

LG

ORIFICE PLATE, VENTURI,
NOZZLE FLOW METERS

Operation Manual

LG- DT- JS- 1016- 2018(A)



Preface

Thank you for choosing the products of Dandong Top Electronics Instrument (Group) Co., Ltd.

This operation manual provides you with important information about installation, connection and commissioning as well as maintenance, troubleshooting and storage. Please read it carefully before installation and commissioning and save it as an integral part of the product near the instrument for reading at any time.

This manual can be downloaded from www.ddtop.com.

If you do not follow this manual, the protection provided by this instrument may be damaged.

Trademarks, Copyrights and Restrictions Instructions

Dandong Top Electronics Instrument (Group) Co., Ltd.®, Dandong Top Pump Co., Ltd.®, DDTOP® are registered trademarks of the company.

The performance specifications of this instrument are effective from the date of release, and are subject to change without notice. Dandong Top Electronics Instrument (Group) Co., Ltd reserves the right to modify the products described in this manual at any time without prior notice.

Quality Assurance

Dandong Top Electronics Instrument (Group) Co., Ltd guarantees that all products will be free from defects in materials and manufacturing processes within one year from the date of leaving the factory.

During the warranty period, if the product is returned due to quality problems, and the claim is determined to fall within the scope of the warranty after inspection by the manufacturer, Dandong Top Electronics Instrument (Group) Co., Ltd is responsible for repairing or replacing it for the buyer (or owner) free of charge.

Dandong Top Electronics Instrument (Group) Co., Ltd is not responsible for the costs caused by improper use of equipment, labor claims, direct or subsequent damage, and installation and use of equipment. Except for the special written warranty certificate for certain products, Dandong Top Electronics Instrument (Group) Co., Ltd does not provide any express or implied quality guarantee.

Quality

Dandong Top Electronics Instrument (Group) Co., Ltd has passed the ISO9001 quality system certification. The entire production process is strictly implemented in accordance with the scope of the quality system, providing the strongest guarantee for the quality of products and services.

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1 Safety Tips

For safety reasons, it is expressly prohibited to modify or change the product without authorization. Repair or replacement is only allowed to use the accessories specified by the manufacturer.

1.1 An explosion may cause death or serious injury.

When installing the device in an explosive environment, be sure to comply with applicable local, national, and international standards, codes, and regulations. Ensure that the equipment is installed in accordance with intrinsically safe or non-flammable site operating procedures.

1.2 Process leaks can cause serious injury or death.

If the process seal is damaged, the medium may leak at the connection.

1.3 Failure to follow the safety installation guidelines may result in death or serious injury.

The operations described in this manual need to be completed by professionals who have received professional training and obtained corresponding qualifications or special end-users.

2 Product Description

2.1 Product Structure

Figure 1-1 Product Structure Diagram of Orifice Plate Flow Element

Figure 1-2 Product Structure Diagram of Nozzle Flow Element

Figure 1-3 Product Structure Diagram of Venturi Flow Element

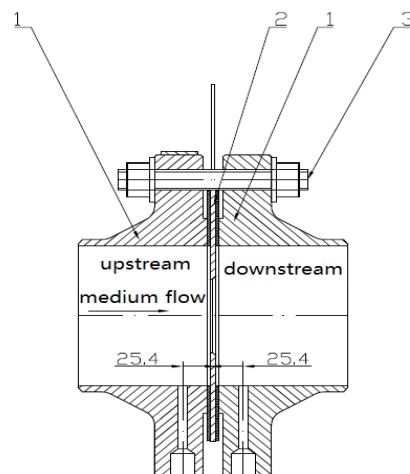
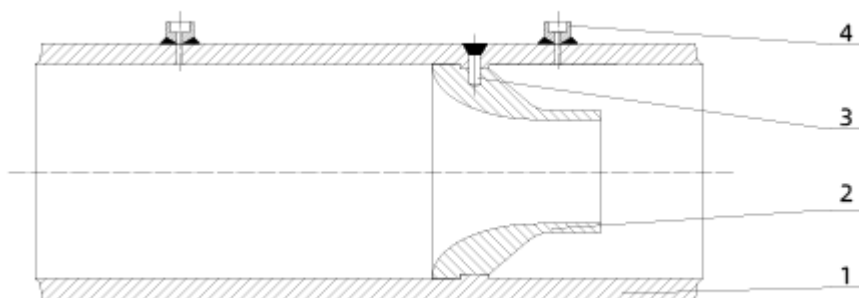


Figure 1-1

1- Flange, Clamp Flange, Welded to Site

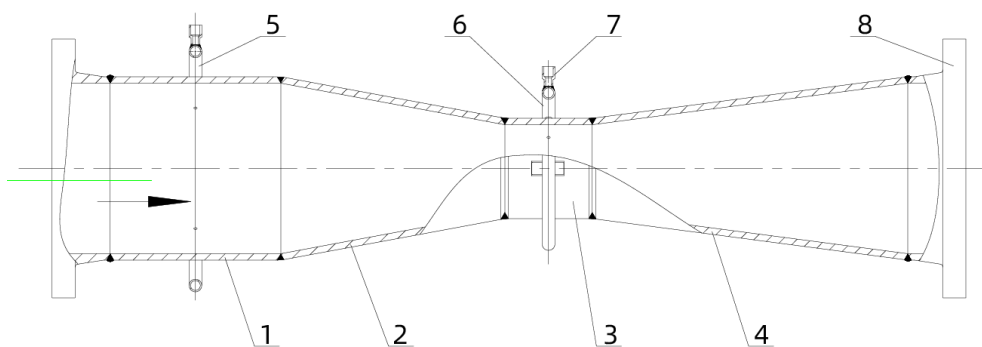
2- Flow Element, Flow Measuring Element

3- Fasteners, Including Bolts, Nuts, Washers



1. Straight Pipe Section
2. Long Diameter Nozzle
3. Pin
4. Tap Short Section

Figure 1-2



3. Throat Tube
4. Conical Diffuser
5. Front Equalizing Ring
6. Back Equalizing Ring
7. Tap Tube
8. Connection Flange

Figure 1-3

2.2 Operating Principle

In the pipeline filled with single-phase continuous fluid, install a flow element (such as an orifice plate, nozzle etc). When the fluid passes through the orifice of the flow element, the vapor forms a local contraction, the flow velocity increases, the kinetic energy increases, and the static pressure decreases. There is a static pressure difference between the front and back of the flow element, that is, $\Delta P = P_1 - P_2$. If the area of the orifice is F , the mass flow of the fluid is q_m , the volume flow is q_v , and the density is ρ , according to the principle of flow continuity and Bernoulli equation can derive the relationship between pressure difference and fluid flow:

$$q_m = \alpha F \sqrt{\Delta p \rho} \text{ or } q_v = \alpha F \sqrt{\Delta p / \rho}$$

In the formula, α is the flow coefficient. It can be seen from the above relationship that if the orifice area and fluid density are constant, the flow rate is proportional to the square root of the pressure difference, that is, as long as the pressure difference is measured, the flow rate can be calculated. The flow element measures the fluid flow rate based on this principle.

2.3 Package

Please send packaging waste to a special recycling agency.

2.4 Lifting Transportation

Please use qualified lifting equipment and lifting straps, and pay attention to safety.

2.5 Storage

Storage temperature $-20^{\circ}\text{C} \sim 40^{\circ}\text{C}$; storage humidity $\leq 20\%$.

3 Main Executive Standard

Comply with GB/T2624-2006, ISO5167-2003, BS1042-1992 and other standards.

4 Main Features

4.1 The standard flow element can ensure the accuracy of measurement without calibration.

4.2 The measuring range is wide, and it can be applied if it is smaller than DN1000.

4.3 The applicable temperature range is wide: $-196 \sim 650^{\circ}\text{C}$.

4.4 The daily maintenance is small and the operation is simple.

5 Outline Dimension Diagram

The dimensions of D and L in the picture are subject to the actual product.

Figure 2-1 Schematic diagram of dimensions of the orifice plate flow element

Figure 2-2 Schematic diagram of dimensions of the nozzle flow element
Figure 2-3 Schematic diagram of dimensions of the venturi flow element.

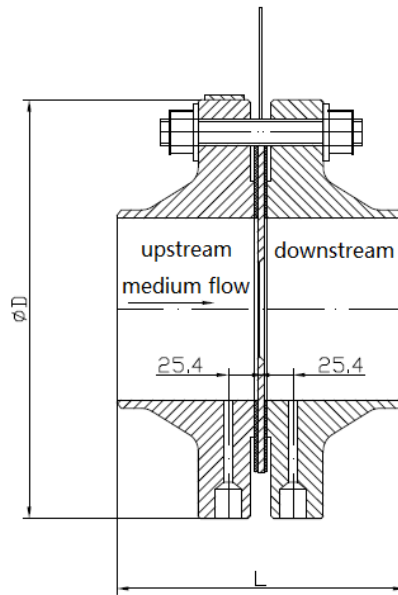


Figure 2-1

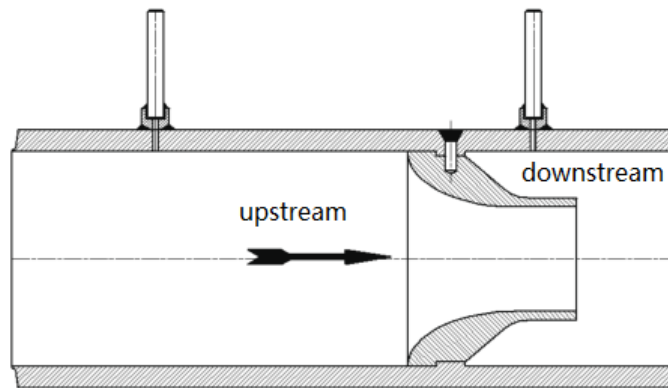


Figure 2-2

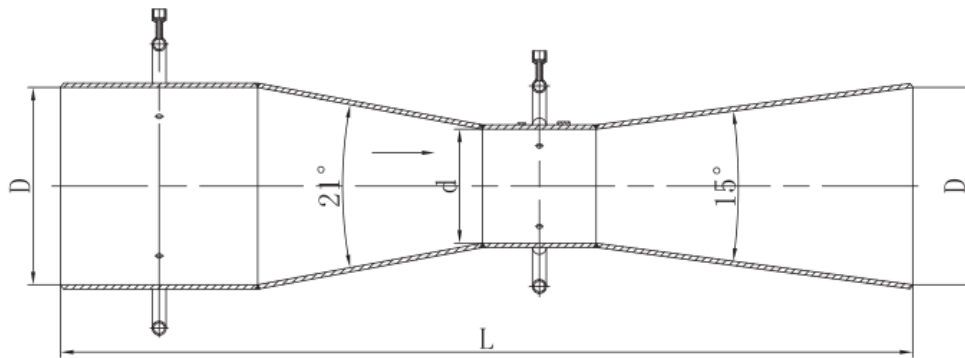


Figure 2-3

6 Unpacking and Inspection

6.1 Precautions for Unpacking Inspection

6.1.1 Check whether the product nameplate (Figure 3) is consistent with the supply list information.



		<div style="border: 1px solid black; width: 100px; height: 20px; display: inline-block;"></div>		Flow Element	
					
Pipe inner diameter/Throttle aperture		mm		Nominal Pressure	
Scale Flow		Tag No.			
Upper limit of differential pressure		KPa		Date of manufacture/No.	
Dandong Top Electronics Instrument (Group) Co., Ltd					

Figure 3 Product Nameplate

6.1.2 Check the quantity and material of each part against the packing list.

6.2 Check Content

6.2.1 Check whether the appearance of the instrument is defective or damaged.

7 Installation

7.1 Flow element is butt welded with the on-site pipeline to ensure the welding quality and

suppress no leakage.

7.2 Installation Technical Requirements

7.2.1 When installing the flow element, pay attention that the direction of the inlet and outlet is consistent with the direction of the mark on the nameplate and the direction of arrow label. Do not install it backwards. Printing mark surface of the handle is the upstream side (Figure 4)

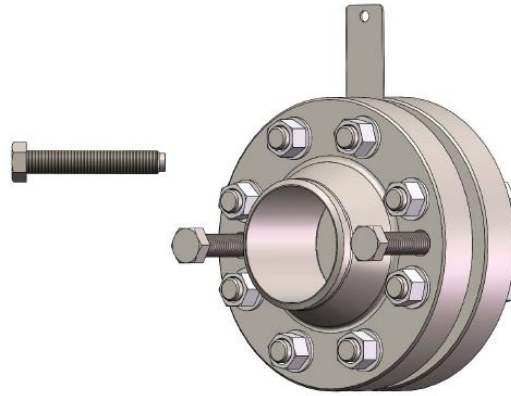


Figure 4

7.2.2 The gasket shall not protrude into the inside of the pipe after clamping.

7.2.3 The valve used to adjust the flow should preferably be installed outside the shortest straight pipe downstream of the flow element (Figure 5).

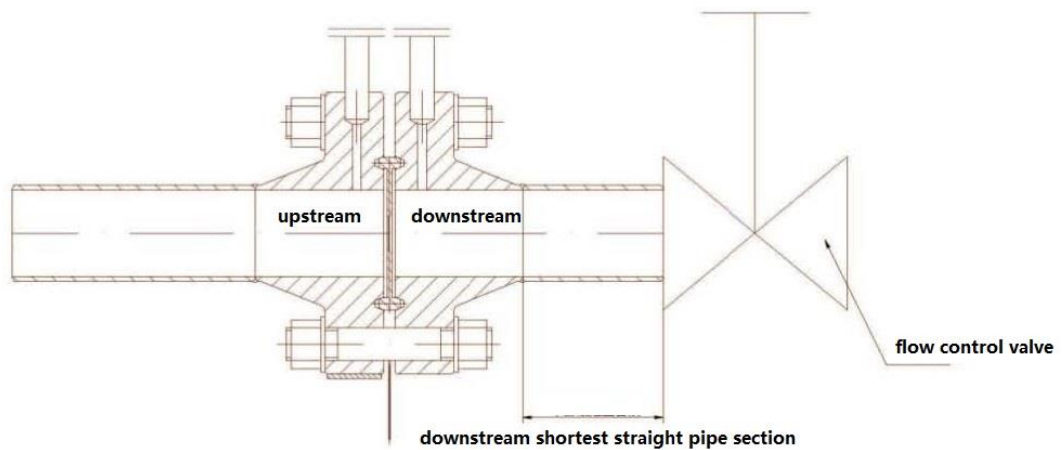


Figure 5

7.2.4 There shall be no sudden changes in pipe diameter at the connection of each pipe section and pipe fittings of the flow element.

7.2.5 For newly installed piping systems, the flow element must be installed after piping flushing and line sweeping.

7.2.5.1 When the measurement accuracy is high, it is best to assemble the flow element, the tapping device and the upstream and downstream straight pipe sections first, and then connect to the process pipeline after passing the inspection (Figure 6).

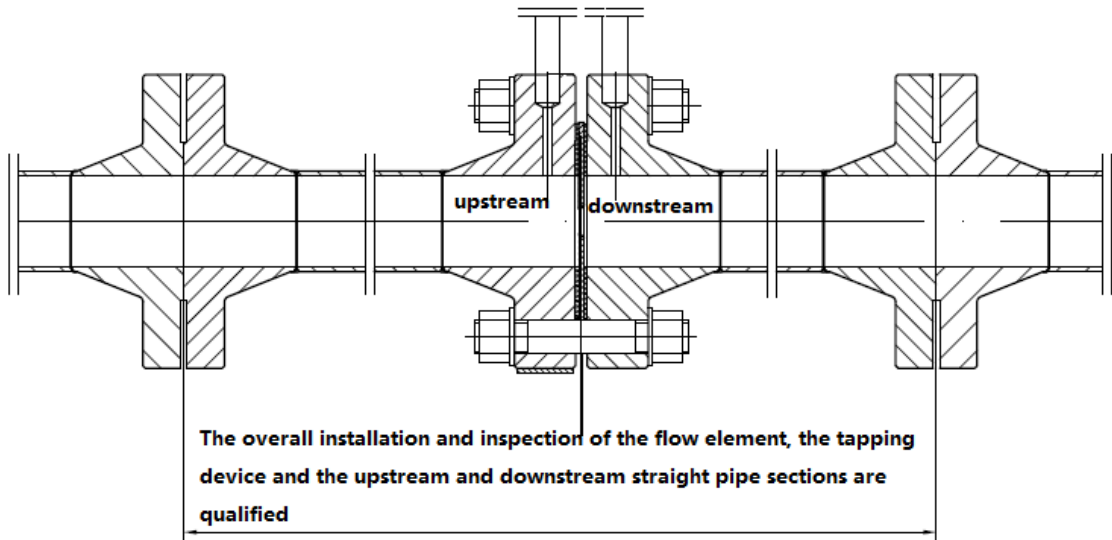


Figure 6

7.2.5.2 Each high point of the tapping signal pipeline must be equipped with a vent valve (Figure 7), and each low point must be equipped with a drain valve (Figure 8).

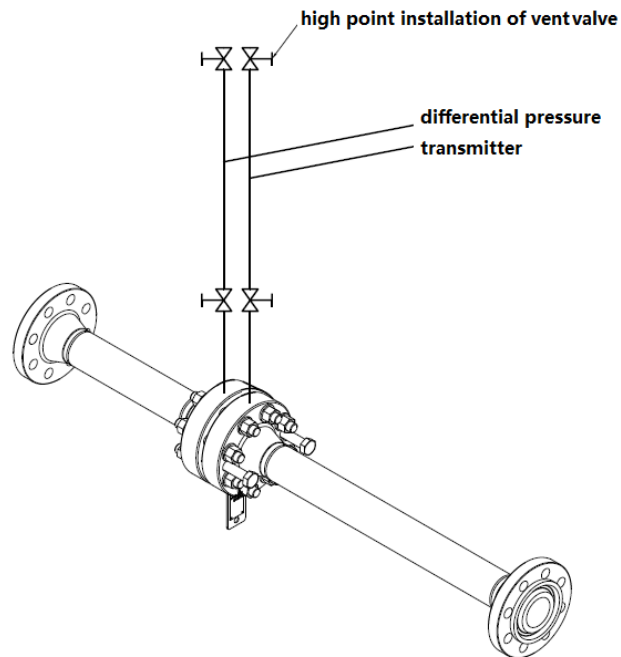


Figure 7

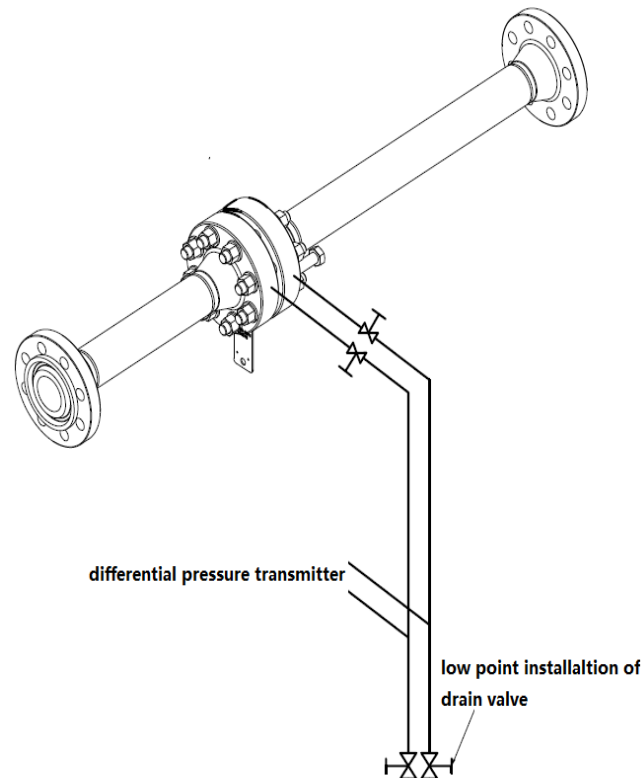


Figure 8

8 Requirements for the Use of Flow Element

- 8.1 The fluid must be filled with round pipes and throttling devices, and flow through the pipes continuously;
- 8.2 The fluid must be a Newtonian fluid, which is homogeneous, single-phase in physics and thermodynamics, or can be considered single-phase; including gas, liquid and steam, etc.;
- 8.3 No phase change occurs when the fluid flows through the flow element;
- 8.4 The fluid flow rate does not change with time, or changes slowly;
- 8.5 Before the fluid flows through the flow element, its stream must be parallel to the axis of the pipeline, and there must be no rotating flow;
- 8.6 The standard flow element is not suitable for flow measurement of pulsating flow and critical flow.

9 Fault Analysis and Troubleshooting

Failure Phenomenon	Reason	Method
Differential pressure transmitter indicates no change	1. Stop valve is not opened	Open the stop valve
	2. differential pressure pipeline is blocked	Unblock the differential pressure pipeline
	3. Differential pressure transmitter failure	Check differential pressure transmitter
The indication value of the differential pressure transmitter obviously deviates from the indication value of the gauge	1. The installation direction of the flow element is wrong	Reinstall flow element
	2. Differential pressure transmitter failure	Check differential pressure transmitter
	3. The working condition parameters of the measured medium are inconsistent with those used when designing the flow element	Communicate with the company after-sales service
	4. The length of the straight pipe before and after the flow element is not enough	Adjust straight pipe section length
	5. The inner diameter of the straight pipe section is out of tolerance	Measure the inner diameter of straight pipe section and recalculate the maximum flow
	6. Throttle aperture tolerance	Measure the throttle aperture, recalculate the maximum flow
	7. Deformation of flow element	Replace flow element
	8. There are attachments on the flow element	Clean and replace flow element
	9. Improper installation of tapping signal pipeline	Retake the tapping signal pipeline in the correct way
	10. The condensate level in the condenser varies.	Adjust the condensate level to make the height uniform.
Differential pressure transmitter has no indication	1. Power supply is not turned on	Turn on power supply
	2. Stop valve is not opened	Open the stop valve
	3. Differential pressure transmitter failure	Check differential pressure transmitter
Medium leakage at the flow element	1. Insufficient clamping force of connector	Refasten the connection
	2. Sealing gasket failure	Replace the gasket
	3. Material is corroded	Replace corroded parts

10 Disassemble

10.1 Warning

Before disassembling, pay attention to dangerous process conditions, such as pressure, high temperature, corrosive or toxic media in the container, etc.

10.2 Waste Disposal

Please follow the current regulations in each region for waste disposal.

11 Product Certificate

产品认证		
认证	证书编号	认证范围/描述
计量器具型式批准		10F213-21

Product Certificate		
Certificate	Certificate No.	Scope and Description
Approval of Measuring Instrument Form		10F213-21