Intelligent Gas Turbine Flowmeter

User's Manual

Contents

1. Product Introdcution

LWQ gas turbine flowmeter is a kind of velocity flow meter that accurately measures gas flow. It has the advantages of simple and light structure, high measurement accuracy, good repeatability, wide measurement range, convenient installation and maintenance, etc. It is widely used in the measurement of various gases such as natural gas, city gas, propane, butane, air, nitrogen and other gases in petroleum, chemical industry, metallurgy, aviation, scientific research and other departments and industrial fields. Due to its high precision and good repeatability, the instrument is suitable for trade measurement and industrial process detection.

When the gas turbine flowmeter is measured online, its medium density changes with the change of temperature and pressure. In order to measure accurately, the temperature and pressure of the medium must be tracked and detected at the same time, and the volume flow under different working conditions must be converted into the volume flow under the standard state or the agreed state.

Since the flowmeter integrates temperature, pressure and flow sensors, tracks and detects the medium temperature and pressure on line, and performs automatic compensation and compression factor correction operation, it has excellent low-pressure and high-pressure metering performance, and is especially suitable for the measurement of various single-phase gases, such as natural gas and other gases. According to different requirements of users, the company provides turbine flow meters with different precision grades.

2. Main Features

1) High precision, good repeatability, small pressure loss and good seismic performance.
2) Use high-quality bearings, with small friction resistance, good sealing performance and hand name.
3) Integrating a microprocessor, a flow sensor, a high-precision temperature sensor and a pressure sensor, directly measuring the flow rate, the temperature and the pressure of the measured gas, and automatically performing flow tracking compensation and compression factor correction operation.
4) The instrument has pulse signal and analog signal output, and can directly realize centralized collection and real-time management of computer data through RS485 communication interface or GPRS system.
5) Low power consumption, internal battery power supply or external power supply.
6) It has a real-time data storage function, which can prevent data loss during battery replacement or sudden power failure. In the power failure state, internal data can be stored permanently.
7) It can be used with IC card prepayment system to facilitate trade settlement.

3.Technical Performance

3.1 Accuracy Class

Class 1.0: Qmax-0.2max	±1.0%	0.2Qmax-min	±2.0%
Class 1.5: Qmax-0.2max	±1.5%	0.2Qmax-min	±3.0%

Products that are not specially marked shall be delivered in accordance with Class 1.5 precision. For other precision, special instructions shall be required for customization when ordering.

3.2 Model, specification and basic parameters of flowmeter (see Table 1)

Model	Nominal Diameter DN(mm)	Flow Range(m3/h)	Max pressure loss （kPa）	Initial flow （m3/h）	Connection type
LWQ-25	25	2.5-25		1	Flange (thread)
LWQ-25		4-40		2	
LWQ-40	40	5-50		1.8	
LWQ-50	50	6-65	0.7	2.5	Flange
LWQ-50		10-100	0.7	2.5	
LWQ-80	80	13-250	0.3	6	
LWQ-80		20-400	0.8	6	
LWQ-100	100	20-400	0.2	8	
LWQ-100		36-650	0.5	8	
LWQ-125	125	35-700	0.5	12	
LWQ-150	150	32-650	0.4	15	
LWQ-150		50-1000	1.7	15	
LWQ-200	200	80-1600	0.2	35	
LWQ-200		130-2500	0.9	35	
LWQ-250	250	130-2500	0.2	40	
LWQ-250		200-4000	0.5	50	
LWQ-300	300	300-6000	1.5	50	

Table 1

3.3 Conditions of Use

3.3.1 Standard condition: P=101.325kPa　T=293.15

3.3.2 Conditions of use:

A. ambient temperature:-25 ~+80 ℃

B. medium temperature:-20 ~+60 ℃

C. relative humidity: 5-95%

D. atmospheric pressure: 86 kpa-106 kpa

3.4 Electrical Performance Indicators

3.4.1 Working power supply

A. Internal instrument power supply: 3.6VDC lithium battery, which can work normally when the battery voltage is 3.1 ~ 3.6 v.

B.External power supply:+24VDC±15%,ripple ≤ 5%, suitable for 4-20ma output, pulse output, alarm

output, RS-485,etc.

3.4.2 Overall power consumption:

External power supply, < 2W.

Internal instrument power supply, average power consumption ≤1mW, can work continuously for more than 2 years.

3.4.3 Pulse Output Mode

1) Base meter pulse signal: (used for calibration of instrument):

Directly outputting the original pulse signal of the base meter detected by the flow sensor through an amplifier, wherein the high level is more than or equal to ≥20V and the low level ≤1V.

2) Modified working condition pulse signal (or standard volume flow):

Set by software, the default is the volume flow pulse output of the modified working condition, with amplitude values of: high level ≥20V and low level ≤1V.

3) Equivalent Pulse Signal (for IC Card Controller Input):

A.TTL output amplitude is 0 ~ 3v, output pulse width ≥50ms.

B.OC output.

3.4.4 Current Output:

4 ~ 20mA Standard Analog Current Output Function

It is directly proportional to the standard volume flow rate, 4mA corresponds to 0 Nm3/h, 20mA corresponds to the maximum standard volume flow rate (this value can be set).

The output form is: two-wire system

3.4.5 RS485 Communication

Through the internal RS485 standard interface, it can be connected with host computers such as personal computers and PLC for serial communication. It can display medium pressure, temperature, instantaneous flow rate, accumulated standard flow rate, battery voltage, etc.

4.The Function Of Meter Header

1. Interface with temperature/pressure sensor. The temperature can be connected with Pt100 or Pt1000, and the pressure can be connected with gauge pressure or absolute pressure sensor.

2. The output signals are diversified, and two-wire 4-20mA output, three-wire pulse output, equivalent output and 485 communication can be selected according to customer requirements.

3. It has excellent non-linear correction function and greatly improves the linearity of the instrument.

4. It has software spectrum analysis function, which improves the anti-interference and anti-seismic capability of the instrument.

5. Ultra-low power consumption, a dry battery can maintain full performance for at least 3 years.

6. The working mode can be switched automatically, with battery power supply, two-wire system and three-wire system.

7. Self-checking function, rich self-checking information; It is convenient for users to overhaul and debug.

8. It has independent password setting. Parameters, total amount reset and calibration can set passwords of different levels, which is convenient for users to manage.

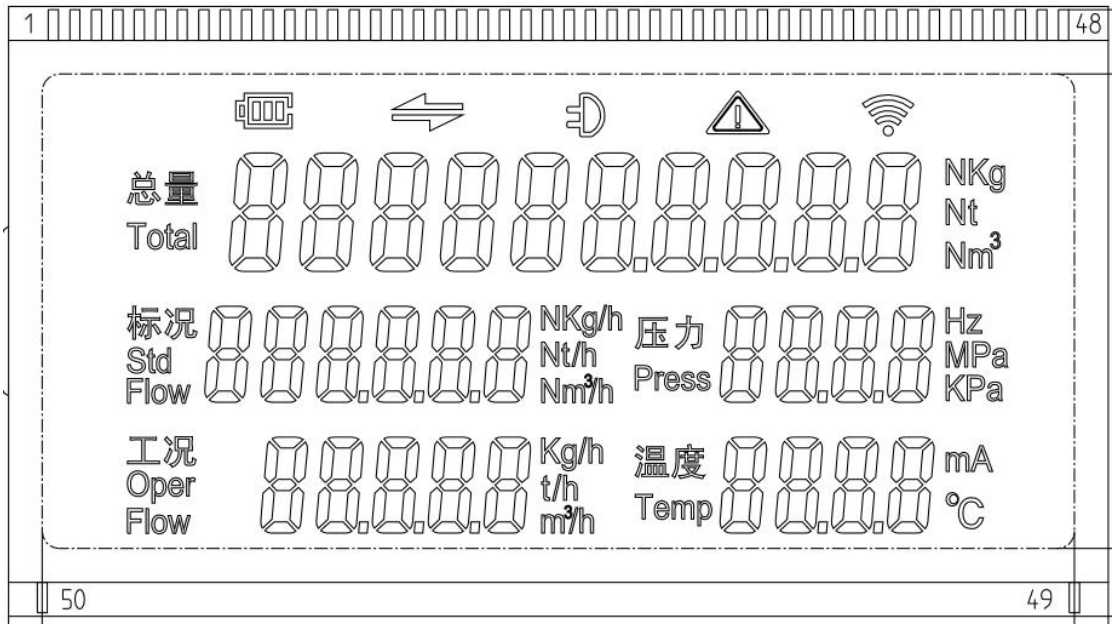
5.Operation, use and setting

5.1 Key operation instructions

The buttons of intrinsically safe converter are four buttons: "K1", "K2", "K3" and "K4"

K1: Page turning browse key; Parameter modification confirmation storage key
K2: Shift key
K3: Parameter setting modification status digit increment key; Page turning key on unmodify status menu
K4: Parameter setting modification status exit modification key; When the parameter is not modified, click to exit and return to the main display screen
Description: You can turn pages circularly.

5.2 Constant display screen



1. **“Total”:** Total amount, three digits after the decimal point can be reserved at most, and the number will be automatically rounded up after overflow. If the number exceeds 9999999999, the remainder cannot be lost. The working condition total amount and standard temperature and pressure total amount are distinguished by units, with the working condition total amount in m3 and the standard temperature and pressure total amount in Nm3. The accumulated amount is stored every 30s.

2. **“Std Flow”:** Instantaneous flow of standard temperature and pressure, two decimal places can be reserved at most, and the number will be automatically rounded up after overflow, with the maximum value of 999999 Nm3/h.

3. **“Oper Flow”:** Instantaneous flow under working conditions, two decimal places can be reserved at most, and the number will be automatically rounded up after overflow, with the maximum value of 99999 m3/h.

4. **“Press”:** Pressure, display at most two digits after decimal point, and the displayed value range can be set in the meter. The units are fixed in KPa and MPa.

5. **“Temp”:** Temperature, display at most one digits after decimal point,, and the unit is℃.

6. **Battery capacity sign“ ”:** When the battery voltage is more than 3.5V, it displays full grid; When it is less than 3.5V and more than 3.4V, it displays the lower grid; When it is less than 3.4V and more than 3.2V, it displays blank space; When it is lower than 3V, it does not display.

7. **External power supply access sign“ ”:** When there is external power supply access (24V power supply or two-wire power supply), the external power supply sign will be on.

8.**Communication sign“ ”:** When the instrument communicates with 485, the communication sign is on.

9.After entering the menu, the password is correct, and the " " "sign lights up, indicating that the parameter can be modified; Otherwise, the password is wrong and can only be viewed.

Press the "K2" key on the constant display screen to enter the auxiliary menu of the user, and turn pages with the "K2" key

The main display screen displays:

Line1: battery, external power supply, communication and infrared sign

Line 2: total amount of standard temperature and pressure

Line 3: instantaneous flow and pressure of standard temperature and pressure

Line 4: instantaneous flow and temperature under working conditions

The second main screen displays:

Line 2: total amount under working conditions

Line 3: sensor frequency and correction frequency

Line 4: compression factor coefficient

The third main screen displays:

Line 2: instrument coefficient

Line 3: baud rate and communication address

Line 4: serial port parameters and battery voltage

The fourth main screen displays:

Line2: upper limit of flow

Line4: software version number, current (displayed when current output function is available)

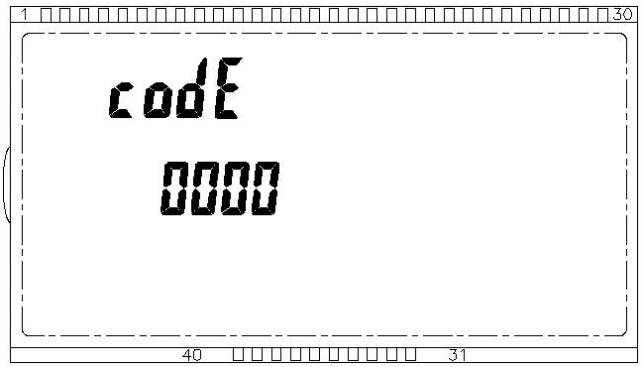
Time and date display

5.3 Menu selection screen

U--: user setting menu.
F--: engineer setting menu.
S--: special function setting menu.

Press "K2" or "K3" key to enter the menu, and press "K1" key to enter the password screen after the selection is completed.

5.4. Password screen



The following table is the password operation instructions:

Default password	Function
0111	Enter the user parameter setting screen
0222	Enter the engineer parameter setting screen
0333	Special function setting screen Clear the accumulated quantity of the first, second and third screens. Set password: 0101. The fourth screen recovery password: 0333, storage: 0111. The fifth screen special setting password: 0101

Table 1 password operation instructions

Note: When the password is wrong, the "← "sign in the upper right corner of the screen does not light up, indicating that the corresponding parameters can be viewed but cannot be modified.

5.5 User screen

Select U-- from the auxiliary constant display screen and press the "K1" key to enter.
See Table 2 for the specific parameter setting operation of the user screen.

Table 2

User parameter setting（0111）			
Code	***Parameter***	Description	Default parameters
1	Damping time	Range: 01-99s, the higher the value, the slower the flow rate change. Application scope of damping time: when the change is less than 5% of the current input signal, the damping will work within 2Hz; if the change is higher than this change, it will fill quickly, which has certain disadvantages and can not be processed by sudden change; when the input signal is more than 100Hz, it will be treated as 5% change.	01
	Upper limit of flow	The corresponding flow value is output at the frequency of 20mA and 1000Hz. When the flow value is morer than 1.5 times of this value, it is displayed and calculated as 1.5 times. The flow rate under working condition is not limited by this, only limited by the number of display digits "999999". No decimal point, six-digit integer, lighting unit.	4000Nm³/h
	Flow cut off under working condition	If flow rate under working condition is lower than this value, the flow rate will be displayed as 0. One decimal point, five-digit integer, lighting unit. **Note: Whether the original frequency output and the modified frequency output are cut off.**	0m³/h
2	Baud rate	0:1200; 1:2400; 2:4800; 3:9600; 4:19200.	3:9600
	Address	001-255 a decimal number. When set to 0, it defaults to 1. When it exceeds 255, it defaults to 255.	001
	uart set up	n: none check, O: odd check E: even check, 7: seven data bits 8: eight data bits, 1: one stop bit 2: two stop bits.	n81
	RTU/ASCII	0：RTU, 1：ASCII	0

3	Pulse equivalent	Any number can be set, 0.001-9999.999 . Four-digit integer, three-digit decimal, light Nm3. **Note: Corresponding to the cumulative flow of standard temperature and pressure. If it exceeds the equivalent output range, the output can be delayed, but the output number and waveform should be normal. At the same time, after modifying the equivalent value, the output number is cleared and recalculated.**	1.0
	Pulse width	The unit is ms and the range is 1-9999ms	100
	Output mode selection	0: Equivalent pulse output 1: 0-1000 corresponds to standard temperature and pressure output 2.Corrected frequency output 3:Original frequency output Corresponding terminal P_OUT	0
4	High alarm threshold	Unit Nm^3	
	High alarm electrical level	0: High, 1：Low	
5	Low alarm threshold	Unit Nm^3	
	Low alarm electrical level	0: High, 1：Low	
6	Language	0：Chinese 1：English	0
	Backlight	0: The battery, two lines and three lines don’t light up. 1: The battery lights up automatically for 20 seconds, two lines don't light up and three lines always light up. 2: The battery always light up, two lines don’t light up and three lines always light up.	1
7	Time setting	Year, month, day and time	2017-01-01-01-01
8	Password modification	The four-digit password can be modified arbitrarily, and the second line is password encryption prompt. When the user forgets the password, it can be decrypted according to this value	

Engineer parameter setting (password 0222)			
Code	***Engineer setting***	Description	Default parameters
1	Eight-point correction factor	Correction factor: two-digit integer, four-digit decimal Frequency:four-digit integer, two-digit decimal Note for correction: **Temporary procedures can only correct the frequency of integers, does not support decimal point correction.** **When a point correction coefficient is 0, the following parameters do not participate in the operation.**	1.0；100 （The first point） 0；100 （The rest point）
2	Instrument coefficient	Six-digit integer, three-digit decimal, unit is P/m3.	3600
3	Temperature compensation mode	0: no compensation (four zeros are displayed) 1: setting (display setting value) 2: automatic	2
	Temperature set point	The first digit is a positive and negative sign, which guarantees three integers and two decimal places. The unit is ℃. It can be set arbitrarily between -40-150 ℃.	20
	Temperature offset	The first digit is a positive and negative sign, which guarantees three integers and two decimal places. The unit is ℃. When compensation is set at that time, this value is invalid and only works on automatic compensation.	0
4	Measured PT resistance value		
	Selection of PT100/PT1000	0 stands for PT100 1 stands for PT1000	0
	1000 ohm measured value input		
	1750 ohm measured value input		

5	Pressure compensation mode	0: no compensation (pressure shows four zeros) 1: setting 2: automatic	2
	Pressure set point	Four-digit integer, two decimal places, in kPa.	101.32
	Pressure offset	The first digit is a positive and negative sign, which guarantees three integers and two decimal places. The unit is kPa. When compensation is set at that time, this value is invalid and only works on automatic compensation.	0
6	Upper pressure limit	Four-digit integer and two decimal places, in kPa.	206.84
	Selection of pressure sensor	0: digital pressure sensor 1: analog pressure sensor	0
	Local atmospheric pressure	Local atmospheric pressure setting, three-digit integer and three-digit decimal, this value has no effect when absolute pressure sensor is used, and the unit is kPa.	101.325
	Sensor type	0: absolute pressure 1: gauge pressure	0
7	Pressure correction switch	0: no correction 1: amendment	0
	Five points amendment	The first line is the pressure value collected without correction. The second line is the corresponding correction. This value must be set from small to large. When a point is zero, the following point does not work. When the correction is turned on, five points are displayed, and each point is a four-digit integer and two decimal places.	1000:1000 （The first point） 0:0 （The rest point）
8	Standard temperature	Three-digit integer and two decimal places,can be arbitrarily modified, can not be modified to a negative number, unit ℃.	20
	Standard pressure	Three digit integers and three decimal places in kPa.	101.325

9	Set value of compression factor	Two digit integers and four decimal places	1.0
	Compression factor compensation mode	0: no compensation 1: setting 2: molar components	0 Molar composition algorithm, calculated by NX-19, parameter range: Relative density =0.55-0.75 CO2 molar content < 0.15 N2 molar content ＜0.15
	Relative density	two-digit integer and three-digit decimal	0
10	Mole fraction of CO2	One-digit integer and three-digit decimal	0
	Mole fraction of N2	Two-digit integer and two-digit decimal	0
11	Working condition relative humidity	One-digit integer and three-digit decimal	0
	Relative humidity in standard temperature and pressure	One-digit integer and three-digit decimal	0
12	Password modification	The four-digit password can be modified arbitrarily, and the second line is password encryption prompt. When the user forgets the password, it can be decrypted according to this value.	
Special parameter setting (0333)			
Code	***Parameter***	Description	Default parameters
1	Clear accumulated quantity	After confirmation, the accumulated quantity of working condition and standard condition shall be cleaned up.	

2	Working condition cumulative quantity setting	Ten-digit integer and three-digit decimal	0
3	Standard condition cumulative quantity setting	Ten-digit integer and three-digit decimal	0
4	Restore the factory	0： F-R confirm key to restore the factory settings. When the instrument is powered on for the first time, the default parameters are automatically written into the recovery storage area, so the factory settings must be saved when the instrument leaves the factory. Description: restart after recovery.	
	Storage factory	1：The F-S key saves the factory settings.	
5	Special setting	Reserved, eight digit integer.	0
6	Password modification	The four-digit password can be modified arbitrarily, and the second line is password encryption prompt. When the user forgets the password, it can be decrypted according to this value.	

Special tips:

1. When the battery power is lower than 1 grid, it indicates that the battery is low. It is recommended to replace the battery in time.
2. The correct setting of parameters is the key to the normal operation of the instrument. Please confirm whether the parameters are correct before formal use.
3. In the menu screen or auxiliary menu screen for a long time without any operation, it will automatically exit to the main display screen in 5 minutes
4. BL is battery low voltage alarm, lower than 3.2V alarm, default low level, high level alarm.
5. BC is the valve closing signal. When the temperature, pressure, flow and other faults occur, it will output high level. After the temperature and pressure flow display is normal, if it is set to set compensation, no alarm will be given at this time.

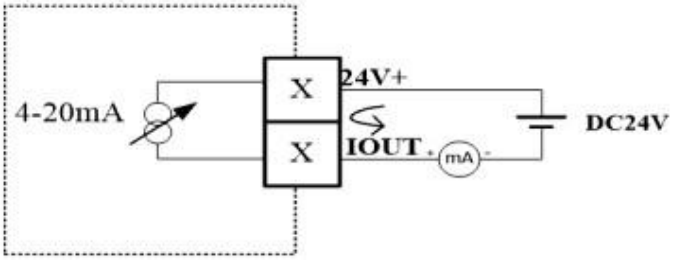
6.Wiring Method

Terminal wiring instructions:

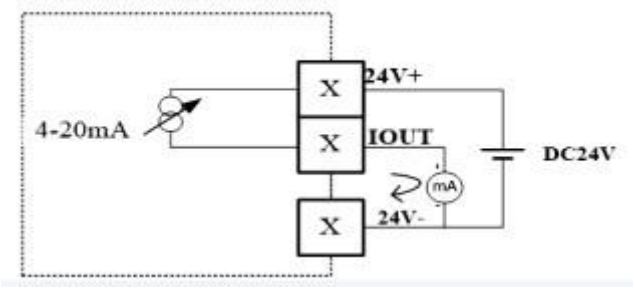
Signal output terminal		
Code	Description	remarks
24V+	Positive pole of 24 V power supply	
24V-	Negative pole of 24 V power supply	
IOUT	Current output terminal	
FOUT	Calibration pulse output terminal	Only the corrected frequency can be output, and the original frequency is not measured when the correction is not used
PULSE	Pulse or equivalent pulse output	User menu F_ 03 screen select output mode, jumper (or 0r resistor) can choose NPN or PNP output
AH	High alarm output	
AL	Low alarm output	
485A	RS_485 Communication A terminal	
485B	RS_485 Communication B termina	
PE	Grounding	EMC anti-interference
BC	Valve closing alarm output end	Not gate output
BL	Battery undervoltage alarm output terminal	
IC	IC card signal output terminal	
GND	IC、BC、BL signal ground	
Signal input terminal		
PT	PT100 interface	Temperature sensor interface
PT		
C	Communication clock terminal of pressure sensor	Digital pressure interface
P	Communication data terminal of pressure sensor	
V	Positive power supply terminal of pressure sensor	
G	Negative terminal of pressure sensor power supply	
+	Pressure sensor power supply positive	Analog pressure interface
-	Pressure sensor power supply negative	
P+	Pressure sensor output positive	
P-	Pressure sensor output negative	
G	Negative power supply terminal of	Magnetoresistive sensor interface

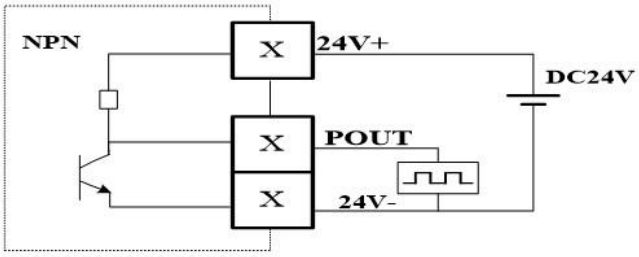
	magnetoresistive sensor	
S	Output end of magnetoresistive sensor	
V	Positive power supply terminal of magnetoresistive sensor	

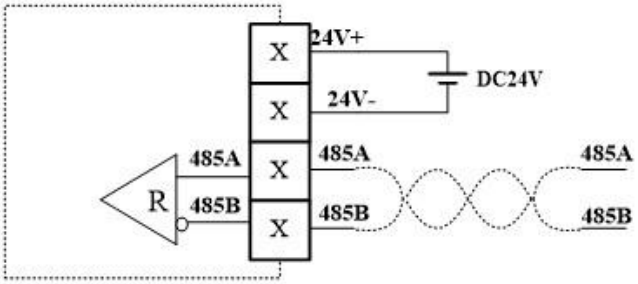
Two-wire 4-20mA output function wiring description



Three-wire 4-20MA output,pulse output and RS485 communication function wiring description







7.Selection and Installation

7.1 Flowmeter Selection

7.1.1 Scope of Use

1) Where the required flow range is less than that in accordance with Table 1 and the initial flow is relatively strict.

2) There is no fluid medium with short interval time and large flow fluctuation amplitude

3) Suitable for natural gas, city gas, compressed air, nitrogen, etc.

7.2. Determination of Specifications

The user shall estimate the maximum and minimum volume flow rate of the pipeline according to the gas transmission rate of the pipeline and the temperature and pressure range that the medium may reach, and correctly select the flowmeter specification. When both calibers of flowmeter can cover the lowest and highest volume flow, small calibers shall be selected if the pressure loss allows. A standard state of the time limit for a project flow range and medium pressure, calculate the flow range under the working state, selection formula is as follows:

Qg=Zg/Zn*Pn/(Pg+Pa)*Tg/Tn*Qn=101.325/(Pg+Pa)*(1/Zn/Zg)*(Tg/293.15)Qn

Type:

Tg: the absolute temperature (k) under the medium working condition;

Pg: the medium pressure (kpa); Pa is the local atmospheric pressure (kpa);

Qg: the volume flow rate (m3/h) under working conditions;

Qn: the volume flow rate (Nm3/h) in the standard state;

Zn and Zg respectively represent the compression coefficient under the standard state and the compression coefficient under the working condition.

Due to the large calculation step size, the data in the table are calculated according to the natural gas real density Gr=0.600 and the mole fractions of nitrogen and carbon dioxide are both 0.00. When the medium pressure is lower than 0.1Mpa, it can be estimated by Zn/Zg=1.00.

The selection calculation shall be based on the formula.

7.3 Selection Examples

It is known that the actual working pressure of a certain gas supply pipeline is 0.5 MPa ~ 0.6 MPa (gauge pressure), the medium temperature range is-10 ~+40 ℃, and the peak gas supply amount is 400 ~ 500 Nm3/h. The local atmospheric pressure is 101.3kPa, and it is required to determine the caliber of the flowmeter.

Analysis: Since the flow range given in Table 1 above is the flow range under actual working condition, the standard temperature and pressure flow should be converted into the working condition flow first, and the appropriate caliber should be selected.

Calculation: When the medium pressure is the lowest and the temperature is the highest (the influence of natural gas compression factor may not be considered in the estimation and selection), the

medium has the maximum volume flow when it is in the peak period of gas supply, so there are:

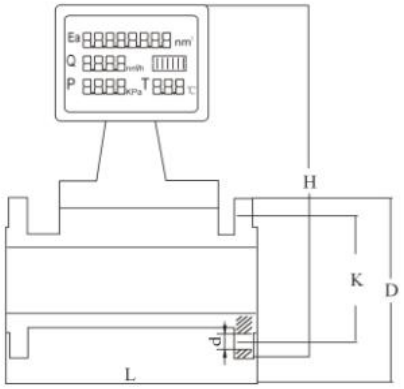
$$Q_{\max} = Q_0 \cdot \frac{P_0}{P} \cdot \frac{T}{T_0} = 9500 \times \frac{101.325}{101.3 + 1000} \times \frac{273.15 + 40}{293.15} = 933.7 m^3 / h \quad (2)$$

Similarly, when the medium pressure is the highest and the temperature is the lowest, it has the minimum volume flow when it is in the gas supply valley period, so there are:

$$Q_{\min} = 4000 \times \frac{101.325}{101.3 + 1500} \times \frac{273.15 + (-10)}{293.15} = 227.2 m^3 / h \quad (3)$$

That is, the flow range of medium under working condition is 227.2 ~ 933.7m3/h, which is found in table 1. LWQ-150B should be selected.

7.3.1 Flowmeter Profile (Figure 1)



7.3.2 Overall dimensions of flowmeter (see Table 2)

Table 2

Model	Nominal diameter (mm)	L	D	K	n	d	Bolt specification	Press rating (MPa)
LWQ-25	25	200	115	85	4	Φ14	M12×50	4.0
LWQ-40	40	200	150	110	4	Φ18	M16×55	
LWQ-50	50	200	165	125	4	Φ18	M16×60	
LWQ-65	65	200	185	145	4	Φ18	M16×65	1.6
LWQ-80	80	240	200	160	8	Φ18	M16×70	
LWQ-100	100	300	220	180	8	Φ18	M16×80	
LWQ-125	125	300	250	210	8	Φ18	M16×80	
LWQ-150	150	450	285	240	8	Φ22	M20×80	
LWQ-200	200	450	340	295	12	Φ22	M20×90	
LWQ-250	250	450	403	355	12	Φ26	M24×90	

LWQ-300	300	450	460	410	12	ϕ26	M24×100	

8. Installation Precautions

8.1 Installation and Precautions of Flowmeter

● When installing the gas turbine flow meter, the user should install the filter in front of the meter. Note: Any damage to the impeller bearing caused by not installing the filter is not covered by the warranty.
● Before using the instrument, the pipeline shall be cleaned in advance.
Note: Any damage to the impeller bearing caused by not cleaning the pipeline or not cleaning the pipeline is not covered by the warranty.
● The installation site of the meter shall have sufficient space to facilitate the inspection and maintenance of the flowmeter, and shall meet the requirements of the flowmeter. Environmental requirements.
● When the flowmeter needs remote signal transmission, it shall be connected to external power supply (8 ~ 24) strictly according to the requirements of "electrical performance index" VDC, it is strictly prohibited to directly connect 220VAC or 380VAC power supply at the signal output port.
● When using the instrument, slowly open the valve. After the pipeline is filled with gas, open the large valve again to prevent impeller damage.
● In case of temperature and pressure compensation, the pressure sensor valve on the instrument shall be opened first.
● When the flowmeter is installed outdoors for use, it is recommended to add a protective cover to prevent rainwater intrusion and sun exposure from affecting the flowmeter. The service life of.
● There shall be no strong external magnetic field interference and strong mechanical vibration around the flowmeter.
● When installing the flowmeter, it is strictly prohibited to directly conduct electric welding at its inlet and outlet flanges to avoid burning out the internal parts of the flowmeter.
● During pipeline construction, consideration should be given to installing expansion pipes or bellows to avoid serious stretching or fracture of flowmeter.
● The sensor can be installed at vertical, horizontal or any inclined position according to the flow direction sign.
● The flowmeter shall be installed coaxially with the pipeline and prevent sealing piece and butter from entering the inner cavity of the pipeline.
● When using external power supply, the flowmeter must have reliable grounding, and must not share the ground wire with the high-voltage power system, and be installed or inspected in the pipeline. During repair, the ground wire of the electric welding system shall not be overlapped with the flowmeter.

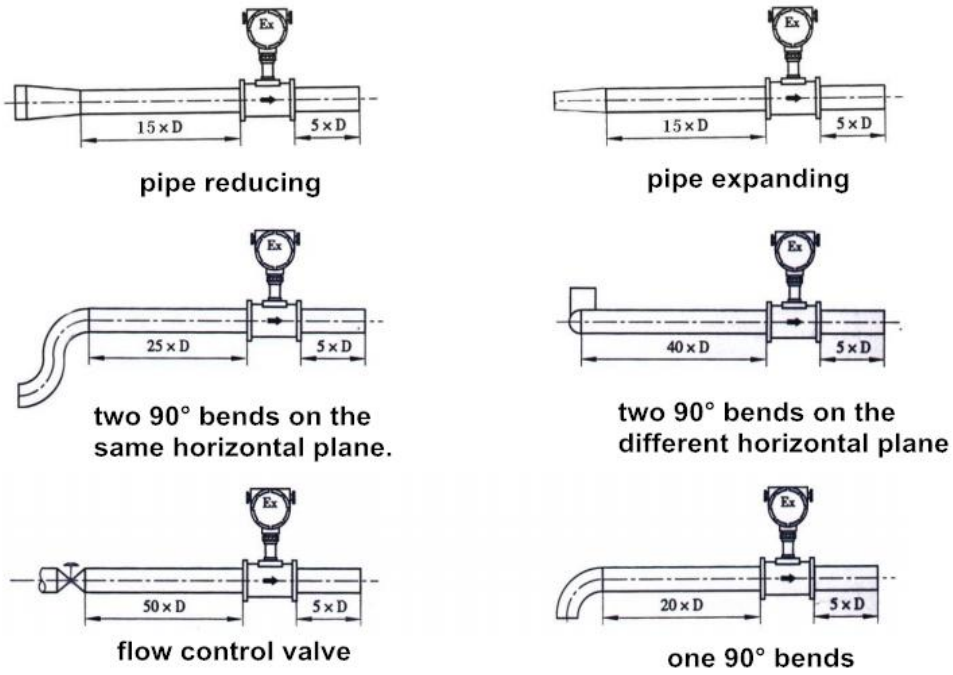
8.2. Requirements for straight pipe sections

In order to ensure accurate measurement, there must be a long enough straight pipe section upstream of the flowmeter, and the upstream flow distribution should not be disturbed as much as possible. If there are control and throttling devices, it is better to install them downstream. The length of the straight pipe section is expressed by multiple of the inner diameter d of the pipe, and the requirements for the smallest straight pipe section upstream and downstream are as follows:

● Upstream: 10d (10 diameter)

● Downstream: 5D (5 diameter)

If there are elbow, diameter reduction, diameter expansion, valve and other conditions upstream of the flowmeter, a longer straight pipe section is required. The specific conditions are as follows (as shown in fig. 2).



(Figure 2) Form and Size Requirements of Upstream and Downstream Pipelines

● Requirements for piping The inner diameter of upstream and downstream piping at the installation point of flowmeter shall be the same as that of flowmeter, which shall meet the requirements of the following formula:

0.98D ≤ DN ≤1.05D

Type: D is the inner diameter of flowmeter

DN is pipe inner diameter

Piping shall be concentric with flowmeter with coaxial deviation not more than 0.05DN

● Treatment of pipeline vibration The flowmeter shall be prevented from being installed on the pipeline with mechanical vibration. If it is necessary to install the flowmeter, vibration reduction measures must be taken. Hose transition can be added, or pipeline fixing support points and shock-proof pads can be added at 2D upstream and downstream of the flowmeter.

8.3 Use and Replacement of Built-in Battery

● Battery power display

When the battery shows only one cell, the user is required to replace the battery within one month. When only the battery shape symbol is displayed, power is turned on The battery has run out of power and must be replaced immediately.

● Battery replacement method

Open the back cover of the intelligent flow totalizer, loosen the three screws on the battery cover plate,

unplug the battery socket, and take out the battery. Replace the battery and reinstall it.

8.4 Installation Requirements for Explosion-proof Sites

● The flowmeter shall have reliable grounding. Explosion-proof grounding shall not be shared with protective grounding of high-voltage power system.

● When testing power supply on site, AC power supply is not allowed to be grounded.

● Under any circumstances, users are not allowed to change explosion-proof circuits, components and explosion-proof types.

● The external power supply must be cut off before opening the converter cover.