



青岛创梦仪器有限公司

Qingdao Chuang Meng Instrument Co. Ltd.



## 高温高压稠化仪

型号:2012  
使用手册

Instruction Manual

更新 11/17/2017

Updated 11/17/2017

版本.1.0

Ver. 1.0

©版权所有青岛创梦仪器有限公司

© copyright all instrumentQingdao Chuangmeng Instrument Co., LTD

请你仔细阅读《使用手册》，正确掌握本产品的安装和使用方法。阅读后请将本《使用手册》妥善保管，以备今后进行检修和维护时使用。

Please read the *Instruction Manual* carefully, for correctly grasping the installation and using method of this product. Please keep properly this *Instruction Manual* after reading, for the usage during troubleshooting and maintenance in the future.

**联系方式:**

**Contact:**

**邮编 Zip code:** 266100

**网址 Website:** [www.qdcmyq.com](http://www.qdcmyq.com)

**电话 Tel:** 86-0532-66993768

**传真 Fax:** 86-0532-66993744

**邮箱 E-mail:** [cmtech@sina.com](mailto:cmtech@sina.com)

**公司地址:** 中国·青岛市市北区温州路7号

**生产基地:** 青岛市城阳区流亭街道兴海路3号

**Address:** No. 7 Wenzhou Road, City Northern District, Qingdao City, China

**Production base:** No. 3 Xinghai Road, Liuting Street, Chengyang District, Qingdao

## 一、概述

2012 型高温高压稠化仪是严格按照美国石油学会（API）规范 10 的要求制造，是专用于测量水泥浆稠化时间的仪器。

水泥浆稠化时间是进行一次或二次固井前必须测量的一项重要指标，相应的技术要求和操作程序在美国（API）规范 10 推荐测试方法 RP-10B 中有详细说明。

2012 型高温高压稠化仪具有较宽的压力和温度范围。该仪器结构紧凑，体积较小，可放置在一般实验室的工作台上。釜体采用高强度合金材料制作，其主要控制及执行单元采用进口部件（德、日、美等国），能够完成绝大多数美国石油协会所要求的高温高压实验方案。

该产品操作非常简便，所有控制阀门和开关均布置于前面板上，温度和稠度可方便地由装在面板上的显示仪表和记录仪表读出，压力可由压力表指示。温度控制器自动地控制水泥浆的升温速率（即升温梯度），当温度达到所需值时，温控器自动保持恒定的目标温度。压力控制通过释压阀和泵开关控制液力泵的输入气压来完成，温度和稠度数值由系统笔式记录仪绘制，仪器仪表板上的温度控制器也同时显示釜体内的实时温度，用户也可选购 4000 计算机数据采集器与控制系统，将测试结构送入计算机（PC），实现试验数据的实时采集、储存及打印。

水泥浆的稠度是经电位计标准弹簧上的受力得出。当浆杯按规定转速转动时，浆杯内的浆叶受水泥浆作用，施力给叶片连接的标准弹簧，当达到所需稠度时，仪器将自动断开加热器，关闭驱动电机电源，同时自动打开冷却水并终止计时器计时，仪器给出音响报警，提示操作人员试验结束。

## 二、主要技术参数

名称	技术参数
最高工作温度	315℃
最高工作压力	275Mpa
环境温度稠度范围	0~100BC
浆杯转速	150r/min
加热器功率	4000W
电源要求	VAC220±10% 50/60HZ
输入功率	5000W
环境要求	温度：0~40℃；湿度：0~95%
压缩空气	600~1000kpa
水	200~600kpa
压力介质	矿物油

### 三、特点

- 完全符合美国石油协会规范 10 的要求；
- 制造企业通过 ISO9001 质量认证；
- 数字式智能温度控制器及数字温度显示；
- 釜体采用特殊合金制造；
- 压力最大可达 315Mpa；
- 温度最大可达 275℃；
- 采用大功率加热器；
- 坚固耐用使用方便；
- 主要控制和执行单元全部采用进口零部件；
- 采用磁力驱动装置，维修方便；
- 釜体可得到快速冷却；
- 釜体的密封采用高温“O”型圈及特制金属圈，确保密封；
- 笔式记录仪绘制温度及稠度数值；
- 可选配基于计算机的 4000 数据采集与控制系统，通过通讯 1 端口进行试验数据的实时采集、储存及打印。

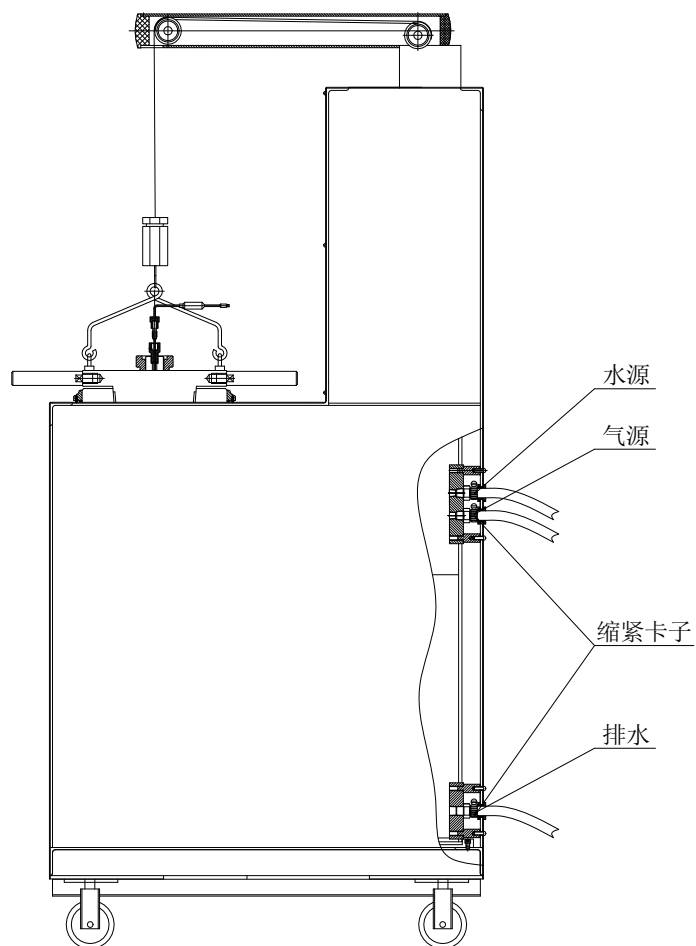
### 四、安装

#### （一）拆箱

拆箱后，根据装箱单检查仪器和备件，确保所有配件已收到，且没有损坏，如有意外情况，请与本公司联系。

#### （二）安装仪器

##### 1、连接空气和水（图一）



(图一) 侧向图

- ①连接【Φ10】胶管到仪器背面进气口并缩紧；
- ②连接【Φ10】胶管到仪器背面进水口并缩紧；
- ③连接【Φ10】胶管到仪器背面底部排水口并缩紧；

## 2、连接电源

将仪器和相应电压电源接通，电源必须可靠接地。在打开侧盖进行安装或维修时，必须关闭所有电源，以免造成伤害。

## 五、仪器的操作

### （一）准备

1、仔细检查安装各部件是否到位。全部电器开关及空气至釜阀、气源开关、手动释压阀都必须在关闭状态。

2、向油箱内注油。或将油倒入釜体，给釜体内加压，将油压回到油箱，具体步骤如下：（见图六）

①在釜体内倒入约 2000ml 稠化仪专用油。

②将釜盖【4】旋入釜体中，用手轻轻旋入即可，不要太紧。

③利用热电偶上的紧固螺钉密封釜盖，即：将热电偶插入釜体内旋紧即可。

注意：热电偶上端有一左旋小套管，旋紧前小套管应在螺纹上端。

④逆时针方向旋转，打开空气至釜阀（此时压缩空气进入釜体）。

⑤逆时针方向旋转打开手动释压阀，（此时压力油慢慢流进油箱）。

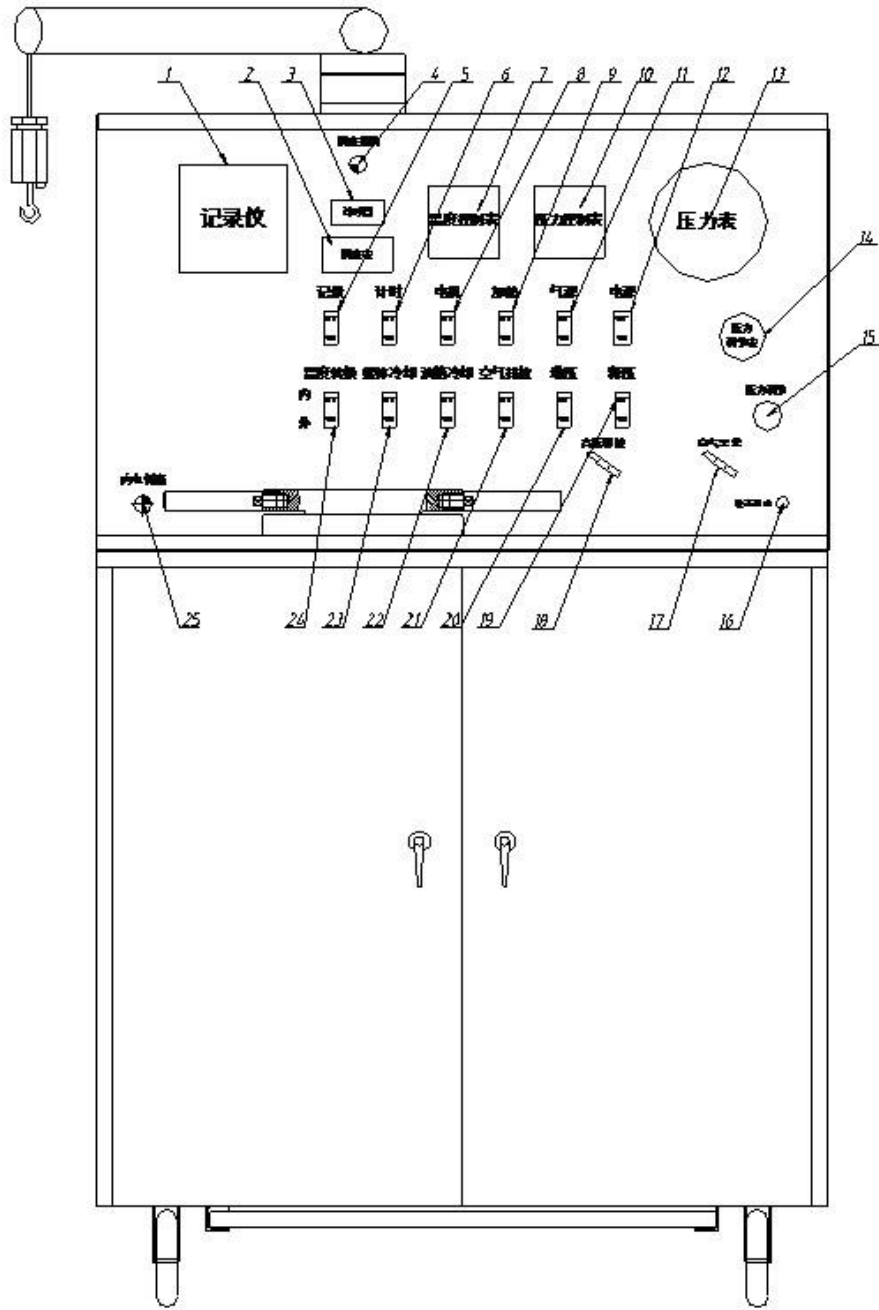
注意：油箱内的油不允许太满，要求在油标中能看到液位，如加油太多可打开油箱下面的球阀排出。

⑥关闭空气至釜阀。

⑦打开热电偶上的紧固螺钉，将釜体内余气排除。

⑧关闭手动释压阀。

⑨取下热电偶，取下釜盖，加油完毕。

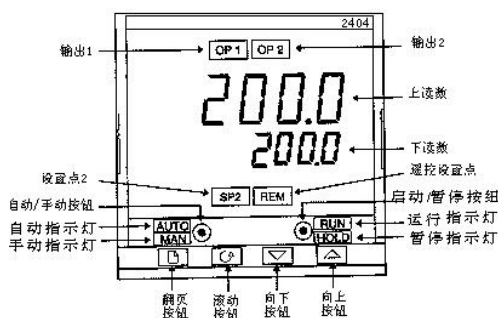


(图二) 操作面板

序号	名称	序号	名称
1	记录仪	14	压力调节表
2	稠度表	15	压力调节
3	计时器	16	校正器座
4	稠度报警	17	空气至釜
5	记录开关	18	高压释放
6	计时开关	19	释压开关
7	温度控制表	20	增压开关
8	电机开关	21	空气排放开关
9	加热开关	22	油箱冷却开关
10	压力控制表	23	釜体冷却开关
11	气源开关	24	温度转换开关
12	总电源开关	25	内电偶座
13	压力表		

3、按试验样品要求的升温速率设定温度控制器。

设定方法如下：



温度控制器面板

- ①输出 1 或 2 (OP1/OP2)：连接到输出 1 或 2 的继电器接通时，灯亮。
- ②上读数 (UPPERREADOUT)：显示当前温度值。
- ③下方读数 (LOWERREADOUT)：如果控制器正在执行一个程序，在此显示目标温度。显示值随控制器所在的模式而变化。
- ④设置点 1 或 2 (SP1/2)：指示控制器所用的设置点。多数情况下，控制器都用设置点 1。
- ⑤远程传输 (REM)：如果控制器备了这个选项，指示远程传输状态。
- ⑥自动/手动按钮 (AUTO/MAN)：在自动和手动之间改变控制器的模式。如果控制器不用时，应把控制器设置为手动模式并核实输出功率调到0.0%。
- ⑦启动/暂停按钮 (RUN/HOLD)：用来启动，暂停或终止温控程序。按第一次为启动，再按一次为暂停，按住三秒以上为终止。
- ⑧翻页按钮 (PAGE-2)：用于翻阅控制器的不同菜单。
- ⑨转换菜单按钮 (SCROLL-↵)：在某个菜单内翻阅控制参数。
- ⑩上/下按钮 (UP/DOWN)：用来改变参数值。按住此按钮可快速改变参数值。

#### 4、操作

在温控器上设置一个控温方案，需要用户输入两个基本参数：升温时间（即由当前温度升至最终保持温度的时间），及最终目标温度。通常分别称为“升温时间”和“保持温度”。升温时间以分钟为单位。

控温方案由用户输入到控制器中。温控程序输入到温控器中后，按“启动/暂停”键即开始执行控制程序。如须暂停正在执行的温控程序，在运行状态下按一次“启动/暂停”（此时控制



器面板上 RUN-运行指示灯闪亮), 再按一次即恢复执行该程序。如须终止控制程序, 按住“启动/暂停”键直到面板上的“RUN”运行指示灯熄灭。

注意: 每次终止控温程序后, 按下“自动/手动”按钮把温控器调到手动状态, 用上/下按钮将控制器输出调到 0.0%。这样可防止无意中误操作加热器。

输入温控程序步骤:

- 1) 打开控制器的开关。
- 2) 按 2 翻页按钮, 直到出现“Prog”
- 3) 按  $\rightarrow$  滚动按钮, 直到出现“Segn”
- 4) 输入数值 1; 即定义程序升温段 (升压段)
- 5) 按  $\rightarrow$  滚动按钮。
- 6) 输入段的类型 Type; 用上/下按钮选择升温时间 (升压时间) rmP. t 方式。
- 7) 按  $\rightarrow$  滚动按钮。
- 8) 输入目标温度 tGt; 即此段的目标温度 (目标压力)。
- 9) 按  $\rightarrow$  滚动按钮。
- 10) 输入升温时间(分钟) (dur);
- 11) 按  $\rightarrow$  滚动按钮。
- 12) 输入数字值 2; 即定义程序保温段。
- 13) 按  $\rightarrow$  滚动按钮。
- 14) 选择段的类型(Type)为 End; 用“上/下”按钮选择保温方式(dwE11)
- 15) 按  $\rightarrow$  滚动按钮。
- 16) 按 2 翻页按钮, 直到看到面板上方显示当前温度。
- 17) 按“自动/手动”按钮, 把控制器设置为自动模式。
- 18) 按下启动/暂停按钮开始运行温控程序。输出 OP1 指示灯闪亮表示有控制输出。

注意：仪器面板上的加热器开关处于“开”位置。温控程序输入到控制器中后，可重复使用。只需按启动/暂停按钮即重新运行该程序。

终止控制程序步骤：

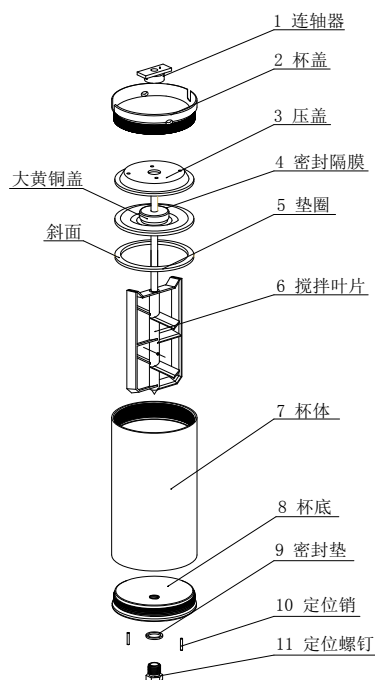
- 1) 按住启动/暂停按钮，直到 RUN 运行指示灯熄灭。
- 2) 按下自动/手动按钮，把控制器设置为手动模式。
- 3) 用上/下键将输出功率百分比为调到 0.0%。
- 4) 关闭仪器前面板上加热器开关。

稠度设定方法如下：

打开稠度表上的面板门，左边黑色拨码为上限报警设定，右边白色拨码为下限报警设定。

注意：下限报警在出厂之前已经设定好，无需再次设定，数值为（-19999）。上限报警在出厂后可根据需要设定，例：设定报警值为 70，把上限报警的“第十位数”用上下键调至“7”，把“个位数”调至“0”，“百位”以上应在出厂前已设定为“0”，因此无需设定。

## 5、API 浆杯准备（见图三）



（图三）浆杯分解图

浆杯的准备须按以下步骤：

- 1、彻底清洁所有部件并检查其状况良好。
- 2、用高温润滑脂涂在浆杯所有内表面，螺纹部位应涂厚一些。

3、参照图四的排列顺序，依次将垫圈【5】，密封隔膜组件【4】，压盖【3】，将杯盖【2】装入杯体【7】中，并用专用扳手轻轻拧紧。

注意：密封隔膜组件【4】大的黄铜盖向上，垫圈【5】的斜面向上。

4、倒转杯体，将其置于杯座上，座落在杯座上的两个销子上。

5、将搅拌片【6】从密封隔膜【4】中穿入。

6、依次将杯底【8】，垫片【9】，定位螺钉【11】旋入，用手拧紧。

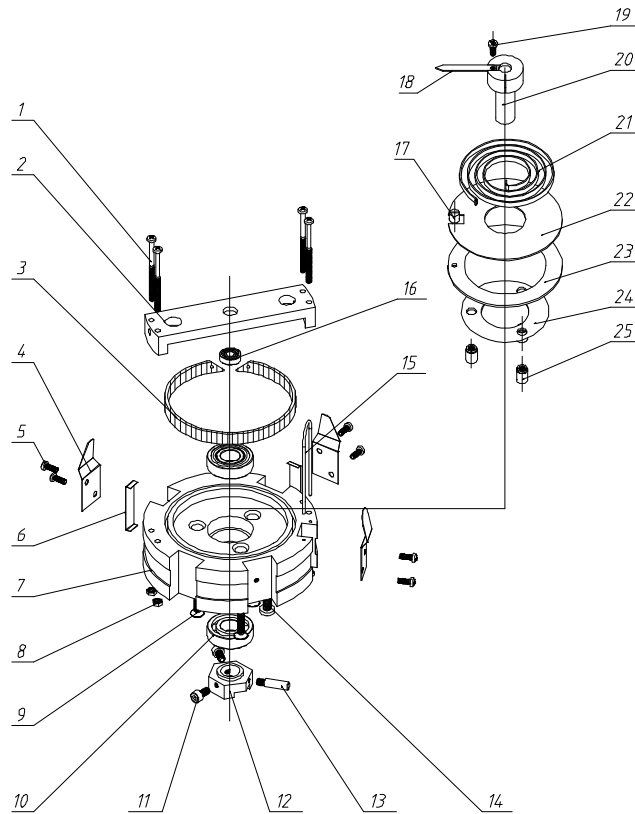
注意：叶片一端的锥度应座落在定位螺钉的中心，使其活动自如。

7、连轴器组件【1】装入伸出的叶片轴上。

8、取出电位计（见图四），将电位计装入叶片轴上，调整连轴器组件【1】，使其与档块 12 配合，最后用内六角扳手拧紧定位螺钉。

9、调整完毕后，将电位计组件从叶片轴上取下。

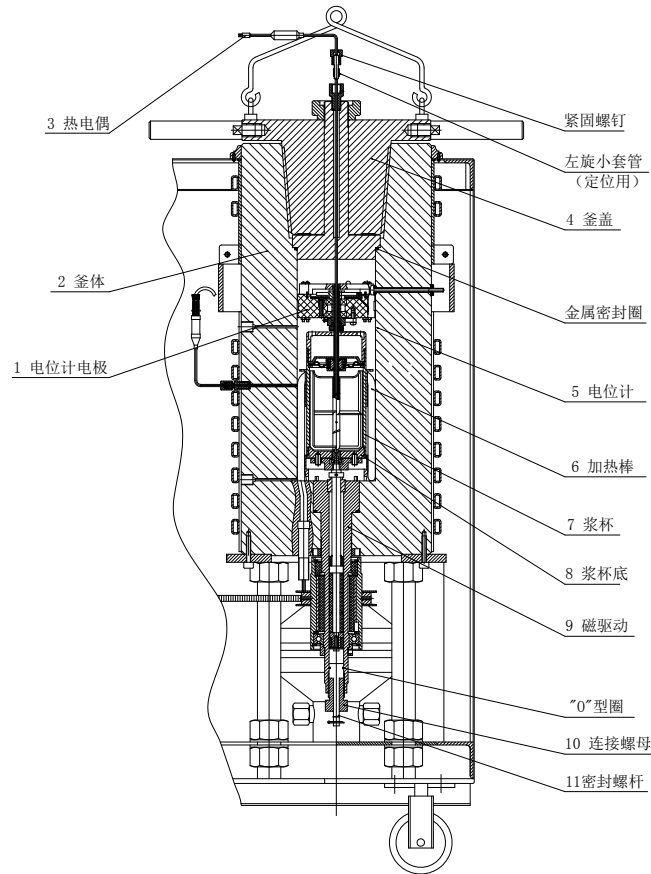
10、将定位螺钉【11】，杯底【8】取下，此时浆杯准备工作结束，等待下步实验。



序号	图号	名称及规格	序号	图号	名称及规格
1	GB818-85	十字槽盘头螺钉M3×5	14	S0148	内六角螺钉M5×10
2	P2502	电位计盖	15	P2507	挂钩
3	P2504	电阻片	16	GB278-82	轴承3080085
4	P2506	弹簧片	17	P25141	弹簧调整销
5	S0104	十字槽盘头螺钉M3×8	18	P2505	弹簧片指针
6		薄铜片	19	S0104	十字槽盘头螺钉M3×8
7	P2509	电位计体	20	P2511	轴承套
8	GB6170-86	螺母M3	21	P2503	扭矩弹簧
9	S0117	十字槽盘头螺钉M4×25	22	P2510	压片
10	GB278-82	轴承80101	23	P25142	固定盘
11	GB70-85	内六角圆柱头螺钉M4×8	24	P25122	压片板
12	P2513	挡块	25	P25121	螺柱
13	P2501	挡销			

(图四) 电位计分解图

(二) 实验操作 (参见图二、图五) 所示



(图五) 釜体装配图

1、打开总电源开关【12】。

2、将搅拌好的水泥浆，边搅拌边倒入浆杯中，至浆杯螺纹部位，向下推浆叶扩展浆杯隔膜，排除气体，继续倒入水泥浆；

注意：浆杯中不允许有残留空气，否则影响测试，如果水泥浆倒满，拧紧底盖，少量水泥浆将从底盖上流出，相反可以从中间孔中添加水泥浆，从孔中溢出为准，表明浆杯内无气体。

3、正向放置浆杯，用专用提手将浆杯放入釜体底部，转动浆杯直至浆杯底部销子插入旋转杯上的两孔中，取走提手。

4、用专用提手勾住电位计放入釜体内，转动电位计直到电位计槽对齐釜体接触电极，浆杯轴穿过电位计后面轴承，并转动自由，也可以打开电机开关【9】转动浆杯来实现确认到位，关闭电机【9】。

5、将釜盖【4】顺时针方向旋入釜体中，釜盖中的“O”型圈接触釜体密封部位时，会有一个反作用力，继续旋转釜盖使釜盖中的金属密封圈与釜体接触；注意：千万不能突然加力拧紧，用手轻轻旋到位即可（否则试验结束后很难取下釜盖）。

6、将热电偶电源插入内热电偶座【25】中，前面通过釜盖插到底，检查（如图五）中所示，热电偶连接处有一左旋小套管，是定位密封用，小套管应在螺纹的上端，如在下端将无法实现密封，因此，必须逆时针方向旋转小套管，使其回到上端，（该项工作每次做实验都必须要做）；

然后再将紧固螺钉旋入釜盖中，不能旋到底，保留一圈以上间隙。

7、打开气源开关【11】至ON，（此时压缩空气进入油箱，附体内开始进油）。

8、当釜体内油满时，多余的油则从上部小孔中溢出，此时迅速将紧固螺钉旋紧。

9、打开电机开关【8】，打开加热器开关【9】，打开打印开关【5】，打开计时器开关【6】，立即按动温度控制器上的按钮到“自动”，实验开始，记录仪记录温度和稠度。

10、设定的稠度一到，警报器响，此时加热器电源自动切断，马达停止转动，冷却水自动打开，冷却釜体，实验结束。

压力部分的操作与控制：

仪器后左边有一泵压力调节阀（出厂时已经调整好，一般情况下不允许再调整，如果需快速加压，可以调整前面板上的压力调节钮【15】，即：顺时针方向旋转，观察压力表，其压力最大不得超过0.6MPa），压力是通过手动来实现的，如果在加压过程中，不要求压力，那么随温度的升高压力会自然增大，需要通过手动释压来控制，反之，只要打开增压开关【20】，立即增压。注意：当最高工作温度设定  $> 200^{\circ}\text{C}$  时，最高工作压力设定上限为100Mpa。

拆卸：

1、关闭马达【8】，关闭加热器【9】，关闭打印【5】，关闭计时器【6】，停止温控器的运行，保留冷却开关继续冷却釜体。

2、关闭气源开关至OFF位置，（此时进气源被切断，油箱内低压空气被排出）。

3、打开空气排放开关【21】（此时油箱及管道空气排出）。

4、逆时针方向慢慢地旋转高压释放阀【18】。

5、逆时针方向旋转空气至釜阀【17】，（此时压缩空气进入釜体，使油流回油箱）当听到排气声后，回油结束。

6、关闭空气至釜阀【17】。

7、逆时针方向，旋出紧固螺钉，将釜体内余气放出，取出热电偶。

8、逆时针旋转压力调节器【15】，（使指针归零）。

9、逆时针方向取下釜盖【4】。

10、取出电位计，放入带油的容器中。

11、取出浆杯并立即放入水中冷却，去除水泥浆，清洗干净并涂上耐高温油脂，备下次使用。

## 七、仪器维护

### （一）压力釜

1、检查并清除釜体内的污物。

2、检查釜盖上的“○”型圈及金属圈，清除擦净（包括螺纹），在螺纹部位涂一层润滑脂。

## （二）浆杯

1、每次实验结束，应将各部件内的压力、气体释放干净。泄压后方可打开浆杯清洗干燥。

2、检查浆杯底塞，内锥度座凹陷或者磨圆，磨损超出磨损范围后，将造成叶片轴偏心导致叶片摩擦浆杯内壁或者转动不灵活。

3、检查浆杯轴尖是否磨损，确保轴转动垂直，浆杯轴尖磨损后或者轴弯曲将妨碍轴对准浆杯底塞中心，并导致浆叶摩擦浆杯内壁或者转动不灵活。

4、如果叶片损坏（偏向、叶片有裂口）更换浆叶，在第一次使用前记录浆叶重量，做20次实验以后记录重量，如果重量少于20%，更换叶片。

5、用二硫化钼油脂润滑所有部件。

## （三）热电偶

检查热电偶确保垂直，检查螺纹接头密封位置并清洁干净，接头任何部件疲劳受损都是一个安全隐患，如果螺纹损坏，热电偶可能在高压下弹出，仔细检查热电偶接头内部密封是否变薄或者有缺口，如有缺陷应立即更换，以保证操作者的安全。

## （四）电位计

随机出厂的电位计已标定，可以直接使用。

每次实验结束，电位计必须清洁干净，用毛刷沾少量洗涤剂轻轻刷掉水泥颗粒、弹簧、电阻片等外表面的水泥沉淀物，要清洗干净，将整个电位计在水中漂洗干净，然后放在盛有油的容器中。

## （五）电阻片更换

1、拆掉中心万向轴承固定块和指针。轻轻取下电阻片。

2、安装新电阻片，电阻片两端与接触片重叠部分之外长度应该留相同。将电阻片牢牢卡入槽子，电阻片上表面必须水平。

3、用一个硬木轻轻磨光电阻片绕线上表面，这样可确保指针滑动光滑。

4、用手转动指针，确保指针转动光滑，接触良好，并且指针在接触片与接触片之间滑动无发涩感觉，如果需要，上下弯曲调整指针接触。

5、调整中心轴上的指针停止臂位置，确保指针在接触片与接触片之间滑动，所有螺钉必须拧紧。

6、安装轴承固定块，标定电位计。

## （六）更换标定弹簧

1、拆掉中心万向轴承固定块和指针。取下标定弹簧。

2、安装一个新弹簧，（电位计轴逆时针转，弹簧拉紧）。

3、安装指针。

4、松开但不要拆掉电位计3个内六角螺钉。

5、转动弹簧调节器，直到弹簧开始拉紧，并且指针与接触片对齐，拧紧螺钉。

6、安装轴承固定块，标定电位计。

#### （七）磁力驱动

该装置属组合元件，一般情况不易损坏，如出现问题需组件更换，通常由于维护保养的需要，将连接螺母【10】打开，取出密封杆【11】或更换“○”型圈。（见图五）

#### （八）高压过滤器

只需将上下两个螺母打开即可清洗，其缩紧的结构与热电偶的密封是相同的，注意小套管的位置，必须在螺纹上端。

#### （九）低压过滤器

与高压过滤器相同。

## 八、故障的判定与排除

故障	原因	维修方法
设备不供电	保险丝烧断	更换保险丝
不稳定/错误的温度输出	热电偶缺陷	检查所有热电偶线路和组件
	接线端断开	更换热电偶，修复线路
不能增压或不能增至较高压力	供油量不足	检查油箱中存油量（如油标中没有指示，应加油）
	空气至釜阀、高压释放阀打开或泄漏	检查所有管道及阀门
	高压管道泄漏	检查气源是否畅通，调压器有无压力输出
	釜盖密封不严（泄漏）	更换“○”型密封圈或金属密封圈
	调压器失灵	检查电磁阀是否正常，否则更换电磁阀
	泵进气压力太低	检查空压机输出压力，一般情况下应>7kgf/cm <sup>2</sup>
压力无法释放	水泥或其它杂质进入“高压释放”阀	拆下并清洁阀，重新安装
泵工作不稳定	泵的活塞腔空气阻塞	逐渐增加空气驱动压力，放慢泵工作循环
	泵的阀体内有污物	泵必须有技术售后部维修

## I .Summary

Model 2012 HTHP consistometer is in strict accordance with the requirements of the American Petroleum Institute (API) Specification 10, is dedicated to measure the time of slurry thickening .

The cement slurry thickening time is an important indicator of the secondary or primary cementing must be measured before, Technical requirements and operating procedures are described in detail in the United States (API) specification recommended 10 RP-10B test methods.

2012 type of high temperature and high pressure thickening instrument has a wide range of pressure and temperature. The kettle body of high strength alloy material, the main control and execution unit adopts imported parts (Germany and Japan, U.S. and other countries, able to complete the high-temperature and high-pressure experimental program required by the vast majority of the American Petroleum Institute.

The operation of product is very simple, all control valves and switches are arranged on the front panel, the temperature and consistency can be easily reading by the display instrumentation mounted on the panel and recording instrument readout, pressure can be indicated by the Pressure Gauge. The temperature controller control the rate of temperature increase ( temperature gradient) of the grout, automatically, when the temperature reaches the desired value, the thermostat maintain a constant target temperature, automatically. The pressure to control the input air pressure to control the hydraulic pump through the pressure relief valve and pump switch ,the numerical mapping of temperature and consistency of value drawn by the system pen recorder, The temperature on the instrument panel controller and display the real-time temperature of the kettle body, users can also to buy HTD5270 computer data acquisition and control system, the test structure is fed into the computer (PC) to test real-time data acquisition, storage and printing.

The consistency of the cement slurry is elicited by the standard spring force of potentiometer. When the pulp cup to turn in accordance with the rotational speed of required, the blade in slurry cup under the slurry process, Give strength to the standard spring that connected to blade, when the desired consistency is reached, Instrument will disconnect the heater automatically , shut off the motor power supply, at the same time, cooling water opens automatically and terminates the timer, the instrument gives audio alarm and prompt the operator to the end of the test.



## II .technical parameter

Name	Technical parameter
<u>Maximum operation temperature</u>	315℃
Maximum operation pressure	275Mpa
Consistency range of ambient temperature	0~100BC
Speed of the slurry cup	150r/min
Heater power	4000W
Power requirements	VAC220±10% 50/60HZ
<u>Input power</u>	5000W
Environmental requirement	Temperature: 0~40℃; Humidity: 0~95%
Compressed air	600~1000kpa
Water	200~600kpa
Pressure medium	Mineral oil

### III. Features

- Completely accord with the requirements of the American Petroleum Institute (API) Specification 10.
- Manufacturing enterprises through the ISO9001 quality certification.
- Intelligent digital temperature controller and digital temperature display.
- Kettle body is made of a special alloy.
- Most pressure up to 315 MPa.
- Temperature up to 275 °C.
- Adopting the high-power heater.
- Durable and easy to use.
- Main control and execution unit all adopt the imported components.
- Magnetic drive, maintenance is easy.
- The kettle body can be obtained rapid cooling.
- Kettle body sealed with high temperature "o"-ring and special metal ring to ensure sealing.
- Pen recorder drawing the numerical of temperature and the consistency .
- Optional based the computer HTD5270 data acquisition and control system, through the communication port 1 to complete real-time collection of data、 storage and print.

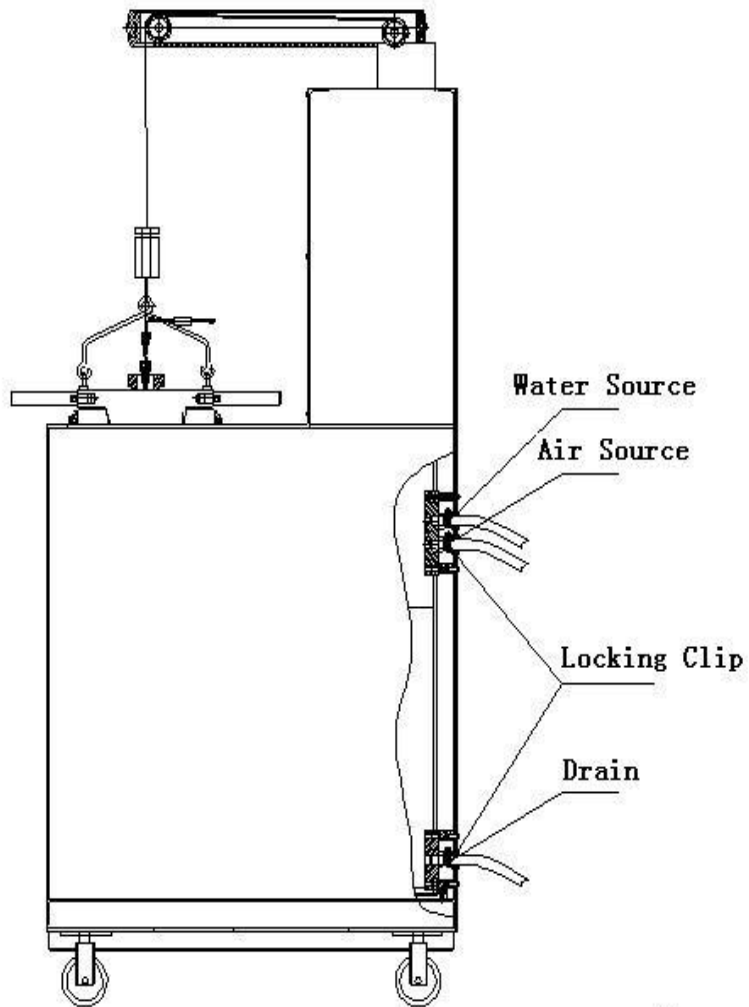
### IV. Installation

#### (1) Unpacking

After unpacking, according to the packing list to check equipment and spare parts, to ensure that all accessories have been received, and there is no damage. If there are any unforeseen circumstances, please contact with the company.

#### (2) Install instruments

1.Connected to the air and water(Figure1)



(Fig. 1) Side view

- ① Connect 【Φ10】 hose to the back of the instrument air intake and tightening
- ② Connect 【Φ10】 hose to the back of the instrument water intake and tightening.
- ③ Connect 【Φ10】 hose to the bottom of the back of the instrument outfall and tightening.

## 2.Link Power

Turned on the Instrument and corresponding voltage power supply , and the power supply must be grounded. Open side cover for installation or maintenance, all power must be turned off, so as not to cause harm.

## V. Operation of the instrument

### (1) Preparation

1. Carefully check the various components of installation are in place or not. All electrical switches and air to the kettle valve、 gas source switch、 manual pressure relief valve must be in the off state.

2. To the fuel tank oiling, Or poured oil into the kettle, and give the kettle body pressure, the oil will back into the tank. The concrete steps are as follows :(As shown in figure 6).

① Poured the oil of be exclusively used in Gelled gauge into the about 2000ml kettle body .

② Will still the cover 4 screwing in the kettle body, when screwing in gently with the hand, don't be too tight.

③ Using the fastening screw on thermocouple to seal the cover, that is: Inserted thermocouple into the kettle body, and tighten.

**Notice: Have a sinistroyration small casing on the thermocouple , before fastening , the small casing should be on upper end of the thread.**

④ Counterclockwise rotation to open the air valve (The compressed air into the kettle body).

⑤ Counterclockwise rotation to open the manual pressure relief valve (The pressure oil flows into the oil tank slowly).

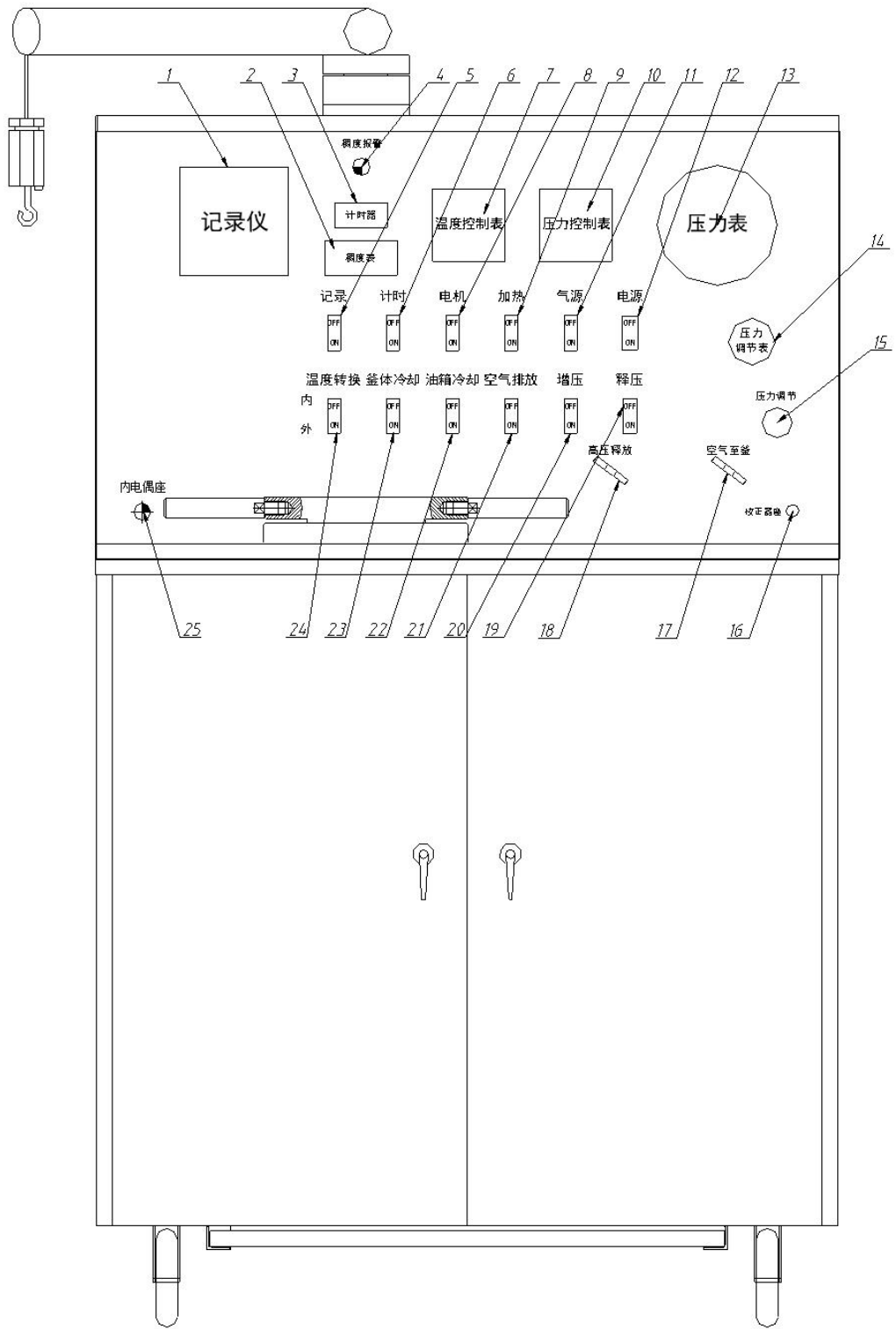
**Notice: Not allow the oil in the tank is too full, requirements to be able to see the liquid level in the oil pointer, if refueling too much, to open the ball valve below the tank to discharge.**

⑥ Shut off the air valve.

⑦ Open the fastening screws on the thermocouple to ruled out the residual air within the kettle body .

⑧ Shut off the manual pressure relief valve.

⑨ Remove the thermocouple and kettle cover, when refueling is completed.



(Figure 2) Operation panel

No.	Name	No.	Name
1	Recorder	14	Pressure adjust meter
2	Consistency meter	15	pressure adjust
3	Timer	16	Corrector seat
4	Consistency alarm	17	Air kettle
5	Record switch	18	High pressure release
6	Time switch	19	Pressure release switch
7	Temperature control meter	20	Pressure boost switch
8	Motor switch	21	Exhaust switch
9	Heating switch	22	Tank cool switch
10	Pressure control meter	23	Kettle cool switch
11	Gas source switch	24	Temperature conversion switch
12	Total power switch	25	ELEC.PAIR seat
13	Piezometer		

3. In accordance with the requirements of test sample heating rate set temperature controller.

The setting method is as follows:

TIME BUTTON    SURVEILL BUTTON    DOWN BUTTON    UP BUTTON

Attenuator panel

- ① Output 1 or 2 (OP1/OP2) : When the relay Connected to the output 1 or 2 is turn on ,light begin to shine.
- ② Upper reading: Display the current temperature.
- ③ Lower reading: If the controller is executing a program, here shows the target temperature. Display changes according to the controller's model.
- ④ The set point 1 or 2 (SP1/2) : The set point that the Indicates controller used .In most cases, the controller uses the set point 1
- ⑤ REM: If the controller for this option, instructs the remote transmission state.
- ⑥ AUTO/MAN BUTTON: Change the mode of the controller between automatic and manual.

If the controller is not use, the controller should be set to manual mode. And verify the output power is set to 0.0%.

⑦ RUN/PAUSE BUTTON: Used to start, pause or stop temperature control procedure. Press the button for the first time is to start, press the button again is to pause, press the button more than 3 seconds is to stop.

⑧ PAGE BUTTON(2) : Used to leaf through the different menu on the controller.

⑨ SCROLL BUTTON(↻):leaf through control parameters in a menu.

⑩ UP/DOWN BUTTON: Used to change the parameter values. Hold down the button to change the parameter values quickly.

#### 4.Operation

Set a temperature control scheme on the thermostat, requires the user to input two basic parameters: Heating up time( by the current temperature to the end time that maintain temperature), and final target temperature. Usually referred to as “heating up time” and “holding temperature”. Minutes as the heat up time unit.

The temperature control scheme inputed to controller by user. After temperature control program input into the thermostat, Press the start/ pause key began to implement control procedures. If temperature control procedure requires Suspension, press the start/ pause once under the running condition (At that time the run indicator on the controller panel is shining), press again, the program resumes execution. If stop the control program is required, hold down the “start / ` pause” button until run indicator on the panel die out.

***Notice: After end temperature control procedure, press the auto / manual button to set the thermostat to manual condition, Use up / down button adjust the controller output to 0.0%.This can help to prevent operating heater in wrong accidentally.***

#### **The step that input temperature control procedures:**

- ① The switch of the controller..
- ② Press the page button ( 2 ) ,until appear “Prog”
- ③ Press scroll button(↻),until appear“Segn”
- ④ Input 1; Which is to define temperature programmed period, (Booster section).
- ⑤ Open Press scroll button(↻).
- ⑥ Type of input Use the up / down button select heating up time,( pressure rising time)
- ⑦ Press scroll button(↻).
- ⑧ Input the target temperature tGt; That is the target temperature of this section.
- ⑨ Press scroll button(↻).

- ⑩ Input heating up time (minute) (dur) ;
- ⑪ Press scroll button(↔).
- ⑫ Input the number 2; That is to say define the program of insulation section.
- ⑬ Press scroll button(↔).
- ⑭ Choose the type of segments as the end; Use up/down button to select insulation way. (dwell)
- ⑮ Press scroll button(↔).
- ⑯ Press the page button ( 2 ) , until you see the panel displays the current temperature.
- ⑰ Press the Auto/Manual button, set controller to automatic mode.
- ⑱ Press the Run/Pause button to start running temperature control program. Output OP1 indicator glister indicate have control to output.

***Notice: Heater switch on the instrument panel in the open position. After input temperature control program to the controller, can be repeated use. Just press start/pause button to run the program again.***

#### **The step that terminate the control program:**

- ① Hold down the start/pause button until the run indicator was out.
- ② Hold down the Auto/Manual button set the controller to manual mode.
- ③ Use the up/ down key adjust the output power percentage to 0.0%.
- ④ Close the heater switch on the instrument front panel.

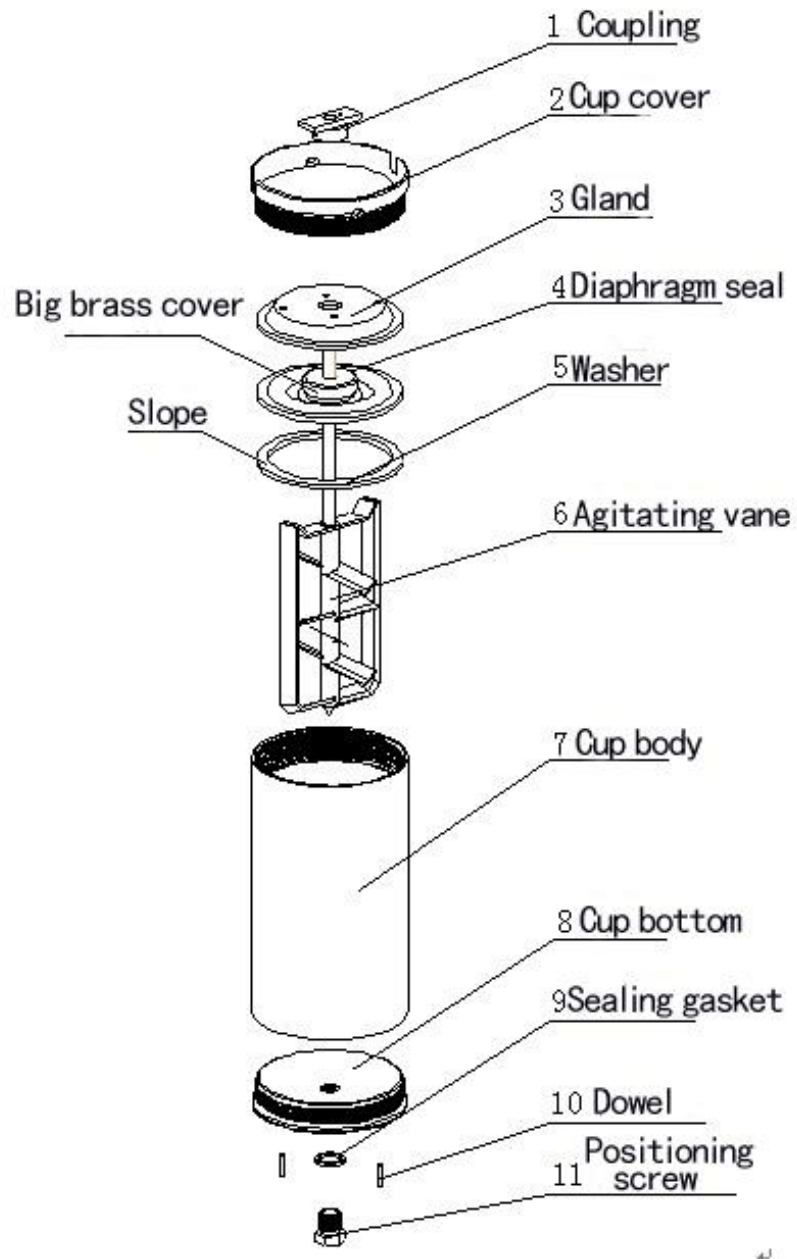
Consistency setting method is as follows:

Open the panel on the list of consistency, black dial on the left is the setting that upper limit alarm, white dial on the right is the setting that lower limit alarm.

**Notice:** Lower limit alarm has been set before leaving the factory, don't need to set again, the value is (-19999) . Upper limit alarm can be set according to need after leave the factory, example: Set the alarm value is 70, use the up/down key switch the ten digits of limit alarm to 7, set the single digits to 0, more than hundreds should have been set to zero before leaving the factory, therefore is no need to set again.



### 5、 Slurry cup ready(Figure 3)



( Figure3 ) The slurry cup diagram

The step of Slurry cup ready:

- 1、 Thoroughly clean all parts and check its in good condition.
- 2、 All inner surface of slurry cup smear high temperature grease, threaded parts should be thicker .
- 3、 Reference to the order of figure 4, in turn ,put washer 【5】 、 seal diaphragm components 【4】、 gland 【3】 、 the cup cover 【2】 into the cup body 【7】 and tighten gently With special spanner.

**Notice:** The big brass cover on the seal diaphragm components 【4】 upward, the slope of washer 【5】 upward.

- 4、 Invert the cup body and place it on the cup seat, Located on the two pin of the cup seat.

5、 The agitating vane 【6】 penetrate from seal diaphragm 【4】 .

6、 Successively, screwing in cup bottom 【8】 、 washer 【9】 、 positioning screw 【11】 , to tighten by hand.

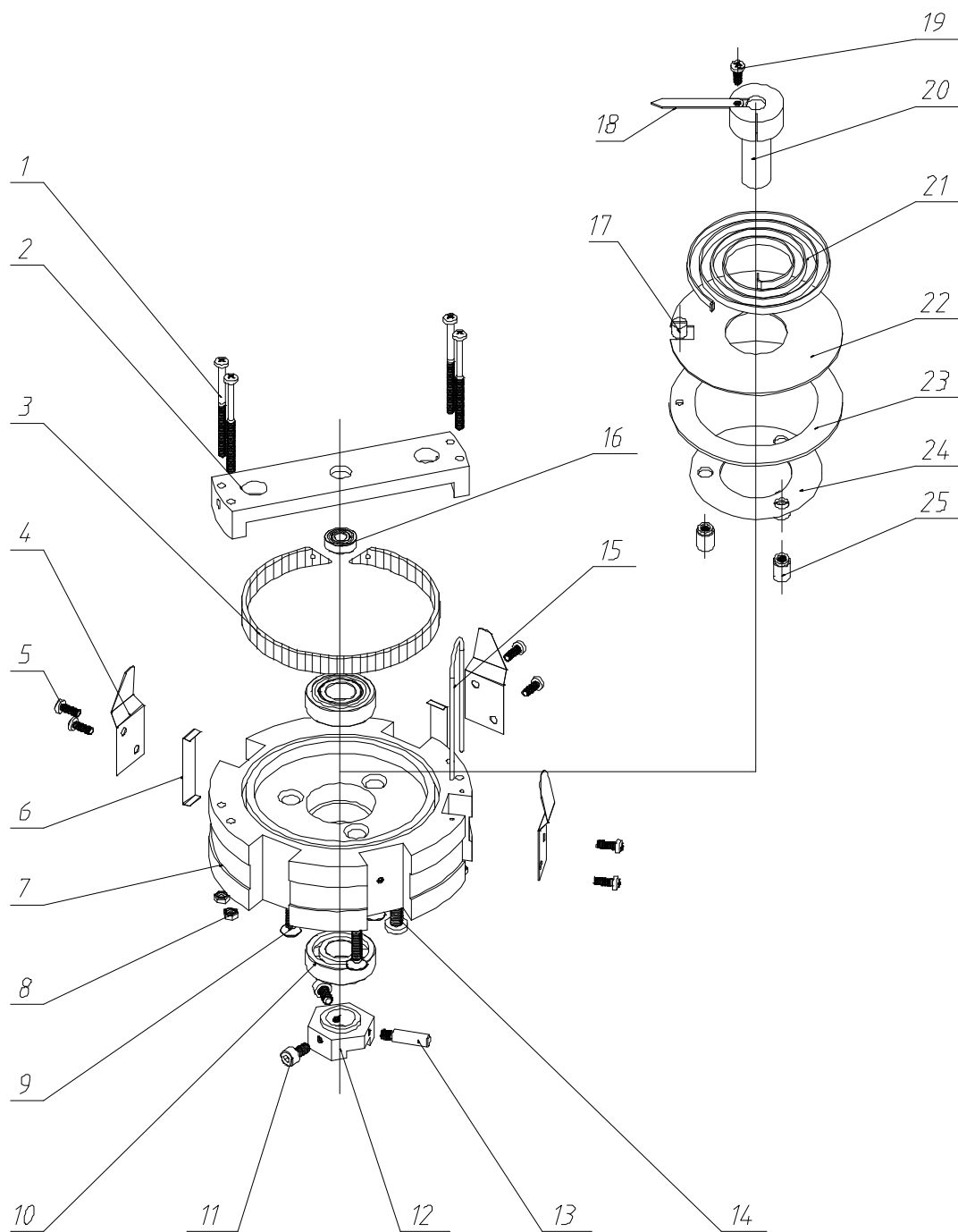
***Notice: The conical degree of one blade's should be located in the center of the positioning screw, make it move freely.***

7、 Put coupling components 【1】 into the blade shaft that hold out.

8、 Remove the potentiometer(As shown in figure 4),put it into the blade shaft, adjust the coupling components 【1】 ,make it cooperate with gear block 12. Finally, tighten the set screw with inner hexagon spanner.

9、 After the adjustment, removed potentiometer component from the blade shaft.

10、 Remove the positioning screw 【11】 and the cup seat 【8】 , Slurry cup ready is end at this time, Waiting for the next experiments.



序号	图号	名称及规格	序号	图号	名称及规格
1	GB818-85	十字槽盘头螺钉M3×5	14	S0148	内六角螺钉M5×10
2	P2502	电位计盖	15	P2507	挂钩
3	P2504	电阻片	16	GB278-82	轴承3080085
4	P2506	弹簧片	17	P25141	弹簧调整销
5	S0104	十字槽盘头螺钉M3×8	18	P2505	弹簧片指针
6		薄铜片	19	S0104	十字槽盘头螺钉M3×8
7	P2509	电位计体	20	P2511	轴承套
8	GB6170-86	螺母M3	21	P2503	扭矩弹簧
9	S0117	十字槽盘头螺钉M4×25	22	P2510	压片
10	GB278-82	轴承80101	23	P25142	固定盘
11	GB70-85	内六角圆柱头螺钉M4×8	24	P25122	压片板
12	P2513	挡块	25	P25121	螺柱
13	P2501	挡销			

No	Figure No	Name	No	Figure No	Name
1		Cross Recess Head Screw M3×5	14	S0148	Socket head cap screw M5×10
2	P2502	Potentiometer cover	15	P2507	Hanger
3	P2504	Resistor disc	16		Bearing3080085
4	P2506	Spring piece	17	P25141	Spring adjusting pin
5	S0104	Cross Recess Head Screw M 3×8	18	P2505	Spring leaf pointer
6		Thin copper sheet	19	S0104	Cross Recess Head Screw M 3×8
7	P2509	The potentiometer body	20	P2511	Bearing sleeve
8		Screw nut	21	P2503	Torque spring
9	S0117	Cross Recess Head Screw M 4×25	22	P2510	Preforming
10		Bearing 80101	23	P25142	Fixed disk
11		Hexagon socket head cap screwsM4×8	24	P25122	Film pressure plate
12	P2513	Baffle plate	25	P25121	Stud
13	P2501	Stop pin			

(Figure4) Potentiometer breakdown drawing

(二) Experimental operation (See figure 2 and figure 5)



(Figure5) The kettle body assembly drawing

1. Open the total power switch 【12】

2. As stirring the stirred slurry as poured it into the cup to the threaded parts of pulp cup. Push down on the blade to extended pulp cup diaphragm, venting the air then continue to pour into the slurry;

***Notice: The pulp cup are not allowed to have the residual air, otherwise, impact the test. If water mud filled, screwed case back, a small amount of grout will flow out from the bottom cover. On the contrary, can add slurry from the middle hole, overflow from a hole as the criterion showed that no gas in the pulp cup.***

3. Positive Place cup pulp forward direction, put the pulp cup into the bottom of kettle body with special handle, rotating pulp cup until the pin at the bottom of the pulp cup insert the two holes on the rotating cup, remove the handle.

4. With the special handle hook potentiometer then put it in the kettle body, rotate the potentiometer until potentiometer slot alignment kettle body then contact electrodes, pulp cup shaft through the bearing that on the behind of potentiometer and rotational freedom, also can open the motor switch 【9】 rotating pulp cup for confirmation in place, shut down

the motor 【9】 .

5. Screwing the kettle cover 4 clockwise into the kettle body ,when the O-ring on the kettle cover contact body sealing parts, there will be a reaction, Continue to rotate kettle cover makes the metal sealing ring that on the kettle cover touch the kettle body ; Notice: Don't be suddenly tighten the tension, spin in place with the hand gently (Otherwise, the end of the test is very difficult to remove the kettle cover).

6. Insert the thermocouple power within the thermocouple seat 【25】, front , get through the kettle cover insert to the end, check as shown in figure 5, there is a sinistral small casing at thermocouple junction to locate and seal . Small casing should be on the top of the thread, if in the bottom will not be able to achieve sealing, so, small casing must be rotating counterclockwise to make it back to the top (each experiment had to do the work) ; Then tighten bolt and screwing in kettle cover, can't spin to the bottom, Keep the gap that more than a circle.

7. Rotate the gas switch 【11】 to NO, (Now, the compressed air into tank, oil Start to inject the appendage) .

8. When the kettle body filled with oil, excess oil is spilled from the upper holes, at this time, tighten the screws rapidly .

9. Open the motor switch【8】、 the heater switch【9】and the print switch【5】. Open the timer switch 【6】 , Immediately press the button on the temperature controller to auto, begin to test and recorder record the temperature and consistency.

10. The alarm will go off when reach to the setting consistency ,now the heater cut off power supply automatically. Motor stop running, cooling water opened automatically, cooling the kettle body and end the test.

### **The operation and control of pressure parts :**

Have a pump pressure regulator on the left side of the instrument back (Have been adjusted when delivery from factory, under normal circumstances are not allowed to adjust again) . If you need to boost pressure quickly, adjust the pressure adjustment button 【15】 on the front panel, that is: turning in clockwise direction, observe the pressure gauge, the most pressure should not be greater than 0.6 MPa, pressure is done by manual, If in the process of pressurize, pressure are not required, then increases pressure naturally with the rise of temperature, need to control by manual pressure relief. On the contrary, as long as you open the pressure switch 【20】 , boost pressure immediately.

Notice: Setting the highest working pressure up to 100 Mpa,

When the highest working temperature more than 200°C.

Disassemble:

1. Shut down the motor 【8】 、 the heater 【9】 、 the print 【5】 and the timer 【6】 , stop the running of the thermostat, keep cooling switch to cooling kettle body.

2. Rotate the air switch to the OFF position (At this time, the air supply is cut off , the low pressure air in tank expelled) .

3. Turn on the air emissions switch 【21】 (Now, the air in the fuel tank and piping discharged) .

4. Rotate HP release valves slowly CCW 【18】

5. Counter-clockwise rotate the kettle air valve【17】,(At this time, compressed air into the kettle body make the oil flow back into the tank)when heard the exhaust noise, oil return end.

6. Shut off the air to the tank valve 【17】 .

7. Anticlockwise turn the fastening screws to release the residual air in kettle body , take out the thermocouple.

8.Counterclockwise rotation pressure regulator 【15】 , (Make the pointer back to zero)

9.Take the kettle cover 【4】 counterclockwise.

10.Take out the potentiometer, put it into oil containers.

11.Take out pulp cup and immediately put it into the water to cool, then eliminate Cement Slurry, clean up and Coated with high temperature resistance grease for other time use.

## VII.Instrument maintenance

### (1)Pressure reactor

1.Check and remove the dirt from the kettle body.

2.Check the O- ring and metal ring on the kettle cover and wipe them(Including the thread), coated with a layer of grease in the threaded area.

### (2)Pulp cup

1.End of each experiment, all parts should be release the pressure and the gas. After pressure relief you can open the slurry cup to clean and dry.

2.Check the bottom plug of pulp cup , the internal taper sag or rounded and after wear beyond scope of wear will lead to blade shaft eccentric then the blade chafes slurry cup wall or rotation is not flexible.

3.Check whether the pulp cup pivot wear or not, ensure shaft shifts is vertical. After Slurry cup pivot wear or shaft is bending will obstruct shaft trains on the bottom plug center of pulp cup and lead to the blade chafes slurry cup wall or rotation is not flexible.

4.If the blade is damage(deviation, blade has a split )change the blade. Record weight of blade before the first use and record weight after do twenty times experiment. If the weight less than twenty percent, replace the blade.

5.Use molybdenum disulfide grease to lubricate all parts.

### (3)Thermocouple

Check the thermocouple to ensure it vertical then check the sealed position of screwed joint and clean it. It is hidden danger that any part of the joint damages. If the thread is damaged the thermocouples may pop up under high pressure, please check carefully whether the thermocouple junction internal seal thinning or chipped. If there are any defects should be replaced immediately to

ensure the safety of the operator.

#### (4) Potentiometer

Potentiometers that random delivery have demarcated so you can use them directly.

End of each experiment potentiometer must be clean. Gently brush away the cement particles and cement sediment on the outside surface of spring 、 resistance card use brush with a small amount of detergent then clean them. The entire potentiometer should be immerse into water rinse clean, then put it into the oil container filled with oil.

#### (5) Replace the resistance card

1. Remove the center universal bearing fixed block, and the pointer. Gently take down the resistance card.

2. Fix new resistance card, outside the overlapping portions of the both ends of the resistor and the contact pads should stay the same length.

Click the resistance card into trough firmly, and the upper surface of resistance must be level.

3. Gently with hardwood polish resistance card then winding on the upper surface, this can ensure that pointer sliding smooth.

4. Turn the pointers by hand to ensure the pointers rotate smooth and have good contact. And Pointers slide in the between two contact clip without astringent feeling, if you need flex up and down to adjust the pointer contact.

5. Adjust the position of pointer stop arm on the central axis and ensure the pointer slide in between the two contact clip. All screws must be tightened.

6. Install bearing fixed block and calibrate potentiometers.

#### (6) Replace the calibration spring

1. Remove the center universal bearing fixed block, and take down the calibration spring .

2. Install a new spring, ( turned potentiometer shaft anticlockwise, and stretched spring ) .

3. Install pointer.

4. Loosen but don't take down the three socket head cap screw that on the potentiometer.

5. Rotate spring regulator until the spring begin to tension. Align the pointer and contact plate, and tighten the screws.

6. Fix the shaft fixed block, and calibrate potentiometer.



#### (7)Magnetic drive

The device belongs to the composite components, in general, is not easy to damage. If there is problem need to change components, usually due to the need of maintenance you can open the coupling nut 【10】 to take out the sealing bar 【11】 Or replace the O- ring. (As shown in figure 5) .

#### (8)High pressure filter

Just open both the upper and lower nut can be cleaned, tightening structure is the same with the thermocouple seal. Pay attention to the position of the small casing must be in the upper thread.

#### (9)Low pressure filter

It is same with the high pressure filter.

## VIII. Fault judgement and exclusi

Fault	Cause	Maintenance Methods
Device does not power	Fuse burns out	Replace the fuse
Instability/ Output the erroneous temperature	Thermocouple is defective	Check all the thermocouple circuit and components
	Terminal disconnect	Replace thermocouple and repair the line
Can't pressurize Or can not be increased to the higher pressure	Lack of oil	Check remaining oil in the oil tank ( If oil leveler have no indication should refuel )
	Air to the kettle valve、 high pressure relief valve opened or leak	Check all the pipes and valves
	High-pressure pipeline leak	Check whether air supply is smooth and the regulator have pressure output or not.
	Kettle lid seal is lax (leak)	Replace the o-ring or metal seal ring
	Voltage regulator is out of order]	Check whether the solenoid valve is normal or not, otherwise replace the solenoid valve
	Pump inlet pressure is too low	Check air compressor exported pressure, under normal circumstances should be more than 7 KGF/cm2
Pressure cannot be released	The cement or other impurity into the high pressure relief valve	Take down and clean the valve, then reinstall it.
Pump work is not stable	The piston cavity of pump is air binding	Add the air drive pressure, slow down work cycle of the pump
	Pump body has dirt	Pump must have technical service department to maintenance it

# 青岛创梦仪器有限公司 装箱单

Qingdao Chuangmeng Instrument Co., Ltd. Packing list

生产企业: 青岛创梦仪器有限公司

Manufacturing enterprise: Qingdao Chuangmeng Instrument Co., Ltd.

生产地址: 青岛市城阳区流亭街道兴海路 3 号

Production address: No. 3 Xinghai Road, Liuting Street, Chengyang District, Qingdao

主机型号:

Model of the main motor:

出厂编号:

Manufacturing No:

序号	编号	名称及规格	单位	数量	备注
1		主机	台	1	
2		保险丝 (30A $\phi 6 \times 30$ )	个	2	
3		保险丝 (5A $\phi 5 \times 20$ )	个	2	
4		釜盖密封圈	只	1	
5		浆杯组件	套	1	
6		密封隔膜	个	1	
7		搅拌叶片	个	1	
8		热电偶	只	1	
9		电位计	套	1	
10		浆杯拧紧扳手	个	1	
11		浆杯 电位计取出器	套	1	
12		呆扳手 5/8"-11/16" (英制)	套	1	
13		活扳手 (375mm)	把	1	
14		内六角扳手	套	1	
15		浆杯座	套	1	
16		主机电源线	根	1	
17		胶管	米	15m	
18		橡胶锤	把	1	
19		管夹	个	6	
20		稠化仪专用油	桶	2	
21		高温润滑脂	盒	1	
22		通讯线	根	1	
23		通讯转换器	个	1	
24		软件光盘	个	1	
25		电脑	台	1	
26		使用手册	份	1	
27		合格证	份	1	