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УЛЬТРАЗВУКОВЫЕ РАСХОДОМЕРЫ

UFM 530 НТ



1.1 Robust solution for high temperature liquids

UFM 530 HT is a dual beam ultrasonic flow meter for crudes and a broad range of refined products, that are processed under extreme conditions (high temperature / high pressure). Also for accurate flow measurement of synthetic heat transfer oil at extreme high temperatures (500 °C) and rapidly changing temperatures, the UFM 530 HT offers a unique solution. The UFM 530 HT with its robust industrial construction performs with minimum operational – and maintenance costs, due to a solid fully welded construction without any moving parts and hence no wear.

UFM 530 HT is a combination of a UFS 500 HT flow sensor and a UFC 030 signal converter. The UFC 030 signal converter is installed separately from the high temperature UFS 500 HT flow sensor.



Highlights

- Major measurement even at temperatures up to 500 °C
- Excellent long term stability and reliability
- No moving or intruding parts
- Robust construction, resistant to corrosive and abrasive products
- Dual parallel paths for Reynolds independency
- Wide selection of materials, sizes and pressure classes

Industries**Petrochemical - refineries:**

- Vacuum distillation unit (VDU)
- Topping unit (atmospheric installations)
- Visbreaking unit
- Coker unit

Renewable energy - concentrated solar power (CSP):

- Solar field heat transfer circuit
- Thermal salt tanks
- Power block

Applications

- Furnace flow measurement
- Recycled product
- Reduced crude
- Vacuum residues
- Long residues
- Heavy bottom products
- Synthetic heat transfer fluids (HTF)
- Molten salt

1.2 Measuring principle

- Like canoes crossing a river, acoustic signals are transmitted and received along a diagonal measuring path.
- A sound wave going downstream with the flow travels faster than a sound wave going upstream against the flow.
- The difference in transit time is directly proportional to the mean flow velocity of the medium.

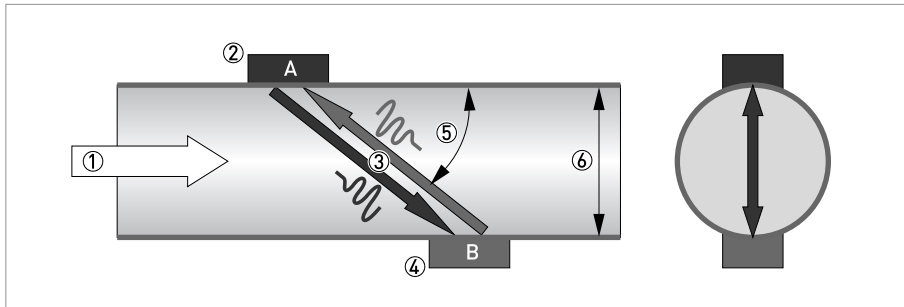


Figure 1-1: Measuring principle

- ① Flow velocity
- ② Transducer A
- ③ Acoustic path
- ④ Transducer B
- ⑤ Angle [between flow vector and acoustic path vector]
- ⑥ Diameter

2.1 Technical data

- *The following data is provided for general applications. If you require data that is more relevant to your specific application, please contact us or your local representative.*
- *Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website (Download Center).*

Measuring system

Measuring principle	Ultrasonic transit time.
Application range	(Non) conductive fluids.
Measured value	
Primary measured value	Transit time.
Secondary measured value	Volume flow rate, totalised volume, velocity of sound (VoS), signal strength, flow direction.

Design

	The measurement system consists of a measuring sensor and a signal converter. It is only available as separate version.
Measuring range	0.5...20 m/s / 1.7...66 ft/s
Signal converter	
Wall-mounted housing (W) - remote version	UFC 030 F
Measuring sensor	
UFS 500 HT is available in the following pipe diameters and building constructions:	
DN25...80 / 0.98...3/15"	Single beam construction.
DN100...300 / 3.94...11.81"	Dual beam construction.
	Larger diameters on request.
Options	
Inputs / outputs	Current (incl. HART [®]), pulse, frequency and/or status output, limit switch and/or control input (depending on the I/O version)
Counters	2 internal counters with a max. of 8 counter places (e.g. for counting volume and/or mass units)
Display and user interface	
Graphic display	3-Line local display with backlight
	Display turnable in 90° steps
	The readability of the display could be reduced at ambient temperatures below -25°C / -13°F
Operator input elements	3 keys for operator control of the signal converter
	Magnetic pin for operator control of the signal converter (optional)
Remote control	All DTM's and drivers are available at the internet homepage of the manufacturer
	PACTware [®] including Device Type Manager (DTM)

Display functions	
Menu	Display of volume flow, mass flow, flow speed, velocity of sound, gain, signal to noise ratio, diagnosis value, forward, reverse and counters, warning and diagnosis information, setting parameters via operating menu
Language of display texts	English, French, German

Measuring accuracy

Reference conditions	
Medium	Water
Temperature	20°C
Pressure	1 bar
Inlet section in DN	10 DN
Maximum measuring error	±1% of the measured value for Re > 5000 and v = 1...20 m/s (3.28...65.62 ft/s), temperature influence: 0.1% / 10 K. ±1 cm/s at v < 1 m/s (±0,39" (s at v < 3,28 ft/s)
Repeatability	±0.3%
Calibration	2-point, water, under reference conditions.

Operating conditions

Temperature	
Process	Standard versions: -25...+500°C / -13...+932°F
	Ex versions: -25...+440°C / -13...+824°F
Ambient (signal converter)	-40...+65°C / -40...+149°F
Storage (signal converter)	-40...+70°C / -40...+158°F
Pressure	
Ambient	Atmospheric
EN 1092-1	DN25...80: PN40
	DN100...150: PN16
	DN200...300: PN10
	Higher pressure ratings on request.
ASME B16.5	1...12": 150 lbs
	Higher pressure ratings on request.
JIS	10K
Medium properties	
Physical condition	Liquids.
Permissible gas content (by volume)	<2%
Permissible solid particle content (by volume)	<5%
Viscosity	<100 cSt
	Higher viscosities on request
Recommended flow velocity	0.5...20 m/s / 1.7...66 ft/s

Installation conditions

Minimum inlet run	DN25...80 / ASME 0.98...3.15": 50 DN
	DN100...300 / ASME 3.94...11.81": 15 DN
Minimum outlet run	DN25...80 / ASME 0.98...3.15": 10 DN
	DN100...300 / ASME 3.94...11.81": 5 DN
Dimensions and weights	See chapter "Dimensions and weights".

Materials

Sensor	
Sensor material	Measuring tube (DN25...300 / 0,98...11,81"): Stainless steel 1.4404 (AISI 316L).
	Bundle wave guides: Stainless steel 1.4404 (AISI 316L).
	Connection box: Die-cast aluminium (polyurethane coating).
	Others materials on request
Process connections	
Flange	DN25...300 / 0,98...11,81": stainless steel 1.4404 (AISI 316L).
	Others materials on request
Finish (measuring tube)	No paint.
Converter	
Housing material	Standard
	Die-cast aluminum (polyurethane coated).
	Option
	Stainless steel 1.4404 (AISI 316L).
Finish	Standard
	Silver paint.
	Optional
	Offshore paint system, silver.

Electrical connections

Description of used abbreviations	Q = XXX ; I_{\max} = maximal current; $U_{\text{in}} = \mathbf{XXX}$; U_{int} = internal voltage; U_{ext} = external voltage; $U_{\text{int, max}}$ = maximal internal voltage.
Galvanic insulation	All inputs/outputs are standard isolated from the power supply.
Power supply	
Voltage	100...240 VAC (+10% / -15%), 48...63 Hz. 24 VAC (20...27 V), 24 VDC (18...32 V).
Power consumption	AC: 10 VA DC: 8 W
Cable entries (to power supply and sensor)	Standard M20 x 1.5 Optional ½" NPT or PF ½
Cable length	Standard 5 m / 16.40 ft Optional 10...30 m / 32.81...98.43 ft
Current output	
Function/output data	Measurement of volume flow rate, velocity of sound, signal strength, flow direction.
Settings	Q = 0%: 0...16 mA (HART versions: 4...16mA, in steps of 1 mA, limit 20...22 mA). Q = 100%: 4...20 mA.
Operating data/Connection	Active mode: $U_{\text{int}} = 24$ VDC, maximal load: 680 Ω . Passive mode: $U_{\text{ext}} \leq 24$ VDC, maximal load: 680 Ω .
Pulse output	
Function/output data	Measurement of volume flow rate, actual volume, velocity of sound, signal strength, flow direction.
Settings	Calculated mass flow rate. Pulse or frequency: 0...2000 Hz, status: on/off.
Operating data/Connection	Active mode: $U_{\text{int}} = 24$ VDC, $I_{\max} = 50$ mA. Passive mode: $U_{\text{ext}} = 19...32$ VDC, $I_{\max} = 150$ mA.
Analog inputs	
Function/output data	Inputs for calculated (or user defined) mass flow rate.
Settings	For both inputs (A1 and A2): 4...20 mA.
Operating data/Connection	Active mode: $I_{\max} = 22$ mA, maximal load: 58 Ω . Passive mode: $I_{\max} = 22$ mA, maximal load: 58 Ω .
Digital input	
Function/output data	Reset totalised volume, reset errors, force outputs to zero.
Settings	On/off
Operating data/Connection	Active mode: $U_{\max} \leq 24$ VDC. Passive mode: $U_{\max} \leq 24$ VDC.

Approvals

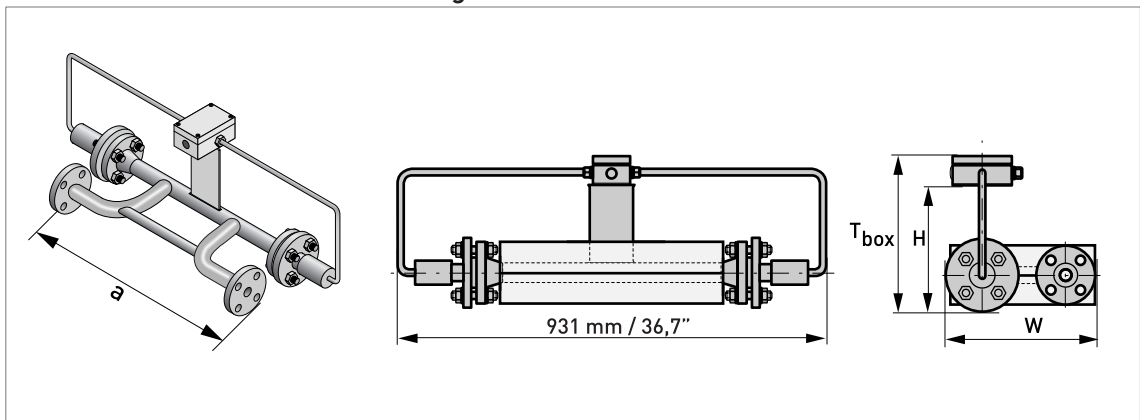
CE	See section 1.3.1.
Hazardous areas	
Ex zone 1	According to European Directive 94/9 EC (ATEX 100a).
FM Div. 1	Approval number 3016332
CSA	Approval number 1515313
Protection category according to IEC 529 / EN 60529	
Sensor	IP65 eq. NEMA 4 / 4X

Other diameters, pressure classes or materials than the above-mentioned on request.

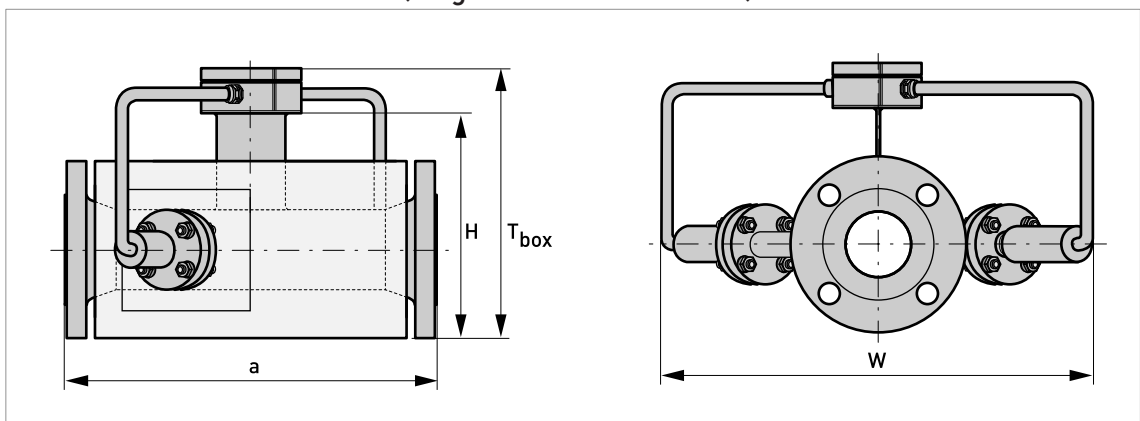
2.2 Dimensions and weight

2.2.1 Flow sensors

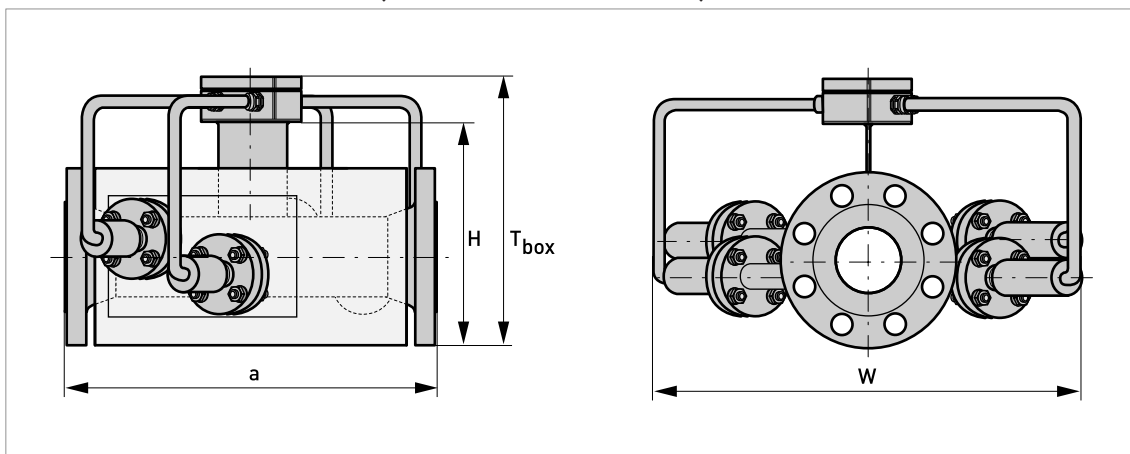
Front and side view DN25...40 (single beam construction)



Front and side view DN50...80 (single beam construction)



Front and side view \geq DN100 (dual beam construction)



DIN flanges

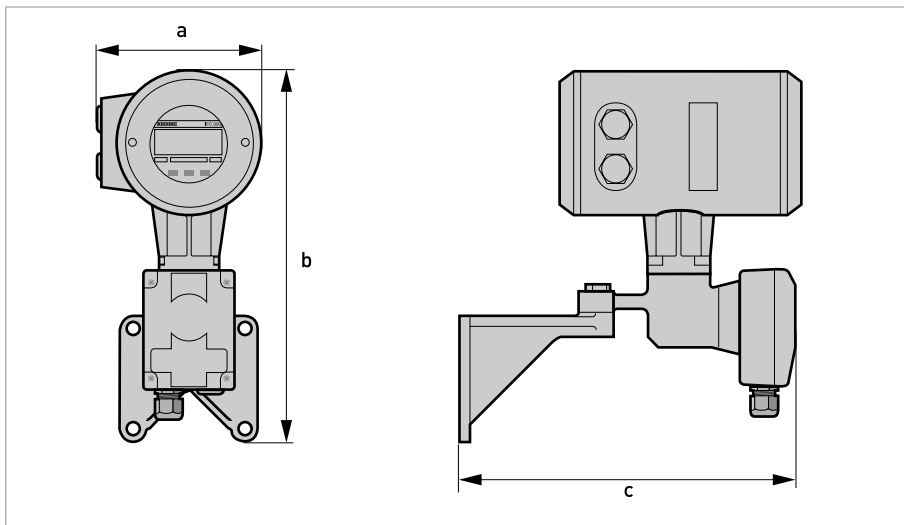
Nominal size	Nominal pressure	Material	Dimensions [mm]				Approx. weight
			a	W	H	T _{box}	
DN	[bar]	Tube/Flange					[kg]
25	40	Steel 1.4404	600	310	267	324	28
32	40	Steel 1.4404	600	325	267	324	29
40	40	Steel 1.4404	600	330	270	327	30
50	40	Steel 1.4404	600	500	283	340	27
80	40	Steel 1.4404	700	530	328	385	49
100	16	Steel 1.4404	800	550	353	410	56
150	16	Steel 1.4404	900	610	397	454	76
200	10	Steel 1.4404	1000	660	450	507	84

ASME flanges

Nominal size	Nominal pressure	Material	Dimensions [inch]				Approx. weight
			a	W	H	T _{box}	
ASME	[lbs]	Tube/Flange					[lbs]
1"	150	SS 316L	23.62	12.40	10.51	12.76	59.5
2"	150	SS 316L	23.62	19.69	10.90	13.15	57.3
3"	150	SS 316L	27.56	20.87	12.21	14.45	72.8
4"	150	SS 316L	31.50	21.26	13.46	15.71	130.1
6"	150	SS 316L	35.43	23.62	15.51	17.76	167.6
8"	150	SS 316L	39.37	25.59	17.80	20.04	229.3
10"	150	SS 316L	39.37	29.13	20.08	22.32	235.9
12"	150	SS 316L	39.37	31.10	20.63	22.87	299.8

Other diameters, pressure classes or materials than the above-mentioned on request.

2.2.2 UFC 030 signal converter



Version	Material	Dimensions [mm / inch]			Approx. weight [kg / lbs]
		a	b	c	
UFC 030 F	Aluminium	156 / 6.14	315 / 12.40	285 / 11.22	4.2 / 9.30
UFC 030 F / EEx	Aluminium	156 / 6.14	315 / 12.40	301 / 11.85	4.5/9.90
UFC 030 F / EEx	Stainless steel 1.4404	158 / 6.22	315 / 12.40	320 / 12.60	15/33.10

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