

# LGNC

## INTEGRAL ORIFICE FLOW METER

Operation Manual

LGNC - DT - JS - 1029 - 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](http://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.

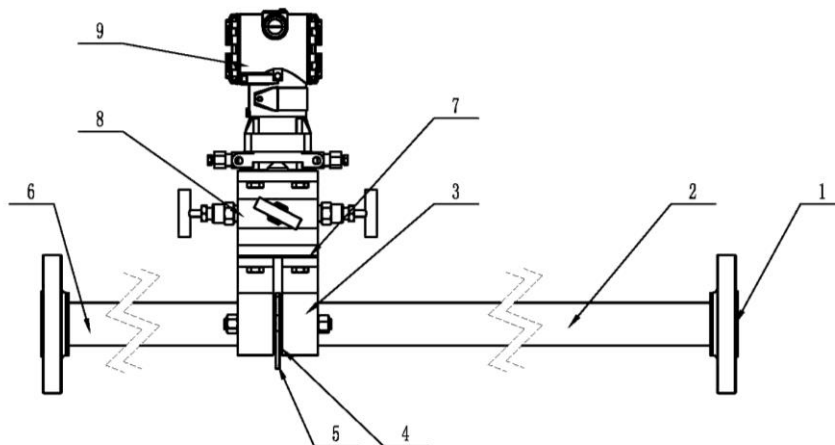
If the process seal is damaged, the medium may leak at the connection.

### 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. Connecting Flange 2. Front Straight Pipe Section 3. Tapping Body 4. Seal Gasket 5. Integral Orifice Plate 6. Rear Straight Pipe Section 7. Small Seal Gasket 8. Manifold 9. Differential Pressure Transmitter

图 1 Figure 1

## 2.2 Operating Principle-Figure 2

Integral orifice flow meter and standard orifice plate are based on the principle of fluid continuity and Bernoulli's equation of conservation of energy, putting a piece of integral orifice plate into a full tube of medium in the process pipeline, when the fluid flows through the integral orifice plate flow meter, the flow beam will be in the flow element to form a local contraction, thereby increasing the flow rate, low static pressure, so the flow element will produce a pressure drop before and after the pressure drop, that is, the pressure difference, the greater the flow of the medium, the greater the pressure difference generated before and after the flow element, through the differential pressure transmitter can output and the measured fluid flow value as a square relationship between the standard signal, can be converted into flow value.

Basic Calculation Formula:

$$q_m = \frac{C_d}{\sqrt{1-\beta^2}} \frac{\pi d^2}{4} \sqrt{2\Delta P} \quad \text{或} \quad q_v = \frac{C_d}{\sqrt{1-\beta^2}} \frac{\pi d^2}{4} \sqrt{2\Delta P}$$

$$q_m = \frac{C_d}{\sqrt{1-\beta^2}} \frac{\pi d^2}{4} \sqrt{2\Delta P} \quad \text{or} \quad q_v = \frac{C_d}{\sqrt{1-\beta^2}} \frac{\pi d^2}{4} \sqrt{2\Delta P}$$

C-- Outflow coefficient dimensionless

ε-- Coefficient of expansion

β-- Throttle diameter ratio

d—mm Throttle orifice diameter mm

ΔP--Pa Differential pressure Pa

ρ-- kg/m<sup>3</sup> Density of measured medium kg/m<sup>3</sup>

## 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°C~40°C; storage humidity ≤20%.

## 3 Main Executive Standard

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

## 4 Main Features

4.1 Transmitter and flow element integrated installation, saving installation and maintenance work.

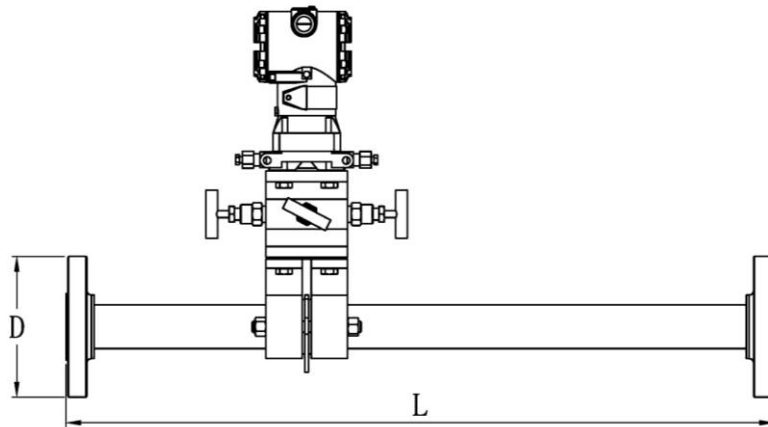
4.2 Integral orifice plate has an internally polished straight pipe section with 20 times the pipe diameter upstream and 10 times the pipe diameter downstream, which achieves a good rectification effect and reduces uncertainty.

4.3 High precision, after the actual flow calibration of integral orifice plate flow meter, the basic error of the flow coefficient can be up to  $\pm 0.5\%$ .

4.4 The tapping body is machined from stainless steel forgings to ensure overall strength and to minimize possible leakage points.

## 5 Outline Dimension Diagram-Figure 2

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



## 6 Unpacking and Inspection

### 6.1 Precautions for Unpacking Inspection

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

### 6.2 heck Content

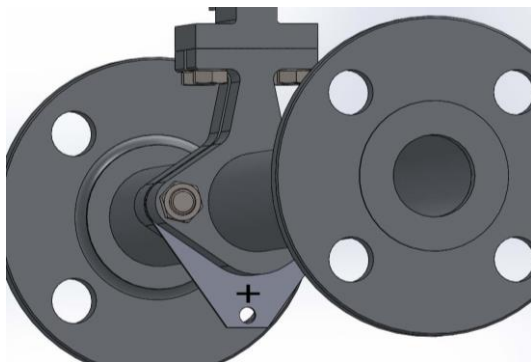
Check whether the appearance of the instrument is defective or damaged.

## 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 integral orifice flow meter, pay attention that the direction of the inlet and outlet is consistent with the direction of the "+" sign on the integral orifice plate.



**Figure 3**

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

## 8 Requirements for the Use of Integral Orifice Plate

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 transmitter failure	Check differential pressure transmitter
The indication value of the differential pressure transmitter obviously deviates from the	1. The installation direction of the flow element is wrong	Reinstall flow element
	2. Differential pressure transmitter failure	Check differential pressure transmitter

indication value of the gauge	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. There are attachments on the flow element	Clean and replace flow element
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

## 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.