

Variable area flowmeter DFM 165 to 350

For all industrial uses

- Practical graduated measuring ranges according to DIN, from 3 l/h to 50000 l/h
- DN 10 to DN 65 graduated tubes
- Tube lengths = type description 165 to 350 mm
- Materials for (almost) all media: uPVC, PA, PSU and PVDF
- Process automation using limit signal transmitters and measured value remote transmission

High measurement accuracy and operational reliability

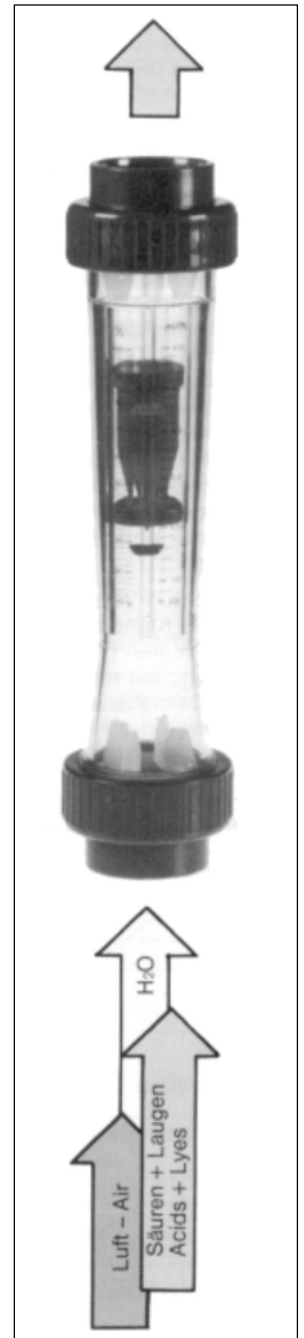
- Indicator accuracy according to VDI/VDE 3513
- Materials with reduced moisture absorption increase the measured value stability
- Pressure level PN 10, materials with high impact resistance and increased creep strength
- Hermetically sealed, connected with O-rings
- Require little maintenance, install radially

The medium, water, air liquid or gaseous chemicals, flows vertically from the bottom to the top.

The flow forces cause the float to lift without friction and its top graduation edge (largest diameter) indicates directly the flow volume on the graduated tube scale.

- **The flowmeters DFM 165 to 350 have been further developed according to the increased demands in process engineering, and provide the following additional features:**

- **Optimized graduated tube geometry for increased accuracy**
- **Improved stabilization of the float to make reading easier**
- **Tube lengths to industrial standard**
- **Variety of options with up to 3 different tube lengths and DN per measuring range**
- **Material variants for practically every purpose**



Flowmeter programme overview

Measuring range ¹⁾ l/h	DN mm	Series DFM			Measuring range ¹⁾ l/h	DN mm	Series DFM			Measuring range ¹⁾ l/h	DN mm	Series DFM	
		165	170	185			200	335	350			335	350
3 - 24	10	•			15 - 150	25			•	400 - 4000	50		•
5 - 60	10	•			25 - 250	25	•			600 - 6000	50	•	•
10 - 100	10	•			30 - 300	25			•	1000-10000	50	•	•
25 - 250	10	•			40 - 400	25	•			1500-15000	65		•
										2500-25000	65	•	•
5 - 50	15		•		60 - 600	25		•	•	10000-50000	65	•	•
15 - 150	15		•		100 - 1000	25	•	•	•				
25 - 250	15		•		150 - 1500	25	•						
40 - 400	15		•										
					150 - 1500	32			•				
15 - 150	20			•	250 - 2500	32			•				
40 - 400	20			•									
60 - 600	20			•	200 - 2000	40		•	•				
100 - 1000	20			•	300 - 3000	40		•	•				

¹⁾ for water at 20 °C

The conical graduated tube is equipped as standard with a measuring range scale in l/h - from DFM 335 also in % - for water at 20 °C. It has external dovetailed strips with 2 movable set-point indicators for the optimum marking of minimum and maximum flow volume or for accommodating limit signal transmitters.

In the measuring tube the float is located, of PVDF as standard, as well as the float trap. From DFM 335 two are provided, one at the top and one at the bottom. For automatic measurement, the float is equipped with a magnet insert which is impervious to fluids.

A newly adapted magnetic technology makes the distinction between monostable and bistable magnets unnecessary.

The connections, inserts as socket ends for solvent (PVC) or fusion welding (PP, PVDF), ANSI sockets, ensure a reliable sealing with only two O-rings and guarantee fast, unproblematic radial installation.

The DFM 165 to 350 flowmeters are calibrated with defined density and the viscosity of water at 20 °C. The measurement accuracy corresponds to class 4 according to VDI/VDE 3513, sheet 2.

Flowmeter with limit signal transmitters. Connected with limit switches (see under accessories) for the direct switching of valves and pumps or for triggering an optical or acoustic alarm.



Series DFM 165 - Ident No.

Measuring range ¹⁾ l/h	DN mm	d mm	G ²⁾ Inch	PVDF	uPVC Magnet ³⁾	PVDF	PA Magnet ³⁾	PVDF	PSU Magnet ³⁾	PVDF	PVDF Magnet ³⁾
3 - 24	10	16	3/4	47500	47683	47516	47699	47532	47715	47548	47731
5 - 60	10	16	3/4	47501	47684	47517	47700	47533	47716	47549	47732
10 - 100	10	16	3/4	47502	47685	47518	47701	47534	47717	47550	47733
25 - 250	10	16	3/4	47503	47686	47519	47702	47535	47718	47551	47734

Series DFM 170 - Ident-No.

Measuring range ¹⁾ l/h	DN mm	d mm	G ²⁾ Inch	PVDF	uPVC Magnet ³⁾	PVDF	PA Magnet ³⁾	PVDF	PSU Magnet ³⁾	PVDF	PVDF Magnet ³⁾
5 - 50	15	20	1	47504	47687	47520	47703	47536	47719	47552	47735
15 - 150	15	20	1	47505	47688	47521	47704	47537	47720	47553	47736
25 - 250	15	20	1	47506	47689	47522	47705	47538	47721	47554	47737
40 - 400	15	20	1	47507	47690	47523	47706	47539	47722	47555	47738

Series DFM 185 - Ident No.

Measuring range ¹⁾ l/h	DN mm	d mm	G ²⁾ Inch	PVDF	uPVC V2A Magnet ³⁾	PVDF	PA V2A Magnet ³⁾	PVDF	PSU V2A Magnet ³⁾	PVDF	PVDF Magnet ³⁾
15 - 150	20	25	1 1/4	47508	48734	47508	48734	47540	48766	47556	47739
40 - 400	20	25	1 1/4	47509	48735	47509	48735	47541	48767	47557	47740
60 - 600	20	25	1 1/4	47510	48736	47510	48736	47542	48768	47558	47741
100 - 1.000	20	25	1 1/4	47511	48737	47511	48737	47543	48769	47559	47742

Series DFM 200 - Ident No.

Measuring range ¹⁾ l/h	DN mm	d mm	G ²⁾ Inch	PVDF	uPVC V2A Magnet ³⁾	PVDF	PA V2A Magnet ³⁾	PVDF	PSU V2A Magnet ³⁾	PVDF	PVDF Magnet ³⁾
25 - 250	25	32	1 1/2	47512	48738	47512	48738	47544	48770	47560	47743
40 - 400	25	32	1 1/2	47513	48739	47513	48739	47545	48771	47561	47744
100 - 1.000	25	32	1 1/2	47514	48740	47514	48740	47546	48772	47562	47745
150 - 1.500	25	32	1 1/2	47515	48741	47515	48741	47547	48773	47563	47746

¹⁾ with water at 20 °C

²⁾ measuring tube connection

³⁾ PVDF with magnet, monostable and bistable



Materials

Measuring tube:

- uPVC (polyvinyl chloride) - transparent
- PA (polyamide) - transparent, with strongly reduced moisture absorption
- PSU (polysulfone) - transparent
- PVDF (polyvinylidene fluoride) - opaque

Float:

- PVDF
- 1.4301 (V2A)
- PVDF, with encapsulated magnet impervious to fluids and only one polarization for monostable and bistable function

O-rings:

- EPDM
- FPM (e.g. Viton A) on request

Union sockets ends:

- uPVC. Colour: grey, RAL 7011
- PP (polypropylene) available on request. Colour: grey, RAL 7032
- PVDF, standard with corresponding measuring tube. Colour: opaque (yellowish-white)
- White malleable cast iron on request.

Other materials or combinations of materials available on request.

Technical Specifications

Type of fluids:

Technical clean, neutral and aggressive or gaseous liquids, provided that the selected materials are resistant at operating temperature.

Refer to the ASV resistance guide.

Measuring ranges:

DFM-series	165 - 3 up to	250 l/h
	170 - 5 up to	500 l/h
	185 - 15 up to	1000 l/h
	200 - 25 up to	1500 l/h
	335 - 15 up to	50000 l/h
	350 - 15 up to	50000 l/h

Measuring tube dimensions:

- DN 10 to DN 65
- Threaded connection for pipe union G 3/4" to G 3 1/2" and ANSI
- Tube length mm = series designation

Installation:

Vertical, flow direction from the bottom to the top (see front page illustration).

Pressure stage:

PN 10 at 20 °C

Note:

For gaseous media do not use graduated tubes made of PVC.

Flowmeter with flow sensor ZE 2000



Series DFM 335 - Ident No.

Measuring range ¹⁾ l/h	DN mm	d mm	G ²⁾ Inch	PVDF	uPVC V2A	Magnet ³⁾	PVDF	PA V2A	Magnet ³⁾	PVDF	PSU V2A	Magnet ³⁾	PVDF	PVDF	Magnet ³⁾
60 - 600	25	32	1 1/2	46272	48563	47576	46299	48590	47603	46326	48617	47630	-	-	-
100 - 1.000	25	32	1 1/2	46273	48564	47577	46300	48591	47604	46327	48618	47631	-	-	-
200 - 2.000	40	50	2 1/4	46282	48573	47586	46309	48600	47613	46336	48627	47640	-	-	-
300 - 3.000	40	50	2 1/4	46283	48574	47587	46310	48601	47614	46337	48628	47641	-	-	-
600 - 6.000	50	63	2 3/4	46287	48578	47591	46314	48605	47618	46341	48632	47645	-	-	-
1.000 - 10.000	50	63	2 3/4	46288	48579	47592	46315	48606	47619	46342	48633	47646	-	-	-
2.500 - 25.000	65	75	3 1/2	46293	48584	47597	46320	48611	47624	46347	48638	47651	-	-	-
10.000 - 50.000	65	75	3 1/2	127891	127892	127893	127894	127895	127896	127897	127898	127899	-	-	-

Series DFM 350 - Ident No.

Measuring range ¹⁾ l/h	DN mm	d mm	G ²⁾ Inch	PVDF	uPVC V2A	Magnet ³⁾	PVDF	PA V2A	Magnet ³⁾	PVDF	PSU V2A	Magnet ³⁾	PVDF	PVDF	Magnet ³⁾
15 - 150	25	32	1 1/2	127854	127855	127856	127857	127858	127859	127860	127861	127862	127863	127864	127864
30 - 300	25	32	1 1/2	46275	48566	47579	46302	48593	47606	46329	48620	47633	46356	47660	47660
60 - 600	25	32	1 1/2	46276	48567	47580	46303	48594	47607	46330	48621	47634	46357	47661	47661
100 - 1.000	25	32	1 1/2	46277	48568	47581	46304	48595	47608	46331	48622	47635	46358	47662	47662
150 - 1.500	32	40	2	46279	48570	47583	46306	48597	47610	46333	48624	47637	46360	47664	47664
200 - 2.500	32	40	2	46280	48571	47584	46307	48598	47611	46334	48625	47638	46361	47665	47665
200 - 2.000	40	50	2 1/4	46284	48575	47588	46311	48602	47615	46338	48629	47642	46365	47669	47669
300 - 3.000	40	50	2 1/4	46285	48576	47589	46312	48603	47616	46339	48630	47643	46366	47670	47670
400 - 4.000	50	63	2 3/4	46289	48580	47593	46316	48607	47620	46343	48634	47647	46370	47674	47674
600 - 6.000	50	63	2 3/4	46290	48581	47594	46317	48608	47621	46344	48635	47648	46371	47675	47675
1.000 - 10.000	50	63	2 3/4	46291	48582	47595	46318	48609	47622	46345	48636	47649	46372	47676	47676
1.500 - 15.000	65	75	3 1/2	46295	48586	47599	46322	48613	47626	46349	48640	47653	46376	47680	47680
2.500 - 25.000	65	75	3 1/2	46296	48587	47600	46323	48614	47627	46350	48641	47654	46377	47681	47681
10.000 - 50.000	65	75	3 1/2	127865	127866	127867	127868	127869	127870	127871	127872	127873	127874	127875	127875

¹⁾ with water at 20 °C

²⁾ measuring tube connection

³⁾ PVDF with magnet, monostable and bistable

Indicator scales

The flowmeters are equipped with scales for water at 20 °C as standard.

For various media, including air Nm³/h, HCl with a concentration of 30 to 33 w/w percent and NaOH with 30 and 50 w/w percent as well as the units of measurement m³/h, l/sec, l/min or USGPM, IGPM, further indicator scales are available on request.

These special scales can be stuck on easily and reliably afterwards. Alterations to the float are not necessary.

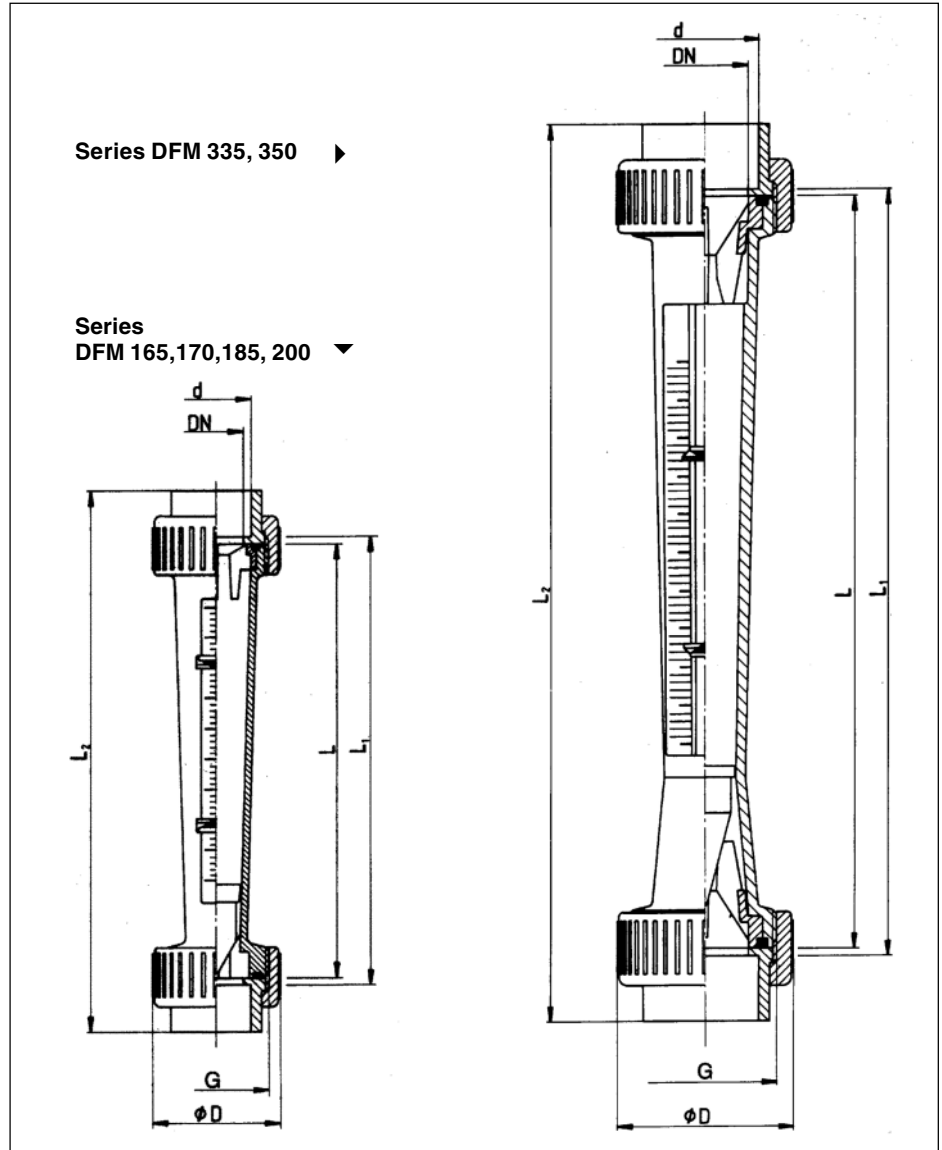
Special precise scales depending on the parameters used in operation are available on request.

We require the following information for this:

- operating or medium temperature t_A
- density at t_A
- viscosity at t_A
- as well as
- operating pressure in case of gaseous media

For different applications and the according selection please contact our service departments.

Dimensions, series DFM 165 to 350



Dimensions and technical specifications

Series				Dimension mm							Technical data		
DFM	d mm	DN mm	DN Inch	G ⁴⁾ Inch	D mm	L* mm	L** mm	L1* mm	L1** mm	≈ L2 mm	Δp ¹⁾ m bar	Δp ²⁾ m bar	Weight in g ³⁾
165	16	10	3/8	3/4	35	165	161.3	171	167.3	199	3.3	4.8	78
170	20	15	1/2	1	43	170	166.3	176	169.3	208	2.5	4.3	96
185	25	20	3/4	1 1/4	53	185	181.0	191	187.0	229	6.1	8.3	125
200	32	25	1	1 1/2	60	200	195.5	206	201.5	250	6.1	8.3	250
335	32	25	1	1 1/2	60	335	-	341	-	385	12.3	15.9	435
335	50	40	1 1/2	2 1/4	83	335	-	341	-	403	12.3	15.9	1005
335	63	50	2	2 3/4	103	335	-	341	-	417	22.2	27.1	1470
335	75	65	2 1/2	3 1/2	122	335	-	341	-	429	33.7	40.0	1900
350	32	25	1	1 1/2	60	350	340.5	356	346.5	400	12.3	15.9	475
350	40	32	1 1/4	2	72	350	340.5	356	346.5	408	12.3	15.9	710
350	50	40	1 1/2	2 1/4	83	350	340.5	356	346.5	418	12.3	15.9	1050
350	63	50	2	2 3/4	103	350	340.5	356	346.5	432	22.2	27.1	1530
350	75	65	2 1/2	3 1/2	122	350	340.5	356	346.5	444	33.7	40.0	2100

¹⁾ pressure loss with water at +20 °C

²⁾ pressure loss with air at +20 °C

³⁾ PVDF version approx. +40 %

⁴⁾ PVDF measuring tube thread is special thread

* valid for tube materials PVC, PSU and PA

** valid for tube material PVDF

Operating pressure:

In order to determine the permissible operating pressure as a function of the working temperature, the creep strength of the particular material needs to be taken into account, among other factors. Please inquire.

Fluid temperature:

Depends on the operating conditions (system pressure, load etc.). Taking creep strength into account, the following approximate temperatures apply:

- uPVC: + 60 °C
- PA: + 75 °C
- PSU: +100 °C
- PVDF: +110 °C

Connections:

- PVC socket ends for solvent welding according to DIN 8063.
- PP, PVDF socket ends for fusion welding according to DIN 16 962.
- On request we supply the flowmeters with flange connections - loose flanges according to DIN 2501, PN 10/16 - or malleable unions according to DIN 2950 with female end.

Please inquire.

Mounting:

To avoid unstable flow conditions (flutter of the float) a distance of 5 up to 7 x DN should be considered ahead and behind the flowmeter.

Approximate temperature correction for DFM 335, 350 series

Example:

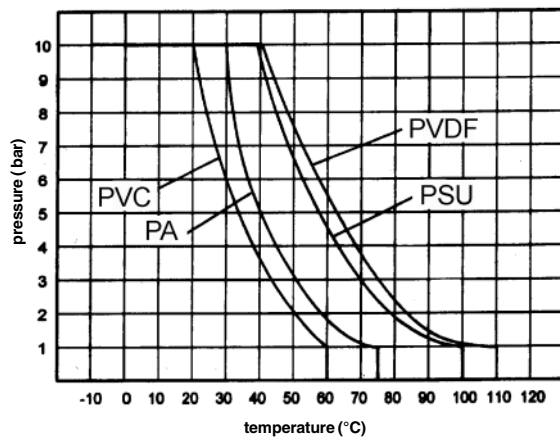
Required flow rate 4000 l/h.

Liquid H₂O at $t_A = 60\text{ °C}$.

Correction of flow rate acc. diagram

$Q_K = \sim -98\text{ l/h}$.

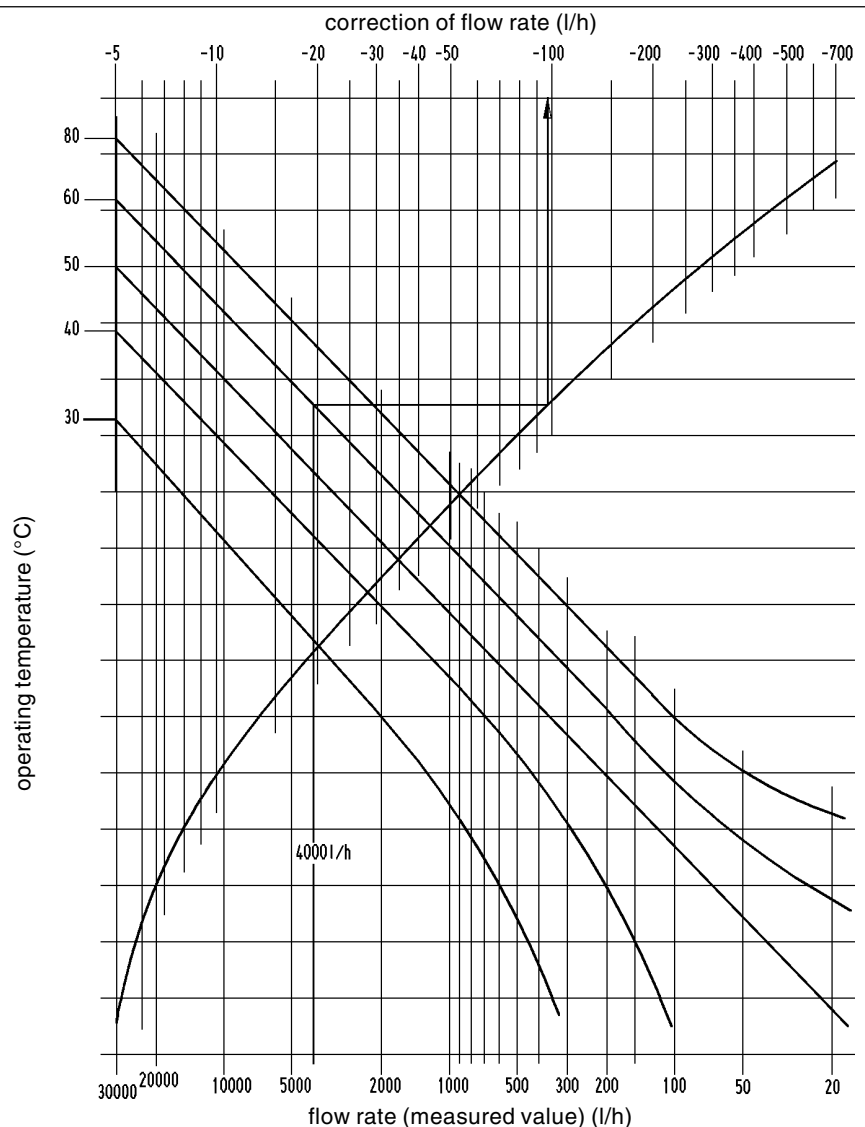
The scale indicates 3902 l/h, and the actual flow volume is 4000 l/h.



The above diagram is applicable for a computed operating life factor of 20 years.
Values < 0 °C on request with exact data of operation.

Pressure/temperature diagram:

Standard values for resistance of material for harmless fluids.



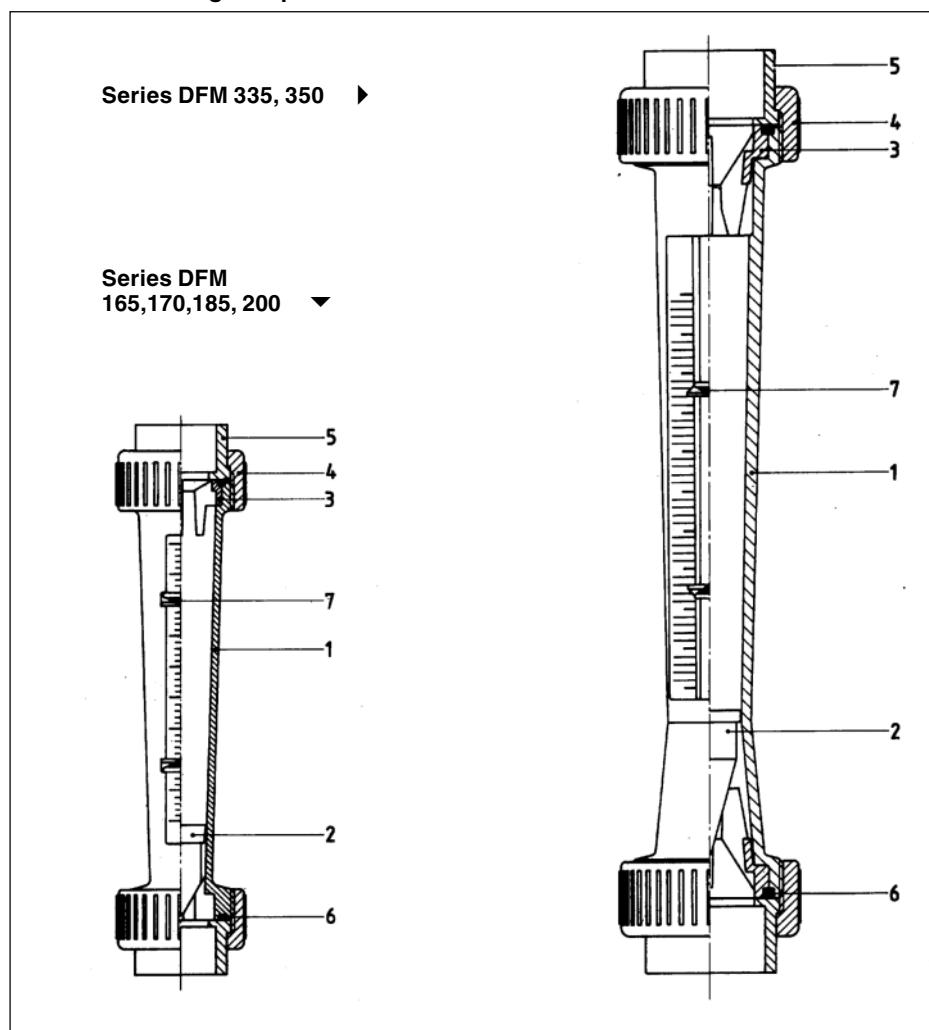
Accessories

For process automation or control the following are available:

New:

- Flow sensor ZE 2000
(data sheet 330 203)
- measurement accuracy
± 1 % of the measured value
- analog output
4...20 mA
- digital output
RS 232
- programmable
- Float with liquid-proof sealed magnet.
Polarization for monostable and bi-stable limit signal transmitters.
- Limit signal transmitters, monostable or bistable, for one signal at min. or max. flow rate.
- Limit switches for direct power switching of valves or pumps.
- Flow remote indication - digital display - with adjusting or switching option at minimum and maximum values.

Sectional drawing and part list



Series DFM 165-170-185-200			Series DFM 335-350		
Pos.	Qty.	Description	Pos.	Qty.	Description
1	1	measuring tube	1	1	measuring tube
2	1	float	2	1	float
3	1	float trap	3	2 ¹⁾	float trap
4	2	union nut	4	2	union nut
5	2	insert	5	2	insert
6	2	O-rings	6	2	O-rings
7	2	set-point indicator	7	2	set-point indicator

¹⁾ for DFM DN 65, 10000-50000 l/h, 2 different float traps

Conversion of flow rate units

	m³/s	m³/h	l/min	GB - gal/min	US - gal/min	ft³/sec
1 m³/s	= 1	3600	60000	13198	15850	35.3
1 m³/h	= 2.788 x 10 ⁻⁴	1	16.667	3.663	4.405	9.803 x 10 ⁻³
1 l/min	= 1.667 x 10 ⁻⁵	6 x 10 ⁻²	1	0.219	0.264	0.163
1 IGPM	= 7.577 x 10 ⁻⁵	0.273	4.55	1	0.833	2.676 x 10 ⁻³
1 USGPM	= 6.309 x 10 ⁻⁵	0.227	3.783	1.203	1	2.225 x 10 ⁻³
1 cusec	= 2.833 x 10 ⁻²	102	1700	373.69	444.44	1

Technical alterations excepted