



Ultrasonic Flowmeter



measuring
•
monitoring
•
analysing

DUE



- Measuring range: 1.5 - 20 m³/h... 127 - 2000 m³/h (water)
- p_{max}: PN 40; t_{max}: 150 °C
- Connection: flange DN 32 - DN 300
- Accuracy: from ±0.5 % of reading



SS

KOBOLD companies worldwide:

ARGENTINA, AUSTRALIA, AUSTRIA, BELGIUM, BULGARIA, CANADA, CHILE, CHINA, COLOMBIA, CZECHIA, EGYPT, FRANCE, GERMANY, GREAT BRITAIN, HUNGARY, INDIA, INDONESIA, ITALY, MALAYSIA, MEXICO, NETHERLANDS, PERU, POLAND, REPUBLIC OF KOREA, ROMANIA, SINGAPORE, SPAIN, SWITZERLAND, TAIWAN, THAILAND, TUNISIA, TURKEY, USA, VIETNAM

KOBOLD Messring GmbH
Nordring 22-24
D-65719 Hofheim/Ts.
Head Office:
+49(0)6192 299-0
+49(0)6192 23398
info.de@kobold.com
www.kobold.com



Description

Ultrasonic flowmeters of the DUE-1 (single-beam) and DUE-2 (dual-beam) type series are intended for flow-rate measurements of conductive, non-conductive and aggressive liquids in a pipe completely filled with the flowing fluid.

Ultrasonic flowmeters operate on the principle of measuring the difference in transit times of ultrasonic waves travelling in and against the fluid flow direction. The meter consists of a flow sensor and associated electronic unit. Ultrasonic flowmeters offer excellent user value in their high measurement accuracy over a wide range of measured values, long-term stability, negligible hydraulic losses and the capability of measuring the flow-rate of virtually any liquid medium.

The evaluation unit in separate plastic housing, supplies power to the ultrasonic probes and gives the flow rate in form of pulses (option 0/4-20 mA, RS485).

Application

- Power plants: cooling water, district heating, pump protection, condensate and boiler feedwater measurements
- Water and waste water industry: treatment plant inflow, treatment plant outflow, drinking water networks, verification of water meters, pump protection, distribution and consumption measurements, leakage detection
- Facility management: hot and cold water, cooling system and air conditioning systems, pump control
- Chemical and petrochemical industry: crude oil and light oil, raw and waste water, aggressive and toxic media

Technical Details

Measuring principle:	ultrasonic transit-time
Nominal diameter DN:	DN32 ... DN300
Measurement accuracy	
DUE-1:	± 1.0% for velocity of the measured liquid (velocity > 0.5 m/s)
DUE-2:	± 0.5% for velocity of the measured liquid (velocity > 0.5 m/s)
Rated pressure:	PN40 or PN16
Process temperature:	0 ... +150 °C
Ambient temperature:	+5 ... +55 °C
Ambient humidity:	max. 80% relative
Storage temperature:	-10 ... +70 °C at the relative humidity up to 70%
Protection class	
Evaluation	
electronic unit:	IP65
Ultrasonic sensors:	IP67
Process connection:	flanges EN 1092-1, stainless steel 1.4301, carbon steel
Connecting cables for sensor electronic:	standard length 5 m, maximum length 100 m

Electronic unit

Dimensions:	length 230 mm, height 217 mm, width 85 mm
Weight:	1.5 kg
Power supply:	100 - 250 V, 50/60 Hz
Stand-by power supply:	3 V, Li battery (lifetime 5 years)
Power requirement:	6 VA
Fluid flow velocity:	minimum 0.1 m/s maximum 10 m/s
Display:	2 x 16-digit alphanumeric LC display
Electrical connection:	1 x PG7, 4 x PG9
Outputs (galvanically isolated):	impulse, 0.1 ... 1 000 l/imp adjustable (impulse length 50 ms) frequency, 0 ... 1 000 Hz (corresponds to total measuring range q_s) switching output 24 V _{AC} /0,1 A
Optional equipment:	interface RS 485 galvanically isolated current output 0 - 20 mA or 4 - 20 mA (corresponding to the flow rate range of 0 to q_s) extended range process temperature: -20 °C ... +180 °C sensor's protection IP 68 two-direction flow measurement and direction indication



Sensor Selection

The meter sensor shall be selected with respect to the fluid flow parameters at the measuring location. The normal steady-state flow rate should be as close as possible to the q_p value (the rated flow rate) of the sensor (see table below). Attention shall be also paid to the pressure loss value of the sensor which, although it is generally very low, adds up to the total losses of the fluid piping, in particular at high flow velocities.

In applications where the standard sensor parameters do not meet the operational requirements, the values of q_s and q_{min} of the selected sensor size can be re-set (using the customer control push-button panel). The graph below shows the pressure loss values at various flow rates for particular sensor sizes. It holds that the sensor parameter q_{min} is a fixed value in respect of the given measurement accuracy and the sensor parameter q_s should not, for the given sensor size, exceed the maximum value given in the table below.

Measuring Range

DUE-1

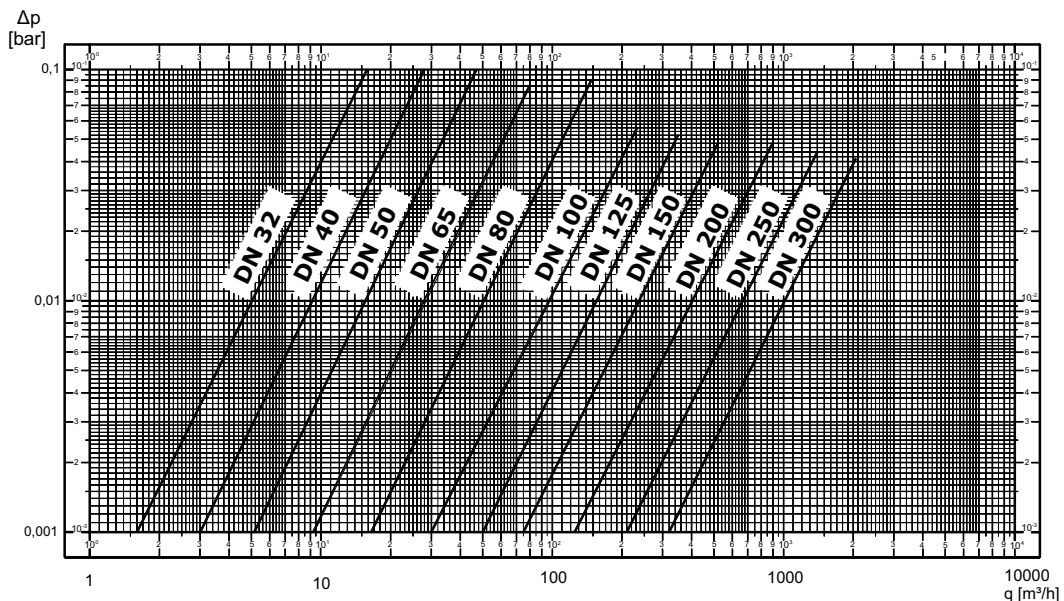
DN	32	40	50	65	80	100	125	150	200	250	300
q_s [m³/h]	20	32	50	80	150	240	350	500	900	1400	2000
q_p [m³/h]	10	16	25	40	75	120	175	250	450	700	1000
$q_{min 1\%}$ [m³/h]	1.5	2.3	3.5	6	9	14	22	32	57	89	127
$q_{min 5\%}$ [m³/h]	0.2	0.32	0.5	0.8	1.5	2.4	3.5	5.0	9.0	14	20
q_{NEC} [m³/h]	0.07	0.09	0.14	0.22	0.37	0.6	0.9	1.2	2.2	3.5	5

DUE-2

DN	32	40	50	65	80	100	125	150	200	250	300
q_s [m³/h]	20	32	50	80	150	240	350	500	900	1400	2000
q_p [m³/h]	10	16	25	40	75	120	175	250	450	700	1000
$q_{min 0.5\%}$ [m³/h]	1.5	2.3	3.5	6	9	14	22	32	57	89	127
$q_{min 3\%}$ [m³/h]	0.2	0.32	0.5	0.8	1.5	2.4	3.5	5.0	9.0	14	20
q_{NEC} [m³/h]	0.07	0.09	0.14	0.22	0.37	0.6	0.9	1.2	2.2	3.5	5

- q_s = overload (maximum) fluid flow rate
- q_p = steady-state (rated) fluid flow rate
- q_{min} = minimum flow rate for specified measurement accuracy
- q_{NEC} = sensitivity threshold (flow rate) level of the sensor concerned

Pressure losses of Ultrasonic Sensors





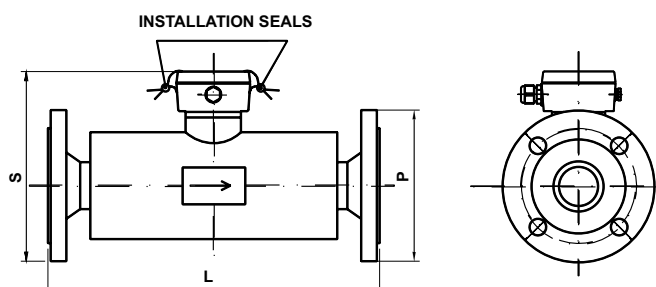
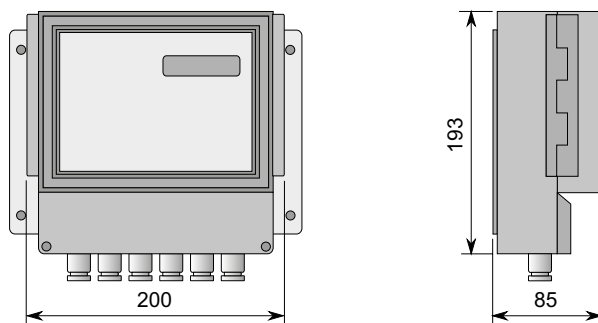
Order Details (Example: DUE-2 2 A32 C 1 A0)

Model	Housing-/ sensor material	Process connection	Design/ cabel length, sensor protection class	Default measuring	Output	Options
DUE-1 = single beam DUE-2 = double beam	1 = stainless steel, carbon steel with polyurethane surface 2 = complete stainless steel 1.4301	A32 = DN32, PN40 A40 = DN40, PN40 A50 = DN50, PN40 A65 = DN65, PN40 A80 = DN80, PN40 C1H = DN100, PN16 C1Z = DN125, PN16 C1F = DN150, PN16 C2H = DN200, PN16 C2F = DN250, PN16 C3H = DN300, PN16 ASME flanges class 150: code Lxx, ASME flanges class 300: code Mxx	C = separate / 6 m, IP67 D = separate / 10 m, IP67 E = separate / 15 m, IP67 F = separate / 20 m, IP67 G = separate / 30 m, IP67 H = separate / 40 m, IP67 I = separate / 50 m, IP67 J = separate / 60 m, IP67 L = separate / 6 m, IP68 M = separate / 10 m, IP68 N = separate / 15 m, IP68 P = separate / 20 m, IP68 Q = separate / 30 m, IP68 R = separate / 40 m, IP68 S = separate / 50 m, IP68 T = separate / 60 m, IP68 X = special design (max. cable length 100 m)	1 = one- directional, volume 2 = bi- directional, volume	00 = without A0 = analogue output 0-20 mA A4 = analogue output 4-20 mA RS = RS485	0 = without Y = specify in clear text

Note: Factory language setting English (werkseitig), switchable to German/French/Spanish.
3-point factory calibration is included as standard (5-point or 9-point calibration on request).

Dimensions

Remote electronic unit



PN	Nominal diameter	DN 32	DN 40	DN 50	DN 65	DN 80
16/40	Ø P [mm]	140	150	165	185	200
16/40	S [mm]	181	191	206	220	237
16/40	L [mm]	360	360	360	360	360

PN	Nominal diameter	DN 100	DN 125	DN 150	DN 200	DN 250	DN 300
16	Ø P [mm]	220	250	285	340	405	460
16	S [mm]	256	285	314	361	419	471
40	Ø P [mm]	235	270	300	375	450	515
40	S [mm]	263	296	321	379	441	499
16/40	L [mm]	360	360	360	450	450	450

Weight DUE-1 ultrasonic sensor [kg]

Weight DUE-2 ultrasonic sensor [kg]

DN	PN 16	PN 40	PN 16	PN 40
32	9	9	12	12
40	9	9	16	16
50	11	11	11	11
65	12	12	12	12
80	15	15	15	15
100	17	17	17	17
125	18	20	18	20
150	19	21	19	21
200	28	37	28	37
250	45	70	45	70
300	58	84	58	84