青岛创梦仪器有限公司

Qingdao Chuangmeng Instrument Co. Ltd.

扭簧测力计

TORSIONAL SPING DYNAMOMETER

型号 Model:1105

使用说明
Instruction Manual

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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。

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.

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1、概述

扭簧测力计是为校正旋转粘度计中扭簧刚度和示值误差而设计的专用测试仪器，是保证粘度计准确度而定期测定扭簧的效验仪器。

2、型号及规格

型号	名称	配置
1105	扭簧测力计	

3、仪器的主要技术参数：

主要技术参数

名称	技术参数
测量范围	在弹簧刚度标准值范围内，可连续测定（砝码从 1 克到 70 克）
外形尺寸	200×142×300mm

4、仪器的结构及工作原理

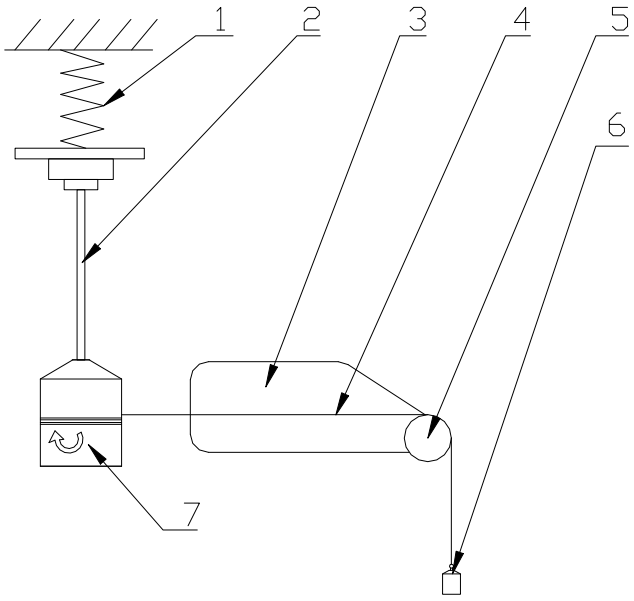
该仪器主要由以下部分组成

（一）机座部分：由底座及双立柱构成。支座可调节高度并定位，构成主体，能使测力计对正测试粘度计相应位置。

（二）转轮部分：作用是用牵引线联接内筒和砝码作引导件，以确定测定载荷下扭簧在粘度计上的转角。

（三）工作原理

1、用扭簧测力计测定时，以六速粘度计上的计量元件-内筒为传力媒介，校正方法直接。
2、采用支座自动调节高度，对准被测粘度计内筒高度，定位可靠。
3、测力计的工作示意图：



（图二）测力计工作示意图

序号	编号	名称及规格	单位	数量	备注
1	1105	粘度计扭簧	件	1	
2		粘度计内筒轴	件	1	
3		测力计滑轮固定架	件	1	
4		牵引线	件	1	带钩
5		测力计滑轮	件	1	
6		砝码	套	1	
7		粘度计内筒	件	1	

（表二）工作示意结构明细表

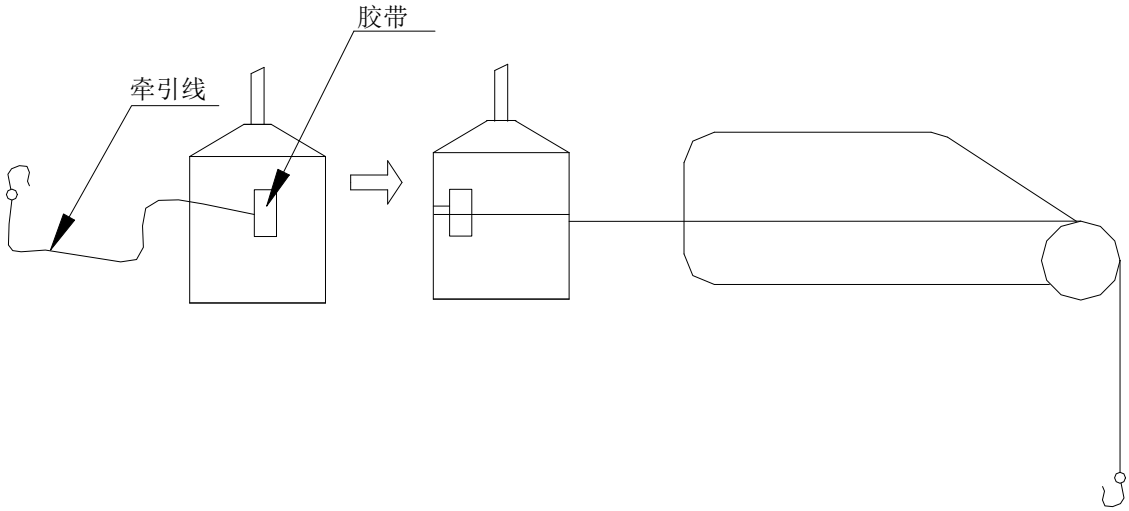
5、仪器的操作：

1、将待测仪器（粘度计），外转筒取下。与测力计摆平。
2、用粘度计内筒作卷筒，将牵引线的一端用胶纸固定在粘度计内筒中间部位，绕内筒向左转一圈，绕过支架上的滑轮，另一断垂下后挂上砝码。
3、松开（图一）所示调节旋钮（10），调整轴（4）高度，使测力计转轮部分的高度与粘度计内筒平齐。进行扭簧效验。
4、根据《扭力弹簧刚度线性测试表》调挂砝码，从粘度计视窗处读取测量值，效验扭簧。
测量标准值的计算方法：

$$KS = \frac{G.r}{\phi}$$

G：砝码重量（克）　　r：内筒半径（r=1.7245）
ϕ：刻度盘读数（度）　　KS：标准弹簧刚度。
例：R1-B1 测组，在标准弹簧刚度值下（F1 扭力弹簧：KS=0.394 克．厘米/度），加效验砝码 50 克则表针转角为：

$$\phi = \frac{50 \times 1.7245}{0.394} = 218.8\text{（度）}$$



（图三）操作示意图

不同砝码测重，应符合扭力《弹簧刚度线性测试表》所示数值。

砝码（克）	允许转动范围（格）	实测（格）	砝码（克）	允许转动范围（格）	实测（格）
5	21.55~22.21		40	172.45~177.70	
10	43.11~44.42		45	194.00~199.90	
15	64.66~66.63		50	215.57~222.13	
20	86.23~88.85		55	237.12~244.30	
25	107.78~111.06		60	258.68~266.56	
30	129.34~133.28		65	280.23~288.77	
35	150.89~155.49		70	301.80~310.99	

（表三）F1 扭力弹簧刚度线性测试表

砝码（克）	允许转动范围（格）	实测（格）	砝码（克）	允许转动范围（格）	实测（格）
1	21.55~22.21		8	172.45~177.70	
2	43.11~44.42		9	194.00~199.90	
3	64.66~66.63		10	215.57~222.13	
4	86.23~88.85		11	237.12~244.30	
5	107.78~111.06		12	258.68~266.56	
6	129.34~133.28		13	280.23~288.77	
7	150.89~155.49		14	301.80~310.99	

（表四）F0.2 扭力弹簧刚度线性测试表

6、仪器的维护与保养

1、要求实验员熟悉全部操作过程和操作时可能出现的情况，一定按操作程序操作。
2、操作完毕，各部均应清理干净。取下砝码单独放置妥善保管。
3、当移动、维修或清洁仪器时。要轻拿、轻放，以免造成部件变形影响精度和使用。
4、（图一）所示轴（4）与套筒（2）之间，滑轮（8）与固定轴之间要经常加润滑油润滑

7、仪器的运输与储存

仪器的运输与储存应符合于 JB/T9329-1999 标准。产品应储存在通风的室内，室内空气中不含有能引起器件腐蚀的杂质。

8、故障的判定与排除

故障	原因	排除方法
滑轮（8）转动不灵活。	滑轮（8）与固定轴之间产生摩擦阻力。	在滑轮（8）与固定轴之间加入适量润滑油润滑。
轴（4）与套筒（2）之间上下活动不灵活。	轴（4）与套筒（2）之间产生摩擦阻力。	在轴（4）与套筒（2）之间加入适量润滑油润滑。

1. Summary

Torsional spring dynamometer is a special testing instrument designed to correct the stiffness and indication error of torsion spring in rotary viscometer. It is also an effective instrument for regularly measuring torsion spring to ensure the accuracy of viscometer.

2. Model and specification

Model	Name	Configuration
1105	Torsional spring dynamometer	

3. The main technical parameters

Name	Technical parameter
Measuring range	Within the range of standard value of the rigidity of the spring, can determine in succession（Weight:1g—70g）
External size	200×142×300mm

4. The Structure and Working Principles of the Instrument

The structure is mainly composed of the following parts

1) Base: composed of base and double vertical shaft. The height of the support is regulable and located. They form the main body and can make dynamometer align viscometer corresponding position.

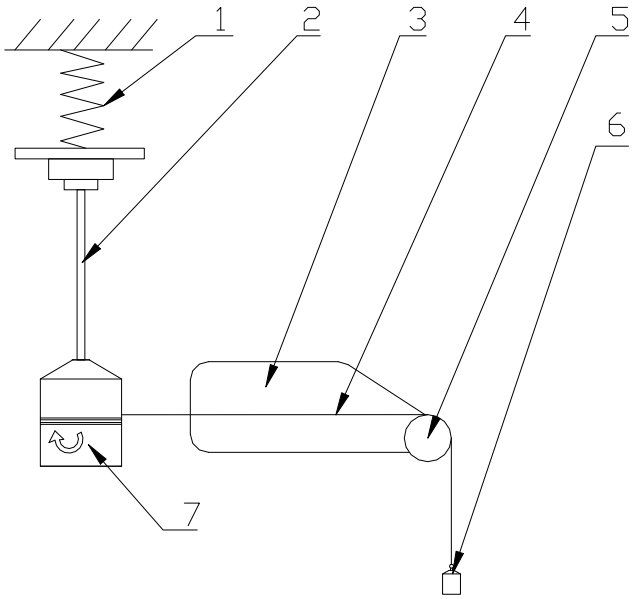
2)Runner part: it is used to connect the inner cylinder and the weight as the guide part to determine the rotation angle of the torsion spring on the viscometer under the measured load.

3)working principle

1. When measuring with torsion spring dynamometer, the measuring element inner cylinder of six speed viscometer is used as the force transmission medium, and the correction method is direct.

2. The height of the viscometer is adjusted automatically by the support, and the height of the inner cylinder of the viscometer is aligned, and the positioning is reliable.

3. Working diagram of dynamometer:



（Figure 2）Working diagram of dynamometer

Number	Part number	Name and specification	Quantity	Remarks
1	1105	Viscometer torsion spring	1	
2		Viscometer inner cylinder shaft	1	
3		Dynamometer pulley holder	1	
4		Traction line	1	With hook
5		Dynamometer pulley	1	
6		Weight	1	
7		Viscometer inner cylinder	1	

（Table 2）Working schematic structure list

5. Operation of apparatus

1.Remove the instrument to be tested (viscometer) and the outer rotating cylinder. Level with dynamometer.

2.Make the reel drum with the inner of the viscometer. Fix one end of the draw wire with the adhesive tape to the middle of the inner, circle the inner towards the left then draw straight and circle the pulley on the support .Hung up the weights on the other end.

3.Loosen the adjusting knob (10) (see fig.1) and adjust the height of the axis (4) in order to make the height of the rotary wheel of the dynameter alignment to the inner of the viscometer. Then begin to do the efficacy of the torsional spring.

4.Adjust the weights according to “rigidity linear test form of torsional spring ".Read the measured value from the viewing window and check the torsional spring.

Computational method of measuring standard value,

$$KS = \frac{G.r}{\phi}$$

Gr---weights (g)

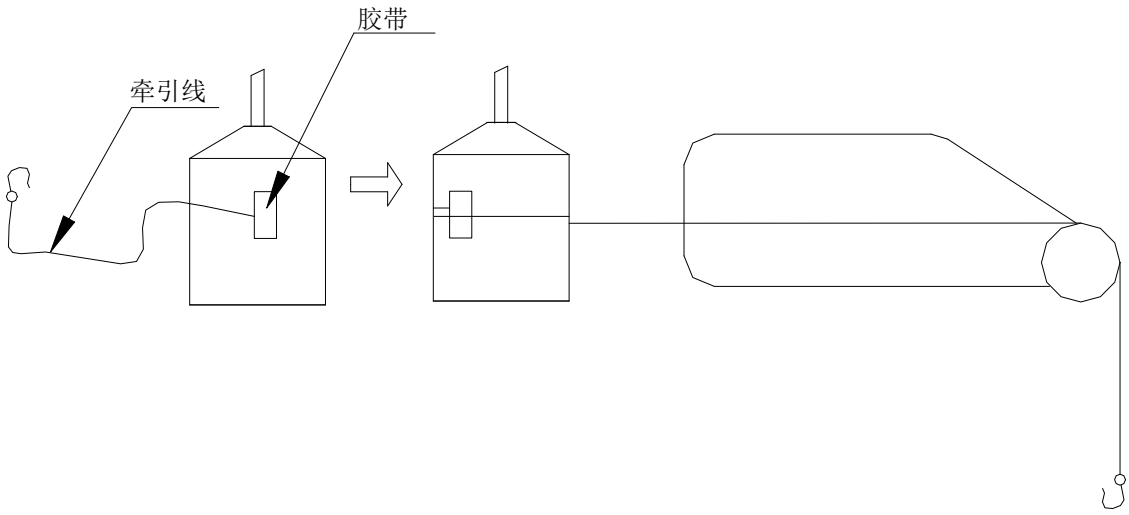
r---radius of inner（r=1.7245）

φ---dial reading（degree）

K_S---Standard spring rigidity

Example: A R_1-B_1 measuring group. Under standard spring rigidity value (F1 torsion spring:K_S=0.394g. centimeter per degree), add the weights 50g then the corner of the needle is:

$$\phi = \frac{50 \times 1.7245}{0.394} = 218.8\text{（degree）}$$



（Figure 3）Operation schematic diagram

Measures with different weights should conform to the torsion value shown in the ‘rigidity linear test form of spring’

Weights（g）	Scope（case）	Actual measurement（case）	Weights（g）	Scope（case）	Actual measurement（case）
5	21.55~22.21		40	172.45~177.70	
10	43.11~44.42		45	194.00~199.90	
15	64.66~66.63		50	215.57~222.13	
20	86.23~88.85		55	237.12~244.30	
25	107.78~111.06		60	258.68~266.56	
30	129.34~133.28		65	280.23~288.77	
35	150.89~155.49		70	301.80~310.99	

（Table 3）F1Rigidity linear test form of torsional spring

Weights（g）	Scope（case）	Actual measurement（case）	Weights（g）	Scope（case）	Actual measurement（case）
1	21.55~22.21		8	172.45~177.70	
2	43.11~44.42		9	194.00~199.90	
3	64.66~66.63		10	215.57~222.13	
4	86.23~88.85		11	237.12~244.30	
5	107.78~111.06		12	258.68~266.56	
6	129.34~133.28		13	280.23~288.77	
7	150.89~155.49		14	301.80~310.99	

（Table 4）Rigidity linear test form of torsional spring

6. The maintenance of the instrument

1). The operator should be familiar with all the operation process and possibly occurring circumstances, and operate according to the testing procedures

2). Having finished operating, each part should be clean out. Take down the weights, put and keep properly alone

3). Take and place carefully when moving, repairing and cleaning the instrument in order to avoid causing parts deformed and influencing precision and use

4). As fig.1 shows, between axis (4) and sleeve (2), pulley (8) and fixed axis, lubricating oil must be applied frequently.

7. The Transportation and Storage of Instrument

The transportation and storage of instrument should correspond to the JB/T9329-1999 standard. The product should be stored in the room with ventilation. The indoor air does not contain the impurity which can arouse device corrosion.

8. Fault judge and remove

Sequence number	Fault	Cause	Removing method
1	As it shown in Fig.1 the pulley (8) can not rotate flexibly.	The friction drag is produced between pulley (8) and fixed axis	Lubricating oil should be applied as required between pulley(8) and fixed axis
2	As it shown in Fig.1,the axis(4)and sleeve(2) can not rotate flexibly	The friction drag is produced between pulley (4) and sleeve(4)	Lubricating oil should be applied as required between axis(8) and sleeve(2)

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:1105
Model of the main motor:1105

出厂编号：
Manufacturing No:

No	Part number	Name	Unit	Quantity	Remarks
1	P03A2	砝码（100g） Gweight（100g）	set	1	
2	P03A3	牵引线 Traction	piece	1	The line is 1 meter long
3		使用说明书 Manual		1	