



青岛创梦仪器有限公司

Qingdao ChuangMeng Instrument Co., Ltd.



高温高压滤失仪

HTHP Filter Press

使用手册

Instruction Manual

版本 1.0

Version 1.0

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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。

Carefully read this User Manual to learn how to install and use the product correctly. After reading, properly keep the User Manual as a reference for future maintenance and repair.

## 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

## Контакт:

Почтовый индекс: 266100

Телефон: 86-0532-66993768

Электронная почта: [cmtech@sina.com](mailto:cmtech@sina.com)

Адрес: Но. 7, Ул. Вэньчжоу, Район Север города, Г. Циндао, Китай

Производственная база: Но. 3, Ул. Синхай, Пр. Лютин, Район Чэнян, Г. Циндао, Кит



## 一、概述 Introduction

创梦仪器生产的高温高压滤失仪是一种模拟深井（高温高压）下钻井液和水泥浆的滤失量，并同时可制取在高温高压状态下，滤失后形成的滤饼。是按照美国石油协会（API）规范制造,具有精度高，重复误差小，操作简单，测试数据准确等特点。广泛使用于各油田、科研院所、实验室等部门。

The high temperature and high pressure filtration instrument produced by Chuangmeng Instrument is a device that simulates the filtration rate of drilling fluid and cement slurry in deep wells (high temperature and high pressure), and can simultaneously produce the filter cake formed after filtration under high temperature and high pressure conditions. It is manufactured according to the specifications of the American Petroleum Institute (API), with high precision, small repeatability error, simple operation, and accurate test data. Widely used in various oil fields, research institutes, laboratories, and other departments.

## 二、型号及规格 Model and specification

型号 Model	名称 Name	特征 Distinguishes
1211	高温高压滤失仪 HTHP Filter Press	
1212	高温高压滤失仪 HTHP Filter Press	数字控温 Digital temperature control
1218	高温高压滤失仪 HTHP Filter Press	CO2 气弹 CO2 Cartridges
1210	高温高压滤失仪 HTHP Filter Press	数字控温 Digital temperature control CO2 气弹 CO2 Cartridges
1223	泥浆杯 Mud cup (175ml)	砂盘 Porous Ceramic Filter



## 二、技术参数 Technical Parameter

名称 Name	技术参数 Technical parameter
电源 Power supply	220V $\pm$ 5% 50/60Hz
功率 Power	400W
试验温度 Operating temperature	室温至 150°C From normal temperature to 150°C
容积 Volume	175ml
过滤面积 Effective filtration area	3.5 in <sup>2</sup> (22.6 cm <sup>2</sup> )
气源 Air source	N <sub>2</sub> /CO <sub>2</sub>

## 四、仪器结构 Instrument structure

1、主体：由底座、立柱、加热系统等组成，是仪器的主体组件。

1. Main body: it is consisted of base, stand column and heating system, etc, and it is the main component of the instrument.

2、三通组件：用来连接输气管和连通阀杆。可放掉管汇系统内余气。

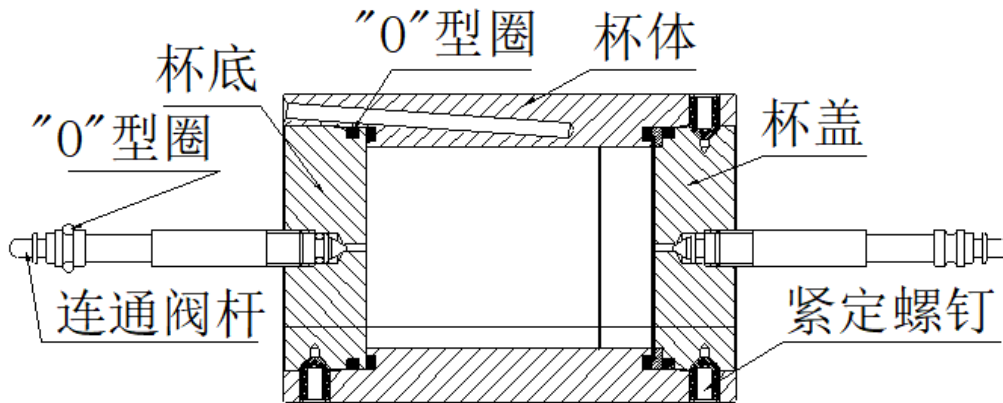
2. Three direct-links component: it is used to connect the gas pipe and the valve stem. And the residual air within the piping system could be let out.

3、浆杯：耐腐蚀的不锈钢容器。

3. Thick liquid cup: it is the corrosion-resistant stainless container.

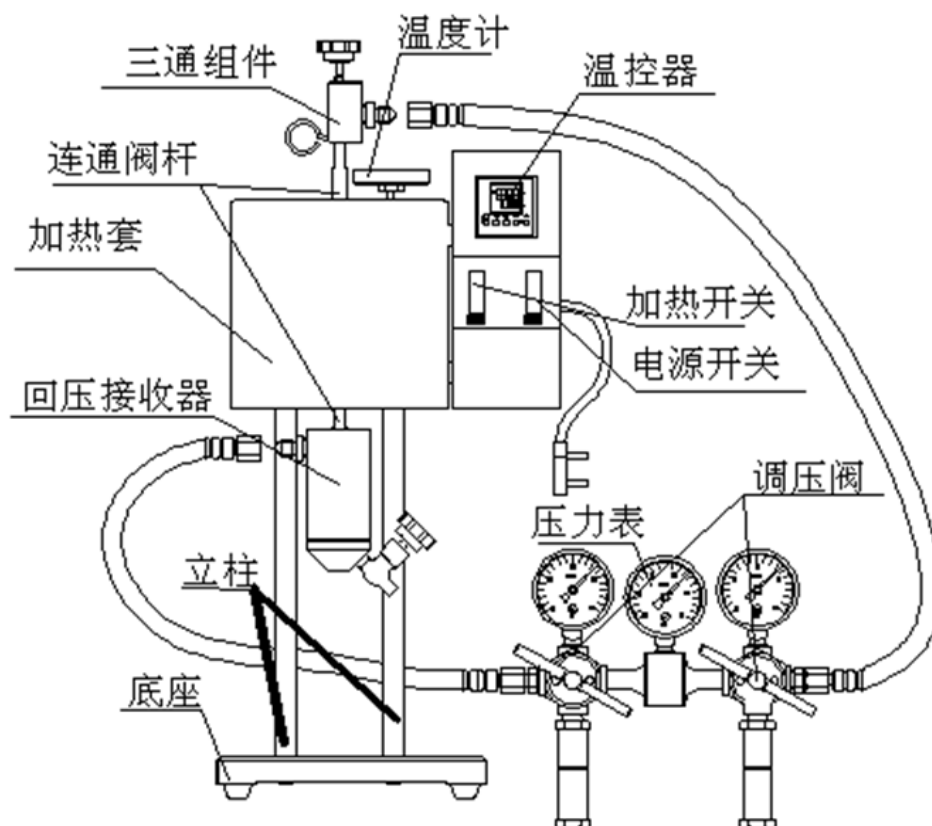
4、回压接收器组件：用来接收滤液，调节接收器内压力用。

4. Components of the back-pressure receiver: used for receiving filter liquor and adjusting the internal pressure of receiver.



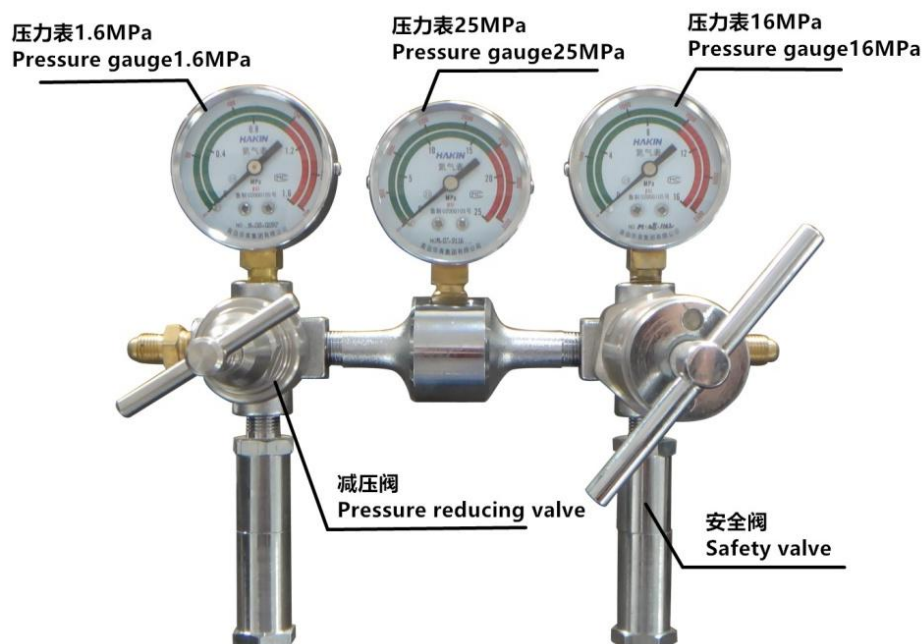
浆杯结构图

Structure chart of thick liquid cup



使用结构图 Using structure chart

## 五、仪器的操作 Instrument operation



警告：设置键“o”非本厂技术人员严禁触碰。

Warning: for the “Setup” key “o”, people a strictly prohibited to touch that except the technician of our factory.

1、将加热套和相应电压电源接通。将温度计插入温度计孔。将加温套加热至比选定的测量温度高 10°F (6°C)，在整个测试过程中用温控器保持温度恒定。

1. Switch on the heating jacket with the corresponding voltage source. And insert the thermometer into the hole of the thermometer. Heat the heating jacket to the temperature that is 10°F(6°C) higher than the selected measured temperature, and keep a constant temperature by using the temperature controller during the whole test process.

2、将样品搅拌 10min。

2. Stir the sample for ten minutes.

3、将样品装入浆杯，注意样品液面不要超过离杯上端 1 / 2in(13mm) 处。放上滤



纸，上好浆杯。

3. Put the sample into the thick liquid cup, and pay attention to that the liquid level does not exceed 1/2 in (13mm) of the cup's upper end.

Put on the filter paper and place the thick liquid cup on that.

4、将杯的上端和下端气阀关闭，反把浆杯放入加温套。将温度计插入温度计孔中。

4. Close the upper end and lower end's air valve of the cup, and put the thick liquid cup reversely into the heating jacket. Insert the thermometer into the hole of the thermometer.

5、将加压管汇与上、下二气阀连接，并将其销住。在气阀关闭状态下，将上、下管汇施加 100psi (690kPa) 的压力。打开上端气阀，通入气压，并加温至选定的温度。

5. Connect the forcing manifold with the up and down air valves, and fasten that. Under the condition that the air valve is closed, put 100psi (690kPa) upon the up and down manifolds. Open the upper air valve, and inlet the pressure, also heat it to the selected temperature.

6、当温度达到设定的温度时，将上端气压加至 600 psi (4137kPa)，打开下端气阀。在 30 min 的整个测量过程中，保持预先设定的温度 ( $\pm 3^{\circ}\text{C}$ )，收集滤液。在测量过程中使下端压力保持在 100psi (690kPa)，若下端回压超过 100 psi，泄放一些滤液，以放掉一些回压。记下测量温度和压力下的滤液体积的毫升数。样品在杯中加热的时间不应超过 1h.

6. When the temperature reaches to the setting temperature, increase the upper-end air pressure to 600 psi (4137kPa), and open the lower-end air valve. Keep the pre-setting temperature ( $\pm 3^{\circ}\text{C}$ ) and collect the filter



liquor during the whole measuring process. Make the lower-end pressure to keep at 100psi (690kPa) during the measurement process, discharge some filter liquor for letting out some back-pressure if the lower-end back-pressure has exceeded 100 psi. Record the measuring temperature and the milliliter of the filter liquor volume under the pressure. The heating time of the sample in the cup shall not exceed one hour.

7、标准过滤面积为  $7.0\text{in}^2$ ，如过滤面积为  $3.5\text{in}^2$  ( $22.6\text{cm}^2$ )，将滤液体积乘 2，记入记录。

7. The standard filter area is  $7.0\text{in}^2$ , while if the filter area is  $3.5\text{in}^2$  ( $22.6\text{cm}^2$ ), then multiply the filter area by two and write it in the record.

8、在测量接近结束后，关闭上下二气阀，拔掉“T”型销，释放调压器中的气压。

8. When the measurement is close to end, close the up and down air valves, pull up the “T” pin, and release the air pressure of the pressure regulator.

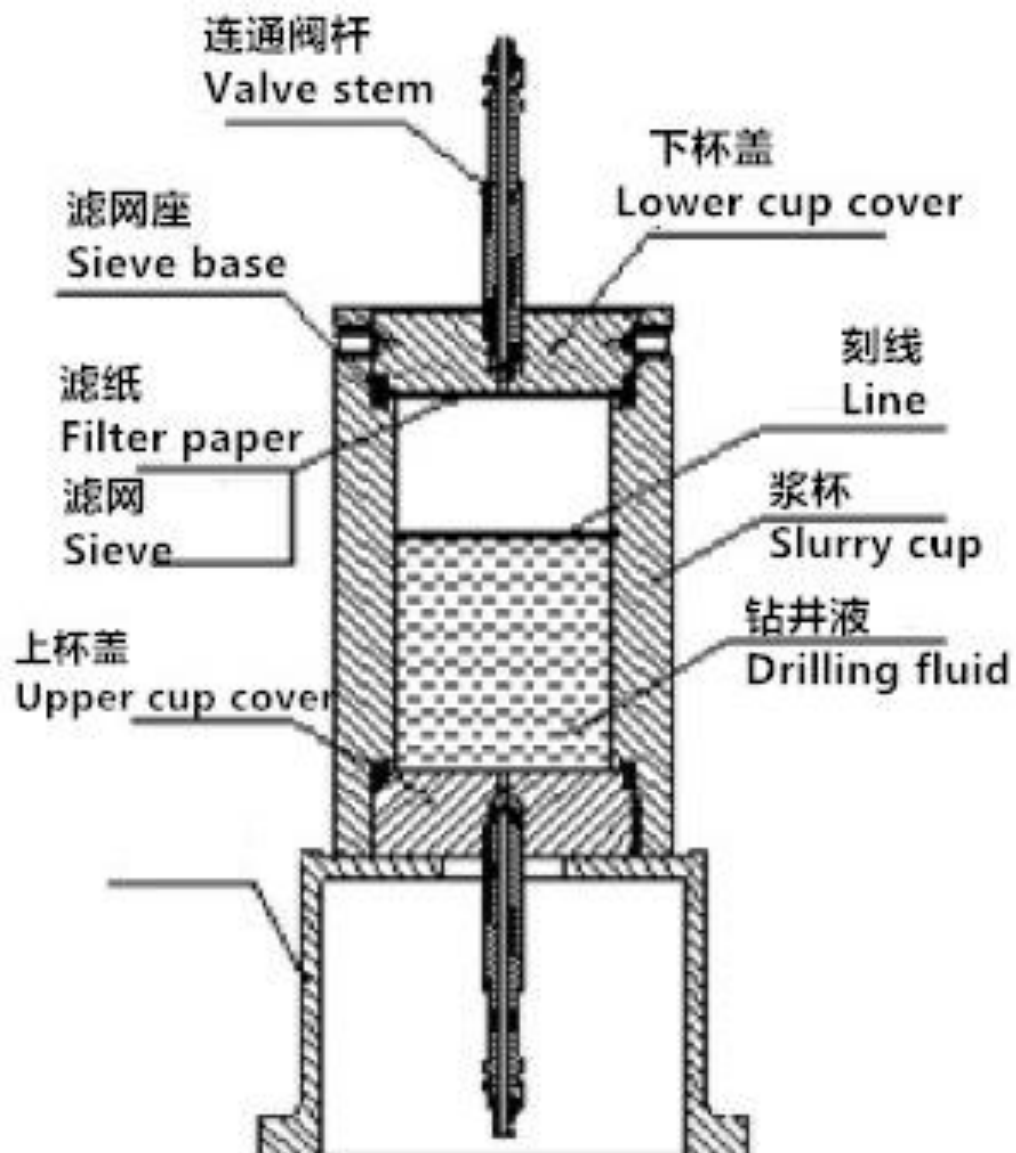
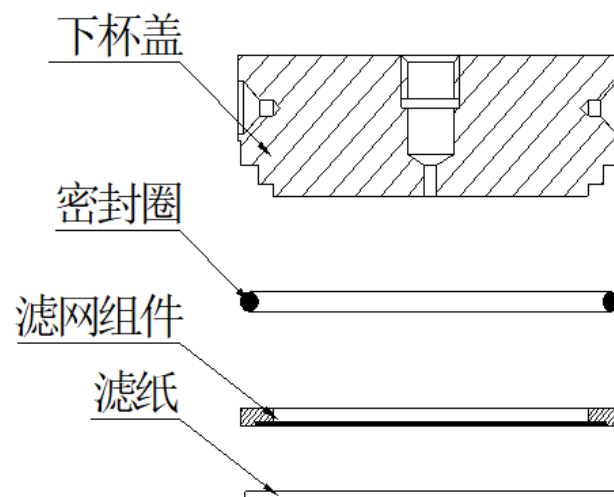
9、以毫米或  $1/32\text{in}$  为记录单位，量测泥饼厚度，并描述泥饼质量。

9. Set mm or  $1/32\text{in}$  as the record unit to measure the thickness of mud cake, and describe the quality of mud cake.

注意：液杯中将有 500 psi (3448kPa) 的气压。要使液杯保持在垂直状态，直至冷却至室温。

Notice: there will still have 500 psi (3448kPa) of air pressure within the liquid cup. The liquid cup needs to be kept at a vertical condition till it is cooled to the indoor temperature.







## 六、维护与保养 Maintenance

1、清洗各部件并干燥，涂抹润滑脂待用，仪器置于干燥环境中。确保通气孔内清洁。“o”型圈和滤网未变形、无破损，密封面无损伤。

Clean and dry each component, smear them with lubricating grease and set aside, place the instrument in a dry environment. Ensure the cleanness of the internal air hole, and the non-deformation& damage of “o”-ring and filter screen, and zero damage of the sealing surface.

2、移动或保养仪器时。要轻拿、轻放，以免造成部件变形影响精度和使用。

When moving or maintaining instruments. Handle with care to avoid deformation of components that may affect accuracy and usability.

3、调节压力时不能将压力调至超过压力表总量程的  $2/3$ ，逐渐加压，不得敲击压力表。

The pressure cannot be adjusted to  $2/3$  of the pressure gauge's total range when adjust the pressure, increase the pressure gradually and it is prohibited to knock on the pressure gauge.

4、仪器使用结束后，应将各部件内的压力、气体释放干净。泄压后方可清洗浆杯。

After using the instrument, the pressure and gas inside each component should be released completely. Clean the slurry cup only after relieving pressure.

5、输气管禁止与腐蚀性介质接触，不得敲击和划伤。

The gas piping is banned to be contacted with the corrosive medium, struck or scratched.

6、气源严禁使用氧气。

For the air source, it is prohibited to use oxygen.

7、装杯时，杯盖尽量压平，对角上紧螺钉。

When install the cup, planish the cup lid as much as possible, and tighten the bolt on the opposite angles.

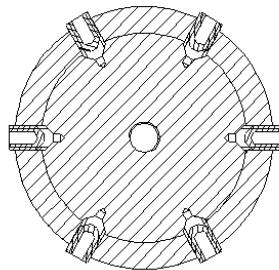
注意 Note:

1、先锥面引正螺钉，如图（一）。

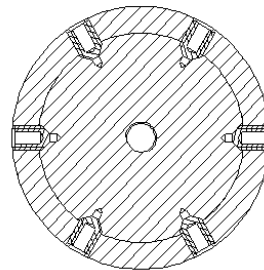
1. Correct the bolts according to the conical surface first, as shown in the figure(1)

2、螺钉引正后对角上紧，如图（二）。

2. Tighten the bolts diagonally after correction, as shown in the figure(2).

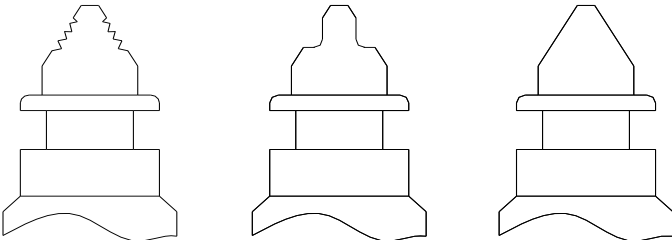


图（一）



图(二)

## 七、故障的判定与排除 Fault judging and clearing

故障 Fault	原因 Causes	维修方法 Maintenance methods
回压接收器溢出泥浆 The back-pressure receiver overflows mud	1.滤网受损 1.The filter screen is damaged 2.滤纸破碎 2.The filter paper is broken	1.更换滤网 1.Change the filter screen. 2.更换滤纸 2.Change the filter paper.
杯盖漏浆 The cup lid has a mud leakage	1.杯盖安装不当 1.The cup lid is inappropriately installed . 2.杯内“o”型圈老化或破损 2.The “o” type ring within the cup is aging or damaged.	1.重新安装杯盖 1.Re-install the cup lid. 2.更换“o”型圈 2.Change the “o” type ring
升温太慢 Warming is too slow	加热棒烧坏 Heating rod burns out	更换坏的加热棒 Change the broken heating rod.
如何鉴别连通阀杆的好坏 How to identify the good or bad of the connection valve rod	 <p>不好 尖端有凹槽      不好 尖端有凹陷      好</p>	

推荐最小回压 Recommend the minimum back-pressure					
实验温度 Experimental temperature		水蒸气压力 Vapor pressure		最小回压 Minimum back-pressure	
°F	°C	psi	kPa	psi	kPa
212	100	14.7	101	100	690
250	121	30	207	100	690
300	149	67	462	100	690
350	177	135	932	160	1,104



\*多孔陶瓷过滤器有许多应用,但在油田使用它们代替高温高压滤失仪的滤纸。根据不同的孔隙大小和渗透率,陶瓷过滤器可模拟真实的钻井地层情况。比起过滤纸来这是一个巨大的优势。陶瓷过滤器不像纸,是有深度(通常 6.5mm) 因此可以进行岩心侵入分析和渗透率研究。可以分析钻井和钻入流体的桥接特性。

\*The porous ceramic filter has various applications, and it is used for replacing the filter paper of high-temperature& pressure filter tester in the oil field. The ceramic filter could simulate the real conditions of the well drilling's stratum according to different pore sizes and penetration rate. And that is a huge advantage compared to the filter paper. Not like paper, the ceramic filter has depth(normally it is 6.5mm), thus it could make analysis on the core invasion and research on penetration rate. The bridging features of the well drilling and drilled fluid could be analyzed as well.

\*多孔陶瓷由相同大小的粒子紧密结合在一起形成一个统一的透水材料, 流体通过时形成曲折的道路。最常见的材料是氧化铝和二氧化硅,但也可以定制各种各样的材料和形状。高温高压泥浆杯必须进行调整以适应陶瓷磁盘。如果需要的话可提供一定的间隔用于使用滤纸。可以联系公司来定制不同大小的陶瓷盘和其他各式各样的孔隙疏密度/渗透率。

\*The porous ceramic is an unified permeable material formed by the close integration of same-size particles, and the zigzag road would be formed when it is passed through by the fluid. The most common materials are the aluminium oxide and silicon dioxide, while all kinds of materials and shapes also could be customized. The high-temperature& pressure cup must be adjusted for adapting to the ceramic disk. If it is needed, a certain of interval can be provided for using the filter paper. Can contact the company for customizing the different-size ceramic disks and other varied



pore's degree of closeness/ penetration rate.

\*这些陶瓷过滤器是由平均的孔隙大小或渗透率的单位来分类的。平均的孔隙是通过圆盘的平均最小孔隙直径，它是以微米为单位的，或千分之一毫米。渗透率是通过一个多孔介质或半多孔介质在受到不同压力时流体流量的测量。从数学上来说，它与达西的渗透性定律是等价的。

\*These ceramic filters are classified by the average pore size or the unit of the penetration rate. The average pore size refers to the minimum average pore diameter that passes through the disk, which has micrometer or a thousandth of millimeter as the unit. The penetration rate is a fluid flow's measurement when it goes through a porous medium or semi-porous medium and under different pressures. From the aspect of mathematics, it is equivalent to Darcy's law of permeability.

\*在此之前，通过空气渗透仪的技术，我们可以大致确定孔隙的大小和渗透率。最近由美国石油协会(API)资助的研究使用了最新的汞注射毛细管压力技术来确定这些特征。这个新程序发现，制造过程不允许陶瓷批次之间的绝对一致性，但是经过数年的多次测试，最终的结果在统计上非常接近。尽管陶瓷过滤器是相同的过滤器提供了多年来,新 API 方法确定平均孔喉大小和渗透导致新的和改进的规范中列出的图表。所有的结果和所有的订单都应该基于图表中的信息。

\*Previously, we could roughly make sure the size and penetration rate of pore through the technology of air permeameter. Currently, the research funded by API has used the latest Mercury-Injection Capillary Pressure Technology to make sure these features. This new procedure has found that the absolute consistency between the batch of ceramic is not allowed during the manufacturing process, while through several-year many times of tests, the final result is very close on statistics. Though the ceramic filters are same and they have been here since long time ago, while the new



API method has confirmed the average pore-throat size and the penetration rate, thus leading to the new and modified standard chart. All the results and orders shall be based on the information in the chart.

\*所有的陶瓷盘必须浸泡在被测试的基础液使用前至少 30 分钟。如果不这样做，就会导致磁盘内部的气孔堵塞，从而导致错误的结果。实验室保守的做法通常将陶瓷过滤盘一直浸泡在基液里。

\*All the ceramic disks must be soaked in the tested basic liquid for at least 30 minutes before use, if not, the pore inside the disk will be blocked and thus leading to the inaccurate result. The conservative method of the laboratory is to soak the ceramic filter disk in the basic liquid all the time.

规 格	孔径 $\mu\text{m}$	气孔率%	抗压强度(Mpa)	耐酸度%	耐碱度%	最大工作温度 $^{\circ}\text{C}$
0.1 $\mu\text{m}$	1.5-2	43-45	38-45	98	95	800
0.2 $\mu\text{m}$	3-4	42-43	38-45	98	95	800
0.5 $\mu\text{m}$	5-6	41-42	38-45	98	95	800
0.8 $\mu\text{m}$	7-8	40-41	38-45	98	95	800
1 $\mu\text{m}$	10-15	39-40	39-47	98	95	800
3 $\mu\text{m}$	30-35	37-39	39-47	98	95	800
5 $\mu\text{m}$	40-50	36-38	37-38	98	95	800
10 $\mu\text{m}$	80-100	35-37	36-37	98	95	800
20 $\mu\text{m}$	100-120	34-36	36-37	98	95	800
35 $\mu\text{m}$	150-170	32-34	36-37	98	95	800
150 $\mu\text{m}$	200-220	30-32	36-37	98	95	800
250 $\mu\text{m}$	230-250	30-31	32-34	98	95	800
380 $\mu\text{m}$	350-380	29-31	32-34	98	95	800

### 滤芯型号及参数



## 八、一年备件（选购）

### One-year repair parts(selective purchasing)

编号 No.	名称及规格 Name and specification	数量 Quantity
S0191	内六角锥端紧定螺钉 Hexagon socket set screw with cone point	30
121002	连通阀杆 Valve stem	10
P0302	988 滤纸 988 Filter paper	5
P0313	双金属温度计 Bimetal thermometer	1
S0502	“O”型圈（ $\phi 8 \times 1.9$ ） “O”-ring( $\phi 8 \times 1.9$ )	50
S0507	“O”型圈（ $\phi 37 \times 1.9$ ） “O”-ring( $\phi 37 \times 1.9$ )	50
S0508	“O”型圈（ $\phi 64 \times 3.5$ ） “O”-ring ( $\phi 64 \times 3.5$ )	50
P0132	保险丝（6A） Fuse(6A)	30
G0106	量筒（25ml） Measuring cylinder(25ml)	10





## 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 No	编号	名称及规格	单位	数量
1		滤失仪机体 Filter press body	台	1
2	1320	高压管汇 High pressure manifold	套	1
3	P0302	高温高压滤纸 HTHP filter paper	盒	1
4	12105	回压接收器 Back pressure receiver	套	1
5	G0302	钻井液杯 Drilling fluid cup	套	1
6	121002	连通阀杆 Connected valve stem	件	2
7	12101	三通阀 Three-way valve	套	1
8	12107	杯座 Cup holder	只	1
9	G0106	量筒(25mL) Measuring cylinder(25mL)	只	1
10	T0104	内六角扳手(4mm)Inner hexagon spanner(4mm)	个	1
11	T0139	呆扳手(17mm) Adjustable wrench(17mm)	只	1
12	T0143	呆扳手(7mm) Robot(7mm)	只	1
13	S0502	“O” 型圈( $\phi 8 \times 1.9$ )"O" ring( $\phi 8 \times 1.9$ )	只	8
14	S0507	“O” 型圈( $\phi 37 \times 1.9$ )"O" ring( $\phi 37 \times 1.9$ )	只	1
15	S0508	“O” 型圈( $\phi 64 \times 3.5$ )"O" ring( $\phi 64 \times 3.5$ )	只	4
16	P0313	双金属温度计 Bimetal thermometer	支	1
17	T0295	使用说明书 Instrument instruction manual	份	1
18	T0264	合格证 Certificate	份	1



# 产品合格证

## Product Quality Certificate

出厂编号:

Manufacturing No:

产品名称: Description:	
产品型号: Model:	
检验标准: Standard:	
生产日期: Date of Manufacture:	
产品编号: Product Code:	
<p>结论: Conclusion:</p> <p>经检验, 青岛创梦仪器有限公司生产的产品符合上述标准的要求。准予出厂。 After inspection, Qingdao Chuangmeng Instrument Co., Ltd The products produced meet the requirements of the above standards. Approved for delivery.</p>	
<p>本企业通过: IS0014004 环境管理体系认证; IS09001:2015 质量管理体系认证; IS018000 职业健康安全管理体系认证质检科;</p> <p>QC Department:</p>	