



Signify the flow of
Significant force.



An ISO 9001 Registered Company

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PROFILE

About us

With considerable industrial experience of over one decade, ADDMAS Measurement able to manufacture & supply various field instruments.

Our Mission

To provide products which meet highest quality & safety norms by using latest technology. With total teamwork we aim at delivering the products on time to become global manufacture and supplier of process measuring instruments.

Product Range

ADDMAS offer highly efficient & cost effective solution in area of:

- Pressure Measurement
- Temperature Measurement
- Flow Measurement
- Data logging & Recording Solution

Quality Policy

Every instruments we manufacture is calibrated against highly accurate instruments and undergoes series of test such as Leak Test, Over Load Test and Accuracy Test.

All our products are check on the following parameters like

- Quality
- Reliability
- Accuracy
- Durability



Testing / Calibration Facility

Flow Meters for:
LIQUID WATER STEAM AIR GAS

Electro Magnetic Flowmeters

INTRODUCTION

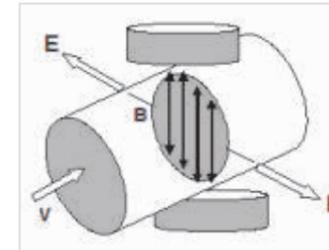
ADDMAS a versatile Electromagnetic flow meter is ideal for conductive liquids such as Raw Water, Chilled water, effluents, Potable water etc. Using time proven electromagnetic flow metering principle, the meter achieves a flow meter for pipes from 15mm to 600mm. Since there are no moving parts, the flow meter gives years of maintenance free service.

ADDMAS flow-head can be supplied in Teflon lining or Hard Rubber lining is available with all the features required in a field mounted water metering equipments. These include - weather proof enclosure, communication options, RTC with data logging with printer option and 4 to 20 mA isolated Flow signal transmission option for flow pattern recording. The converter is available as field mounted-IP65 protection category. GSM modem interface can also be supplied as an optional add-on feature.



MEASURING PRINCIPLE

The operating principle of Magnetic flow meters is based upon Faraday's Law of electromagnetic induction, " It state that a voltage will be induced in a conductor moving through a magnetic field".



Faraday's Law : $E = kBDV$ where
E = Induced Voltage
B = Strength of the magnetic field
D = Conductor Width
V = Velocity of the conductor

The magnitude of the induced voltage E is directly proportional to the velocity of the conductor width D, and the strength of the magnetic field B. Liquid acts as a conductor as it flows through pipes.

APPLICATION

This Flowmeters find varied applications where the flowing medium is difficult to handle. Major advantage of these flowmeters are : zero pressure drop, No moving part and highest accuracy level at most affordable cost. Some of the major application can be described below

- Effluent Treatment plant
- Sewage Treatment plant.
- Water supply Schemes
- Pulp and Papers
- Sugar industries and distilleries
- Steel and Aluminums
- Chemical / Pharmaceuticals
- Food and Drugs.

ADVANTAGES

- Tolerates High percentage of suspended solids
Sludge, slurries, minerals, paper, sewage – flows with high level of solids which can not be measured other type of meters.
- Obstruction less measurements
- Nothing projects into the flow stream, no head loss, no parts to maintain.

- Suitable for corrosive liquid
- Acids, caustic and corrosive additives are isolated from the meter pipe by inert linings and compatible electrodes.
- Suitable for all types of electrically conductive liquids
- Liquid where conductivity is of sufficient level to induce measurable e.m.f..



TECHNICAL SPECIFICATIONS

Full-Bore EMFM from 1/2" to 24" sizes

- Medium Conductivity : >5 uS/cm
- Meter Sizes : 1/2" to 24" Pipe sizes. For Higher size consult Factory.
- Flow Tube Part : SS 316 / SS 304 (Non Magnetic)
- Electrodes : SS 316L or optionally Hastalloy 'C'
- Process Connection : S series: SS 304 M.S. #150 Flange • E series: Epoxy painted M.S. #150 Flange
- Lining : S series Lining: PTFE • E series: Hard Rubber / EPDM / Neoprene
- Sensor Housing : Epoxy painted M.S OR SS 304 optional
- Flow Velocity : 0.1 to 10 m/s in two ranges
- Pressure Rating : Standard Flanges - ASA150 options on request 15 bar Standard, higher on request
- Operating Temperature Medium : S series: 0 to 150 Deg.C for PTFE lining • E Series: 0 to 70 DegC for Hard Rubber lining
- Operating Temperature Ambient : 0 to 55 Deg. C

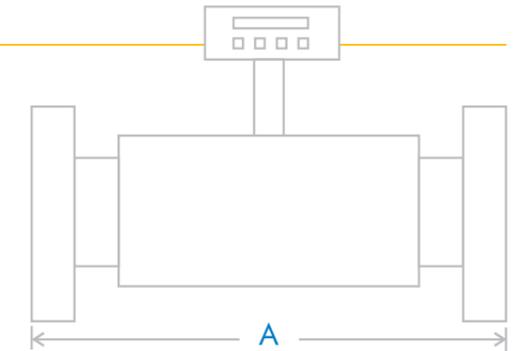
1. Power Supply : 24Vdc or 230Vac or Battery Operated
2. Power Consumption : 12VA max
3. Key Board : 6 Key Membrane Key Board
4. Programmable parameters : Volume Units : ltrs, M3, ML, CF, BG; Time Units: sec, min, hrs- 4 to 20 mA range, % Low flow cut of, Pipe Dia, Discharge range, Comm. Parameters Calibration Constant, Filter Constant
5. Data Logger (Optional) : RTC with 24 column Printer, Battery Charger +SMF Batteries and
6. Data Transmission(Optional : RS 485 MODBUS RTU or ASCII Protocol or RS232C, HART, with 4 to 20 mA option as add-on module -available
7. Data Communication (Optional) : An SMS based or GPRS based communication module with software is available as optional extra. The Modem connects through the RS232C port .The flow meter can be equipped with GSM Modem. Thus following configuration can be given:
 - Respond with data to a message (SMS) from any user. (Query response mode)
 - Periodic GPRS based Data transmission to a fixed IP address / user's website.
 - Respond by an SMS to Cell number stored, in case of alarm condition.
9. Flow parameter : Programmable - Volume Units : ltrs, M3, ML, CF, BG - Time Units : sec, min, hrs
10. Configurable Parameters : F.S. for 4 to 20 mA range, %Low flow cut off, Communication Parameters Calibration Constant Damping (Filter)
11. Calibration : Factory Calibrated on certified flow rig
12. Ingress protection : IP 65 / IP 67
13. Electronics Enclosure : Powder coated Die cast Aluminum
14. Flame proof Version : Please contact factory



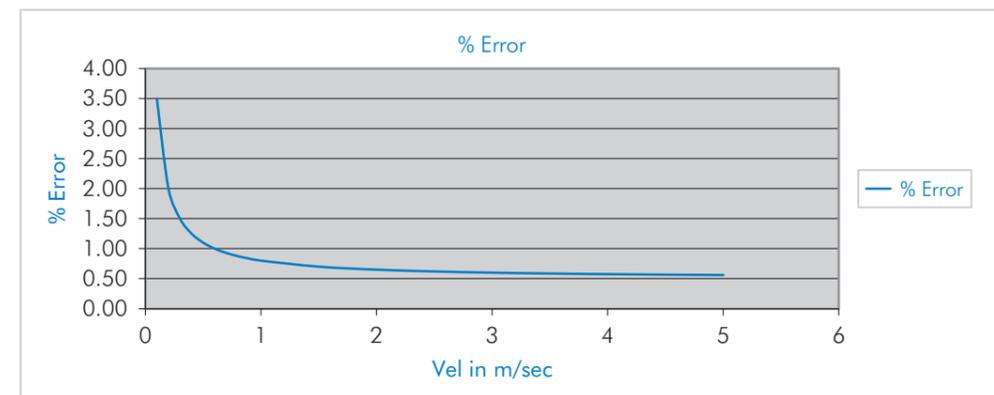
DIMENSION DETAILS

Distance between Two Flanges

Line Size	A	Line Size	A
15 mm (1/2")	142 mm	100 mm (4")	242 mm
25 mm (1")	142 mm	150 mm (6")	350 mm
40 mm (1 1/2")	142 mm	200 mm (8")	360 mm
50 mm (2")	194 mm	300 mm (12")	590 mm
80 mm (3")	242 mm		



TYPICAL ERROR GRAPH



TYPICAL FLOW RATE TABLE

Pipe - Size (NB)	At velocity 0.5 m/sec in LPM	At velocity 5 m/sec in LPM
15(1/2")	~5	~50
25 (1")	~15	~150
40 (1 1/2")	~37	~370
50 (2")	~60	~600
65 (2 1/2")	~100	~1000
80 (3")	~150	~1500
100(4")	~235	~2350
150 (6")	~530	~5300
	At velocity 0.5 m/sec in m3/hr	At velocity 5 m/sec in m3/hr
200(8")	~50	~500
250 (10")	~90	~900
300 (12")	~125	~1250
350 (14")	~180	~1800
400 (16")	~225	~2250

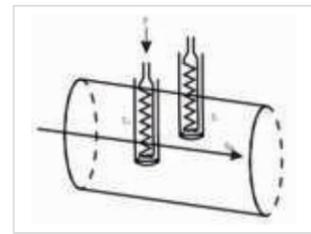
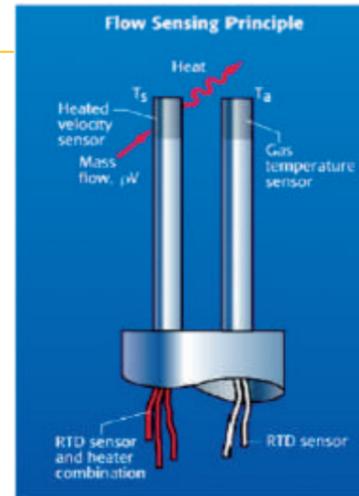
Thermal Mass Flowmeters

AT Thermal Mass Flowmeter is one of the most advanced flowmeter in gas mass monitoring. The sensor of AT Thermal Mass Flowmeter is related to flow rate of the gas mass and meet the situation which the temperature and pressure is unstable

PRINCIPLE OF OPERATION

Thermal sensor consists of two sensing elements - a velocity sensor and a temperature sensor that automatically corrects for changes in gas temperature (figure 1). The transducer electronics heats the velocity sensor to a constant temperature differential above the gas temperature and measures the cooling effect of the gas flow. The electrical power required to maintain a constant temperature differential is directly proportional to the gas mass flow rate.

In order to keep the stable temperature between T_s and T_a , circuit should be provided higher power. The range of power is related to the mass flow rate of liquid. Through test the output of power can get the mass flow rate. Furthermore, the heat on the heated velocity sensor bring by the move of gasses not cause the heat exchange. So this kind of flowmeter can measure all kinds of gases. The table of AT Series Thermal Mass Flowmeter please see figure



Classic ITMF flow meter consists of two temperature sensor figure 2. A measured portion of heating power p be put into one sensor to rise the temperature to measured value T_2 . Other sensor test gas temperature T_1 . Gas mass flow can be assured according to the difference between heated sensor and gas in temperature ($\Delta T = T_2 - T_1$) and heating power P .

$$\frac{P}{\Delta T} = K_1 + K_2 \times (Q_m)^{K_3}$$

In the formula: K_1, k_2, k_3 --design and calibration parameters;

ΔT -- Range of temperature ($=T_2-T_1$), K;

P --input heating power, w;

Q_m -- mass flow, kg/s.

This is defined as Gregory King's law. k_1, k_2, k_3 depend on geometric dimensioning of sensor and gas characters, as heat conductivity, viscosity and specific heat capacity.

These quotient numerical value are particular own by flowmeter and gas, thus ITMF should correct according to the tested gas.

The relevance among heating power P , range of temperature and mass flow (q_m) can be signified as follows:

In the formula: K_1, k_2, k_3 --design and calibration parameters;

ΔT -- Range of temperature ($=T_2-T_1$), K;

P --input heating power, w;

Q_m -- mass flow, kg/s.

This is defined as Gregory King's law. k_1, k_2, k_3 depend on geometric dimensioning of sensor and gas characters, as heat conductivity, viscosity and specific heat capacity.

These quotient numerical value are particular own by flowmeter and gas, thus ITMF should correct according to the tested gas.



Feature

ACCURACY

AT series thermal mass flowmeter has well Repeatability, $\pm 0.1\%$ of full scale. The accuracy of system can reach $\pm 1\%$. Although the accuracy of other kinds of flowmeter will be better than $\pm 1\%$, but the accuracy is hard to reach $\pm 1\%$ through the combination of temperature transmitter, pressure transmitter, secondary meter, the total error for real system will be more than that value, especially when the component of flow changes. Because AT series thermal mass flowmeter directly measure mass flow, it has sensor and transmitter and display by its own. But the traditional gas flow meter need to make up for a measurement system with temperature transmitter, pressure transmitter, secondary meter. According to reliable design theories, obviously, AT series thermal mass flowmeter possess a good reliabilities and measurement accuracies.

WIDE MEASURING RANGE

AT series thermal mass flowmeter use advanced intelligent chips and display alphanumeric 2×16 digit backlit LCD, it can display ten digits of cumulant flow and four digits of instantaneous flow and flow percentage and the self-check. There are three keys behind the display, which can switch display content and setting various data. It also can use the remote-control which has three matching keys.

You can do all operations by using the remote-control with no cover opened. The unit of flow rate can set kg/h or Nm³/h. The connection has 4-20mA signal output and RS232 communicator, and adopting MODBUS or HART protocol.

NON CUT OFF INITIAL INSTALLATION OF INSERTION METERS

When the diameter of duct between $\Phi 40 - \Phi 2000$ mm, we suggest you use AT series insertion Thermal Mass flowmeter (figure 4). In many occasions, the installation need no stop gas, the insertion ones which with ball valve and special tools could well achieve the non cutoff installing and demounting. (figure 5) More details please refer to the "installation".

APPLICABLE DUCT DIAMETER RANGE

$\Phi 6 - \Phi 10000$ mm

MASS FLOW MEASUREMENT

Measure and display gas mass flow without compensation of temperature and pressure.

DISPLAY ON-SITE

Accumulated mass flow or standard cube flow, instantaneous mass flow or standard cube flow, flow percentage.

WIDE MEASURING RANGE

The range ability of orifice plate is 1:3, the range of vortex flowmeter is about 1:10. But AT series thermal mass flowmeter is 1:120. The upper limit of min flow velocity is 0.5m/s, upper limit of max flow velocity is 60m/s and lower limit is 0 m/s. This feature make AT series thermal mass flowmeter can meet almost all occasions that the flow has big changes.

AT series thermal mass flowmeter is rare to adjust to low flow velocity measurement products among all kinds of flowmeters. Because of radiation, orifice meter has a high error when flow rate is lower than 30%, and the vortex flowmeter will have normal vortex to be measured when the flow velocity is higher than 5m/s. Yet the sensor of AT series thermal mass flowmeter has good sense to low flow rate and it could take 0.5 m/s as a upper limit.

EASY INSTALLATION

AT series thermal mass flowmeter can be installed on the level, uprightness and incline duct, but should be upright with duct.

AT series thermal mass flowmeter use flange hold way to installed. It can provide a set of flange, bolt and nut. AT series thermal mass flowmeter mate flange at random and used for welding on the trapping duct.

AT series thermal mass flowmeter usually need 15D straight pipe. When the occasion can not meet this require, you can choose our own rectifier.

When fixing the flowmeter by flange, the thermal mass flow in the dust could be shown after being electrified.

HIGH PRESSURE RESISTANT

Maximum internal duct pressure is 20Mpa.

LOWER FLOW RATE

Minimum upper limit flow rate is 0.5m/s, lower limit is 0 m/s.

SETTING ON-SITE

Suited for all occasions, automatic identification and revise on-site according to different composition of gas.

NON LINEARITY REVISE

Conduct data processing by adopting specified intelligent chip, conduct nonlinearity revise and various kinds operations by utilizing softwares, 16 nonlinearity functions could be set.

HIGH RELIABILITY

Automatic fault checking, automatic repair for display and fault.

PROTECTION

Explode-proof and water-proof.

APPLICATION

- Industrial And Process Gas Mass Flow.
- Fuel Flow For Burners And Fuel Cells.
- Nox Control Using Ammonia
- Aeration Air And Digester Gas Waste Water Treatment Facilities
- Compressed Air
- Natural Gas
- Combustion Air
- Metering Semi-conductor Gases
- Chloring Metering In Paper Industries
- Solvent And Voc Recovery
- Air Sampling
- General Purpose Mass Flow, Rd.
- Flow Calibration Standards

AT SERIES THERMAL MASS FLOWMETER TECHNICAL SPECIFICATIONS:

AT series in-line thermal mass flow meter AT series insertion thermal mass flowmeter

Pipe Size	: In Line Type: $\Phi 6-\Phi 200\text{mm}$, Insertion Type: $\Phi 40-\Phi 10000\text{mm}$
Power Supply	: 24VDC $\pm 10\%$, $\geq 350\text{mA}$ (you can also use our private power supply DW2407), or 220VAC $\pm 10\%$
Output	: 4-20mA load resistance $\leq 350\Omega$ (750 Ω optional) communication output, RS-485, MODBUS,
HART Power	: dissipation <8W suitable
Medium	: All kinds of gases (pure & stable gases), except for acetylene
Display	: Upper row cumulant flow displayed by ten digits, Bottom row instantaneous flow displayed by four digits (double rows displayed)
Accuracy	: $\pm 0.5\%$; $\pm 1\%$
Medium Temperature	: -40~120°C (200°C optional)

cont....

OVER RUNNING PRESSURE ALARM

HIGH would appear when flow over the setting value.

COMMUNICATION FUNCTION

Standard Connector RS485, Protocol MODBUS

MULTIPLE OUTPUT

can choose mass flow and temperature double-line output.

Rated Pressure	: <2.5MPa G(<20MPa optional)
Environment Temperature	: -40~50°C
Relative Humidity	: 5%~90%
Atmospheric Pressure	: 86~106Kpa
Straight Pipe	: 15D, only 3D Up Scale and Down Scale Resp.
Explosion-proof Flame-proof:	Exd II CT3
Water-proof	: Spraying protection type IP65, submerged type IP68
M.O.C (Wettes Parts)	: 1Cr18Ni9Ti,316L(non-stick nano materials optional), 1Cr18Ni9Ti(non-stick nano materials optional)
Characteristics	: Wide range---range proportion 1:120 (exceptional 1:1000)。 Minimum flow rate is 0, Maximum flow rate could reach to 60m/s。 intelligentialize---adopt the latest smart chip appeared at abroad In recent years, liquid crystal display with double row sixteen digits. Mass flow measurement---temperature and pressure are not needed for compensation, can measure and display the flow of gaseous mass or standard. Lower flow rate measurement---upper limit flow rate could be 0.5m/s, lower limit is 0. Display on-site---accumulated mass flow or standard cube flow, instantaneous mass flow or standard cube flow, flow percentage. Setting on-site---suited for all occasions, automatic identification and revise on-site according to different composition gas.

IN LINE THERMAL MASS FLOW METER

AT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	A	B	C	D	E	F	G	H	I
A.	Pipe Line size: 25, 40, 50, 80, 100, 150, 200, 250, 300, 400								
B.	Explosion Proof: 1: Yes, 2: No								
C.	Installation Form: Integral, Remote, Submerge type								
D.	Output Signal: 1. Normal 4 to 20 ma, 2. Communication Output								
E.	Wetted Part M.O.C: 1 cr18Ni9Ti, 316L								
F.	Protect Class: IP 65, IP 68								
G.	Pressure: 1. 2.5 Mpa, 2. 6 Mpa, 3. 20 Mpa								
H.	Max. Flow Rate: Nm ³ /Hr. Kg/Hr, T/H								
I.	Medium								

INSERTION THERMAL MASS FLOW METER

AT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	A	B	C	D	E	F	G	H	I
A.	Pipe Line size: 40, 50, 80, 100, 150, 200, 250, 300, 400, 500,700, 800, 900, 1000, 1200, 1500, 1800, 2000, 3000								
B.	Explosion Proof: 1: Yes, 2: No								
C.	Installation Form: Integral, Remote, Submerge type								
D.	Output Signal: 1. Normal 4 to 20 ma, 2. Communication Output								
E.	Wetted Part M.O.C : 1 cr18Ni9Ti, 316L								
F.	Protect Class: IP 65, IP 68								
G.	Pressure: 1. 2.5 Mpa, 2. 6 Mpa, 3. 20 Mpa								
H.	Max. Flow Rate: Nm ³ /Hr. Kg/Hr, T/H								
I.	Medium								

Vortex Flowmeters (VSF)

SUMMARY

Vortex flowmeter (VSF) is a kind of the vibration meters. It simple configuration, and install conveniently. It can measure and control various liquid (e.g.: water, oil, petroleum, alcohol, acid, alkali and different chemical fluids) gas (e.g.: air, oxygen, N2, natural gas, coal gas), and steam (e.g.: saturation steam, overheated water vapor).

THE PRINCIPLE OF OPERATION

The principle of operation of vortex flowmeter

Vortex Flowmeter is based on "Karman" principle. Flow transmitter is composed of a body with the same nominal diameter and a column with triangular transect. When a column object placed in flowing fluids (including gas and liquid) in pipe, a series of vortexes will be generated alternately on each side of the object as shown below (figure 1).

Figure 1 The principle of operation of vortex flowmeter.

The frequency of the vortex shedding is proportional to the velocity, and inverse proportional to the width of column.

$$f = St \times V / d \quad (1)$$

Where: f-frequency of Karman Vortex shedding

V – flow rate velocity

St – Strouhal number

D – width of column object

From the expressions (1), by measuring frequency of Karman Vortex shedding can get velocity and instantaneousness. By testing, get the Strouhal number St. From frequency f of Karman Vortex shedding, know the velocity, and then get volume flow-rate. Output pulse number in period of time separate volume of fluid (corresponding shift pulses of fluid in unit volume), we call the coefficient of instrument K, which expression is:

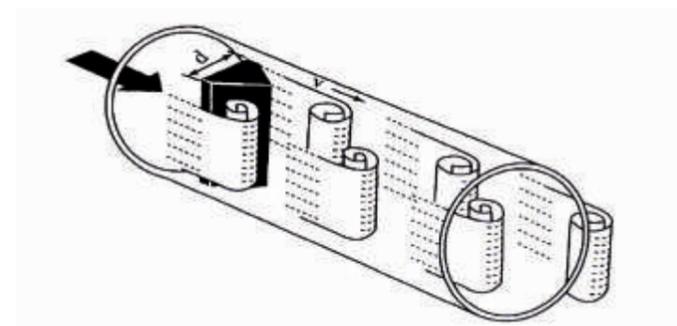
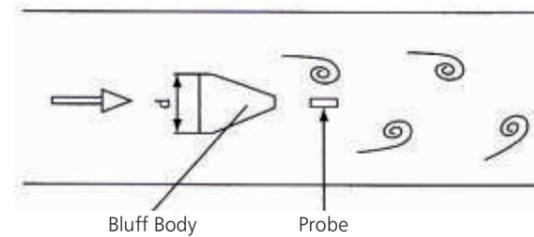
$$K = N / Q \quad (2)$$

Where: K – Coefficient of instrument (Pulse number/ m3)

N – Pulse number

Q – Volume of fluid (m3)

HQ series vortex flowmeter utilize piezo-crystal to measure frequency of Karman Vortex shedding. As the vortex separation on both sides of column, produce pressure pulse, and installed in the cylinder behind in the wake of the probe piezo-crystal in probe feel alternating charge. Convert the alternating charge from piezo-electric unit into voltage. Alternating charge signal output by voltage frequency signal (sensor) after disposed by detection amplifier, or convert 4-20mA standard signal output proportionally with flow.



FLOW RANGES

Chart 1 air flow range (kg/h)

DN (MM)	MIN (KG/HR)	USVAL (KG/HR)	MAX (KG/HR)
25	0 – 1.14	0-78	0-204
40	0-2.90	0-194	0-204
50	0-4.57	0-310	0-822
80	0-11.7	0-775	0-2106
100	0-18.3	0-1292	0-3291
150	0-41.1	0-2584	0-7404
200	0-73.1	0-5168	0-13161
250	0-114	0-7752	0-20564
300	0-165	0-11162	0-29613

Chart 2: Flow measuring max limit of some gas (Nm³ /h)*

*Standard: T=0°C, P=1.01325×10⁵Pa

Remarks: the unit of flow rate(kg/h,t/h,Nm³/h,Nkm³/h)

DN (MM)	CO ₂	N ₂	O ₂	H ₂
25	60	60	60	28
40	150	150	150	70
50	240	240	240	112
80	600	600	600	282
100	1,000	1,000	1,000	470
150	2,000	2,000	2,000	940
200	4,000	4,000	4,000	1,880
250	6,000	6,000	6,000	2,820
300	8,640	8,640	8,640	4,060
400	15,360	15,360	15,360	7,219
500	24,000	24,000	24,000	11,280
600	34,560	34,560	34,560	16,243
700	47,040	47,040	47,040	22,108
800	61,440	61,440	61,440	28,876
900	77,760	77,760	77,760	37,807
1000	96,000	96,000	96,000	45,120
1200	138,240	138,240	138,240	64,972
1500	216,000	216,000	216,000	101,520



MODEL SELECTION AND CODING OF VORTEX FLOWMETER

AV 96 O1 - O2 - O3 - O4 - O5 - O6 - O7 - O8 - O9 - O10 - O11 - O12

- o1 Installation form: 1. In-line type • 3. Insertion type
- o2 Outer diameter/Wall thickness:
- o3 Ex-proof: 1. Normal
i. intrinsic safety • d. explosion-proof
- o4 Protect class: 1. IP65 (Integral type)
2. IP68 (Separable type)
3. IP68 (Submerged separable type)
- o5 Anticorrosion:
1. Stainless steel • 2. 316L • 3. Others
- o6 Temperature: 1. <120°C • 2. ≥120°C
- o7 Pressure:
1. 0-2.5MPa • 2. 2.5-6.0MPa • 3. Others
- o8 Power: 1. Battery (no signal output) • 2. 24VDC
- o9 Output: 1. Three-wire system frequency output
2. 4~20mA output
3. 4~20mA output + HART
4. No output signal

o10 Medium: L: Liquid • G: Gas • S: Steam

o11 Display:

- 1. Scene shows (intelligent) • 2. No scene shows

o12 MAX. flow rate:

Sample 1: AV961-219/8.5-i121112S2-20T/h
Indication: in-line type, outer diameter is 219mm, intrinsic safety type, integral type, stainless steel, medium temperature >120°C, pressure ≤ 2.5Mpa, 24VDC power supply, 4-20mA output, steam medium, no field display, MAX flow 20T/h.

Sample 2: AV963-273/11-111114L1-1200m³/h
Indication: insertion type, outer diameter is 273mm, Normal, integral, stainless steel, medium temperature <120°C, pressure ≤ 2.5Mpa, Battery supply, no signal output, liquid medium, field display, MAX flow 1200m³/h.

THE MEASUREMENT RANGE OF FLOWMETER UNDER STANDARD CONDITION (TABLE 1)

Vortex flowmeter (VSF) is a kind of the vibration meters. It simple configuration, and install conveniently. It can measure and control various liquid (e.g.: water, oil, petroleum, alcohol, acid, alkali and different chemical fluids) gas (e.g.: air, oxygen, N2, natural gas, coal gas), and steam (e.g.: saturation steam, overheated water vapor).

DN	FLOW - RATE m ³ /h		
	L	G	S
25	0.8-12	7.6-60	8-120
40	2-30	18-150	20-300
50	3-50	30-240	30-450
80	10-130	70-600	100-1300
100	20-200	120-1000	200-2000
150	45-450	240-2000	450-4500
200	90-900	480-4000	900-9000
250	125-1250	750-6000	1000-13600
300	180-1800	1080-8640	1080-16200
400	192-3200	1920-15360	1920-28800
500	300-5000	3000-24000	3000-45000
600	432-7200	4320-34560	4320-64800
700	588-9800	5880-47040	5880-88200
800	68-12800	7680-61440	7680-115200
900	972-16200	9720-77760	9720-145800
1000	1200- 20000	12000-96000	12000-180000
1200	1728-28800	17280-138240	17280-259200
1500	2700-45000	27000-216000	27000-405000
2000	4800-80000	48000-3284000	48000-720000

Table 1 The measurement range of flow meter under standard condition



Standard condition:

1. Gas: normal temperature and pressure (t=20°C, Pn=0.1MPa, ρ₀=1.292Kg/m³)
2. Liquid: normal temperature (t=20°C, ρ₀=1000Kg/m³)
3. Steam: saturation steam (t=143°C, Pn=0.4MPa, ρ₀=2.124Kg/m³)

TYPE	Normal AD	MEASUIE RANGE								
		Nm ³ /h								
INLINE	25	0MPaG	0.1MPaG	0.2MPaG	0.4MPaG	0.6MPaG	0.8MPaG	1MPaG	1.5MPaG	2MPaG
	40	7.2-60	10.2-120	12.5-180	16.1-300	19.2-420	21.6-540	23.9-660	28.8-960	33.0-1260
	50	18-150	25.5-300	31.2-450	40.2-750	45.3-1050	54-1350	59.7-1650	72-2400	82.5-3150
	80	30-240	42.4-480	52.0-720	67.1-1200	79.4-1680	90-2160	99.5-2640	120-3840	137-5040
	100	70-600	99.0-1200	121-1800	157-3000	185-4200	210-5400	232-6600	280-9600	321-12600
	150	120-1000	170-2000	208-3000	268-5000	317-7000	360-9000	398-11000	480-16000	550-21000
INSERTION	200	240-2000	339-4000	415-6000	537-10000	635-14000	720-18000	796-22000	960-32000	1100-42000
	250	480-4000	679-8000	831-12000	1073-20000	1270-28000	1440-36000	1592-44000	1920-64000	2200-84000
	300	480-3840	679-7680	831-11520	1073-19200	1270-16880	1440-34560	1592-42240	1920-61440	2200-80640
	400	750-6000	1061-12000	1299-18000	1677-30000	1984-42000	2250-54000	2487-66000	3000-96000	3437-126000
	500	1080-8640	1527-17280	1871-25920	2415-43200	2857-60480	3240-77760	35821-95040	4320-138240	4949-181440
	600	1920-15360	2715-30720	3326-46080	4293-76800	5080-107520	5760-138240	6368-168960	7680-245760	8799-322560
	700	3000-24000	4243-48000	5196-72000	6708-120000	7937-168000	9000-21600	9950-264000	12000-384000	13748-504000
	800	4320-34560	6109-69120	7482-103680	9660-172800	11430-241920	12960-311040	14328-380160	17280-552960	19797-725760
	900	5880-47040	8316-94080	10184-141120	13148-235200	15557-329280	1764-423360	19502-517740	23520-752640	26946-987840
	1000	7680-61440	10861-122880	13302-184320	17173-307200	20319-430080	23040-552960	25472-675840	30720-983040	35194-1290240
	1200	9720-77760	13746-155520	16836-233280	21735-380000	25717-544320	29160-699840	32238-855360	38880-1244160	44543-1632960
	1500	12000-96000	16971-192000	20785-288000	2683-480000	31749-672000	36000-864000	39799-1056000	48000-1536000	54991-2016000
	2000	17280-138240	24438-276480	29930-414720	38639-691200	45719-967680	51840-1244160	57311-1520640	69120-2211840	79187-2903040
		27000-216000	38184-432000	46765-648000	6037-1080000	71435-1512000	81000-194400	89549-2376000	108000-3456000	123730-4536000
	48000-384000	67882-768000	83138-115200	107331-1920000	126996-2688000	140000-3456000	159198-4224000	192000-6144000	219944-8064000	

Table 2 Measuring range table of air flow under certain working pressure (standard status :t:20 °C ,p means atmospheric pressure)

Advance Orifice Plate Based DP Flowmeters

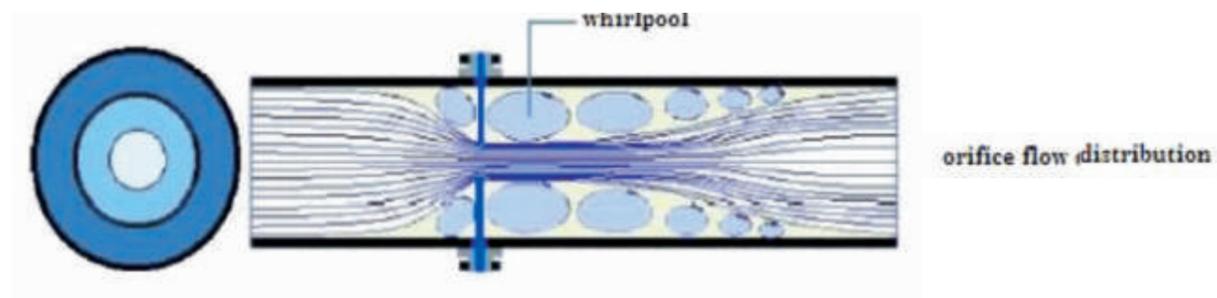
OPERATING PRINCIPLE

It operated on the principle that, when flowing fluid flow through obstruction placed in direction of flow, it create pressure drop called ΔP .

This ΔP is proportion to square root of flow flowing liquid/steam/gas inside the pipe.

Orifice plate base flow meter consist of :-

- Integral orifice plate
- Differential Pressure Transmitter
- Pressure Transmitter
- Temp. Sensor
- Measurement precision 0.3, Tenfold of Orifice Plate
- Requirement of straight pipe less than 0.5D
- Pressure loss is 1/3 of orifice plate, pressure recovering double faster than orifice plate
- Flowing noise proportion orifice plate 1:15
- Replace orifice plate to save cost directly
- Complex working conditions could be measured
- Balanced and stable, energy saving and environmental

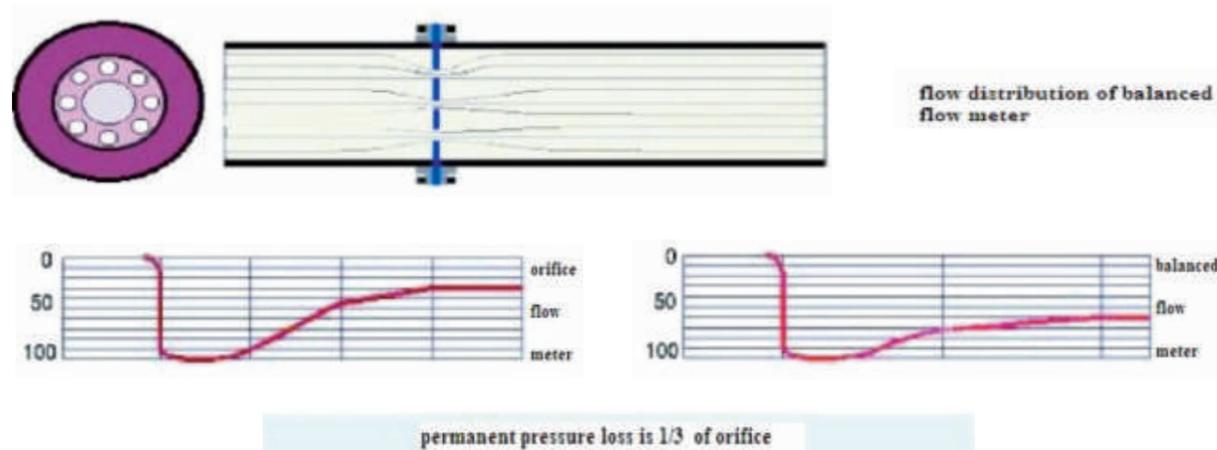


SOLUTIONS

ADDMAS balanced flowmeter is kinds of energy saving and have several function apertures, which could make flow area balanced into ideal current, leading a innovation to global measurement technology. it has already been widely used among petroleum, chemicals, metallurgy, electricity and natural gas.

ADDMAS series balanced flowmeter has a multi-hole disc throttling rectifier which is installed at pipeline section, every hole's dimensions and distribution depend on special formula and datas, they are called function hole. when current flows by the hole, it's balanced and vortex minimize, form ideal current and stable differential pressure signal by pressure device, volume flow and a mass flow are cumulated by Bernoulli equation.

Currently, energy saving has become the national policy of many countries, which is also most of enterprises focus on. Traditional flow technology makes the fluid lose ideal status, a mass of permanent pressure loss and kinetic energy consume in the vortex. also random and turbulent whirlpool disturb the repetitiveness and linearity of the measuring data, leading lower precision.



ADVANTAGES OF PRODUCT

- **High Accuracy**
Structure with multi hole could balance the flow field, reduce the vortex shake and signal noise, substantially improve the stability of flow field, make the precision improved tenfold than orifice plate, repeatability reach to 0.1%.
- **Lower requirement of straight pipe**
Because of stable flow field and twofold pressure recovery than orifice plate, the straight pipe least could less than 0.5D, which could save a mass of straight pipe, especially expensive ones.
- **Reduce the permanent pressure loss**
The design of multi hole symmetry decrease the shear force of turbulent flow and whirlpool shape, reduce the energy of motion loss, and save pretty big cost of operation energy.
- **Directly replace the orifice plate**
Be familiar with the use method and appearance of orifice plate, which allows directly replacement and adjust to the energy metering reform of changing orifice plate into ADDMAS series balanced flow meter .
- **Resistant to smudginess and blockage**
Balanced design of porous and asymmetric structure reduce the retention shape and assure dirty mediums flow through the holes.
- **Wide measuring range**
Reynolds number least to be less than 200, maximum greater than 107, β 0.25~0.9
- **Long-term and good stability**
Apparent decreasing of turbulent flow shear force drastically reduce the rub of mediums and throttling part, the stable β number and non movable parts keeps the long-term stability.
- **High temperature and pressure measuring**
MAX Working temperature 850 $^{\circ}$ C, MAX working pressure 42 Mpa.
- **Complex working conditions measuring**
Special structure design enables its special functions, which allows to all the measurements of gas-liquid two-phase mediums, all kinds of mixed gases, all kinds of lower temperature gases, stuff, multi phase stream, vibrative stream, electromagnetic interference mediums and bidirectional flow.



TECHNICAL PARAMETERS

Mediums gas, liquid, steam, gas-liquid two-phase, mixed gases, lower temperature gases, Stuff, Bidirectional flow etc.

Accuracy $\pm 0.3\%$ (5:1) $\pm 0.5\%$ (7:1) $\pm 1.0\%$ (10:1)

DN DN2~DN3800

Installation methods in-line, flange form, clamping form, square tube form, rectangular tube

Repeatability 0.10%

Working temperature 850 $^{\circ}$ C

Working pressure 42 Mpa

Pipe material carbon steel, stainless steel (1Cr18Ni9Ti), 316L

anti-explosion class explosion-proof type Exd II BT2~T5

Protection class IP65

Measuring range 1:10 (special 1:30)

Flange standard GB/T9112-9124-2000

Output signal 4-20mA (correspond 0 largest range)

Communication type RS 485, MODBUS, HART

Power 24VDC \pm 10%

FEATURES

1. No moving part , hence long life
2. Wide operating pressure range
3. Wide operating temp. range
4. Pressure / Temp. calculation and compensation, hence derivation of mass flow value
5. Provision of signal output from PLC/SCADA/DCS/Computer connectivity.