# Darhor Technology Co.,Itd DH900 OVAL FLOWMETTER

# **INSTRUCTION MANUAL**

# GENERAL DESCRIPTION

Oval meters are instruments used for the continuous and intermittent measurement and control of the pipe liquid flow ,which are typical of Volumetric flowmeter,feature large flow range ,low pressure loss, large viscosity range ,easy installation, high accuracy and can measure high temperature,high viscosity liquids with easy calibration .the meters are widely used for the flow measurement in the field of petroleum, chemical,chemical fiber,traffic,food industries and commerce,medical and sanitary departments.

TypeDH900 oval meters are fitted with on-sie pointer indication and roller intergration device which can indicate the liquid flow and intermittent flow passing through the pipeline. Type LL-AL meter incor-portes a pulse generator installed on the counter, when matched to the electronic flow indicator ,it can realize remote(batch,cumulative,intermittent)measurement and control,

For the different liquids(acid,alkali,salt,organic,solution etc.)the meters can be made of different materials(casted iron,casted steel,stainless steel etc,)with the material code as follow;A represents casted iron,E represents casted steel,and B represents stainless steel(1Cr18ioTi)

The stainless steel flowmeters are specially made for the chemical liquid measurement 98% sulfuric acid,50% caustic acid.

#### STRUCTURE AND OPERATION PRINCLPAL

Oval meter is generally comprised of a flow chamber and a counter mechanism .The main part of the transducer is a measuring chamber which consists of a pair of oval wheels and a sealing coupling, The counter mechanism contains speed reduction gears, adjusting device, counter, and pulse transmitter(Type DH900



In the measuring chamber, a pair of oval wheels and cover plate make a cover shape cavity which is used as a measuring element. The oval wheels are rotated by the pressure difference in the inlet and out-let of the meter and drive the inlet liquid through the cavity of the outlet, each revolution of the oval wheels displaces fluid four times the volume of the mechanical counter, and the total liquid volume and instantaneous flow will be known by the pointer display and the roller intergration .The attached signal gene-rator converts the rotary axial angular shift to the pulse signal and then transmitters it to the electrical indicator for remote intergrated flow and instantaneous flow indication and control.



# **TECHNICAL SPECLFICATION**

| Allowed basic error(%)             | $\pm 0.5$ , $\pm 0.2\%$ |
|------------------------------------|-------------------------|
| Allowed operating pressure(MPa)    |                         |
| Casted iron(A), stainless steel(B) | 1.6                     |
| Casted steel(E):DN15 to DN100      | 6.4                     |
| Pipe connecting flange             | JB78-59,79-59           |
| Viscosity(mpa.s)                   | class 0.5 : 0.6-200     |
|                                    | class0.2 : 3-200        |
| Measured media temp.(°C)           | -20-60°C                |
| FLOW RANG                          |                         |

| NI- main al | Flow range(m3/h) |            |              |                                  |  |
|-------------|------------------|------------|--------------|----------------------------------|--|
| Diameter    | viscosity        |            |              |                                  |  |
| (mm)        | 0.6~2mPa • s     | 2~8mPa • s | 8~200mPa • s | Chemical liquids<br>0.6-200mpa.s |  |
| 10          |                  | 0.08~0.4   | 0.04~0.4     | 0.08~0.4                         |  |
| 15          |                  | 0.3~1.5    | 0.15~1.5     | 0.3~1.5                          |  |
| 20          | 0.75~3           | 0.4~3      | 0.3~3        | 0.6~3                            |  |
| 25          | 1.5~6            | 0.8~6      | 0.6~6        | 1.2~6                            |  |
| 40          | 3~15             | 2~15       | 1.5~15       | 2.4~12                           |  |
| 50          | 4.8~24           | 3~24       | 2.4~24       | 3.8~19                           |  |
| 65          | 8~40             | 5~40       | 4~40         | 8~30                             |  |
| 80          | 12~60            | 8~60       | 6~60         |                                  |  |
| 100         | 20~100           | 13~100     | 10~100       |                                  |  |
| 150         | 38~190           | 25~190     | 19~190       |                                  |  |
| 200         | 68~340           | 45~340     | 34~340       |                                  |  |

Table1.Diameter and flow flange of Oval meters for class0.5

| Nerminel | Flow range(m3/h) |              |            |            |  |  |
|----------|------------------|--------------|------------|------------|--|--|
| Diameter | viscosity        |              |            |            |  |  |
| (mm)     | 0.3~0.8mPa • s   | 0.8~2mPa • s | 2~8mPa • s | 8~200mpa.s |  |  |
| 10       | 0.2~0.4          | 0.15~1.5     | 0.1~0.5    | 0.08~0.5   |  |  |
| 15       | 0.75~1.5         | 0.65~1.5     | 0.3~1.5    | 0.25~1.5   |  |  |
| 20       | 1.5~3            | 1~3          | 0.6~3      | 0.5~3      |  |  |
| 25       | 3~6              | 2~6          | 1.2~6      | 1~6        |  |  |
| 40       | 7.5~15           | 5~15         | 3~15       | 2.5~15     |  |  |
| 50       | 12~24            | 8~24         | 4.8~24     | 4~24       |  |  |
| 65       | 20~40            | 15~40        | 8~40       | 6.5~40     |  |  |
| 80       | 30~60            | 20~60        | 12~60      | 10~60      |  |  |
| 100      | 50~100           | 34~100       | 20~100     | 16~100     |  |  |
| 150      | 95~190           | 64~190       | 38~190     | 32~190     |  |  |
| 200      | 170~340          | 180~340      | 68~340     | 56~340     |  |  |

Table1.Diameter and flow flange of Oval meters for class0.2

**Notes:**1. The flow meter should be selected in accordance with the flow range, but not in accordance with the pipe diameter.

2. If the temperature of the metered liquid is between 100-200 °C, the max, flow fate must subtract by 10%.

3. While metered liquid is not petroleum product, if it visco-sity is equivalent to that listed in the table, the flow rang is also equivalent to that listed above.

4. For chemical.high temperature, and high viscosity liquid, consult the factory.

5. While the metered media is of strong corrosive ,the max,flow must reduce by 1/3. PERFORMANCE

The preformance of the meter's high accuracy and low pressure loss is shown in the following error versus pressure olss characteristics.



| 1 Space petrol    | 0.7mpa.s |
|-------------------|----------|
| 2 Water           | 1mpa.s   |
| 3 Light diesel    | 5mpa.s   |
| 4 Transformer oil | 20mpa.s  |

Error and pressure loss characteristics for class 0.5 meter The above accuracy curve shows the meter error when the metered liquids have different viscosities, and the meter error can be adjusted up and down the Axis 0by the accuracy adjustor to optimize the error.

For any liquid when the flow range atio is reduced.the meter accu-racy can be improved, and the error will be adjusted between  $\pm 0.2\%$  by mans of accuracy adjustor.



# **DIMENSION**

Oval meter of DN10~40



#### Oval meter of DN50~100



#### Oval meter of DN150~200



| DN(mm) | L(mm) | H(mm) | B(mm) | I(mm) | D(mm) | D <sub>1</sub> (mm) | N  | Φ(mm) |
|--------|-------|-------|-------|-------|-------|---------------------|----|-------|
| 10     | 150   | 100   | 210   | 45    | 90    | 60                  | 4  | 14    |
| 15     | 170   | 118   | 226   | 54    | 95    | 65                  | 4  | 14    |
| 20     | 200   | 150   | 238   | 13    | 105   | 75                  | 4  | 14    |
| 25     | 260   | 180   | 246   | 14    | 115   | 85                  | 4  | 14    |
| 40     | 245   | 180   | 271   | 22    | 145   | 110                 | 4  | 18    |
| 50     | 275   | 205   | 372   | 142   | 160   | 125                 | 4  | 18    |
| 65     | 320   | 325   | 386   | 116   | 180   | 145                 | 4  | 18    |
| 80     | 420   | 325   | 433   | 118   | 195   | 160                 | 8  | 18    |
| 100    | 515   | 418   | 458   | 88    | 215   | 180                 | 8  | 18    |
| 150    | 540   | 515   | 557   | 210   | 280   | 240                 | 8  | 23    |
| 200    | 650   | 650   | 720   | 244   | 335   | 295                 | 12 | 23    |

A dimensions for casted iron Oval meter

| DN(mm) | L(mm) | H(mm) | B(mm) | A(mm) | D(mm) | D <sub>1</sub> (mm) | N  | Φ(mm) |
|--------|-------|-------|-------|-------|-------|---------------------|----|-------|
| 10     | 150   | 100   | 210   | 165   | 90    | 60                  | 4  | 14    |
| 15     | 200   | 138   | 180   | 232   | 105   | 75                  | 4  | 14    |
| 20     | 250   | 164   | 160   | 220   | 125   | 90                  | 4  | 18    |
| 25     | 300   | 202   | 185   | 252   | 135   | 100                 | 4  | 18    |
| 40     | 300   | 202   | 208   | 293   | 165   | 125                 | 4  | 23    |
| 50     | 384   | 262   | 312   | 394   | 175   | 135                 | 4  | 23    |
| 80     | 450   | 337   | 332   | 452   | 210   | 170                 | 8  | 23    |
| 100    | 555   | 442   | 310   | 478   | 250   | 200                 | 8  | 25    |
| 150    | 540   | 510   | 347   | 557   | 300   | 250                 | 8  | 26    |
| 200    | 650   | 650   | 476   | 720   | 360   | 310                 | 12 | 26    |

E dimensions for casted steel Oval meter

#### INSTALLATION AND OPERATION

1. A strain should be installed in front of the meter, and be sure that the arrow on the casting of the meter and the strain pointing the same direction of the liquid flow.

2. If the metered media contains gas, a gas seperator should be install-led in front of the meter

3. Whether the pipe line is vertically or horizontally installed, the wheel's shaft of the meter must be fixed horizontal, that is the dial is vertical to the surface.

4. Prior to the installation of the meter ,the pipe line must be thoroughly cleaned.

5. While the meter is installed properly, the counter may be turned  $180^{\circ}$  or  $90^{\circ}$  for easy reading.

6. Prior to the installation of the new-meter ,first push the Oval wheels from the inlet for several times with a bamboo rod ,if the whiles don't move ,they can be immersed in the

petrol to prevent from deposits in the meter after the factory's inspection .

7. A regulating valve must deposits in the meter after the factory's inspection.

8. IT is forbidden to clean the meter with steam.

9. For the continuous operating departments, a by-pass should be mounted.

10. During the operating of the meter the flow rate can't exceed the flow marked on the Name plate. It is preferable to operate the meter at 70-80% of the max. Flow.

11. The strainer should be peroidally cleaned out of foreign matter to prevent from blocking.

12. During the running of the meter, it must be taken care that whether abnormal noise arises, the pointer moves properly, the pressure loss is stable.

13. Prior to the delivery of the meter, it has been calibrated with the light diesel in the factory, and water calibration is not allowed in order to prevent the Oval wheels from dusting . For the detail,see,the national inspecting procedures standard TTG 667-2010(Verification Regulation of Oval Wheel Flowmeters)



Vertical installation pipeline

pipeline

## **TPOUBLE SHOOTING**

| Trouble   |                     | Cause   | Measures   |  |
|---|---------------------|---|--|--|
|   |                     | Foreign matters drops into<br>meter,blocking the Oval wheels<br>during installation.                      | Disassemble and clean, then<br>refit the meter.                    |  |
|   |                     | The meter has been laid side for a long time, the Oval wheels rusts,                                      | Disassemble and clean if they<br>are heavily rust,replace<br>them. |  |
| 1. Oval wi  | heels don't<br>ate. | The pressure of the metered media<br>is over low.   | Add the pressure,raise the liquid level.                           |  |
|   |                     | The metered media is frozen in the  | Preheat the outer surer  |  |
|   |                     | metered media is frozen is the meter.   | surface of the meter ,melt the media.                              |  |
|   |                     | The transmission system   | Find the cause of the  |  |
|   |                     | blocked, and stop rotating the Oval   | transmission system, and try                                       |  |
|   |                     | wheels.   | to solve the problem.  |  |
|   |                     | The magnetic coupling is damaged.   | Find the damaged parts,and<br>relace them .                        |  |
| 2. Oval wheels<br>move,But the Roller<br>Don't Move |                     | The stud connecting the claw and shaft drops.   | Put the stud in right position.                                    |  |
|   |                     | The counter is damaged.   | Disassemble and check it, replace the damaged parts.               |  |
| 3. The Poin   | nter (roller)       | The flow direction is counter to  | Disassemble, and assemble in                                       |  |
| counter moves                                       |                     | that marked on the casing.  | correct direction.   |  |
|   |                     | The counter is not well assembled ,the pointer fixed loose.   | Reassemble the pointer.  |  |
|   |                     | The flow rate exceeds the stipulated value.   | Adjust the flow rate to the stipulated value.                      |  |
| 4. Pointer Movers<br>unstably                       |                     | The magnetic coupling bumps against the support wall.   | Replace or repair the<br>magnetic coupling .and the<br>support.    |  |
|   |                     | Accuracy adjusting gears loose  | Tighten the screw again.   |  |
|   | +Error              | Oval wheels,jacket and washer are weared.   | Replace the jacket,washer<br>Oval wheels.                          |  |
| Error is<br>lager                                   |                     | rror is<br>lager The on-site metered media's<br>viscosity is much lower than that of<br>the tested media. |  | Calibrate again according to the on-site metered liquid. |
|   |                     | The flow rate is less than the stipulated value.  | Adjust the flow rate to the stipulated value.                      |  |

|                                   | -Error | The liquid contains gas.                                   | To fix a gas seperator before meter and strainer.                     |
|-----------------------------------|--------|--|---|
| Axial sealing coupling<br>leakage |        | The sealing stuffing wears of the sealing oil is in short. | Tighten the gland or replace<br>the stuffing,fill the sealing<br>oil. |

## **EROOR ADJUSTMENT STEPS**

(Guide for the error adjustment tagle)

Error adjustment step for class 0.5 flowmeter

1. When designed, the standard gear set of the counter mechanism is 35/38, if the tested meter is found to be running slower, cause a plus(-)error, for instance, the error is -1.02-0.3, the gear set 38/41 should be selected in place of gear set 38/35, and the coordinate origin of the error curve shifts from zero pointer for the set 38/35 up to the -0.62 pointer for the set 38/41 (see table 1), so the error curve stays in the new coordinate system, then the error is adjusted with the error range of +0.4~+32.

2. During the operation of the flowmeter, the error range will be changed or over ranged due to the wearing of the gear set etc. If the error range doesn't exceed 1%, it can be adjusted within the error range ,for instance, the meter error drops to  $-0.21 \sim +0.68$ , when the gear set is needed to be replaced ,fist check, the tooth number of it, if it is 38/41, error-0.62 corresponding to it will be regarded as zero pointer (coordinate origin), then the set 38/41 will be replaced by the set 37/40, the error will be adjusted within the range of  $-0.41 \sim +0.49$ 

