

SITRANS F M MAGFLO

Electromagnetic flowmeter type MAG 3100

New dimensions and weight from DN 500...DN 2000

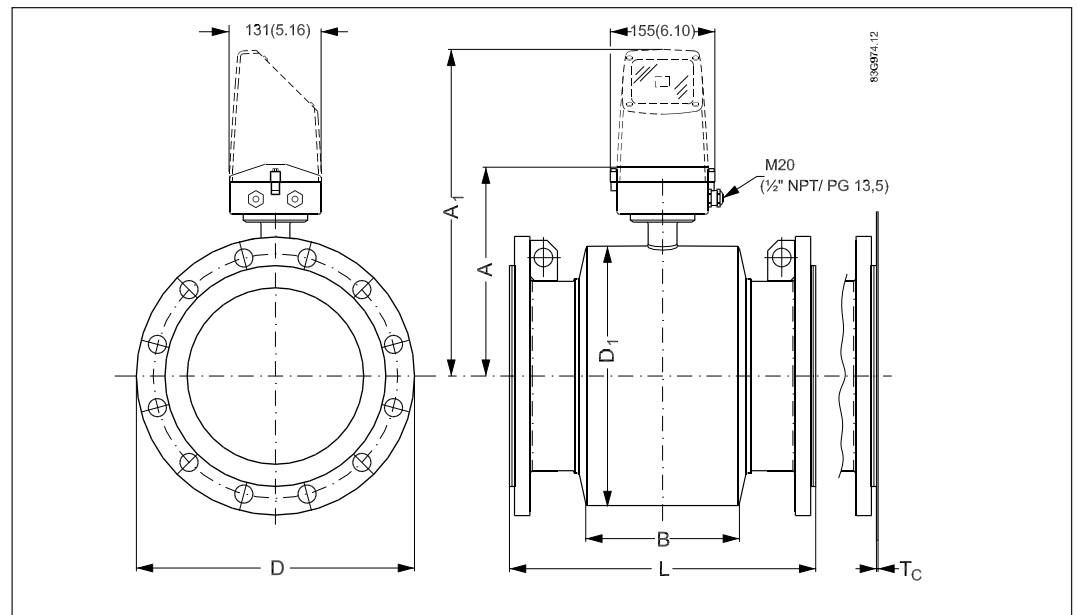
Introduction

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, compact/separate



Nominal size	A ¹⁾	A ₁	B	D ₁	L ²⁾								AS 2129 E AS 4087 Class 14, 21, 35 ³⁾	AWWA C-207 Class D	T _C ⁴⁾	Weight ⁵⁾	
					EN 1092-1-2001				ANSI 16.5								
					PN 6, 10, 16 PED	PN 16 non PED	PN 25	PN 40	PN 63	PN 100	Class 150	Class 300					
[mm] [inch]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
15 ½	187	338	59	104	-	-	-	200	-	-	200	200	200	-	-	-	4
25 1	187	338	59	104	-	-	-	200	-	260	200	200	200	-	1.2	-	5
40 1½	197	348	82	124	-	-	-	200	-	280	200	200	200	-	1.2	-	8
50 2	205	356	72	139	-	-	-	200	276	300	200	200	200	-	1.2	-	9
65 2½	212	363	72	154	200	-	-	200	320	350	200	272	200	-	1.2	-	11
80 3	222	373	72	174	200	-	-	272	323	340	272	272	200 ⁶⁾	-	1.2	-	12
100 4	242	393	85	214	250	-	-	250	380	-	250	310	250	-	1.2	-	16
125 5	255	406	85	239	250	-	-	250	420	-	250	335	250	-	1.2	-	19
150 6	276	427	85	282	300	-	-	300	415	-	300	300	300	-	1.2	-	27
200 8	304	455	137	338	350	-	350	350	480	-	350	350	350	-	1.2	-	40
250 10	332	483	157	393	450	-	450	450	-	-	450	450	450	-	1.2	-	60
300 12	357	508	157	444	500	-	500	500	-	-	500	500	500	-	1.6	-	80
350 14	362	513	270	451	550	-	550	550	-	-	550	550	550	-	1.6	-	110
400 16	387	538	270	502	600	-	600	600	-	-	600	600	600	-	1.6	-	125
450 18	418	569	310	563	600	-	600	600	-	-	600	600	600	-	1.6	-	175
500 20	443	594	350	614	600	-	625	680	-	-	600	730	600 ⁷⁾	-	1.6	-	200
600 24	494	645	430	715	600	-	750	800	-	-	600	860	600 ⁸⁾	-	1.6	-	287
700 28	544	695	500	816	875	700	-	-	-	-	-	-	700	700	2.0	-	330
750 30	571	722	556	869	-	-	-	-	-	-	-	-	750	750	2.0	-	360
800 32	606	757	560	927	1000	800	-	-	-	-	-	-	800	800	2.0	-	450
900 36	653	804	630	1032	1125	900	-	-	-	-	-	-	900	900	2.0	-	530

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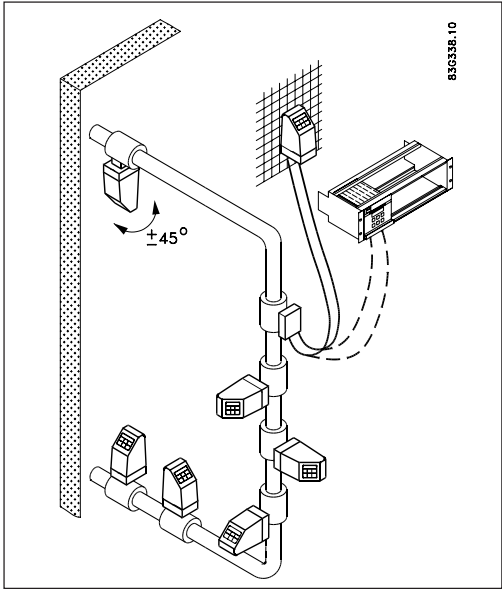
SITRANS F M MAGFLO® Electromagnetic flowmeter type MAG 3100

1000	40	704	906	670	1136	1250	1000	-	-	-	-	-	-	1000	1000	2.0	660
	42	704	906	670	1136	-	-	-	-	-	-	-	-	-	1000	2.0	-
1100	44	755	906	770	1238	-	-	-	-	-	-	-	-	1100	1100	2.0	1140
1200	48	810	961	792	1348	1500	1200	-	-	-	-	-	-	1200	1200	2.0	1180
1400	56	925	1076	1000	1675	-	1400 ⁹⁾	-	-	-	-	-	-	-	1400	3.0	1600
1500	50	972	1123	1020	1672	-	1500 ⁹⁾	-	-	-	-	-	-	-	1500	3.0	2460
1600	64	1025	1176	1130	1915	-	1600 ⁹⁾	-	-	-	-	-	-	-	1600	3.0	2140
1800	72	1123	1274	1250	1974	-	1800 ⁹⁾	-	-	-	-	-	-	-	1800	3.0	2930
2000	78	1223	1374	1375	2174	-	2000 ⁹⁾	-	-	-	-	-	-	-	2000	3.0	3665

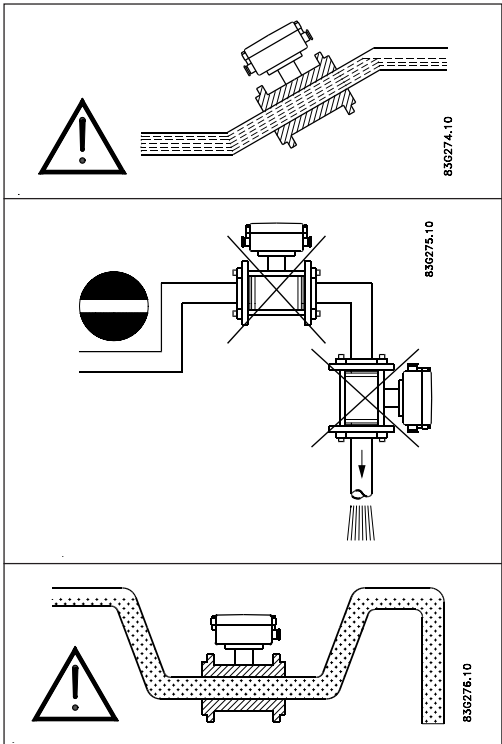
- 1) 13 mm shorter with AISI terminal box (Ex and high temperature)
- 2) When earthing flanges are used, the thickness of the earthing flange must be added to the build-in length
- 3) Class 14 (PN 16), Class 21 (PN 21) and Class 35 (PN 35)
- 4) T_C = Type C grounding ring
- 5) Weights are approx. and for PN 16 without transmitter
- 6) PN 35 DN 80 = 272 mm
- 7) PN 35 DN 500 = 680 mm
- 8) PN 35 DN 600 = 750 mm
- 9) Applies to PN6 and PN10 also

- 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:

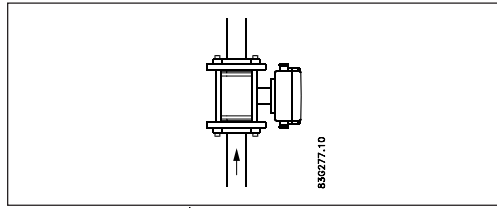


The sensor must always be completely full with liquid.

- Therefore avoid:
- Installation at the highest point in the pipe system
 - Installation in vertical pipes with free outlet

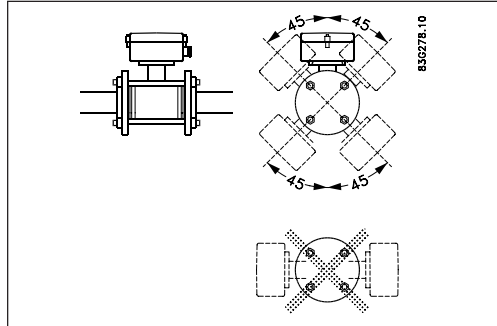
For partially filled pipes or pipes with downward flow and free outlet the flowmeter should be located in a U-tube.

Installation, general
(continued)



Installation in vertical pipes

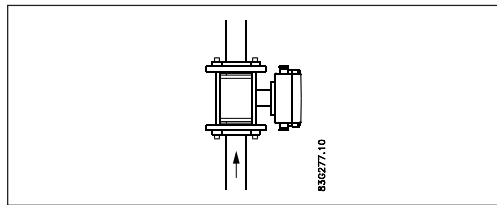
Recommended flow direction: upwards. This minimizes the effect on the measurement of any gas/air bubbles in the liquid.



Installation in horizontal pipes

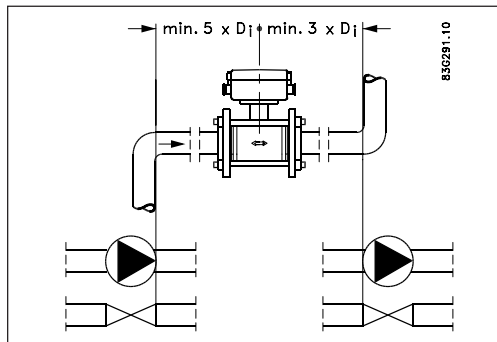
The sensor must be mounted as shown in the upper figure. Do not mount the sensor as shown in the lower figure. This will position the electrodes at the top where there is possibility for air bubbles and at the bottom where there is possibility for mud, sludge, sand etc.

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



Measuring abrasive liquids and liquids containing particles

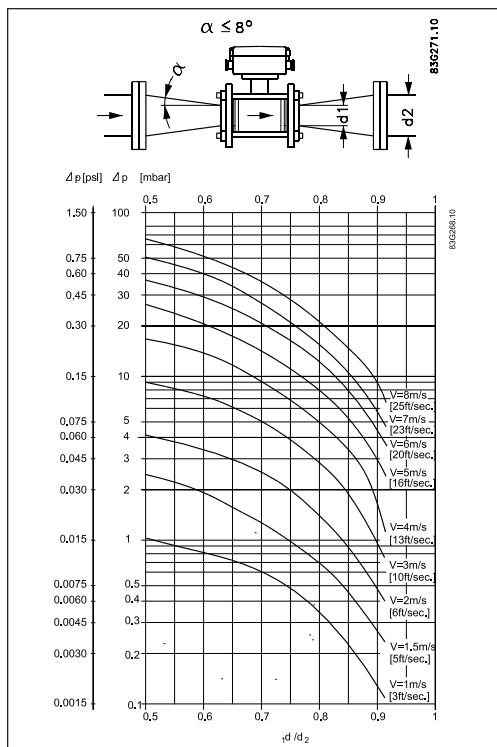
Recommended installation is in a vertical/inclined pipe to minimize the wear and deposits in the sensor.



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.



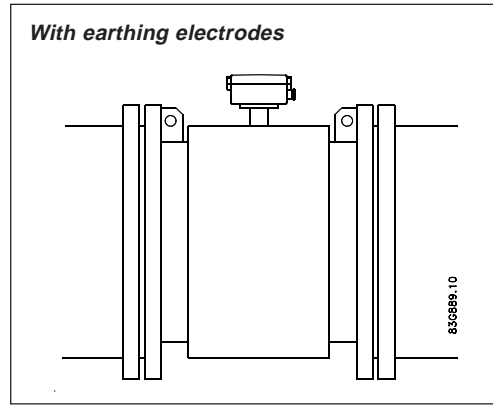
Pressure drop

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

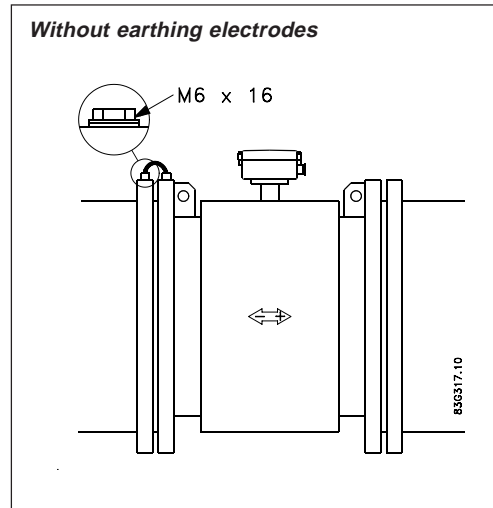
Example:

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.

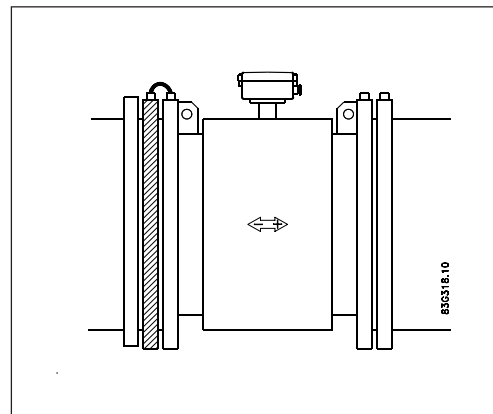
Potential equalisation



Potential equalisation is carried out with the built-in earthing electrodes.



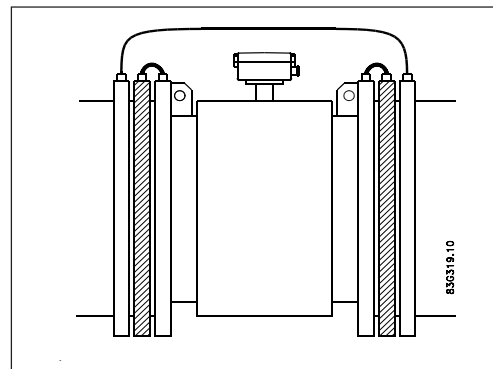
Electrically conductive piping
Use an earth straps on one side.



Non-conductive piping
Here an earthing flange is used, placed between flowmeter and the adjacent pipe flange.

Liner material	Suitable earthing flange
All except PTFE/Novolak	Type C
PTFE	Type E

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.

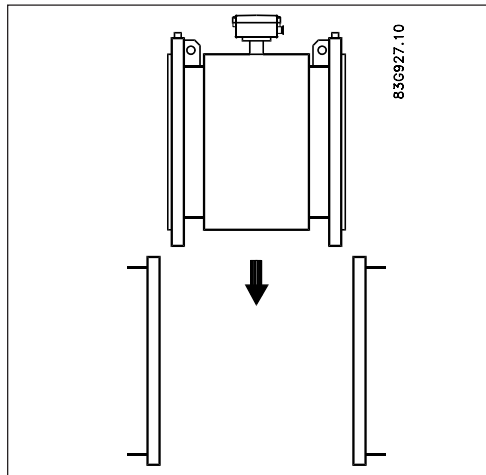
By remote mounting:

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:

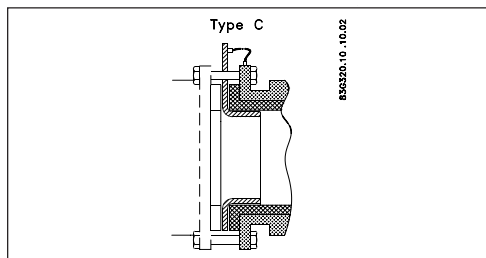
If above mentioned connections are unacceptable the sensor must be isolated from the pipe work.

Installation



The sensor must be mounted between two flanges. Standard flange gaskets to be used. If earthing rings are used use standard flange gaskets on both sides of the ring.

Inlet protection



When measuring abrasive liquids the use of flowmeter inlet protection may be necessary. Here type C earthing flanges are used.

Effect of temperature and material on working pressure

Metric (Pressures in bar)

Flanges to EN 1092-1				
Material group	Flange rating	Temperature °C		
		-20	50	100
1C1 (A105)	PN 6	6.0	6.0	6.0
	PN10	10.0	10.0	10.0
	PN16	16.0	16.0	16.0
	PN 25	25.0	25.0	25.0
	PN 40	40.0	40.0	40.0
	PN 63	63.0	63.0	63.0
2C1 (304)	PN 6	5.5	5.3	4.5
	PN 10	9.1	8.8	7.5
	PN 16	14.7	14.2	12.1
	PN 25	23.0	22.1	18.9
	PN 40	36.8	35.4	30.3
	PN 63	57.9	55.8	47.7
2C2 (316)	PN 6	5.5	5.3	4.6
	PN 10	9.1	8.9	7.8
	PN 16	14.7	14.3	12.5
	PN 25	23.0	22.3	19.5
	PN 40	36.8	35.6	31.3
	PN 63	57.9	56.1	49.2
2C2 (316)	PN 100	91.9	89.1	78.1

Imperial (Pressures in Psi)

Flanges to EN 1092-1				
Material group	Flange rating	Temperature °F		
		-5	122	212
ASTM A105	PN 6	87	87	87
	PN 10	145	145	145
	PN 16	232	232	232
	PN 25	363	363	363
	PN 40	580	580	580
	PN 63	914	914	914
ASTM A240 304	PN 100	1450	1450	1450
	PN 6	80	77	65
	PN 10	132	128	109
	PN 16	213	206	175
	PN 25	334	320	274
	PN 40	534	513	439
ASTM A240 316	PN 63	840	809	692
	PN 100	1333	1285	1098
	PN 6	80	77	67
	PN 10	132	129	113
	PN 16	213	207	181
	PN 25	334	323	283
ASTM A240 F304	PN 40	534	516	454
	PN 63	840	813	713
	PN 100	1333	1292	1132

ANSI flanges				
Material group	Flange rating	Temperature °C		
		-20	38	93
1.1 (A105)	Cl. 150	19.7	19.7	17.9
	Cl. 300	51.0	51.0	46.6
2.1 (F304)	Cl. 150	19.0	19.0	15.9
	Cl. 300	49.7	49.7	41.4
2.2 (F316)	Cl. 150	19.0	19.0	16.2
	Cl. 300	49.7	49.7	42.8

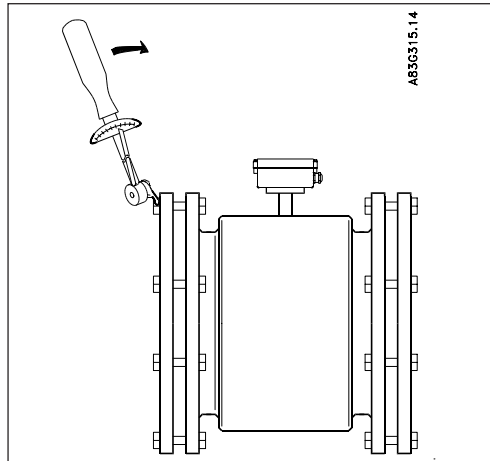
ANSI flanges				
Material group	Flange rating	Temperature °F		
		-5	100	200
ASTM A105	Cl. 150	285	285	260
	Cl. 300	740	740	675
ASTM A240 F304	Cl. 150	275	275	230
	Cl. 300	720	720	600
ASTM A240 F316	Cl. 150	275	275	235
	Cl. 300	720	720	620

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.

Tightening



Standard bolts must be well lubricated and tightened evenly around the flange 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		PN 63		PN 100	
mm	Inch	Nm	F/Lbs	Nm	F/Lbs	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	N/A	N/A	N/A	N/A
25	1"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	16	12	N/A	N/A	50	37
40	1½"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	34	25	N/A	N/A	100	74
50	2"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	46	34	90	66	140	103
65	2½"	10	7	N/A	N/A	25	18	N/A	N/A	34	25	64	47	110	81
80	3"	25	18	N/A	N/A	25	18	N/A	N/A	42	31	82	61	130	96
100	4"	25	18	N/A	N/A	25	18	N/A	N/A	72	53	136	100	190	140
125	5"	25	18	N/A	N/A	32	24	N/A	N/A	114	84	200	148	250	185
150	6"	25	18	N/A	N/A	50	37	N/A	N/A	144	106	275	203	210	155
200	8"	25	18	50	37	52	38	105	77	185	137	330	244	400	295
250	10"	25	18	50	37	88	65	160	118	300	221	500	369	550	406
300	12"	50	37	62	46	117	86	170	125	320	236	525	387	700	517
350	14"	50	37	60	44	120	89	240	177	450	332	750	554	1200	886
400	16"	50	37	88	65	170	125	330	244	650	480	1100	812	N/A	N/A
450	18"	56	41	92	68	170	125	320	236	570	421	N/A	N/A	N/A	N/A
500	20"	53	39	103	76	230	170	390	288	740	546	N/A	N/A	N/A	N/A
600	24"	81	60	161	119	350	258	560	413	1220	900	N/A	N/A	N/A	N/A
700	28"	100	74	200	148	304	224	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
800	32"	140	103	274	202	386	285	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
900	36"	172	127	288	213	408	301	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1000	40"	180	133	382	282	546	403	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1200	48"	252	186	395	292	731	539	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1400	54"	330	244	503	371	736	543	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1600	66"	380	280	684	505	913	674	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1800	72"	382	282	771	569	937	692	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2000	78"	432	319	867	640	1128	832	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

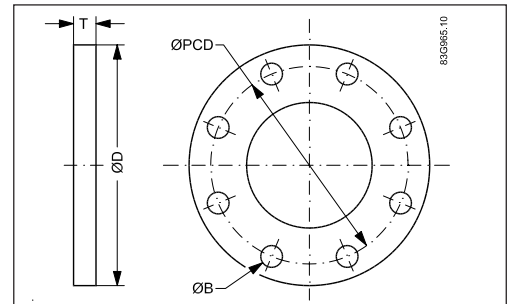
Torque calculations

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
700	895	840	30	30	24	M27
800	1015	950	32	33	24	M30
900	1115	1050	34	33	28	M30
1000	1230	1160	34	36	28	M33
1200	1455	1380	38	39	32	M36
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
700	910	840	36	36	24	M33
800	1025	950	38	39	24	M36
900	1125	1050	40	39	28	M36
1000	1255	1170	42	42	28	M39
1200	1485	1390	48	48	32	M45
PN 40						
25	115	85	16	14	4	M12
40	150	110	18	18	4	M16



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
AWWA						
700	927	864	33	35	28	M33
750	984	914	35	35	28	M33
800	1060	978	38	41	28	M39
900	1168	1086	41	41	32	M39
1000	1289	1200	41	41	36	M39
1050	1346	1257	44	41	36	M39
1200	1511	1422	48	41	44	M39

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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