

Ultrasonic Flowmeter

KATflow 160

- Dual mode flow transmitter
- Easy to install clamp-on sensors with no process interruption
- Non-invasive flow measurement of liquids, no pipeline disturbance, no pressure loss
- Suitable for all commonly used pipe materials with pipe diameters from 10 mm to 3 m (2/5" to 118")
- 1 or 2 flow channels, IP 66 field enclosure
- ATEX certified for hazardous areas Zone 1 & 2



Description

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

The field transmitter **KATflow 160** has been designed for permanent installations in potentially explosive atmospheres and for field applications with harsh environmental conditions. The opening of the enclosure is not required for instrument set-up and operation and without the necessity of a separate hand-held remote control or laptop computer.

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 liquid. 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 160** can be applied to any type of standard pipe carrying clean or dirty liquids.

Advantages

- Low installation effort and costs
- Measurement is independent of fluid conductivity and pressure
- 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.
- Low stocking costs, nearly all pipe sizes are covered with only 2 types of sensors
- Transmitter and sensors can be located in hazardous areas Zone 1 and 2

Specification

General

Measuring principle	: Ultrasonic transit-time correlation principle and Doppler-NoiseTrek™
Flow velocity range	: 0.01 ... 25 m/s
Resolution	: 0.025 cm/s
Repeatability	: 0.15 % of measured value ± 0.01 m/s
Accuracy	: <i>Volume flow</i> ± 1 ... 3 % ± 1.0 cm/s of measured value depending on application, ± 0.5 % ± 1.0 cm/s of measured value with process calibration <i>Flow velocity</i> ± 0.5 % ± 1.0 cm/s of measured value
Rangeability:	: 1/2500
Turn down ratio	: 1/100
Measurable liquids	: All acoustically conductive liquids with a gas or solid content of < 10 % of volume

Flow transmitter

Enclosure	: Field transmitter housing
Degree of protection	: IP 66 according EN 60529
Operating temperature	: -10 ... 50 °C (14 ... 122 °F)
Housing material	: Aluminium, powder coated
Weight	: Approx. 2.8 kg
Flow channels	: 1 or 2
Power supply	: 100 ... 240 V AC or 18 ... 36 V DC, specials upon request
Display	: 2 x 16 digit LCD, dot matrix, backlit
Keyboard	: Programming via internal 5 x micro switches or external access with magnetic pen
Dimensions	: W 140 x H 295 x D 260 mm (without cable glands and mounting support)
Power consumption	: < 15 W
Signal damping	: 0 ... 100 s, user configurable
Response time	: 1 s (1 channel), 70 ms optional
Measuring cycle	: 100 ... 1000 Hz (1 channel)
Calculation functions	: Average/difference/sum
Operating languages	: Selectable between Danish, English, German, French, Dutch, Norwegian, Polish, Czech, Spanish
Protection concept	: Flameproof (d), increased safety (e)
Certification code	:  II 2 G EEx de IIC T6 T _a -20 °C ... 60 °C
Certificate number	: IBExU02ATEX1134

Quantity and units of measurement

Volumetric flow rate	: m ³ /h, m ³ /min, m ³ /s, m ³ /day, l/h, l/min, l/s, Ml/day, USgph (US gallons per hour), USgpm, USgps, USgald, bbl/d (barrels per day), bbl/h, bbl/min, bbl/s
Flow velocity	: m/s, inch/s
Mass flow rate	: g/s, t/day, t/h, kg/h, kg/min
Volume	: m ³ , l, Ml, gal (US gallons), bbl
Mass	: g, kg, t

Communication

Serial interface	: RS 485 (optional)
Data	: Instantaneous measured value, totalised values, parameter set and configuration
Protocol	: KATnet , others upon request

PC Software KATdata

Functionality	: Downloading of measured values/parameter set, graphical presentation, list format, export to third party software, on-line transfer of measured data
Operating systems	: Windows™ 95, 98, ME, NT, 2000

Process outputs	: Galvanically isolated from main electronics
Current	: Max. 2 x 0/4 ... 20 mA; active (R _{ext} < 500 Ω)
Digital (pulse, status)	: Max. 2 x Open Collector 24 V DC/4 mA Max. 2 x relay contacts 48 V/0.1 A Totaliser pulse: 0.01 ... 1000/unit; width 80 ... 1000 ms Status: Limit, sign change or error

Clamp-on sensors

Type Q4N-Ex, M4N-Ex (for use in hazardous areas Zone 1 and 2)

Rated (possible) diameter range	: <i>Type Q4N-Ex:</i> 10 ... 400 mm <i>Type M4N-Ex:</i> (50) 100 ... 3000 mm
Dimensions	: 60 x 30 x 34 mm
Material	: Stainless steel, contact surface PEEK (Q-type), Polyimid (M-type)
Temperature range	: -20 ... 120 °C (-4 ... 248 °F) Specials up to 300 °C on request
Degree of protection	: IP 65 acc. EN 60529, specials on request
Protection concept	: Encapsulation
Certification code	: EEx m II T4 - T6
Certificate number	: IBExU98ATEX1012X

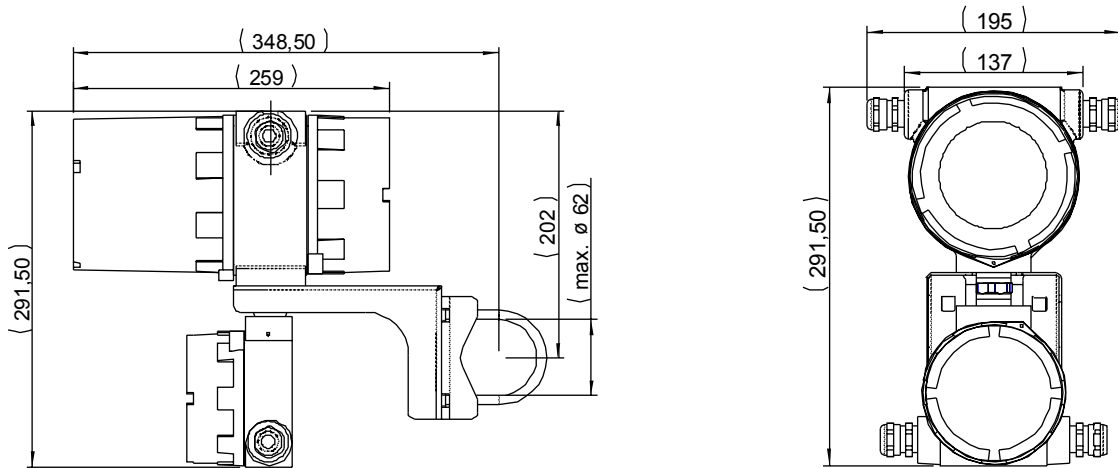
Connection cable (sensors to junction box)

Diameter	: (5.32 ± 0.2) mm
Length	: 5 m
Material	: TEFLON-FEP
Operating temperature:	: 200 °C (392 °F)

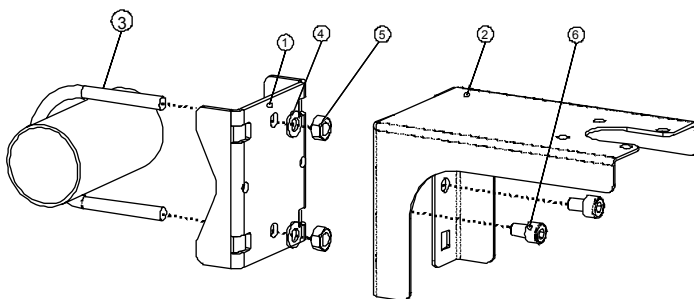
Connection cable (junction box to transmitter)

Diameter	: (11.5 ± 0.5) mm
Length	: 5 m, 10 m, 20 m, 50 m, other lengths as per order
Material	: Santoprene®
Operating temperature:	: 115 °C (339 °F)

External dimensions

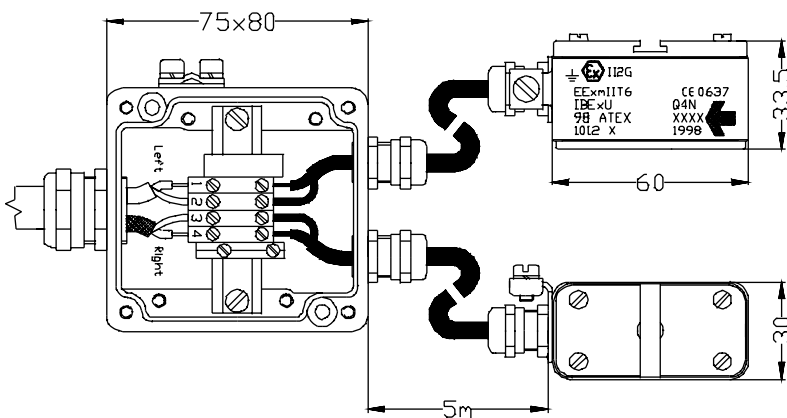


Flow transmitter **KATflow 160** (dimensions in mm)



Optional pipe mounting bracket

- 1 - Pipe fixture plate
- 2 - Instrument mounting plate
- 3 - Mounting clamp
- 4 ... 6 - Screws, nuts and washers



Clamp-on sensors type **Q4N/M4N-Ex-7-1-xx-J-C**...

Order code	KF 160 - x - x - x - x x x - x - x x									
Number of flow channels:										
1 flow channel	1									
2 flow channels	2									
Power supply:										
100 ... 240 V AC, 50/60 Hz	1									
18 ... 36 V DC	2									
Special (please specify)	Z									
Serial communication:										
None	0									
RS 485	1									
Special (please specify)	Z									
Process outputs:										
0/4 ... 20 mA, active (source)				C*						
Digital output, Open Collector				D**						
Digital output, relay				R***						
Enclosure:										
With front glass cover								1		
With blind cap								2		
Special (please specify)								Z		
Options:										
Without pipe mounting bracket									0	
With pipe mounting bracket									1	
Special (please specify)									Z	
Without stainless steel tag										0
With stainless steel tag (specify text)										1

Flow transmitter

Ordering examples:

KF160-1-1-1-C1D2R0-1-10

Ultrasonic Flowmeter model **KATflow 160**, 1 flow channel, 100 ... 240 V AC power supply, with RS485 serial interface, 1 x 0/4 ... 20 mA current output (source), 2 x digital outputs, Open Collector (pulse/status), with front glass cover, with pipe mounting bracket, without stainless steel tag

KF160-2-2-0-C2D2R2-1-01

Ultrasonic Flowmeter model **KATflow 160**, 2 flow channels, 18 ... 36 V DC power supply, without serial interface, 2 x 0/4 ... 20 mA current output (source), 2 x digital outputs, Open Collector (pulse/status), 2 x digital outputs, relay (pulse/status), with front glass cover, without pipe mounting bracket, with stainless steel tag

Notes:

* 1 x 0/4 ... 20 mA current output standard, max. 2 possible

** 1 x digital output, Open Collector, standard, max. 2 possible

*** Digital relay output optional, max. 2 possible

Clamp-on flow sensors

Ordering examples:

Q4N-Ex-7-1-10-J-C005

Transducer for pipe diameter range 10 ... 400 mm including acoustic coupling component, certified for hazardous area use, temperature range -20 ... 120 °C, degree of protection IP 65, with metallic straps and clamps for pipes DN 40 ... 100, without stainless steel tag, with junction box and 5 m connection cable

M4N-Ex-7-1-21-J-C025

Transducer for pipe diameter range (50) 100 ... 3000 mm including acoustic coupling component, certified for hazardous area use, temperature range -20 ... 120 °C, degree of protection IP 65, with metallic straps and clamps for pipes DN 100 ... 3000, with transducer tag, with junction box and 25 m connection cable

Order code	Transducer type	x	x	x	-	x	x	x	x	x	x	x	xxx
Pipe diameter range:													
10 ... 400 mm	Q												
with hazardous area approval	4	N-Ex											
(50) 100 ... 3000 mm	M												
with hazardous area approval	4	N-Ex											
Temperature range:													
Standard -20 ... 120 °C	N												
Version:													
Always				7									
Degree of protection:													
IP 65 (standard)								1					
Special								Z					
Transducer accessories:													
No mounting accessories											0		
With metallic straps and clamps for DN 40 ... 100											1		
With metallic straps and clamps for DN 100 ... 3000											2		
With clamping set for Q4N-Ex, DN 10 ... 40											3		
Special mounting accessories (please specify)											Z		
Without stainless steel tag												0	
With stainless steel tag (specify text)												1	
Electrical connections:													
With junction box												J	
Connection cable length:													
5 m													C 005
10 m													C 010
20 m													C 020
50 m													C 050
Special (specify in meter)													—