

KRD300 Series Moment of Inertia Measurement System

Mass Moment of Inertia (Moment of Inertia) is a measure of an object's resistance to change in rotation direction. Moment of Inertia has the same relationship to angular acceleration as mass has to linear acceleration.

Moment of Inertia of a body depends on the distribution of mass in the body with respect to the axis of rotation. The axis may be internal or external and may or may not be fixed. The moment of inertia (I), however, is always specified with respect to that axis and is defined as the sum of the products obtained by multiplying the mass of each particle of matter in a given body by the square of its distance from the axis.

When a body is free to rotate around an axis, torque must be applied to change its angular momentum. The amount of torque needed to cause any given angular acceleration (the rate of change in angular velocity) is proportional to the moment of inertia of the body. Moments of inertia may be expressed in units of kilogram metre squared ($\text{kg}\cdot\text{m}^2$) in SI units and pound-foot-second squared ($\text{lb}\cdot\text{ft}\cdot\text{s}^2$) in imperial or US units.

Moment of inertia measurement system mainly measures the axial and radial moment of inertia. The radial moment of inertia is calculated by measuring the free swing period of the swing system under load and no-load when the specimen installation axle is parallel with the swing axle of the measurement instrument according to the swing measurement principle. As for the specimen that cannot be fixed vertically, the axial moment of inertia is calculated with the measured rolling period of the system when the specimen is made to roll.



KRD300-5 (manual)

System Features

- ◆ Pre-spiral driven by the motor can automatically deflect and release, which is easy and convenient to operate.
- ◆ The limit mechanism is designed for the pre-spiral and rolling of the motor; when the limit reaches, the motor will automatically stop to protect the device from the damage caused by mis operation, and enhance operational safety.
- ◆ Moment of inertia measurement system that does not need to be leveled can be installed directly on the ground for easy moving.
- ◆ The frequency of the measurement system equipped with a rapid-response photoelectric sensor enjoys high measurement accuracy and good repeatability.
- ◆ Automatic calibration device is specialized to calibrate the system online.
- ◆ The measurement range is related to the measurement accuracy. If the measurement accuracy of I_y is $\pm 0.3\%$, the ratio of maximum moment of inertia measured to the minimum is no greater than 10; if the measurement accuracy of I_y is $\pm 0.5\%$, the ratio of maximum moment of inertia measured to the minimum is no greater than 20; it is similar to I_x , if measurement accuracy of I_x is $\pm 1\%$, the ratio of maximum moment of inertia measured to the minimum is no greater than 10.
- ◆ The measurement of radial and axial moments of inertia can be designed as one to occupy less space.
- ◆ KRD300 series measurement system can measure product of inertia and angle of principle axle of inertia in the slender body.
- ◆ Air-floating moment of inertia instrument is suitable for the product whose load is less than



KRD300-10 (I_x and I_y are simultaneously measured)



KRD300-20 (manual)



KRD300 grouped with KRD310

Measurement and Control System

Measurement and control system includes IPC/business computer, printer, measurement and control box installed in one cabinet, so it is easy to operate and move.

The software is divided into two separate parts, one is mass and center of gravity measurement software, the other is moment of inertia measurement software, which can be combined together.

The Windows-based software which is developed in the Labwindows platform is user interface friendly, easy to operate, reliable and so on.

The measurement and control system can be divided into three modules. KRD200 series uses the mass and center of gravity measurement Module and data management module.



Control cabinet (portable)



Control cabinet (enclosed)

Moment of Inertia Module

The module of moment of inertia measurement software can simultaneously measure the I_x , I_y and I_z of the specimen. The measurement value contains the swing frequency of I_y no-load and load, I_z no-load and load, I_x no-load and load, and the moment of inertia will be calculated automatically. The sequence for each measurement is flexible and a certain one may not be measured.



Moment of inertia
measurement module

Data Management Module

质量特性测试结果显示

产品代号	产品名称	质量 (kg)	重心 (mm)	Y向质偏mm	Z向质偏mm	Jx转动惯量	Jy转动惯量
MPTS-10	样棒	26.58	1190.19	-0.87	1.18	0.6780	11.173
MPTS-10	样棒	26.59	1198.01	-0.84	1.18	0.6200	15.375
MPTS-10	样棒	0.00	0.00	0.00	0.00	0.6155	15.396
MPTS-10	样棒	0.00	0.00	0.00	0.00	0.6155	15.396
MPTS-10	样棒	0.00	0.00	0.00	0.00	0.6155	15.396
MPTS-10	样棒	57.60	650.09	0.00	0.00	0.6194	15.385
MPTS-10	样棒	57.60	650.09	0.00	0.00	0.6194	15.385
6KV-19S	演示验证试	80.06	1203.19	0.61	-0.60	1.2598	28.931

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Data management module

Data management module is designed to save, apply, delete result data and process data and print the measurement result. Users can easily find the previous measurement records, view the measurement data, and print previous test results in the data management module, where the items in the database can be multi-selected to export to Word/Excel, which is easy for users to file and print centrally.