

HH5 Variable Area Flowmeter (2013 Edition)

1.Introduction

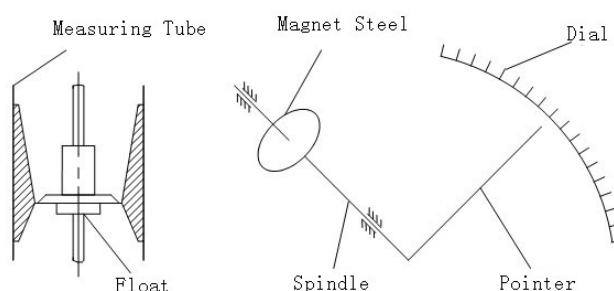
HH5 series variable area flowmeter is a kind of measuring meter which the flow rate is changing along with the area and is widely used in the process control of industrial automation. It has the merit of little volume, broad measuring range and convenience for use. It can be used to measure liquid, gas and vapor flow especially fits for the flow rate measurement of low flow velocity and little flow rate.

HH5 series variable area flowmeter has local indication type and smart remote type with a pointer LCD displaying instantaneous/ accumulated flow rate, upper-limit and lower-limit alarm output, accumulative pulse output, batch control, standard two-wire 4-20mA current output, ect. Additionally, this instrument employs advanced microprocessing central chip and high-quality industrialized components of Motorola corporation to ensure the good performances of flowmeters in all applicational fields.



For many years variable area flowmeter are well received by many industries such as petrochemical, steel and iron, electric power, metallurgy, light industry, food, pharmacy and water processing.

2.Function



The series HH5 flowmeter consists essentially of three basic parts:

- the metering tube
- the tapered float
- the indicator.

The flow rate determines the position of the float, the meter float is in dynamic balance, when the difference

between the weight of the float and the weight of the displaced fluid equals the upward pressure resulting from the fluid velocity through the meter. The annular area between the tapered float and the tube increases until the upward and downward forces are in dynamic balance.

Since the position of the float in the metering tube can not be seen, an indicator is required, this indicator employs a magnetic coupling where a magnet follows the position of the float. The float encase an ALNICO-transmitting magnet with two follower magnets arranged in parallel on the indicator shaft.

3.Special features

- Firm work, little maintenance and long life
- Low requirements to straight pipe part
- Broader ratio of flow rate 10:1
- Two-wire LCD indicator; instant/accumulated display of flow rate are available; backlight option.
- Single axis and sensitive display
- Rotation of non-contact magnetic coupling
- Can be applied to hazardous occasions such as flammable and explosive ones
- All-metal structure, fit for high temperature, high pressure and mediums with strong erosion.
- power supply such as two-wire system, battery, alternating current option
- Multi-parameters calibration function
- Function of date recovery, date copy and power-off protection

4. Technical data

Table 1

Measuring range	water (20°C) 1- 200000 l/h Air (20°C , 0.1013 Mpa) 003-4000m ³ /h Make reference to flow rate sheet, order for special flow rate
Ratio of spans	standard type 10 : 1 special type 20 : 1
Accuracy	standard type class1.5 special type class1.0
Pressure Class	DN15-DN50 4.0Mpa; DN80 -DN200 1.6Mpa; Special type: DN15-DN50 25Mpa; DN80 -DN200 16Mpa; Pressure class of clamp cover is 11.6 Mpa Contact the plant for special type before choosing the type and ordering
Pressure loss	7kPa-70kPa
Medium temperature	standard type : -80°C ~ + 200°C : PTFE : 0°C ~ 85°C High temperature type : at most 400°C

Medium viscosity	DN 15 : $\eta < 5\text{mPa}\cdot\text{s}$ (F15.1-F15.3) $\eta < 30\text{mPa}\cdot\text{s}$ (F15.4-F15.8) DN 25 : $\eta < 250\text{mPa}\cdot\text{s}$ DN 50-DN 150 : $\eta < 300\text{mPa}\cdot\text{s}$
Ambient temperature	liquid crystal type -30°C ~+85°C Pointer type -40°C ~ +120°C
Connection forms	DIN 2510 standard flange Special type : flange and thread appointed by users of any standard
Cable interface	M20 × 1.5
Power Supply	standard type : 24V DC two-wire 4~20 mA (10.8 VDC ~ 36 VDC)
Alarm output	upper limit and lower limit instant flow rate alarm Standard type: collect electrode open circuit output (at most 100mA@ 30VDC inner impedance 100Ω) Special type : relay output (feeler capacity at most 5A @ 250 VAC)
pulse output	accumulated pulse output, least interval 50 milliseconds
Liquid crystal display	indication range of instant flow rate : 0-50000 Indication range of accumulated flow rate : 0-99999999
Protection class	IP65
Explosion-proof symbols	intrinsically safe : Exia IICT3-6 Explosion separation type : ExdIIBT4

5.HH50 Variable Area Flowmeter Description for Selection

Code	Description		
	Mounting	Fluids Direction	Wetted Parts Material
HH50	Vertical	Low in and Top out	316 SST,304 SST,PTFE,HC, Titanium
HH51	Vertical	Top in and low out	316 SST, 304 SST, 316L
HH 52	Side-Side	Side in and side out	316 SST, 304 SST, 316L
HH 53	Bottom-side	Low in and Top horizontally out	316 SST, 304 SST, 316L
HH 54	Screw	Low in and Top out	316 SST, 304 SST, 316L
HH 56	R	Horizontal	Right in and left out
	L	Horizontal	Left in and right out

Code	Measuring tube structure		
50	Low in and Top out direction; vertical mounting		
51	Top in and low out; vertical mounting		
52	Side in and side out; Side-Side mounting		
53	Low in and Top horizontally out; Bottom-side mounting		
54	Low in and Top out ; Screw mounting		
56R	Right in and left out ;horizontal mounting		
56L	Left in and right out ; horizontal mounting		
	Code	Tube Diameter	
	15	DN15	
	25	DN25	
	50	DN50	
	80	DN80	
	100	DN100	
	150	DN150	
	200	DN200	
		Code	Measuring Media
		L	Liquid
		G	Gas
		Code	Indicator Options
		M1	Local indication, square shell body, mechanical pointer displaying instant flow rate
		M2	Power supply type square shell body, mechanical pointer displays instant flow rate, LCD display of instant/accumulated flow rate
		M3	Power supply type round shell body, no mechanical pointer indicates, LCD display of instant/accumulated flow rate
		Code	Power supply
		A	No power supply, Only for M1 indicator
		B	220VAC 50Hz power supply,4-20mA signal output, back light allowed
		C	Battery power supply, no signal output
		D	24VDC two wire power supply, 4-20mA signal output, no back light
		E	24VDC three-or-four-wire power supply, 4-20mA signal output, back light allowed
		Code	Alarm or pulse output
		K1	No alarm or pulse output
		K2	Upper-limit alarm or one-way pulse output
		K3	Lower-limit alarm or one-way pulse output
		K4	Upper-limit or Lower-limit alarm or two-way pulse output
		Code	Explosion-proof
		X	non-explosion-proof
	1	Intrinsically safe ia II CT5 square shell body	
	d	Explosion separation type d II BT4 round shell body	
	Code	Wetted Parts material	

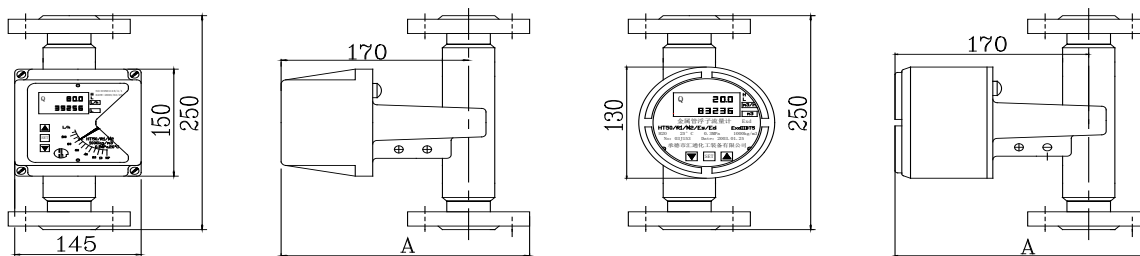
							R0	SS316
							R1	SS304
							Rp	PTFE
							Ti	Titanium alloy
							RL	316L
							Code	Accessory *
							X	None
							T	<input checked="" type="checkbox"/> Jacket type(only HH-51, HH-52, HH-53R, HH-53L)
							Z	Damping type
							G	High temperature type
							Y	High pressure type

* Accessories	Description
Damping Type	To measure air or for the application when inlet pressure is unstable.
Jacket Type	For Heat Preservation or cooling purpose
High Temp.	≥220°C
High press	≥ 4.0MPa

6.Dimensions & Weights

1) HH50 Type

A. HH50 Standard Type



Intrinsically Safe

Explosion-Proof

Table 6

Nominal Size	DN15	DN25	DN50	DN80	DN100	DN150
A (mm)	220	230	255	270	280	320
Weight (kg)	5.0	6.5	10	15.5	17	35

B. HH50/T Clamp-on Type

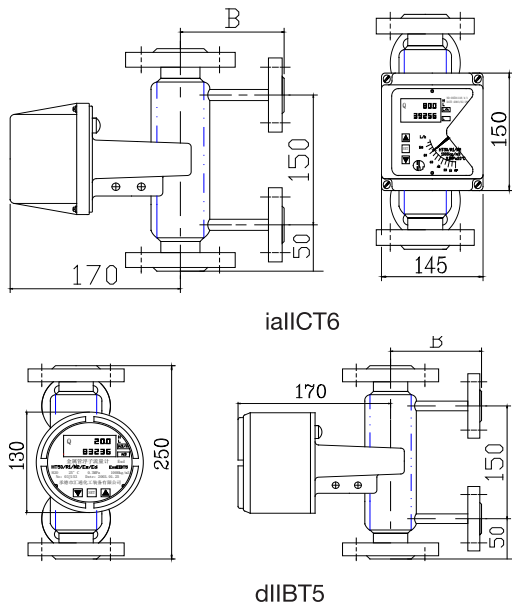


Table 7

Nominal	Size B (mm)	Weight(kg)
DN15	100	7.5
DN25	110	10
DN50	120	13
DN80	140	19
DN100	150	21
DN150	180	38

C. HH50 PTFE wetted parts

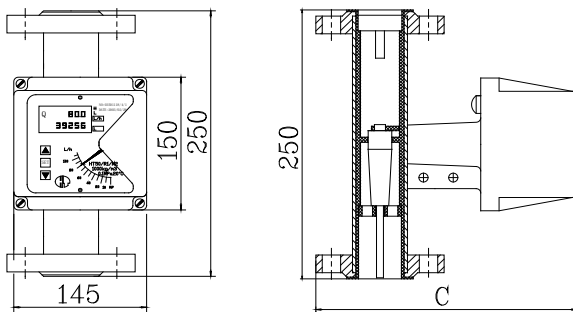


Table 8

Nominal	SizeC (mm)	Weight(kg)
DN15	220	5.0
DN25	230	6.5
DN50	255	10
DN80	270	15.5
DN100	280	16.5

2) HH51 Type

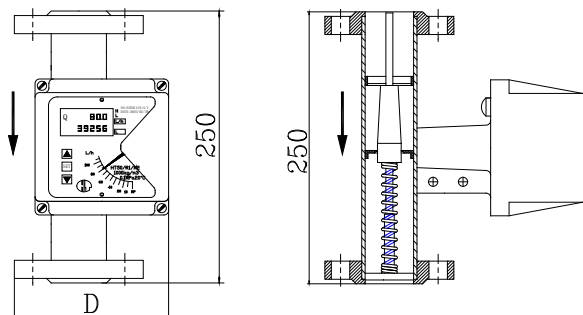
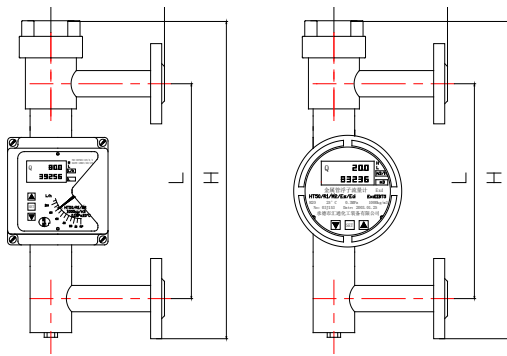


Table 9

Nominal	Size D(mm)	Weight (kg)	Pressure loss(kpa)
DN50	190	10	18
DN80	220	15.5	22
DN100	240	17	28
DN150	320	35.5	35

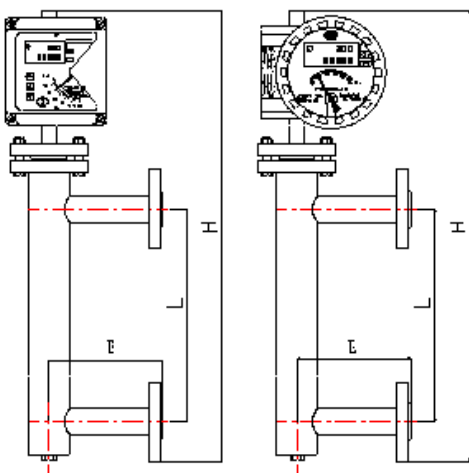
3) HH52 Type



(DN15 ~ DN25)

Table 10

Nominal Size	DN15	DN25
E (mm)	120	120
L (mm)	250	250
H (mm)	500	500
Weight(kg)	6	7.2
Pressure loss	(kpa)21	30

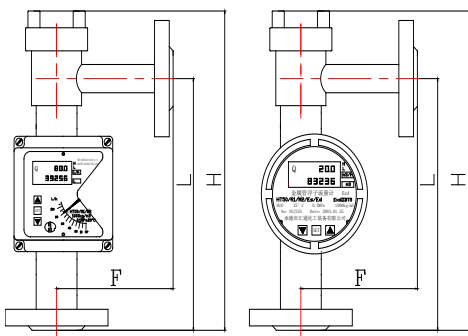


(DN50 ~ DN150)

Table 11

Nominal Size	E (mm)	L (mm)	H (mm)	Weight (kg)	Pressure loss (Kpa)
DN50	120	250	650	13	36
DN80	150	300	800	34	45
DN100	150	300	800	49	58
DN150	180	350	850	66	63

4) HH53 Type

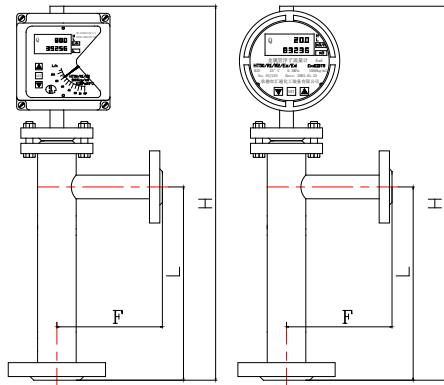


(DN15 ~ DN25)

Table 12

	DN15	DN25
F (mm)	120	120
L (mm)	250	250
H (mm)	350	350
Weight(kg)	4.5	7
Pressure loss(kpa)	18	22

Table 13



(DN50 ~ DN150)

Nominal Size F (mm)	F (mm)	L (mm)	H (mm)	Weight (kg)	Pressure loss (Kpa)
DN50	120	250	600	13	28
DN80	150	250	700	34	35
DN100	150	250	700	49	45
DN150	180	300	760	66	58

5) HH54

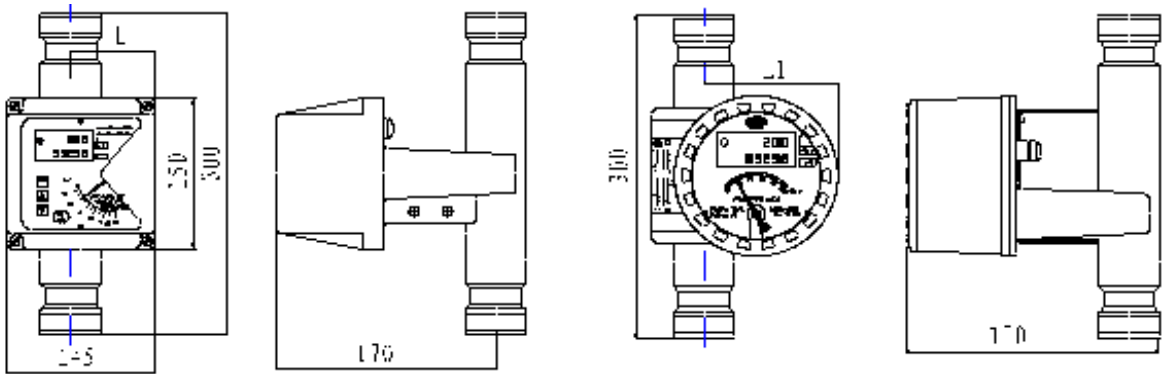
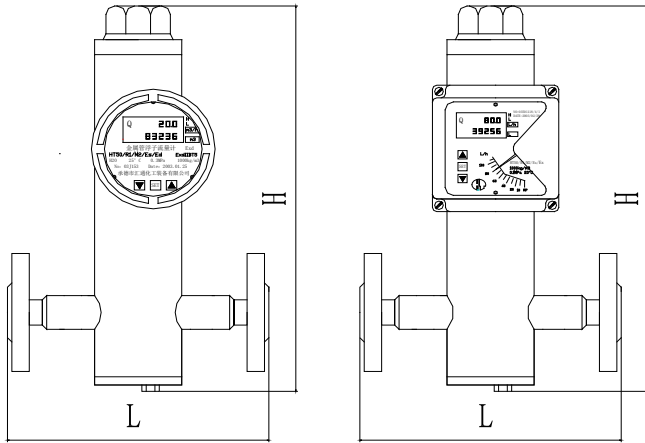


Table 14

Nominal Size	Max Operating Pressure (bar)	L (mm)	L1 (mm)	Weight (kg)
DN15	40	80	75	2
DN25	40	90	85	3.5
DN50	40	105	100	5
DN80	25	120	115	7.5
DN100	25	130	125	10.5

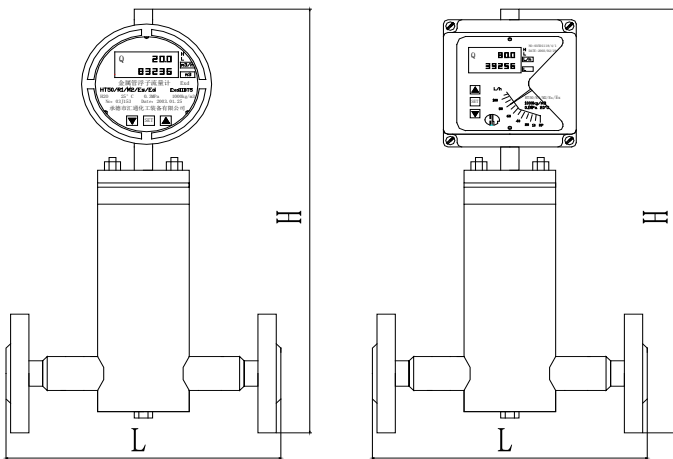
6) HH56 Dimensions,Weights,Pressure Loss



(DN15 ~ DN25)

Table 15

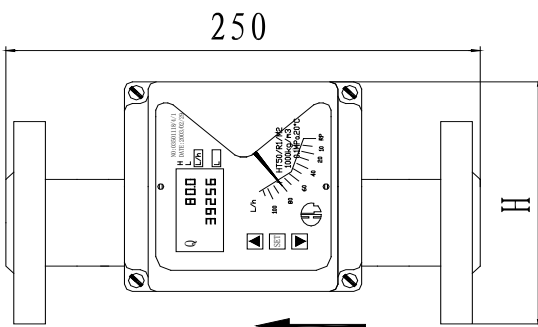
Nominal Size	DN15	DN25
L (mm)	250	250
H (mm)	380	400
Weight(kg)	5.5	9.5
Pressure Loss (kpa)	30	35



DN50

Table 16

Nominal Size	DN50
L (mm)	250
H (mm)	480
Weight(kg)	20
Pressure Loss (kpa)	42



(DN80 ~ DN150)

Table 17

Nominal Size	DN80	DN100	DN150
H (mm)	220	240	320
Weight (kg)	15.5	17	35.5
Pressure Loss (kpa)	22	28	35

7. Accessories Choosing and Installation Illustration

It is critical for the stable system running and measuring accuracy to choose appropriate variable area flow meters and the accessories. Some points are worth drawing attentions

1) For some transmitter type variable area flow meters, Hazardous area protection should be carefully considered; firm enclosure and sealed electrical ports need to meet the demand of flame-proof, intrinsically safe and whether proof.

2) When the temperature of the medium is higher than 220°C or extremely low, the transmitters of flow meters need to be taken methods of heat preservation or insulation, then high temperature indicators need to be chosed.

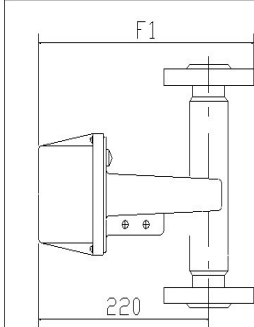
3) for some medium with heat preservation or cooling methods, clamped type variable area flow meter are needed. Standard clamped type connecting is DIN2501, DN15, PN16 flanges, other standard flanges or screw are available upon requirement.

4) When the inlet of the flow meter is unstable medium, such as air, Damping Type variable area flow meter is needed to ensure the accuracy and lifetime.

5) When the pressure rating of the medium is much high, which exceeded the standard pressure (4.0Mpa), high pressure type variable area flow meter need to be chosed. Standard high pressure type is HG20595-97 welding neck flanges, other standard flanges are available upon requirement.

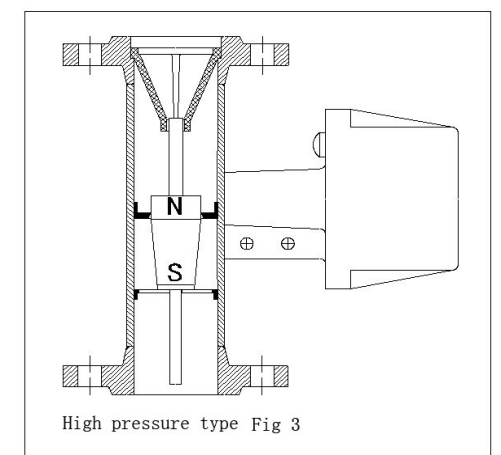
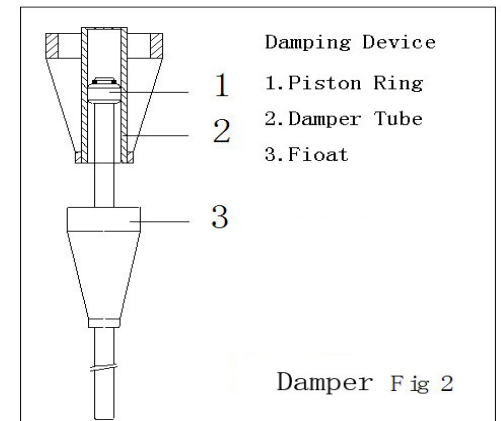
6) The Perpendicularity of the measuring tube is more than 5%, by-pass piping is needed for maintenance and cleaning.

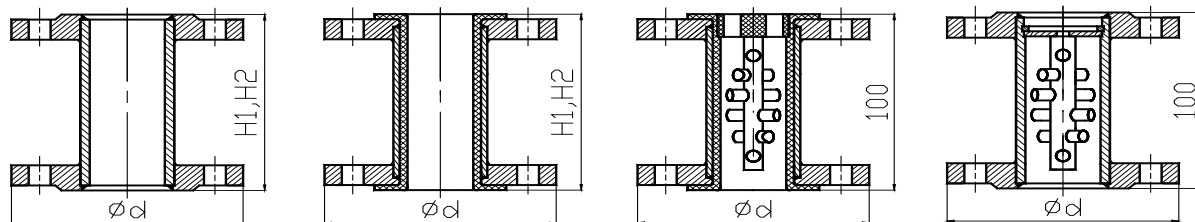
7) Straight pipe inlet length of the flow meter is $\geq 5D$, outlet length of the straight pipe is more than 250mm. when the medium contains ferro magnetic substance, magnetic filter is required. (see following magnetic filter and straight pipe figures)



Caliber	F1
DN15	270
DN25	280
DN50	305
DN80	320
DN100	330
DN150	370

High Temperature Fig 1





Pipeline

PTFE Pipeline

PTFE Magnetic filter

Magnetic filter

Table 18

Meter size	DN15	DN25	DN50	DN80	DN100	DN150
H1 ≥ (mm)	75	125	250	400	500	750
H2 ≥ (mm)	250	250	250	250	250	250
Fd (mm)	95	115	165	200	220	285

Note: Straight pipe and magnetic filter are all DN2501 standard flanges, special standard upon requirement

8)Control valve in the measuring system should be in the downstream of the flow meter, when air is measured, working pressure should be higher than the 5 times of pressure loss of flow meter.

9)The Pipes should be cleaned before installation, stopping elements should be taken out during installation; after installation, control valves should be opened slowly to avoid damage to the flow meter.

10)For HH50 & HH56 Horizontal mounting variable area flow meters, in-built magnetic filter can be chosen. For HH50 Type, the length of the in-built magnetic filter is 350mm.

8.Flow Range & Pressure Loss

Table 19

Diameter	Float No.	Water (L/h)		Air
		Material Ro, R1, Ni, RL	Material PTFE	m3/h
DN15	F15.0	1~10		0.03~0.3
	F15.1	1.6~16		0.05~0.5
	F15.2	2.5~25		0.07~0.7
	F15.3	4.0~40	1.6~16	0.11~1.1
	F15.4	6.3~63	2.5~25	0.18~1.8
	F15.5	10~100	4.0~40	0.28~2.8
	F15.6	16~160	6.0~60	0.4~4
	F15.7	25~250	10~100	0.7~7
	F15.8	40~400	16~160	1.0~10
	F15.9	63~630	25~250	1.6~16
DN25	F25.0	63~630		
	F25.1	100~1000	63~630	3.0~30
	F25.2	160~1600	100~1000	4.5~45
	F25.3	200~2000		
	F25.4	250~2500		
	F25.5	320~3200	60~1600	7.0~70
	F25.6	400~4000		
	F25.7	500~5000	200~2000	12~120
	F25.8	630~6300	250~2500	18~180
			320~3200	
DN50	F50.0	500~5000		
	F50.1	630~6300	400~4000	18~180
	F50.2	1000~10000	630~6300	25~250
	F50.3	1600~16000	1000~10000	40~400
	F50.4	2000~20000	1600~16000	
	F50.5	2500~25000		63~630
DN80	F80.0	1600~16000		
	F80.1	2000~20000		
	F80.2	2500~25000		
	F80.3	4000~40000	1600~16000	70~700
	F80.4	6300~63000	2500~25000	120~1200
		4000~40000	180~1800	
DN100	F100.0	4000~40000		
	F100.1	6300~63000	4000~40000	180~1800
	F100.2	8000~80000	6000~60000	
	F100.3	10000~100000	8000~80000	300~3000
DN150	F150.0	8000~80000		
	F150.1	10000~100000		
	F150.2	15000~150000	8000~80000	300~3000
	F150.3	20000~200000		
DN200	F200.0	15000~150000		
	F200.1	20000~200000		