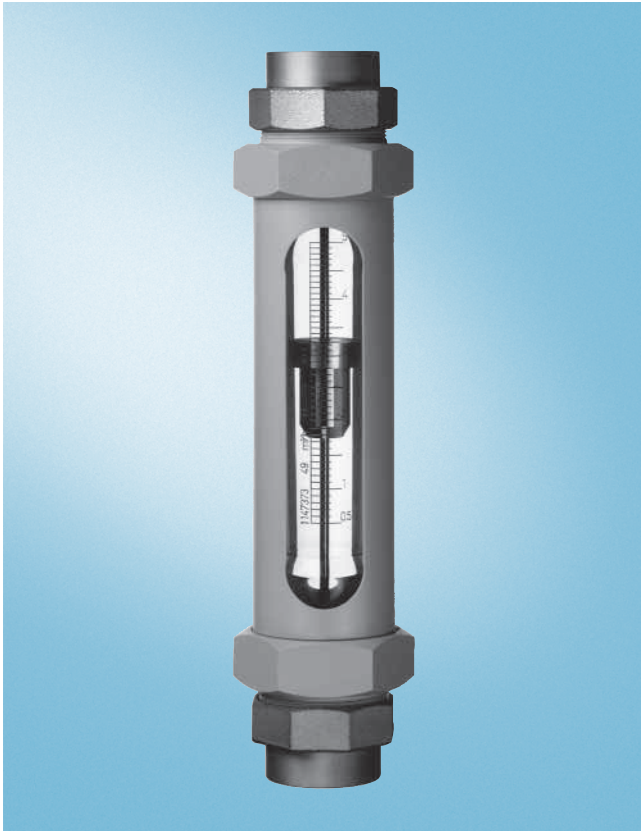


SITRANS F flowmeters

SITRANS F VA

Tubux variable area meter

Overview



SITRANS F VA Tubux variable area meter

Application

The SITRANS F VA Tubux variable area meters are used to measure the volume of 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.

The flow tube is also optionally available with a percentage or 2-mm (0.078 inch) scale.

Design and operation

The main components of the SITRANS F VA Tubux variable area meters are the glass variable-area flow tube with float, the fitting 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.

Benefits

- Product scales for liquids and gases
- Rugged versions with various materials
- Can be used for high pressures and temperature
- 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.

The locking rod must be pulled upwards out of the variable area meter.

In versions with a float guide rod, the float is usually held in place at the top by a rubber buffer. Push this buffer down to the bottom limit by pressing on the float.

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 meters respond extremely sensitively to changes in flow, control elements should always be adjusted slowly.

The calibration has been carried out for defined media conditions. Deviations 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 and if the fitting is made of stainless steel (see Table on page 4/255). When using for the first time, move the float completely past the contact to permit polarization.

Float guide rod

(see tables on page 4/253 and 4/254)

The float guide rod prevents the float from making contact with the glass flow tube.

The option is recommended to increase the operational safety and to protect against glass breakages in the case of operating conditions such as solenoid valve control. The option is not possible in conjunction with floats with magnets and weighted PVC/PVDF floats.

Liquids

Standard: flow tube E 4000 to H 25000

Option: flow tube C 125 and upwards

Gases

Standard: flow tube D 2500 to H 25000

Option: flow tube C 125 and upwards

SITRANS F flowmeters

SITRANS F VA

Tubex variable area meter

Technical specifications

Application	See page 4/251
Mode of operation	See page 4/251
Measuring principle	Float
Input	
Flow	Vertically upwards
Pressure limit with threaded connection	
• ≤ G $\frac{3}{4}$	Max. 10 bar (145 psi)
• G1	Max. 8 bar (116 psi)
• G1 $\frac{1}{4}$ to G3	Max. 5 bar (73 psi)

Rated operating conditions

Temperature limits

• With float made of mat. No. 1.4305 / 303, 1.4571 / 316Ti or aluminium	-10 to +150 °C (14 to 302 °F)
• With float made of PVDF	-10 to +100 °C (14 to 212 °F)
• With float made of PVC	-10 to +50 °C (14 to 122 °F)
• With fitting made of PVC	-10 to +50 °C (14 to 122 °F)

Etched scale is necessary with medium temperature > 90 °C (194 °F)

Medium conditions

• Accuracy	Class 1.6 (according to VDE/VDI 3513, sheet 2)
• Measuring range	Dependent on flow tube, see Tables on pages 4/253 and 4/254
- For liquids	0.1 l/h to 25 m ³ /h (0.00044 to 110 USgpm)
- For gases	1.6 l/h to 400 m ³ /h (0.0009 to 235 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
• Dimensions for measured variable	l/h (up to flow tube D2500) m ³ /h (flow tube D3000 and above)

Design

Connections	Screwed gland G $\frac{1}{4}$ to G3
Material	
• Flow tube	Borosilicate glass (length 300 mm (11.8 inch))
• Connection	Cast iron, stainless steel, mat. No. 1.4571, steel/PVC / 316Ti, steel PVC
• Float	Stainless steel, mat. No. 1.4305/303, mat. No. 1.4571, PVC and PVDF, aluminium/316Ti
• Float guide rod	Stainless steel, mat. No. 1.4571 / 316Ti
• Gasket	Buna N up to 90 °C (194 °F), Viton up to 150 °C (302 °F), EPDM (for potable water plants) up to 150 °C (302 °F)
• Limit	Springs made of stainless steel for non-guided floats, otherwise rubber buffers for guided floats
Weight	
• With threaded connection G $\frac{1}{2}$	2.5 kg (5.51 lb)
• With threaded connection G1	5.5 kg (12.12 lb)
• With threaded connection G2	9 kg (19.8 lb)
• With threaded connection G3	24 kg (52.9 lb)

Classification according to PED 97/23/EC

	Order No. 7ME5810-	Permissible media	Category
G $\frac{1}{4}$ to G3	xxxax-xxxx; a ≠ 2	Gases of fluid group 2 and liquids of fluid group 1	Article 3.3
≤ DN 25 (G $\frac{1}{4}$ to G1)	xxxax-xxxx; a = 2	Gases of fluid group 1 and liquids of fluid group 1	Article 3.3
> DN 25 (G1 $\frac{1}{4}$ to G3)	xxxax-xxxx; a = 2	Gases of fluid group 1 and liquids of fluid group 1	I

Technical specifications of contacts

Switching principle	Magnetic contact unit, bistable
Designation	
• Flow tube size C 125 to H 25000	K 17 A, K17 B
• Flow tube size D 650 to H 25000	K 23
Housing/plug	PP/PA 6
Contact material	Rhodium
Degree of protection	IP 65
Ambient temperature	-20 to +80 °C (-4 to +176 °F)
Max. switching frequency	5/min
Max. rating	
• K 17	AC 250 V/0.5 A/10 VA DC 250 V/0.5 A/5 W
• K 23	AC 250 V/1 A/150 VA DC 250 V/1 A/100 W Rating data apply to resistive loads; a suppressor circuit is required for inductive loads

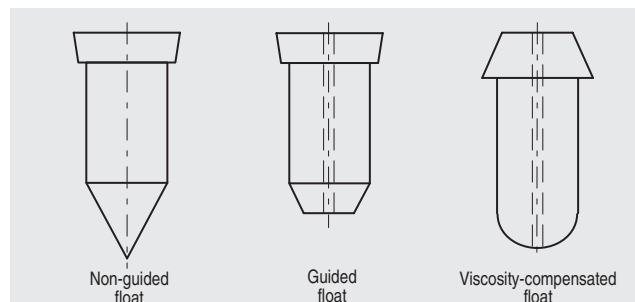
Selection of float

There are three versions of floats:

- Non-guided float
- Guided float
- Viscosity-compensated float.

Use of the viscosity-compensated float is necessary above the following viscosities:

Flow tube	mPa·s
C 125 to C 500	≥ 3
D 650 to D 3000	≥ 5
E 4000 to F 10000	≥ 8
G 12500 to H 25000	≥ 10



Float versions

SITRANS F flowmeters

SITRANS F VA

Tubex variable area meter
Measuring ranges for liquids

Connection	PVC adhesive bushing	Flow tube	Pressure loss		Max. measuring range for the selected floats								
					Up to flow tube B100, mat. No.		Viscosity-compensated, mat. No.		With magnet, mat. No.		PVC weighted		
					1.4305, 1.4571	303, 316Ti	1.4571	316Ti	1.4571	316Ti			
	mm (inch)		mbar (psi)	l/h (USgpm)	l/h (USgpm)	l/h (USgpm)	l/h (USgpm)	l/h (USgpm)	l/h (USgpm)				
(G ¹ / ₄), (G ³ / ₈), G ¹ / ₂	20 (0.79)	A 1	10 (0.145)		1	(0.0044)	-	-	-	-	-	-	
		A 3			3	(0.013)	-	-	-	-	-	-	
		A 5			5	(0.022)	-	-	-	-	-	-	
		A 10			10	(0.044)	-	-	-	-	-	-	
		A 25			25	(0.110)	-	-	-	-	-	-	
		B 30			30	(0.132)	-	-	-	-	11	(0.048)	
		B 40			40	(0.176)	-	-	-	-	15	(0.066)	
		B 50			50	(0.22)	-	-	-	-	20	(0.088)	
		B 65			65	(0.29)	-	-	-	-	25	(0.110)	
		B 80			80	(0.35)	-	-	-	-	32	(0.140)	
		B 100			100	(0.44)	-	-	-	-	40	(0.176)	
		C 125			20 (0.290)	125	(0.55)	100 *	(0.44)*	120	(0.53)	65	(0.29)
		C 160				160	(0.70)	125 *	(0.55)*	150	(0.66)	90	(0.40)
		C 200				200	(0.88)	160 *	(0.70)*	180	(0.79)	110	(0.48)
		C 250				250	(1.10)	200 *	(0.88)*	240	(1.06)	140	(0.62)
		C 315				40 (0.58)	315	(1.39)	240 *	(1.06)*	300	(1.32)	175
		C 400			400		(1.76)	300 *	(1.32)*	360	(1.59)	220	(0.97)
C 500	500	(2.20)	360 *	(1.59)*	480		(2.11)	250	(1.10)				
(G ¹ / ₂), (G ³ / ₄), G1	32 (1.26)	D 650	19 (0.28)		650	(2.86)	400 *	(1.76)*	600	(2.64)	500	(2.20)	
		D 800			800	(3.52)	500 *	(2.20)*	750	(3.30)	600	(2.64)	
		D 1000			1000	(4.4)	600 *	(2.64)*	950	(4.18)	750	(3.30)	
		D 1250			1250	(5.5)	750 *	(3.30)*	1200	(5.3)	1000	(4.40)	
		D 1600			24 (0.35)	1600	(7.0)	1000 *	(4.40)*	1500	(6.6)	1250	(5.50)
		D 2000				2000	(8.8)	1200 *	(5.30)*	1800	(7.9)	1600	(7.0)
		D 2500			33 (0.48)	2500	(11.0)	1400 *	(6.20)*	2400	(10.6)	2000	(8.8)
		D 3000				3000	(13.2)	1800 *	(7.9)*	2800	(12.3)	2400	(10.6)
(G1 ¹ / ₄), (G1 ¹ / ₂), G2	63 (2.48)	E 4000	25 (0.36)		4000 *	(17.6)*	2500 *	(11.0)*	3800 *	(16.7)*	3200	(14.0)	
		E 5000			5000 *	(22.0)*	3000 *	(13.2)*	4800 *	(21.1)*	3800	(16.7)	
		E 6500			6500 *	(28.6)*	4000 *	(17.6)*	6400 *	(28.2)*	5000	(22.0)	
		F 8000			8000 *	(35.2)*	4500 *	(19.8)*	7500 *	(33.0)*	6400	(28.0)	
		F 10000			10000 *	(44.0)*	5500 *	(24.2)*	9500 *	(41.8)*	7500	(33.0)	
(G2), (G2 ¹ / ₂), G3	-	G 12500	34 (0.49)		12500 *	(55.0)*	7000 *	(30.8)*	12000 *	(52.8)*	-	-	
		G 16000			16000 *	(70.4)*	9000 *	(39.6)*	16000 *	(70.4)*	-	-	
		H 20000	38 (0.55)		20000 *	(88.0)*	11000 *	(48.4)*	18000 *	(79.2)*	-	-	
		H 25000			25000 *	(110.0)*	14000 *	(61.6)*	24000 *	(105.6)*	-	-	

 Standard measuring range for liquid ($\rho = 1 \text{ kg/l}$ (62.43 lb/cu.ft), viscosity 1 mPa·s (1 cp)) (dynamic range 1:10)

Remarks

* Guided float.

Non-standard sizes for the thread are listed in brackets.

Standard versions are bold printed.

SITRANS F flowmeters

SITRANS F VA

Tubex variable area meter

Measuring ranges for air

Connection	Flow tube	Pressure loss	Max. measuring range for the selected floats										
			Aluminium, mat. No. 3.1645		Aluminium, mat. No. 3.1645 with magnet		PVC		PVDF		PVC with magnet		
Female thread G, NPT	PVC adhesive bushing mm (inch)	mbar (psi)	l/h	(scfm)	l/h	(scfm)	l/h	(scfm)	l/h	(scfm)	l/h	(scfm)	
(G $\frac{1}{4}$), (G $\frac{3}{8}$), G $\frac{1}{2}$	20 (0.79)	A 1 A 3 A 5 A 10 A 25 B 30 B 40 B 50 B 65 B 80 B 100	4 (0.058)	16	(0.009)	-	-	10	(0.006)	10	(0.006)	-	-
				50	(0.029)	-	-	25	(0.015)	25	(0.015)	-	-
				80	(0.047)	-	-	50	(0.029)	50	(0.029)	-	-
				160	(0.094)	-	-	80	(0.047)	80	(0.047)	-	-
				400	(0.235)	-	-	250	(0.147)	250	(0.147)	-	-
				500	(0.294)	-	-	320	(0.188)	360	(0.212)	-	-
				650	(0.383)	-	-	450	(0.265)	500	(0.294)	-	-
				800	(0.471)	-	-	550	(0.324)	650	(0.383)	-	-
				1100	(0.647)	-	-	750	(0.441)	800	(0.471)	-	-
				1400	(0.824)	-	-	900	(0.530)	1000	(0.589)	-	-
	1600	(0.942)	-	-	1100	(0.647)	1250	(0.736)	-	-			
	6.5 (0.094)	C 125 C 160 C 200 C 250	6.5 (0.094)	2000	(1.18)	2500	(1.47)	1400	(0.824)	1500	(0.883)	2200	(1.29)
				3000	(1.77)	3200	(1.88)	1800	(1.06)	2000	(1.18)	3000	(1.77)
				3600	(2.12)	4000	(2.35)	2200	(1.29)	2500	(1.47)	3600	(2.12)
				4000	(2.35)	5000	(2.94)	2800	(1.65)	3000	(1.77)	4500	(2.65)
5000				(2.94)	6400	(3.77)	3400	(2.00)	3600	(2.12)	6000	(3.53)	
6400				(3.77)	8000	(4.71)	4000	(2.35)	5000	(2.94)	7000	(4.12)	
(G $\frac{1}{2}$), (G $\frac{3}{4}$), G1	32 (1.26)	D 650 D 800 D 1000 D 1250	7 (0.102)	10000	(5.89)	12000	(7.06)	7000	(4.12)	8000	(4.71)	10000	(5.89)
				13000	(7.65)	15000	(8.83)	9000	(5.30)	9000	(5.30)	12000	(7.06)
				16000	(9.42)	20000	(11.77)	11000	(6.47)	12000	(7.06)	16000	(9.42)
				20000	(11.77)	24000	(14.13)	14000	(8.24)	15000	(8.83)	20000	(11.77)
				28000	(16.48)	32000	(18.83)	18000	(10.59)	20000	(11.77)	25000	(14.71)
	9 (0.131)	D 1600 D 2000	9 (0.131)	36000	(21.19)	40000	(23.54)	22000	(12.95)	25000	(14.71)	32000	(18.83)
				40000*	(23.54)*	-	-	28000*	(16.48)*	30000*	(17.66)*	-	-
				50000*	(29.43)*	-	-	32000*	(18.83)*	36000*	(21.19)*	-	-
				64000*	(37.67)*	75000*	(44.14)*	45000	(26.49)	50000	(29.43)	60000	(35.31)
				80000*	(47.09)*	100000*	(58.86)*	55000	(32.37)	65000	(38.26)	80000	(47.09)
(G1 $\frac{1}{4}$), (G1 $\frac{1}{2}$), G2	63 (2.48)	E 4000 E 5000 E 6500 F 8000 F 10000	10 (0.145)	100000*	(58.86)*	125000*	(73.57)*	75000	(44.14)	80000	(47.09)	100000	(58.86)
				140000*	(82.40)*	150000*	(88.29)*	90000	(52.97)	100000	(58.86)	125000	(73.57)
				160000*	(94.17)*	180000*	(105.9)*	120000	(70.63)	125000	(73.57)	160000	(94.17)
				200000*	(117.7)*	220000*	(129.5)*	130000*	(76.52)*	150000*	(88.29)*	175000*	(103.0)*
				280000*	(164.8)*	300000*	(176.6)*	180000*	(105.9)*	200000*	(117.7)*	240000*	(141.3)*
(G2), (G2 $\frac{1}{2}$), G3	-	G 12500 G 16000 H 20000 H 25000	13 (0.189)	320000*	(188.3)*	360000*	(211.9)*	220000*	(129.5)*	250000*	(147.1)*	300000*	(176.6)*
				400000*	(235.4)*	450000*	(264.9)*	280000*	(164.8)*	300000*	(176.6)*	360000*	(211.9)*
				200000*	(117.7)*	220000*	(129.5)*	130000*	(76.52)*	150000*	(88.29)*	175000*	(103.0)*
				280000*	(164.8)*	300000*	(176.6)*	180000*	(105.9)*	200000*	(117.7)*	240000*	(141.3)*

Standard measuring range for air ($p_{abs} = 1.013 \text{ bar}$ (14.69 psi) at $T = 20 \text{ °C}$ (68 °F)) (dynamic range 1:10)

Remarks

* Guided float.

Non-standard sizes for the thread are listed in brackets.

Standard versions are bold printed.

SITRANS F flowmeters

SITRANS F VA

Tubex variable area meter

Versions

Eight standard versions are defined in the price list using different combinations of fittings, connection materials and floats (the type number corresponds to the 4th digit of the second block of the order number).

Version	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	Type 7	Type 8
Can be used for	liquids					gases		
Fitting	Steel	Mat. No. 1.4571/316Ti	Steel	PVC	Mat. No. 1.4571/316Ti/s teel	Steel	Steel	Mat. No. 1.4571/316Ti/s teel
Connection	Steel (cast iron)	Mat. No. 1.4571/316Ti	Mat. No. 1.4571/316Ti	PVC	Steel	Steel (cast iron)	Mat. No. 1.4571/316Ti	Steel (cast iron)
Float	Mat. No. 1.4571/316Ti/1 .4305/303	Mat. No. 1.4571/316Ti	Mat. No. 1.4571/316Ti	PVC weighted	Mat. No. 1.4571/316Ti	Aluminium (PVC and PVDF as special version)		Aluminium (PVC as special version)
Magnet	-	-	-	-	X	-	-	X
Flow tube, size	A and B	X	X	X	X	-	X	X
	C to F	X	X	X	X	X	X	X
	G and H	X	-	X	-	X	X	X

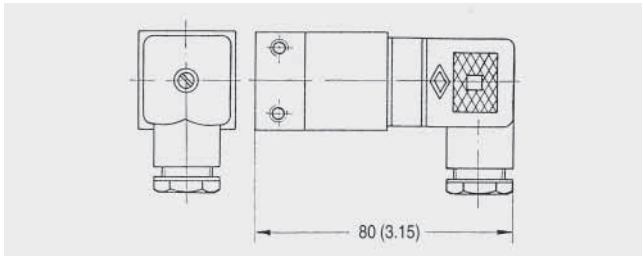
Standard variable area meter versions

Contact assembly

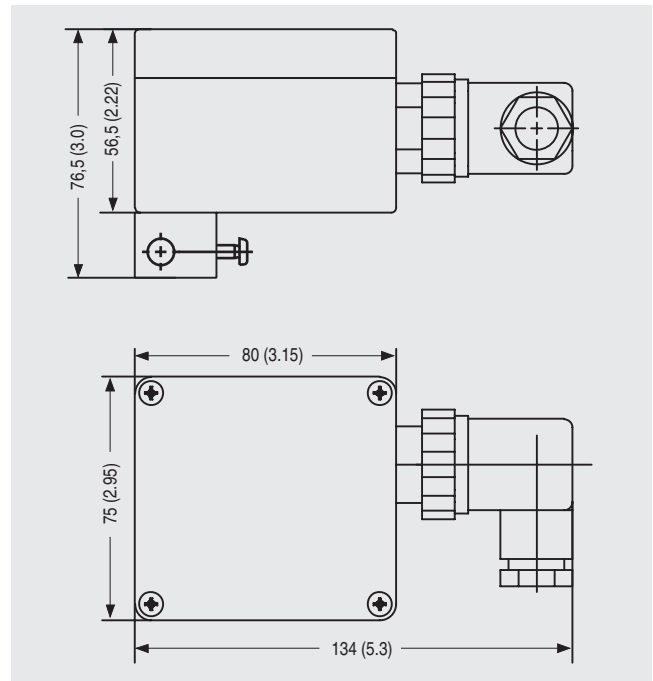
The bistable contact assembly consists of a contact spring set sealed in a glass tube filled with protective gas.

Three contacts can be selected:

- K 17 A: contact closes when the limit is fallen below
- K 17 B: contact closes when the limit is exceeded
- K 23: changeover contact.



Contact K17, dimensions in mm (inches)



Changeover contact K 23, dimensions in mm (inches)

SITRANS F flowmeters

SITRANS F VA

Tubux variable area meter



Connection	A [mm] ± 4 mm (A [inch] ± 0.16 inch)
G½	405 (15.94)
G1	435 (17.13)
G2	455 (17.91)
G3	470 (18.50)

SITRANS F VA Tubux, dimensions in mm (inch)

Selection and Ordering data		Order No.	Order code
SITRANS F VA variable area meter		7	ME 5 8 1 0 -
Type Tubux			
Glass flow tube			
Flow tube size			
A 1	1 A		
A 3	2 A		
A 5	3 A		
A 10	4 A		
A 25	5 A		
B 30	1 B		
B 40	2 B		
B 50	3 B		
B 65	4 B		
B 80	5 B		
B 100	6 B		
C 125	1 C		
C 160	2 C		
C 200	3 C		
C 250	4 C		
C 315	5 C		

Selection and Ordering data		Order No.	Order code
SITRANS F VA variable area meter		7	ME 5 8 1 0 -
Type Tubux			
Glass flow tube			
C 400	6 C		
C 500	7 C		
D 650	1 D		
D 800	2 D		
D 1000	3 D		
D 1250	4 D		
D 1600	5 D		
D 2000	6 D		
D 2500	7 D		
D 3000	8 D		
E 4000	1 E		
E 5000	2 E		
E 6500	3 E		
F 8000	1 F		
F 10000	2 F		
G 12500	1 G		
G 16000	2 G		
H 20000	1 H		
H 25000	2 H		
Standard versions			
according to Table page 4/255			
Flow tube			
<ul style="list-style-type: none"> • Size A, B ¹⁾ • Size C • Size D • Size E, F • Size G, H ^{2) 4)} 		A	
		C	
		D	
		E	
		G	
Version			
<ul style="list-style-type: none"> • Type 1 Fitting: steel Connection: steel (cast iron) Float: 1.4571/316Ti, 1.4305/303 • Type 2 Fitting, connection, float: 1.4571/316Ti • Type 3 Fitting: steel Connection, float: 1.4571/316Ti • Type 4 Fitting, connection: PVC Float: PVC, weighted • Type 5 Fitting: 1.4571/steel, 316Ti Connection: steel (cast iron) Float: 1.4571/316Ti with magnet • Type 6 Fitting: steel Connection: steel (cast iron) Float: aluminium, PVC ³⁾ or PVDF ³⁾ • Type 7 Fitting: steel Connection: 1.4571/316Ti Float: aluminium, PVC ³⁾ or PVDF ³⁾ • Type 8 Fitting: 1.4571/steel, 316Ti Connection: steel (cast iron) Float: aluminium or PVC ³⁾ with magnet 		1	
		2	
		3	
		4	
		5	
		6	
		7	
		8	
Special version		Z 9	
Specify Order code and plain text:			K 1 Y
Flow tube: ...; Version: ...			
Gasket material			
<ul style="list-style-type: none"> • Buna N (standard) • Viton • EPDM 		1	
		4	
		8	

SITRANS F flowmeters

SITRANS F VA

Tubux variable area meter

4

Selection and Ordering data	Order No.	Order code
SITRANS F VA variable area meter	7 ME 5 8 1 0 -	
Type Tubux		
Glass flow tube		
Contacts (only with magnetic float)		
• Without contact		0
• Contact K17/A (closes when limit is fallen below)		1
• Contact K17/B (opens when limit is fallen below)		2
• 2 contacts K17/A		3
• 2 contacts K17/B		4
• Changeover contact K 23		5
• 1 per contact K17/A and K17/B		6
Connection size (see Tables on pages 4/253 and 4/254)		
• PVC adhesive bushing (for plastic pipe only)		A
• Female thread G1/4		B
• Female thread G3/8		C
• Female thread G1/2		D
• Female thread G3/4		E
• Female thread G1		F
• Female thread G1 1/4		G
• Female thread G1 1/2		H
• Female thread G2		J
• Female thread G2 1/2		K
• Female thread G3		L
Connection type		
• Female thread DIN ISO 228 ⁵⁾		A
• Adhesive bushing (only for type ⁴⁾		B
• Female thread (NPT) ⁵⁾		C
Float version		
• Standard		0
• Guided		2
• Float viscosity-compensated for liquids (SV)		3
• PVC for gases		4
• PVC with magnet for gases		5
• PVDF for gases		6
• PVC guided		7
• PVDF guided		8
• Special versions Specify Order code and plain text: Float: ...		9 R 1 Y

1) Not available for the types 5 and 8.

2) Not available for the type 4.

3) Available as special version.

4) Not available for the type 2.

5) With type 4: material PVC

Selection and Ordering data	Order code
Further designs	
Please add „-Z“ to Order No. and specify Order code(s).	
Measured medium	Y01
Always required, specify in plain text: Medium, measuring range with dimension, density with dimension, viscosity with dimension, operating temperature, operating pressure	
With etched scale (>90 °C (194 °F))	Y02
Silicone-free version	Y04
Medium: water	Y05
Viscosity: 1 mPa·s (1 cp) Density: 1 kg/l (62.43 lb/cu.ft)	
Special version: specify in plain text	Y99

Selection and Ordering data	Order No.
SITRANS F VA variable area meter, Glass flow tube as spare part for Tubux	7 ME 5 8 9 0 -
Flow tube	
Without flow tube	0 A
A 1	1 A
A 3	2 A
A 5	3 A
A 10	4 A
A 25	5 A
A 35	6 A
B 30	1 B
B 40	2 B
B 50	3 B
B 65	4 B
B 80	5 B
B 100	6 B
C 125	1 C
C 160	2 C
C 200	3 C
C 250	4 C
C 315	5 C
C 400	6 C
C 500	7 C
D 650	1 D
D 800	2 D
D 1000	3 D
D 1250	4 D
D 1600	5 D
D 2000	6 D
D 2500	7 D
D 3000	8 D
E 4000	1 E
E 5000	2 E
E 6500	3 E
F 8000	1 F
F 10000	2 F
G 12500	1 G
G 16000	2 G
H 20000	1 H
H 25000	2 H
Float material	
Without float	A 0 8
Flow tube: size/material	
A / mat. No. 1.4571/316Ti	A 1
A / aluminium	A 3
A / PVDF, not weighted	A 7
A / PVC, not weighted	A 8
B / mat. No. 1.4571/316Ti	B 1
B / aluminium	B 3
B / PVC, weighted	B 7
B / PVC, not weighted	B 8
C / mat. No. 1.4305/303	C 1
C / mat. No. 1.4571/316Ti	C 2
C / aluminium	C 3
C / PVC, weighted	C 7
C / PVC, not weighted	C 8
D / mat. No. 1.4305/303	D 1
D / mat. No. 1.4571/316Ti	D 2
D / aluminium	D 3
D / PVC, weighted	D 7
D / PVC, not weighted	D 8

SITRANS F flowmeters

SITRANS F VA

Tubux variable area meter

Selection and Ordering data	Order No.
SITRANS F VA variable area meter, Glass flow tube as spare part for Tubux	7 ME 5 8 9 0 - ■■■■■ - ■■■■ 0
E, F / mat. No. 1.4305/303	E 1
E, F / mat. No. 1.4571/316Ti	E 2
E, F / aluminium	E 3
E, F / PVC, weighted	E 7
E, F / PVC, not weighted	E 8
G, H / mat. No. 1.4571/316Ti	F 2
G, H / aluminium	F 3
G, H / PVC, weighted	F 4
G, H / PVC, not weighted	F 5
Float design	
• Standard	0
• With magnet	1
• Guided	2
• With magnet and guided (only for flow tube sizes E, F, G, H)	3
• Version without float	8
Gasket material (only together with declaration of flow tube)	
Without gaskets	0 A
<u>For Tubux</u> <u>Flow tube: size / material</u>	
A, B / buna N	1 A
C / buna N	2 A
D / buna N	3 A
E, F / buna N	5 A
G, H / buna N	7 A
<u>For Unox</u> <u>Flow tube: size / material</u>	
A, B, C / buna N	1 B
D up to D1000 / buna N	3 B
D for D1250 and above / buna N	4 B
E / buna N	5 B
F / buna N	6 B
G / buna N	7 B
H / buna N	8 B
<u>For Tubux</u> <u>Flow tube: size / material</u>	
A, B / Viton	1 C
C / Viton	2 C
D / Viton	3 C
E, F / Viton	5 C
G, H / Viton	7 C
<u>For Unox</u> <u>Flow tube: size / material</u>	
A, B, C / Viton	1 D
D up to D1000 / Viton	3 D
D for D1250 and above / Viton	4 D
E / Viton	5 D
F / Viton	6 D
G / Viton	7 D
H / Viton	8 D
Accessories	
Without accessories	A
<u>2 stainless steel limit springs for:</u>	
Flow tube size A, B	B
Flow tube size C	C
Flow tube size D	D
<u>Float guide rod and buna N limits for Tubux</u>	
Flow tube size C, D	E
Flow tube size E, F	F
Flow tube size G, H	G

Selection and Ordering data	Order No.
SITRANS F VA variable area meter, Glass flow tube as spare part for Tubux	7 ME 5 8 9 0 - ■■■■■ - ■■■■ 0
<u>2 stainless steel limits with float guide rod and buna N limits for Unox</u>	
Flow tube size C	H
Flow tube size D	J
Flow tube size E	K
Flow tube size F	L
Flow tube size G	M
Flow tube size H	N

Selection and Ordering data	Order code
Further designs	
Please add „-Z“ to Order No. and specify Order code(s).	
Calibration certificate	B06
Measured medium	Y01
Always required, specify in plain text: Medium, measuring range with dimension, density with dimension, viscosity with dimension, operating temperature, operating pressure	
With etched scale (>90 °C (194 °F))	Y02
Silicone-free version	Y04
Medium: water Viscosity: 1 mPa·s (1 cp) Density: 1 kg/l (62.43 lb/cu.ft)	Y05
Special version: specify quotation number/date in plain text	Y99

SITRANS F flowmeters

SITRANS F VA

SITRANS FVA250 variable area meter

Overview



SITRANS FVA250 variable area meter

Application

The SITRANS FVA250 variable area meters with a standard length of 250 mm (9.84 inch) and their completely metal design can be used to measure many different types of liquids and gases passing through closed piping. The robust design means that they can also be used in harsh conditions. Different types of flanges, liners and float materials satisfy the requirements of the pharmaceutical and chemical industries.

The measured value is displayed directly on the scale, and output via a switch contact or as a current output (HART or PROFIBUS PA).

The SITRANS FVA250 is primarily used in the following industries:

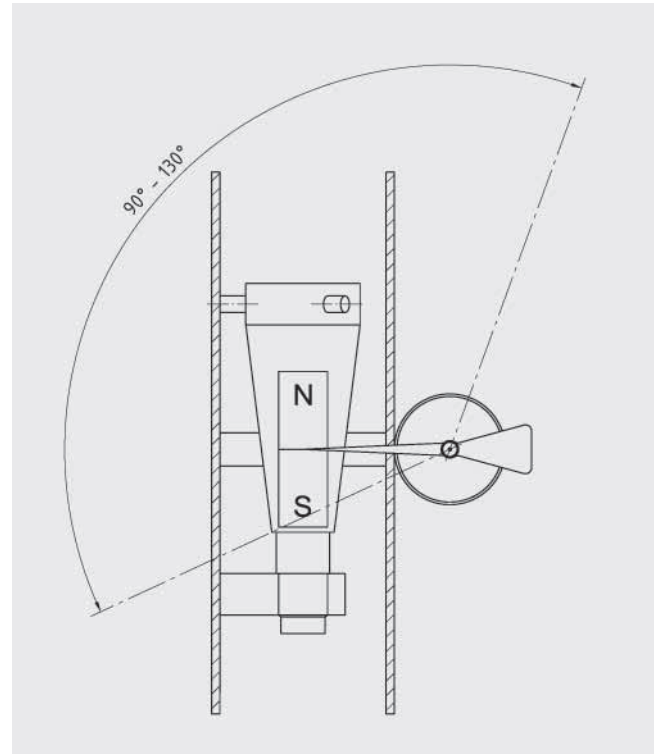
- Chemical industry
- Water
- Power generation and distribution.

Special features

- Standard design available at short notice
- Robust all-metal fitting with impact-resistant housing cover
- Can also be used for corrosive and flammable media
- Use possible at high pressures and temperatures
- Product and percentage scales
- Can be optionally fitted with heating and cooling sheaths
- Contamination-insensitive guiding of float.

Design and mode of operation

Like the other units in the SITRANS F VA range, the SITRANS FVA250 operates according to the variable-area flow tube principle: the flowing medium lifts the conical float in the flow tube. The annular gap is then increased until there is an equilibrium between the buoyant force of the medium and the force due to the weight of the float. The height of the float is directly proportional to the flow quantity. The movement of the float is transmitted by a magnet to a slave magnet in the display unit outside the flow tube.



Flow tube/tube angle

SITRANS F flowmeters

SITRANS F VA

SITRANS FVA250 variable area meter

Technical specifications

Application	See page 4/259	
Design and mode of operation	See page 4/259	
Measuring principle	Variable area flowmeter	
Input		
Measuring range	See table on page 4/262	
Pressure rating	PN 10 to PN 40 (145 to 580 psi) depending on version (see table on page 4/262)	
Flow	upwards	
Dimensions for measured variables	l/h, from 4000 l/h (17.6 USgpm) in m ³ /h	
Rated conditions		
Mounting	vertical	
Ambient temperature		
• With local display	-40 ... +80 °C (-40 ... +176 °F)	
• With limit transmitter	-40 ... +65 °C (-40 ... +149 °F)	
• With HART, PA output	-40 ... +70 °C (-40 ... +158 °F)	
Medium conditions		
• Measuring accuracy		
- For liquids	± 1.6%	
- For gases	± 2.0%	
• Temperature of medium	See page 4/262	
Viscosity limits		
Q _{max} m ³ /h	Q _{max} (USgpm)	Viscosity mPa·s (cp)
≤ 0.1	(≤ 0.44)	1.0
> 0.1 ... 0.5	(> 0.44 ... 2.20)	1.0 ... 3.0
> 0.5 ... 3	(> 2.20 ... 13)	1.0 ... 5.0
> 3 ... 10	(> 13 ... 44)	1.0 ... 8.0
> 10 ... 25	(> 44 ... 110)	1.0 ... 10
> 25 ... 50	(> 110 ... 220)	1.0 ... 15
> 50 ... 100	(> 220 ... 440)	1.0 ... 25
> 100	(> 440)	1.0 ... 50
Design		
Flanges	EN 1092-1, ANSI	
Material		
• Fitting	Stainless steel, mat. No. 1.4404/316L	
• Float	Stainless steel, mat. No. 1.4404/316L, Hastelloy, PTFE	
• Wetted parts materials	Stainless steel mat. No. 1.4404/316L, PTFE, C 22.8, Hastelloy depending on version	
Degree of protection (display unit)		
• Display unit made of aluminium	IP65	
• Display unit made of stainless steel	IP66	
Electromagnetic immunity		
• EN 61000-6-2: 1999	Interference immunity industrial environment	
• EN 50081-1	Interference immunity residential environment	
• EN 55011: 1998 + A1: 1999	Group 1, Class B	
• NAMUR recommendation	NE 21	

Classification according to pressure equipment directive (DGRL 97/23/EG)

	Order No. 7ME5822- 7ME5823-	Permissible media	Category
DN 15	xAxxx-xxxx	Gases of fluid group 1 and liquids of fluid group 1	Article 3.3
DN 20	xFxxx-xxxx		Article 3.3
DN 25	xBxxx-xxxx		Article 3.3
DN 32	xGxxx-xxxx		III
DN 40	xHxxx-xxxx		III
DN 50	xCxxx-xxxx		III
DN 65	xJxxx-xxxx		III
DN 80	xDxxx-xxxx		III
DN 100	xExxx-xxxx		III

Technical specifications of contacts

Limit transmitter

Switching principle

Inductive contact, single contact and twin contact

Connection

M20x1.5

Auxiliary power supply

DC 8 V

Self-inductance

500 µH

Self-capacitance

80 nF

Ambient temperature

• When used in non-hazardous locations

-40 ... +65 °C (-40 ... +149 °F)

Explosion protection

II 2G EEx ia IIC T6 - T4

EC-Type Examination Certificate for

PTB 99 ATEX 2219 X

Directive 94/9/EG

Electric remote transmitter, signal output HART

Connection

2 wire connection

Auxiliary power supply

DC 14 ... 30 V

Output

4 ... 20 mA

Load

min. 250 Ω

Ambient temperature

• When used in non-hazardous locations

-40 ... +70 °C (-40 ... +158 °F)

Explosion protection

ATEX II 2G EEx ia IIC T6

EC-Type Examination Certificate for

DMT 00 ATEX E 075

Directive 94/9/EG

Electric remote transmitter, signal output PROFIBUS PA

Auxiliary power supply

DC 10 ... 25 V

Basic current

< 16.5 mA

Fault current

< 18 mA

Transfer rate

31.25 kBaud

Ambient temperature

• When used in non-hazardous locations

-40 ... +70 °C (-40 ... +158 °F)

Explosion protection

ATEX II 2G EEx ia IIC T6

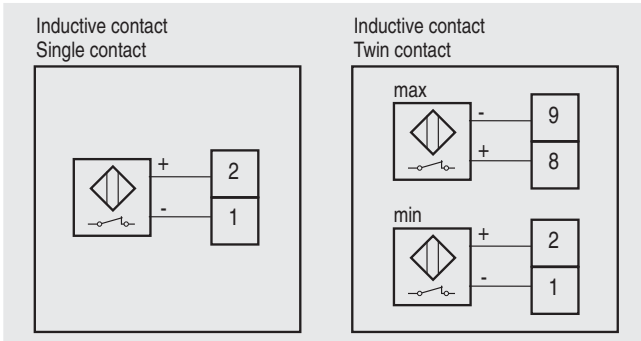
EC-Type Examination Certificate for

DMT 00 ATEX E 075

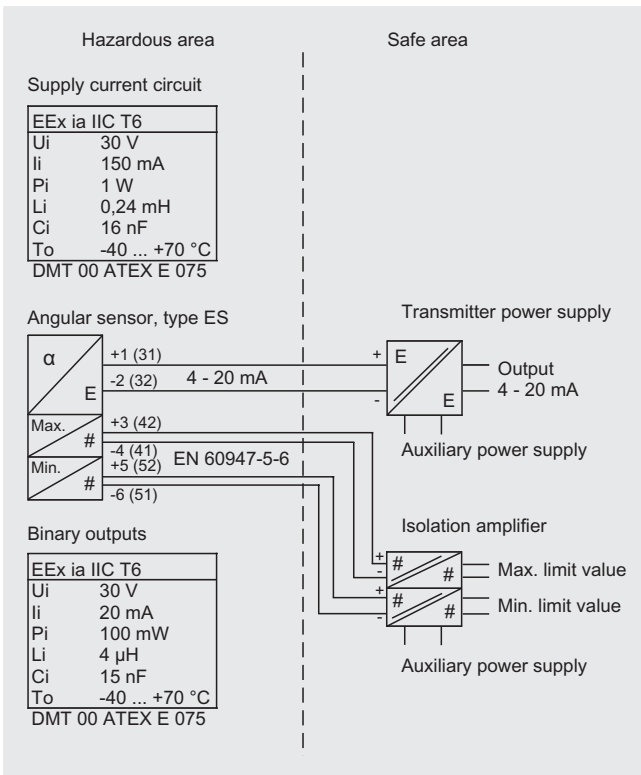
Directive 94/9/EG

SITRANS F flowmeters SITRANS F VA

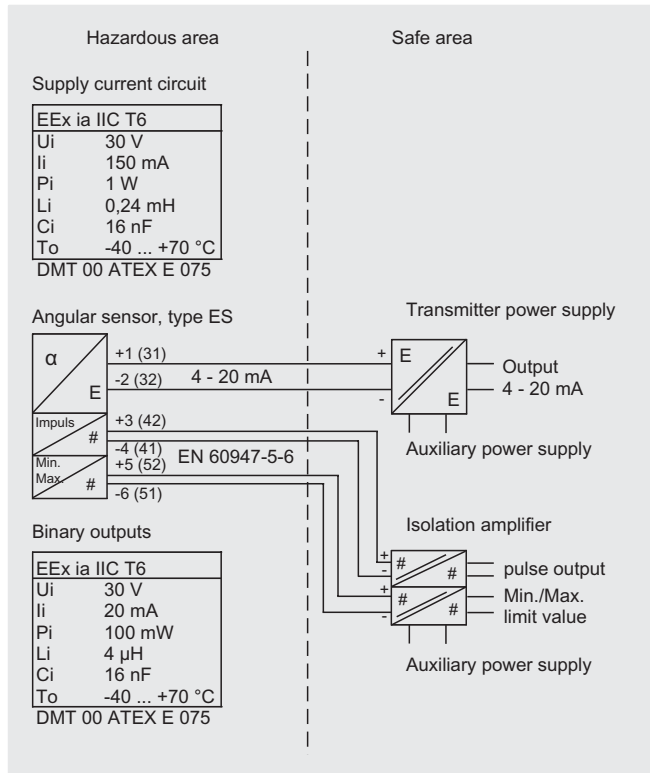
SITRANS FVA250 variable area meter



SITRANS FVA250, contact, terminal assignment



Transmitter (HART) with 4 ... 20 mA output and 2 limit contacts, connection diagram



Transmitter (HART) with 4 ... 20 mA output and pulse output and limit contact, connection diagram

SITRANS F flowmeters

SITRANS F VA

SITRANS FVA250 variable area meter

Measuring ranges for liquids/gases

		Design	CF-S	EF-H	FF-P ¹⁾											
		Wetted parts materials	Mat. No. 1.4404/316L	Hastelloy C	PTFE											
		Fitting	Mat. No. 1.4404/316L	Mat. No. 1.4571/316Ti	Mat. No. 1.4571/316Ti with PTFE liner											
		Flange	Mat. No. 1.4404/316L	≤ DN 25: Hastelloy > DN 25: Hastelloy/ stainless steel	Mat. No. 1.4571/316Ti with PTFE liner											
		Float/flow tube	Mat. No. 1.4404/316L	Hastelloy	PTFE											
		Max. temperature of medium	200 °C (392 °F) optional 350 °C (662 °F)	200 °C (392 °F) optional 350 °C (662 °F)	120 °C (248 °F)											
		Nominal pressure	DN15 ... DN 80 (½ ... 3 inch): PN 40 (580 psi) DN100 (4 inch): PN 16 (232 psi) optional up to 400 bar (5800 psi)	DN15 ... DN 80 (½ ... 3 inch): PN 40 (580 psi) DN100 (4 inch): PN 16 (232 psi) optional up to 400 bar (5800 psi)	PN 16 (232 psi)											
Possible flange connections to EN 1092-1 gray = Type CF-S and Type EF-H X = Type FF-P																
DN 15 ²⁾	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100	Pressure loss [mbar] in relation to full-scale value	Order code in MLFB	Liquid l/h	Gas m ³ /h	Liquid l/h	Gas m ³ /h	Liquid l/h	Gas m ³ /h
									40	Z + K1A	5	0.15	–	–	–	–
									40	Z + K1B	10	0.30	–	–	–	–
									40	A	16	0.48	–	–	–	–
									40	B	25	0.75	–	–	–	–
X									40	C	40	1.3	–	–	–	–
X	X								40	Z + K1C	50	1.5	50	1.5	50 ¹⁾	1.5 ¹⁾
X	X								40	D	70	2.1	70	2.1	70 ¹⁾	2.1 ¹⁾
X	X								60	E	100	3.0	100	3.0	100 ¹⁾	3.0 ¹⁾
X	X								60	F	160	4.6	160	4.6	160	4.6
X	X								60	G	250	7.0	250	7.0	250	7.0
X	X								70	H	400	11.0	400	11.0	400	11.0
X	X								80	J	600	17.0	600	17.0	600	17.0
	X								60	K	1000	30.0	1000	30.0	1000	30.0
	X								70	L	1600	46.0	1600	46.0	1600	46.0
	X								DN < 40: 100 DN ≥ 40: 50	M	2500	70.0	2500	70.0	2500	70.0
					X				DN < 40: 240 DN ≥ 40: 80	N	4000	110.0	4000	110.0	4000	110.0
					X				DN < 40: 180 DN ≥ 40: 90	P	6000	170.0	6000	170.0	6000	170.0
					X				110	Q	10000	290.0	10000	290.0	10000	290.0
					X	X			DN < 80: 230 DN ≥ 80: 70	R	16000	460.0	16000	460.0	16000	460.0
					X				DN < 80: 230 DN ≥ 80: 70	S	20000	550.0	20000	550.0	–	–
						X			DN < 80: 500 DN ≥ 80: 100	T	25000	700.0	25000	700.0	25000	700.0
						X			DN < 80: 350 DN ≥ 80: 120	U	40000	1100.0	40000	1100.0	40000	1100.0
						X			DN < 80: 350 DN ≥ 80: 120	V	50000	1350.0	50000	1350.0	50000	1500.0
							X		360	W	60000	1700.0	60000	1700.0	–	–
									600	Z + K1D	80000	2400.0	80000	2400.0	–	–
									600	X	100000	3000.0	100000	3000.0	–	–

¹⁾ The measuring range dynamics is always 1:10. For type FF-P, the measuring range dynamics 1:5 for small flow rates.

²⁾ Not available in ANSI ½" for type FF-P; rated size available: ANSI ¾".

SITRANS F flowmeters

SITRANS F VA

SITRANS FVA250 variable area meter

Installation and operating instructions

The main information for installation and startup is listed below. Further information can be obtained from VDI/VDE 3513, sheet 3, installation recommendations for variable area meters.

Installation instructions

The variable area meter is delivered protected in a PVC sleeve, and is ready for operation. It has been checked for correct functioning prior to delivery. Before installing, check that the float moves freely: the float must slide smoothly in the flow tube without sticking or tilting. The pointer must smoothly follow the movement of the float. In the rest position (zero flow), the pointer must point to the marked reference point (first scale line). In the end position of the float, the pointer must be positioned above the full-scale value.

The variable area meter must be fitted into the piping vertically and without tension. Magnetic fields from other equipment may influence the result. If several variable area meters are installed next to one another, the following minimum distances must be observed between the main axes of the variable area meters:

- DN 15 to 50 (½ to 2 inch): 250 mm (9.84 inch)
- DN 80 to 100 (3 to 4 inch): 400 mm (15.74 inch).

The flange screws of the PTFE-lined fittings must only be tightened with the following maximum torques:

- DN 15 to 25 (½ to 2 inch): 14 Nm
- DN 50 (2 inch): 25 Nm
- DN 80 (3 inch): 35 Nm
- DN 100 (4 inch): 42 Nm.

Interference-free inlet and outlet pipe sections are not usually required. However, additional measures (inlet pipe sections, flow stabilizers) may be meaningful to retain the measuring accuracy in the case of highly asymmetric flow profiles.

To prevent pulsations resulting from compression when measuring gases, a throttle should be positioned directly downstream of

the variable area meter. To avoid faulty measurements, the arrangement should be selected such that the pressure in the variable area meter corresponds to the reference pressure for the calibration.

The device may only be used within the pressure and voltage limits specified on the identification plate.

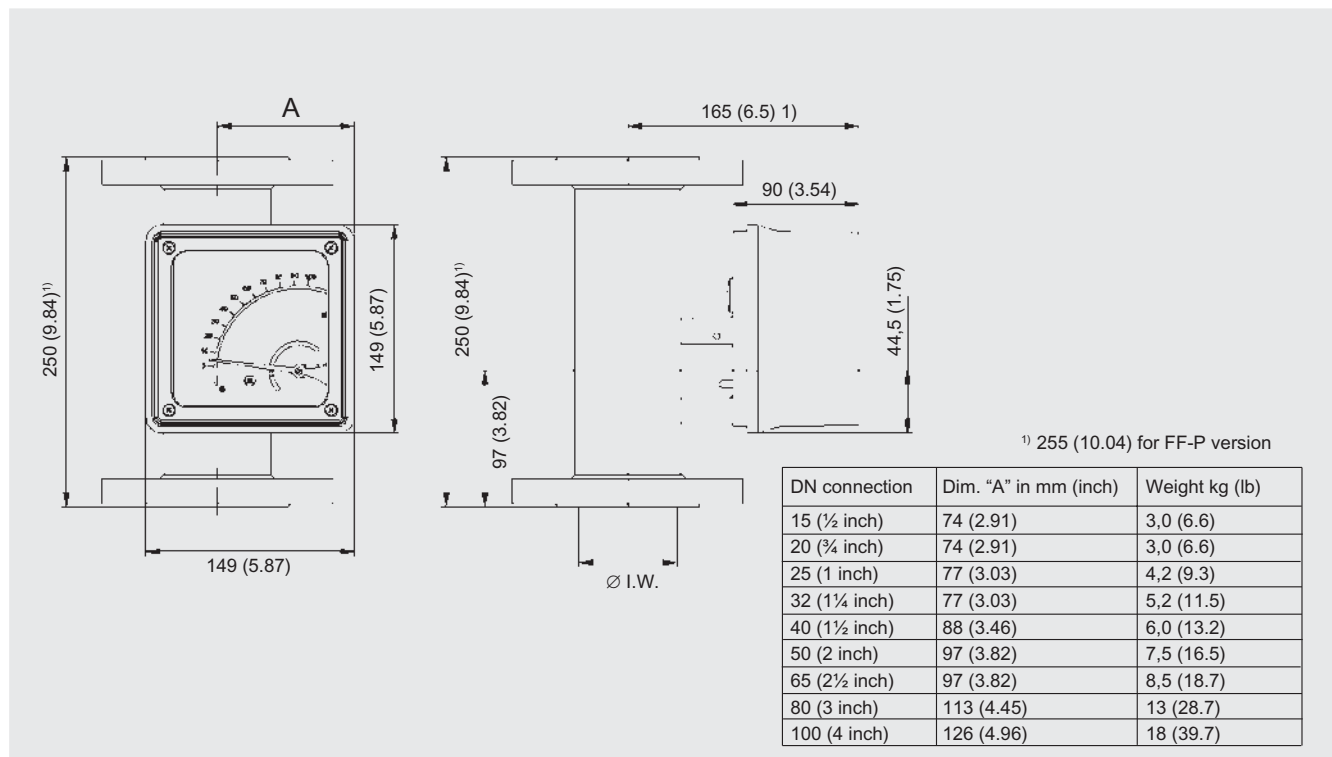
Startup

1. When starting up new plants, material residues (e.g. welding spatter) are carried over in the medium and could be deposited on the variable area meter. In such cases it is recommendable to clean the variable area meter after a short period of operation.
2. The float must not be exposed to sudden pressures. It is therefore recommendable to start with a closed valve which is then slowly regulated to the operating pressure. Liquids should be vented carefully to prevent pressure surges resulting from gas bubbles.
3. The variable area meter outputs values in all scale ranges according to its accuracy class. Each time a flow is started, permit the variable area meter to settle. When measuring in the lowest range, initially set a higher flow for a short time.

Maintenance and repair

Depending on the medium, contamination, abrasion or chemical reactions may attack the orifice and the float, thus influencing the accuracy of the measurement. In such cases it is recommendable to dismount the variable area meter and to clean it, including the float, with appropriate agents. The orifice and float must not be damaged mechanically or by aggressive cleaning agents. If erosion is noticed on the orifice or float, recalibration or replacement is necessary. Following all maintenance and cleaning operations, carry out a function test of the variable area meter before using it again.

4



SITRANS F VA 250, Maße in mm (inch)

SITRANS F flowmeters

SITRANS F VA

SITRANS FVA250 variable area meter

Selection and Ordering data					Order-No.	Order Code
SITRANS FVA250 variable area meter, made completely of metal						
<ul style="list-style-type: none"> • for the measurement of liquids 					7 ME 5 8 2 2 -	0 -
<ul style="list-style-type: none"> • for the measurement of gases 					7 ME 5 8 2 3 -	0 -
Flow tube						
Measuring range for liquids l/h	Measuring range for gases m ³ /h	Nominal diameters				
		FF-P	EF-H	CF-S		
0.5 ... 5	0.015 ... 0.15	–	–	DN 15 ... 25	Z	K 1 A
1 ... 10	0.03 ... 0.3	–	–	DN 15 ... 25	A	K 1 B
1.6 ... 16	0.045 ... 0.48	–	–	DN 15 ... 25	B	
2.5 ... 25	0.075 ... 0.75	–	–	DN 15 ... 25	C	
4 ... 40	0.13 ... 1.3	–	–	DN 15 ... 25		
5 ... 50	0.15 ... 1.5	DN 15 ... 25	DN 15 ... 25	DN 15 ... 25	Z	K 1 C
7 ... 70	0.2 ... 2.1	DN 15 ... 25	DN 15 ... 25	DN 15 ... 25	D	
10 ... 100	0.3 ... 3.0	DN 15 ... 25	DN 15 ... 25	DN 15 ... 25	E	
16 ... 160	0.5 ... 4.6	DN 15 ... 25	DN 15 ... 25	DN 15 ... 25	F	
25 ... 250	0.7 ... 7.0	DN 15 ... 25	DN 15 ... 25	DN 15 ... 25	G	
40 ... 400	1.0 ... 11	DN 15 ... 25	DN 15 ... 25	DN 15 ... 25	H	
60 ... 600	1.7 ... 17	DN 15 ... 25	DN 15 ... 25	DN 15 ... 40	J	
100 ... 1000	3 ... 30	DN 25	DN 15 ... 25	DN 15 ... 40	K	
160 ... 1600	4 ... 46	DN 25	DN 15 ... 25	DN 15 ... 40	L	
250 ... 2500	7 ... 70	DN 25	DN 15 ... 25	DN 15 ... 40	M	
400 ... 4000	11 ... 110	DN 50	DN 25 ... 65	DN 25 ... 65	N	
600 ... 6000	17 ... 170	DN 50	DN 40 ... 65	DN 40 ... 65	P	
1000 ... 10000	29 ... 290	DN 50	DN 50 ... 65	DN 50 ... 65	Q	
1600 ... 16000	46 ... 460	DN 50 ... 80	DN 50 ... 80	DN 50 ... 80	R	
2000 ... 20000	55 ... 550	–	DN 50 ... 80	DN 50 ... 80	S	
2500 ... 25000	70 ... 700	DN 80	DN 50 ... 80	DN 50 ... 80	T	
4000 ... 40000	110 ... 1100	DN 100	DN 80 ... 100	DN 80 ... 100	U	
5000 ... 50000	135 ... 1350	DN 100	DN 80 ... 100	DN 80 ... 100	V	
6000 ... 60000	170 ... 1700	–	DN 100	DN 100	W	
8000 ... 80000	240 ... 2400	–	DN 100	DN 100	Z	K 1 D
10000 ... 100000	300 ... 3000	–	DN 100	DN 100	X	
Temperature shield/degree of protection						
Standard up to 150 °C for electric output /200 °C for local display						0
Standard, with displaced display						2
Stainless steel IP66 for process temperature 150 °C						5
Stainless steel IP66 preferred						6
Heating/cooling sheath						
Without (standard)						0
H/C with flange connection						2
H/C without flange connection						3
Display						
With local display						AA
With local display and an inductive contact, SJ 3.5N (1 NC for downward violation of a limit value)						CJ
With local display and two inductive contacts, SJ 3.5N						CL
With HART protocol, 4 ... 20 mA, EEx ia						FA
With HART protocol, 4 ... 20 mA, EEx ia with two inductive contacts, SJ 3.5N (1 NO contact for downward violation of a limit value, 1 NO contact for upward violation of a limit value)						GL
With HART protocol, 4 ... 20 mA, EEx ia with one inductive contact, SJ 3.5N and a pulse output (1 NC contact for downward violation of a limit value)						HJ
Electric transmitter with PROFIBUS PA, EEx ia						PA
Calibration						
Standard calibration						0
<ul style="list-style-type: none"> • Without calibration certificate 						1
<ul style="list-style-type: none"> • With calibration certificate 						

SITRANS F flowmeters

SITRANS F VA

SITRANS FVA250 variable area meter

Selection and Ordering data

Order Code

Further designs for measurement of liquids and gases

Add "-Z" to Order No. and specify Order Code.

Rating plate in English

B11

Factory certificate 2.2

C11

Acceptance test B

to DIN 50 049, Section 3.1 and EN 10 204

C12

Measured medium

specify in plain text (always required) Medium, measuring range, dimension, density, density dimension, viscosity, viscosity dimension, operating temperature, operating pressure

Y01

Silicone-free version

Y04

Stainless steel tag plate

Y17

Specify special version in plain text

Y99

Note:

For all possible combinations of nominal diameters and flow tubes, see the table on page 4/262

Selection and Ordering data

Order Code

Further designs for measurement of liquids

Add "-Z" to Order No. and specify Order Code

Limit stop and damping	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100
Type CF-S with liquid damping	D01	D02	D03	D04	D05	D06	D07	D08	D09
Type EF-H with liquid damping	E01	E02	E03	E04	E05	E06	E07	E08	E09
Type FF-P with liquid damping	P01	–	P03	–	–	P06	–	P08	P09

Note: The overall length for the FF-P version is 5 mm (0.2") longer.

Selection and Ordering data

Order Code

Further designs for measurement of gases

Add "-Z" to Order No. and specify Order Code.

Limit stop and damping	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100
Type CF-S with gas damping	D11	D12	D13	D14	D15	D16	D17	D18	D19
with spring stop for gas	D21	D22	D23	D24	D25	D26	D27	D28	D29
with gas damping and spring stop	D31	D32	D33	D34	D35	D36	D37	D38	D39
Type EF-H with gas damping	E11	E12	E13	E14	E15	E16	E17	E18	E19
with spring stop for gas	E21	E22	E23	E24	E25	E26	E27	E28	E29
with gas damping and spring stop	E31	E32	E33	E34	E35	E36	E37	E38	E39
Type FF-P with gas damping	P11	–	P13	–	–	P16	–	P18	P19
with spring stop for gas	P21	–	P23	–	–	P26	–	P28	P29
with gas damping and spring stop	P31	–	P33	–	–	P36	–	P38	P39

Note: The overall length for the FF-P version is 5 mm (0.2") longer.