青岛创梦仪器有限公司

Qingdao ChuangMeng Instrument Co., Ltd.

粘滞系数测定仪
Friction Coefficient Tester

型号 Model:1802

使用手册

Instruction Manual

版本 1.0
Version 1.0

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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1、概述 Introduction

随着钻井工艺技术的飞跃发展，特种工艺井、定向井、丛式井越来越多。对钻井液润滑性能的要求也越来越多，同时用于钻井液润滑的处理剂也在逐年增多。由于润滑剂质量的差异，加上需要合理的配伍性，都需要一种仪器来评价。为此，创梦仪器研制了 1802 型粘滞系数测定仪。该仪器携带方便、工作可靠、精度高、重复性好，是对钻井液分析的必备仪器。

With the rapid development of drilling technology, there are more and more special process wells, directional wells, and cluster wells. The requirements for the lubrication performance of drilling fluids are also increasing, and the number of treatment agents used for drilling fluid lubrication is also increasing year by year. Due to differences in lubricant quality and the need for reasonable compatibility, an instrument is required to evaluate it. For this purpose, Chuangmeng Instrument developed the 1802 viscosity coefficient tester. This instrument is easy to carry, reliable in operation, highly accurate, and has good repeatability, making it an essential tool for drilling fluid analysis.

二、参数 Parameter

名称 Name	粘滞系数测定仪 Friction Coefficient Tester
型号 Model	NZ-3A
工作电源 Working power	220V±5%AC 50/60Hz
电机功率 Power of generator	5 W
翻转速度 Turning speed	每转 5.5～6.5 分钟 5.5～6.5 minutes per turn
角度读值 Reading of angles	数字显示 Digital display
精度 Precision	0.5°
环境湿度 Moisture of environment	10～85RH%
外形尺寸 Outer size	335×190×170

三、结构与工作原理 Structure and Working Principle

1.结构 Structure

该仪器主要由外壳、工作台、液晶显示屏、传动机构及微电机组成。便携式。

1)电器罩盒面板。（见图 1）

2)滑块、滑棒：不锈钢材料制成。用来测试的标准件。（见图 2）

3)工作台：耐蚀材料制造。上下两面镶有水平泡，有一面带凹槽，是用来测试的工作台。

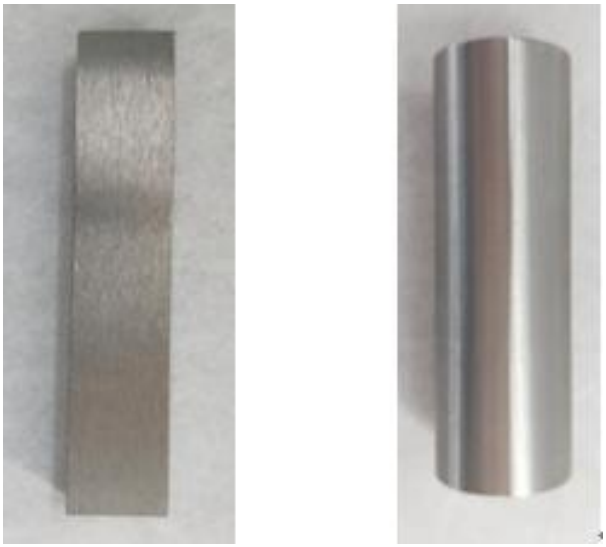
The instrument is mainly composed of shell, Workbench, liquid crystal display, transmission mechanism and micro motor. It is a portable style.

1) The face plate of the cover of electrical equipment (See Fig 1)

2)Slide block and Slide stick: Made of stainless steel. It is a standard piece for testing. (see Fig 2)

3）Workbench：Corrosion resistant material is made. There are horizontal bubbles on both sides.There is a grooves with one side. It is a workbench for testing.

（图 1）电器罩盒面板图 Panel diagram



（图 2） 滑块 Slide block　　滑棒 Slide stick

2.工作原理 Working principle

在工作台倾斜条件下，放在泥饼上的滑块受向下的重力作用，当克服粘滞力后开始滑动。如图所示。根据牛顿摩擦定律：

Under the tilted workbench, the slide block that puts on mud cake is exerted the downward gravity role and will begin to slide after overcoming the sticking force. According to the Newtonian's friction law:

$$\text{摩擦系数 } f = F/P$$

f----摩擦系数Friction coefficient

F----摩擦力Friction force

P----正压力Vertical pressure

设滑块重量为 W、其分力与斜面平行者为 F，即摩擦力。垂直者为 P，即正压力。由三角形关系。（见图 3）

The weight of the slide block is W, and the force of the slider is F, that is, the friction force. The vertical is P, that is, positive pressure. The relationship between the triangle and the triangle. (see Figure 3)

$$F = W\sin \quad , \quad P = W\cos$$

在滑块开始下滑时的摩擦系数：

The coefficient of friction when the slide block begins to slide.

$$f = (W\sin\ ) / (W\cos\ ) = tg$$

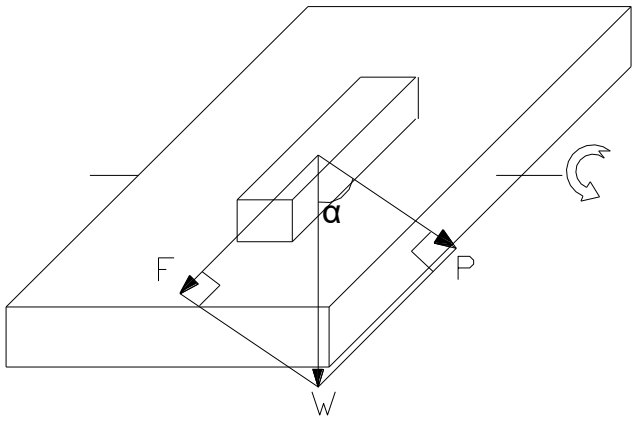
又由相似三角形关系可知：

It is also known by the relation of similar triangles:

$$\angle\alpha = \angle\beta\ tg\alpha = tg\beta$$

而∠β 为仪器所测，所以 tgβ 就是泥饼的摩擦系数，即泥饼的摩擦系数为仪器所测粘滞系数。

And ∠β is measured by the instrument, so tgβ is the friction coefficient of mud cake, that is, the friction coefficient of mud cake is the viscosity coefficient measured by the instrument.



（图 3）工作原理图

(Figure 3) Working principle diagram

四、仪器的操作 Operations of the Instrument

1.滑块测试法

1）仔细阅读说明书。检查各连接部位连接是否牢固可靠。电源可靠接地。

2）接通电源，显示屏显示 0.0。按下运行键，检查各转动部位是否运转正常。若正常，将工作台不带槽面转至向上，按两下清零键，把数值清零待用。

3）左右调整调平手柄，观察水平泡，将工作台不带槽面调至水平，准备工作结束。 （见图 4）

4）将按 API 标准做的滤失后所得的泥饼放在工作台不带凹槽的平面上。

5）将滑块轻轻的放在泥饼上，静置一分钟。

6）按下运行键，电动机带动传动机构，使工作台带动滑块慢慢翻转。而显示屏上的数字也随着工作台的翻转从零慢慢增加。

7）当滑块随着工作台的翻转开始滑动时，按下停止键,读取显示屏上角度值及 tg 值。tg 值就是泥饼的摩擦系数。

1. The testing method using slide block.

1) Read the instructions carefully. Check whether the connection parts are strong and reliable. The power supply is reliably grounded.

2) Connect the power supply, display the display ‘0. 0’. Press the ‘run’ button to check whether the rotating parts are running normally. If normal, turn the non-grooved side of the workbench up to the top. Press the ‘reset’ button two times.

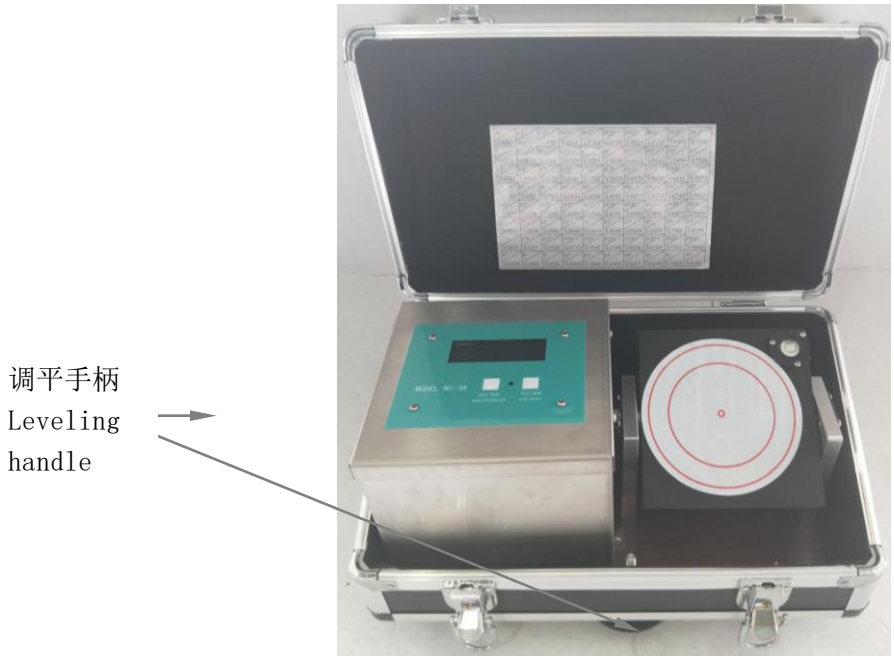
3) Adjust the leveling handle around, observe the level bubble, Adjust the non-grooved side of the worktable to the level, and prepare for the end of the work. (see Figure 4)

4) The mud cake obtained after filtration after the API standard is placed on the non-grooved side of the workbench.

5) Place the slide block gently on the mud cake for 1 minute.

6) Press the ‘run’ button and the motor drives the transmission mechanism, so that the workbench drives the slider slowly to turn over. And the number on the screen also slowly increases with the workbench turning from zero.

7) When the slide block starts sliding with the workbench, press the ‘stop’ button to read the angle value and ‘tg’ value on the display screen. The ‘tg’ value is the friction coefficient of the mud cake.



（图 4）操作示意图

(Figure 4) Operation schematic diagram

2.滑棒测试法

1）重复滑块测试法 1 和 2。确认各项正常后，将工作台带凹槽面转至上面，按两下清零键，把数值清零待用。

2）左右调整调平手柄，观察水平泡，将工作台带凹槽面调至水平，准备工作结束。

3）将按 API 标准做的滤失后所得的泥饼放在工作台凹槽内，先在泥饼上面放一部分同一钻井液。再将滑棒轻轻地放在凹槽内的钻井液上。静置一分钟。

4）按下运行键，电动机带动传动机构，使工作台带动滑棒慢慢翻转。而角度显示窗上的数字也随着工作台的翻转从零慢慢增加。

5）当滑棒随着工作台的翻转开始滑动时，按下停止键,读取显示屏上角度值及 tg 值。tg 值就是泥饼的摩擦系数。

6）这项测试需要钻井液的多个泥饼,而且各个泥饼的滑棒静置时间不同，时间可选为 1、3、5、7、9、11、13……分钟。一直做到滑棒静置到某个时间。以后的几点摩擦系数不再增大为止，若以测得的角度和静置时间画一曲线图可以看出，曲线上升到一定程度。就趋于平滑状态，取拐点值就是最大的摩擦系数和静压时间。以后，再做同类钻井液直接做最大静置时间即可。

注：当 tan 值出现第一位出现不完整时说明已超出测量范围。

2.The testing method using slippery stick

1) Repeated slider block test methods 1 and 2. After confirming the normal conditions, Turn the workbench with a grooved side to the top, Press the ‘reset’ button two times.

2) Adjust the ‘leveling handle’ around, observe the horizontal bubble, Adjust the grooves of the workbench to the level, and finish the work.

3) The mud cake will be placed in the groove of the workbench according to the standard of API, and a portion of the same drilling fluid will be put on the mud cake first. Then slide stick gently into the drilling fluid in the groove. Leave it for 1 minute.

4)Press the ‘run’ button and the motor drives the transmission

mechanism, so that the workbench drives the slider slowly to turn over. And the number on the screen also slowly increases with the workbench turning from zero.

5) When the sliding stick starts sliding with the workbench, press the ‘stop’ button to read the angle value and ‘tg’ value on the display screen. The ‘tg’ value is the friction coefficient of the mud cake.

6) This test requires mud cakes from drilling fluids, and the sliding stick time of each mud cake is different. The time is 1, 3, 5, 7, 9, 11 and 13……Minutes. The slider can be placed until a certain time. The friction coefficient of the later points no longer increases. If we draw a curve from the measured angle and the static time, we can see that the curve rises to a certain extent. The value of the turning point is the maximum friction coefficient and the static pressure time. Later, do the same drilling fluid directly to make the maximum static time.

Note: When the first value of the ‘tan’ value appears incomplete, it indicates that it has exceeded the measuring range.

五、维护与保养 Maintenance and upkeep

1、仪器置于干燥环境中。

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。

3、水平泡不得碰撞，以免破损。

4、滑块和滑棒是仪器的主要测试件，使用和存放时注意不要破坏表面。

1. The instrument is placed in a dry environment.

2. When moving, repairing, or maintaining the instrument. It is necessary to take lightly and put it lightly so as not to cause deformation of parts and affect accuracy and use.

3. The horizontal bubble must not collide, so as not to be damaged.

4. Slider block and slide stick are the main test pieces of the instrument. Do not destroy the surface when using and storing.

六、故障的判定与排除 Fault judge and remove

故障 Phenomenon	原因 Cause	维修方法 Removing method
接通电源，显示屏不显示 Connect the power, the display screen does not show.	电源插头未插好。 The power plug is not properly plugged in。	检查电源插头安装是否牢固可靠。 Check if the power plug is securely and reliably installed.
接通电源，数字显示窗显示数字不完整 Connect the power, the digital display window shows incomplete numbers。	1)系统控制电路不稳定 2)系统控制电路出现故障 1) The system control circuit is unstable 2) System control circuit malfunction	卸掉箱体底部的调平手柄和固定螺取出主机，打开电器罩盒排除电路故障或更换线路板 Remove the leveling handle and fixing screw at the bottom of the box, take out the main unit, open the electrical cover box to troubleshoot the circuit or replace the circuit board.
用“调平手柄”调整水平时，不起作用 The ‘leveling handle’ does not work.	固定“调平手柄”的紧定螺钉松动 The screws to fix the ‘leveling handle’ loosen	将仪器盖上箱盖，底朝上放置检查“调平手柄”的紧定螺钉是否松动。若松动将紧定螺钉拧紧. Cover the lid of the instrument and place it on the top. Check whether the tightening screws of the leveling handle are loose. Tightening screw tightened if loosening
“工作台”有较大松动。 The workbench is loose.	固定“工作台”的支撑板的螺钉松动 The screws securing the support plate of the workbench are loose.	卸掉箱体底部的调平手柄和固定螺钉取出主机，底朝上检查固定“工作台”的支撑板的螺钉是否松动。若松动将螺钉拧紧. Remove the leveling handle and fixing screws at the bottom of the box and take out the main unit. Check if the screws fixing the support plate of the "workbench" are loose with the bottom facing upwards. If loose, tighten the screw.

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
1		主机 Main engine	台	1
2		滑棒 Slide stick	个	1
3		滑块 Slide block	个	1
4		函数表 Function table	份	1
5		电源线 Power line	套	1
6		使用手册 Instruction Manual	份	1
7		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:	

结论：Conclusion:

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.

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；

QC Department: