







HAPT-1(2)F General Information



Measurement principle of Hitbar sensor is explained below. When a Hitbar is installed in the pipeline through which the fluid is flowing, the flow velocity at the front side of Hitbar becomes zero for a moment, the pressure at this location is called as a stagnation pressure, and the difference between the stagnation pressure and the static pressure inside the pipeline is termed



as a dynamic pressure. This dynamic pressure has a certain relationship with the flow velocity in the pipeline, and therefore, once stagnation pressure and static pressure are measured, then the dynamic pressure can be obtained.

Design of Hitbar Sensor

There is almost no vibration since the configuration of cone-type Hitbar sensor is fluid-mechanically designed so that the fluid drag force becomes the minimum, and the

constant pressure distribution is generated. Hitbar flow sensor consists of one body, and averaged dynamic pressure over the entire cross section of the pipeline is transferred through two sensing ports and pressure measuring tubes. The pressure difference between stagnation pressure and static pressure, so called dynamic pressure is proportional to the square of flow rate according to Bernoulli equation.

Maximum pressure difference and flow ranges(HAPT-1F)

Pipe	Sensor Size : 1"				
Size	Р	GPM	SCFM		
2″	185	230	880		
3″	105	390	1500		
4″	70	560	2100		
6″	40	970	3700		
SCFM : Air @14.73 Psia, 60°F GPM : Water @60°F, SG=1.0 P : Inch of water column					

	Sensor Size								
Pipe		1 " 1 1/2 "			2 "				
Size	DP	GPM	SCFM	DP	GPM	SCFM	DP	GPM	SCFM
2 "	1200	590	2200						
3 "	590	940	3500						
4 "	370	1200	4900						
6 "	1800	2000	8000	600	3700	14000			
8 "				370	5100	19000			
10 "				250	6600	25000			
12 "				180	8000	31000	30	12000	47000
14 "				150	9000	34500	360	13500	53000
16 "				115	10500	40000	280	16000	62000
18 "				95	12000	46500	220	18000	71000
20 "				75	13500	53000	180	21000	81000
24 "				55	15000	65000	130	26000	100000
30 "				35	22000	84000	85	34000	130000
36 "				25	27000	10000	60	42000	160000
42 "				20	32000	120000	45	50000	190000
48 "							35	59000	255000
60 "							25	725000	285000
72 "							15	91000	345000
SCFM : Air (a) 14.73 Psia, and 60°F GPM : Water (a) 60°F, SG=1.0 DP : Inch of water column									

Maximum pressure difference and flow ranges(HAPT-2F)

Advantages

System Arrangement

Measuring fluid	liquid, gas, steam and etc.	Specifica	tions
Material	304 SS	opeenieu	
	option : 316 SS, 316L SS, Monel, and etc.		
Pipe size	from 50 mm to 1800 mm(2 " to 72 ")		
Flow ranges	refer above table		
Pressure difference ranges	refer above table		
Operating temperature	300 °C		
	option : maximum 600 $^\circ \!\!\!\!\!\!\mathrm{C}$		
Operating pressure	10 kgf/cm ²		
	Option : 150 kgf/cm ²		
Accuracy	± 1.0 % FS		
Reproducibility	± 0.1 % FS		
Turndown ratio	10:1(extensible according to request)		

- * It is easy to install since it is inserted into the pipeline.
- * Welding of mounting hardware is small compared with the other differential pressure flow meter.
- * Operating energy cost is reduced since it has a less permanent pressure loss compared with other differential pressure flow meters such as an orifice plate.
- * It has a very high measurement accuracy since the discharge coefficient is obtained using HITROL's flow standard facilities which is traceable to and a part of Korean National Calibration System.
- * It has a high measurement accuracy since it measures the averaging velocity in the pipe.
- * When measuring the incompressible fluids
- 1 HAPT-1(2)F flow sensor
- 2 3-way or 5-way valve
- ③ differential pressure transmitter ⑤ pressure transmitter
- * When measuring the compressible fluids
- 1 HAPT-1(2)F flow sensor 2 3-way or 5-way valve
- ③ differential pressure transmitter
- (4) flow computer or flow indicator
- (4) flow computer or flow indicator (6) temperature transmitter (PT 100Ω)



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Assembly Parts

HAPT Instrument Valve

Schematic diagram	Description	Material
	Ball valve 1/2″ NPT max. 85 bar at 40 ℃ 16 bar at max. 230 ℃	CS 316SS
	Ball valve 1/4″ NPT max. 85 bar at 40℃	CS
	16 bar at max. 230 ℃	316SS
	Shut-off valve 1/4" NPT	CS
	max. 85 bar at 40℃ 16 bar at max. 230℃	316SS
	Shut-off valve 1/2" NPT	CS
	max. 400 bar at 90 ℃ 270 bar at max. 240℃	316SS

HAPT Mounting Hardware

HAPT-1F		HAPT-1F	
Without assembly parts MH 01		Without assembly parts	MH 11
With assembly parts MH 02 material CS(Standard)		With assembly parts material CS(Standard)	MH 12
With assembly parts MH 03 material 316		With assembly parts MH 1 material 316	
Flange DN 25		Flange DN 32	

HAPT-2F		HAPT-1F		HAPT-2F	
Without assembly parts	MH 21	Without assembly parts MH 31 Without as		Without assembly parts	MH 41
With assembly parts material CS(Standard)	MH 22	With assembly parts MH 32 material CS(Standard)		With assembly parts material CS(Standard)	MH 42
With assembly parts material 316	MH 23	With assembly parts material 316	MH 33	With assembly parts material 316	MH 43
Flange DN 32		Flange DN	I 65	Flange DN 65	

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Hitbar can be designed and the differential pressure can be calculated only when the flow parameters shown below should be known

When the fluid is incompressible

Tag No.		
Flow parameter		
Max. Flow Rate(m ³ /h)		
Min. Flow Rate(m ³ /h)		
Max. Temperature(°C)		
Max. Pressure(psia)		
Pipe Inside Diameter(mm)		
Density(kg/m ³)		
Viscosity(cP)		

When the fluid is compressible or steam

Tag No.		
Flow parameter		
Max. Flow Rate(m ³ /h)		
Min. Flow Rate(m³/h)		
Max. Temperature(℃)		
Max. Pressure(psia)		
Pipe Inside Diameter(mm)		
Density(kg/m³)		
Viscosity(cP)		

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