

#### 汉盛(上海)海洋装备技术股份有限公司 Hansun(Shanghai)Marine Technology Co.,Ltd.

地址:上海浦东张江高科园区张衡路1000弄60号楼 邮编: 201203 电话:86-21-50793367 传真:86-21-50793370 网址:www.hansun-marine.com

## **Final Document**

完工资料

# Marine Incinerator 船用焚烧炉

**Model: HSINC-18** 

**FOR** 

浙江振兴船舶修造有限公司 6300DWT 沥青船

Hull No.: ZX2306

M23192 Version ( A.0 ) 2024.10.16





## ⚠ WARNING 警 告

The stator of the dosing pump will be damaged immediately with no-load running, even if the time is very short.

禁止空载运转计量泵,即便时间很短,泵的定子也会立即被损坏。

b. Before starting, please check the diesel oil return lines, to avoid damaging the diesel oil pump!

启动前必须检查柴油管路,以免损坏柴油泵!

Any shut-down with un-cooling would seriously damage the burner! 未经冷却, 停机会损坏燃烧器!

The slagging door can only be opened below combustion temperature 220 °C after shut-down!

出灰门只能在停机时,炉温低于220摄氏度以下打开!

The air inlet in the bottom of the incinerator can't be blocked, otherwise it will affect the incinerator's normal operation.

焚烧炉底下空气入口不能被堵住,否则将影响焚烧炉正常工作。

Warning against unauthorized opening of doors to combustion chambers during operation and against loading more than 2/3of the furnace volume of garbage.

在操作时,禁止打开燃烧室的门;禁止放入超过炉膛体积 2/3 的垃圾。

- The flue gas damper should not be compulsive operated with the power on. 禁止带电强制操作烟气风门。
- Glass, metal, harmful substance contaminated rags are strictly forbidden for burning. 禁止燃烧玻璃、金属以及含有有害物质的油布。

Rev:V2.0



## CONTENTS 目 录

Chapter 1	System Introductions 系统简介	1 -
Chapter 2	Technical Specifications 技术规格	2 -
2.1	Incinerator 焚烧炉	2 -
2.2	Burner 燃烧器 (安装在焚烧炉本体)	2 -
2.3	Flue gas fan 烟气风机(散供)	3 -
2.4	Flue gas damper 烟气风门(散供)	3 -
2.5	Sludge tank 汚油柜(散供)	3 -
2.6	Sludge circulating pump 污油循环泵(安装在污油柜)	3 -
2.7	Sludge dosing pump 污油计量泵(安装在焚烧炉本体)	3 -
2.8	Electrical control panel 电控箱(安装在焚烧炉本体)	
2.9	Expansion Bellow 膨胀节(散供)	4 -
2.10	Incinerator MGO Supply Pump 焚烧炉柴油泵组件(散供)	4 -
Chapter 3	Installation 安装	5 -
3.1	General Storage Instructions 常规储存说明	5 -
3.2	Storage Instructions For the Construction Period 建造阶段的储存建议	5 -
3.3	Installation Instructions 安装指导	
3.4	Location requirements for incinerators 焚烧炉布置要求	7 -
3.4	4.1 Application of IMO documents 国际海事组织(IMO)的应用文献	7 -
3.4	4.2 Passenger vessels 客船	7 -
3.4	4.3 All other vessels 其他所有船	7 -
3.4	4.4 Location on the open deck 露天甲板上的安装	7 -
3.4	4.5 Under deck fire-fighting equipment 舱内消防设备	8 -
3.4	4.6 Open deck fire-fighting equipment 露天甲板上的消防设备	8 -
3.4	4.7 Hot surfaces 热表面	8 -
3.4	4.8 Garbage chutes 垃圾输送管道	9 -
Chapter 4	Operation Instruction 操作指导	10 -
4.1	General description 概述	10 -
4.2	Menu tree 菜单结构	10 -
4.3	Interface operation guidance 操作界面详细说明	10 -
4.3	3.1 Language selection 语言选择	10 -
4.3	3.2 Flow diagram 流程图	11 -
4.3	3.3 Main menu 主菜单	15 -
4.3	3.4 Operate page 操作页面	15 -
4.3	3.5 Chart of trend 趋势图	21 -
	3.6 Alarm page 报警页面	



4.3.7	/ Alarm history record 报警历史记录	22 -
4.3.8	B Data setting 参数设置	22 -
4.4	Alarm 报警系统	31 -
4.4.1	General description 概述	31 -
4.4.2	Alarm list 报警内容	31 -
4.5	Function description 功能描述	37 -
4.5.1	General description 概述	37 -
4.5.2	Solid operation description 固体垃圾焚烧操作说明	40 -
4.5.3	Sludge mode operation 污油焚烧操作说明	43 -
4.5.4	Solid + Sludge oil mode 固体垃圾+污油模式	45 -
4.5.5	Communication protocol with computer station 与上位机的通讯协议	46 -
4.6	Operation 日常操作	49 -
4.6.1	Sludge burning 污油焚烧	49 -
4.6.2	Solid mode 固体垃圾焚烧	51 -
4.6.3	Solid + sludge 固体垃圾+污油焚烧	52 -
4.7	Control System Input/output Signal Configuration 控制系统输入 / 输出信号	号清单- 53 -
4.7.1	Input signal 输入信号	53 -
4.7.2	Output signal 输出信号	54 -
4.7.3	Description of Electronic and Electric Elements 电气主要元件说明	55 -
4.8	Frequency Inverter Parameters Set 变频器参数设置	58 -
Chapter 5 M	Iaintenance Instructions 维护	60 -
	Preventive maintenance 维护	
5.1.1	Daily 日常检查	60 -
5.1.2	Weekly 每周	60 -
5.1.3	Monthly 每月	60 -
5.1.4	Yearly 每年	60 -
5.2	Inspection 检查	61 -
	Cleaning and lubrication 清洗和润滑	
Chapter 6 T	rouble Shooting 故障排除	63 -
Chapter 7 S	tandard Spara Darts 女件事首	65

APPENDIX 附录 A: Drawings 图纸 APPENDIX 附录 B: Others 其它



## Chapter 1 System Introductions 系统简介

The Hansun marine technology Incinerator meets the following specifications: IMO Resolution MEPC 244(66)"Standard Specification for Shipboard Incinerators" and MARPOL73/78 Annex VI, Regulation16.

汉盛船用焚烧炉满足以下规范:国际海事组织环保会 MEPC.244(66)决议《船用焚烧炉标准技术条件》以及 MARPOL 73/78 公约附则VI 第 16 条。

The type of HSINC-18, which is designed for on board incineration of ship's waste oil and solid, it mainly consists of four parts:

汉盛 HSINC-18 焚烧炉主要用于焚烧船上的固体垃圾和污油,主要由以下四部分组成:

a. Combustion chamber with diesel oil burner, sludge burner, and electric control panel.

焚烧炉炉体(附带可以燃烧柴油和污油的燃烧器,电气控制柜);

- b. Flue gas fan 烟气风机;
- c. Flue gas damper 烟道风门;
- d. Sludge tank with circulating pump and heater 带循环泵和加热器的污油柜。

The incinerator HSINC-18 is equipped with single door in front, which are intended for loading of solid waste and ash removing. The slagging door cannot be opened while the combustion chamber temperature is above  $220^{\circ}$ C. If the incinerator is running in cooling down mode, when the combustion temperature is less than  $100^{\circ}$ C, the slagging door can be opened after the incinerator stop .

在焚烧炉的正面装有 1 个门,用来向炉内装固体垃圾和清除炉灰的。当燃烧室温度高于 220℃时,不能打开出灰炉门。当焚烧炉运行在冷却模式下,温度降至 100℃以下时,停机后方可以打开出灰炉门。

The control box is mounted on the incinerator. The control box is built according to international standards for marine equipment. The operator panel which is located at the right side of the control panel has a touch screen and defined buttons for system starting /stopping and selecting burner modes.

电气控制柜安装在焚烧炉的燃烧器一侧。电气柜是按照国际船用电气的标准来设计的。带触摸的人机界面安装在控制柜的侧面,屏上有预定义的按键,可以用来选择燃烧方式和启动/停止系统。

The burning process is controlled by the PLC, monitored by the HMI (Human Machine Interface) and scanned by the flame detector. The combustion chamber temperatures are also regulated automatically by the PLC control system.

整个燃烧过程由 PLC 自动控制,由人机界面监视,并安装有火焰探测器进行燃烧时火焰的 检测,燃烧时炉膛温度也由 PLC 自动控制。



## Chapter 2 Technical Specifications 技术规格

## 2.1 Incinerator 焚烧炉

Type 型号	HSINC-18	
Capacity 容量	180,000 kCal/h (208kW)  22.5 kg/h IMO sludge oil, {IMO sludge (20% water content)}  22.5 kg/h IMO 污油,含水量为 20%  30 kg/charge solid waste, {IMO class 02 solid waste}  30 kg/炉 固体垃圾, IMO 02 类固体垃圾	
Combustion chamber temperature 燃烧室温度	Max.最大 1180 ℃ Working 工作 850-1150℃	
Flue gas temperature 烟气温度	Max. 最大 350℃ Working 工作 250-340℃	
Surface temperature 外表温度	Should not exceed 20 ℃ above ambient temperature, and less than $60$ ℃. 不得高于环境温度 $20$ ℃,且低于 $60$ ℃。	
Power Consumption 消耗功率	9kW	
Exhaust pipe back pressure 排烟管背压	Should not exceeding 60mm W.C. 不超过 60mmW.C.	
Negative pressure 炉膛负压	5-35 mm WC (Negative pressure in combustion chamber )	
Total weight 总 重 Color 颜 色	Approx. 1293 kg  Munsell 7.5BG 7/2	

## 2.2 Burner 燃烧器 (安装在焚烧炉本体)

Type 型号	HY01/HSMB30S		
Max. oil flow 最大燃油量	26kg/h	One nozzle 一个喷嘴, 3.0gph	
	Working pressure 工作压力 1.6 MPa		
Oil pump 油泵	Max. Pressure 最大压力 2.1 MPa.		
El. Motor 马达	440V, 60Hz, 0.75kW, 3460 rpm, IP54,F		
Ignition transformer 点火变压器	Input 输入・230V。 Output 输出・15 kV		
Weight 重量	Approx. 25 kg		



## 2.3 Flue gas fan 烟气风机 (散供)

Type 型号	HSMF4.0C
Capacity 容量	3000 Nm ¾h
El. Motor 马达	440V,60Hz, 4kW, 3500 rpm, IP54, F
Weight 重量	Approx. 180kg

## 2.4 Flue gas damper 烟气风门(散供)

Type 型式	Flange damper with actuator 带执行器的焊接法兰风门
Size 尺寸	DN200
Actuator motor	Drive force 最大扭矩 25N m.
	Travel time for 90° is 150s.
执行器 	旋转 90°的行程时间为 150 秒
Weight 重量	Approx. 35kg

## 2.5 Sludge tank 污油柜(散供)

Volume 容积	500L
Flange rating 法兰	PN10
Weight 重量	Approx. 580 kg
Heating form 加热形式	Thermal oil heating 热油加热
Color 颜色	Munsell 7.5BG 7/2
Insulation thickness	20
隔热层厚度	30 mm

## 2.6 Sludge circulating pump 污油循环泵(安装在污油柜)

Type 型号	CF20-10
Capacity 容量	20 m <sup>3</sup> /h @0.11 MPa
El. Motor 马达	440V,60Hz,2.2kW, IP54, F, 3470 rpm
Weight 重量	Approx. 42 kg

## 2.7 Sludge dosing pump 污油计量泵(安装在焚烧炉本体)

Type 型号	CB14J8/G (CB14-05/14)
El. Motor 马达	3x220V, 50Hz, 0.12kW,IP54,F, 675 rpm



## 2.8 Electrical control panel 电控箱(安装在焚烧炉本体)

Outline dimension 外型尺寸	600x250x1000 (mm)		
Protection grades 防护等级	IP44	Color 颜色	RAL7035

## 2.9 Expansion Bellow 膨胀节(散供)

Item 部件	Expansion Bellow 膨胀节 DN200	
Description 描述	1 set of expansion bellow (two pcs) 1 套膨胀节(1 套两只)	
Deformation	Axial displacement ∆X≤65.9 轴向总位移 ∆X≤65.9,	
变形量	radial total displacementΔy≤20.9 径向总位移 Δy≤20.8.	

## 2.10 Incinerator MGO Supply Pump 焚烧炉柴油泵组件(散供)

Item 部件	Incinerator MGO Supply Pump 焚烧炉柴油泵组件
Description 描述	Not less than 230L/h@2840rpm
Weight 重量	Approx. 52 kg



## Chapter 3 Installation 安装

#### 3.1 General Storage Instructions 常规储存说明

The equipment must be stored at a clean and dry place, protected against weather and moisture. Ambient temperature should not be below 0 °C and above 50 °C. During transportation, severe shocks or vibrations should be prevented.

设备必须放置在清洁、干燥的地方,防止雨淋和潮湿。周围环境温度不应低于 0℃或高于 50℃。运输过程中,应避免剧烈的振动和撞击。

All equipment is packed by Hansun marine technology Co. Ltd and suitable for storage under above-mentioned conditions. If equipment, such as blowers, is stored for a period longer than 12 months, it may be required to check the lubrication. If necessary, it must be replaced.

所有设备由汉盛海洋装备技术股份有限公司包装,并适合按照上述要求储存。如果储存超过 12 个月,比如风机,应该检查润滑系统。如果需要,必须更换。

#### 3.2 Storage Instructions For the Construction Period 建造阶段的储存建议

• The construction period means: "The period between removing the packaging material, the installation of the equipment into the ship (or into a segment of the ship) and the commissioning of the complete ship". During this construction period of the ship the equipment must be stored according to the General storage instructions mentioned above.

所提到的建造阶段是指,从移除包装材料,安装整个设备到船上(或到船上某个部分), 一直到整艘船完工的时间段。在船舶的这段建造时间内,整个设备必须按照上述常规储存 的说明进行储存。

 Great care must be taken to protect the equipment against damages while working in the surrounding area of the equipment.

在周围区域作业时, 必须非常注意不应损坏设备

 Special care must be taken to protect the equipment from sparks when welding near to the equipment.

在周围进行焊接作业时,必须特别注意焊接飞溅。

#### 3.3 Installation Instructions 安装指导

• The sludge tank should be mounted on the same deck as the incinerator.

污油柜应与焚烧炉安装在同一层甲板上。

• Make sure sludge oil pipelines to incinerator should be covered with heat insulation material to avoid causing low temperature alarm of sludge oil. Sludge oil temperature should be at 75-85°C when burning(Alarm temperature: < 60°C or > 90°C)

应确保污油至焚烧炉的管路应包绝缘,防止污油低温报警。燃烧时,污油温度应保证



在 75-85℃之间 (污油报警温度为: <60℃ 或者 >90℃)。

• The diesel oil tank should be mounted on the same deck as the incinerator. However, it is the most important to make sure the diesel oil pump inlet and outlet pressure cannot exceed 4bar.

柴油柜应与焚烧炉布置在同一层甲板上,然而最主要是应该保证柴油泵进出口压力不能超过 4bar。

 The diesel oil pump cannot run dry for more than 5 minutes, and cannot jog frequently, otherwise it will damage the diesel pump easily.

柴油泵不能干转超过5分钟,同时不能点动频繁,否则极易损坏柴油泵。

 According to MEPC 244 (66) standard specification, the flue gas thermocouple should be mounted at a distance within 2.5m away from the incinerator outlet. Not to exceed 2.5m.

根据 MEPC 244(66) 规范要求,烟气热电偶应安装在焚烧炉出口 2.5m 内。不得超过 2.5m。

• The flue gas fan should be mounted at a distance of 5m away from the incinerator outlet. The foundation material of fan installation should be channel or other section bar. Make sure the foundation have enough strength and stiffness. The Fan should be placed horizontally, not be vertically or fixed on the wall. Besides these, the installation position should be convenient for maintenance.

烟气风机应安装在离焚烧炉出口 5m 处,同时风机的安装底座应为槽钢或者其他型材,并且保证底座有足够的强度及刚度。风机应水平固定,不能垂直放置和固定在墙壁上。除此之外,风机安装位置应方便风机的维护。

• The expansion joints provided shall be installed at the inlet and outlet of the fan, which is to prevent the fan volute from deforming due to thermal expansion, thus affecting the performance of the fan. The expansion joints are designed according to GB/T12522-2009.

提供的膨胀节应安装在风机的进出口,目的是为了防止因热膨胀导致蜗壳的变形,进 而影响风机的性能。膨胀节的设计标准请参考 GB/T12522-2009。

• The flue gas damper should be installed as close as possible in the front of the expansion joint at the fan inlet, which can protect the damper actuator better.

烟气风门应尽可能安装在靠近风机进口的膨胀节前面位置,这样可以更好的保护风门执行器。

Elbows below 90 degree should be avoided as far as possible to avoid affecting the performance of the incinerator. The back-pressure of the fan should not exceeding 60mmWC. The design of other exhausted pipelines can refer to CB/T3605-93. When designing, the pressure loss of the pipeline should be reduced as far as possible. At the same time, the pipeline fixing bracket and expansion joints should be added at the appropriate position, to prevent the deformation of the metal plate at the incinerator flue gas outlet and spiral case, which are caused by the weight of the pipes and high temperature.

应尽量避免使用 90°以下弯头,以免影响焚烧炉性能。当设计焚烧炉烟气管路时,应确保风机的背压不超过 60mm 水柱,其他的烟气管路设计可参考 CB/T3605-93。设计时,



应尽量降低管路的压力损失,同时应保证在相应位置增加管路固定支架及膨胀节,防止管路的重量及由于高温导致的风机蜗壳变形、焚烧炉烟气出口金属板的变形。

 The ventilation of the incinerator installation position shall not be lower than the capacity of the fan.

焚烧炉安装位置的通风量应不小于风机的通风量。

#### 3.4 Location requirements for incinerators 焚烧炉布置要求

#### 3.4.1 Application of IMO documents 国际海事组织(IMO)的应用文献

For the purpose of construction, arrangement and insulation, incinerator spaces and waste stowage spaces shall to be treated as category A machinery spaces(SOLAS: 1997, II-2/3.19) and trash stowage rooms (service space (high risk), SOLAS II-2/3.12), respectively. To minimize the fire hazards that these spaces represent, the SOLAS requirements in chapter II-2, given in B.2 and B.3, shall apply.

就构造、布置和隔离的目的而言,焚烧炉处所和废弃物堆装处所应分别按 A 类机器处所(SO LAS:1997,II -2/3.19)和高可燃性废弃物堆装室仁服务处所(高危险性),SOLAS,II -2/3.12)来处置。为了将这些处所潜在的火灾危险最小化,应按第 II -2章的 SOLAS(国际海上人命安全公约)来要求(B.2 和 B.3 中给出)。

#### 3.4.2 Passenger vessels 客船

Regulation 26.2.2(12) shall apply to incinerator and combined incinerator/waste storage spaces.

焚烧炉和组合式焚烧炉/废弃物堆装室应使用条例 26.2.2(12)进行空间布置。

Regulation 26.2.2(13) shall apply to waste storage spaces.

废弃物堆装处所应使用条例 26.2.2(13)进行空间布置。

#### 3.4.3 All other vessels 其他所有船

Including vessels not carrying more than 36 passengers.

包括载客 36 人以下的船

- The incinerator space shall meet either
   焚烧炉处所布置应符合下面任意一条:
- Regulation 44.2.2(6) whenever the incinerator is designed for unattended operation; 条例 4.2.2(6)适用于无人操作的焚烧炉;
- Regulation 44.2.2(7) which shall apply to the incinerator spaces and combined incinerator/waste storage spaces.

条例 4.2.2(7)适用于焚烧炉和组合式焚烧炉/废弃物堆装室。

Regulation 44.2.2(9) shall apply to separate waste storage spaces.
 条例 4.2, 2(9)适用于隔离的废弃物堆装处所的布置。

#### 3.4.4 Location on the open deck 露天甲板上的安装

Incinerator and waste storage may be located on the open deck without being structurally separated or required to have any fire-detection or fixed fire-extinguishing system, provided both the incinerator and waste storage areas are:



在下列条件均满足的情况下,安装于露天甲板上的焚烧炉和废弃物堆装处所在结构上可以 不必分离,并且不需要安装任何火灾指示器或固定灭火装置:

- Located as far as possible on the vessel. 尽可能安装于船艉;
- Not less than 5m away from hazardous or combustible liquid or vapor vents and openings: such vents and opening shall be secured while the incinerator is in operation;

焚烧炉和废弃物堆装处所远离危险易燃性液体或气体进出口至少 5m;在焚烧炉工作时,应确保这些进、出口的安全;

• The distance of separation between the incinerator and waste material storage area is not less than 2m, unless some structural fire barrier exists between them.

若焚烧炉和废弃物储存室之间不存在某种结构的防火间隔,则它们之间相隔的距离应至少为 2m。

#### 3.4.5 Under deck fire-fighting equipment 舱内消防设备

Fire-detection and suppression systems shall be installed in spaces where incinerators are designed for unattended operation (including incinerators with automatic waste feeders) and in combined incinerator waste storage spaces.

在焚烧炉为无人操作(包括带有废弃物自动供给系统的焚烧炉)和组合式焚烧炉/废弃物堆装室的情况下,应安装火灾指示器和灭火装置。

#### 3.4.6 Open deck fire-fighting equipment 露天甲板上的消防设备

Where an incinerator or waste storage space is located on the weather decks, it must be accessible with two means of fire extinguishment, consisting of two fire hoses, semi-portable fire extinguishers, fire monitors or a combination of any two of these devices. A fixed fire-suppression systems is acceptable as one means of extinguishment.

如焚烧炉和废弃物堆装处所位于露天甲板上,必须拥有两种灭火方式,即消防水龙带、半 便携式灭火器、火灾监控器或这些灭火设备中任何两种的组合。固定式灭火系统可作为一种灭 火方式。

#### 3.4.7 Hot surfaces 热表面

• Flue-gas uptakes and surfaces of incinerators shall not be less than 500mm from fuel, oil tank, or accommodation bulkheads. Flue-gas uptakes and exhaust pipes shall be insulated and shall be located well away from electrical installations and flammable items. Exhaust pipes in the casing shall be led to the top of the funnel. Exhaust uptakes from incinerators, which are installed in separate rooms outside the engine room, shall be approved in each case.

烟气排出气道和焚烧炉表面应距离燃油、油箱或船舱壁至少 500 mm;烟气排出管道应包扎绝热层,并与电气设备和易燃元件保持适当的距离;带套管的烟气排出管道应通到烟囱顶端;安装于机舱外隔离室中的焚烧炉,其烟气排出管道在任何情况下都应保持安全可靠。

 Incinerators and flue-gas uptakes shall be located outside hazardous areas as defined by the applicable rules.

焚烧炉和其烟气排出管道应安装于相关条例规定的危险区域以外。

 The flue lines of incinerating systems shall not open into the flue or exhaust lines of other equipment but shall be arranged separately at the point of discharge.



烟气排出管道不应与其他装置的烟道或排气管道相连通,并应单独排放。

## 3.4.8 Garbage chutes 垃圾输送管道

Garbage chutes shall comply with the same fire standards as incinerator rooms outside engine rooms. 输送管道应遵循与机舱外焚烧炉处所同样的消防标准。



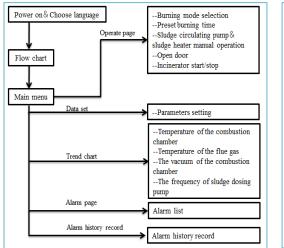
## Chapter 4 Operation Instruction 操作指导

#### 4.1 General description 概述

HSINC-18 has one set of PLC control module, which mainly comprise of PLC module, digit input and output module, A/D input/output module, touch panel (HMI). The system operation can be carried out on HMI, there are 6 buttons in HMI for easy operation.

HSINC-18 由一套 PLC 控制系统工作,核心控制部件包括 PLC 主机、开关量输入/输出扩展模块、模拟量输入/输出扩展模块、触摸屏 (HMI)。主要的控制功能都是通过触摸屏来实现,触摸屏上有 6 个功能键,使操作更加方便快捷。

#### 4.2 Menu tree 菜单结构



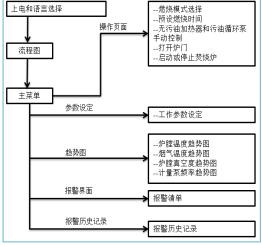


Figure 4-1 Menu tree

图 4-1 菜单结构图

## 4.3 Interface operation guidance 操作界面详细说明

#### 4.3.1 Language selection 语言选择

There would be a language selection page when the system power-on, the user can confirm preferred language by pressing certain button. If no such operation within 5 seconds, the default language of latest operation will be selected. Software and hardware version are available on page bottom with latest updating date.

每次上电后都会跳出一个页面要求用户选择语言,用户可以根据需要按相应的按钮进行选择,如果 5 秒钟内没有进行选择,将执行上一次选择。页面下部标注有软件及对应的硬件版本号,以及最后修改的时间。



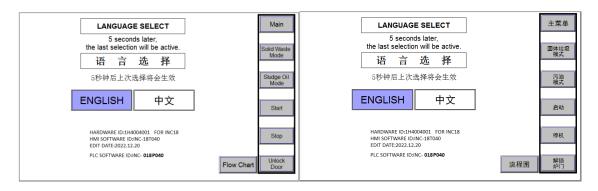


Figure 4-2 Language select

图 4-2 语言选择

#### 4.3.2 Flow diagram 流程图

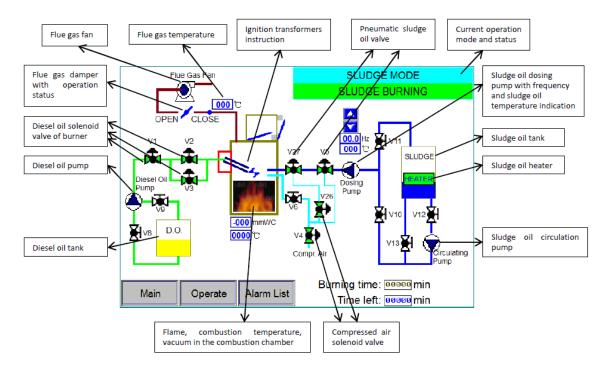


Figure 4-3 Flow diagram



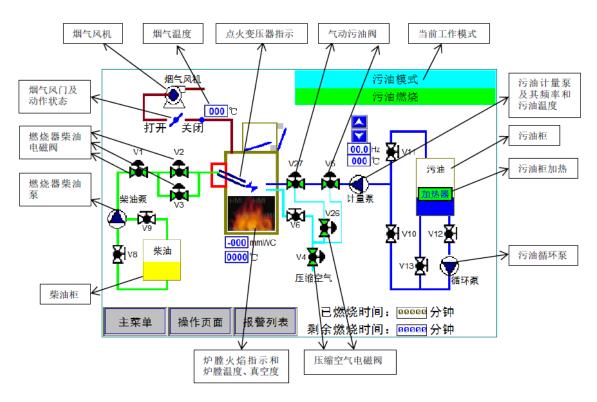


图 4-3 流程图

4.3.2.1 Flue gas fan with flue gas temperature: The flue gas fan symbol show in green while it's running.

烟气风机及烟气温度:烟气风机运行时显示为绿色。

4.3.2.2 Flue gas damper with operation status: "Open "flashing means damper opening, "Close" flashing means damper closing. No moving stands for no displaying.

烟气风门及动作状态:烟气风门正在打开时显示打开,正在关闭时显示关闭,停止时没有显示。

4.3.2.3 Diesel oil solenoid valve of burner:Indicationin green while solenoid valve open.

燃烧器的柴油电磁阀: 打开时显示为绿色。

4.3.2.4 Diesel oil pump: Indicationin in green while burner running.

燃烧器柴油泵:燃烧器运转时显示为绿色。

4.3.2.5 Flame, combustion temperature, vacuum in the combustion chamber: The flame symbol flashing while the incinerator is running, there are vacuum in mmWC and combustion temperature in °C available below the symbol of the combustion chamber.

炉膛火焰指示和炉膛温度、真空度: 当火焰传感器检测到火焰时,代表炉膛的矩形下部会有火焰图案闪动。火焰图案下方的两个数字分别是炉膛压力(负压表示为负数,单位是毫米水柱)和炉膛温度。

4.3.2.6 Compressed air solenoid valve: it's used to control the compressed air and the pneumatic valve for sludge oil,indication in green while it's open.

压缩空气电磁阀:用于控制污油压缩空气以及污油气动阀,打开时显示为绿色。

4.3.2.7 Sludge oil circulation pump: it's used to mix sludge oil and water, indication in green while it's running.



污油循环泵: 用于混合污油以及水等成份, 其运行时显示为绿色。

4.3.2.8 Sludge oil dosing pump with frequency and sludge oil temperature indication: Sludge oil dosing pump regulated by frequency converter, indication in green while it's running. The sludge temperature sensor fitted beside the dosing pump.

污油计量泵及其频率和污油温度:污油计量泵的转速受变频器控制,运行时显示为绿色:污油温度传感器安装在污油计量泵旁边。

4.3.2.9 Sludge oil heater: indication in green while heating.

污油加热器:加热时显示为绿色。

4.3.2.10 Pneumatic sludge oil valve: it's controlled by compressed air, indication in green while it's open.

气动污油阀: 受压缩空气控制, 打开时显示为绿色。

4.3.2.11 Igniting indication: flashing with symbol of "thunder" while it's on.

点火变压器指示: 当点火变压器工作时, 画面显示一个"闪电"图标。

4.3.2.12 Burning time: burning time displaying.

燃烧时间: 当前操作燃烧的时间。

4.3.2.13 Time left: if preset burning time, it displays time left, then system will automatically stop upon preset time. If no preset time, it displays as "0".

剩余时间:如果预设了燃烧时间,预设时间达到时自动停机,则显示剩余的燃烧时间;如果没有预设燃烧时间(设定为0),则显示为0。

4.3.2.14 Current operation mode and statue: display current system running mode and status, if any alarm or not. It includes displaying as follow:

当前工作模式:用于显示当前的模式选择及是否有报警存在,包括如下内容:

• Sludge oil mode: select this mode to burn sludge.

污油模式: 当前工作模式选择了污油焚烧。

Solid waste mode: select this mode to burn solid.

固体垃圾模式: 当前工作模式选择了垃圾焚烧模式。

• Solid waste+ sludge oil mode: select this mode to burn solid waste + sludge, the incineration perfumes solid burning first, and turns to sludge burning mode if there is insufficient heat during solid burning.

固体垃圾+污油模式: 当前工作模式选择了固体垃圾加污油模式, 焚烧时首先执 行固体垃圾焚烧程序, 如果垃圾热量不足则自动转换到污油焚烧模式

• Alarm: means interchanging display between current operation status and alarm continuously if any alarm occurs.

报警:如果存在报警,画面文字将不停地切换显示当前工作模式和"报警"

 Warning: means interchanging display between current operation status and warning continuously if any warning occurs (i.e. battery voltage low).

警告:如果存在警告(电池低压),画面文字将不停地切换显示当前的工作模式和"警告"。

4.3.2.15 Current status description: intended for describing current working status, mainly as follow:

当前动作描述: 说明当前正在执行的程序,包括如下内容:

• Stand-by: system in stand-by mode.



待机:系统处于停止状态。

• Manual operation of circulating pump / sludge heater: manually start sludge circulating pump, sludge heater. The sludge heater shuts down automatically when the temperature exceed the set value of the thermal switch on the sludge tank, and no start-up even the temperature decreased under the set value. Meanwhile the circulating pump and sludge heater will stop automatically when the low level switch activated and no start-up even sludge level return to normal.

手动操作循环泵/污油加热器:手动启动了污油循环泵、污油加热器。污油温度超过污油柜温度开关设定值后将会自动停止加热,并且温度降低后也不会再自动启动加热器。如果出现了污油液位低,污油循环泵和污油加热器都会自动停止,并且在污油液位正常后也不会再自动启动。

• Sludge oil heating: Sludge oil mode or Sludge oil + Solid waste mode, the circulating pump and the sludge heater will start-up automatically. When the temperature exceed the set value of sludge tank temperature switch or exceed the set value of the low temperature alarm by more than 5 degrees. After that the incinerator will carry out pre-purge.

污油加热:如果选择了污油或污油+固体垃圾模式,系统启动后将自动启动污油循环泵和污油加热器。当温度超过污油柜温度开关设定值或者超过污油低温报警设定值5度以上,然后自动执行前扫风程序。

 Pre-purge: The incinerator will carry out pre-purging, and expel combustible gas more than 15 seconds.

前扫风:在点火前将炉膛内可能存在的可燃气体排出,时间不小于 15 秒。

 Ignition: If flame was detected before ignition, the system HMI will flash out the page for confirmation, once the user confirmed, the system will turn-on igniting transformer, the diesel oil solenoid valve open. If ignition success, it will carry out the solid mode or sludge mode according to the former selection.

点火:如果炉膛内有火焰,将会提示并要求确认。然后点火变压器送电、柴油电磁阀打开,如果点火成功,将根据工作模式的选择,分别执行相关程序。

 Combustion chamber heating: close down the burner damper a little, and increase the combustion chamber temperature quickly.

燃烧室加热:燃烧器风门关小,尽快提高炉膛温度。

• Sludge oil mode: sludge oil mode burning as per program.

污油焚烧:按照预定程序焚烧污油。

• Solid waste mode: solid waste mode burning as per program.

固体垃圾焚烧:按照预定程序焚烧固体垃圾。

Post-purging: expel combustible gas in combustion chamber more than 30 seconds.

后扫风:将炉膛内的可能存在的可燃气体排出,时间不小于30秒。

 Cooling down: cooling down the incinerator till the temperature down to the pre-setting, then the system return to stand-by mode.

冷却:将炉膛冷却到预定温度以下,然后回到待机状态。

Slag: the incinerator will close the flue gas damper, then start-up flue gas fan upon certain time delay, after that the slagging door can be opened and the slag can be removed manually.

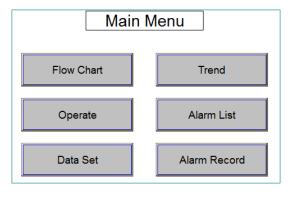


出灰:系统关闭烟气风门,经过一定延时后启动烟气风机,此时可以手动将炉膛内的残灰清除。

#### 4.3.3 Main menu 主菜单

Including function button as follow:

包括如下功能键:



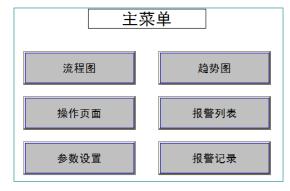


Figure 4-4 Main menu

图 4-4 主菜单

• Flow chart: skip to flow chart page.

流程图: 跳转到流程图。

• Operate: skip to operate page for selecting working mode, start or stop the system.

操作页面: 跳转到操作页面,可以执行选择工作模式、启动、停止等动作。

Data set: skip to data setting page.

参数设置: 跳转到参数设置页面。

• Trend: skip to trend page for the combustion chamber temperature, the flue gas temperature, the combustion chamber vacuum and the frequency of sludge dosing pump.

趋势图:可以查看炉膛温度、烟气温度、炉膛真空度、计量泵频率的趋势图。

• Alarm list: display current alarm status.

报警页面:显示当前报警项目的状态。

• Alarm record: display the alarm record for the current operation.

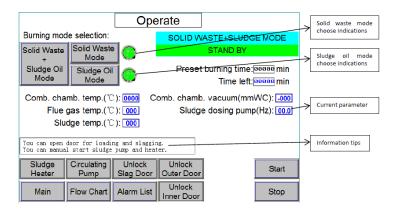
报警记录:显示当次连续供电下的报警历史记录。

#### 4.3.4 Operate page 操作页面

Operate page mainly include as follow:

操作页面主要包括如下内容:





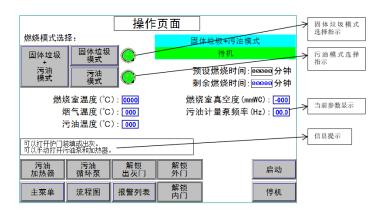


Figure 4-5 Operate page

图 4-5 操作页面

#### 4.3.4.1 Burning mode selection:

燃烧模式选择:

 Solid waste mode: solid waste burning mode button, indication turns green upon the button pressed.

固体垃圾模式: 固体垃圾模式选择按钮,选择固体垃圾模式时,指示变成绿色。

• Sludge oil mode: sludge oil mode button, indication turns green upon the button pressed.

污油模式:污油模式选择按钮,选择污油模式时,指示变成绿色。

4.3.4.2 Preset burning time (minute): the parameter can be set at "0~9999", the system will automatically stop upon preset time, then the set value return to "0". If the set value at "0", that means the function of system automatic shut-down is cancelled, this mode is also available to sludge oil burning mode.

预设燃烧时间(分钟):可以输入一个"0-9999"的数字,在焚烧时间达到该设定值后自动停机,设定值归零。如果该设定值为"0",则定时停机的功能被取消。该模式也可以适用于污油燃烧模式。

4.3.4.3 Information: display certain information for attention, main details as follow:

信息提示: 显示一些与当前状态相关的提示信息,包括如下内容。

 In stand-by status, display as "You can open door for loading and slagging. You can manually start sludge pump and heater".

在待机状态下显示"可以打开炉门装填或出灰,可以手动打开污油循环泵和加热



器"。

In slag remove status, display as "You can remove the slag. Push key 'Stop' for stopping flue gas fan".

在出灰状态下显示"现在可以出灰,按'停止'按钮可停止烟气风机"。

• In system running status, display as" The door cann't be open, while system is running or temperature over 220 degrees."

在系统运行状态下显示"当系统运行时或炉膛温度超过 220℃时,不允许打开炉门"。

4.3.4.4 Current parameter indication: display current parameter in turn.

当前参数显示:依次循环显示如下内容。

Combustion chamber temperature.

燃烧室温度

Combustion chamber vacuum.

燃烧室真空度

Flue gas temperature.

烟气温度

• Sludge oil temperature.

污油温度

Sludge dosing pump frequency.

污油计量泵频率

4.3.4.5 The button of "Sludge Heater", manually start and stop sludge heater, it is an interchangeable button, the button turns cyan upon sludge heater "on" and turns grey upon sludge heater "off". The manual start-up function is to be cancelled automatically as per certain status as follows:

"污油加热器"按钮,是一个交替开关,用于手动启动污油加热器,污油加热器启动时显示青色,停止时显示灰色。在如下条件,污油加热器手动启动信号自动取消:

 System running in "Sludge or Solid waste+ Sludge" mode, except post-purge and cooling down.

在污油或固体垃圾+污油模式下启动并运行焚烧炉,后扫风和冷却阶段除外。

Sludge oil low level.

污油柜液位低

Sludge oil temperature reaches the set value of the temperature switch on sludge oil tank.

污油温度达到污油柜温度开关设定值

Manually start-up sludge heater by pressing of "Stop" in stand-by mode.

在待机状态下,手动启动污油加热器后,按"停止"按钮

4.3.4.6 "Circulating pump "button, which intended for manually start or stop sludge circulating pump, it is an interchangeable button, the indication turns cyan upon pump start-up, and turns grey upon pump shut-off. The manual start-up function is to be cancelled automatically as per certain status as follows:

"污油循环泵"按钮,用于手动启动污油循环泵,是一个交替开关,污油循环泵 启动后显示青色,停止后显示灰色。在如下条件,污油循环泵的手动启动信号自动取



消:

 System running in "Sludge or Solid Waste+ sludge" mode, except post-purge and cooling down.

在污油或固体垃圾+污油模式下启动并运行焚烧炉,后扫风和冷却阶段除外。

• Sludge oil low level.

污油柜液位低。

Manually start-up sludge circulating pump by pressing of "Stop" in stand-by mode.

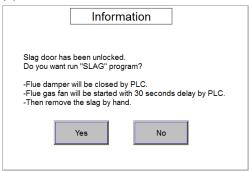
在待机状态下,手动启动污油循环泵后,按"停止"按钮。

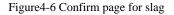
- 4.3.4.7 "Unlock Door/Remove slag" button, display "Unlock Door" when the door is closed; display "Remove Slag" when the door is opened.
  - "解锁炉门/出灰"按钮,在炉门关闭的情况下按钮文字显示"解锁炉门";在炉门打开后按钮文字显示"出灰"。
- 4.3.4.8 "Unlock Door" button: the door can be opened upon combustion chamber temperature less than the set value or system in stand-by. There is a status feedback available on door locker, the incinerator can not be start-up when the door is opened. The button "Unlock Door" is pressed when the system is in suitable conditions, then the door can be opened. If the button "Unlock Door" is pressed without opening the door, then the door locker to be secured upon 10 seconds delay.

"开门"按钮:炉门只有在系统停机,并且炉膛温度低于开门温度设定值时才可以打开。门锁有一个状态反馈,在开门的情况下不能启动焚烧炉。在合适的条件下按"开门"按钮,门锁打开,即可手动打开炉门。如果按下"开门"按钮却没有去开炉门,10秒后炉门重新被锁定。

"Slag" button: in order to avoiding ashes insufflating outside, the incinerator will close the damper, then start the flue gas fan after time delay, the suspending ashes will be blew out by the flue gas fan. Figure 4-6 will flash out upon the button "Slag" is pressed, confirm "Slag" procedure by pressing button "Yes", or cancel "slag" procedure by pressing button "No" and return to normal operation page.

"出灰"按钮: 出灰时为了防止炉灰在机舱内飘散,所以要执行关烟气风门动作, 经过延时后,启动烟气风机,飘散的炉灰被烟气风机排出。按"出灰"按钮后会跳出 一个要求确认的页面(图 6),按"是"即可执行出灰程序。按"否"即可返回操作页 面。





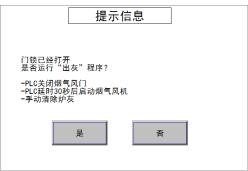


图 4-6 出灰确认界面

4.3.4.9 The button of "Start": start up incinerator according to working mode selected. Detail



condition as follow:

"启动"按钮:根据工作模式的选择,启动焚烧程序。启动的条件如下:

Door of incinerator is closed.

炉门已经关闭。

• If the "Sludge" or "Solid + Sludge" mode is selected, the sludge oil level must exceed the low level switch.

如果选择了污油或固体垃圾+污油模式,污油液位必须高于低位液位开关。

 No alarm, (the incinerator can be started even though the flue gas temperature or the combustion chamber temperature is high, then the incinerator will turn into the cooling process automatically).

没有报警(烟气高温或炉膛高温时可以启动,但是会马上转到冷却程序)。

4.3.4.10 button of "Stop": Stop the current operation, detail function as follow:

"停止"按钮:用于停止当前的动作,功能如下:

When the incinerator is stand-by, if the sludge circulating pump or the sludge oil heater is started manually, pressing the button "Stop" can stop the sludge circulating pump or the sludge oil heater.

如果系统没有运行,污油循环泵或污油加热器手动启动后,可以用"停止"按钮停止污油循环泵和污油加热器。

• If the incinerator is in slag mode, press the button "Stop" can stop the flue gas fan, then the incinerator return to stand-by.

如果在执行出灰程序,"停止"按钮可以停止烟气风机,返回待机状态。

• If the incinerator is started up and the flue gas fan is running, press the button "Stop" will stop the incinerator and turn into the post-purging and cooling process.

如果系统已经启动,风机开始运行,按"停止"按钮,系统会执行后扫风和冷却程序。

• If the incinerator is running in sludge oil heating and the flue gas fan is not running, press the button "Stop" will make the incinerator return to stand-by.

如果在污油加热阶段,并且烟气风机没有运行时,按下"停止"按钮,系统会马上停机进入待机状态。

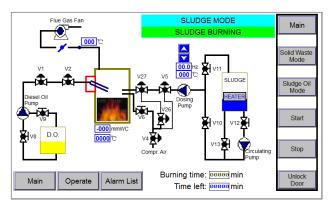
• If the incinerator is running in cooling, and the combustion chamber temperature is lower than the temperature setting value of opening the door (220°C), but is higher than the temperature setting of stopping the incinerator (100°C), press the button "Stop" will stop the incinerator and return to stand-by mode.

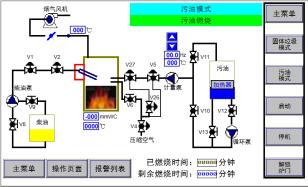
在冷却阶段,如果炉膛温度已经低于开炉门的温度(220°C),但是还高于停机温度(100°C),此时按"停机"按钮,系统会马上停机进入待机状态。

4.3.4.11 Functional button: there are six functional buttons available in the right side of the HMI. The functional buttons have the same working functions, even though the HMI is in different pages. The functional buttons are easy operation to access certain function of the incinerator, details as follow:

快捷功能键:人机界面右侧有六个功能键。无论屏幕显示的是哪个页面,功能键的功能都相同,操作方便快捷。具体描述如下:







a. Main: Switch to the main screen.

主菜单:切换至主菜单界面。

b. Solid Waste Mode: Solid waste mode selection button, the same function as the "Solid Waste Mode" button on the operate page.

固体垃圾模式: 固体垃圾模式选择按钮,等同于操作页面上的"固体垃圾模式"按钮。

c. Sludge Oil Mode: Sludge oil mode selection button, the same function as the "Sludge Oil Mode" button on the operate page.

污油模式:污油模式选择按钮,等同于操作页面上的"污油模式"按钮。

d. Start: Start button, the same function as the "start" button on the operate page.

启动: 启动按钮, 等同于操作页面上的"启动"按钮。

e. Stop: Stop button, the same function as the "stop" button on the operate page.

停止:停止按钮,等同于操作页面上的"停止"按钮。

f. Unlock Door: Unlock door button, the same function as the "Unlock" button on the operate page.

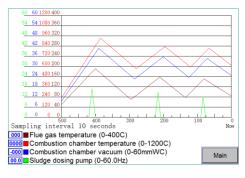
解锁炉门:解锁炉门按钮,等同于操作页面上的"解锁炉门"按钮。

g. Solid waste and sludge mode: press the "Solid Waste Mode" and the "Sludge Oil Mode" button in one second, solid waste mode and sludge oil mode indication turns green upon the buttons pressed.

固体垃圾和污油模式:在一秒钟内连续按"固体垃圾"和"污油"两个按钮,选择 固体垃圾模式和污油模式时,指示同时变绿。



#### 4.3.5 Chart of trend 趋势图



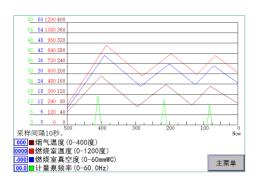


Figure 4-7 Chart of trend

图 4-7 趋势图

Chart of trend including the temperature of the combustion chamber, the flue gas, the vacuum of the combustion chamber and the frequency of sludge dosing pump. The data will record every 10s.

趋势图包括炉膛温度、烟气温度、炉膛真空度、计量泵频率的数据记录曲线,每 10 秒钟记录一个数据。

#### 4.3.6 Alarm page 报警页面

There is an alarm list with status available in this page, lamp in red stands for alarm, in green stands for normal, in yellow stands for warning. (Just for battery voltage low of PLC).

画面显示一个报警项目清单及当前状态,指示灯报警时显示为红色,正常时显示为绿色,警告时显示为黄色(只有 PLC 电池低电压是警告)

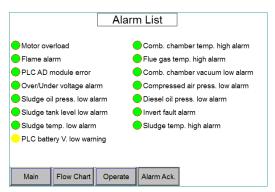




Figure 4-8 Alarm page

图 4-8 报警页面

状态

0ff

0ff

Off Off Off Off

0ff Off

Off Off

0ff

0ff

0ff



#### Alarm history record 报警历史记录

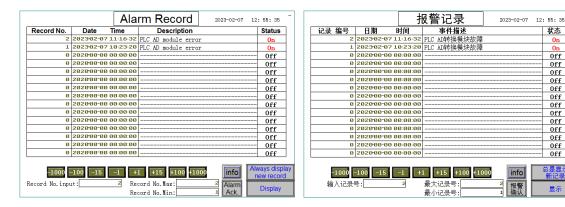


Figure 4-9 Alarm history record

图 4-9 报警历史记录

At the back of description, "On" mean: Alarm, "Off" mean: Alarm cancel.

事件描述后面显示的 On 指的是:报警;Off 指的是报警取消。

#### 4.3.8 Data setting 参数设置

When you pressed the button "LOGOUT", the page of "more data set" will be locked, and press the button of "Data set" in the main Menu will require a keyword, the initial keyword is "123456". In the page of "Data set", each item has code number xx. There would be №xx Corresponding to certain data, for example, the code of "Max combustion chamber setting" is "1", that means "№1" standing for "combustion chamber setting" in follow-up description for clearly understanding. There would be detail description of the meaning and function for every data item.

当按了"注销"按钮后,"更多参数设置"页面将被锁定,在主菜单按参数设定按钮, 将会要求输入密码,密码是"123456"。在参数设定页面,所有数值输入项都有一个编号 xx,在后续说明中将会使用Nexx替代这个参数,比如"最高炉膛温度设定值"的编号是1, 则"№1"代表"炉膛温度设定值",以便使描述更加清晰。各个参数的含义及作用将在后 面的功能描述中详加说明。

#### 4.3.8.1 Main page description

主要页面说明

4.3.8.2 Data setting page 1, parameters setting of the incinerator.

参数设定页面 1,设定焚烧炉运行的主要参数。



Figure 4-10 Data setting page

图 4-10 参数设置页面



Working parameter of the incinerator

设定焚烧炉运行的主要参数。

- Button of "More Data Set", turn to more setting page
  - "更多参数设定"按钮,将会进入更多的参数设定页面。
- The button of "LOGOUT" intended to logout from "Data set" page to the main page and delete keyword record, if the user intends to enter "Data set" page again, the keyword required once more; if the user does not "LOGOUT", the keyword remains available till power off, the user can freely enter "Data set" page without keyword.

"注销"按钮,用于注销进入设定页面所输入的密码记录,回到主菜单后再进入 设定页面还需要输入密码;如果不经注销,输入的密码记录一直有效直到断电,进入 设定页面不需要再输入密码。

4.3.8.3 Data set page 2 (Figure 4-11), details as follow:

参数设定页面 2 (图 4-11),内容如下:

• Flue gas fan automatic start-up, default as 1.

自动启动烟气风机,出厂默认值为1。

- 0: If the combustion chamber temperature in stand-by is higher than the temperature of door open (№34, default at 220°C), the combustion temperature high alarm occurs.
  - 0: 如果在待机时炉膛温度超过了炉膛开门的温度(№34, 默认值 220 度)将会触发炉膛高温报警。
- 1: If the combustion chamber temperature in stand-by is higher than the temperature of door open (№34), Figure 4-12 will pop up for the user attention of combustion temperature high, the flue gas fan will start up within 5s to cool down the combustion chamber, and the combustion chamber high alarm occurs. If the button "No" is pressed, the cooling down process is to be terminated, but the combustion chamber temperature high alarm still occurs.
  - 1: 如果在待机时炉膛温度超过了炉膛开门的温度(№34)将会跳出一个提示窗口(图 12),提示由于炉膛温度高,烟气风机将在 5 秒钟后启动冷却炉膛,将会触发炉膛高温报警。如果此时按"取消"按钮,将会终止将要启动的冷却程序,但是会触发炉膛高温报警。

Caution: if automatic cooling down inhibited, there could be risk of burner damage due to burner un-fully cooling down; power off the system during maintenance and repairing, in order to avoiding risk of flue gas fan and burner start up automatically.

注意:如果禁止自动启动冷却程序,燃烧器有被未经冷却的高温炉膛损坏的可能;维修设备时一定要停电,防止烟气风机和燃烧器的自动启动。

Read the warning board before operating, as follow.

运作前请务必通读警示牌(如下图)



注意:1.未经冷却,停机会损坏燃烧器!

- 2.出灰门只能在停机时,220摄氏 度以下打开!
- 3.启动前必须检查柴油管路,以免损坏柴油泵!
- 4.在操作时,禁止打开燃烧室的门,禁止焚烧炉里放入 过多垃圾。

# $\bigwedge$

#### CAUTION:

- 1. Any shut-down with un-cooling would seriously damage the burner!
- 2.The slagging door only opened below 220 °C after shut-down!
- Before starting, please check the diesel oil return lines, to avoid damage the Diesel oil pump!
- 4.Warning against unauthorized opening of doors to combustion chambers during operation and against overloading the incinerator with garbage.
- Alarm contact, default as 0

报警继电器,出厂默认值为0。

- 0: Alarm contact activated upon alarm
  - 0:报警时报警继电器线圈得电。
- 1: Alarm contact activated without alarm, intended for detecting power failure alarm.
  - 1: 不报警时报警继电器线圈得电,用于需要检测电源故障的场合。
- Sludge alone burning mode, default as 1.

独立燃烧污油,出厂默认值为1。

- 0: It is not allowed to burn sludge alone, whatever the combustion temperature is, at least one diesel oil nozzle should accompany sludge oil burning, intended for sludge burning with high percentage water or bad quality sludge, and avoiding frequent flame alarm.
  - 0:不允许独立燃烧污油,无论炉膛温度是多少,至少有一个柴油喷嘴与污油伴烧, 用于水分含量很高或不易燃烧的污油焚烧,以防出现过多的火焰故障。
- 1: In order to save diesel oil, if the combustion temperature exceeds setting (№3), diesel oil will be reduced gradually until sludge oil burning independently.
  - 1: 为了节约柴油,在炉膛温度超过设定值(№3)时会逐步减少柴油消耗,直到独立燃烧污油。
- Hour meter: turn to page of hour meter, displaying of working hour accumulated of each motor.

累积计时器: 跳转到累积计时器页面,显示各个马达的累积运行时间。

■ Flue gas fan accumulating time: 0.00-21474836.00 hr.

烟气风机累积运行时间, 0.00-21474836.00 小时

■ Burner accumulating time: 0.00-21474836.00 hr.

燃烧器马达累积运行时间, 0.00-21474836.00 小时。

■ Sludge oil circulating pump time: 0.00-21474836.00 hr.

污油循环泵累积运行时间, 0.00-21474836.00 小时。

■ Sludge oil dosing pump time: 0.00-21474836.00 hr.

污油计量泵累积运行时间, 0.00-21474836.00 小时。



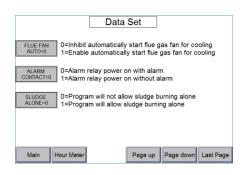


Figure 4-11 Data set page2

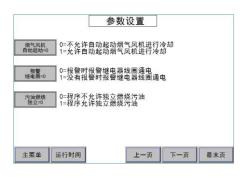


图 4-11 参数设置页面 2

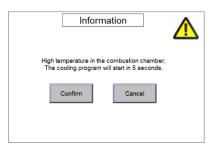


Figure 4-12 Warning page

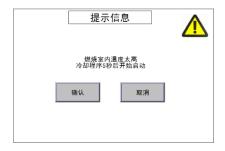


图 4-12 警示页面

4.3.8.4 Last page of more data set, Figure 4-13, intended for default setting.

在更多参数设定的末页,如图 4-13,用于恢复默认设定。

Restore to factory setting: all data restore to default.

恢复出厂设定: 所有参数恢复到程序中的默认值。

• Save commissioning setting: save the current setting, probably better than default.

保存调试设定:保存当前的设定值,可能会比出厂设定更适合当前的设备。

Restore commissioning setting: restore previous commissioning setting.

恢复调试设定:恢复以前保存的调试设定值。

 In order to avoiding wrong operation, corresponding button need to keep pushed more than 8s.

为了防止意外操作,所以要长按相应的按钮约8秒钟。

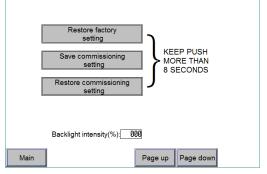


Figure 4-13 Last page of data set

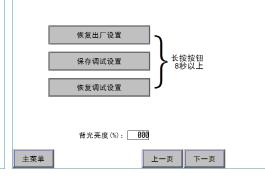


图 4-13 参数设置末页



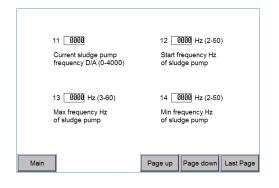




Figure 4-14 Other data setting page

图 4-14 其他参数设置页面

4.3.8.5 Other data setting as Figure 4-14, or equivalent, please check by turning page, and modify setting by pressing number keyboard. Details as follow:

其它参数设定页面如图 4-14,或者类似,可以通过翻页进行浏览,点击显示的数字框即可修改,不再一一列举,将以表格的形式加以说明如下:

Table 4-1 Other data setting 表 4-1 其他参数设定表

Item 序号	Description 描述	Default 默认值	Setting 设定范 围			
No1	Max combustion chamber temperature setting: combustion chamber temperature exceeds such setting, oil injection reduced and chamber vacuum increased 最高炉膛温度设定值 CCTMAX: 炉膛温度超过这个温度后会减少喷油量或增加真空度。	1050℃	0-1150			
No2	Temperature setting of combustion chamber for initial sludge oil injection 850℃ 0-开始供给污油的炉膛温度 CCTSS					
No3	Temperature setting of sludge oil burning independently: diesel oil is to be reduced gradually till sludge oil burning independently; if sludge oil independent burning disabled, the minimum diesel oil accompanying with sludge oil burning 污油独立燃烧时的温度 FGTMAX: 超过这个温度柴油会逐次减少,直至独立燃烧污油; 如果不允许污油独立燃烧,将会有一个小的柴油喷嘴与污油伴烧。	950℃	0-1050			
No4	Max flue gas temperature: oil injection is to be reduced upon the flue gas temperature exceeding this setting. 烟气温度最大值:超过这个温度会减少喷油量的动作。	330℃	0-350			
No5	Max combustion temperature alarm setting: Max combustion temperature alarm occurs and stop burning upon the combustion temperature exceeding this setting. 炉膛温度高报警值:超过这个值会触发炉膛高温报警且停炉。	1180°C	0-1180			



		1	,
No6	Flue gas temperature high alarm: flue gas temperature alarm occur and stop burning upon the flue gas temperature exceeding this setting. 烟气温度高报警值:超过这个值会触发烟气高温报警且停炉。	350°C	0-375
No7	Combustion chamber vacuum low alarm: combustion chamber vacuum low alarm occur upon the combustion chamber vacuum less than this setting.  炉膛真空度低报警:炉膛真空度低于这个值会触发低真空度报警。	5mmWC	1-9
No11	Inner setting in PLC for sludge oil pump frequency D/A, 0-0Hz, 4000-Max frequency (No44), the default setting (No44) is 50Hz, No11/80=current frequency, subject setting is waving corresponding to running situation of program, also can be modified manually, in order to change oil injection. 污油泵频率 D/A 的 PLC 的内部数据,0-对应 0Hz,4000 对应变频器的最大频率(No44),比如 No44 出厂设定为 50Hz,No11/80=当前频率,这个值受程序控制增大或减小,可以手动修改,以便改变喷油量。		0-4000
No12	Initial start-up frequency of the sludge oil pump: initial frequency of the sludge oil pump start-up, the program need to control the combustion temperature and vacuum base on this		2-50
No13	Max frequency of sludge oil pump: no increasing of frequency upon this setting reached. 污油泵最大频率: 达到这个值后将不会再增加。	50 Hz	3-60
No14	Minimum frequency of sludge oil pump: no decreasing of frequency upon such setting reached. 污油泵最小频率: 达到这个之后将不会再减小。	2 Hz	2-50
No15	Combustion chamber vacuum of ignition. 点火时的炉膛真空度。	18mmWC	1-40
No16	Max vacuum of combustion chamber during burning. 燃烧时炉膛最大真空度。  35mmWC 1-		1-99
No17	Combustion chamber vacuum on cooling during postpurge. 后扫风、冷却时的炉膛真空度。	20mmWC	1-120
No18	Combustion chamber vacuum on initial sludge oil dosing. 开始喷污油时的炉膛真空度。	20mmWC	1-40
No19	Combustion chamber vacuum on pre-purging. 前扫风时的炉膛真空度。	20mmWC	1-99



		1	<del>, , , , , , , , , , , , , , , , , , , </del>	
No20	Minimum combustion chamber vacuum: if the combustion chamber temperature cannot be increased, the program needs to slow down the combustion vacuum, which is no less than this setting.  炉膛最小真空度,如果无法提高炉膛温度,程序会尝试降低炉膛真空度以便提高炉膛温度,但是不能小于这个设定值。	12mmWC	1-30	
No21	Control dead zone of combustion chamber vacuum: if the combustion chamber vacuum is more deviated from pre-setting, the program will drive the flue gas damper to rectify the vacuum till the value is less than this setting.  炉膛真空度的控制死区:如果炉膛真空度偏离设定值,程序会通过操作烟气风门进行修正,直到误差小于这个值。			
No22	Offset value of each vacuum increasing step: vacuum offset increasing of each step interval according to No38 defined. 炉膛真空度增加时的步长: 在 No38 规定的时间间隔中, 按程序要求增加真空度的步长。	2mmWC	1-5	
No23	Offset value of each vacuum decreasing step: vacuum offset decreasing of each step interval according to No38 defined . 炉膛真空度减小时的步长: 在 No38 规定的时间间隔中, 按程序要求减小真空度的步长。	2mmWC	1-5	
No24	In solid mode, the minimum temperature increasing interval according to No25 defined, if combustion chamber temperature increasing less than such value, the program need to increase diesel oil injection or decrease vacuum in order to increase combustion temperature rising speed. 在固体垃圾模式下,在 No25 规定的时间间隔中的最小温升值,如果温升小于这个温度,程序会尝试增加柴油或减小真空度的方式提高温升速度。	25℃	0-50	
No25	In solid mode, time interval of combustion temperature rising speed. 在固体垃圾模式下测量温升速度(No24)的时间间隔。	60s	1-99	
No26	Max combustion temperature control dead zone, if the combustion chamber temperature exceeding No1, the program will decrease oil injection. If less than (No1-No26), the program will increase oil injection. 炉膛最高温度(No1)控制死区,炉膛温度超过 No1 后会减油,低于(No1-No26)后可能会加油。	10℃	1-30	



No27	Flue gas temperature control dead zone, if the flue gas temperature exceeding No4, the program will decrease oil injection, if less than (No4-No27), the program will increase oil injection. 烟气温度的控制死区,烟气温度超过 No4 后会减油,低于 (No4-No27)后可能会加油。	5℃	1-20
No28	Temperature control dead zone, that's corresponding to initial oil injection temperature (No2) and sludge oil independent burning temperature (No3). 针对开始喷污油的温度(No2)、污油独立燃烧的温度(No3)的温度控制死区	10℃	1-99
No29	Combustion vacuum is to be increased to Max, if combustion temperature exceeding such setting. 超过此设定温度,真空度将逐步增加到最大值。	1000°C	0-1150
No30	Spare 备用		
No31	Spare 备用		
No32	In sludge mode, the Minimum temperature rising rate within each sampling time that defined in No33, if the temperature rising rate is less than this value, the program will increase diesel oil injection and further reduce vacuum in order to increasing temperature rising; if temperature rising rate exceeding this value such data, that means sludge oil to be increase properly, frequency of sludge oil dosing pump is to be increase accordingly.  在污油模式下,在 No33 设定的取样时间内的最小温升值,如果温升小于这个值将会增加柴油、减小真空度,以提高温升; 如果温度超过这个值,说明污油将会酌情增加,污油计量泵频率会被提高。	0°C	0-99
No33	Measurement interval of combustion temperature rising (No32) in sludge oil mode. 污油模式下,测量炉膛温升(No32)的时间间隔。	30s	1-99
No34	Combustion chamber temperature of door-open permission in stand-by mode, No34-No35 is the shut-down temperature setting in cooling program. 待机时允许开炉门的温度,No34-No35 即为冷却程序中的停机温度。	220℃	0-220



No35	The incinerator comes into stand-by mode upon combustion chamber temperature drop less than (No34-No35) during cooling down; in stand-by mode, if the combustion chamber temperature is high than No34, the incinerator will perform cooling down program (if permitted) until the combustion chamber temperature is less than (No34-No35). 在运行冷却程序时如果炉膛温度低于(No34-No35)即会进入待机状态;在待机状态,如果温度高于 No34 即会启动冷却程序(如果允许),直到炉膛温度低于(No34-No35)。	120℃	1-199
No36	Combustion vacuum is to be increased to maximum, if the flue gas temperature exceeding this value. 烟气温度超过这个值后,炉膛真空度将会逐步增加到最大值(No16)	310℃	0-340
No37	Spare 备用		
No38	Interval of automatic vacuum increasing/ decreasing, deviation of each step No22/No23. 自动增加/降低真空度的时间间隔,每次改变的步长是 No22/No23	60s	1-99
No39	Closing the flue gas damper before the slag performing, the flue gas fan starting-up is delayed after (No39)s. 执行出灰程序时首先执行烟气风门关闭动作,烟气风机延时(No39)秒后开始运行。	30s	0-200
No40	In sludge oil mode, time delay of sludge low temperature alarm during incinerating. 污油模式下,焚烧时污油低温报警的延时时间。	20s	1-999
No41	In sludge oil mode, time delay of sludge low temperature alarm upon heating activated . 污油模式下,"启动"后污油加热阶段的污油低温报警延时。	300min	1-999
No42	Sludge oil high temperature alarm. 污油高温报警设定值。	90℃	0-99
No43	Sludge oil low temperature alarm. 污油低温报警设定值。	60℃	0-80
No44	Max frequency of converter, which is corresponding to setting of frequency converter. 变频器的最大频率,要与变频器的设定值相匹配。	50Hz	10-100
No45	Reduce frequency step of sludge oil dosing pump, refer to No11, (No45)/4000*(No44) is equal to real frequency. 降低污油计量泵频率的步长,数值含义参见 No11, (No45)/4000*(No44)等于实际变化的频率数。	20	1-99
No46	Increase frequency step of sludge oil dosing pump, refer to No11, (No46)/4000*(No44) is equal to real frequency. 提高污油计量泵频率的步长,数值含义参见 No11, (No46)/4000*(No44)等于实际变化的频率数。	20	1-99



	Measurement range of the combustion vacuum sensor, which		
No47	needs to match the measurement range of the real sensor.	127mmWc	50-500
	炉膛真空度传感器的量程,要与实际传感器匹配。		
	Battery voltage low of PLC, just for indication no		
	modification, alarm occurs upon voltage low than 2.7V. The		
	battery life is no more than 5 years, it's no problem		
	functionally within one month upon initial alarm occurs. If		
N. 40	running out of battery, there could be the risk of losing		
No48	program upon PLC power-off.		
	PLC 电池电压,数值显示,不能修改,低于 2.7V 会触发电		
	池低压警告。一般电池寿命不超过5年,首次出现电池低		
	压报警后一个月内也不会有问题。如果电池耗尽,在 PLC		
	电源关断的情况下有丢失程序的风险。		

#### 4.4 Alarm 报警系统

#### 4.4.1 General description 概述

Alarm lamp flashing and relay deliver extension upon alarm occurs.

在出现新报警时,报警指示灯会闪动,报警继电器输出报警信号。

• New alarm occurs without former alarm resetting, alarm relay will be reset 2s in order to giving alarm extension to ECR.

存在未复位报警的情况下,如果出现新的报警,报警继电器将会复位 2 秒钟,以便触发报警监控系统。

Alarm lamp stop flashing upon user confirm and acknowledge alarm.

要用户确认以后报警指示灯停止闪动。

• Upon acknowledgement of alarms, which are under reset condition, the alarm relay with lamp is to be reset accordingly.

报警经过确认,并且达到报警复位的条件后,报警才会复位,所有报警复位后报警指示灯熄灭。

#### 4.4.2 Alarm list 报警内容

Table 4-2 Alarm list

表 4-2 报警内容清单

No.	Alarm item	Cause	Act	ion	Reset condition
序号	报警项目	触发原因	安全保	护动作	复位条件
	Motor	Any motor overload.	Stop	burning,	Reset all motor overload
	overload	任何一个马达断路	post-purge	and	relay.
	马达过载	と お お お お お お お お お お お お お お り お り お り	cooling.		所有马达断路器处在正常
1.			停止燃烧,	如果在运	位置。
			行中, 执行	<b></b> 后扫风和	
			冷却。		



	Combustion	The combustion	Ston humina	Combustion chamber
	chamber	chamber	Stop burning,	
			post-purge and	temperature is less than the
	high	temperature exceeds the setting (No5,	cooling.	setting value.
	temperature alarm.	the setting (No3, default 1180 $^{\circ}$ C )	停止燃烧,进行后扫	炉膛温度低于炉膛高温报
		when the flue gas	风和冷却。	警值。
	燃烧室高温	fan is running.		
	报警	C		
		烟气风机运行时,		
		炉膛温度超过炉膛		
		高温报警值(No5,		
		默认 1180 度)。		
		The combustion	Non	Combustion chamber
		chamber	(If automatic cooling	temperature lower down to
2.		temperature exceeds	down enabled, no	the setting of open door, or
		the setting of open	alarm activates).	the flue gas fan keeps
		door (No34, default		running.
		$220^{\circ}\text{C}$ ) when the	无	
		flue gas fan is	(如果允许自动启动	炉膛温度降低到开门温度
		stopped and disable	冷却程序,将不会报	以下,或者烟气风机运行。
		to restart.		
		烟气风机停机时,	警)	
		炉膛温度超过炉门		
		开门的温度(No34,		
		默认 220 度),并且		
		不允许烟气风机自		
		动启动。		
	Flame	No flame detected	Stop burning ,	Alarm acknowledge and
	failure	during incinerator	post-purge and	reset.
		burning.	cooling.	报警确认后即可复位。
3.	火焰故障	在燃烧过程中火焰	· · · · · · · · · · · · · · · · · · ·	46 日 AN A O 日 - 1、 1 公 1元 a
	<i>八八</i> 口以(字	传感器没有检测到	风和冷却。	
			1 1/ 1/1 H 1 4 AP 0	
		火焰信号。		



	<u> </u>	A.C.	G. 1 .	A1 1 1 1 1 1
		After pre-purge,	Stop burning ,	Alarm acknowledge and
		before ignition, the flame sensor needs	post-purge and	reset.
		to detect flame or	cooling.	
			停止燃烧,进行后扫	报警确认后即可复位。
		not, a window jump out for flame	风和冷却。	
		confirmation.		
		前扫风后,点火前,		
		火焰传感器检测到		
		了火焰信号,跳出		
		提示窗口后没有得		
		到炉膛有火焰的确		
		认。		
	Flue gas	Flue gas temperature	Stop burning ,	Flue gas temperature is less
	high	exceeds the high	post-purge and	than the high temperature
	temperature.	temperature alarm	cooling.	alarm setting.
	烟气高温报	setting.	停止燃烧,进行后扫	烟气温度低于高温报警的
4.	<u>敬</u>	烟气温度超过高温	风和冷却。	设定值。
		报警的设定值		
		(No6,默认 350		
		度)。		
	Failure of	No A/D converter	Stop burning ,	A/D converter detected
	PLC A/D	detected	post-purge and	检测到 A/D 转换模块
	converter	│ │ 检测不到 A/D 转换	cooling.	
		模块	停止燃烧,进行后扫	
	PLC A/D 转	A/D module failure	风和冷却。	Failure disappeared of A/D
	換模块故障 換模块故障	during data		module on data
5.		transmission		transmission.
		(cannot be		A/D 模块在数据转过程中
		simulated)		的故障消失
		A/D 模块在数据转		
		过程中出现故障		
		(无法模拟)		



	Combustion	The combustion	Stop burning ,	Combustion chamber
	chamber	chamber vacuum	post-purge and	vacuum exceeds alarm
	vacuum low	detecting within 45s	cooling	setting or incinerator in
	alarm.	in continuously	停止燃烧,进行后扫	stand-by mode.
	燃烧室真空	during the flue gas	风和冷却。	
6.	度低报警。	fan working, (except slag program).		真空度超过报警设定值或
0.		在烟气风机运行时		者处于待机状态。
		(出灰过程除外)		
		连续 45 秒低于炉膛		
		真空度报警设定值		
		(No7) 。		
	Over/under	The control voltage	Stop burning ,	Control voltage within range
	voltage alarm.	over/under 220V ±10%.	post-purge and cooling	of 220V±10%. 控制电压处于 220V±10%
7.	过/欠电压	220v ±10%.   控制箱内的控制电	停止燃烧,进行后扫	的范围内。
	报警。	压超出 220V±10%	风和冷却。	H142 FB k 1 0
	11/10/20	的范围。	, <b>(</b> ), , , , , ,	
	Compressed	In sludge mode, the	Stop burning ,	Step out sludge mode, or
	air pressure	compressed air	post-purge and	rectify compressed air
	low alarm.	pressure is less than	cooling	pressure and keep exceeding
8.	压缩空气压	the setting(0.4 MPa)	停止燃烧,进行后扫	setting.
	力低报警。	选择了污油模式,	风和冷却。	取消了污油模式或者压缩
		并且压缩空气的压		空气的压力超过压力开关
		力低于压力开关的 设定值(0.4 MPa)。		的设定值。
	Sludge oil	The sludge oil	The incinerator	The sludge oil pressure
	pressure low	pressure is less than	shut-down, post-purge	exceeds the setting of the
	alarm.	the setting of the	and cooling if the	pressure switch, or the
		pressure switch	incinerator is working	sludge pump was stopped.
	污油压力低	during the sludge oil	in automatic mode;	污油压力超过污油压力开
	报警。	circulation pump	Sludge oil circulation	关的设定值,或者污油泵停
		running.	pump doesn't stop if	止。
9.		污油循环泵运行	the incinerator is	
		中,污油压力低于	working in manual	
		污油压力开关的设   定值。	mode! 如果在自动运行中,	
		た IE。	如来任百 <i>切运</i> 行中, 停止燃烧,执行后扫	
			风和冷却;	
			如果在手动启动的污	
			油泵将不会自动停	
			止!	



	Diesel oil	The diesel oil	Stop burning ,	Keep diesel oil pressure
10.	pressure low alarm. 柴油压力低 报警。	pressure is lower than the setting during the burner is running. 燃烧器马达运行中,柴油压力低于柴油压力开关的设定值。	post-purge and cooling 停止燃烧,进行后扫 风和冷却。	exceeds the setting of the pressure switch. 柴油压力超过柴油压力开关的设定值
11.	Sludge tank level low alarm. 污油柜液位 低报警。	Confirm sludge mode before start-up, the sludge level is lower than the low level switch. 选择了污油模式,在启动时,污油柜液位低于低液位液位开关。	Stop burning, post-purge and cooling; If the sludge oil pump or the heater start-up in manual, stop both of them. 停止燃烧,进行后扫风和冷却; 如果污油泵或污油加热器手动启动的,停止运行。	Sludge oil level is higher than the low level switch, or cancel sludge oil mode, or keep system in stand-by mode.  污油柜液位高于低液位液位开关,或者取消了污油模式,或者处于待机状态。
12.	Frequency converter alarm. 变频器故障 报警。	Frequency converter failure 变频器出现故障。	Stop burning, post-purge and cooling 停止燃烧,进行后扫 风和冷却。	Frequency converter resumes to normal 变频器恢复正常。
13.	Sludge oil low TEMP. 污油低温报 警。	Sludge oil temperature is lower than the setting within pre-set time (No41, default 300min) during automatic heating stage 处于污油自动加热阶段,污油温度低于污油低温报警值超过预设时间(No41,默认300分钟)	Stop heating, turns to stand-by 停止加热,待机。	Keep the sludge oil temperature lower than the alarm setting, or cancel sludge oil mode, or the incinerator in cooling and stand-by stage 污油温度超过低温报警设定值,或者取消污油模式,或者处于冷却、待机阶段。



	I			
		In sludge oil mode,	Stop burning,	
		the sludge oil	post-purge and	
		temperature is less	cooling.	
		than the pre-setting	停止燃烧,进行后扫	
		for more than the	风和冷却。	
		setting time (No	, <b>(</b> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1	
		40,default 20s).		
		污油模式下, 开始		
		焚烧后,污油温度		
		低于污油低温报警		
		值超过预设时间		
		(No40, 默认 20 秒		
		钟)		
	Sludge oil	The sludge oil	Stop burning ,	Sludge oil temperature is
	high	temperature is	post-purge and	lower than the setting.
	temperature	higher than the	cooling, stop manual	污油温度低于污油高温报
	alarm.	alarm setting.	heating.	警设定值
14.	污油高温报	污油温度超过污油	停止燃烧,执行后扫	I WELL
	歡。	高温报警的设定	风和冷却; 停止手动	
		值。	加热。	



15.	PLC battery low voltage alarm. PLC 电池电压低警告。	PLC battery voltage is lower than 2.7V.  PLC 电池电压低于 2.7V。	Warning activated once, for attention to user to change battery. There is warning flashing available in HMI panel. Please keep power on during the battery replacing. Caution: There is risk of PLC program missing if power off incinerator with PLC battery voltage low. Please read carefully for battery replacing	Confirm the alarm and then the relay is reset. The alarm lamp will on yellow till the battery voltage return to normal. 确认后报警指示灯、报警继电器复位。报警页面中对应的警告灯保持黄色直到电池电压恢复正常。
			用户更换电池。流程 图页面有文字闪动提 醒有警告信息。在更 换电池前应保持供给 电源 注意: PLC 电池耗尽 后停电有丢失 PLC程 序的风险,请仔细阅 读更换电池的章节。	

# 4.5 Function description 功能描述

#### 4.5.1 General description 概述

When we are planning the program of the incinerator, we have followed those rules:

我们在设计焚烧炉程序时,均满足以下几点要求:

- a) Meet the requirement of IMO.满足 IMO 规范要求。
- b) Working stable and without alarm.工作稳定并没有报警。
- c) Burning more sludge and save fuel oil.可以焚烧大量污油并节约燃油消耗。

#### A. During start up, some conditions will cause flame fail. such as:

在系统启动期间,某些情况会导致点火失败,例如:

• The unit is start with a hot chamber, the temperature of the combustion chamber will reach 970 degree even with a very low sludge dosing, if the fuel oil is shut off, it is possible to cause a



flame alarm.

当系统热炉启动,炉膛温度将要达到 970℃,即便污油计量泵还有低流量的输入,如果燃油关闭,就有可能导致火焰报警。

• The unit can be switch over between "Sludge Oil Mode"/"Solid Waste Mode"/"Sludge and Solid Waste Mode" without restart. There maybe is a hot chamber and very low sludge dosing level, if shut off the fuel directly, maybe cause a flame alarm.

系统可以在"污油模式"/"固体垃圾模式"/"污油和固体垃圾模式"间直接切换,不需重启。但是在热炉状态下并有少量污油输入时,如果柴油立即切断,可能会导致火焰报警。

• The suitable start dosing level of the sludge is difficult to setting to meet all condition. Because the water content of the sludge is unknown, if it is setting too higher, will cause black smoke; if it is setting too lower, will cause flame fail. We hope the unit can be running with any water content, and without flame fail.

为了满足所有条件去设定污油的初始喷入量是非常难的,因为污油含水量是未知的,如果污油计量泵频率设定过高,将会导致黑烟产生;如果频率设定太低,将会火焰报警。 我们希望焚烧炉系统无论是燃烧多少含水量的污油,并且没有火焰报警的情况下能正常运行。

B. In the program, there is a register, this register is used to decide increase/decrease/shut off the fuel oil. When this register is lower, the fuel is decreased; if this register is higher, the fuel is increased. When the unit is start, this register is set in a middle level. If the chamber temperature if rising quickly, this register will be decrease slowly; if the chamber temperature rising slowly, this register will be increase slowly; if the chamber temperature is drop down, this register will increase fast; if the temperature is over 970gedree and without temperature drop down, this register will be decrease. That mean, the fuel will increase until the chamber temperature arise. When the chamber temperature reached 970degree, this register will decrease step by step, and then the fuel will be decrease step by step. How long time will be taken is decided by the current value of this register, and level of the temperature arising. So the temperature of shut off fuel is not a constant. 970degree is the point to decrease this register step by step. So there is a time delay, When the temperature arising fast, then the delay is shorter; when the temperature arise slowly, the delay will be a little longer, then the system get the time to increase the dosing level of sludge.

在程序里面有个寄存器,主要是用来增加/减少/关闭燃油的。当寄存器的数值变小,燃油就是相应的减少输入量;如果寄存器数值变大,燃油也会相应增加输入量。当系统启动时,寄存器设定在一个中间值。如果炉温上升速度较快,寄存器的数值会慢慢的减小;如果炉温升温缓慢,寄存器数值将会慢慢增加;如果炉温快速降低,寄存器数值会快速增加。如果炉温超过 970℃并且没有快速下降,寄存器数值会减少。也就是说。燃油一直增加直到炉温升高。当炉温到达 970℃,寄存器将逐步减小数值,燃油也将逐步减少其输入量。至于要花多少时间取决于寄存器的当前数值以及炉堂升温速率。所以关闭燃油输入时的温度不是一个常数。970℃是寄存器逐步减少数值的一个节点,所以这里有个时间延迟,当炉温上升较快,延迟比较短暂;当炉温上升较慢,延迟稍微长一些,所以系统会有一段时间来增加污油的输入量。

C. The PLC program is intended for perform function of solid/sludge incinerator under pre-set parameter and requirement.



控制程序按照操作要求和各种设定的参数,执行相应的垃圾及污油焚烧功能。

The PLC program mainly as follow: 主要的程序包括:

Stand-by for follow function available:

待机, 待机时可以执行如下动作:

Manual start/stop sludge oil circulating pump, refers to "operate page" in regard to description of the circulating pump.

手动启动、停止污油循环泵,请参考"操作页面"关于"循环泵"按钮的描述。

Manual start/stop the sludge oil heater, refers to "operate page" in regard to description of "sludge oil heater".

手动启动、停止污油加热器,请参考"操作页面"关于"污油加热器"按钮的描述。

Open the incinerator door for solid waste loading.

开炉门,装填垃圾

■ The incinerator will perform automatic cooling if the combustion chamber temperature exceeding the setting of open door in default, refer to data page 2 in regard to description of automatic cooling down.

默认情况下,如果炉膛温度高于开炉门的温度会自动启动冷却程序,请参考参数设定页面2中关于自动启动冷却程序的描述。

- Start-up the incinerator in mode of "Solid Waste", "Sludge oil", "Solid Waste+ sludge" 启动焚烧炉,按选定的工作模式(固体垃圾、污油、固体垃圾+污油)执行预定程序
- Open the incinerator door, slag

开炉门, 出灰

• Solid waste mode description, mainly as follow:

固体垃圾焚烧程序,主要执行如下内容:

Pre-purging.

前扫风

Ignition.

点火

■ Solid incinerating.

固体垃圾焚烧

■ Post-purging and cooling.

后扫风及冷却

Sludge mode description, mainly as follow

污油焚烧程序,主要执行如下内容:

■ Sludge oil heating

污油加热

■ Pre-purging

前扫风

■ Ignition

点火

Combustion chamber heating.



炉膛加热

■ Sludge oil incinerating

污油焚烧

Post-purging and cooling

后扫风及冷却

Solid waste+ sludge oil mode, the incinerator perform the program of solid mode at first. If solid
heat is insufficient, then turn to sludge mode, mainly as follow.

固体垃圾+污油焚烧程序,首先执行固体垃圾焚烧程序,如果检测到固体垃圾的热量已经不是很高了,那就转到污油焚烧程序执行。主要执行如下内容:

Sludge heating

污油加热

Pre-purging

前扫风

■ Ignition

点火

Solid burning

固体垃圾焚烧

Sludge burning

污油焚烧

Post-purging and cooling

后扫风及冷却

Slag of incinerator, closing of the flue gas damper, start the flue gas fan after (No39s) delay in order to remove ashes

出灰,关闭烟气风门,延时(No39秒)启动烟气风机,以便清除炉灰。

Vacuum adjustment, adjusting of combustion vacuum through the flue gas damper control as program. Stop the flue gas damper action if vacuum deviation is less than (No21, mmWC)

真空度调节程序,辅助程序,根据其他程序设定的炉膛真空度,通过控制烟气风门去调节炉膛真空度。当真空度偏差小于(No21, mmWC)时,将停止风门动作。

#### 4.5.2 Solid operation description 固体垃圾焚烧操作说明

#### 4.5.2.1 Pre-purging 前扫风

In order to secure displacement of the combustible gas in the combustion chamber before ignition, the incinerator will perform pre-purging, which is no less than 15s before ignition. Vacuum setting of pre-purging as No19.

为了在点火以前将炉膛内可能存在的可燃气体排出炉膛要进行前扫风,前扫风的时间不小于 15 秒,前扫风时的真空度设定值为 No19。

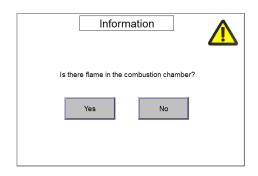
#### 4.5.2.2 Ignition 点火

Flame checking before ignition, if the PLC detects flame in the combustion chamber, there will be an caution page jumping out, if button "YES" pressed within 5s or button "NO" pressed directly, flame failure alarm is to be activated accordingly; if button "YES" pressed, further



confirmed residual flame in combustion chamber, the incinerator will perform normal ignition program accordingly.

点火前首先要进行火焰检查,如果炉膛内检测到了火焰信号,将会弹出一个提示界面,如果 5 秒钟内没有按 "是"的按钮或直接按了"否"按钮将会触发火焰故障报警;如果在 5 秒钟内按了"是"按钮以确认炉膛内确实有残存的火焰,系统将会按照正常的操作执行点火程序。



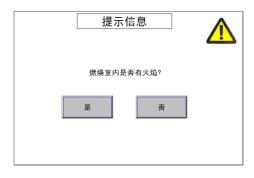


Figure 4-15 Caution page

图 4-15 提示页面

- Adjustment of combustion chamber vacuum till setting reached (No15, default 18 mmWC)
   将炉膛真空度控制到点火真空度(No15, 默认 18mmWC)设定的水平。
- Ignition transformer power on 10s, solenoid valve of diesel oil nozzle opens at 6th second. 然后点火变压器送电 10 秒钟,从第 6 秒钟开始可打开柴油喷嘴。
- Check whether there is flame or not in the combustion chamber after power-off ignition transformer. Alarm occurs if no flame; the incinerator perform following program if flame detected.

点火变压器断电后,然后检查炉膛内是否有火焰。如果没有火焰将触发火焰故障报警;如果检测到火焰将会去执行固体垃圾焚烧程序。

- 4.5.2.3 Control program of solid mode 固体垃圾焚烧控制程序
- Increase combustion vacuum to Max (No16, default 35 mmWC) upon solid mode start-up. 启动固体垃圾焚烧程序后,首先将炉膛真空度调节到最大值(No16,默认 35 mmWC)。
- Check combustion temperature rising within interval of preset time (No25, default 60s), if temperature rising rate is less than Minimum setting (No24, default 25°C), the PLC will slow down combustion vacuum to pre-setting, the adjustment space of vacuum (No23, default 2 mmWC) on each interval of pre-set (No38, default 60s), till Minimum combustion vacuum setting (No20). If the combustion temperature reaches pre-setting No29(default 1000°C), or flue gas temperature reach pre-setting No36 (default 310°C), the combustion vacuum is no more slow down.

在预定的时间间隔(No25,默认 60 秒)上检测炉膛温升,如果温升小于最小温升限定值(No24,默认 25 度),那就会按照预定的程序降低炉膛真空度,在设定的时间间隔上(No38,默认 60 秒)每次降低(No23,默认 2 mmWC)设定的数值,最小可以减到炉膛最小真空度(No20)。如果炉膛温度达到 No29 设定的温度(默认 1000 度)或者烟气温度达到 No36设定的温度(默认 310 度),真空度将不再降低。



• If the combustion temperature reaches Maximum setting (No1, default 1150°C) or the flue gas temperature reaches the Maximum setting (No4, default 330°C), the PLC will increase the combustion vacuum gradually under pre-setting vacuum adjustment space (No23, default 2mmWc) on each interval of pre-set (No38, default 60s), until the Maximum combustion vacuum (No16, default 35 mmWC); if the combustion temperature is less than No1-No26 (corresponding to dead zone, default 10°C), and the flue gas temperature is less than No4-No27 (corresponding to dead zone, default 10°C), the incinerator will intend to lower-down vacuum, and keep combustion temperature maintained in high level.

当炉膛温度达到最大设定值(No1,默认 1150 度)或者烟气温度达到最大设定值(No4,默认 330 度)将会逐步增加炉膛真空度,在设定的时间间隔上(No38,默认 60 秒)每次升高(No22,默认 2mmWc)设定的数值,最大可以增加到炉膛最大真空度(No16,默认 35 mmWC);如果炉膛温度低于 No1-No26(对应的死区温度,默认 10 度),并且烟气低于 No4-No27(对应的死区温度,默认值 5 度)时将尝试降低真空度,炉膛温度将最终保持在一个较高的水平。

 If alarm occur, or "Emergency Stop" button pressed, or running-out of time pre-setting, the incinerator will turn to post-purging and cooling.

当出现报警、或按下"停止"按钮、或预设燃烧时间达到时将会转到后扫风和冷却程序 执行。

- 4.5.2.4 Post-purging and cooling 后扫风和冷却
- Combustion vacuum to be adjusted to setting of post-purging vacuum (No17, default 20 mmWC).

负压将会被调整到后扫风真空度(No17,默认 20 mmWC)的设定值。

Post-purging time is not less than 30s.

后扫风时间不少于30秒钟。

• Incinerator turns to stand-by mode if the combustion temperature is less than No34-No35 (default 220-120=100°C).

如果炉膛温度低于 No34-No35(默认 220-120=100 度)时转入待机状态。

• The incinerator turns to stand-by mode if the combustion temperature is less than (No34) temperature setting of open door, and press button "stop" once more. If the combustion chamber temperature rising over the temperature setting of open door again, and "auto cooling" enabled, the incinerator will turn to automatic cooling as program; otherwise the high temperature alarm of combustion chamber is to be activated.

如果炉膛温度低于炉膛开门温度(No34)后,再按一次"停止"按钮,会马上转入待机状态。如果此后炉膛温度又超过了炉膛开门温度,如果允许自动启动进行冷却,将会自动转入冷却程序;否则将会触发炉膛高温报警。

• If diesel oil pressure low alarm occurs and vacuum is normal, the burner will stop; if diesel oil pressure low alarm occurs, but the combustion chamber vacuum is less than setting (No7), the burner will not be shut-down due to diesel oil pressure low.

如果出现柴油低压报警,炉膛真空度正常,燃烧器将停止运行;如果出现了柴油低压报警,但是同时炉膛真空度低于真空度低报警值(No7)时,燃烧器不会因为柴油低压而停止运行。



#### 4.5.3 Sludge mode operation 污油焚烧操作说明

#### 4.5.3.1 Sludge oil heating 污油加热程序

• Check the sludge oil temperature first, if it is higher than the setting of sludge oil tank, or the sludge oil temperature is lower than setting over 5°C, the incinerator will turn to pre-purging automatically.

首先检查污油温度,如果污油温度高于污油柜温度开关的设定值,或者污油温度比污油低温报警温度高出 5 度以上,都将执行前扫风程序。

 If the combustion chamber temperature exceeds the temperature setting (No34) of open door, the flue gas fan will start automatically, and carry out cooling down until the combustion chamber temperature is lower than (No34-No35), the combustion chamber vacuum equals to (No19) of pre-purging vacuum.

如果在此期间炉膛温度超过炉膛开门温度(No34),烟气风机将会自动启动来冷却炉膛,直到炉膛温度低于冷却终止温度(No34-No35),炉膛真空度等同于前扫风的真空度No19。

• If shut-down or alarm occurs, the incinerator will carry out further program step up according to status of the flue gas fan; and turn to stand-by mode if flue gas fan is not running; or turns to cooling mode if the flue gas fan is running.

如果在此期间出现停机命令或报警时,将根据烟气风机的

状态决定程序走向:烟气风机没有运行时将会马上转到待机状态;如果烟气风机正在运行将会直接转到冷却程序。

#### 4.5.3.2 Pre-purging 前扫风

Equals to pre-purging program in solid oil mode.

等同干固体垃圾焚烧的前扫风程序。

#### 4.5.3.3 Ignition 点火

Equals to ignition program in solid waste mode.

等同于固体垃圾焚烧的点火程序。

- 4.5.3.4 Combustion chamber heating 炉膛加热
- Close the air damper to minimum manually, combustion vacuum slow down to minimum ste(No2)-20 also, nozzle opens so that increase temperature rising speed.

手动关小燃烧器风门,炉膛真空度调节到最小值(No20),柴油喷嘴打开,以便提高炉膛升温速度。

 The incinerator turns to sludge oil mode automatically upon combustion chamber temperature reach (No2)-20 of sludge oil burning setting.

当炉膛达到起始污油焚烧温度低(No2)-20度时,将会转到污油焚烧控制程序。

 If shut-down or alarm occurs, the incinerator will turn to post-purging and cooling program automatically.

如果出现停机命令或报警,将转入后扫风和冷却程序。

- 4.5.3.5 Sludge mode operation of program 污油焚烧控制程序
- Combustion chamber vacuum to be adjusted to initial vacuum setting (No18).

首先真空度调节到污油起始真空度(No18)。



• Combustion chamber temperature reaches between (No2, default 850°C) and (No3, default 950°C).

炉膛温度在(No2,默认 850 度)至(No3, 默认 950 度)之间。

Upon combustion temperature reaching initial setting (No2), sludge oil dosing pump starts up under initial frequency (No12).

当炉膛温度达到污油起始炉膛温度(No2)后,污油计量泵启动,频率为污油泵起始频率(No12)。

■ If temperature rising exceeds (No32, default 0°C) within rated time setting (No33, default 30s), sludge oil dosing frequency will step up gradually, increasing span (No46) with rated time setting (No33).

如果在额定时间内(No33,默认 30 秒),温升超过(No32,默认 0 度),污油频率将会逐步增加,额定时间内(No33)增加(No46)设定的数值。

■ Lack of combustion temperature rising speed, the incinerator will step down combustion chamber vacuum gradually in order to increasing combustion chamber temperature.

如果连续温升不足,则炉膛真空度会逐步减小以便提高炉膛温度。

If the combustion chamber temperature reaches (No3) of sludge independent burning, diesel oil will reduced gradually to minimum until sludge oil independent burning. If sludge oil independent burning mode disabled, there will be diesel oil accompanying burning with sludge always.

炉膛温度达到污油独立燃烧的温度(No3)后,柴油油量将会初步减小,直到污油独立燃烧。但是如果不允许污油独立燃烧时,最终会有柴油小火与污油伴烧。

■ If combustion chamber temperature lowers down less than (No3-No10), there will be diesel oil accompanying burning again.

如果炉膛温度又降到(No3-No10)以下时,就会重新有柴油参与伴烧。

• If temperature exceeds independent sludge burning setting from (No3) to (No1-50)°C, sludge oil will be increased according to temperature rising speed, the higher rising speed the lower sludge dosing rate, the lower rising speed the higher sludge dosing rate.

温度大于污油独立燃烧炉膛温度(No3)直到(No1-50)度,污油会根据温升速率增加,温升快加油慢,温升慢加油快。

• If the combustion chamber temperature exceeds (No29, default 1000°C) or flue gas temperature exceeds (No36, default 310°C), the combustion chamber temperature will increase gradually till maximum vacuum. The increasing time interval (No38), step (No22)mmWc; if combustion chamber temperature lower than (No29, default1000°C), and flue gas temperature lower than (No36, default 310°C), combustion chamber vacuum will be reduced gradually to minimum, step (No23)mmWc.

当炉膛温度超过(No29,默认 1000℃)或烟气温度超过(No36,默认 310℃)后炉膛温度逐步增加,直到最大真空度。增加时间间隔为(No38)秒,步长为(No22)mmWc;当炉膛温度低于(No29,默认 1000℃),并且烟气温度低于(No36,默认 310℃)后,炉膛真空度将逐步减小,步长为(No23)mmWC。

 If combustion chamber temperature exceeds (No1-50), but does not reach maximum setting (No1), sludge oil dosing frequency is to be corresponding to temperature waving rate, temperature slow down and sludge to be increased, temperature increasing highly and sludge



decreased rapidly also, and finally keep combustion temperature stable.

当炉膛温度超过(No1-50℃),但是还没有达到最大设定值(No1)时,污油也会根据炉膛温升加减频率,降温加油,升温快减油,以便使温度更加稳定。

• If the combustion chamber temperature reaches maximum (No1), sludge oil to be decreased, and increased again upon combustion chamber temperature less than (No1-No26).

当炉膛温度达到最大设定值(No1)后,将减污油;低于(No1-No26)时将会加污油。

• If the flue gas temperature reaches maximum (No4), sludge oil to be decreased, and increased again upon combustion chamber temperature less than (No4-No27).

当烟气温度达到最大设定值(No4)后将会减污油; 低于(No4-No27)时将会加污油。

• If the status above appears simultaneously, performs sludge oil reducing action in first.

上述程序中如果同时出现了加油和减油的条件,减油动作优先执行。

4.5.3.6 Post-purging and cooling 后扫风和冷却

Equals to post-purging and cooling in solid mode.

等同于固体垃圾焚烧的后扫风和冷却程序。

#### 4.5.4 Solid + Sludge oil mode 固体垃圾+污油模式

The incinerator running in solid mode first, then turn to sludge oil mode, details as follow:

首先按照固体垃圾模式工作,然后在按照污油模式工作,具体步骤如下:

Sludge oil heating

污油加热

Pre-purging

前扫风

Ignition

点火

 Solid incinerating, upon solid heat running out to minimum, the incinerator will turn to sludge oil mode automatically, detailed condition of change-over as follow:

固体垃圾焚烧,当固体垃圾的热值已经降低的时候就会自动转换到污油模式,转换的 条件为:

Diesel oil big nozzle working.

柴油大火燃烧。

Combustion chamber vacuum less than (No16-5, default 35-5=30 mmWC) or ((No16+No20)/2, default (35+16)/2=25 mmWC).

炉膛真空度小于(No16-5, 默认 35-5=30mmWC)或者炉膛负压小于((No16+No20)/2, 默认(35+16)/2=25 mmWC)。

■ Such situation keeping no less than 5min.

此种工况至少保持5分钟。

Sludge oil incinerating.

污油焚烧。

Post purging and cooling.

后扫风及冷却。



### 4.5.5 Communication protocol with computer station 与上位机的通讯协议

#### 4.5.5.1 General description 概述

HSINC incinerator is available of RJ45 communication with protocol Modbus TCP. Detail connection, data setting and protocol information as follow.

HSINC 系列焚烧炉可通过 RJ45 通信连接方式,采用 Modbus TCP 通信协议实现数据传输。下面将详细介绍通信的连接方法、参数设置、协议格式等内容。

#### 4.5.5.2 RJ45 Communication connection RJ45.通信线连接。

#### 4.5.5.3 Communication data setting 通信参数设置

Data setting of RJ45 as follow:

本设备的 RJ45 通信设置如下:

• IP address: 192.168.2.10

IP 地址: 192.168.2.10

● Subnet mask: 255.255.255.0

子网掩码: 255.255.255.0

Default gateway: 192.168.2.1默认网关: 192.168.2.1

#### 4.5.5.4 Data format and description 数据格式及含义说明:

Table 4-5 Data format and description list

表 4-5 数据格式以及含义说明清单

Item	Byte code		Description	
项目	字编号		描述	
		.0	PLC AD/DA failure PLC AD/DA 模块故障	
	W400	.1	Motor overload 马达过载	
Switch Data	报警位 Alarm Bit 0: 正常 0: Normal 1:报警 1: Alarm	.2	Spare 备用	
开关量数据		0: Normal 1:报警 .4	.3	Voltage over/low alarm 电源过压/欠压报警
			Flame failure 火焰报警	
		.5	Diesel oil pressure low 柴油低压报警	
		.6	Flue gas temperature high alarm 烟气高温报警	



		.7	Combustion chamber tem 炉膛高温报警	perature high alarm
		8	Combustion chamber vacu 炉膛低负压报警	uum low alarm
		.9	Compressed air pressure l 压缩空气低压报警	ow alarm
		.10	Sludge oil pressure low al 污油低压报警	arm
		.11	Converter failure alarm 变频器故障	
		.12	Sludge oil level low alarm 污油柜液位低	1
		.13	Sludge oil temperature hig 汚油温度高	gh alarm
		.14	Sludge oil temperature lov 污油温度低	w alarm
		.15	PLC battery voltage low v PLC 电池电压低(警告,	warning (warning, no action) 不产生其它动作)
		.0	Start order 启动命令	0: No action 没动作 1: Start-up reset to 0 启动,然后自动复位为 0
		.1	Shut-down order 停止指令	0: No action 没动作 1: Shut-down reset to 0 停止,然后自动复位为 0
l v	V401	.2	Solid mode 固体垃圾模式选择	00: No action 没动作
命	命令 Oder	.3	Sludge mode 污油模式选择	01: select solid mode 选择固体垃圾模式 10: Select sludge mode 选择污油模式 11: Select solid + sludge mode then reset to 0 选择固体垃圾+污油模式,然后 自动复位为 0
		4	Spare 备用	
			Spare 备用	
		7	Spare 备用	
W	V402	.0	Running indication 运行指示	0: Stop 停止 1: Running 运行



	 状态		Burner	0: Stop 停止	
	Status	.1	燃烧器	1: Running 运行	
	Status		Flue gas fan	0: Stop 停止	
		.2	烟气风机	1: Running 运行	
			Sludge oil dosing pump	0: Stop 停止	
		.3	污油计量泵	1: Running 运行	
		_	Sludge oil mode	0: Unselect 未选择	
		.4	污油模式已选择	1: Selected 已选择	
			Solid mode selected	0: Unselect 未选择	
		.5	固体垃圾模式已选择	1: Selected 已选择	
		.6	V2 status 状态	0: Close 关 1: Open 开	
		.7	V3 Status 状态	0: Close 关    1: Open 开	
		.8	Sludge circulation pump 污油循环泵	0: Stop 停止 1: Running 运行	
			Sludge heating	0: Stop 停止	
		.9	污油加热	1: Running 运行	
			Flame sensor	0: No flame 没有火焰	
		.10	火焰传感器	1: Flame detected 检测到火焰	
		11	Loading/ slag	0: Close 关闭	
		.11	填料/出灰门	1: Open 打开	
		.12	Flue gas damper open 烟气风门正在打开	0: Not opening 不在打开 1: Opening 正在打开	
		.13	Flue gas damper closing 烟气风门正在关闭	0: Not closing 不在关闭 1: Closing 正在关闭	
		.14	Spare 备用	1. Closing IL/L/(A)	
			Spare 备用		
	W/402	.15	Spare 备用		
	W403		Current combustion cham	her temperature	
	W404		当前炉膛温度(℃)	•	
	W405		Current flue gas temperat 当前烟气温度(℃)	ure	
Analog Data	W406		Current sludge oil temperature		
模拟量数据			当前污油温度(℃) Current sludge oil dosing frequency		
	W407		当前污油计量泵频率(0.1Hz)		
	W408		Current combustion vacuum 当前炉膛真空度(mmWC)		
	W409		Spare 备用		
	W409 W410		Spare 备用		
	***************************************		Max combustion chamber	r temperature	
System	W411		炉膛最大燃烧温度(°C)	· ······pormuro	
	1		// /// V////////////////////////////		



Parameter Setting 系统参数设 置	W412 Initial sludge burning temperature 污油燃烧起始温度(℃)					
	W413	Sludge shut-down and diesel accompanying burning temperature 污油停止柴油伴烧温度(℃)				
	W414	Max flue gas temperature 最大烟气温度(℃)				
	W415	Combustion chamber temperature high alarm 炉膛报警温度(℃)				
	W416	Flue gas temperature high alarm 烟气报警温度(℃)				
	W417	Combustion chamber vacuum low alarm 炉膛低负压报警值(mmWC)				
	W418	Spare 备用				
	W419	Spare 备用				

### 4.6 Operation 日常操作

#### 4.6.1 Sludge burning 污油焚烧

#### 4.6.1.1 Sludge getting ready 污油准备

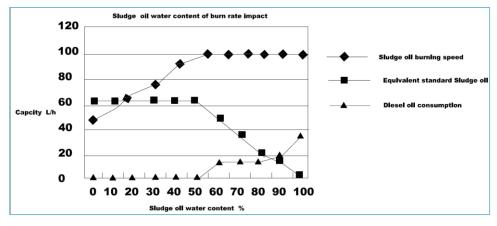
 Transfer sludge oil to sludge tank, if more water is in sludge oil, drain water after certain of sediment; if sludge oil is inseparable by gravity, the sludge can be burnt directly.

将需要焚烧的污油驳运到污油柜,如果污油中有较多水分,并且能够分层,可以在沉淀后将油柜下层的污水泄放到舱底水舱;如果污油中的水分不能重力分离,可以直接焚烧。

- If more water in sludge, in order to preventing flame failure, disable sludge independent burning.
   如果水分过多,为了防止频繁出现火焰故障报警,可以选择禁止污油独立燃烧。
- Sludge burning speed is corresponding to water content, if sludge and water well homogenized that doesn't affect sludge burning rate, in contrary more water can take more heat, and more sludge to be burnt; if sludge and water are not well homogenized, that will cause flame failure, in case of this, sludge oil independent burning can be disabled, the sludge can be accompanied burning with the diesel nozzle. For detail sludge burning speed, please refer to chart as follow. (Standard sludge means sludge oil with 20% water), the maximum sludge oil burning rate is prohibited by capacity of dosing pump, pipe size.

焚烧污油的速率与污油的含水量相关,污油中含有一定的水分,只要混合均匀,并不会影响污油的焚烧速率,相反由于水蒸气带走更多的热量,可以少量增加污油(换算为100%的污油)的焚烧速率;如果污油内的含水量过多或者混合不均匀,有可能会出现火焰故障,此时可以采用禁止污油独立燃烧,使柴油喷嘴与污油伴烧。具体污油焚烧速率可以参考下表。图中的标准污油值指含水量20%的污油。最大污油焚烧速率受制于计量泵容量、管路直径,不能无限增加。





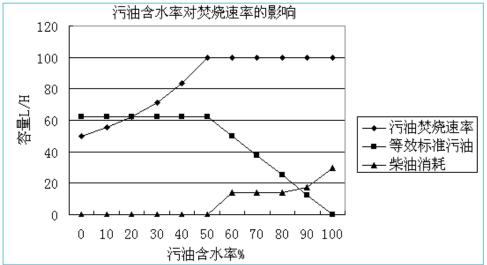


Figure 4-16 Sludge oil water content

图 4-16 污油含水量

#### 4.6.1.2 Start-up in automatic mode 启动自动焚烧

• Open diesel oil, sludge oil, compressed air valve.

将柴油、污油、压缩空气管路上相关的阀门打开。

Note: there is extremely forbidden for any closed valve or blind plate on diesel oil return line, if any valve closed and blind plate on diesel oil return line, there would be serious damage caused to diesel oil pump.

<u>注意:燃烧器到柴油柜的回油管路上不能有关闭的阀门或盲板,如果在回油管路阻塞</u>的情况下运转燃烧器会严重损坏燃烧器油泵。

• "Sludge Oil Mode" button pressed, and confirm sludge oil mode.

按"污油模式"按钮,选择污油模式。

• "Start" button pressed, incinerator starts automatically.

按"启动"按钮, 焚烧炉开始自动运行。

 Upon low level of sludge tank or "Stop" button pressed, the incinerator will shut-down automatically.

当污油柜液位低,焚烧炉停止焚烧;或者按"停止"按钮停炉。



#### 4.6.2 Solid mode 固体垃圾焚烧

#### 4.6.2.1 Solid getting ready 固体垃圾准备

"Unlock Door" button pressed then open door and loading.

按"解锁炉门"按钮开启炉门,然后装填固体垃圾。

 Dangerous liquids that flashing point less than 60°C is extremely prohibited to load into incinerator, or other dangerous explosives are extremely forbidden for loading.

不要将闪点低于 60 度的危险液体填入炉膛焚烧,也不要把其它危险物品放入焚烧炉焚烧。

Glasses or equivalents are to be extremely prohibited for loading to incinerator.

不要将玻璃等能够在炉膛中熔融的材料填入焚烧炉焚烧。

• High heat material (such as oil fully absorbed rages, plastics) can not be loaded together. In order to avoiding combustion chamber temperature high alarm, certain materials over 1 kg, which of them needs to be mixed and arranged with low heat material.

不要将大量高热量的材料(如吸油的棉纱、塑料等)集中堆放,1 公斤以上的此类物质要与低热值的物质混放,以免炉膛高温报警。

 Do not put oiled cotton rag on hot brick of combustion chamber, perform "Slag" during oiled cotton rag loading, so that fully displacement of combustible gas.

不要让油棉纱直接与较热的耐火砖接触,装填油棉纱时请启动"出灰"程序,以便排除可能产生的可燃气体。

 In order to avoiding high consumption of fuel oil, wet and un-combustible material are not recommended loading on top.

湿的、不易燃烧的材料要放在表面,以节省燃油。

 In order to avoiding foreign solid wrongly displaced to flue gas fan and cause further clogging of damper and flue gas fan, light material is not recommended loading on top, if it's necessary, please load in garbage bag, and put them on bottom of combustion chamber.

重量很轻的材料不要散放在表面,需要装入垃圾袋或装填在其他垃圾下面,以免前扫 风时抽入烟道,阻塞烟气风门或烟气风机。

• Solid garbage is not recommended exceeding 2/3 of combustion chamber.

固体垃圾最多不要超过炉膛体积的 2/3。

4.6.2.2 Start up of solid mode 启动固体垃圾焚烧

Close door.

关闭炉门。

Check valves on diesel oil pipe line.

检查柴油管路的阀门。

"Solid Waste Mode" button selected to further confirm solid mode.

按"固体垃圾模式"按钮选择固体垃圾模式。

 Preset burner time, normally 90mins is enough for complete incinerating. If preset time is 0, the incinerator needs to be stop manually.

设定预设燃烧时间,一般 90 分钟就可以焚烧完毕。如果预设燃烧时间是 0,需要手动停机。

"Start" button pressed, start-up incinerator.



按"启动"按钮,启动焚烧炉。

#### 4.6.2.3 Stop 停机

Stop incinerator by button "Stop" pressed or preset time running out.

预设燃烧时间结束或按"停机"按钮停止

Cooling down carried out automatically till combustion chamber temperature low than No34-No35 (default 220-120=100℃); if combustion chamber temperature less than (No34, default 220℃), stop incinerator by pressing of button "stop" once more. If further solid loading required, the combustion chamber needs to be cooled down completely, so that self-burning to be avoided.

自动开始炉膛冷却程序,直到炉膛温度低于 No34-No35(默认 220-120=100 度)后自动停机;如果炉膛温度低于(No34,默认 220 度)后再按一次"停机"按钮也可以马上停机。如果要继续装填易燃的固体垃圾,需要将炉膛温度降低一些,以免在装填过程中自燃。

 Button "Unlock Door" pressed once more then open door, button "Slag" pressed once more then start up slag mode, slag out ashes and residuals manually.

按"解锁炉门"按钮打开炉门,再按"出灰"按钮启动出灰程序,手动将炉膛内的残余物质清除。

#### 4.6.3 Solid + sludge 固体垃圾+污油焚烧

4.6.3.1 Solid and Sludge getting ready 准备固体垃圾和污油

Refer to sludge mode description to get sludge oil ready; refer to solid mode description to get solid ready.

参照污油焚烧的说明准备污油;参照固体垃圾焚烧的说明准备固体垃圾。

#### 4.6.3.2 Start-up 启动

• Check valves of sludge oil, diesel oil, compressed air prior to start-up.

启动前检查污油、柴油、压缩空气管路的阀门。

● button "Solid Waste Mode+ Sludge Oil Mode" pressed, confirm solid and sludge mode 按"固体垃圾模式+污油模式"按钮,选择固体垃圾+污油模式。

 button "Start" pressed, start incinerator, the system will carry the sludge heating, solid and sludge burning program.

按"启动"按钮,启动焚烧程序,系统会自动执行污油加热、固体垃圾焚烧、污油焚烧 程序。

#### 4.6.3.3 Stop 停止

Refer to solid mode and shut-down program

参照固体垃圾的停机程序。

#### 4.6.3.4 Emergency stop 应急停机

Upon emergency button pressed or power supply failure, if the combustion chamber temperature exceeds 220°C, the flue gas fan must be start-up and carry out cooling down program. Any shut-down incinerator without fully cooling down will seriously destroy burner. In normal condition, enable un-manned automatic cooling-down program, so that incinerator start cooling down program without manual operation upon power resume, and eliminate risk of further seriously damage of burner.

In emergency situation, user can manually push the "Emergency state fan" selection button which is on the upper part of the control box to "ON" to start the flue gas fan.



当按下应急停机按钮或出现电源故障时,如果炉膛温度超过 220℃,一定要尽快启动烟气风机以便冷却炉膛。<u>未经冷却的炉膛可能会严重损坏燃烧器。</u>一般情况下应该允许自动启动冷却程序,以便在电源恢复后、操作人员无暇顾及的情况下能够自动启动冷却程序,避免燃烧器的严重损坏。在紧急情况下可以手动将控制箱上部的"应急状态风机"选择按钮打到"ON"档以启动烟气风机。

# 4.7 Control System Input/output Signal Configuration 控制系统输入/输出信号清单

### 4.7.1 Input signal 输入信号

Input signal shown as Table 4-7 输入信号统计如表 4-7:

Table 4-7 Input signal list 表 4-7 输入信号清单

No.	Input	Description				
序号	PLC 地址	信号说明				
	A2-X0	Micro switch active at locked door.				
1	A2-X0	门锁信号反馈:炉门关闭时开关闭合。				
	10 771	Motor overload, active when any one of motors overload.				
2	A2-X1	马达过载信号:有马达过载时开关闭合。				
		Diesel oil pressure switch, active at normal pressure.				
3	A2-X2	轻柴油压力开关信号:压力满足时开关闭合。				
4	A2-X3	Spare 备用				
5	A2-X4	Spare 备用				
		Safety thermostat high temp sludge tank with steam valve active at				
6	A2-X5	temperature over set point.				
		污油加热温度开关信号:到设定值时开关闭合。				
		Flame signal from flame controller. Active at normal flame in the combustion				
7	A2-X6	chamber.				
		火焰信号: 有火焰时开关闭合。				
		Over/under voltage, active at abnormal level.				
8	A2-X7	过压/欠压保护信号:高压(+10%),欠压(-10%),不在该范围时继电				
		器动作。				
		Compressed air pressure switch, active at normal pressure.				
9	A6-X0	压缩空气压力开关信号:压力满足时开关闭合。				
10	A C 37.1	Sludge oil pressure switch, active at normal pressure.				
10	A6-X1	污油压力开关信号:压力满足时开关闭合。				
11	A6-X2	Cylinder position (spare)气缸位置(备用)				



12	A6-X3	LS2 Door feedback (spare)外门锁反馈(备用)		
1.2		Sludge tank low level switch, active at low level.		
13	A7-X0	污油柜液位信号:液位低时开关闭合。		
14	A7-X1	Inverter fault. 变频故障信号		
		Burner air damper position feedback (spare)		
15	A7-X2	风门位置信号反馈(备用)		
16	A7-X3	Spare 备用		
1.5		Analog signal (4-20mA) from temperature transmitter flue gas.		
17	A4-CH1	烟气温度模拟输入信号(4-20mA)		
10	1 4 CI12	Analog signal (4-20mA) from temperature transmitter combustion chamber.		
18	A4-CH2	炉膛温度模拟输入信号(4-20mA)		
		Analog signal (4-20mA) from temperature transmitter sludge oil temp in		
19	А4-СН3	dosage pump.		
		污油温度模拟输入信号(4-20mA)		
		Analog signal (4-20mA) from temperature transmitter combustion chamber		
20	A4-CH4	negative pressure.		
		炉膛负压模拟输入信号(4-20mA)		

## 4.7.2 Output signal 输出信号

Output signal shown as Table 4-8

输出信号统计出下表 4-8:

Table 4-8 Output signal list

表 4-8 输出信号清单

No.	Output	Description
序号	PLC 地址	信号说明
1	A 2 X/O	External alarm, contact closed at alarm condition.
1	A2-Y0	远程报警输出信号(常开/常闭可选)
2	A2-Y1	Output signal, contact closed at flue gas running. 系统运行指示输出信号
3	A2-Y2	Output signal for opening of flue gas damper. 开烟道门输出信号
4	A2-Y3	Output signal for closing of flue gas damper. 关烟道门输出信号
5	A2-Y4	Output signal for start of flue gas fan. 烟气风机启动输出信号
6	A2-Y5	Output signal for start of burner motor. 燃烧器启动输出信号
7	A2-Y6	Spare 备用
8	A2-Y7	Output signal for local alarm buzzer. 本地报警输出信号
9	A3-Y0	Output signal for ignition transformer. 点火变压器启动输出信号
10	A 2 X71	Output signal for common solenoid valve diesel oil.
10	10 A3-Y1	柴油电磁阀 V1 输出信号
11	A3-Y2	Output signal for solenoid valve nozzle 1. 柴油电磁阀 V2 输出信号
12	A3-Y3	Output signal for solenoid valve nozzle 2(spare). 柴油电磁阀 V3 输出信



		号(备用)
13	A3-Y 4	Output signal for burner damper control 1 (spare)燃烧器风门控制 1(备用)
14	A3-Y 5	Output signal for burner damper control 2 (spare)燃烧器风门控制 2(备用)
15	A3-Y 6	Spare 备用
16	A3-Y 7	Spare 备用
17	A6-Y0	Output signal for start of sludge circulating pump motor. 污油循环泵启动输出信号
18	A6-Y 1	Output signal for solenoid valve steam/air. 压缩空气电磁阀输出信号
19	A6-Y 2	Output signal for Cylinder open(spare) 气缸打开信号(备用)
20	A6-Y 3	Output signal for LS2 Door lock(spare) 除灰门打开信号(备用)
21	A7-Y0	Output signal for sludge tank heater (steam or electric). 污油加热输出信号
22	A7-Y 1	Output signal for solenoid door lock. 开炉门输出信号
23	A7-Y 2	Output signal for inverter run. 变频器运行输出信号
24	CH1	Analog output signal for frequency inverter (0-10v). 变频器频率给定输出信号
25	CH4	Spare 备用

## 4.7.3 Description of Electronic and Electric Elements 电气主要元件说明

The detailed information of electronic and electric elements is described as table 4-9 主要电气元件的型号、规格和作用如表 4-9 所示

Table 4-9 Description of electric elements list

表 4-9 主要电器元件说明清单

Name	Pos. No.	Function
名 称	位 号	功能
Operator Panel		Operator panel for operation of the system. Displaying for
1	A1	all reading of status.
人机界面		完成数据显示,参数设置,过程操作功能。
		PLC main unit containing 8 digital input and 8 digital output
PLC main unit	4.0	signals (relay).
PLC 主单元模块	A2	PLC 主单元模块,包括 8 点输入和 8 点输出(继电器输
		出)。
Extension unit		Extension unit for PLC main unit 8 digital output signals
扩展模块	A3	(relay).
リールコ大クへ		扩展单元 8 点继电器输出单元。



Analogue input module 模拟量输入模块	A4	Analogue input module having 4 channels. Signal from temperature transmitter and vacuum controller (4-20mA) 4 通道模拟量输入模块(4-20mA)。			
Analogue output module 模拟量输出模块	A5	Analogue output module having 4 channels. Signal to frequency inverter (0-10V /4-20mA). 2 通道模拟量输出模块(4-20mA/0-10V)。			
Extension unit 扩展模块	A6	Extension unit for PLC main unit 4 digital inputs and 4 digital output signals (relay). 4 点输入,4 点继电器输出扩展模块。			
Extension unit 扩展模块	A7	Extension unit for PLC main unit 4 digital inputs and 4 digital output signals (relay). 4 点输入, 4 点继电器输出扩展模块。			
Motor over current Protection 带过载保护的电源开关	F1	Protection of flue gas fan motor. 烟气风机马达过载保护			
Motor over current Protection 带过载保护的电源开关	F2	Protection of burner motor. 燃烧器马达过载保护			
Over current protection 备用过载保护	F3	Spare 备用			
Motor over current Protection 带过载保护的电源开关	F4	Protection of sludge circulation pump motor. 污油循环泵过载保护			
Over current protection 控制回路主开关	F5	Protection of primary 440V (380V) transformer circuit. 控制回路主开关。			
Automatic fuse 控制回路保险丝	F6	220V (110V) control circuit protection. 控制回路过电流保护。			
Automatic fuse 人机界面保险丝	F7	Operator panel 24V circuit protection. 人机界面回路过电流保护			
Contactor 接触器	KM1	Start/stop flue gas fan motor. 启动/停止烟气风机。			
Contactor 接触器	KM2	Start/stop burner motor. 启动/停止燃烧器。			
Contactor 接触器	KM3	Spare 备用			
Contactor 接触器	KM4	Start/stop sludge circulation pump. 启动/停止污油循环泵。			
Main switch 电源开关	Q1	Isolate control panel power supply. 主电源开关。			
Breaker 空气开关 S1		Protection of control voltage 220v 用于控制回路通断。			



Frequency inverter		Frequency control for variable speed of sludge dosing		
变频器 U1		pump. 用于控制污油的供给量。		
Power indicator 电源指示灯	HL1	Power indicator (White or Yellow). 用于控制柜的电源指示(白色或黄色)。		
Running indicator 运行指示灯	HL2	System running indicator (green). 系统运行指示(绿色)。		
Alarm indicator with buzzer 报警指示灯带蜂鸣器	HL3	System sound and light(red) alarm indication. 系统声光报警指示(红色)。		
Heating indicator 污油加热指示	HL4	Sludge oil heating indicator(green) 污油加热指示(绿色)		
Emergency stop button 紧急停止按钮	SB1	Emergency stop (red). 紧急停止(红色)。		
Emergency state fan 应急状态风机	SB4	Independent start/stop selection button for flue gas fan 烟气风机独立启停选择按钮		
1-phase over-/under voltage relay 单相过压/欠压保护继电器	K1	Monitoring of 220V (110V) control circuit. Relay activate at voltage outside limit setting. 当电压过高或偏低时继电器动作,产生报警。		
Motor 电机	M1	Motor for flue gas fan. 烟气风机电机		
Motor 电机	M2	Motor for burner. 燃烧器电机		
Motor 电机	M3	Motor for sludge circulating pump. 污油循环泵电机		
Motor 电机	M4	Motor for sludge dosing pump. 污油供给泵电机		
Heater 加热器	R1	Heater (spare). 加热器(备用)		
Transformer 变压器	T1	Control circuit transformer, primary 380/440V, secondary 220V. 电源变压器,初级: 380V/440V 次级: 220V		
Power supply 开关电源	T2	24V DC power supply for display and PLC controller. 24V DC 开关电源		
Temperature transmitter 温度变送器	TT1	Transmitter for combustion chamber temperature. Sensor giving a 4-20mA signal. 炉膛温度热电偶温度变送器(4-20mA)		
Temperature transmitter 温度变送器	TT2	Transmitter for oil temperature in sludge dosing pump. Sensor giving a 4-20mA signal. 污油热电阻温度变送器(4-20mA)		
Temperature transmitter 温度变送器	TT3	Transmitter for flue gas temperature. Sensor giving a 4-20mA signal. 烟气温度热电偶温度变送器(4-20mA)		



Pressure transmitter 压力变送器 PT1		Transmitter for combustion chamber pressure. Sensor giving a 4-20mA signal. 炉膛负压变送器(4-20mA)		
Flame detector relay 火焰继电器	FD1	Activated at no flame, when burner running. 火焰监测继电器		
Relay	KA00-K	Use for plc relay output.		
中间继电器	A32	PLC 继电器输出		
Pressure switch 压力开关	PA1	Pressure switch giving alarm and stop of burner at low diesel oil pressure. 柴油压力开关,当柴油压力低时,产生报警并切断燃烧		
Pressure switch 压力开关	PA2	Pressure switch giving alarm and stop at low compressed air pressure. 压缩空气压力开关,当压缩空气压力低时,产生报警并切断燃烧		
Pressure switch 压力开关	PA3	Pressure switch giving alarm and stop at low sludge oil pressure. 污油压力开关,当污油压力低时,产生报警并切断燃烧		
Temperature switch 温度开关	TA3	Activate at sludge oil temperature over set point. 污油温度达到预设定值时,开关动作		
Level switch 液位开关	LA1	Level switch for stop at low level in sludge tank. 污油液位低时开关动作		
Solenoid valve 电磁阀	V1	Solenoid common valve for diesel oil nozzle 1. 柴油总电磁阀		
Solenoid valve 电磁阀	V2	Solenoid valve for diesel oil nozzle 1. 柴油分电磁阀 1.		
Solenoid valve 电磁阀	V4	Solenoid valve for compressed air. 压缩空气电磁阀		
Sludge oil heating valve 污油加热阀	V15	Sludge oil heating valve 污油加热阀		
Terminal end plate 端子排 X1		Terminal for site signals 仪表信号		
Terminal end plate 端子排	X2	Terminal for motors 电机信号		
Terminal end plate 端子排	X3	Terminal for signals of burner and solenoid. 燃烧器和电磁阀等信号(位于燃烧器上)		
Terminal end plate 端子排 X4		Terminal for signals in the sludge tank. 污油柜信号(位于污油柜接线盒中)		

# 4.8 Frequency Inverter Parameters Set 变频器参数设置

The inverter type is ATV-12. Parameters set shown as follows:

变频器的型号为: ATV-12, 其操作说明及参数设置如下:



#### Table 4-10 Frequency inverter parameters set list

#### 表 4-10 变频器参数设置清单

Code 代码	Function 功能	Factory Default 出厂默认值	Describe 描述
FCC	Control type 控制类型	20	Two line control input switch state control run or stop 2 线控制输入的开关状态控制运行或停止
nPL	Logical input type 逻辑输入类型	P05	Positive: Voltage is greater than or equal to 11v when the input activated 正逻辑: 电压高于或等于 11V 时输入激活
AllE	AI1 type AI1 类型	100	Voltage: 0-10V DC 电压: 0-10V DC
r 1	R1 distribute R1 分配	FLE	Not detect the error 未检测到错误
6Fr	Standard motor frequency 标准电机频率	50	
nPr	Motor rated power 电机额定功率	0.12	
Un5	Rated voltage motor 电机额定电压	220	
n[r	Motor rated current 电机额定电流	1. 15	
Fr5	Motor rated frequency 电机额定频率	50	
£Fr	Maximum frequency 最大频率	60	
CFF	Motor control type 电机控制类型	5Ed	Standard 标准
Frl	Given channel 1 给定通道 1	AII	Analogue terminals 模拟量端子
H5P	High speed 高速	50	
dEC	Deceleration time 减速时间	٥	Time to decelerate from the rated motor frequency to 0 HZ 电机从额定频率减至 0HZ 的时间



# Chapter 5 Maintenance Instructions 维护

### 5.1 Preventive maintenance 维护

### 5.1.1 Daily 日常检查

Check the combustion chamber. Remove all ash and slag after burning is finished.

每次燃烧后检查燃烧室,移除炉灰。

NOTE: The combustion chamber air inlets in the bottom must always be cleaned.

注意: 炉膛底部空气进口必须始终畅通。

Check the burner diesel oil pressure. Normal reading 1.6 MPa.

检查燃烧器柴油压力,正常应该在 1.6 MPa。

• Check the dosing pump sludge oil pressure. Normal reading 0.05 MPa.

检查计量泵污油压力,正常应该在 0.05 MPa。

• Check and clean the sludge nozzle after burning is finished.

每次燃烧后检查并清理污油枪。

#### 5.1.2 Weekly 每周

Clean photo resistor on burner.

清洁燃烧器上感光电阻。

 Check that combustion air inlets and cooling air inlets are free from obstructions. Clean if necessary.

检查焚烧炉上的空气进口和冷却口免于阻塞,有必要就清扫。

Check diesel oil burner.

检查柴油燃烧器。

Check sludge oil burner.

检查污油燃烧器。

#### 5.1.3 Monthly 每月

Check fan belts and tensions.

检查风机皮带的松紧。

• Check refractory condition.

检查耐火砖。

• Check visually thermocouple for combustion chamber.

检查炉膛上的热电偶。

#### 5.1.4 Yearly 每年

• Check paint work. Make sure the paint is not chipped or scratched.

检查油漆,确保没有油漆破坏。

Check the control and alarm system.

检查控制和报警系统。

• Check all safety devices and calibrate if necessary.



有必要检查所有安全和报警设备。

• Check all valves on oil system for leakage.

检查所有阀门和油系统, 防止泄漏。

• Check all oil solenoid valves for leakage.

检查电磁阀防止泄漏。

• Replace nozzles for diesel oil burner with new ones.

更换柴油喷嘴。

## 5.2 Inspection 检查

Table 5-1 Inspection list

表 5-1 检查项目清单

ITEM	ACTION
项 目	内 容
	Monthly check: Check visually the refractory inside the combustion chamber. If
	pieces of refractory have fallen out so the insulation or steel is visible, then use of
Combustion	the incinerator must be discontinued until a repair has been carried out. Pay attention
chamber	to residue on the walls. If this is over 20 mm thick, remove this by means of a wire
燃烧室	brush and a paint-scraper. Do not use a hammer!
	每月检查炉膛内耐火砖,假如耐火砖一片片剥落,露出绝热材料或者钢板,请
	停止使用焚烧炉,直到维修好。假如砖上结碳,请清理掉,不能使用锤子。
	Daily check: Check visually for leakage. The pressure is to be checked daily. If
	pressure drops below 1.6 MPa and cannot be adjusted by means of the adjustment
	screw, clean the filter.
	每天检查泄漏和压力,假如压力在 1.6MPa 以下且调不上去,必须清洗过滤器。
	To clean the filter proceed as follows:
Diesel oil pump	清洗过滤器过程如下:
上 上 上 上 上 上 、 五 五 五 五 五 五 五 五 五 五 五 五 五	Close the valves on supply and return line to Diesel oil pump. Remove all 8 bolts at
未 個 永	the end the pump opposite the drive-side. Remove the end cover and the cover
	gasket.
	The filter is now visible and can be pulled out without the use of tools.
	Clean the filter in diesel oil and blow dry with compressed air.
	Reassemble and adjust the pressure to 1.6 MPa.
	关闭泵进出口阀门,打开油泵,取出滤器,清洗后再安装上。
Flue gas fan	Monthly Check the belt looseness, if use 3kg of force deformation more than 10mm
	belt will be corrected.
烟气风机	每月检查皮带的松紧度,假如使用 3kg 的力皮带偏差超过 10mm 请矫正。
C1 1 1	Weekly check: check visually for leakage. Turn the shaft by hand to check it is
Sludge dosage	moving freely.
污油计量泵	每周检查泄漏,用手转动轴,转动灵活。



# 5.3 Cleaning and lubrication 清洗和润滑

Table 5-2 Cleaning and lubrication list

表 5-2 清洗和润滑项目清单

ITEM	ACTION		
项 目	内容		
	The slag must be removed daily before starting up the incinerator. Make sure that		
Ashes trash has been incinerated completely and that the fire is dead and ashe			
灰渣	Use a hoe for this purpose.		
	每天在焚烧垃圾前请先清理掉炉渣。		
Photo resistor	The photo resistor should be cleaned by means of a damp cloth every week.		
光敏电阻	每周用湿布清洁光敏电阻。		
Diesel oil burner	Caution: The main switch must be in OFF position whenever working with the		
柴油燃烧器	burner.		
不但然が日	维修燃烧器时请关掉主电源开关。		
	The grease in the bearings must be changed after the fan operate in 1500 hours.		
	Use heat resistant type. Make sure the bearings are completely clean and that the		
Flue gas fan	top half of the bearing is mounted correctly to the bottom half.		
烟气风机	当风机运行 1500 小时后更换轴承里的油脂。		
	Also check the tension of the V-belts.		
	检查皮带状态。		
Door hinges Door hinges to be greased every six months. Use ordinary ball bearing			
门铰链	门铰链每6个月涂上普通轴承油脂。		
Sludge burner	The sludge burner should be cleaned every six months, if necessary.		
污油燃烧器	假如有必要污油燃烧器每6个月清洗一次。		



# Chapter 6 Trouble Shooting 故障排除

Detailed information about this section is shown as Table 6-1.

根据经验,列举以下可能出现的故障原因及解决办法,供参考,见表 6-1 所示:

Table 6-1 Trouble shooting list

表 6-1 故障排除清单

No.	Symptom	Probable Cause	Checkout Procedure
序号	故障状况	原因分析	解决办法
1	Power indicator not "ON" 电源指示灯不亮	(1) Main power supply fault. 电源开关没有置于"ON"位置 (2) F5 turn off. F5 断开 (3) Fuse -F6 fault. 保险丝-F6 故障 (4) S1 turn off 开关 S1 断开	(1) Check main switch -Q1. 检查主电源开关-Q1 手柄位置 (2) Check breaker-F5 检查断路器-F5 (3) Check fuse -F6. 检查保险丝-F6 是否完好 (4) Check switch S1 检查开关 S1 状态
2	Operator panel no display 人机界面无显示	(1) Fuse -F7 fault. 保险丝-0F7 故障 (2) 24V power supply fault. 24V 开关电源故障 (3) Wiring fault. 线路故障 (4) Loose electrical connection. 线路接线不牢固	(1) Check fuse –F7. 检查保险丝—F7 是否完好 (2) Check 24V power supply. 检查 24V 开关电源 (3) Check wiring improper. 检测相关接线 (4) Tighten connection. 重新坚固相关连接线
3	Alarms 报警	Described in section "4.4.2 Alarm Page" 有关报警原因及信息请查看 "4.4.2"	Check the condition that alarm occurred. 检查引发报警的外设
4	"Start" button pressed but system not start proper 按下"Start"按键时,系统 没有按要求启动运行	(1)Alarm existence and not acknowledged. 报警存在或旧的报警没有确认并消除。 (2) Burning mode selected wrong 没有正确选择燃烧方式	(1) Check the alarm occurring and cancel it. 检查报警并确认 (2) Check the selected burning mode. 检查已选择的燃烧方式
5	Burner start but no flame 燃烧器启动,但没有检测 火焰	(1) Diesel oil supply solenoid valve fault. 柴油电磁阀故障	(1) Check solenoid valve open/close properly. 检查柴油电磁阀是否打开



7	System not stop while "stop" button pressed 按下 "STOP" 按键,但系 统并未停止运行  No sludge oil was injected when the incinerator is operation in the "sludge oil mode".  当焚烧炉在污油模式下运 行时不喷污油	(1) Wiring fault. 接线错误 (2) Operator panel defective 人机界面故障  (1)Negative pressure value is not in conformity with the requirements. 负压值不符合要求 (2)Combustion chamber temperature is not in conformity with the requirements. 炉温不符合要求 (3)The dosing pump is not start.	(1) Check or tighten wiring. 检查连接线是否正确 (2) Replace the operator panel. 更换人机界面 (1)Check the negative pressure setting value and negative pressure transducer is normal. 检查负压设定值以及负压传感器是否正常。 (2) Check the temperature setting of combustion chamber for initial sludge oil injection and thermocouple is normal. 检查喷油的炉温设定值以及热电偶是否正常。
		计量泵没有启动	(3) Check the dosing pump. 检查计量泵是否正常。
8	Frequency inverter run Improperly 变频器异常	Refer to the attachment frequency inverter diagnostic and troubleshooting. 详见附件变频器诊断与故障排除	Refer to the attachment frequency inverter diagnostic and troubleshooting. 详见附件变频器诊断与故障排除
9	Combustion chamber temperature is not rise. 炉温不上升	(1)The thermocouple fault. 炉膛热电偶故障。 (2)Too much air flow into the furnace. 炉膛进风量太多。	(1)Check whether the thermocouple is normal. 检查热电偶是否正常。 (2)Adjust the 8 air inlet of furnace bottom and the door. 调节炉膛底部八个进风口以及炉门。



# Chapter 7 Standard Spare Parts 备件清单

Item 序号	Photo 照片	Part name 名称	Description 说明	Quantity 数量	Part No. 编号			
Standa	Standard Spare Parts 标准备件							
1	-	Fuse 保险丝	2A, 250V 5×20	10	1H5360011			
2		Green lamp 绿色指示灯	220V Green	1	1H5030002			
3		Red lamp 红色指示灯	220V Red	1	1H5030003			
4		White lamp 白色指示灯	220V White	1	1H5030001			
5		Relay 中间继电器	220V	2	1H5510002			
6	Q	Flame sensor 火焰传感器		1	1B1200009			
7		Bearing of flue gas fan 风机轴承	2209K	1	1B2500027			
8		V belt of flue gas fan 风机三角带	SPA-950(60HZ)	2	1B6070021			
9	-	Burner coupling 燃烧器联轴节		1	1B1200012			
10	420	Diesel oil nozzle 柴油喷嘴	3.0gph	1	1B1200016			
11		O-rings of circulating pump 污油循环泵 O 型圈	118×3.55	2	1B2711093			
12	$(\bigcirc)$	O-rings of circulating pump 污油循环泵 O 型圈	73×3.55	2	1B2711104			
13		O-rings of circulating pump 污油循环泵 O 型圈	27.3×2.65	2	1B2711095			
14		Shaft Seal of circulating pump 污油循环泵机械轴封	U154-40	1	1B2721002			
15	4	Thermocouple of flue gas 烟气热电偶	800℃	1	1H5433004			
16		Thermocouple of combustion chamber 炉膛热电偶	1200℃	1	1H5433006			

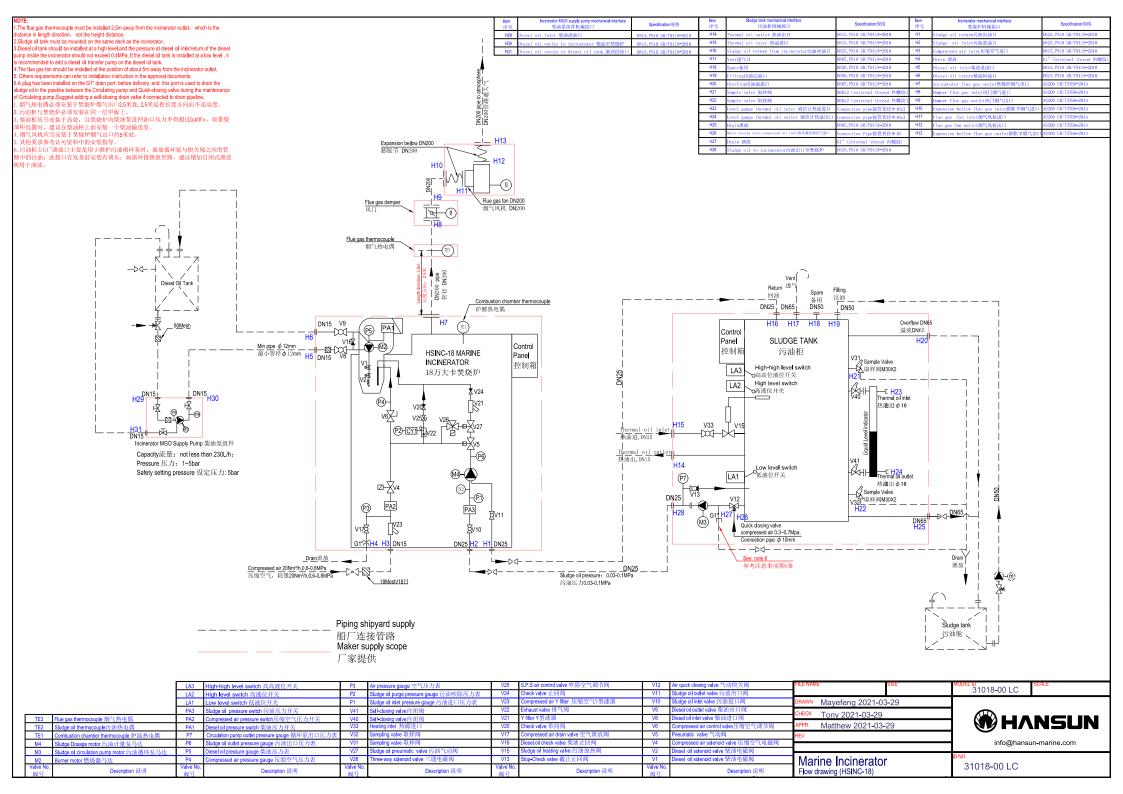


Item 序号	Photo 照片	Part name 名称	Description 说明	Quantity 数量	Part No. 编号
Tools	专用工具				
17		Socket wrench 套筒扳手		1	1B1200030
18		Tool for fan impeller dismounting 风机叶轮拆装工具		1	1B1121012

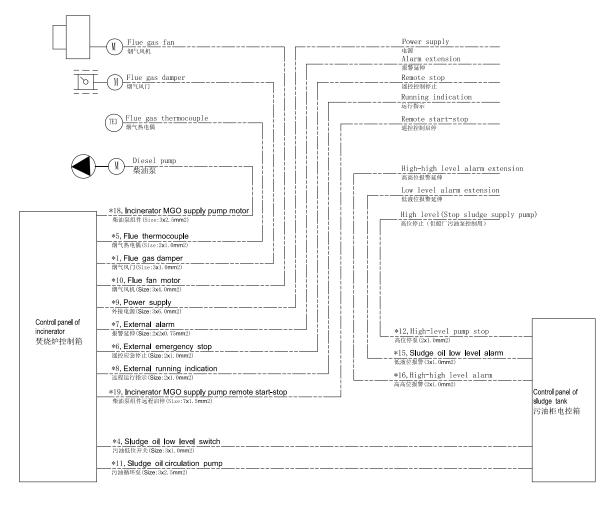


# APPENDIX 附录 A: Drawings 图纸

Drawing Description		Drawing No.	Version	Total number of pages
描述		图号	版本号	总页数
Flow Drawing 流程图		31018-00 LC		2
Mechanical Drawings 机械图纸	HSINC-18	31018-00 XS		3
	Pipelines	21018-8-0		3
	SLT-500	31021FT-00		3
	HSMF4.0C	36030G-00		3
	FGD-200	31041-00XS		1
	Expansion Joint DN200	1B1110001		1
	Flue Gas Thermocouple	1H5433004		1
	Incinerator MGO supply pump	21050-47-0XS		2
Electric Drawings 电气图纸		1018-80-0 DL		5



### Shipyard Cable Connection船厂外接线

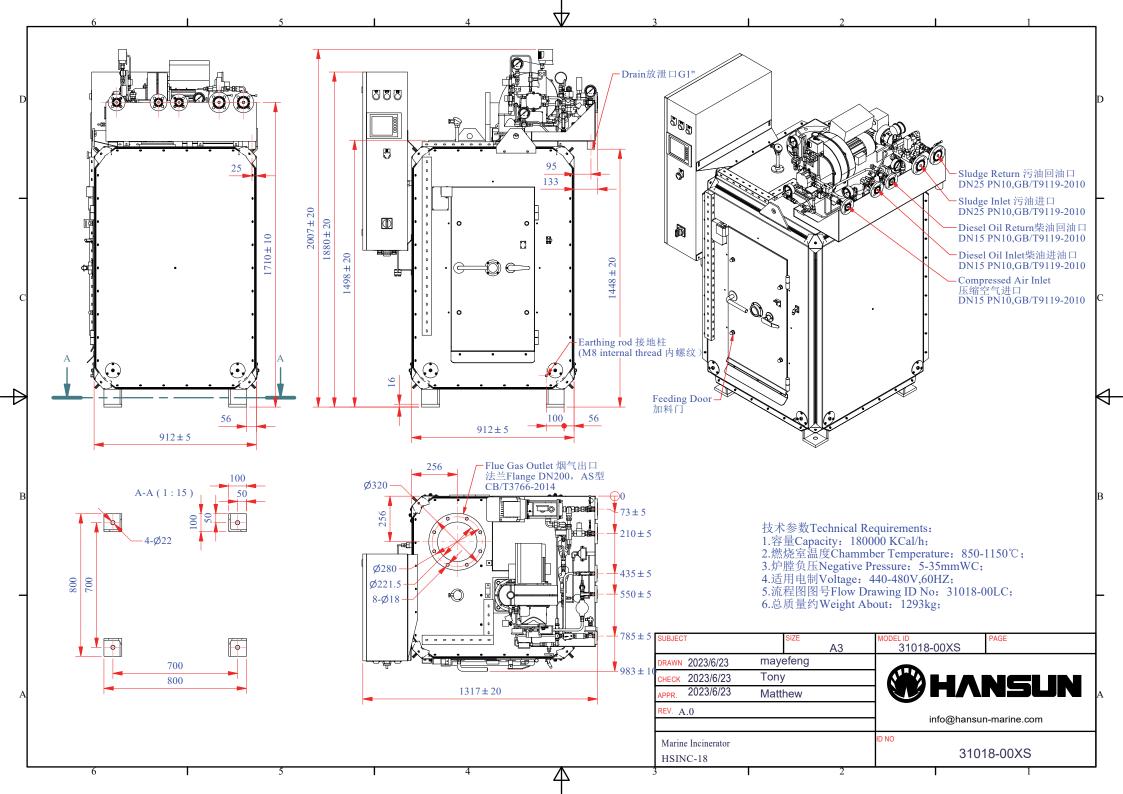


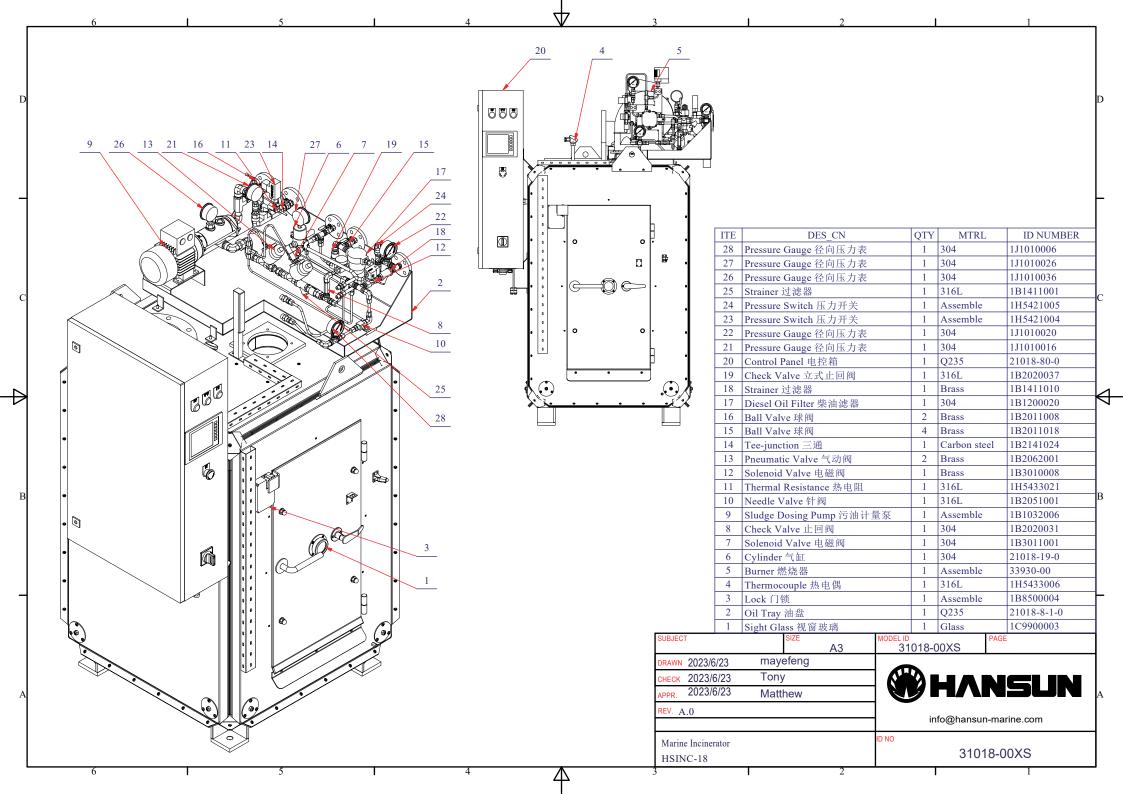
Cabling shipyard supply

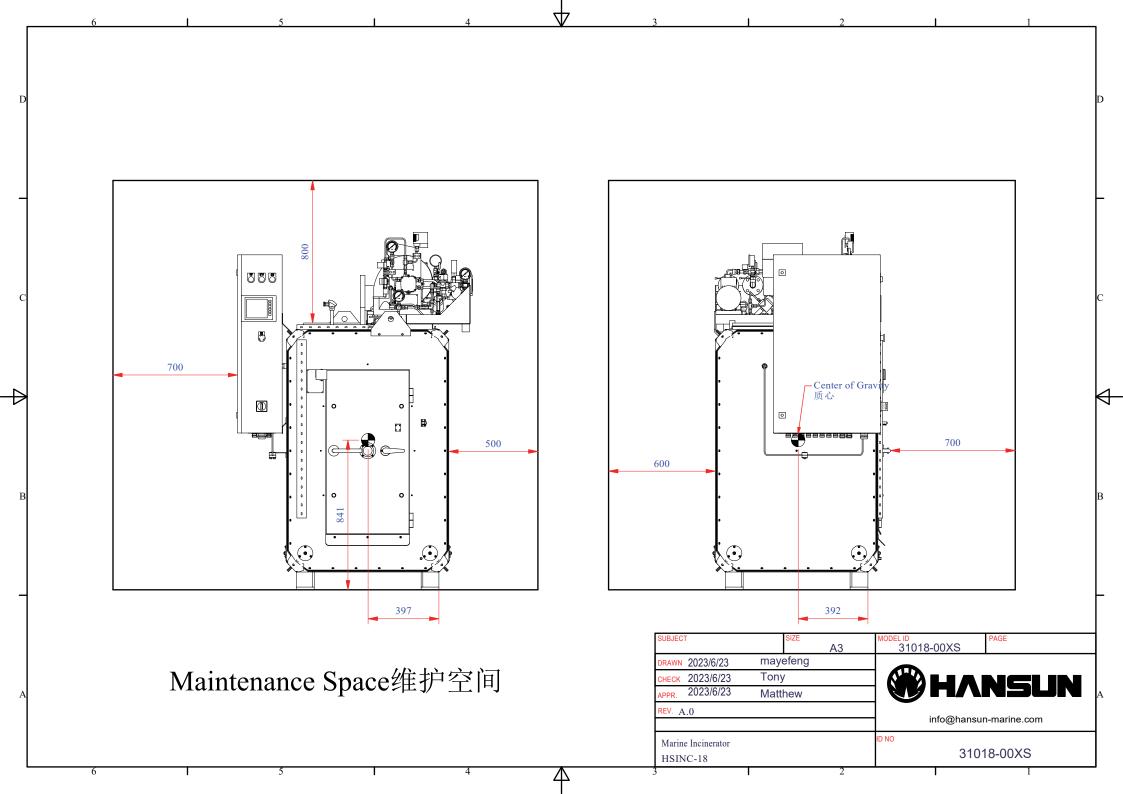
\*1~\*20 Shipyard Cable Connection

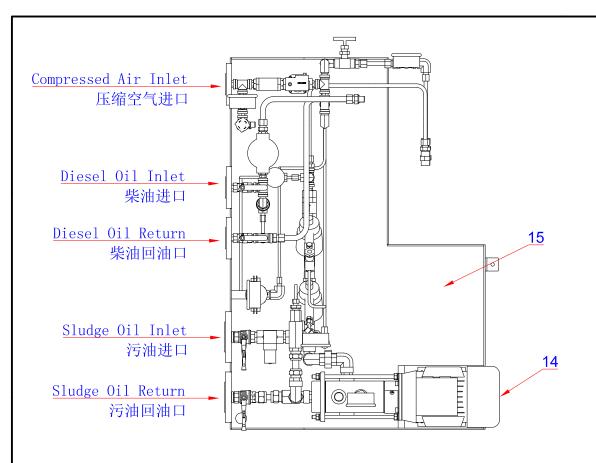
\*1~\*20 船厂连接电缆

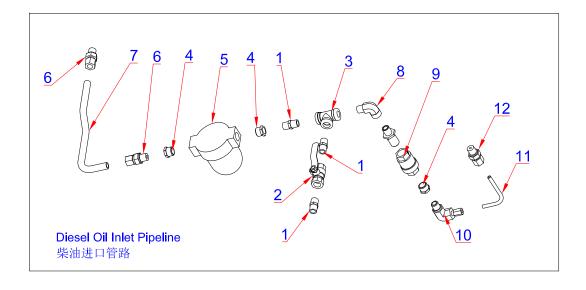


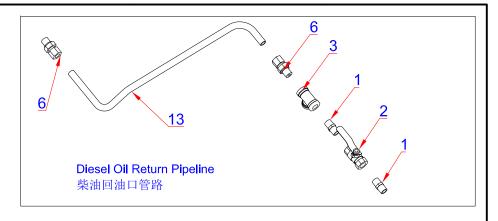




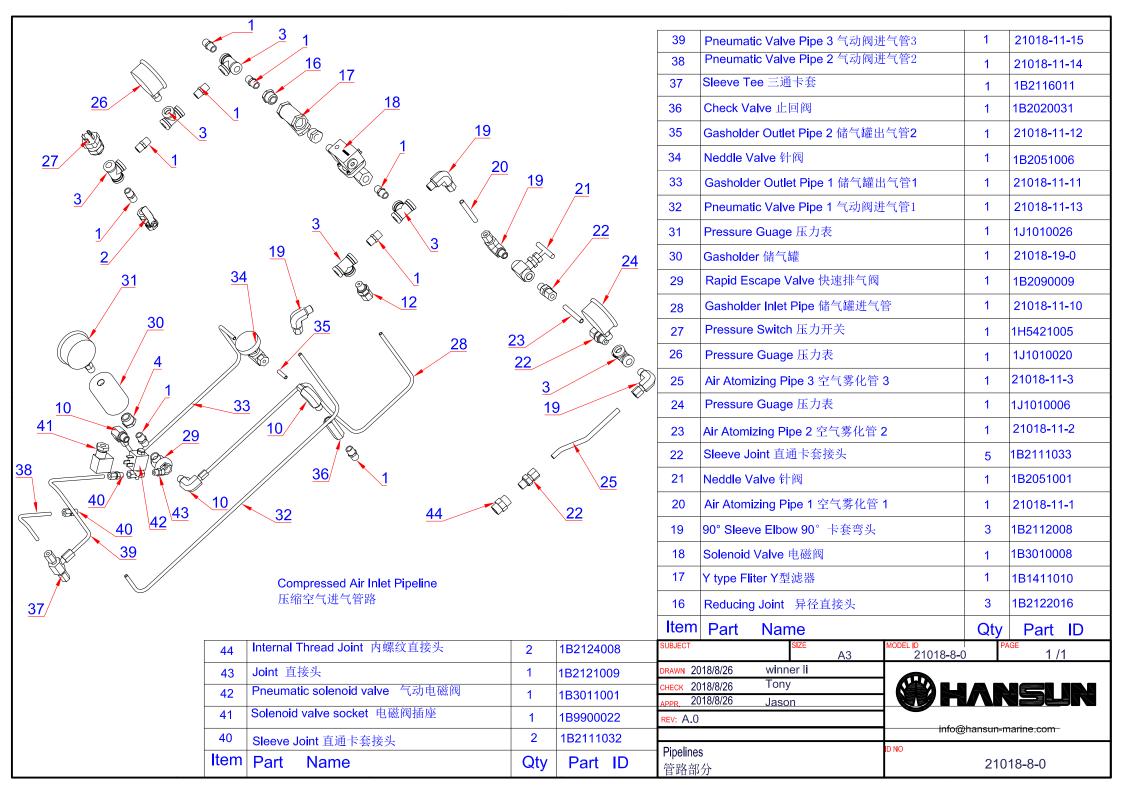


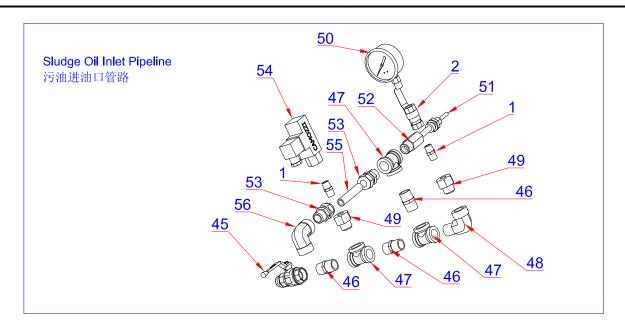


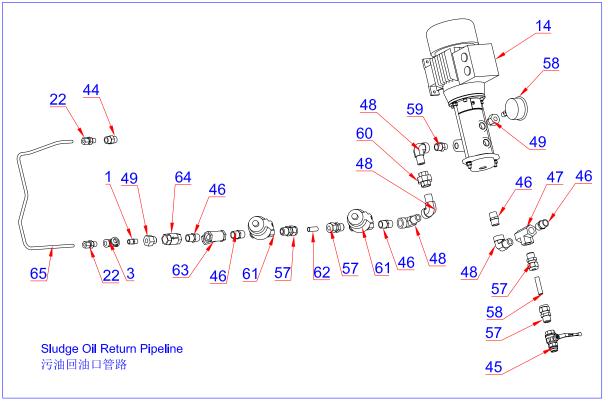




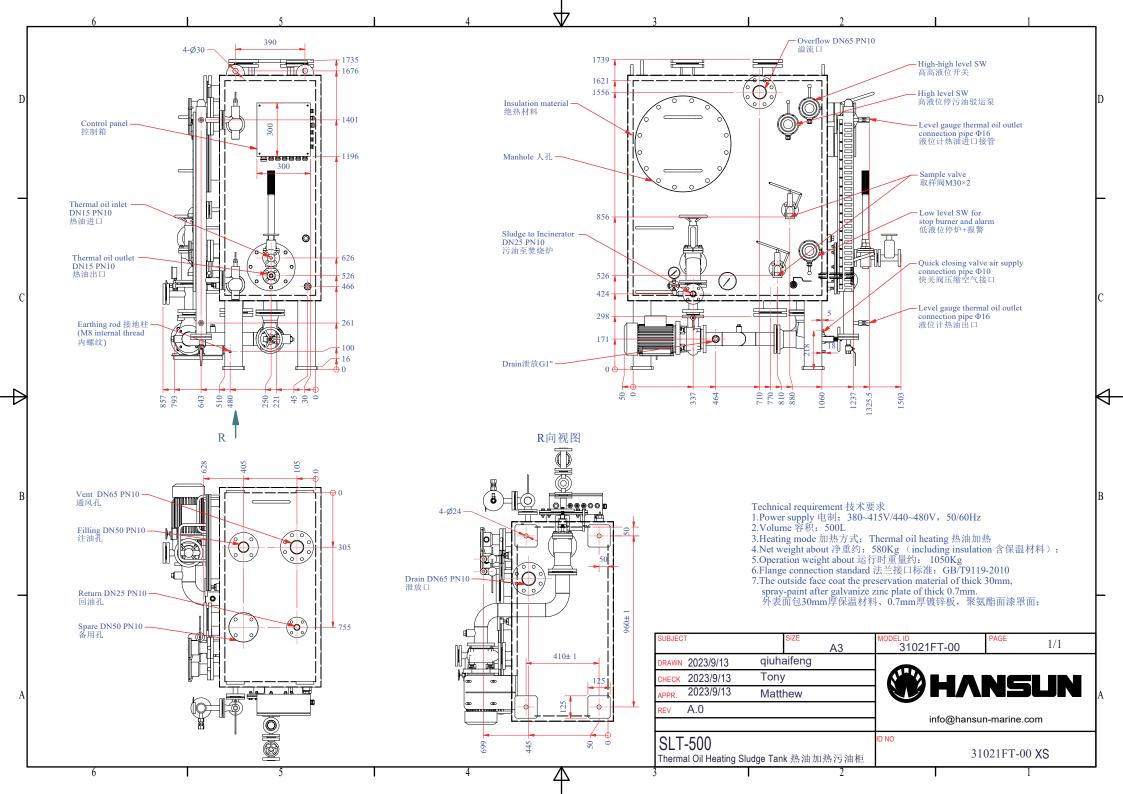
		<u>.</u>		
15	Oil Tray 滴油盘		1	21018-8-1-0
14	Sludge Oil Pump 污油泵			1B1032006
13	Diesel Oil Return Pipe from Pump	· 柴油泵回油管	1	21018-11-5
12	Sleeve Joint 直通卡套接头		3	1B2111031
11	Diesel Oil Return Pipe 柴油回油管	<b></b>	1	21018-11-6
10	90° Sleeve Elbow 90°卡套接头		4	1B2112007
9	Check Valve 止回阀		1	1B2020037
8	90° Thread Joint 90° 弯头		1	1B2131019
7	Diesel Oil Inlet Pipe to Pump 柴油泵进口管			21018-11-4
6	Sleeve Joint 直通卡套接头			1B2111029
5	Diesel Filter 柴油滤器			1B1200020
4	Reducing Joint 异径直接头			1B2122015
3	Tee 三通接头		9	1B2141022
2	Ball Valve 球阀		4	1B2011018
1	External Thread Joint 外螺纹接头	<	18	1B2121025
Item	Part Name		Qty	Part ID
SUBJECT	SIZE MODEL ID 21018-8-0			GE 1 /1
DRAWN 20	•		•	
	CHECK 2018/8/26 Tony			
AFFN.				
REV: A.0				narine.com
Pipelines	3	ID NO		
管路部			210	18-8-0

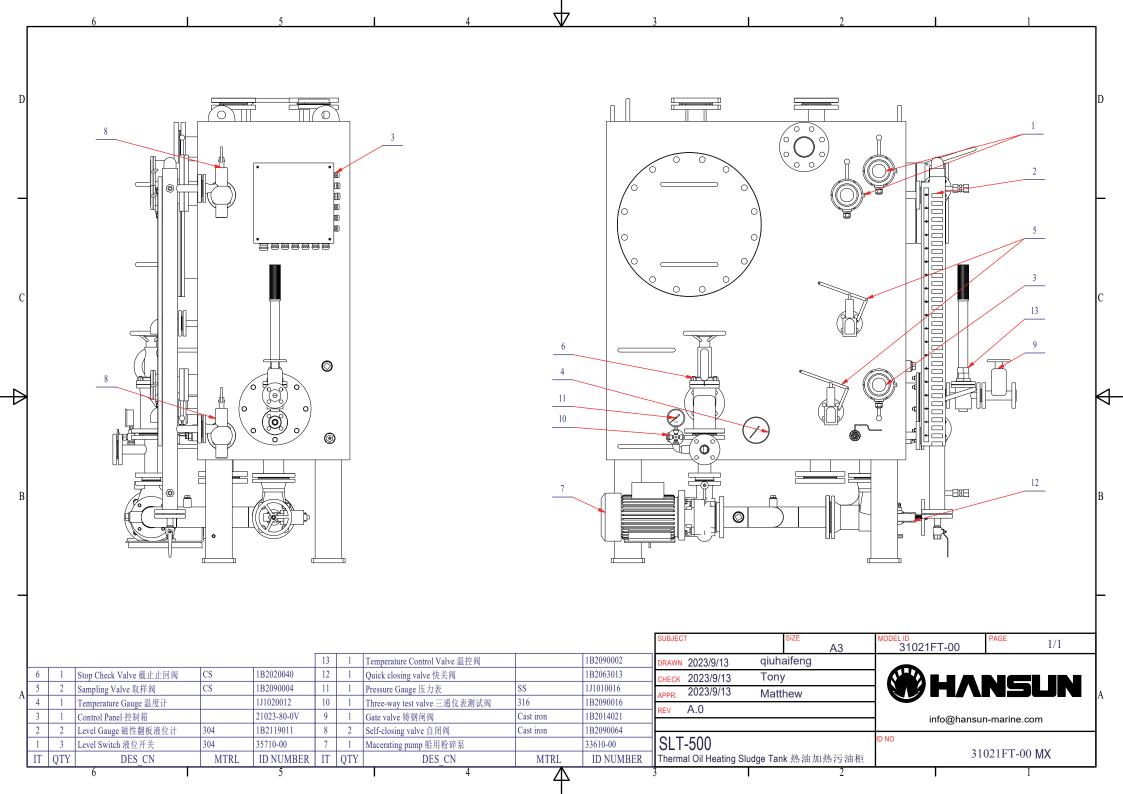


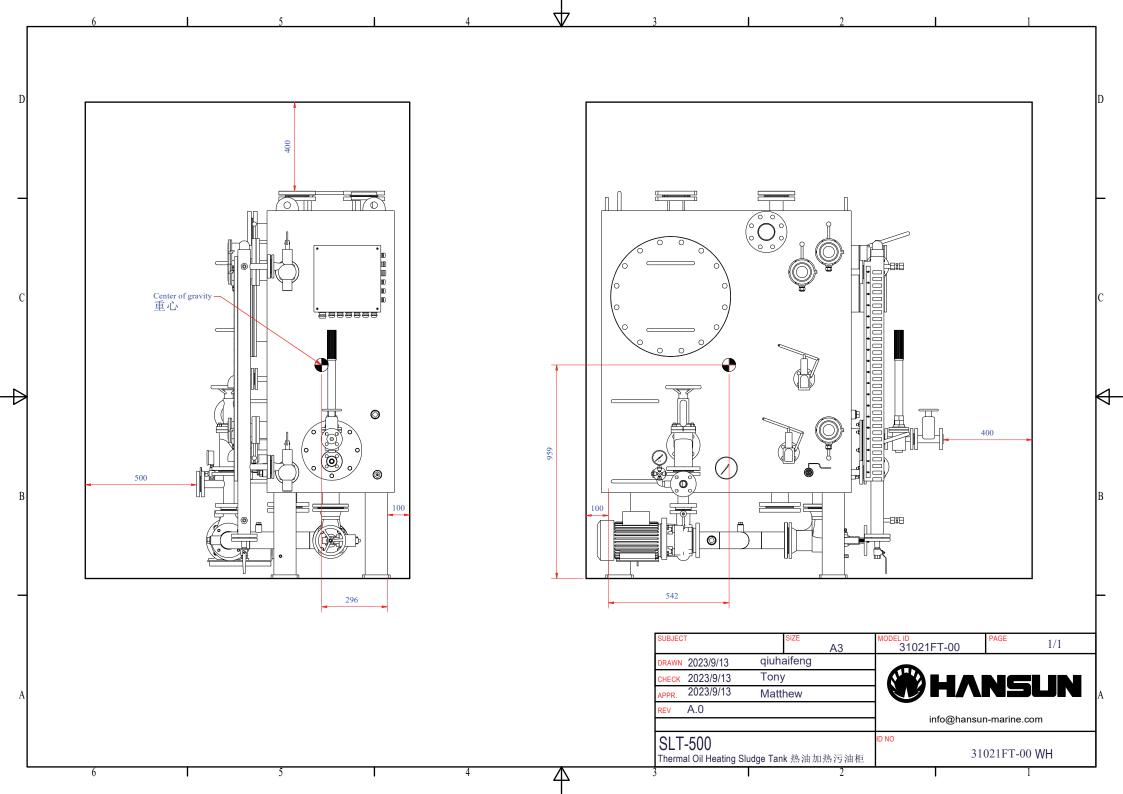


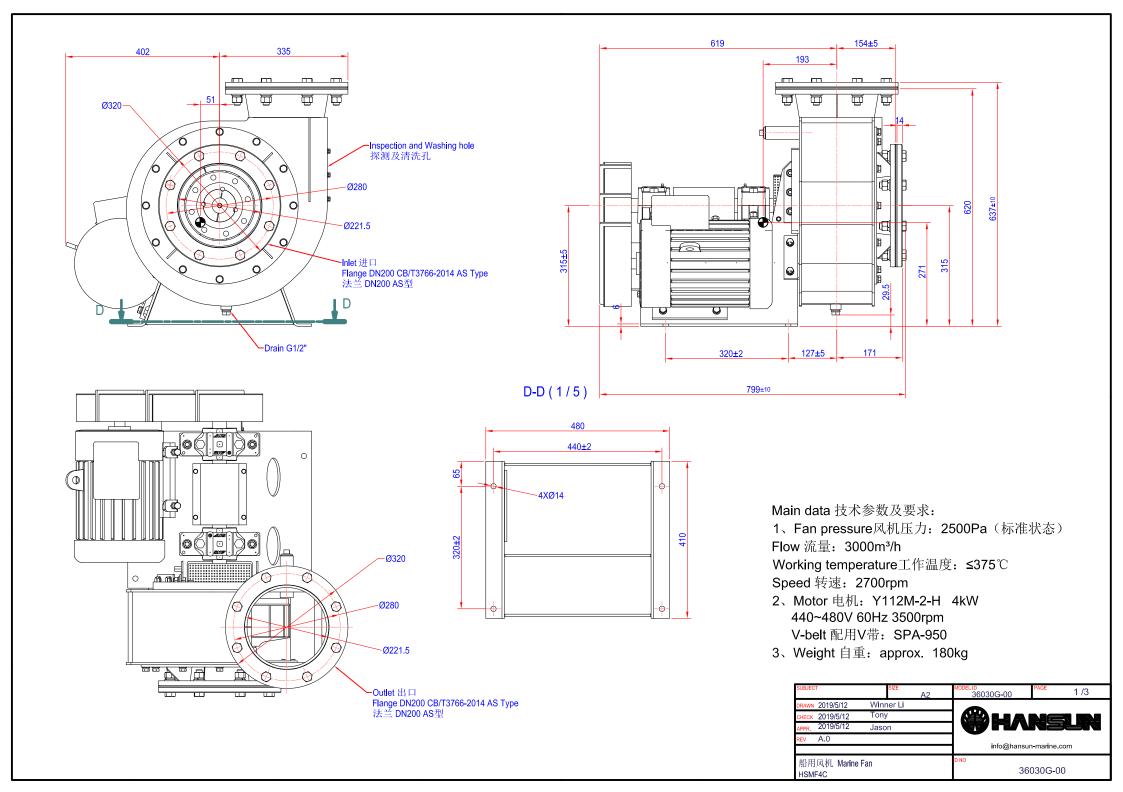


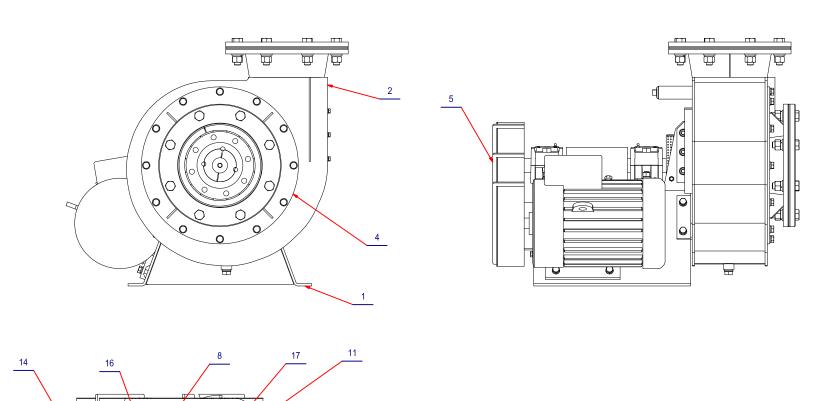
				,
64	Sludge Oil Pipe to Burner 燃烧器污油进口管			21018-11-9
63	Check Valve 止回阀			1B2020001
63	Stainless-Y Filter 不锈钢Y型滤器		1	1B1411001
62	Sludge Oil Inlet Pipe 3 污油进口管	<b>=</b> 3	1	21018-11-16
61	Pnuematic Valve 气动阀		2	1B2062001
60	Movable Joint 活络接头		1	1B2126001
59	Reducing Joint 异径直接头		1	1B2123022
58	Pressure Guage 压力表		1	1J1010036
57	Sleeve Joint 直通卡套接头		4	1B2111026
56	90° Thread Joint 90° 内螺纹弯头	<b>;</b>	1	1B2132025
55	Sludge Oil Inlet Pipe 1 污油进口管	等1	1	21018-11-8
54	Pressure Switch 压力开关	1	1H5421005	
53	Sleeve Joint 直通卡套接头	2	1B2111024	
52	Brass Reducing Joint 黄铜异径直接头			21050-70-0
51	Thermal sensor 热电阻			1H5433021
50	Pressure Guage 压力表		1	1J1010016
49	Reducing Joint 异径直接头		4	1B2122038
48	90° Thread Joint 90° 弯头		5	1B2131020
47	Tee 三通接头		4	1B2141024
46	External Thread Joint 外螺纹接头	ξ.	8	1B2121023
45	Ball Valve 球阀		2	1B2011008
Item	Part Name		Qty	Part ID
SUBJECT	SIZE A3	MODEL ID 21018-8-0	P.A	1 /1
DRAWN 20	T			
200	18/8/26 Tony 18/8/26 Jason		AR	42N%
APPR. 2018/8/26 Jason  REV: A.0				
		info@l	nansun-n	narine.com
Pipelines 管路部		ID NO	210	18-8-0

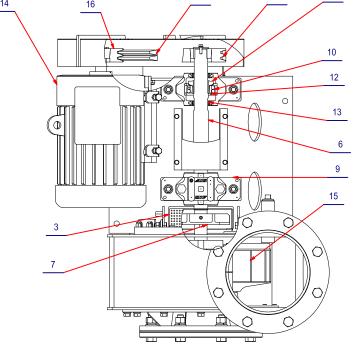




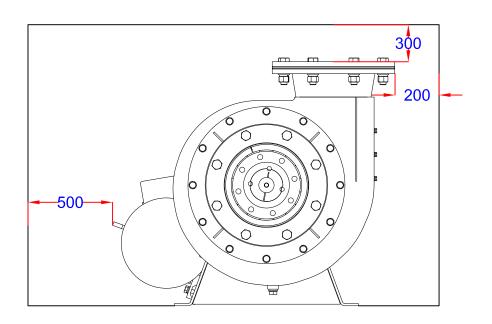


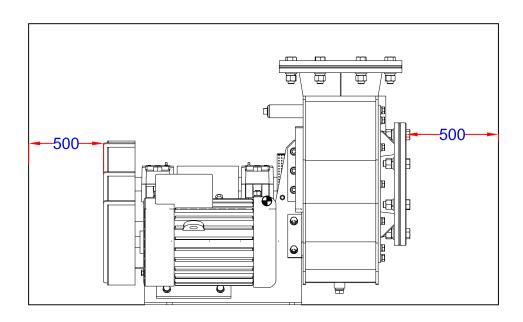






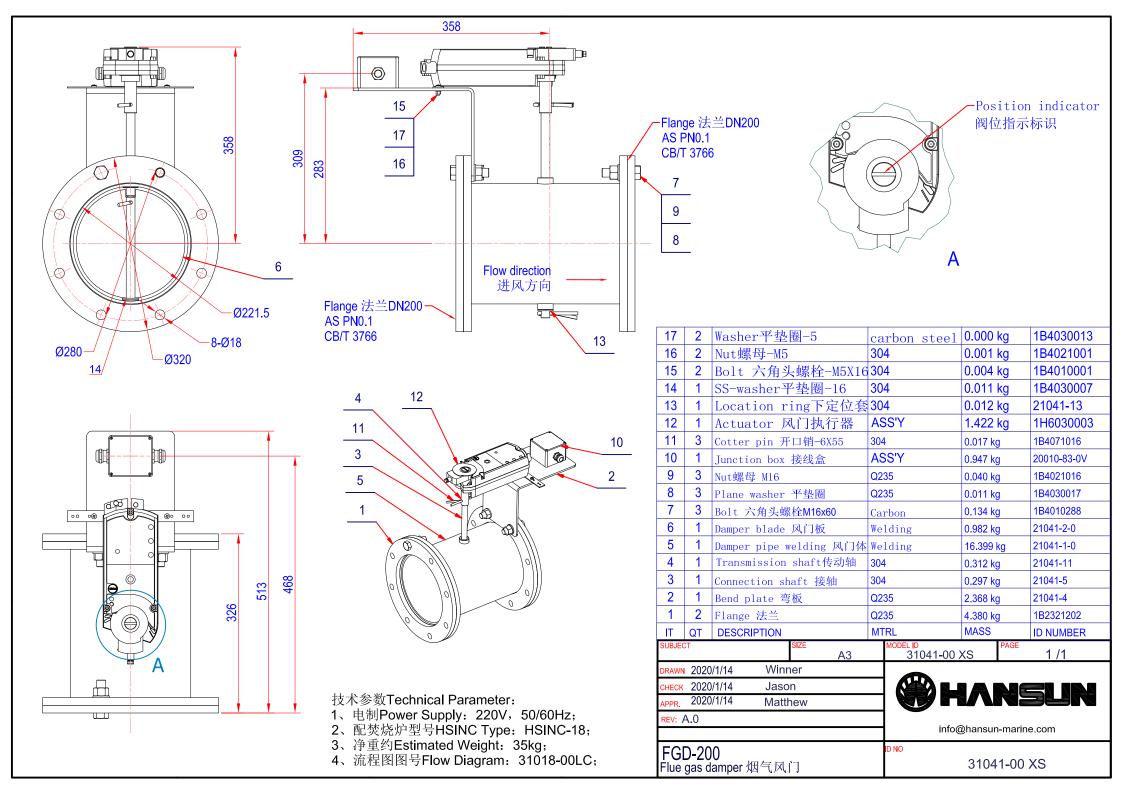
17	1	Pulley皮带轮	HT250	0.335 kg	1B6011015
16	1	Pulley 皮带轮	HT250	0.260 kg	1B6011016
15	1	Impeller 叶轮	310S	11.560 kg	26030F-7-0
14	1	Motor 三相异步电动机		41.483 kg	1H6020111
13	4	Sear ring 密封圈	Rubber	0.011 kg	1B2500038
12	2	Location ring 定位环		0.029 kg	1B2500029
11	2	Fastening sleeve 紧定套		0.287 kg	1B2500028
10	2	Bearing 轴承		0.454 kg	1B2500027
9	2	Bearing seat 轴承座	Cast iron	4.347 kg	1B2500022
8	2	V-belt V型传动带	Rubber	0.084 kg	1B6070021
7	1	Radiator fan 轴承散热风扇		0.546 kg	26030-10
6	1	Shaft 传动轴	45	4.473 kg	26030-9
5	1	Belt cover皮带防护罩	Welding	3.800 kg	26030F-5-0
4	1	Inlet Pipe进风口法兰接管	Q235	10.854 kg	26030F-4-0
3	1	Fan cover风扇罩	Welding	0.657 kg	26030F-3-0
2	1	Shell风机壳体	Q235	37.554 kg	26030F-2-0
1	1	Base 底座	Q235	26.508 kg	26030F-1-0
IT	QT	DESCRIPTION	MTRL	MASS	ID NUMBER
SUBJEC	Т	SIZE A2	MODEL ID 36030	G-00	2 /3
DRAWN	2019			-	
CHECK	2019	/5/12 Tony			
APPR,	2019	/5/12 Jason			
REV	A.0		1		
			] ir	nfo@hansun-ma	anne.com
船用	风机	Marine Fan	D NO		
HSMI	F4C			36030	)G-00



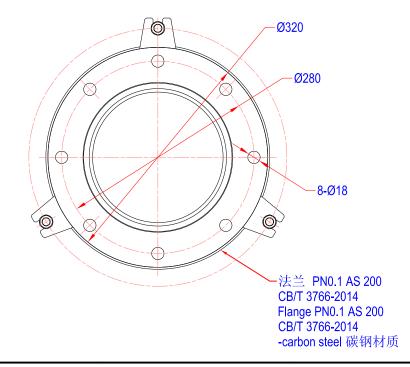


# Maintenance Space

SUBJECT	SIZE	A2	MODEL ID 36030G-00	3 /3
DRAWN 2019/5/12	Winner Li			
CHECK 2019/5/12	Tony			
APPR. 2019/5/12	Jason			
REV A.0			info@hansur	n-marine.com
船用风机 Marine HSMF4C	Fan		<sup>D NO</sup> 360	030G-00



## Positoning Screw 定位螺杆 Flow Direction 流向 Outlet Inlet 14 \_ 14 X=400 安装距离 Installation Distance Bellow-stainless steel 波纹管-不锈钢材质



#### Theoretical Character 理论特性

- 1.Allowable compensation value of expansion joint: ΔX=65.9mm; Δy=20.9 mm 膨胀节许用膨胀量: ΔX=65.9mm; Δy=20.9 mm;
- 2.Effective Cross-section Area of bellows: F=547.4 cm<sup>2</sup>; 波纹管有效截面积: F=547.4 cm<sup>2</sup>:

- 3.Stiffness: Axial rigidity Kx=48.1 N/mm,Lateral rigidity Ky=25.4N/mm; 刚度:轴向刚度 Kx=48.1N/mm,横向刚度Ky=25.4N/mm;
- 4. Number of allowable cycles: Nf=3000

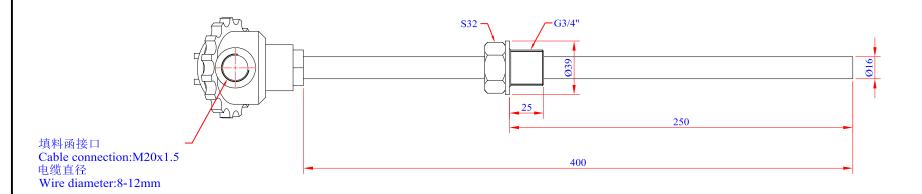
膨胀节许用循环次数: Nf=3000次;

- 5.Refer design standard 参考设计标准: GB/T12522-2009;
- 6. This expansion joint is used for matching fan to prevent deformation of fan from affecting performance; 此膨胀节是给配套的风机使用, 防止风机变形影响性能;

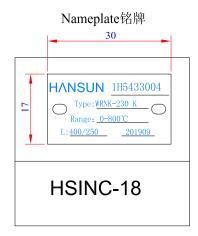
#### Installation Requirements 安装要求

- 1.Make sure the installation distance of expansion Joint shall comply with the drawing (Supply Status 400mm); 确保膨胀节安装距离应符合图纸要求; (供货状态400mm);
- 2.After the expansion joint is installed, the positioning screw must be removed by loosening the nuts (absolutely avoid using gas cutting) to recover its property of expanding; 膨胀节安装完毕,必须用拧松螺母的方法拆除定位螺杆(严禁用气割方法),以便恢复膨胀节的性能;
- 3. Connecting Pipelines should be welded by Argon arc welding; 相连管路焊接时应采用氩弧焊;
- 4. The direction of installation should comply with the drawing, its direction shall not be reverse; 膨胀节的安装方向应与图纸所示方向一致,不得装反;

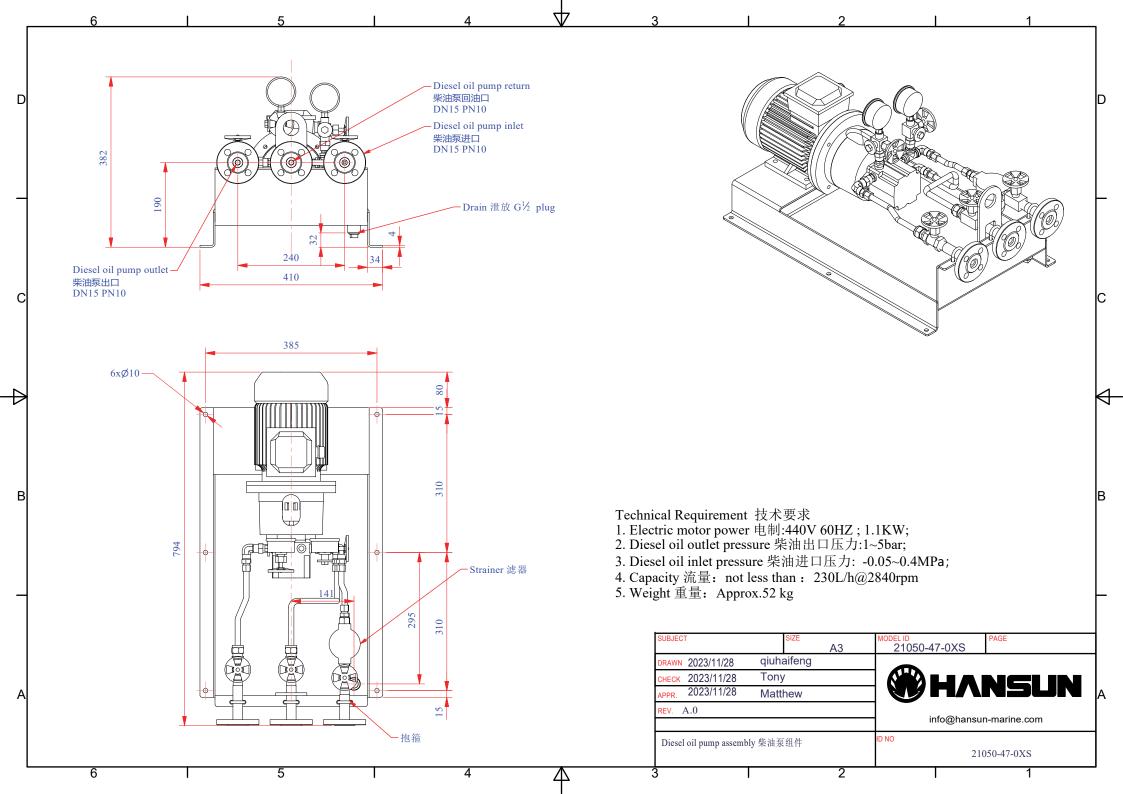
1	2	Expansion Joints AS 200-5 膨胀节 AS200-5		16.8 kg	1B1110001
IT	QT	DESCRIPTION	MTRL	MASS	ID NUMBER
SUBJEC	T	SIZE A3	MODEL ID 1B111	0001 PAG	1 /1
DRAWN	2018	/6/27 niopengfei			
CHECK				LIAN	
APPR.	2018	/6/27 Matthew			
REV: /	۷.0		in	fo@hansun-ma	arine.com
		on Joint AS200-5 AS200-5	ON O	1B11	10001

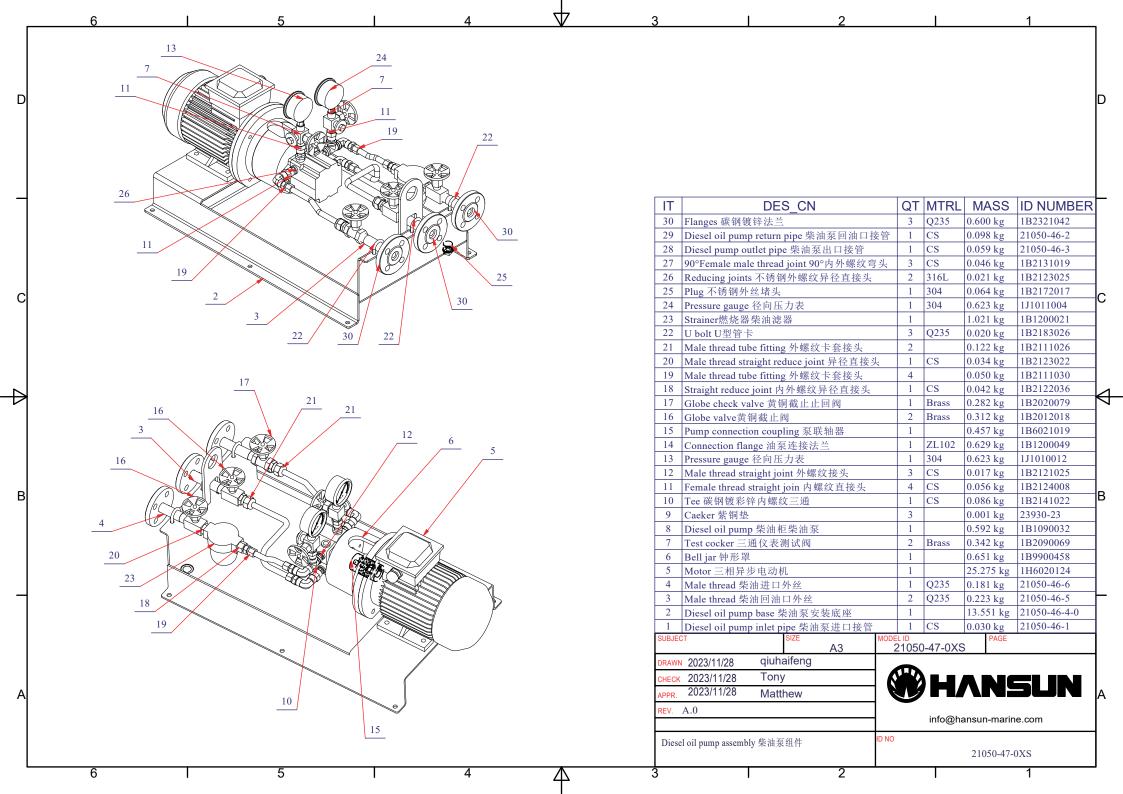


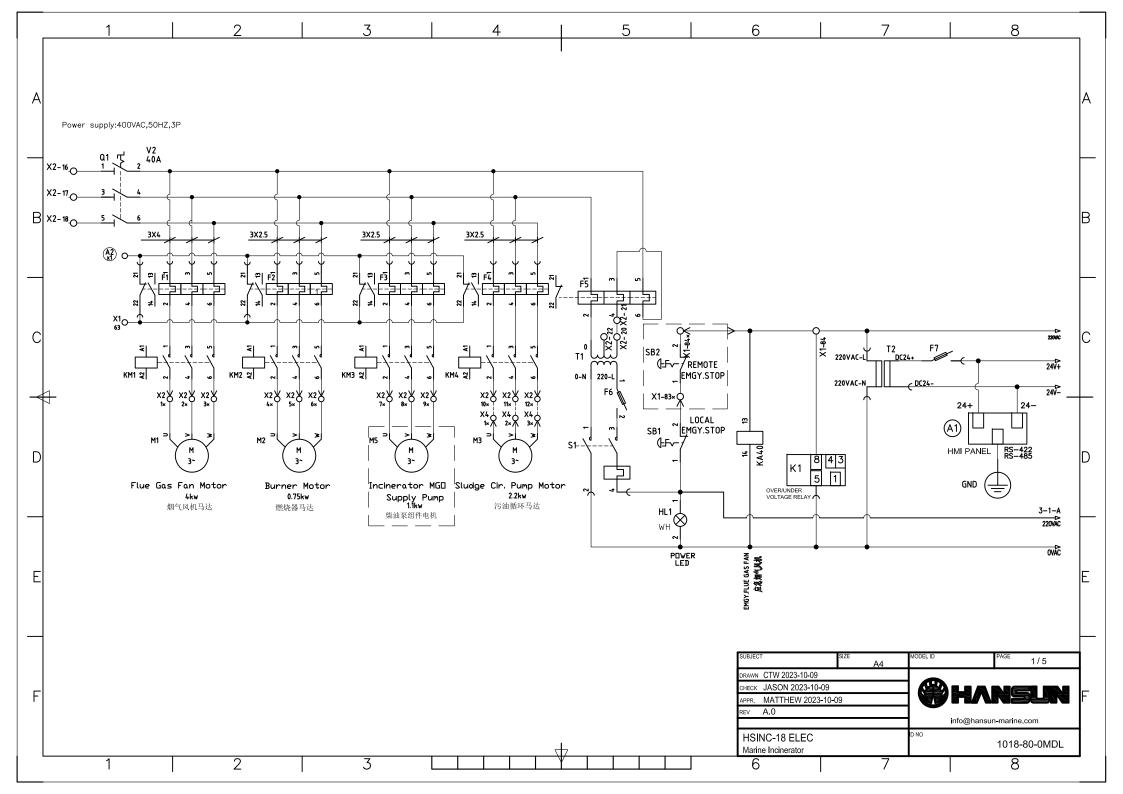
1.Type型号: WRNK-230,K type; 2.Temperature range温度范围: 0-800℃, accuracy测量精度: ±0.4%; 3.Matched incinerator model匹配的焚烧炉型号: HSINC-18; 4.Material of nameplate铭牌材质: Brass黄铜;

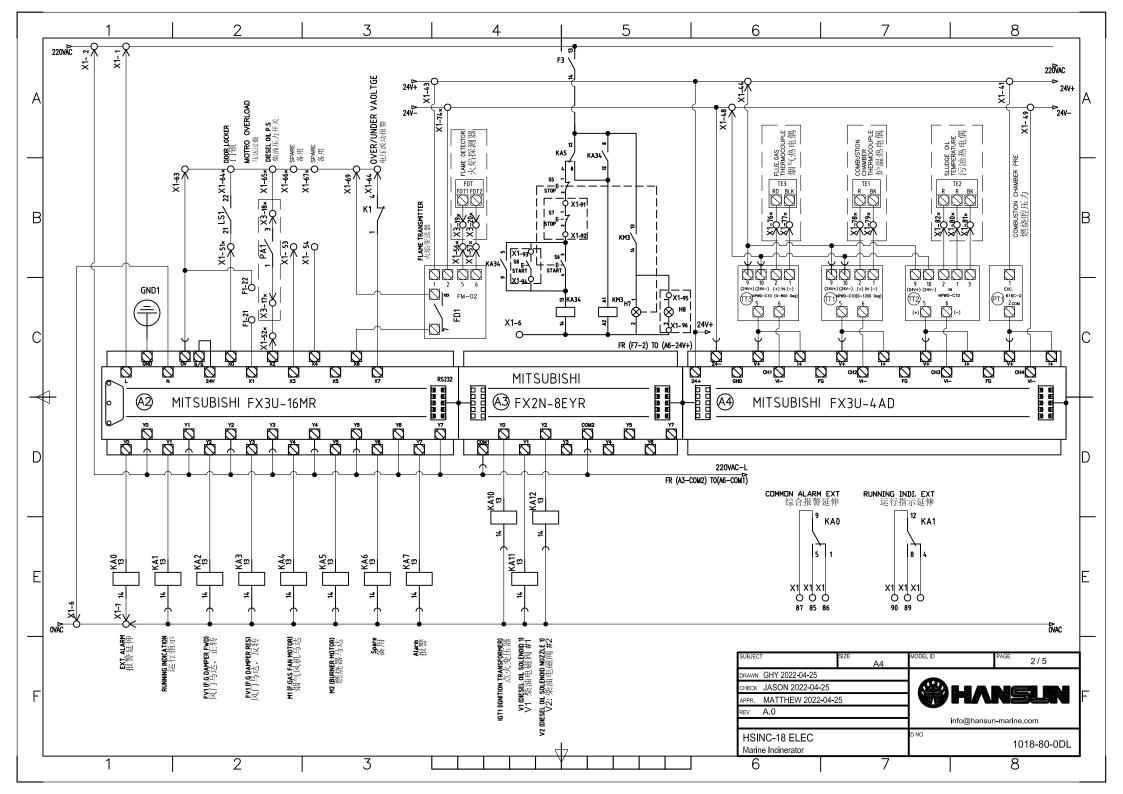


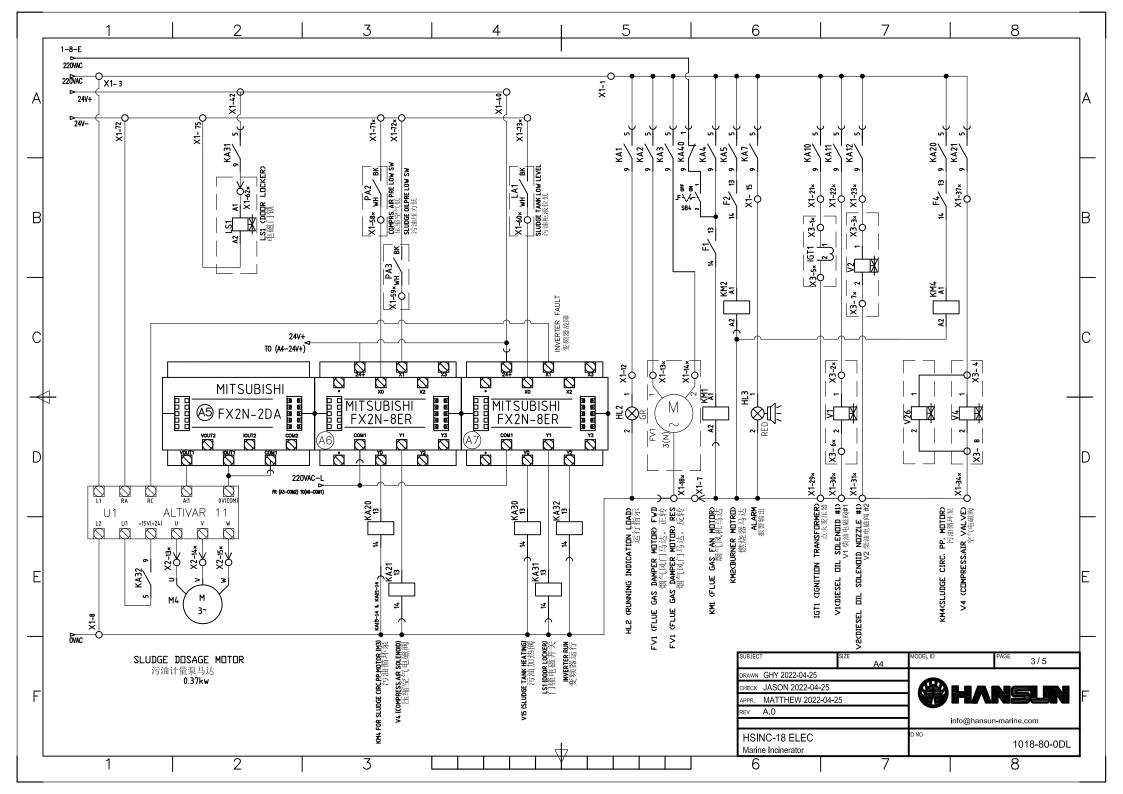
SUBJECT			SIZE	A3	MODEL ID 1H5433004	PAGE
DRAWN 20	022/5/24	maye	feng			
CHECK 20	022/5/24	Tony				
APPR. 20	022/5/24	Jasor	1			<b>MELIK</b>
REV. A.0					info@hansi	un-marine.com
烟气热电	偶0-800℃				ID NO	
	s thermocouple				11-	15433004

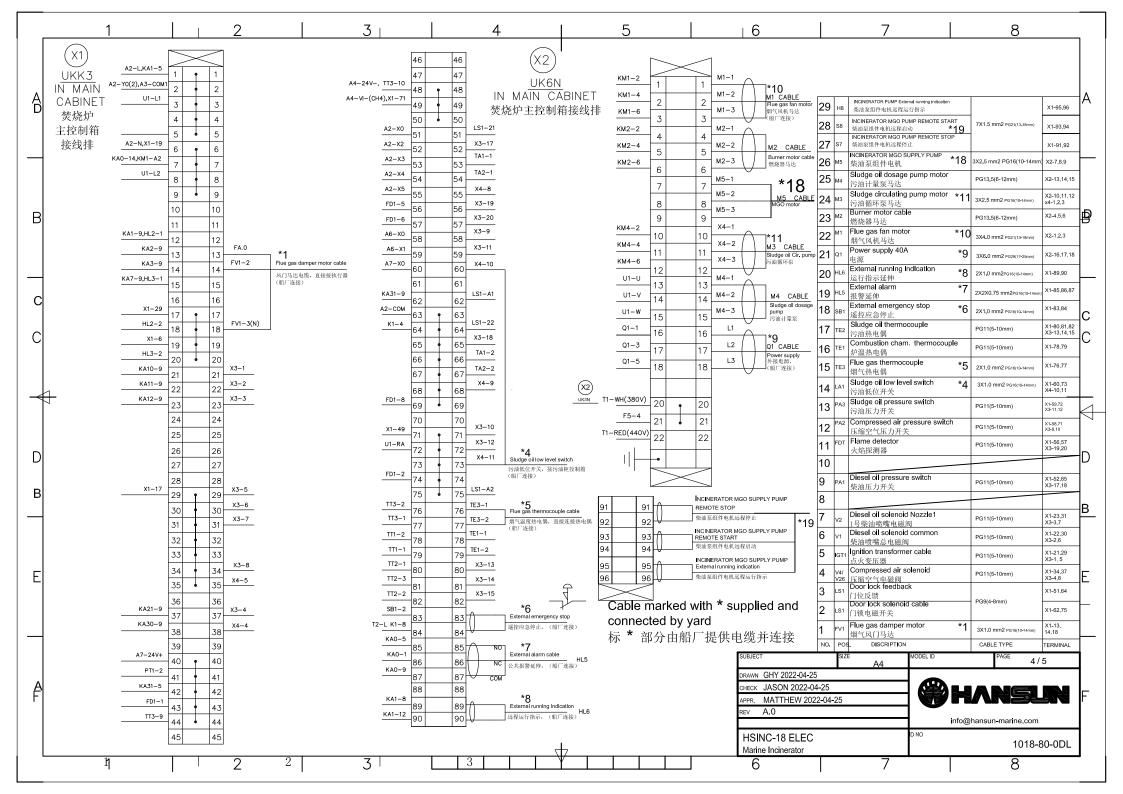


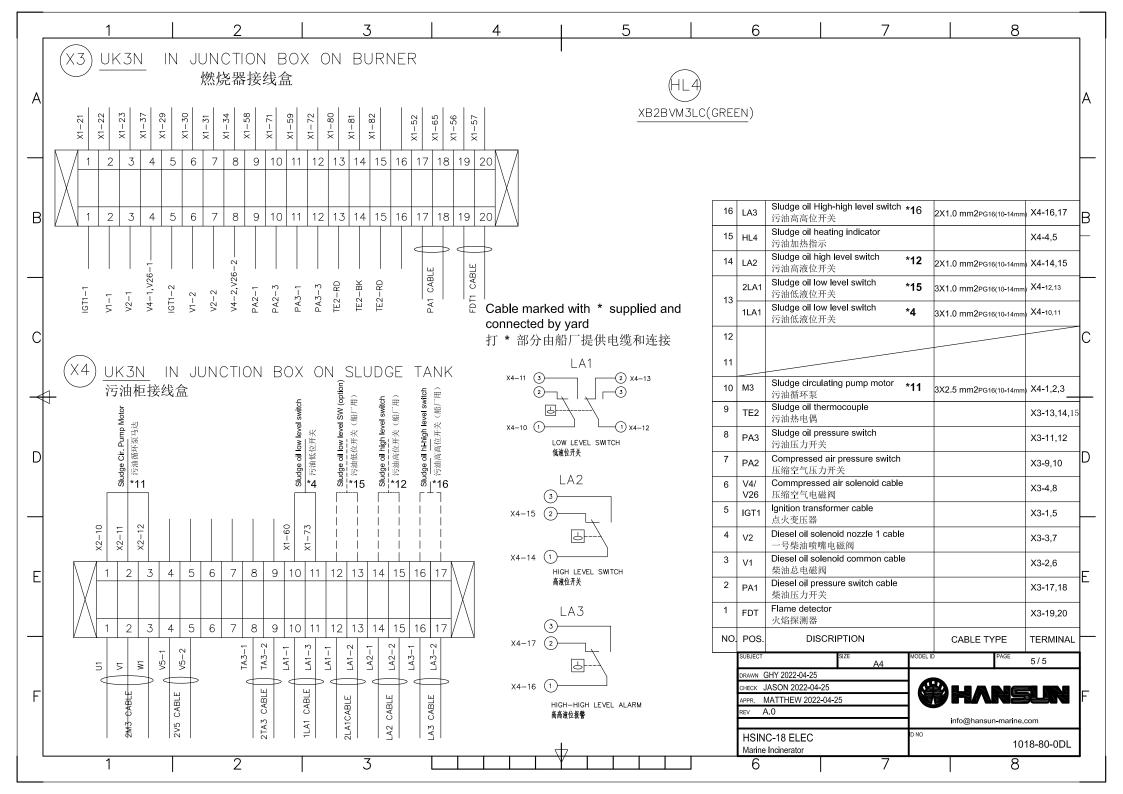














## APPENDIX 附录 B: Others 其它

Drawing Description 描述	Type 型号	Total number of pages 总页数
Replacement procedure of battery		2
Frequency transformer manual	ATV12	9
Instruction manual for air damper actuator		8
Instruction manual for marine burner	HSMB30S	19
Instruction manual for diesel oil pump		6
Instruction manual for marine fan	HSMF4.0C	21
Instruction manual for centrifugal macerating pump	CF20-10	20
Instruction manual for sludge dosing pump		15



#### Hansun(Shanghai)Marine Technology Co.,Ltd.

Addr: Building 60, No. 1000, Zhangheng Rd., Zhangjiang Hi-Tech Park, Pudong Shanghai 201203, China Tel: 86-21-50793367 Fax: 86-21-50793370

Web: www.hansun-marine.com

# Replacement Procedure

For

PLC Battery



### **Replacement Procedure of PLC Battery**



Attention: When the PLC voltage is low, Replacing the battery requires live replacement, Otherwise it is easy to lose the PLC program.

注意: 当 PLC 电池低时,更换电池需要带电更换,否则容易丢失 PLC 程序。



Addr: Building 60, No. 1000, Zhangheng Rd., Zhangjiang Hi-Tech Park, Pudong Shanghai 201203, China Tel: 86-21-50793367 Fax: 86-21-50793370

Web: www.hansun-marine.com

## **Instruction Manual**

## For

Frequency Transformer

Type: ATV12



### Altivar 12

Guide simplifié Simplified manual Kurzanleitung Guía simplificada Guida semplificata 简明手册 Variateurs de vitesse pour moteurs asynchrones Variable speed drives for asynchronous motors Frequenzumrichter für Asynchronmotoren Variadores de velocidad para motores asíncronos Variatori di velocità per motori asincroni 异步电机变频器





### Diagnostic and Troubleshooting

#### Drive does not start, no error code displayed

- If the display does not light up, check the power supply to the drive (ground and input phases connection, see page 50).
- The assignment of the "Fast stop" or "Freewheel" functions will prevent the drive starting if the corresponding logic inputs are not powered up. The ATV12 then displays n 5 ½ in freewheel stop and F 5 ½ in fast stop. This is normal since these functions are active at zero so that the drive will be stopped if there is a wire break. Assignment of LI to be checked in C D n F/F U L L/F U n -/5 ½ ½ menu (see user manual).
- Make sure that the run command input(s) is activated in accordance with the selected control mode (Type of control <u>F</u> <u>C</u> and 2 wire type of control <u>F</u> <u>C</u> parameters in <u>C</u> <u>D</u> <u>n</u> <u>F</u> | F <u>U</u> <u>L</u> <u>L</u> | I <u>D</u> menu).
- If the reference channel or command channel is assigned to a Modbus, when the power supply is connected, the drive displays "n 5 b" freewheel and remain in stop mode until the communication bus sends a command.
- In factory setting "RUN" and "STOP" button are inactive. Adjust Reference channel 1
   Fr I page 67 and Command channel 1 E d I parameters to control the drive locally (E D n F/F U L L/E L menu). See chapter How to control the drive locally page 68.

#### Fault detection codes which cannot be reset automatically

The cause of the fault must be removed before resetting by cycling power to the drive.

SOF and tnF faults can also be reset remotely by means of a logic input (Detected fault reset assignment - 5 F parameter in C D n F/F L/L L/F L L - menu).

InFb, SOF and tnF codes can be inhibited and cleared remotely by means of a logic input (Detected fault inhibition assignment. In H parameter).

Code	Name	Possible causes	Remedy
Eef I	Precharge	Charging relay not operating properly or charging resistor damaged	Turn the drive off and then back on again Check the connections Check the stability of the main supply Contact local Schneider Electric representative.
Inf i	Unknown drive rating	The power card is different from the card stored	Contact local Schneider Electric representative.
InF2	Unknown or incompatible power board	The power card is incompatible with the control card	Contact local Schneider Electric representative.
InF3	Internal serial link	Communication fault between the internal cards	Contact local Schneider Electric representative.



### Fault detection codes which cannot be reset automatically (continued)

Code	Name	Possible causes	Remedy
InF4	Invalid industrialization zone	Internal data inconsistent	Contact local Schneider Electric representative.
InF9	Current measurement circuit failure	Current measurement is not correct due to hardware circuit	Contact local Schneider Electric representative.
	Problem with application Firmware	Bad updated of the application firmware with the Multi-Loader	Flash again the application firmware of the product
InFb	Internal thermal sensor failure	The drive temperature sensor is not operating correctly The drive is in short circuit or open	Contact local Schneider Electric representative.
InFE	Internal CPU	Internal microprocessor fault	Turn the drive off and then back on again     Contact local Schneider Electric representative.
OCF	Overcurrent	Parameters in the Motor control menu d r L - are not correct     Inertia or load too high     Mechanical locking	Check the parameters Check the size of the motor/drive/load Check the state of the mechanism Connect line motor chokes Reduce the Switching frequency 5 Fr Check the ground connection of drive, motor cable and motor insolation.
SEF I	Motor short circuit	Short-circuit or grounding at the drive output     Ground fault during	Check the cables connecting the drive to the
SEF3	Ground short circuit	Ground fault during running status     Commutation of motors during running status     Significant current leakage to ground if several motors are connected in parallel	motor, and the motor insulation  Connect motor chokes
5EF4	IGBT short circuit	Internal power component short circuit detected at power on	Contact local Schneider Electric representative.



### Fault detection codes which cannot be reset automatically (continued)

Code	Name	Possible causes	Remedy
50F	Overspeed	Instability     Overspeed link with the inertia of the application	Check the motor and connected mechanical equipment Overspeed is 10% more than Maximum frequency Fr so adjust this parameter if necessary Add a braking resistor Check the size of the motor/drive/load Check parameters of the speed loop (gain and stability)
EnF	Auto-tuning	Motor not connected to the drive     One motor phase loss     Special motor     Motor is in rotation (by load for example)	Check that the motor/ drive are compatible     Check that the motor is present during auto-tuning     If an output contactor is being used, close it during auto-tuning     Check that the motor is completly stopped



#### Fault detection codes that can be reset with the automatic restart function, after the cause has disappeared

These faults can also be reset by turning on and off or by means of a logic input (Detected

fault reset assignment **~ 5 F** parameter).

OHF, OLF, OPF1, OPF2, OSF, SLF1, SLF2, SLF3 and tJF faults can be inhibited and cleared remotely by means of a logic input (Detected fault inhibition management In H parameter).

Code	Name	Possible causes	Remedy
LFFI	Al current lost fault	Detection if:     Analog input Al1 is configured in current     Al1 current scaling parameter of 0% E r L I is greater than 3mA     Analog input current is lower than 2 mA	Check the terminal connection
Obf	Overbraking	Braking too sudden or driving load too high	Increase the deceleration time Install a module unit with a braking resistor if necessare. Check the main supply voltage, to be sure that we are under the maximum acceptable (20% over maximum main supply during run status). Set automatic adaptation of decel ramp br R to YES.
ПНF	Drive overheat	Drive temperature too high	Check the motor load, the drive ventilation and the ambient temperature. Wait for the drive to cool down before restarting. See Mounting and temperature conditions page 46.
OLE	Process overload	Process overload	Check the process and the parameters of the drive to be in phase
DLF	Motor overload	Triggered by excessive motor current	Check the setting of the motor thermal protection, check the motor load.
DPF 1	1 output phase loss	Loss of one phase at drive output	Check the connections from the drive to the motor     In case of using downstream contactor, check the right connection, cable and contactor



#### Fault detection codes that can be reset with the automatic restart function, after the cause has disappeared (continued)

Code	Name	Possible causes	Remedy
DPFZ	3 output phase loss	Motor not connected     Motor power too low, below 6% of the drive nominal current     Output contactor open     Instantaneous instability in the motor current	Check the connections from the drive to the motor Test on a low power motor or without a motor: In factory settings mode, motor phase loss detection is active Output phase loss detection  DPL = YE 5. To check the drive in a test or maintenance environment, without having to use a motor with the same rating as the drive, deactivate motor phase loss detection Output phase loss detection Output phase loss detection Option parameters: IR compensation UF r, Rated motor voltage Un 5 and Rated motor current ner and perform Autotuning Un.
05F	Main overvoltage	Line voltage too high:     Only at power on of the drive, supply is 10% over the maximal voltage acceptable     Power with no run order, 20% over maximal main supply     Disturbed mains supply	Check the line voltage
PHF	Input phase loss	Drive incorrectly supplied or a fuse blown     Failure of one phase     3-phase ATV12 used on a single-phase line supply     Unbalanced load     This protection only operates with the drive on load	<ul> <li>Check the power connection and the fuses.</li> <li>Use a 3-phase line supply.</li> <li>Disable the fault by Input phase loss</li> <li>IPL = n D.</li> </ul>



#### Fault detection codes that can be reset with the automatic restart function, after the cause has disappeared (continued)

Code	Name	Possible causes	Remedy
SEFS	Motor short circuit	Short-circuit at drive output     Short circuit detection at the run order or DC injection order if parameter IGBT test     SERE = 9E5	Check the cables connecting the drive to the motor, and the motor's insulation
SLFI	Modbus communication	Interruption in communication on the Modbus network	Check the connections of communication bus. Check the time-out (Modbus time-out E E D parameter) Refer to the Modbus user manual
SLF2	SoMove communication	Loss of communication with SoMove software	Check the SoMove connecting cable.     Check the time-out
5LF3	HMI communication	Loss of communication with the external display terminal	Check the terminal connection
ULF	Process underload fault	Process underload Motor current below the Application underload thereshold L UL parameter during a period Application underload time delay UL E to protect the application.	Check the process and the parameters of the drive to be in phase
EJF	IGBT overheat	Drive overheated     IGBT internal temperature is too high according to ambient temperature and load	Check the size of the load/motor/drive. Reduce the Switching frequency 5 F r. Wait for the drive to cool before restarting



## Faults detection codes that will be reset as soon as their causes disappear

The USF fault can be inhibited and cleared remotely by means of a logic input (Detected fault inhibition management In H parameter).

Code	Name	Possible causes	Remedy
<i>LFF</i>	Incorrect configuration	HMI block replaced by a HMI block configured on a drive with a different rating     The current configuration of customer parameters is inconsistent	Return to factory settings or retrieve the backup configuration, if it is valid.     If default remains after factory setting, Contact local Schneider Electric representative.
EF 1	Invalid configuration	Invalid configuration     The configuration loaded in     the drive via the bus or     communication network is     inconsistent.	Check the configuration loaded previously.     Load a compatible configuration
U5F	Undervoltage	Line supply too low     Transient voltage dip	Check the voltage and the parameters of Undervoltage Phase Loss Menu U 5 b -

#### HMI block changed

When a HMI block is replaced by a HMI block configured on a drive with a different rating, the drive locks in Incorrect configuration  $\digamma \digamma$  fault mode on power-up. If the card has been deliberately changed, the fault can be cleared by pressing the ENT key twice, which causes all the factory settings to be restored.



#### Hansun(Shanghai)Marine Technology Co.,Ltd.

Addr: Building 60, No. 1000, Zhangheng Rd., Zhangjiang Hi-Tech Park, Pudong Shanghai 201203, China Tel: 86-21-50793367 Fax: 86-21-50793370

Web: www.hansun-marine.com

## **Instruction Manual**

## For

Air Damper Actuator



# Content 目录

1	Introduction 介绍·	- 1 -
2	Technical Data 技术参数	- 1 -
	Basic Function Introduction 基本功能介绍	
4	Mechanical Design 机械设计	- 2 -
5	Engineering Notes 工程注释	- 4 -
6	Commissioning Notes 调试说明	- 5 -
	Diagram 原理图	
	Dimension 尺寸图	

**Rev: V2.0** 



## 1 Introduction 介绍

The actuator is used in ventilation plants to operate air damper. It is available for three-position and modulating control . The actuator's connecting cables are prewired . 此执行器用于通风设备,它有三个位置及调节控制,执行器的线已提前预配好。Three-position as follow三个位置如下:

- Damper opens (0° -90°) 风门开(0°-90°)
- Damper closes (90° -0°) 风门关(90°-0°)
- Damper remains in the current position 风门停留在当前位置

## 2 Technical Data 技术参数

Application Information 相关参数						
	Air Damper Actuator					
Control Type Three-position control 控制型式						
Operating Voltage 工作电压	230VA	AC				
Nominal rotary angle 正常转动角度	90°					
Max. rotary angle 95° ±2° 最大转动角度		2°				
Frequency 频率	50/60HZ					
Power Consumption	Turning actuator	5VA/5W				
功率	Holding(economy function)	6VA/0.5W(after > 200s)				
Nominal Torque 额定扭矩	25Nn	n				
Maximum torque (blocked) 最大扭矩	50Nn	n				
Runtime for 90° rotary angle 转动 90° 时间	150s(50HZ)/125S(60HZ)					
Mechanical life Max 10 <sup>5</sup> cycles 机械寿命		cycles				
Operating Temperature 操作温度	-32~55	${\mathbb C}$				



## 3 Basic Function Introduction 基本功能介绍

## ♦ Rotational movement 旋转:

The actuator's rotational movement (clockwise or counterclockwise) depends on the electrical control. As soon as the operating voltage AC 230 V is applied, the actuator starts to turn.

执行器的旋转(顺时针或逆时针)是由电气来控制。当接头230V交流电时,执行器开始得电工作。

#### ♦ Fail-safe function故障安全功能:

After uninterrupted runtime of approximately 200 s, the actuator turns off in the same direction.

当出现故障,执行器会在不间断运行200s后,按照相同方向关闭。

#### ♦ Position indication位置检测:

The position indicator located on the shaft adapter displays the rotational angle position of the damper blade.

安装在轴适配器上的位置检测器将会显示风门叶片的转动角度位置。

#### ♦ Manual Override手动调节:

To manually adjust the actuator or the air damper, the gear train must be disengaged using the button PUSH". Refer to "Operating and setting elements" in the chapter "Mechanical design".

当需要手动调节执行器或者风门时,应通过按下"PUSH"按钮,将齿轮系分开,具体可参照"机械设计章节"里面的"操作机设置部分"内容。

#### ♦ Mechanical limitation of rotational angle转动角度的限制:

The rotational angle of the shaft adapter can be limited to  $5^{\circ}$  increments between  $0^{\circ}$  and  $90^{\circ}$ . 轴适配器的转动角度在 $0-90^{\circ}$  之间,增量每次为 $5^{\circ}$  。

## 4 Mechanical Design 机械设计

#### ■ Motor technology 电机计算

The reversible synchronous motor provides accurate speed control and nominal force monitoring to protect the actuator and dampers.

可逆同步电机提供精确的速度控制及标称力检测,以保护执行器及风门。

#### ■ Basic Components 基本组成部分

#### ➤ Housing 基座:

Robust, lightweight all metal housing made from aluminum diecast which guarantees a long actuator life even under extreme ambient conditions.

坚固、轻质的全金属外壳,由铝压铸而成,即使在极端情况下,仍然可以保持较长寿命。

#### ➤ Gear train 齿轮副:

Maintenance-free and noise-free gear train with stall and overload protection for the life of the actuator.

免维护与无噪音的齿轮副能够有效的保护执行器,并提供失速与过载保护。

#### ➤ Actuator factory setting 出厂设置:

The actuator has a factory setting of +2.5 mm which ensures a tight close-off for the air dampers.

执行器的出厂设置为+2.5 mm,这确保了风门的紧密关闭。

#### > Manual adjustment 手动调节:



You can manually adjust the actuator by pushing the button "PUSH". 接下"PUSH"接钮,可以手动调节执行器。

#### > Self-centering shaft adapter 自定心轴适配器

The actuator can be fastened to shafts with various diameters and in various shapes (square, round) using just one screw .Insert the shaft adapter from either side into the opening for the shaft adapter depending on the damper shaft length. For short shafts, the shaft adapter is on the duct side. The shaft adapter coupling and the shaft holding are coupled via double-sided gearing.

执行机构可以用一个螺丝固定在不同直径、不同形状(方形、圆形)的轴上。根据减震器轴长,将轴适配器从两侧插入到轴适配器的开口中。对于短轴,轴适配器在管道一侧。轴接头联轴器和轴承座通过双面齿轮联轴器

## ▶ Mechanical limitation of the rotational angle 转动角度的机械限制

The limitation of the rotational angle can be adjusted in the span of  $0...90^{\circ}$  in increments of  $5^{\circ}$ .

轴适配器的转动角度在 0-90°之间,增量每次为 5°

#### ▶ Mounting bracket 安装支架

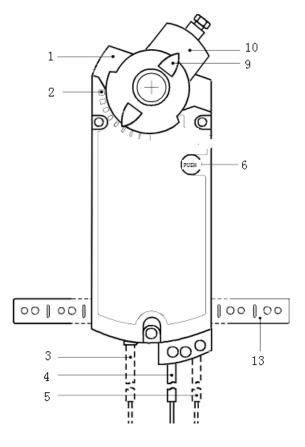
A metal strip with bolt serves to fasten the actuator on the opposite side of the shaft holding. 带螺栓的金属条用于将执行机构固定在轴座的另一侧

#### > Electrical connection 电气连接

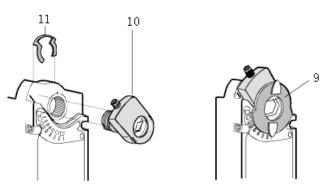
All actuators come with pre-wired 0.9 m long connection cables. 所有执行机构都配有预连接 0.9 m 长的电缆

### > Setting and operating elements 设置及操作说明

Refer to "Mechanical design" and "Commissioning notes" in this data sheet 请参阅本数据表中"机械方面"与"调试说明"



- 1. Housing 基座
- 2. Angle of rotation scale 0°...90°转动角度表
- 3. Connection cable for positioner 位置检测器线
- 4. Connection cable for power supply 电源线
- 5. Connection cable for auxiliary switches 辅助调节连线
- 6. Gear train disengagement button 齿轮副断开按钮
- 9. Position indicator 位置检测器
- 10. Self-centering shaft adapter 自定心轴适配器
- 11. Locking ring for shaft adapter 轴适配器卡环
- 13. Mounting bracket 安装支架





Note: the actuator may not contains all the parts.

注意: 执行器不一定包含所有的零部件

## 5 Engineering Notes 工程注释

STOP

The basic system data for the control systems in use contains all engineering notes. Read all the engineering notes before mounting, wiring, and commissioning the actuator and pay special attention to all safety information.

使用中的控制系统的基本系统数据包含所有工程注释。在安装、布线和调试 行机构之前,阅读所有工程注释,并特别注意所有安全信息。

Proper use These actuators must be used in a system only for applications as described in the basic system data documents for the applied control systems. Additionally, all actuator specific features and rules must be observed as described in the brief description on the title page of this data sheet (bold print) and in the chapters "Use", "Engineering notes", and "Technical data".

正确使用 这些执行机构必须仅用于应用于应用控制系统的基本系统数据文档中 描述的应用程序。此外,所有执行机构的具体特性和规则都必须按照 本数据表标题页(粗体印刷)和"使用"、"工程注释"和"技术数 据"章节的简要说明进行遵守。

Δ

All paragraphs marked with the special warning triangle as illustrated on the left contain additional safety information and limitations that must be observed under any circumstances to avoid physical injuries or damages to equipment.

左边以三角警戒线标示的所有段落都包含了额外的安全信息和限制,在任何情况下都必须遵守,以避免对设备造成人身伤害或损坏。

▲ AC 230 V supply 230V 交流电

The actuators are double-insulated and do not provide a connection for the protective ground.

执行机构是双绝缘的,不为保护地面提供连接。



## Warning, maintenance: Do not open the actuator!

#### 警告: 不要打开执行器

The actuator is maintenance-free. Maintenance work may only be conducted by the manufacturer.

执行机构是免维护的。维修工作只能由制造商进行。



## Parallel connection of actuators 执行机构并联

• **Electric:** Electric parallel connection for the same actuator types is permissible provided the operating voltage is within the required tolerance. Voltage drops at the feed lines must be included.

电气:如果工作电压在要求的公差范围内,对于相同类型的执行机构,允许电并联。馈线上的电压降必须包括在内。

Mechanical: Do not mechanically couple the actuators.
 不要机械地连接执行机构。

## 6 Commissioning Notes 调试说明

• Check to ensure that the cables are connected in accordance with the plant wiring diagram (see "Diagrams").

检查电缆连接,确保按照设备接线图(见图)。

• The operating voltage AC 230 V must be within the tolerance values.

操作电压 230VAC 必须在承受的范围内。

- Control signal AC 230 V 控制信号 230VAC。
- between wires 6-4: Actuator turns clockwise. 线 6-4 为执行器顺时针转动。
- between wires 7-4: Actuator turns counter clockwise. 线 7-4 为执行器逆时针转动。
- The actuator remains in its current position if no control signal is applied. 如果不使用控制信号,执行机构保持在当前位置。
- Position indication by measuring the potentiometer resistance while the actuator turns from  $0...90^{\circ}$  .

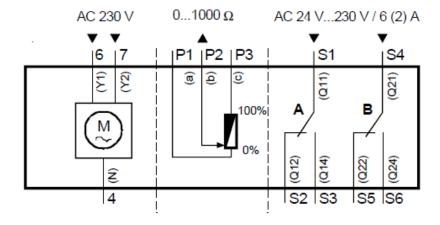
在执行器从 0···90° 转动时, 位置指示通过测量电位器电阻实现。

**Attention:** The angle values are valid only for the actuator position "0°" (clockwise direction).

注意: 执行器的角度值有效,必须要求执行器在"0"位(顺时针方向)

## 7 Diagram 原理图

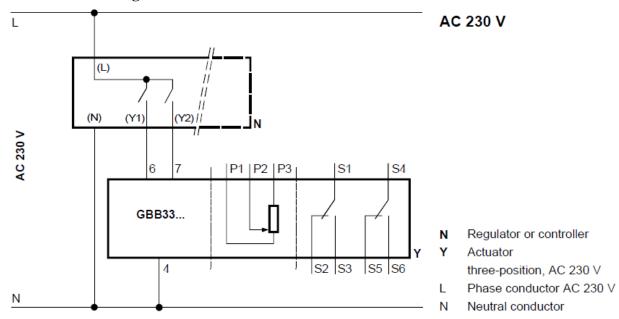
● Internal Diagram 内部原理图



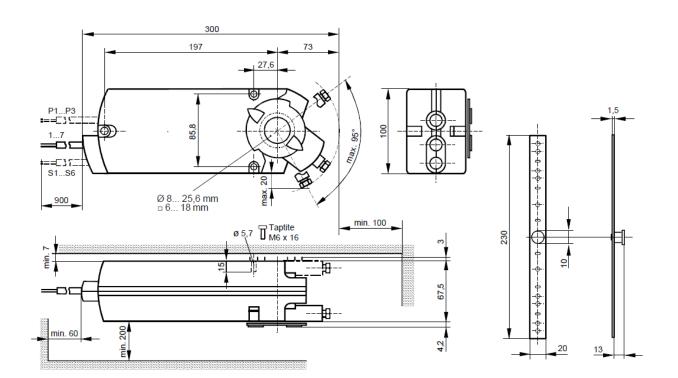
AC 230 V



## ● Connection Diagram 接线图



# 8 Dimension 尺寸图





#### Hansun(Shanghai)Marine Technology Co.,Ltd.

Addr: Building 60, No. 1000, Zhangheng Rd., Zhangjiang Hi-Tech Park, Pudong Shanghai 201203, China Tel: 86-21-50793367 Fax: 86-21-50793370

Web: www.hansun-marine.com

# **Instruction Manual**

For

Burner

Type:HSMB30S

# Index 目录

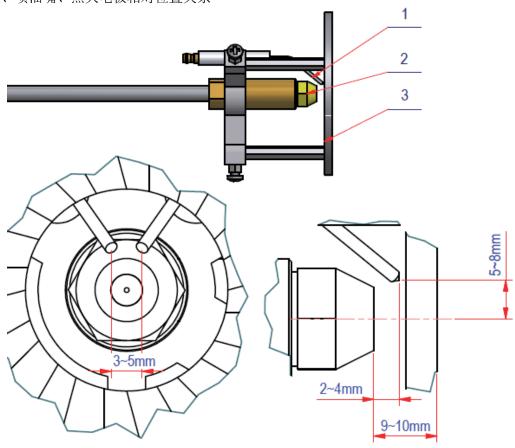
1.	Position relation 位置关系	1 -
2.	Instruction for air damper adjusting 燃烧器风门调节说明	2 -
3.	Nozzle 油嘴	2 -
4.	Maintenance of burner 燃烧器的维护	3 -
5.	Maintenance of sludge oil burner 污油燃烧器的维护	3 -
6.	Nozzle replacement.柴油喷嘴更换	5 -
7.	Flame stabilizer cleaning 稳焰盘清洗	6 -
8.	Other parts disassembly instruction 其他零部件拆卸指导	7 -
9.	General trouble shooting chart 常见故障	8 -
10.	Parts List 零件列表1	4 -



#### 1. Position relation 位置关系

The relative position between the flame stabilizer, oil nozzle and ignition electrode.

稳焰盘、喷油嘴、点火电极相对位置关系



1、Ignition Electrode 点火电极 2、Nozzle 喷嘴 3、Flame Stabilizer 稳焰盘

Fig. 1 Install schematic for burner head

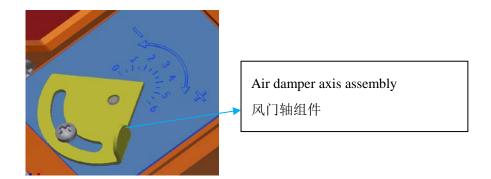
图 1 燃烧头部件位置关系示意图

The relative position of the ignition electrode and the flame stabilizer is very important; the electric spark should be in the range of the combustible gas. And the gas flow rate should not be too high to ignite. The suggested relative position and distance between ignition electrodes are shown in fig. 1. The electrode is near oil nozzle, the distance between the two electrode rode is about 3-5mm, the horizontal distance between the oil nozzle and the electrode is **2-4mm**, the vertical distance between the oil nozzle and the electrode is **5-8mm**.

点火电极与稳焰盘的相对位置很重要(见图 1),它所产生的电火花须处在可燃气体的范围之内,并且那里气体的流速不能过高,否则不易点燃火焰。对双油嘴的燃烧器,1#油嘴为小油嘴,2#油嘴为大油嘴。点火电极靠近如图 1 所示的油嘴,点火电极两个电极的距离为 3-5mm,油嘴到点火电极端部的距离为 2-4mm,油嘴中心线到点火电极的距离为 5-8mm,如图 1 所示。



#### 2. Instruction for air damper adjusting 燃烧器风门调节说明



This air damper is manually adjusted, and if necessary, the opening of the damper can be changed only by shifting the air damper axis assembly

此风门为手动调节,如果需要,仅仅需要拨动风门轴组件即可改变风门开度。

#### 3. Nozzle 油嘴

The oil nozzle is the most important parts of the burner, the nozzle working well or not, that more affects the operation and output of the burner. The HSMB burner uses high-pressure centrifugal oil nozzle. This kind of nozzle can achieve well atomization when the spray pressure is higher than 0.6MPa. With the spray pressure increased, atomization quality improved and spray quantity increased. With the spray pressure decreased, the atomization quality and spray quantity decreased.

喷油嘴是燃烧器最关键的部件,它的工作好坏直接影响燃烧器的运行情况和出力,HSMB 型燃烧器采用高压离心雾化式喷油嘴,这种喷油嘴在喷油压力≥0.6MPa 时就能得到良好的雾化,随着喷油压力的提高雾化质量也不断改善,同时喷油量增加,反之喷油压力降低,雾化质量降低,喷油量减少。

Under the same spray pressure, the smaller specification nozzle achieves better atomization quality. The head face of the nozzle is sealing surface, which need to be protected carefully, for any slight scratches and bruising would lead to the oil leaking. The spray hole on oil nozzle shield and cyclone atomization cone guarantee the oil atomization quality, atomization angle and spray quantity, for these two parts, precise size and clean surface are essential. They need to be cleaned and replaced at fixed periods, because any damage, transformation or fouling will impact oil nozzle and burner operation. The clamping screw cover should be fixed on the above atomization cone firmly, otherwise will affect atomization effect and spray quantity. The oil screen's function is oil filtering, to prevent impurities into oil nozzle, which makes nozzle unworkable. It should be kept clean and complete.

在同样的喷油压力下,规格较小的喷油嘴可以获得较好的雾化质量。喷油嘴外壳的端面是密封面,任何轻微的划痕和碰伤均会引起燃油的滴漏,应十分注意保护。喷油嘴外壳上的喷油孔和旋流



雾化锥体上的斜槽是保证燃油雾化质量,雾化锥角和喷油量的关键,应保证尺寸准确和表面干净,任何损坏、变形和污垢都会严重影响喷油嘴以及燃烧器的正常工作,因此应定期清洗和更换。压紧螺盖应紧压在雾化器头上,否则会影响燃油雾化效果和喷油量。滤油网用来过滤燃油,防止杂质进入喷油嘴,影响喷油嘴的正常工作,应保持滤油网的清洁和完整。

#### 4. Maintenance of burner 燃烧器的维护

The HSMB type burners don't need special maintain, but always need do the following works for good working condition:

HSMB 型燃烧器不需要特别的维修,但需要经常做好以下工作以保持良好的工作状态:

- > Shut off power, pull out the flame sensor and clean it with dry cloth. 切断电源,卸下火焰传感器,用清洁干布擦净。
- > Clean it with gasoline or kerosene after you unpack the oil nozzle and replace the oil nozzle which working about 2,000 hours.
  - 拆下喷油嘴,用汽油或煤油仔细清洗,正常运行2000小时左右,喷油嘴应该换新
- ➤ Regularly clean the carbon deposits on sludge oil burner to prevent blockage, at least once a month. 定时清除污油燃烧器上面的积碳,防止堵塞污油燃烧器,至少一个月一次
- ➤ Regularly clean the dust and carbon deposits on the flame stabilizer. at least once a month. 定时清除稳焰盘上面的灰尘和积碳,至少一个月一次
- > Regularly clean the carbon deposit and dust in the electrode, proofread the distance and position between two electrodes.
  - 清洁电极, 刮除灰尘和积碳, 校正两电极的位置及其间的距离
- ➤ Regularly clean the diesel oil filter. 定时清洗柴油滤器

#### 5. Maintenance of sludge oil burner 污油燃烧器的维护

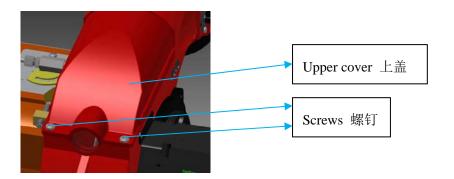
#### 5.1 Removal Procedure 拆除步骤

It is easy for the removal of the sludge oil burner, The sludge oil burner can be taken out by carrying out only two steps.

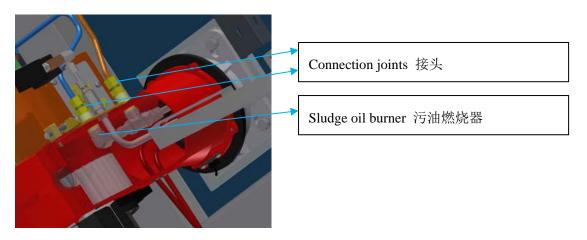
污油燃烧器的拆除工作其实是很简单的,只需要两步即可完成。



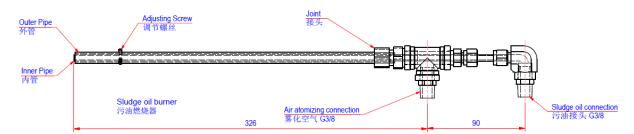
**Step 1:** Unscrew the screws and remove the upper cover. 拧开螺丝,拿掉上盖



Step 2: Unscrew the connection joints and take the Sludge oil burner out. 拧开接头,拿出污油燃烧器



#### 5.2 Sludge oil burner cleaning 污油燃烧器清洗



- Check the sludge oil burner frequently, at least once a month and clean it if necessary. 时常检查污油燃烧器,至少一个月一次,如有必要,请及时清洗。
- Unscrew the adjusting screw and joint, then pull out the outer pipe.
   拧开调节螺丝和接头,然后拉出外管。
- Clean the outer pipe and inner pipe.
   清洗外管与内管。
- After that, reassemble the sludge oil burner in reverse order. Check whether the inner pipe is in the center of the outer pipe and adjust the adjusting screw if necessary.
  - 之后,按相反顺序重新装配污油燃烧器,检查内管是否在外管中心,如有必要,调整调节螺丝。



## 6. Nozzle replacement.柴油喷嘴更换

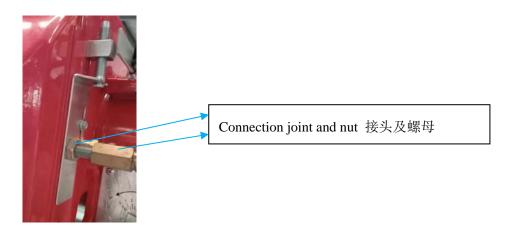
It is easy for removing the replacement of diesel oil nozzle replacement. Before start, make sure the removal of the sludge oil burner has been completed. As shown in **chapter 5** 

更换柴油喷嘴其实很简单,在开始之前,需要确认已完成污油燃烧器的拆除工作,如第5章所示。

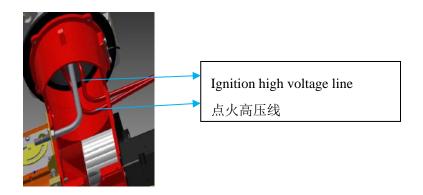
#### The specific removal steps are as follow:

具体的拆除步骤如下:

**Step 1:** Unscrew the joint and nut. 拧开接头及螺母



**Step 2:** Pull out the ignition high voltage line. 拔出点火高压线

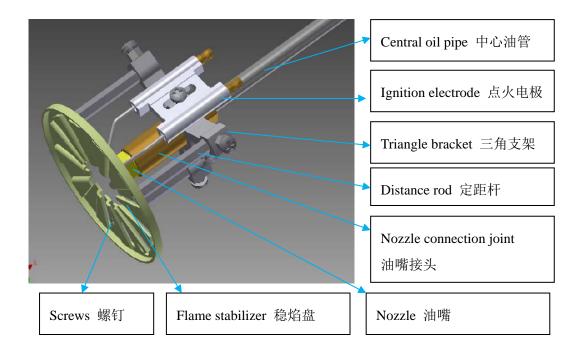


Step 3: Pull out the diesel oil nozzle assembly. 拔出油嘴组件





**Step 4:** Replace the nozzle and clean the flame stabilizer. 更换油嘴及清洗稳焰盘



• Fix the nozzle assembly and unscrew the nozzle with suitable hex wrench (normal S16 or S17) to complete the disassembly of the nozzle.

固定好油嘴组件,用合适六角扳手(通常是 S16 或者 S17)拧开油嘴,即可完成油嘴的拆卸;

● Unscrew the screws, the flame stabilizer can be removed. 拧开螺丝,即完成的稳焰盘的拆卸

**Step 5:** After that , reassemble the diesel oil nozzle in reverse order. 之后,按相反顺序重新装配油嘴。

#### Attention 注意:

The relative position of the electrode and the flame stabilizer, the nozzle is very important. The detail requirements can refer to chapter 1.

点火电极与稳焰盘、点火电极的相对位置是非常重要的,具体的要求可参照第一章。

### 7. Flame stabilizer cleaning 稳焰盘清洗

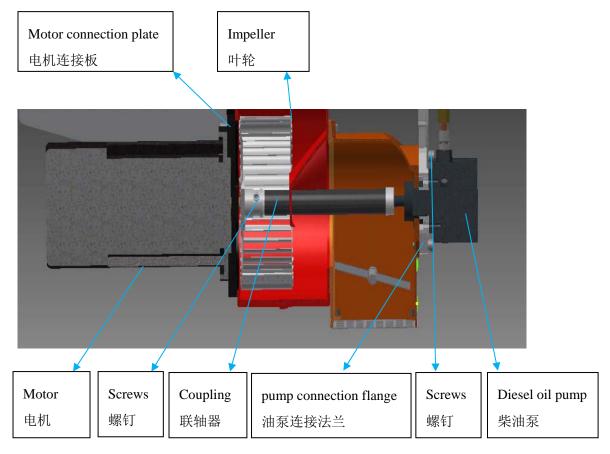
As described in chapter 6, after removing the flame stabilizer. The flame stabilizer can be cleaned by using brush and air rifle or other tools.

如第6章所述,拆除稳焰盘后,就可以通过刷子、气枪或者其他工具进行稳焰盘清洗。



## 8. Other parts disassembly instruction 其他零部件拆卸指导

This part, it is easy for you to disassembly and install.



- 1. Remove the pump connection flange fixing screws, and disassembly the diesel oil pump. 拆除油泵安装座固定螺丝,然后拆除柴油泵。
- 2. Remove the screw for impeller. 拆除叶轮固定螺丝
- 3. Remove the screws for motor, and take out the assembly. 拆除电机固定螺丝,就可以拿出其它的组件了。





# 9. General trouble shooting chart 常见故障

#### **Table 1 Failure list**

#### 表 1 故障列表

Failure	Possible Causes	Remedies	
故障类型	原因	排除方法	
Burner motor does not	No power supply or low voltage.	Check power supply line.	
start	2. The flame sensor may be light leakage	2. Check the sensor wiring or replace	
燃烧器不启动	or wiring short cut.	the sensor.	
	1. 电源线无电压或低电压	1. 检查原因并排除之	
	2. 火焰传感器短路或有漏光短路	2. 排除短路原因	
Burner motor does not	1. The wire or joint was loose.	Rewiring or check the joint.	
start	2. The motor burned out.	2. Replace.	
电动机不转	3. Capacitor break down.	3. Replace.	
	4. The motor was blocked by foreign	4. Disassemble and check, remove the	
	matter.	foreign matter.	
	1. 电动机接线或接头松动	1. 重新接线、检查接头	
	2. 电动机烧坏	2. 更换	
	3. 电容击穿	3. 换电容	
	4. 有异物卡住电机	4. 分解检查,排除异物	
Pump didn't supply oil	Connector fault	1. replace connector	
油泵不供油 回油管无回	2. Leakage of oil line or filter.	2. Tighten the seal nuts; replace the oil	
油	3. Gas blocking of oil pump.	pipe or connector.	
	4. filter block	3. Unscrew the nuts for the air to out.	
	5. pump damage	4. Clean the filter.	
	1. 油泵不转, 联轴器损坏、脱开	5. Replace the oil pump.	
	2. 进油管或过滤器漏气	1. 换联轴器	
	3. 油泵气堵	2. 拧紧密封螺母、换油管或接头	
	4. 滤油网堵塞	3. 拧开排气螺母进行排气	
	5. 油泵磨损	4. 清洁滤油网	
		5. 换油泵	
The burner spray oil, but	1. Wire damage	Check the wiring and repair.	
stop without flame.	2. Line aging of ignition transformer.	2. Replace.	
燃烧器喷油,但点不着火	3. Wrong connect of line.	3. Tighten.	



而导致停机	4. Ignition transformer fault.	4. Replace.		
	5. Wrong distance between ignition	5. Adjust to right position.		
	electrodes.	6. Clean or replace.		
	6. Ignition electrode dirty.	7. Adjust the pump pressure.		
	7. Bad atomization caused by abnormal	8. Drain the water out using other pump		
	pump pressure.	(not the pump on the burner).		
	8. Water in oil.	9. Reduce the combustion air (turn		
	9. Too much combustion air.	down the air damper).		
	10. The channel between the flame	10. Adjust the position of the burner		
	stabilizer and the burner head is too large.	head.		
	11. Oil nozzle wear or dirty.	11. Clean or replace.		
	1. 点火电路损坏	1. 检查整个电路,并修理		
	2. 点火变压器导线老化失效	2. 更换		
	3. 点火变压器导线未真正接好	3. 拧紧		
	4. 点火变压器损坏	4. 更换		
	5. 点火电极尖端间的距离不正确	5. 调整到正确的位置		
	6. 电极向地(壳体)放电,因电极肮	6. 清洁,必要时更换		
	脏或绝缘破坏,同时检查绝缘器接线柱	7. 重新调整油压		
	7. 油泵压力不正常,雾化不良	8. 用合适的油泵将水从油箱中排出		
	8. 油中有水	(但不准用燃烧器上的油泵做这项工		
	9. 燃烧空气量太大	作)		
	10. 旋流器与燃烧头间的通道太大	9. 减少燃烧空气量(关小风门)		
	11. 喷油嘴磨损或脏污	10. 调整燃烧头到正确位置		
		11. 清洗或更换		
The oil nozzle cannot	1. One phase of the power supply was off.	Check and repair the power.		
spray oil.	2. Motor failure.	2. Repair or replace.		
喷油嘴不喷油而导致停	3. The oil did not reach to the pump.	3. Check the oil suction pipe.		
机	4. No oil in the oil tank.	4. Fill the oil tank.		
	5. The valve in the oil suction line was	5. Open the valve.		
	closed.	6. Take off the oil nozzle and clean it		
	6. Oil nozzle blocked.	fully.		
	7. Wrong rotation direction of the motor.	7. Change any one phase of the power.		
	8. Oil suction valve leak or block.	8. Remove the valve and clean.		
	9. Pump damaged.	9. Replace.		

10. The solenoid valve not working, the 10. Repair or change the coil if



	coil is damaged, or the spool was	necessary, and clean.		
	blocked.	11 . Contact the power supply		
	11. Voltage was too low.	department.		
	12. The pump shaft was slip.	12. Check the fixing screw, shaft and		
	13. Light gets in the burner or the flame	the connector, replace if necessary.		
	sensor was damaged.	13. Repair or replace.		
	14. The filter was block or the oil suction	14. Replace or clean.		
	pipe was leak.	15. Replace.		
	15. The connector was damaged.	1. 检查电源并修理		
	1. 电源一相脱落	2. 修理或更换		
	2. 电动机失效	3. 检查吸油管道		
	3. 燃油未达到油泵	4. 加油		
	4. 油箱中无油	5. 打开		
	5. 吸油管上的阀门关闭	6. 拆下并充分清洗		
	6. 喷嘴堵塞	7. 在电源开关内调换任一相的位置		
	7. (三相)电动机旋转方向反了	8. 拆下并清洗		
	8. 吸油阀泄露或堵塞	9. 更换		
	9. 油泵失效	10. 修理,必要时更换线圈,清洗脏		
	10. 电磁阀未工作(闭合),线圈损坏,	物		
	电磁阀芯堵塞	11. 与供电部门联系		
	11. 电压太低	12. 检查转动轴固定螺丝、胶轴、胶		
	12. 泵传动轴打滑	套,必要时更换		
	13. 火焰探测器见光或损坏	13. 捂住光电管或更换		
	14. 过滤器或吸油管裂或漏或阻塞造成	14. 更换或清洗		
	泵抽不上油	15. 更换		
	15. 联轴器损坏未带动油泵			
The oil can be ignited but	Improper air damper position.	Adjust the air damper.		
the flame can not be	2. Bad atomization due to insufficient	2. Adjust the oil pressure to the setting		
formed.	pump pressure.	value.		
喷油点火但形不成火焰	3. Water in oil.	3. Change the oil to drain out the		
	4. Oil nozzle wear out, wrong atomizing	water.		
	angle.	4. Replace the oil nozzle.		
	1. 风门位置不当	1. 调节风门		
	2. 油泵压力不够雾化不良	2. 调油压为要求值		
	3. 油内有水份	3. 更换燃油去水		
	- 10 -			

**Rev: V2.0** 

Γ	I	I	
	4. 喷嘴磨损,雾化角不对	4. 换喷嘴	
The burner was stop even	1. The flame sensor was damaged or	1. Replace or clean.	
with flame.	covered by soot.	2. Open wide the air damper.	
在有火焰燃烧的情况下	2. Insufficient air flow.	3. Clean.	
停机(包括喷火后又熄	3. The flame stabilizer or the burner head	4. Adjust air damper.	
灭),故障出在火焰控制	dirty.	5. Correct the direction	
器上	4. Improper air damper.	1. 更换或清洗	
	5. Wrong direction of the flame sensor.	2. 检查锅炉和烟囱的烟道,并清扫	
	1. 火焰探测器损坏或被油烟堵塞	3. 清洗	
	2. 通风不足	4. 调整风门	
	3. 旋流器和燃烧头污脏	5. 改为正确朝向	
	4. 风门不当		
	5. 火焰探测器管朝向插反		
Pump noise	1. Diameter of the oil pipe is small.	Replace the oil pipe	
油泵有噪声	2. The distance between the oil tank and	2. Shorten the length of the inlet oil	
	the burner is too long or the partial	pipe.	
	resistance (elbow or throttle) is high.	3. Found the leakage and replace it.	
	3. Air flow into the oil pipe.	4. Clean.	
	4. The filter at the inlet oil pipe is blocked	5. Replace.	
	1. 油管直径太小	1. 根据说明书更换油管	
	2. 油箱与燃烧器的距离过长,或 附加	2. 缩短吸油管的长度	
	的局部阻力(弯头、节流等)大	3. 找漏并排除漏入空气	
	3. 空气漏入油管中	4. 清洗	
	4. 油滤肮脏		
Flame defective, sparkle	1. The atomizing pressure is too low.	Increase the oil pressure.	
火焰不良, 有火星	2. Too much air for burning.	2. Reduce the air flow.	
	3. Oil nozzle fault( block or wear)	3. Clean or replace.	
	4. Water in oil.	4. Drain the water out using other	
	1. 雾化压力太低	pump (not the pump on the burner).	
	2. 燃烧空气太多	1. 提高油压	
	3. 喷嘴失效(磨损或堵塞)	2. 减少燃烧空气	
	4. 燃油中有水	3. 清洗或更换	
		4. 用合适的泵将水从油箱中抽出(不	
		准用燃烧器上的油泵做这项工作)	
Bad flame form, dark	Insufficient air capacity.	1. Increase the air capacity.	



smoke or carbon black.	2. Oil nozzle fault (wear or block).	2. Clean or replace.
火焰形状不好,有烟和碳	3. Low spray capacity of oil nozzle.	3. Replace the oil nozzle with a higher
黑	4. Atomizing pressure is too low (pump	capacity one.
	wear or filter block).	4. Adjust the pressure or clean the filter
	5. The channel between the diffuser and	or replace the pump.
	the burner head is small.	5. Adjust the position of the diffuser to
	6. Low voltage, low velocity of the motor.	increase the channel.
	7. The spray angle of the nozzle is too	6. Adjust the voltage.
	large.	7. Replace the nozzle with a small
	1. 燃烧空气量不足	angle.
	2. 喷嘴失效(磨损或堵塞)	1. 增加燃烧空气量
	3. 相对于燃烧室的尺寸,喷嘴的喷油量	2. 清洗或更换
	不足	3. 更换喷嘴,增加其出力
	4. 雾化压力过低(泵磨损或滤油网堵	4. 调高油压或换泵、清洗
	塞)	5. 调整旋流器位置
	5. 旋流器与燃烧头间通道过小	6. 调整电压
	6. 电压低, 电机转速慢	7. 换小角度喷嘴
	7. 喷嘴雾化角度过大	
Bad flame, flashing or	1. High air velocity or pressure.	1. Adjust the open scale of the air
flame-lifting.	2. Oil nozzle failure (wear or blocked)	damper.
火焰不良,脉动或脱火	3. Water in the oil.	2. Clean or replace.
	4. Flame stabilizer dirty	3. Drain the water out using other pump
	5. large air flow. (big damper open angle)	(not the pump on the burner).
	6. The channel between the flame	4. clean
	stabilizer and the burner head is big.	5. Reduce the combustion air.
	7. The flow rate of the oil pump is	6. Adjust the position of the flame
	unstable.	stabilizer to reduce the channel.
	8. Abnormal velocity of the fan motor.	7. Adjust or replace.
	1. 通风抽力过大(当烟道上有引风机	8 . Check the voltage and the
	时)	temperature of the motor, adjust or
	2. 喷油嘴失效(磨损或堵塞) 3. 燃油中	replace according to the check result.
	有水	1. 调节风门开度。
	4. 旋流器污垢	2. 清洗或更换喷嘴
	5. 燃烧空气量过大(风门过大)	3. 用合适的泵将水从油箱中抽出(不
	6. 旋流器与燃烧头间的通道过大	许用燃烧器的泵做这项工作)



Marine Burner HSMB30S Rev: V2.0

	7. 泵流量不稳	4. 清洗
	8. 电机转速不正常,引起风油量不稳	5. 减少燃烧空气量
	定	6. 调节旋流器的位置,减少通道
		7. 调整或更换
		8. 检查电压,电机温度,如不正常应
		调整或更换
Flame was formed after	1. The first stage solenoid valve was	1. Clean or replace.
start, but burned out	leak	1. 清洗或更换
immediately.启动后立即	1. 一级电磁阀失控、漏油	
喷火,稍后即灭		
The flame was out slowly	1. The coil of the solenoid valve was	1. Tighten the coil and power on the
or the oil was still spray	loose or the spool of the solenoid valve	solenoid valve several times to make
after the burner was	was locked	the spool active.
stopped.	1. 电磁阀线圈松动或电磁阀阀芯卡住	1. 上紧线圈螺母,给电磁阀反复几次
停机后火继续燃烧缓慢	(有异物) 不能立刻关闭	上电动作,活动冲击
熄灭或继续喷一段油		



## 10. Parts List 零件列表

**Table 2 Parts List** 

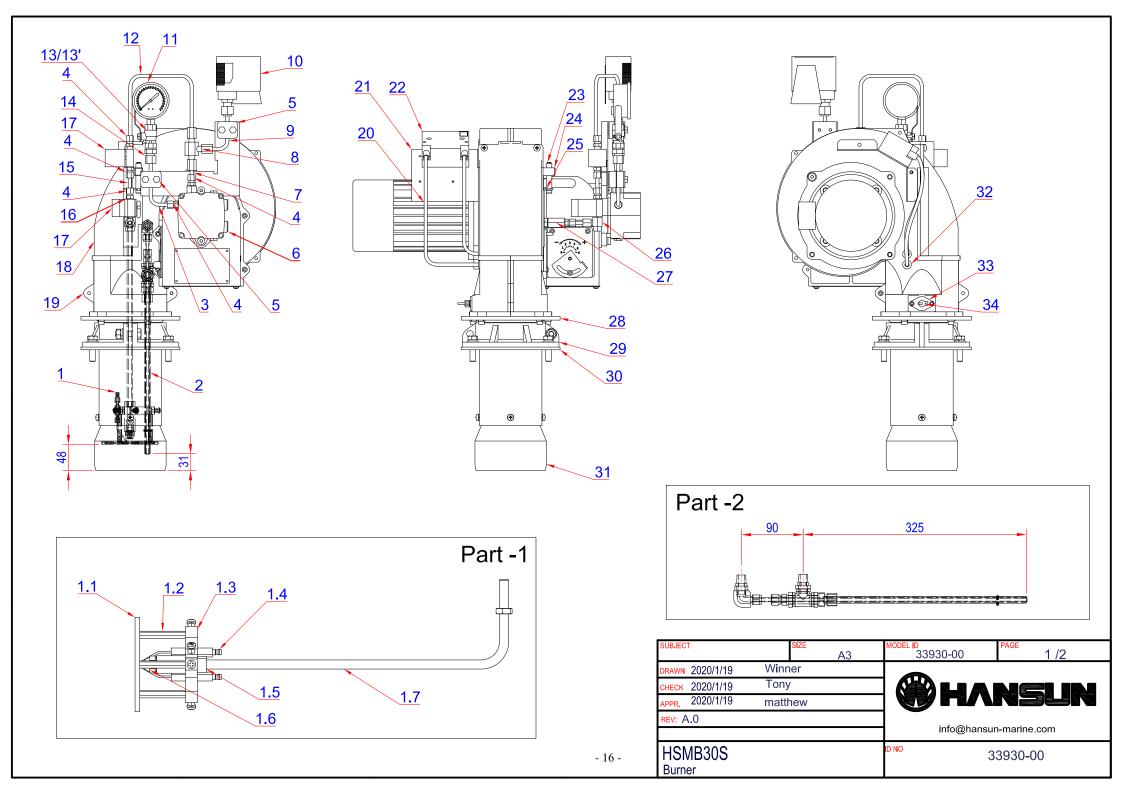
## 表 2 零件列表

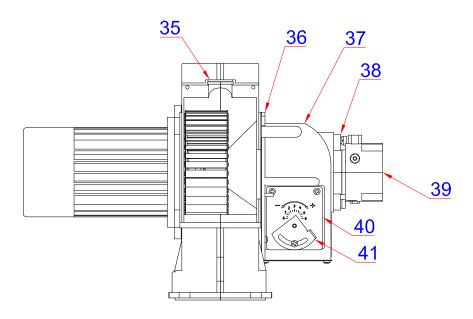
	Parts List 零部件清单					
Item 序号	Name 名称	Material 材料	Qty 数量	ID Number		
1	Diesel oil nozzle assembly 油嘴组件	Ass'y	1	23930-2-0		
1.1	Flame stabilizer 稳焰盘	Carbon steel	1	1B1200034		
1.2	Distance rod 定距杆	Carbon steel	3	23930-2-4		
1.3	Triangle bracket 三角支架	ZL	1	23930-2-3		
1.4	Ignition electrode 点火电极	Assemble	1	1B1200010		
1.5	Nozzle connection joint 油嘴接头	Bronze	1	23930-2-2		
1.6	Nozzle 油嘴	Ass'y	1	1B1200016		
1.7	Central oil pipe 中心油管	carbon steel	1	23930-2-1		
2	Sludge oil burner 污油燃烧器	Ass'y	1	21018-41-0		
3	Pipe for pressure guage 压力表接管	Carbon steel	1	21018-30-2		
4	Sleeve joint 卡套接头	carbon steel	5	1B2111032		
5	Light pipe clamp 轻型管卡	Ass'y	2	1B2284003		
6	Joint gasket 接头垫片(紫铜垫)	Copper	2	1B2710050		
7	Inlet pipe-1 进管 1	Carbon steel	1	21018-30-3		
8	Sleeve tee 卡套三通	carbon steel	1	1B2116011		
9	Pipe for pressure switch 压力开关接管	Carbon steel	1	21018-30-4		
10	Pressure switch 压力开关	Ass'y	1	1H5421002		
11	Pressure guage 压力表	Ass'y	1	1J1010017		
12	Inlet pipe-2 进管 2	Carbon steel	1	21018-30-5		
13 (13')	Ball valve 球阀	Ass'y	1	1B2011018		
	Cock valve 三通仪表测试阀	Ass'y	1	1B2090069		
14	Sleeve joint 卡套接头	carbon steel	1	1B2111031		
15	Pipe 管 Φ6x1-30	Carbon steel	1	23930-9		
16	Joint gasket 接头垫片(紫铜垫)	Copper	7	23930-23		
17	Diesel oil solenoid valve 柴油电磁阀	Ass'y	2	9B3090001		
18	Upper cover 上盖	ZL	1	23930-25		
19	Burner shell 机壳	ZL	1	23930-26		
20	Ignition High Voltage Line 点火高压线		2	1B1200033		

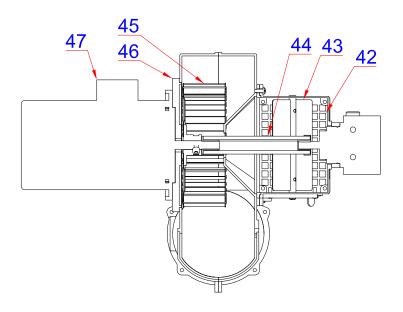


Marine Burner HSMB30S Rev: V2.0

		1		1
21	Ignition Transformer mounting plate 点火变压器安装板	carbon steel	1	23930-15
22	Ignition Transformer 点火变压器	Ass'y	1	1H5820004
23	Adjusting axis 调节杆	carbon steel	1	23930-12
24	Adjusting base 调节座	carbon steel	1	23930-13
25	Adjusting plate 调节板	carbon steel	1	23930-11
26	Hinge Joint 铰接头	carbon steel	1	1B2112019
27	Connection joint of central oil pipe 中心油管接头	carbon steel	1	23930-8
28	Combustion cylinder 燃烧筒	Welding	1	23930-1-1-0
29	Mounting flange 安装法兰	ZL	2	23930-21
30	Flange washer 法兰垫片		1	1B1200043
31	Diffuser 扩散管	304	1	23930-1-2
32	High voltage wire sheath 高压线保护套	Rubber	1	1C6090011
33	Flame sensor flange 火焰探测器法兰	Plastic	1	1H5450005
34	Flame sensor 火焰探测器	Ass'y	1	1B1200009
35	Sight glass 观火镜	Glass	1	1B1200025
36	Connection plate 连接板	ZL	1	23930-27
37	Air inlet cover 进风罩	ZL	1	23930-28
38	Diesel oil pump connection flange 油泵连接法兰	ZL	1	1B1200039
39	Diesel Oil Pump 柴油泵	Ass'y	1	1B1200014
40	Air damper scale plate 风门刻度板	carbon steel	1	23930-31
41	Air damper axis assembly 风门轴组件	carbon steel	1	23930-5-0
42	Air inlet halftone 进风网板	carbon steel	1	23930-17
43	Air damper plate 风门板	carbon steel	1	23930-19
44	Coupling 联轴器	Ass'y	1	1B1200012
45	Impeller 叶轮	Ass'y	1	1B1200052
46	Motor connection plate 电机连接板	carbon steel	1	23930-3
47	Motor 电机	Ass'y	1	9B9900393







CURIECT	SIZE		MODEL ID	PAGE
SUBJECT	SIZE	A3	33930-00	2/2
DRAWN 2020/1/19	Winner			
CHECK 2020/1/19	Tony			
APPR. 2020/1/19	matthew			MSUN
REV: A.0			info@hana	un-marine.com
			mownanse	un-manne.com
HSMB30S			ID NO	22020 00
Burner			,	33930-00



#### Hansun(Shanghai)Marine Technology Co.,Ltd.

Addr: Building 60, No. 1000, Zhangheng Rd., Zhangjiang Hi-Tech Park, Pudong Shanghai 201203, China Tel: 86-21-50793367 Fax: 86-21-50793370

Web: www.hansun-marine.com

# **Instruction Manual**

For

Diesel Oil Pump

Rev: V2.0



# Content 目录

1 Introduction 介绍	1
2.Technical Specification 技术参数	
3.Working Flow diagram 工作流程图	
4. Running 运转	

Rev: V2.0



## 1 Introduction 介绍

It is a gear pump, with a compact construction and maximum performance characteristics. Its typical applications include: Light oil and heavy oil.

该泵为一种齿轮泵,结构紧凑,性能优异。可应用于: 轻油及重油.

There are two pumps for the incinerator , one for HISNC-18,the other is for HSINC- 50/50A/80/100 .

此设备共用2种柴油泵,一种供HSINC-18 焚烧炉,另一种供HSINC-50/50A/80/100使用。

## 2.Technical Specification 技术参数

Application Information 相关参数					
	Diesel pump HSINC-18	Diesel pump HSINC-50/50A/80/100			
Oil type 油品		LFO			
Viscosity range 粘度范围	1.3-75cSt				
Filter mesh 过滤精度	150um	150um			
Pressure range 压力范围	5.5-21bar				
Factory setting 出厂设置	16bar				
Max.pressure in suction inlet/return outlet 最大背压(进出口)		4bar			
Speed 转速	1400-3450 r/min				
Max.starting torque 最大起始扭矩	0.24 N*m	0.30 N*m			
Gear output 齿轮副输出	142 L/h	225 L/h			
Flow 流量	Figure 1 图 1	Figure 2 图 2			
Working torque 工作扭矩	Figure 1 图 1	Figure 2 图 2			
Temperature of medium 介质温度	-10∼+70°C				
Ambient temperature 环境温度	-20∼+70°C				
Storage temperature 储存温度	-25∼+70°C				





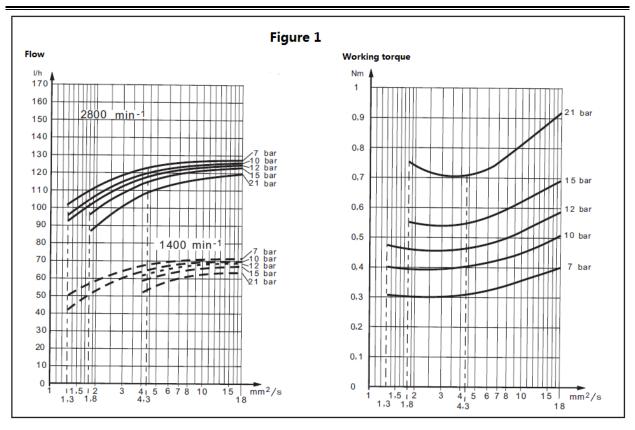


Figure 1 图 1

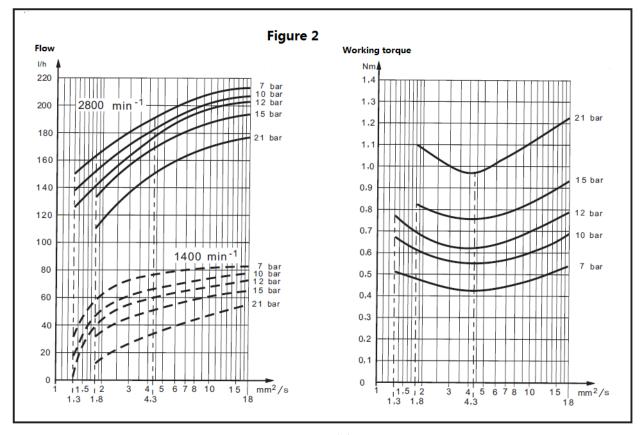
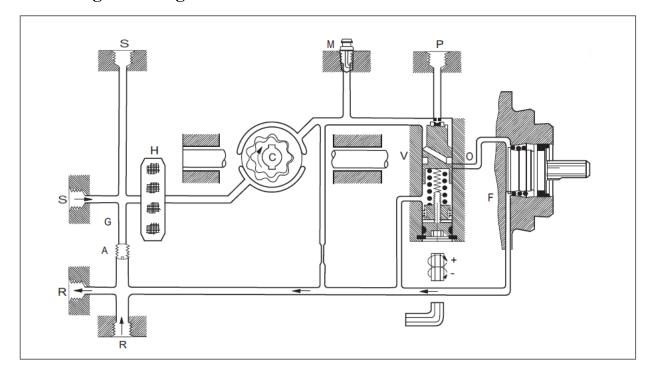


Figure 2 图 2



## 3.Working Flow diagram 工作流程图



## Working Theory 动作机能:

- After the oil pump is started, the fuel enters the gear pair ( C ) through the oil suction port ( S ) and the oil filter ( H ). generates pressure oil through its engagement, and is pumped out to the pressure regulating shut-off valve ( V ), which opens when the oil pressure reaches the set pressure. Pressure control and stabilization are achieved by the valve, while oil is distributed to the fuel injection nozzle ( P ) and returned to the oil return port ( R ) through the shaft sea ( F ). In a two-pipe system, fuel is returned to the tank.

  油泵启动后,燃油通过吸油口(S)、滤油器(H)进入齿轮副(C),经过其齿合产
  - 佃泉启动后,燃油通过吸油口(S)、滤油器(H)进入齿轮副(C),经过具齿合产生压力油,泵出至压力调节切断阀(V),当油压达到设定压力时,该阀(V)即打开。压力的控制与稳定均由该阀来实现,而油则分配给喷嘴(P)及通过轴密封(F)回流至回油口(R)。在双管系统中,则燃油回流至油箱。
- The amount of oil supply to that nozzle (P) is determined by the set pressure of the valve (V) and the pressure loss in the nozzle oil line 供给喷嘴 (P) 油量由阀 (V) 的设定压力 与喷嘴油路上的压力损失来决定的。
- When the oil pump is turned off, the output becomes smaller and the oil pressure decreases accordingly. The return spring in the pressure regulating valve (V) moves the piston until the oil nozzle (P) is closed, thus completing the function of cutting off the oil line 油泵关闭时,输出变小,油压随之降低。压力调节阀(V)中的复位弹簧使活塞移动直至关闭喷嘴油路(P),完成切断油路功能。
- If the oil pump is overloaded, the oil pressure will not reach the set pressure value, making the pressure regulating valve unable to connect the return line. At this time, the following measures can be taken:
  - 若油泵过载,则油压达不到设定的压力值,使压力调节阀无法接通回流管路,此时

Rev: V2.0



可采取以下措施:

A) Reduce the set pressure of the oil pump 减少油泵设定压力;

- B) Reduce output, such as switching to a smaller flow nozzle 减少输出,如换用流量较小的喷嘴;
- C) Choose oil pump with larger output 采用更大输出的油泵;

## 4. Running 运转

Warning:Never run the pump in a dry condition for more than 5min 警告: 严禁泵空转超过五分钟!



#### Hansun(Shanghai)Marine Technology Co.,Ltd.

Addr: Building 60, No. 1000, Zhangheng Rd., Zhangjiang Hi-Tech Park, Pudong Shanghai 201203, China Tel: 86-21-50793367 Fax: 86-21-50793370

Web: www.hansun-marine.com

# **Instruction Manual**

For

Marine Fan

Type:HSMF4.0C



# Content 目录

1.	Technical requirements for fan installation 风机安装技术条件	1 -
2.	General Regulations of Start & Operation 风机起动和运行规程	2 -
2.1.	Inspection Before Start 起动前检查	2 -
2.2.	Inspection of bearing and Shaft 轴承润滑情况检查	2 -
2.3.	Inspection of shaft centerline 轴中心线对中检查	2 -
2.4.	Flexibility of impeller turn 叶轮转动灵活性	2 -
2.5.	Connector 连接件	2 -
2.6.	Inspection During Operation 运行期间的检查	3 -
3.	Fan Assembly Steps 风机安装步骤	3 -
3.1.	Motor Installation 电机安装	3 -
3.2.	Installation of shaft and bearing 轴与轴承的安装	4 -
3.3.	Protective cover of cooling fan installation 散热风扇防护罩的安装	10 -
3.4.	Volute mounting 蜗壳安装	10 -
3.5.	Impeller mounting 叶轮安装	11 -
3.6.	Flange connecting pipe 法兰接管安装	11 -
3.7.	Installation of Pulley and Belt 皮带轮和皮带的安装	12 -
3.8.	Protective cover installation 防护罩安装	12 -
4.	General Failures 常见的故障	- 13 -
5.	Cleaning and Balance 清洗和平衡	17 -
6.	Maintenance 维护和保养	17 -
7.	Part Lists 零部件清单	- 18 -



## 1. Technical requirements for fan installation 风机安装技术条件

- > During installation of the fan, the rope used to transport and lift should not be tied to the rotor and the casing or bearing cover rings.
  - 整体安装的风机,搬运和吊装时的绳索,不得捆缚在转子 和机壳或轴承盖的吊环上。
- When connect the line and the fan, the flange surface should be centered and coordinated, and should not be hard drawn; the fan casing should not bear the weight of other parts, to prevent the casing deformation. After pipe installation, the unit alignment should be retest to comply with the requirements.
  - 各管路与风机连接时法兰面应对中贴平,不应硬拉和别劲,风机机壳不应承受其他机件的 重量,防止机壳变形。管路安装完毕后,应复测机组的不同轴度是否符合要求。
- The connection pipe should be cutting or welding after separate the pipe and the fan casing, and should not make the casing deformation occur.
  - 风机连接的管路需要切割或焊接时,不应使机壳发生变形,一般宜在管路与机壳脱开后进行。
- Refer to the manual GB/T12522-1996 Expansion Joint Design, please make sure that expansion joint on the job,the axial displacement  $\Delta X \le 35$ , radial total displacement  $\Delta y \le 15$ , ensure line 5m apart are installing expansion joint.
  - 参考标准 GB/T12522-1996 膨胀节设计手册,请保证膨胀节工作时,轴向总位移  $\Delta X \le 35$ ,径向总位移  $\Delta y \le 15$ ,保证管路相隔 5m 处都安装有膨胀节。
- ➤ Metal bellows expansion joints can not load-bearing, should separate lifting. 金属波纹管膨胀节不能承重,应单独吊装。
- For metal bellows expansion joint with inner cylinder, the direction of inner liner should be consistent with the flow direction of medium.
  - 对带内筒的金属波纹管膨胀节应注意内衬筒的方向与介质流动方向一致。
- > Except the design requirements for the amount of pre-deformation, non deformation of the metal bellows expansion joints should be use to adjust the deviation of the pipeline installation, so as not to affect its normal function.
  - 除设计要求预变形量外,严禁用使金属波纹管膨胀节变形的方法来调整管道的安装偏差, 以免影响到其正常的功能。
- ➤ The installation process does not allow welding slag splashing to the surface of the metal bellows expansion joints and subject it to other mechanical damage.
  - 安装过程不允许焊渣飞溅到金属波纹管膨胀节的表面和使其受到其他机械损伤。
- For metal bellows expansion joints with flange connection, forced twisting the other end of the expansion joint to align the bolt holes are not allowed.
  - 法兰连接安装的金属波纹管膨胀节,不允许为了对准螺栓孔而强行利用外力扭动膨胀节的 另一端。
- Auxiliary tool must be dismantled immediately after the the expansion joint installation. 辅助工具在膨胀节安装结束后必须立即拆除。
- Due to the transmission medium for high temperature flue gas, therefore, when



Installing expansion joint, please allow  $\Delta X/2$  between flange, in order to reduce the damage of expansion joint and the flue gas pipeline.

由于输送介质为高温烟气,所以在安装膨胀节时,法兰之间的间隙请预留  $\Delta X/2$ ,为了减少对膨胀节以及烟气管路的损伤。

## 2. General Regulations of Start & Operation 风机起动和运行规程

#### 2.1. Inspection Before Start 起动前检查

- ♦ All of the bolts should be tightened according to the regulation 所有螺栓已经按规定旋紧。
- ♦ All of the foundation bolts 全部地脚螺栓
- ♦ Bolts of fixing bearing pedestal and chassis 轴承座固定在底盘上的螺栓
- ♦ The bolts of connection bearing with bearing pedestal 轴承与轴承座的螺栓
- ◆ The bolts of fixing motor and chassis 电动机与底盘的固定螺栓
- ◆ The bolts of fixing bearing cover and bearing box 轴承盖与轴承箱的固定螺栓
- ◆ The bolts of fixing hub and shaft 轮毂与转轴部件的固定螺栓
- ◆ The bolts of fixing inlet air enclosure 进风罩与蜗壳的固定螺栓
- ♦ The bolts of fixing volute and chassis 蜗壳与底盘的固定螺栓
- ♦ The bolts of fixing inlet chamber and volute 进气室与蜗壳的固定螺栓
- ◆ Others 其他螺栓

### 2.2. Inspection of bearing and Shaft 轴承润滑情况检查

◆ Inspect the bearing for lubricating grease quantity, quality and distribution. 检查轴承的润滑油的量、质量和分布情况

## 2.3. Inspection of shaft centerline 轴中心线对中检查

- ◆ Radial offset 径向偏心
- ♦ Axial deviation 轴向偏移

## 2.4. Flexibility of impeller turn 叶轮转动灵活性

- ◆ Inspect interstice of the impeller entrance and the inlet enclosure. 检查叶轮进口处与进风罩之间的间隙
- ◆ Turn the whole of impeller and drive mover with hands to inspect operation. 用手盘动叶轮与驱动原动机的整体,检查运转情况

#### 2.5. Connector 连接件

- ♦ The smoothness and tightness of fan connection flange 风机的连接法兰平整性和密封性
- ◆ Confirm the tensioning of motor belt 确认电机皮带的张紧程度
- ◆ Protection cover inspection 检查防护罩:
- ♦ Protection cover of the motor belt



Rev 2.0



电机皮带轮的防护罩

◆ Other parts protection cover 其它运转部件的防护罩

- ◆ Protection grille of the inlet and the outlet 进出口的防护格栅
- ◆ Foreign materials 外来杂物是否存在:
- ◆ Inner parts inspection of fan 对风机作内部检查
- ◆ Inner parts inspection of flue pipe 对风管作内部检查
- ◆ Protect operation sites before start 起动前运行场地的防护:
- ◆ Inspect electrical circuit 检查电气线路是否合格
- ◆ Inspect motor rotate direction 确认电机的转向
- ◆ Appoint the director of starting operation 委任起动运行的现场指挥

#### 2.6. Inspection During Operation 运行期间的检查

- ◆ If there is abnormal voice 是否有异常的声音
- ◆ If there is abnormal vibration 是否有异常的振动
- ◆ If there is abnormal temperature-rise on bearing 轴承等处是否有异常升温。

#### 3. Fan Assembly Steps 风机安装步骤

#### 3.1. Motor Installation 电机安装

◆ Motor fixing 电机固定

Fix the motor on the base with 4 bolts, as shown in the following figure 将电机用 4 个的螺栓固定在底座上,如下图:





#### Note 注:

The position of the motor should be upward as far as possible. do not tighten the 4 bolts too tightly, tighten them after adjustment.

电机位置应尽量往上,4个螺栓不要拧太紧,待调整好后拧紧。

#### ◆ Motor adjustment 电机调节

A bolt and a nut are respectively installed on the two motor adjusting plates for adjusting the position of the motor.

在2个电机调节板上分别安装一个螺栓和一个螺母,用于调节电机位置。

#### 3.2. Installation of shaft and bearing 轴与轴承的安装

#### ◆ Confirm environment 确认环境

Make sure the environment is clean. Confirm the accuracy of journal size and shape.

确保环境清洁。 确认轴颈尺寸和形状精度。

#### ◆ Checking 检查

Check the surface roughness Ra of the bearing surface  $\leq 12.5\mu$  m. Flatness (flatness) tolerance shall reach IT7.

核查支承面的表面粗糙度 Ra≤12.5 μm。 平面性(平面度)公差应当达到 IT7。

#### ◆ Marking bearing seat 标记轴承座

The bearing seat is divided into an upper cover and a base. In one set of bearing seats, the upper cover 1 and the base 1 are marked respectively, while the other marks the cover 2 and the base 2.

轴承座分为上盖与底座,在一套轴承座内,分别标记上盖 1 和底座 1,另一个则标记盖上 2 和底座 2。

#### ◆ Bearing seat location confirmation 轴承座位置确认

For the bearing installed on the tightening sleeve, determine the position of the bearing seat relative to the tightening sleeve on the shaft. For bearings that must be lubricated from the side (all self-aligning ball bearings and CARB bearings), the nozzle on the bearing housing cover should always face away from the lock nut on the lock sleeve. When the bearing seat is installed at the shaft



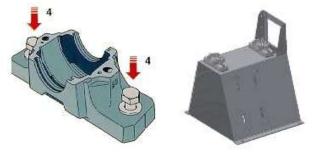
end, grease should be supplied on one side of the end cover. Since the top cover is only fixed in one direction, it is necessary to ensure the correct positioning of the base.

对于装在紧定套上的轴承来说,确定轴承座相对于轴上紧定套的位置。 对于必须从侧面 再润滑的轴承(所有自调心球轴承和 CARB 轴承)来说,轴承座盖上的油嘴应始终背向紧定 套上的锁紧螺母。 在轴承座安装在轴端的场合,应当在端盖一侧供应油脂。 由于顶盖只在一 个方向上安装固定,因此必确保将底座正确定位。

#### ◆ Bearing seat mounting 轴承座安装

Position the bearing seat on the support surface and install the connecting bolt but do not tighten it, as shown in the figure.

将轴承座定位在支撑表面上,安装连接螺栓但不拧紧,如图:



#### ◆ Add sealing ring and grease 添加密封圈及油脂

Insert half of the seal into each groove of the bearing seat base. Fill the space of the two inner half lip gaskets with grease, as shown in the figure.

在轴承座底座的每个槽内嵌入半个密封件。用油脂填充两个内部半唇形密封垫的空间,如图:



#### ◆ Mounting bearing 装配轴承

As shown in the following figure, install 1 retaining ring, 2 round nuts, 3 bearings, 4 fastening sleeves on the shaft in sequence. Note that the bearings are the conical bore bearings, and the installation direction should match the direction of the fastening sleeves 4. Note that the two fastening sleeves should be installed symmetrically and the bearings at both ends should be installed symmetrically. During initial installation, it is not necessary to tighten 2 round nuts. Fill the bearing completely with grease.

如下图所示,按照顺序,依次把1挡圈、2圆螺母、3轴承、4紧定套安装在轴上,



注意轴承 3 为圆锥孔轴承,安装的方向需和紧定套 4 方向配合。**注意两个紧定套要对称安装,两端轴承对称安装。**初步安装时,不需要拧紧 2 圆螺母。



#### ◆ Installation of cooling fan 散热风扇安装

Install the cooling fan on the transmission shaft with one bolt. Pay attention to the position of the cooling fan, between the volute and the bearing seat, close to the volute, to ensure that the protective cover can be installed.

将散热风扇用螺栓安装在传动轴上,注意散热风扇位置,蜗壳与轴承座之间,靠近蜗壳处, 保证防护罩能安装上。



#### ◆ Bearing fastening 轴承紧固

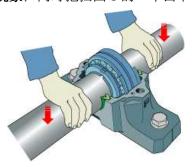
As shown in the following figure, place the components assembled in the previous step into the installed bearing seat. At this time, adjust the position of the bearing in the bearing seat to facilitate the installation of the bearing locating ring. Since the fan works at a higher temperature, in order to prevent axial displacement from being released, the positioning rings on both sides of the bearing on one side of the impeller are cancelled, and only the positioning rings are added on both sides of the bearing on the drive side (motor side). After installing the locating ring, tighten the round nut 2 with a hook wrench. The tightening position shall ensure that the inner ring of the bearing can rotate flexibly without sticking and abnormal noise. At the same time, one tooth of the retaining ring 1 is clamped in one tooth slot of the round nut.

如下图所示,把上一步骤装配好的部件,放置在安装的轴承座内。此时,调整轴承在轴承



HSMF5C

座内的位置,以方便安装轴承定位环。由于风机工作在较高温度下,为了防止轴向产生位移无法释放,在叶轮一侧的轴承两边定位环取消,只在驱动侧(电机端)轴承两边增加定位环。安装完定位环后,采用钩形扳手拧紧圆螺母 2,拧紧位置应能保证轴承内圈转动灵活,无卡滞异响等现象;同时把挡圈 1 的一个齿卡在圆螺母的一个齿缝内。



110-115



Fan type 风机型号	Bearing Type 轴承型号	C3 clearance	Required clearance reduction
		C3游隙(mm)	要求间隙减小(mm)
HSMF4C	2209 EK	0.033-0.052	0.02025
HSMF4.5C	2210 EK	0.041-0.061	0.0225
HSMF5C	2213 EK	0.050-0.075	0.02925
Fan type 风机型号	Torque reference 扭矩参		
	考值(Nm)		
HSMF4C	50-55		
HSMF4.5C	55-60		

Fill the bearing completely with grease as shown in the figure. The remaining recommended grease quantity should be put into the bearing seat bases on both sides of the bearing. See the following table for grease quantity

用油脂完全填满轴承如图,剩余的建议油脂量应放入轴承两侧的轴承座底座内,油脂量见下表:



Table- grease 表 - 油脂量

	Grease 油脂量		
Housing	First filling 首次加注 g	Supplementary filling 补充润	



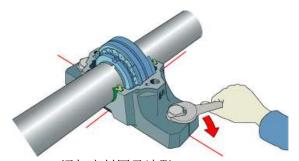
HUCHVE	Marine	Fan	Instruction	Manual	Rev 2.0
				滑g	5
SE_509		65		10	
SE_510-608		75		10	
SE_513-611		180		20	

- 1) Fill about 40% of the free space inside the bearing seat.加注约轴承座内部自由空间的 40%;
- 2) grease adopts 2# lithium grease 油脂采用 2#锂基润滑脂

#### ◆ Centering inspection 对中检查

Vertical marks located in the middle of the side and end faces of the bearing seat base facilitate centering of the bearing seat base, and then tighten the connecting bolts lightly, as shown in the figure.

位于轴承座底座侧面和端面中间的垂直标识便于对中轴承座底座,然后轻轻拧紧连接螺栓,如图:



#### ◆ Add sealing ring and grease 添加密封圈及油脂

Insert the remaining half of the seal into the sealing groove in the upper cover of the bearing seat, and fill the space between the two inner sealing lips with grease, as shown in the figure.

将密封件的剩余一半嵌入轴承座顶盖中的密封槽内,两个内部密封唇间的空间应用油脂填充,如图:



#### ◆ Mounting Upper cover of bearing seat 安装轴承座上盖

Check the top cover and base to see if they have the same mark. Install the top cover on the base and tighten the top cover bolts to the torque specified in the following table.

核查顶盖和底座,看是否具有相同的标示,将顶盖安装在底座上,并将顶盖螺栓拧紧至下 表中规定的扭矩。



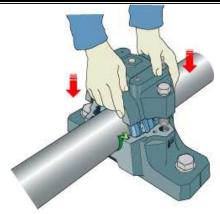
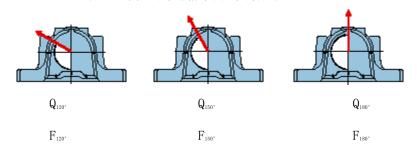


Table-Load capacity and Tightening torque 表 - 螺栓的承载能力和锁紧扭矩



	Cap bolts 盖螺栓							
<b>抽承座规格</b>	Yield point		Maximum load		Tightening torque		Designation	
	Q <sub>120</sub> °	Q <sub>150</sub> °	Q <sub>180</sub> °	F <sub>120</sub> °	F <sub>150</sub> °	F <sub>180</sub> °		
	kN			kN			Nm	-
SNL 509	150	85	75	50	30	25	50	M 10x50
SNL 510-608	150	85	75	50	30	25	50	M 10x55
SNL 513-611	220	125	110	80	45	40	80	M 12x65
Attachment bo	olt 连接螺ේ	全						
	Size 规格		Tightening	g torque 锁!	紧扭矩			
SNL 509	M 12		80					
SNL 510-608	M 12		80					
SNL 513-611	M 16		200					

#### ◆ Tighten the connecting bolt 拧紧螺栓

Tighten the connecting bolt completely on the bearing seat base. Refer to the above table for the recommended locking torque. The final installation is as follows:

将联接螺栓完全拧紧在轴承座底座上,建议的锁紧扭矩,参见上表。最后安装完成如下:

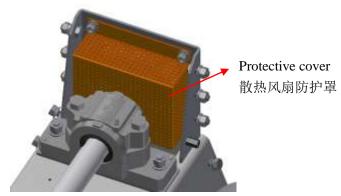
Rev 2.0





#### 3.3. Protective cover of cooling fan installation 散热风扇防护罩的安装

Turn the fan and install the protective cover after seeing that the fan rotates smoothly. 转动风扇,看风扇转动平稳后,装上防护罩。



#### 3.4. Volute mounting 蜗壳安装

#### ◆ Connection 连接

Connect the volute with the base with the bolts as shown in the figure: 将蜗壳用螺栓与底座连接起来如图:



- 10 - / 19



#### ◆ Centering 对中

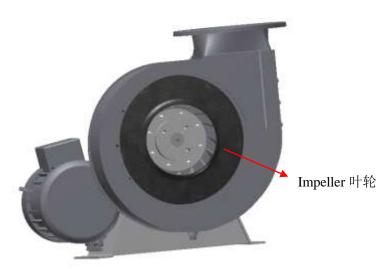
Adjust the position so that the shaft is at the center of the hole on the volute.

调节位置,使轴在蜗壳上的孔的中心。

#### 3.5. Impeller mounting 叶轮安装

Take the impeller cone sleeve out of the impeller, fit the impeller on the shaft, fit the cone sleeve, and finally screw on 2 hexagon socket head cap screws. The minimum clearance between impeller and volute shall be 8-10 mm.

将叶轮锥套从叶轮中取出,将叶轮套在轴上,再将锥套装上,最后拧上 2 个内六角螺钉。 应保证叶轮与蜗壳之间的最小间隙在 8-10mm。



### 3.6. Flange connecting pipe 法兰接管安装

Install the inlet flange connection pipe to the volute with the bolts, and pay attention to the flange angle, as shown in the figure.

将进风口法兰接管用螺栓安装到蜗壳上,注意法兰角度,如图:



After the installation is completed, check the clearance between the impeller and the air inlet flange



connection pipe to ensure the clearance is about 8 ~ 10 mm.

安装完成后检查叶轮和进风口法兰接管的间隙,保证间隙在8~10mm左右。

#### 3.7. Installation of Pulley and Belt 皮带轮和皮带的安装

#### ◆ Installation of Pulley 皮带轮安装

Install the two pulleys on the motor shaft and the transmission shaft respectively, noting that the two pulleys need to be in a straight line, as shown in the figure.

将两个皮带轮分别装到电机轴和传动轴上,注意两个皮带轮需在一直线上,如图:

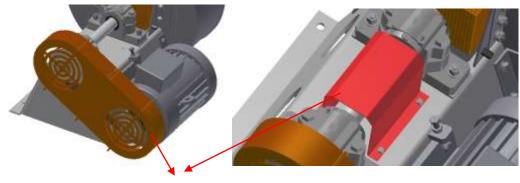


#### ◆ Installation of belt 皮带安装

Put the belt on the pulley, the belt is loose at this time, adjust the upper and lower positions of the motor to tighten the belt, but not too tight (press the belt with a force of 3kg, and the belt should have a displacement of 10mm).

将皮带套上皮带轮,此时皮带是松的,调节电机上下位置,使皮带张紧,但不要过紧(用 3kg 的力按在皮带上,皮带应有 10mm 位移)。

#### 3.8. Protective cover installation 防护罩安装



Protective cover 防护罩

Mounting the protective covers for belt and shaft 安装皮带防护罩及轴防护罩



## 4. General Failures 常见的故障

Failures	Reasons	Remedies
故障	原因	排除方法
High bearing	There is too much lubrication	Make grease in proper dosage.
temperature	grease in bearing.	恢复合适的润滑脂量
轴承温度过高	轴承内润滑脂过多	Remove the bearing and cleaning, add
	The lubricant quality is wrong.	suitable grease
	润滑脂质量不对	拆下轴承,彻底清洗,再加合适的润滑脂
	Bearing inside is lack of grease.	Make grease in proper dosage
	轴承内缺少润滑脂	恢复合适的润滑脂量
	Bearing inside radial interstice is	Adjust radial interstice
	too large.	重新调整径向间隙
	轴承内径向间隙过大	Tension drive belt according to regulation
	Drive belt is too loose.	按规定张紧驱动皮带
	驱动皮带过松(打滑)	Inspect operation condition, make exhaust
	Exhaust temperature is too high	temperature normal
	排气温度过高	检查运行条件,恢复排气正常温度
	Ambient temperature is too high	Shorten interval time of adding lubricant
	环境温度过高	缩短加润滑脂的时间间隔
The noise of bearing	Lack of lubricant or unsuitability	Check operation condition of lubricant fitting,
is abnormal 轴承处	润滑脂不足或不适当	renew to normal lubrication dose
噪声不正常:	Bearing wear	检查润滑器具的工作情况,恢复正常的润滑
A. Screaming 尖叫	轴承磨损	脂量
声	There are foreign materials in	Replace the bearing
Knock or rumble in	bearing box	更换轴承
bearing box 敲击声	在轴承箱内有外来杂物	Remove foreign materials, clean and inspect
或隆隆响(在轴承	During installation bearing is worn	bearing. Replace the bearing and lubricate
   箱内)	Rotating components have imprint,	grease if necessary.
	flute or wear.	去除杂物,清洗和检查轴承, 如有必要,
	轴承在安装时有损伤,滚动元件有	更换轴承和润滑脂。
	印痕、凹槽或磨损	Replace the bearing
		更换轴承
Fan vibration	The blade gathers dust	Clean the impeller
风机振动	叶片上积灰	彻底清洗叶轮
	Impeller has abnormal erosion and	Re-balance the impeller or replace it
	corrosion	叶轮重作平衡或更换
	叶轮有不正常的侵蚀或腐蚀	Eliminate overheating reason, to replace the
	The impeller or axle bended cause	rotor 消除过热原因—更换转子
	by over heating.	Re-balance the impeller.



Failures	Reasons	Remedies	
故障	原因	排除方法	
	过热引起叶轮或轴挠曲		
	The impeller has poor balance.	Recover the position of center line	
		   恢复中心线的线对中不齐	
	Centre line of the coupling or belt is	Tension belt suitably and check the centering	
	centering irregularity.	line.	
	联轴器或皮带驱动中心线对中不	   适当张紧皮带并检查中心线的对中	
	齐	Check motor's balance and conditions of	
	Belt's tension is wrong.	abnormal operation. Repair it or replace if	
	· 驱动皮带张紧不正确。	necessary.	
	Motor's balance is poor or	检查驱动机器的平衡情况及工作不正常条	
	operation abnormal.	件—修理或如有必要,更换	
	·   驱动机器平衡不良或工作不正常	Replace anchor gasket.	
	Anchor gaskets of motor and fan	重新配置地脚垫片置或与底盘固定不正确	
	configuration or chassis fixed.	或重新固定	
	电动机-风机地脚垫片配置或与底	Tight the bolts suitably.	
	盘固定不正确	适当拧紧部件螺栓	
	The bearing bolt becomes less	Replace cushion blocking with right one, to	
	crowded.	avoid resonance.	
	轴承部件螺栓松	用选择正确的减振垫来代替不生共振	
	The installation position of cushion	Check the motor speed or belt transmission	
	blocking is not right. (to produce	ratio, to be corrected.	
	resonance phenomenon).	检查电动机转速或皮带的传动比,可作必要	
	减振垫安装不正确(产生共振)	的修正	
	The rotate speed is higher.		
	转速过高		
Abnormal noise	There are foreign materials inside	Check and clean the fan.	
风机有不正常噪声	fan.	检查并清洁风机	
	风机内有外来杂物	Check the gap between impeller and air inlet	
	Internal friction.	cover, the gap between axle and sealing	
	内部有摩擦	element, turn the fan by hand.	
	External friction.	检查叶轮与进风罩之间的间隙和轴与密封	
	外部有摩擦	件之间的间隙—用手盘动风机	
		Check the position of protective cover and	
		fixed situation.	
		检查防护罩的部位和固定情况—用手盘动	
		风机	
The bearing was	Too intense vibration	A. Check and correct vibration cause by 检	
prematurely worn	振动过分剧烈		
	- 14 - / 19		



Failures	Reasons	Remedies
故障	原因	排除方法
轴承过早磨损	Inappropriate lubrication	查,根据不同原因产生的振动加以纠正
	润滑不恰当	B. Check and correct lubrication 检查和纠正
	When the fan stopped, it was	润滑情况
	affected by external vibration 当风	C. Isolate the fan and others machines to
	机停下时, 风机受到外部振动所	avoid vibration 把风机与其他机器隔振
	冲激	D. According to various environments and
	The fan is not been deal with	requirements of operating condition take
	anti-corrosion, when it is unused ≝	preventive actions. (For example, when the
	风机不使用时,未作防腐蚀保养处	fan is unused, it should be periodic operated,
	理	maintained or reheated.)
		针对环境和工作条件的要求采取预防措施
		(如不用风机时,定期运转、保养或再加热
Failure-to-start or	The rotor is locked	Check up the locked cause by rotated the fan
staring time too	转子卡住	用手盘动风机以检查和调查卡住原因(摩
long	The voltage of motor wiring is too	擦、有障碍物等)
起动失败或起动时	low	Check voltage of power line. If the
间过长	在电动机的接线处电压过低	consumption is excessive, should increase the
	The motor is overload	power line
	电动机拖不动	检查电源线电压—如损耗过大,加大电源线
	Rated power is too low	Check setting value of safety gear
	电动机额定功率过低	检查安全机构的设定值
	Starting procedure is incorrect	Replace motor
	起动程序不正确	更换电动机
	The starting power consumption is	Adjust starting equipment
	excessive	调整起动设备
	当起动时功率消耗过大	When starting the fan, gas flow control
		mechanism should be closed
		核实当起动时气体流量控制机构是否处在
777		关闭位置
The performance	Rotational speed is excessive	Check rotational speed or transmission ratio
can not meet	转速过高   The amount does incide the size	of belt, can make necessary corrective
requirements 性能达不到要求	The pressure drop inside the air	检查电动机转速或皮带传动比,可作必要的
工形心小判女不	pipe is under the required value 本风等内的压力降低于更求值	纠正
	在风管内的压力降低于要求值	Adjust flow control mechanism to reach the setting flow value
	Low rotation speed 转速过低	设定流量控制机构以达到设气体流量
	Design of air pipe between fan inlet	Check rotational speed or transmission ratio



Marine Fan Instruction Manual Rev 2.0

Failures	Reasons	Remedies	
故障	原因	排除方法	
	and outlet is badly	of belt, can make the necessary corrective,	
	在风机进口和出口处的风管设计	tension belt as required	
	不良	检查电动机转速或皮带传动比,可作必要的	
	Wrong rotation direction	纠正, 按要求张紧皮带	
	旋转方向错误	Correct air pipe design and dimension setting	
	The gap between the impeller and	改正风管的设计和尺寸配置	
	the air inlet cover is excessive	Reverse the motor rotation direction	
	叶轮和进风罩之间的间隙过大	把电动机的旋转方向反过来	
		Adjust the gap	
		调整间隙	



#### 5. Cleaning and Balance 清洗和平衡

Dust may be gathered in some devices, which result in the impeller unbalance due to corrosion and erosion. Thus gradually damage the bearings. In such cases, the vibration of the fan should be checked regularly to confirm the condition of the fan. When it is necessary, the fan should be cleaned and rebalanced. A lot of dust may also influence the performance of the fan.

在一些装置内可能产生积灰,这些会致使风机叶轮由于侵蚀或腐蚀而产生不平衡,从而逐渐损伤轴承。在这样条件下,最好定期检查风机的振动情况,以确定风机情况的改变。如有必要,应清洗风机并重新作平衡。大量积灰也有可能降低风机的性能。

#### 6. Maintenance 维护和保养

Lubricating grease should be timely added into the bearing seat after the fan operation in 1500 hours. The filled quantity should be according to table1. Adequate lubricating grease should be regular supplied every three months.

风机在运行 1500 小时后,应及时补充轴承座内润滑油脂,油脂的加入量如表 1 所示。以后每三个月定期补给适量油脂。

Housing	Grease Quantity				
轴承座型号	   润滑脂添加量				
	Initial fill	Re-lubrication			
	首次添加	补充添加			
	g (克)				
SNL 507-606	50	10			
SNL 508-607	60	10			
SNL 509	65	10			
SNL 510-608	75	10			
SNL 511-609	100	15			
SNL 512-610	150	15			
SNL 513-611	180	20			

Table 1 grease quantity 表 1 润滑脂添加量

The filled grease should be industrial lithium based grease2#.

添加的润滑脂应该是锂基 2#润滑脂。



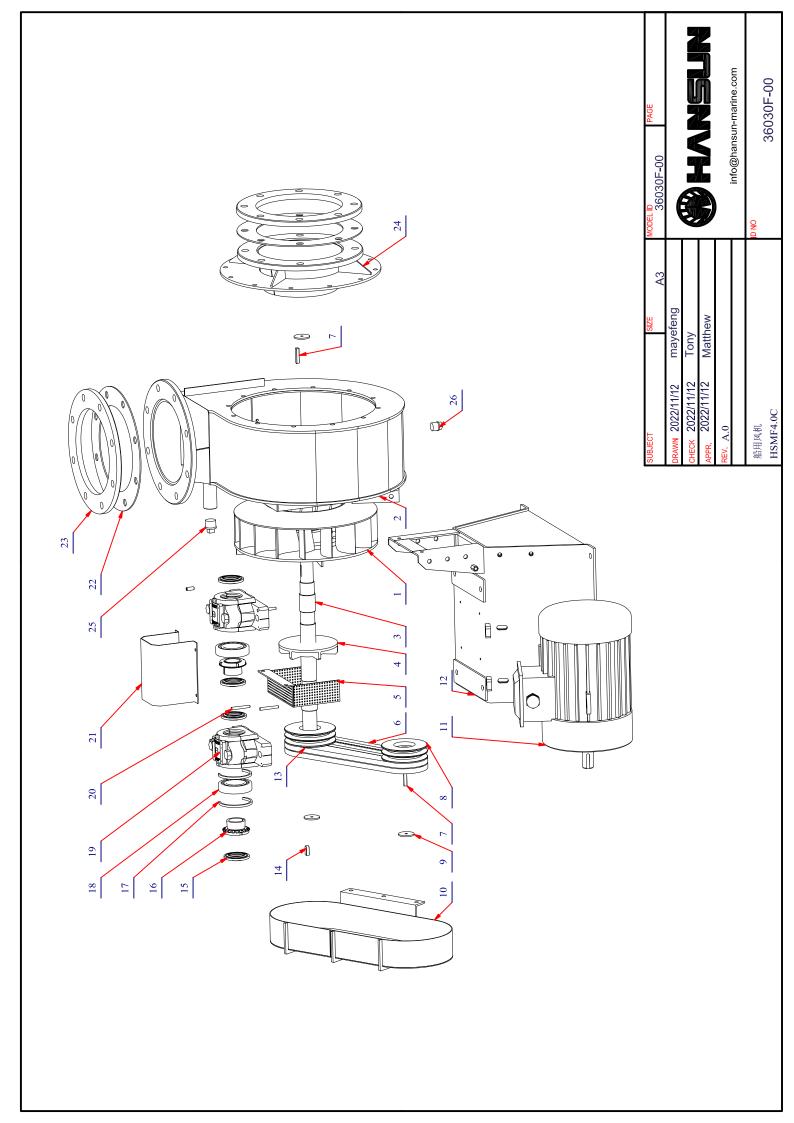
## 7. Part Lists 零部件清单

	P	art List 零部件清单	<u> </u>	
Item	Name	Material	Qty	ID Number
序号	名称	材料	数量	物料编码
1	Impeller 叶轮	Welding 焊接件	1	26030F-7-0
2	Flue Gas Fan Shell	Welding	1	26030F-2-0
3	风机壳体 Transmission Shaft 传动轴	焊接件 45	1	26030-9
4	Fan 轴承散热风扇	ZL102	1	26030-10
5	Cover of Fan 风扇罩	Welding 焊接件	1	26030F-3-0
6	V Belt	(60HZ) Rubber	2	1B6070021
O	V型带	(50HZ) Rubber	2	1B6070020
7	Flat Key 平键	45	2	1B4070004
0	Pulley and Taper Sleeve	(60HZ)	1	1B6011016
8	皮带轮及锥套	(50HZ)	1	1B6011014
9	Shaft End Retaining Ring 轴端挡圈	Q235	3	26030-19
10	Protection Cover for V Belt V 型带防护罩	Q235	1	26030F-5-0
11	Motor 三相异步电动机	Assemble	1	1H6020111
12	Foundation 底座	Welding 焊接件	1	26030F-1-0
13	Pulley and Taper Sleeve 皮带轮及锥套		1	1B6011015
14	Flat Key 平键	45	1	1B4070014
15	Seal Ring 密封圈		4	1B2500038
16	Fastening Sleeve 紧定套	Assemble	2	1B2500028



如果有

不锈钢外丝堵头





Addr: Building 60, No. 1000, Zhangheng Rd., Zhangjiang Hi-Tech Park, Pudong Shanghai 201203, China Tel: 86-21-50793367 Fax: 86-21-50793370

Web: www.hansun-marine.com

# **Instruction Manual**

# For

# Centrifugal Macerating Pump

Type: CF20-10



### ⚠ WARNING 警 告

- a. The equipment must be operated by qualified an authorized persons only. 只有专业或被授权的人员才能操作设备。
- b. Please read the instructions carefully before lifting, installing and operating the equipment.

在对设备进行起吊、安装和操作前,请先仔细阅读使用说明书。

c. Before running the equipment for the first time, the installation must be thoroughly checked.

第一次使用设备前,须确认所有的安装已完成。

- d. Before proceeding with maintenance on the equipment, power must be cut off and visible warning notice displayed. 设备进行维护、检修时,须先关闭电源,并在醒目的位置悬挂警示标识。
- e. The equipment is should not be installed in an explosive atmosphere. 设备不能安装在爆炸性的环境中。
- f. It is forbidden to dry running. 严禁干运转。



## CONTENTS 目 录

Chapter 1	Introductions 简介	3
1.1	Nameplate 铭牌	3
1.2	Quantity warranty 质量保证	3
Chapter 2	Technical specification 技术规格	4
Chapter 3	Installation & Working 安装及运转	5
3.1	Working environment 工作环境	5
3.2	Suction head 吸口压头	5
3.3	Piping 管路	5
3.4	Wiring 接线	5
Chapter 4	Operator instruction 操作指导	6
4.1	Working 运转	6
4.2 Cł	naracteristic curve 性能曲线	6
Chapter 5	Inspection and maintenance 检查和维护	8
5.1	Checking before start启动前检查	8
5.2	Checking While running运转中检查	8
5.3	Checking When stop停机检查	9
5.4	Regularly checking 定时检查	9
Chapter 6	Assembling and Disassembling 泵装配与拆卸	10
6.1	Assembling 装配	10
6.2	Disassembling 拆卸	16
Chapter 7	Trouble shooting 故障排除	18
Chapter 8 I	Parts list 零件明细	19



### Chapter 1 Introductions 简介

This operation and maintenance manual apply to Hansun centrifugal macerating pump, CF Series Marine pulverizing pump is the open impeller centrifugal discharge pump, which is used to pulverize and transfer the soft foul in the sewage under  $85\,^{\circ}$ C. The diameter of the maximum solid particles is not more than 3mm after circular crushing. It is also applicable to pulverizing the coagulated heavy fuel oil under low temperature, in order to facilitate injection. 此操作维护手册适用于汉盛离心粉碎泵。CF 系列船用粉碎泵系开式叶轮离心排放泵,用于输送温度低于 85°C的生活污水及粉碎其中的软杂质,经循环粉碎后的最大固体颗粒直径不大于 3mm,该泵同样适用于低温凝固的船用重油喷射前的粉碎。

#### 1.1 Nameplate 铭牌

The pump delivered with nameplate description as follow:

水泵交货时带有铭牌,具体如下:

Type 型号	CF20-10	Capacity 排量 m³/h	20
S/N 序号		Pressure 压头 MPa	0.1
Weight 重量	32 kg	Power 功率 kW	2.2
Data 日期		Speed 转速 r/min	2845/3470

#### 1.2 Quantity warranty 质量保证

We secure warranty period of 12 months after delivery, also please kindly be careful for replacing with original parts upon any repairs.

质量保证期为交货后12个月,务必确保修理时使用原厂的零部件。



## Chapter 2 Technical specification 技术规格

For your understanding, we hereby list with technical specification as follow:

为了便于理解,该泵的规格参数如下:

Pump /泵		Motor/马达	
Capacity /排量	20 m3/h	Model /型号	Y90L-2-H
Head /压头	0.1MPa	Power /功率	2.2kW
Type of seal/轴封型 式	Mechanical	Power supply /电制	380~415/440~ 480VAC, 50/60Hz, 3P
Impeller / 叶轮	9Cr18MoV	Revolution /转速	2845/ 3470RPM
Shaft /轴	Stainless steel	Insulation /绝缘等级	F
Pump shell /泵壳	Stainless steel 316L	Protection /保护等级	IP56
Media /介质	Sewage/污油	Connection /接法	Y



### Chapter 3 Installation & Working 安装及运转

And pump mounted on motor, whose base connected with device Motor shaft integrated with impeller shaft, which aligned before delivery. The pump installation is very important to keep system working in good condition.

水泵与马达组装,通过马达底座可连接到设备本体。马达轴直接连接叶轮,交货前已经在工厂对准。水泵安装的好坏直接影响其能否正常工作。

#### 3.1 Working environment 工作环境

The pump should be mounted and fastened on a robust foundation, and keep away from vibration and wet.

水泵应该安装在一个坚实牢靠的底座上,应该远离震动源、水气等。

#### 3.2 Suction head 吸口压头

Secure suction head positive for this kind centrifugal pump working without self-priming. 该泵没有自吸能力,故吸口需要保证正压。

#### 3.3 Piping 管路

Please be sure tightness of piping upon pump installed, and keep no leakage. The pump can't bear weight of the pipeline.

安装完毕后保证管路的密封性,避免渗漏。水泵不能作为管路支承,以防水泵变形。

#### 3.4 Wiring 接线

Wiring needs to be carried out by experienced and authorized operators.

水泵的接线需要由有经验并被授权的操作人员完成。



### Chapter 4 Operator instruction 操作指导

#### 4.1 Working 运转

Check power connection of motor, then push the contactor momentarily and check rotation of pump. It should follow up with arrow mark, if not, exchange two wires position and try again. 首次启动前检查马达的电源连接是否正确。点动马达,检查马达转向是否正确,需和箭头标记一致,否则,需交换两相电线再试一次。

It should be filled up with water before the first starting. If operated for sometimes, filling with water isn't required, but make sure the suction and discharge valves opened.

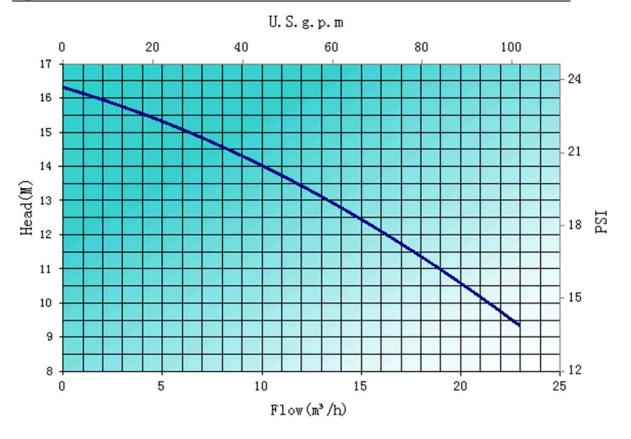
首次启动前应先向泵内灌满水。如已运转过一段时间则不必灌水,此时应打开泵进口阀和出口阀。

If the pump intended for pumping hot or cold liquids, the operator must be aware that it is dangerous to touch the pump surface, consequently, must take the necessary safety measures. 如果水泵用于输送热或非常冷的液体,操作者应注意不要触碰水泵表面,以免受伤。因此,需要对水泵采取一些安全措施。

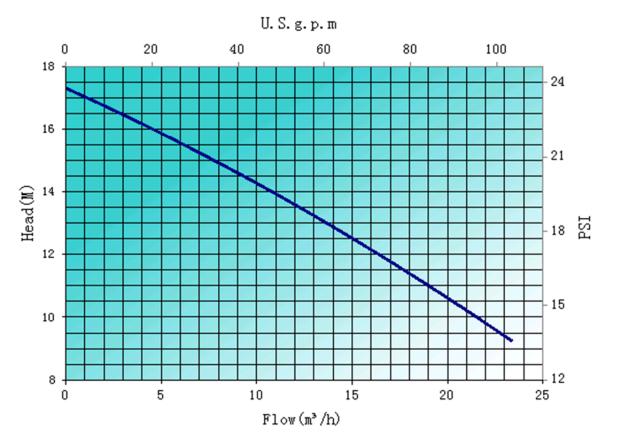
#### 4.2 Characteristic curve 性能曲线

CF20-10 (50Hz)





#### CF20-10 (60Hz)





### Chapter 5 Inspection and maintenance 检查和维护

#### 5.1 Checking before start启动前检查

Before inspection of pump, please make sure main power has been shut down, and the system is without pressure and liquid drained completely. The repairman must be familiar with the type of liquid which has been pumped as well as the safety measures he is to take when handling the liquid.

在检查水泵前确保主电源已经切断,泵体内没有压力,残水已经完全泄放。维修人员必须熟悉水泵及所输送的液体,并采取相应的措施。

Check power connection of motor is correct, then turn on the pump for moment time and check rotation of pump, it should follow up with arrow mark.

检查马达的电源连接是否正确,然后点动马达,检查马达转向是否正确,并和箭头标记 是否一致。

➤ It should fill up with water before the first starting, and if the pump has operated for sometimes, filling with water isn't required, but it should to be opened with suction and discharge valve.

首次启动前应先向泵内灌满水。如已工作过则不必灌水,此时应打开泵吸入阀和压出阀。

#### 5.2 Checking While running运转中检查

When the pump is in operation, check if the reading for all instruments is abnormal, the pointer of instruments should be no strong jumping.

水泵运转时,应检查各仪表读数是否正常,表针应无剧烈跳动。

- ➤ Look for heating up motor and the condition of mechanical packing leakage.

  经常注意电机及轴承温升以及机械密封的泄漏情况,如发现异常应查处原因及时排除。
- When in operation for a long time, tightness of the connections on suction pipe must be checked, cocks and others as to avoid the air leakage, otherwise the pump condition would be failed.



泵长期工作时应经常检查吸入管路上的接头、螺塞等的紧密性,以防空气吸入,破坏泵 的正常工作。

#### 5.3 Checking When stop停机检查

- Close discharge valve and vacuum gauge then stop motor.
  - 慢慢关闭出口阀, 真空表, 关闭电动机。
- When it is not in use for long time, pump should be dismantled for checking cleaning and oiling. Then keep it carefully.

长期停止使用,应将泵拆洗上油,妥善保存。

#### 5.4 Regularly checking 定时检查

可以在腔体内注入防冻液。

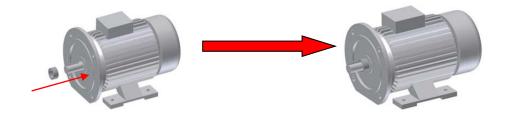
- > Check the mechanical seal leakage weekly. Check the current of motor in rated (shown on the motor nameplate) or not. Check sound as normal or not.
  - 每周检查一次机械轴封是否有渗漏,检查马达电流是否在额定范围内(电机铭牌上所示),检查声音是否正常。
- The pump motor is equipped with a ball bearing 6205-2Z for a nominal life of 15000 working hours. The bearing is lubricated for life and requires no attention but is to be replaced in case of abnormal sound or bearing wear.
  - 水泵马达轴承型号为 6205-2Z,每 15000 小时需要更换检修。轴承是带润滑油无需维护型,但声音异常或磨损过大时需要更换。
- ➤ The pumps, which are not in operation during frost period, and to be drained for avoiding frost damage. Alternatively, it is possible to use anti-frost liquids in normal constructions. 泵不能在冰冻期内使用,为了避免被冻坏,请在气温过低时泻放泵体内的残水。此外,



### Chapter 6 Assembling and Disassembling 泵装配与拆卸

#### 6.1 Assembling 装配

#### 6.1.1 Load the spacing collar on the motor shaft 将隔圈装到电机轴上

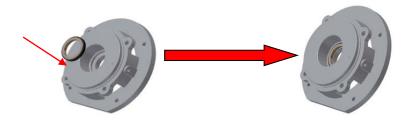


#### Note 注:

Make sure the spacing collar is clean without burrs and smear its inner surface with machinery oil before this step.

进行该步骤前确保隔圈干净无毛刺,并在其内圈抹上机械用油。

#### 6.1.2 Press the seal stator into the water seal seat 将轴封静环压到水封座上





Press the seal stator symmetrically so as not to break it.

#### 平衡对称地压以免轴封静环破损

#### Note 注:

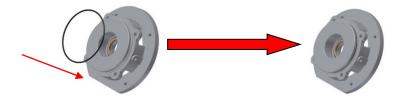
Make sure the components are clean without burrs and smear the interface with machinery oil before this step.

进行该步骤前确保零部件干净无毛刺,并在接触面上抹上机械用油。



#### 6.1.3 O-ring installation 装O型圈

Place the O-ring of 118mm internal diameter in the corresponding groove on the water seal seat 将内径 118mm 的 O 型圈装入水封座上对应的槽内。

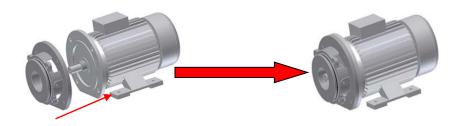


#### Note 注:

Smear the groove surface with machinery oil before this step.

进行该步骤前在槽表面抹上机械用油。

#### 6.1.4 Position the water seal seat to the motor 将水封座定位到电机上



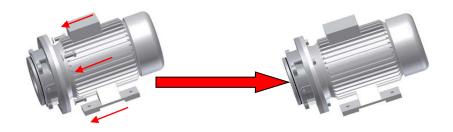
A Pay attention to the radical angle 注意角向

#### Note 注:

Smear the interface with machinery oil before this step.

进行该步骤前在接触面上抹上机械用油。

#### 6.1.5 Tighten the screws and spring washers 将螺钉和弹垫收紧





#### Note 注:

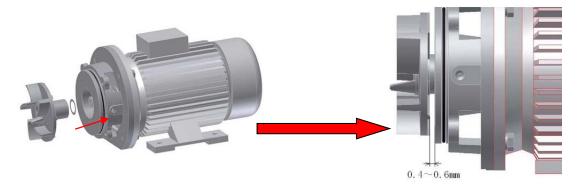
Smear the thread surface of the screws with machinery oil before this step.

进行该步骤前在螺钉的螺纹面上抹上机械用油。

#### 6.1.6 Add shim 增加垫片

Add shim of 0.2mm thickness between spacing collar and impeller to limit the gap between impeller and water seal seat in range  $0.4\sim0.6$ mm when pressed.

在隔圈和叶轮间增加 0.2mm 厚的薄垫片,控制叶轮副叶片面与水封座外端面间压紧后间隙 在 0.4mm 至 0.6mm 范围内。



#### Note 注:

Measure the gap roughly by two pile-up shims, take off the impeller till eligible.

该间隙值可用两片叠在一起的薄垫片粗略测量,符合条件后取下叶轮。

#### 6.1.7 Position the key in key-way 装键



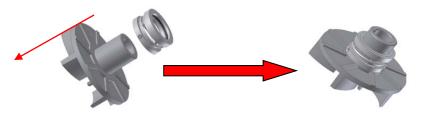
#### Note 注:

Make sure the key and the key-way are clean without burrs and smear the interface with machinery oil before this step.

进行该步骤前确保键和键槽干净无毛刺,并在接触面上抹上机械用油。



#### 6.1.8 Fit the seal rotor 装轴封动环

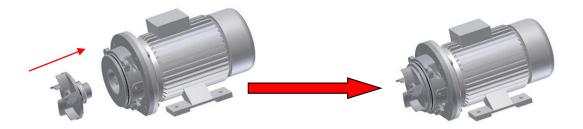


#### Note 注:

Make sure the impeller is clean without burrs and smear the interface with machinery oil before this step.

进行该步骤前确保叶轮干净无毛刺,并在接触面上抹上机械用油。

#### 6.1.9 Load the impeller 装叶轮

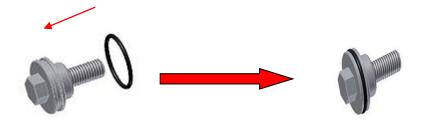


#### Note 注:

Smear the key-way of the impeller with machinery oil before this step. 进行该步骤前在叶轮键槽内抹上机械用油。

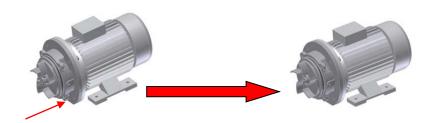
#### 6.1.10 O-ring installation 装O型圈

Place O-ring of 27.3mm internal diameter in the corresponding groove on the secure bolt. 在紧定密封螺钉上装上 O 型圈。





#### 6.1.11 Tighten the secure bolt 收紧紧定密封螺钉



### ⚠ The thread is left-hand 螺纹为左旋

#### Note 注:

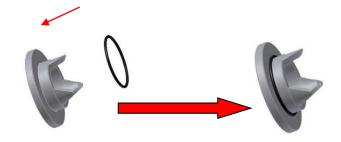
Make sure the components are clean without burrs and smear the thread surface of the bolt with machinery oil before this step. After this step, turn the impeller several rounds, take it apart to examine if any abnormal friction.

进行该步骤前确保零件干净无毛刺,并在锁紧螺钉螺纹面上抹上机械用油。安装到位后转动叶轮两周,看是否有异常摩擦,如有需拆开检查。

#### 6.1.12 O-ring installation 装O型圈

Place O-ring of 73mm internal diameter on the scissor

在剪刀上装上O型圈



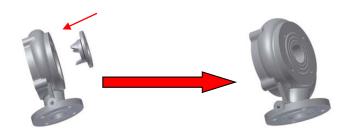
#### Note 注:

Make sure the scissor is clean without burrs.

进行该步骤前确保剪刀干净无毛刺。



#### 6.1.13 Set scissor to the pump shell 将剪刀固定在泵壳上

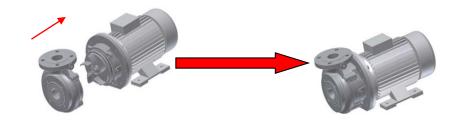


#### Note 注:

Check the reliability of the interference fit between scissor and pump shell,take some measures and reset the scissor if loose.

剪刀和泵壳间过盈配合,安装后检查剪刀与泵壳间牢靠度,过松需拆开处理后重装。

#### 6.1.14 Position pump casing 装泵壳



A Pay attention to the radical angle 注意角向

#### Note 注:

Smear the interface with machinery oil before this step.

进行该步骤前在配合面上抹上机械用油。

#### 6.1.15 Tighten the screws between pump casing and water seal seat

收紧泵壳水封座间螺钉





#### Note 注:

Smear the thread surface of the screw with machinery oil before this step. After this step, poke the impeller several rounds at the inlet or poke the fan several rounds at the motor end, take it apart to examine if any abnormal friction.

安装前在螺钉螺纹上抹机械用油。安装完成后,需在泵进水口拨转叶轮两周或者在电机尾部 拨转电机风扇两周,看叶轮是否有异常摩擦,如有需拆开检查。

#### 6.2 Disassembling 拆卸

The pump disassembling is to be followed with guidance, and avoid any defectives and injuries caused.

请按照如下指导拆卸水泵,以避免不必要的损坏和受伤。

- Before disassembling, make sure that it has been stopped and the power has been cut off.
   在拆卸前,请确保水泵已经完全停止并确认已切断主电源。
- Empty the pump of liquid before it is dismantled from the piping system.
   在水泵从管路上拆下前放空水泵内残水。



If the pump has been used for dangerous liquids, it is to be aware of this and take the necessary safety measures. If the pump has been pumping hot liquids, take great care that it is drained before it is removed from the piping system. Consequently, take the necessary safety measures.

如果曾经输送过危险液体,请采取必要的安全措施。如果水泵输送过加热液体,请在 泻放管路和水泵时需要非常小心,避免受伤,并采取必要的安全措施。



#### 6.2.1 Impeller disassembly 叶轮拆卸

- Unscrew bolts between pump casing and water seal seat, then take off the pump shell.
   松开泵壳和水封座之间的螺栓,将泵壳取下来。
- Unscrew secure bolt of impeller and use two flat-bladed screwdrivers to pull the impeller out evenly and symmetrically.

松开叶轮的锁紧螺钉,并用两个一字螺丝刀均匀对称地将叶轮拨下来。

#### 6.2.2 Dismantling of shaft seal rotor泵机械轴封动环拆卸

Dismantle impeller as above, and reach mechanical seal.

依据上面的方法拆下叶轮, 然后可以脱卸机械轴封

#### 6.2.3 Dismantling of shaft seal stator泵机械轴封静环拆卸

Dismantle impeller as above, take key off, unscrew bolts between motor and water seal seat, then water seal seat can be taken off. Push seal stator down carefully with a slotted screwdriver.

依据上面的方法拆下叶轮,取下平键,松开发动机与水封座间的螺栓,然后可以取下水封座。 用一字螺丝刀将轴封静环轻轻推下来。

#### 6.2.4 Inspection 检查

When the pump has been dismantled, check the following parts for wear and damages.

Mechanical seal: check interface any breakage

Bearing: Check any wear and noise when you turn bearing.

当水泵拆卸解体后,请检查一下相应部件是否有磨损

机械轴封:检查接触面,是否有破损

轴承: 转动轴承时是否有磨损和噪音。



## Chapter 7 Trouble shooting 故障排除

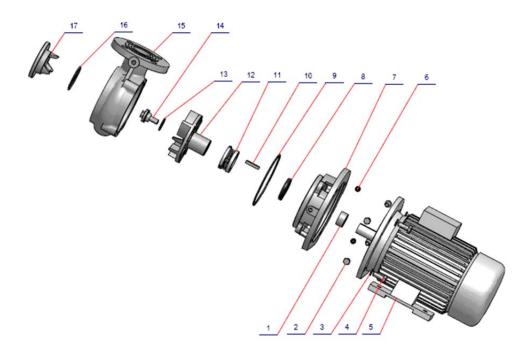
If the pump is not functioned, please process according to trouble-shooting sheet as follow:

如果水泵运行不正常,请根据如下指导检查修正:

Trouble / 故障	Reason / 原因	Measure / 措施		
	1. Wrong direction of rotation	1. Correct direction		
	2. Piping system choked	2. Clean up		
	3. The pump is clogged	3. Clean up		
	4. Pump takes in air from the suction line	4. Find leakage and rectify		
The pump has no or too low	leakages	5. Keep pump with the same size of		
capacity	5. The sizes of pump and piping system	piping		
capacity	doesn't match	1. 修正转向		
   泵没有或流量过低	1. 水泵转向错误	2. 清理		
A SOCIAL POLICE AND A SOCI	2. 管路堵塞	3. 清理		
	3. 水泵堵塞	4. 找到渗漏点,修正		
	4. 水泵进口管路渗漏,吸进空气	5. 修正管路尺寸		
	5. 泵和管路尺寸不符合			
	Bearing abnormal	Check the bearing and replace if		
	2. The liquid viscosity too high	needed		
	3. Foreign clogging inside pump casing	2. Check the liquid viscosity, which		
	4. Electric motor running in 2 phase	should be corresponding to motor		
	1. 轴承异常	power.		
	2. 液体黏度过大	3. Dismantle the pump, remove		
High power consumption of pump	3. 泵壳内有异物堵塞	clogging.		
水泵消耗功率过大	4. 马达缺相	4. Check cable connection, and correc		
		them.		
		1. 检查轴承,需要时更换		
		2. 检查液体黏度,需要对应于马达功		
		率		
		3. 拆卸水泵,取出堵塞物		
		4. 检查电缆连接,并修正		
	1. Cavitations in pump	1. Suction line wrong, High		
	2. Worn out of bearing	temperature, High viscosity of		
	3. Impeller loose	liquid		
Th	1. 水泵有气蚀	2. Renew the bearing		
The pump makes noise	2. 轴承磨损	3. Check and tighten it		
水泵噪音过大	3. 叶轮松脱	1. 吸口管路安装错误或液体温度		
		过高或液体黏度过高		
		2. 更新轴承		
		3. 检查并旋紧		



# Chapter 8 Parts list 零件明细



17	Scissor 剪刀	1	9Cr18MoV	23610-5	
16	O-ring O型圈	1	NBR	1B2711104	
15	Pump casing 泵壳	1	316L	23610-6	
14	Secure bolt 紧定螺钉	1	316L	23610-4	
13	O-ring O型圈	1	NBR	1B2711095	
12	Impeller 叶轮	1	9Cr18MoV	23610-3	
11	Shaft Seal 轴封动环	1	assembly	1B2721002	
10	Key 平键	1	45	1B4070004	
9	O-ring O型圈	1	NBR	1B2711093	
8	Seal stator 轴封静环	1	assembly	1B2721002	
7	Water seal seat 水封座	1	316L	23610-2	
6	Hexagon socket plug 内六角堵头	1	304	1B2172028	
5	Motor 电机	1	assembly	1H6020016	
4	Hexagon bolt 六角头螺栓	4	304	1B4010026	
3	Spring washer 弹垫	4	304	1B4031005	
2	Hexagon bolt 六角头螺栓	4	304	1B4010024	
1	Spacing collar 隔圈	1	304	23610-1	
Item	Description	Qty	Material	ID Number	



#### 汉盛(上海)海洋装备技术股份有限公司 Hansun(Shanghai)Marine Technology Co.,Ltd.

地址:上海浦东张江高科园区张衡路1000弄60号楼 邮编: 201203 电话:86-21-50793367 传真:86-21-50793370

网址:www.hansun-marine.com

# **Instruction Manual**

# For

**Sludge Dosing Pump** 



# **CONTENTS** 目录

1	l Introduction 介绍		
	1.1	Technical Specification 技术参数	- 1 -
	1.2	General Arrangement 整体布置图	- 2 -
	1.3	Exploded view 爆炸图	- 3 -
	1.4	Performance Curve 性能曲线	- 5 -
2	Stora	age 存放	- 6 -
	2.1	Short Term Storage 短期存放	- 6 -
	2.2	Long Term Storage 长期存放	- 6 -
3	Start	t-up and Operation 启动运转	7 -
	3.1	Fill 充水	7 -
	3.2	Electrical 电气	7 -
	3.3	Dry Running 空转	7 -
	3.4	Noise 噪音	7 -
4	Mair	ntenance of Wearing Components 易损部件的维护	- 8 -
	4.1	Rotor and Stator 转子和定子	8 -
	4.2	Flexible Shaft 挠性轴	8 -
5	Diag	mostic Chart 故障诊断表	- 9 -



#### 1 Introduction 介绍

It is a competitively priced progressing cavity pump, with a compact construction and maximum performance characteristics. Its typical applications include: domestic and industrial effluents, sludge, agricultural slurries.

该泵为一种具有价格优势的单螺杆泵,结构紧凑,性能优异。可应用于:生活和工业废水、污泥、农业泥浆等行业。

Low running speeds reduced wear for a longer working pump life which extends the periods between routine maintenance.

泵低转速运行,减少了部件的磨损和日常维护。

### 1.1 Technical Specification 技术参数

#### Application Information/工作参数

Liquid/介质: Sludge Concentration/含固量: 3%

Solids Handling/固体颗粒: Soft/软 1.5mm,Hard/硬 0.1mm

Temperature/温度:  $0\sim120$  °C Head 扬程 2.76bar NPSH(r)/汽蚀余量(r): 1.8m

Viscosity/粘度: Assumed 150cP

#### Build/Material 结构/材料

Casing/壳体: Cast Iron/铸铁

Flexible Shaft /柔性轴: Black Fluoroelastomer/氟橡胶

Stator/定子: Hydrogenated Nitrile Rubber/氢化丁晴橡胶

Rotor/转子: Alloy Steel HCP/合金钢镀硬铬 Drive Shaft/主轴: Stainless Steel HCP/不锈钢

Suction/ $\lambda \square$ : Horizontal G1/2

Discharge/出口: Vertical G1/2 can be rotated.

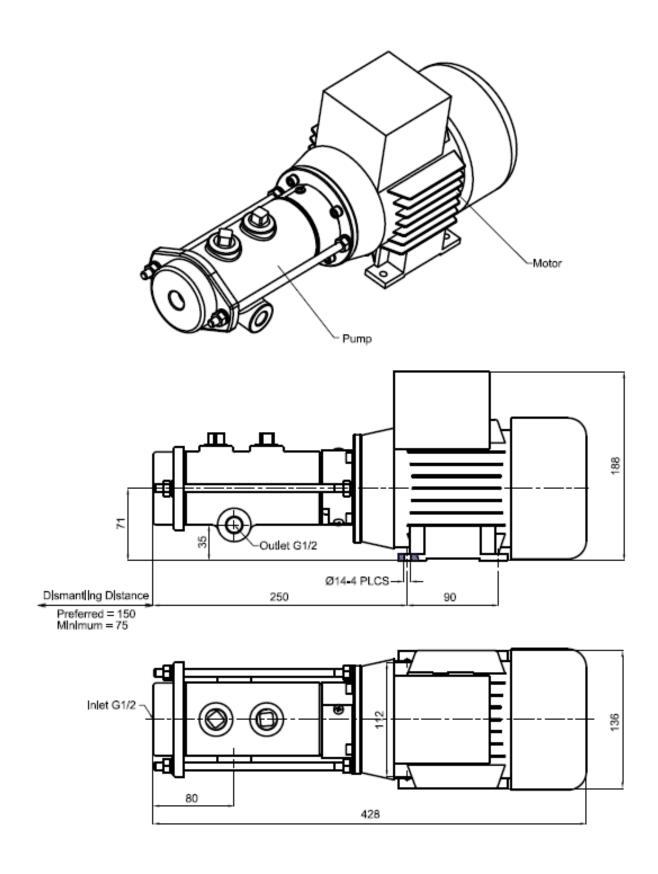
#### Drive Specification-驱动参数

Power Supply/电制 Optional With Frequency Converter 3×220VAC, 50Hz 可带变频器

Power Consumption/功耗 0.37kW@1370rpm / 0.12 kW@675rpm Drive Type/驱动方式: Driven by Motor Directly 电机直联驱动

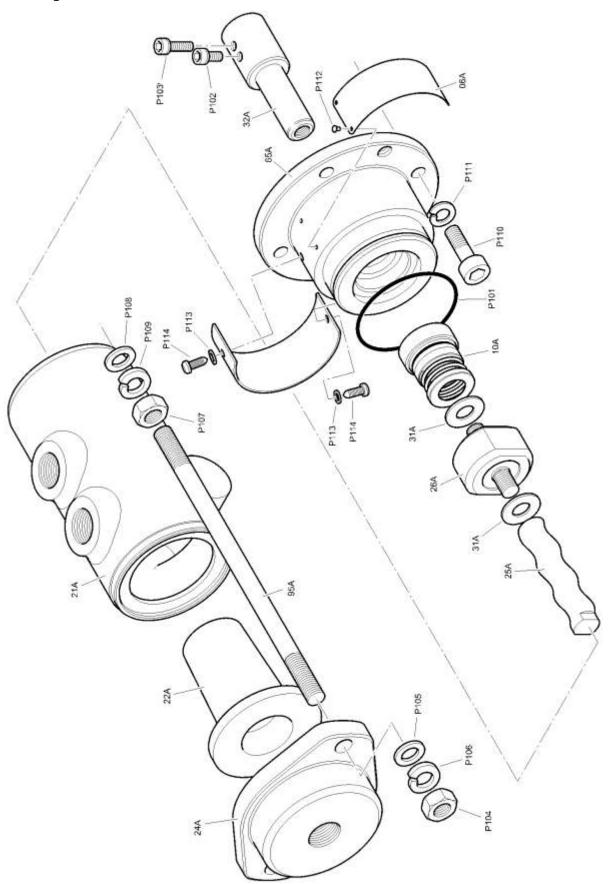


## 1.2 General Arrangement 整体布置图





# 1.3 Exploded view 爆炸图

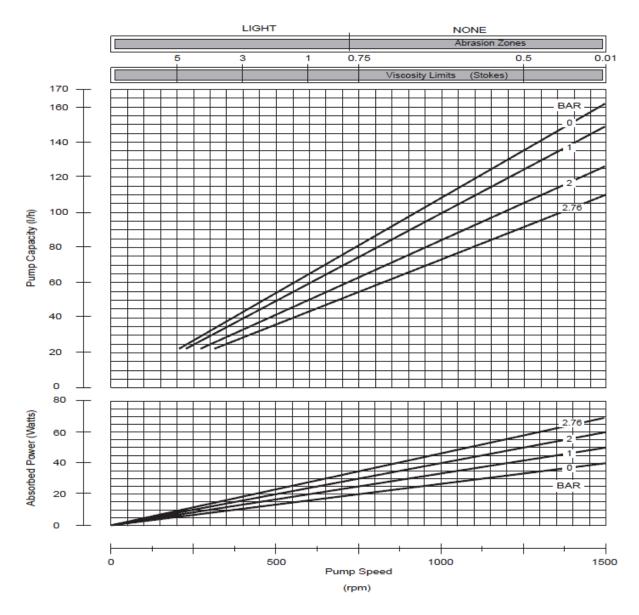




Item 序号	Description 名称	Order Number 订购物料号
06A	Nameplate 铭牌	1B9900309
10A	Mechanical Seal 机械密封	1B2721019
15A	Thrower Guard 抛油挡环	23414-10
21A	Barrel 筒	23414-6
22A	Stator 定子	9B9900003
24A	End Cover 端盖	23414-7
25A	Rotor 转子	1B9900038
26A	Flexible Shaft 挠性轴	1B9900312
31A	Washer 垫圈	9B9900223
32A	Drive Shaft 驱动轴	23414-1
65A	Mechanical Seal Carrier 机封腔	23414-5
95A	Tie Rod 拉杆	1B4050023
P101	O-ring O型圈	1B2711053
P102	Bolt 螺钉	1B4010139
P103	Bolt 螺钉	9B9900619
P104	Hexagon Nut 六角螺母	1B4021003
P105	Washer 垫圈	1B4030003
P106	Spring Washer 弹簧垫圈	1B4031004
P107	Hexagon Nut 六角螺母	1B4021003
P108	Washer 垫圈	1B4030003
P109	Spring Washer 弹簧垫圈	1B4031004
P110	Bolt 螺钉	1B4010177
P111	Spring Washer 弹簧垫圈	1B4031003
P112	Tapping Screw 自攻螺钉	1B9900323
P113	Washer 垫圈	1B9900324
P114	Tapping Screw 自攻螺钉	1B4041004



## 1.4 Performance Curve 性能曲线



SLIP CORRECTION	Not applicable.					
TEST PARAMETERS	Above data represents tests on water @ 20°C using RR stator materials.					
	SOLIDS HANDLING (mm)		STARTING TORQUE (Nm)			
	Hard Angular	Soft and compressible	Mark 0	Mark 1	Mark 3	Mark 5
CB/SB	0.1	1.5	N/A	0.42	N/A	N/A



## 2 Storage 存放

### 2.1 Short Term Storage 短期存放

Where a pump has to be stored for 6 months or less then the following steps are advised: 如果泵需要存放6个月以内的时间,建议采取以下措施:

- a. Store the pump inside wherever possible or if this is not feasible then provide protective covering. **Do not allow moisture to collect around the pump.**尽可能将泵放在室内,如不能则至少应加防护罩。**保持泵周围环境干燥!**
- b. Remove the drain plug. Ensure that the suction housing can drain and dry completely. 拧开排水堵头,确保泵彻底晾干。

#### 2.2 Long Term Storage 长期存放

If the pump is to be kept in storage for more than six months, then in addition to the above, the following procedures should be carried out regularly (every 2 - 3 weeks if possible):

如果泵的存放时间超过了6个月,除了上面的要求外,还应定期的采取如下措施(每2~3周一次):

- a. If practicable rotate the pump at least three quarters of one revolution to avoid the rotor setting in the stator.
  - 将泵转子转动至少四分之三周,防止转子与定子咬死。
- b. Note, however, that the pump is not to be rotated for more than two revolutions each time because damage could be caused to the rotor/ stator elements.
  - 注意:每次旋转不应超过两周,以免对转子/定子部件造成损害。



## 3 Start-up and Operation 启动运转

#### 3.1 Fill 充水

Pumps must be filled with liquid before starting. The initial filling is not for priming purposes, but to provide the necessary lubrication of the stator until the pump primes itself. When the pump is stopped, sufficient liquid will normally be trapped in the rotor/stator assembly to provide lubrication upon restarting.

泵启动前应注满液体,直至泵可以达到自吸,此举不仅是为了灌泵,还可以在启动前为定子提供足够的润滑。泵停止运转时,转子/定子腔体内会存留足够的液体,为泵的下次启动提供润滑。

If, however, the pump has been left standing for an appreciable time, moved to a new location, or has been dismantled and re-assembled, it must be refilled with liquid and given a few turns before starting. The pump is normally somewhat stiff to turn by hand owing to the close rotor/stator fit. However, this stiffness disappears when the pump is running normally against pressure.

如果泵长期不用,或移动到新位置,或者被重新组装,那么在启动前应在泵腔内灌 满液体,并手动旋转几次。由于定子/转子配合比较紧密,所以转动泵时,通常会有些困 难。但在泵正常启动后,阻力就会消失。

#### 3.2 Electrical 电气

The pump should be installed with starting equipment arranged to give direct on line starting. When the motor is being wired and checked for rotation, the start/stop sequence must be instantaneous to prevent dry running or pressurising upstream equipment. Check direction arrow on pump nameplate: Clockwise when viewed from drive end. The electrical installation should include appropriate isolating equipment to ensure that the pump unit is safe to work on.

泵的启动装置为直接启动, 电机在带电情况下检查转向时, 起停应在瞬间完成, 以防止空转或加压于上游设备, 检查泵铭牌上的转向箭头: 从电机端观察, 顺时针方向旋转。电力设备应包括合适的绝缘装置, 以保证泵的安全工作。

## 3.3 Dry Running 空转

**Never run the pump in a dry condition** even for a few revolutions or the stator will be damaged immediately. Continual dry running could produce some harmful or damaging effects.

严禁泵空转!即使几圈,也会立即损坏定子。连续的空转将产生破坏性后果。

#### 3.4 Noise 噪音

The noise sound pressure level will not exceed 85dB at one meter distance from the pump. 距离泵 1 米处的噪音不超过 85dB。



### 4 Maintenance of Wearing Components 易损部件的维护

#### 4.1 Rotor and Stator 转子和定子

The wear rate on these components is dependent on many factors, such as product abrasivity, speed, pressure etc.

这两种部件的磨损率与多种因素有关,例如泵送物质的磨损特性、转速、压力等。

When pump performance has reduced to an unacceptable level one or possibly both items will need replacing.

当泵的性能降低到不能满足要求的时候,应更换定子和转子中的一个元件或者两个 同时更换。

#### 4.2 Flexible Shaft 挠性轴

With this design there are no wearing items to replace in the drive train, however, if during routine inspection the shaft is visibly damaged / distorted or the protective coating is damaged, then this item should be replaced to avoid unexpected breakdowns.

采用这种设计的泵,传动部分没有需要更换的易损件。但在例行检查时,如果挠性 轴有明显的损伤/变形,或其上的保护层有明显破损时,应更换以防止轴意外断裂。



# 5 Diagnostic Chart 故障诊断表

Symptoms 故障	Possible Causes 故障原因
1. No discharge	1.2.3.7.24.26.27
2. Loss of capacity	3.4.5.6.7.8.9.10.22.13.16.20.21.22.27
3. Irregular discharge	3.4.5.6.7.8.13.15.27
4. Priming lost after start	3.4.5.6.7.8.13.15
5. Pump stalls at start up	8.11.23
6. Pump overheats	8.9.11.12.17.19
7. Motor overheats	8. 11. 12. 15. 17. 19
8. Excessive power absorbed by pump	8. 11. 12. 15. 17. 19
9. Noise and vibration	3.4.5.6.7.8.9.11.13.15.17.18.19.21.22.25
10. Pump element wear	9.11.
11. Excessive seal wear	12.14
12. Seizure	9.11.12.19
List of Causes 原因列表	Remedial Actions 解决办法
1. Incorrect direction of rotation	1. Reverse motor
2. Pump unprimed	2. Bleed system of air/gas
3. Insufficient N.P.S.H. available	3. Increase suction head or reduce speed/temp.
4. Liquid evaporating in supply line	4. Increase n.p.s.h. available (see 3 above)
5. Air entering supply line	5. Check pipe joints
6. Suction lift too high	6. Raise vessel/increase pipe size
7. Foot valve/strainer blocked	7. Clean out suction line/valves
8. Product viscosity above rated figure	8. Decrease pump speed/increase temp.
9. Product temp. above rated figure	9. Cool the product
10. Product viscosity below rated figure	10. Increase pump speed/reduce temp.
11. Delivery pressure above rated figure	11. Check for blockages in delivery line
12. Gland overtight	12. Adjust gland
13. Gland undertight	13. Adjust gland
14. Gland flushing inadequate	14. Check fluid flows freely into gland
15. Pump speed above rated figure	15. Decrease pump speed
16. Pump speed below rated figure	16. Increase pump speed
17. Coupling misaligned	17. Check and adjust alignment
18. Insecure pump/drive mounting	18. Check and tighten all pump mountings
19. Shaft bearing wear/failure	19. Replace bearings
20. Worn pump element	20. Fit new parts
21. Relief valve chatter	21. Check condition of valve/renew
22. R.v. incorrectly set	22. Re-adjust spring compression
23. Low voltage	23. Check voltage/wiring sizes
24. Drive train breakage	24. Check and replace broken components
25. Negative or very low delivery head	25. Close delivery valve slightly
26. Discharge blocked/valve closed	26. Reverse pump/relieve pressure/clear
	blockages
27. Stator turning	27. Replace worn parts/tighten up stator bolts



