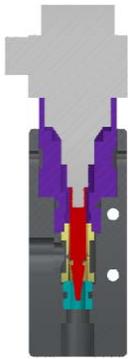


# FC 流量比例阀组

## Proportional Flow Control Valve



### 应用产业 Industrial application

- 气体混合 Gas Mixing
- 分析仪器 Analytical Instrument
- 半导体设备 Semiconductor equipment
- 高精度、高分辨率流量控制 High Accuracy and High Resolution Flow Control
- 吹瓶机器 Blow Molding
- 本体有不锈钢、铝合金及 Peek 可选择 Stainless steel, aluminum and Peek body material.
- 密封件有 FFKM 及 FKM 可选择 FFKM or FKM seals

流量比例阀组是由 PM 驱动控制器+FC 流量比例阀所组成的，透过输入信号 0-10 V、4-20 mA、RS485 Modbus 三种信号中，选一种输入至 PM 驱动器进而控制，FC 流量阀中的马达来移动轴芯，达到阀体开度由小至大的变化，不管是气体或液体的控制中，流量都可以呈线性度且精准与微小的控制流量，有助于对客人的机台设备提升。流量比例阀的开发，是针对随时需要精准调控液体或气体流量变化的产业。 Proportional Flow Control Valve consists of PM series driver and FC series proportional flow valve. With an input signal either through analogue or digital, the needle inside the proportional valve moves proportionally to the signal. This series is able to control the flow rate of air and liquid with high resolution, high accuracy, and high repeatability. It is developed for industries that require a high degree of adjustment in flow rate.

### 产品规格 Specifications

型号 Model	FC-10	FC-20	FC-120	FC-300
阀门类型 Valve Type	两口两位比例式针阀 2-Way Proportional Needle valves			
口径 Port Size	G 1/8"			
流体 Medium	真空、惰性气体、油、水...等液体 Vacuum, Compatible gases, oil, water and liquids			
压力范围 Pressure Range	-1~7bar			
流量范围(空气) Flow Range of air	0~35L/min @6bar	0~65L/min @6bar	0~230L/min @6bar	0~400L/min @6bar
流量范围(水) Flow Range of water	0~1L/min @6bar	0~1L/min @6bar	0~4L/min @6bar	0~8L/min @6bar
重复精度 Repeatability	±0.1% F.S.			
流量分辨率(空气) Flow Resolution of air	0.1 L/min@3bar	0.1L/min@3bar	0.1L~0.2 L/min@3bar	0.3 L/min@3bar
流量分辨率(水) Flow Resolution of water	0.003L/min@3bar	0.003L/min@3bar	0.003~0.005L/min@3bar	0.008L/min@3bar
温度范围 Temperature Range	-20 ~84° C			
开关时间(全开到全关) Full stroke time	1.5 sec	1.5 sec	2 sec	2 sec
本体材质 Body material	不锈钢 Stainless steel	铝合金、不锈钢或 Peek Aluminum, Stainless steel or Peek	铝合金 Aluminum	铝合金、不锈钢或 Peek Aluminum, Stainless steel or Peek
密封件 Seals	本体-铝合金:全 VITON 或 VITON+EPDM Body- Aluminum : All VITON or VITON+EPDM 本体-不锈钢或 Peek : 全 FFKM 或 FFKM+EPDM Body- Stainless steel : All FFKM or FFKM+EPDM ----- **若用于真空或水，建议搭配 EPDM.			
防护等级 Ingress Protection	IP 52			

# FC 流量比例阀组

## Proportional Flow Control Valve

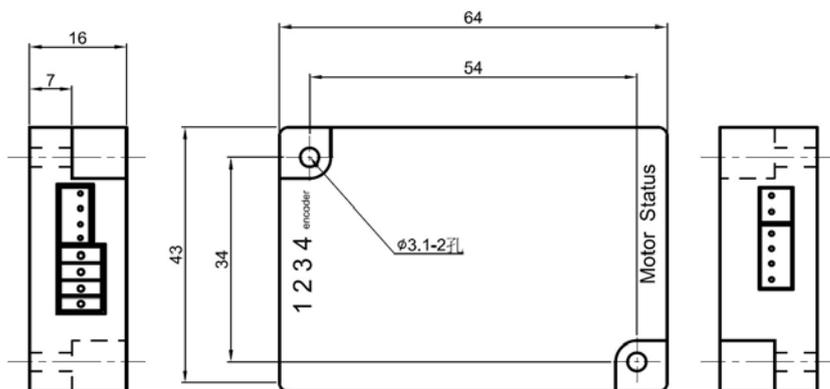


### 产品规格 Specifications

型号 Model	FC-1000	FC-1500	FC-2000	FC-3000
阀门类型 Valve Type	两口两位比例式针阀 2-Way Proportional Needle valves			
口径 Port Size	G3/8"		PT 1/2"	
流体 Medium	真空、惰性气体、油、水...等液体 Vacuum, Compatible gases, oil, water and liquids.			
压力范围 Pressure Range	-1~6bar	-1~3 bar	-1~15 bar	-1~20bar
流量范围(空气) Flow Range of air	0~1200L/min@5bar	0~1200L/min@3 bar	0~2600L/min@7 bar	0~5000L/min@10bar
流量范围(水) Flow Range of water	0~28L/min@5bar	0~35L/min@3 bar	0~50L/min@7bar	0~94L/min@10bar
重复精度 Repeatability	±0.1% F.S.			
流量分辨率(空气) Flow Resolution of air	0.3~0.5 L/min @3bar	1~2 L/min @3bar	1~2 L/min @3bar	1~2 L/min @3bar
流量分辨率(水) L/min Flow Resolution of water	0.008~0.014 L/min @3bar	0.027~0.055 L/min @3bar	0.027~0.055 L/min @3bar	0.027~0.055 L/min @3bar
温度范围 Temperature Range	-20 ~84° C			
开关时间(全开到全关) Full stroke time	2.5 sec	2.5 sec	2.5 sec	5 sec
本体材质 Body material	铝合金 Aluminum	铝合金或不锈钢 Aluminum or Stainless steel	铝合金或 Peek Aluminum or Peek	铝合金或不锈钢 Aluminum or Stainless steel
密封件 Seals	本体-铝合金:全 VITON 或 VITON+EPDM 本体-不锈钢或 Peek: 全 FFKM 或 FFKM+EPDM Body- Aluminum : All VITON or VITON+EPDM Body- Stainless steel or Peek : All FFKM or FFKM+EPDM ----- ----- **若用于真空或水·建议搭配 EPDM.			
防护等级 Ingress Protection	IP 52			
*牙口另有 NPT 牙·若有需请洽询业务·谢谢!				
There are also NPT port. If you need it, please contact our sales representative, thank you!				

# PM 驱动器

## PM Series Proportional Valve Driver



PM 驱动器主要是提供了 FC 比例阀所需要的电源和控制信号(步骤和方向)·并以模拟讯号(0-10VDC/4-20mA/RS485 Modbus)转换为双极步进马达之步骤控制。

Series PM driver provides series FC valve with the required power and control signal (step and direction). It controls the step of a bipolar stepper motor with an analogue signal (0-10 VDC/4-20mA/RS485 Modbus).

### 接线方式 Wiring



编号 No.	功能 Function
1	DC24V +
2	DC24V -
3	Signal + 、 RS485 +
4	Signal - 、 RS458-

### 产品特点 Features

- ◆ 体积小 compact
- ◆ 低成本 low cost
- ◆ 灵敏度高 High sensitive
- ◆ 模拟/数字讯号 Analog / Digital signal
- ◆ 简易控制 easy-control
- ◆ 线性全流量控制

Full scale linearity flow rate control

### 规格 Specifications

输入讯号 Input signal	0-10V / 4-20mA / RS485
工作电源 Supply	DC24V (≤12W)
指示灯状态 Indicator LED Status	on/off 灯亮表示马达运转(LED on is motor running) on/off 灯熄表示马达停止(LED off is motor stopping) on/off 闪烁表示马达故障(LED flashing is motor error)
马达状态输出 Motor Status output	Sink 50mA
环境温度 Ambient Temp.	0-60°C
线材长度 Cable Length	一米或五米 1 meter or 5 meter

# FC 流量比例阀组

## Proportional Flow Control Valve



### 型号选择 Ordering Code

FC  -  -  + PM  -  -

#### Type

10	0~35 LPM@6bar	G 1/8"
20	0~65 LPM@6bar	
120	0~230 LPM@6bar	
300	0~400 LPM@6bar	
1000	0~1200 LPM@5bar	G 3/8"
1500	0~1200 LPM@3bar	
2000	0~2600 LPM@7bar	
3000	0~5000LPM@10bar	PT 1/2"

#### \*Body Material

-	Aluminum
SUS	Stainless steel
PK	Peek

\*Please refer to product specifications for the body materials of each series.

#### Seal

For Aluminum Body	
-	VITON
E	VITON+EPDM
For SUS / Peek Body	
-	FFKM
E	FFKM+EPDM

#### Type

10	For FC-10
20	For FC-20
120	For FC-120
300	For FC-300
1000	For FC-1000
1500	For FC-1500
2000	For FC-2000
3000	For FC-3000

#### Input Signal

**E	0 - 10 V
A	4 - 20 mA
R	RS485 Modbus

#### Wiring

L1	1m
L5	5m

\*\*注 1：若控制讯号选择 0-10V，请留意最小的驱动电流为 3mA。

For Command Signal type 0-10V, the minimum driving current is 3mA.

注 2：以上标示流量为用于空气流量，若使用于液体，流量需另外计算。

The indicated flow rate is air, please consult for liquid flow rate.

注 3：如需订制特别流量范围，请洽询本公司

Please contact us for customized flow range.

注 4：以上产品组合于出货前皆一对一校正完成。安装该产品时，需依产品序号一对一配对 (比例阀本体序号和控制器序号需相同)，避免混搭造成产品不良情形。

FC and PM series are calibrated in pair. Before operating, please ensure the serial numbers on FC and PM are in pair in order to prevent potential leakage issue.

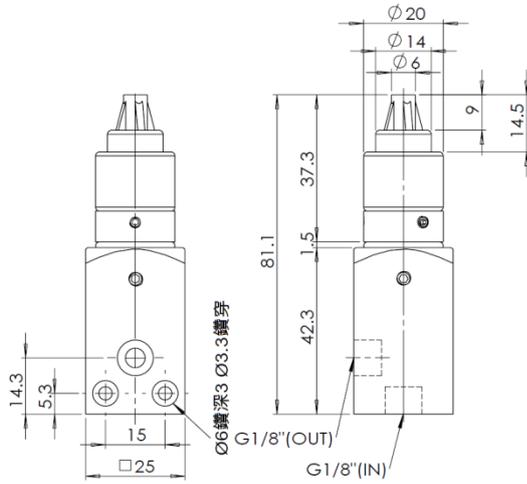
# FC 流量比例阀组

## Proportional Flow Control Valve

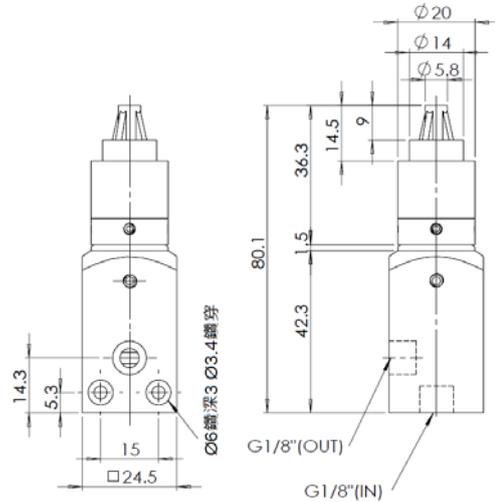


### 外观尺寸 Dimensions

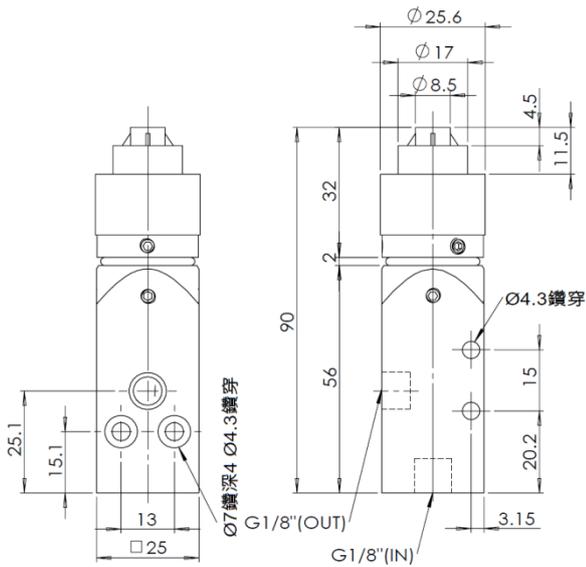
#### ◆ FC-10/FC-20 不锈钢



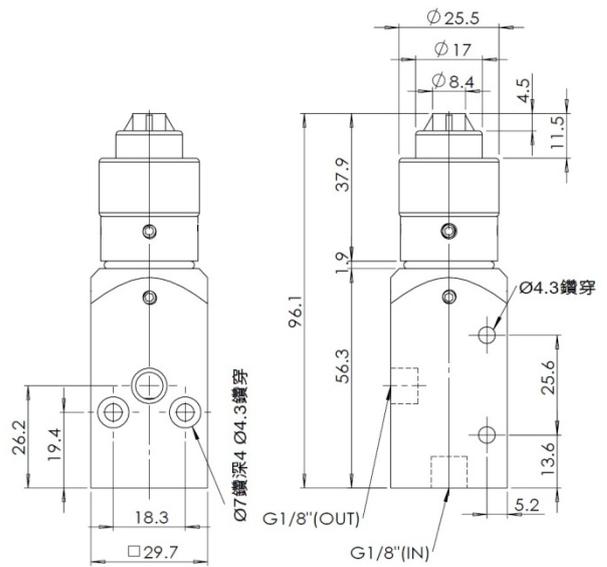
#### ◆ FC-20 铝合金



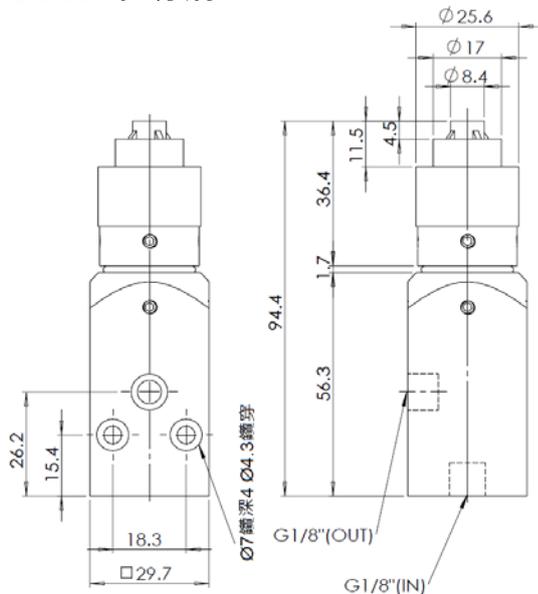
#### ◆ FC-120 铝合金



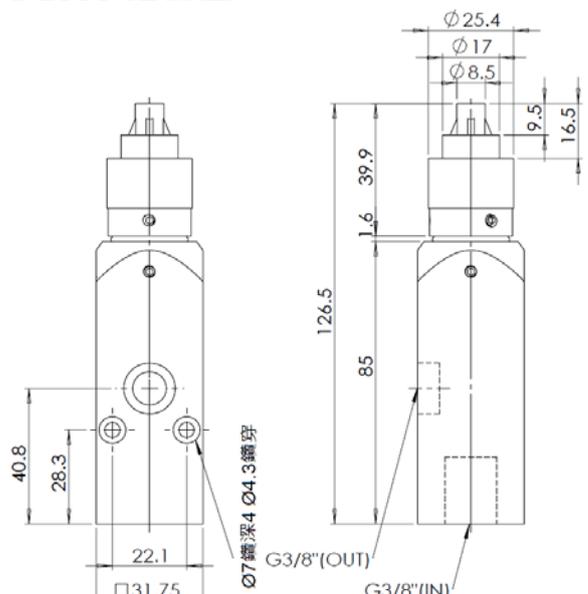
#### ◆ FC-300 铝合金



#### ◆ FC-300 不锈钢



#### ◆ FC-1000 铝合金



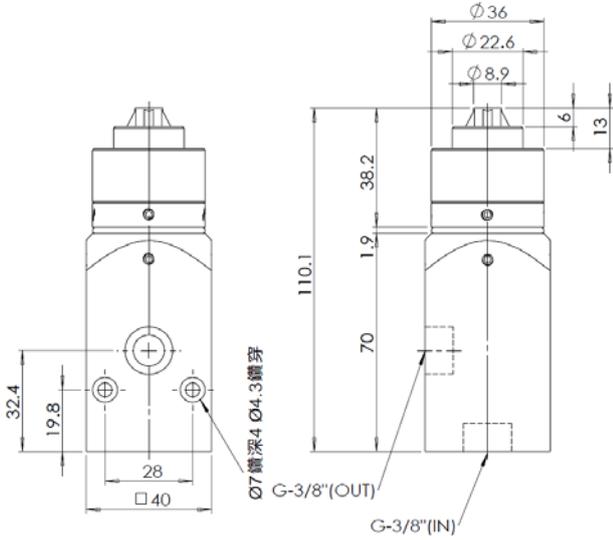
# FC 流量比例阀组

## Proportional Flow Control Valve

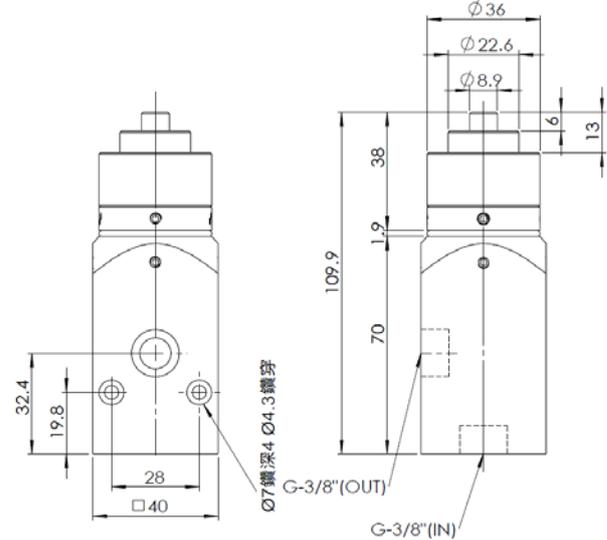


### 外观尺寸 Dimensions

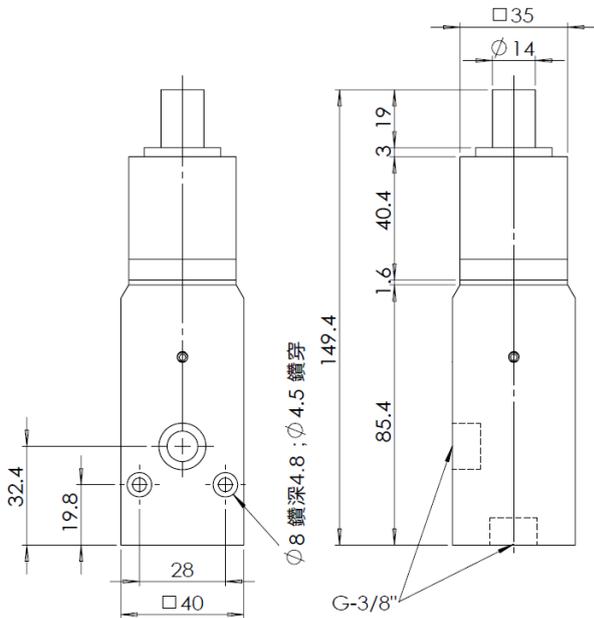
#### ◆ FC-1500 铝合金



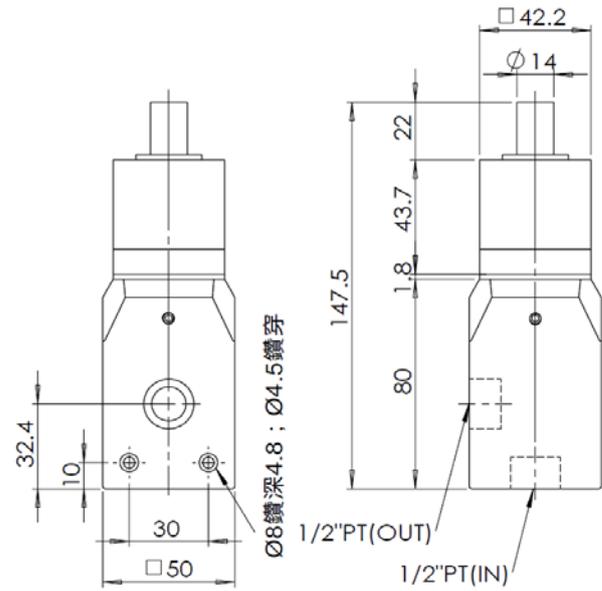
#### ◆ FC-1500 不锈钢



#### ◆ FC-2000 铝合金



#### ◆ FC-3000 铝合金/不锈钢



# FC 流量比例阀组

## Proportional Flow Control Valve



### 安装前注意事项

1. 配管前处置 :配管前请进行空气吹拭(气流冲洗)或清洗 ,以去除管内的切削粉、切削油、杂物等。
2. 密封带的卷法 :配管及接头锁紧时 ,不要让配管螺牙的切削粉、密封带进入阀内部。使用密封带时 ,留下螺牙 1.5-2 牙距的位置进行缠绕。
- ★ 3. 产品组合于出货前皆一对一校正完成。安装该产品时 ,需依产品序号一对一配对(比例阀本体序号和控制器序号需相同) ,避免混搭造成产品不良情形。



### 控制信号注意事项

1. 勿给超过 10V 或 20mA 以上的控制信号 ,避免马达长时间运转会卡住在最高点的位置。
2. 若 DC24 电源持续供给状态下 ,需开关控制信号或是插拔马达和控制器的连接线时 ,请确保开关动作前信号保持在 0V 或 4mA。因讯号开启时 ,电路板会默认零点 ,因此若信号高于 0V 或 4mA 会造成零点默认错误 ,长时间运转可能马达会卡住。  
\*\*当不确定心轴位置是否偏移或已失步 ,请重新开启 DC24 电源 ,让马达重新校正起始位置。
3. 如果断开控制器和马达的连接线时 ,请重复开关电源 ,确保两者有正确连接。



### 流量比例阀使用注意事项

1. 请勿在腐蚀性气体、化学药品、海水环境或附着上述物质的场所使用。
2. 经过的介质不管是气体或液体 ,切勿残有杂质。请设置过滤系统并采取适当的保护对策。
3. 日光照射或潮湿场合 ,请用保护罩等遮蔽保护。

本产品不能用做紧急关闭装置。应在系统中安装安全系统 ,以防止严重伤害或生命损失。



### 保固

自出厂起 6 个月以内为保固期限 ,请务必遵守使用注意事项。因人为因素造成的产品不良 ,则本公司对本保修不承担任何责任。



## Product Precautions

1. Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.
2. When screwing together pipes and fittings, etc., be certain that chips from the pipe threads and sealing material do not get inside the piping. When sealant tape is used, leave 1.5 to 2 thread ridges exposed at the end of the threads.
3. Do not operate in locations having an atmosphere of corrosive gases, chemicals, sea water, or where there will be contact with the same.
4. Ensure the fluid passing through the valve does not contain solid particles. Please use a filter before the inlet port.
5. In locations which receive direct sunlight, provide a protective cover etc.
6. KaoLu's product cannot be used as an emergency shutoff. A redundant safety system should be installed in the system to prevent serious injury or loss of life.
- ★ 7. FC and PM series are calibrated in pair. Before operating, please ensure the serial numbers on FC and PM are in pair in order to prevent potential leakage issue.



## Precautions of control signal

1. Don't give the control signal over 10V or 20 mA. In order to avoid the motor being stuck at the highest position when it runs for a long time.
2. If the DC24V keep supplying during the control process, but there is an action of switching control signal or unplugging the motor and controller. Please make sure to control the signal in 0V or 4mA. When the signal turned on, the circuit board would default the zero point. Therefore, if the signal is higher than 0V or 4mA, it would cause the zero point get error. The motor would stuck if it runs for a long time.  
\*\*If you're not sure whether the position of needle valve swifts or not, please turn on the DC24V again to let the motor calibrate to the zero starting position.
3. When the connection between the controller and stepper motor is disconnected, please turn on and off the power repeatedly to ensure the both are connected successfully.



## Warranty

KaoLu Enterprise Co. Ltd. products are warranted to the original purchaser only against defects in material or workmanship for 6 months from the date of manufacture. The extent of KaoLu's liability under this warranty is limited to repair or replacement of the defective unit at KaoLu's option. KaoLu shall have no liability under this warranty where improper installation or filtration occurred.