DVT 系列涡街流量计

选型手册

西斯特控制设备（天津）有限公司

2021.08

目录

提示信息

⚠警告 Caution
本产品隔爆外壳紧固螺栓应保证抗拉强度≥700MPa，屈服强度≥450MPa。 The product explosion-proof shell fastening bolts should ensure that the tensile strength ≥ 700MPa, yield strength ≥ 450MPa

⚠警告 Caution
样品表面涂层有潜在静电电荷危险，使用时用湿布擦拭。 Sample surface coating is a potential electrostatic charge hazard, wipe with a damp cloth when in use.

一．产品概述

One． Vortex Flowmeter Instruction

涡街流量计是一种应用卡门涡街原理的流量计，用于测量液体、气体和蒸汽的流量，也可测量含有微小颗粒、杂质的浑浊液体，广泛应用于石油、化工、制药、造纸、冶金、电力、环保、食品等行业。

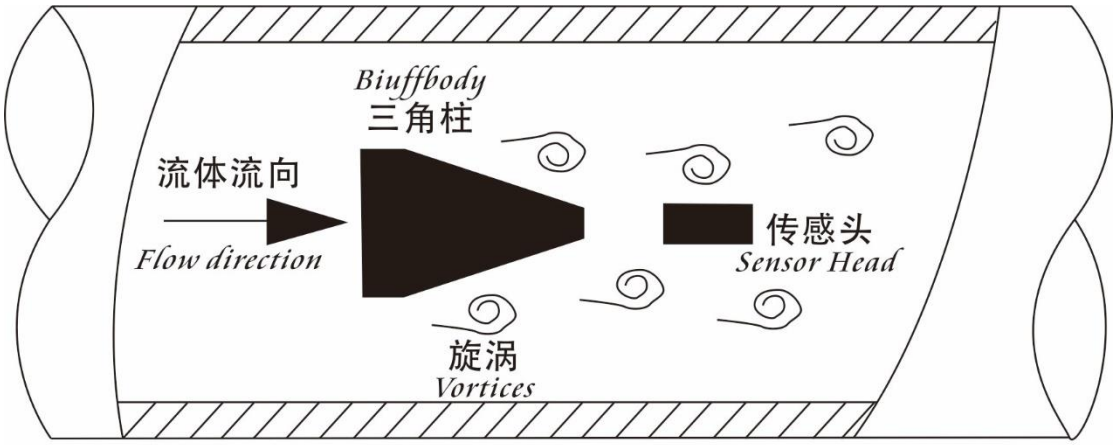
Vortex Flowmeter is on the principle of Karman street, to measure liquid, gas and vapour even turbid liquid including micro grain and impurity. Applications: petroleum, chemical industry, paper making, metallurgy, electric force, environmental protection, food industry and etc.

二．工作原理

Two.　Working Principle

DVT 系列涡街流量计是以卡门和斯特罗哈尔有关旋涡的产生和旋涡与流量关系的理论为依据来测量蒸汽、气体及低粘度液体的流量的。如图一所示，在表体中垂直插入一根三角柱即旋涡的发生体，当表体中有介质流过时，在三角柱的后面交替产生方向相反有规则的卡门旋涡，其旋涡的分离频率 F 与介质的流动速度 V 成正比。通过传感头检测出旋涡的个数，就可以测算出流体流速，再根据表体口径计算出被测介质的体积流量。

Series DVT Vortex flowmeter work on the principle of generated vortex and relation between vortex and flow by theory of Karman and Strouhal, which specialize in measurement of steam, gas and liquid of lower viscosity. As shown in below illustration, medium flows through bluff body and then vortex is generated, vortices are alternately formed on both sides with opposite directions of rotation, Vortices frequency is directly proportional to medium velocity. Through numbers of vortices that is measured by sensor head, medium velocity is calculated, plus flowmeter diameter, final volume flow come out.



图一 *Fig.1*

计算公式如下：

Computational formula as follows:

$$F = St * V / md \quad \text{公式 1}$$

$$Q = 3600 * F / K \quad \text{公式 2}$$

$$M = Q * \rho \quad \text{公式 3}$$

$$F = St * V / md \quad \text{Formula 1}$$

$$Q = 3600 * F / K \quad \text{Formula 2}$$

$$M = Q * \rho \quad \text{Formula 3}$$

式中 Among Formula:

- F……流体流过涡街流量计三角柱产生的旋涡频率（单位：Hz）

  Fluid flow through bluff body generate frequency of vortex (Unit : Hz)

- St… 斯特罗哈尔常数（无量纲）

  Strouhal constant (zero dimension)

- V……管道内流体平均流速（单位：m/s）

  Mean velocity of fluid inside the pipeline (Unit : m/s)

- m……三角柱两侧弓形流通面积与测量管道的横截面积之比（单位：无量纲）

  The ratio between Lune Circulation area of bluff body at both sides and cross-sectional area (Unit: zero dimension)

- d……涡街流量计表体内三角柱迎流面宽度（单位：m）

  Upstream face width of bluff body inside vortex flowmeter (Unit : m)

- D……涡街流量计表体内径（单位：m）

  Inside diameter (ID) of vortex flowmeter (Unit : m)

- Q……瞬时体积流量（单位：m^3/h）

  Instantaneous volume flow (Unit : m^3 / h)

- K……涡街流量计的仪表系数（单位：脉冲个数/立方米）

  Instrument coefficient of vortex flowmeter (Unit : pulses / m^3)

- M……瞬时质量流量（单位：kg/h）

  Instantaneous mass flow (Unit : kg/ h)

- ρ.....流体密度（单位：kg/ m^3）

  Fluid density (Unit : kg/ m^3)

注：不同口径的涡街流量计，仪表系数 K 值是不同的，其具体数值是通过流量标定装置实际标定得到的。即流过工况下一立方米流体传感器输出的脉冲数。

Note: vortex flowmeter "K" coefficient is corresponding with one diameter, the exact "K" value should be calibrated in practice. Viz. one cubic meter fluid through sensor output numbers of pulse under working condition.

三．技术参数

Three.　Technical Parameters

3.1 物理参数

3.1 Physical Parameters

- 测量介质：液体、气体（含天然气）、蒸汽（饱和蒸汽、过热蒸汽）

Medium: liquid , gas (including natural gas), steam (saturated steam and superheated steam)

- 公称通径

DVT2100 管道式：DN10~DN500

DVT2150 插入式：DN200~DN2000

Normal diameter
DVT2100 Pipeline-version: DN10~DN500
DVT2150 insertion-version: DN200~DN2000

- 精度等级:

DVT2100 管道式：1.0 级、1.5 级（0.5 级、0.2 级协议供货）

DVT2150 插入式：2.5 级　(1.5 级、1.0 级协议供货)

Accurate:

DVT2100 Pipeline-version:　±1.0%,±1.5% (±0.2% & ±.5% supply by negotiation)

DVT2150 insertion-version:　±2.5% (±1.0% & ±1.5% supply by negotiation)

- 流量范围：见表 2、表 3、表 4、表 5、表 6、表 7

FLOW RANGE：see table 2~7

- 数字滤波智能型涡街流量计流速范围: 液体（0.30 m/s~10 m/s）、气体、蒸汽（3.0 m/s~90 m/s）

Velocity scope of flow about intelligent digital filtering vortex flowmeter
Liquid (0.30 m/s~10 m/s),　Gas/steam (3.0 m/s~90 m/s)

- 公称压力: DVT2100 管道式法兰卡装：DN10~DN500（首选压力等级 PN2.5MPa）

DVT2100 管道式法兰连接：DN10~DN80　（首选压力等级 PN2.5MPa）

DN100~DN200（首选压力等级 PN1.6MPa）

DN250~DN500（首选压力等级 PN1.0MPa）

DVT2150 插入式连接法兰：DN200~DN2000 （首选压力等级 PN1.6MPa）

Normal pressure:

DVT2100 pipeline-version wafer connection: DN10~DN500 (priority PN2.5MPa)

DVT2100 pipeline-version flange connection: DN10~DN80 (priority PN2.5MPa)

DN100~DN200 (priority PN1.6MPa)

DN250~DN500 (priority PN1.0MPa)

DVT2150 insertion-version attachment flange: DN200~DN2000 (priority PN1.6MPa)

注：卡装式涡街使用厂家特制专用法兰，出厂时已含配对法兰（法兰连接型涡街法兰执行国家标准 GB/T 9119-2010; ANSI/ASME/DIN/JIS/KS.....）首选压力等级为出厂默认压力等级，其它压力等级或其它法兰标准可协议供货

Note : wafer-version vortex flowmeter assemble made-to-order flanges, when flowmeter leave factory including companion flanges. We are able to provide GB/T9119-2010, ANSI/ASME, DIN. JIS. KS.... Standard flanges (GB-China standard priority), pressure class recommend priority level.

- 介质温度：

DVT2100 管道式：-40℃~+150℃ -40℃~+260℃ -40℃~+320℃ -40℃~+420℃

DVT2150 插入式：-40℃~+150℃ -40℃~+200℃

Medium temperature

DVT2100 pipeline-version: -40℃ ~ +150℃ -40℃ ~ +260℃ -40℃ ~ +320℃ -40℃~ +420℃

DVT2150 insertion-version: -40℃ ~ +150℃ -40℃~ +200℃

- 环境条件

环境温度：-20℃~+60℃（普通型）； -20℃~+40℃（防爆型）

相对湿度：5%~95%RH

大气压力：86kPa~106kPa

Ambient conditions:

Ambient temperature: -20℃~+60℃(normal); -20℃~ +40℃(explosion-proof)

Relative humidity (RH): 5%~95%RH

Atmospheric Pressure: 86kPa~106kPa

- 电气接口：M20*1.5 内螺纹（其它类型接头可协议供货）

Electrical Interface: M20*1.5 internal thread (priority).

- 防护等级：IP65（IP67、IP68 可协议供货）

Protection level：IP65 (IP67, IP68 supply by negotiation)

- 防爆等级：本安型、隔爆型；

Explosion-proof class: Intrinsic safety; Flame-proof;

- 表体材质：不锈钢(其它材质协议供货)

Main body material: stainless steel (other material supply by negotiation)

- 压力损失：$\triangle P \leq 1.2\rho_{工} V^2$（$\triangle P$ 单位为 Pa，$\rho_{工}$单位为 kg/m^3，V 单位为 m /s)

Pressure lose: $\triangle P \leq 1.2\rho_{工} V^2$（$\triangle P$ unit is Pa, $\rho_{工}$ unit is kg/m^3，V unit is m /s)

- 标定方式：本公司流量计出厂标定时，采取流量计下游侧取压方式

Calibration method：all flowmeters should be calibrated in the way of lower reaches taking pressure before flowmeters leave factory.

3.2 电气参数

3.2 Electrical Parameter

- 工作电源：24VDC±5%、锂电池 3.6VDC（电池使用寿命大于 2 年)

Working Power Supply: 24VDC±5%, Li Battery-3.6VDC (> 2 years service life)

- 输出信号：

1. 工况瞬时流量对应电压频率脉冲（低电平≤1V,高电平≥6V)

2. 标况瞬时流量对应电压频率脉冲（低电平≤1V,高电平≥6V)

3. 标况瞬时流量当量脉冲输出（低电平≤1V,高电平≥6V)

4. 工况瞬时流量对应两、三线制 4~20mA 输出（负载电阻≤300Ω)

5. 标况瞬时流量对应两、三线制 4~20mA 输出（负载电阻≤300Ω)

Signal output：

1. Instantaneous flow under working condition corresponding voltage-frequency- pulse output (lower PWL≤1V, higher PWL≥6V)

2. Instantaneous flow under standard condition corresponding voltage-frequency- pulse output (lower PWL≤1V, higher PWL≥6V)

3. Instantaneous flow under standard condition pulse equivalent output (lower PWL≤1V, higher PWL≥6V)

4. Instantaneous flow under working condition corresponding two-wire or three-wire 4~20mA output（load resistance≤300Ω)

5. Instantaneous flow under standard condition corresponding two-wire or three-wire 4~20mA output（load resistance≤300Ω）

- 通讯接口：RS485、HART

Communication interface: RS485；HART

- 显示方式：

智能字符显示型 -- 双行液晶字符显示，可同时显示瞬时流量、累积流量。

智能点阵显示型 -- 汉字或英文 128*64 点阵液晶显示，可显示瞬时流量、累积流量、工况温度、工况压力、电池电压或工况密度、工况瞬时流量、输出量、菜单修改次数等

Display mode:
A . Intelligent numeric alphabetic display type: twin-row numeric alphabetic LCD (instantaneous flow rate and totalizer)
B. Intelligent dot matrix LCD: Chinese or English 128*64 dot matrix LCD (instantaneous flow rate, totalizer, temperature and pressure under working condition, battery voltage or density under working condition, instantaneous flow rate under working condition, send-out, menu modify records, etc.)

3.3 选型参数

3.3 Model selection parameters

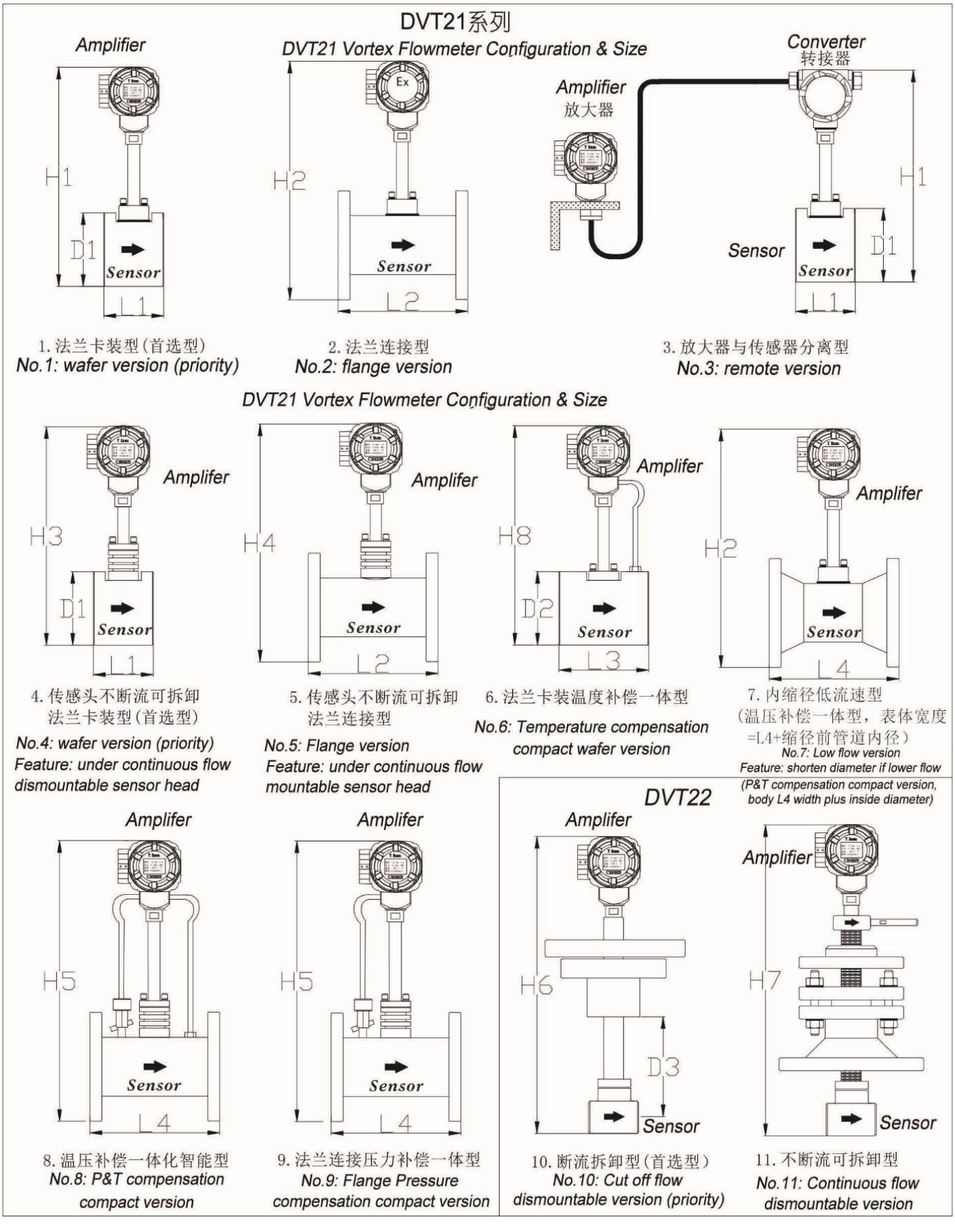
3.3.1 DVT 系列涡街流量计外形结构及外形尺寸

Series DVT Vortex Flowmeter configuration & size

所有DVT2100型法兰卡装式涡街流量计法兰为厂家提供的专用法兰；所有DVT2100型法兰连接式涡街流量计法兰尺寸为对应口径、压力下的标准法兰（法兰尺寸见附录2、附录3）；所有DVT2150型插入式涡街流量计表体与管道连接处法兰为DN100标准法兰。所有法兰参照标准为GB9119-2010。涡街流量计外形尺寸见图二、表一.

DVT2100 wafer connection vortex flowmeter: special companion flanges.
DVT2100 flange connection vortex flowmeter: see appendix 2 & 3 flanges size of configuration. we are able to provide GB (China); ANSI; DIN; JIS and etc.
DVT2150 insertion-version vortex flowmeter: flanges choose DN100 standard flange (reference GB9119-2010)
Dimensions of vortex flowmeter as per fig2 and table 1.

DVT系列涡街流量计外形结构示意图　　图 2　Fig 2



DVT2100 型、DVT2150 型涡街流量计最大外形尺寸　　表一（单位：mm）

DVT2100 and DVT2150 vortex flowmeter max configuration size　Table 1 (unit: mm)

口径 DN	$H1^a$	$H1^b$	$H1^c$	$H2^a$	$H2^b$	$H2^c$	$H3^a$	$H3^b$	$H3^c$	$H4^a$	$H4^b$	$H4^c$	$H5^b$	$H5^c$	H6	H7	$H8^b$	$H8^c$	D1	D2	D3	L1	L2	L3	L4
10		441		338	428	508													90			50	200		
15		445		340	430	510													95			50	200		
20		450		345	435	515													100			50	200		
25		451		350	440	520							468	548			428		100	60		50	200		275
32		456		362	452	532							481	561			432		105	65		54	200		275
40	345	435	515	378	468	548	400	490	570	428	518	598	518	598			477	557	92	92		78	200	112	275
50	348	438	518	390	480	560	407	497	577	441	531	611	531	611			484	564	98	98		78	200	112	275
65	363	453	533	412	502	582	418	508	588	458	548	628	548	628			495	575	110	110		78	200	112	275
80	386	476	556	425	515	595	442	532	612	473	563	643	563	643			519	599	134	134		90	225	112	300
100	409	499	579	444	534	614	466	556	636	494	584	664	584	664			543	623	158	158		78	250	112	350
125	430	520	600	474	564	644	483	573	653	522	612	692	612	692			560	640	175	175		78	275	112	375
150	455	545	625	503	593	673	508	598	678	554	644	724	644	724			585	665	200	200		100	300	140	400
200	505	595	675	557	647	727	558	648	728	605	695	775	695	775	530	1150	635	715	250	250	100	120	350	160	450
250	555	645	725	610	700	780	608	698	778	658	748	828	748	828	530	1150	685	765	300	300	125	140	400	180	500
300	605	695	775	660	750	830	658	748	828	708	798	878	798	878	580	1200	735	815	350	350	150	160	450	200	550
350	655	745	825	715	805	885	708	798	878	763	853	933	853	933	580	1200	785	865	400	400	175	165	500	220	600
400	705	795	875	771	861	941	758	848	928	818	908	988	908	988	630	1250	835	915	450	450	200	185	550	240	650
450	855	845	925	820	910	990	808	898	978	868	958	1038	958	1038	630	1250	885	965	500	500	225	205	600	260	700
500	805	895	975	875	965	1045	858	948	1028	921	1011	1091	1011	1091	680	1300	935	1015	550	550	250	225	650	280	750
600															730	1350					300				
800															830	1450					400				
1000															930	1550					500				
1200															1130	1650					600				
1500															1230	1750					700				
1800															1330	1850					800				
2000															1430	1950					900				

注：本产品有多种支柱，长度不同，因此部分型号整表高度分 a、b、c 三种，可对应上表 H 角标查看整表高度。

1、卡装无补偿断流型（H1）：150℃传感头，高度 a；260℃传感头，高度 b；320℃传感头，高度 c；

2、法兰无补偿断流型（H2）：150℃传感头，高度 a；260℃传感头，高度 b；320℃传感头，高度 c；

3、卡装无补偿不断流型（H3）：150℃传感头，高度 a；260℃传感头，高度 b；320℃、420℃传感头，高度 c；

4、法兰无补偿不断流型（H4）：150℃传感头，高度 a；260℃传感头，高度 b；320℃、420℃传感头，高度 c；

5、法兰补偿型（H5）：蒸汽上补偿型：高度 c；

非蒸汽上补偿型：150℃、260℃传感头，高度 b；320℃、420℃传感头，高度 c；

侧补偿型：150℃、260℃传感头，高度 b；320℃、420℃传感头，高度 c；

6、卡装温度补偿型（H8）：蒸汽型：高度 c；

非蒸汽型：150℃、260℃传感头，高度 b；320℃、420℃传感头，高度 c。

Note: this product has a variety of pillars with different lengths, so some models can be divided into three types of height in the table: a, b and c, which can be viewed according to the Angle mark H in the above table. According to the different sensor head, the height of the whole table is different.

1.Card type without compensation interruption (H1): For the sensor head at 150℃, the height of the whole table refers

to a; for the sensing head at 260℃, the height is b; for the sensing head at 320℃, the height is c;
2.Flange type without compensation interruption (H2) : For the sensor head at 150℃, the height of the whole table refers to a; for the sensing head at 260℃, the height is b; for the sensing head at 320℃, the height is c;
3. Card type without compensation and uninterruptible flow (H3): For the sensor head at 150℃, the height of the whole table refers to a; for the sensing head at 260℃, the height is b; for the sensing head at 320℃/420℃, the height is c;
4. Flange type without compensation and uninterruptible flow (H4): For the sensor head at 150℃, the height of the whole table refers to a; for the sensing head at 260℃, the height is b; for the sensing head at 320℃/420℃, the height is c;
5.Flange type with compensation (H5): Steam type compensation (above): the height is c;
Non-steam compensated type (above): For the sensing head at 150℃/260℃, the height is b; for the sensing head at 320℃/420℃, the height is c;
Compensation type (side): For the sensing head at 150℃/260℃, the height is b; for the sensing head at 320℃/420℃, the height is c;
6.Card type with temperature compensation (H8): Steam type: the height is c;
Non-steam type: For the sensing head at 150℃/260℃, the height is b; for the sensing head at 320℃/420℃, the height is c;

3.3.2. 型号及功能选择 Model Selection

DVT	21	A	B	-	C	D	E	-	F	G	H	J	-	K	L	M	N	-	P	Q	R	S

DVT21 ……涡街流量计	L．放大器安装形式
A．形式	0、表体与放大器一体
0、管道式	1、表体与放大器分体（距离≤10 米）
5、插入式	2、潜水式
B．版本	M．电源
0、标准版本	0、12VDC 供电
C．表体连接形式	1、24VDC 供电（当选数字滤波方式时，必须选 24VDC 供电）
1、法兰连接式（温压补偿式必选）;	2、3.6V 锂电池供电（只限带液晶显示无信号输出型）
2、法兰卡装式（首选型）;	3、3.6V 锂电池、24VDC 电源同时供电（只限带液晶显示有信号输出型）
3、卡箍型（需定制）	N．检测功能及放大器显示形式
4、无（插入式需要选择）	0、无补偿式(无温度、压力补偿功能)
D．介质种类	1、现场显示气体温度、压力补偿一体化智能式(只限智能
1、气体、液体、蒸汽通用（只限数字滤波智能显示型）	

2、测量液体 3、测量气体 4、测量饱和蒸汽、过热蒸汽 E．口径 三位数字直接代表口径，A 代表“00” F．输出信号 0、电压脉冲（低电平≤1V，高电平≥6V，脉宽≥10uS) 1、两线制 4~20mA 输出 2、无信号输出现场显示 3、当量脉冲输出（只限智能型） 4、三线制 4~20mA 输出 5、其它信号输出 G．介质温度 0、-40°C~+150°C 1、-40°C~+260°C(插入式 200°C) 2、-40°C~+320°C(插入式不可选) 3、-40°C~+420°C(限传感头不断流拆卸型) H．防爆等级 0、无防爆，防护等级为 IP65（IP67、IP68） 1、本安防爆型 2、隔爆防爆型 J．放大器显示	型放大器，管道式法兰连接式气体表体专用。可显示标况瞬时流量、累积流量、温度、压力或频率等。可选择 4~20mA 输出或电压脉冲输出，脉冲低电平≤1V，高电平≥6V，脉冲占空比 50%） 2、现场显示过热蒸汽温度、压力补偿一体化智能式(只限智能型放大器，管道式法兰连接式过热蒸汽、饱和蒸汽表体专用。可进行密度补偿计算。可显示瞬时质量流量、累积质量流量、温度、压力或工况体积量、频率等。可选择 4~20mA 输出或电压脉冲输出，脉冲低电平≤1V，高电平≥6V，脉冲占空比 50%） 3、现场显示温度补偿智能式(只限智能型放大器，管道式饱和蒸汽表体专用，可根据温度进行密度补偿计算。可显示瞬时质量流量、累积质量流量或温度、压力等。可选择 4~20mA 输出或电压脉冲输出，脉冲低电平≤1V，高电平≥6V，脉冲占空比 50%） 4、现场显示压力补偿智能式(只限智能型放大器，管道式饱和蒸汽表体专用，可根据压力进行密度补偿计算。可显示瞬时质量流量、累积质量流量或温度、压力等。可选择 4~20mA 输出或电压脉冲输出，脉冲低电平≤1V，高电平≥6V，脉冲占空比 50%） 5、PN1.6MPa（插入式选项） 6、PN2.5MPa（插入式选项） P．传感器安装形式

0、无现场显示 1、现场显示型（注:出厂默认流体流向为自左向右，若有现场情况不符，请在订货时注明.液晶显示,可显示瞬时流量、累积流量,补偿型还能显示温度、压力、标况流量等） K．精度 0、1%（插入式协议供货） 1、0.5 级（只限管道式） 2、0.2 级（只限管道式，需协议供货） 3、2.5 级 4、1.5 级（插入式需协议供货）	0、传感头断流拆卸 1、传感头不断流拆卸（≥320℃必选） Q．通讯方式 0、无通讯 1、RS485 通讯（只限智能型放大器） 2、RS232 通讯（协议供货） R．HART 协议 0、无 HART 协议 1、带 HART 协议（需协议供货） S．滤波方式 0、普通方式 1、智能数字滤波方式

3.3.2. Model Selection

DVT	21	A	B	-	C	D	E	-	F	G	H	J	-	K	L	M	N	-	P	Q	R	S

DVT21…….Votex Flowmeter A. Type 0. Pipeline-version 1. Insertion-version B. Version 0. Standard C. Connection amplifier and sensor: 1. flange Connection (P/T compensation required) 2. wafer Connection (Priority) 3. Clamp type (customized) 4. None (For Insertion-version) D. Measurable medium: 1. Gas, Liquid, Steam-(Digital Filtering Intelligent Display)	M. Amplifier power supply 0. 12VDC 1. 24VDC (Digital filtering type required) 2. 3.6V Li Battery (LCD screen without signal output only) 3. 3.6V & 24VDC (LCD screen with signal output only) N. Measuring Functions & amplifier display version : 0. without compensation (w/o T/P compensation function) 1. status display / gas temperature & pressure compensation / intelligent amplifier compact version (intelligent amplifier only with flange connection) (matching either 4~20mA output or

2. Liquid
3. Gas
4. Saturated steam & superheated steam

E. Diameter

The three digits directly represent the caliber, and a represents "00"

F. Signal output

0. voltage pulse (lower PWL≤1V, higher PWL≥6V, pulse ≥10uS)
1. two-wire 4~20mA
2. without signal output and status display (flow rate, totalizer .....)
3. pulse equivalent (intelligent amplifier priority)
4. three-wire 4~20mA
5. other

G. Measurable high temperature medium:

0. -40°C ~ 150 °C
1. -40°C ~ 260 °C (DVT2150 mode200°C)
2. -40°C ~ 320 °C (mismatching DVT2150 insertion-version)
3. -40°C ~ 420 °C (patent)

H. Explosion-proof class

0. without explosion-proof certificate and its protection level - IP65 (IP67, IP68)
1. intrinsic safety
2. flame-proof

J. Amplifier display version

0. without status display
1. status display (note: factory settings of fluid flow direction is from left to right, if special requirement, please advise manufacturer in advance.)

K. Accuracy

0. ±1.0% (Priority for DVT2100)
1. ±0.5% (DVT2100 only)
2. ±0.2% (DVT2100 only, by negotiation supply)

voltage pulse output, pulse lower PWL≤1V, higher PWL≥6V, pulse duty-factor 50%)
2. Status display / superheated steam temperature & pressure compensation / intelligent amplifier compact version (intelligent amplifier only with flange connection) (superheated steam and saturated steam expert) (density for compensation calculation and display mass flow) (matching either 4~20mA output or voltage pulse output, pulse lower PWL≤1V, higher PWL≥6V, pulse duty-factor 50%)
3. Status display with temperature compensation (intelligent amplifier only with flange connection or wafer connection) (saturated steam expert) (via temperature and do density compensation calculation display mass flow) (matching either 4~20mA output or voltage pulse output, pulse lower PWL≤1V, higher PWL≥6V, pulse duty-factor 50%)
4. Status display with pressure compensation (intelligent amplifier only with flange connection or wafer connection) (saturated steam expert) (via pressure and do density compensation calculation display mass flow) (matching either 4~20mA output or voltage pulse output, pulse lower PWL≤1V, higher PWL≥6V, pulse duty-factor 50%)
5. PN1.6MPa (for DVT2150)
6. PN2.5MPa (for DVT2150)

P. Sensor Head Installation

0. stop medium flow to dismantle sensor head
1. keep medium flow to dismantle sensor head (medium temp ≥320°C is required)

Q. Communication

0. without communication
1. RS485 (intelligent amplifier only)
2. RS232 (supply by negotiation)

3. ±2.5% (priority for DVT2150) 4. ±1.5% (DVT2150 by negotiation supply) L. Amplifier installation 0. integration between transmitter and sensor (compact version) 1. amplifier separate from sensor (remote distance ≤10m,) 2. submergible version	R. HART protocol 0. without HART protocol 1. with HART protocol (supply by negotiation) S. The mode of wave filtering 0. common mode 1. Intelligent Digital filtering mode

3.3.3. DVT2100 型满管式涡街流量计可测流量范围（见表二至表五）

3.3.3. DVT2100 pipeline-version vortex flowmeter measurable flow range (refer to table 2~5)

注：当选择不断流拆卸型涡街流量计或精度为 0.5 级涡街流量计时，流量范围应取表二至表四对应下限流量值乘以 1.5，上限流量值乘以 0.8

Notes : when choose vortex flowmeter that keep medium flow with dismountable sensor head or vortex flowmeter with accuracy is ±0.5%, the lower limit of flow range is 1.5 times of corresponding value from table 2~4, upper limit multiplied by 0.8

DVT2100 型涡街流量计测量不同密度的液体时可测工况流量范围　　表二

DVT2100 vortex flowmeter measurable liquid of different density corresponding with flow range under working condition Table 2

项目 ITEM	500 kg/m³	600 kg/m³	700 kg/m³	800 kg/m³	900 kg/m³	1000 kg/m³	1200 kg/m³	1400 kg/m³	1600 kg/m³	1800 kg/m³	Q-max (单位 unit: m³/h)
	不同密度的液体，可测下限流量 Q-min（单位：m³/h） Different density of liquid matching its measurable lower imit flow Q-min (unit:m³/h)										
DN10	0.30	0.28	0.24	0.21	0.19	0.15	0.14	0.13	0.12	0.11	2.0
DN15	0.60	0.50	0.47	0.37	0.36	0.35	0.30	0.28	0.26	0.24	4.5
DN20	1.15	1.00	0.98	0.90	0.80	0.60	0.58	0.56	0.54	0.52	8.0
DN25	1.30	1.20	1.10	1.05	1.00	0.90	0.82	0.76	0.71	0.68	12
DN32	1.90	1.80	1.70	1.62	1.56	1.50	1.45	1.35	1.20	1.00	20
DN40	3.50	3.20	3.00	2.80	2.60	2.28	2.20	2.10	2.00	1.90	32
DN50	4.70	4.30	3.9	3.70	3.60	3.50	3.00	2.80	2.60	2.50	50
DN65	7.10	6.50	6.30	6.20	6.10	6.00	5.00	4.50	4.20	4.00	84
DN80	11	10	9.60	9.20	9.10	9.00	8.00	7.60	7.00	6.00	127
DN100	20	18	17	16	15	14	13	12	10	9.00	198
DN125	28	26	25	24	23	22	21	20	18	14	310
DN150	52	50	45	42	36	32	30	28	26	20	445
DN200	99	88	78	70	62	57	53	50	43	35	791
DN250	184	165	150	130	110	89	80	72	68	55	1237

DN300	250	220	200	180	160	128	120	110	98	77	1780
DN350	350	280	250	210	190	173	160	140	120	100	2450
DN400	450	400	360	300	260	226	200	180	160	140	3160
DN450	500	450	400	350	300	286	260	240	210	180	4000
DN500	600	530	480	420	380	355	330	300	260	220	4950

DVT2100 型涡街流量计测量不同密度的气体时可测工况流量范围　　表三

DVT2100 Vortex flowmeter measure gas of different density corresponding with flow range under standard condition　Table 3

项目 ITEM	0.50 kg/m³	0.80 kg/m³	1.20 kg/m³	2.40 kg/m³	3.60 kg/m³	4.80 kg/m³	6.00 kg/m³	7.20 kg/m³	8.40 kg/m³	9.60 kg/m³	12.0 kg/m³	20 kg/m³	Qmax (单位: m³/h)
	不同工况密度下气体，可测下限流量 Qmin（单位：m³/h） Different gas density under standard condition, lower limit Q-min (unit: m³/h)												
DN10	2.8	2.0	1.6	1.5	1.4	1.3	1.2	1.1	1.0	0.9	0.8	0.7	16
DN15	4.8	3.5	3.2	2.8	2.7	2.6	2.5	2.4	2.3	2.2	2.1	2.0	38
DN20	8.2	6.6	5.0	4.8	4.7	4.5	4.3	4.0	3.9	3.8	3.7	3.0	67
DN25	10	9	7.9	7.6	7.2	6.9	6.6	6.2	5.9	5.4	5.0	4.5	100
DN32	26	18	14	13.2	12.8	12.2	12	11.7	11.2	10.9	10.1	9	170
DN40	38	25	20	19	18	17	16	15	14	13	12	10	300
DN50	48	40	31	29	28	26	23	22	21	20	18	12	500
DN65	80	66	53	45	44	42	40	38	35	30	26	18	780
DN80	130	100	80	76	70	66	62	58	50	46	38	28	1200
DN100	180	160	120	110	100	90	80	70	62	56	48	35	2000
DN125	280	250	190	170	156	145	135	120	100	90	76	55	2900
DN150	380	310	280	260	240	220	200	180	160	140	110	85	4100
DN200	800	600	500	480	430	400	380	360	330	300	270	200	7500
DN250	1000	880	790	730	680	620	590	520	480	420	400	300	12500
DN300	1300	1190	1140	1060	980	900	820	760	700	620	580	400	16500
DN350	1800	1600	1550	1400	1300	1200	1100	1000	900	820	720	600	22000
DN400	2200	2160	2000	1800	1650	1500	1400	1300	1200	1100	1000	700	30000
DN450	2700	2580	2500	2300	2100	1900	1700	1600	1500	1400	1200	800	37000
DN500	3500	3200	3100	2900	2600	2400	2200	2000	1800	1600	1300	1000	46000

气体工况体积流量与标况体积流量折算公式：

$Q_{工}=Q_{标}*P_{标}*Z*（273.15+T_{工}）/[(P_{工}+P_{当地})*(273.15+T_{标})]$---公式 4

式中：

$Q_{工}$ --- 工况体积流量（单位：m^3/h）；

$P_{工}$ --- 气体工况表压力（单位：MPa）；

$T_{工}$ --- 气体工况温度（单位：℃）；

Z ----- 气体相对压缩系数 $Z=Z_{工}/Z_{标}$ （无量纲）；

$Q_{标}$ --- 标况体积流量（单位：m3/h）；

$P_{标}$ --- 标准大气压力(取绝对压力等于 0.101325MPa)；

$T_{标}$ --- 标况温度（为 0℃或 20℃）；

$P_{当地}$ -- 当地大气压力（单位：MPa）；

Conversion formula of gas volume flow under working condition & volume flow under standard condition:

$Q_{工}=Q_{标}*P_{标}*Z*（273.15+T_{工}）/[(P_{工}+P_{当地})*(273.15+T_{标})]$---FORMULA 4

Among formula：

$Q_{工}$ --- volume flow under working condition (unit: m^3/h)

$P_{工}$ --- gas pressure under working condition (unit: Mpa)

$T_{工}$ --- gas temperature under working condition (unit: ℃)

Z ----- gas relative compressibility $Z=Z_{工}/Z_{标}$ (zero dimension)

$Q_{标}$ --- volume flow under standard condition (unit: m^3/h)

$P_{标}$ --- Atm press under standard condition (take absolute pressure =0.101325 MPa)

$T_{标}$ --- temperature under standard condition (0℃ or 20℃)

$P_{当地}$ -- local Atm press (unit: MPa)

DVT2100 型涡街流量计测量不同密度的饱和蒸汽时可测工况流量范围 表四

DVT2100 Vortex flowmeter measure saturated steam of different density corresponding with flow range under working condition Table 4

表压力 MPa		0.10	0.20	0.30	0.40	0.50	0.60	0.80	0.90	1.00	1.20	1.60	2.00	流量单位
温度℃		120	134	144	152	159	165	175	180	184	192	204	215	
密度 Kg/m³		1.12	1.67	2.19	2.68	3.18	3.67	4.62	5.16	5.63	6.67	8.52	10.57	
口径 mm	范围 Range	不同密度的蒸汽，涡街流量计可测流量范围 Different steam density corresponding with its measurable flow range												
10	Qmin	1.55	2.28	2.99	3.68	4.46	5.10	6.48	7.27	7.82	9.11	11.8	14.6	(unit) Kg/h
	Qmax	15.5	22.9	30.0	36.9	44.6	51.0	64.8	72.8	78.2	91.1	119	146	
15	Qmin	3.50	5.15	6.74	8.29	10.0	11.4	14.5	16.3	17.6	20.5	26.7	32.9	
	Qmax	35.0	51.5	67.4	83.0	100	115	146	163	176	205	268	329	
20	Qmin	6.22	9.15	11.9	14.7	17.8	20.4	25.9	29.1	31.3	36.4	47.5	58.5	
	Qmax	62.2	91.6	120	147	178	204	259	291	313	365	476	586	
25	Qmin	9.71	14.3	18.6	23.0	27.9	31.8	40.5	45.4	48.9	56.9	74.3	91.4	
	Qmax	97.1	143	187	230	279	318	405	454	489	569	743	914	
32	Qmin	15.9	23.3	30.6	37.7	45.7	52.2	66.3	74.5	80.1	93.3	121	149	
	Qmax	159	234	306	378	457	522	664	745	802	933	1218	1499	
40	Qmin	23	33	43	53	64	73	93	100	110	130	170	210	
	Qmax	300	440	575	710	860	980	1250	1400	1500	1750	2280	2810	
50	Qmin	35	35	52	63	76	88	111	125	130	150	200	250	
	Qmax	550	460	680	845	1020	1170	1480	1670	1800	2100	2730	3360	
65	Qmin	59	87	114	137	166	190	240	276	297	345	450	550	
	Qmax	790	1160	1520	1835	2222	2540	3230	3620	3970	4620	6030	7422	
80	Qmin	89.5	131	172	212	257	290	370	410	450	520	680	840	
	Qmax	1195	1760	2300	2800	3400	3900	4900	5580	6000	6999	9100	11000	
100	Qmin	0.14	0.20	0.27	0.33	0.40	0.46	0.58	0.65	0.70	0.82	1.00	1.30	(unit) t/h
	Qmax	1.87	2.75	3.60	4.43	5.36	6.12	7.78	8.73	9.40	11	14.3	17.6	
125	Qmin	0.22	0.32	0.42	0.51	0.62	0.71	0.91	1.00	1.10	1.28	1.67	2.00	
	Qmax	2.91	4.29	5.62	6.91	8.37	9.56	12	13.6	14.7	17	22.3	27.4	
150	Qmin	0.32	0.46	0.60	0.74	0.90	1.03	1.31	1.47	1.58	1.84	2.40	2.96	
	Qmax	4.20	6.18	8.09	9.96	12	13.8	17.5	19.6	21.1	24.6	32.1	39.5	

200	Qmin	0.56	0.82	1.08	1.32	1.60	1.83	2.33	2.61	2.81	3.28	4.28	5.27
	Qmax	7.50	11	14.4	17.7	21.4	24.5	31.1	35	37.6	43.7	57.1	70.3
250	Qmin	0.87	1.28	1.68	2.0	2.51	2.87	3.64	4.09	4.40	5.10	6.69	8.20
	Qmax	11.6	17	22	27.6	33	38	48	54	58.7	68	89	110
300	Qmin	1.25	1.85	2.42	2.98	3.61	4.13	5.25	5.89	6.34	7.38	9.60	11.8
	Qmax	16.7	24.7	32	39	48	55	70	78	84	98	128	158
350	Qmin	1.71	2.52	3.30	4.06	4.92	5.62	7.15	8.02	8.60	10.0	13	16
	Qmax	22.8	33.6	44	54	65	74.9	95	106	115	133	174	215
400	Qmin	2.24	3.29	4.30	5.30	6.40	7.30	9.30	10.5	11.2	13.1	17	21
	Qmax	29	43.5	57	70	85	97	124	139	150	174	228	281
450	Qmin	2.83	4.17	5.45	6.72	8.13	9.29	11.8	13.2	14.2	16.6	21.6	26.6
	Qmax	37	56	72	89	108	123	157	176	190	221	289	355
500	Qmin	3.49	5.15	6.74	8.29	12.3	14	17.9	20.1	21.6	25.2	33	40.5
	Qmax	46	68	89.8	110	164	188	239	268	289	336	439	540

注：当测量介质为过热蒸汽时，请查阅表五对应温度、压力下的工况密度，然后再根据此密度查阅表四对应密度下不同口径涡街流量计的流量范围。

Notes : when measurable medium is superheated steam, please refer to temperature and pressure of table 5 under working condition, then according to density of table 4 consult flow range as reference.

过热蒸汽密度表　　表五（单位：kg/m^3）

Superheated steam　Table 5 (unit : kg/m^3)

项目 ITEM	130℃	140℃	150℃	160℃	170℃	180℃	190℃	210℃	220℃	250℃	300℃	360℃	420℃
0.10MPa	1.10	1.07	1.04	1.02	0.99	0.97	0.95	0.91	0.89	0.83	0.76	0.69	0.63
0.15MPa	1.38	1.34	1.34	1.28	1.24	1.21	1.19	1.13	1.11	1.04	0.95	0.86	0.78
0.26MPa		1.96	1.90	1.85	1.81	1.76	1.72	1.64	1.61	1.51	1.37	1.24	1.13
0.30MPa			2.12	2.067	2.01	1.96	1.92	1.83	1.79	1.68	1.53	1.38	1.26
0.36MPa			2.46	2.39	2.33	2.27	2.21	2.11	2.06	1.94	1.76	1.59	1.45
0.40MPa				2.61	2.54	2.47	2.41	2.30	2.25	2.11	1.91	1.73	1.57
0.50MPa				3.16	3.07	2.99	2.91	2.77	2.71	2.54	2.30	2.07	1.89
0.60MPa					3.61	3.51	3.42	3.25	3.18	2.97	2.69	2.42	2.21
0.70MPa						4.05	3.94	3.74	3.65	3.41	3.09	2.78	2.53
0.80MPa						4.59	4.46	4.23	4.13	3.85	3.48	3.13	2.84
0.90MPa						5.15	4.99	4.73	4.61	4.30	3.88	3.48	3.16
1.00MPa							5.54	5.23	5.09	4.75	4.28	3.84	3.48
1.15MPa							6.37	6.00	5.84	5.43	4.88	4.37	3.97
1.50MPa								7.87	7.64	7.05	6.30	5.63	5.10
1.65MPa								8.70	8.43	7.76	6.92	6.17	5.59
1.80MPa								9.55	9.24	8.48	7.55	6.72	6.08
2.00MPa									10.36	9.47	8.39	7.45	6.74
2.20MPa									11.51	10.47	9.24	8.20	7.40
2.50MPa										12.02	10.55	9.32	8.39

几种常见气体的标准状态密度　　表六（单位：kg/m³）

Several normal gas of density under standard condition　Table 6 (unit : kg/m³)

名 称 Tag	空气 Air	氢气 Hydrogen	氧气 Oxygen	氮气 Nitrogen	氯气 Chlorine	氨气 Ammonia gas	半水煤气 Semi- watergas
密 度 Density	1.293	0.0889	1.43	1.251	3.214	0.77	0.836
名 称 Tag	氩气 Argon	乙炔 Acetylene	甲烷 Methane	乙烷 Ethane	丙烷 Propane	丁烷 Butane	焦炉煤气 Coke-oven gas
密 度 Density	1.79	1.017	0.717	1.357	2.005	2.703	0.4849
名 称 Tag	乙烯 Ethylene	丙烯 Propylene	天然气 Natural gas	煤气 Coal gas	一氧化碳 CO	二氧化碳 CO_2	
密 度 Density	1.264	1.914	0.828	0.802	1.25	1.977	

注：标准状态指绝对压力为 0.101325MPa，温度为 0°C时的状态。

Notes: standard state is absolute pressure 0.101325MPa and temperature 0°C.

3.3.4 DVT2150 型插入式涡街流量计可测介质工况流速范围（见表七）及工况流量范围计算

DVT2150 insertion-version vortex flowmeter measurable flow range under working condition and its calculation. See table 7

DVT2150 型插入式涡街流量计测量不同密度的流体可测工况流速范围　表七

DVT2150 insertion-version vortex flowmeter measure liquid of different density corresponding with flow range under working condition.　Table 7

气体 Gas	密度 Density ρ(kg/ m³)	1.0	1.2	2.0	3.0	4.0	6.0	8.0	10	15	20	可测上限流速 Vmax(m/s)
	可测下限流速 Vmin(m/s)	5.5	5.2	5.0	4.8	4.6	4.2	4.0	3.8	3.6	3.5	55
液体 Liquid	密度 Density ρ（kg/m³）	500	600	700	800	900	1000	1200	1400	1600	1800	可测上限流速 Vmax(m/s)
	可测下限流速 Vmin(m/s)	0.96	0.8	0.70	0.66	0.62	0.60	0.56	0.52	0.50	0.45	6.0

注：表七是插入式涡街流量计精度为 2.5 级时的流速范围。当精度优于 2.5 级时，流速范围应取下限流速值乘以系数 R(R=2~3)，上限流速值乘以 0.8。

Notes : table 7 that is accuracy ±2.5% of insertion-version vortex flowmeter flow range. When accuracy is better than ±2.5%, velocity of flow = lower limit of velocity multiplied by coefficient R(R=2~3), the upper limit multiplied by 0.8.

3.3.5　DVT2150 型插入式涡街流量计可测介质工况流量范围计算

DVT2150 insertion-version vortex flowmeter measurable medium flow range calculation under working condition.

- 气、液最小工况体积流量计算公式

Qmin=3600*Vmin*(π*D^2/4) ---------- 公式 5

Gas & liquid : min volume flow formula under working condition
Qmin=3600*Vmin*(π*D^2/4) ---------- Formula 5

- 气、液最大工况体积流量计算公式

Qmax=3600*Vmax*(π*D^2/4) ---------- 公式 6

Gas & liquid : max volume flow formula under working condition
Qmax=3600*Vmax*(π*D^2/4) ----------Formula 6

- 气体最小标况体积流量计算公式

QNmin=Qmin *[($P_{当地}$+$P_{工}$)*(273.15+$T_{标}$)]/ [$P_{标}$*Z*(273.15+$T_{工}$)] ------- 公式 7

Gas : min volume flow formula under standard condition

QNmin=Qmin *[(P 当地+P 工)*(273.15+T 标)]/ [P 标*Z*(273.15+T 工)] ----Formula 7

- 气体最大标况体积流量计算公式

QNmax=Qmax *[($P_{当地}$+$P_{工}$)*(273.15+$T_{标}$)]/ [$P_{标}$*Z*(273.15+$T_{工}$)]-------- 公式 8

Gas : max volume flow formula under standard condition

QNmax=Qmax *[($P_{当地}$+$P_{工}$)*(273.15+$T_{标}$)]/ [$P_{标}$*Z*(273.15+$T_{工}$)]---------Formula 8

- 气体工况密度计算公式

ρ=$ρ_n$[($P_{当地}$+ $P_{工}$)*(273.15+$T_{标}$)]/ [$P_{标}$*Z*(273.15+ $T_{工}$)] ---------- 公式 9

Gas : density formula under working condition

ρ=$ρ_n$[($P_{当地}$+ $P_{工}$)*(273.15+$T_{标}$)]/ [$P_{标}$*Z*(273.15+ $T_{工}$)] ---------- Formula 9

式中：Among (insertion-version vortex flowmeter) :

Qmin -- 插入式涡街流量计可测流体最小工况体积流量（单位：m^3/h)；

Qmin -- min volume flow under working condition (unit : m^3/h)

Qmax -- 插入式涡街流量计可测流体最大工况体积流量（单位：m^3/h)；

Qmax -- max volume flow under working condition (unit : m^3/h)

Vmin -- 插入式涡街流量计可测流体最小工况流速（单位：m/s 见表七)；

Vmin -- min velocity under working condition (unit : m/s refer to table 7)

Vmax -- 插入式涡街流量计可测流体最大工况流速（单位：m/s 见表七)；

Vmax -- max velocity under working condition (unit : m/s refer to table 7)

D ----- 插入式涡街流量计测量口径（单位：m)；

D ----- nominal diameter of insertion-version vortex flowmeter (unit : m)

π----- 圆周率 3.1415926535898;

π----- circumference ratio 3.1415926535898

QNmin - 插入式涡街流量计可测气体最小标况体积流量（单位：m^3/h)；

QNmin - gas min volume flow under standard condition (unit : m^3/h)

QNmax - 插入式涡街流量计可测气体最大标况体积流量（单位：m^3/h)；

QNmax - gas max volume flow under standard condition (unit : m^3/h)

$T_{标}$ --- 标况温度，一般为 0℃或 20℃。(单位：℃)；

$T_{标}$ --- temperature under standard condition, general is 0℃ or 20℃. (unit:℃)

$T_{工}$ --- 被测气体工况温度（单位：℃)；

$T_{工}$ --- measurable gas temperature under working condition (unit:℃)

$P_{标}$ --- 标准大气压力（取 0.101325MPa)；

$P_{标}$ --- normal atmospheric pressure （ =0.101325MPa)

$P_{工}$ --- 被测气体工况下表压力（单位：MPa)；

$P_{工}$ --- measurable gas pressure under working condition (unit : MPa)

Z ----- 测量流体的相对压缩系数 $Z=Z_{工}/Z_{标}$;

Z ----- measurable fluid relative compressibility $Z=Z_{工}/Z_{标}$

ρ----- 气体工况下的密度（单位：kg/m^3)；

ρ----- gas density under working condition (unit : kg/m^3)

ρ_n---- 气体标准状态下的密度（单位：kg/m^3,指温度为 0℃或 20℃,绝对压力为 0.101325MPa 时的状态，公式 9 中 $T_{标}$应与 ρ_n所对应温度相同，几种常见气体的标准状态密度见表六)；

ρ_n---- gas density under standard state (unit: kg/m^3 ; temp is 0℃ or 20℃, absolute pressure is 0.101325MPa , among formula 9 the temperature is the same between $T_{标}$ and ρ_n corresponding temp. Several normal gas density under standard state see table 6)

$P_{当地}$ -- 当地大气压力（单位：MPa)；

$P_{当地}$ -- local atmospheric pressure (unit : MPa)

- DVT2150 型插入式涡街流量计测量蒸汽时流量范围计算方法如下：

➢ DVT2150 insertion-version vortex flowmeter Numerical Methods of flow range matching steam measurement:

1. 根据蒸汽的温度、表压力查表四或表五，得出蒸汽的工况密度 ρ；

According to steam temperature and pressure refer to table 4 & table 5 then gain exact density "ρ" under working condition.

2. 根据蒸汽工况密度 ρ，查表七气体栏得出插入式涡街流量计可测最小工况流速 Vmin 或最大工况流速 Vmax；

According to steam density "ρ" under working condition, refer to table 7 then gain max/min velocity of flow under working condition " Vmax/Vmin " .

3. 根据已知插入式涡街流量计的测量管径，通过公式 5、公式 6 计算出最小工况体积流量 Qmin 或最大工况体积流量 Qmax；

According to pipe diameter of insertion-version vortex flowmeter, through Formula 5 and Formula 6 calculate min volume under working condition or max volume.

4. 最后用工况密度 ρ 乘以 Qmin 或 Qmax 就得到了不同口径插入式涡街流量计测量蒸汽时的质量流量范围；

The final density "ρ" under working condition x Qmin or Qmax = mass flow range .

四．安装指南

Four.　Installation Instruction

➢ 安装场所和环境选择

Installation Place and Environment Selection

1. 尽量避开强电力设备、高频变频设备、强电源开关设备；

Try to avoid strong power equipment, high-frequency equipment and strong power switchgear.

2. 尽量避开高温热源、辐射热源影响；室外安装应做好遮阳防雨措施；

Try to avoid high-temp thermal source and source of radiant heating; outdoor installation should do some measures of sun-shading and rain shelter.

3. 尽量避开振动场所和强腐蚀环境等；同时要考虑安装维修方便；

Try to avoid shock places and corrosion environment ; meanwhile, easy maintenance should be considered.

➢ 安装位置选择

Reasonable and correct installation position.

1. 安装位置尽量避免选择振动较强的管道，否则必须采取减振措施，加装减震短节等；

Installation position should avoid strong shock pipeline, or take some measures of shock absorption.

2. 流量计可水平、垂直、倾斜安装。测量液体时，必须保证流体由低处向高处流动；测量气体时，流向不限；测量蒸汽或者高温气体时，表体支柱尽量与竖直方向成 45°安装；

Horizontal, vertical and slanting installation. Liquid measuring ensure flow direction from low to high. Gas measuring, direction no required. When measuring vapor or high-temp gas, flow meter body pillar should be at an angle of 45 Deg with vertical direction.

➢ 接地要求

Grounding requirement.

流量计安装时表体应可靠接地，若现场管道不具备接地条件，应单独做一根可靠地线与仪表外壳接地端相连。

When pipelines without available grounding conditions, a ground-wire is essential between housing and earth.

➢ 直管段要求

Straight length requirement

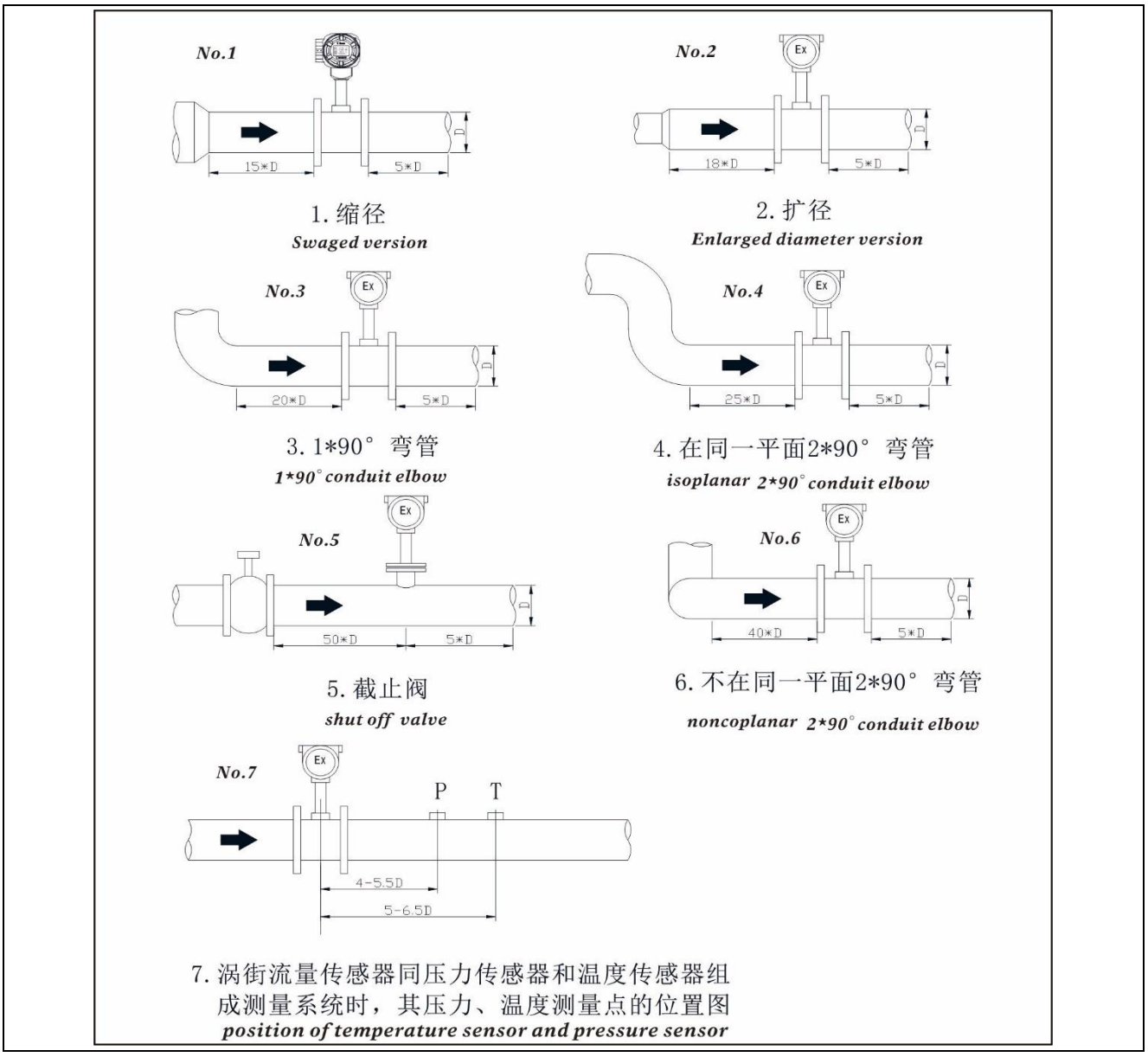
为了准确测量，流量计的上、下游必须留有足够的直管段，上游不应有影响流体流速分布的部件，下图为各种管

路情况下流量计前、后直管段要求；

In order to correct measurement, upstream or downstream of flow meter should obligate enough straight length. No components to effect fluid velocity in upstream of flow meter. All types of straight length installation reference:

DVT2100、DVT2150 型涡街流量计安装直管段尺寸图 图 3

DVT2100 and DVT2150 Vortex Flowmeter Straight Length Size Drafts Fig 3



- 流量计的安装方式及焊接

Installation and welding of flow meter

1. DVT2100、DVT2150 型涡街流量计的仪表安装点的上下游配管的内径应与仪表内径一致，传感器应与管道同

心，传感器与法兰间的密封垫不能凸入管道内，插入式涡街流量计应确保连接法兰端面与管道轴线的平行。其具体安装形式如图 4；

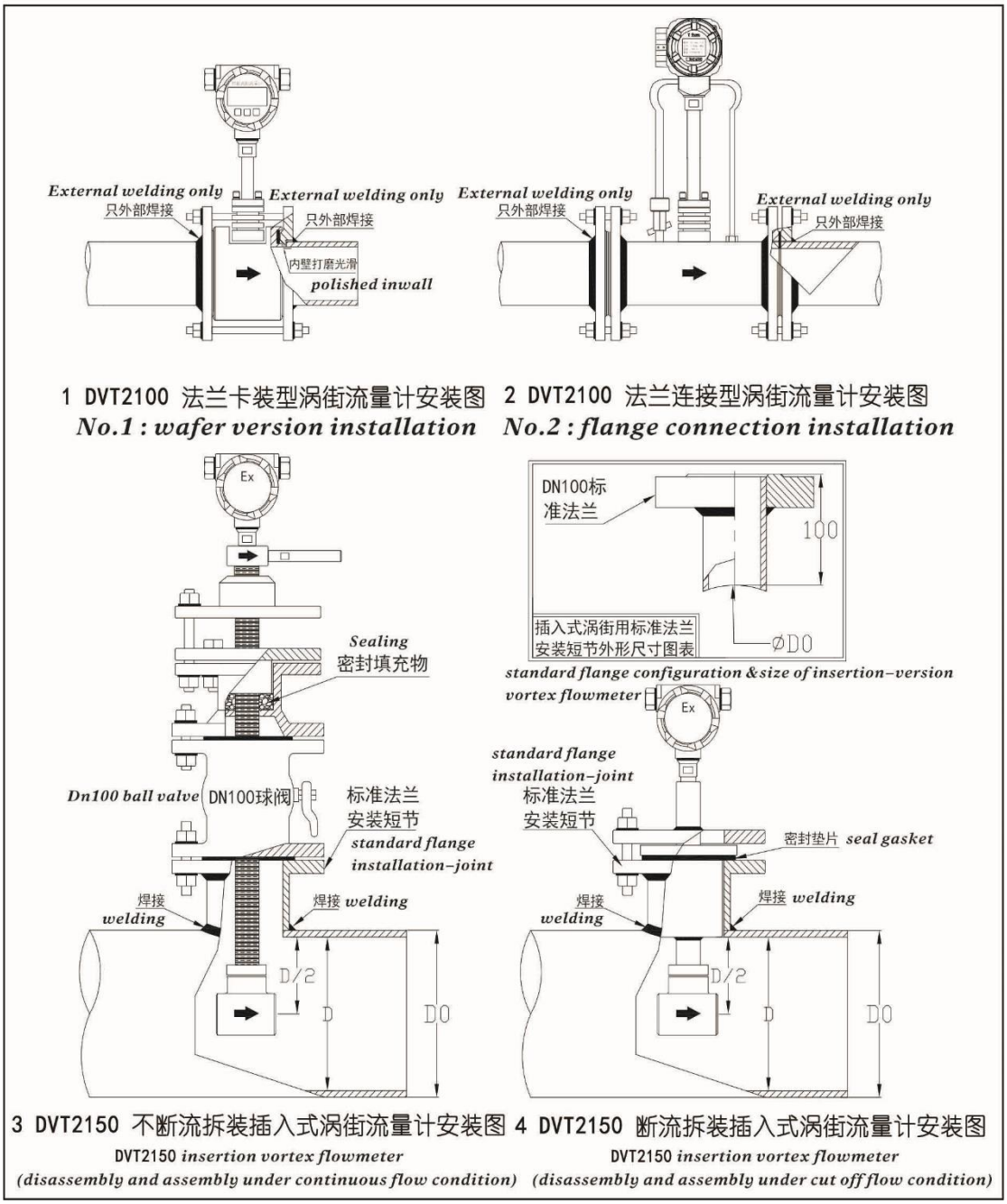
DVT2100 and DVT2150 Vortex diameter is accordant to upstream and downstream tubing diameter at installation point; sensor is concentric with pipeline; prohibit gaskets between sensor and flanges bulge out into pipeline. Make sure that the connection end face of insertion-version vortex flowmeter parallel to the pipe axis. Details as per fig.4.

2. 表体初装完成以后，当测量介质为蒸汽或其它高温介质时，在管道内充满介质后，应对法兰螺栓进行重新紧固。并对管道进行保温，避免因为环境温度过热而将放大器损坏；

After initial installation, when medium is steam or other high-temp medium, flanges & bolts should be re-tightened when medium full of pipeline. Do heat reservation measures for pipeline in order to protect amplifier.

DVT系列涡街流量计安装及焊接示意图　　图 4

Sieries DVT Vortex Flowmeter Installation & Welding Reference　　Fig 4



请注意：对于温压补偿一体化型流量计，为了避免高温或水击将压力传感器损坏，在管道内充满流体前，务必将表体上的压力阀门关闭。当管道内充满流体且达到工作温度、压力后，再缓慢开启阀门。对于在室外安装的表体，应将取压弯管及压力测头部分进行保温!!!

Be attention: concerning P/T compensation integrated vortex flow meter, to avoid high-temp or liner shock damage pressure transmitter, Pressure control valve must be closed before medium is full of pipeline. When medium full of pipeline meanwhile approaching working temperature and pressure, slowly turn on control valve. Pressure tapping and pressure detector should be done heat reservation if flow meter outdoor installation.

附录 1　各种类型表体功能一览表

Appendix 1: Functions Schedule of all Models

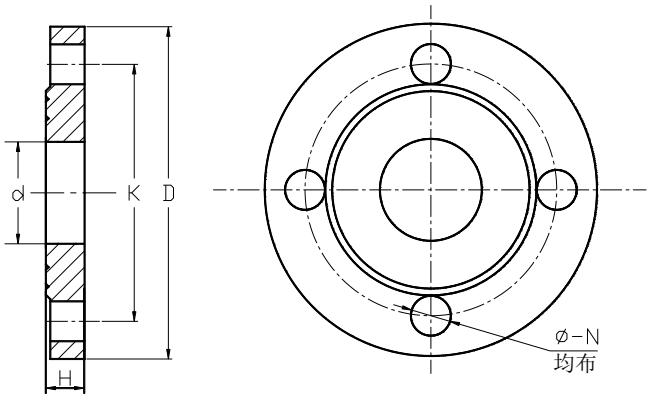
名　称 Tag	口径范围 Diameter	介质类型 Medium	可测介质温度 Medium temp	功 能 简 介 Function description
法兰卡装型表体 Wafer connection	DN10~ DN500 (mm)	气体 Gas 液体 Liquid 饱和 蒸汽 Saturated steam 过热 蒸汽 Superheated steam	-40~+150℃ -40~+260℃ -40~+320℃	表体材质：不锈钢 Flowmeter body material: stainless steel 卡装法兰材质：锻压碳钢 Wafer type companion flange: forged carbon steel 最高工作压力：2.5MPa（大于 2.5MPa 时需协议供货） Max working pressure: 2.5Mpa (over 2.5Mpa supply by negotiation)
法兰连接型表体 Flange connection				
法兰卡装 Wafer connection 传感头不断流 可拆卸型表体 Patent type	DN25~ DN500 (mm)		-40~+150℃ -40~+260℃ -40~+320℃ -40~+420℃	表体材质：不锈钢（其它材质需协议供货） Flowmeter body material: stainless steel (other material supply by negotiation) 最高工作压力：2.5MPa（大于 2.5MPa 时需协议供货） Max working pressure: 2.5Mpa (over 2.5Mpa supply by negotiation) 特点：可在不影响管道内流体流动的情况下更换传感头 Features : replace sensor head without effect fluid flow inside pipeline.
法兰连接 Flange connection 传感头不断流 可拆卸型表体 Patent type				
法兰连接 Flange connection 传感头可拆卸 低流速型涡街 Low flow version equipped dismountable sensor head				表体材质：不锈钢（其它材质需协议供货） Flowmeter body material: stainless steel (other material supply by negotiation) 最高工作压力：2.5MPa（大于 2.5MPa 时需协议供货） Max working pressure: 2.5Mpa (over 2.5Mpa supply by negotiation) 特点：1.比相同口径的涡街流量计具有更低的下限流量测量功能 2.传感头不断流拆装型可在不影响管道内流体流动的情况下更换传感头 Features : 1. Compare same diameter vortex flowmeter its more lower limit. 2. Replace sensor head without effect fluid flow inside pipeline.
法兰连接 Flange connection 低流速型涡街 Low flow version			-40~+150℃ -40~+260℃ -40~+320℃	
法兰卡装温度 补偿型表体 Wafer version with temp compensation	DN25~ DN500 (mm)	饱和 蒸汽 Saturated steam	+100~+260℃	表体材质：不锈钢（其它材质需协议供货） Flowmeter body material: stainless steel (other material supply by negotiation) 法兰材质：锻压碳钢 Flanges material: forged carbon steel 温度测头：PT100

<table>
<tr><td>法兰卡装
温度补偿传感头现场可拆卸型表体
Wafer version with Temperature Compensation equipped dismountable sensor head</td><td></td><td></td><td></td><td>Temperature gauge head: PT100
最高工作压力：2.5MPa
Max working pressure : 2.5Mpa
特点：Features :
1.专用测量饱和蒸汽。将流量与温度补偿传感器集于一体。
1. Special for saturated steam. Integrated flow and temperature sensor in one.
2.传感头现场可拆卸型表体，可在不影响管道内流体流动的情况下更换传感头
2. Sensor is dismountable type, replace sensor head without effect fluid flow inside pipeline.</td></tr>
<tr><td>法兰连接
温压补偿一体化型表体
Flange connection Integrated temperature with pressure compensation</td><td rowspan="2">DN25~
DN500
(mm)</td><td rowspan="2">气体
Gas
饱和
蒸汽
Saturated steam
过热
蒸汽
Superheated steam</td><td>-40~+150℃
-40~+260℃
-40~+320℃</td><td rowspan="2">表体材质：不锈钢（其它材质需协议供货）
Flowmeter body material: stainless steel (other material supply by negotiation)
温度测头：PT100
Temperature gauge head: PT100
压力测头：扩散硅压力传感器
Pressure gauge head: diffuse silicon pressure sensor.
最高工作压力：2.5MPa(大于 2.5MPa 时需协议供货)
Max working pressure: 2.5Mpa (over 2.5Mpa supply by negotiation)
特点：
Features :
1. 将流量与温度、压力补偿传感器集于一体。
1. Integrated temperature and pressure compensation in one.
2. 传感头现场可拆卸型表体，可在不影响管道内流体流动的情况下进行更换传感头
2. Sensor is dismountable type, replace sensor head without effect fluid flow inside pipeline.</td></tr>
<tr><td>法兰连接
温压补偿一体化
传感头可拆卸型表体
Flange connection Integrated temperature with pressure compensation equipped dismountable Sensor head</td><td>-40~+150℃
-40~+260℃
-40~+320℃
-40~+420℃</td></tr>
<tr><td>插入式断流
拆卸型表体
Insertion-version with dismountable body need stop medium flow</td><td>DN200~
DN2000
(mm)</td><td>气体
Gas
液体
Liquid
饱和
蒸汽</td><td>-40~+150℃
-40~+200℃</td><td>表体材质：不锈钢
Flowmeter body material: stainless steel
连接短节：碳钢
Connection joint: carbon steel
最高工作压力：2.5MPa（大于 2.5MPa 时需协议供货）
Max working pressure: 2.5Mpa (over 2.5Mpa supply by negotiation)</td></tr>
</table>

插入式 不断流拆卸型表体 Insertion-version with dismountable body no need stop medium flow			Saturated steam 过热 蒸汽 Superheated steam		特点：Features: 1.断流拆卸型为插入式首选型。其结构紧凑，抗振动性能好 1. Stop medium flow is the priority for insertion vortex flowmeter. Its compact conformation and good anti-vibration performance. 2.不断流拆卸型表体需配装 DN100 球阀，可在不影响管道内流体流动的情况下进行表体安装、更换、维护 2. No need stop medium flow with dismountable flowmeter body is equipped DN100 glove valve. Do installation, maintenance and replacement without effect medium flow.
潜水型涡街流量计 Submergible-version vortex flowmeter	法兰卡装型表体 Wafer-version	DN10~DN500 (mm)	气体 Gas 液体 Liquid	-40~+150℃ -40~+260℃	表体及法兰材质：同对应类型表体材质 Flowmeter body and flange material: same 最高工作压力：2.5MPa（大于 2.5MPa 时需协议供货） Max working pressure: 2.5Mpa (over 2.5Mpa supply by negotiation) 特点：Features : 1.表体为潜水型，可长期潜在水中。适用于地井管道或潜水管道流量的测量。 1. Flowmeter sensor is Submergible-version. Application: subsurface and Submergible pipeline. 2.放大器与表体分离安装，可方便的安装到可以直接操作的地方。（分离距离≤10 米） 2. Remote-version: transmitter and sensor is separated installation. (The biggest distance suggest ≤10m.)
	法兰连接型表体 Flange-version	DN25~DN500 (mm)			
	插入式表体 Insertion-version	DN200~DN2000 (mm)			

附录 2 法兰连接型表体法兰尺寸图表

Appendix 2: Configuration Size of Flange Connection Models



法兰口径(mm) Flange diameter(mm)	压力等级 (MPa) Pressure class(MPa)	法兰连接型表体用标准法兰 Flange standard of connection version				
		D(mm)	K(mm)	¢(mm)	N(个)	H(mm)
DN10	1.0/1.6/2.5	90	60	14	4	14
DN15	1.0/1.6/2.5	95	65	14	4	14
DN20	1.0/1.6/2.5	105	75	14	4	16
DN25	1.0/1.6/2.5	115	85	14	4	16
DN32	1.0/1.6/2.5	140	100	18	4	18
DN40	1.0/1.6/2.5	150	110	18	4	18
DN50	1.0/1.6/2.5	165	125	18	4	20
DN65	1.0/1.6/2.5	185	145	18	8	20/20/22
DN80	1.0/1.6/2.5	200	160	18	8	20/20/24
DN100	1.0/1.6/2.5	220/220/235	180/180/190	18/18/22	8	22/22/26
DN125	1.0/1.6/2.5	250/250/270	210/210/220	18/18/26	8	22/22/28
DN150	1.0/1.6/2.5	285/285/300	240/240/250	22/22/26	8	24/24/30
DN200	1.0/1.6/2.5	340/340/360	295/295/310	22/22/26	8/12/12	24/26/32
DN250	1.0/1.6/2.5	395/405/425	350/355/370	22/26/30	12/12/12	26/29/35
DN300	1.0/1.6/2.5	445/460/485	400/410/430	22/26/30	12/12/16	26/32/38
DN350	1.0/1.6/2.5	505/520/555	460/470/490	22/26/33	16/16/16	30/35/42
DN400	1.0/1.6/2.5	565/580/620	515/525/550	26/30/36	16/16/16	32/38/48
DN450	1.0/1.6/2.5	615/640/670	565/585/600	26/30/36	20/20/20	36/42/54
DN500	1.0/1.6/2.5	670/715/730	620/650/660	26/33/36	20/20/20	38/46/58

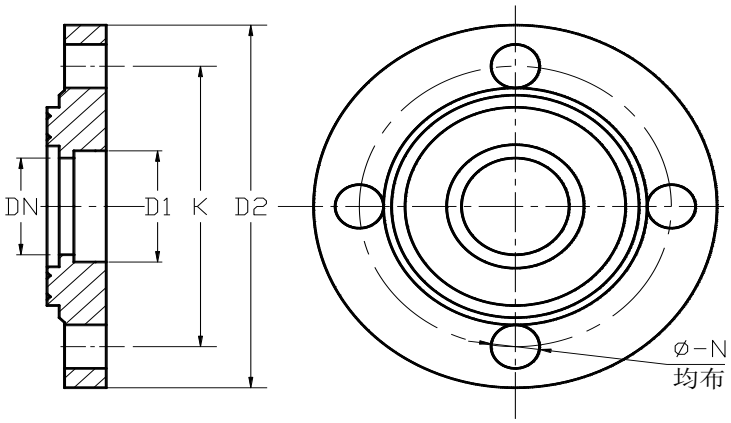
注：DVT2100 型法兰连接式涡街流量计的法兰出厂压力等级：DN10~DN80 为 PN2.5MPa；DN100~DN200 为 PN1.6MPa；DN250~DN500 为 PN1.0MPa；超出出厂压力等级时，请务必在订货时注明。法兰标准执行 GB9119-2010。

Notes: DVT2100 flange connection vortex flowmeter its flange pressure class: DN10~DN80 is PN2.5MPa; DN100~DN200 is PN1.6MPa; DN250~DN500 is PN1.0MPa; if over above pressure class, please mention clearly

in purchasing order. GB (China flange standard follows GB9119-2010). International standard, such as ANSI/DIN/JIS... Please customer provide clear model number.

附录 3　法兰卡装型表体法兰尺寸图表

Appendix 3: Configuration Size of Wafer Connection Models



法兰口径 (mm) Flange DN	压力等级 (MPa) Pressure class	法兰卡装型表体专用法兰 flange standard of wafer connection version				
		D1(mm)	D2(mm)	K(mm)	¢(mm)	N(个)
DN10	1.0/1.6/2.5	14	90	60	14	4
DN15	1.0/1.6/2.5	19	95	65	14	4
DN20	1.0/1.6/2.5	26	100	70	14	4
DN25	1.0/1.6/2.5	33	100	75	14	4
DN32	1.0/1.6/2.5	39	105	80	14	4
DN40	1.0/1.6/2.5	49	150	116	18	4
DN50	1.0/1.6/2.5	60	160	124	18	4
DN65	1.0/1.6/2.5	76	175	138	18	4
DN80	1.0/1.6/2.5	90	204	164	20	4
DN100	1.0/1.6/2.5	109	234	192	22	6
DN125	1.0/1.6/2.5	134	250	205	22	6
DN150	1.0/1.6/2.5	163	280	232	22	6
DN200	1.0/1.6/2.5	220	340	286	24	8
DN250	1.0/1.6/2.5	274	390	338	24	8
DN300	1.0/1.6/2.5	327	450	393	26	12
DN350	1.0/1.6/2.5	377	510	460	26	16
DN400	1.0/1.6/2.5	426	565	510	26	16
DN450	1.0/1.6/2.5	482	620	565	30	16
DN500	1.0/1.6/2.5	534	685	620	33	20

注：出厂法兰卡装型涡街的法兰均按 PN2.5MPa 压力等级制造，当工况压力大于 2.5MPa 订货时请注明相应压力等级。

Notes: companion flanges for wafer connection follows PN2.5MPa pressure class, when over 2.5MPa please make

clearly mention.