacity	: approx. 30,000 samples (128 kByte), optional > 100,000 samples (512 kByte)
Logging data	: All measured and totalised values, parameter sets

Communication

Serial interface	: RS 232, RS 485 (optional)
Data	: Instantaneous measured value, parameter set and configuration, logged data

Software KATdata+

Functionality	: Downloading of measured values/parameter sets, graphical presentation, list format, export to third party software, on-line transfer of measured data
Operating systems	: Windows 2000, NT, XP, 07, Linux, Mac (optional)

Process inputs	: Galvanically isolated from main electronics and from other I/O's
Temperature	: PT 100, four-wire circuit, measuring range -50 ... 400 °C, resolution 0.01 K, accuracy ±0.1 K
Current	: 0 ... 20 mA active or 4 ... 20 mA passive, U = 30 V, R _i = 50 Ω, accuracy 0.1 % of MV

Process outputs	: Galvanically isolated from main electronics and from other I/O's
Current	: 0/4 ... 20 mA, active (R _{Load} < 500 Ω), 16 bit resolution, U = 30 V, accuracy = 0.1 %

Voltage	: Upon request, 0 ... 10 V, R _i = 500 Ω
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Digital (Open-Collector)	: Totaliser pulse, value 0.01 ... 1000/unit, width 30 ... 999 ms, U = 24 V, I _{max} = 4 mA
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Digital (relay)	: Alarm, fault (programmable) Form C (SPDT-CO) contacts, U = 48 V, I _{max} = 250 mA
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Clamp-on sensors

Type K1L, K1N, K1E

Diameter range	: 50 ... 3000 mm for type K1N/E 50 ... 6500 mm for type K1L
Dimensions	: 60 x 30 x 34 mm
Material	: Stainless steel
Temperature range	: <i>Type K1L:</i> -30 ... 80 °C (-22 ... 176 °F) <i>Type K1N:</i> -30 ... 130 °C (-22 ... 266 °F) <i>Type K1E:</i> -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 optional
Cable length	: 4 m (Type K1N, K1E), 10 m (Type K1L)

Type K4L, K4N, K4E

Diameter range	: 10 ... 250 mm
Dimensions	: 43 x 18 x 22 mm
Material	: Stainless steel
Temperature range	: <i>Type K4L:</i> -30 ... 80 °C (-22 ... 176 °F) <i>Type K4N:</i> -30 ... 130 °C (-22 ... 266 °F) <i>Type K4E:</i> -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 optional
Cable length	: 2.5 m (Type K4N, K4E), 10 m (Type K4L)

Type K1Ex, K4Ex

(for use in hazardous areas Zone 0, 1 or 2)

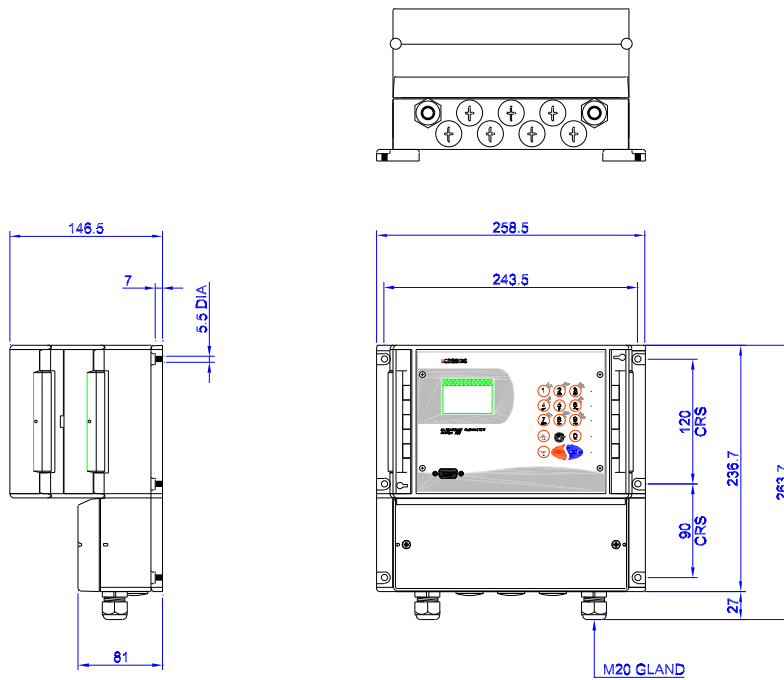
Diameter range	: <i>Type K4Ex:</i> 10 ... 250 mm <i>Type K1Ex:</i> 50 ... 3000 mm
Dimensions	: 60 x 30 x 34 mm
Material	: Stainless steel
Temperature range	: -50 ... +115 °C
Degree of protection	: IP 66 acc. EN 60529, IP 67 and IP 68 optional
Cable length	: 5 m
Protection concept	: Encapsulation
Certification code	: II 1 G Ex ma II T6 - T4 X (Gas) I 1 D Ex maD 20 IP68 T80°C - T115°C X (Dust)
Certificate	: CE0891 TRAC09ATEX11226X

Insertion sensors

Type KUS2.1

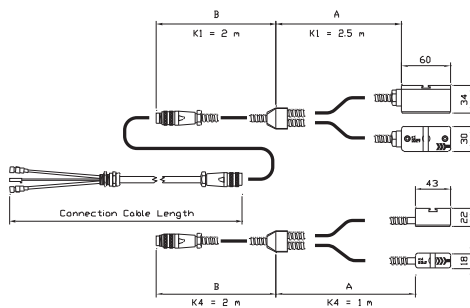
Diameter range	: 200 ... 2000 mm
Pressure rating	: PN10, PN 16, PN 40
Weld-on adapter	: 45° standard, 60° for pipes > 800 mm
Temperature range	: 0 ... 150 °C (32 ... 302 °F)
Material	: Stainless steel (sensors), carbon steel (weld-on adapter)
Degree of protection	: IP 54 (standard), IP 68 (optional)
Cable length	: 8 m standard, others on request
Hot-tap installation	: Possible

Flow transmitter



Ultrasonic flowmeter KATflow 150 - General arrangement

Clamp-on sensors

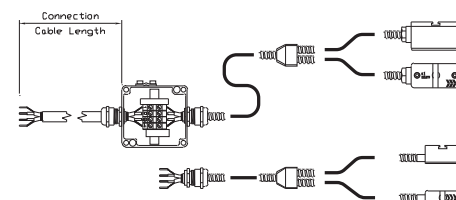


Transducer pair type K1 with Amphenol connector and connection cable

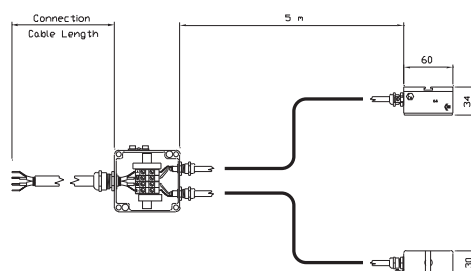
Transducer pair type K4 with Amphenol connector

Transducer pair type K1 with junction box and connection cable

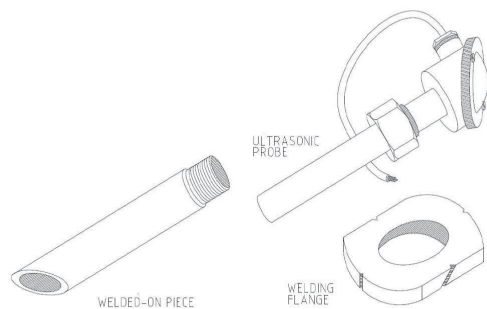
Transducer pair type K4 (direct sensor connection)



Hazardous area sensors type K1Ex and K4Ex with junction box and connection cable

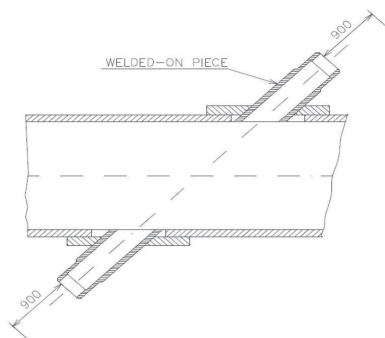
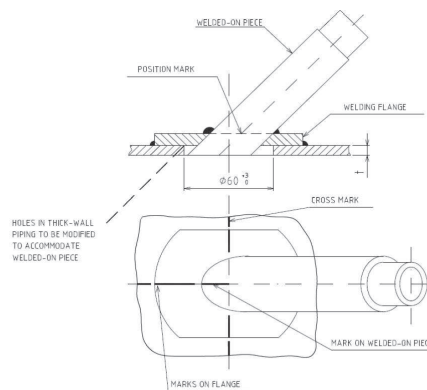


Insertion sensors



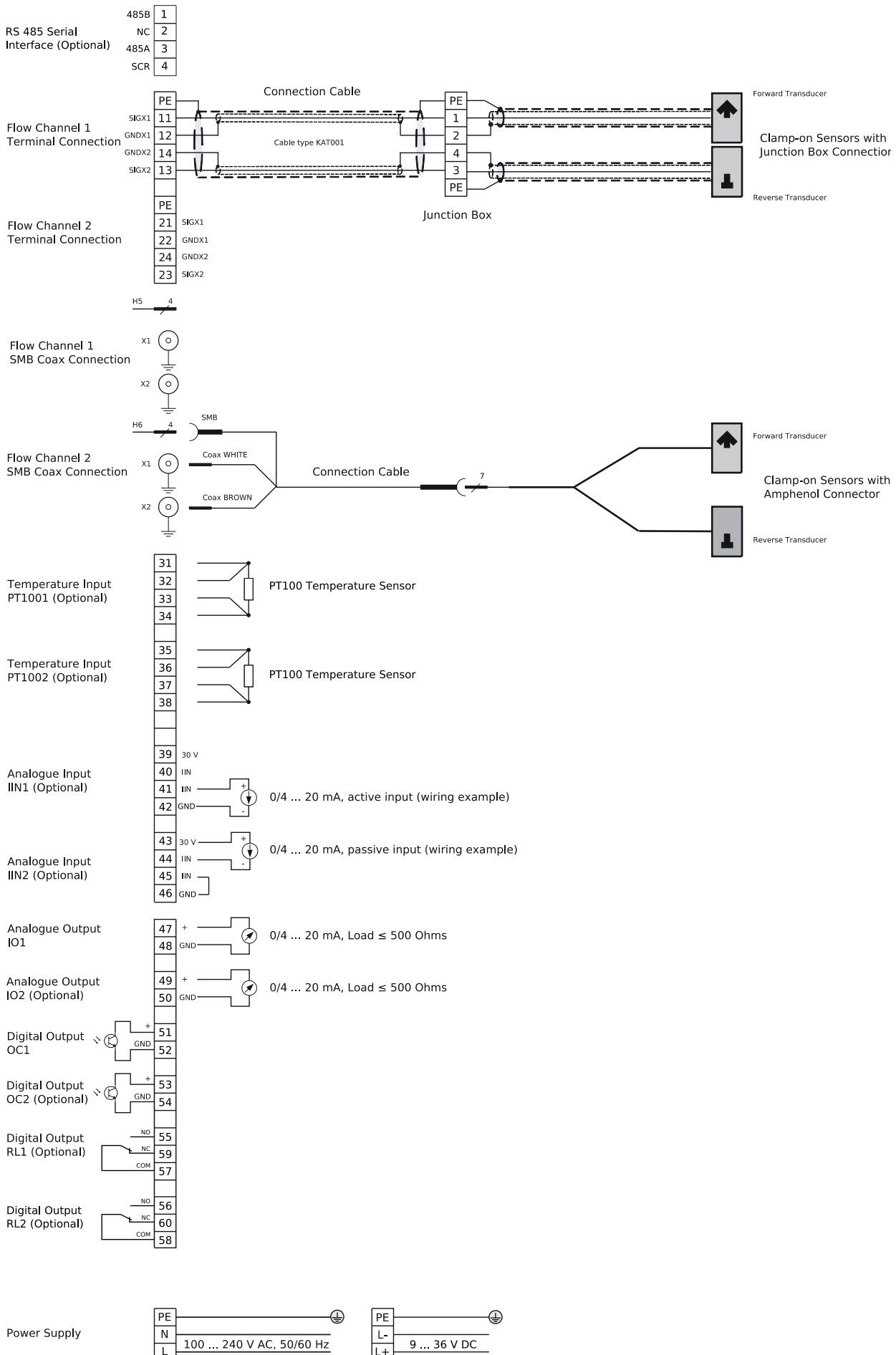
Insertion sensor type KUS2.1 assembly

Insertion sensor type KUS2.1 assembly installation



Insertion sensor type KUS2.1 installation requirements

Wiring diagram (typical)



Ordering information

KF150 Ultrasonic flowmeter KATflow 150, serial interface RS 232 including operating instructions

Number of flow channels

- 1 1 flow channel
- 2 2 flow channels

Power supply

- 1 100 ... 240 V AC, 50/60 Hz
- 2 9 ... 36 V DC
- Z Special (please specify)

Enclosure type

- 1 Plastic ABS, wall mount, IP 66
- Z Special (please consult factory)

Serial communication

- 0 Without
- 1 RS 485 serial interface
- Z Special (please consult factory)

Process outputs

Analogue outputs

- C1 1 x current output 0/4 ... 20 mA, active (source)
- C2 2 x current output 0/4 ... 20 mA, active (source)
- Z Special (please consult factory)

Digital outputs, Open-Collector

- D1 1 x digital output, Open-Collector
- D2 2 x digital output, Open-Collector
- Z Special (please consult factory)

Digital outputs, relay

- N Without
- R1 1 x digital output, relay
- R2 2 x digital output, relay
- Z Special (please consult factory)

Process inputs

Temperature inputs

- N Without
- A2 2 x PT100 temperature input
- Z Special (please consult factory)

Analogue inputs

- N Without
- B2 2 x current input 0/4 ... 20 mA, active/passive (source/sink)
- Z Special (please consult factory)

Internal data logger

- 0 Without
- 1 Standard 30,000 samples
- 2 Extended 100,000 samples
- Z Special (please consult factory)

Heat quantity measurement (HQM)

- 0 Without
- 1 With HQM incl. 2 x PT100 clamp-on sensors, 10 m cables*)
- Z Special (please consult factory)

Sound velocity measurement (SVM)

- 0 Without
- 1 With SVM
- Z Special (please consult factory)

Options

- Ex Hazardous area sensors
- SW With logger download SW and RS 232 cable
- SU With logger download SW and USB cable

KF150 - 2 - 1 - 1 - 1 - C1 D1 N - A2 N - 1 - 1 - 0 / * typical Order Code

/ * ... Leave blank for no optional items

*) ... Selection of process input option A2 (2 x PT100 temperature input) required

Clamp-on sensors

Pipe diameter range									
K1									Transducer pair, pipe diameter range 50 ... 3000 mm (K1N/K1E), 50 ... 6500 mm (K1L)
K4									Transducer pair, pipe diameter range 10 ... 250 mm
Z									Special
Temperature range									
L									Process temperature -30 ... 80 °C, including acoustic coupling component
N									Process temperature -30 ... 130 °C, including acoustic coupling component
E									Process temperature -30 ... 200 °C, including acoustic coupling component
Ex									Ex ma II T6 – T4, process temperature -50 ... +115 °C, including acoustic coupling component
Z									Special, process temperature up to 500 °C (please consult factory)
Internal code									
x									Version (internal code)
Degree of protection									
1									Degree of protection IP 66 (standard)
2									Degree of protection IP 67 (please consult factory for availability)
3									Degree of protection IP 68 (please consult factory for availability)
Transducer accessories									
0									No mounting accessories
1									With metallic straps and clamps, DN 40 ... 100
2									With metallic straps and clamps, DN 100 ... 3000
3									With clamping set DN 10 ... DN 40
A									With universal mounting frame FLEXIfix DN 50 ... 6500
Z									Special mounting accessories (please consult factory)
0									Without stainless steel tag
1									With stainless steel tag (please specify text)
Electrical connection and cable length									
0									Without connector/junction box (for fixed units)
C000									Direct sensor connection
A									With Amphenol connectors (for fixed units, not available for Ex sensors)
C010									Connection cable length 10 m
C___									Special (specify in m)
J									With junction box (for fixed units)
C005									Connection cable length 5 m
C010									Connection cable length 10 m
C020									Connection cable length 20 m
C050									Connection cable length 50 m
C___									Special (specify in m)
Z									Special (please consult factory)
xxxx									
Options									
CA									5-point calibration with certificate
K1	N	-	1	-	1	-	2	0	A - C010 / * typical Order Code

/ * ... Leave blank for no optional items

Insertion sensors

Sensor type KUS2.1: Specify pipe diameter, pipe material, pipe wall thickness, medium, process temperature range, pressure rating, degree of protection, required cable length, installation and tooling requirements.