MBR AMpure EDI 模块

用户手册

一、EDI 技术简介

电去离子（Electrodeionization，简称 EDI），或称连续电除盐，是当今世界最先进的纯水、高纯水生产技术，它巧妙地将电渗析和离子交换技术相结合，利用离子交换膜的选择透过性和树脂的高传导能力，在模块两端正负电极形成的直流电场作用下，快速将淡水室中的电解质离子定向迁移至浓水室，从而得到纯水和高纯水。它可以替代传统的离子交换树脂，利用水解离产生的 H^+和 OH^-来自动再生树脂，无需酸碱，因此最大限度地降低了设备的运行费用，减少了污染，可实现连续运行，生产出电阻率高达 18MΩ•cm 的超纯水。

二、规格型号

MBR AMpure EDI 模块规格齐全，单个模块产水量范围从 500L/h 到 6m^3/h。下表为 MBR AMpure 系列模块型号，同时还提供各种非标准吨位的模块。

表 1　MBR AMpure　AP 系列模块型号

型　号	产水量（m^3/h）	产水电阻率（MΩ•cm）	操作电压（V）	操作电流（A）	外形尺寸 长×宽×高（mm）	重量（kg）
AP-500	0.3~0.8	5.0~18.0	10~60	1.0~4.0	221×325×670	35
AP-1000	0.7~1.7	5.0~18.0	20~80	1.0~4.0	299×325×670	49
AP-2000	1.5~3.5	5.0~18.0	35~110	1.0~4.0	453×325×670	78
AP-3000	2.4~4.9	5.0~18.0	50~140	1.0~4.0	593×325×670	105
AP-4000	3.5~6.5	5.0~18.0	70~170	1.0~4.0	729×325×670	130
AP-5000	4.5~7.8	5.0~18.0	80~210	1.0~4.0	836×325×670	151
AP-6000	5.5~9.1	5.0~18.0	90~240	1.0~4.0	947×325×670	171
AP-7000	6.6~10.2	5.0~18.0	105~280	1.0~4.0	1010×325×670	183

三、产品技术优点

- 独特的流道设计，流水阻力更小
- 更富裕的产水量，处理效率高
- 更低的膜对电压，更低的能耗，吨水耗电量远小于 0.10kWh
- 更大的树脂填充量，产水水质好

- 更容易建立 EDI 系统，可操作性好
- 具有优良的“免清洗”、“免再生”和“自动恢复”性能

四、进水要求

以下是保证 MBR AMpure 模块正常工作的最低进水条件，为了使模块安全、长期、稳定、高效的运行，进水条件必须更高。

- 进水电导率：反渗透产水，电导率 1～40μS/cm，建议＜10μS/cm
- 硬度（以 $CaCO_3$ 计）：≤1.0mg/L，建议≤0.1mg/L。
- 温度：5～35℃，最适温度 20～30℃。
- pH：6～9，最佳范围为 7～8。
- CO_2：≤5mg/L，建议≤2mg/L。
- 总有机碳（TOC）：≤0.5 mg/L，建议为零。
- SiO_2：≤0.2mg/L，建议≤0.05mg/L。
- 活性金属（Fe、Mn）：≤0.01mg/L，建议为零。
- 氧化剂：Cl_2≤0.01mg/L，O_3≤0.01mg/L，建议为零。
- 颗粒：SDI<1，建议为零。

五、系统运行操作

为保证 MBR AMpure 模块正常运行，获得更高质量的产品水，同时提高模块的工作年限，运行操作时参照以下基本程序：开机准备、开机、关机和停机恢复。

- **开机准备**

①检查各管路和电路连接，确保模块已经被正确的连接到管路系统中和直流电源上；

②调校电导率仪、电阻率仪、压力表和流量计等仪表；

③检查各流量保护开关和低压保护开关以及联动装置，确保无水流通过或流量过低时模块的直流电源是关闭的；

④准备好数据表格和运行记录本，记录起始数据和观察到的任何现象。

- **开机**

①模块进水设立不合格水排放，直到达到模块的进水水质要求为止；

②打开给水阀门，调节阀门获得产品水、浓极水所需的流量和压力，使产品水、浓极水流量达到设计范围，浓极水流量一般设置为产品水流量的 10%左右；

③持续运行 3～5min，将模块内产生的气体排净（如有必要，加大浓极水流量，但此时浓极水的进水压力不能超过产品水进水压力，此过程后必须将浓极水流量调回原值）；

④检查产品水、浓极水的进水压力损失是否与出厂时提供的调试数据相近；

⑤确定产品水、浓极水的流量和压力正常后，打开直流电源给模块供电，将直流电源的操作电压、电流调整到模块出厂时提供的调试数据；

⑥将模块开始工作时的不合格产品水重新返回到进水系统，直到获得满足使用需要的产品水；

⑦产品水水质满足使用需要后，即可连续工作；

⑧记录运行数据。

- **关机**

①断开模块直流电源，运行 1～2min，此时将模块的产品水返回到进水系统；

②关闭进水泵；

③关闭进水阀门。

- **停机恢复**

当 MBR AMpure 模块由于某种原因，中途停机运转，下次开机运转前，需进行以下几项操作：①停机；②停机后开机。

- **停机**

①关闭模块的进水阀门；

②把模块内存留的水排放干净；

③关闭模块的出水阀门，避免模块内部水份蒸发。

- **停机后开机**

①用合格的进水将模块内部充满，浸泡 6h 以上；

②调整产品水、浓极水的进水流量、压力至出厂值的 20%，运行 10～

30min（视停机时间长短而定），将产品水排放掉；

③调整产品水、浓极水的进水流量、压力至出厂值，运行 10min；

④确保一切正常后，开启模块直流电源给模块供电，连续运行 8～16h；

⑤观察模块产品水水质，当产品水水质满足使用要求时，即可恢复正常工作。

六、 MBR AMpure 模块使用注意事项

- 模块必须安放在 5℃以上的环境中，以免冻坏。切勿拆卸模块，以免损坏。
- 模块直流电源应有良好的接地！保证模块正、负极与配套电源连接良好。
- 将管件与模块连接时，应柔和用力，以免进出水口在过大的扭力作用下损坏。
- 开机时，一定先通水，再接通模块直流电源。
- 模块供水泵视模块供水压力及流量选择合适的供水泵，建议供水方式选择软启动方式，防止水锤产生，破坏模块。
- 模块初次使用前，先将浓极水进水阀门关闭，待水进入模块后，再缓慢打开阀门调整其流量，以防瞬间浓极水流量过大而损坏模块。
- 模块初次使用时，在保证浓极水进水压力不高于淡水进水压力的前提下，应将浓极水流量调大冲洗数分钟以排出模块中的空气，然后再将浓极水流量调整至额定值，再给模块供直流电，以防模块局部干烧。
- 模块每个出水口均应保持水流通畅，不能有任何背压，经常注意模块产品水管、浓极水管是否有水正常流出以及流量是否正确，发现故障时应及时排除。
- 应保证模块进水流量正常后再供直流电压，调节模块操作电流至规定值，切忌模块缺水或流量过低的情况下施加操作电流，也不允许长时间通水不加电。模块工作时，带有较高的直流电压，不要用手直接触摸模块表面，防止触电。

- 切勿随意调整模块操作电流、电压以及进水流量等运行参数。改变操作电流后，模块产品水水质变化会有一定的响应时间。过高的操作电压、电流可能会损坏模块。
- 模块运行一段时间后，特别是当模块较长时间停机后恢复运行时，需要重新设置模块紧固螺母的扭力。螺母扭力太大将导致模块变形，太小将导致模块内、外部泄漏。
- 模块存储时应注意避免水分蒸发而导致模块内部的膜与树脂干裂。长时间放置后，应首先用水浸润过夜。次日通水时由小流量逐渐调至额定流量。

七、 MBR AMpure 模块故障处理

故障现象	可能原因	排除方法
产品水水质差	1. 给水水质超出允许值 2. 模块无电流 3. 模块电流低 4. 模块的直流电源极性接反 5. 浓极水出口压力比产品水出口压力高 6. 模块污染	1. 检查给水水质 2. 检查直流电源保险丝、输入、输出及模块接线端子 3. 调整模块电流至额定值 4. 调整电流极性 5. 调整浓水流量、背压，确保产品水出口压力高于浓水出口压力 6. 清洗模块
产品水、浓极水流量小	1. 模块堵塞 2. 阀门关闭	1. 查找原因，进行清洗 2. 开启阀门，调整流量至额定值
进水压力大	1. 模块堵塞 2. 流量过大 3. 产品水出口憋压	1. 查找原因，进行清洗 2. 调整流量至额定值 3. 检查产品水出口管道
进水压力小	流量过小	调整流量至额定值
模块溢出太	电压设定太高，电流过大	降低电压、电流

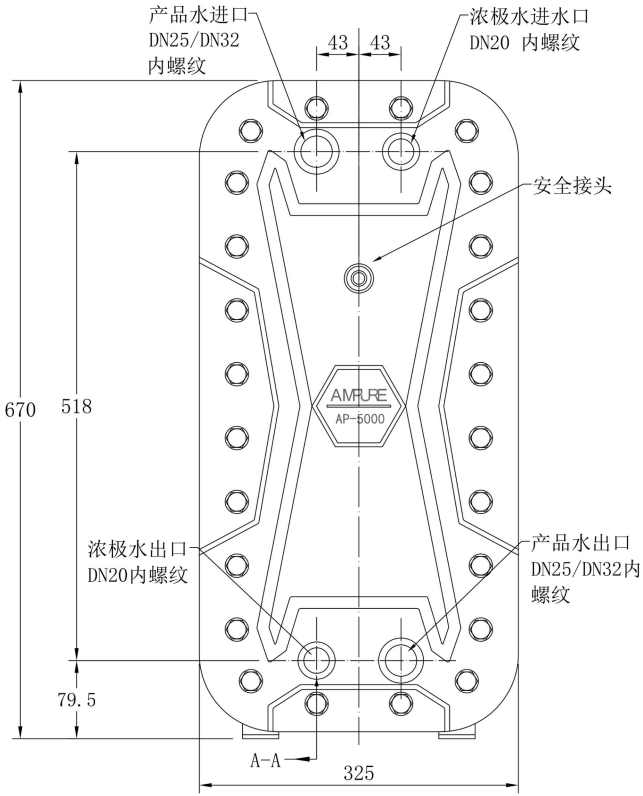
多气体		

注：以上模块故障中可能原因不包括模块烧坏。

八、 MBR AMpure 模块管道与电力连接

- 管道连接

MBR AMpure 模块进出水口采用内螺纹设计，产品水进出水口采用 1 寸或 1 1/4 寸内丝，浓极水进出水口采用 6 分内丝。进行管件连接时，分别选用 MBR AMpure 自带密封外丝即可。四个接口详细信息如下：



- 电力连接

MBR AMpure 模块为了用户能更便捷、安全的进行接电，配备了专用的

航空插头，每一连接处都有专门的密封装置，确保用电安全。详细航空插头连接图如下所示：

九、模块化学清洗

● 化学清洗中安全注意事项

①在配置清洗药液时，必须穿戴好防护服、防护眼镜和防护手套；

②需要清洗的设备管路必须是与其他连接设备的连接管路完全隔离的；

③需要清洗的设备其电源必须是完全断开状态；

④整个清洗过程中清洗的工作压力不能超过 0.20MPa。

● 清洗设备组件

①清洗循环泵（耐腐蚀泵）

②清洗水箱（PP）

③耐腐蚀清洗软管（与清洗泵适配）

④耐腐蚀阀门（UPVC）

⑤耐腐蚀压力表、流量计

⑥精密过滤器（滤芯精度≤1μm）

⑦工具：便携式 pH 测试仪表

● 清洗所用化学药品

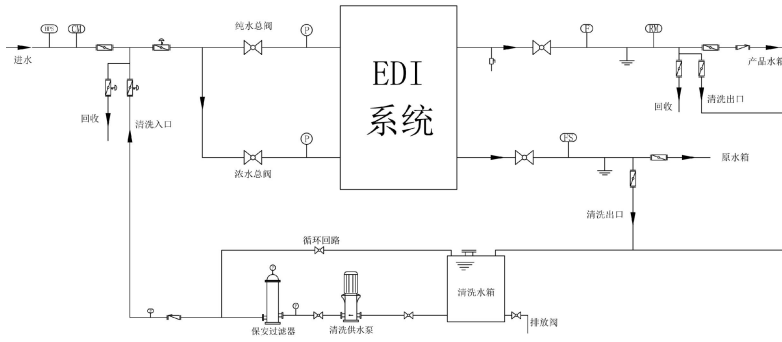
①2%盐酸（分析纯）—用于清除结垢和金属氧化物；

②5%氯化钠/1%氢氧化钠（分析纯）—用于清除有机物污染物及生物膜；

膜块清洗时药液配用量

单模块产水量为 5.0m³/h 的 EDI 模块药液配用量为 100L，对于膜块数量大于 1 块时，单模块配液量乘以膜块数量即可。

● 清洗流程图



● 清洗前准备工作

①关闭直流电源；

②关闭进水阀、产品水阀、浓水排水阀和循环水箱排水阀，打开清洗出水阀（流程图中）；

③确定所有管路连接牢固；

● 清洗方案 1

● 浓水室结垢清洗

一、盐酸（2%HCl）循环清洗：

①向清洗水箱中注入所需数量的水（二级反渗透产水）

②将所需数量的浓度为 36.5%的盐酸与清洗水箱里的水混合，在循环期间，视情况或许需要加入更多盐酸

③完全打开清洗泵吸入阀和循环回路阀

④启动清洗泵

⑤当化学制品彻底混合后，测定清洗水箱中药液的 pH 值，然后关闭纯水进水阀和纯水清洗回流阀，依次打开浓水清洗回流阀、浓水进水阀、清洗出水阀，慢慢关闭循环回路阀的同时，观察进水压力，不超过 0.20MPa。

⑥将药液通过模块循环 30 分钟

⑦循环时，监控药液 pH 值，如果 pH 值开始升高，则可加入更多盐酸，以维持原药液的 pH 值。

⑧关闭清洗泵

⑨检查清洗水箱中药液的 pH 值，如有必要，进行中和，然后排放清洗水箱中的药液

二、氯化钠（5%NaCl）冲洗

①关闭清洗水箱的排水阀，向清洗水箱中注入足够多的水（二级反渗透产水）

②打开浓水排水阀，关闭浓水清洗回流阀，开启清洗泵，冲洗 1 分钟，将模块中残留的药液冲出

③关闭清洗泵，关闭浓水排水阀，打开浓水清洗回流阀

④将水注入清洗水箱

⑤将氯化钠加入清洗水箱

⑥启动清洗泵，冲洗模堆大约十分钟

⑦关闭清洗泵，排放清洗水箱中的药液

三、清水冲洗

①关闭清洗出水阀、浓水清洗回流阀、纯水清洗回流阀，打开进水阀、产水阀、浓水排水阀

②开启 EDI 系统供水，慢慢开启纯水进水阀和浓水进水阀，让 RO 产水通过模块后直接排放

③进水 5 分钟后，开启直流电流开始正常工作

- 清洗方案 2
- 有机物污堵清洗

一、5%氯化钠/1%氢氧化钠循环清洗

①向清洗水箱中注入所需体积的水

②完全打开吸入阀和循环回路阀，启动供水泵

③将所需量的氯化钠和氢氧化钠混合在清洗水箱中

④彻底混合后，打开清洗出水阀，慢慢关闭循环回路阀的同时，观察进水压力，不超过 0.20MPa。

⑤将药液在模块中循环 30~60 分钟

⑥关闭清洗泵

⑦检测清洗药液的 pH 值，如有必要中和后排放

二、清水冲洗

①关闭清洗出水阀、浓水清洗回流阀、纯水清洗回流阀，打开进水阀、产水阀、浓水排水阀

②开启 EDI 系统供水，慢慢开启纯水进水阀和浓水进水阀，让 RO 产水通过模块后直接排放

③进水 5 分钟后，开启直流电流开始正常工作

注：清洗期间观察模块进水压力上升情况，如果上升较快则表明模块出现污堵的情况，应及时更换保安过滤器内精密滤芯。如果已经出现污堵的情况，则用纯水对模块进行反向冲洗，待把污染物冲洗出后，再进行清洗步骤。

十、模块出厂检测结果

产品编号：

进水电导：　　μS/cm　　产水电阻率：　　MΩ•cm

进水流量（m^3/h）		进水压力（kgf/cm^2）		操作电压（V）	操作电流（A）
淡水	浓极水	淡水	浓极水		

测试系统工艺：城市自来水——多介质过滤器——活性炭过滤器——保安过滤器———一级反渗透——调 pH——二级反渗透——水箱——EDI

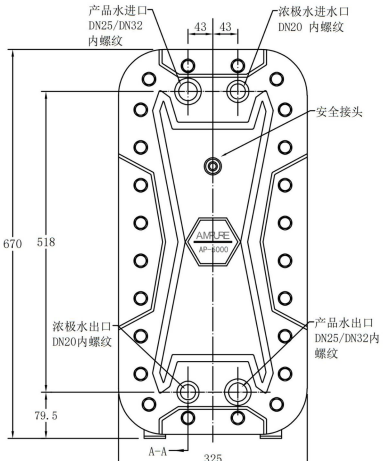
出厂日期：　　年　　月　　日

检验员：

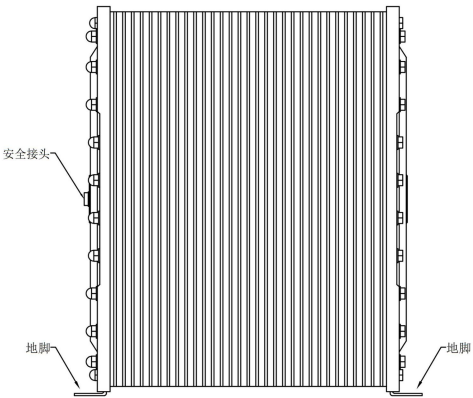
MBR AMpure AP 系列模块技术参数：

型号 / 参数	AP-500	AP-1000	AP-2000	AP-3000	AP-4000	AP-5000	AP-6000	AP-7000
外形尺寸（mm） 长×宽×高	221*325 *670	299*325 *670	453*325 *670	593*325 *670	729*325 *670	836*325 *670	947*325 *670	1010*325 *670
电压（V）	10~60	20~80	35~110	50~140	70~170	80~210	90~240	105~280
工作电流（A）	1~4	1~4	1~4	1~4	1~4	1~4	1~4	1~4
产水电阻率（MΩ•cm）	5.0~18.0	5.0~18.0	5.0~18.0	5.0~18.0	5.0~18.0	5.0~18.0	5.0~18.0	5.0~18.0
产品水流量（m^3/h）	0.3~0.8	0.7~1.7	1.5~3.5	2.4~4.9	3.5~6.5	4.5~7.8	5.5~9.1	6.6~10.2
浓极水流量（m^3/h）	0.05~0.07	0.1~0.17	0.2~0.3	0.3~0.5	0.4~0.6	0.5~0.7	0.6~0.8	0.6~0.9
产品进水压力（MPa）	0.06~0.2	0.07~0.2	0.08~0.22	0.08~0.22	0.08~0.24	0.08~0.25	0.08~0.25	0.08~0.3
浓极进水压力（MPa）	0.01~0.04	0.01~0.04	0.01~0.05	0.01~0.05	0.01~0.05	0.01~0.05	0.01~0.05	0.01~0.06
模块重量（kg）	35	49	78	105	130	151	171	183

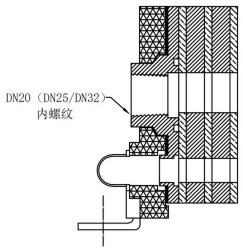
MBR AMpure AP 系列模块外形尺寸图：



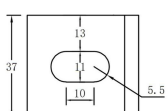
前视图



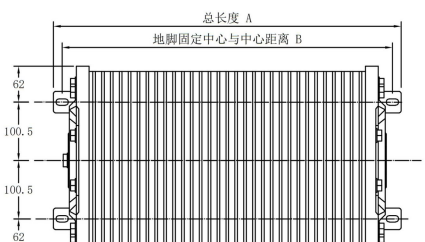
侧视图



截面图 A-A
进出水口结构详图



地脚定位孔尺寸

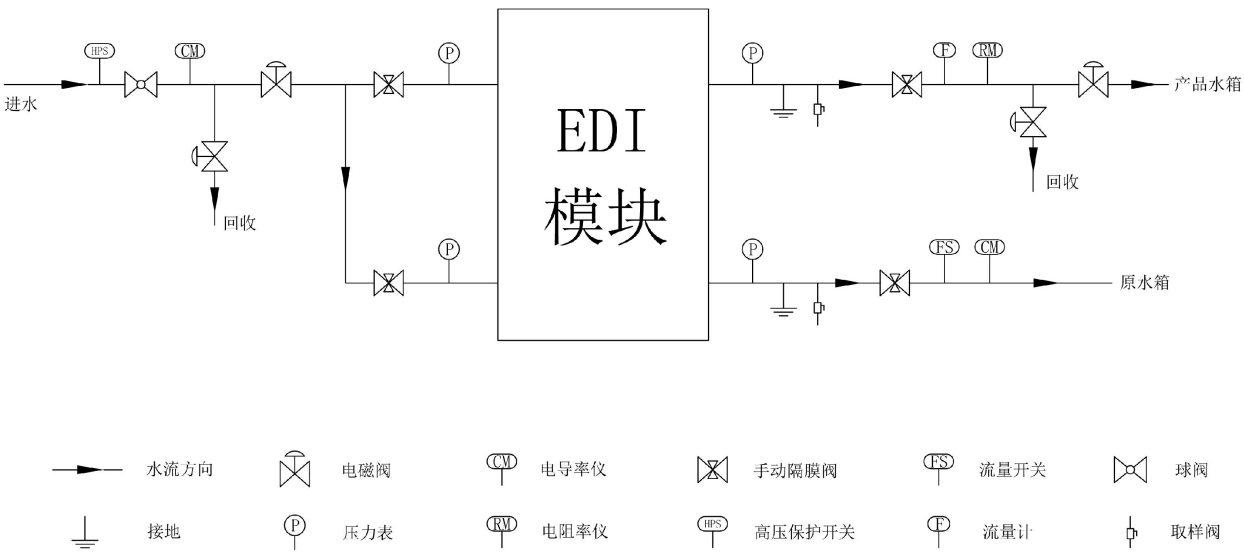


俯视图

模堆型号	A	B
AP-500	221.0	181.0
AP-1000	299.0	259.0
AP-2000	453.0	413.0
AP-3000	593.0	553.0
AP-4000	729.0	689.0
AP-5000	836.0	796.0
AP-6000	947.0	907.0
AP-7000	1010.0	970.0

注：
1、图中所有尺寸单位为毫米（mm）；
2、地脚固定中心与中心距离尺寸与实际尺寸不一致时，以实际尺寸为准.

MBR AMpure 模块工艺流程图



MBR AMpure EDI Modules

Operation & Maintenance Manual

I Introduction of EDI Technology

Electrodeionization (EDI) or Continuous Electrodeionization is considered as the world's most advanced technology for pure water and high purity water production. Through integrating technologies of electrodialysis and ion exchange, in DC electric field formed by electrodes of two ends of the module it can remove electrolyte ion in fresh water compartment to concentrated water compartment fast and directly by applying the permselectivity of ion exchange membrane and the high conductivity of resin, so as to produce purified water and high purified water. With no need of acid-base regeneratants, it can replace the traditional ion exchange resin, using H^+ and OH^- dissociated from water for resin regeneration in order to reduce equipment operation cost and pollution, make operation continuously and stably, and most importantly, produce ultra pure water with resistivity up to 18MΩ • cm.

II Specifications

AMPURE's MBR AMpure EDI modules has a complete range of specifications with water output of single module from 500L/h to 6m^3/h. The MBR AMpure EDI series are listed in the following table. Meanwhile our company also supplies all kinds of non-standard tonnage modules.

Table 1 MBR AMpure AP series Modules (standard)

Type	Water output (m^3/h)	Product Resistivity （MΩ•cm）	Operating voltage (V)	Operating current (A)	Dimension L×W×H (mm)	Weight （kg）
AP-500	0.3~0.8	5.0~18.0	10~60	1.0~4.0	221×325×670	35
AP-1000	0.7~1.7	5.0~18.0	20~80	1.0~4.0	299×325×670	49
AP-2000	1.5~3.5	5.0~18.0	35~110	1.0~4.0	453×325×670	78
AP-3000	2.4~4.9	5.0~18.0	50~140	1.0~4.0	593×325×670	105
AP-4000	3.5~6.5	5.0~18.0	70~170	1.0~4.0	733×325×670	130
AP-5000	4.5~7.8	5.0~18.0	80~210	1.0~4.0	842×325×670	151
AP-6000	5.5~9.1	5.0~18.0	90~240	1.0~4.0	966×325×670	171

AP-7000	6.6~10.2	5.0~18.0	105~280	1.0~4.0	1010×325×670	183

III Technical advantages

1. Unique Structure design with minimum fluid resistance
2. Much more water output and high treatment efficiency
3. Lower energy consumption with power consumption per ton of product water more less than 0.10kWh
4. Maximum resin feed and good water quality
5. Easier to establish EDI system and good maneuverability
6. Excellent performances of "no-clean", "free regeneration" and "self-recovery"

IV Feed water requirements

Feed water for MBR AMpure modules must always meet the specifications outlined below for safe, stable, efficient long-term operation.

1. Feed water conductivity: RO permeate, 1～40μS/cm. ＜10μS/cm (recommended)
2. Hardness (as $CaCO_3$): ≤1.0mg/L, or ≤0.1mg/L (recommended).
3. Temperature: 5～35℃, optimum temperature: 20～30℃.
4. pH: 6～9, optimum range: 7～8.
5. CO_2: ≤5mg/L, or ≤2mg/L (recommended).
6. TOC: ≤0.5 mg/L, or zero (recommended).
7. SiO_2: ≤0.05mg/L, or ≤0.02mg/L (recommended).
8. Reactive metal (Fe, Mn): ≤0.01mg/L, or zero (recommended).
9. Oxidant: Cl_2≤0.01mg/L, O_3≤0.01mg/L, or zero (recommended).
10. Particles: SDI<1, or zero (recommended).

V System operation

To guarantee proper operation of MBR AMpure modules, obtain higher quality water and increase its service life, the system must be operated by

following the procedures – startup precautions, startup, shutdown and short shutdown for
recovery.

1.Startup precautions

1. Check the connections of all pipes and power lines to make sure the module is correctly connected to pipe system and DC power.
2. Adjust conductivity meter, resistivity meter, pressure meter, flow meter and
others.
3. Check protection switches for flow and low pressure to make sure the DC power is closed when there is no or too less water flowing.
4. Prepare data table and operation book to record initial data and anything observed.

2.Startup

1. RO system drains unqualified water until it meets the requirements of the quality of feed water for EDI modules.
2. Open and adjust feed-water valve to make flow and pressure proper for product water and concentrated water (it means to be in between design range), with the flow of concentrated water accounting for about 10% of that of product water.
3. Run for 3~5 minutes to remove all the gas generated in module (if necessary, increase the flow of concentrated water, but its intake pressure must not exceed the intake pressure of product water; then the flow of concentrated water must be readjusted to the original value).
4. Check if the intake pressure loss of product water and concentrated water is close to the data value offered as leaving factory.
5. When the flow and intake pressure of product water and concentrated water are proper, open DC power to charge the module and adjust the operating voltage and current of DC power to the data values offered as leaving factory.

6. Drain the original unqualified product water until the desirable product water is obtained.

7. When the quality of product water is desirable, continue the operation.

8. When the system is in stable state, record the operating data.

3.Power off

1. Disconnect module power supply,run for 1~2 minutes continuely.

2. Close switch for feed pump.

3. Close feed valve.

4.Short shutdown for recovery

When MBR AMpure modules is stopped halfway, follow the steps below before start the system again: 1. shutdown; 2. startup after shutdown.

1.Shutdown

1. Close intake valve of module.

2. Drain all the water in module.

3. Close outlet valve of module and avoid the evaporation of water in module.

2.Startup after shutdown

1. Open the flow of qualified water, fill the module and soak for over six hours.

2. Adjust feed water flow and pressure to 20% of factory values, run for 10~30 minutes (it depends on the period of downtime), and discharge the product water.

3. Adjust feed water flow and pressure to factory values, and run for 10 minutes.

4. If everything goes well, start DC power of module, and run continuously for 8~16 hours.

5. Observe the quality of product water in module, and resume normal operation when the quality of product water is desirable.

VI Precautions for use of MBR AMpure modules

1. The module must be put at a sutable temperture of over 5℃ to avoid frost damage. Do not dismantle module to avoid damage.

2. The DC power of module shall have good grounding! Make sure the positive and negative poles of module are well connected to supporting power supply.

3. Connect pipe fittings to module gently to avoid water inlet and outlet damage caused by too much torsion.

4. Before starting up, supply water first and connect to module power supply!

5. Before using the module for the first time, close the intake valve of concentrated water and slowly open and adjust the valve after water flowing into the module to avoid module damage caused by instantly excessive concentrated water flow.

6. When using the module for the first time, under the condition of intake pressure of concentrated water less than that of fresh water, increase the flow of concentrated water to wash the module for several minutes to discharge the air in the moule. Then adjust the flow of concentrated water to rated value and power up the module to avoid particial dry burning of module.

7. Each water outlet of module shall maitain smooth flow and have no back pressure. Check regularly if the flow from pipes of product water and concentrated water is proper and the quantity of flow is accurate, and fix the troubles immediately.

8. Increase DC voltage when the intaking flow is proper, and adjust the operating current of module to rated value. Do not increase DC current when there is not enough water in module or the flow is too low. The long-time water supply without powering up is not allowed. The module has higher DC voltage when working, so do not touch the surface of module diectly to avoid electric shock.

9. Do not adjust the operating current, voltage, flow distribution and other operating parameters of module at will because frequent alteration of current parameter reduces its perfromance. After changing current parameter, it takes certain response time for the quality change of product water. So run the system for a perod of time and observe carefully. Excessive operating voltage and current may cause module damage!

10. After the module running for a while, especially when the module resumes running after a long-time shutdown, reset the torque of module's fitting nut. Too much torque causes module deformation and too less causes internal and external leakage of module.

11. When storing modules, try to avoid water evaporation which leads to inner film and resin cracking. After leaving alone for a long time, fill water and keep it for one night. Then supply water from small flow to rated flow the next day.

VII Trouble shooting

Troubles	Possible reasons	Troubleshooting
Poor quality of product water	1.Feed water quality exceeds allowable value	1.Check feed water quality
	2.No current in module	2.Check DC current fuse, input and output terminals and module connecting terminals
	3.Low current in module	3.Adjust module current to rated current
	4.Reverse polarity of module	4. Adjust polarity
	5. Outlet pressure of concentratedwater higher than that of productwater	5. Adjust flow and back pressure of concentrated water to ensure outlet pressure of product water higher than that of concentrated water
	6.Module contamination	6.Clean module
Small flow of product and concentrated water	1. Module blocking	1. Find the reason and clean
	2. Valve closed	2. Open valve and adjust flow to rated flow
High intake pressure	1. Module blocking	1. Find the reason and clean
	2. Excessive flow	2. Adjust flow to rated flow
	3. Outlet pressure of product water kept down	3. Check outlet pipe of product water

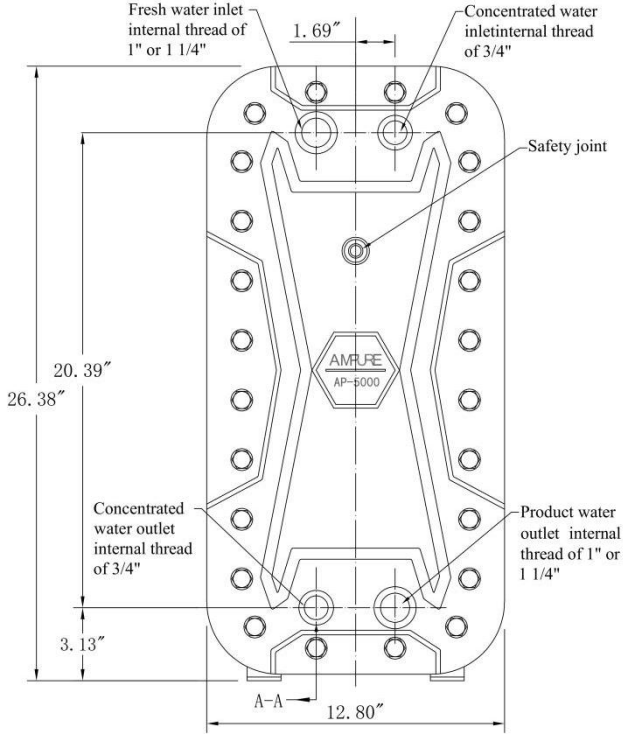
Low intake pressure	Flow too low	Adjust flow to rated flow
Too much overflow gas from module	Voltage setting too high, current too high	Reduce voltage and current

Note: the possible reasons for above module troubles exclude module burnout.

VIII Pipe and power connection

1.Pipe connection

The inlet and outlet of MBR Ampure module adopts internal thread design, the inlet and outlet of product water adopts 1-inch or 1 1/4-inch internal thread, and the inlet and outlet of concentrated polar water adopts 6-point internal thread. When connecting pipe fittings, MBR Ampure with its own sealing outer wire can be selected respectively. The details of the four interfaces are as follows:



2.Power connection

MBR Ampure module is equipped with a special aviation plug for users to connect power more conveniently and safely. Each connection is equipped with a special sealing device to ensure power safety. The detailed aviation plug connection diagram is as follows:

IX Module chemical cleaning

1. safety precautions in chemical cleaning

① When preparing cleaning solution, you must wear protective clothing, protective glasses and protective gloves;

② The equipment pipeline to be cleaned must be completely isolated from the connecting pipeline of other connected equipment;

③ The power supply of the equipment to be cleaned must be completely disconnected;

④ The working pressure during the whole cleaning process shall not exceed 0.20mpa.

2.Cleaning equipment components

① Cleaning circulating pump (corrosion resistant pump)

② Cleaning water tank (PP)

③ Corrosion resistant cleaning hose (suitable for cleaning pump)

④ Corrosion resistant valve (UPVC)

⑤ Corrosion resistant pressure gauge and flowmeter

⑥ Precision filter (filter element accuracy ≤ 1μm)

⑦ Tool: Portable pH test instrument

3.Chemicals used for cleaning

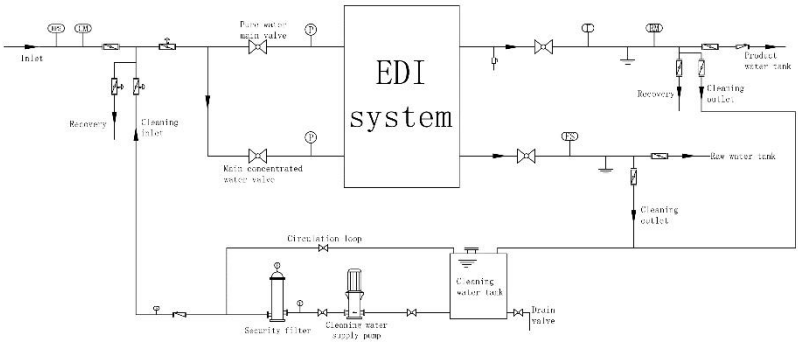
① 2% hydrochloric acid (analytical purity) - used to remove scaling and metal oxides;

② 5% sodium chloride / 1% sodium hydroxide (analytical purity) - used to remove organic pollutants and biofilm;

Dosage of drug solution during membrane block cleaning

The water yield of single module is 5.0m ³/ The dosage of EDI module solution for H is 100L. When the number of membrane blocks is greater than 1, the dosage of single module can be multiplied by the number of membrane blocks.

4.Cleaning flow chart



5. Preparation before cleaning

① Turn off the DC power supply;

② Close the inlet valve, product water valve, concentrated water drain valve and circulating water tank drain valve, and open the cleaning outlet valve (in the flow chart);

③ Ensure that all pipelines are firmly connected;

6. Cleaning scheme 1

6.1concentrated water chamber scaling cleaning

A. Hydrochloric acid (2% HCl) circulating cleaning:

① Fill the cleaning water tank with the required amount of water (secondary reverse osmosis water production)

② Mix the required amount of 36.5% hydrochloric acid with the water in the cleaning water tank, and add more hydrochloric acid as appropriate during the cycle

③ Fully open the suction valve and circulating circuit valve of the cleaning pump

④ Start the cleaning pump

⑤ After the chemicals are thoroughly mixed, measure the pH value of the traditional Chinese medicine solution in the cleaning water tank, then close the pure water inlet valve and pure water cleaning return valve, open the concentrated water cleaning return valve, concentrated water inlet valve and cleaning outlet valve in
turn, slowly close the circulating circuit valve, and observe the inlet pressure, which shall not exceed 0.20mpa.

⑥ Circulate the solution through the module for 30 minutes

⑦ During circulation, monitor the pH value of the drug solution. If the pH value begins to rise, more hydrochloric acid can be added to maintain the pH value of the original drug solution.

⑧ Turn off the cleaning pump

⑨ Check the pH value of the liquid medicine in the cleaning water tank, neutralize it if necessary, and then discharge the liquid medicine in the cleaning water tank

B. Flushing with sodium chloride (5% NaCl)

① Close the drain valve of the cleaning water tank and inject enough water (secondary reverse osmosis produced water) into the cleaning water tank

② Open the concentrated water drain valve, close the concentrated water cleaning return valve, start the cleaning pump, flush for 1 minute, and flush out the residual liquid medicine in the module

③ Close the cleaning pump, close the concentrated water drain valve, and open the concentrated water cleaning return valve

④ Fill the washing water tank with water

⑤ Add sodium chloride to the cleaning water tank

⑥ Start the cleaning pump and flush the mold stack for about ten minutes

⑦ Turn off the cleaning pump and discharge the liquid medicine in the cleaning water tank

C. Clean water flushing

① Close the cleaning water outlet valve, concentrated water cleaning return valve and pure water cleaning return valve, and open the water inlet valve, water production valve and concentrated water drainage valve

② Open the water supply of EDI system, slowly open the pure water inlet valve and concentrated water inlet valve, so that the RO produced water can be discharged directly after passing through the module

③ After 5 minutes of water inflow, turn on the DC current and start normal operation

7.Cleaning scheme 2

7.1organic fouling cleaning

A. 5% sodium chloride / 1% sodium hydroxide circulating cleaning

① Fill the cleaning water tank with the required volume of water

② Fully open the suction valve and circulation circuit valve and start the water supply pump

③ Mix the required amount of sodium chloride and sodium hydroxide in the cleaning water tank

④ After thorough mixing, open the cleaning water outlet valve, slowly close the circulating circuit valve, and observe the water inlet pressure, which shall not exceed 0.20mpa.

⑤ Circulate the solution in the module for 30 ~ 60 minutes

⑥ Turn off the cleaning pump

⑦ Detect the pH value of the cleaning solution and discharge it after neutralization if necessary

B. Clean water flushing

① Close the cleaning water outlet valve, concentrated water cleaning return valve and pure water cleaning return valve, and open the water inlet valve, water production valve and concentrated water drainage valve

② Open the water supply of EDI system, slowly open the pure water inlet valve and concentrated water inlet valve, so that the RO produced water can be discharged directly after passing through the module

③ After 5 minutes of water inflow, turn on the DC current and start normal operation

Note: Observe the rise of water inlet pressure of the module during cleaning. If the rise is fast, it indicates that the module is polluted and blocked. Replace the precision filter element in the security filter in time. In case of pollution blockage, the module shall be backwashed with pure water, and the cleaning steps shall be carried out after the pollutants are washed out.

X Factory acceptance test results

Item No.:

Feed conductivity: μS/cm Product Resistivity : MΩ•cm

Rate of inflow (m^3/h)		Pressure (kgf/cm^2)		Operating voltage (V)	Operating current (A)
Fresh water	Concentrated water	Fresh water	Concentrated water		

Testing process: urban water supply--- multi-media filter active carbon filter------

cartridge filter---first RO--- adjust pH second--- RO water tank EDI------

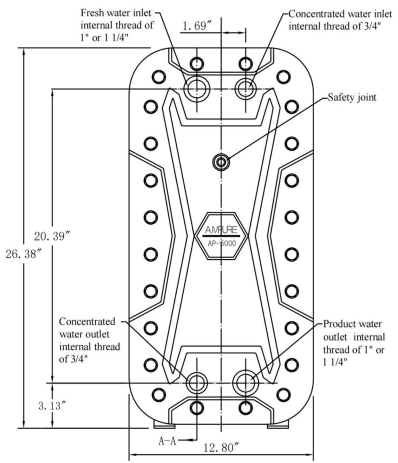
Ex-Factory Date:
(Year) _____(Month) _____(Day)_____

Inspector:

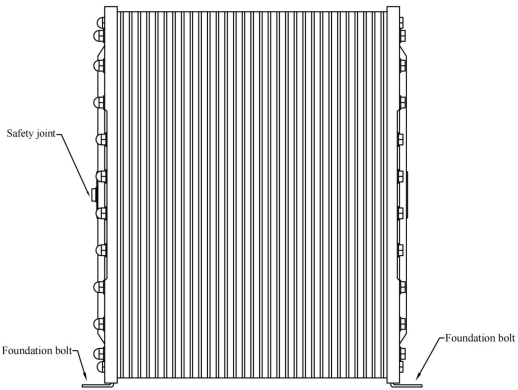
Technical parameters of MBR Ampure AP Series modules:

Type / Parameter	AP-500	AP-1000	AP-2000	AP-3000	AP-4000	AP-5000	AP-6000	AP-7000
Outline dimension（mm）L×W×H	221*325*670	299*325*670	453*325*670	593*325*670	729*325*670	836*325*670	947*325*670	1010*325*670
Working Voltage（V）	10~60	20~80	35~110	50~140	70~170	80~210	90~240	105~280
Working Current（A）	1~4	1~4	1~4	1~4	1~4	1~4	1~4	1~4
Product Resistivity（MΩ•cm）	5.0~18.0	5.0~18.0	5.0~18.0	5.0~18.0	5.0~18.0	5.0~18.0	5.0~18.0	5.0~18.0
Product Water Flow（m^3/h）	0.3~0.8	0.7~1.7	1.5~3.5	2.4~4.9	3.5~6.5	4.5~7.8	5.5~9.1	6.6~10.2
Concentrated Water Flow（m^3/h）	0.05~0.07	0.1~0.17	0.2~0.3	0.3~0.5	0.4~0.6	0.5~0.7	0.6~0.8	0.6~0.9
Product Water Intake Pressure（MPa）	0.06~0.2	0.07~0.2	0.08~0.22	0.08~0.22	0.08~0.24	0.08~0.25	0.08~0.25	0.08~0.3
Concentrated Water Intake Pressure（MPa）	0.01~0.04	0.01~0.04	0.01~0.05	0.01~0.05	0.01~0.05	0.01~0.05	0.01~0.05	0.01~0.06
Weight（kg）	35	49	78	105	130	151	171	183

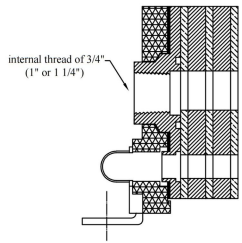
Overall dimension drawing of MBR Ampure AP Series module:



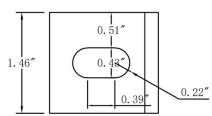
Front view



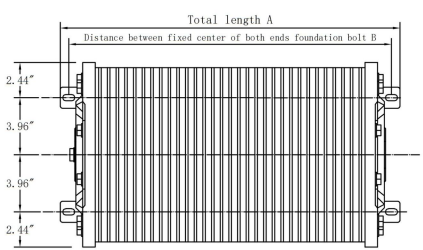
Side view



Sectional view A-A
Detail drawing of water inlet and outlet structure



the size of the foot bolt hole



Top view

Module type	A(in)	B(in)
AP-500	8.70	7.13
AP-1000	11.77	10.20
AP-2000	17.83	16.26
AP-3000	23.35	21.77
AP-4000	28.70	27.13
AP-5000	32.91	31.34
AP-6000	37.28	35.71
AP-7000	39.76	38.19

Note:
1. The size in drawing is inch (in);
2. In the event of any inconsistency between the distance between the fixed center of both ends foundation bolt and the actual distance, the actual distance shall prevail.

Process flow diagram of MBR Ampure module