

OUTLINE

Wafer-Cone® Differential pressure flowmeter with wafer type connections among V-cone flowmeters is designed and fabricated by TOKYO KEISO CO., LTD under the license of McCROMETER, Inc. U.S.A. Its newly born body is made of the precision casting using lost wax process. The simple and rigid construction taking advantages of V-Cone flowmeter realized the low cost.

FEATURES

- Simple installation
Wafer connection makes installation simple. Flowmeter body flanges designed to match the pipe flanges guides to the pipe center line.
- Wide application
Wafer-Cone flow meter can measure almost all process fluids, i.e. liquids, gases and steam.
- Short straight runs
The required straight runs are less than 1/5 of those required for orifice and vortex flowmeters. The narrow installation space allows simple and flexible piping arrangement plan. It leads to space and cost saving.
- Stable differential pressure output
Stable measurement is assured if the differential pressure across the meter is more than 0.025 kPa.
- Wide rangeability
Since the differential pressure created by the meter is stable at low flow rate, it can measure the flow rate in the range of the turn down ratio 10:1 with the standard maximum differential pressure.
- Low pressure loss
Small differential pressure allows low pressure loss with less throttling.
- High reliability
V shape cone has durable structure against wear or adhesion. Moreover, it is maintenance-free because of structure without a moving part. For a long period, reliable flow measurement is assured.



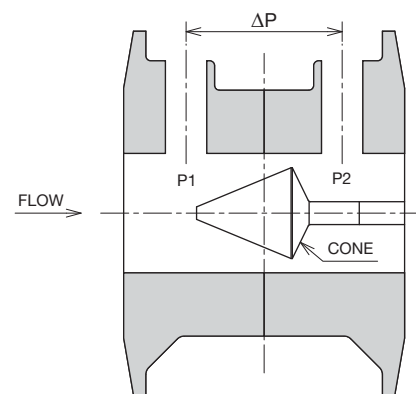
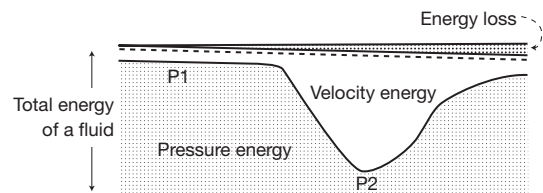
MEASUREMENT PRINCIPLE

The principle of Wafer-Cone flowmeter is the same as that of a common differential pressure type flowmeter, and it is based on the Bernoulli's theorem of the conservation of a fluid energy.

As shown in Fig.1, the pressure P1 at the approaching point to V-Cone decreases to P2 at the edge point with increasing fluid velocity by throttling the flow path along the contoured shape of Wafer-Cone.

P1 and P2 are measured from the pressure taps and the difference of the two pressures is given as:

$$\Delta P = P1 - P2 \quad \Delta P \text{ is differential pressure output.}$$



[Fig. 1]

STANDARD SPECIFICATION

| | |
|--|--|
| ● Meter size | 25, 40, 50, 65, 80, 100 mm 1, 1-1/2, 2, 2-1/2, 3, 4 inch |
| ● Connection | Wafer type |
| ● Rating | JIS10K, 20K ANSI Class150, 300 DIN PN16, 40 GB PN1.6, 4.0 |
| ● Connection size | Same as meter size |
| ● Materials | SCS14A (Body) SUS316 (Cone) |
| ● Measuring fluids | Liquids, Gases, Steam |
| ● Fluid pressure/temperature | According to pressure and temperature rating of flanges |
| ● Uncertainty of discharge coefficient | ±1.0% (Standard) |
| Turn down ratio | 10:1 (Standard) |
| Reynolds No. | ≧ 8000 |
| Differential pressure | ≧ 0.025 kPa |
| ● V-Cone β ratio | 8 types are available. 0.45, 0.50, 0.55, 0.60 0.65, 0.70, 0.75, 0.80 |
| ● Differential pressure tapings | Taper pipe threads, Rc1/4 or Rc1/8, NPT1/4 or NPT1/8 |
| ● Flow direction | Horizontal or vertical |

● Required straight runs

[Measuring fluid : Liquids general, Gases*1 and Steam*1

*1 Reynolds No. < 200,000]

| Type of joints | Upstream side | Downstream side |
|--|---------------|-----------------|
| 1 piece of 90° bend | 0D | 0D |
| 2 pieces of 90° bend | 0D | 0D |
| T joint | 0D | 0D |
| Butterfly valve (Flow control valve) | 3D | 3D |
| Butterfly valve (Fully open) | 3D | 0D |
| Gate valve (Fully open) | 0D | 0D |
| Expander (Diameter 0.67D expands to 1D, length 2.5D) | 1D | 1D |
| Reducer (Diameter 3D reduces to 1D, length 3.5D) | 1D | 1D |

[Measuring fluid : Gases and Steam Reynolds No. >200,000]

| Type of joints | Upstream side | Downstream side |
|--|---------------|-----------------|
| 1 piece of 90° bend | 1D | 1D |
| 2 pieces of 90° bend | 1D | 1D |
| T joint | 1D | 1D |
| Butterfly valve (Flow control valve) | 10D | 5D |
| Butterfly valve (Fully open) | 5D | 3D |
| Gate valve (Fully open) | 1D | 1D |
| Expander (Diameter 0.67D expands to 1D, length 2.5D) | 2D | 2D |
| Reducer (Diameter 3D reduces to 1D, length 3.5D) | 1D | 1D |

[Notes]

- D shows the nominal size of Wafer-Cone flowmeter.
- The required straight runs are the distance from the flange faces of Wafer-Cone flowmeter.
- Add 1D to the above mentioned figures for the service β ratio is 0.65 or more.

SIZING

Based on a selected Wafer-Cone β ratio, the differential pressure at maximum flow range is determined by the meter size and fluid properties. The maximum differential pressure corresponds to the maximum flow range of indicator. The maximum differential pressure can be selected as required by designating a Wafer-Cone β ratio and a flow range if meter size and fluid properties are given.

The Wafer-Cone® sizing program presents a solution to meet your requirements such as low pressure loss measurement or more precise flow measurement.

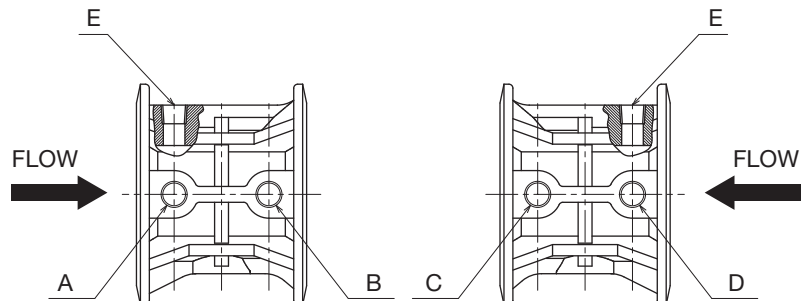
Please contact TOKYO KEISO for further information of the Wafer-Cone® sizing program.

MODEL CODES

| MODEL CODES | | | | | | | CONTENTS | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------|--------|-------|
| VH | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | | |
| Materials | 1 | | | | | | SCS14A/SUS316 | | |
| Meter size /Connection size | 3 | | | | | | 25A | 1" | DN25 |
| | 4 | | | | | | 40A | 1-1/2" | DN40 |
| | 5 | | | | | | 50A | 2" | DN50 |
| | 6 | | | | | | 65A | 2-1/2" | DN65 |
| | 7 | | | | | | 80A | 3" | DN80 |
| | 8 | | | | | | 100A | 4" | DN100 |
| Connection rating | J1 | | | | | | JIS10K | | |
| | J2 | | | | | | JIS20K | | |
| | A2 | | | | | | ANSI Class 150 | | |
| | A5 | | | | | | ANSI Class 300 | | |
| | G1 | | | | | | GB PN1.6 | | |
| | G4 | | | | | | GB PN4.0 | | |
| | D1 | | | | | | DIN PN16 | | |
| | D4 | | | | | | DIN PN40 | | |
| V-Cone β ratio | | | | -45 | | | 0.45 | | |
| | | | | -50 | | | 0.50 | | |
| | | | | -55 | | | 0.55 | | |
| | | | | -60 | | | 0.60 | | |
| | | | | -65 | | | 0.65 | | |
| | | | | -70 | | | 0.70 | | |
| | | | | -75 | | | 0.75 | | |
| | | | | -80 | | | 0.80 | | |
| Screws of pressure taps | | | | | -1 | | Rc | | |
| | | | | | | -2 | NPT | | |
| Differential pressure tap location (See tap location below) | | | | | | 1 | Type 1 (Standard) | | |
| | | | | | | 2 | Type 2 | | |
| | | | | | | 3 | Type 3 | | |
| | | | | | | 4 | Type 4 | | |
| | | | | | | 5 | Type 5 | | |
| | | | | | | 6 | Type 6 | | |

Differential pressure tap location type

| Type | High pressure tap | Low pressure tap |
|------|-------------------|------------------|
| 1 | A | B |
| 2 | A | C |
| 3 | D | C |
| 4 | D | B |
| 5 | E | B |
| 6 | E | C |

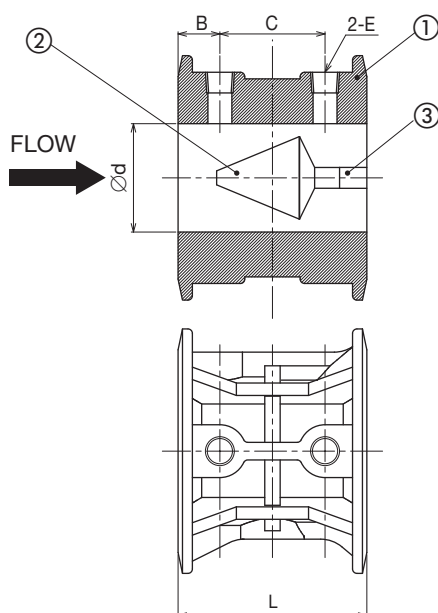


Low pressure tap

Following size of stud bolts are recommended.

| Connection rating | | | JIS | | ANSI | | DIN | | GB | |
|-------------------|--------|-------|----------|----------|-----------------|-----------------|-----------|-----------|------------|------------|
| | | | 10K (mm) | 20K (mm) | Class150 (inch) | Class300 (inch) | PN16 (mm) | PN40 (mm) | PN1.6 (mm) | PN4.0 (mm) |
| 25A | 1" | DN25 | M16×130 | M16×140 | 1/2×5 | 5/8×5-1/4 | M12×130 | M12×130 | M12×130 | M12×130 |
| 40A | 1-1/2" | DN40 | M16×160 | M16×160 | 1/2×6 | 3/4×6-3/4 | M16×160 | M16×160 | M16×160 | M16×160 |
| 50A | 2" | DN50 | M16×170 | M16×170 | 1/2×6-1/2 | 5/8×6-3/4 | M16×170 | M16×170 | M16×170 | M16×170 |
| 65A | 2-1/2" | DN65 | M16×190 | M16×190 | 5/8×7-1/2 | 3/4×8 | M16×190 | M16×190 | M16×190 | M16×190 |
| 80A | 3" | DN80 | M16×210 | M20×220 | 5/8×8-1/4 | 3/4×9 | M16×210 | M16×220 | M16×210 | M16×220 |
| 100A | 4" | DN100 | M16×240 | M20×260 | 5/8×9-1/2 | 3/4×10-1/2 | M16×240 | M20×260 | M16×240 | M20×260 |

DIMENSIONS



● Materials

| Part No. | Part name | Materials |
|----------|-----------------|-----------|
| 1 | Body | SCS14A |
| 2 | Cone | SUS316 |
| 3 | Support | SUS316 |
| 4 | Fastening bolts | SUS316L |

● Dimension list

| Meter size (mm) | L (mm) | \d (mm) | B (mm) | C (mm) | E (Rc or NPT) | Weight (kg) |
|-----------------|--------|---------|--------|--------|---------------|-------------|
| 25 | 57 | 24.31 | 12.7 | 31.8 | 1/8 | 1.0 |
| 40 | 76 | 38.1 | 16.5 | 43.2 | 1/8 | 2.0 |
| 50 | 86 | 49.25 | 19.0 | 47.8 | 1/4 | 2.5 |
| 65 | 102 | 59.0 | 19.0 | 63.5 | 1/4 | 4.5 |
| 80 | 121 | 73.66 | 25.4 | 69.9 | 1/4 | 6.5 |
| 100 | 152 | 97.18 | 31.8 | 88.9 | 1/4 | 12 |

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* Specification is subject to change without notice.

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