

SITRANS F M MAGFLO®

Electromagnetic flowmeter type MAG 3100 with PTFE liner - new dimensions and weight ≥ DN 500

A5E01019391

Introduction

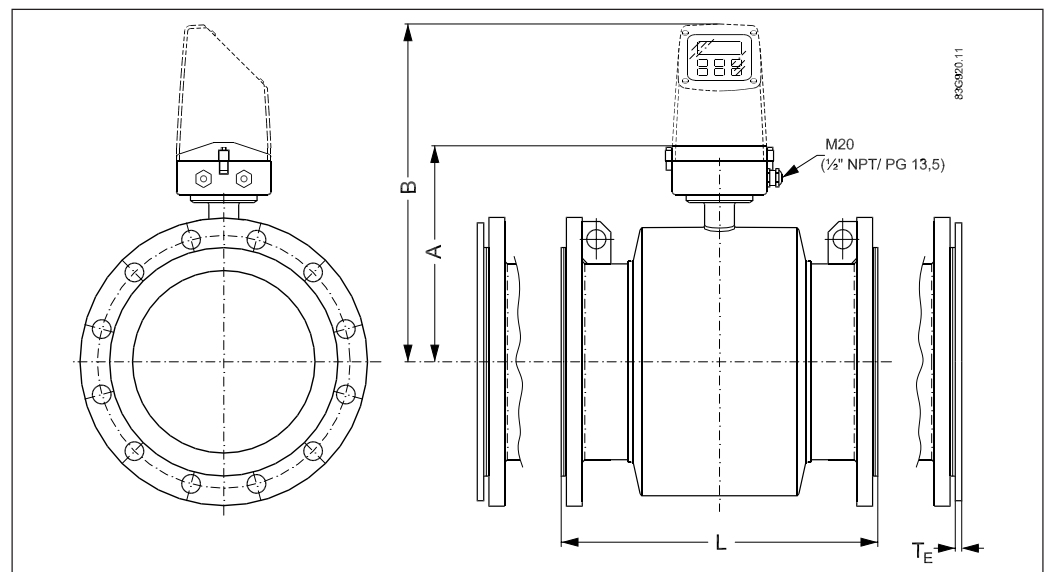
Siemens Flow Instruments SITRANS F M MAGFLO® electromagnetic flowmeters consist of a sensor and a transmitter. These instructions only describe the sensor installation. For further information on the transmitter installation, please refer to the SITRANS F M MAGFLO® handbook.

Technical Documentation (handbooks, instructions, manuals etc.) on the complete product range SITRANS F can be found on the internet/intranet on the following links:

English: <http://www4.ad.siemens.de/WW/view/en/10806951/133300>

Dimensions and weight

MAG 3100 with PTFE liner



Nominal size	A	A ₁	B	D ₁	L ¹⁾					AS 2129 E AS 4087 Class 14 (PN 16) Class 21 (PN 21) Class 35 (PN 35)	T _E ²⁾	Weight ³⁾
					EN 1092-1-2001			BS 1560/ANSI 16.5				
					PN 6, 10, 16	PN 25	PN 40	Class 150	Class 300			
[mm] [inch]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
15 ½	187	338	59	104	-	-	200	200	200	200	6	4
25 1	187	338	59	104	-	-	200	200	200	200	6	5
40 1½	197	348	82	124	-	-	200	200	200	200	6	8
50 2	205	356	72	139	-	-	200	200	200	200	6	9
65 2½	212	363	72	154	200	-	200	200	272	200	6	11
80 3	222	373	72	174	200	-	272	272	272	200 ⁶⁾	6	12
100 4	242	393	85	214	250	-	250	250	310	250	6	16
125 5	255	406	85	239	250	-	250	250	335	250	6	19
150 6	276	427	85	282	300	-	300	300	300	300	6	27
200 8	304	455	137	338	350	350	350	350	350	350	8	40
250 10	332	483	157	393	450	450	450	450	450	450	8	60
300 12	357	508	157	444	500	500	500	500	500	500	8	80
350 14	362	513	270	451	550	550	550	550	550	550	8	110
400 16	387	538	270	502	600	600	600	600	600	600	10	125
450 18	418	569	310	563	600	600	600	600	600	600	10	175
500 20	443	594	350	614	600	625	680	600	730	600 ⁴⁾	10	200
600 24	494	645	430	715	600	750	800	600	860	600 ⁵⁾	10	287

1) When earthing flanges are used, the thickness of the earthing flange must be added to the built-in length

2) T_E = Type E grounding ring

3) Weights are approx. and for PN 16 without transmitter

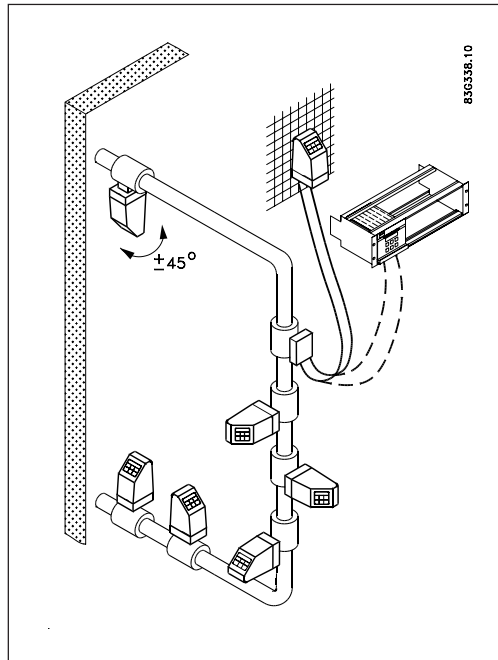
4) PN 35 DN 500 = 680 mm

5) PN 35 DN 600 = 750 mm

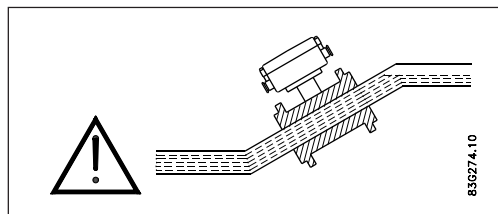
6) PN 35 DN 80 = 272 mm

- Not available, D = Outside diameter of flange, see flange tables

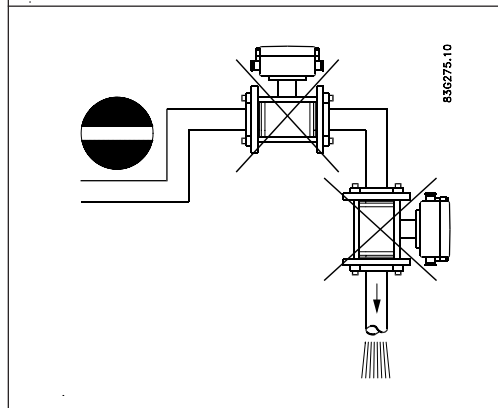
Installation, general



Reading and operating the flowmeter is possible under almost any installation conditions because the display can be oriented in relation to the sensor. To ensure optimum flow measurement attention should be paid to the following:

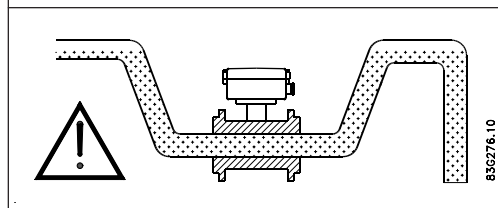


The sensor must always be completely full with liquid.

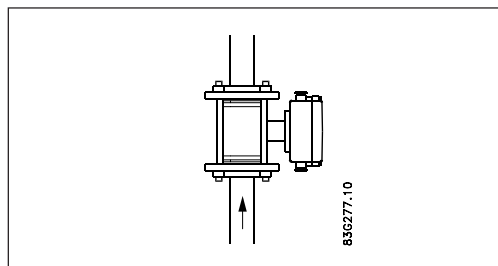


Therefore avoid:

- Installation at the highest point in the pipe system.
- Installation in vertical pipes with free outlet.



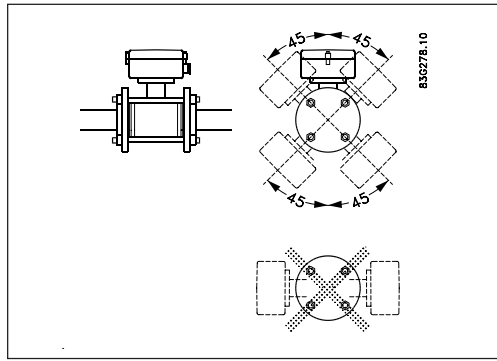
For partially filled pipes or pipes with downward flow and free outlet the flowmeter should be located in a U-tube.



Installation in vertical pipes

Recommended flow direction: upwards. This minimizes the effect on the measurement of any gas/air bubbles in the liquid.

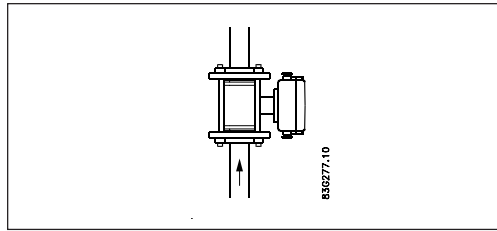
Installation, general
(continued)



Installation in horizontal pipes

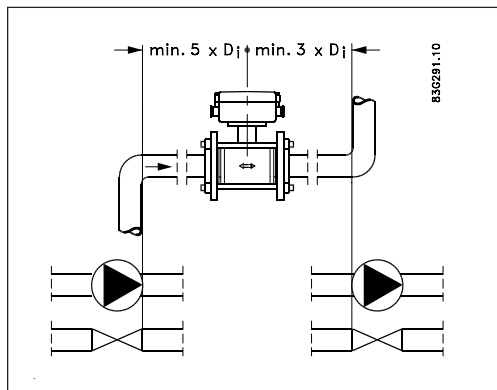
The sensor must be mounted as shown in the upper figure. Do not mount the sensor as shown in the lower figure. This will position the electrodes at the top where there is possibility for air bubbles and at the bottom where there is possibility for mud, sludge, sand etc.

If using empty pipe detection, the sensor can be tilted 45°, as shown in the upper figure.



Measuring abrasive liquids and liquids containing particles

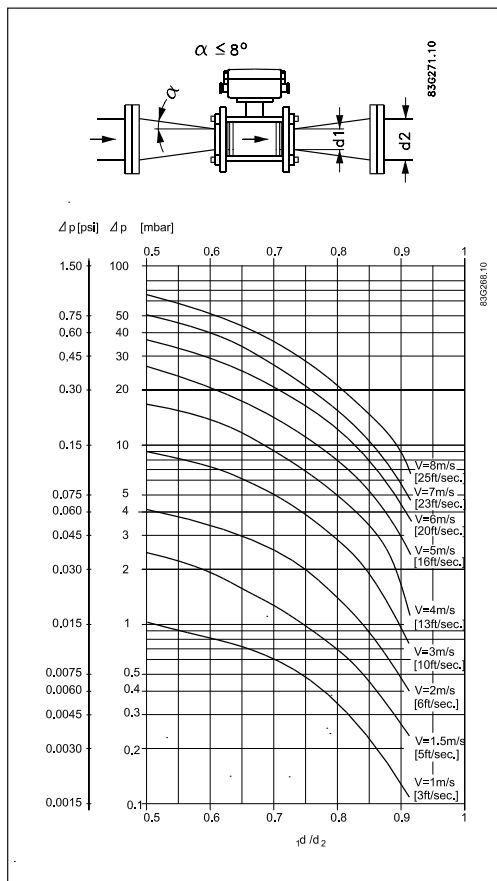
Recommended installation is in a vertical/inclined pipe to minimize the wear and deposits in the sensor.



Inlet and outlet conditions

To achieve accurate flow measurement it is essential to have straight lengths of inlet and outlet pipes and a certain distance between pumps and valves.

It is also important to centre the flowmeter in relation to pipe flanges and gaskets.



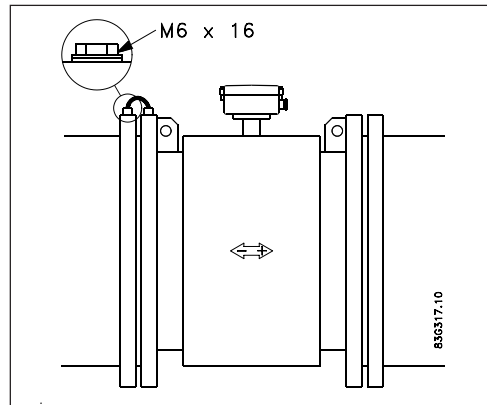
Pressure drop

The flowmeter can be installed between two reducers (e.g. DIN 28545). At 8° the following pressure drop curve applies. The curves are applicable to water.

Example:

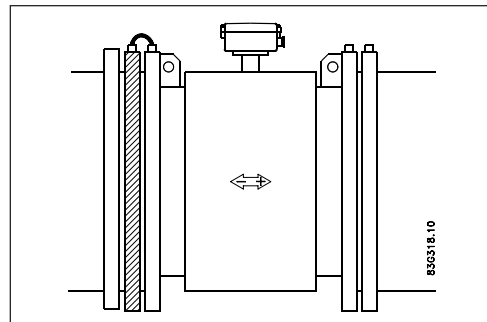
A flow velocity of 3 m/s (V) in a sensor with a diameter reduction from DN 100 to DN 80 ($d_1/d_2 = 0.8$) gives a pressure drop of 2.9 mbar.

Potential equalization



Electrically conductive piping

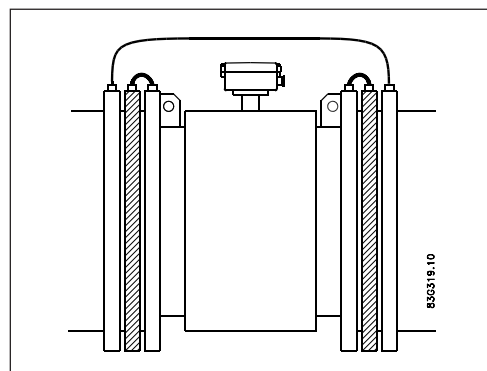
Potential equalization with an electrically conductive pipe. Use an earth straps on one side.



Non-conductive piping

Here an earthing flange is used, placed between flowmeter and the adjacent pipe flange. Earthing flange type E must be used.

Cathodic protected piping



Special attention must be given to systems with cathodic protection.

By compact mounting:

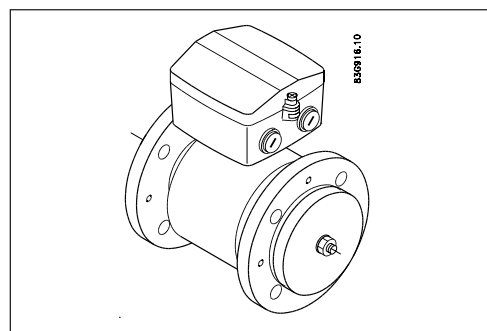
The transmitter must be supplied through an isolation transformer. The terminal "PE" must never be connected.

By remote mounting:

The screen must only be connected at the sensor end via a 1.5 µF condensator. The screen must never be connected at both ends.

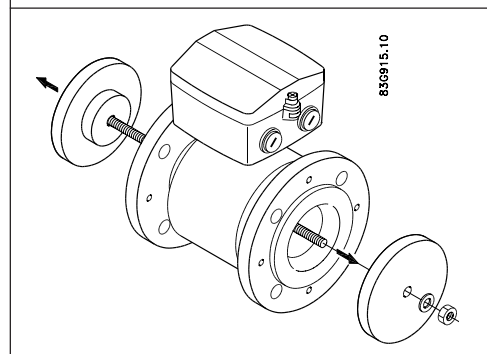
By isolated sensor:

If above mentioned connections are unacceptable, the sensor must be isolated from the pipe work.

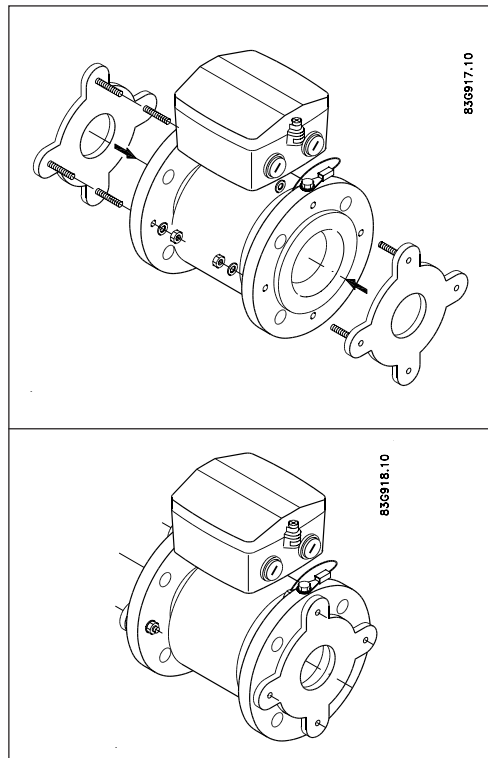


The sensor is equipped with a liner of PTFE teflon. At delivery the sensor is mounted with wooden blanks to hold the liner in place during transportation and storage. These blanks should remain on the sensor until installation. Without the blanks the liner will creep back towards its original shape and installation will be more difficult to carry out.

The sensor should max. be left a few hours without the blanks.



Immediately before installation, remove the blanks.



Where necessary on non conductive pipes, mount earthing flanges type E.

For potential equalization one earthing flange is sufficient even for bidirectional flow. With unidirectional flow the earthing flange should be mounted on the inlet side.

In special cases with abrasive flow the earthing flanges will also work as inlet protection.

High temperature sensors are delivered with two factory mounted earthing flanges. No further action need to be taken for potential equalisation.

Earthing flanges must be connected to the meter body with the enclosed earthing straps.

Effect of temperature and material on working pressure

Metric (Pressures in bar)

PN rated flanges						
Material group	Flange rating	Temperature °C				
		-20	50	100	150	180
1C1 (A105)	PN 6	6.0	6.0	6.0	5.8	5.6
	PN10	10.0	10.0	10.0	9.7	9.4
	PN16	16.0	16.0	16.0	15.6	15.1
	PN 25	25.0	25.0	25.0	24.4	23.7
	PN 40	40.0	40.0	40.0	39.1	37.9
2C1 (304)	PN 6	5.5	5.3	4.5	4.1	3.8
	PN 10	9.1	8.8	7.5	6.8	6.3
	PN 16	14.7	14.2	12.1	11.0	10.2
	PN 25	23.0	22.1	18.9	17.2	16.0
	PN 40	36.8	35.4	30.3	27.5	25.5
2C2 (316)	PN 6	5.5	5.3	4.6	4.2	3.9
	PN 10	9.1	8.9	7.8	7.1	6.6
	PN 16	14.7	14.3	12.5	11.4	10.6
	PN 25	23.0	22.3	19.5	17.8	16.5
	PN 40	36.8	35.6	31.3	28.5	26.4

Imperial (Pressures in Psi)

PN rated flanges						
Material group	Flange rating	Temperature °F				
		-5	122	212	302	356
ASTM A105	PN 6	87	87	87	84	81
	PN 10	145	145	145	141	136
	PN 16	232	232	232	226	219
	PN 25	363	363	363	354	344
	PN 40	580	580	580	567	550
ASTM A240 304	PN 6	80	77	65	59	55
	PN 10	132	128	109	99	91
	PN 16	213	206	175	160	148
	PN 25	334	320	274	249	232
	PN 40	534	513	439	399	370
ASTM A240 316	PN 6	80	77	67	61	57
	PN 10	132	129	113	103	96
	PN 16	213	207	181	165	154
	PN 25	334	323	283	258	239
	PN 40	534	516	454	413	383

ANSI flanges						
Material group	Flange rating	Temperature °C				
		-20	38	93	149	180
1.1 (A105)	Cl. 150	19.7	19.7	17.9	15.9	14.7
	Cl. 300	51.0	51.0	46.6	45.2	44.4
2.1 (F304)	Cl. 150	19.0	19.0	15.9	14.1	13.6
	Cl. 300	49.7	49.7	41.4	37.2	35.5
2.2 (F316)	Cl. 150	19.0	19.0	16.2	14.8	14.1
	Cl. 300	49.7	49.7	42.8	38.6	36.9

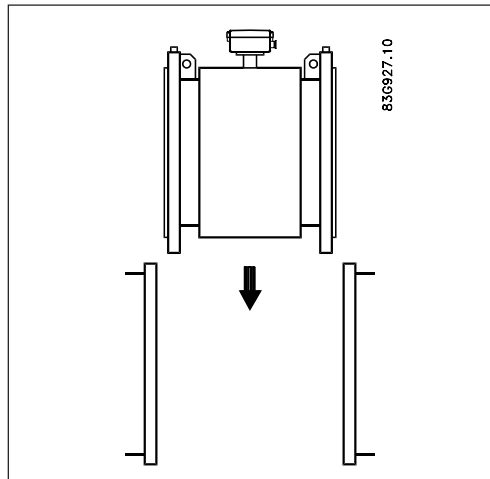
ANSI flanges						
Material group	Flange rating	Temperature °F				
		-5	100	200	300	356
ASTM A105	Cl. 150	285	285	260	230	213
	Cl. 300	740	740	675	655	644
ASTM A240 F304	Cl. 150	275	275	230	205	197
	Cl. 300	720	720	600	540	515
ASTM A240 F316	Cl. 150	275	275	235	215	204
	Cl. 300	720	720	620	560	535

The above tables show the effect that an increase of temperature or change of material have on the maximum working pressure of the flange. The values are independent of nominal size. For intermediate temperatures use value from nearest higher temperature.

Example

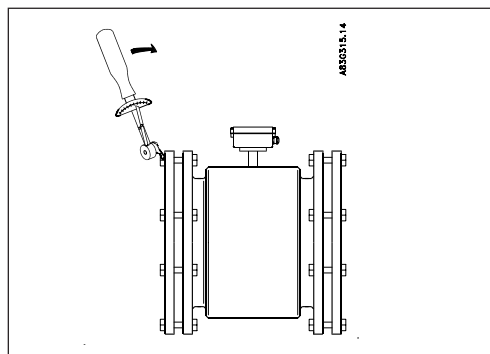
For a PN 16 flange in 2C2 (316) material at 80 degrees the maximum working pressure should be taken as 12.5 bar.

Installation



The sensor must be mounted between two flanges. Gaskets are only necessary when the flowmeter is installed with earthing flanges as the liner replaces gaskets.

Tightening



Standard bolts must be well lubricated and tightened evenly around the gasket. Leakage/damage to the flowmeter or piping may arise if bolts are overtightened.

**Maximum allowable torques
(to meet PED)**

Nominal size		Maximum torque									
		PN 6		PN 10		PN 16		PN 25		PN 40	
mm	Inch	Nm	F/Lbs	Nm	F/Lbs	Nm	F/Lbs	Nm	F/Lbs	Nm	F/Lbs
15	½"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10	7
25	1"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	16	12
40	1½"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	34	25
50	2"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	46	34
65	2½"	10	7	N/A	N/A	25	18	N/A	N/A	34	25
80	3"	25	18	N/A	N/A	25	18	N/A	N/A	42	31
100	4"	25	18	N/A	N/A	25	18	N/A	N/A	72	53
125	5"	25	18	N/A	N/A	32	24	N/A	N/A	114	84
150	6"	25	18	N/A	N/A	50	37	N/A	N/A	144	106
200	8"	25	18	50	37	52	38	105	77	185	137
250	10"	25	18	50	37	88	65	160	118	300	221
300	12"	50	37	62	46	117	86	170	125	320	236
350	14"	50	37	60	44	120	89	240	177	450	332
400	16"	50	37	88	65	170	125	330	244	650	480
450	18"	56	41	92	68	170	125	320	236	570	421
500	20"	53	39	103	76	230	170	390	288	740	546
600	24"	81	60	161	119	350	258	560	413	1220	900

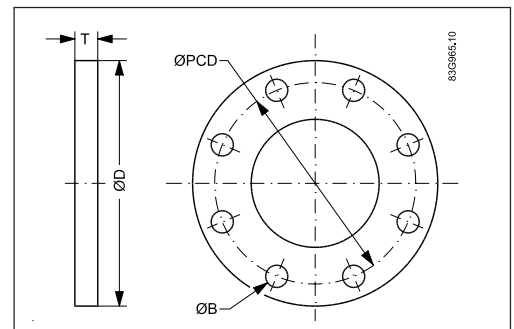
Torque calculations

All values are theoretical and are calculated making the following assumptions:

1. All bolts are new and material selection is according to EN 1515-1 table 2
2. The standard flange gasket material to be used between the flowmeter and mating flanges should not exceed 75 shore A durometer
3. All bolts are galvanized and adequately lubricated
4. The values are calculated for use with carbon steel flanges
5. Flowmeter and mating flanges are correctly aligned

Flange mating dimensions (Metric)

mm	Dimensions mm				Bolting	
	OD	PCD	T	B	Holes	Bolts
PN 10						
200	340	295	24	22	8	M20
250	395	350	26	22	12	M20
300	445	400	26	22	12	M20
350	505	460	28	22	16	M20
400	565	515	32	26	16	M24
450	615	565	36	26	20	M24
500	670	620	38	26	20	M24
600	780	725	42	30	20	M27
PN 16						
50	165	125	19	18	4	M16
65	185	145	20	18	8	M16
80	200	160	20	18	8	M16
100	220	180	22	18	8	M16
125	250	210	22	18	8	M16
150	285	240	24	22	8	M20
200	340	295	26	22	12	M20
250	405	355	29	26	12	M24
300	460	410	32	26	12	M24
350	520	470	35	26	16	M24
400	580	525	38	30	16	M27
450	640	585	42	30	20	M27
500	715	650	46	33	20	M30
600	840	770	52	36	20	M33



mm	Dimensions mm				Bolting	
	OD	PCD	T	B	Holes	Bolts
150 lb						
25	108	79	14	16	4	M14
40	127	98	18	16	4	M14
50	152	121	19	19	4	M16
65	178	140	22	19	4	M16
80	190	152	24	19	4	M16
100	229	191	24	19	8	M16
125	254	216	24	22	8	M20
150	279	241	25	22	8	M20
200	343	298	29	22	8	M20
250	406	362	30	25	12	M24
300	483	432	32	25	12	M24
350	533	476	35	28	12	M27
400	597	540	36.5	28	16	M27
450	635	578	40	32	16	M30
500	699	635	43	32	20	M30
600	813	749	48	35	20	M33

Manufacturer's design and safety statement

1. Responsibility for the choice of lining and electrode materials with regard to their abrasion and corrosion resistance lies with the purchaser; the effect of any change in process medium during the operating life of the flowmeter should be taken into account. Incorrect selection of lining and/or electrode materials could lead to a failure of the flowmeter.
2. It is the responsibility of the user to ensure that stresses and loading caused by earthquakes, traffic, high winds and fire damage are taken into account during installation, when appropriate. These forces are not taken into account during flowmeter design.
3. It is the responsibility of the user to ensure that the flowmeter is installed such that it does not act as a focus for pipeline stresses. External loadings are not taken into account during flowmeter design.
4. During operation do not exceed the pressure and/or temperature ratings indicated on the data label or in the installation instructions.
5. It is the responsibility of the user to ensure that all installations include over pressure protection, means for draining/venting, and that adequate protection is provided to minimise any risk of contact with hot surfaces.
6. Under the Pressure Equipment Directive this product is a pressure accessory, and not approved for use as a safety accessory, as defined by the Pressure Equipment Directive.
7. Removal of the terminal box except by Siemens Flow Instruments or their approved agents will invalidate the PED conformity of the product.

In accordance with the Pressure Equipment Directive (97/23/EC)

We have checked the contents of this manual for agreement with the hardware and software described. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the data in this manual are reviewed regularly and any necessary corrections included in subsequent editions. Suggestions for improvement are always welcomed.

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