



Flowmeter Series FLOMID FX

FLOMID FX Electromagnetic Flowmeter

Introduction

Modular design in two versions:

- Compact, sensor and electronics unit forming a single unit
- Separate, sensor and electronics separated, joined by a cable

Various possibilities of pipe fittings:

- Flange: DIN, ANSI, JIS norms etc.
- Sandwich: for DIN, ANSI, JIS norm flanges etc.
- Sanitary: DIN 11851 thread, ISO 2852 Clamp, SMS 1145 thread
- Sanitary welding: DIN 11850, ISO 2037 norms

Sensor liners PP, PTFE, PVDF & hard rubber
Electrodes in AISI-316L, Hastelloy C22 (UNS-06022),
Zirconium, Titanium
Exterior construction in AISI-316L

Benefits

- Flow rate measurement is independent of the flow profile
- Square wave ac magnetic field to avoid electrolysis
- Readings are independent of density, temperature, viscosity and pressure
- Absence of obstructing elements gives zero pressure loss and will allow the pass of solids
- Can be mounted in any position, provided that the pipe is always full
- Low power consumption
- Good stability with temperature and age
- No moving parts provides zero maintenance
- Can be installed with short straight pipe sections (5DN / 3DN)
- Good chemical resistance of construction materials
- All electronic control units for use with all sensors

Technical data FLOMID FX sensor

- Accuracy: $\pm 0.5\%$
- Working pressure: PN16 standard,
on demand up to PN250
- Complying according to DIN, ANSI, JIS, Sanitary
- DN3...DN500
- Working temperature:
 - PP, -10...+80°C
 - PTFE, PVDF, -20...+120°C
 - Hard rubber, -20...+90°C
 (temperatures for sensor with separated electronics)



Measurement Principle

The measurement principle is based on FARADAY'S induction law. A conductive liquid ($>5\mu\text{S}/\text{cm}$) creates a voltage T_m when flowing in a pipe of diameter D , at an average velocity of V_m , through a magnetic field B (which is perpendicular to the flow direction). This voltage is proportional to the velocity of the liquid. Two electrodes, mounted perpendicular to the magnetic field inside the pipe, transmit the voltage T_m to the control unit.

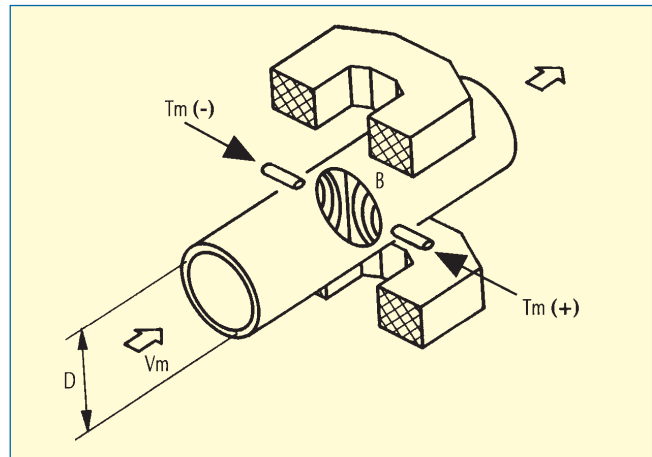
$$T_m = B \times V_m \times D$$

T_m = Voltage across the electrodes

V_m = Liquid velocity

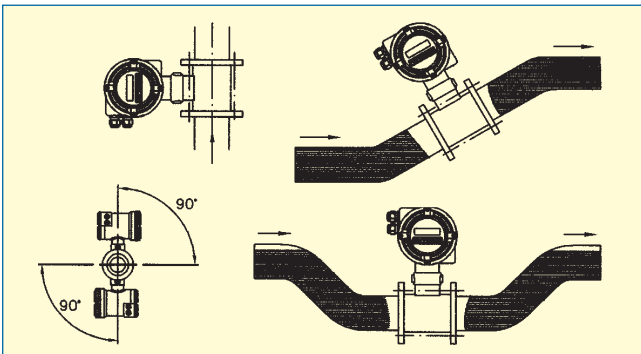
B = Magnetic field strength

D = Pipe diameter



Basic Installation Recommendations

For the mechanical installation the most important factor to be taken into consideration is that the pipe must always be full and the electrodes in contact with the liquid. To guarantee this, the metering body should be mounted with the electrodes in a horizontal plane and in a position so that the pipe will always be full, without air pockets.

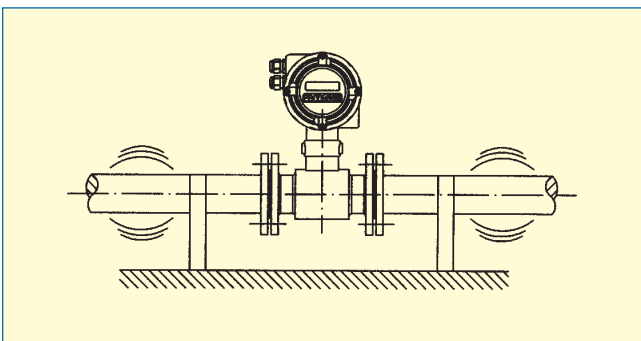


Vibration

Fasten the pipe before and after the sensor.

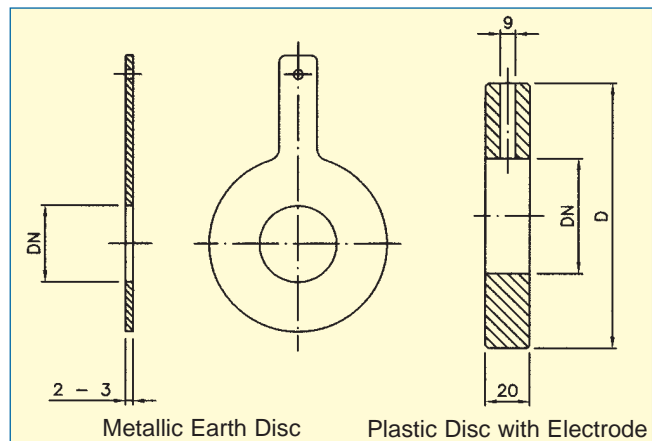
Caution: Excessive vibration will need separate mounting of sensor and electronics.

With free runs of piping over 10 m long, mechanical supports are recommended to minimize external forces.



In installations where strong axial ground currents can be found, the earth connections should have at least 50 mm^2 in contact with the liquid.

Mixtures of different liquids. The sensor should be installed a minimum of 30DN from the point of mixture to avoid unstabilities in the readings.



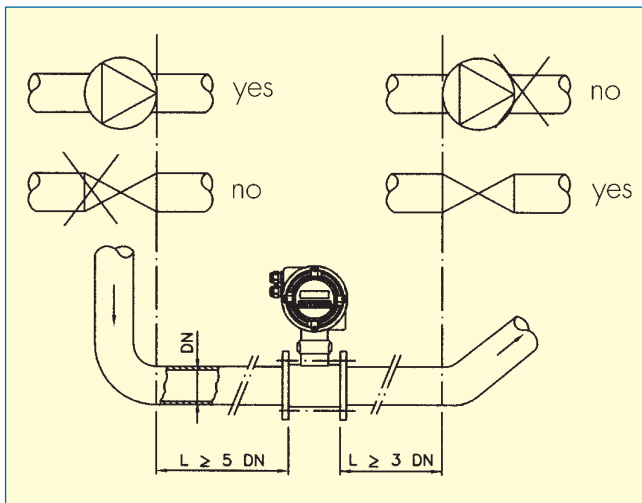
A good earth connection between the measuring body and the liquid can be considered as the most important factor for the correct working of the unit. In the event that the pipe is made of electrically conductive material, just connect the two earth wires to the pipe flanges, one to each side of the instrument body. If the inside of the pipe is plastic (or of any other non-conductive material) two earth discs and two more rubber washers, one on each side of the body, must be installed and the earth wires connected to the earth discs. This earth should be only used for the measuring body, do not connect other equipment to it since electrical interferences may cause problems.

Straight sections of pipe are necessary for the correct working of the flowmeter. Curves, pipe reductions, control elements and pumps should be at least 5 DN upstream and 3 DN downstream from the flowmeter.

Valves should be downstream from the flowmeter to keep the pipe full and to avoid vacuums which can damage the flowmeter liner.

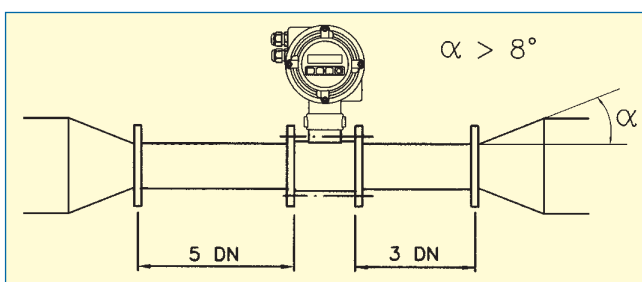
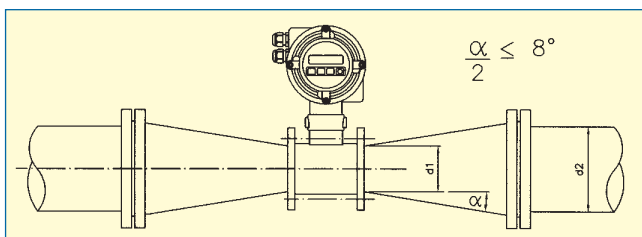
Pumps should be upstream from the flowmeter to avoid vacuums.

When installing near curves, control elements and pumps, a minimum straight section of pipe must be installed before and after these elements (Minimum 5 DN before and 3 DN after).

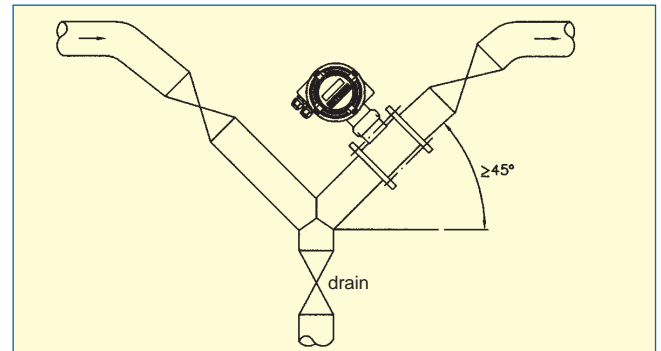


Pressure loss when reducing the pipe diameter

In installations where, due to the low flow rate, it is necessary to reduce the pipe diameter to be able to install a flowmeter with a nominal diameter less than the pipe diameter, this should be done using a reduction cone with an angle of less than 8° in order to avoid turbulences which can give false readings.

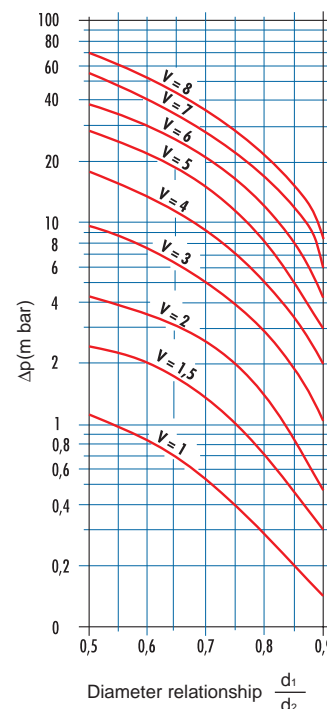
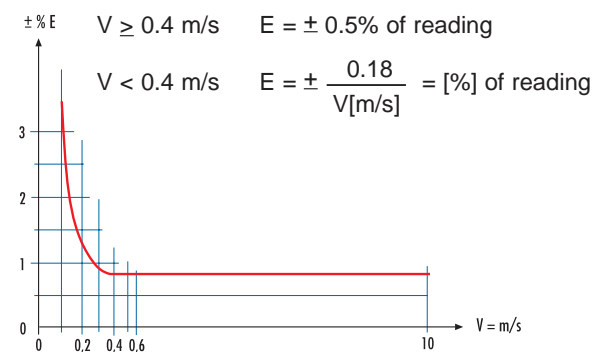


For abrasive liquids or liquids with particles in suspension, it is recommended to mount the flowmeter in a rising pipe. For a horizontal pipe the installation can be made as in the following drawing with a valve system for cleaning.



Measuring Precision (DIN 19200)

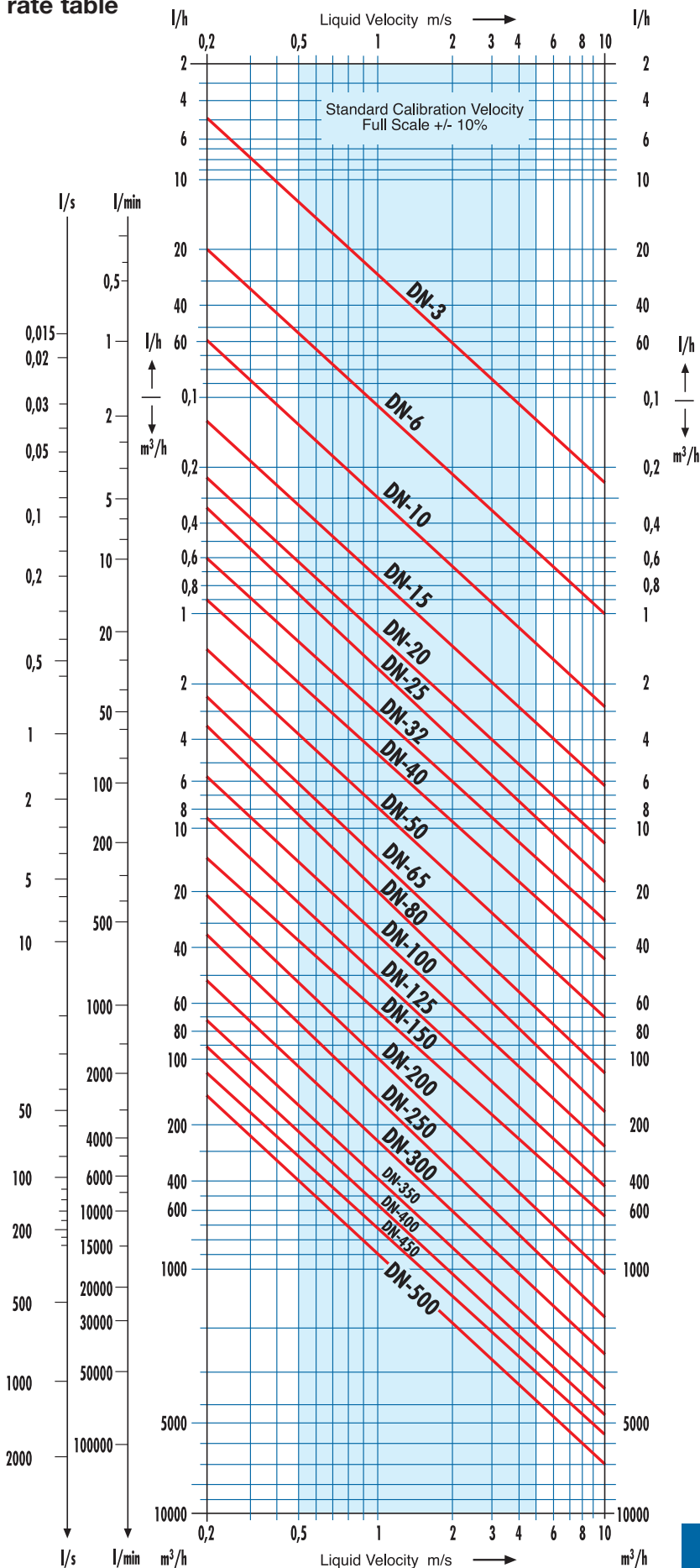
Ambient temperature	20°C ± 2°C
Liquid temperature	20°C ± 2°C
Power supply	± 1%
Heat up time	30 min.
Minimum straight pipe	10 DN y 5 DN



The graph shows the pressure loss (ΔP) for water at different velocities and pipe reductions.



Flow rate table



Metering body selection

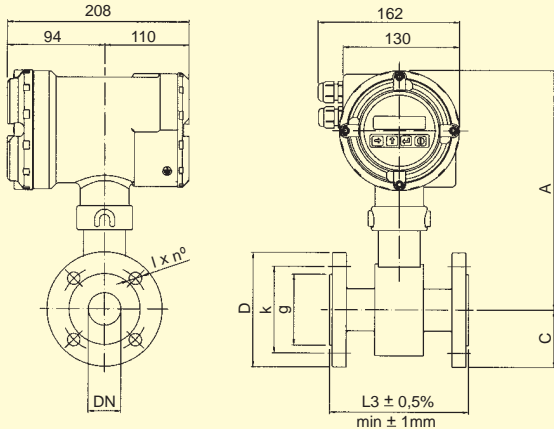
The diagram shows the relation between the liquid speed and the flow rate for different body sizes. The metering body diameter should be chosen to obtain a maximum normal working liquid velocity of about 3-4 m/s. The minimum working liquid velocity should not be below 0.5 m/s.

A recommended working liquid velocity is between 1 and 3 m/s. When the liquid has solids in suspension, it is better to work between 3 and 5 m/s to avoid sedimentation in the pipe and metering body.

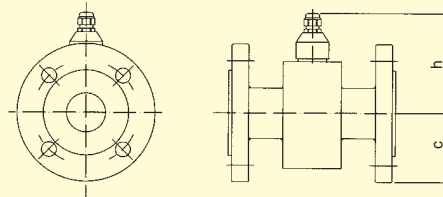
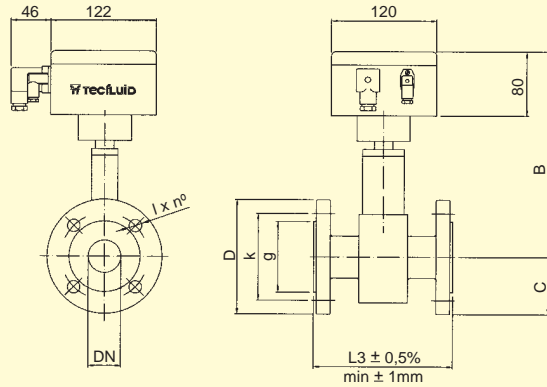


DIN, ANSI Flanges **FLOMID 2 FX / FLOMID 4 FX**

MX Compact electronics

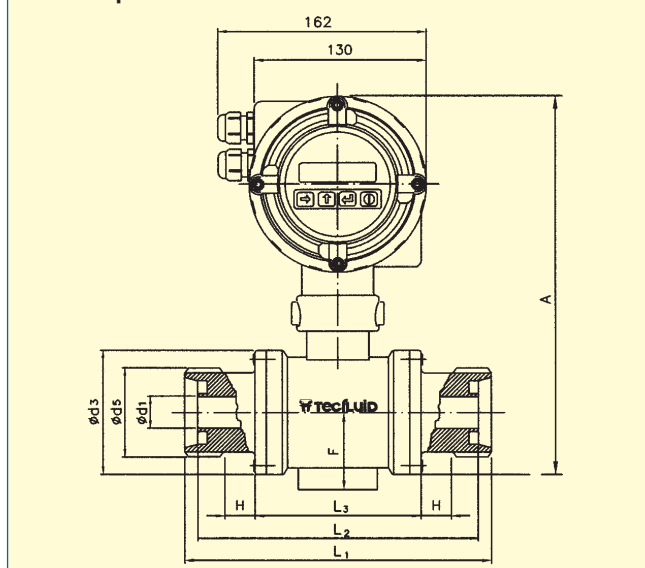


MCX Compact electronics

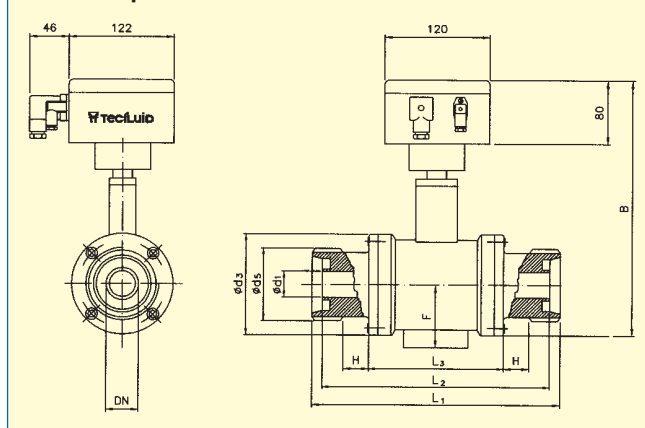
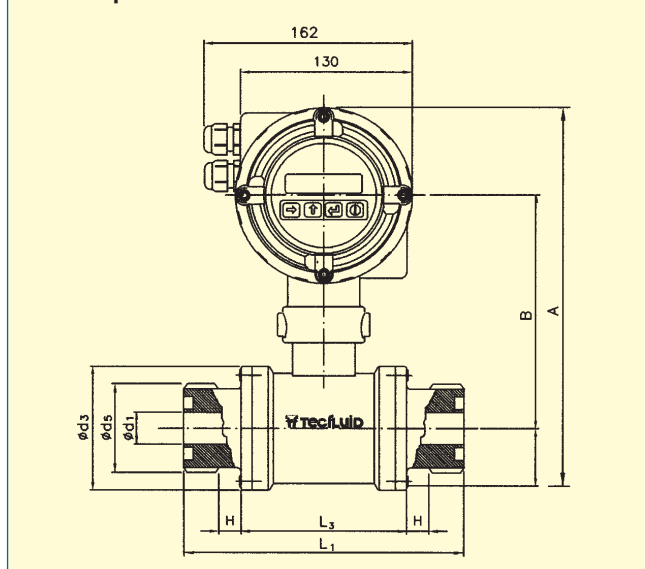


FX Sensor (Separate electronics)

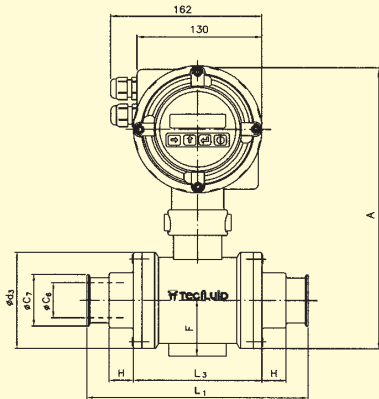
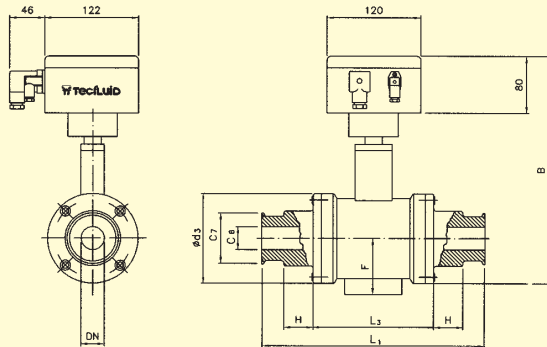
FLANGES mm (inch)				DIMENSIONS mm (inch)											Weight kg	
DIN 2632-2635		ANSI B16.5		A	B	L	D	K	g	1xn°	h	D	K	g		1xn°
DN	PN (bar)	DN	PN (lbs)	mm	mm (inches)	mm	DIN	DIN	DIN	DIN	DIN	ANSI	ANSI	ANSI		ANSI
1-10	16	3/8"	150	285 (11,2)	235 (9,3)	150 (5,90)	90	60	40	14x4	205 (8,1)	88,9				4,5 (9,92)
15	16	1/2"	150	285 (11,2)	235 (9,3)	150 (5,90)	95	65	45	14x4	205 (8,1)	88,9	60,3	34,9	16x4	4,8 (10,60)
20	16	3/4"	150	285 (11,2)	235 (9,3)	150 (5,90)	105	75	58	14x4	205 (8,1)	98,4	69,8	42,9	16x4	6 (13,22)
25	16	1"	150	285 (11,2)	235 (9,3)	150 (5,90)	115	85	68	14x4	205 (8,1)	107,9	79,4	50,8	16x4	7,5 (16,53)
32	16	1 1/4"	150	330 (13,0)	280 (11,1)	150 (5,90)	140	100	78	18x4	250 (9,9)	117,5	88,9	63,5	16x4	8 (17,63)
40	16	1 1/2"	150	330 (13,0)	280 (11,1)	150 (5,90)	150	110	88	18x4	250 (9,9)	127,5	98,4	73	16x4	8,5 (18,74)
50	16	2"	150	347 (13,6)	297 (11,7)	200 (7,87)	165	125	102	18x4	267 (10,5)	152,4	120,6	92,1	19x4	10 (22,05)
65	16	2 1/2"	150	367 (14,5)	317 (12,5)	200 (7,87)	185	145	122	18x4	287 (11,3)	177,8	139,7	104,8	19x4	11 (24,25)
80	16	3"	150	367 (14,5)	317 (12,5)	200 (7,87)	200	160	138	18x4	287 (11,3)	190,5	152,4	127	19x4	12,5 (27,55)
100	16	4"	150	418 (16,4)	368 (14,5)	250 (9,84)	220	180	158	18x4	338 (13,3)	228,6	190,5	157,2	19x8	15 (33,06)
125	16	5"	150	443 (17,4)	393 (15,5)	250 (9,84)	250	210	188	18x4	363 (14,3)	254	215,9	185,7	23x8	18,5 (40,78)
150	16	6"	150	473 (18,6)	423 (16,7)	300 (11,81)	285	240	212	22x8	393 (15,5)	279,4	241,3	215,9	23x8	20,6 (45,41)
200	10	8"	150	523 (20,6)	473 (18,6)	350 (13,77)	340	295	268	22x8	443 (17,5)	342,9	298,4	269,9	23x8	32 (70,54)
250	10	10"	150	575 (22,6)	525 (20,7)	400 (15,74)	395	350	320	22x8	495 (19,5)	406,4	361,9	323,8	25x12	45 (99,20)
300	10	12"	150	621 (24,5)	571 (22,5)	500 (19,68)	445	400	370	22x8	541 (21,3)	482,6	431,8	381	25x12	52 (114,63)
350	10	14"	150	671 (26,4)	621 (24,5)	500 (19,69)	505	460	430	22x8	591 (23,3)	533,4	476,2	412,7	30x12	62 (136,68)
400	10	16"	150	721 (28,4)	671 (26,4)	600 (23,62)	565	515	482	26x16	641 (25,3)	596,9	539,7	469,9	30x16	76 (167,54)
500	10	18"	150	825 (32,5)	775 (30,5)	600 (23,62)	670	620	585	26x20	745 (29,4)	635	577,8	533,4	33x16	98 (216,04)

DIN 11851
FLOMID 1 FX
MX Compact electronics

DIN 11851
FLOMID 1 FX

DN	10	15	20	25	32	40	50	65	80	100
NW $\varnothing d_1$	10	16	20	26	32	38	50	66	81	100
$\varnothing d_5$	Rd 28 x 1/8"	Rd 34 x 1/8"	Rd 34 x 1/6"	Rd 52 x 1/6"	Rd 58 x 1/6"	Rd 65 x 1/6"	Rd 78 x 1/6"	Rd 95 x 1/6"	Rd 110 x 1/4"	Rd 130 x 1/4"
H	28	28	28	29	29	29	29	31	27	28
$\varnothing d_3$	60	64	70	80	90	100	114	144	160	180
A	268	272	275	280	286	290	300	310	318	328
L_1		200		220		240		280		330
L_2		192	188	206		226		264		310
L_3		120		134		154		186		234
F	45	48	54	-	-	-	-	-	-	-

FLOMID 1...3 FX
MXC Compact electronics

ISO 2853
FLOMID 3 FX
MX Compact electronics

ISO 2853
FLOMID 3 FX

DN	25	32	38	51	63,5	76
NW $\varnothing d_1$	22,5	29,5	35,5	48,5	60,5	72,9
$\varnothing d_5$	Rd 40 x 1/6"	Rd 48 x 1/6"	Rd 60 x 1/6"	Rd 70 x 1/6"	Rd 85 x 1/6"	Rd 98 x 1/6"
H	25	25	25	25	25	25
$\varnothing d_3$	80	90	100	114	144	160
A	280	286	290	300	310	318
L_1		220		240		280
L_2		134		154		186
Equival. DIN-DN	25	32	40	50	65	80

CLAMP ISO 2852:1993
FLOMID 6 FX
MX Compact electronics

MCX Compact electronics

CLAMP ISO 2852 : 1993
FLOMID 6 FX

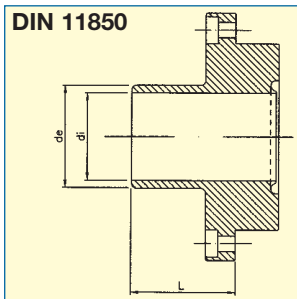
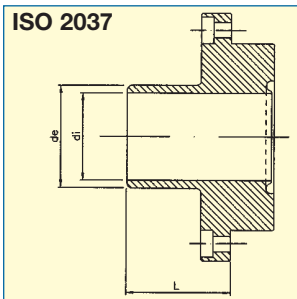
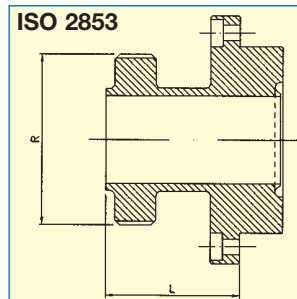
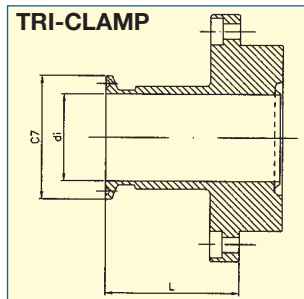
Coupling dimensions	-	-	1/2"	-	-	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
Equival. DIN-DN	6	6	10	15	20	25	32	40	50	65	80	100
pipe outside ø	8	12	12,7	17,2	21,3	25	33,7	38	51	63,5	76,1	101,6
Ø C ₆	6	10	10,7	15,2	19,3	22,6	31,3	35,6	48,6	60,3	72,9	97,6
Ø C ₇	34	34	34	34	34	50,5	50,5	50,5	64	77,5	91	119
H	30	30	30	30	30	31	31	31	31	34	34	34
Ø d ₃	60	60	60	64	70	80	90	100	114	144	160	180
A	268	268	268	272	275	280	286	290	300	310	318	328
L ₃			120			134		154		186		234
L ₁			200			220		240		280		330
F	45	45	45	48	54	-	-	-	-	-	-	-


DIN 11850
FLOMID D10 FX

DN	10	15	25	40	50	65	80
d _e	12(0,47)	18(0,71)	40(1,57)	52(2,05)	68(2,03)	83(3,27)	83(3,27)
d _i	10(0,39)	16(0,63)	26(1,02)	38(1,50)	50(1,97)	66(2,60)	81(3,19)
L	50(2)		63(2,48)			60(2,36)	

ISO 2853
FLOMID I38 FX

DN	15	20	25	40	50	65	80
R	1/2"	3/4"	1"	1 1/2"	2"	2 1/2"	3"
L	50(2)		63(2,48)			60(2,36)	

DIN 11850

ISO 2037

ISO 2853

TRI-CLAMP

ISO 2037
FLOMID I70 FX

DN	10	15	25	40	50	65	80
d _e	12(0,47)	18(0,71)	25,6(1,01)	38,6(1,52)	51,6(2,03)	64,1(2,52)	76,6(3,02)
d _i	10(0,39)	16(0,63)	22,6(0,89)	35,6(1,40)	48,6(1,97)	60,3(2,37)	72,9(2,87)
L	50(2)		63(2,48)			60(2,36)	

TRI-CLAMP
FLOMID D30 FX

DN	25	40	50	65	80	100
C ₇	50,4	50,4	64	77,8	91	119
d _i	22,1	34,8	47,5	60,2	72,9	97,4
L	63(2,48)			60(2,36)		

*The rest of the dimensions as with FLOMID 1 (page 7)
() dimensions in inches

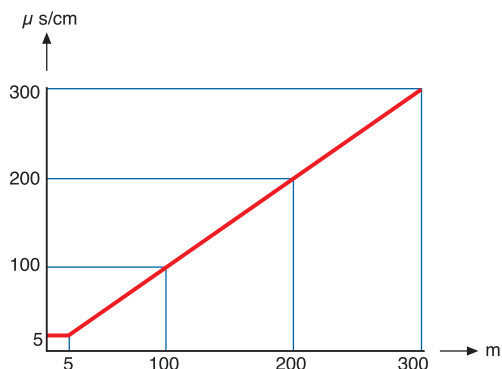
Liner materials. Temperature, Pressure and Vacuum (20°C reference temperature)

DN	PTFE				PTFE / PVDF				PP				EBONITA			
	Flomid 2 FX, Flomid 4 FX				Flomid 0 FX Flomid 1, 3, 5, 7 FX				Flomid 0 FX				Flomid 2 FX, Flomid 4 FX			
	PN		Vacuum ⁽¹⁾		PN		Vacuum ⁽¹⁾		PN		Vacuum ⁽¹⁾		PN		Vacuum ⁽¹⁾	
	DIN2501 ⁽³⁾	ANSI B 16.5 ⁽⁴⁾	mbar	psi	DIN2501	ANSI B 16.5	mbar	psi	DIN2501	ANSI B 16.5	mbar	psi	DIN2501	ANSI B 16.5	mbar	psi
3			0	0												
6																
10	16 > 40	150 > 300	∇	∇	16	150 > 300	∇	∇	16	150 > 300	∇	∇				
15							500	7,5				600	9			
20			0	0												
25			80	1,2											100	1,5
32	16 > 40	150 > 300	∇	∇	16	150 > 300	100	1,5	16	150 > 300	180	2,7	16 > 40	150 > 300	∇	∇
40							∇	∇			∇	∇				
50			500	7,5			600	9			700	10,5			200	3
65	16 > 40	150 > 300	150	2,2	16	150 > 300	150	2,2	16	150 > 300	200	3	16 > 40	150 > 300	120	1,8
80			∇	∇			∇	∇			∇	∇			∇	∇
			650	9,7			700	10,5			800	12			250	3,7
100			250	3,7			300	4,5			380	5,7			280	4,2
			∇	∇			∇	∇			∇	∇				
125	16	150	750	11,2	10	150 > 300	800	12	10	150 > 300	900	13,5	10	150	∇	∇
	∇		450	6,7			480	7,2			650	9,7	∇			
			∇	∇			∇	∇			∇	∇				
150	40		800	12			900	13,5			1000	15	40		400	6
200			450	6,7											250	3,75
			∇	∇												
			900	13,5												
250			500	7,5												
	10	150	∇	∇									10	150		
			∇	∇												
300	∇		1000	15									∇		450	6,7
350			750	11,2											500	7,5
400			∇	∇											∇	∇
500	40		1000	15									40		600	9
Max. Temp.	-20...+120°C (-4...+248°F)				-20...+120°C (-4...+248°F)				-10...+80°C (14...+176°F)				-20...+90°C (14...+194°F)			
Limit ⁽²⁾	130°C (266°F)				130°C (266°F)				—				—			

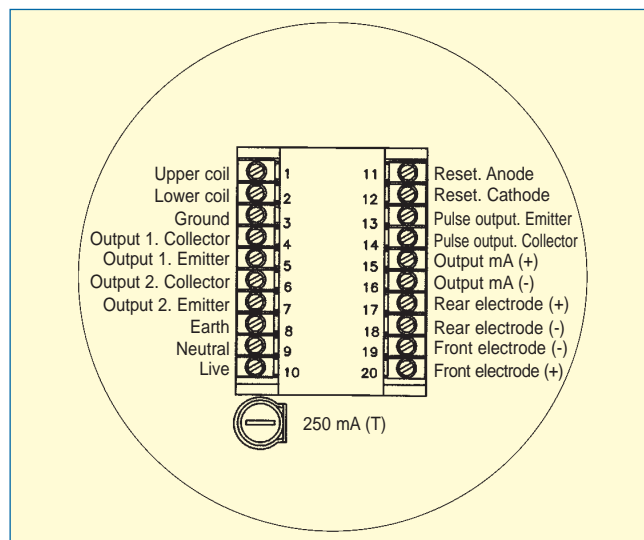
(1) In mbar absolute 40°C and 80°C reference temperature
 (2) Maximum 30'. On order up to 180°C and PN200

(3) bar
 (4) lbs

Wiring



- Wire for separate electronics:
 PAR-POS 2 x 2 x 0.34 (recommended)



Electronic Control Units

Different models of electronic control units are available to comply with the options of flow indication, maximum/minimum flow rate controls, analog outputs, pulse outputs or flow switches. All are compatible with the different Flomid FX sensor models.

For compact mounting directly on the sensor

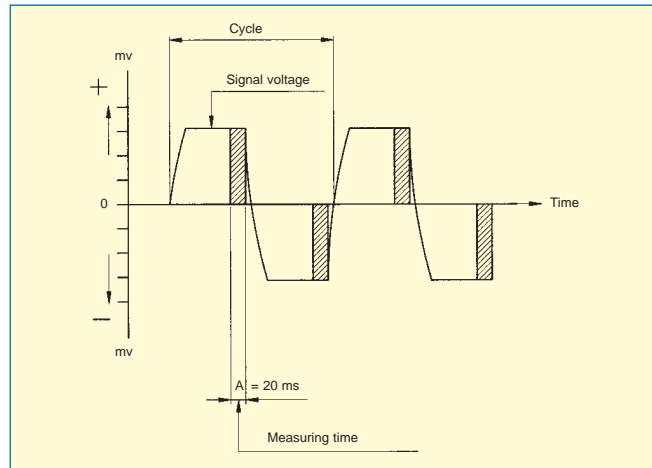
- Series MX, with local indication, signal, mA and pulse outputs
- Series MCX/T ... FT ... FI, without local indication, with analog output and/or pulse output

For wall and pipe bracket mounting

- Series MX (Local Indication) - M* ... T*
- Series MCX (Without Local Indication) - M* ... T*

*M = wall mounting

*T = pipe mounting



Note: There is no difference between the compact and the separated electronics except for the M or T accessory (supplied for its mounting on a wall or on a pipe), and for the cable for its connection to the sensor.

Electronic Technical Data

Series MX (Compact) and Series MX-M, MX-T (Separated)

- Plastic coated (Polyamide 11) injected aluminium housing. IP 67 degree of protection
- Programming via front tactile pushbuttons
- Totalising and partial volume counters
- Programmable batching volume with remote input for starting
- Magnetic field: 6.25 Hz square wave for 50 Hz mains
7.5 Hz square wave for 60 Hz mains
- Mains supply: 12 V, 24 V, 110 V, 120 V, 220 V, 240 V ac, $\pm 10\%$, 50 or 60 Hz
24 Vdc
(others on demand)
- Power consumption: <10 VA
- Min. Flowrate cut off: Programmable
- Measuring range: 0...10 m/s
- Display: 16 character x 2 lines LCD
6 languages to be selected.
Program for auto-edition of other languages
- Flowrate indication: User programmable measuring units
- Analog output: 4...20 mA programmable
- Programmable pulse output mode:
Flowrate x Pulses/unit volume < 2 pulses/s
- Programmable frequency output mode: 10..1000 Hz
- Logic outputs: Two programmable outputs for flowrate alarms, empty pipe detection, flow direction or batching

- Adaptive flowrate filter: Integration time programmable
0.1 ... 25.5 seconds
Filter reset window programmable
- Linearity: 0.1%
- Zero drift: 0.05%
- Temperature drift: 0.015% / °C
- Working ambient temperature range: -10 ...+60°C



The MCX Series are a reliable and economical solution for a majority of industrial processes that require specific controls such as:

- **Analog transmitters & pulse output (MCX/T)**
Output to panel indicators, control units, automats, etc.
- **Analog transmitter with fast response (MCX/FT)**
For applications that require very fast response times.
- **Pulse transmitter with fast response (MCX/FI)**
For batching processes that require very fast response times.

Compact electronics MCX/T ... FT ...FI
 Separate electronics MCX/T ... M/T*
 MCX/FT ... M/T*
 MCX/FI ... M/T*

*M = wall mounting

*T = pipe mounting

FLOMID MCX/T, MCX/FT & MCX/FI



Note: There is no difference between the compact and the separated electronics except for the M or T accessory (supplied for its mounting on a wall or on a pipe), and for the cable for its connection to the sensor.

Transmitters Technical Characteristics

	Electronic control model		
	FLOMID MCX/T	FLOMID MCX/FT	FLOMID MCX/FI
IP-65 housing (polyamide 11 plastic covered)	yes	yes	yes
Galvanic separation between sensor and outputs	yes	no	yes/no
Flow direction selected by jumpers	yes	yes	yes
Magnetic Field			
Square wave 6.25 Hz at 50 Hz mains	yes	no	no
Square wave 7.5 Hz at 60 Hz	yes	no	no
Square wave 12.5 Hz at 50 Hz	no	yes	yes
Square wave 15 Hz at 60 Hz	no	yes	yes
Response time (ms)	≈ 2500 ms	200 ms	200 ms
Power supply ±10%	yes	yes	yes
12 V, 24 V, 110 V, 120 V, 220 V, 240 V at 50 & 60 Hz	confirm with the order	confirm with the order	confirm with the order
Analog output	yes	yes	-
0-5 V, 0-10 V, 1-5 V, 2-10 V, 0...4-20 mA	confirm with the order	confirm with the order	-
Standard pulse output	0...100 Hz / 0...1000 Hz	no	-
1, 10, 100 p/l (others on demand)	-	-	yes
Measuring range	0,15...10 m/s	0,15...10 m/s	0,15...10 m/s
3 full scale ranges selectable by jumpers	no	0-100 % f.s.v* 0-50 % f.s.v* 0-25 % f.s.v*	no
Minimum flowrate (3% of nominal full scale value at 5 m/s)	0,15 m/s	0,15 m/s	0,15 m/s
Linearity	0,3 %	0,3 %	0,3 %
Zero drift	0,15 %	0,15 %	0,15 %
Working ambient temp. range	-10 +60°C	-10 +60°C	-10 +60°C
Temperature drift	0,015 % / °C	0,015 % / °C	0,015 % / °C

* Full scale



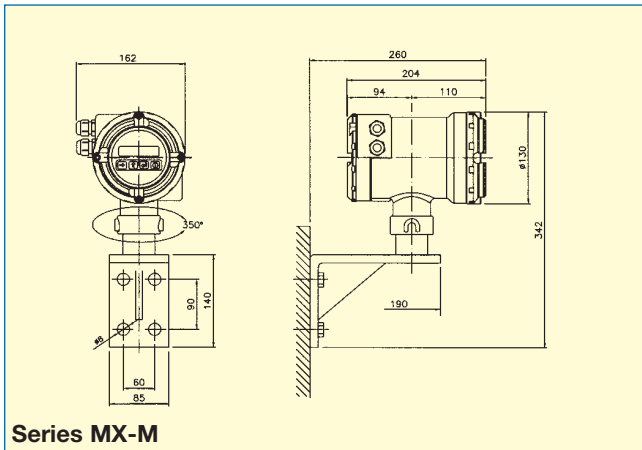
MCX/T-M...T, MCX/FT-M...T, MCX/FI-M...T
(Separate electronics)



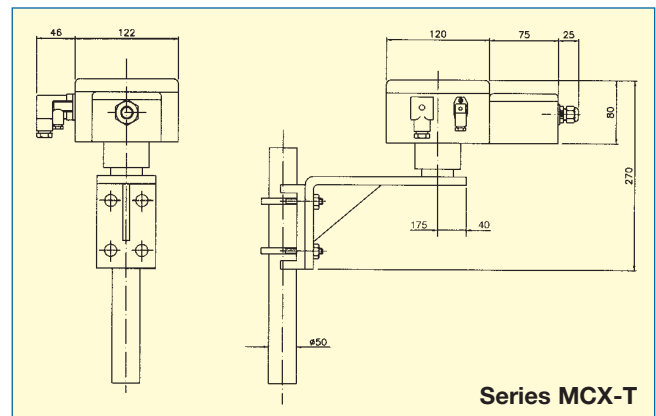
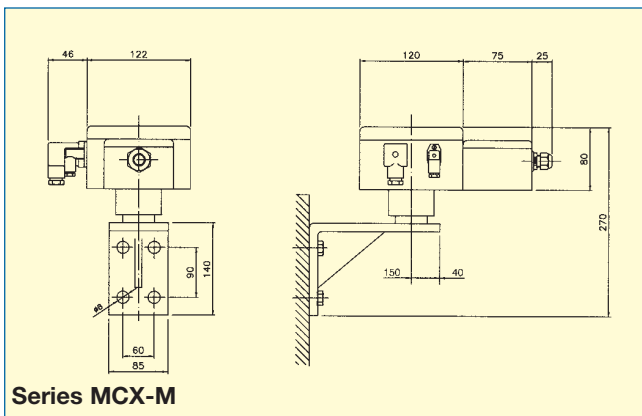
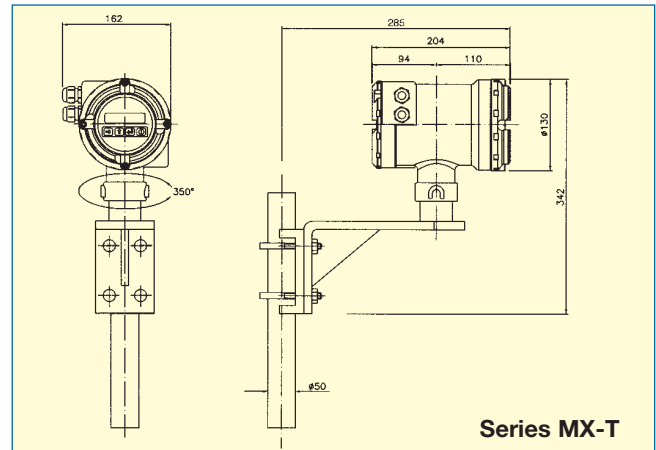
Flomid MCX/T, MCX/FT, MCX/FI
(Compact electronics)



Wall Mounting Electronics



Pipe Mounting Electronics



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Data in this pamphlet is subject to modification without notification, if the technical innovations in the product or manufacturing processes so require.