process measurement solutions

KDG AC616

Portable ultrasonic flowmeter

Data sheet
IP373

Description

The AC 600 range of non-invasive flowmeters utilises ultrasonic technology for the accurate flow measurement of liquids in full pipes.

The portable device has been designed to meet the needs of the Service/Maintenance and Commissioning Engineer wishing to check the flow rate of liquids at different locations in the plant. The set-up of the unit is simple and user friendly in order to obtain the required flow information in minutes.

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.

The ultrasonic sensors are clamped onto the outside of the pipe, thus eliminating the need to dismantle the pipework and interrupt the process. The AC 616 can be applied to any type of standard pipe carrying clean or dirty liquids.

- Portable dual mode flowmeter
- 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 6 mm to 6.5 m (1.4" to 256")
- Integrated wall thickness measurement, 2 flow channels as standard

Advantages:

- Low installation effort and costs
- Measurement is independent of fluid conductivity and pressure
- No possibility of leakage
- Retrospective installation for existing plants possible
- No cutting of pipes necessary
- 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
- Dual measuring mode (transit-time and Doppler)
- Indication and output of speed of sound data of liquid possible
- Cost advantages when used with large diameter pipes, high-pressure systems, etc.

Technical specification

Measuring principle	Ultrasonic time difference correlation principle and Doppler
Flow velocity range	0.01 ... 25 m/s
Resolution	0.25 mm/s
Repeatability	0.15 % of measured value ± 0.01 m/s
Accuracy	Volume flow:
	± 1 ... 3 % of measured value depending on application
	± 0.5 % of measured value with process calibration
	Flow velocity: ± 0.5 % 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

Technical specification

Enclosure	Portable		Internal data logger
Degree of protection :	IP 54 according EN 60529, IP 67 optional	Storage capacity :	approx. 27,000 (optional > 100,000) measuring values
Operating temperature :	-10 ... 60 °C (14 ... 140 °F)	Logging data :	All measured and totalised values, parameter sets
Housing material :	Aluminium, powder coated	**Communication**	
Flow channels :	2	Serial interface :	RS 232
Power supply :	Internal rechargeable battery 6 V/4 Ah or external power supply 9 ... 15 V DC	Data :	Instantaneous measured value, parameter set and configuration, logged data
Operating time :	> 14 h with fully charged battery	**Software KATdata**	
Display :	2 x 16 digit LCD, dot matrix, backlit	Functionality :	Downloading of measured values/parameter set, graphical presentation, list format, export to third party software, on-line transfer of measured data
Dimensions :	H 118 x W 276 x D 310 mm (with handle)		
Weight :	3.5 kg		
Power consumption :	< 2.5 W in measurement mode	Operating systems :	WindowsTM 95, 98, ME, NT, 2000
Signal damping :	0 ... 60 s, configurable	**Process inputs** :	Galvanically isolated from main electronics
Response time :	1 s, 70 ms optional		
Measuring cycle :	100 ... 1000 Hz, single channel	Temperature :	PT 100, four-wire circuit, measuring range -50 ... 400 °C
Calculation functions:	Average/difference/sum	Current :	0/4 ... 20 mA, Ri = 50 &!
Operating languages:	Selectable between Danish, English, German, French, Dutch, Norwegian, Polish, Czech, Turkish, other languages on request	Voltage :	0 ... 1 V, Ri = 1 M&!
		Process outputs :	Galvanically isolated from main electronics
Quantity and units of measurement		Current :	0/4 ... 20 mA, passive (Uext < 24 V) or active (Rext < 500 &!)
Volumetric flow rate :	m3/h, m3/min, m3/s, l/h, l/min, l/s, USgph (US gallons per hour), USgpm, USgps, bbl/d (barrels per day), bbl/min, bbl/s	Voltage :	0 ... 1 V or 0 ... 10 V, Ri = 500 &!
Flow velocity :	m/s, inch/s	Frequency :	0 ... 1 kHz or 0 ... 10 kHz (OC)
Mass flow rate :	g/s, t/h, kg/h, kg/min	Digital (pulse, status):	Totaliser value 0.01 ... 1000 / unit, width 80 ... 1000 ms (OC/ Reed) Reed = Reed-NO contact (300 V / 0.5 A) OC = Open-Collector
Volume :	m3, 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)		

Clamp-on flow sensors:

Type M Rated (possible)			
diameter range :	(50) 100 ... 2500 ... 6500 mm	Degree of protection :	IP 65 acc. EN 60529, IP 67 or IP 68 optional Special clamp-on sensors
Dimensions :	60 x 30 x 34 mm		
Material :	Stainless steel		
Temperature range :	*MxN* -30 ... 130 °C(-22 ... 266°F) *MxE* -30 ... 200 °C(-22 ... 392 °F) for short periods up to 300 °C (572 °F) Specials up to 500 °C	Type S :	For very small pipe diameters 6 ... 40 mm
		Type K :	For very large pipe diameters 400 ... 6500 mm and liquids with very high solid/gas content
Degree of protection :	IP 65 acc. EN 60529, IP 67 or IP68 optional	Other types :	Hazardous area sensors, specials on request Wall thickness measurement
Type Q Rated diameter range :	10 ... 400 mm	Measuring range :	1.0 ... 200 mm
		Resolution :	0.01 mm
Dimensions :	43 x 18 x 22 mm	Linearity :	0.1 mm
Material :	Stainless steel	Temperature range :	Standard version NT
Temperature range :	*Q3N* -30 ... 130 °C(-22 ... 266 °F)		-20 ... 60 °C High temperature HT version 0 ... 200 °C, for short periods up to 540 °C
	Q3E -30 ... 200 °C (-22 ... 392 °F) for short periods up to 300 °C (572 °F) Specials up to 500 °C		

Accessories

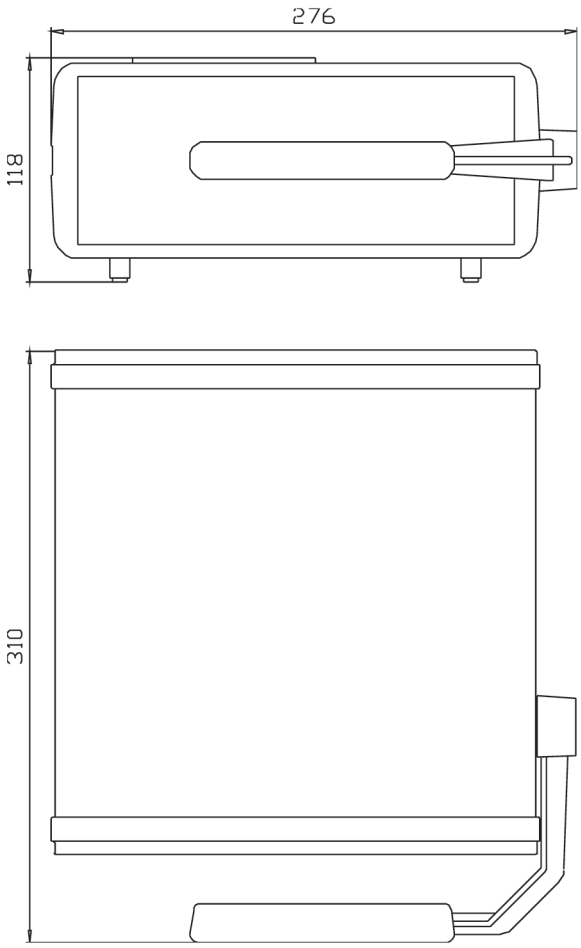
- External power supply 230 V, 50Hz/12 V, 1.2 A; IP 30
- Car power adapter 12 V, 2 A
- Soft carying case
- Cable extension 5 m, 10 m or 20 m
- Sensor mounting fixtures
- External printer, ink jet 192 dpi

Recommended spares

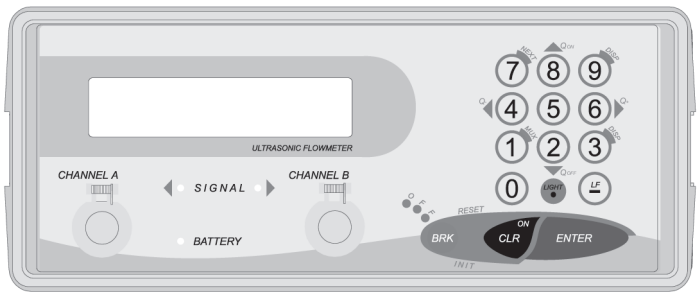
- Acoustic coupling component
- Transducer mounting clips and chains, chain repair set

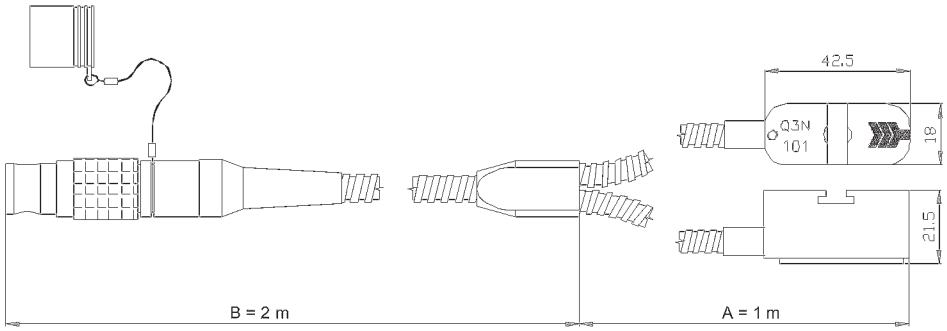
External dimensions

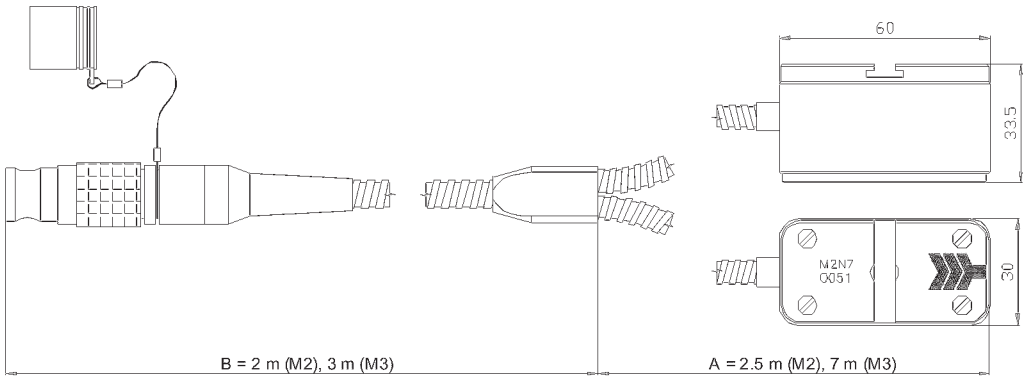
Portable flowmeter
AC616L



Front panel - portable flowmeter
AC616L

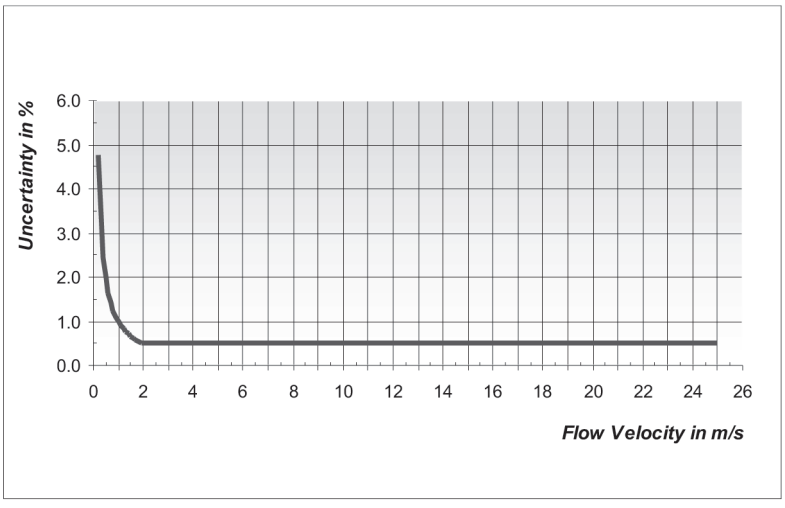






Clamp-on sensors type Mxx-7-1-00-P-E000 for pipe diameters DN (50) 100 ... 2500 ... 6500

Uncertainty specification AC616L ultrasonic flowmeters



AC616 Portable Ultrasonic Flowmeter

Code	Configuration
0	Basic unit without accessories
1	With standard accessories *)
	Special (please specify)

Code	Power cord
0	Without
1	UK
2	US
3	Europe
Z	Special (please specify)

Code	Degree of protection
1	IP 54 (standard)
2	IP 67
Z	Special (please specify)

Code	Process outputs
	Slot 1
N	Without
C	Current 0/4 ... 20 mA, active (source)
P	Current 0/4 ... 20 mA, passive (sink)
U	Voltage 0 ... 1 V
V	Voltage 0 ... 10 V
F	Frequency 0 ... 1 kHz
G	Frequency 0 ... 10 kHz
D	Digital (pulse/status), Open-Collector
R	Digital (pulse/status), relay
Z	Special (please specify)
	*Slot 2 **
	*Slot 3 **
	*Slot 4 **

Code	Process inputs
A	*Slot*
N	Without
A2	2 x PT100 temperature input
B2	2 x current 0/4 ... 20 mA, active (source)
E2	2 x current 0/4 ... 20 mA, passive (sink)
H2	2 x voltage 0 ... 1 V
Z	Special (please specify)
	*Slot B ***

Code	Internal data logger
0	Without
1	Standard 27,000 values incl. software/cable
2	Extended 100,000 values incl. software/cable
Z	Special (please specify)

Code	Heat quantity measurement (HQM)
0	Without
1	With heat quantity measurement incl. *** 2 x PT100 clamp-on temperature sensors
Z	Special (please specify)

Code	Sound velocity measurement (SVM)
0	Without
1	With sound velocity measurement incl. current output (source)
Z	Special (please specify)

Code	Wall thickness measurement (WTM)
0	Without
1	With wall thickness probe NT incl. cable
2	With wall thickness probe HT incl. cable

Code	Options:
0	Without
1	Suitable for connection with hazardous area sensors
Z	

AC616	1	1	1	CNNN	A2N	2	1	0	1	0

Portable flowmeter Notes :

*) Standard accessories include transport case, power adapter and battery charging unit, operating instructions and measuring tape.

* Please select the required type of process output as per coding for slot 1.

** Please select the required type of process inputs as per coding for slot A.

*** For HQM functionality, selection of process inputs required.

Ordering example :

Portable flowmeter AC616 including standard accessories, UK power cord, degree of protection IP 54, 1 x 0/4 ... 20 mA current output (source), 2 x PT100 temperature inputs, standard data logger including software/ cable, withheat quantity measurement, no sound velocity measurement, with wall thickness probe NT including cable, no options

AC616- Clamp-on transducer

Code	Pipe diameter range
S2	6 ... 40mm
Q3	10 ... 400mm
M2	(50) 100 ... 2500mm
M3	(50) 100 ... 6500mm
Z	Special (please specify)

Code	Temperature range
N	Standard -30 ... 130°C
E	Extended -30 ... 200 (300) °C
Z	Special (please specify)

Code	Internal code
7	Always

Code	Degree protection
1	IP 65 (standard)
Z	Special (please specify)

Code	Transducer mounting accessories
0	No mounting accessories
4	With clips and chains DN 15 ... 310
5	With clips and chains DN 25 ... 600
6	With clips and chains DN 25 ... 1200
7	With mounting fixture, rail and chains DN 6 ... 40 (alwyas for S2N)
8	Wtih mounting fixture, rail and magnet DN 10 ... 250 (optional for Q3)
9	With mounting fixture, rail and magnets DN50 ... 3000 (optional for M)
Z	Special mounting

Code	Electrical connections
P	With LEMO connector (for portable units)
Z	Special (please specify)

Code	Extension cable
E000	Without
E005	5m cable length
E010	10m cable length
E___	Special (specify in meter)

AC616	M2	N	7	1	5	P	E005	Typical ordering code

Clamp-on flow sensors

Q3N-7-1-40-P-E000

Clamp-on transducer for pipe diameter range 10 ... 400m, standard temperature range -30 ... 130°C, degree of protection IP 65, with mounting clips and chains DN 15 ... 310, with LEMO connector (for portable unit), no extension cable.

M2E-7-1-90-P-E010

Clamp-on transducer for pipe diameter range (50) 100 ... 2500mm, extended temperature range -30 ... 200 (300) °C, degree of protection IP 65, with mounting fixture, rail and magnets DN 50 ... 3000 with LEMO connector (for portable unit), with extension cable 10m length.

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