



青岛创梦仪器有限公司

Qingdao ChuangMeng Instrument Co., Ltd.

电稳定性测试仪

Electrical Stability Tester

型号 MODEL:1810



使用手册

Instruction Manual

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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.

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一、概述 Introduction

电稳定性测试仪(1810)是一个正弦波仪器,是依照美国石油学会(API)“推荐实践标准程序为实地测试油性钻井液” 13B-2 制造。它精确、简洁、便携。用于常规现场和实验室来测量有连续油相的钻井液相对电强度。

Electrical stability tester (1810) is a sine wave instrument, in accordance with the American Petroleum Institute (API) recommended practice standard procedures for field testing of oil drilling fluid 13B-2 manufacturing. It is accurate, simple, portable. Used to measure the relative electrical strength of drilling fluid with continuous oil phase in conventional field and laboratory.

1810 测试仪由测试仪器、探针组成,它采用四节常见的 9 伏碱性电池,还有高、低两个校准块来保证精度。电介质击穿电压是钻井液导电的关键,电池的直流电源在低频率下提供了一个交流电压给电极。

The 1810 tester is composed of a measuring instrument and a probe, which uses four common 9 volt alkaline batteries, as well as high and low calibration blocks to ensure the accuracy of two. Dielectric breakdown voltage is the key to the conductivity of drilling fluid. The DC power supply of the battery provides an AC voltage to the electrode at low frequency.

电稳定测试仪的大小、电极间的间距以及电流都已经标准化了。两个电极一样大,间距为 0.061 英寸;电流大小设为 61uA,持续增长的电压,其频率固定为 $340 \pm 10\text{Hz}$,且幅值持续增长的正弦波一直加载在电极上。将电极浸在钻井液中,若电极间的电流开始导通且增长到 61uA,电压自动停止增长且峰值电压读数会稳定,这时的峰值电压会被记录并且显示电介质的击穿电压。

The size of the electrical stability tester, the spacing between the electrodes and the current have been standardized. Two electrodes as large as the pitch of 0.061 inches, the current size is set to 61uA, the continuous growth of the voltage, the frequency is fixed at $+ 340 + 10\text{Hz}$, and the amplitude of the continuous growth of the sine wave has been loaded on the electrode. Soak the electrode in the drilling fluid, if the current between the electrodes and the conduction began to grow to 61uA growth, and the peak voltage readings will automatically stop the stable voltage, peak voltage will be recorded and then display the breakdown voltage of the dielectric.

电稳定性值将随测试温度增加而减少,被推荐的 API 测试温度为 $120 \pm 5^\circ\text{F}$ ($49 \pm 3^\circ\text{C}$)。化学成分和钻井液的剪切过程控制 1810 的绝对值。

Electrical stability value will decrease with the temperature test, API test temperature is recommended for $120 \pm 5^\circ\text{F}$ ($49 \pm 3^\circ\text{C}$). The absolute value of the chemical composition and the shear process control 1810.

由于以石油为基础的钻井液的 1810 是复杂多变的,影响钻井液电稳定性的条件主要有:

- (1)电阻率的连续性(通常是指重石油)
- (2)电导率的非连续性(通常是水滴与溶解的盐)
- (3)有悬浮属性的固体颗粒
- (4)温度
- (5)液滴大小
- (6)不同类型的乳化剂
- (7)液体的介电性能
- (8)样本的剪切性

Due to the fact that the oil based drilling fluid is complex and variable, The main factors affecting the stability of drilling fluid are:

- (1)The continuity of the resistivity (usually refers to the heavy oil)
- (2)The non continuity of the conductivity (Usually of water and dissolved salt)
- (3)Suspended solids

- (4)The temperature
- (5)Droplet size
- (6)Different types of emulsifiers.
- (7)Dielectric properties of liquids
- (8)Sample shear

因此，从一次电稳定性测试的结果解释其油湿状态，并不能代表钻井液的性能。由于诸多因素影响测量，一次测量的绝对值不具有绝对意义。建议多测几次，用多次测量结果建立趋势图。这个趋势图可以准确的反映钻井液的性质，并为钻井液处理提供依据。

*Therefore, it is not representative of the performance of the drilling fluid to explain the oil wet state from the results of the primary stability test. Because many factors influence the measurement, the absolute value of the first measurement is not absolute. Recommended to measure several times, using multiple measurements to establish the trend chart. This trend chart can accurately reflect the properties of drilling fluid and provide basis for drilling fluid treatment.

二、安全原则 Safety

操作和维护电稳定性测试仪时应遵守试验室操作和流程规范。一些测试样本可能存在潜在危险或含有易燃材料。当使用这些样本做实验时，应当保持良好的通风并使用抽油烟机。

Operation and maintenance of electrical stability tester shall comply with laboratory operation and process specifications. Some test samples may be potentially hazardous or contain flammable materials. When using these samples to do the experiment, good ventilation should be maintained and the range hood is used.

由四节 9V 锂电池或交流电压（100-240V，50/60Hz）供电。当用交流电供电时，若发生短路或用了超过量程的电压供电，电路断路器会自动关闭仪器。操作时应遵守以下安全原则：

Powered by four 9V lithium batteries or AC voltage (100-240V, 50/60Hz). When AC power is used, the circuit breaker will turn off the instrument automatically if a short circuit occurs or the voltage exceeds the range. The following safety principles shall be observed in the operation:

- 1、探头会加载高达 2000V 的电压，测试期间不要触摸探头。
- 2、用户使用探头应远离电器接地端。
- 3、测试水溶液时应小心操作。探头应该在测试开始之前就浸入水溶液中，切忌先开始试验，再将探头浸入水溶液。突然浸入水溶液中会产生高达 61uA 的电流。

- 1.The probe will load up to 2000V of the voltage during the test without touching the probe.
- 2.The user should use the probe to stay away from the ground.
- 3.Be careful when testing aqueous solutions. The probe should be immersed in an aqueous solution prior to the start of the test, not to start the test, and then dip into the water solution. Sudden immersion in aqueous solution produces up to 61uA of current.

三、仪器的主要技术参数 Features and Specifications

电稳定性测试仪是由电池或交流电压驱动的，是符合 API 13B-2 规范的电稳定测试流程的便携式仪器。

Electrical stability tester is driven by the battery or AC voltage, is in line with the API 13B-2 standard electrical stability test flow of portable instruments.

仪器的部件包括测试单元、电极探头、两个校准块（选配）、一根电源线、四节电池。

The components of the instrument include a test unit, an electrode probe, two calibration blocks (matching), a power supply line, and a four battery.

分类 Category	规格 Specification
使用温度范围 Operating Temperature Range	0—50°C (32—122°F)
探头最高测试温度 Maximum Probe Temperature	120 ± 5°F (49 ± 3°C ± 3°)
存储温度范围 Storage Temperature Range	-20--70°C (-4--158°F) (无电池) (without batteries)
精确度 Accuracy	期望值的±2% ± 2% of Expected Reading
自动断电时间 Time before Auto Power Off	1 分钟 1 minutes
输出频率 Output Frequency	340±2Hz
输出波形 Output Wave Form	正弦波 Sinusoidal, <1% total harmonic distortion
输出电压范围 Output Voltage Range	0-2025V±25V (有效值 1432V) (1432 Volts RMS)
破乳电流 Breakdown Peak Output Current	61μA
电压显示 Peak Volts Readout	数字液晶显示器 Backlit Digital LCD
电压上升率 Voltage Ramp Rate	150±10V/秒 150 ± 10 V/sec
电源 Power Supply	4 节 9V 锂电池 Four, 9 Volt alkaline batteries 输入 (Input) :100-240V, 50/60Hz,1.2A 输出(Output):16V, 3.5A
电池使用寿命 Battery Life	大约可测试 260 次 Approximately 260 tests
探头和线缆长 Probe and Cable Length	85cm (3.35in)
探头电极间距 Probe Electrode Spacing	0.155cm (0.061in)

四、仪器配置 Instrument configuration

- 用 12 孔试验筛或马氏漏斗
- 温度计（0 到 104 摄氏度）
- 玻璃烧杯
- 热板或热源
- With 12 hole test sieve or a funnel
- Thermometer (0 to 104°C)
- Glass beaker
- Hot plate or heat source

五、仪器的操作与测试 Operations

- 1.用 12 孔试验筛或马氏漏斗过滤样品中的大块固体物，把样品放入可加热的烧杯或可加热的粘度杯中。
- 2.调节、保持容器和样品的温度在 $50\pm 2^{\circ}\text{C}$ ，（ $120\pm 5^{\circ}\text{F}$ ）。
- 3.用纸巾彻底地将电极探头擦拭干净，电极间应多擦拭几次。
- 4.用探头搅拌油基，以保证可用于泥浆中，如果油基不合适，其他油或试剂（如异丙醇）也可以，测试前擦净并烘干探头。

- 1.The use of 12 hole test sieve or funnel filter samples of large solids, the sample can be placed in a beaker or heated heating viscosity cup.
- 2.Regulation, keep container and the temperature of the sample at $50\pm 2^{\circ}\text{C}$ ，（ $120\pm 5^{\circ}\text{F}$ ）
- 3.With a paper towel will completely wipe clean electrode probe, the electrode should wipe several times.
- 4.Using the probe to stir the oil base, to ensure that can be used in mud, if the oil base is not appropriate, other oil or reagents (such as isopropyl alcohol) can also be cleaned before the test and drying probe.

注意：勿将电极探头连接到仪器上！

Note: Do not connect the electrode probe to the instrument!

注意：仪器上没有“关闭”按钮，仪器将在最后一步操作完成 1 分钟后自动关闭。

Note: There is no "off" button on the instrument, the instrument will automatically shut down after 1 minutes of operation.

将电极连接到仪器上，见下图。

Connect the electrodes to the instrument. See Figure



注意：严禁使用清洁剂或芳香烃溶剂擦拭探头或线缆。

Note: Do not use detergent or aromatic hydrocarbon solvent to clean the probe or cable.

探头浸入溶液中，见下图。

The probe is immersed in the solution. See Figure



注意：确保探头不能接触容器！

Note: Make sure that the probe is not in contact with the container!

至少用探头搅动 10 秒钟，用温度计确保溶液温度在 $50 \pm 2^\circ\text{C}$ ，（ $120 \pm 5^\circ\text{F}$ ）。

At least 10 seconds with a thermometer stirring probe, ensure the solution temperature at $50 \pm 2^\circ\text{C}$ ，（ $120 \pm 5^\circ\text{F}$ ）.

注意：测试过程中不要移动电极探头！

Note: do not move the electrode probe during testing!

按下“测试”按钮，电压开始自动上升。测试期间不要移动探头，当达到击穿电压时电压停止增长，此时电压值记录为电介质击穿电压（电稳定性读数）。

Press the "test" button and the voltage starts to rise. During the test, do not move the probe, when the voltage reaches the breakdown voltage, the voltage is recorded as the dielectric breakdown voltage (electrical stability reading)

注意：如果仪器的电压读数大于 2000V，表明此溶液样品的击穿电压超过了 $2025 \pm 25\text{V}$ （峰值）。

Note: If the voltage reading of the instrument is greater than 2000V, the breakdown voltage of the sample is more than $2025 + 25\text{V}$ (peak value).

测定试验的重复性，重复上述步骤。电稳定性读数误差不应超过 5%。例：一个初始点稳定性峰值电压为 900V，则重复测试的读数应在 855V 到 945V 之间（峰值 900V 的 $5\%=45\text{V}$ ）。如果读数超出了 5%，

Determine the repeatability of the test, repeat the above steps. Electrical stability reading error should not exceed 5%. Example: an initial point stability peak voltage of 900V, the repetition of the test should be between 855V to 945V (peak

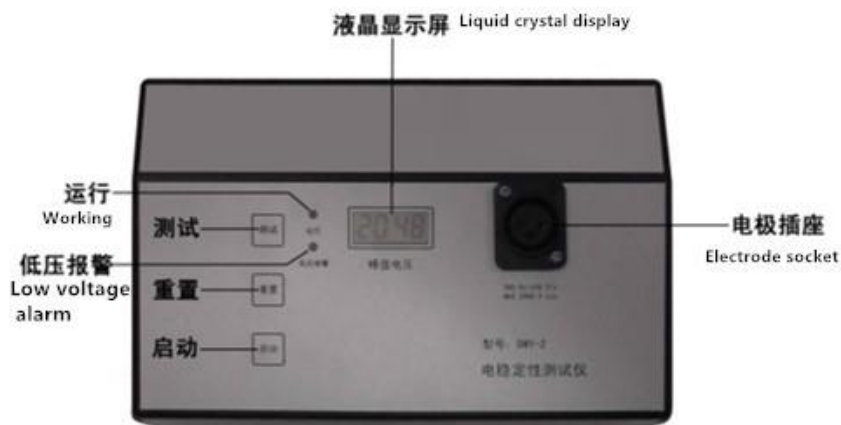
900V 5%=45V). If the reading exceeds 5%.

记录并算出两次或多次测试的油基泥浆电稳定性的平均值。

Record and calculate the average value of the electrical stability of the oil base mud for two or more tests.

注意：该仪器会保留最后一次测试的读数。再次按下“重置”按钮，将读数置零并开始下一次测试。见下图

Note: The instrument will retain the readings for the last test. Press the reset button again, set the reading to zero and start the next test. See Figure



六、仪器校准 Calibration Check

没有可同时测试 1810 型电稳定性测试仪和电极探头的标准液。仪器和探头的性能是可以分别校准的。

A standard fluid is not available to test the performance of both the Model 1810 and its electrode. However, performance checks can be done on the instrument and the electrode separately.

6.1 开路实验 Open Circuit Test

1. 从仪器上拔下探头。

2. 按下“启动”按钮，启动仪器。

3. 按下“测试”按钮，电压读数应该上升到超出 2000V。

1. Unplug the probe from the instrument.

2. Press the ON button, and then run the tester.

3. Next, press the TEST button. The voltage readings should increase to more than 2000 volts, and then a dashed line will flash on the screen to indicate the reading is over range.

6.2 校准 Calibration Standards

仪器提供两种校准标准---高量程和低量程。每个标准都可以从仪器上读到理想的读数。见下图

The instrument provides two calibration standards - high and low range. Each standard can be read from the instrument to an ideal reading. See Figure



注意：青岛创梦仪器有限公司为电压制定了校准标准和校准测试，每种校准标准都有唯一的电压读数。

Note: Qingdao Chuangmeng Instrument Co., Ltd. for the voltage calibration standards and calibration tests, each calibration standard has a unique voltage reading.

- 1.按下“启动”按钮，启动仪器。
- 2.在探头插座里插入一个校准块。
- 3.按下“测试”按钮，电压开始自动增长。
- 4.用另一个校准块重复上述步骤2和步骤3。
- 5.如果仪器的读数不是标准校准电压的2%，可能是校准块或仪器有故障。

- 1.Press the "start" button to start the instrument.
- 2.Insert a calibration block in the probe socket.
- 3.Press the "test" button and the voltage starts to grow.
- 4.Repeat step 2 and step 3 with another calibration block.
- 5.If the reading of the instrument is not 2% of the standard calibration voltage, the calibration block or instrument may be faulty.

6.3 探头校准 Probe Check

- 1.拔下探头。
 - 2.检查探头线缆的绝缘处是否有断裂和其它损坏。
 - 3.检查并确定电极孔的堆积物彻底擦拭干净。
 - 4.检查探头插头的三个电极间是否潮湿或有堆积物。
 - 5.检查两侧头处电极间的间距，应该在 0.160 厘米到 0.155 厘米之间（0.063 英寸到 0.061 英寸之间）。
 - 6.将探头插入仪器，保证探头在干燥的空气中，并按下“测试”按钮，峰值电压应该上升到 >2000V，见下图
- 1.Pull off probe.
 2. Check the insulation of the probe cable for breakage and other damage.
 3. Check and make sure that the electrode holes are thoroughly cleaned.
 4. Check whether or not the three electrodes of the probe plug are wet or stacked.
 - 5.Check the distance between the electrodes on both sides of the head, between 0.160 cm to 0.155 cm (between 0.063 and 0.061 inches).
 6. Insert the probe into the instrument to ensure that the probe is in dry air and press the "test" button. The peak voltage should be increased to 2000V, See Figure



如果不超过 2000V, 则意味着在电极间就像探头放入泥浆中那样, 有其它的电通路。擦拭干净探头插头和电极, 重做一次, 如果仍失败则需要更换探头。

If it is not more than 2000V, it means that there are other channels in the electrode as the probe is put into the mud. Clean the probe plug and electrode, redo it once, and replace the probe if it fails.

7. 将探头浸入流动的自来水中并按下“测试”按钮, 仪器读数应该小于 3 伏, 如果读数大于 3 伏, 则说明有什么绝缘物使电极和泥浆不能接触, 或者探头线缆损坏。擦拭干净探头的插头和电极, 小心干燥探头, 重做一次。见下图

7. The probe is immersed in flowing tap water and press the "test" button, the instrument should be less than 3 volts, if readings greater than 3 volts, then there is what makes the electrode insulation and mud can not contact, or probe cable damage. Clean the plug and electrode of the probe, carefully dry the probe, redo it. See Figure



8. 探头电极如果不能通过以上测试, 说明探头内部已经损坏, 请与厂家联系更换。

8. If the probe electrode can not pass the above test, indicating that the probe has been damaged, please contact the manufacturer to replace.

七、故障排除和维修 Troubleshooting and Maintenance

故障现象 Problem or Symptom	可能的原因 Possible Cause	纠正 Corrective Action
按钮“开始”(“ON”)按下后不工作 Does not activate when the ON button is pressed.	1.没有电池或电池没电 2.按钮按的太轻 1. Missing or weak batteries. 2. Did not firmly press the ONbutton.	1.更换电池 2.用点力按 1. Replace the batteries. 2. Press the button again with more pressure.
“低压报警”灯闪烁 LOW Voltage message.	电池没电 Weak batteries.	更换电池 Replace the batteries.
校准时读数不正确 Voltage readings obtained with calibration standards are incorrect.	1.校准探头脏 2.探头损坏 3.仪器不能校准 1.Dirty calibration standards. 2.Damagedcalibration standards. 3. Out of calibration.	1.清洁连接处并彻底干燥 2.更换探头 3、返修 1.Clean and thoroughly dry connector pins. 2. Replace them. 3. Factory repair.
探头不能通过测试 Probe does not pass the performance check.	探头损坏 Probe failure.	更换探头 Replace the probe.
若没连探头，峰值电压没有上升到>2000V If the probe is not connected, the peak voltage does not rise to > 2000V.	仪器的连接处被导电物污染 The junction of the instrument is contaminated by electrical conductivity	擦净 Clean

7.1 维护 Maintenance

- 1.经常擦拭，保持仪器无灰尘，远离腐蚀液和溶剂，保证仪器经久耐用。
- 2.避免仪器的探头插槽和电池盒暴露并被溅入液体。
- 3.杜绝野蛮的操作仪器。
- 4.用纸巾彻底地将电极探头擦拭干净。

- 1.Wipe frequently, keep the equipment free of dust, away from the corrosive solution and solvent, and ensure the durability of the instrument.
- 2.To avoid the probe slot and the battery box is exposed to the liquid.
- 3.Put an end to the barbaric operation of instruments.
- 4.Thoroughly wipe the electrode probe with a paper towel.

7.2 更换电池（锂电池） Replace battery (lithium battery)

- 1.电池（锂电池）寿命应该能满足 260 次测试，如果电压平均值高于 1000 伏电池寿命会降低。
- 2.如果仪器长时间使用交流电源供电或不使用仪器时，应该将四节电池全部取出。否则电池会泄露并腐蚀仪器。
- 3.当“低压报警”灯闪烁时，更换锂电池。
- 4.将电池从仪器的后面安装，抽出电池盒，按照盒底所画正极性端在左侧放入新电池。（注意：电池为锂电池）见下图。

- 1.Battery (lithium battery) life should be able to meet the 260 test, if the average voltage higher than 1000 volts battery life will be reduced.
- 2.If the instrument is powered by an AC power supply for a long time or is not in use, the four batteries should be removed.

3. When the "low voltage alarm" light flashes, replace the lithium battery.

4. Install the battery from the back of the instrument, draw out the battery box, and put the new battery on the left side of the positive side of the box. (Note: the battery is a lithium battery) See figure.



*有可能用交流电压给仪器供电，交流电压应该是 100-240V, 50/60Hz, 10 瓦。

*It is possible to use AC voltage to power the instrument, AC voltage should be 100-240V, 50/60Hz, 10 watts.

7.3 保存校准块 Save calibration block

校准块应该保持清洁，防止探头引脚之间形成导电薄膜。避免探头暴露在潮湿的空气中，应保存在密封的塑料袋或密封罐中。

The calibration block should be kept clean to prevent the formation of conductive film between the probe pins. To avoid the exposure of the probe in the humid air, should be kept in a sealed plastic bag or sealed tank.

八、零件和附件 **Parts and accessories**

编号 No	描述 Describe
1850	1810 主机 1810 Host
18503	电极 Electrode
P0446	校准块(高范围)---(选配) Calibration block (high range) - (optional)
P0445	校准块(低范围)---(选配) Calibration block (low range) - (optional)
P01156	电池盒 Battery box

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 Name and specification	单位	数量 Quantity	备注 Remarks
1		主机 Main engine	台	1	
2		电极 Electrode	根	1	
3		校准块 1800±2% Calibration block 1800±2%	个	1	
4		校准块 900±2% Calibration block 900±2%	个	1	
5		电源适配器 16V 3.5A The power adapter 16V 3.5A	套	1	
6		使用手册 Instruction Manual	份	1	
7		合格证 Certificate	份	1	
8		装箱单 Packing list	份	1	