Instruction Manual

Manufacturing Certificate
CMC Shanghai No.02220105

TYPE LS

Rotating-Piston Flow Meter

SHANGHAI NO.9 AUTOMATION INSTRUMENTATION CO., LTD.

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SHLJ B-008-C-Z

Contents

READ THIS MANUAL CAREFULLY BEFORE INSTALLATION AND USE

1. General Description

This manual is for the installation, application and maintenance of TYPE LS Rotating-Piston Flow Meter designed and made by SAIC No.9 .

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The company reserves the rights to the explanation and modification of this manual, which is subject to change without prior notice.

Type LS Rotating-Piston Flow Meter is a volumetric Flow Meter, mainly used for liquid volumetric flow measuring. its prominent feature is suitable for small flow measurement. it displays Total Flow on site, and also being attached with interface for remote transfer. if LPJ-12D (or LPJ-12D/FI) Optical-Electrical Pulse Convertor is mounted on it, pulse or 4-20mA standard current signal output is available for remote transfer purpose.

The Advantages of this Flow Meter are simple in structure, reliable in operating, wide in range, accurate in measuring, less influenced by viscosity and access to remote transfer. because the main components for its measuring part are made of Aluminum Alloy, so it is only suitable to non-corrosive or less-corrosive liquids flow measuring, such as heavy oil and other petrol items.

Product Standard: Q/TDSM 01-2014

2. Technical Specifications

Please see **Table 1** for Flow Meter Specifications.

Table 1

<table>
<tr><th rowspan="2">Type</th><th>Nominal Diameter</th><th>Fundamental Tolerance</th><th colspan="2">Flow Range (L/h)</th><th>Nominal Pressure</th><th>Fluid Temperature</th><th>Ambient Temperature</th><th>Viscosity Range</th><th>Weight</th></tr>
<tr><th>DN mm</th><th>%</th><th>Low-Limit</th><th>Up-Limit</th><th>MPa</th><th>℃</th><th>℃</th><th>mPa.s</th><th>kg</th></tr>
<tr><td>LS-15A</td><td rowspan="2">15</td><td rowspan="3">±0.5%</td><td>25</td><td>250</td><td rowspan="3">1.6</td><td rowspan="3">0~120</td><td rowspan="3">-10~+60</td><td rowspan="3">3~500</td><td rowspan="2">8.5</td></tr>
<tr><td>LS-15B</td><td>40</td><td>400</td></tr>
<tr><td>LS-25A</td><td>25</td><td>160</td><td>1600</td><td>12.5</td></tr>
</table>

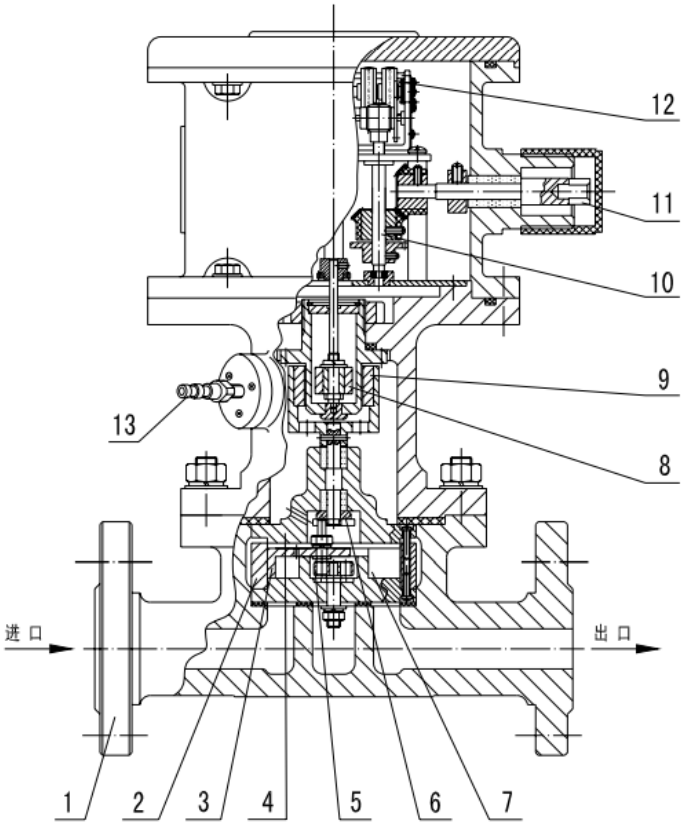
Main Technical Specifications

1. Fundamental Tolerance: ±1.0%
2. Nominal Pressure: 1.6MPa
3. Fluid Temperature: 0℃ to 120℃
4. Fluid Medium: Liquid
5. Viscosity Range: 3 to 500mPa.s

3. Structure & Working Principle

1) Structure:

The Flow Meter structure is as shown on Fig.1, consisting of Body, Measuring Chamber, Rotating-Piston, Eccentric Wheel, Connecting Magnets, Gear Mechanism, Counting Mechanism, and Rotation-Output Shaft etc.



1. Body	4.Measuring-Chamber Cover	7. Isolating Plate	11. Rotation-Output Shaft
2. Measuring Chamber	5. Eccentric Wheel	8. & 9. Connecting Magnets	12. Counting Mechanism
3. Rotating-Piston	6. Moving Fork	10. Gear Mechanism	13. Gas Eliminating Screw-Plug

Fig.1

Fluid passing through Body Inlet and entering into Measuring Chamber, it is, therefore, driving Rotating-Piston to revolve; the rotation of Rotating-Piston is being transmitted to Gear Mechanism through Moving Fork and Connecting Magnets, and to Counting Mechanism after deviation correcting for Flow totalizing; meanwhile, the Rotation is also being transmitted to Output Shaft by Bevel Gear, which is considered to be connected with an Electrical Pulse Convertor when Electrical Output Signal is requested.

2) Working Principle:

Please refer to Fig.2 for Flow Meter working principle:

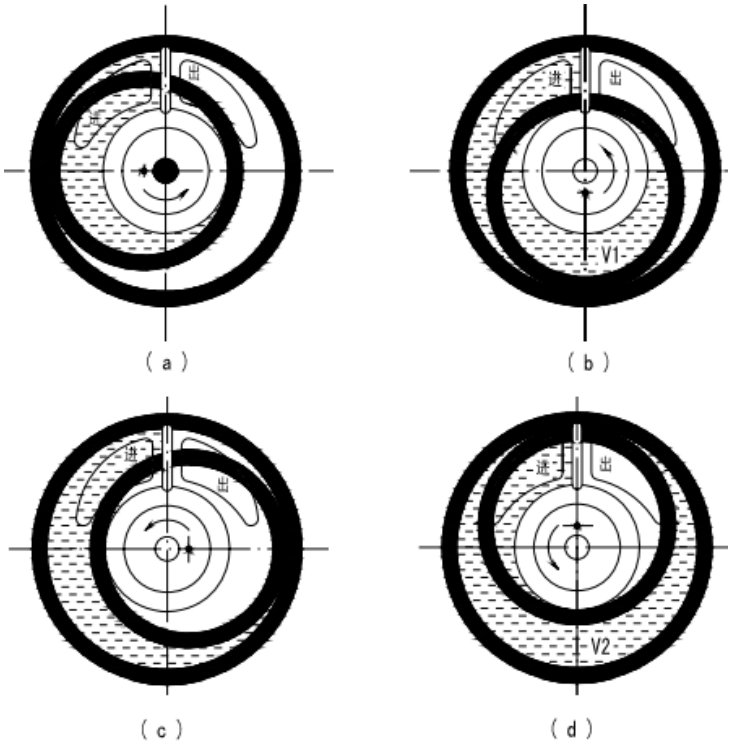


Fig.2 Flow Meter Working Principle

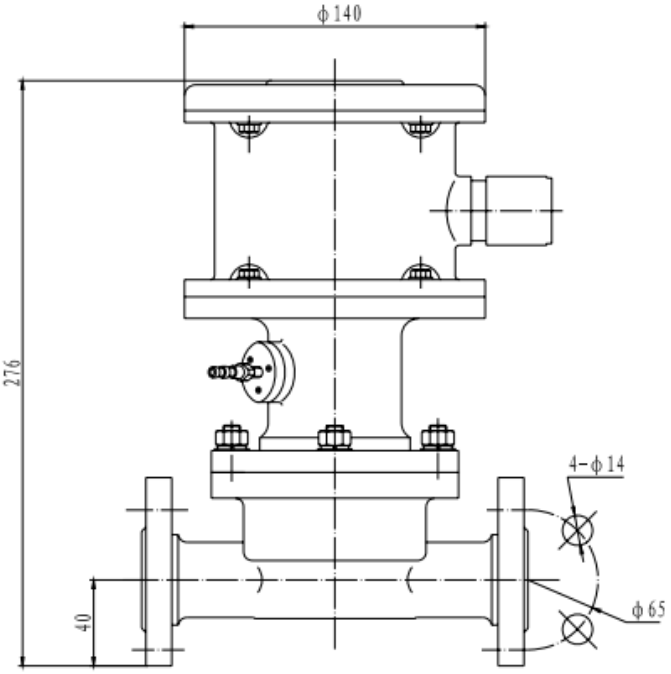
As shown on Fig.2 (a), the Fluid to be measured is passing through Flow Meter Inlet and entering into Measuring Chamber; Pressure Difference is being developed between Inlet and Outlet, it is forcing Piston revolving in the direction as shown by an Arrow on the Fig. With more Fluid is coming in, the Rotating Piston is going to the position as shown on Fig. 2 (b). At the time, Chamber V1 with an enclosed section-area like a new-moon in shape is forming. Under the influence of pressure difference, Piston is revolving continuously. Then, Chamber V1 just formed is reaching to connect Outlet for Fluid displacing as shown on Fig.2 (c). When Piston is still rotating to the position shown on Fig.2 (d), another Chamber V2 with an enclosed section-area like a new-moon in shape is formed. With Piston continuous revolving, Chamber V2 is connecting to Outlet for Fluid displacing. Meanwhile, Piston is returning to its initial position as shown on Fig.2 (a).

Therefore, with each rotation of Piston, the Volume of Fluid that is passing through Flow Meter Measuring Chamber from Inlet to Outlet equals to V1+V2 totally.

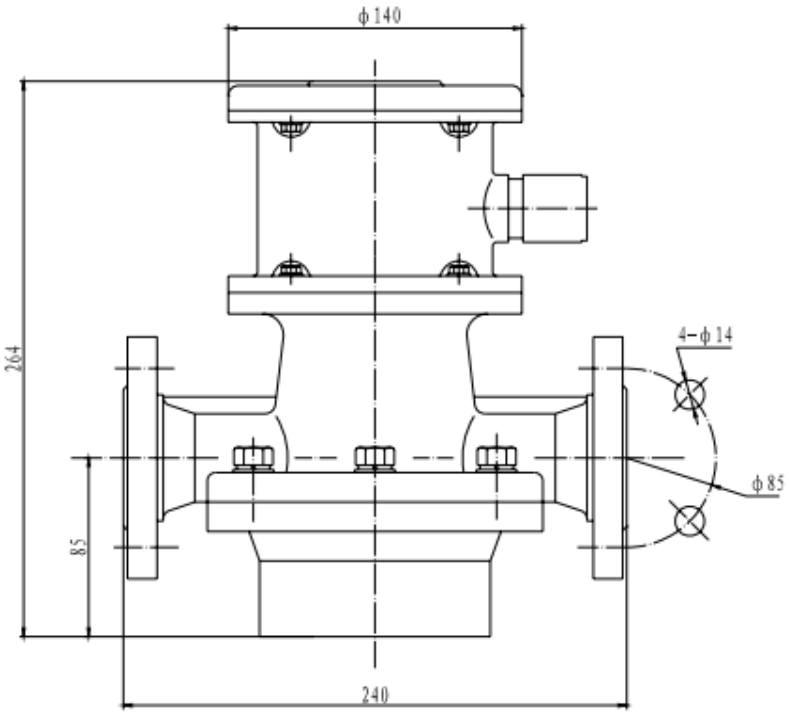
4. Dimensions & Installation

1) **Dimensions**:

For Flow Meter Dimensions, please see Fig.3 below:



Type LS-15B (A)



Type LS-25A

Fig.3 Flow Meter Dimensions for installation

2) **Installation**:

(1) Flow Meter should be installed in horizontal pipelines, where vibration is less, humidity is low, and good raining-proof measures are taken with less corrosive atmosphere.

(2) Cleaning up the pipeline thoroughly before Flow Meter installation; an adaptable Flow Filter at the up-stream seems necessary to prevent Flow Meter from any impurities which may cause Flow Meter damaging or stalling.

(3) The Filter needs cleaning very often; to avoid Flow Meter Working interruption, an arrangement of two Filters installed in parallel at the upstream is recommended (see Fig.4); it is better to arrange suitable Pressure Gauges at up/down streams of Filters in order to check out any possible blockage and eliminate it in time by necessary cleaning.

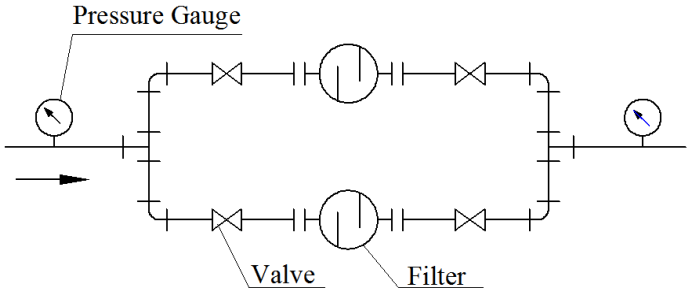


Fig.4 Recommended Installation Arrangement 1

(4) During Flow Meter maintenance, to avoid flow interruption within the pipeline, additional by-pass pipe is needed (see Fig.5). To secure no flow measuring may be affected, to equip the pipeline with two Flow Meters installed in parallel for alternative operation without by-pass pipe is also a good suggestion.

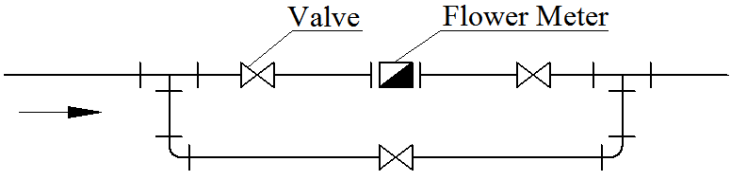


Fig.5 Recommended Installation Arrangement 2

(5) During installation of Flow Meter and Filter, please be sure that Arrow Direction shown on their Bodies must be in accordance with the actual fluid flowing direction within the pipeline.

(6) Flow Meter Gauge on the Body of Flow Meter for ex-works is arranged in assuming that the fluid flowing-direction is likely Left-in and Right-out; when Right-in and Left-out is required, please turn the Gauge by 180º for your reading convenience;

(7) In case of Type LS-15A(B) Flow Meter, before Gauge 180º turning, loosen 6 pieces of M8 Screw first, then turn the Gauge together with its Connector by 180º, restore and fasten screws.

(8) In case of Type LS-25A Flow Meter, before Gauge 180º turning, loosen 4 pieces of M5 Screw first, take off Gauge Cover, then loosen 3 pieces of M4 Screw, turn Gear Mechanism together with Counting Mechanism by 180º and restore them, fasten M4 Screws, and turn the Cover with 180º, restore it and fasten M5 Screws finally.

5. Usage & Care

(1) Start the Flow Meter operation by opening the Inlet Valve gently, and then open the Outlet Valve to see if the Flow Meter is working properly.

(2) The Flow Rate of fluid passing through Flow Meter should not exceed its specified range.

(3) If Type LS-15A (B) Flow Meter is used, in starting an initial operation or resuming a discontinued operation during which the pipeline is vacant, in order to get an accurate measuring with Flow Meter, to eliminate the gas inside in advance is necessary; Loosen the Gas Eliminating Screw-Plug (see Fig.1) for eliminating the gas detained in Measuring Chamber. As soon as the liquid is overflowing from the Screw-Plug hole, fasten the Screw-Plug immediately for starting formal measuring.

(4) During discontinued operation, measured liquid might be condensed in Flow Meter due to the temperature decreasing; before the operation resuming, warming-up measures for condensed-liquid eliminating or melting-down are necessary, but no steam-blowing is allowed that may cause Flow Meter damaging;

(5) Periodically lubricate Gear Mechanism with appropriate amount of Clock-Oil on its bearings and gear-teeth surface to make its nimble rotating with less wear & tear.

6. Storage

Flow Meter shall be stored in the room where the ambient temperature is ranging from -10~ +45ºC, the relative humidity is not higher than 80%, and being well-ventilated without corrosive atmosphere.

7. Accessories

(1) Instruction Manual one copy
(2) Quality Certificate one original

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