

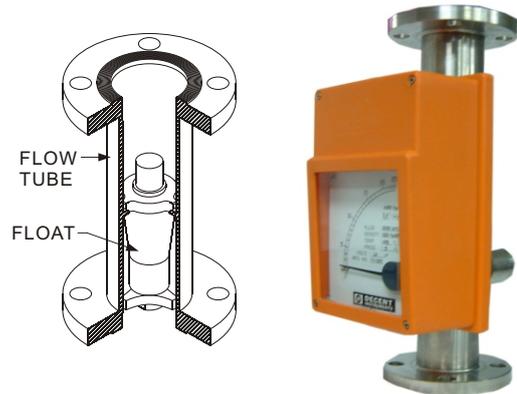


ARMORED FLOWMETERS 616

Metallic Meter Tube / Variable Area Type SERIES

FEATURES

- SUITABLE FOR LIQUIDS · STEAM OR GASES
- RIGID AND DURABLE BODY
- HIGH SAFETY AND RELIABILITY
- EASILY READABLE LARGE INDICATING SCALE
- AIR DAMPER OPTIONAL
- VARIOUS CONNECTIONS & FLOW DIRECTIONS OF YOUR CHOICES



GENERAL SPECIFICATIONS

- **INDICATOR PORTION**
 Scale length : 120 mm (arch)
 Flowrate unit : M³/H or specified
 Metering range : 1 : 10
 Accuracy : ±1.5% F.S.
 Material :
 Follower / 304SS
 Housing / 304SS Frame & ABS cover
 Sight window / Safety glass
 Housing gasket / Buna-N
 Damper : Discal / gas damper
 Enclosure : IP65
 Ambient temperature : -20 to +60°C
- **METER TUBE PORTION**
 Pressure rating :
 ≤ 10 kg/cm²G (Standard)
 ≤ 100 kg/cm²G (Options)
 Operating temp. :
 -20 to +120°C (Standard)
 ≤ 400°C (Options)
 Material : 304SS, 316SS, 316LSS or PTFE lining

ALARM DEVICE

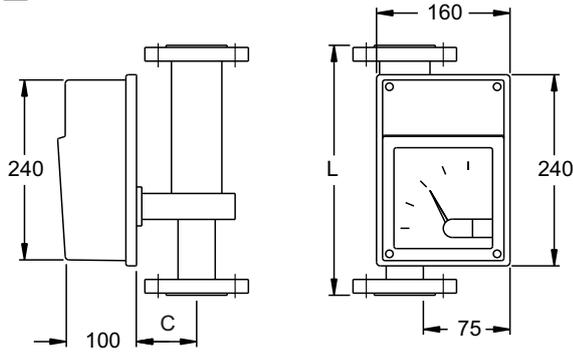
| ITEMS | SPECIFICATIONS | |
|---------------------------------|---|---|
| | 1 | 2 |
| FUNCTION CODE | 1 | 2 |
| DETECTING MODE | Inductive Proximity Switch | |
| CONTACT FORM | Transistor PNP - NO | NAMUR (Monostable Proximity Switch) |
| POWER SUPPLY | 10~30V DC | 8V DC |
| OPERATING CURRENT | 100mA max. | ≤ 1mA at detecting ≥ 3mA at No-detecting |
| SWITCH FREQUENCY | 2 KHz max. | 3 KHz max. |
| ELECTRIC PROTECTION | With short-circuit & reverse-polarity protection. | PTB NO. Ex-83/ 2023X Eex ia IIC T6 |
| EMC DESIGN & TESTING | According to EN 60947-5-2 | According to EN 60947-5-2 & DIN EN 60947-5-6 (NAMUR) |
| ENCLOSURE CLASS | IP67 | |
| SETTING RANGE | 10~100% adjustable and 15% gap for H/L alarm | |
| ALARM SETTING | The switch with a screw can be set on the slot of scale | |
| AMBIENT TEMP. | -25~+70°C | |
| ACCESSORIES (OPTIONAL) | Relay unit | Safety Barrier KF DC/AC Power supply or MTL5011B / 5018 DC system (Prox input / Relay output) |

WIRING CONNECTION FOR ALARM DEVICE

| FUNCTION CODE | | 1 | 2 |
|-------------------|---|--|--|
| WIRING CONNECTION | A-MODE Note : This connector should be assembled at the back of meter housing | DIN43650 IP65 connector | DIN43650 IP65 connector |
| | B-MODE Note : This mode with a cable entry 1/2"NPT (F) placed at the back of meter housing | Terminal Block, 6.3mm ^w Barrier | Terminal Block, 6.3mm ^w Barrier |

DIMENSIONS

616A

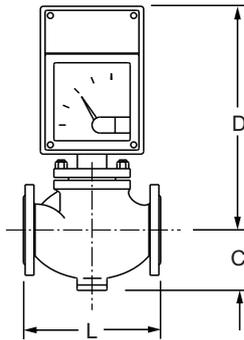


Options : Extended Follower (code item 6)

616A

| METER SIZE | | WATER MAX. | | Air @1 atm 0°C | | ⑤ INSTALLATION |
|------------|-------|-------------------|-----------------------|--------------------|-----------------------|----------------|
| mm | inch | M ³ /H | ΔP mmH ₂ O | NM ³ /H | ΔP mmH ₂ O | L mm |
| 15 | 1/2 | 2.0 | 650 | 30 | 1000 | 350 |
| 20 | 3/4 | 2.5 | 650 | 50 | 1000 | 350 |
| 25 | 1 | 4.0 | 700 | 100 | 1000 | 350 |
| 40 | 1-1/2 | 8.0 | 900 | 200 | 1000 | 350 |
| 50 | 2 | 15.0 | 600 | 400 | 1000 | 375 |
| 65 | 2-1/2 | 25.0 | 700 | 500 | 1000 | 375 |
| 80 | 3 | 40.0 | 900 | 800 | 1500 | 375 |
| 100 | 4 | 60.0 | 1100 | 1200 | 2000 | 375 |

616B

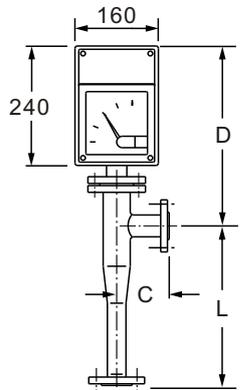


Options :
Extended follower
Cooling Fin (code item 6)

616B

| METER SIZE | | WATER MAX. | | Air @1 atm 0°C | | ⑤ INSTALLATION | | |
|------------|-------|-------------------|-----------------------|--------------------|-----------------------|----------------|------|------|
| mm | inch | M ³ /H | ΔP mmH ₂ O | NM ³ /H | ΔP mmH ₂ O | L mm | C mm | D mm |
| 15 | 1/2 | 1.5 | 800 | 18 | 1000 | 148 | 55 | 380 |
| 20 | 3/4 | 2.0 | 800 | 50 | 1000 | 148 | 55 | 380 |
| 25 | 1 | 4.0 | 900 | 100 | 1100 | 158 | 62 | 390 |
| 40 | 1-1/2 | 7.0 | 900 | 200 | 1200 | 198 | 75 | 400 |
| 50 | 2 | 15.0 | 1000 | 400 | 1400 | 228 | 85 | 420 |
| 65 | 2-1/2 | 25.0 | 1000 | 500 | 1500 | 288 | 118 | 430 |
| 80 | 3 | 35.0 | 1200 | 800 | 1700 | 320 | 135 | 450 |
| 100 | 4 | 60.0 | 1400 | 1200 | 2000 | 360 | 155 | 470 |

616C

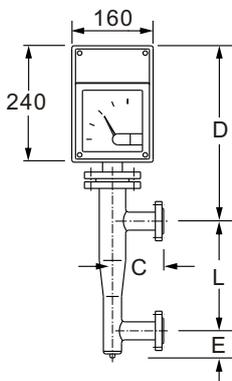


Options :
Extended Follower
Cooling Fin (code item 6)

616C

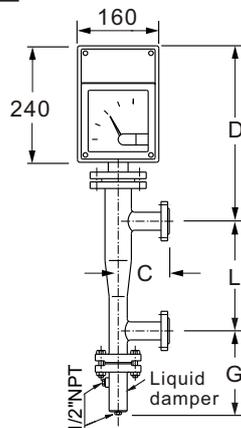
| METER SIZE | | WATER MAX. | | Air @1 atm 0°C | | ⑤ INSTALLATION | | |
|------------|-------|-------------------|-----------------------|--------------------|-----------------------|----------------|------|------|
| mm | inch | M ³ /H | ΔP mmH ₂ O | NM ³ /H | ΔP mmH ₂ O | L mm | C mm | D mm |
| 15 | 1/2 | 2.0 | 600 | 30 | 400 | 250 | 100 | 350 |
| 20 | 3/4 | 2.5 | 600 | 50 | 400 | 250 | 100 | 350 |
| 25 | 1 | 4.0 | 700 | 80 | 400 | 250 | 100 | 380 |
| 40 | 1-1/2 | 8.0 | 700 | 130 | 400 | 250 | 130 | 400 |
| 50 | 2 | 15.0 | 800 | 300 | 400 | 250 | 130 | 400 |
| 65 | 2-1/2 | 25.0 | 800 | 600 | 500 | 350 | 150 | 400 |
| 80 | 3 | 40.0 | 1000 | 1000 | 500 | 350 | 180 | 420 |
| 100 | 4 | 70.0 | 1200 | 1800 | 600 | 350 | 180 | 420 |

616D



Options : Extended follower
Cooling Fin
(code item 6)

616E



Options : Extended follower
Cooling Fin
(code item 6)

616D / E

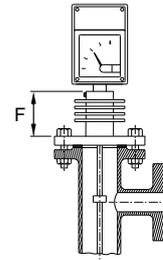
| METER SIZE | | STEAM @9Kg/cm ² G | Air @1 atm 0°C | | ⑤ INSTALLATION | | | | | |
|------------|-------|------------------------------|-----------------------|--------------------|-----------------------|------|------|------|------|------|
| mm | inch | M ³ /H | ΔP mmH ₂ O | NM ³ /H | ΔP mmH ₂ O | L mm | C mm | D mm | E mm | G mm |
| 15 | 1/2 | 30 | 800 | 30 | 600 | 250 | 100 | 350 | 45 | 190 |
| 20 | 3/4 | 40 | 900 | 50 | 600 | 250 | 100 | 350 | 45 | 190 |
| 25 | 1 | 60 | 1200 | 80 | 600 | 250 | 100 | 380 | 45 | 200 |
| 40 | 1-1/2 | 130 | 1300 | 130 | 600 | 250 | 130 | 400 | 55 | 210 |
| 50 | 2 | 250 | 1500 | 300 | 600 | 250 | 130 | 400 | 65 | 250 |
| 65 | 2-1/2 | 400 | 1700 | 600 | 700 | 350 | 150 | 400 | 75 | 250 |
| 80 | 3 | 600 | 1800 | 1000 | 700 | 350 | 180 | 420 | 90 | 260 |
| 100 | 4 | 1100 | 1800 | 1800 | 900 | 350 | 180 | 420 | 100 | 270 |

MODEL SELECTION

| ITEMS | CODE | SPECIFICATIONS |
|----------------------------|------|--|
| ① MODEL | 616A | Bottom to top flow direction |
| | 616B | Horizontal flow direction |
| | 616C | Bottom to top side flow direction |
| | 616D | Sideways flow direction |
| | 616E | Sideways flow direction with liquid damper |
| | 616F | OEM Versions |
| ② ALARM DEVICE | -0 | Not required (Indicator only) |
| | -1 | Transistor PNP-NO output |
| | -2 | NAMUR without safety barrier |
| | -3 | NAMUR with DC safety barrier |
| | -4 | NAMUR with AC safety barrier |
| | -5 | To be specified |
| ③ ALARM POINTS | 0 | Indicator without alarm device |
| | 1 | With 1 point alarm device |
| | 2 | With 2 points alarm device |
| | 3 | To be specified |
| ④ CONNECTION | 0 | ANSI 150 ^{lb} Flange |
| | 1 | JIS 10K Flange |
| | 2 | DIN 2632 / 2633 Flange (PN10/16) |
| | 3 | To be specified |
| ⑤ MATERIAL OF WETTED PARTS | 0 | 304SS (1.4301) |
| | 1 | 316SS (1.4571) |
| | 2 | 316LSS |
| | 3 | PTFE Lining |
| | 4 | To be specified |
| ⑥ INSTALLATION LENGTH | -A | Standard design |
| | -B | To be specified |
| ⑦ OPTIONAL COOLING PARTS | A | Not required (-20 to +120°C) |
| | B | Extended follower (≤300°C) |
| | C | Cooling fin (≤400°C) |
| | D | To be specified |
| ⑧ OPTIONAL JACKET PARTS | A | Not required |
| | B | Semi-Jacket |
| | C | Full Jacket |
| | D | To be specified |
| ⑨ OPTIONAL ACCESSORIES | A | Not required |
| | B | Flow adjusting valve |
| | C | Magnetic filter |
| | D | To be specified |
| ⑩ METER SIZE | -015 | 15mm (1/2") |
| | } | } |
| | -100 | 100mm (4") |
| | -xxx | To be specified |

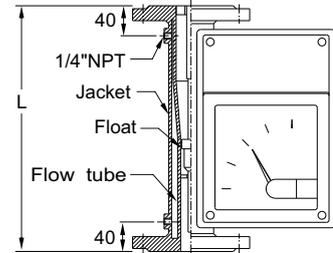
OPTIONAL

COOLING FIN

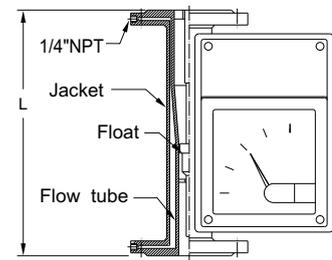


| METER SIZE | F (mm) | |
|------------|--------|--------|
| | ≤250°C | ≤400°C |
| 15~25 | 50 | 70 |
| 40~65 | 80 | 100 |
| 80 | 90 | 110 |
| 100 | 100 | 120 |

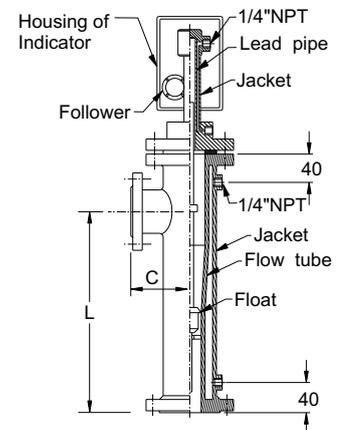
SEMI-JACKET



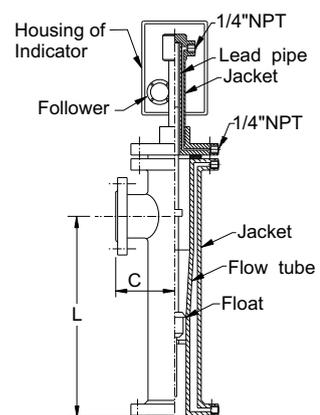
FULL JACKET



SEMI-JACKET (Back view)

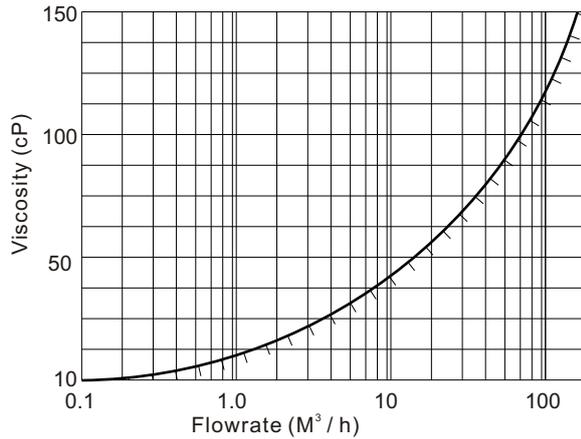


FULL JACKET (Back view)

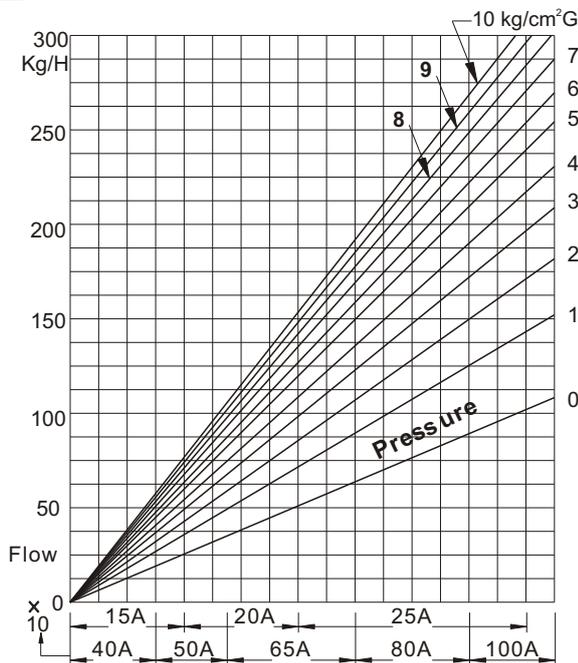


INSTRUCTIONS

SUITABLE RANGE FOR THE LIQUID VISCOSITY



PIPE SIZE OF STEAM FLOWS



GAS FLOW CALCULATION

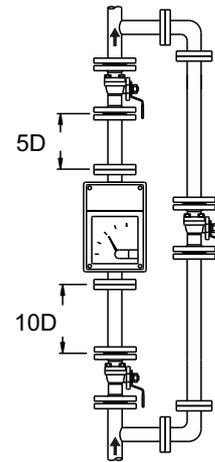
When the gas flowmeter is different from the ordered specifications, errors in measurement may occur. In this case, further calculation is necessary. The formula is as follows:

$$Q_a = Q_g \times \sqrt{\frac{\gamma}{1.293}} \times \sqrt{\frac{1.033}{(1.033+P)}} \times \sqrt{\frac{(273+t)}{273}}$$

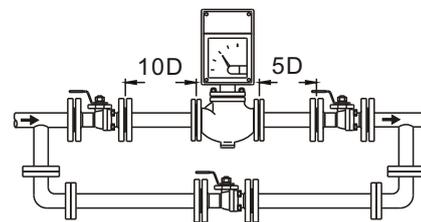
- Q_a: Air flowrate for converted result (M³/H)
- Q_g: Flowrate of the gas to be metered (M³/H)
- γ: Density of the gas to be metered (kg/NM³)
- P: Operating pressure (kg/cm²G)
- t: Operating temperature (°C)

PIPELINE PLANNING

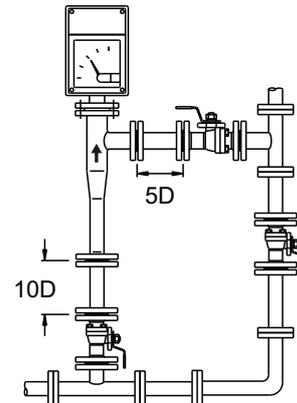
616A



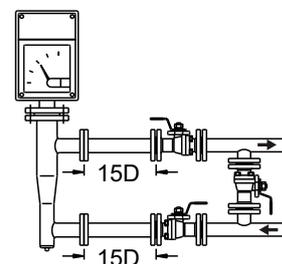
616B



616C



616D



2K503-03A1

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