

FLOMAT Electromagnetic Insertion Flowmeter:

Introduction

For use in large diameter pipes or open channels as an economical solution for liquid metering.

Flow rate for liquids with electrical conductivity better than 20 $\mu\text{S}/\text{cm}$, for example:

- Water treatment
- Sewage treatment
- Acid, neutral or alkaline solutions
- Chemical and pharmaceutical products

Suitable for use at low and medium temperatures.

The body is constructed in stainless steel AISI 316, on request available in PVDF wetted parts with electrodes in Hastelloy C, Zirconium, Titanium.

Benefits

- Readings are independent of density, temperature, viscosity and pressure.
- Alternating magnetic field for metering avoids electrolysis.
- Absence of obstructing elements gives low 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 (10 DN / 5DN).
- Good chemical resistance of construction materials.

Metering Body Technical Data

- Rating Pressure (bar)
PN 16
- Liquid Temperature range
PVDF Head -20 °C.....+130 °C
- Electrodes
Standard Hastelloy C
Special Order Titanium, Zirconium



- Field coil current 130 mA 6.25 / 7.5 Hz
- Liquid Conductivity > 20 $\mu\text{S} / \text{cm}$
- Accuracy $\pm 3,5\%$

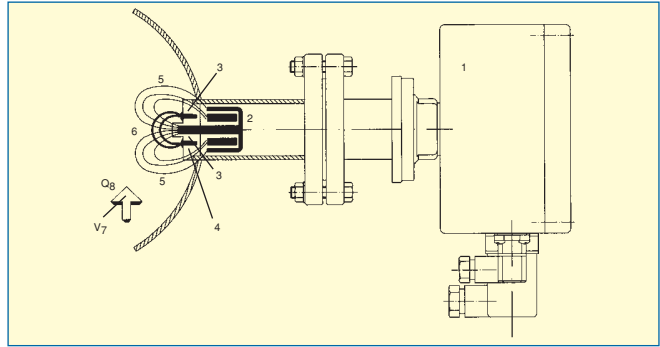
NOTE:

For temperatures above 70 °C it may be necessary to separate the control unit from the metering body, depending on air temperature and ventilation of the control unit.

Measurement Principle

The Flomat electromagnetic insertion flowmeter consists of a sensor which generates a magnetic field in the liquid to measure. The conductive liquids, as they flow through the magnetic field (5), generate a voltage E_6 (6) between the electrodes (3) which is proportional to the liquid velocity (V_7). The generated voltage is processed by the microprocessor electronic circuit (1) to give outputs of mA or Hz proportional to the flow rate (Q_6).

$$Q_6 = K \cdot V_7 \cdot E_6$$



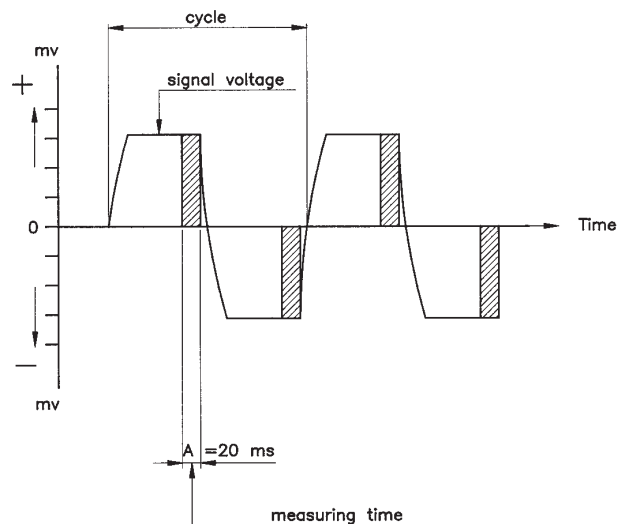
FLOMAT/MC

The standard microprocessor control unit that will adapt to all Flomid & Flomat measuring bodies is designed to cover most industrial process requirements.

For Flomat measuring bodies it is always supplied in separate mounting version.

Technical Data

- Housing : IP-65 protected in coated aluminium (polyamide 11).
- Magnetic push buttons operated from the exterior.
- Batching relay with partial and total volume counter.
- Remote push button for batching.
- Galvanic separation between measuring body and all outputs.
- Automatic switch over for flow direction.
- Magnetic Field : 6.25 Hz square wave for 50 Hz mains (7.5 Hz for 60 Hz mains).
- Mains supply : 12 V, 24 V, 110 V, 120 V, 220 V, 240 V $\pm 10\%$ 50 or 60 Hz
Consult factory for other options. Specify voltage and frequency when ordering.
Power consumption : < 10 VA
- Minimum flow rate : 0.15 m/s (3% nominal Q_{nom} at 5 m/s) indicated by LED pilot light.
- Measuring range : 0.15 m/s 7 m/s
- Display : 16 character x 2 lines LCD (back light optional).
Selection of 6 working display formats.
- Flow rate indication in m³/h.
- Totalising volume counter up to 100,000,000 m³.
- Batching relay : programmable in m³ with partial volume counter.
- Analog output : programmable voltage (4 ranges) and current (0-20 mA and 4-20 mA).
- Pulse output : programmable 0.001 Hz 10,000 Hz
- Alarms: Two relays programmable to act as flow rate alarms or as empty pipe and flow direction alarms.



- Adaptive filter : integration time programmable 0.1 25.5 s
- RS 232 C baud rates : programmable 300, 600, 1200, 2400, 4800, 9600, 19200
- Linearity : 0.1 %
- Zero drift : 0.05%
- Temperature drift 0.015% / °C
- Working Temperature -10 °C..... + 60 °C

Control Units FLOMAT MC/T, MC/FT & MC/S

The **MC** series of microprocessor control units have available economical solutions to cover most industrial processes which require specific solutions, such as:

- The **FLOMAT MC/T**, is an analog transmitter. (mA & Hz.without local indication) for flow rate transmission applications to panel meters, control units such as automats & PLC's.
- The **FLOMAT MC/FT**, is a fast analog transmitter. (mA , without local indication) for analog flow rate control applications which need a fast response time.
- The **FLOMAT MC/S** is a flow switch. (Without local indication) for flow detection, max. or min, alarms etc. with a relay output.

This series of instruments can be supplied in two basic mounting options:

- Compact version in which the electronics housing is mounted directly on the FLOMAT metering body.
- Separate version in which the electronics housing is mounted separate from the FLOMAT metering body with 2 m of cable.

FLOMAT MC/T (Analog & Frequency output)

Technical Data

- Housing : IP-65 protected in coated aluminium (polyamide 11).
- Galvanic separation between measuring body and outputs.
- Selectable flow direction (by means of jumpers).
- Magnetic Field : 6.25 Hz square wave for 50 Hz mains (7.5 Hz for 60 Hz mains).
- Mains supply : 12 V, 24 V, 110 V, 120 V, 220 V, 240 V $\pm 10\%$ 50 or 60 Hz
Consult factory for other options. Specify voltage and frequency when ordering.
Power consumption : < 10 VA
- Minimum flow rate : 0.15 m/s (3% nominal Q_{nom} at 5 m/s).
- Measuring range : 0.15 m/s 10 m/s
- Analog output 0 - 5 V, 0 - 10 V, 1 - 5 V, 2 - 10 V
4 - 20 mA, 0 - 20 mA
- Output frequency 0....100 Hz standard.
- Linearity : 0.3 %
- Zero drift : 0.15%
- Temperature drift 0.015% /°C
- Working Temperature -10 °C..... + 60 °C
- Factory adjusted.



FLOMAT MC/FT (Fast Analog output)

Technical Data

- Housing : IP-65 protected in coated aluminium (polyamide 11).
- Without galvanic separation between measuring body and output.
- Selectable flow direction (by means of jumpers).
- Response time 200 ms.
- Magnetic Field : 12.5 Hz square wave for 50 Hz mains (15 Hz for 60 Hz mains).
- Mains supply : 12 V, 24 V, 110 V, 120 V, 220 V, 240 V $\pm 10\%$ 50 or 60 Hz
Consult factory for other options. Specify voltage and frequency when ordering.
Power consumption : < 10 VA
- Minimum flow rate : 0.15 m/s (3% nominal Q_{max} at 5 m/s).
- Measuring range : 0.15 m/s 10 m/s
- Analog outputs 0 - 5 V, 0 - 10 V, 1 - 5 V, 2 - 10 V
4 - 20 mA, 0 - 20 mA
- 3 output ranges 0-100%, 0-50% & 0-25% of full scale, by means of jumpers.
- Linearity : 0.3 %
- Zero drift : 0.15%
- Temperature drift 0.015% /°C
- Working Temperature -10 °C..... + 60 °C
- Factory adjusted.



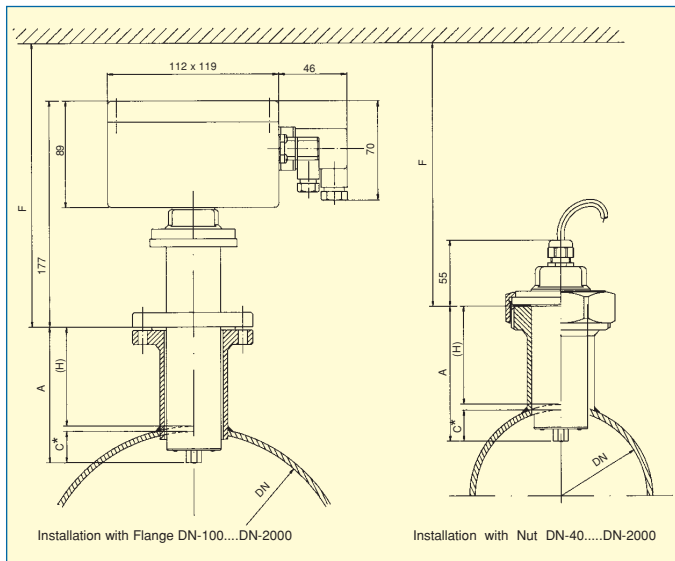
FLOMAT MC/S (Relay output)

Technical Data

- Housing : IP-65 protected in coated aluminium (polyamide 11).
- Automatic changeover for flow direction.
- Magnetic Field : 6.25 Hz square wave for 50 Hz mains (7.5 Hz for 60 Hz mains).
- Mains supply : 12 V, 24 V, 110 V, 120 V, 220 V, 240 V $\pm 10\%$ 50 or 60 Hz
Consult factory for other options. Specify voltage and frequency when ordering.
Power consumption : < 10 VA
- Minimum flow rate : 0.15 m/s (3% nominal Q_{max} at 5 m/s).
- Measuring range : 0.15 m/s 10 m/s
- Relay output , 1 A 250 V SPDT potential free contacts.
- Zero drift : 0.15%
- Temperature drift 0.015% /°C
- Working Temperature -10 °C..... + 60 °C
- Switch point selectable in 0,1 m/s steps.



Installation

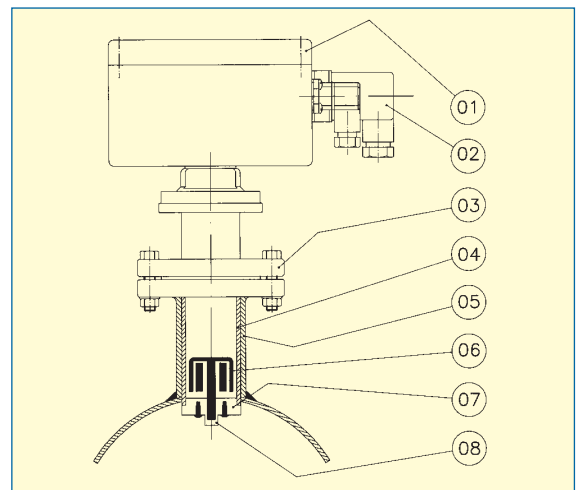


Dimensions in mm				F	
DN	A	C*	(H)	Flange	Nut
40...100	105	15...15	90...88		
125...300	105	19...45	82...53	300	180
350...400	105	52...60	46...32		
500...1000	210	75...150	125...50	400	280
1200...2000	360	180...300	168...40	550	430

*Approximately 15 % of DN

Sensor Construction

01	Electronics housing	Aluminium
02	Connectors	Plastic
03	Flange/BSP nut	AISI-316
04	Body	AISI-316
05	Mounting Insert	AISI-316
06	Field Coil	
07	Head	PVDF
08	Electrodes	Hastelloy C



Flow rate table in m³/h

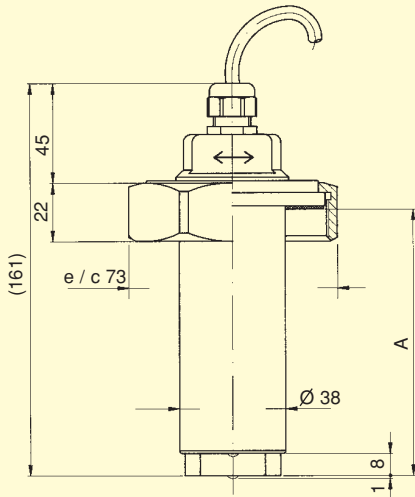
DN	Fluid speed m/s		
	0,5	5	10
100	14,1	141	282
125	22,1	221	442
150	31,8	318	636
200	56,5	565	1.131
225	71,5	715	1.431
250	88,3	883	1.767
300	127,2	1.272	2.544
350	173,2	1.732	3.463

DN	Fluid speed m/s		
	0,5	5	10
400	226,2	2.262	4.524
500	353,4	3.534	7.068
600	508,9	5.089	10.178
700	692,7	6.927	13.854
800	904,8	9.048	18.095
900	1.145,1	11.451	22.902
1000	1.413,7	14.137	28.274
1200	2.035,7	20.357	40.714

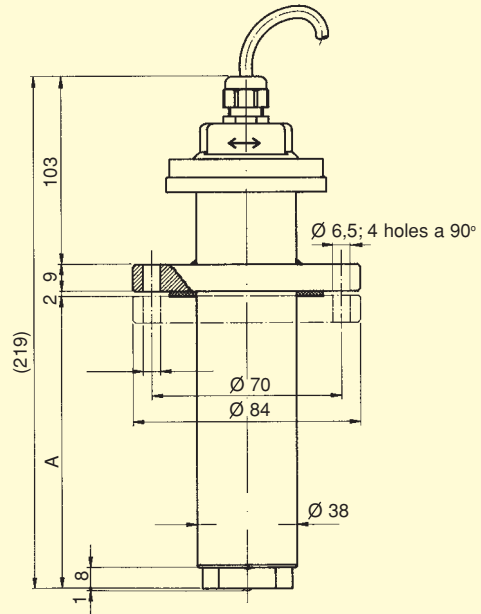
The electronics is normally supplied adjusted at 5 m/s full scale except the Flomat MC/S which is adjusted for 10 m/s full scale.

Dimensions and weights

Remote Version Mounting

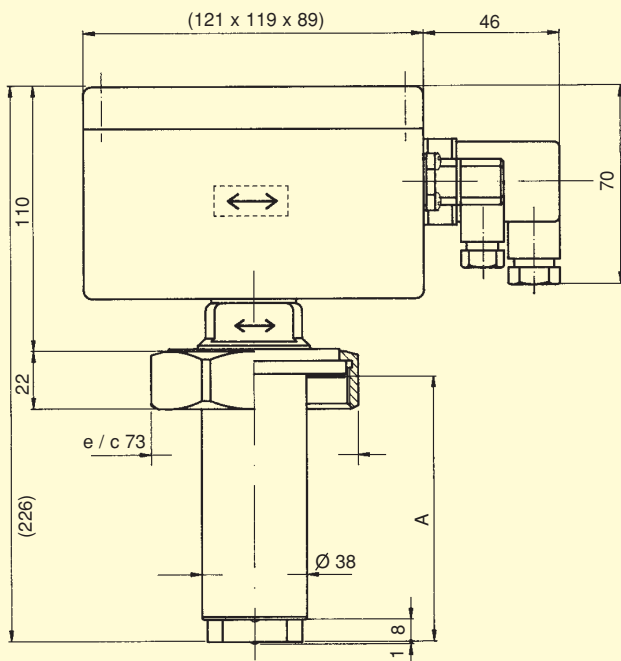


2 1/4 " BSP thread
(Others on demand)
Weight 0,9 Kg

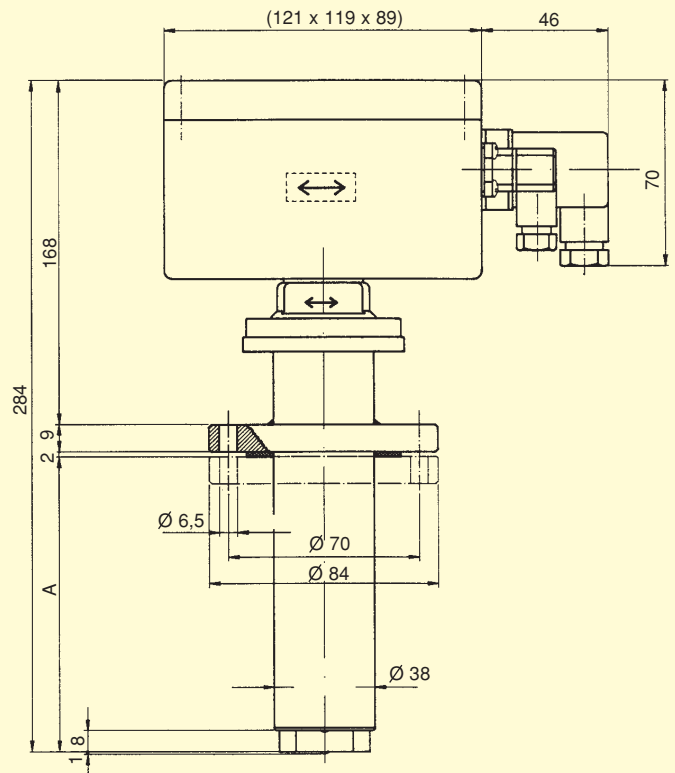


Standard flanged version
(Others on demand)
Weight 1,5 Kg

Compact Version Mounting



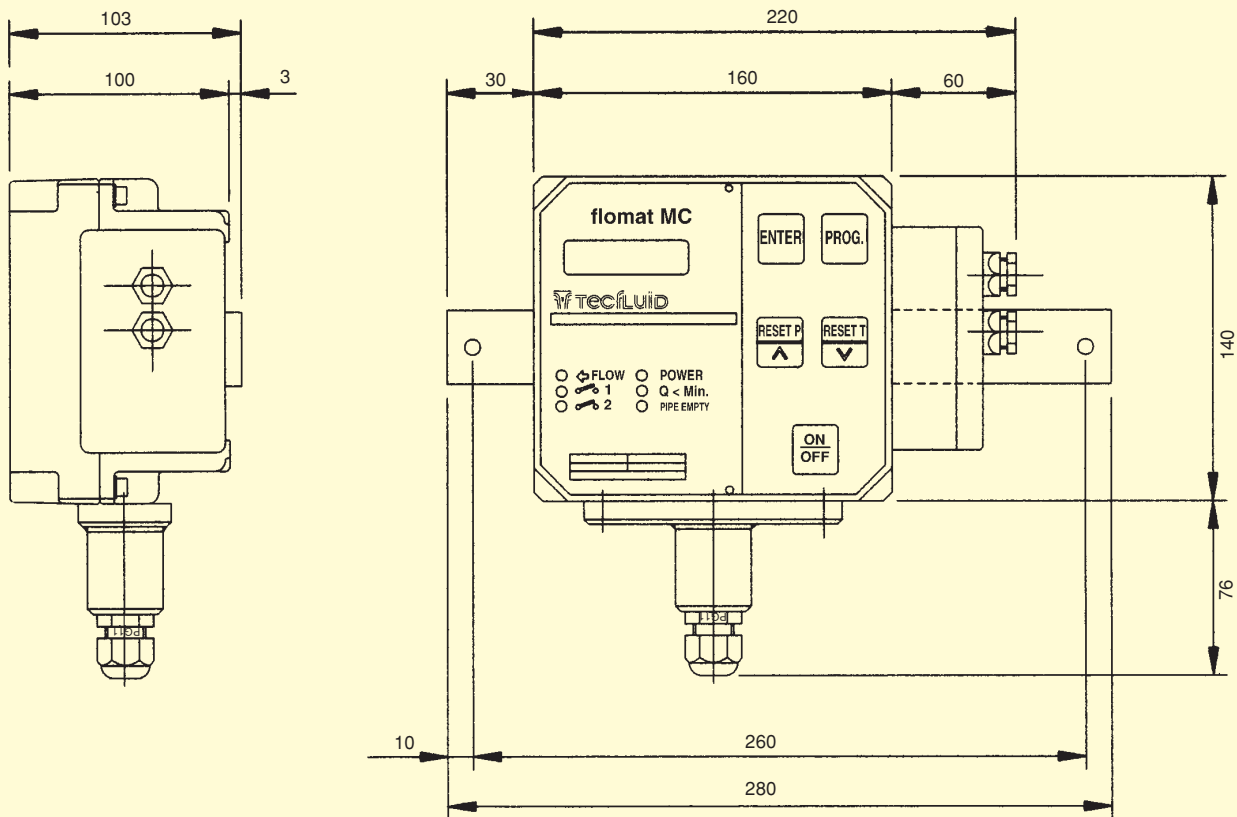
2 1/4 " BSP thread
(Others on demand)
Weight 1,9 Kg



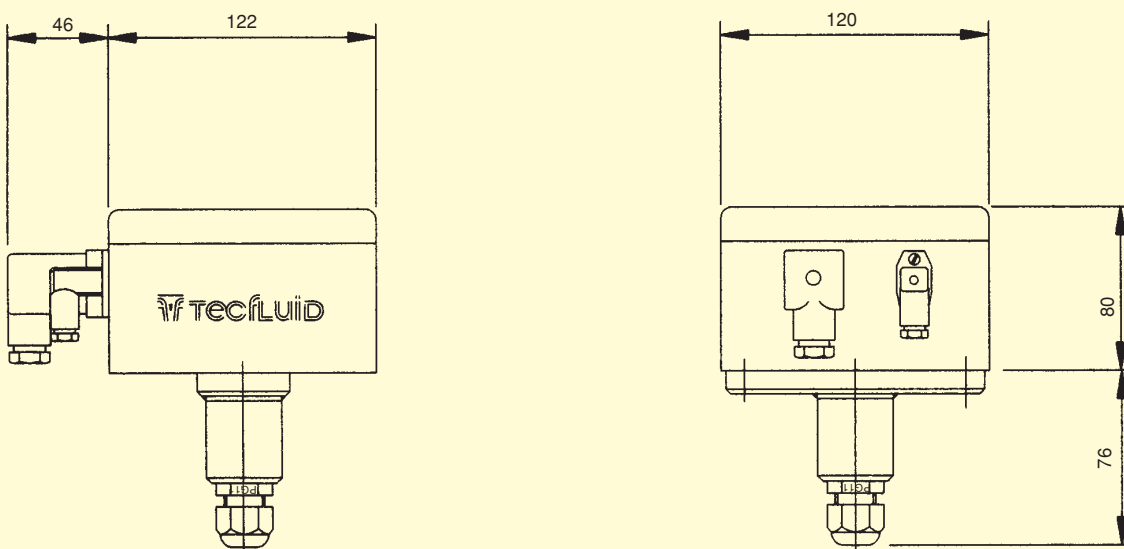
Standard flanged version
(Others on demand)
Weight 2,5 Kg

Remote Version Mounting

With MC Electronics



With MC/T...FT, S Electronics

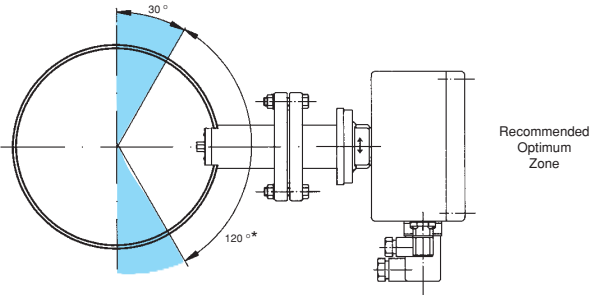




Installation

- Install with a straight section of minimum 10 DN length before and 5 DN after.
- The pipe should always be full - install in a rising section.

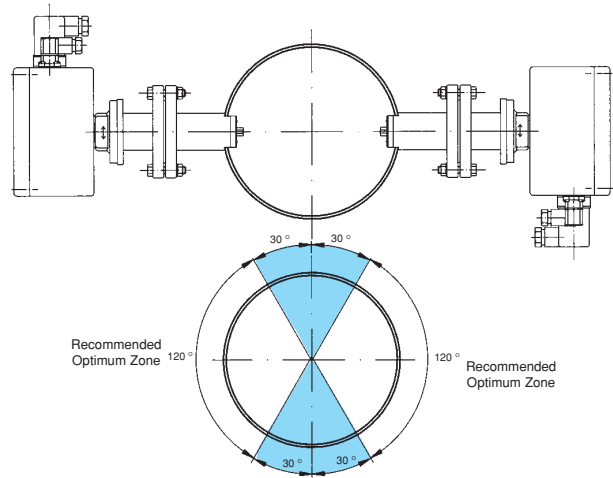
Mounting of one Flomat (DN-40...DN600)



* Correct mounting positions to avoid air pockets and dirt deposits on the electrodes.

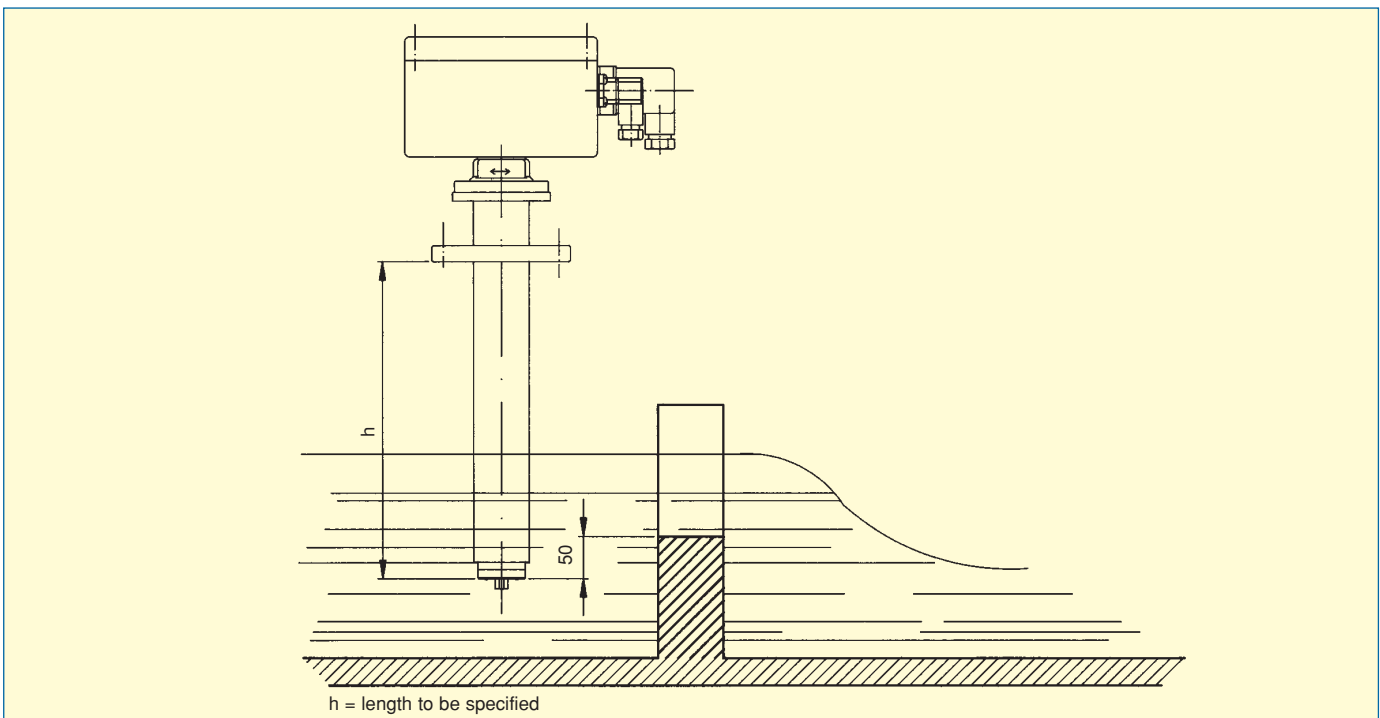
NOTE.- Blue zone not recommended

Mounting of 2 or more Flomat (DN-700.....DN2000)



- Valves should be mounted after the sensor to maintain a full pipe.
- Pumps should be installed before the sensor.

Open Channel



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