

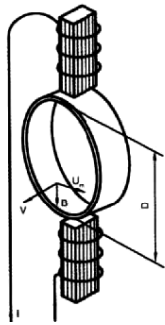


Flow

<b>ELECTROMAGNETIC FLOWMETER</b>	3 - 7
For measurements in pressurized pipes to full section	
Suitable for clean and dirty water with a conductivity of at least 5 $\mu$ S	
<b>ULTRASONIC FLOW METERS</b>	8-9
For measurements in open channels to be installed upstream of narrowing or Venturi shaped channels	
<b>TRANSIT TIME FLOWMETERS</b>	10-11
For measurements in pressurized pipes to full section	
Suitable for clean and dirty water with solids in suspension up to a maximum of 20 g / l, non-conductive liquids, harsh chemicals, oils	
Available with non-invasive measurement sensors - clamp-on-tube plastic or metal or with sensor insertion in concrete or steel tube	
<b>ULTRASONIC DOPPLER FLOWMETERS</b>	12-13
For pressurized pipes with fluids high in suspended solids and sludge, solids or air bubbles (at least 100 microns) and 100 ppm concentration are required	
<b>AREA VELOCITY FLOWMETERS</b>	14-15
For measurements in open channels without restrictions, can be installed in partially filled pipes or under pressure. Installation possible without stopping the flow capacity	

# Electromagnetic Flowmeter

An electromagnetic flowmeter consists of a sensor and a transmitter. Using the Faraday Law, the flowmeter is used to measure volumetric flowrate for conductive liquids and pulps. Several output signals are available. The main application range can be found in the following fields: chemical industry, power generation and distribution, mine, water treatment, paper industry, pharmaceutical industry, food and environmental protection. The measurement is independent of the density, viscosity, temperature, pressure and conductivity of the measured fluid. No moving parts in the measuring tube. No pressure loss. Low requirement for the upstream and downstream straight pipes. It has a special suitability for pulp measurement.



## Measuring Principle

All electromagnetic flow-meters using the Faraday Law:

$$U_m = K \times B \times V \times D$$

$U_m$  – Induced signal voltage measured from both electrodes.

$K$  – Sensor corrected factor.

$B$  – Magnetic flux density (Induction)

$V$  – Velocity of fluid.

$D$  – Inner diameter of the measuring tube.

An induced signal voltage will be generated when the inductive liquid flows through a magnetic field. The magnetic field produced by the energized coils in sensor penetrates the magnetically and non-inductive measuring tube and the medium flowing through it. A voltage is generated in the medium, which is proportional to the velocity of the medium. The voltage can be picked up by the electrodes.

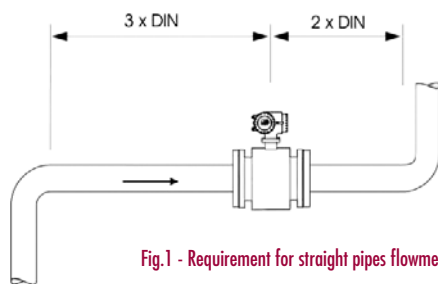


Fig. 1 - Requirement for straight pipes flowmeter

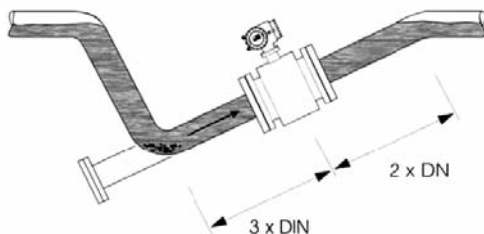


Fig. 2 - Installation in a constantly filled pipe

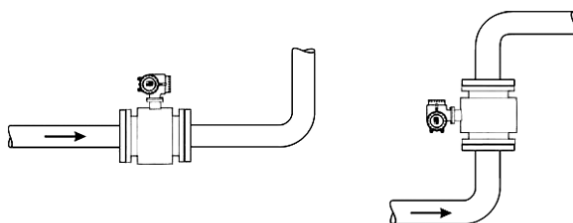


Fig. 3 - Installation in horizontal or vertical pipeline

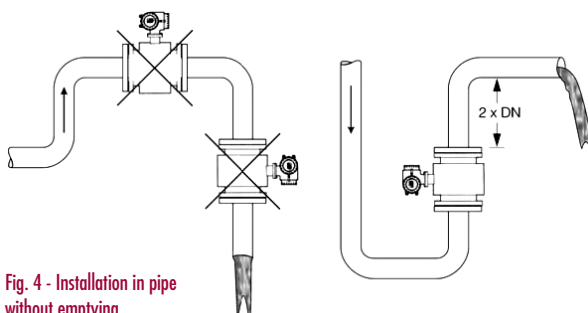


Fig. 4 - Installation in pipe without emptying

## Installation

The flowmeter can test automatically flow direction. Because the direction arrow marked on the nameplate is flow direction, when calibration is done in the factory, you should install the flow-meter to make the actual flow direction is the same as the flow direction arrow marked on the nameplate. The upstream straight pipe should be longer than  $5 \times DN$  to guarantee the accuracy of measurement. When the distance is more than  $5 \times DN$  between the device (e.g. Cone tube, orifice plate, valve) and the sensor of flow-meter, their affection is negligible. And the downstream straight pipe should be more than  $2 \times DN$ . (Fig. 1)

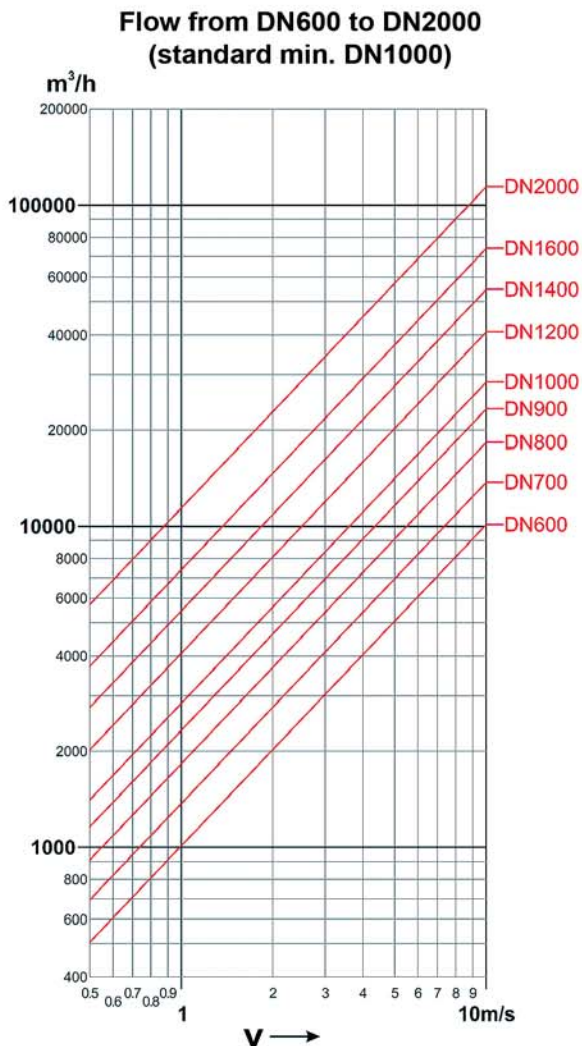
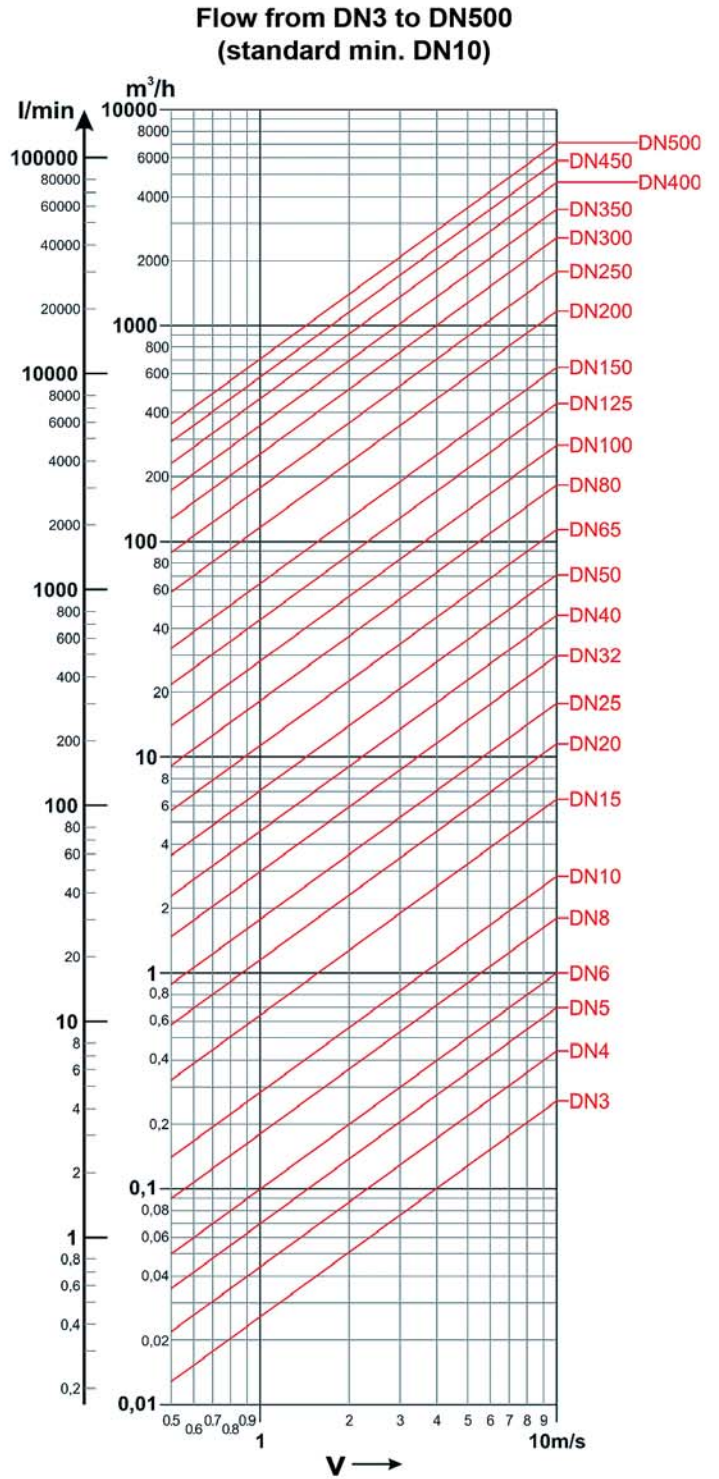
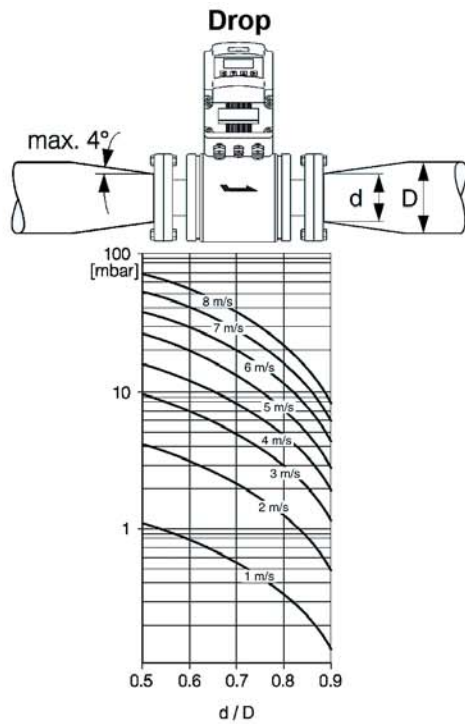
## Installation in pipeline

The electromagnetic flowmeter must be installed in a way that the tube is always completely filled with fluid. In the case of half-empty tube, the electromagnetic flowmeter must be installed in the pipe fully filled with medium. The flowmeter must be installed in the culvert with siphon phenomena in the case of an unfilled pipe. (Fig. 2)

In principle, the measurement of the electromagnetic flow-meter is independent of the distribution of velocity as long as the distribution of velocity in measuring tube is symmetrical. Installation may be horizontal or vertical, but make sure no deposit on the electrodes when horizontal installation. (Fig. 3)

The electromagnetic flow-meter should not be installed in the pipe section with a free pipe outlet that could run empty. When installation in a downstream pipe, please make sure the pipe is always fully filled with medium. (Fig. 4)

# Abacus for the optimal selection of the measuring tube





<b>Ambient Conditions</b>	Ambient Temperature	-25°C ÷ +55°C
	Relative Humidity	5%÷100%
	Ambient Pressure	86÷106 bar
<b>Operating Conditions</b>	Fluid Conductivity	>5µS/cm
	Pressure	4.0MPa (DN15÷DN150)
		1.6MPa (DN100÷DN450)
		1.0MPa (DN200÷DN1000)
		0.6MPa (DN1200÷DN1600)
	Process Temperature	Remote version < 80°C (rubber coating) < 150°C (180°C peak with PTFE coating)
Compact version < 70°C		
Power supply	85÷265Vac; 24Vac or 24Vcc	
Consumption	Less Than 20W	

## Specifications

<b>Sensor</b>	
DN pipe	15, 25, 32, 40, 50, 65, 80, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, 1000, 1200, 1400, 1600
Velocity Range	0m/s÷10m/s
Pipe Material	Stainless Steel AISI321
Coating Type	Rubber, PTFE
Electrode Material	Stainless Steel AISI316Ti, Hastelloy B, Hastelloy C, Titanium, Tantalum
Flange Material	UNI 2223 in Carbon Steel; AISI316
Protection Degree	Compact IP67 ; Remote IP67 / IP68 (only pipe for remote versions)

**Transmitter** Microprocessor-controlled transmitter. There are two versions: remote and compact.

<b>Special features</b>	<ul style="list-style-type: none"> <li>The magnetic field excitation is a programmable rectangular wave with low frequency. It increases the stability of flow measurement and has low consumption.</li> <li>It uses a 16-bit microprocessor, fast processing and high accuracy</li> <li>Switching power supply is suitable for the wide changing range of voltage, EMC according to CE requirements.</li> <li>Dual direction measurement function. It can display forward direction flow-rate and reverse direction flow-rate.</li> <li>Three inside counters can respectively display forward direction volume, reverse direction volume and the different volume of both directions.</li> <li>Optionally it is possible to communicate via RS485 using MODBUS protocol. HART (by 4÷20mA).</li> <li>Multifunction intelligent transmitter has self-test and self-diagnosis function.</li> <li>EEPROM can save the setting and the counters when power off.</li> </ul>
<b>Accuracy</b>	±0,5% of the measured value (optional ±0,2%, ±0,3%)
<b>Repeatability</b>	0,17% of the measured value for accuracy , ±0,5% ( 0,07% for accuracy ±0,2% ; 0,1% for accuracy ±0,3%)
<b>Analog Output</b>	Current output: 4÷20mA Load resistance: 0÷750ohm for 4÷20mA Basic error: measured value plus basic error ±10µA
<b>Frequency or Pulse Output</b>	Frequency can be set between 1÷5000Hz. for forward direction and reverse direction The pulses can be up to 15000 per second. For forward and reverse direction. The pulse width is up to 25ms.
<b>Alarm Outputs</b>	Two alarms are the open collector transistor output with galvanic isolation. External power supply should be less than 30V, and maximum current for the collector is 250mA when it works.
<b>Display</b>	Display with five characters for flow-rate and ten characters for volume.
<b>Serial Output (optional)</b>	RS485 opto isolated
<b>Damping</b>	2÷100s (90%) speed of adjustment measure instantaneous
<b>Flow Cut -Off</b>	Adjustable 0,0÷ 9,9% . The value for flow cut off is stated as a percentage that relates to the upper range value of the flow-rate.
<b>Isolation</b>	The isolating voltage is more than 500V between analog output, pulse (frequency output), alarm and ground

# S103/P



<b>Ambient Conditions</b>	Ambient Temperature	-20°C ÷ +75°C
	Relative Humidity	0%÷100 RH to 65°C non condensing
	Ambient Pressure	86÷106 bar
<b>Operating Conditions</b>	Fluid Conductivity	>5µS/cm
	Pressure	4.0MPa (DN10÷DN80)
		1.6MPa (DN100÷DN150)
		1.0MPa (DN200÷DN1000)
	Process Temperature	Remote version < 80°C (rubber coating)
		Compact version - 20 ÷ + 70°C
Power supply	85÷265Vac; 24Vac or 24Vcc	
Consumption	tipico 6W, max 8W	

## Specifications

<b>Sensor</b>	
DN pipe	10,15, 25, 32, 40, 50, 65, 80, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, 1000
Velocity Range	0÷10m/s
Pipe Material	Stainless Steel AISI321
Coating Type	Rubber, PTFE
Electrode Material	Stainless Steel AISI316Ti, Hastelloy B, Hastelloy C, Titanium, Tantalum
Flange Material	UNI 2223 in Carbon Steel; AISI316
Protection Degree	Compact IP67 ; Remote IP67 / IP68 (only pipe for remote versions)

<b>Trasmitter</b> Microprocessor-controlled transmitter. There are two versions: remote and compact.	
Special features	<ul style="list-style-type: none"> <li>The magnetic field excitation is a programmable rectangular wave with low frequency. It increases the stability of flow measurement and has low consumption.</li> <li>It uses a 16-bit microprocessor, fast processing and high accuracy</li> <li>Switching power supply is suitable for the wide changing range of voltage, EMC according to CE requirements.</li> <li>Dual direction measurement function. It can display forward direction flowrate and reverse direction flow-rate.</li> <li>Three inside counters can respectively display forward direction volume, reverse direction volume and the different volume of both directions.</li> <li>Optionally it is possible to communicate via RS485 using MODBUS protocol.</li> <li>Multifunction intelligent transmitter has self-test and self-diagnosis function.</li> <li>EEPROM can save the setting and the counters when power off.</li> </ul>
Accuracy	±0,5% of the measured value for velocity of 0.5÷10m/s
Repeatability	0,1% of the measured value for accuracy
Analog Output	Current output: 4÷20mA; 0÷750ohm
Frequency or Pulse Output	Frequency can be set between 1÷ 5000Hz for forward and reverse direction The pulse width can be set for the output state H or L
Alarm Outputs	-
Display	Display with four characters for flow-rate and eight characters for volume. Displaying range for forward and reverse.
Serial Output (optional)	RS485 opto isolated with MODBUS protocol (optional)
Damping	Adjustable 0,1 ÷ 99 seconds
Flow Cut -Off	Adjustable 0.0 ÷ 9.9%. Below the set point the value of instantaneous flow and outputs are forced to zero.



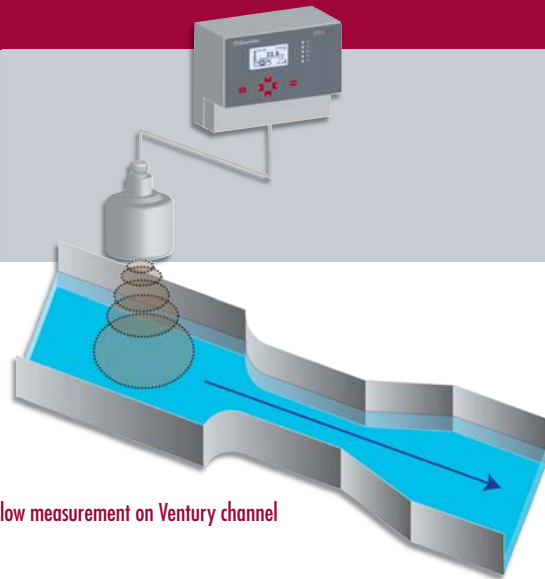
<b>Ambient Conditions</b>	Ambient Temperature	-40°C ÷ +75°C	
	Relative Humidity	0%÷100 RH to 65°C non condensing	
	Ambient Pressure	86÷106 bar	
<b>Operating Conditions</b>	Fluid Conductivity	>5µS/cm	
	Pressure	1.6MPa (DN10÷DN150)	
	Process Temperature	Remote version:	< 120°C (PTFE coating)
		Compact version:	- 40 ÷ + 75°C
	Power supply	90250Vac; 24Vac o 18÷36Vcc	
Consumption	Typical 10W		

## Specifications

<b>Sensor</b>	
DN pipe	10,15, 25, 32, 40, 50, 65, 80, 100, 125, 150
Velocity Range	0,2÷10m/s
Pipe Material	Stainless Steel AISI321
Coating Type	PTFE /PFA
Electrode Material	Stainless Steel AISI316Ti, Hastelloy B, Hastelloy C, Titanium, Tantalum
Flange Material	Swivel DIN 11851/ DIN CLAMP in AISI
Protection Degree	Compact IP67 ; Remote IP67 / IP68 (only pipe for remote versions)

<b>Trasmitter</b> Microprocessor-controlled transmitter . There are two versions: remote and compact.	
<b>Special features</b>	<ul style="list-style-type: none"> <li>The magnetic field excitation is a programmable rectangular wave with low frequency. It increases the stability of flow measurement and has low consumption.</li> <li>It uses a 16-bit microprocessor, fast processing and high accuracy</li> <li>Switching power supply is suitable for the wide changing range of voltage, EMC according to CE requirements.</li> <li>Dual direction measurement function. It can display forward direction flowrate and reverse direction flow-rate.</li> <li>Three inside counters can respectively display forward direction volume, reverse direction volume and the different volume of both directions.</li> <li>Optionally it is possible to communicate via RS485 using MODBUS protocol. HART (by 4÷20mA).</li> <li>Multifunction intelligent transmitter has self-test and self-diagnosis function.</li> <li>EEPROM can save the setting and the counters when power off.</li> </ul>
<b>Accuracy</b>	±0.5% of the measured value for velocity 0.5÷10m/s
<b>Repeatability</b>	0,1% of the measured value for accuracy
<b>Analog Output</b>	Current output: 4÷20mA; 0÷1000ohm
<b>Frequency or Pulse Output</b>	Frequency can be set between 1÷ 10.000Hz for forward and reverse direction The pulse width can be set for the output state H or L
<b>Alarm Outputs</b>	-
<b>Display</b>	Display with four characters for flow-rate and eight characters for volume. Displaying range for forward and reverse.
<b>Serial Output (optional)</b>	RS485 with MODBUS, PROFIBUS protocol
<b>Damping</b>	Adjustable 0,1 ÷ 99 secondi
<b>Flow Cut -Off</b>	Adjustable 0.0 ÷ 9.9%. Below the set point the value of instantaneous flow and outputs are forced to zero.
<b>Isolation</b>	-

# 4004



Flow measurement on Ventury channel

## Specifications

Measure	
Measuring range	Flow: 0 ÷ 9999 mc/h - Level: 0.30 ÷ 5.00 mt. - Temperature: 0 ÷ 100 °C
Precision	±0.2% F.S.
Measure unit	Flow: mc/h, lt/sec - Level: mt, cm, mm - Temperature: °C
Types of devices / representatives for calculating flow PMD (primary measuring device)	RECTANG (rectangular weir ) / TRAPEZ (weir Cipolletti) / VENTURI (Venturi weir) / PARSHALL (Parshall flume) / L LEOPOLD (Leopold Lagco flume) / STRAM. V (V notch) / OTHER (Exponent freely programmable) / Table with 20 points for free programming
No. 2 totalizers	1 x Absolute 9-digit non resettable saved on Flash EEPROM 1 x Partial 9-digit resettable
Hardware	
Display	Graphic DISPLAY LCD STN 128x64 back lighted. Simultaneous display of: level/flow and temperature measurement, digital output status. Analogues output values. Recording status and malfunctioning. Pump hours of functioning. Last 6 alarms event Keyboard ( 4 digit ) for programming.
Controls	6 Keys
Data logger	Internal Flash 4 Mbyte
Serial Output	n.1 RS485 Isolated MODBUS RTU
Analog Outputs	n.2 Isolated and programmable - 1°Output: Flow / Temperature - 2°Output: Flow / Temperature / Level
Relay Outputs	n.5 per Set-point/ totaliser repeat - n.1 x Alarm (max load .1A a 230Vac resistive)
Digital Inputs	n.5 Programmable
Power supply	90±260Vac/dc 50-60Hz - (Optional 24Vac/dc) - Isolated Transf. 4KV
Power consumption	< 12W
Dimensions / Weight	Dimensions: (L x H x P) 230x185x120mm / Weight: 1 Kg

## S425/5 Ultrasonic level sensor with Measuring range of 0,3...5m

- ▶ Material: PP
- ▶ Process connection: 1" G.M.
- ▶ Mechanical protection: IP68
- ▶ Electrical connection : 3mt. shielded cable
- ▶ Working temperature: - 30 a + 80°C
- ▶ Pressure: from 0,5 to 1,5bar (absolute)
- ▶ Electrical supply: 24Vdc
- ▶ Absorbed power: 1 W
- ▶ Maximum measuring distance: 5m
- ▶ Measuring dead zone: 0,3m
- ▶ Interface: RS485 (opt. 4...20mA )
- ▶ Temperature compensation: from -30 to +80°C
- ▶ Accuracy: +/- 0.5% absolute anytime not better than +/- 1 mm
- ▶ Resolution: 0.2 mm
- ▶ Visualization: Red LED x power-on yellow LED x eco signal
- ▶ Dimension mm. (Ø x H ): 90 x 137 included connector for cable



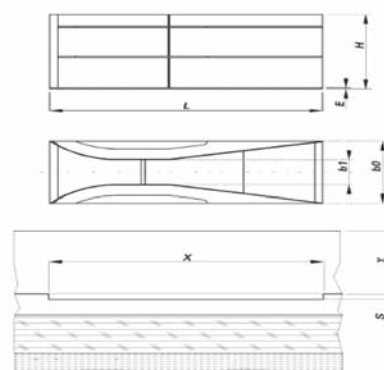
## Specifications

<b>MEASUREMENT RECORDING</b>		
Flow rate	1/2/5/10/15/20/30/60 min	Total Volume
Recording steps	5/10/30 min. 1/2/6/12/24 h.	
Type	f.i.f.o. or filling	f.i.f.o. or filling
Showing	Graphic: minimum ,maximun and average period value plus Zoom function	Tabular
<b>Analog Outputs</b>		
Flow rate	Flow / Temperature	Total Volume
Size	Flow / Temperature	Flow / Level / Temperature
Typology	Limit Programming: Lower / Upper	
Range	0.00 ÷ 20.00 mA / 4.00 ÷ 20.00 mA	
Maximun Load	500 Ohm	
Alarm Output NAMUR std	2.4 mA (with Range 4/20mA)	
<b>No.5 Relay Outputs</b>		
Function - Selectable	Set-point	Pulse
Programming	ON-OFF with hysteresis	Scaler: 1,10,100mc/h Duration: 250,500,1000,2000 msec
<b>Alarm</b>		
Alarm	Alarm thresholds Echo Loss	
Programming	Time Out ( echo loss time ): 00:00 ÷ 24:00 h	
<b>Operating Conditions</b>		
Operating Temperature, Storage and Transport	0÷50°C -25÷65°C	
Humidity	10-95% non condensating	
Protection Degree	Close panel IP65 EN60529 - with Clear Open lid IP54	
EMI / RFI	CEI-EN55011 – 05/99	

## VENTURI CHANNEL

Venturi polypropylene channel for flow measurement in open channels are. designed to be installed in existing rectangular channels. There are different measures according to the scale min / max (see table 1).

Channels model BS600/BS800/BS1000 must be connected with the rectangular channel as show in Fig .. 2 , size indicated by L1, taking care to respect the measures as reported in table 2.



Flow values min. and max.

Model	Flow	Qmin	Qmax
BS150	1m <sup>3</sup> /h 0,28l/s	50m <sup>3</sup> /h 13,8l/s	
BS200	2m <sup>3</sup> /h 0,55l/s	55m <sup>3</sup> /h 17,27l/s	
BS300	3m <sup>3</sup> /h 0,83l/s	150m <sup>3</sup> /h 41,6l/s	
BS400	10m <sup>3</sup> /h 2,7l/s	310m <sup>3</sup> /h 86,1l/s	
BS500	20m <sup>3</sup> /h 5,5l/s	500m <sup>3</sup> /h 138,8l/s	
BS600	25m <sup>3</sup> /h 7,15l/s	850m <sup>3</sup> /h 236l/s	
BS800	50m <sup>3</sup> /h 13,9l/s	1400m <sup>3</sup> /h 389l/s	
BS1000	60m <sup>3</sup> /h 16,6l/s	2250m <sup>3</sup> /h 625l/s	

◀ Tab. 1

▼ Tab. 2

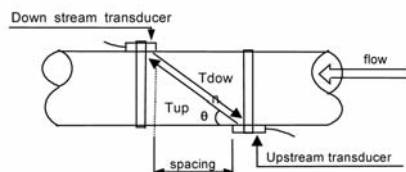
Overall dimensions (mm) and installation for Venturi Channels

Dimens. Model	L	L1	H	E	b0	b1	X	Y	S
BS150	479		270	5	150	60	483	280	7
BS200	639		240	5	200	80	645	250	7
BS300	958		360	6	300	120	968	370	8
BS400	1277		480	8	400	160	1281	490	10
BS500	1597		600	8	500	200	1617	610	10
BS600	1500	416	720	10	600	240	1520	740	14
BS800	2000	555	900	10	800	320	2030	920	14
BS1000	2500	694	1000	15	1000	400	2550	1020	19

# S100F

The S-100F is composed by a digital converter and two clamp-on or insertion ultrasonic transducers. It is designed to measure the fluid velocity of a liquid inside a closed conduit. The transducers are a non-contacting, clamp-on type, which provide benefits of non-fouling operation and easy installation.

The DSP digital technology (Digital Signal Processing) ensure a low sensibility of the instrument against potential transient factors. The size of the pipe may vary from 20 to 4000 mm (using different transducers), while the liquid can be: ultra-pure drinking water, chemicals, waste water, cooling water, river water. Since the transducers are applied externally to the tube, not in contact with the liquid and have no moving parts, the transmitter will not be damaged by wear, by fouling or pressure. All configuration user-entered values are saved in EE PROM, which is password protected to prevent accidental changes. The transmitter is equipped with a clock to store the measure detection date and time, operated by battery. In case of power failure will be necessary to re-set the (time) lost. In the case of incorrect setting of the totalizer, the other functions are not compromised.



Ultrasonic transducers with protection IP68 available in:

- Clamp-on**
  - S1 type suitable for pipes from 15 to 100mm up to 70 °C
  - SH type suitable for pipes from 15 a 100mm up to 150°C
  - M1 type suitable for pipes from 50 a 700mm up to 70°C
  - MH type suitable for pipes from 50 a 700mm up to 150°C
  - L1 type suitable for pipes from 300 a 4000mm up to 70°C
- Insert**
  - L1 type suitable for Stainless Steel pipes up to 150°C
  - L2 type suitable for concrete pipes l up to 150°C

## Specifications

<b>Measurement pipe</b>	from DN 20 to 4000mm
<b>Pipe material</b>	Steel, Stainless Steel, cast iron, copper, PVC, aluminium, fiberglass (Cement with insertion transducers)
<b>Unit (User selectable)</b>	Meters, cubic meters, liters, feet, cubic feet, U.S. gallons, Imperial gallons, oil barrels, U.S. oil barrels imperial oil barrels U.S million gallons.
<b>Totalizer</b>	Total 7 digits, for differential, direct and reverse flow
<b>Fluid Type</b>	Virtually all fluids that transmit sound waves
<b>Velocity Range</b>	±32m/s
<b>Linearity</b>	0,5% - Repeatability: 0,2% - Total Accuracy: ± 1%
<b>Response Time</b>	Programmable from 1 to 999s
<b>Display</b>	2x2016 alphanumeric characters
<b>Keypad</b>	4 membrane keys
<b>Data Shown</b>	Instant flowrate, total flow, other
<b>Totalizers internal volume</b>	7 digit totalizer; direct and reverse flow 7 digit totalizer
<b>Security</b>	Setting and changing password protected
<b>Internal Data logger</b>	Automatic memory : total flow of the last 64 days, 64 months, 5 years
<b>Input</b>	Up to 5 4÷20mA inputs
<b>Output</b>	Selectable 4÷20m or 0÷20mA
<b>Programmable frequency output</b>	10÷9999HZ
<b>Output relay</b>	Pule or Alarm totalizer
<b>Communication Interface</b>	RS-232C ( Opzional RS485) Protocol available upon request
<b>Operating temperature</b>	-30÷80°C
<b>Max. Humidity</b>	85% RH non condensing (40°C) Process Temperature Sensor: 0÷150°C
<b>Humidity Sensor</b>	98% RH non condensing (40°C)
<b>Power supply</b>	230Vac / 24Vdc
<b>Casing</b>	Aluminum - Wall mounting
<b>Dimensions / Weight</b>	251 x 192 x 80mm / 3,1Kg

## Transit time portable ultrasonic flowmeter

# S100H

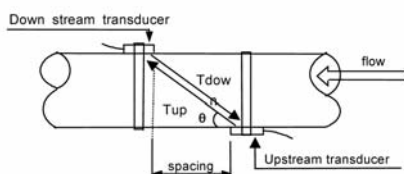
The S-100H is composed by a digital converter and two clamp-on ultrasonic transducers. It is designed to measure the fluid velocity of a liquid inside a closed conduit. The transducers are a non-contacting, clamp-on type, which provide benefits of non-fouling operation and easy installation.

The DSP digital technology (Digital Signal Processing) ensure a low sensibility of the instrument against potential transient factors. The size of the pipe may vary from 20 to 4000 mm (using different transducers), while the liquid can be: ultra-pure drinking water, chemicals, waste water, cooling water, river water. Since the transducers are applied externally to the tube, not in contact with the liquid and have no moving parts, the transmitter will not be damaged by wear, by fouling or pressure. All configuration user-entered values are saved in EE PROM, which is password protected to prevent accidental changes. The transmitter is equipped with a clock to store the measure detection date and time, operated by battery. In case of power failure will be necessary to re-set the (time) lost. In the case of incorrect setting of the totalizer, the other functions are not compromised.



Ultrasonic transducers with protection IP68 available :

- Clamp-on** M1 type suitable for pipes from 50 to 700mm  
L1 3 type suitable for pipes from 00 to 4000mm
- Clamp-on mounted on metric rail** S1F type suitable for pipes from 15 to 100mm  
M1F type suitable for pipes from 50 to 700mm
- Clamp-on for high temperature** S1H type suitable for pipes from 15 to 100mm  
M1H type suitable for pipes from 50 to 700mm
- Connection cable length** 2 x 5 meters, up to 2 x 50 meters



## Specifications

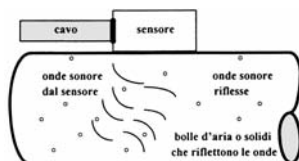
<b>Measurement pipe</b>	from DN 20 to 4000mm
<b>Pipe material</b>	Steel, Stainless Steel, cast iron, copper, PVC, aluminium, fiberglass (Cement with insertion transducers)
<b>Unit (User selectable)</b>	Meters, cubic meters, liters, feet, cubic feet, U.S. gallons, Imperial gallons, oil barrels, U.S. oil barrels imperial oil barrels U.S million gallons.
<b>Totalizer</b>	Total 7 digits, for differential, direct and reverse flow
<b>Fluid Type</b>	Virtually all fluids that transmit sound waves
<b>Velocity Range</b>	±32m/s
<b>Linearity</b>	0,5% - Repeatability: 0,2% - Total Accuracy: ± 1%
<b>Response Time</b>	Programmable from 1 to 999s
<b>Display</b>	4 digits, 16 alphanumeric characters. Displays flow rate, totalizer, operating mode
<b>Keypad</b>	16+2 membrane keys
<b>Data Shown</b>	Instant flowrate, total flow, other
<b>Totalizers internal volume</b>	7 digit totalizer; direct and reverse flow 7 digit totalizer
<b>Security</b>	Setting and changing password protected
<b>Internal Data logger</b>	Storage capacity of 2000 records
<b>Communication Interface</b>	RS-232C Protocol available on request
<b>Casing</b>	ABS
<b>Power supply</b>	External power supply 100±253Vac or 3 AAA Ni-mH integrated rechargeable batterie that last about 10 hours fully charged
<b>Rechargeable Batteries</b>	autonomy > 10h
<b>Dimensions / Weight</b>	460 x 400 x 110 mm / 4,5 kg

Flowmeter with "Doppler effect"

# DFM-5.0

The flow transmitter Doppler DFM-5.0 is suitable for most liquids, like water, sewage, chemical liquids, slurries and viscous liquids. Controls, states, totals and transmit the flow in gallons, liters or other units. The sensor is mounted outside of a metal or plastic pipes.

To measure the flow, the acoustic pulses generated by the sensor are reflected by particles or gas bubbles present in the liquid and returned to the sensor. Installation can be done without stopping the system. There is no contact between the sensor and the fluid of the measured flow, and there is no need for any cutting or drilling of the pipe. The sensor has a parallelepiped shape, It is not afraid of dirt or scale and is easy to mount on the outside of a pipe using a tape. Easy programming through three program buttons. Using the menu you can select the diameter of the pipe, the engineering units (gallons, liters, etc.), the speeds of aggregation define sets of relays, the sensitivity and damping. The data aggregation and the calibration is password protected against power outages. The DFM-5.0 is recommended for liquids containing solids or air bubbles, for steel pipes, iron, PVC, ABS



## Principle of Operation

The DFM 5.0 Sensor transmits continuous high frequency sound through the pipe wall into the flowing liquid. Sound is reflected back to the Sensor from particles or gas bubbles in the liquid. If the liquid is flowing, the reflected sound returns at an altered frequency (the Doppler effect). The DFM 5.0 continuously measure this frequency shift to accurately measure flow.

## Specifications

Flow Rate Range	from 0,08 to 12,2 m/sec
Pipe Size	from 1/2" to 180" (from 12.7 mm to 4,5 m)
Display	4 digits , 16 alphanumeric characters. Displays flow rate, totalizer, operating mode and calibration menu
Power supply	100-160 Vca, 180-260 Vca, 12 or 24 Vcc
Output	4÷20 mA - 1000 ohm
Relays	2 SPDT - 5A, programmable x alarms and/or flow proportional pulses
Sensor	sealed, single head, ultrasonic with 6 m cable and mounting kit
Assembly Kit	Glue and steel belt
Working Temperature	Sensor: from -40 to +95°C / Amplifier: from -5 to +40°C
Case	watertight NEMA 4X (IP67), Fiberglass and transparent front
Dimensions	188 x 278 x 130 mm
Precision	± 2%, suspended solids or air bubbles with min. diameter 100 micron and concentration of 75 ppm required
Repeatability	± 0,1%, Linearity: ± 0,5%
Calibration	By 3 frontal keys
Sensitivity	adjustable, Damping: adjustable
Protection	On sensor, signal and power
<b>Options</b>	
Sensor	intrinsically safe, for diameters 1/2", immersion for wood or concrete pipes , double-headed
Cable	Up to 150 m
Data logger	with 2 million points adjustable. Data download via USB
Heating	thermostat for temperature up to -40°C

Flowmeter with "Doppler effect"

# PDFM-5.0

The PDFM 5.0 Portable Doppler Flow Meter is used to monitor and balance flow, or to troubleshoot flow problems in full pipes. It is ideal to evaluate performance of in-line flow meters and can be installed, calibrated and started-up in minutes. Use It for projects where a permanent flow meter is not required or to temporarily replace installed flow transmitters

## Light & Easy to carry

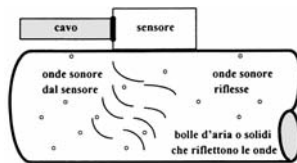
Each PDFM 5.0 comes complete with rugged watertight carrying case, strap-on sensor and stainless steel mounting kit. The unit can be used for a short time or left in a position to transmit and / or record data.

## Battery Powered for a Full Day's Work

With its built-in NiMH rechargeable battery, you can operate the PDMF 5.0 up to 18 hours continuously. Display brightness is adjustable to conserve power. Plug into an AC outlet (100-240 VAC 50/60 Hz) to activate the 4-20 mA output and to fully recharge in 6 to 8 hours (you can continue to use the PDMF 5.0 while charging).

## Simple start-up and calibration

Sensor mounting and a full calibration can be done in just a few minutes. Put coupling compound gel (included) on the sensor face and mount the sensor on the outside of the pipe with the stainless steel mounting bracket (supplied). Use the five-key calibration system to enter pipe diameter and engineering units. The PDFM 5.0 will immediately begin to display, transit and totalize.



## Principle of Operation

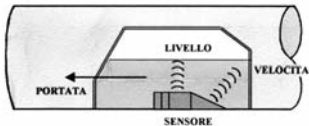
The PDFM 5.0 Sensor transmits continuous high frequency sound through the pipe wall into the flowing liquid. Sound is reflected back to the Sensor from particles or gas bubbles in the liquid. If the liquid is flowing, the reflected sound returns at an altered frequency (the Doppler effect). The PDFM 5.0 continuously measure this frequency shift to accurately measure flow.

## Specifications

<b>Flow Rate Range</b>	from 0,03 to 12,2 m/sec
<b>Pipe Size</b>	Ultrasonic sensor mounts on any pipe from 1/2" to 180" (from 12.7 mm to 4,5 m)
<b>Display</b>	4 digits , 16 alphanumeric characters. Displays flow rate, totalizer, operating mode
<b>Power supply</b>	Built-in battery (3Axora - 12 Vcc), for up to 18 hours continuous operation. External charger with 100 o 240 VAC 50/60 Hz input.
<b>Output</b>	4÷20 mA (500 ohm) when AC powered. USB for data log transfer by direct <pc connection
<b>Data logger</b>	Programmable, 300.000 data point capacity, time and date stamped or formatted flow reports including total, average, minimum, maximum and times of occurrence
<b>PC Software</b>	For Windows 98 or higher
<b>Operating Temperature</b>	from -23 to + 60°C
<b>Electronic Enclosure</b>	Portable ABS IP 67, enclosure
<b>Dimensions / Weight</b>	110 x 204 x 41mm / about 4 Kg
<b>Precision</b>	± 2%, suspended solids or air bubbles with min. diameter 100 micron and concentration of 75 ppm required
<b>Repeatability</b>	± 0,1%, Linearity: ± 0,5%
<b>Calibration</b>	By 5 frontal keys
<b>Sensitivity</b>	Adjustable cut-off, Damping: adjustable
<b>Protection</b>	On sensor, signal and power
<b>PSE4 Sensor</b>	
<b>Ultrasonic type</b>	Clamp-on, single head ultrasonic with 3,4 m shielded dual-coaxial cable
<b>Mounting Kit</b>	Stainless Steel pipe clamp and 150 gr silicone coupling compound
<b>Working Temperature</b>	from -40 to +120 °C
<b>Options</b>	
Extension cable 15 m. length	

# AVFM-II

The system simultaneously measures the level and velocity of fluids to calculate the flow in an open channel or a pipe. The sensor can be mounted inside the pipe or on the bottom of a rectangular channel. The sensor doesn't need any special devices, equipment or materials.



### Channel Recommended Conditions

The best accuracy is obtained if the flow is uniformly distributed, rather than turbulent. The channel immediately upstream of the sensor, must not have sharp variation on the ground level. The flow must not have excessive

turbulence and velocity should be less than 1 m / sec. if the surface profile just above the sensor does not change, the conditions downstream of the sensor will not affect the measure.

### Difficult flow conditions tolerance

The system can measure speeds up to 6 m / sec.. To get an accurate precision, we developed the electronic and software design to offset the highest and lowest values, caused by turbulence. The standard level / velocity sensor can measure flow in pipes partially or completely filled up to a pressure of 0.65 bar. without any adjustment.

### Alternate sensors configuration

The standard immersed sensor, is unique for the two measures, the level and velocity. Can be installed with a set of screws on the bottom of the pipe or channel, or inserted using the bracket supplied with the instrument. Other models are available with sensors for special applications, such as low range Ultrasonic level and a transmitter for measuring velocity inside a manhole. The sensor cable can be up to 150 m.

### No Calculation - No Programming code

To calibrate the AVFM-II just enter the pipe diameter or the channel width and select the unit from the menu. The flow, level and velocity can be expressed in gallons, liters, ft<sup>3</sup> or m<sup>3</sup>. The calibration parameters are stored even with power failure.



## Specifications

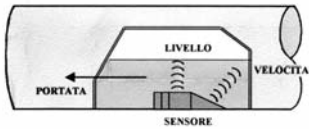
Amplifier	
Electronic Enclosure	polycarbonate IP66
Precision	Level: $\pm 0,25\%$ of the field/ Velocity: $\pm 2\%$ of readings
Display	4 digits LCD, menu, totalize, 16 alphanumeric characters
Programming	3 total menu keys : RS232 output with SW for password-protected parameters
Power supply	100-130 / 200-250 V ca, 50/60 Hz
Output	2 x 4 $\pm$ 20 mA isoletd on 1000 ohm programmable for flow, level and velocity
Relays Outputs	3 x SPDT, 5A programmable x alarms or flow proportional pulse
Surge Protection	On 4 $\pm$ 20 mA and power supply
Temperature	-20 / +60 °C

QZ-A Sensor	
Range	Velocity: da 0,03 a 6,2 m/sec - Level: min. 25,4 mm; max. 4,57 m
Temperature	-15 / +65 °C
Material	PVC, epoxy, polyurethane
Cable	7,6 m, submersible, 3 shielded cables
Temperature compensation	Automatic

Options	
Data logger	programmable; capacity 50,000 points; report brought with date and time, minimum, maximum, average and total: RS232
Sensor cable	Standard cable lenght 15 m or up to 150 m with separated RG62AU cable
Junction Box	Stainless Steel
Power supply	12 or 24 V cc
Thermal Regulator	For temperature below 0 °C
I.S. Barriers	To install sensor in a dangerous area or confined space
Sensors	<b>PZ12LP</b> : ultrasonic level sensor / <b>QZ-B</b> : velocity sensor
Sensor Mounting	Mounting pipe bands from 150 to 600 mm diameter

# STINGRAY

Stingray is a compact, battery-powered logger with an ultrasonic sensor. It data logs level, velocity and water temperature readings for flow monitoring through open channels, partially full sewer pipes and surcharged pipes. Use it for flow surveys, I&I studies, stormwater, irrigation water and sewage.



STINGRAY uses a submerged ultrasonic sensor to continuously measure both velocity and level in the channel. The sensor is a completely sealed ultrasonic unit with no orifices or ports. It mounts inside the pipe or at the bottom of a rectangular channel. No special compounds, are tools or

hardware required. The watertight electronics enclosure is hung in the manhole or at convenient location. Sensor mounting bracket, batteries, software and cables are included with each STINGRAY. Requires no calibration. You can check Stingray operation with the built-in LCD bar graph display. It scrolls through level, velocity and temperature readings, plus remaining battery and logger storage capacity. The display turns off automatically after 60 seconds to conserve battery power. Powerful Windows software software is used to set the logger interval, to download log files and view Level, Velocity and water temperature readings in real time. The logger will display log files and flow rates in graph and table formats. It will generate flow reports including minimum, maximum and average flow, calculate flow totals, and convert between common measurement units.



- Ultrasonic Level and velocity measure
- No need for restrictions or weirs
- Alkaline batteries powered
- Data logger with 130.000 data points

- Powerful Windows software
- RS232 Output
- Bargraph LCD indicator
- Suitable for studying and monitoring flow, infiltration, irrigation water treatments

## Specifications

Electronics	
Electronic Enclosure	Water tight, air tight, dust proof IP67 polycarbonate
Accuracy	Level: $\pm 0,25\%$ of range / Velocity: $\pm 2\%$ of reading
Display	LCD level, velocity, Water temperature, battery and memory capacity
Programming	By SW for Windows
Logging interval	10 sec (15 g), 30 sec (45 g), 1 min (3 months), 2 min (6 months), 5 min (1 year), 10 min (2 years), 20 min (4 years)
Logger Software for Windows	Real-time monitoring, log file download and export, graph and data table presentation, level/velocity to flow conversion
Power supply	4 alkaline "D" cells
Output	RS232, 28.800 bd
Cable	RS232 6 m shielded with DB9 M/F connettors
Operating Temperature	-20 / +60 °C
QZ02 Sensor	
Velocity Range	from 0,03 to 3,05 m/sec
Operating Level range	25,4 mm, max 4,5 m
Operating Temperature	-15 / +65 °C
Material	PVC, polyuretane, epoxy
Cable	7.6 m submersible polyurethane racket, shielded, 3-coaxial
Sensor mount	Stainless Styeel mounting bracket
Temperature compensation	Automatic, continuos
Options	
Sensor cable	15 m
Mounting Bands	Stainless Steel sensor mounting bands for pipes from 150 a 1800 mm



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