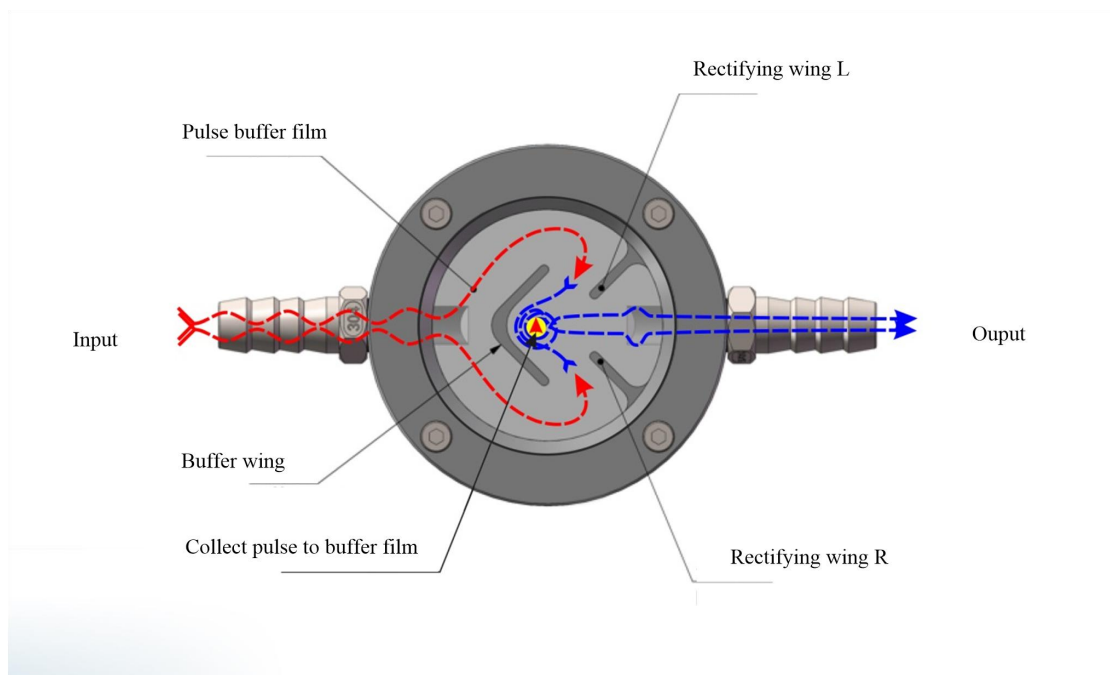


Technique Parameters for Pulse Damper

1. Product Introduction



Note: Connect to output side of peristaltic pump.

If you need the pulse data, follow the steps:

- 1) A pressure sensor should be connected in series between the output end of the peristaltic pump and the input end of the damper, do the same operation between output end of the damper and the output end of tubing;
- 2) Connect the signal ports of two pressure sensors with oscilloscope;
- 3) Turn on the peristaltic pump power supply, the fluid will be buffered and spit flow through buffer wing when the water flows through damper. The fluid will flows into fluid cavity in two ways. And the fluid in the two ways will separately attach to the Rectifying wing R and Rectifying wing L and gather into the buffering wing inside with the Rectifying wing R, L.
- 4) The pulse of fluid will be fully released to buffer air chamber through pulse buffer film cause of the fluid pressure. And then, the pulse of fluid will be discharged into the atmosphere with breathing hole in the upper cover.
- 5) The fluid which rectified by rectifying wing R, L, will be output smoothly under the continuously input fluid force, as a ideal liquid with approximate advection to reach rectifying inhibiting the pulse.

Effectively solve the shortcomings of pulsating fluids, especially the unstable water flow of peristaltic pumps.

Suitable sites: laboratory, chemical, pharmaceutical, food industry cause of simple principle and construction, easy to maintain, good applicability.

In the medical field, it can be used for blood pulse rectification of blood transfusion pump. The stable blood flow can reduce medical risk. It will play a important role to saving the patient' life in the critical time.

The pulse of D1606 series in the typical application can reach to over 95% at the inhibition ratio. You can use two dampers in serial to reach more higher pulse rectification effect in the application which needs more higher stability for the fluid. The inhibition ratio almost can reach over 99%.

2. Applicable Scenario

2.1 Universal Type

Material: PC (Polycarbonate);

- 1) Suitable Environment: ETO (ethylene oxide) and Steam sterilization in 121°C;
- 2) Biocompatibility meets most ISO 10993-1 test requirements;
- 3) RoHS compliance;
- 4) Maximum working temperature: 130°C;
- 5) Working pressure: $\leq 0.3\text{Mpa}$.

2.2 Industrial Type

● **Material:** PPS (Polyphenylene sulfide)

- 1) One of the best heat resistance material in the engineering plastic.
- 2) Corrosion resistance, radiation resistance, flame retardancy and balanced physical and mechanical properties.
- 3) The corrosion resistance is close to Teflon, and the chemical resistance is second only to PTFE.
- 4) The excellent performance in electric, mechanics, flame retardancy.
- 5) RoHS compliance;
- 6) Maximum working temperature: 220°C.
- 7) Working pressure: $\leq 0.46\text{Mpa}$

2.3 Medical Type

● **Material:** PSU (Polysulfone)

- 1) Resistance to oxidation and hydrolysis, antistatic, resistance to mineral acid, alkali and salt solutions.
- 2) Good resistance to detergents and hydrocarbon oils.
- 3) Electron beam disinfection, high intensity, good disinfection, anti gamma radiation.
- 4) Agency rating: FDA 21 CFR 177.1655.
- 5) RoHS compliance.
- 6) Food contact compliance.
- 7) Maximum working temperature: 175°C.
- 8) Working pressure: $\leq 0.3\text{Mpa}$.

3. Instruction

- (1) How to select a suitable damper:

Step 1: Ensure the tubing size, and select model series corresponding to the joint matched with the damper;

Step 2: Ensure the maximum pressure of fluid in working, select the damper specification suitable for the pressure according to the selection table.

Step3: Ensure the maximum temperature of fluid in working, select the damper specification suitable for temperature according to the selection table.

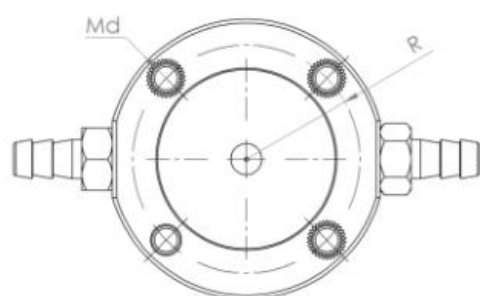
- (2) It is easy to install after selecting the damper. You just need to connect the input port of the damper with the output port of peristaltic pump. At the same time, the output end of the damper is connected with a tubing of at least over 30cm. So as to eliminate the liquid turbulence at the output end of the damper. A typical application of the damper is completed until the liquid without pulse and close to the advection state.
- (3) The damper could be horizontal, side and vertical in stalling. Please do not direct the output with the output side down, that may cause that the liquid pressure flows out directly without being applied on the buffer membrane, resulting in the damper not having any effect. The correct method is that the fluid level at the output port should be higher than the damper itself.
- (4) Please be attention to that when in low flow rate:
 - a. The diameter of the output end is smaller than that of the input end;

- b. The length of output tubing shall be more than 30cm;
 - c. The fluid level at the outlet port shall be higher than that of the damper itself.
- (5) The inhibition rate of the pulse will be reached to over 95% after that the damper correctly installed. The method of two dampers in series can be used in the case of high requirements for liquid flow pattern, and the pulse suppression rate can be close to 100%.
- (6) The most common scenario of d1606 series fluid pulse damper is peristaltic pump, and all pumps with pulse are applicable.

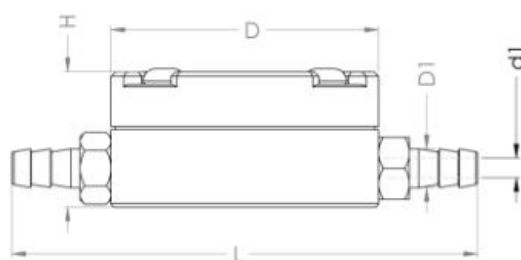
4. Material

Currently, there are more than 5 different materials for damper body base for choices: POM, PC, PPS, PSU, PTFE, SS304, SS316 etc.

5. Specification



Bottom view

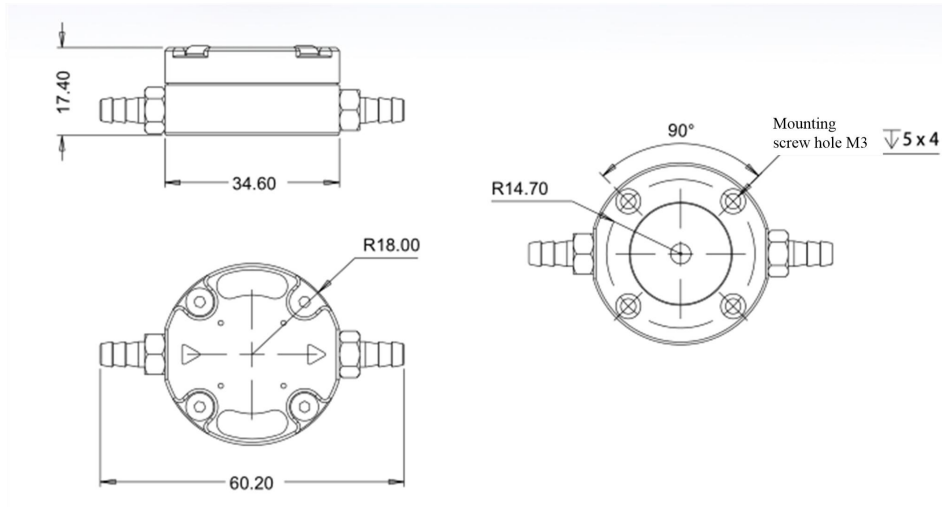


Front view

Note: The pressure of liquid is $\leq 0.3\text{Mpa}$, the temperature is $< 100^\circ\text{C}$ for the ordinary liquid.

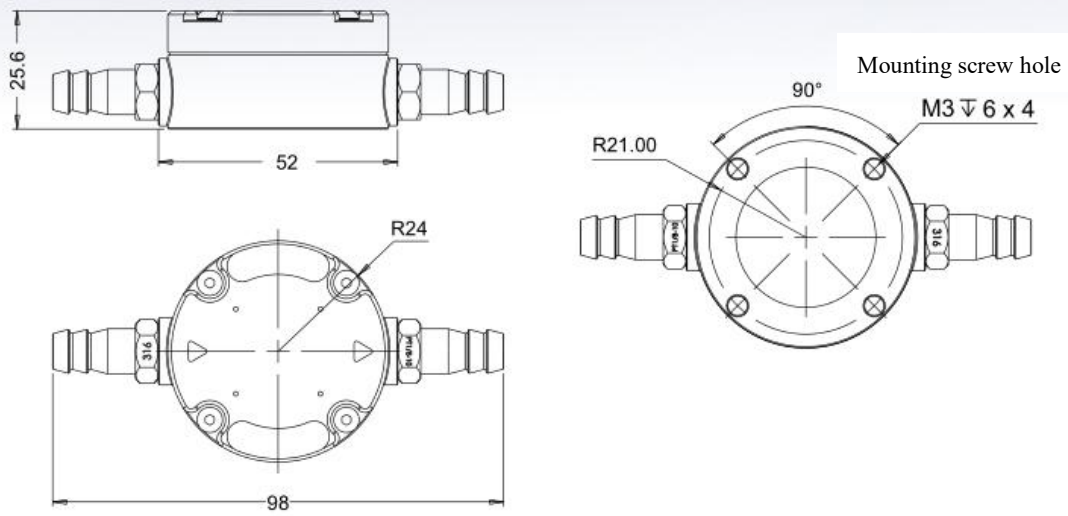
| Type | | Suitable tubing (The unit of ID (mm)) | Specification of connector | Dimension Drawing | | | | | | |
|----------|---|--|-------------------------------|-------------------|----|-----|-------|-------|------|----|
| | | | | D | H | L | D1 | d1 | R | MD |
| D1606-3N | B | 13# (0.8), 14# (1.6) | M5 | 36 | 17 | 60 | 2.6 | 1.4 | 14.7 | M3 |
| | D | 19# (2.4), 16# (3.1), 15# (4.8) | M5 | 36 | 17 | 60 | 5 | 3.0 | 14.7 | M3 |
| D1606-6N | B | 15# (4.8), 25# (4.8), 24# (6.4) | DN6 PT1/8 | 48 | 26 | 98 | 7 | 4.9 | 21 | M3 |
| | D | 17# (6.4), 18# (7.9) 24# (6.4), 35# (7.9) | DN6 PT1/8 | 48 | 26 | 98 | 10 | 6.6 | 21 | M3 |
| D1606-10 | | 36# (9.6), 73# (9.6) | DN8 G1/4 | 78 | 27 | 142 | 12 | 8.5 | 34 | M4 |
| D1606-12 | | 82#(12.7), 88# (12.7) | DN10 G3/8 | 98 | 35 | 168 | 15 | 11.6 | 44 | M4 |
| D1606-25 | | The ID of the tubing is 16-32mm | DN20 G1 | 98 | 56 | 188 | 16-32 | 12-28 | 44 | M5 |

D1606-3 Series



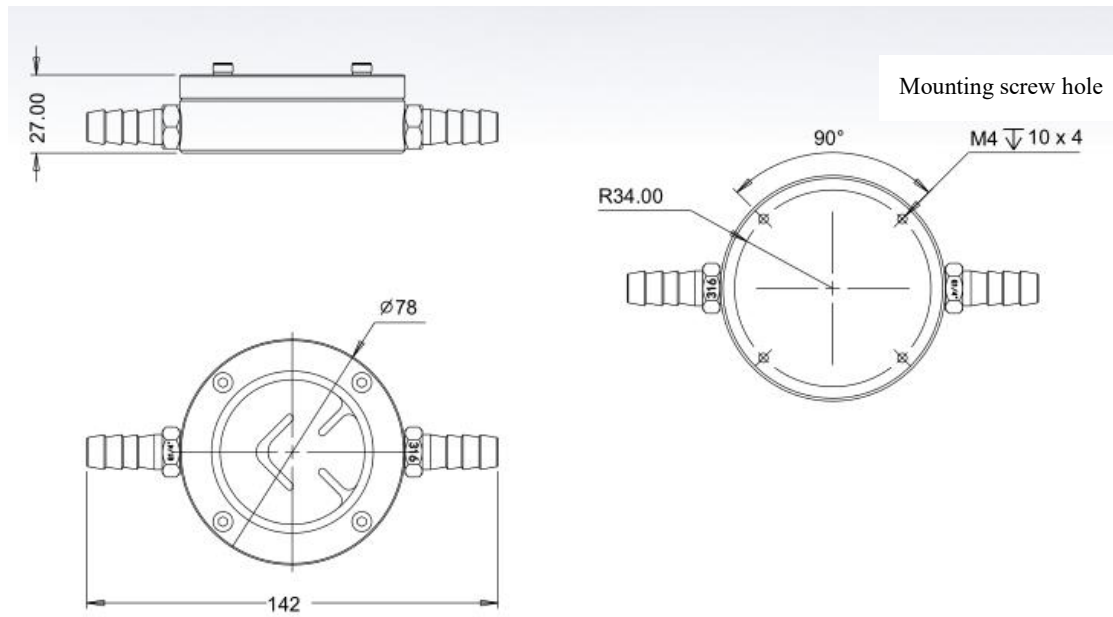
| Type | Joint thread specification (Thread*Pitch) | Joint outer diameter (mm) | Material of the joint | Basic material | Buffer film material | Buffer cavity volume (ml) | Withstand voltage ≤ | | | Temperature resistance °C |
|---------------|--|------------------------------|-----------------------|----------------|----------------------|---------------------------|---------------------|-----|------|---------------------------|
| | | | | | | | Mpa | bar | PSI | |
| D1606-3B-PC | M5*0.8 | 2.6 | SUS316 | PC | Silicone | 1.88 | 0.3 | 3 | 43.8 | 130 |
| D1606-3B-PPS | M5*0.8 | 2.6 | SUS316 | PPS | Silicone | 1.88 | 0.45 | 4.5 | 65.7 | 220 |
| D1606-3B-PSU | M5*0.8 | 2.6 | SUS316 | PSU | Silicone | 1.88 | 0.3 | 3 | 43.8 | 175 |
| D1606-3D-PC | M5*0.8 | 5.0 | SUS316 | PC | Silicone | 1.88 | 0.3 | 3 | 43.8 | 130 |
| D1606-3D-PPS | M5*0.8 | 5.0 | SUS316 | PPS | Silicone | 1.88 | 0.45 | 4.5 | 65.7 | 220 |
| D1606-3D-PSU | M5*0.8 | 5.0 | SUS316 | PSU | Silicone | 1.88 | 0.3 | 3 | 43.8 | 175 |
| D1606F-3B-PPS | M5*0.8 | 2.6 | SUS316 | PPS | Fluoroelastomer | 1.88 | 0.6 | 6 | 87.6 | 220 |
| D1606F-3D-PPS | M5*0.8 | 5.0 | SUS316 | PPS | Fluoroelastomer | 1.88 | 0.6 | 6 | 87.6 | 220 |

D1606-6 Series



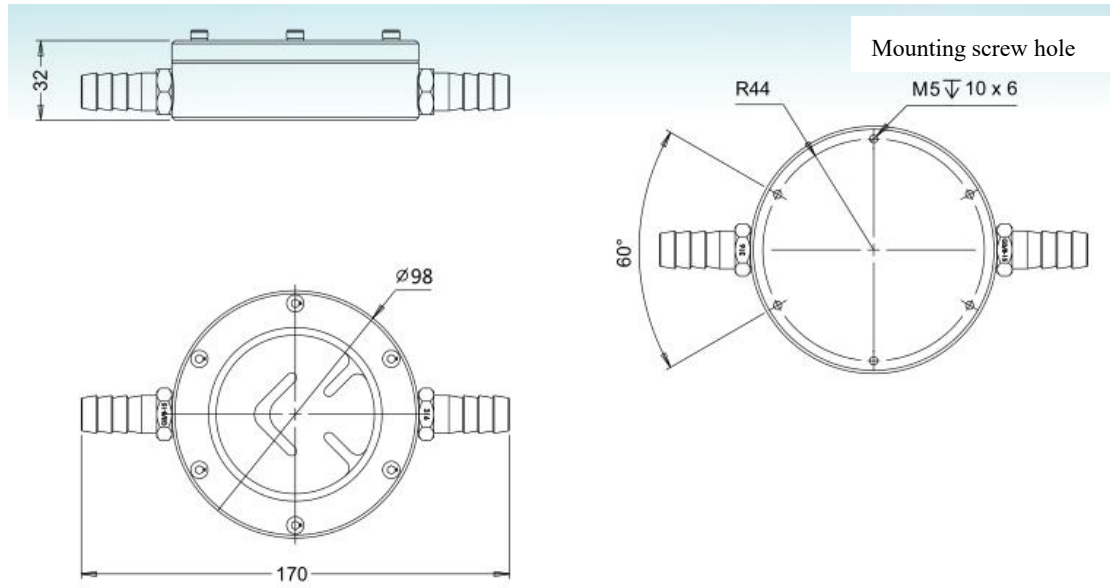
| Type | Joint thread specification Pitch 0.907 | Joint outer diameter (mm) | Material of the joint | Basic material | Buffer film material | Buffer cavity volume (ml) | Withstand voltage ≤ | | | Temperature resistance °C |
|---------------|---|------------------------------|-----------------------|----------------|----------------------|---------------------------|---------------------|-----|------|---------------------------|
| | | | | | | | Mpa | bar | PSI | |
| D1606-6B-PC | PT1/8"-28 | 7 | SUS316 | PC | Silicone | 6.36 | 0.3 | 3 | 43.8 | 130 |
| D1606-6B-PPS | PT1/8"-28 | 7 | SUS316 | PPS | Silicone | 6.36 | 0.45 | 4.5 | 65.7 | 220 |
| D1606-6B-PSU | PT1/8"-28 | 7 | SUS316 | PSU | Silicone | 6.36 | 0.3 | 3 | 43.8 | 175 |
| D1606-6D-PC | PT1/8"-28 | 10 | SUS316 | PC | Silicone | 6.36 | 0.3 | 3 | 43.8 | 130 |
| D1606-6D-PPS | PT1/8"-28 | 10 | SUS316 | PPS | Silicone | 6.36 | 0.45 | 4.5 | 65.7 | 220 |
| D1606-6D-PSU | PT1/8"-28 | 10 | SUS316 | PSU | Silicone | 6.36 | 0.3 | 3 | 43.8 | 175 |
| D1606F-6B-PPS | PT1/8"-28 | 7 | SUS316 | PPS | Fluoroelastomer | 6.36 | 0.6 | 6 | 87.6 | 220 |
| D1606F-6D-PPS | PT1/8"-28 | 10 | SUS316 | PPS | Fluoroelastomer | 6.36 | 0.6 | 6 | 87.6 | 220 |

D1606-10 Series



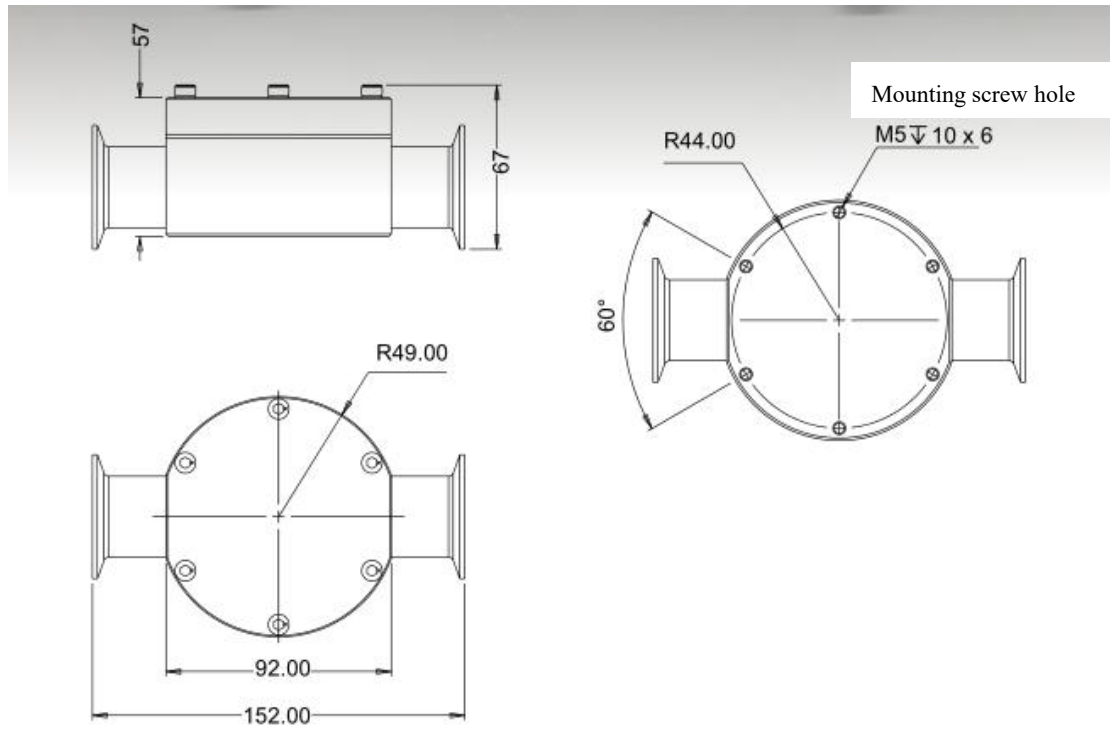
| Type | Joint thread specification Pitch 1.337 | Joint outer diameter (mm) | Material of the joint | Basic material | Buffer film material | Buffer cavity volume (ml) | Withstand voltage ≤ | | | Temperature resistance °C |
|----------------|---|------------------------------|-----------------------|----------------|----------------------|---------------------------|---------------------|-----|------|---------------------------|
| | | | | | | | Mpa | bar | PSI | |
| D1606-10-POM | PT1/4"-19 | 12 | SUS304 | POM | Silicone | 29 | 0.3 | 3 | 43.8 | 100 |
| D1606-10-PTFE | PT1/4"-19 | 12 | SUS316 | PTFE | Silicone | 29 | 0.3 | 3 | 43.8 | 220 |
| D1606-10-SS304 | PT1/4"-19 | 12 | SUS304 | SS304 | Fluoroelastomer | 29 | 1.5 | 15 | 219 | 220 |

D1606-12 Series



| Type | Joint thread specification Pitch 1.337 | Joint outer diameter (mm) | Material of the joint | Basic material | Buffer film material | Buffer cavity volume (ml) | Withstand voltage ≤ | | | Temperature resistance °C |
|----------------|---|------------------------------|-----------------------|----------------|----------------------|---------------------------|---------------------|-----|------|---------------------------|
| | | | | | | | Mpa | bar | PSI | |
| D1606-12-POM | PT3/8"-19 | 15 | SUS304 | POM | Silicone | 59 | 0.3 | 3 | 43.8 | 100 |
| D1606-12-PTFE | PT3/8"-19 | 15 | SUS316 | PTFE | Silicone | 59 | 0.3 | 3 | 43.8 | 220 |
| D1606-12-SS304 | PT3/8"-19 | 15 | SUS304 | SS304 | Fluoroelastomer | 59 | 1.5 | 15 | 219 | 220 |

D1606-25 Series



| Type | Joint thread specification Pitch 2.309 | Joint outer diameter (mm) | Material of the joint | Basic material | Buffer film material | Buffer cavity volume (ml) | Withstand voltage ≤ | | | Temperature resistance °C |
|----------------|---|---------------------------|-----------------------|----------------|----------------------|---------------------------|---------------------|-----|------|---------------------------|
| | | | | | | | Mpa | bar | PSI | |
| D1606-25-POM | G1"-11 | 16-32 | SUS304 | POM | Silicone | 103 | 0.3 | 3 | 43.8 | 100 |
| D1606-25-PTFE | G1"-11 | 16-32 | SUS316 | PTFE | Silicone | 103 | 0.3 | 3 | 43.8 | 220 |
| D1606-25-SS304 | G1"-11 | 16-32 | SUS304 | SS304 | Fluoroelastomer | 103 | 1.5 | 15 | 219 | 220 |

6. FAQ

Q: What flow range is the damper suitable for?

A: To choose the D1606 series damper is based on the tubing ID and liquid pressure. If two parameters match, it can be used.

Q: How is the damper? Can the pulse be completely eliminated?

A: It can meet almost consumer's needs cause that the pulse suppression rate is more than 95% for D1606 series fluid pulse damper. You can connect two dampers in series for occasions with high requirements for liquid flow pattern, the pulse suppression rate is close to 100%.

Q: Will this change the pressure and flow of the liquid after adding damper?

A: The flow rate per unit time is constant, and the pressure at the output end of the damper is the average value at the input end.

Q: Is there a lower flow limit for D1606 series? Does it work when in a low flow rate?

A: There is no lower flow limit. But the output port of the damper should change the diameter, it means that the output port is smaller than input port.

Q: Does it affect the control accuracy of the pump after using damper?

A: No, it doesn't. The D1606 series damper using a Three-wing rectification technology (buffer wing + L Rectifier wing + R Rectifier wing).

Q: Why didn't it work and have pulse?

A: This is basically due to improper installation when occurred this situation. And you may take a video included a complete tubing, and send it to technical personnel of shechen precision pump. We will give you a solution in time according to the video.

Q: How to solve the problem of intermittent liquid when the pump speed is slow?

A: It may reduce the tubing diameter of damper output port to increase the liquid pressure of buffer cavity, and reach to release the intermittence. It should make the two damper be in series to solve the problems which still occurs when at a extremely low speed.

Q: To what extent can the instantaneous liquid pulse be theoretically reduced?

A: The damper released momentary pulses through an elastic buffer membrane with the buffer wing and two rectifying wings. The momentary pulse suppression rate is over 95%. If the two dampers were in series, the pulse suppression rate would be close to 100%.

Q: What are the advantages about the Three-wing rectification technology of D1606 damper?

A: Easy to clean, it is suitable to low flow, high pulse suppression rate, and it will not effect the flow when goes through particle-laden liquids.

Q: Can D1606 series damper go through liquid with particles?

A: Yes, it can. D1606 reaches to suppress pulse through Three-wing rectification technology and pass particulate

matter. The size of the particles passing through the body can be determined according to the model of the damper.

Q: How long is the life of the damper, and do you need to replace the wearing parts?

A: The using life hinges on working condition, such as: liquid pressure, temperature, PH value, pulse frequency etc. Only pulse buffer film is a vulnerable part for the D1606 series damper. The using life is over 2 years in regularly using (Normal temperature, normal pressure, neutral liquid). Easy to replace the buffer film when it was broken.

Q: Can D1606 series damper be used on pulsed gas?

A: Yes, it can. It can also inhibit the gas pulse.

Q: What method can be used to eliminate the effusion in the damper cavity after shutdown?

A: During installation, the input end is downward, the output end is upward, and the inclination angle is 45 degrees. Operate the peristaltic pump in reverse for a few seconds during shutdown. A damper or a drain valve can be arranged between the input end and the output end of the pump.

Q: Do D1606 series dampers need to be disassembled during cleaning?

A: No, it is convenient to clean the dampers, and do not to disassemble. Just start the pump and wash with clean water or hydrogen peroxide.

7. Material Properties

| Material Physical property level | POM | PC | PPS | PSU | PTFE | Silicone buffer film | Fluorine rubber buffer film |
|-------------------------------------|-------------------------------------|--|--------|---|-----------------|---|-----------------------------|
| | Ozone resistance | △ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| Weather resistance | × | △ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| Heat resistance | 100°C | 120°C | 220°C | 175°C | 280°C | 220°C | 320°C |
| chemical resistance | △ | ○ | ⊙ | ⊙ | ⊙ | ⊙○ | ⊙ |
| Oil resistant | ○ | ○ | △ | ⊙ | ⊙ | △○ | ⊙ |
| Water tightness | ○ | ○ | ⊙ | ⊙ | ⊙ | ○ | ⊙ |
| Cold resistance | -40°C | -60°C | -100°C | -100°C | -100°C | -70°C | -20°C |
| Wear resistance | ○ | △ | ⊙ | ○ | ⊙ | × | ⊙ |
| Deformation resistance | ○ | ○ | ⊙ | ⊙ | × | ⊙ | ⊙ |
| Acid resistance | ○ | ○ | ⊙ | ⊙ | ⊙ | △ | ⊙ |
| Alkali resistance | △ | △ | ⊙ | ⊙ | ⊙ | △ | ⊙ |
| Tensile strength | ○ | ○ | ○ | ○ | △× | × | ⊙○ |
| Water vapor resistance | △ | △ | ⊙ | ⊙ | ○ | △○ | ⊙ |
| Fire resistance | | ○ | ⊙ | ⊙ | ⊙ | △× | ⊙ |
| Compliance | RoHS compliance | Biocompatibility meets ISO 10993-1 testing requirements; RoHS compliance | RoHS | Agency rating: FDA 21CFR177.1655 ; RoHS compliance; Food contact compliance | RoHS compliance | Agency rating: FDA 21CFR177.1655; Food contact compliance | RoHS compliance |
| Icon Description | ⊙ Excellent ○ Good △ Ordinary × Bad | | | | | | |