



Fig. 1 F VA Trogflux variable area meter – short-version

### Application

The F VA Trogflux variable area meters in short-version are used to measure transparent liquids and gases passing through closed piping. The variable area meters can also be used for flow monitoring if they are equipped with one or more switching contacts. Standard scales are available for liquids with a density of 1 kg/l (62.43 lb/cu.ft). The scales must be recalculated for all other media depending on the physical characteristics.

### Design and operation

The main components of the F VA Trogflux in short-version are the plastic variable-area flow tube with float and the connection parts. The flow is displayed directly on the scale present on the flow tube (e.g. in l/h) and is read at the position of the float's widest diameter.

### Special features

- Product scales for liquids and gases
- Simple assembling and handling
- Low-price plastic design
- Short delivery times for standard versions

### Connection and mode of operation

For certain variable area meter sizes, the float is packed in a plastic net for transport purposes. Prior to fitting, this must be removed out of the variable area meter from the top. Free movement of the float in the flow tube should then be rechecked.

The variable area meter must be fitted vertically and without tension. Control elements or reductions/extensions in the pipe diameter upstream or downstream of the variable area meter have no influence on the accuracy when measuring liquids. However, when measuring gases, the variable area meter should be installed upstream of valves to prevent pulsations resulting from compression. Since variable area meter respond extremely sensitively to changes in flow, control elements should always be adjusted slowly.

The calibration has been carried out for the defined medium conditions. Deviation in the density pressure or temperature of gases, or in the density or viscosity of liquids, result in

measurement errors. It is essential to observe the calibration conditions.

When ordering, it is therefore essential to provide data on the medium, density and viscosity at the operating temperature and pressure. With gases, it is additionally necessary to specify the exact reference point for the pressure (pressure above atmospheric, or absolute pressure).

Retrofitting of switching contacts is only possible if variable area meters with magnets are used. When using for the first time, move the float completely past the contact to permit polarization.

### Technical specifications

<b>Application</b>	See left
<b>Mode of operation</b>	See left
<b>Measuring principle</b>	Float
<b>Input</b>	
Flow	Vertically upwards
Pressure limit	Max. 10 bar (145 psi) see page 3
<b>Rated operating conditions</b>	
<b>Ambient conditions</b>	
Temperature limits	
• for Trogamid-flow tube	Max. 60°C (140°F) (with Water 50°C (122 °F))
<b>Medium conditions</b>	
• Accuracy	Class 4 (according to VDE/VDI 3513, sheet 2)
• Measuring range	
- for liquids	4 l/h to 1600 l/h / 0,0176 to 7,0433 USgpm
- for gases	70 l/h to 25 m <sup>3</sup> /h / 0,0412 to 14,712 scfm
	A special scale must be provided for liquids with a density other than 1 kg/l (62,43 lb/cu.ft and all gases
• Dim. for measured variable	L/h
<b>Design</b>	
Connections	PVC-adhesive bushing, female thread, cast iron
Material	
• Flow tube	Trogamid
• Connection	
- Union nut	PVC, cast iron
- Insert	PVC, cast iron, stainless steel
• Float	Stainl. steel mat.No. 1.4571 / 316 Ti, PVC, aluminium
• Float guide rod	Stainl. steel mat.No. 1.4571 / 316
• Gasket	Buna N Viton EPDM
• Limit	Polysulfone
<b>Certificates and approvals</b>	
Classification according to (DGRL 97/23/EG)	For gases of fluid group 2 and liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice SEP)

### Contact assembly

The bistable contact assembly K18 consists of a contact spring set sealed in a glass tube filled with protective gas. The contact are polarized by a fixed magnet such that they exhibit a bistable response.

Two contacts can be selected:

- K 18 A: contact closes when the limit is fallen below
- K 18 B: contact closes when the limit is exceeded

### Technical specification of contacts

Designation	K18 A, K18 B
Housing/plug	PP/PA 6
Contact material	Rhodium
Degree of protection	IP65
Ambient temperature	-20 to 80 °C / (-4 to 176 °F)
Max. switching frequency	5/min
Max. rating (rating data apply to resistive loads; a suppressor circuit is required for inductive loads)	AC 250 V/0,5 A/10 VA DC 250 V/0,5 A/5 W

## Variable area meter F VA Troglux - short version

### Measuring ranges for liquids and gases

Standard measuring range for liquid ( $\rho = 1 \text{ kg/l}$  (62,43 lb/cu.ft), Viscosity 1 mPa.s (1 cp)

For air  $p_{abs} = 1,013 \text{ bar}$  (14,69 psi), at  $T=20^\circ\text{C}$  (68°F),  
 $\rho=1,293 \text{ kg/m}^3$ ,  $\nu=0,0181 \text{ mPa.s}$

Connection Tube	Flow Dynamics	max. Measuring range for the selected floats for liquids								
		Stainless steel mat.No.		Stainl. steel with magnet, mat.No.		PVC weighted		PVC with magnet weighted		
		1. 4305	303	1.4571	316Ti					
		l/h	Usgpm	l/h	Usgpm	l/h	Usgpm	l/h	Usgpm	
20 (G1/4), (G3/8) G 1/2	C 40	1:10	40	0,176	40	0,176	20	0,088	20	0,088
	C 65	1:10	65	0,286	60	0,264	35	0,154	35	0,154
	C 100	1:10	100	0,44	90	0,396	55	0,242	55	0,242
	C 160	1:10	160	0,704	160	0,704	100	0,396	90	0,396
	C 250	1:10	250	1,101	240	1,057	140	0,616	140	0,616
32 (G1/2), (G3/4), G1	D 400	1:10	400	1,761	400	1,761	300	1,101	250	1,101
	D 650	1:10	650	2,861	650	2,861	500	1,981	450	1,981
	D 1000	1:10	1.000	4,402	1000	4,402	750	2,861	650	2,861
	D 1600	1:10	1.600	7,043	1.600	7,043	1.200	4,402	1.000	4,402

(connections in brackets are non-standard)

max. Measuring rang for the selected floats for gases					
Aluminium mat.No.3.1645		PVC non-weighted		PVC with magnet non-weighted	
		l/h	scfm	l/h	scfm
		700	0,412	450	0,265
		1200	0,706	700	0,412
		1800	1,059	1000	0,588
		2800	1,648	1800	1,059
		4000	2,354	3000	1,765
		7000	4,119	5000	2,942
		12000	7,062	8000	4,708
		17.000	10,00	12000	7,062
		25.000	14,71	20.000	11,77

### Pressure losses

Pressure loss				
Flow tube	Liquid		Air	
	mat.No.	Float mat.No.	Aluminium float mat.No.	3.1645
	mbar	psi	mbar	psi
C 40	10	0,145	4	0,058
C 65	10	0,145	4	0,058
C 100	10	0,145	4	0,058
C 160	12	0,174	5	0,073
C 250	12	0,174	5	0,073
D 400	17	0,247	7	0,102
D 650	17	0,247	7	0,102
D 1000	17	0,247	7	0,102
D 1600	20	0,29	7	0,102

Pressure losses of variable area meters

### Pressure and temperature limits

Connection parts PVC DIN 8062		
Media	t [°C (°F)]	$P_e$ [bar (psi)]
With water and non-corrosive liquids	20 (68)	10,0 (145)
	40 (104)	10,0 (145)
	60 (140)	2,5 (36)
With corrosive liquids	20 (68)	10,0 (145)
	40 (104)	4,0 (58)
	60 (140)	1,0 (15)

$P_e$  = effective pressure = pressure above atmospheric

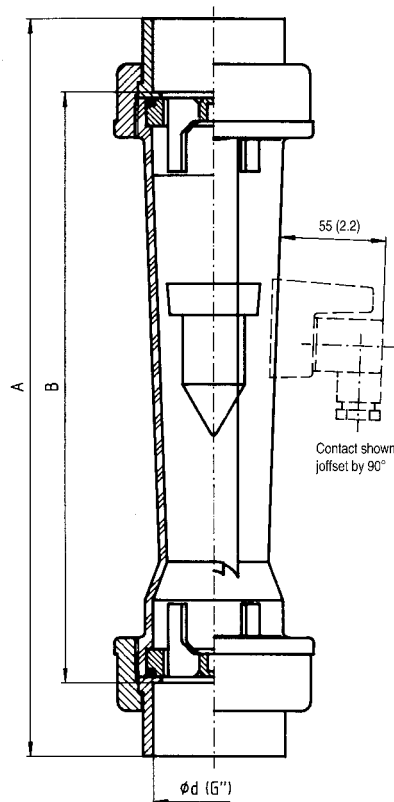
### Note of application

The operator of these instruments is responsible for suitability, proper use and corrosion resistance of the used materials with regard to the measuring material. It must be ensured that the materials selected for the meter parts in contact with the medium are suitable for the used process media. The meter may only be used within the pressure and voltage limits specified in the operating instructions. Provide a touch guard for surface temperatures of  $> 55^\circ\text{C}$  (158 °F). This touch guard must be designed in a way that the max. allowable ambient temperature on the unit is not exceeded. Before replacing the measuring tubes, check that the unit is free of hazardous media and pressures. The flowmeter meets the requirements of the PED 97/23/EG, article 3, paragraph 3. The most hazardous allowable media are gases of fluid group 2.

### Dimensions

Connection	Dimension of inserts			Weight	
PVC-adhesive bushing (inch) D	Bushing female thread	with female thread	With PVC adhesive bushing		
		A±4 [mm] (A±0,16in)	A±4 [mm] (A±0,16in)	B±4 [mm] (B±0,16in)	aprox. kg (lb)
20 (0,79)	G1/2	207 (8,15)	203 (7,99)	171 (6,73)	0,15 (0,33)
32 (1,26)	G1	252 (9,92)	250 (9,84)	206 (8,11)	0,35 (0,77)

Fig. 2 Troglux TS-K, dimensions in mm (inch)



### Ordering data (C40-C250) Connection G 1/4-G 1/2 / DN 20 / NPT 1/4"-1/2"

F VA Troglux  
Variable area meter - short version  
Troglamid flow tube

**Gasket material**

Buna N	1
Viton	4
EPDM	8

#### Measuring range Q<sub>v</sub>/h for liquids (ρ=1 kg/l, ν=1mPa.s)

Size flow tube	Float material	mat.No.	Range	Code	Option
C	40	mat.No. 1.4305/303	4,0 - 40,0	A C 1	0
		mat.No. 1.4571/316Ti	4,0 - 40,0	A C 2	0
		mat.No. 1.4571/316Ti, with magnet	4,0 - 40,0	A C 2	1
		PVC, weighted	2,0 - 20,0	A C 3	0
		PVC, weighted, with magnet	2,0 - 20,0	A C 3	1
		C	65	mat.No. 1.4305/303	6,5 - 65,0
mat.No. 1.4571/316Ti	6,5 - 65,0			B C 2	0
mat.No. 1.4571/316Ti, with magnet	6,0 - 60,0			B C 2	1
PVC, weighted	3,5 - 35,0			B C 3	0
PVC, weighted, with magnet	3,5 - 35,0			B C 3	1
C	100			mat.No. 1.4305/303	10,0 - 100,0
		mat.No. 1.4571/316Ti	10,0 - 100,0	C C 2	0
		mat.No. 1.4571/316Ti, with magnet	9,5 - 90,0	C C 2	1
		PVC, weighted	5,5 - 55,0	C C 3	0
		PVC, weighted, with magnet	5,5 - 55,0	C C 3	1
		C	160	mat.No. 1.4305/303	16,0 - 160,0
mat.No. 1.4571/316Ti	16,0 - 160,0			D C 2	0
mat.No. 1.4571/316Ti, with magnet	16,0 - 160,0			D C 2	1
PVC, weighted	10,0 - 100,0			D C 3	0
PVC, weighted, with magnet	9,0 - 90,0			D C 3	1
C	250			mat.No. 1.4305/303	25,0 - 250,0
		mat.No. 1.4571/316Ti	25,0 - 250,0	E C 2	0
		mat.No. 1.4571/316Ti, with magnet	24,0 - 240,0	E C 2	1
		PVC, weighted	14,0 - 140,0	E C 3	0
		PVC, weighted, with magnet	14,0 - 140,0	E C 3	1

#### Measuring range Q<sub>v</sub>/h for air (pabs=1,013 bar, T=20°C, ρ=1,293 kg/m³, ν=0,0181 mPa.s)

Size flow tube	Float Material	Range	Code	Option
C	Aluminium	70,0 - 700,0	A C 5	0
	PVC, non-weighted	45,0 - 450,0	A C 6	0
	PVC, non-weighted, with magnet	80,0 - 800,0	A C 6	1
C	Aluminium	120,0 - 1200,0	B C 5	0
	PVC, non-weighted	70,0 - 700,0	B C 6	0
	PVC, non-weighted, with magnet	130,0 - 1300,0	B C 6	1
C	Aluminium	180,0 - 1800,0	C C 5	0
	PVC, non-weighted	100,0 - 1000,0	C C 6	0
	PVC, non-weighted, with magnet	200,0 - 2000,0	C C 6	1
C	Aluminium	280,0 - 2800,0	D C 5	0
	PVC, non-weighted	180,0 - 1800,0	D C 6	0
	PVC, non-weighted, with magnet	320,0 - 3200,0	D C 6	1
C	Aluminium	400,0 - 4000,0	E C 5	0
	PVC, non-weighted	300,0 - 3000,0	E C 6	0
	PVC, non-weighted, with magnet	500,0 - 5000,0	E C 6	1

### Ordering data (C40-C250)

F VA Troglux  
Variable area meter - short version  
Troglamid flow tube

Connection	Material	Type	Size	Option	
C - C	PVC	adhesive bushing	20	1 1 A	
			(DN 15)		
C - C	PVC	female thread	G 1/4	1 2 B	
			DIN ISO 228	G 3/8 1 2 C	
			G 1/2	1 2 D	
C - C	cast iron	DIN ISO 228	G 1/2	2 2 D	
			steel	female thread	G 1/4 3 2 B
				DIN ISO 228	G 3/8 3 2 C
C - C	steel	mat.No. 1.0254	female thread	1/4" 3 3 B	
			NPT	3/8" 3 3 C	
			1/2"	3 3 D	
C - C	stainless steel	mat.No. 1.4571	female thread	G 1/4 4 2 B	
			DIN ISO 228	G 3/8 4 2 C	
			G 1/2	4 2 C	
C - C	stainless steel	mat.No. 1.4571	female thread	1/4" 4 3 B	
			NPT	3/8" 4 3 C	
			1/2"	4 3 D	

#### Contacts (only with magnetic float)

- Without contact **A**
- Contact K18/A (closes when limit is fallen below) **C**
- Contact K18/B (closes when limit is exceeded) **D**

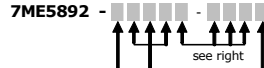
#### Further designs

- Please add "-Z" to Order No. and specify Order codes
- B06** with calibration certificate
  - Y01** measured medium: specify in plain text: medium, always required, measuring range with dimension, density with dimension, viscosity with dimension, operating temperature, operating pressure
  - Y04** Silicone-free version
  - Y05** Water as measured medium  
Viscosity: 1mPas (cp); Density: 1 kg/l (62,43 lbs/cu.ft)
  - Y99** Specify special version in plain text

# Variable area meter F VA Troglux - short version

## Ordering data (D400-D1600) Connection G 1/2-G1 / DN 32 / NPT 1/2"-1"

F VA Troglux  
Variable area meter, short version  
Troglamid flow tube



### Gasket material

Buna N  
Viton  
EPDM

1  
4  
8

### Measuring range $Q_v$ /h for liquids

( $\rho=1 \text{ kg/l}$ ,  $v=1\text{mPa.s}$ )

Size flow tube	Float material						
D	400	mat.No. 1.4305/303	40 - 400	<b>FD 1</b>	-	-	<b>0</b>
		mat.No. 1.4571/316Ti	40 - 400	<b>FD 2</b>	-	-	<b>0</b>
		mat.No. 1.4571/316Ti, with magnet	40 - 400	<b>FD 2</b>	-	-	<b>1</b>
		PVC, weighted	30 - 300	<b>FD 3</b>	-	-	<b>0</b>
		PVC, weighted, with magnet	25 - 250	<b>FD 3</b>	-	-	<b>1</b>
D	650	mat.No. 1.4305/303	65 - 650	<b>GD 1</b>	-	-	<b>0</b>
		mat.No. 1.4571/316Ti	65 - 650	<b>GD 2</b>	-	-	<b>0</b>
		mat.No. 1.4571/316Ti, with magnet	65 - 650	<b>GD 2</b>	-	-	<b>1</b>
		PVC, weighted	50 - 500	<b>GD 3</b>	-	-	<b>0</b>
		PVC, weighted, with magnet	45 - 450	<b>GD 3</b>	-	-	<b>1</b>
D	1000	mat.No. 1.4305/303	100 - 1000	<b>HD 1</b>	-	-	<b>0</b>
		mat.No. 1.4571/316Ti	100 - 1000	<b>HD 2</b>	-	-	<b>0</b>
		mat.No. 1.4571/316Ti, with magnet	100 - 1000	<b>HD 2</b>	-	-	<b>1</b>
		PVC, weighted	75 - 750	<b>HD 3</b>	-	-	<b>0</b>
		PVC, weighted, with magnet	65 - 650	<b>HD 3</b>	-	-	<b>1</b>
D	1600	mat.No. 1.4305/303	160 - 1600	<b>JD 1</b>	-	-	<b>0</b>
		mat.No. 1.4571/316Ti	160 - 1600	<b>JD 2</b>	-	-	<b>0</b>
		mat.No. 1.4571/316Ti, with magnet	160 - 1600	<b>JD 2</b>	-	-	<b>1</b>
		PVC, weighted	120 - 1200	<b>JD 3</b>	-	-	<b>0</b>
		PVC, weighted, with magnet	100 - 1000	<b>JD 3</b>	-	-	<b>1</b>

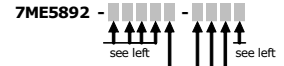
### Measuring range $Q_v$ /h for air

( $p_{abs}=1,013 \text{ bar}$ ,  $T=20^\circ\text{C}$ ,  $\rho=1,293 \text{ kg/m}^3$ ,  $v=0,0181 \text{ mPa.s}$ )

Size flow tube	Float Material						
D	400	Aluminium	700 - 7000	<b>FD 5</b>	-	-	<b>0</b>
		PVC, non-weighted	500 - 5000	<b>FD 6</b>	-	-	<b>0</b>
		PVC, non-weighted, with magnet	630 - 6300	<b>FD 6</b>	-	-	<b>1</b>
D	650	Aluminium	1200 - 12000	<b>GD 5</b>	-	-	<b>0</b>
		PVC, non-weighted	800 - 8000	<b>GD 6</b>	-	-	<b>0</b>
		PVC, non-weighted, with magnet	1000 - 10000	<b>GD 6</b>	-	-	<b>1</b>
D	1000	Aluminium	1700 - 17000	<b>HD 5</b>	-	-	<b>0</b>
		PVC, non-weighted	1200 - 12000	<b>HD 6</b>	-	-	<b>0</b>
		PVC, non-weighted, with magnet	1600 - 16000	<b>HD 6</b>	-	-	<b>1</b>
D	1600	Aluminium	2500 - 25000	<b>JD 5</b>	-	-	<b>0</b>
		PVC, non-weighted	2000 - 20000	<b>JD 6</b>	-	-	<b>0</b>
		PVC, non-weighted, with magnet	2500 - 25000	<b>JD 6</b>	-	-	<b>1</b>

## Ordering data (D400-D1600)

F VA Troglux  
Variable area meter, short version  
Troglamid flow tube



Connection	Material	Type	Size				
D - D	PVC	adhesive bushing	32	<b>1</b>	<b>1</b>	<b>A</b>	
			(DN 25)				
D - D	PVC	female thread	G 1/2	<b>1</b>	<b>2</b>	<b>D</b>	
			DIN ISO 228	G 3/4	<b>1</b>	<b>2</b>	<b>E</b>
				G 1	<b>1</b>	<b>2</b>	<b>F</b>
D - D	PVC	female thread	1/2"	<b>1</b>	<b>3</b>	<b>D</b>	
			NPT	3/4"	<b>1</b>	<b>3</b>	<b>E</b>
				1"	<b>1</b>	<b>3</b>	<b>F</b>
			cast iron	DIN ISO 228	G 1	<b>2</b>	<b>2</b>
D - D	steel	female thread	G 1/2	<b>3</b>	<b>2</b>	<b>D</b>	
			DIN ISO 228	G 3/4	<b>3</b>	<b>2</b>	<b>E</b>
D - D	steel	female thread	1/2"	<b>3</b>	<b>3</b>	<b>D</b>	
			NPT	3/4"	<b>3</b>	<b>3</b>	<b>E</b>
			mat.No. 1.0254	1"	<b>3</b>	<b>3</b>	<b>F</b>
D - D	stainless steel	female thread	G 1/2	<b>4</b>	<b>2</b>	<b>D</b>	
			DIN ISO 228	G 3/4	<b>4</b>	<b>2</b>	<b>E</b>
			mat.No. 1.4571	G 1	<b>4</b>	<b>2</b>	<b>F</b>
D - D	stainless steel	female thread	1/2"	<b>4</b>	<b>3</b>	<b>D</b>	
			NPT	3/4"	<b>4</b>	<b>3</b>	<b>E</b>
			mat.No. 1.4571	1"	<b>4</b>	<b>3</b>	<b>F</b>

### Contacts (only with magnetic float)

- Without contact **A**
- Contact K18/A (closes when limit is fallen below) **C**
- Contact K18/B (closes when limit is exceeded) **D**

### Further designs

Please add "-Z" to Order No. and specify Order codes

- B06** with calibration certificate
- Y01** measured medium: specify in plain text: medium, always required, measuring range with dimension, density with dimension, viscosity with dimension, operating temperature, operating pressure
- Y04** Silicone-free version
- Y05** Water as measured medium  
Viscosity: 1mPas (cp); Density: 1 kg/l (62,43 lbs/cu.ft)
- Y99** Specify special version in plain text