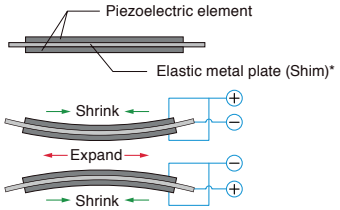
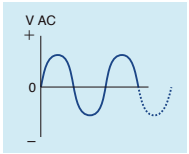
Principle

<Bimorph vibrator> The BIMOR pump's driving force, the bimorph, comprises two parallel piezoelectric wafers.





- The Bimorph deforms like a bowl when applied with AC voltage, positive and reverse deformation is achieved by alternating frequency from + to –.
- Discharge volume can be adjusted by controlling the number of amplitude of power supply.
  (50 Hz = 50 times / sec. 60 Hz = 60 times / sec.)

*Elastic metal plate (Shim): Where ceramic is affixed.

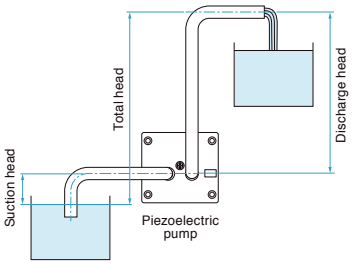
Frequently Asked Questions

Durability of Piezoelectric pump
The durability of the pump is affected by the compatibility between the wetted material and the liquid. Please check to confirm the suitability against the specfic application/conditions.

Viscosity of liquid
At internal lab test, the flow rate is halved at a viscosity of 30 mPa·s. The viscosity of fluids such as lubricating oil can change considerably with temperature.

Self-priming power :
The power the pump requires to draw water.
1 kPa = the power to draw up 25°C water 10 cm.

Dischage pressure :
The force to pressurize the liquid.
30 kPa = the power to pressurize 25°C water 3 m.



The discharge pressure of the bimorph pump is the measurement value when the suction head is zero, so the discharge pressure = the total head.

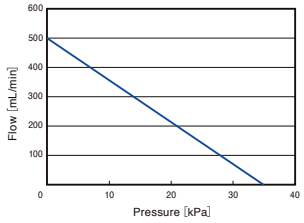
Flow adjustment methods

The flow rate of the piezoelectric pump can be adjusted by the following three methods.

1. Narrowing the discharge port or piping

By narrowing the discharge port, the discharge pressure rises and the flow rate linearly decreases. Even if the discharge port is in a closed condition, the oscillator amplitude will only decrease and not burn out like a motor driven pump.

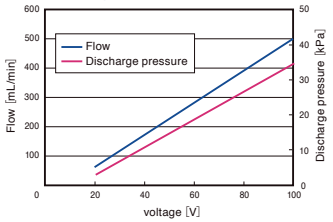
Pressure - Flow characteristics



2. Lowering the drive voltage

The flow rate and discharge pressure linearly decrease with the voltage drop. Please do not exceed the rated voltage since the thickness of the piezoelectric element is designed close to the withstand voltage.

Voltage - Flow characteristics

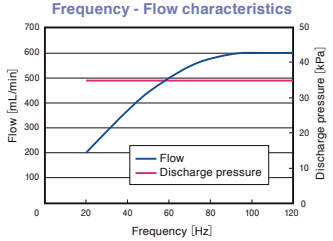


*The flow characteristics of 120 V and 240 V models are equivalent.

3. Varying the drive frequency

The flow rate varies with the frequency, but the discharge pressure is constant. It is effective for changing the flow rate without being affected by discharge pressure. The maximum flow rate varies depending on model, but it occurs at about 100 to 120 Hz.

Frequency - Flow characteristics



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ISO9001 JQA-2025
ISO14001 JQA-EM4057
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NITTO KOHKI

BIMOR PUMP Series

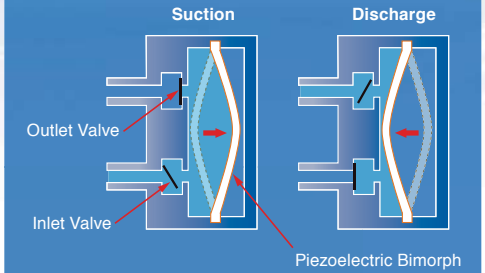
Utilizing a Piezo-Electric Bimorph to reach New Standards in Pumping Technology

BIMOR PUMP

BPS/BPH/BPHS/BPF type

Principle/Structure

Driving power: Piezoelectric Bimorph Bending



Applications

Liquids

- For water supply and drainage
- For cooling water circulation
- For chemical injection
- For liquid sampling

— Piezoelectric Pump series —

BIMOR PUMP

— Piezoelectric Pump series —

Specifications

240V models are newly redesined.
The flow rate is increased by about 160 %.

Voltage(AC) —120 V 60 Hz					Voltage(AC) —240 V 60 Hz					Material of Wetted Parts			Weight (g)
Model	Current (mA)	Self-priming Pressure (kPa)	Flow Rate (mL/min)	Discharge Pressure (kPa)	Model	Current (mA)	Self-priming Pressure (kPa)	Flow Rate (mL/min)	Discharge Pressure (kPa)	Housing	Liquid Contact Sheet	Valve / O-ring	
BPS-215i	3	3	30	15	—	—	—	—	—	PP	PP	IIR	40
BPH-214E	15	8	350	18	BPH-214E	7.5	8	350	18	PP	PP	EPDM	140
BPH-214G	15	7	350	17	BPH-214G	7.5	7	350	17	PP	PTFE	FKM	140
BPH-414E	30	12	500	35	—	—	—	—	—	PP	PP	EPDM	140
—	—	—	—	—	BPH-474G	15	10	400	35	PPS	PTFE	FKM	170
—	—	—	—	—	BPH-474P	15	10	400	35	PPS	PTFE	FFKM/FEP	170

Made to order models

These models are made-to-order models.
Please send a request for quotation to your nearest distributor.

Specifications

Voltage(AC) —120 V 60 Hz					Voltage(AC) — 240 V 60Hz					Material of Wetted Parts			Weight (g)
Model	Current (mA)	Self-priming Pressure (kPa)	Flow Rate (mL/min)	Discharge Pressure (kPa)	Model	Current (mA)	Self-priming Pressure (kPa)	Flow Rate (mL/min)	Discharge Pressure (kPa)	Housing	Liquid Contact Sheet	Valve / O-ring	
—	—	—	—	—	BPS-215i	1.8	3	30	15	PP	PP	IIR	40
—	—	—	—	—	BPS-235G	1.8	1.5	30	15	POM	PTFE	FKM	40
BPH-214i	15	8	350	18	BPH-214i	7.5	8	350	18	PP	PP	IIR	130
—	—	—	—	—	BPH-214D	7.5	8	350	18	PP	PP	VMQ	130
—	—	—	—	—	BPH-414i	15	12	500	35	PP	PP	IIR	140
BPH-414D	30	12	500	35	BPH-414D	15	12	500	35	PP	PP	VMQ	140
—	—	—	—	—	BPH-414E	15	12	500	35	PP	PP	EPDM	140
BPH-414G	30	10	450	32	BPH-414G	15	10	450	32	PP	PTFE	FKM	140
BPH-474G	30	10	400	35	—	—	—	—	—	PPS	PTFE	FKM	170
BPH-474P	30	10	400	35	—	—	—	—	—	PPS	PTFE	FFKM/FEP	170
—	—	—	—	—	BPHS-414i	15	12	700	35	PP	PP	IIR	160
—	—	—	—	—	BPHS-414E	15	12	700	35	PP	PP	EPDM	160
—	—	—	—	—	BPHS-414G	15	12	700	35	PP	PTFE	FKM	160
—	—	—	—	—	BPHS-474G	15	10	500	35	PPS	PTFE	FKM	180
—	—	—	—	—	BPHS-474P	15	10	500	35	PPS	PTFE	FFKM/FEP	180
BPF-465P	30	10	400	35	BPF-465P	15	10	400	35	PFA	PTFE	FFKM/FEP	350

Material Description

EPDM ····· Ethylene Propylene Rubber
FEP ····· Fluoroethylene Propylene
FFKM ····· Perfluoroelastomer
FKM ····· Fluorine Rubber
IIR ····· Butyl Rubber
PFA ····· Fluororesin (Perfluoroalkoxy)
POM ····· Polyacetal
PP ····· Polypropylene
PPS ····· Polyphenylene Sulfide
PTFE ····· Tetrafluororesin (Polytetrafluoroethylene)
VMQ ····· Dimethyl Silicon Rubber

Condition of Use

Ambient temperature	5 to 50°C *1
Ambient humidity	35 to 85% *2
Fluid temperature	5 to 50°C

*1) No Freezing
*2) No condensation

The meaning of each letter in the model name

BP H - 4 1 4 D

Pump type
S : Small type
H : Dismantlable type
F : Chemical-resistant type
HS : High flow type

Diaphragm type
2: Single
4: Double

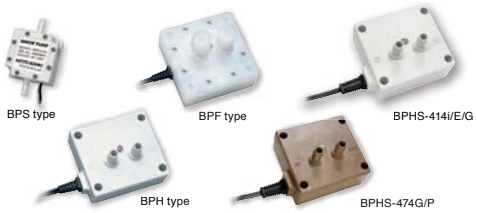
Housing material
1: Polypropylene (PP)
2: Polyacetal (POM)
6: Fluororesin (Perfluoroalkoxy) (PFA)
7: Polyphenylene Sulfide (PPS)

Pump type
4: Dismantlable type
5: Chemical-resistant type and small type

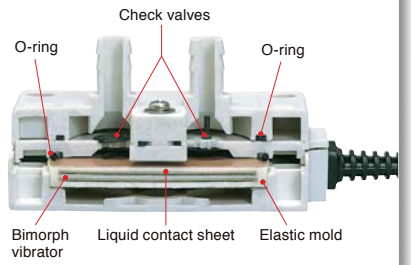
Rubber material (Valve, O-ring)
i : Butyl Rubber (IIR)
D : Dimethyl Silicon Rubber (VMQ)
E : Ethylene Propylene Rubber (EPDM)
G : Fluorine Rubber (FKM)
P : Perfluoroelastomer (FFKM)

Revolutionary piezoelectric bimorph technology

The BIMOR pump's driving force, the bimorph, comprises two parallel piezoelectric wafers. Their nature is to expand or contract depending on the direction of the voltage. Therefore when an alternating current is applied, one wafer expands then contracts while the other contracts then expands, causing the bimorph to bend. Repeating the cycle creates the pumping action.



[Cross section]

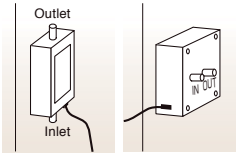


How to install

Please install the pump to a flat side.

BPS type
When installing, make sure the outlet is at the top and the inlet is at the bottom.

BPH,BPHS,BPF type
Install the pump so that the IN / OUT display is in the correct orientation.

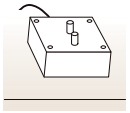


BPS type | BPH, BPHS, BPF type

Attention

Depending on the direction of installation, sufficient performance may not be obtained.

e.g. :
If installed on the bottom of a device, the performance may deteriorate.



Suitable/unsuitable chemical liquids

Model	○ Examples of suitable chemical liquids	✕ Examples of unsuitable chemical liquids
BPS-215i BPH-214i BPH-414i BPHS-414i	Ethanol,Dilute hydrochloric acid, Sodium carbonate,Benzaldehyde,Formalin	Xylene, Mineral oil, Carbon tetrachloride, Trichloroethylene, Toluene, Benzene
BPH-214E BPH-414E BPHS-414E	Ammonia water, Ethanol, Dilute hydrochloric acid, Caustic potash, Caustic soda, Methanol	
BPS-235G	Ethanol, Xylene, Silicone oil, Kerosene, Toluene, Benzene	Ammonia water, Hydrochloric acid, Hydrogen peroxide, Sodium hypochlorite, Nitric acid, Sulfuric acid
BPH-214D BPH-414D	Ammonia water, Ethanol, Sodium hypochlorite, Methanol	Caustic soda, Carbon tetrachloride, Silicone oil, Trichloroethylene, Toluene, Benzene
BPH-214G BPH-414G BPHS-414G	Ethanol, Hydrogen peroxide, Mineral oil, Sodium hypochlorite	Acetone, Ammonia water, Glacial acetic acid, Hydrofluoric acid, Formalin
BPH-474G BPHS-474G	Ethanol, Xylene, Carbon tetrachloride, Silicone oil, Trichloroethylene	Acetone, Ammonia water, Chlorosulfonic acid, Glacial acetic acid, Hydrofluoric acid, Formalin
BPH-474P BPHS-474P	Ethanol, Chloroform, Glacial acetic acid, Benzene, Methyl ethyl ketone	Chlorosulfonic acid, Fluorine oil, CFC 112, CFC 113
BPF-465P	Ethanol, Aqua regia, Ozone, Carbon tetrachloride, Concentrated nitric acid, Concentrated sulfuric acid, Fuming sulfuric acid	Fluorine oil, CFC 112, CFC 113