

ORDERING INFORMATION:

CODE	SERVICE
100 01	AIR
100 02	BIOGAS
100 03	LPG
100 04	ANY OTHER FLUID
200 05	STEAM

CODE	LINE SIZE
25	25 NB
40	40 NB
50	50 NB
80	80 NB
100	100 NB
150	150 NB
AO	ANY OTHER PL. SPECIFY

CODE	DENSITY COMPENSATION
01	REQUIRED
02	NOT REQUIRED

CODE	END CONNECTION
01	WNRF
02	SORF

CODE	DPT
01	BLIND
02	WITH DISPLAY

CODE	FIT
01	PANEL
02	WALL

CODE	PT
01	BLIND
02	WITH DISPLAY

GFM 100 01 50NB 01 01 01 01 01 SAMPLE ORDERING INFORMATION

Due to continuous development specifications are subject to change without prior notice.

manas microsystems pvt. ltd.

REGD. OFFICE : ROW HOUSE NO. 5, PARVATI PARK, DATTAWADI, PUNE 411 030
 WORKS : EL 54 ELECTRONIC ZONE, M.I.D.C. BHOSARI, PUNE 411 026. (INDIA)
 TEL. : 020-27127044,27127047, 27127858 FAX : 020-27127045
 E-MAIL : mktg@manasmicro.com, manasmicro@yahoo.com
 WEBSITE : www.manasmicro.com



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Crownsn @ vsnl.com nov 2005-2000

**GFM 100 & GFM - 200
GAS, AIR & STEAM FLOW METERING SYSTEM.**

INTRODUCTION:

Use our GFM series flow meter for measuring flow rates of bio-gas, LPG, compressed air, steam (saturated & superheated) in closed pipes. The flow meter is suited for wide range of applications where affordability, reliability and ruggedness are of prime importance.

In conventional system of measurement, the differential pressure generated by orifice plate is measured by D.P. transmitter. The output from D.P. transmitter after square rooting is accepted as proportional to flow - rate. This assumption is true only when density is constant.

Unfortunately, density of compressible fluid is never constant. The density of compressible fluid changes with line pressure & line temperature. Thus, introducing errors in flow rate measurement.

**MANAS MAKE GFM FLOW METERING SYSTEM:
PRINCIPLE OF OPERATION:**

GFM series provides on - line density correction to conventional system.

As per BS 1042 / ISO : 5167 standard, the equation for mass flow when measured with orifice states:

$$Q_m \propto \sqrt{\rho \cdot \Delta P}$$

Where,

- Q_m = mass flow rate.
- ρ = instantaneous density.
- ΔP = differential pressure.

Thus, by measuring line pressure & temperature & using the relevant algorithms, instantaneous density can be found out & also the state of steam (i.e. saturated / superheated) .By knowing the correct density one can compute the accurate mass-flow rate. The further operation of integration, square rooting is similar to ordinary flow Totaliser.

We, at MANAS understand our users' needs & hence offer two models for orifice flow meter: GFM100 for Biogas, LPG & air application & GFM 200 specifically for steam.

In GFM 200 the hardware like valve, temperature-sensing elements etc can be provided with IBR approval.

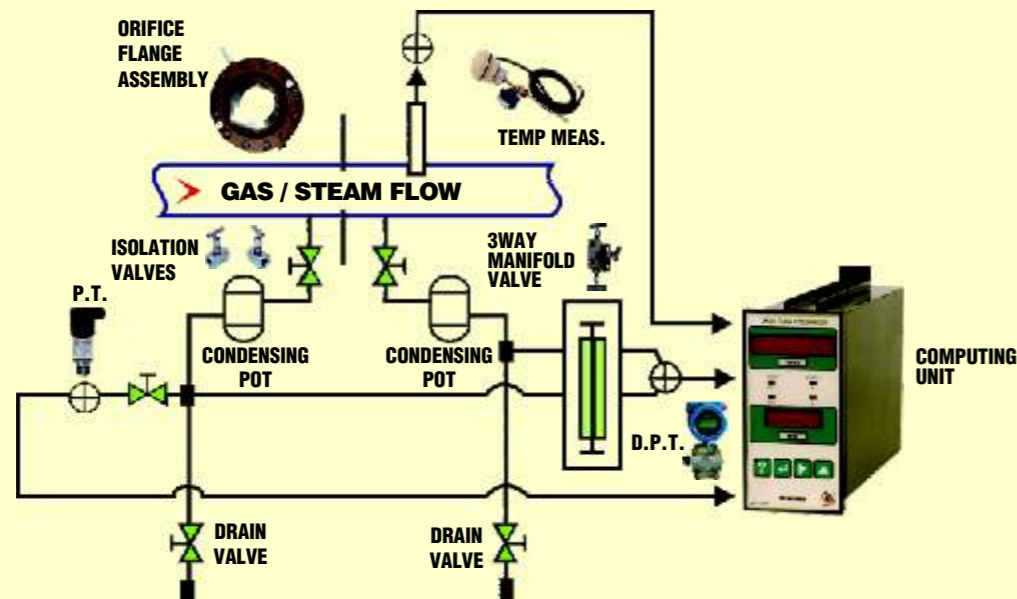
The complete GFM system is provided in chemically compatible material with the fluid and includes all the necessary hardware for the installation. Since the density

calculations for steam and gases differ, the computing units used for GFM100 & GFM200 are different. GFM series can also be used for flow measurement of non-compressible fluids like water, furnace oil etc. which increases its versatility.

PRINCIPAL ADVANTAGES OF GFM SERIES:

1. On - line density compensation possible because of on-line temperature & pressure measurement.
2. Various sizes of orifice assemblies available with accurate calculations
3. Various types of needle valves, gate valves & manifolds with or without IBR approval as per application.
4. Sturdy, rugged field mounting type pressure transmitter is supplied with standard end connections.
5. On - line display of compensated mass flow rates, density, temperature; output of DP transmitter is offered. LED indication for status of steam (saturated or superheated) is provided.
6. Various models of mass flow integrators (computing units) μ CS-3001, μ CS-3002, μ CS-3003 available to suit your application.
7. User friendly. No need to feed all the complicated orifice constants since the system is intelligent enough to calculate.
8. Isolated 4-20mA dc output proportional to compensated flow rate.
9. Disconnection of DPT, PT, Temperature sensor or TT is indicated by error message.
10. Partial system available to suit your existing uncompensated flow rate using existing orifice & DP transmitter or vortex flow meter.
11. Complete system engineered to suit your requirement.
12. Typical Turndown 10:3.
13. Accuracy: $\pm 3\%$ of actual reading.
14. It is a standard system & highly reliable.
15. It is easy to maintain. Calibration of orifice, DP transmitter, pressure transmitter is easy & inexpensive.
16. No moving parts.

**Schematic
Arrangement for
GFM Series**



**GFM 100 & GFM - 200
GAS, AIR & STEAM FLOW METERING SYSTEM.**

MANAS MAKE INTEGRAL ORIFICE ASSEMBLY :

The INTEGRAL ORIFICE ASSEMBLY is a flow element capable of adapting to DP transmitter to make a compact, complete flow metering transmitting device without the need of separate impulse piping.

ADVANTAGES OF INTEGRAL ORIFICE :

1. It provides simple & cost-effective solution.
2. Increase in reliability.
3. Installation cost reduces.
4. Time is saved because the unit is supplied as one complete solution.
5. Available in sizes from 1/2" to 1 1/2".

APPLICATION :

GFM series is most suitable for compressible fluids, which are difficult to measure because of variations in their pressure and temperature.

IDEAL FOR :

- Sectors generating & consuming steam.
- Measuring compressor efficiency.
- Measuring biogas, LPG consumption & many other similar applications.

SECTORS :

- Chemical / Pharmaceutical.
- Food & Drugs.
- Petrochemicals
- Fertilizers.
- Steel / Aluminium.
- Sugar Factories / Distilleries.

*** SPECIFICATIONS:**

1. Service Composition : Biogas, Compressed Air, Compressed Gas, LPG, Steam. User to specify.
2. Size : 1/2" to 14"
3. Type of Flow meter : Differential Pressure Type.
4. Flow Element : Orifice / Integral Orifice / Nozzle
5. MOC Of Flow element : SS 316
6. Density Compensation : Can be provided.
7. Type of Flanges : WNRF (Weld Neck Raised Face) / SORF (Slip On Raised Face)
8. MOC of Flange : C.S / S.S / P.P.
9. Flange Rating : ANSI 150 / ANSI 300 / ANSI 600
10. Type Of Taps : Flanged Tapping / Corner Tapping / D & D/2
11. No. Of DP Tappings : 1 Pair
12. No. Of Drain Tappings : 1 Pair
13. Design Standard : BS - 1042 / ISO : 5167
14. Accuracy : $\pm 3\%$ of actual reading

* Specifications are subject to change without prior notice.

WHY ORIFICE BASED FLOW METER PREFERRED OVER VORTEX METER?

Sr. No.	Parameter	Orifice	Vortex
1.	Well established standards	Available	Not Available
2.	Suitability for high pressure & temperature application (steam)	Most suitable	Seal fails in majority of cases after certain duration.
3.	Installation	Easy to install	Critical & expensive because of requirement of special machined pipe lengths.
4.	Existing pipe line modifications for installation	No modifications required.	Design is based on velocity & not on line size. As a result customer line size & selected flow meter size may differ.
5.	Recalibration of transmitter	Easy & can be done in house	Has to be done on a flow-rig and hence is expensive
6.	Changes in Pressure, Temperature	Taken care during density compensation.	May or may not be taken care of.
7.	Suitability for line size 1" & below	Integral orifice assembly . available	Not practical.
8.	Suitability for higher line sizes 8" & above	Suitable.	Higher cost as compared to orifice & limited output pulse resolution.
9.	Suitability for low velocity measurement	Suitable	Not suitable
10.	Durability	No moving parts and hence less wear and tear and virtually maintenance free	Diaphragm based sensor and hence is prone to wear and tear.