KOGANEI

ISO9001 ISO14001

TÜV CERT
DIN EN ISO 9001
JIS Z 9901
Certificate: 09 100 5919

TÜV Rheinland / Berlin Brandenburg
TÜV
Anlagentechnik GmbH
ISO 14001, JIS Q 14001
Certificate-No.: 09 104 8118

Electric CT Pump

PAT. PEND.

NEW
Products

World's First!
High-precision of dispensing
control unit by using
CT pump construction

New generation pumps for photo resist solution giving

Electric CT Pump

World's first !

CT pump construction

Patent pending

[CT pump]

The CT pump, a precision dispensing unit for photo resist solution, is completely new in construction and replaces current diaphragm or bellows construction units.

consistent finer patterns on semiconductor wafers!

Low Residue

By using a surface finish of Rt: 0.3μm or less, the new PFA tubes used in the pump chamber result in less build up of solids due to “smaller wet surfaces”, about 1/5 of current bellows type pumps.

Good replacing solution characteristic

The pump chamber is a thin tube shape. Its ideal shape, with almost no solution residue, enables dispensing of fresh resist solution.

Good removal of foams

The resist solution’s flow path travels from downward to upwards. Consequently even if foam enters into the solution, it will be conveyed to the discharging port and it will not affect the pump’s performance enabling it to dispense with high precision. Upon start-up of equipment and pouring solution, it is easy to remove air foams from the solution and it is ideal for solutions apt to generate foams.

Prevents air penetration

There are just two seals, the fewest ever (Koganei’s electric Bellows pump has five), in the pump chamber to keep out external air. This new structure with fewer seals eliminates concerns over foam generation caused by air penetration.

Comes with check valves with new configuration

Achieved through a combination of single channels, almost no solution residue and allows smooth flow. Comes with check valves with a new configuration.

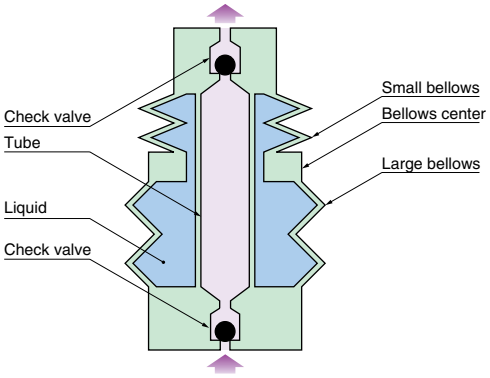
Compact and high precision operation

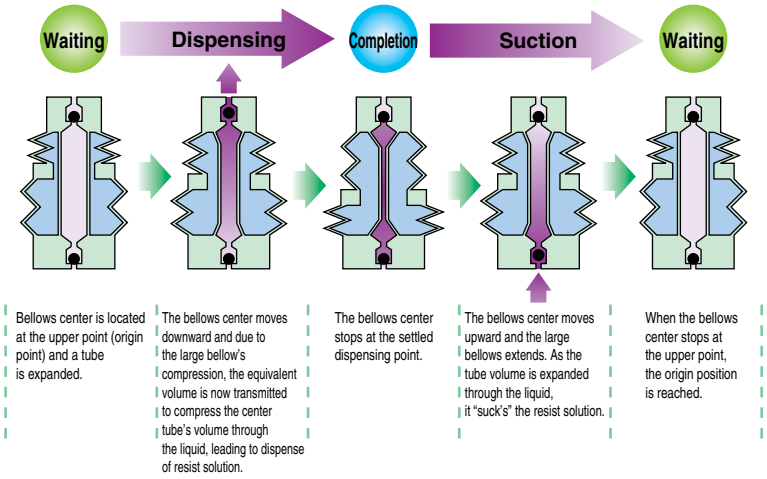
The ingenious CT pump construction offers a compact appearance ideally suited for use in side by side installations. A five phase stepping motor and a precision feed screw are used for drive achieving high resolution and repeatability, and an encoder will detect any potential faults, e.g. accidental “out of position”.

Highly reliable simple construction

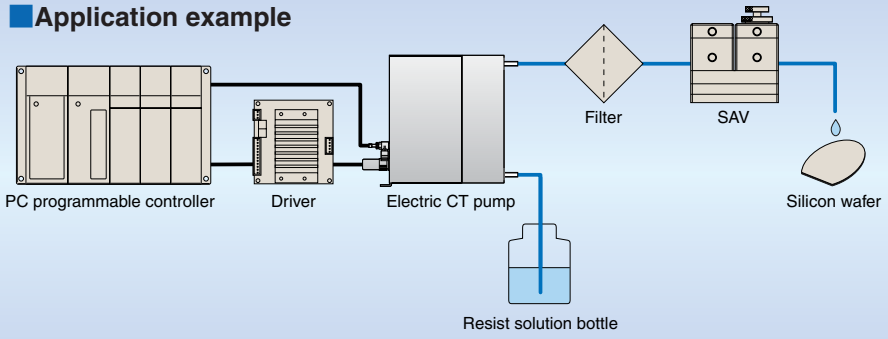
Simple construction containing liquid between coaxial bellows and tube welded joint section maintains high precision due to preventing loss of leaking liquid or air penetration. This arrangement is more reliable than current pumps using many seals.

Note: A sensor is built-in for detecting abnormal motor temperature rise and a port for purging Nitrogen gas is available.
This pump is not an explosion prevention type. Consequently, explosion preventive measures will be required for customer site equipment where called for.





Application example



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Safety Precautions (Electric CT pump)

Always read these precautions carefully before use.

Before selecting and using products, please read all the Safety Precautions carefully to ensure proper product use.
The Safety Precautions shown below are to help you use the product safely and correctly, and to prevent injury or damage to assets beforehand.

The directions are ranked according to degree of potential danger or damage: "DANGER!" "WARNING!" "CAUTION!" and "ATTENTION!"

⚠ **DANGER**	Expresses situations that can be clearly predicted as dangerous. If the noted danger is not avoided, it could result in death or serious injury. It could also result in damage or destruction of assets.
⚠ **WARNING**	Expresses situations that, while not immediately dangerous, could become dangerous. If the noted danger is not avoided, it could result in death or serious injury. It could also result in damage or destruction of assets.
⚠ **CAUTION**	Expresses situations that, while not immediately dangerous, could become dangerous. If the noted danger is not avoided, it could result in light or semi-serious injury. It could also result in damage or destruction of assets.
⚠ **ATTENTION**	While there is little chance of injury, this content refers to points that should be observed for appropriate use of the product.

■This product was designed and manufactured as parts for use in General Industrial Machinery.

■Before selecting the equipment and using any product, always read the Safety Precautions, the Catalog, the Instruction Manual, etc.

■For use, the customer is responsible for any verifications and judgments regarding the compatibility of this product with customer's systems.

■After reading the Instruction Manual, etc., always place the Manual where it can be easily available for reference to users of this product.

■The danger, warning, and caution items listed under these "Safety Precautions" do not cover all possible cases. Read the catalog and user's manual carefully, and always keep safety first.

⚠ DANGER

●Do not use for the purposes listed below:

1. Medical equipment related to maintenance or management of human lives or bodies.
2. Mechanical devices or equipment designed for the purpose of moving or transporting people.
3. Critical safety components in mechanical devices.

This product was not planned or designed for uses that require advanced levels of safety. Use in situations where equipment failure would immediately lead to dangerous conditions could result in human injury.

●This pump is not explosion prevention type. Do not use in dangerous locations where the probability of an explosion is high, due to the high densities of explosive gases, steam, or dust. There is a possibility of causing flashes or explosions in such situations.

●Since this pump was designed for photo resist solution, do not use with any flammable fluid other than photo resist solution. And since photo resist solution normally contains various flammable solvents, always observe the following precautions in use. Failure to observe the precautions could lead to the build-up of dangerous, explosive atmospheres inside and around the pump, when a failure in the pump's electrical circuits etc., could generate a spark that could ignite the photo resist solution and lead to fire or an explosion and cause injury to human life.

1. Since this pump is not explosion prevention type, provide ventilation, etc., around the pump, and under all circumstances not let the pump be exposed to a dangerous atmosphere.
2. Constantly supply N_2 (nitrogen gas) to the pump's purge gas supply port, and keep the pump interior under positive pressure to ensure that a dangerous atmosphere does not enter into the pump interior.
3. When the system (the customer's machinery using this product) is shut down, there is a possibility of a dangerous atmosphere around and inside the pump. Therefore, whenever starting up the system always supply ventilation air around the pump, purge the pump interior with N_2 gas, and confirm that no dangerous atmosphere exists around or inside the pump before starting the motor and sending various operation signals.
4. When removing the piping, or when using solvent to clean the pump fluid contact areas, or when conducting any other system maintenance that could result in a dangerous atmosphere around or inside the pump, always shut off power and stop various operations signals. When restarting operation, provide ventilation air around the pump, purge the pump interior with N_2 gas, and then confirm that no dangerous atmosphere exists around or inside the pump before starting the motor and sending the various operation signals.
5. Use abnormal temperature output as a part of the interlock circuit, and firmly shut down the power and stop the various operations signals whenever an abnormal temperature occurs.
6. Never attempt to connect or disconnect the connector when the power is supplied or the various operations signals are transmitted.
7. Keep the pump control equipment and motor driver separated from the pump, tank, or other places where liquid exists, placing them in a location where is safe from explosions.
8. Whenever you discover a solution leak, operation failure, abnormal temperature rise, or other abnormality, immediately shut off power and stop various operations signals.
9. Always monitor liquid leaks anywhere along the customer's system (using gas or liquid leak sensors, etc.), and take other appropriate safety measures.

●Do not touch the product while it is in operation, or otherwise approach too closely. Also, do not attempt to adjust any mechanisms of the product (opening or closing the chamber, removing or attaching pipes and tubes, removing or connecting connectors, adjusting the throttle valve, etc.) while it is in operation.

●Do not splash resist solution, other chemical solutions, or water on the product. Splashing resist solution, other chemical solutions, or water on the product, cleaning it, or using it underwater, could lead to abnormal operation that could result in injury, electrical shock, or fire.

● Always perform Type 3 ground contact work (ground resistance of 100Ω or less). There is a possibility of fire or explosion caused by static electricity. Also, power leaks could lead to electrical shocks or erratic operation.

●When installing the product, always ensure that it is securely fixed in place. Falling or dropping the product or improper operation could result in injury.

● Never attempt to rebuild the product. It could result in abnormal operation leading to injury, electric shock, fire, etc.

⚠ WARNING

- When approaching the pump for maintenance, etc., be sure that the area around the pump is well-ventilated. Since the use of nitrogen gas for purging causes the risk of oxygen deficiency, always check the ambient oxygen levels, and exercise care in approaching the equipment.
- When performing maintenance and inspection, adjustment, replacement, or various other similar operations for the product, always be sure to completely shut off power and stop the various operations signals.
- Do not scratch the piping tubes. Scratching or bending the tubes could damage them, resulting in solution leaks, fires, electrical shocks, and abnormal operation.
- Do not touch the terminal and the miscellaneous switches, etc., while the device is plugged in. There is a possibility of electric shock and abnormal operation.
- Avoid scratching the cable, sheath etc.
  Letting the cables be subject to scratching, excessive bending, pulling, rolling up, or being placed under heavy objects or squeezed between two objects, may result in current leaks or defective transmission that lead to fires, electric shocks, or abnormal operation.
- Do not allow the product to be thrown into fire. The product could explode and release toxic gases.
- Do not sit on the product, place your foot on it, or place other objects on it. Accidents such as falling and tripping over could result in injury. Dropping the product may damage or break the product resulting in abnormal, improper or erratic operation.

⚠ CAUTION

- When transporting or installing the product, use a lift or support to firmly hold it up, or use a large number of people, and take full precautions to ensure personal safety.
- Take adequate shielding measures when using the product in the places listed below. Failure to take such measures could result in erroneous operation.
  1. Locations subject to large electrical currents or magnetic fields
  2. Locations subject to static electricity and other electrical noise
  3. Locations that may be subject to radiation
- Do not use in locations under direct sunlight (ultraviolet), in locations subject to dust, salt, or iron powder, or in the media and/or the ambient atmospheres that include organic solvents, phosphoric ester-based hydraulic fluids, sulfur dioxide gas, chlorine gas and acids. These conditions could lead to functional shutdowns, sudden degraded performance, or shortened operating life in a brief period of time. For the materials used, see the Major Parts and Materials.
- When mounting the product, leave room for adequate working space around it. Failure to assure adequate working space will make it more difficult to conduct daily inspections or maintenance, which could eventually lead to system shutdown or damage to the product.
- When transporting or installing heavy products, use a lift or support to firmly hold it up, or use a large number of people, and take full precautions to ensure personal safety.

⚠ ATTENTION

- When using in conditions or environments not covered in the Catalog or the User's Manual, or planning to use in situations that require particular safety, such as aircraft facilities, fuel facilities, amusement machines, safety equipment, or other areas where it can be expected to have a large effect on human life or property, use well within the ratings and performance specifications, and take adequate failsafe measures. In these situations, always contact Koganei for consultations.
- Always check the Catalog for product piping and wiring.
- When handling the product, use protective gloves, safety glasses, and safety boots, etc., where necessary to ensure safety.
- When the product can no longer be used, or is no longer necessary, dispose of it appropriately as industrial waste. Note that the interior parts of the Electric CT Pump use fluororesin material. Never incinerate the product for disposal, because fluororesin can release toxic gases when incinerated.
- This pump can exhibit degraded performance and function over its operating life. Always conduct daily inspections of the pump, and confirm that all requisite system functions are satisfied, to prevent accidents from failure.
- For inquiries about the product, contact your nearest Koganei sales office or Koganei overseas division. The address and telephone number is shown on the back cover of this catalog.

⚠ OTHER

- Always observe the following items.
  KOGANEI cannot be responsible if these items are not properly observed.
  1. When using this product in pneumatic systems, always use genuine KOGANEI parts or compatible parts (recommended parts).
     When conducting maintenance and repairs, always use genuine KOGANEI parts or compatible parts (recommended parts). Always observe the required means and methods.
  2. Do not attempt inappropriate disassembly or assembly of the product relating to basic configurations, or its performance or functions.

Handling Instructions and Precautions

Handling instructions

- Please read the following before using, or selecting, Koganei's electric CT pump.
  1. With regard to the chemical circuit, when positioning the nozzle (dispensing end), place the nozzle in a position that is higher than the fluid level in the tank (resist bottle).
  2. This pump requires a valve on the secondary side (dispensing side), and when necessary on the primary side (inlet side). As leakage of the built-in check valve is not 100% preventable, fluid backwash may occur when it is used as a pump unit.
  3. Check valve leakage strongly affects the stability of the rate. Even if there is a minute impurity in the check valve, the dispensing flow volume will vary greatly upon occlusion. Therefore, be sure to use no particle fluid.
  4. When the solution is suck in the pump, prime the pump by means such as bottle pressurization.

Specifications

General specifications

Media Note1,Note2	Photo-resist solution, pure water, chemical solution (flammable substances not allowed)
Media temperature range	5 ～ 40℃
Ambient temperature range	18 ～ 30℃
Ambient humidity	20 ～ 85 % RH (no condensation permitted)
Mounting direction	Horizontal mounting

Pump specifications

Item \ Type		F-EPT06A1	F-EPT10A1
Dispensing volume Note3		0.5 ～ 6mℓ	0.5 ～ 10mℓ
Maximum dispensing pressure Note4		0.15MPa {1.5kgf/cm²}	
Dispensing flow rate Note3		0.1 ～ 4mℓ/s	
Suction flow rate Note3		0.1 ～ 4mℓ/s	
Maximum viscosity of media		200cp Note1	
Repeatability of dispensing volume Note5		±0.1%F.S.	
Proof pressure		0.2MPa {2.0kgf/cm²}	
Input pulse vs. dispensing volume Note6		1,400 pulse (full step)/1mℓ	
Input pulse vs. Encoder output pulse		Full step operation: 1:1, Half step operation: 2:1	
Motor	Motor type	5-phase stepping motor	
	Drive current range	450 ～ 500mA/phase (chopper constant current control DC24V)	
Mass		3.1kg	3.6kg

Notes 1. Do not use for fluids that degrade, permeate or infiltrate Fluororesin.
2. Do not use for fluids that dissolve or degrade the part “Ball”.
3. Dispensing volume flow rates, and suction flow rates provided are those obtained within operating ranges possible under Koganei’s test conditions. These are restricted by normal operating ranges that take account of fluid viscosity and chemical circuit conditions including the pump. In cases where these are inappropriate, the pump may be damaged. For details, consult us.
4. Maximum pressure is the maximum pressure allowed by the pump. It is necessary to examine filter selection (pressure loss), piping resistance, and operating conditions, etc., to ensure that pressure within the pump and pressure on the secondary side do not exceed this value. Also, we recommend that a check is made to confirm the connection of a pressure meter on the pump OUT port (as near to the pump as possible).
5. Repeatability of dispensing volume are those obtained under Koganei’s test conditions. They do not represent dispensing accuracy for a system that combines other equipment (filters, valves, etc.) than the pump.
6. The input pulse us dispensing volume is the design value. That is a difference of ±4% from the actual valve.

Order code

Maximum dispensing volume 6mℓ

F - EPT06A1 - T1/4 - □

- **F** — SC equipment
- **EPT06A1** — Basic type
- **T1/4** — Piping port: **T1/4** : with φ6.35× φ4.35 tube
- **□** — **Blank** : Pump unit only; **D** : With driver

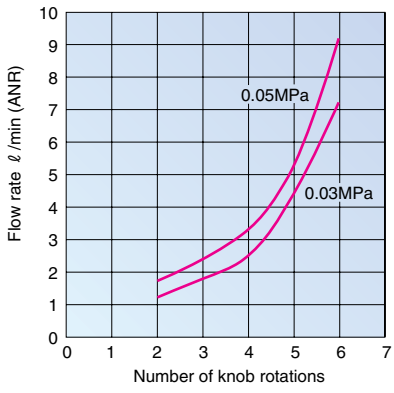
Maximum dispensing volume 10mℓ

F - EPT10A1 - T1/4 - □

- **F** — SC equipment
- **EPT10A1** — Basic type
- **T1/4** — Piping port: **T1/4** : with φ6.35× φ4.35 tube
- **□** — **Blank** : Pump unit only; **D** : With driver

For customer’s installation of the electric CT pump, please consult first with Koganei about specifications. Contact at the nearest Koganei sales office.

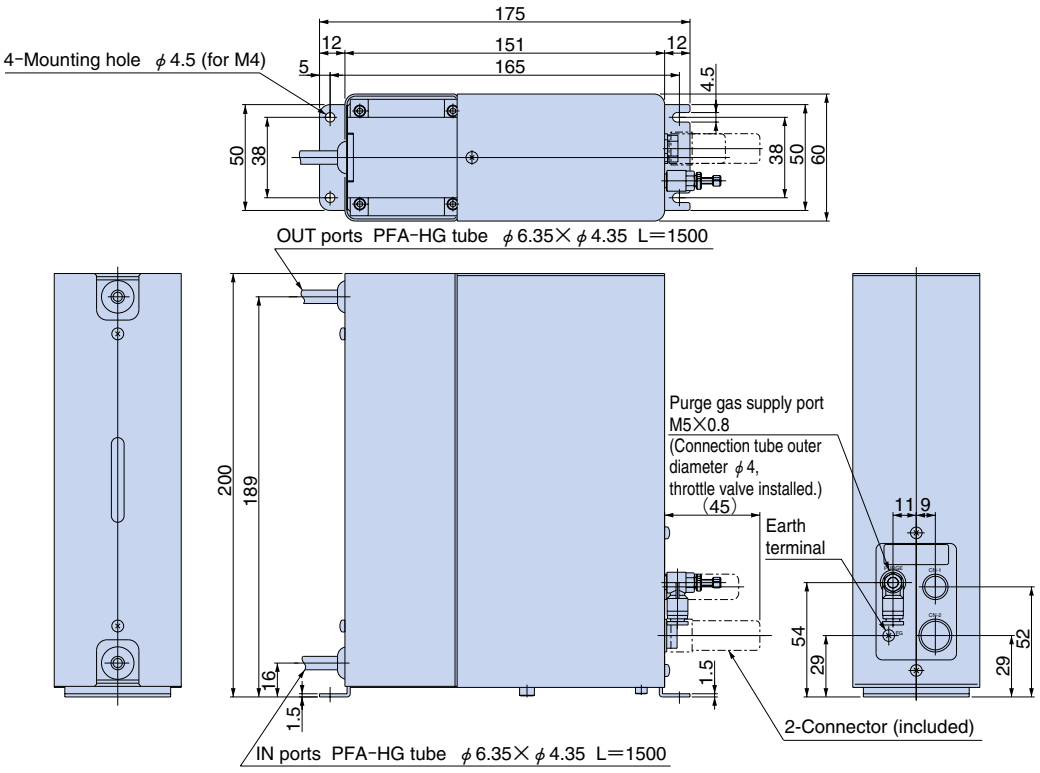
Throttle valve flow rate characteristics (for purge gas)



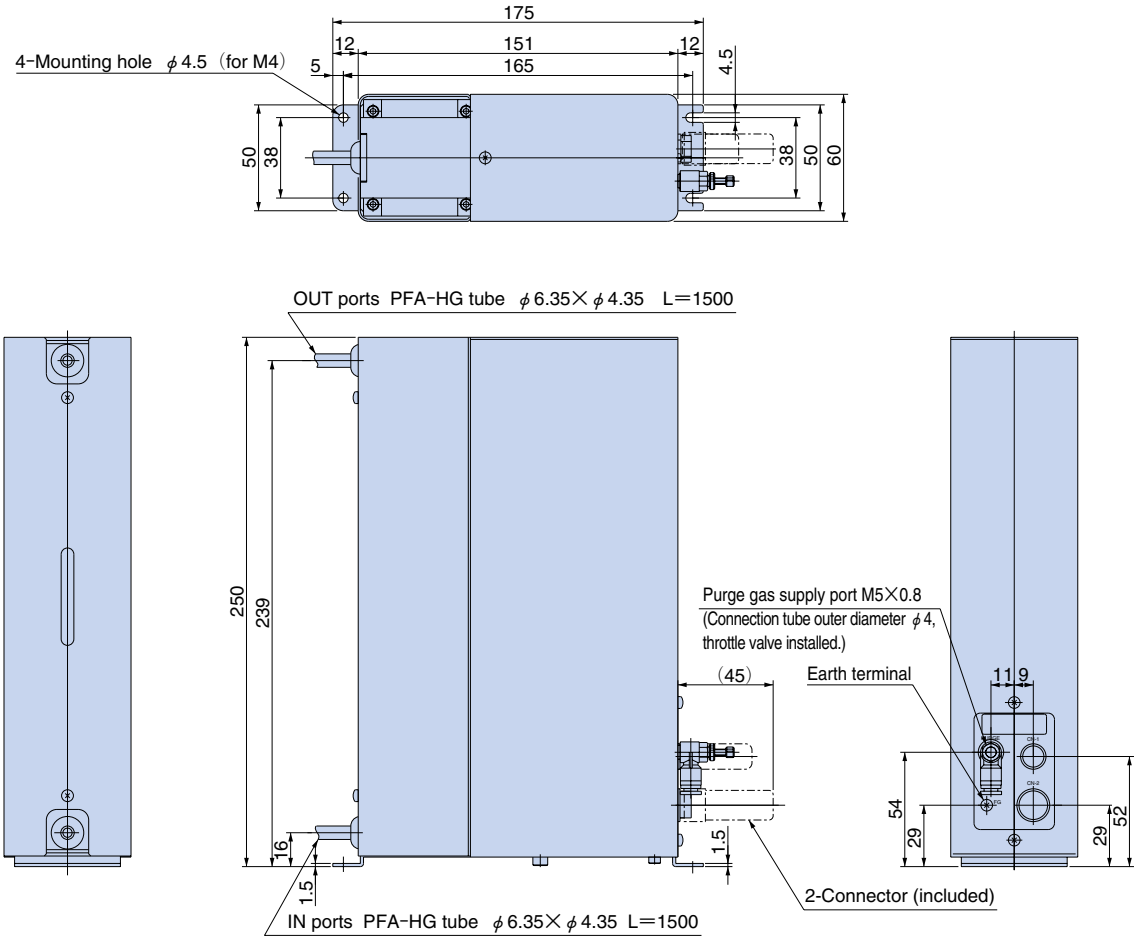
Note: Number of rotations from the knob’s totally closed position

Dimension diagrams (Unit mm)

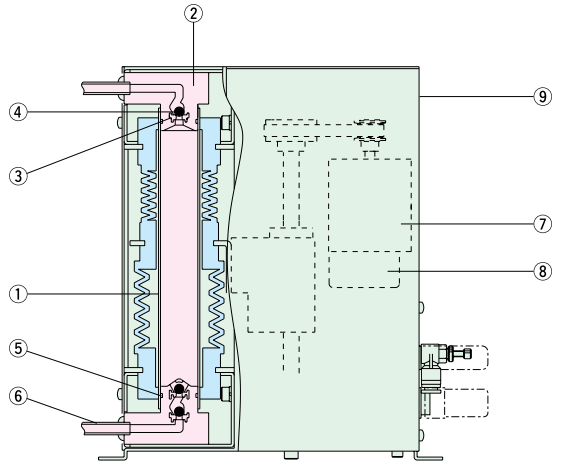
F-EPT06A1-T1/4



F-EPT10A1-T1/4



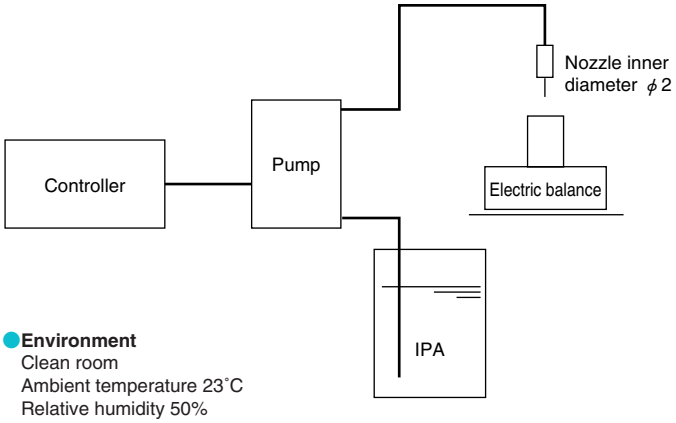
Inner Construction



Major Parts and Materials

No.	Parts	Materials
①	Tube	NEW PFA
②	Fitting block etc.	PTFE
③	Seat	CTFE
④	Ball	Si_3N_4
⑤	O ring	IIR
⑥	Tube	NEW PFA
⑦	Stepping motor	—
⑧	Encoder	—
⑨	Enclosure	SUS

Koganei's Test Conditions



- **Environment**
  Clean room
  Ambient temperature 23˚C
  Relative humidity 50%
- **Fluids used**
  IPA (Less than 100 particles/mℓ in isopropyl alcohol of 0.1 μm or more)
- **Operating conditions** (when measuring repeating accuracy of dispensing volume)
  Dispensing volume: maximum dispensing volume
  Dispensing flow rate: 1mℓ/s
  Suction flow rate: 1mℓ/s
  Dispensing intervals: regular

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