WCMBR- 30(U)型船用膜法
生活污水处理装置
WCMBR-30(U) Series
Marine Membrane Sewage Treatment Plant

使用说明书
Instruction Book

						321NJUV-3-00E4SM
Mark	Qty.	Modi. No.	Signature	Date		
标记	数量	修改单号	签字	日期		
编制 Design					使用说明书 Instruction Book	图样标记 Drawing Mark / 总面积 Total Area m^2
校对 Examine						
审核 Verify						共 35 页 / 第 1 页
标检 Check						
审定 Approval		日期 Date				江苏南极机械有限责任公司 JIANGSU NANJI MACHINERY CO., LTD.

标 志 MARKS

1. 本装置可使用于检查船舶或非检查船舶。

The sewage treatment plant can be used on inspected or un-inspected vessels.

2. 本装置可使用于淡水冲洗或海水冲洗厕所污水。

The device is designed to flush toilet in salt or fresh water.

3. 本装置柜体的压力试验为 0.021MPa。

The test pressure of the tank is 0.021MPa.

4. 本装置排放水指标符合 IMO、MEPC227（64）的排放标准。

The effluent quality of the device is in compliance with the standards of IMO、MEPC227（64）.

警 告 WARNING

1. 本装置不得安装在爆炸性大气中，即非防爆型。

The device should not be installed in an explosive atmosphere, i.e. explosion proof type.

2. 本装置柜内壁涂防腐漆，不得在柜上再焊接。

Inside surface of the tank shall be coated with anticorrosive paint, re-welding should not be allowed on the surface of the tank.

目 录

1 概述 General

1.1 用途 Purpose

本装置适用于处理来自船上人员厕所的生活污水，使之达到 IMO、MEPC227（64）的排放标准，排至舷外。

The device is applicable to treat the sewage and the grey water from the toilet, to meet the standard of IMO. MEPC227（64), and discharge the effluent overboard.

1.2 工作条件 Working Condition

1.2.1 环境条件 Environment Condition

1.2.1.1 工作环境温度 Working Environment Temperature：0℃～+50℃

1.2.1.2 环境相对湿度 Environment Relative Humidity：≤90%

1.2.2 电源 Power：AC380V、50Hz、3φ

2 组成和技术特性 Composition and specifications

2.1 组成 Composition

本装置主要由如下主要部件组成

The device consists of main components as follows:

序号 No.	名 称 Name	单位 Unit	数量 Qty.	备注 Remarks
1	WCMBR-30(U)型装置 WCMBR-30(U) Type Marine Membrane Sewage Treatment Plant	套 set	1	
1.1	本体 Main body	套 set	1	Q235-B
1.2	粉碎泵 Cutting pump（0.5CWF-30B）	台 set	1	
1.3	风机 Fan (4RB 310-0AH26-7-J)	台 set	1	
1.4	排放泵 Discharge pump (32CGW-5-30)	台 set	1	
1.5	加药泵 Dosing pump (XH-10-07)	台 set	1	
1.6	膜组 Membrane assembly (6040W)	套 set	1	
1.7	紫外线消毒装置 UV-sterilizer (JX-0.5UV)	套 set	1	
1.8	电控箱 Electric control box	台 set	1	
1.9	电动二通球阀 Motor two-way ball valve (C800-40BF)	只 set	2	
1.10	电动三通球阀 Motor three-way ball valve (C80031-32BF)	只 set	1	
1.11	流量计 Flowmeter (Z-6016)	只 set	2	
1.12	液位开关 Level switch	套 set	1	
1.13	压力表 Pressure gauge (YC-60N)	只 set	1	0～0.06MPa
1.14	药箱 Chemical box	只 set	1	塑料 plastic

2.2 主要技术参数

⑴ 型号 Model：WCMBR-30 (U)

⑵ 处理能力 Treatment capacity：平均 Average 2310L/d

⑶ 排放水质 Effluent quality：

TSS≯35mg/l

BOD_5≯25 mg/l

COD≯125 mg/l

大肠菌 Coliform≯100 个/100ml

PH=6～8.5

余氯 Residual chlorine＜0.5mg/l

⑷ 排放水压力 Effluent pressure：0.1MPa

⑸ 压缩空气（用户提供）Compressed air (provided by the client)： 0.2～0.4MPa

⑹ 膜冲洗水 Membrane flush water：清洁水，压力 Fresh water, Pressure：0.5MPa

2.3 接口 Connection

2.3.1 电源接口 Power connection

AC380V 50Hz 3φ

2.3.2 物理接口 Physical connection

（法兰标准：GB/T2506-2010 PN10）（Flange standard: GB/T2506-2005 PN10）

⑴	污水入口 Sewage inlet	DN150
	医务室污水入口 Hospital Sewage Inlet	DN80
⑵	通气口 Vent	DN65
⑶	排放口 Effluent	DN32
⑷	冲洗水口 Flush water inlet	DN40
⑸	溢流口 Overflow	DN40
⑹	膜冲洗水口 Membrane flush water inlet	DN25
⑺	压缩空气入口 Compressed air inlet	DN15
⑻	应急排放口 Emergency discharge outlet	DN40

3 系统原理 System Principle

（请参照系统图 321NJUV-3-00XT）（see system drawing 321NJUV-3-00E4XT）

本装置采用序批式-膜法处理原理处理有机污染物质，其处理流程为：

The device adopts the principle of sequence-membrane to treat organic pollutant, the treatment procedures of the device are as following:

污水入口→ 缓冲柜 → 序批柜 → 清水柜 → 膜组→消毒→排放→

↑

回流 ＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿

sewage inlet→buffer tank→sequence tank→clean water tank→membrane→disinfect→discharge→

↑

recirculation ＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿

生活污水首先进入缓冲柜，以适应生化处理，同时该柜能容纳三倍的水力高峰负荷，当柜内液位达到中位时，粉碎泵启动，将污水转驳至置有软性填料的序批柜，进行序批式接触氧化、生化处理，处理后由流程泵转驳至清水柜内，当液位达到中位时，排放泵启动，将处理水泵入膜组或直接排放，经膜组过滤后的排放水经紫外线消毒后排出舷外。根据国际公约规定的规则海区可灵活使用序批式处理或膜法处理。

Sewage first enters into the buffer tank to adopt the biochemical treatment, meantime the tank can contain the sewage 3 times peak load. When the liquid reaches the middle-level, the cutting pump is started and the sewage is transferred to sequence tank with soft stuffing, and then contact oxidizing 、 biological treatment the sewage. The treated sewage is transferred by flow pump to clean water tank or discharge overboard directly. When the liquid reaches the middle-level in the clean water tank, the discharge pump is started and transferred the treated sewage into membrane assembly. The permeated pure water should be disinfected by UV device, then discharged overboard. According to the regulation of IMO, the regulated sea area should adopt the sequence or membrane treatment.

4 主要功能单元的结构、作用及工作原理 Main unit structure、function and working principle

4.1 粉碎泵 Cutting pump

粉碎泵用于将缓冲柜内的污水转驳至序批柜进行生物处理；或通过应急排放接口将污水直接排放至舷外。

Cutting pump is used to be on pumping the sewage from buffer tank to sequence tank for biologic treatment; or discharge the sewage overboard directly by the emergency discharge connection.

粉碎泵为开式叶轮的离心泵，在叶轮及泵的进口处带有刀刃，粉碎污水中的污物，叶轮背面带有短叶，以平衡泵产生的轴向力。

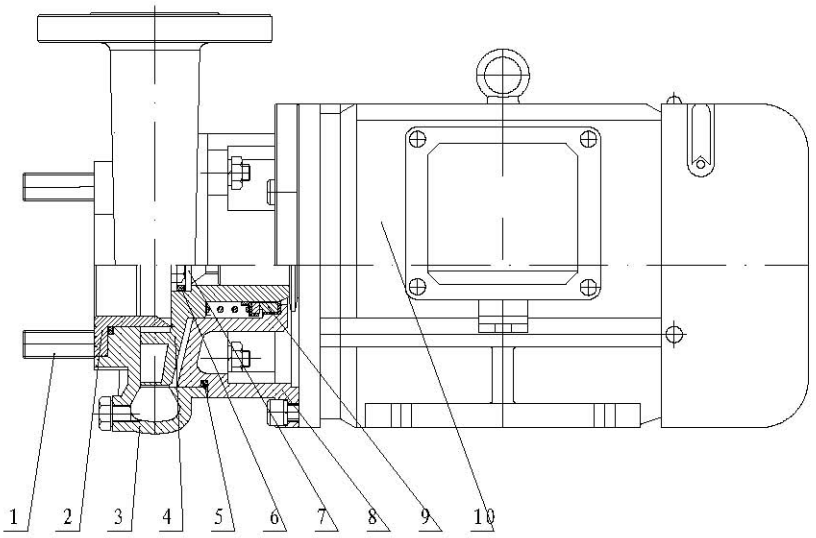
The cutting pump is an open impeller centrifugal pump, the inlet of the pump and the impeller equips with blades, to cut the solid in the sewage. There are short leaves on the back of the impeller for balancing the axial force coming from the pump.

泵的轴封采用机械密封。

The sealing of pump adopts mechanism sealing.

泵体间的连接用 1:5 锥度交合用 4 只螺柱紧固，以便在进行泵的检拆时能方便地将泵卸下，而人体不易接触到污物，连接片采用 O 形橡胶密封圈密封。

The body of pump is tightened rely on 1:5 angle of taper and four double-end bolts, so that the pump can conveniently disassemble, and persons will not touch the sewage directly. The connecting-piece adopts O-ring rubber sealing.



1. 双头螺栓 2. 前刀 3. 泵体 4. 叶轮 5. "0"型密封圈 6. "0"型密封圈 7. 锁紧螺钉
8. 后泵体组 9. 机械密封圈 10. 电机
1. double-head bolt 2.front knife 3.pump body 4.impeller 5."o"-ring 6. "o"-ring
7. lock screw 8. rear pump body set 9. mechanical sealing ring 10.eletrical machinery

4.1 粉碎泵结构图 Structure diagram of Cutting pump

4.2 排放泵 Discharge pump

排放泵为离心泵，兼作流程泵，其有二个功能：

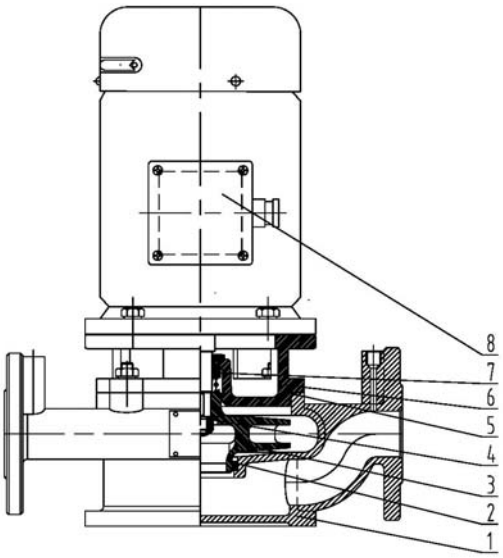
Discharge pump is a centrifugal pump, part time as flow pump. There are two functions:

⑴ 将经序批处理过的污水转驳至清水柜内或直接排放至舷外；

Transfers the treated sewage in the sequence tank to the clean water tank or discharge overboard directly;

⑵ 将清水柜内处理水泵入膜组进行过滤处理。

Transfers the treated sewage from the clean water tank to membrane for permeation treatment.



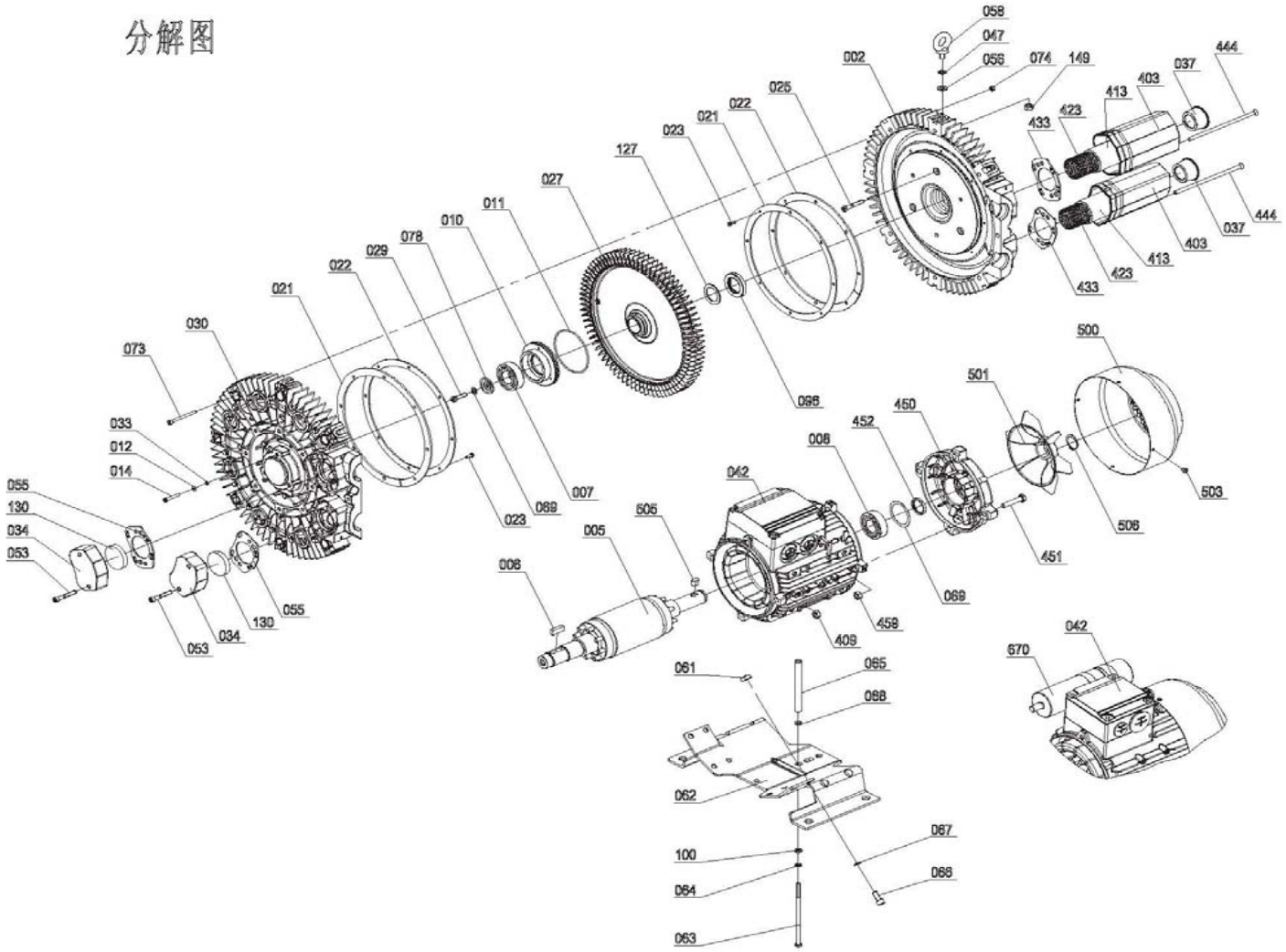
1. 泵体Pump casing 2.密封环 3.叶轮 4.锁紧螺母 5.O型密封圈
6.后泵体7. 机械密封圈 8.电机
1.Pump body 2.Sealing ring 3.Impeller 4.Lock nut 5.O-ring
6.Rear pump body 7.Mechanical seal 8.Motor

4.2 排放泵结构图 Structure diagram of discharge pump

4.3 风机 Fan

风机用于向缓冲柜、序批柜内提供充足的氧气，以利于活性污泥的繁殖。

Fan is used to offer enough oxygen to sewage in the buffer tank、sequence tank, and supply adequate oxygen for breeding of activated sludge.



4.3-1 风机结构图 Structure diagram of fan

配件编号	货物描述
001	驱动电机总成
002	泵体
005	转子
006	平行键
007	深沟轴承
008	深沟轴承
010	轴承座
011	O型圈
012	垫圈
014	螺丝钉
021	密封环
022	支撑环
023	螺丝钉
025	螺丝钉
027	叶轮
029	螺丝钉
030	前盖
033	O型圈
034	法兰
037	塑料盖子
042	接线盒
047	垫片
053	螺丝钉
055	密封件
056	垫片
058	吊耳环
061	方型螺母
062	底板
063	螺丝钉
064	弹簧垫圈
065	套管
066	螺丝钉
067	弹簧垫圈
068	垫圈

配件编号	货物描述
069	弹簧垫圈
072	中泵体
073	螺丝钉
074	方型螺母
078	垫圈
087	斗篷
090	方型螺母
096	轴封
100	垫圈
127	垫圈
128	垫圈
129	垫圈
130	填充物
133	轴封
134	轴管
139	垫圈
140	螺丝钉
149	方型螺母
403	消声器外壳
409	方型螺母
413	消声器填充物
423	网管
433	垫片
444	螺丝钉
450	电机端罩
451	螺丝钉
452	轴封
459	方型螺母
500	风罩
501	风扇
503	螺丝钉
505	平行键
506	扣环
670	电容器

图 4.3-2 4.3-1 风机结构明细表

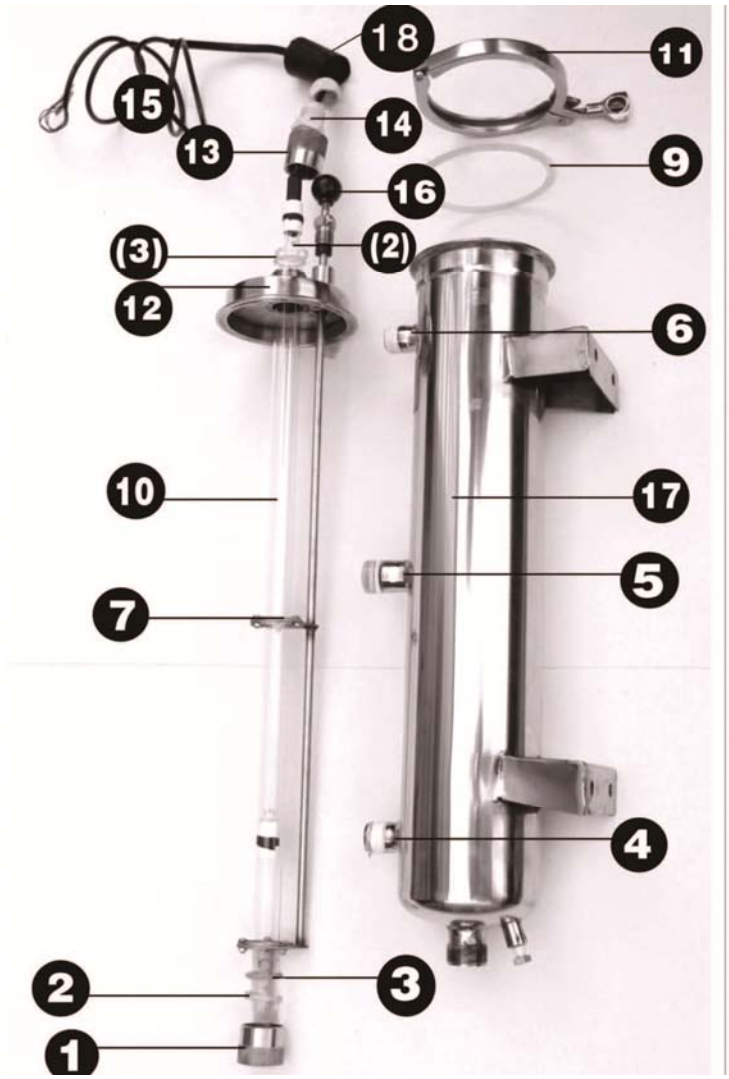
4.4 紫外线消毒装置 UV sterilizer

紫外线消毒装置用于对排放水进行消毒。

The UV sterilizer is used to disinfect the effluent.

紫外线消毒装置主要包括紫外线控制装置、紫外线灯管等。

The UV sterilizer mainly consists of UV controlling device、UV lamp pipe etc.



1.下密封压帽
lower airproof cap
2.活动压圈
active clamping ring
3.石英套管用密封圈
quartz sleeve seal ring
4.进水口
water inlet
5.观察帽
sight glass
6.进出口
water outlet
7.清洗刮片
cleaning blade
8.石英套管
quartz sleeve
9.筒体密封圈
tube seal ring
10.紫外线灯管
uv lamp
11.夹箍
clip
12.上盖
upper cap
13.上密封压帽
upper airproof cap
14.防水电缆接头
water proof cable connecter
15.灯头线
lamp head wire
16.手动清洗杆
manual cleaning pole
17.筒体
uv tube
18.防尘、防水套
waterproof and dustproof

4.4 紫外线消毒器结构图 Structure diagram of UV sterilizer

4.5 膜组 Membrane assembly

膜组由中空纤维超滤膜组成，用于过滤清水柜内的排放水。

Membrane consists of hollow fiber ultrafiltration membrane to penetrate effluent from clean water tank.

4.6 加药泵 Dosing pump

加药泵用于将清洗液泵入膜组，对膜组进行清洗。

The dosing pump is used to transfer the supernatant to the membrane and flush the membrane.

计量泵是由微处理器控制，频率及其冲程可调，工作时间可根据需要设定的，电磁驱动的隔膜式计量泵。可用于多种液体的计量输送。

The metering pump is controlled by a microprocessor, the frequency and its stroke are

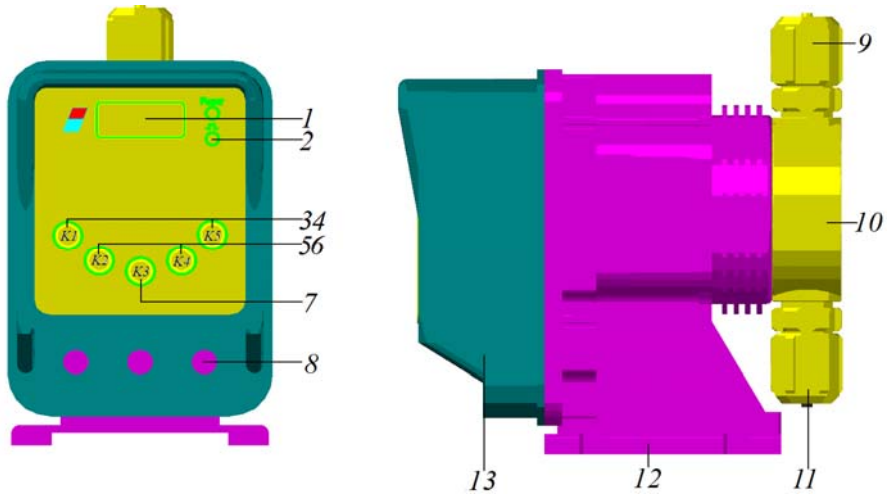
adjustable, and the working time can be set according to the needs. It is an electromagnetically driven diaphragm metering pump. It can be used for metering and conveying of various liquids.

计量泵中电磁推杆带动隔膜在泵头内往复运动，引起泵头膛腔体积和压力的变化，压力的变化引起吸液阀门和排液阀门的开启和关闭，实现液体的定量吸入和排出。

In the metering pump, the electromagnetic push rod drives the diaphragm to reciprocate in the pump head, causing the volume and pressure of the pump head cavity to change. The pressure change causes the opening and closing of the suction valve and the discharge valve to achieve quantitative suction and discharge of liquid.

计量泵的额定排量在 1-20L/H 范围内，对应的最大工作压力一般为 1-10BAR。泵的出口流量可根据频率按钮或冲程长度调节螺钉来调节。LED 发光二极管指示运行状态。

The rated displacement of the metering pump is in the range of 1-20L/H, and the corresponding maximum working pressure is generally 1-10BAR. The outlet flow of the pump can be adjusted according to the frequency button or the stroke length adjustment screw. LED light-emitting diodes indicate operating status.



1、频率指示 frequency indication 2、工作指示灯 work indicator

3、定时设定按钮 Timer setting button 4、定时设定按钮 Timer setting button

5、频率调整按钮 frequency adjustment button

6、频率调整按钮 frequency adjustment button 7、启动停止按钮 start / stop button

8、电源接口 power interface 9、排液阀 Drain valve 10、泵头 pump head
11、吸液阀 suction valve 12、泵体 pump body 13、泵盖 pump cover

4.5 加药泵结构图 Structure diagram of dosing pump

4.7 电气控制箱 Electric control box

警示：本装置操作人员必须首先熟读电气控制使用说明书，在没有弄懂操作程序前不得合上电源和任意按动电气控制箱上的按钮和拨弄《转换开关》！

Caution： The operation personnel should first review the electric control manual. Don't turn off the power and press the button on electric control box and fiddle with《change-over switch》before understanding the operation procedure!

警告：电气控制箱为强电控制设备，操作不当会引起人身伤害甚至生命危险！必须由专业人员才可接触电气控制系统。

Warning：The equipment is supplied with voltages that are dangerous and could prove fatal if not operated properly! Only the professional can contact the electric control system.

电控箱控制本装置各运动部件的启、停，开、关，运行由 PLC 程序控制。各运动部件的运行状态均在电控箱显示屏中体现。

Electric control box controls the "start", "stop", "on", "off" of the components, all operation is controlled by PLC. The operation conditions will be displayed on the display screen of electric control box.

4.7.1 手动运行 Manual operation

接通控制电源后，将面板上的手动转换开关置"运行"位置，可分别对粉碎泵、流程泵、排放泵、风机、紫外线消毒器、加药泵、电动阀进行触点式手动运行。显示屏上对应位置的红灯变为绿色，表示该设备运行，显示屏上对应的绿灯变为黑色，表示该设备停止运行。

After the control power is turned on, set the manual switch on the panel to the "On" position, and the cutting pump, process pump, discharge pump, fan, ultraviolet sterilizer, dosing pump and electric valve can be operated manually by contact. The red light at the corresponding position on the display screen turns green, indicating that the plant is running, and the corresponding green light on the display screen turns dark, indicating that the plant stops running.

4.7.2 自动运行 Auto operation

面板上的手动转换开关置“停止”位置，装置系统处于自动运行状态。

Turn the manual switch to “Stop” position and the plant is under auto operation condition.

4.7.2.1 粉碎泵 Cutting pump

粉碎泵在“自动”时，粉碎泵受缓冲柜内液位或序批柜内液位控制，当缓冲柜内液位达到中位时，粉碎泵启动，直至序批柜内液位至高位或缓冲柜内至低位时停止。

When the switch is at the “AUTO” position, the cutting pump will be controlled by the liquid level of the buffer tank, when the liquid reaches the middle level the cutting pump starts and will not stop until the liquid reaches the low level.

4.7.2.2 排放泵 Discharge pump

排放泵由控制箱在“自动”时，受 PLC 程序控制启、停。

When the switch is at the “AUTO” position, the discharge pump will be controlled by PLC.

4.7.2.4 风机 Fan

风机在“自动”时，受 PLC 程序控制启、停。

For Fan, when the switch is at the “AUTO” position, it will be controlled by PLC.

4.7.2.5 紫外线消毒装置 UV sterilizer

紫外线消毒装置转向“自动”时，当排放泵启动，将处理水泵入膜组进行过滤处理时，消毒装置启动；排放泵停止时，紫外线消毒装置停止运行。

When the switch is turned to the “AUTO” position, the discharge pump will start and the sterilizer will start when the treated water is transferred to the membrane module for filtration, and when the discharge pump stops, the UV sterilizer will stop running.

4.7.2.6 加药泵 Dosing pump

加药泵主要用于清洗膜组件，由控制箱显示屏上的触摸按钮控制，按下触摸按钮时，加药泵连续运行；再次按下此按钮时，加药泵停止运行。

The dosing pump is mainly used to clean the membrane assembly and is controlled by the touch icon on the display screen of the control box. When the icon is touched, the dosing

5 运行方式 Operation modes

5.1 培菌 Breeding bacteria

警示：本装置在启动正常运行前，必须进行培菌程序。

膜不能在原污水状态下运行。

Warning：The “breeding bacteria” procedure should be operated before the device is started to use normally.

The membrane should not be operated under the raw sewage.

将《运行模式》转换开关转向“培菌”程序，打开原污水入口阀，污水进入缓冲柜，当 F1 水位指示灯亮时，说明已有污水进入，当 F2 水位指示灯亮时，表明缓冲柜水位已上升到中位 F2 点，此时粉碎泵 P1 自动启动，将污水转驳至序批柜内，缓冲柜水位因 P1 启动运行而下降，至 R2 或 F1 时，P1 自动停。

Turn the《operation mode》change-over switch to “breeding bacteria” mode, and turn on the raw sewage inlet valve, the sewage will enter into the buffer tank. When the water level indicator lamp F1 is lighted, it indicates that the sewage has entered, when the water level indicator lamp F2 is lighted, it indicates that the water level of buffer tank has reached up to middle F2. At the moment the cutting pump P1 will be started automatically and the sewage will be transferred into the sequence tank, the level in sequence tank will declined follow P1 starts, and P1 will be stopped automatically when the level goes down to R2 or F1.

再进入原污水，缓冲柜因水位升到 F2，这时序批柜液位 R2 指示灯和缓冲柜液位 F2 指示灯都亮，关闭污水入口阀。

When the raw sewage enters again, it will be repeated the above operation because of the water level is up to F2, and close the sewage inlet valve by human until the sequence tank water level indicator lamp R2 is lighted, the buffer tank water level indicator lamp F2 is lighted.

启动风机 PQ1 自动进行，PQ1 连续运行。运行 2 天后，执行一次《公海排放》程序，排去少量上清液后，如上所述加入新鲜污水。

When the fan PQ1 has been started, PQ1 will run continuously. Two days later, the《high sea discharge》mode should be carried out once time, and discharge a few quantity of effluent, then feed raw sewage as above stated.

可以从取样口取出序批的污水，用 100ml 量筒观察活性污泥的培养状态如何，静止沉淀 30 分钟后，如达到 1/3，则说明“培菌”工作完成。一般生的原污水培菌需要 2-3 周时间，如能加入“种泥”菌种可缩短培养时间。

Take a sample of sequencing sewage by 100ml glass of cylinder and observe the breeding state of the activated sludge. After settling for 30 minutes if it reaches one-third, it indicates that the "breeding bacteria" mode has been finished. Normally, the time of "breeding bacteria" mode for the raw sewage needs 2-3 weeks，the time will be shortened if feed the activated sludge seeds.

装置经过一段较长时间的停歇，也可用"培菌"程序，因为柜内已有休眠的活性污泥，培菌过程仅需 1-2 天。

The device can also be used on "breeding bacteria" mode after a long dormancy, because dormant activated sludge has existed in the tank, so the time of "breeding bacteria" mode only needs 1-2 days.

培菌过程中膜组不参加工作。

The membrane should not be worked during "breeding bacteria".

5.2 正常运行 Operation in normal

在"培菌"程序完成后，可将程序转向《正常运行》，打开污水入口阀，当缓冲柜内液位达 F2 时，P1 泵启动，将污水转驳至序批柜内，直至液位至 R2 时停止（此过程为"进水期"），进水期 PQ1 连续运转；进水期完成后，进入"曝气期"，PQ1 连续运转，上述两过程共计 45 分钟；45 分钟后，进入"静止期"进行沉淀，风机 PQ1 停止，30 分钟后，DV1 打开，P2 泵启动，以下有两种选择：

The mode switch can be turned to《normal running》when the mode of "breeding bacteria" has been finished. Open the sewage inlet valve, when the buffer tank water level reaches F2，the pump P1 is started, then the sewage is transferred to the sequence tank and will be stopped until the water level reaches R2 in sequence tank（the procedure is called "feeding time"）, PQ1 will run continuously in the feeding time；after the feeding time, "aeration time" is coming, the PQ1 will run continuously, the total procedure is 45 minutes; after 45 minutes, "stationary time" is coming，in which time PQ1 will be stopped；after 30 minutes，DV1 is open，the pump P2 is started，there are two choices as follows：

5.2.1 膜法处理 Membrane treatment

手动关闭阀 VQ7，打开 VQ5、VQ6，将转换开关转向《膜法处理》，DV3 旁通打开，P2 将处理水泵入清水柜，直至液位至 R1 或 L3 时停止，当清水柜内液位超过 L2

时，DV2 和 VS2 打开、DV3 直通，1 分钟后紫外线、P2 泵启动，手动调节 V1、V3，控制出水量和浓缩液回流量（一般预先都调定为 50%），排放水经膜组过滤后经消毒后排放至舷外，直至液位至 L1 时，P2、紫外线消毒装置停止，DV2、DV3 关闭，延时 1 分钟后，VS1 打开，冲刷膜，10 秒后关闭， 重复一次。

Close the valve VQ7 manually, open VQ5、VQ6，turn the change-over switch to《membrane treatment》，DV3 is open in by pass manner，P2 will transfer the treated water to the clean water tank and stop until the level reaches to R1 or L3，when the level in the clean water tank is upper than L2，DV2 and VS2 are open, DV3 in bypass manner，the UV and the pump P2 will be started one minute later, adjust V1、V3 manually，and control ratio of the effluent and concentrated liquid（generally sets to 50%），the effluent is discharged overboard after being disinfected through membrane permeation. The UV device and P2 are stopped until the water level goes down L1，and DV2、DV3 will be closed，after one minute delay, VS1 will be open to flush membrane and will be stopped in 10 seconds.

也可定期手动打开冲洗水阀 V2，V4，关闭 VQ5、V3、V1，用清水对膜进行清洗，从视流管中看到水变清为止。

Open the flushing water valve V2 and V4 timely by hand，close VQ5、V3、V1，so let the ship clean water flush the membrane until the water in transparent pipe becomes clear.

5.2.2 公海排放 High sea discharge

当船航行于公海或非规则海区时，可关闭阀 VQ5、VQ6，打开阀 VQ7，将转换开关转向《公海排放》，DV3 直通打开，可将经过曝气、沉淀后的上清液直接排放至舷外，此方式可延长膜的使用寿命。

When the vessels navigate on high sea or unregulated sea areas, close the valve VQ5、VQ6，open the valve VQ7，turn the change-over switch to《high sea discharge》，DV3 will be open by straight, the supernatant liquid which has been aerated and settled in sequence tank may be discharged overboard directly. It can be prolong the service life of the membrane if using this mode.

在正常运行过程中，如果 F1、R1 脱水 4 小时以上，装置将自动进入休眠状态，PQ1（）开 20 分钟，停 20 分钟，直至污水进入，休眠才自动中止。

Under normally operation, the device will enter into sleeping state automatically when F1

and R1are dehydrated more than 4 hours，PQ1 will be running for 20 minutes，and stopping for 20 minute，the dormancy will intermit automatically until the sewage enters again.

5.3 应急排放 Emergency discharging

当遇到紧急情况，装置不能正常运行时，可手动关闭 VQ2、VQ4，打开 VQ1，VQ3，将粉碎排放泵转换开关转向“自动”，当液位至 F2 时启动，F1 时停止，缓冲柜内的污水经粉碎后直接排放至舷外。

When in the emergency, the device cannot operate normally, close VQ2 、 VQ4 manually，open VQ1，VQ3，turn the cutting and discharge pump change-over switches to “AUTO”. When the liquid level reaches F2， it will be started and stopped at the level F1. Discharge the effluent from the buffer tank to overboard.

5.4 化学清洗 Chemical cleaning

膜组参加装置正常运行 3 个月以后或当排放流量降低时，需对其进行一次化学清洗。关闭阀 V1、V2、V3、V4、VQ5，打开加药考克 C1、C2，启动加药泵，使药闭式循环 10 分钟后，停止加药泵，关闭 C1、C2。

The membrane should be chemical cleaned one time after running for three months normally or the effluent flux goes down. Close the valve V1、V2、V3、V4、VQ5，open the dosing cock C1、C2，operate the dosing pump，stop it and close C1、C2 after circulating the chemicals for 10 minutes.

3～8 小时浸泡完成，手动打开阀 VQ7，VQ5、V2，关闭阀 V1、V4、VQ6，将残余液排至舷外，5 分钟后关闭阀 V2。

Open the valve VQ7，VQ5、V2，close the valve V1、V4、VQ6 after soaking for 3～8 hours，discharge the remainder liquid to overboard and close the valve V2 after 5 minutes.

化学药剂采用二种溶液：一是采用 3%的 NaOH 溶液，二是采用次氯酸钠溶液。

Chemical cleaning solution should adopt two kinds: (1) 3% NaOH；(2) NaClO.

5.4.1 3%NaOH 溶液配制程序 Procedure of making up 3% NaOH solution：

本装置配有 10 升容量的塑料带盖方桶，先加满清水，然后加入 0.75kg100%的 NaOH 固体粉剂，用木棒搅匀，让其静放 2 小时以上，盖上盖子，连接上加药泵的硅胶管即可使用。

The device is provided with a plastic container with volume of 10 liters. First fill it with

clean water, then feed 0.75 Kg of 100% of sodium hydroxide solid powder into the container, mix them with a stick and put the cover on the container. The solution should be left for more than 2 hours and then connected with the silicone pipe of the dosing pump for using.

注意 Caution:

1) 严禁与易燃物或可燃物、酸类、食用化学品等接触；

Do not contact with tinder or combustible、acid or food stuffs;

2) 失火时，可用水、砂土和各种灭火器扑救，但操作人员应注意水中溶入烧碱后的腐蚀性。

If fire occurs, drench with water、 sand soil and various fire extinguishers, but the operator should notice the corrosion of water mixed with sodium hydroxide;

3) 保存固体氢氧化钠时要注意把瓶口封严，以防止暴露在空气中吸收水分潮解或与二氧化碳反应，保持容器在冷却、干燥的地方，不要任意更换容器；

Make sure the bottle, which is used to keep the solid sodium hydroxide, has been sealed tightly, in case it reacts with carbon dioxide and moisture in the air so as to prevent explosion. Keep the container under cooling and dry conditions. Do not change the container casually;

4) 不要让氢氧化钠接触人眼、皮肤或衣服，吃入口中会发生很大危险；

Do not contact the sodium hydroxide with eyes, skin or clothing, it is fatal if swallowed;

5) 小心安放容器，不要跌落、滚动或拖滑，保持朝上安放位置；

Handle the container with care. Do not drop, roll or skid. Keep it upright;

6) 倒空的容器可能残留有害物，用空后立即用大量水冲洗干净放在安全的处所；

The empty container may remain noxious substance, clean it with a great of clean water and put it away on safe place after emptying;

7) 稀释或制备溶液时，应把碱加入水中，避免沸腾和飞溅；

Feed the sodium hydroxide into the large quantity of water when dilute and make of the solution as to avoid boil and splash;

8) 添加氢氧化钠时，穿戴防护眼镜、口罩与手套，慢慢倒至水中；

Wear protective spectacles、respirator and glove and pour it into the water slowly when

feed the sodium hydroxide;

9) 万一发生氢氧化钠散落，首先将氢氧化钠扫起，慢慢倒至大量水中，然后地面用水冲洗，冲洗水放入废水系统；

If the sodium hydroxide spills, first clear it away and pour it into a great quantity of water slowly, then flush the floor, at last pour the flush water into the waste water system. Sodium hydroxide is extremely slippery when wet;

10) 不要让儿童接触；

Make sure the children do not contact with it.

解毒方法 Antidote：

碱液触及皮肤，可用 5～10%硫酸镁溶液清洗；如溅入眼睛里，应立即用大量硼酸水溶液清洗；少量误食时立即用食醋、3～5%醋酸或 5%稀盐酸、大量橘汁或柠檬汁等中和，给饮蛋清、牛奶或植物油并迅速就医，禁忌催吐和洗胃。

If skin contacts with the lye, clean it with 5～10% magnesium sulphate solution. If the lye splash into the eyes, clean eyes with a great quantity of boracic acid solution. If eat it a little by mistake, counteract vinegar、3～5% acetic acid or 5% diluted hydrochloric acid、large quantity of orange juice or lemon juice, drink egg white、milk or vegetable oil and visit the doctor immediately, avoid pushing vomiting and washing stomach

5.4.2 次氯酸钠溶液配制程序 Procedure of making up NaClO solution：

每次向 10L 容量的塑料桶内加入 2kg65%漂粉精，然后加满水，用木棒搅匀，盖上盖子，让其静放 2 小时以上，然后连上定量泵的硅胶管即可使用。

Feed 2 Kg of 65% of bleaching powder into the 10 liters plastic container every time, then fill with water and mix them with a stick and put the cover on the container. The solution should be left for more than 2 hours and then connected with the silicone pipe of the dosing pump for using.

注意：

1) 不要将下列物品与次氯酸钠溶液混合以及接触：润滑油脂、柴油、机油、酸、碱、肥皂制品、油漆制品、厨房用化学品、醋、泔脚、饮料、松节能油等等。如与这类化学品混和或接触，含氯消毒剂将会引起剧烈燃烧。

Do not mix and contact NaClO solution with the stuff as following: lubricating oil、

diesel fuel、engine oil、acid、alkali、soap、paint、chemical used in the kitchen、vinegar、hogwash、soft drink、turps etc. If mixed or contacted with the above chemical, the chlorination will burn fiercely.

2) 防止任何热的或燃烧物质与次氯酸钠接触，如点燃的香烟。

Do not contact NaClO with any hot or incendiary substances, for example: burning cigarette.

3) 如果发生火灾，必须用大量水浇灭和冷却周围环境。

If fire occurs, drench with water and cool surrounding environment.

4) 不要让次氯酸钠接触人眼、皮肤或衣服，否则可能引起化学燃烧，吃入口中会发生很大危险。

Do not contact NaClO with eyes, skin or clothing, it is fatal if swallowed.

5) 小心安放容器，不要跌落、滚动或拖滑，保持朝上安放位置。

Handle the container with care. Do not drop, roll or skid. Keep it upright.

6) 在添加次氯酸钠粉时必须保持手的干燥，清洁，戴橡皮手套用金属器皿，如果散落，可能引起火灾。

Keep hands dry, clean and wear protective spectacles、respirator and glove and pour it into the water slowly when feed NaClO powder.

7) 万一发生次氯酸钠粉散落，必须用大量水冲洗干净。

If NaClO powder is splashed, flush with a quantity of water.

8) 不要让儿童接触。

Make sure the children do not contact with it casually.

9) 保持容器在冷却、干燥的地方，不要任意更换容器。

Keep the container under cooling and dry conditions. Do not change the container casually.

10) 不要乱扔空桶，用空后立即用大量水冲净放在安全的处所。

Don’t throw the empty container, put it away on safe place after emptying.

解毒方法 **Antidote:**

外部：用大量水冲洗皮肤或眼睛 15 分钟，如果皮肤灼烧，应立即医疗处置，如果眼睛灼烧应立即请外科医生处置。

External：Flush skin or eyes with a great quantity of water for 15 minutes. If the skin is burned, adopt the medical treatment immediately. If the eyes are burned, ask for help from surgeon.

内部：饮大量水或牛奶，然后吃镁盐泻药，蔬菜油或鸡蛋。

Internal：Drink a great quantity of water or milk, then have bitter aloes with magnesium vegetable oil or eggs.

5.5 污泥排放 Sludge Discharge

当装置正常运行半年左右，使用 100mL 量筒从序批柜内取 100mL 污水，放置半个小时，若污泥量达到 1/2 时，就需排去少量污泥，直至达到 1/3 时停止。排放的必须用污泥桶进行收集，或在公海进行排放，不得任意排放。

When the device runs normally for about half a year, take 100ml water sample from the sequence tank using a 100ml glass measure, set for half an hour, if the sludge quantity reaches 50% of the glass measure，discharge a little sludge until it reaches 1/3 of the glass measure. The discharged sludge should be collected with sludge tank. Do not discharge casually.

警示：膜化学清洗程序必须是在采用"公海排放"运行方式或根本不使用本装置时进行。

Warning：The procedure of the membrane chemical cleaning should be operated under the condition of "high sea discharge" operation modes or unused the device.

6 操作 Operation

6.1 启动前的准备 Preparation before starting

1) 检查各泵、接口连接和紧固情况；

   Check pumps、connections and tightness;

2) 检查主电源电路；

   Check the circuit of the main power;

3) 检查并确认所有泵转向正确；

   Check the rotation direction of all pumps;

4) 检查提供的压缩空气气源压力和膜冲洗水压力是否符合要求（应不大于 0.4MPa）。

   Check the compressed air source pressure and membrane flush water pressure whether

accord with the requirements. (Not more than 0.4MPa)

5) 检查装置接地是否牢靠。

Check the earth connection of the device firmly;

6) 出厂时保水阀 VQ5、V3、V1 关紧，保证膜处于保养液中，膜长期脱水干裂会失效。所以，在运转时才能打开。注意在低温地区保存时应加装防冻液，以免膜件被冻坏。

The keep-water valve VQ5、V3、V1 are all shut when the device leaving from factory, so as to make sure the membrane keep in preserved liquid, otherwise, the membrane will be dried and lost effect. So, these valves will be open only before run.

6.2 起动及运行 Start and run

6.2.1 培菌 Breeding bacteria

1) 打开污水入口阀、VQ2、VQ3；

Open the sewage inlet valve VQ2、VQ3;

2) 将运行模式转换开关转向“培菌”；

Turn the operation mode change-over switch to “breeding bacteria”;

3) 当缓冲柜液位达 F2、序批柜液位至 R2 后，关闭污水入口阀；

When the liquid level of the buffer tank reaches F2、the liquid level of the sequence tank reaches R2, close the sewage inlet valve;

4) 每二天启动一次“公海排放”程序后，加入新鲜污水；

Start “high sea discharge” mode every two days, then feed raw sewage;

5) 可以从取样口取出序批柜内的污水，用 100ml 量筒观察活性污泥的培养状态如何，如达到 1/3，则说明“培菌”工作完成。一般生的原污水培菌需要 2-3 周时间，如能加入“种泥”菌种可缩短培养时间。

Take a sample of sequencing sewage by 100ml glass cylinder and observe the breeding state of the activated sludge. When it reaches 1/3， it indicates that the “breeding bacteria” mode has been finished. Normally, the time of “breeding bacteria” mode for the raw sewage needs 2-3 weeks，the time will be shortened if feed the activated sludge seeds before.

6.2.2 正常运行 Normal operation

6.2.2.1 公海排放 High sea discharge

1) 将转换开关转向“正常运行”、“公海排放”；

Turn the change-over switch to “normal operation”、“high sea discharge”;

2) 打开阀 VQ2、VQ3、VQ7、关闭阀 VQ5、VQ6；

Open the valve VQ2、VQ3、VQ7, close the valve VQ5、VQ6;

6.2.2.2 膜法处理 Membrane treatment

1) 将转换开关转向“正常运行”、“膜法处理”；

Turn the change-over switch to “normal operation”、“membrane treatment”;

2) 打开阀 VQ2、VQ3、VQ5、V1、V3、VQ6，关闭阀 V2、V4、VQ7；

Open the valve VQ2、VQ3、VQ5、V1、V3、VQ6，close the valve V2、V4、VQ7

6.2.3 应急排放 Emergency discharge

1) 打开阀 VQ1、VQ3，关闭阀 VQ2、VQ4；

Open the valve VQ1、VQ3，close the valve VQ2、VQ4；

2) 将应急排放转换开关转向“运行”；

Turn the emergency discharge change-over switch to "On";

6.2.4 化学清洗 Chemical cleaning

1) 向药箱内加入清洗溶液，打开加药泵压盖，将硅胶管压入，盖上盖子，将硅胶管的一端接至阀 C2，另一端放在药桶内，再用一段硅胶管将 C1 与药相连；

Feed the solution into chemical box, open the cover of dosing pump and push the silicon pipe into it, then close the cover, connect one end of the silicon pipe with C2 and put the other end into the chemical box, at last connect C1 with chemical using a silicon pipe;

2) 关闭阀 VQ5、V1、V2、V3、V4，打开阀 C1、C2；

Close the valve VQ5、V1、V2、V3、V4，open the valve C1、C2；

3) 按下加药泵触摸按钮启动；

Touch the start icon of the dosing pump;

4) 30 分钟后按下加药泵触摸按钮停止；

Touch the off icon of the dosing pump 30 minutes later;

5) 关闭阀 C1、C2，拆下硅胶管；

Close the valve C1、C2, disassemble the silicon rubber pipe;

6) 3～8 小时后，打开阀 V2，VQ5、VQ7，关闭阀 VQ6，5 分钟后关闭阀 V2。

Open the valve V2，VQ5、VQ7, 3～8 hours later，close the valve VQ6，and close the valve V2 5 minutes later.

6.2.5 清水清洗 Fresh water cleaning

6.2.5.1 当膜组参加装置正常运行 15 天左右，需对其进行一次清水清洗。

When the membrane assembly is under normal operation for 15 days, the membrane assembly should be washed once.

1) 关闭阀 VQ5、V1、V3、V5，打开阀 V2、V4；

Close the valve VQ5、V1、V3、V5，open the valve V2、V4；

2) 直至视流管中的水变清后关闭阀 V2、V4，其它阀门复位。

Close valve V2 until the water in transparent pipe becomes clean.

6.3 停止运行 Stop running

长期停止不用（指超过三个月不用的工况）

Stop for a long time（i.e. it stops for more than three months）

6.3.1 关闭污水进口阀；

Close the sewage inlet valve;

6.3.2 将装置内的水排空；

Discharge thoroughly all water in the device;

6.3.3 打开装置的冲洗水口，用冲洗水冲洗柜子，反复二次，排空；

Open the flushing water valve of the device，wash the tank with flushing water for two times, and discharge thoroughly;

6.3.4 切断电源。

Turn off the power.

7 安装 Installation

7.1 装置安装 Device installation

7.1.1 装置底座用槽钢焊接而成，船舶基座（由用户自制）与底座采用焊接或螺栓联接；

The device base is welded by channel steel, the connection between the ship base which is

supplied by client and the plant base should be welded or bolted;

7.1.2 装置安装处四周加围框，高约 80 毫米用以收集可能从泵轴处漏出的污水；

A barrier should be provided on the location of the plant flow, which is 80mm height and is used to collect the sewage in case from the axle of the pump;

7.1.3 电气控制箱外部接线完毕以后，应将机架接地；

It should be earth connection after finishing connection of external wires of the electric control box;

7.1.4 装置附近应设有清洗用自来水龙头和洗手盆，还应有空间贮存化学药品，此外应保持干燥和远离可能发生爆炸的地方；

A running water tap and a washbasin for cleaning and a space for chlorine storage room should be provided. The space should be kept dry and far away from the place where explosion may occur;

7.1.5 安装装置的房间要求干燥且通风良好。

The room installed the device should be dry and well ventilated.

7.2 电气 Electric

7.2.1 将 AC380V、50Hz、3φ电源接入各装置的电气控制箱，应保证接线填料函的密封，如果各泵转向不对，则应对调两根进线头；

An electric wire power supply of AC380V、50Hz、3φ should be connected into the electric control box. The sealing of wiring stuffing nut should be tightened. If the water pump rotates at a wrong direction, the two incoming wiring terminals should be exchanged with each other;

7.2.2 控制箱前应留有足够的维修空间，建议大于 600 毫米；

A place with enough space of more than 600mm should be reserved for maintenance in front of the control box.

7.3 外部管系 Terminal pipe

7.3.1 污水入口管 Sewage inlet pipe

将厕所下水道污水总管与装置污水入口相连接。

The toilet sewage drain pipe should be connected with the sewage inlet.

7.3.2 医务室污水入口管 Hospital sewage inlet pipe

将医务室下水道污水总管与装置医务室污水入口相连接。

The hospital sewage drain pipe should be connected with the hospital sewage inlet.

7.3.3 通气管 Vent pipe

通气管应由各装置通气口引出，通至上甲板高出甲板 3 米，并带有鹅颈弯管，管口加防火星网（由用户自制），应远离生活区或居室窗口。

The air vent pipe should be led from vent to the upper deck, which is 3 meters higher than the deck. A gooseneck and spark-proof net are provided in pipe connections (provided by client). It is better to keep vent away from residential areas or windows of living rooms.

注意：通气管上不得有盛水弯，以免通气不畅。

Caution: The whole vent pipe should not bend for avoiding vent blocked.

7.3.4 排放水管 Drain pipe

排放水管直接从排放出口接至舷外，舷壁应加装防浪止回阀，如在水线以上，排放水管应做成倒虹管，防止污水从装置自流至舷外。

The drain connection is connected from outlet of the discharge pump to overboard directly. A storm valve should be provided. If the drain connection is above the draft water line, an inverted drain anti-siphon should be provided to prevent the effluent self-flow from the device to overboard.

7.3.5 冲洗水管 Flushing water pipe

船上应有一路水源引至装置冲洗水入口处，供清洗柜子时使用，船厂应加截止阀。膜冲洗水接口联接的冲洗水压力为 0.5MPa，且为清洁的水。

The fire-fighting system on the vessel should be designed that one way can lead to flush water inlet of the device for cleaning the tank, the shipyard should provide with stop valve. The flush water pressure on the membrane flush water connection is 0.5MPa and should be clean water.

7.3.6 空气管路 Air pipe

引一路压缩空气管路至空气接口处，压力为 0.2～0.4MPa。

Lead one way compressed air pipeline to air connection, the pressure is 0.2～0.4MPa.

7.3.6 溢流管 Overflow pipe

装置溢流管接至污水溢流舱。

The overflow pipe of the plant should be connected to the sewage overflow to the cabin.

8 故障及排除 Troubleshooting

序号 No.	故障现象 Failure phenomenon	可能产生的原因 Possible cause	故障排除方法 Troubleshooting method	备注 Remark
1	高位报警 High level alarm	使用人数超标或冲洗水量过大，超负荷处理 The number of users exceeds the standard or the amount of flushing water is too large and the load is overloaded.	临时禁止冲洗厕所，耐心等待排放或应急排放。控制冲洗水 It is forbidden to flush the toilet temporarily, and wait patiently for discharge or emergency discharge. Control the flushing water	
		高液位开关失灵 High level switch malfunction	检查高液位开关是否失灵，检修或更换。 Inspect the high level switch whether it is out of order, repair or replace.	
		电动阀打不开导致无法正常排放 The motor valve cannot be opened, resulting in abnormal discharge	检查线路及控制或用手动打开。 Check wiring and control or open manually.	
		膜污染堵塞导致回流水量加大 Membrane fouling increases, resulting in the amount of back-flow water	进行膜清洗程序或更换。 Perform a membrane cleaning procedure or replace.	
		排放管及浓缩回流管阀门开启角度不正确导致浓	正确调节排放管及浓缩回流管阀门，使排放水量和浓缩水回流量各占	

序号 No.	故障现象 Failure phenomenon	可能产生的原因 Possible cause	故障排除方法 Troubleshooting method	备注 Remark
		缩水回流量大 Opening angle of drain pipe and concentrated return pipe valve is incorrect, resulting in large concentrated water back flow	50%。 Adjust the valve of the discharge pipe and the concentrated return pipe correctly so that the discharged water volume and the concentrated water return flow amount to 50% each.	
2	指示灯不亮 Indicator light does not light	相应指示灯该亮不亮 The corresponding indicator light is off	指示灯坏了，更换。 The indicator light is broken. Replace it.	
		指示灯显示不符 Indicator light displays inconsistent	液位浮球开关有故障，检修或更换。 The liquid level float switch is broken, repair or replaced.	
3	水泵不转 Pump does not rotate	接线脱落 Wiring off	检查并接妥。 Check and connect.	
		异物堵塞 Foreign body blocking	断开电源，打开排堵。 Disconnect the power and open to remove the blocking.	
4	电动阀打不开,关不死 Motor valve cannot be opened and closed tightly	接线不妥 Wiring off	检查并接妥。 Check and connect.	
		异物堵塞 Foreign body blocking	拆除并清理。 Remove and clean up.	
5	装置不能正确按程序运行 Plant does not operate correctly	PLC 失灵 PLC failure	及时联系工厂修理，暂时采用手动。 Contact the factory for repair in time, using by manual temporarily.	
6	膜法处理时不能正常排水 Drainage does not work properly during membrane treatment	培菌未达到规定要求而强制使用“膜法处理程序”进行排放，导致膜堵塞。 The cultivation did not meet the requirements and forced the use of "membrane treatment process" for discharge, which	重新进行“培菌程序”使之达到规定要求后方可使用“膜法处理程序”。同时进行膜清洗程序或更换。 The membrane method can only be used after the "Bacteria culture" is restarted to meet the prescribed requirements. Carry out membrane cleaning procedure or replacement	

序号 No.	故障现象 Failure phenomenon	可能产生的原因 Possible cause	故障排除方法 Troubleshooting method	备注 Remark
		resulted in membrane blockage.	simultaneously.	
		排放管及浓缩回流管阀门开启角 度不正确导致浓缩水回流量大 Opening angle of drain pipe and concentrated return pipe valve is incorrect, resulting in large concentrated water back flow	正确调节排放管及浓缩回流管阀门，使排放水量和浓缩水回流量各占 50%。 Adjust the valve of the discharge pipe and the concentrated return pipe correctly so that the discharged water volume and the concentrated water return flow amount to 50% each.	
		膜正常使用一段时间出现堵塞 The membrane is blocked for a period of normal use	进行膜清洗程序。 Perform the membrane cleaning procedure.	
		膜长期不使用未处于保湿状态，导致膜失效。 The membrane is not used for a long time and is not in a moisturizing state, which causes the membrane to fail.	更换膜件。 Replace the membrane.	
7	培菌一段时间后不能达到规定要求 Cannot meet the specified requirements after a period of bacteria culture	冲洗水量较大导致原污水浓度较稀 Large amount of flushing water leads to thinner raw sewage concentration	控制好冲洗水量，确保原污水浓度大于 500mg/l。培菌过程中不允许进入灰水。 Control the amount of flushing water to ensure that the concentration of raw sewage is greater than 500mg/l. It is not allowed to enter grey water during the cultivation process.	
		厕所采用消毒剂成份的洁厕剂 Toilet adopts cleaner with disinfectant composition	培菌过程中禁止使用消毒剂。 The use of disinfectants is prohibited during the bacteria cultivation process.	
		培菌时间相对较短 Relatively short bacteria culture time	延长培菌时间确保达到规定要求。 Extend the bacteria	

序号 No.	故障现象 Failure phenomenon		可能产生的原因 Possible cause	故障排除方法 Troubleshooting method	备注 Remark
				cultivation time to ensure that the specified requirements are met.	
8	装置正常使用阶段菌种出现死亡减少 During normal use of the plant, the bacteria died and decreased		长时间未进入原污水 Not entering raw sewage for a long time	及时进入新鲜原污水，使菌种达到规定要求 Enter the fresh raw sewage in time to make the bacteria meet the specified requirements	
			厕所大量采用消毒剂成份的洁厕剂 Toilet use a lot of cleaners with disinfectant ingredients	控制使用消毒剂成份的洁厕剂。 Control the use of toilet cleaners with disinfectant ingredients.	
			未根据设计要求装置接入灰水处理 The plant is not connected to the gray water treatment according to the design requirements	停止装置接入灰水处理。 Stop the plant to connect it to gray water treatment.	
			风机未正常运行曝气 Fan is not aerating properly	检修并确保风机正常运转曝气。 Overhaul and make sure that the fan is aerating properly.	
9	排放水质超标 Discharged water quality exceeds standards	悬浮固体TSS超标 Suspended solid TSS exceeded	膜件破损 Damaged membrane	更换膜件。 Replace the membrane.	
		COD、BOD_5超标 COD, BOD_5 exceeded	生化处理效果差 Poor biochemical treatment effect	加强培菌程序 Strengthen the bacteria cultivation process	
		大肠肝菌超标 Coliform bacteria exceeded standards	紫外线杀毒能力差 Poor UV disinfection	清洗灯罩或更换紫外线灯管 Clean the lampshade or replace the UV lamp	
			外在因素导致细菌感染 External factors cause bacterial infection	按要求进行消毒取样并封存。 Sampling and sealing as required.	

9 使用注意事项 Precautions for use

9.1 培菌 Bacteria cultivation

1）培菌时要保证使用人数和控制好原污水质量，原污水总悬浮固体（TSS）应不小于500mg/l，且应无消毒剂成份；

When cultivating bacteria, ensure the number of users and control the quality of the raw sewage. The total suspended solids (TSS) of the raw sewage should not be less than 500mg / l, and should be contains no disinfectant；

2）卫生纸尽可能扔到纸篓中，避免量过多而影响培菌过程；

Dispose the toilet paper in the paper basket as far as possible to avoid excessive volume affecting the cultivation process;

3）设备的实际使用人数应确保在额定使用人数的 80%以上；

The actual number of users of the plant should be more than 80% of the rated number of users;

4）装置培菌时间一般环境温度在 25℃左右时需要 10~15 天左右，温度较低时培菌时间相对长些；

The cultivation time of the plant generally takes about 10-15 days when the ambient temperature is about 25 °C, and the cultivation time is relatively long when the temperature is low;

5）培菌过程中严禁灰水进入装置。

It is strictly forbidden grey water to enter the plant during the cultivation process.

9.2 正常使用 Normal use

1）及时更换易损件 Replace consumables in a timely manner

装置的紫外线灯管和膜组件都属于易损件，当出现故障时及时更换。

The plant's UV light tube and membrane module are all wearing parts, and should be replaced in time when there is a failure.

2）加强船员舱室管理 Strengthen crew cabin management

考虑到很多船舶生活区的垃圾可能会因为船员的违规行为随着抽水马桶进入到生活污水处理装置中，而某些不可分解的垃圾（例如：烟头、棉纱、塑料等）进入到装置后则有可能堵塞管路；而有些厕所清洁剂（例如：84 消

毒剂、洁厕灵等）进入生活污水处理装置后将会迅速杀死装置内的有效菌团，影响设备处理效果。建议：在船员生活区域或公共区域禁止将无法分解的固体垃圾直接丢入抽水马桶，并禁止用含消毒剂成分的清洁剂清洗马桶。

Considering that many garbage in the living area of the ship may enter the sewage treatment plant with the toilet due to the violation of the crew, and some non-decomposable garbage (such as cigarette butts, cotton yarn, plastic, etc.) may enter the plant. The pipeline is blocked; and some toilet cleaners (for example: 84 disinfectant, toilet cleaner, etc.) will quickly kill the effective bacteria in the device after entering the sewage treatment plant, affecting the equipment treatment effect. Suggestion: In the crew living area or public area, it is forbidden to throw solid waste that cannot be decomposed directly into the toilet, and it is forbidden to wash the toilet with detergent containing disinfectant.

3）按时检查设备的运行情况 Check plant operation on time

- 每日检查：应重点关注风机、粉碎泵、排放泵的运行情况是否良好；膜法处理时，浓缩回流观察管中回流是否正常。当膜出现堵塞现象时，及时进行膜冲洗水反冲洗和化学清洗。同时记录设备运行时间，以便判断紫外线灯管的使用寿命。

  Daily inspection: Pay attention to whether the operation of the fan, cutting pump, and discharge pump is good; during the membrane process, check whether the backflow is normal in the concentrated backflow tube. When the membrane is blocked, perform membrane flushing water back-flushing and chemical cleaning in time. Record the plant operating time at the same time in order to determine the service life of the UV lamp.

- 月度检查：应重点关注装置内的生化菌团的活性。应严格按照使用说明书的要求对曝气状态下的菌团状态进行抽样检查，序批柜中取样的混合液体在静置 30min 后，应该具有相对清晰的分层，沉淀物通常是黑褐色的絮状物体，这种絮状物体在取样管中的体积比一般在 30%左右。如果体积比超过 50%建议在公海或采取收集的方式排泥。

  Monthly inspection: Pay attention to the activity of biochemical bacteria in the plant. Sampling inspection should be carried out strictly in accordance with the instructions in the aerated state. The mixed liquid sampled in the sequence tank should have relatively clear layering after standing for 30 minutes. The sediment is usually dark brown

flocculent. The volume ratio of this flocculent in the sampling tube is generally about 30%. If the volume ratio exceeds 50%, it is recommended to discharge mud on the high seas or take a collection method.