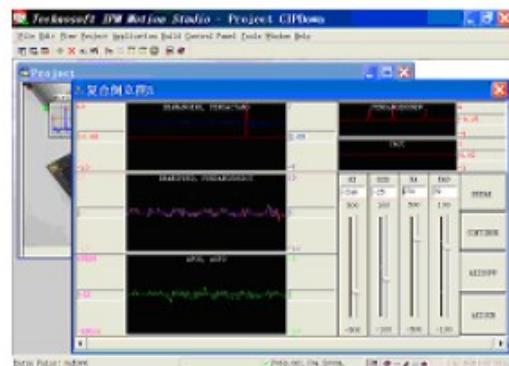


The GCIP2004 Configurable Inverted Pendulum developed by Googol Technology was designed for the basic control courses in automation, mechatronics, electronic, and electrical engineering. It satisfies the experiments of automatic control principle, modern control engineering, and electrical motor control. Equipped with embedded intelligent servo control module, the GCIP2004 is easy to control and reliable result will therefore obtained.

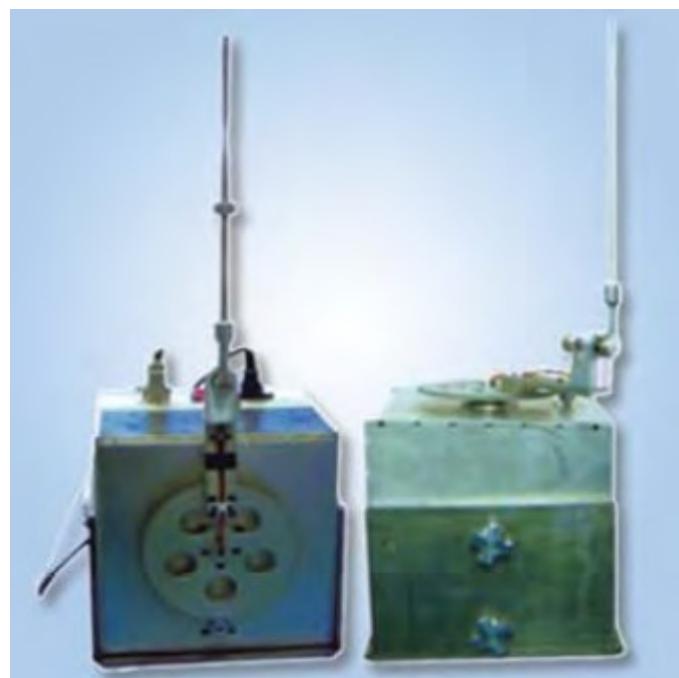
Its flexible mechanical structure combination also allows the user to easily integrate it into three different structure styles such as, (a) the 1-stage rotary inverted pendulum, (b) the top



**Intelligent Control Module**



**Control Interface**



## Main Features

The GCIP2004 consists of two parts, the GCIP2004 body and control system. The body is made up of a cubic steel structure and a free rolling pendulum. The potentiometer measures the angle of the pendulum on the track by measuring the output voltage. A DC motor connected to a gear reducer controls the angle of the rod, accordingly realize the angle control of the inverted pendulum.

The control system is an intelligent digital motion controller. It is a high precision, fully digital servo drive with embedded intelligence, and built-in amplifier. The intelligent motion controller is programmable with high-level Motion Language. A user-friendly graphical control interface can visually show the results of the controller and all of the operating data. Combining with the high-level Motion Language, a graphical platform for quick configuration and motion programming, the Intelligent Control module represents a flexible and easy way to implement solution for wide range of applications.

## System Characteristics

- Structure can be easily changed from one to another
- The rolling pendulum moving circularly without any mechanical restriction
- Open architecture DSP motion control development

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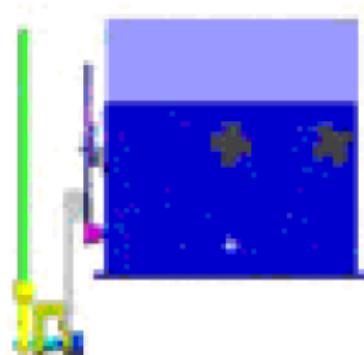
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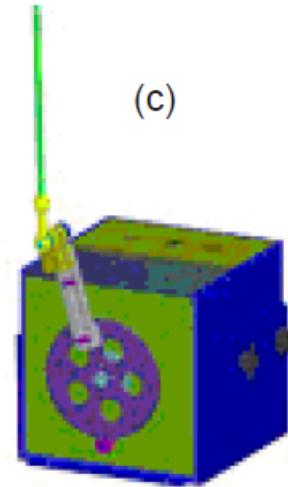
(a)



(b)



(c)



## Technical Specifications

Model	Power	Gear Ratio	Transmission Precision	Dimension	Weight
GCIP2004	40W	7.8:1	± 0.1mm	256 x 244 x 335 mm	< 20Kg

Name	Dimension (L x W x H)(mm)	Rod Length (mm)	Rod Weight (Kg)	Rotating Arm Radius (Kg)	Rotating Range
Configurable 1-stage IP	Height: 1248	500	0.13	255.5	360°
Configurable 2-stage IP	Height: 1423	Rod 1: 175 Rod 2: 500	Rod 1: 0.06 Rod 2: 0.13	280.5	360°

## Suggested Experiments:

- PID controller design
- Root locus trajectory design
- Frequency response design
- State space controller experiment

## Ordering Guide

Model Number	Model Name	Package
GCIP2004	Configurable Inverted Pendulum	<ul style="list-style-type: none"> <li>• GCIP2004 Structure equipped with DC servo motor and intelligent drive</li> <li>• Rotary module</li> <li>• Control software, including intelligent motion control development tool with a part of source code provided</li> </ul>

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