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Graphite Scraper Flowmeter



Instruction Manual



HEFEI JINGDA INSTRUMENT CO.,LTD

The enterprise has passed ISO9001 quality management system certification



■ Product Overview

LBJ graphite scraper flowmeter is a kind of high precision volumetric flowmeter, designed to provide high precision measurement design for refined oil trade settlement, and can be widely used in gasoline, aviation kerosene, diesel and other light fuel measurement, the product has high accuracy, good repeatability and reliable and stable measurement performance. When the flow meter is running, the rotor rotates at uniform speed, no pulsation, low noise and large flow rate, and the accuracy is not less than 0.2 in the range of greater than 10:1.

Graphite scraper flow meter integrated with local display of M1 large word counter, A5/A6 counter or BELZ electronic counter, M1 large word local display and A5/A6 display can show the total cumulative amount of measurement and a single cumulative amount, by supporting the tachometer can also measure the instantaneous flow of fluid through the flow meter, The BELZ electronic counter can display the cumulative flow and instantaneous flow at the same time, and can also realize the pulse and 4-20mA current electrical output, Hart communication or RS485 communication output.

Graphite scraper flowmeter is designed for the high precision requirements of light fuel metering, each flowmeter is a complete and strict performance test after passing the factory, plus regular standard maintenance can maintain its long-term high precision and good reliable performance.

■ Main features

LBJ graphite scraper flowmeter is a kind of high precision positive displacement flowmeter, due to its exquisite and reasonable structure design, has the following characteristics:

- 1、When the flowmeter is running, the rotor rotates at a constant speed, the rotation is smooth and no fluctuation, low noise, and the fluid in the pipeline has no pressure fluctuation.
- 2、Graphite material or PTFE material scraper has wear resistance and self-lubrication, small running damping, to ensure the stability of the measurement performance.
- 3、The range ratio of measurable flow is large, up to 15:1.
- 4、High measurement accuracy, the basic error is better than $\pm 0.2\%$, good repeatability.
- 5、No straight pipe section length restrictions, reduce the installation space.
- 6、A variety of types of counters to choose from, to achieve local indication and a variety of electrical signal output remote transmission.
- 7、Reliable mechanical properties, small maintenance, long machine life.
- 8、The whole single shell structure design, simple and compact mechanism, small size, easy installation and maintenance.



■ Structure and working principle

1、 Structure

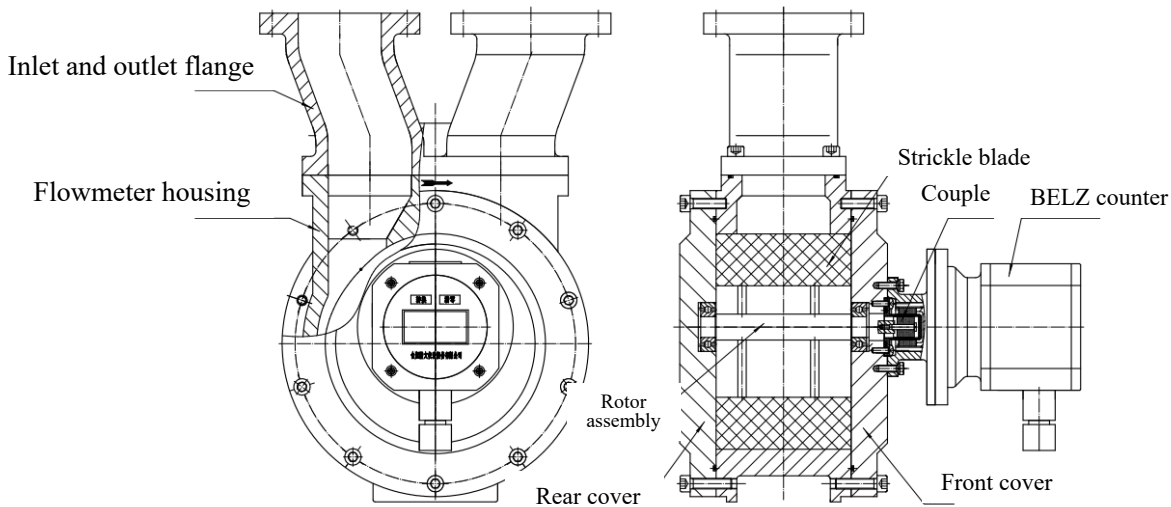


FIG. 1

LBJ type graphite scraper flowmeter mainly consists of import and export flanges, shells, rotor components (runner and scraper), front and rear covers, mechanical counters or BELZ electronic counters and other parts.

2、 Working principle

Under the pressure of the fluid system in the pipeline, the fluid drives the rotor assembly to rotate, and the scraper simultaneously reciprocates with the curved surface of the housing to discharge the quantitative fluid. The rotor assembly simultaneously drives the drive shaft to rotate, and the rotation of the shaft is synchronously output to the mechanical counter or electronic counter through the magnetic coupling, so as to achieve accurate counting and measurement. The principle is shown as follows:

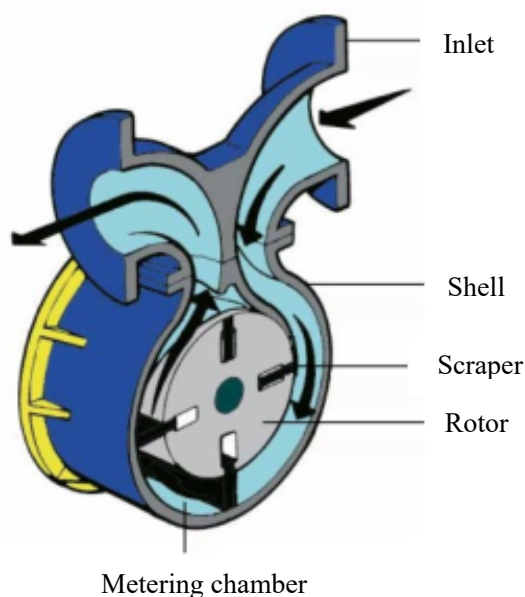


FIG. 2



■ Technical Specification

Nominal diameter (mm) : 25、40、50、80、100、150

Nominal pressure (MPa) : 1.0、1.6、2.0、2.5

Measuring medium: Gasoline, aviation kerosene, diesel and other light fuel

Medium viscosity range: 0.6~150mPa.s

Medium temperature range: -20°C~80°C

Working Temperature: -55°C~80°C(Mechanical counter)、-41°C~80°C(Electronic counter)

Accuracy grade: 0.2、0.5

Signal output type: Three-wire pulsing (BGF Explosion isolator、BELZ Electronic counter)、4-20mA electricity (BELZ Electronic counter)

Communication mode: HART or RS485 (BELZ Electronic counter)

Working voltage : 24VDC (BGF Explosion isolator、) or 12VDC (BGF -IExplosion isolator)

Display output: 8 bits total, 5 single-shift accumulations (M1 Large character mechanical return to zero counter)

9 bits total cumulative display、Instantaneous flow display、5 single-shift accumulations (BELZ Electronic counter)

Flange standard : GB/T9112-GB/T9124、HG/T20592/HG/T20615、ANSI B16.5,etc , or customized as required: explosion suppression ExdIICT6 Gb

Protection grade: IP66

Flow range:

DN	DN25	DN40	DN50	DN80	DN80 (D)	DN100	DN150
Flow range (m ³ /h)	1~6	2~24	3~35	6~80	12~120	15~155	20~240

Dimensions (BELZ electronic liquid crystal counter) :

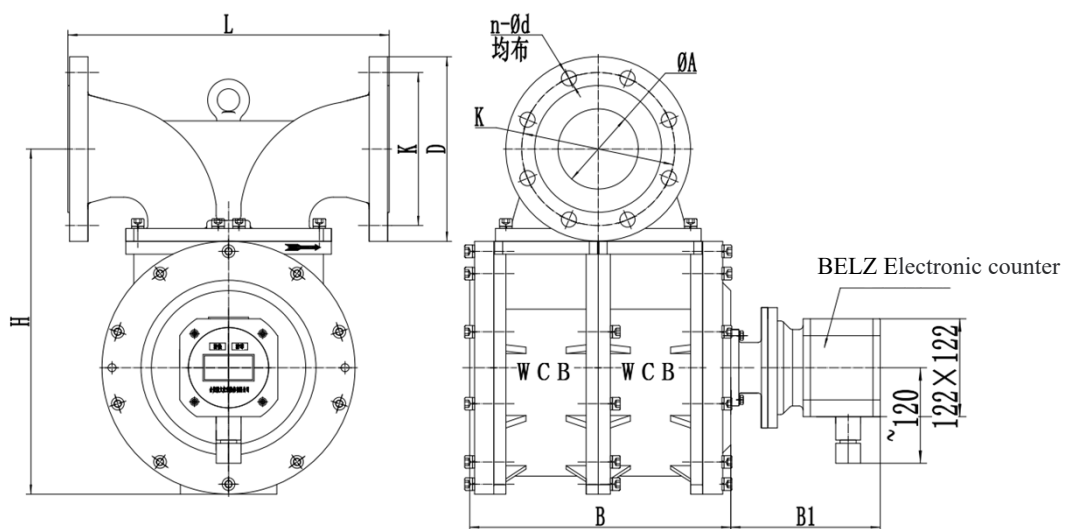


FIG. 3



Type	L	H	A	B	B1	D	K	n	d	Weight (kg)
LBJ-EM25II.2/BELZ	200	70	25	195	185	110	79.4	4	16	15
LBJ-EM40II.2/BELZ	260	276	40	170	185	125	98.4	4	16	36
LBJ-EM50II.2/BELZ	260	276	50	170	185	152.4	120.7	4	19	40
LBJ-EM80II.2/BELZ	400	422	80	195	185	190.5	152.4	4	19	70
LBJ-EM80DII.2/BELZ	400	422	80	195	185	190.5	152.4	4	19	72
LBJ-EM100II.2/BELZ	400	430	100	330	185	229	190.5	8	19	120
LBJ-EM150II.2/BELZ	400	452	150	460	185	279.4	241.3	8	23	180

Note 1: This table corresponds to ANSI B16.5 CLASS150 RF;

Note 2: Flange spacing L size and other flange standards can be customized according to user requirements.

BGF Explosion isolator parameters:

BGF series transmitter is a rotating axis angular displacement sensor, which is compatible with our company integrated flowmeter is used to convert the flow rate of the measured medium into an electrical pulse signal, for remote transmission use; flameproof grade, features and parameters are as follows:

- 1、No contact, square wave output, reliable sending.
- 2、The sending frequency is proportional to the size of the flow.
- 3、Working Temperature : $-40\sim 65^{\circ}\text{C}$ 。
- 4、Explosion-proof sign: ExdIICT6 Gb。
- 5、Signal output electrical interface dimensions: G1/2、1/2NPT or M20*1.5 (One out of three) , dimensions of the hole in the cable: $\Phi 11$ 。
- 6、Working Temperature: $-40\sim 65^{\circ}\text{C}$ 。
- 7、High precision, anti-vibration, especially suitable for trade measurement and quantitative filling.
- 8、Working voltage : 24VDC、12VDC。



FIG.4

M1 counter:

M1 counter shape is 240×210×110mm die-cast aluminum shell structure, as shown on the right, with the total cumulative quantity and single cumulative quantity display, the total cumulative quantity display is located at the top of the 8 small word wheel reading, the single cumulative quantity display value of a certain interval period is 5 large word wheel value, 5 digit large word code single cumulative quantity count can be returned to zero. It is achieved by manually rotating a zero return knob on the right side of the value to zero (note: do not do zero back operation in the counter operation).



FIG. 5



BELZ electronic counter:

BELZ series flow digital counter and flow meter integrated installation, can directly read the total accumulation of flow, single accumulation, instantaneous flow on the flow meter. Battery powered type can be realized in the absence of external power display; External 24VDC power supply, can output flow pulse, analog 4 ~ 20mA current, HART communication or RS485 communication, is an advanced flow digital display counter; The BELZ electronic counter has a flameproof rating of ExdIICT6 Gb, and the detailed operation and setting of this counter should be read the accompanying BELZ special instruction manual (a separate book).



FIG. 6

Model marking method

Type code	Special symbol	Material		DN	Nominal pressure	Counter	Transmitter	Accuracy	Description
		shell	scraper						
LBJ -	H								Metal scraper flowmeter
									Welded steel flowmeter
		E							Cast steel material
		A							Cast iron material
		B/C							304/316L
		M							Graphite
		A							Cast iron
		L							Aluminium alloy
					25				Nominal diameter 25mm
					50				Nominal diameter 50mm
					...				
					300				Nominal diameter 300mm
					-II				Extended Flag
					. 2/				PN16/PN20
					. 3/				PN25
				. 4/				PN40	
					A ₅ , J ₁			Pointer counter	
					A ₆			Return-to-zero counter	
					M1			Large code back to zero counter	
					BELZ			Electronic digital display counter	
						BGF -I		12V three-cable photo-electric transmitter	
						BGF -II		24V three-cable photo-electric transmitter	
						BMF		Analog transmitter	
							. J	High precision flowmeter	



■ Product standard

- 1、JB/T 9242-2015 General technical conditions for liquid displacement flowmeters (industry standard).
- 2、Q/JD2.004-2020 Liquid positive displacement flowmeter (enterprise standard).
- 3、JJG 667-2010 Verification regulation of liquid positive displacement flowmeter.

■ Installation

1、General instructions

- 1) 、 Before installation and use, read the manual carefully.
- 2) 、 Ensure that all personnel involved in the installation, operation and maintenance of the equipment are professionally trained.
- 3) 、 Ensure that the relevant personnel can accurately grasp the contents of this manual after training.
- 4) 、 All pressure components shall be tested and maintained in accordance with national mandatory regulations.
- 5) 、 Normal working conditions should be used within the scope of use specified by the manufacturer, and the manufacturer will not assume any responsibility for equipment damage caused by use beyond the scope.
- 6) 、 Relevant personnel should carefully read the product nameplate on the device and be familiar with the product parameters identified on the nameplate.

2、Mechanical installation instructions

- 1) 、 The installation position of the flow meter should avoid the environment with large mechanical vibration, high temperature and strong magnetic field interference as far as possible, and choose a location that is convenient for maintenance.
- 2) 、 Install the flow meter on the new pipe, in order to avoid impurities in the pipe into the flow meter, you can first replace the flow meter with a section of pipe, clean the pipe, and then replace the upper flow meter.
- 3) 、 The flow meter should be installed on the main channel of the horizontal pipeline, and the bypass pipeline should be set up according to the figure below for easy cleaning and maintenance.

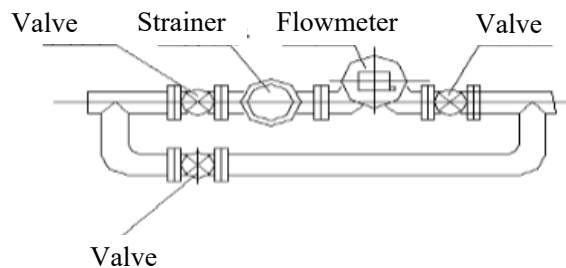


FIG. 7

- 4) 、 The arrow direction on the installation flow meter body should be consistent with the direction of liquid flow. Counter oriented can be adjusted according to user needs.
- 5) 、 The filter is installed before the flow meter is imported. In order to make the measurement accurate, the gas in the pipeline should be excluded, and the gas eliminator should be installed.

6) 、 Flowmeter regulating flow valve should be installed on the downstream side of the flowmeter.

7) 、 Both ends (flanges) of the flowmeter should be concentric with the pipe, and when connected with the flowmeter, the sealing washer should not burst into the inner hole of the pipe.

3、 Electrical wiring instructions

3.1、 BGF transmitter wiring instructions

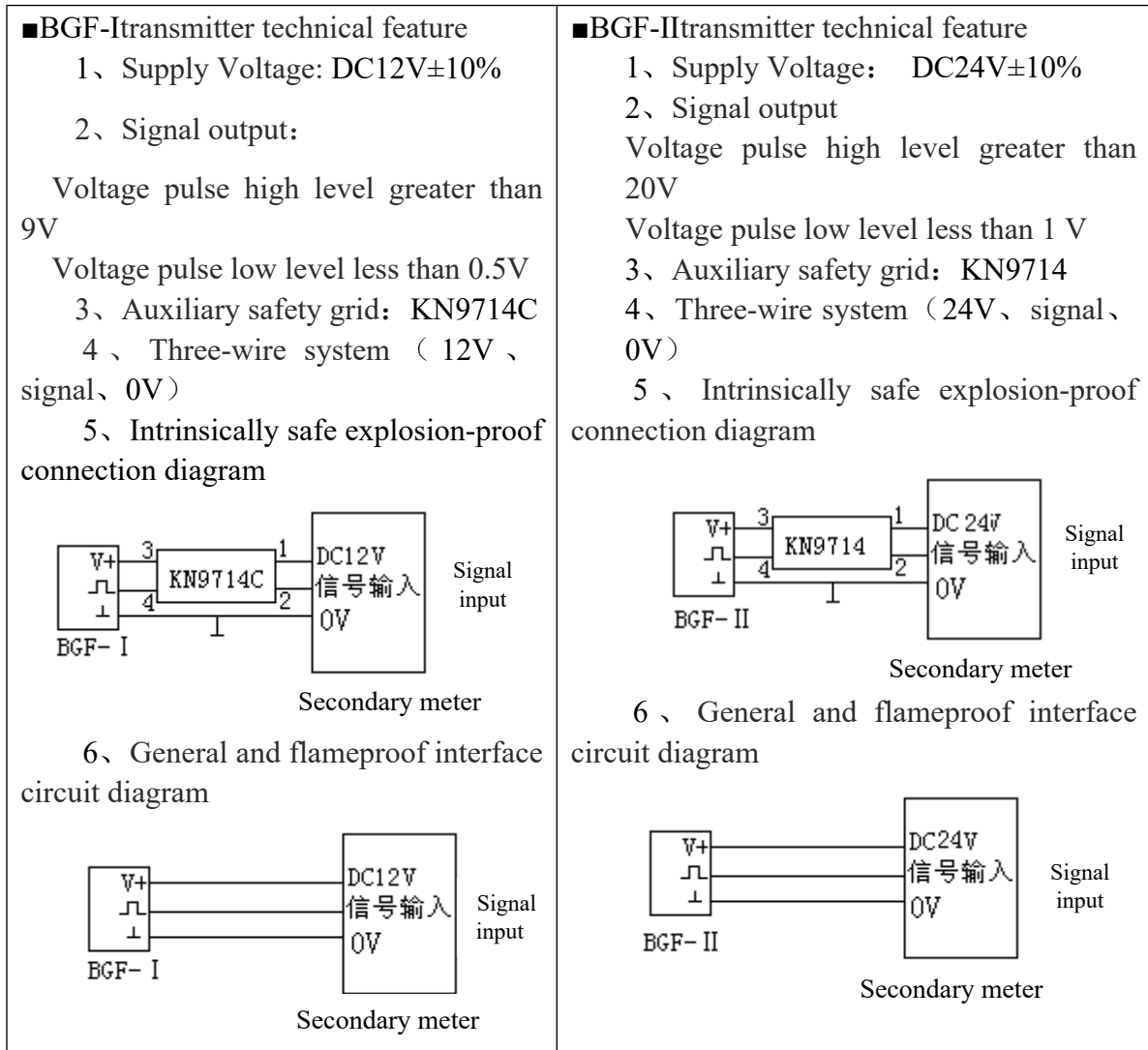


FIG. 8

3.2、 BELZ electronic counter wiring and operation

See BELZ electronic Calculator Instruction booklet for details.

■ Use, maintenance and repair

1、 Flowmeter operation before starting

After the flow meter is installed, the fluid is slowly passed through the bypass of the horizontal line to clean the pipe of impurities. And note that the temperature, pressure and flow of the fluid can not exceed the limited range. When the operating temperature is higher than 65 ° C, the operation specified in Article 3 shall be strictly installed.



2、 Start-up process for room temperature use

After pipe cleaning, start as follows:

2.1 Connect the pulse transmitter to DC power.

2.2 Open bypass valve 3, see Figure 7.

2.3 Slowly open the upstream valve of the flowmeter 1.

2.4 Slowly open flowmeter downstream valve 2.

2.5 Close bypass valve 3.

2.6 Check whether the temperature, pressure, flow rate, etc. comply with the specified range.

2.7 When it is necessary to use a large word counter to reset zero, the grip wheel on the right side of the counter should be pressed in, so that the word wheel rotates clockwise until all the word wheels are reset to zero. Pay special attention to when the flow meter is running, it is strictly prohibited to zero the large word counter, otherwise the counter will be damaged.

3、 High temperature used in the start-up process

When the use temperature is higher than 65°C , in order to avoid permanent damage to the flow meter, it is necessary to preheat the flow meter for 10-15 minutes before high temperature use, and the starting procedure is as follows:

3.1 Valves 1 and 2 are closed, as shown in Figure 2.

3.2 Open the bypass valve 3 step by step until the pipe temperature reaches the operating temperature and is stable before fully opening the valve 3.

3.3 When bypass valve 3 and valve 1 are fully open, open valve 2 by about 5% so that the fluid can pass through the flow meter. At this time, if the flow meter rotor is stuck or makes noise, do not change the opening position of valve 2. The opening of valve 2 should not be further opened until the internal temperature of the flowmeter is completely stable and the rotor is in normal operation.

3.4 After the rotor is running normally, gradually open the opening of valve 2.

3.5 When valve 1 and valve 2 are fully open, gradually close valve 3 and adjust the opening of valve 2 so that the flow of fluid is stable within the controlled flow range.

Note: The above procedure must be followed each time the flowmeter is raised from normal temperature to operating temperature above 65°C .

4、 Flowmeter maintenance

4.1 When the flow meter is used, it is necessary to check frequently whether the temperature, pressure and flow rate are limited within the specified range.

4.2 When the flow meter is running, pay attention to whether the flow meter has noise, whether the word wheel counter is normal, and whether the pressure loss is stable.

4.3 Clean the filter regularly.

4.4 Check and inspect the flow meter regularly.

4.5 When it is necessary to close the flow meter, first fully open the valve 3, then slowly close the valve 2, and then close the valve 1, to prevent the sudden closure of the flow meter inlet and outlet valve, to avoid a sudden rise in pipeline pressure, damage the flow meter and other equipment.



5、Flowmeter troubleshooting method

Fault symptom	Possible causes of the fault	Possible causes of the fault
Fluid cannot be increased by flowmeter or differential pressure	Rotor (or scraper) or metering chamber side wall damage	Repair the bruise
The indicated traffic value is lower than the actual value	Bypass valve leakage The traffic is below the lower limit	Repair or replace bypass valves Increased flow value
The indicated traffic value is higher than the actual value	There is air in a pipe or liquid	Remove air from pipes or liquids
There is fluid passing through the flowmeter, but the direct reading counter word wheel does not turn	The transmission component is loose or damaged Counter transmission is damaged	Repair or replace transmission parts Replace the counter drive
With fluid passing through the flowmeter, the direct reading counter word wheel rotates normally, but there is no input signal from the display meter or computer	Pulse transmission line damaged Pulse transmitter damaged	Check transmission line Replacement pulse generator

■ Ordering instructions

The following details should be known or provided when ordering:

- 1、 Name, model, specification, material.
- 2、 Medium temperature, working pressure, flow range.
- 3、 Medium viscosity value or medium name.
- 4、 There are no special requirements (e.g. explosion-proof, etc.).
- 5、 Pipe flange standard requirements, installation method.
- 6、 Name of ordering and receiving unit.
- 7、 Mailing address, telephone number, postal code.
- 8、 Settlement unit, bank, account number.
- 9、 Transportation mode, arrival station name, contact person.
- 10、 For more information about our products, please write to us for information.
- 11、 The company's products implement three guarantees. Track maintenance during service life.

JINGDA service concept

- Ensure that customers rest assured to choose fine large products.
- The convenience of customers is the trust of enterprises.
- Every day a company loses a customer is another day it loses a market.
- Service first find their own problems, giving priority to the interests of customers.
- Customers will not use JINGDA products, it is not the customer's fault, but our service work is not done.

JINGDA service principle

- Process first, analyze later.
- Act first, talk later.
- Get it right the first time.



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