



- Measuring ranges:
0.2-20 to 200-20 000 m³/h air
- p_{max}: PN 40; t_{max}: 120 °C
- Connection: flange DN 25 - DN 400
- Material: continuous casting, steel or stainless steel
- Accuracy: ±1.5 % of measured value
- No moving parts
- Long-term stability



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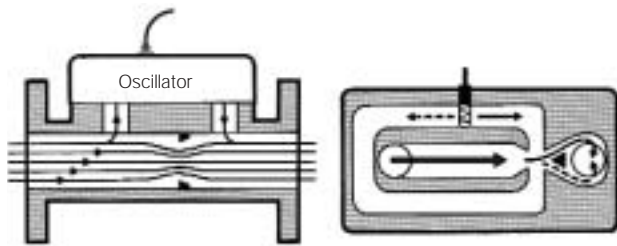
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Model:
 DOG-1
 DOG-3



Description

The KOBOLD flow meter DOG-1 and DOG-3 are used for non-contact flow measurement of gases. The medium flows through an orifice in a tube. Bypass bores are located at the sides. The dynamic pressure at the orifice causes part of the gas volumetric flow to flow into the bypass. The division ratio remains constant over the whole measuring range.



The bypass channel contains the new Flow Oscillator - the measuring cell itself. When the gas flows through the measuring cell, a gas column oscillates in a u-shaped channel mounted to the left and right. This oscillation frequency is proportional to the flow velocity and thus to the total volume flow. The oscillation frequency is sensed with a hot wire sensor. An electrical alternating signal is generated that is displayed in the series-connected electronics.

Application

The inner, connected flow channels are generously dimensioned. The devices are therefore dirt resistant and have no consumables. The mounting position can be chosen at will. When condensate forms in the gas, the horizontal mounting position with the sensing element pointing upwards is recommended. The gas flow velocity anywhere in the pipe-work upstream of the flow meter should not exceed the sound velocity. Pressure drops above critical and pulsating streams must be avoided.

The recommended inlet pipe section is 10xDN and the outlet pipe section 5xDN.

Areas of application

- Compressed air
- Natural gas, biogas, fermentation gas
- Propane
- Hydrogen gas
- Nitrogen
- Argon

Technical details

Measuring accuracy: $\pm 1.5\%$ of meas. value (at Q_t 100%*)
 $\pm 5\%$ of measured value (at $< Q_t$ *)
 *The lower limit Q_t depends on the density

$Q_t = 8\%$ at density 1 kg/m³
 $Q_t = 4\%$ at density 2 kg/m³
 $Q_t = 2\%$ at density 4 kg/m³
 $Q_t = 1\%$ at density ≥ 8 kg/m³

Repeatability: 0.1% of measured value
 Temperature: max. -20 to +120 °C
 Ambient temperature: max. 80 °C
 Operating pressure: DOG-11/12..., DOG-31/32...: PN 16
 DOG-12/13..., DOG-32/33...: PN 40
 Span: DOG-1...: 1 : 100
 DOG-3...: 1 : 50
 Sensor: hot-wire, RDC
 Impulses: max. 200 Hz
 Protection type: IP 65

Materials

Case: DOG-11...: continuous casting GG25
 DOG-13...: steel St.35.8
 DOG-33...: steel St.52-3N
 DOG-12/32...: stainless steel 1.4571

Orifice: stainless steel 1.4436
 Sensing element: polyphenylene sulfide (PPS)
 Sensor: platinum
 Gaskets: silicone, nitrile or FPM

Electronics:

Electrical connection: cable with cable gland Pg 13.5
 Display: 4-digit LCD display, counter
 Power supply: 230 V_{AC} -10%, +12% / 48-62 Hz
 Input: hot wire sensor
 Pulse output 1: 12 V_{DC}, max. 100 mA, open collector
 Pulse output 2: floating contact decadic 250 V_{AC}, max. 3 A
 Analogue output: 0/4-20 mA max. 500 Ω
 Ambient temperature: 0 to +50 °C
 Permissible distance: max. 50 m to DOG-1 to DOG-3
 Connection cable: minimum 0.5 mm², screening recommended
 Ex version: t_{max} 100 °C



Order details for DOG-1 with flange (example: DOG-1101L F25N S A)

Meas. range m³/h air	Model			Connection flange		Gasket	Electronic analyser
	Material contin. casting	Material steel	Material stainless steel	Standard PN 16	Special PN 40		
0.2 - 20 0.35 - 35 0.7 - 70	DOG-1101L.. DOG-1102L.. DOG-1103L..	- - -	DOG-1201L.. DOG-1202L.. DOG-1203L..	F25N=DN25	F25S=DN25	S=silicone N=nitrile V=FPM	with external electronics ...A RDC input, without display, no EX protection, with analogue and pulse output ...D RDC input, with display for instantaneous value and total, no EX protection, with analogue and pulse output ...E RDC input, without display, with EX protection, with analogue and pulse output ...X RDC input, with display for instantaneous value and total, with EX protection, with analogue and pulse output
0.2 - 20 0.4 - 40 0.8 - 80	- - -	DOG-1304L.. DOG-1305L.. DOG-1306L..	- - -	F32N=DN32	F32S=DN32		
0.2 - 20 0.9 - 90 1.8 - 180	DOG-1107L.. DOG-1108L.. DOG-1109L..	- - -	DOG-1207L.. DOG-1208L.. DOG-1209L..	F40N=DN40	F40S=DN40		
0.2 - 20 1.1 - 105 2.5 - 250	DOG-1110L.. DOG-1111L.. DOG-1112L..	- - -	DOG-1210L.. DOG-1211L.. DOG-1212L..	F50N=DN50	F50S=DN50		
0.9 - 90 1.7 - 170 4.5 - 450	- - -	DOG-1313L.. DOG-1314L.. DOG-1315L..	DOG-1213L.. DOG-1214L.. DOG-1215L..	F65N=DN65	F65S=DN65		
1.4 - 135 3 - 290 7.6 - 760	DOG-1116L.. DOG-1117L.. DOG-1118L..	- - -	DOG-1216L.. DOG-1217L.. DOG-1218L..	F80N=DN80	F80S=DN80		
2.7 - 265 6.5 - 650 8.5 - 850	DOG-1119L.. DOG-1120L.. DOG-1121L..	- - -	DOG-1219L.. DOG-1220L.. DOG-1221L..	F1HN=DN100	F1HS=DN100		
4 - 400 9 - 900 20 - 2000	- - -	DOG-1322L.. DOG-1323L.. DOG-1324L..	DOG-1222L.. DOG-1223L.. DOG-1224L..	F1ZN=DN125	F1ZS=DN125		
6 - 600 12 - 1200 30 - 3000	- - -	DOG-1325L.. DOG-1326L.. DOG-1327L..	DOG-1225L.. DOG-1226L.. DOG-1227L..	F1FN=DN150	F1FS=DN150		
12 - 1200 25 - 2500 60 - 6000	- - -	DOG-1328L.. DOG-1329L.. DOG-1330L..	DOG-1228L.. DOG-1229L.. DOG-1230L..	F2HN=DN200	F2HS=DN200*		
20 - 2000 40 - 4000 75 - 7500	- - -	DOG-1331L.. DOG-1332L.. DOG-1333L..	DOG-1231L.. DOG-1232L.. DOG-1233L..	F2FN=DN250	F2FS=DN250*		
30 - 3000 50 - 5000 115 - 11500	- - -	DOG-1334L.. DOG-1335L.. DOG-1336L..	- - -	F3HN=DN300	F3HS=DN300		
40 - 4000 70 - 7000 140 - 14000	- - -	DOG-1337L.. DOG-1338L.. DOG-1339L..	- - -	F3FN=DN350	-		
50 - 5000 100 - 10000 200 - 20000	- - -	DOG-1340L.. DOG-1341L.. DOG-1342L..	- - -	F4HN=DN400	-		

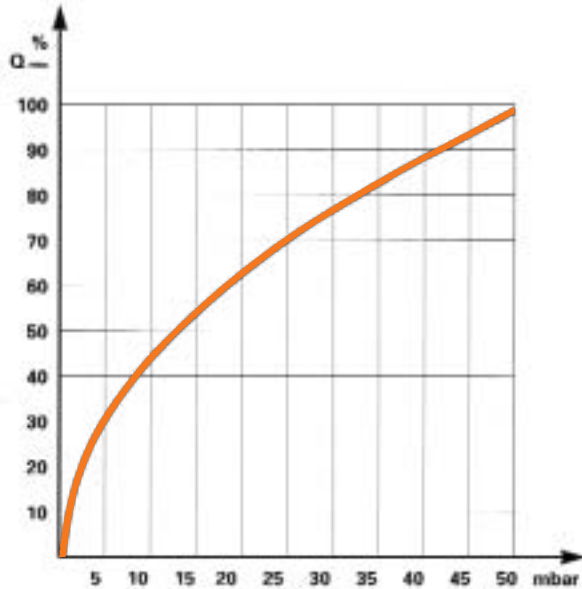
* not for DOG-12 (stainless steel)



Order details for DOG-3 with wafer style (example: DOG-3301L F25N S A)

Meas. range m ³ /h air	Model		Connection water		Gasket	Electronic analyser
	Material steel	Material stainless steel	Standard PN 16	Special PN 40		
0.4 - 20 0.7 - 35 1.4 - 70	DOG-3301L.. DOG-3302L.. DOG-3303L..	DOG-3201L.. DOG-3202L.. DOG-3203L..	F25N=DN25	F25S=DN25	S=silicone N=nitrile V=FPM	with external electronics ...A RDC input, without display, no EX protection, with analogue and pulse output ...D RDC input, with display for instantaneous value and total, no EX protection, with analogue and pulse output ...E RDC input, without display, with EX protection, with analogue and pulse output ...X RDC input, with display for instantaneous value and total, with EX protection, with analogue and pulse output
0.4 - 20 1.8 - 90 3.5 - 180	DOG-3307L.. DOG-3308L.. DOG-3309L..	DOG-3207L.. DOG-3208L.. DOG-3209L..	F40N=DN40	F40S=DN40		
0.4 - 20 2.2 - 105 5 - 250	DOG-3310L.. DOG-3311L.. DOG-3312L..	DOG-3210L.. DOG-3211L.. DOG-3212L..	F50N=DN50	F50S=DN50		
1.8 - 90 3.5 - 170 9 - 450	DOG-3313L.. DOG-3314L.. DOG-3315L..	DOG-3213L.. DOG-3214L.. DOG-3215L..	F65N=DN65	F65S=DN65		
2.8 - 135 6 - 300 16 - 800	DOG-3316L.. DOG-3317L.. DOG-3318L..	DOG-3216L.. DOG-3217L.. DOG-3218L..	F80N=DN80	F80S=DN80		
6 - 300 14 - 700 18 - 900	DOG-3319L.. DOG-3320L.. DOG-3321L..	DOG-3219L.. DOG-3220L.. DOG-3221L..	F1HN=DN100	F1HS=DN100		
8 - 400 18 - 900 40 - 2000	DOG-3322L.. DOG-3323L.. DOG-3324L..	DOG-3222L.. DOG-3223L.. DOG-3224L..	F1ZN=DN125	F1ZS=DN125		
12 - 600 25 - 1250 60 - 3000	DOG-3325L.. DOG-3326L.. DOG-3327L..	DOG-3225L.. DOG-3226L.. DOG-3227L..	F1FN=DN150	F1FS=DN150		
24 - 1200 50 - 2500 120 - 6000	DOG-3328L.. DOG-3329L.. DOG-3330L..	DOG-3228L.. DOG-3229L.. DOG-3230L..	F2HN=DN200	F2HS=DN200		
40 - 2000 80 - 4000 150 - 7500	DOG-3331L.. DOG-3332L.. DOG-3333L..	DOG-3231L.. DOG-3232L.. DOG-3233L..	F2FN=DN250	F2FS=DN250		
60 - 3000 100 - 5000 240 - 12 000	DOG-3334L.. DOG-3335L.. DOG-3336L..	DOG-3234L.. DOG-3235L.. DOG-3236L..	F3HN=DN300	F3HS=DN300		
80 - 4000 140 - 7000 280 - 14 000	DOG-3337L.. DOG-3338L.. DOG-3339L..	DOG-3237L.. DOG-3238L.. DOG-3239L..	F3FN=DN350	F3FS=DN350		
100 - 5000 200 - 10 000 400 - 20 000	DOG-3340L.. DOG-3341L.. DOG-3342L..	DOG-3240L.. DOG-3241L.. DOG-3242L..	F4HN=DN400	F4HS=DN400		

Pressure loss/flow



The diagram applies for gases with a density of air at NPT (0°C and 1000 mbar). The pressure loss is always proportional to the density of the gas. For example, the pressure loss doubles at 100% higher operating pressure.

Calculating the actual density

The actual density can be calculated with the following formula:

$$D = D_0 * \frac{P * T_0}{T}$$

D_0 = density at 1 bar abs. and 0°C (= 273 °K)

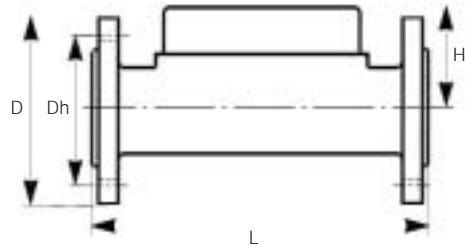
T = temperature in °K

(= °C + 273 for example 20°C = 273 + 20 = 293 °K)

T_0 = 273 °K

P = operating pressure in bar (absolute pressure)

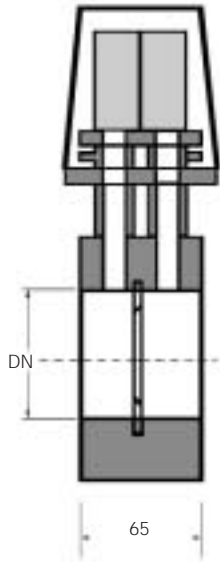
Dimensions and weights DOG-1



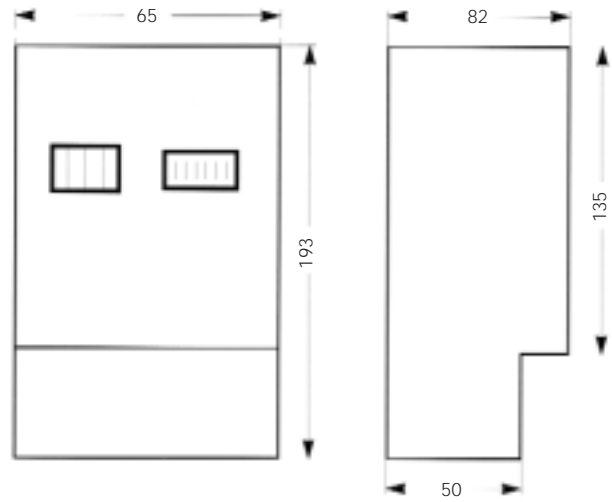
DN mm	L mm	D mm	Dh mm	H mm	Weights kg
25	300	115	85	130	10
32	300	140	100	140	11
40	300	150	110	140	12
50	300	165	125	145	13
65	300	185	145	155	14
80	300	200	160	160	20
100	360	220	180	200	23
125	300	250	210	230	20
150	500	285	240	255	28
200	350	340	295	280	36
250	450	405	355	305	53
300	500	460	410	330	70
350	600	520	470	360	90
400	800	580	525	380	120



Dimensions and weights DOG-3



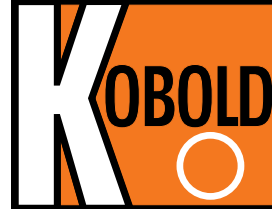
Dimensions of electronics



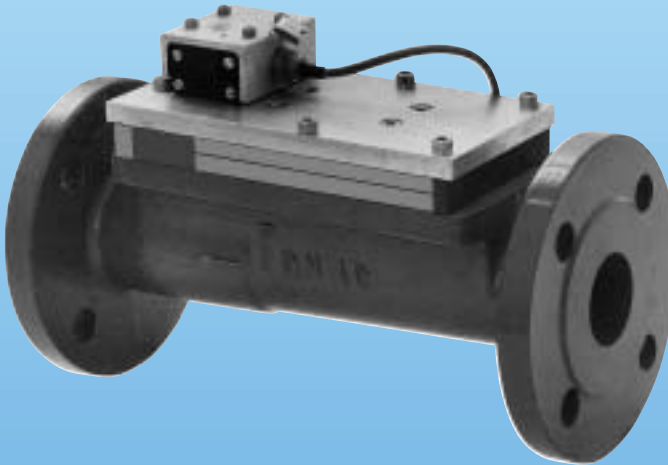
DN mm	D mm	Weights kg
25	65	10
32	65	11
40	65	12
50	65	13
65	65	14
80	65	20
100	65	23
125	65	20
150	65	28
200	65	36
250	65	53
300	65	70
350	65	90
400	65	120



Fluidic Oscillator Meter



measuring
•
monitoring
•
analysing



- Measuring ranges:
0.075-3.75 to 70-3500 m³/h water
- p_{max}: PN 40; t_{max}: 120°C
- Connection: flange DN 25 to DN 400
- Material: continuous casting,
steel or stainless steel
- Accuracy: ±0.5 % of measured value
- No moving parts
- Long-term stability



KOBOLD offices exist in the following countries:

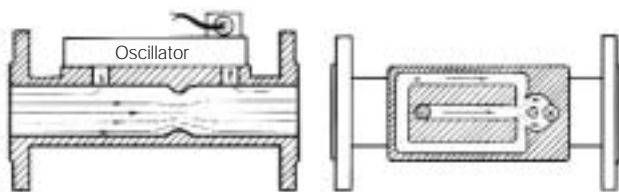
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Model:
DOG-2

Description

The KOBOLD flow meter DOG-2 is used for non-contact flow measurement of low viscosity liquids. The medium flows through an orifice in a tube and side bypass bores. The dynamic pressure at the orifice causes part of the liquid to flow through the bypass. The division ratio remains constant over the whole measuring range.



The bypass channel contains the Flow Oscillator - the measuring cell itself. When the medium flows through the measuring cell, a liquid column oscillates in a u-shaped channel mounted to the left and right. This oscillation frequency is proportional to the flow velocity

A chamber with a hollow ball is situated over this channel. It is connected with the lower channel by two bore holes. The oscillation of the liquid column is thus transferred to the ball, which in turn moves back and forth with the same frequency. The ball movement is sensed by an initiator. An electrical alternating signal is generated that is displayed in the series-connected electronics.

Application

The inner, connected flow channels are generously dimensioned. The devices are therefore extremely dirt resistant and have no consumables. The mounting position can be chosen at will. When the liquid contains air bubbles, the vertical mounting position with the sensing element pointing upwards is recommended. To avoid air bubbles the device should not be mounted at the highest point in a plant. Pulsating flow must be avoided.

The recommended inlet pipe section is 10xDN and the outlet pipe section 5xDN

Areas of application

- Hot water in district heat supply
- Non-conductive liquid

Technical details

Measuring accuracy: $\pm 0.5\%$ of measured value (5...100%*)
 $\pm 2\%$ of measured value (at 2...5%)
 *These values relate to viscosities of ≤ 1 mm²/s

Repeatability: $\pm 0.2\%$ of measured value

Temperature: max. 0 to +120 °C

Ambient temperature: max. 60 °C

Operating pressure: DOG-21...: PN 16
 DOG-22..., DOG-24...: PN 40

Span: 1 : 50 (1 mm²/s)
 1 : 70 (at 0.5 mm²/s)
 per 1 mm²/s halved by the span

Max. viscosity: 3 mm²/s sensor

Connection: cable, 2 m PVC, blue

Protection type: IP 65

Materials

Case: DOG-21...: continuous casting GG25
 DOG-23...: steel St.35.8
 DOG-22...: stainless steel 1.4571

Orifice: stainless steel 1.4436

Sensing element: polyphenylene sulfide (PPS)

Sensor: hollow ball
 proximity switch (high temperature)
 standard: EPDM and silicone
 option: FPM, nitrile

Without electronics with pulse output

Initiator, 5-8 V_{DC}, 3 mA,
 high 5 V_{DC}, low 3 V_{DC}

Electronics

Electrical connection: conduit thread screwing

Protection type: IP 65

Display: 4-position LCD and meter

Power supply: 230 V_{AC} -10 %, +12 % / 48-62 Hz

Input: sensor system DOG

Pulse outputs 1: 12 V_{DC}, max. 100 mA,
 open collector

Pulse output 2: floating contact decadic
 250 V_{AC}, max. 3 A

Analogue output: 0-20 mA or 4-20 mA,
 max. 500 Ω

Case: for surface mounting

Ambient temperature: -15 to +50 °C

Permissible distance: max. 100 m to the DOG-1
 max. 1000 m to the DOG-2

Connection cable: minimum 0.5 mm²,
 screening recommended

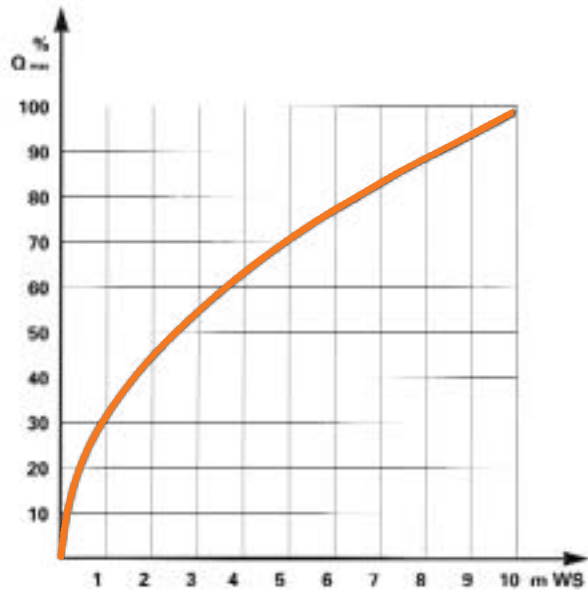


Order details (example: DOG-2101H F25N N F)

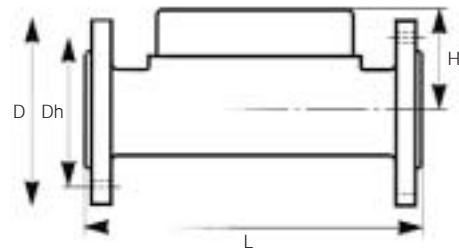
Meas. range m³/h water	Model			Connection flange		Gasket	Electronic analyser
	Material cont. casting	Material steel	Material st. steel	Standard PN 16 only GG, st. st.	Special PN 40 only steel, st. st.		
0.075 - 3.75 0.13 - 6.6 0.2 - 10	DOG-2101H.. DOG-2102H.. DOG-2103H..	- - -	DOG-2201H.. DOG-2202H.. DOG-2203H..	F25N=DN25	F25S=DN25	N=nitrile V=FPM E=EPDM (standard)	Frequency output without electronics ...F Initiator, 5-8 V _{DC} , 3 mA, high 5 V _{DC} , low 3 V _{DC}
0.08 - 4 0.16 - 8 0.3 - 15	- - -	DOG-2304H.. DOG-2305H.. DOG-2306H..	DOG-2204H.. DOG-2205H.. DOG-2206H..	F32N=DN32	F32S=DN32		
0.12 - 6 0.28 - 14 0.6 - 30	DOG-2107H.. DOG-2108H.. DOG-2109H..	- - -	DOG-2207H.. DOG-2208H.. DOG-2209H..	F40N=DN40	F40S=DN40		
0.26 - 13 0.56 - 28 0.96 - 48	DOG-2110H.. DOG-2111H.. DOG-2112H..	- - -	DOG-2210H.. DOG-2211H.. DOG-2212H..	F50N=DN50	F50S=DN50		
0.39 - 19.6 0.76 - 38 1.5 - 75	- - -	DOG-2313H.. DOG-2314H.. DOG-2315H..	DOG-2213H.. DOG-2214H.. DOG-2215H..	F65N=DN65	F65S=DN65		
0.46 - 23 1.32 - 66 2.6 - 130	DOG-2116H.. DOG-2117H.. DOG-2118H..	- - -	DOG-2216H.. DOG-2217H.. DOG-2218H..	F80N=DN80	F80S=DN80		
1.2 - 60 2 - 100 3.2 - 160	DOG-2119H.. DOG-2120H.. DOG-2121H..	- - -	DOG-2219H.. DOG-2220H.. DOG-2221H..	F1HN=DN100	F1HS=DN100		
1.4 - 70 2.6 - 130 5 - 250	- - -	DOG-2322H.. DOG-2323H.. DOG-2324H..	DOG-2222H.. DOG-2223H.. DOG-2224H..	F1ZN=DN125	F1ZS=DN125		
1.9 - 94 4 - 200 10 - 500	- - -	DOG-2325H.. DOG-2326H.. DOG-2327H..	DOG-2225H.. DOG-2226H.. DOG-2227H..	F1FN=DN150	F1FS=DN150		
3.4 - 170 6.8 - 340 19.6 - 980	- - -	DOG-2328H.. DOG-2329H.. DOG-2330H..	DOG-2228H.. DOG-2229H.. DOG-2230H..	F2HN=DN200	F2HS=DN200*		
5.2 - 260 11 - 550 25 - 1255	- - -	DOG-2331H.. DOG-2332H.. DOG-2333H..	- - -	F2FN=DN250	F2FS=DN250		
6 - 300 16 - 800 40 - 2000	- - -	DOG-2334H.. DOG-2335H.. DOG-2336H..	- - -	F3HN=DN300	F3HS=DN300		
8 - 420 19 - 970 50 - 2700	- - -	DOG-2337H.. DOG-2338H.. DOG-2339H..	- - -	F3FN=DN350	- - -		
13 - 650 26 - 1300 70 - 3500	- - -	DOG-2340L.. DOG-2341L.. DOG-2342L..	- - -	F4HN=DN400	- - -		

* not for DOG-22 (stainless steel)

Pressure loss/flow

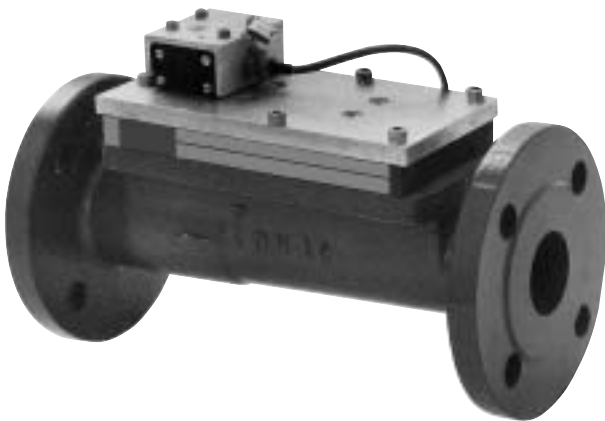


Dimensions and weights



DN mm	L mm	D mm	Dh mm	H mm	Weights kg
25	260	115	85	110	7.9
32	260	140	100	115	8.4
40	300	150	110	120	11.8
50	270	165	125	125	11.9
65	300	185	145	135	12.1
80	300	200	160	140	20.4
100	360	220	180	180	23
125	300	250	210	215	20
150	500	285	240	235	28
200	350	340	295	260	36
250	450	405	355	285	53
300	500	460	410	310	70
350	600	520	470	340	90
400	800	580	525	360	120

Flow meter DOG-2



Signal converter

