KSEC

VOLTAX FLOWMETER

SHEET 1 OF 1

CLIENT : PAKARAB FERTILIZERS LTD
PROJECT : NOx & N2O ABATEMENT SYSTEM
JOB NO. :
LOCATION : MULTAN in PAKISTAN

NO	BY	DATE	REVISION
A		27.07.2006	FOR APPROVAL
B		10.10.2006	AS REQUIRED

SPEC. NO. | REV. B
CONTRACT | DATE 27.07.2006
REQ. or P.O
BY Y.H.HONG | CHK'D | APPR. W.T.KIM

	GENERAL							
	Tag Number		FIT-1001		FIT-1611			
1	Quantity		1 SET		1 SET			
2	Service		NH3 GAS (99.90%)		LNG GAS			
3	Line No. & Sch. No							
	SERIVCE CONDITION							
4	Fluid		GAS		GAS			
5	Press' Nor	Max(bar)			0.4			
6	Temp. Nor	Max(℃)	AMB		AMB			
7	Viscosity(Cp)							
8	Density(kg/m³)							
9	Flow rate.Nor	Max	100(Kg/hr)	105(Kg/hr)		200(Nm3/hr)		
	SENSOR							
10	Conn' Type		INLINE		INLINE			
11	Body Size		1"		1 1/2"			
12	Range		0 ~ 150 (Kg/hr)		0 ~ 200(Nm3/hr)			
13	Process Conn' Size & Rating		ANSI 150# RF		ANSI 150# RF			
14	Linig Material		316SS		316SS			
15	Electrode Material		-		-			
16	Earthring Material		304SS		304SS			
17	Accuracy		±1%		±1%			
18	Electrode Type		INSERTION		INSERTION			
19	Type		HART COMMUNICATION		HART COMMUNICATION			
20	RTD SENSOR		-		YES			
21	Model		TRIO WIRL VT 4000		LATER			
	CONVERTER							
22	Function		INDICATOR / TRANSMITTER		INDICATOR / TRANSMITTER			
23	Mounting		INTEGRAL		INTEGRAL			
24	Power Supply		DC 24V		DC 24V			
25	Enclosure Class		WEATHER PROOF(IP65)		WEATHER PROOF(IP65)			
26	Output Signal		4~20mA / PULSE		4~20mA / PULSE			
27	Conduit Conn'		1/2" PF(F)		1/2" PF(F)			
28	Totalizer		YES		YES			
29	Model							
	ACCESSORIES							
30	Clibraction Data		YES		YES			
31	FLOW COMPUTER		N.A		N.A			
	Manufacturer							
31	M.F.R		ABB		ABB			

Notes :

KSEC

VOLTAX FLOWMETER

SHEET 1 OF 1

CLIENT : PAKARAB FERTILIZERS LTD
PROJECT NOx & N2O ABATEMENT SYSTEM
JOB NO. :
LOCATION : MULTAN in PAKISTAN

NO	BY	DATE	REVISION
A		Mar-20.'07	FOR APPROVAL
B		**Oct-10.'07**	**As built**

SPEC. NO. | REV. **B**
CONTRACT | DATE **Oct-10.'07**
REQ. or P.O
BY Y.H.HONG | CHK'D | APPR. W.T.KIM

	GENERAL							
	Tag Number		FIT-2001		FIT-2611			
1	Quantity		1 SET		1 SET			
2	Service		NH3 GAS (99.90%)		LNG GAS			
3	Line No. & Sch. No							
	SERIVCE CONDITION							
4	Fluid		GAS		GAS			
5	Press' Nor	Max(bar)			0.4			
6	Temp. Nor	Max(℃)	AMB		AMB			
7	Viscosity(Cp)							
8	Density(㎏/㎥)							
9	Flow rate.Nor	Max	30(Kg/hr)	80(Kg/hr)	80	190		
	SENSOR							
10	Conn' Type		INLINE		INLINE			
11	Body Size		1/2"		1"			
12	Range		0 ~ 100 (Kg/hr)		0 ~ 122(Nm3/hr)			
13	Process Conn' Size & Rating		ANSI 150# RF		ANSI 150# RF			
14	Linig Material		316SS		316SS			
15	Electrode Material		-		-			
16	Earthring Material		304SS		304SS			
17	Accuracy		±1%		±1%			
18	Electrode Type		INSERTION		INSERTION			
19	Type		HART COMMUNICATION		HART COMMUNICATION			
20	RTD SENSOR		-		YES			
21	Model		TRIO WIRL VT 4000		TRIO WIRL VT 4000			
	CONVERTER							
22	Function		INDICATOR / TRANSMITTER		INDICATOR / TRANSMITTER			
23	Mounting		INTEGRAL		INTEGRAL			
24	Power Supply		DC 24V		DC 24V			
25	Enclosure Class		WEATHER PROOF(IP65)		WEATHER PROOF(IP65)			
26	Output Signal		4 ~ 20mA		4 ~ 20mA			
27	Conduit Conn'		1/2" NPT(F)		1/2" NPT(F)			
28	Totalizer		YES		YES			
29	Model							
	ACCESSORIES							
30	Clibraction Data		YES		YES			
31	FLOW COMPUTER		N.A		N.A			
	Manufacturer							
31	M.F.R		ABB		ABB			

Notes :

AS BUILT

KSEC

VOLTAX FLOWMETER

SHEET 1 OF 1

NO	BY	DATE	REVISION
A		Mar-20.'07	FOR APPROVAL
B		**Nov-10.'07**	**As built**

SPEC. NO. | REV. **B**

CONTRACT | DATE **Nov-10.'07**

REQ. or P.O

BY Y.H.HONG | CHK'D | APPR. W.T.KIM

CLIENT : PAKARAB FERTILIZERS LTD
PROJECT NOx & N2O ABATEMENT SYSTEM
JOB NO. :
LOCATION : MULTAN in PAKISTAN

	GENERAL					
	Tag Number		FIT-3001			
1	Quantity		1 SET			
2	Service		NH3 GAS (99.90%)			
3	Line No. & Sch. No					
	SERIVCE CONDITION					
4	Fluid		GAS			
5	Press' Nor	Max(bar)				
6	Temp. Nor	Max(℃)	AMB			
7	Viscosity(Cp)					
8	Density(kg/m³)					
9	Flow rate.Nor	Max	10(Kg/hr)	30(Kg/hr)		
	SENSOR					
10	Conn' Type		INLINE			
11	Body Size		1/2"			
12	Range		0 ~ 30 (Kg/hr)			
13	Process Conn' Size & Rating		ANSI 150# RF			
14	Linig Material		316SS			
15	Electrode Material		-			
16	Earthring Material		304SS			
17	Accuracy		±1%			
18	Electrode Type		INSERTION			
19	Type		HART COMMUNICATION			
20	RTD SENSOR		-			
21	Model		TRIO WIRL ST 4000			
	CONVERTER					
22	Function		INDICATOR / TRANSMITTER			
23	Mounting		INTEGRAL			
24	Power Supply		DC 24V			
25	Enclosure Class		WEATHER PROOF(IP65)			
26	Output Signal		4~20mA			
27	Conduit Conn'		1/2" NPT(F)			
28	Totalizer		YES			
29	Model					
	ACCESSORIES					
30	Clibraction Data		YES			
31	FLOW COMPUTER		N.A			
	Manufacturer					
31	M.F.R		ABB			

AS BUILT

Notes :

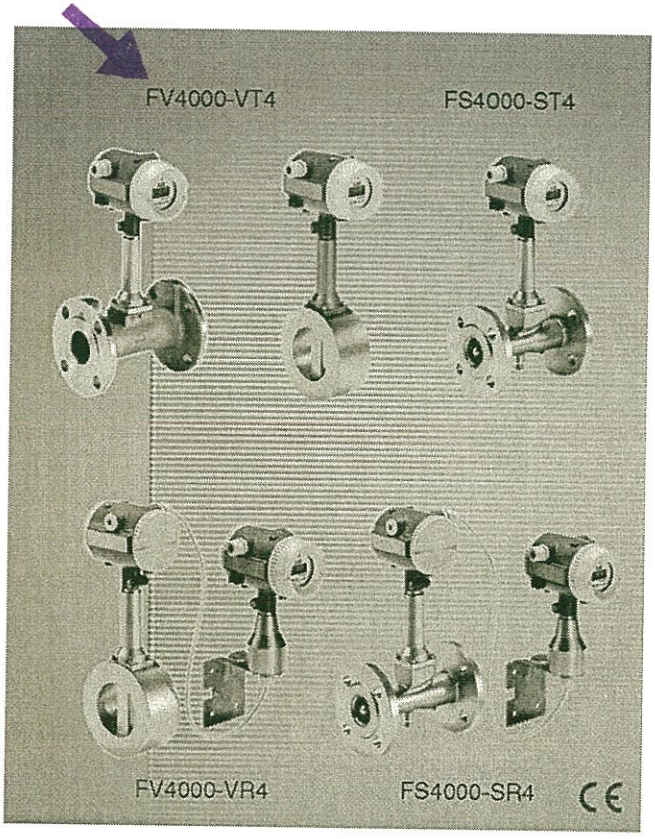
MAGNETIC FLOWMETER

Data Sheet
D184S035U02

Field^{IT}
Vortex Flowmeter FV4000-VT4/VR4
Swirl Flowmeter FS4000-ST4/SR4

Industrial^{IT} enabled

- **The flowrate or the total volume of single phase steam, gases and liquids can be metered with these instruments over a wide flow range, independent of the properties of the fluid**
- **No moving parts, no wear, no maintenance**
- **Ex-Design**
  - II 2G EEx ia/ib IIC T4
  - II 2G EEx d [ib] IIC T6
  - II 3G EEx nA [L] IIC T4
  - II 2D T85 °C ... Tmed IP67
  - FM Approval Class I DIV 1
- **Easy Installation and Start-up**
  - Simply install in pipeline and complete the electrical connections
- **Converter with DSP-Technology**
  - Most modern digital filter techniques assure accurate detection of even the weakest sensor signals
- **Operate without opening the housing using a Magnet Stick**
- **Contact Output**
  - Can be used as an alarm or pulse output
- **Optional integrated Pt100 used as a temperature monitor or for saturated steam calculations**
- **Very short conditioning sections for FS4000**



HART® FIELD COMMUNICATIONS PROTOCOL
PROFIBUS
Fieldbus Foundation

2-Wire Compact Design Meter
Digital-Signal-Processor
Converter Technology

ABB

Operating Principle

Vortex Flowmeter

The operation of the Vortex Flowmeter is based on the Karman Vortex Street principle. As a fluid flows past a shedder body, vortices are alternately formed on both sides. These vortices are shed due to the flow stream forming a vortex street (Karman Vortex Street) as shown in (Fig. 1).

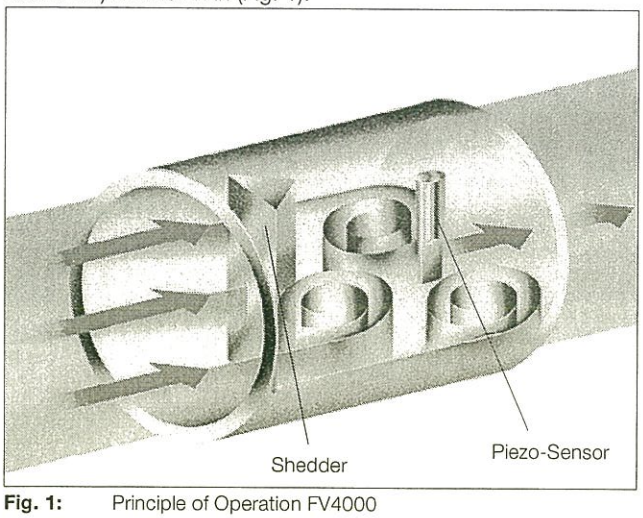


Fig. 1: Principle of Operation FV4000

The frequency *f of the* vortex shedding is proportional to the flow velocity *v* and inversely proportional to the width of the shedder *d*:

$$f = St \times \frac{v}{d}$$

St, the Strouhal Number is a dimensionless number which defines the quality of the vortex flowrate measurements.

When the shedder is dimensioned appropriately, the Strouhal No. *St* is constant over a wide Reynolds No. range (Fig. 2).

$$Re = \frac{v \times D}{\vartheta}$$

ϑ = kinematic viscosity

D = meter pipe diameter

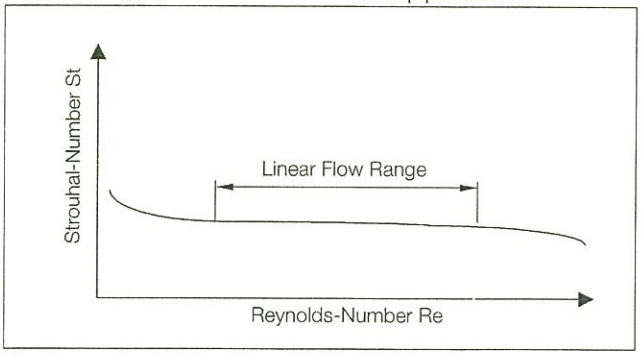


Fig. 2: Strouhal No. / Reynolds No. Relationship

The vortex shedding frequency to be measured is therefore only a function of the flow velocity and is independent of the fluid density and viscosity.

The local pressure changes associated with the vortex shedding are detected by a Piezo-Sensor and converted into electrical pulses representing the vortex shedding frequency.

This flowrate proportional frequency signal coming from the flowmeter primary is processed in the converter.

Swirl Flowmeter

The inlet guide body forces the entering fluid to rotate. In the center of this rotation a vortex core is formed which is forced into a secondary spiral shaped rotation by the backflow (Fig. 3).

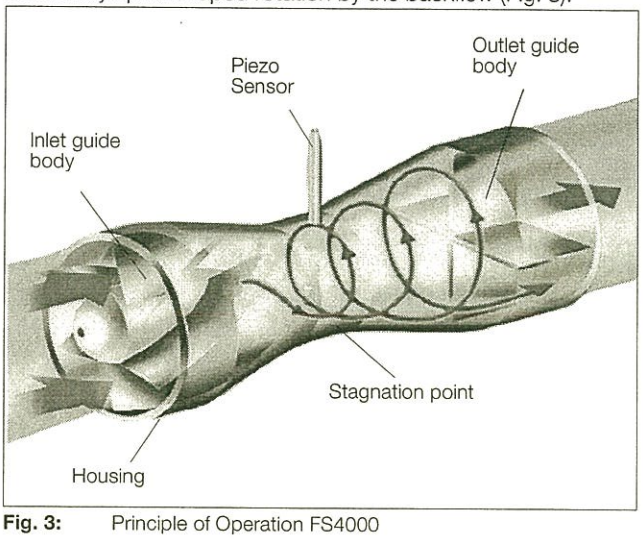
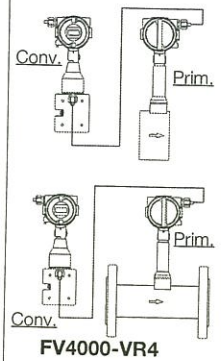
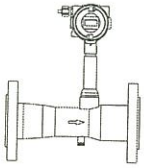
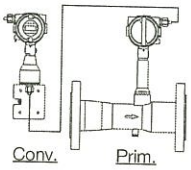


Fig. 3: Principle of Operation FS4000

The frequency of this secondary rotation is proportional to the flowrate and for an optimally designed internal geometry is linear over a wide flow range. This frequency is measured by a Piezo Sensor.

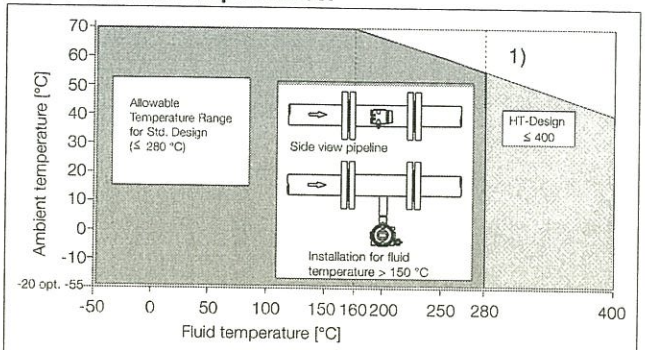
The flowrate proportional frequency signal coming from the flowmeter primary is processed in the converter.

Version Overview

		 **FV4000-VT4** (TRIO-WIRL VT)	 **FV4000-VR4** (TRIO-WIRL VR)	 **FS4000-ST4** (TRIO-WIRL ST)	 **FS4000-SR4** (TRIO-WIRL SR)
Accuracy	Liquids	≤ ± 0.75 % of rate at reference conditions		≤ ± 0.5 % of rate at reference conditions	
	Gases and Steam	≤ ± 1 % of rate at reference conditions			
Reproducibility		DN15[1/2"] ≤ ± 0.3 % of rate		DN15[1/2"] ≤ ± 0.3 % of rate from DN20[3/4"] ≤ ± 0.2 of rate	
		DN15-DN150[1/2"-6"] ≤ ± 0.2 of rate			
		from DN200[8"] ≤ ± 0.25 % of rate			
Allowable Viscosity for liquids (> 7.5 mPas requires a field calibration in the FS4000)		DN15[1/2"] ≤ 4 mPas		DN15[1/2"] to DN 32[1-1/4"] ≤ 5 mPa s	
		DN25[1"] ≤ 5 mPas		DN40[1-1/2"] to DN 50[2"] ≤ 10 mPa s	
		from DN40[1-1/2"] ≤ 7.5 mPas		from DN80[3"] ≤ 30 mPa s	
Typical flow range		1:20		1:25	
Typical in-/outlet sections		15 x D / 5 x D		3 x D / 1 x D	
Flowmeter Primary					
Process connections	Flanges (DIN, ANSI. JIS)	DN 15 to DN 300 (1/2" to 12")		DN 15 to DN 400 (1/2" to 16")	
	Wafer Design (DIN, ANSI. JIS)	DN 15 to DN 150 (1/2" to 6")		-	
Sensor design	Single sensor	yes, optional with integrated temperature measurement			
	Double sensor (≥ DN50[2"])	yes, optional with integrated temperature measurement			
Fluid temperature	Standard	-55 °C to 280 °C		-55 °C to 280 °C	
	High temperature (≥DN25[1"])	-55 °C to 400 °C		-	
Protection Class		IP 67 / NEMA 4X		IP 67 /NEMA 4X	
Materials	Sensor	1.4571[316Ti] opt. Hast. C/Titanium		1.4571[316Ti] opt. Hast. C/Titanium	
	In-/outlet guide body	-		1.4571[316Ti] opt. Hast. C	
	Shedder	1.4571[316Ti] opt. Hast. C		-	
	Meter housing	1.4571[316Ti] opt. Hast. C		1.4571[316Ti] opt. Hast. C	
	Sensor seals	Graphite, Kalrez, Viton, PTFE		Graphite, Kalrez, Viton, PTFE	
Only FVR4000 or FSR4000	2" pipe mount for converter	-	yes, optional	-	yes, optional
	Signal cable length betw. primary & converter	-	max. 10 m	-	max. 10 m
Converter					
Supply power	For analog output 4-20 mA	14-46 V (EEx ib ≤ 28 V)			
	For PROFIBUS PA and FOUNDATION Fieldbus	I < 10 mA (9 - 32 V; EEx ia ≤ 24 V)			
Self monitoring		yes			
Display	2 x 8 char. / 2 x 16 char.	Local indication / totalization with Magnet Stick operation Configure using HART-Protocol / PROFIBUS PA / FOUNDATION Fieldbus selectable			
External FRAM		yes, for storing converter parameters and flowmeter primary calibration data			
Contact output	(Optocoupler is standard) NAMUR-Contact (EEx ia/ib)	Can be configured as an limit contact (flowrate, temperature), alarm or pulse output			
Sat. steam calc's/temperature compensation		yes, when a temperature sensor is installed			
Communication		HART-Protocol, PROFIBUS PA (Profile 3.0), FOUNDATION Fieldbus			
Approvals / Certificates (Approval specifications see Ex-Chapter starting on Page 32)					
Ex-Design (communication capable)					
HART	Ex „ib" intrinsically safe	II 2G EEx ib IIC T4 II 2D T85°C ... Tmed IP67			
	Ex „d" flameproof	II 2G EEx d [ib] IIC T6 II 2D T85°C ... Tmed IP67	Conv.: II 2G EEx d [ib] IIC T6 II 2D T85°C IP67 Prim: II 2G EEx ib IIC T4 II 2D T85°C ... Tmed IP67	II 2G EEx d [ib] IIC T6 II 2D T85°C ... Tmed IP67	Conv.: II 2G EEx d [ib] IIC T6 II 2D T85°C IP67 Prim: II 2G EEx ib IIC T4 II 2D T85°C ... Tmed IP67
	FM	XP/Class I/Div 1/BCD/T4; IS/Class I, II, III/Div 1/A-G/T4; NI/Class I/Div 2/A-D/T4 DIP/Class II, III/Div 1/E-G/T4; S/Class II, III/Div 2/FG/T4			
PROFIBUS PA FOUNDATION Fieldbus	Ex „ia" intrinsically safe	II 2G EEx ia IIC T4 II 2D T85°C ... Tmed IP67 (FISCO-Model)			
EN10204	(DIN 50049-3.1b)	yes, Option			

Installation, Vortex Flowmeter FV4000-VT4/VR4

Fluid /Ambient Temperatures:



1) For the supply power circuit terminals 31, 32 and contact output 41, 42 cables, suitable for temperatures to T = 110 °C, can be used without restrictions. Cable only suitable to T = 80 °C, reduce the temperature ranges as shown in Fig. 9. These reductions also apply to the VR (Remote Design) version and the PROFIBUS PA design with plug connectors.

Fig. 9: Relationship. Fluid Temperature/Ambient Temperature

Information!
For temperatures < 0 °C and > 55 °C the readability of the display may be compromised. The functionality and the outputs of the instrument are unaffected.
Ambient temperatures < -20 °C see Ordering Information.

Converter specifications begin on Page 28

Installation Information

In- and Outlet Sections

In order to guarantee complete functionality, the flow profile at the inlet should be undisturbed.
A inlet straight section length 15 times the nominal diameter should be provided.
After elbows the straight length should be at least 25 times, for double elbows at least 50 times the nominal diameter.
At the outlet, a straight length of 5 times the nominal diameter should be maintained (Fig. 10).

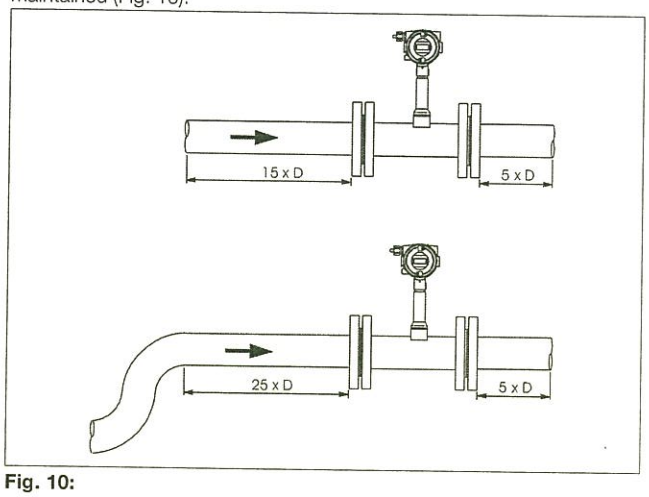


Fig. 10:

Regulating and control devices should be installed at least 5 x D downstream (Fig. 11).

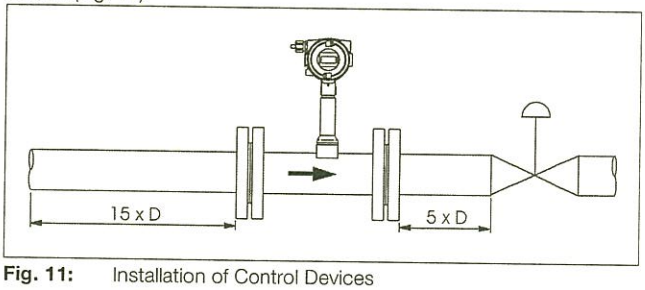


Fig. 11: Installation of Control Devices

If the system utilizes a piston pump or compressor to produce the flow, (pressures for liquids > 10 bar) water hammer may occur when the valve is closed. In this case it is essential that the valves be installed upstream of the flowmeter. Otherwise a suitable dampening device (e.g. a tank when using a compressor) should be provided.

Supplementary Installation Information

- For liquids assure that the flowmeter primary is always completely filled with fluid.
- In horizontal installations with fluid temperatures > 150 °C see Fig. 12 for installation requirements.
- If gas bubbles may be present, a gas separator should be provided.
- For installation in long pipelines susceptible to vibrations, they should be damped up- and downstream of the instrument.

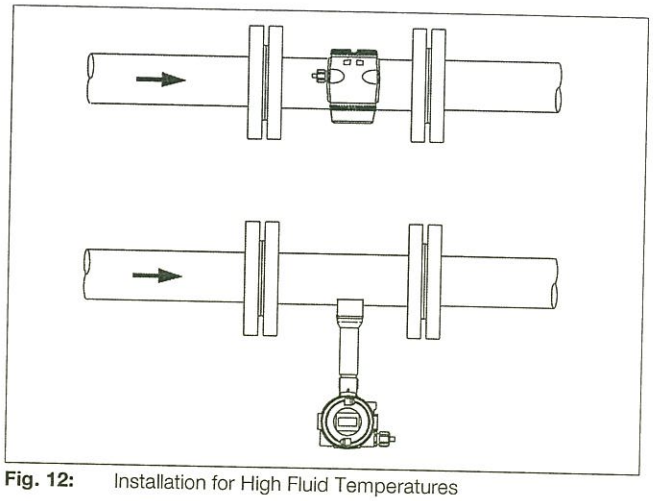


Fig. 12: Installation for High Fluid Temperatures

Pressure and temperature measurements should be made downstream from the flowmeter (Fig. 13). To use the internal temperature measurement see the information in the converter section.

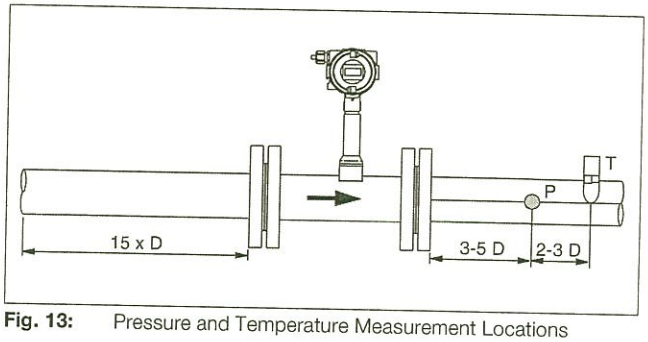


Fig. 13: Pressure and Temperature Measurement Locations

Centering the Wafer Design Flowmeters

The wafer design flowmeter is centered using the outside diameter of the flowmeter primary body and by its mounting bolts. In addition, as a function of the pressure rating, centering sleeves for the bolts, a centering ring (to DN 80 [3"] or segments may be ordered as accessories (see Fig. 14).

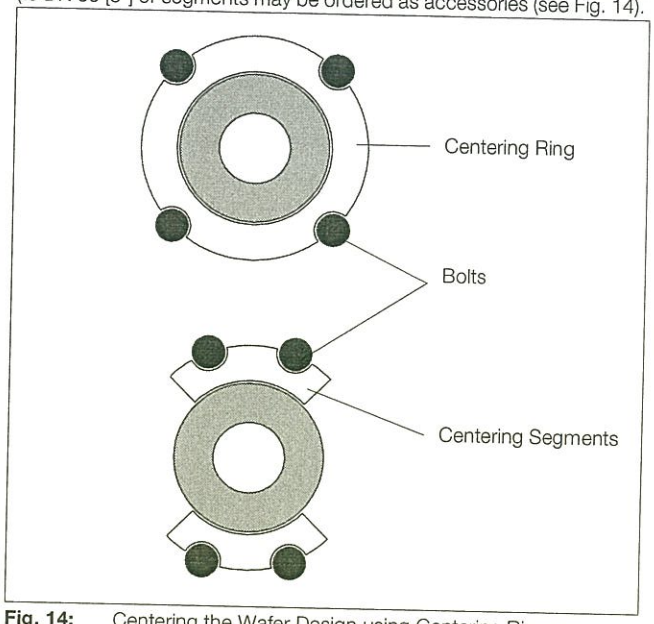
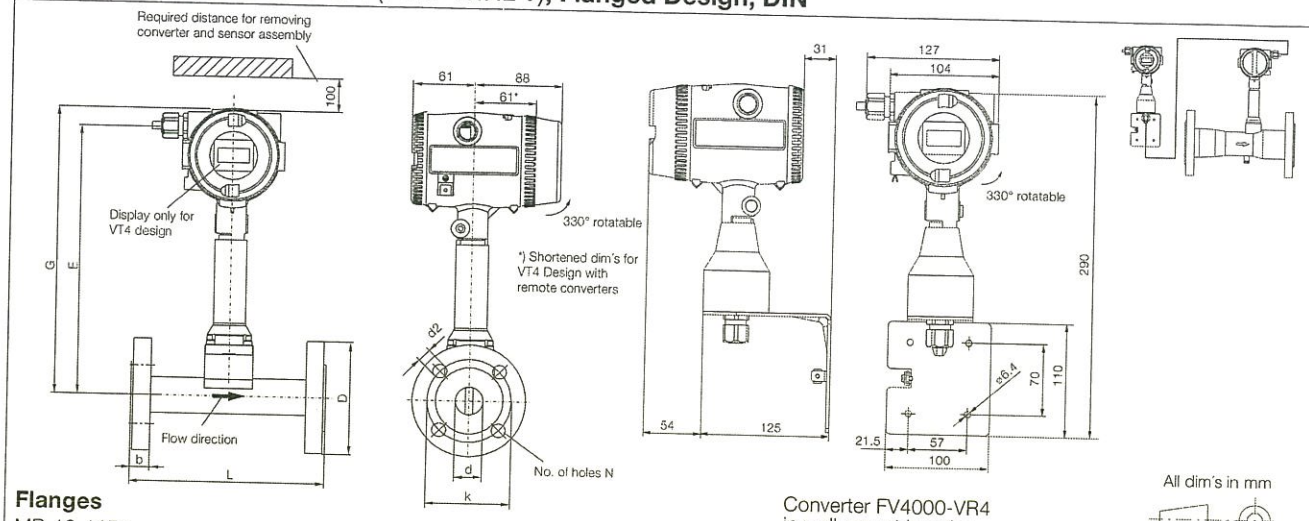


Fig. 14: Centering the Wafer Design using Centering Rings or Segments

Dimensions FV4000-VT4/VR4 (TRIO-WIRL V), Flanged Design, DIN



Converter FV4000-VR4 in wall mount housing

Flanges
MB-10-1174

Meter Size DN	Pres. Rating PN	L[1] Tmax 280 °C	L[1] Tmax 400 °C	E	D	G	k	d2	d	b Tmax 280 °C	b Tmax 400 °C	N	Weight [kg]
15	10-40	200	-	296	95	315	65	14	17.3	16		4	4.5
	64/100	200			105		75	14		20			5.4
	160	200			105		75	14		20			5.4
25	10-40	200		313	115	332	85	14	28.5	18		4	5.1
	64	210	210		140		100	18		24			7.8
	100		-						27.9				
	160		-										
40	10-40	200		291	150	310	110	18	43.1	18		4	6.6
	64	220			170		125	22	42.5	26			10.1
	100	220	-										
	160	225	-		170		125	22	41.5	28			10.5
50	10-40	200		298	165	317	125	18	54.5	20		4	8.7
	64	220			180		135	22		26			12.2
	100	230	-		195		145	26	53.9	28			15.1
	160	245	-		195		145	26	52.3	30			15.6
80	10-40	200	220	316	200	335	160	18	82.5	24		8	13.1
	64	250	250		215		170	22	81.7	28			17
	100	260	-		230		180	26	80.9	32			21.4
	160	280	-		230		180	26	76.3	36			22.9
100	10-16	250		325	220	344	180	18	107.1	21	22	8	14
	25-40	250			235		190	22		28	24		17.8
	64	270			250		200	26	106.3	30			24.1
	100	300	-		265		210	30	104.3	36			32.2
	160	320	-		265		210	30	98.3	40			34.4
150	10-16	300		352	285	371	240	22	159.3	25	22	8	25.4
	25-40	300			300		250	26		38	28	8	33.6
	64	330			345		280	33	157.1	36		8	53.8
	100	370	-		355		290	33	154.1	44		12	70.4
	160	390	-		355		290	33	143.3	50		12	75
200	10	350		414	340	433	295	22	207.3	26	24	8	45.3
	16	350			340		295	22	207.3	28	24	12	45.3
	25	350			360		310	32	206.5	38	30	12	66.3
	40	350			375		320	36	206.5	48	34	12	66.3
	64	370			415		345	36	204.9	42		12	93.1
250	10/16	450		439	395/405	458	350/355	23/27	259	26		12	67.4
	25/40	450			425/450		370/385	30/33		32/38		12	106.4
	64	450			470		400	36	255.4	46		12	135.6
300	10/16	500		464	445/460	483	400/410	23/27	307.9	26/28		12	77.2
	25/40	500			485/515		430/450	30/33		34/42		16	123.2
	64	500			530		460	36	301.9	52		16	170.6

1) Tolerances: DN 15 to DN 200 +0/-3 mm; DN 240 to DN 300 +0/-5 mm

Fig. 16: Dimensions FV4000-VT4/VR4, Flanged Design, DIN

Dimensions FV4000-VT4/VR4 (TRIO-WIRL V), Flanged Design, ASME

Meter Size	Pres. Rating		L[1]		E	D	G	k	d2	d	b	N	Weight [kg]
	Class	Schedule	Tmax 280°C	Tmax 400°C									
1/2"	150	40	200	-	296	88.9	315	60.5	15.9	15.7	11.2	4	5.0
	300	40	200			95.2		66.5	15.9		14.2		5.1
	600	40	200			95.3		66.5	15.9		20.6		5.2
	900	40	200			120.6		82.5	22.3		28.8		7.9
1"	150	80	200	205	313	108	332	79.4	15.9	24.3	14.2	4	5.7
	300	80	200	220		124		88.9	19		17.5		6.7
	600	80	220	-		124		88.9	19		23.9		7.3
	900	80	240	-		149.3		101.6	25.4		34.8		11.2
1-1/2"	150	80	200	220	291	127	310	98.4	15.9	38.1	17.5	4	8.5
	300	80	200	230		155.6		114.3	22.6		20.6		10.9
	600	80	235	-		155.6		114.3	22.6		28.8		12.1
	900	80	260	-		177.8		123.9	28.4		38.2		17.0
2"	150	80	200	220	298	152.4	317	120.6	19	49.2	19.1	4	10.1
	300	80	200	235		165		127	19		22.4	8	11.7
	600	80	240	-		165		127	19		31.8		13.6
	900	80	300	-		215.9		165.1	25.4		44.5		26.5
3"	150	80	200	240	316	190.5	335	152.4	19	73.7	23.9	4	17.6
	300	80	200	260		209.5		168.3	22.2		28.4	8	21.7
	600	80	265	-		209.5		168.3	22.2		38.2		25.8
	900	80	305	-		241.3		190.5	25.4		44.5		35.0
4"	150	80	250	260	325	228.6	344	190.5	19	97.2	23.9	8	20.1
	300	80	250	280		254		200	22.2		31.8		28.8
	600	80	315	-		273.1		215.9	25.4		44.5		41.4
	900	80	340	-		292.1		234.9	31.7		50.8		51.4
6"	150	80	300	310	352	279.4	371	241.3	22.2	146.4	25.4	8	32.8
	300	80	300	330		317.5		269.9	22.2		36.6	12	49.8
	600	80	365	-		355.6		292.1	28.4		54.2		81.6
	900	80	410	-		381		317.5	31.7		62		106.8
8"	150	80	350		414	343	433	298.4	22.2	194	28.4	8	
	300	80	350	370		381		330.2	25.4		41.1	12	
	600	80	415	-		419.1		349.3	31.8		62		
	900	80	470	-		469.9		393.7	38.1		69.9		
10"	150	40	450		439	406.4	458	362	25.4	253	30.2	12	
	300	40	450			444.5		387.3	28.4		47.7	16	
	600	80	470	-		508		431.8	35.1	242.8	69.9	16	
12"	150	40	500		464	482.6	483	431.8	25.4	303.9	31.8	12	
	300	40	500			520.7		450.8	31.7		50.8	16	
	600	80	500	-		558.8		489	35.1	288.8	72.9	20	

1) Tolerances: 1/2" to 8" +0/-3 mm; 10" to 12": +0/-5 mm

Fig. 17: Dimensions FV4000-VT4/VR4, Flanges, ASME

Ordering Information Vortex Flowmeter **FV4000-VT4/VR4** (TRIO-WIRL V)

Ordering Number		**V**
Instrument Design		
Compact		**T**
Remote		**R**
Series		**4**
Ex-Approvals (function of communication option)		
None		**0**
CENELEC „Intrinsic Safety" HART[1)]		**1**
CENELEC „Pressure Tight" HART[2)]		**2**
FM-Approval (Class 1 / Div. 1) HART		**3**
CSA-Approval HART[8)]		**4**
CENELEC „Intrinsic Safety" PA/FF[3)]		**A**
Others		**9**
Process Connections		
Flanges		**1**
Flanges with groove (DIN 2512)		**2**
Wafer design (<DN 200[8"]) max PN 100/CL 600		**3**
Others		**9**
Fluid		
Liquids		**1**
Gas		**2**
Steam		**3**
Oxygen [4)]		**6**
Materials[2)]		
Housing / **Shedder** / **Sensor**		
SS 1.4571[316Ti] / SS 1.4571[316Ti] / SS 1.4571[316Ti]		**1**
SS 1.4571[316Ti] / Hastelloy C / SS 1.4571[316Ti]		**2**
Hastelloy C / Hastelloy C / Hastelloy C		**3**
SS 1.4571[316Ti] / Hastelloy C / Hastelloy C		**4**
Others		**9**
Meter Sizes	**Standard Pressure Rating**	
DN 15 / 1/2"	PN 40	**15**
DN 25 / 1"	PN 40	**25**
DN 40 / 1-1/2"	PN 40	**40**
DN 50 / 2"	PN 40	**50**
DN 80 / 3"	PN 40	**80**
DN 100 / 4"	PN 16	**1H**
DN 150 / 6"	PN 16	**1F**
DN 200 / 8"	PN 16	**2H**
DN 250 / 10"	PN 16	**2F**
DN 300 / 12"	PN 16	**3H**
Pressure Rating		
DIN PN 10		**A**
DIN PN 16		**B**
DIN PN 25		**C**
DIN PN 40		**D**
DIN PN 64		**E**
DIN PN 100[5)]		**F**
DIN PN 160[5)]	(only flanged designs) [6)]	**G**
ASME CL 150		**Q**
ASME CL 300		**R**
ASME CL 600[5)]		**S**
ASME CL 900[5)]	(only flanged designs) [6)]	**T**
Others		**Z**

1) Design also for use in Ex-Zone 2 (II 3G EEx nA [L] IIC T4) and for use in areas with combustible dust (II 2D T85 °C... Tmed IP67) approved.
2) Design also for use in Ex-Zone 2 (II 3G EEx nA [L] IIC T4) and Zone 1 (II 2G EEx ib IIC T4) and for use in areas with combustible dust (II 2D T85 °C... Tmed IP67) approved.
3) Also for use in areas with combustible dust (II 2D T85 °C... Tmed IP67) approved.
4) Flowmeter primary cleaned and marked for Oxygen service.
5) For meter sizes > DN 25 [1"] always with Matl.-Traceability EN10204-3.1C for Applicability Range EC/23/97 (Pressure Equipment Directive)
6) Not in design with FM or CSA Approvals

Ordering Information, Continued

Ordering Number	V
Gasket Surface Roughness[7]	
Rz 16 µm	B
Rz 63 µm	D
Others	Z
Sensor Design	
Standard single sensor (Tmax = 280 °C)	1
Standard single sensor with integr. temperature sensor (Tmax = 280 °C)	2
Double sensor (Tmax = 280 °C) ≥ DN 50[2"] [6) 8)]	3
Double sensor (Tmax = 280 °C) with integr. temperature sensor ≥ DN 50[2"][6) 8)]	4
High temperature (< 400 °C) single sensor ≥ DN 25[1"][6) 8)]	A
High temperature (< 400 °C) with integr. temperature sensor ≥ DN 25[1"][6) 8)]	B
Temperature Range Fluid/Gaskets	
Graphite -55 °C to 280 °C max. PN 64 / CL 300	1
Graphite Special -55 °C to 400 °C only for high temperature sensor max. PN 64 / CL 300[6)]	2
Kalrez (3018) O-Ring 0 °C to 280 °C	3
Viton O-Ring -55 °C to 230 °C (not for steam)	4
PTFE O-Ring -55 °C to 200 °C	5
Kalrez (6375) O-Ring -20 °C to 275 °C[6)]	8
Certifications	
None	A
Inspection Certificate EN10204-3.1B[6)]	B
Material traceability per EN10204-3.1B and Pressure Test per AD2000	C
Pressure Test per AD2000[6)]	D
Others	Z
Communication	
With display with HART	2
With display with PROFIBUS PA[6)]	4
With display with FOUNDATION Fieldbus[6)]	6
Name Plate Language	
German	G
English	E
French	F
Design Level/Software Level (specified by ABB)	A
Accessories	
None	0
2" Pipe mount (only FV4000-VR4)	1
Climate resistant version	2
Climate resistant version + 2" pipe mount (only FV4000-VR4)	3
Operating Mode	
Continuous flowrate	C
Cable Connector	
M20 x 1.5 (not for EEx-Approval „2" or „3" or „4")	A
½" NPT	B
Plug connection M12 (only for communication: „4"/EEx-Approval „0" or „A")[6) 9) 10)]	C
Calibration	
Test report	A
Calibration report	B
Gas/ & liquid Test report	C
Gas/ & liquid calibration report	D
Ambient Temperature Range	
-20 °C to +70 °C (only for Ex-Approval „0", „1", „3" or „A")[11)]	1
-55 °C to +70 °C (only for Ex-Approval „0", „1")[11)]	2
-20 °C to +60 °C (only for Ex-Approval „2")	3
-40 °C to +60 °C (only for Ex-Approval „2" or „A")[11)]	4
Others	9

7) Roughness

Process Connections	Wafer design	Flanges/Flanges with groove
Pres. Rating PN 10-40	Rz16 (12.5-22 µm)	Rz63 (41-160 µm)
PN 64-160		Rz16 (12.5-22 µm)
CL 150-900		

Others roughnesses upon request

8) Upon request

9) Socket (Type EPG300) not included in shipment. Please order separately (see Specifications 63-6-41 DE)

10) Not for use in Ex-Zone 21/22

11) For use in Ex-Zone 21/22 only in the range -20 °C to +60 °C

Accessories:

When P/T compensation is required, see Specifications Sensycal Flow Computer .

Wafer Design Accessories (Option)
Meter size / pressure rating dependent. Included in the optional standard accessories (these include the bolts, nuts, lock washers) and when required, the centering elements.

Gaskets are not included in the accessories.

Material: Stn. stl. No.: 1.4571[316Ti]

Meter Size	Pressure Rating	Ordering Number
DN 15	PN 10-40	D614L384U01
	PN 64-100	D614L384U15
DN 25	PN 10-40	D614L384U01
	PN 64-100	D614L384U11
DN 40	PN 10-40	D614L384U02
	PN 64	D614L384U14
	PN 100	
DN 50	PN 10-40	D614L384U03
	PN 64	D614L384U13
	PN 100	D614L384U18
DN 80	PN 10-40	D614L384U04
	PN 64	D614L384U12
	PN 100	D614L384U09
DN 100	PN 10-16	D614L384U05
	PN 25-40	D614L384U06
	PN 64	D614L384U16
	PN 100	D614L384U19
DN 150	PN 10-16	D614L384U07
	PN 25-40	D614L384U08
	PN 64	D614L384U17
	PN 100	D614L384U20

Meter Size	Pressure Rating	Ordering Number
1/2"	CL 150	D614L498U01
	CL 300	
	CL 600	
1"	CL 150	D614L414U01
	CL 300	D614L414U02
	CL 600	
1-1/2"	CL 150	D614L414U03
	CL 300	D614L414U04
	CL 600	
2"	CL 150	D614L414U05
	CL 300	D614L414U06
	CL 600	D614L414U14
3"	CL 150	D614L414U07
	CL 300	D614L414U08
	CL 600	
4"	CL 150	D614L414U09
	CL 300	D614L414U10
	CL 600	D614L414U13
6"	CL 150	D614L414U11
	CL 300	D614L414U12
	CL 600	D614L414U15