Qube-Servo 3

An integrated servomotor solution for undergraduate controls and mechatronics labs

The Quanser Qube-Servo 3 is a portable, fully integrated servomotor platform designed specifically for teaching control concepts at the undergraduate level. The system is equipped with a high-quality direct-drive brushed DC motor, two encoders, an internal data acquisition system, and an amplifier. Connect with USB to a Windows PC (macOS and Linux support coming soon).

Qube-Servo 3 comes with a quick-connect inertia disk and an inverted pendulum module. You can also design and 3D print your own module to expand the scope of the experiment, or create an engaging student project[1]. Take advantage of the comprehensive ABET-aligned course material[2] for MATLAB® Simulink®, or design and validate your own controllers with additional language support in Python and C/C++, New features include the ability to disable deadband compensation and direct control of the PWM duty cycle.

Features

Portable

Light weight and small form factor

Safe

Built-in motor stall and thermal protection

Comprehensive Courseware

ABET-aligned courseware mapped to popular control engineering textbooks[2] and compatible with all existing Qube-Servo 2 content

Options

Inertia disk and pendulum attachment included

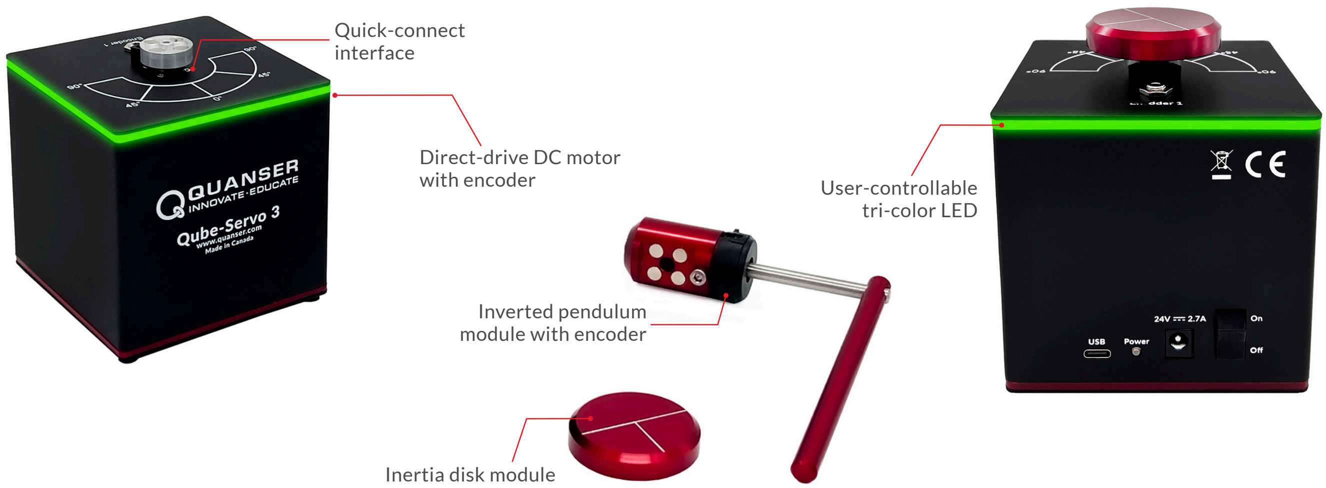
Workstation Components

Data acquisition device	Integrated
Amplifier	Integrated
Control design environment	QUARC™ for MATLAB® Simulink® Quanser API's for Python and C/C++

[1] The performance and safety of the experiment are guaranteed only with the original parts supplied by Quanser. Quanser does not carry any responsibility for damages caused when using any third-party add-on modules.

[2] MATLAB® Simulink® course materials are provided for Qube-Servo 3 USB

Product Details



Courseware

Inertia disk module:

- Hardware integration
- Filtering
- Step response modeling
- Block diagram modeling
- Parameter estimation
- Frequency response modeling
- State-space modeling
- Friction identification
- Stability analysis
- Second-order systems
- Routh-Hurwitz stability
- Nyquist stability
- PD control
- Lead compensator
- Proportional control
- Steady-state error
- Load disturbance
- Robustness
- Optimal control
- Introduction to discrete control
- Discrete control design
- Discrete control stability

Inverted Pendulum Module:

- Moment of inertia
- Pendulum modeling
- State space modeling
- Pendulum balance control
- Swing-up control
- LQR state-feedback balance control
- Pole-placement state-feedback balance control

Courseware textbook mapping:

- Control Systems Engineering (Norman S. Nise)
- Feedback Systems (K.J. Åström, R.M. Murray)
- Mechatronics (W. Bolton)
- Modern Control Systems (R.C. Dorf, R.H. Bishop)
- Automatic Control Systems (F. Golnaraghi, B.C. Kuo)
- Control Systems Engineering (I.J. Nagrath, M. Gopal)
- Modern Control Engineering (K. Ogata)
- Feedback Control of Dynamic Systems (G.F. Franklin, J.D. Powell, A. Emai-Naeini)

Device Specifications

Dimensions (w x h x d)	10.2 x 10.2 x 11.7 cm
Weight	1.083 kg
Pendulum length (pivot to tip)	9.5 cm
DC motor encoder resolution (quadrature mode)	2,048 counts/revolution
Pendulum module encoder resolution (quadrature mode)	2,048 counts/revolution
DC motor nominal voltage	24 V
DC motor nominal current (no Load)	0.16 A
DC motor nominal speed (no load)	5,400 rpm
Current sense	12-bit, with 16 sample PWM synchronized digital filtering
Encoder	2 x 24-bit
Digital tachometer	2 x 32-bit with 13.8ns resolution
Interface	USB

About Quanser:

For 30 years, Quanser has been the world leader in innovative technology for engineering education and research. With roots in control, mechatronics, and robotics, Quanser has advanced to the forefront of the global movement in engineering education transformation in the face of unprecedented opportunities and challenges triggered by autonomous robotics, IoT, Industry 4.0, and cyber-physical systems.