Flow Meters with Float constructive series AF and BF for liquids and gases with remote flow indication

- Quality design
- High corrosion resistance
- Reliable measurement principle
- Low weight and small dimensions

Nomenclature

Flowmeters with float - measuring devices with freely moving float which occupies a flow amount according to a certain position in a vertically mounted measuring pipe in which the flow cross-section continuously increases upwardly.

Device error - the difference between the value showed by instrument and real value of measured quantity.

Accuracy – maximal instrument error in its whole range.

Accuracy class - value represented by a ratio of the device accuracy to the maximum value of the measuring range in percentages.

Usage

Flowmeters with float AF series are designed for measuring the volumetric or mass media flow. The flow rate is read directly on the meter. Due to the high corrosion and physical resistance allow wide use in the chemical, food, paper, metallurgical industries, in the neutralization stations, sewage and water treatment plants also in chemical dosing and in many other applications.

Flowmeters with float BF series allows to connect additional devices - sensors, displays and control units for remote indication of flow on the digital display, including the possibility of obtaining electrical output when reaching selected limits of the flow. This type of flowmeter with a respective additional device is useful in solving problem of regulation and control for automatic dosing pumps running during belaying, etc.

Industrial rights are reserved by the manufacturer of float flowmeter series AF and BF and additional devices.
When developing float flowmeter series AF and BF were used knowledge from many years of operation flowmeters of own design, but also the world's leading manufacturers.

Advantages of flowmeters series AF, BF

- High-quality finish
- High corrosion resistance
- Reliable measurement principle
- Possibility of extended warranty
- Low weight and small dimensions
- Economic efficiency and low prices, discount when ordering larger quantities of the same flowmeter type, discount for orders for longer period, the possibility of further discounts on the terms agreed in the contract
- Customers choice of material

Description

Flowmeters series AF and BF are made of steel structures, which is formed by the body and the clamping heads with flanges. The supporting structure is used to stick the test tube with float, the scale carrier, sight and fixing gaskets with stops float. An important function of supporting structures

is to protect the measuring tube during transport, storage and operation under harsh conditions in manufacturing plants.

The measuring device consists of a combination of vacuum tubes molded borosilicate glass and float made of stainless steel grade 17 or other material. When the medium flow through the measuring pipe vertically disposed float is buoyed and at steady state force effects float assumes a position with a certain amount of stroke, which corresponds to a particular size of flow. We find this flow rate by comparing the reading the edge of the float (the edge of the upper face of the float) and a scale. The dependence of the stroke of the float and the flow rate for a given measuring tube and float empirically determined by calibrating it for each combination separately.

Other parts of the flowmeter are stops which limit the movement of the float in the tube, it absorbs shocks and provide media throughput when the float is in extreme position. The material stops are made of PE or PP.

The glass measuring tube is locked by a pair of inserts.

The inserts are made of stainless steel or plastic. Flowmeters of all sizes are equipped with sights glass.

Installation, operation and maintenance

Flowmeters are connected to the pipeline in a vertical position so that the vertical axis do not flow from the vertical deviation greater than ±1°. The flowmeters are connected so that subsequent pipeline construction do not stretch flowmeter eg. by bending. The medium must be entered from below to the meter. For applications flowmeter is due a guaranteed uninterrupted operation of the equipment needed to provide a bypass flow meter, flow meter which can be put out of media flow.

Control valve (not shut off valve or tap) which is necessary to set the desired flow should always be opened or closed slowly. Sudden opening or closing of the valve, particularly in gaseous media or in aired pipeline, causing a sharp jolt of the float and breaking the measuring tube. Control valve should be placed in the pipe between the meter and the pressure source (pump, fan, etc.). The values shown on the scale of the flowmeter is subject to conditions (medium, pressure, temperature) that are listed on a scale equipment and which should be maintained in the piping system.

Pipeline, which is to be fitted with a flow meter must be flushed before installation. In case of measuring gas, it is necessary particularly for diameters DN 50 and DN 80 before entering the device to place calming pipe of length five times greater than the pipe diameter. If this is not possible, use type flowmeter AFV, BFV with guided float. The connection of metal or plastic pipes is done with flanged necks of cast iron, steel or flat welded flanges according to CSN, DN 15, 25, 40, 50, 80 and PN 10, 16, 25, 40, or crimp collars. Rubber seal in the annulus shape has dimensions D, H listed in table no. 2, where there are also other connecting and mounting dimensions.

Operation and maintenance is limited to regular leakage checking, screen cleaning for input lightness PN15 (DN25) and cleaning of the device, the procedure is as follows:

Partially unscrew and then screw the clamping flanges, the axial displacement pads are moved now gently removed them e.g. by screwdriver together with the seal of the unit. Clean the measuring tube and potentially replace the seal on the inserts. Before deploying liners wet them by soapy water. Deploy the inserts gently by slight pressure towards the device while alternately turn the liner. To remove the measuring tube, it is necessary one chuck head - flange completely unscrewed from the body structure.

Just before inserting flowmeters type AF, BF into the pipe, remove the meter from its packaging, remove the tape from the steel flanges and for all types of flowmeters remove the float catch, which secured the float during transportation.

The lower molded insert which forms a connecting sealing surface (annulus) is necessary to support (by hand) when installing the bottom and thus secure against possible ejection from the insert device.

During operation it is necessary to avoid pressure shocks which could cause that the float would impinge sharply on the float stops.

Technical specifications

Measuring range	1 : 10
Accurancy class	± 4 %, 2,5 %, 1,6 %
Operating medium temperature	0 – 100°C
Type of connection	flanged connections - CSN, PN 10, 16, 25, 40
Nominal size	DN 15, 25, 40, 50, 80
Measurable media	liquid and gaseous
Measuring ranges, weight	table no. 1
Overall and connecting dimensions	table no. 2a , table no. 2b, table no. 1

Material

Materials and their protection must ensure high corrosion resistance.

Supporting structure	material class 11, castings steel acc. to CSN 42 2643, gray cast iron acc. to CSN 42 2420
Sight glass	polymethylmethacrylate acc. to CSN 64 3410

Measured medium is in contact with the following materials:

Measuring tube	borosilicate glass
Sealing elements	rubber acc. to CSN 029281
Float, insert, stop	material acc. to table. no. 3 and 4

Surface treatment

Surface supporting structure is paint by base epoxy paint S 2300/0600. Topcoat is done via email epoxy S 2323/9111 and S 2323/9441 S or by powder-mail. The coating composition is applied by pneumatic spraying. Clamping head with flanges and fasteners are zinc coated.

Stainless steel and plastic material is uncoated.

Safety and health protection during work

Apply all generally binding regulations on safety and hygiene. Due to increased security and a sense of certainty, it is necessary to use a protective shield.

Marking

Each device is labeled with the following information:

- type
- serial number
- year of manufacture
- measuring unit
- type of fluid and the reference conditions (temperature, density, pressure)

Testing

The kinds of tests that are carried out on flowmeters:

- material
- dimensional
- visual
- finish surface
- assembly correctness and marking

Each device is individually calibrated, while verifying the correct operation of the float.

Delivery and acceptance

Delivery
Devices are supplied assembled. Spare parts for two and five-year operation must be ordered separately.

Acceptance
Method of acceptance will be determined in the purchase contract.

Packing, transport, storage, warranty

Packing

Flowmeters with higher float weight the float is secured against movement. The security against the float movement must be removed before installing the flow meter. The flowmeters are packed in paper or wooden containers.

Transport

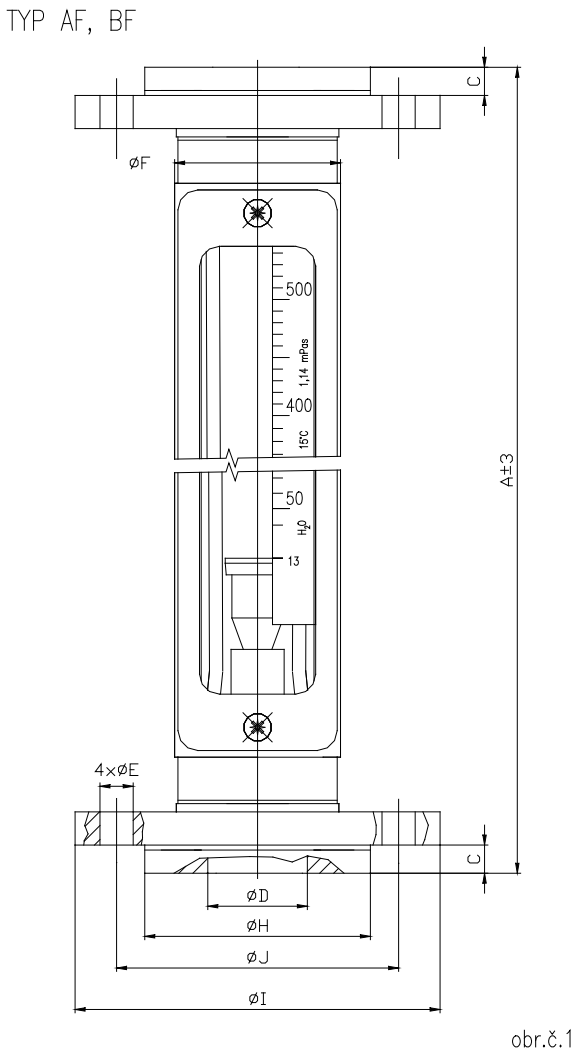
Equipment must be transported in covered and dry vehicles and in accordance with CSN 640090. Details regarding the transport will be specified in the purchase agreement.

Storage

The flowmeters are stored in covered and dry spaces and in accordance with CSN 640090.

Warranty

The extent and conditions of the guarantee will be specified in the purchase agreement.



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Manufacturer type number

Example:

AF	8	02	K1	P2
1.	2.	3.	4.	5.

1.	Type		
	AF	connection by flanges	
	BF	connection by flanges	
	AFV	connection by flanges, with guided float	
	BFV	connection by flanges, with guided float	
2.	Size of measuring tube		
	04, 03, 02 … 8, 9, 10, 11		
3.	Design float emblem		
	01	basic float shape	
	02	modified float shape for greater flow	
	03	basic float shape with the core	
	04	modified float shape with the core for greater flow	
	05	basic float shape with magnet	
	06	modified float shape with magnet for greater flow	
	07	basic float shape with core and magnet	
	08	modified float shape with core and magnet	
	09	lightweight	
	10	bead	
4.	Float material		
	Metal	K1	stainless steel class 17 246
		K2	stainless steel class 17 348
		K5	alloy AL
		K6	titanium
	Plastic	P1	PVC
		P2	PP
		P3	PTFE (Teflon)
5.	Fittings material - inserts		
	- not applicable if the same material as the float		
	Metal	K1	stainless steel class 17 246
		K2	stainless steel class 17 348
		K5	alloy AL
	Plastic	P1	PVC
		P2	PP

Table no. 1 - value of measuring ranges and weight

DN	Type	Type	Measuring range l/h		Weight kg	Max. pressure loss mbar	
			Water +15°C	Air +20°C; 101,3 kPa		Water mbar	Air mbar
15	AF04.01K1	BF04.01K1	0,4 - 2,5	10 - 100	1,9	7	13
15	AF03.01K1	BF03.01K1	0,6 - 6	15 - 220	1,9	21	33
15	AF02.01K1	BF02.01K1	1 - 12	30 - 450	1,9	19	33
15	AF01.01K1	BF01.01K1	2 - 17	60 - 600	1,9	14	20
15	AF1.01K1	BF1.01K1	4 - 35	70 - 1 100	1,6	20	24
15	AF2.01K1	BF2.01K1	8 - 66	300 - 2 300	1,7	32	46
15	AF3.01K1	BF3.01K1	20 -145	450 - 4 300	1,8	53	56
15	AF4.01K1	BF4.05K1	30 -280	1 100 - 9 000	1,8	58	72
15	AF4.02K1	BF4.06K1	40 - 350	-	1,8	90	-
25	AF5.01K1	BF5.05K1	40 - 540	2 000 - 11 000	2,5	90	45
25	AF6.01K1	BF6.05K1	100 - 1 000	2 500 - 19 000	2,6	91	39
25	AF6.02K1	BF6.06K1	200 - 1 250	-	2,6	141	-
40	AF7.01K1	BF7.05K1	200 - 1 900	3 000 - 32 000	4,2	231	79
40	AF7.02K1	BF7.06K1	200 - 2 300	-	4,3	339	-
40	AF8.01K1	BF8.05K1	500 - 3 700	8 000 - 60 000	4,5	318	101
40	AF8.02K1	BF8.06K1	800 - 4 000	-	4,6	372	-
50	AF9.01K1	BF9.05K1	1 200 - 6 300	15 000 - 100 000	6,2	517	157
50	AF9.02K1	BF9.06K1	2 500 - 8 000	30 000 - 140 000	6,7	833	307
50	AFV9.01K1	BFV9.05K1	2 500 - 11 000	40 000 - 170 000	8	1575	453
80	AF10.01K1	BF10.05K1	3 500 - 13 000	60 000 - 230 000	11	1060	400
80	AF10.02K1	BF10.06K1	5 000 - 16 500	-	12	1708	-
80	AFV10.01K1	BFV10.05K1	6 000 - 24 000	130 000 - 420 000	13	3614	1334

Flowmeters type BF can use the sensors.

The value of measuring ranges for water are valid for stainless steel floats. When using other material floats values of measuring ranges are different.

Requirements for other ranges, other media and conditions to be agreed with the manufacturer or mentioned in a questionnaire.

Designation AFV, BFV is a flowmeter with guided float.

Table no. 2a - stainless steel design, value of overall and connecting dimension

DN	Type	Type	A	C	D	E	F	H	I	J
15	AF04.01K1	BF04.01K1	395	7	23	14	50	45	90	65
15	AF03.01K1	BF03.01K1	395	7	23	14	50	45	90	65
15	AF02.01K1	BF02.01K1	395	7	23	14	50	45	90	65
15	AF01.01K1	BF01.01K1	395	7	23	14	50	45	90	65
15	AF1.01K1	BF1.01K1	375	7	23	14	50	45	90	65
15	AF2.01K1	BF2.01K1	375	7	23	14	50	45	90	65
15	AF3.01K1	BF3.01K1	375	7	23	14	50	45	90	65
15	AF4.01K1	BF4.05K1	375	7	23	14	50	45	90	65
15	AF4.02K1	BF4.06K1	375	7	23	14	50	45	90	65
25	AF5.01K1	BF5.05K1	375	7	35	14	50	60	110	85
25	AF6.01K1	BF6.05K1	375	7	35	14	50	60	110	85
25	AF6.02K1	BF6.06K1	375	7	35	14	50	60	110	85
40	AF7.01K1	BF7.05K1	375	7	50	18	50	75	140	110
40	AF7.02K1	BF7.06K1	375	7	50	18	80	75	140	110
40	AF8.01K1	BF8.05K1	424	6,5	55	18	80	85	140	110
40	AF8.02K1	BF8.06K1	424	6,5	55	18	80	85	140	110
50	AF9.01K1	BF9.05K1	450	6,5	65	18	100	95	155	125
50	AF9.02K1	BF9.06K1	450	6,5	65	18	100	95	155	125
50	AFV9.01K1	BFV9.05K1	452	8	47	18	100	78	155	125
80	AF10.01K1	BF10.05K1	480	8	90	18	130	120	190	160
80	AF10.02K1	BF10.06K1	480	8	90	18	130	120	190	160
80	AFV10.01K1	BFV10.05K1	480	8	65	18	130	98	190	160

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Table no. 2b - plastic design, value of overall and connecting dimensions

DN	Type	Type	A	C	D	E	F	H	I	J
15	AF04.03P1-2	BF04.03P1-2	375	7	23	14	50	45	90	65
15	AF03.03P1-2	BF03.03P1-2	375	7	23	14	50	45	90	65
15	AF02.03P1-2	BF02.03P1-2	375	7	23	14	50	45	90	65
15	AF01.03P1-2	BF01.03P1-2	375	7	23	14	50	45	90	65
15	AF1.03P1-2	BF1.03P1-2	375	7	23	14	50	45	90	65
15	AF2.03P1-2	BF2.03P1-2	375	7	23	14	50	45	90	65
15	AF3.03P1-2	BF3.03P1-2	375	7	23	14	50	45	90	65
15	AF4.03P1-2	BF4.07P1-2	375	7	23	14	50	45	90	65
15	AF4.04P1-2	BF4.08P1-2	375	7	23	14	50	45	90	65
25	AF5.03P1-2	BF5.07P1-2	375	7	35	14	50	60	110	85
25	AF6.03P1-2	BF6.07P1-2	375	7	35	14	50	60	110	85
25	AF6.04P1-2	BF6.08P1-2	375	7	35	14	50	60	110	85
40	AF7.03P1-2	BF7.07P1-2	375	7	50	18	50	75	140	110
40	AF7.04P1-2	BF7.08P1-2	375	7	50	18	80	75	140	110
40	AF8.03P1-2	BF8.07P1-2	424	6,5	55	18	80	85	140	110
40	AF8.04P1-2	BF8.08P1-2	424	6,5	55	18	80	85	140	110
50	AF9.03P1-2	BF9.07P1-2	450	6,5	65	18	100	95	155	125
50	AF9.04P1-2	BF9.08P1-2	450	6,5	65	18	100	95	155	125
80	AF10.03P1-2	BF10.07P1-2	480	8	90	18	130	120	190	160
80	AF10.04P1-2	BF10.08P1-2	480	8	90	18	130	120	190	160

1. Medium in plastic flowmeter is not in contact with the metal, but the structure is made of steel.
2. Flowmeter type BF 4.05K1 (BF 4.07P1-2) and larger sizes include float magnet - sensing the float position by sensor SP1, SP2.
3. Flowmeter type BF 3.01K1 meter (BF 3.03P1-2) and smaller sizes don’t include float magnet - sensing the float position by sensor SP3.

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Table no. 3 – materials of the floats, inserts and stops (metal version)

Type	Type	Float	Insert	Stop
AF04.01K1	BF04.01K1	17 246	17 246	PP, PE
AF03.01K1	BF03.01K1	17 246	17 246	PP, PE
AF02.01K1	BF02.01K1	17 246	17 246	PP, PE
AF01.01K1	BF01.01K1	17 246	17 246	PP, PE
AF1.01K1	BF1.01K1	17 246	17 246	PP, PE
AF2.01K1	BF2.01K1	17 246	17 246	PP, PE
AF3.01K1	BF3.01K1	17 246	17 246	PP, PE
AF4.01K1	BF4.05K1	17 246	17 246	PP, PE
AF4.02K1	BF4.06K1	17 246	17 246	PP, PE
AF5.01K1	BF5.05K1	17 246	17 246	PP, PE
AF6.01K1	BF6.05K1	17 246	17 246	PP, PE
AF6.02K1	BF6.06K1	17 246	17 246	PP, PE
AF7.01K1	BF7.05K1	17 246	17 246	PP, PE
AF7.02K1	BF7.06K1	17 246	17 246	PP, PE
AF8.01K1	BF8.05K1	17 246	17 246	PP, PE
AF8.02K1	BF8.06K1	17 246	17 246	PP, PE
AF9.01K1	BF9.05K1	17 246	17 246	PP
AF9.02K1	BF9.06K1	17 246	17 246	PP
AFV9.01K1	BFV9.05K1	17 246	17 246	PP
AF10.01K1	BF10.05K1	17 246	17 246	PP
AF10.02K1	BF10.06K1	17 246	17 246	PP
AFV10.01K1	BFV10.05K1	17 246	17 246	PP

Requirements for other materials to be discussed with the manufacturer. The float for gases can be made of titanium or aluminum alloy.

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Table no. 4 - materials of the floats, inserts and stops (plastic version)

Type	Type	Float	Insert	Stop
AF04.03P1-2	BF04.03P1-2	PVC	PP (PVC)	PP, PE
AF03.03P1-2	BF03.03P1-2	PVC	PP (PVC)	PP, PE
AF02.03P1-2	BF02.03P1-2	PVC	PP (PVC)	PP, PE
AF01.03P1-2	BF01.03P1-2	PVC	PP (PVC)	PP, PE
AF1.03P1-2	BF1.03P1-2	PVC	PP (PVC)	PP, PE
AF2.03P1-2	BF2.03P1-2	PVC	PP (PVC)	PP, PE
AF3.03P1-2	BF3.03P1-2	PVC	PP (PVC)	PP, PE
AF4.03P1-2	BF4.07P1-2	PVC	PP (PVC)	PP, PE
AF4.04P1-2	BF4.08P1-2	PVC	PP (PVC)	PP, PE
AF5.03P1-2	BF5.07P1-2	PVC	PP (PVC)	PP, PE
AF6.03P1-2	BF6.07P1-2	PVC	PP (PVC)	PP, PE
AF6.04P1-2	BF6.08P1-2	PVC	PP (PVC)	PP, PE
AF7.03P1-2	BF7.07P1-2	PVC	PP	PP
AF7.04P1-2	BF7.08P1-2	PVC	PP	PP
AF8.03P1-2	BF8.07P1-2	PVC	PP	PP
AF8.04P1-2	BF8.08P1-2	PVC	PP	PP
AF9.03P1-2	BF9.07P1-2	PVC (PP)	PP	PP
AF9.04P1-2	BF9.08P1-2	PVC (PP)	PP	PP
AF10.03P1-2	BF10.07P1-2	PVC (PP)	PP	PP
AF10.04P1-2	BF10.08P1-2	PVC (PP)	PP	PP

Requirements for other materials to be discussed with the manufacturer.

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