



## Disposable PVDF Turbine Flowmeter

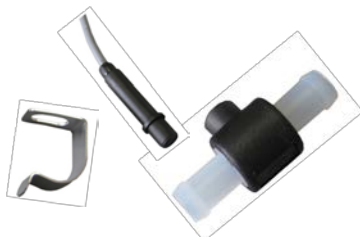
### Outstanding performance in Pharmaceutical-, Medical-, and Bio-technological 'single-use' applications

This flowmeter has low flow capabilities in a wide range of flow processes and has been developed to perform a fast exchange of the flow tube in single-use applications (or have them built in to disposable assemblies). In spite of the name 'Single-use', these devices are also suitable for long-term measurement.

#### Characteristics:

- Performs a fast exchange of the flow tubes
- High resolution square wave output
- Flow Measuring by revolutionary Infra-Red turbine rotor reflection
- PVDF for high chemical and corrosive resistance
- High accuracy (< 1%) and repeatability (< 0.15%)
- Also suitable for opaque liquids
- Programmable pulse output
- PVDF meets all the requirements of the US Pharmacopeia Class VI
- The flow tube can be sterilized up to 140° C.
- Gamma radiation resistant up to 50 kGy

#### Available in 2 designs, both with exchangeable tubes:



1. Clip mounted



2. With Tube holder



Patent US5388466

Model	0045	0085
Inner diameter in mm	4,7	9,3
Flow range	0.03 – 2 L/min	0.3 – 20 L/min
Accuracy	1% of reading	1% of reading
Repeatability	< 0.15 %	< 0.15 %
Wetted parts	PVDF / Ruby bearing	PVDF / Ruby bearing
Tube connection	7 mm hose barb	12 mm hose barb
Tube length in mm	53	62
Liquid temperature in °C	-20 to +80	-20 to +80
Max. pressure at 20°C in MPa	2.5 (25 Bar)	2 (20 Bar)
Viscosity in cSt.	0.8 - 10	0.8 – 10
K factor (water) in pulse/Liter	100.000	4.500
Power supply	5 - 30 Vdc	5 - 30 VDC
Output signal	5 - 30 V square wave	5 - 30 V square wave
Power consumption	34 mA at 5 V	34 mA at 5 V
Electrical cable length	PVC 1 meter	PVC 1 meter
Options: Programmable K-factor – Flow alarm level – Batch functions with preset Other Specs on request.		



## Technical Specifications: Exchangeable PVDF Flowmeter 0045 and 0085

### Description:

The Flowmeter has low flow capabilities in a wide range of flow processes. The exchangeable turbine flowmeters are designed to perform a simple and fast exchange of the Turbine flowtube in single use applications, especially for the Pharmaceutical and Biotech industries. Together with the IR- opto electronics, the flowmeter produces an accurate pulse signal, proportional to the flow, which can easily be transmitted and processed. Electronics available for 5 Vdc or 5-30 Vdc.

The PVDF Turbine Flowmeter is available in two versions, **Clipmounted** and **Tubeholder**.

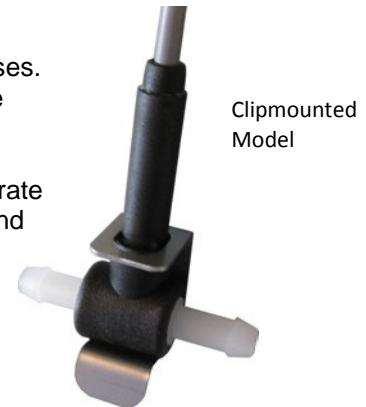
### Availability:

Two models are available:

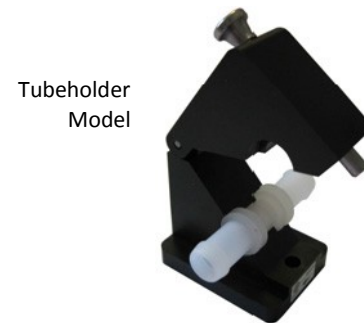
- Clipmounted, if exchanging the tube occurs infrequently
- Use the Tubeholder if a more solid device is desired and exchanging the tube occurs infrequently

### Sterilization of the Turbine tube is possible with:

- Gamma irradiation up to 50kGy
- CIP / SIP
- Autoclave
- ETO



Clipmounted Model

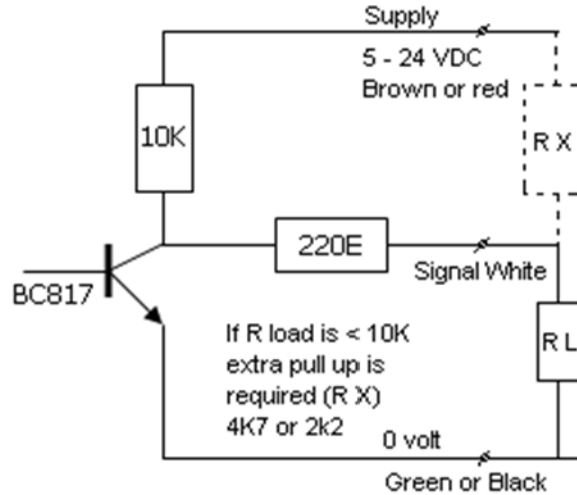


Tubeholder Model

General Process specifications with water at 20 °C / 68 °F		
model >	0045	0085
Flowrange L/min	0.03 - 2.0	0.3 - 20.0
Accuracy +/- in % of reading	1.5	1.5
Repeatability in %	0.15%	0.15%
Wetted Parts	PVDF with ruby bearing	PVDF with ruby bearing
Process connections	8 mm hose barb	12 mm hose barb
Max Liquid temperature °C / F	80/176	80 / 176
Max pressure Bar	25	20
Average Impulse /ltr @ linear range	95000	4800
Average linear flowrange	100 - 1500 ml/min	1 - 18 L/min
Recommend Pre Filter µm	100	100
Std Connection cable	1 mtr / 3.2 Ft	1 mtr / 3.2 Ft



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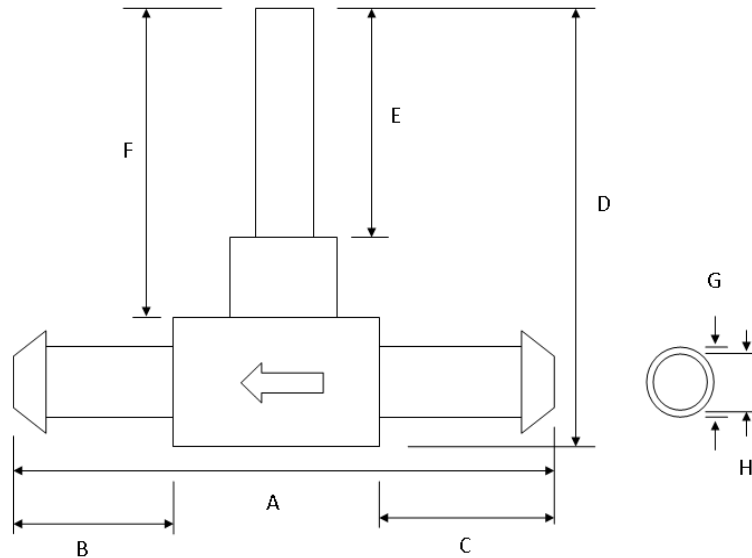
Electrical data			
Power supply version:	5 Vdc	24 Vdc	Tubeholder 24 Vdc
Current consump.	11.5 mA	9.2mA	9.2 mA
Reversed polarity of DC	yes	no	yes
Voltage peak 1 sec max	12 Vdc	36 Vdc	36Vdc
Output Short to ground	4.9 mA	2.4 mA	4.9 mA
Output signal	NPN square wave	Same	Same
<b>Caution:</b>			
If connecting sensor to different electronics like PLCs, an external resistor is required. See image above [RX]			



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### Recommendations before use:

- Check flow direction (arrow on sensor)
- De-aerate the system with gentle pressure before starting the system
- Check for leakage after system start
- Never clean the sensor with compressed Air
- Check chemical resistance of wetted parts
- Avoid influence by direct sunlight on the flowmeter

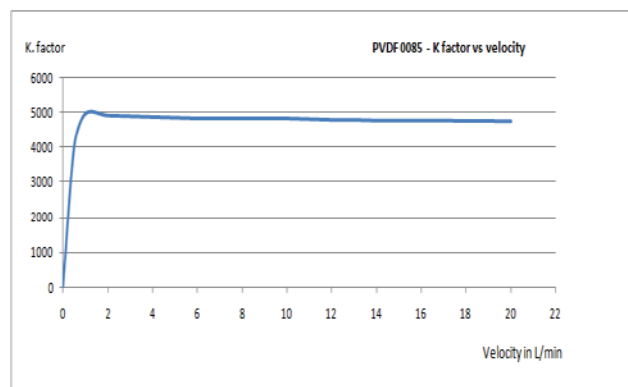
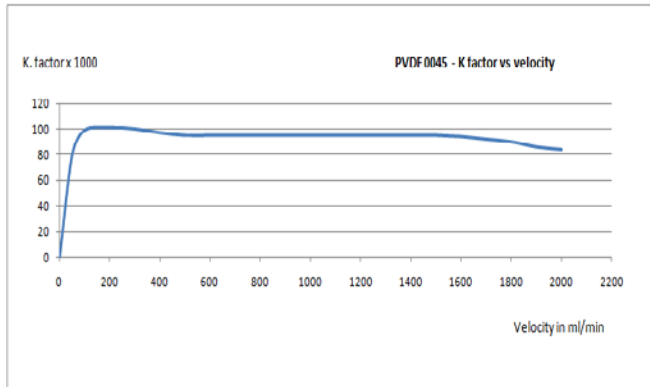


Dimensions in mm	0045 Hose Barbs	0085 Hose Barbs
A	52	62
B	15	20
C	17	20
D	60	67
E	36	36
F	46	46
G	7	12
H	4.5	9



### K-factor - with water 20 °C / 68 °F

The K-factor is the amount of impulses per volume, measured with water at 20 °C / 68 °F



### Effects on K factor at higher viscosities:

A higher liquid viscosity affects the measuring performance of the Flowmeter significantly. Depending on the viscosity, the turbine needs a higher flow to start spinning, while the K factor will be lower (this is easily adjustable).

### Tests with a water / Glycerin solution show following average effects:

Glycerin concentration ( weight )	Viscosity	Density g/cm <sup>3</sup>
65%	15 mPas	1.16
	model PVDF 0045	model PVDF 0085
Turbine rotor starts spinning at	250 ml/min	400 ml/min
linear signal from	900 ml/min	7 l/min
Average K factor deviation vs. water	-11%	-17%

Recommendation:

Any liquid other than water should be tested first to determine the effect on K factor calibration.

### Mounting direction of the turbine tube:

The flowmeter can only be used in 1 direction.

On the flowtube, the middle section shows an arrow with the right flow direction.

The exchangeable flowtube for use with the Tubeholder does not show an arrow, but you can identify the right direction in 3 ways:

1. The Tube only fits in one direction in the tube holder
2. If you look into the tube, the white rotor shows the outlet.
3. Looking at the tube, the biggest ring profile shows the outlet side.



**Effects caused by temperature influence on the electronics:**  
 Recommended max temperature of 80 °C / 176 °F to protect the electronic IR sensor.  
 A short (max 30 minutes) higher temperature (max 120 °C / 248 °F), however, will not cause any damage.

**Effects caused by temperature on max pressure:**  
 The PVDF flowtube maintains its resistance at a continuous medium temperature of 150 °C / 302 °F.  
 At higher temperatures, a lower max pressure is recommended according to the table 'Pressure rating according DIN 2401'

**Effects caused by temperature influence on the K-Factor**  
 At higher medium temperature, the K factor will heighten due to a lower viscosity of the material. Depending on the kind of material and viscosity, we recommend re-calibrating the K factor every time. For more extensive information about material properties, visit our website at [www.hp-na.com](http://www.hp-na.com), or email [info@hp-na.com](mailto:info@hp-na.com).

Pressure rating according DIN 2401	
Temperature in °C / °F	Tensile strength at 23 °C / 73 °F
	PN10
-40 / -40	100%
0 / 32	100%
10 / 50	100%
20 / 68	100%
30 / 86	80%
40 / 104	70%
50 / 122	60%
60 / 140	50%
70 / 158	45%
80 / 176	40%
90 / 194	35%
100 / 212	35%
110 / 230	30%
120 / 248	30%
130 / 266	25%
Example pressure rating: At 20 °C PVDF 0085 is 20 bar (table 1) At 80 °C PVDF 40% = max 8 bar	

**Regulations and Certifications:**

**Material specifications:**

Name of Material	PVDF Solef 1008 /0001 Homopolymer
Chemical name	Polyvinylidene Fluoride
Density	1.78 g/m3
Water absorption (24 h at 23 °C/73 °F)	< 0.04% - ISO 62 (method 1)
Composition of Ruby bearing is Synthetic AL203 monocrystal	

**EU regulations:**

Directive 2002/95/EC	
RoHS - restriction of Hazardous substances in Electrical equipment	Wherein Hg - Pb - Cr(VI) and PBB - PBDPE are below 0.1% and Cd is below 0.01%
WEEE and CE	
KTW recommend	Plastics for drinking water applications

**US Regulations:**

US CONEG	Wherein the sum of Pb - Cd - Cr - Hg shall not exceed 100 ppm
FDA	21 CFR 177.2510(a)
USP	Class VI
UL Standard 94	Flammability of plastic materials Class V-0

**Other International Regulations**

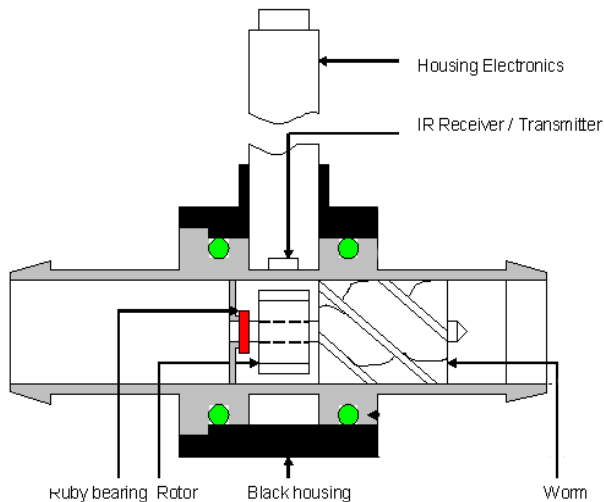
GADSL	Does not contains prohibited of Declarable substances.
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**TSE/BSE Statement:**

This product is manufactured according to a chemical polymerization process that does not involve any substance of animal or biological origin.  
 Source: Solvay.



### Turbine Tube Splice and Inner Parts



### Working principle:

A static worm forces the passing fluid into a spin

The spinning fluid brings the rotor into a frictionless rotation proportional to the flow.

The reflectors on the rotor reflect an IR beam.

The electronics convert the optical signal into an electrical square wave pulse.

This setup even allows measuring opaque liquids.

The frictionless rotation of the rotor ensures that no wear out takes place.

Patent: US5388466

### Compatibility:

The output signal of the PVDF Flowmeters can be connected to:

1. Equiflow 6100 DA converter, to obtain analogue signals 4 - 20 mA and 0-10 V.
2. Equiflow 601 Dose Controller for flowmonitoring, Totalizing, datalogging and Dose control
3. A laptop or PC for Configuration functions.

Optional Configurator set up functions of the 5-30 Vdc - M version:

- Flow switch mode, set switch level at certain flow
- Set Batch mode; frequently dosing the same amount of volume. (Equiflow Configurator required)

