



QUANSER PRODUCTS AND SOLUTIONS

WITH NI LABVIEW™

From Classic Control to Complex Mechatronic Systems Design



YOUR FIRST CHOICE FOR CONTROL SYSTEMS EXPERIMENTS

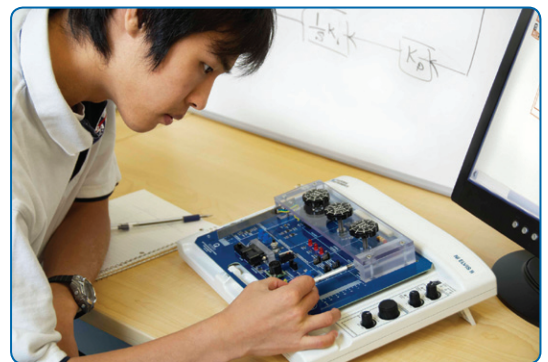
For twenty five years, institutions around the world have chosen Quanser equipment for their control systems education and research. Renowned for the innovative design, robust quality, and complete line of accessories and resources, Quanser provides cost-effective platforms that put your teaching and research ahead of the pack.

GIVE YOUR UNDERGRADS THE BEST IN TEACHING LABS

Whether you want to stress fundamental control concepts, or motivate your students through engaging hands-on application experiences, Quanser provides complete, student-friendly hardware, software, and courseware to build a world-class lab. This means you spend less time and energy on course preparation and student support as you introduce your students to critical, industry-ready concepts and techniques.

ACCELERATE YOUR RESEARCH

Offering the broadest range of motion platforms and plants, Quanser provides a highly efficient real-time control platform to develop sophisticated control strategies and validate your algorithms. Quanser equipment has been at the core of countless research projects ranging from fundamental theoretical control to modern applications such as haptics, teleoperation, robotics, and unmanned vehicles.



CONTROL SOFTWARE DESIGNED BY CONTROL ENGINEERS FOR CONTROL ENGINEERS

RAPID CONTROL PROTOTYPING TOOLKIT FOR LABVIEW USERS

The Quanser Rapid Control Prototyping Toolkit is an add-on for the LabVIEW™ graphical development environment. It significantly simplifies hardware setup and interfacing by taking care of all of the standard low level software and hardware configurations. The resulting control VIs are clear and closely match the standard block diagram system representation of control courses. This helps bridge the gap between theory and practical implementation, and enables students to focus more on the control topics you are teaching. With expanded compatibility and support for NI myRIO portable embedded hardware device, CompactRIO programmable automation controller and PXI, an open PC-based platform, you can teach and perform an advanced control research using LabVIEW environment.



INTRODUCTION TO CONTROL SYSTEMS

Introduction to Control Systems is a typical core course in the engineering undergraduate curriculum in Electrical and Computer Engineering, Mechanical Engineering, Aerospace Engineering, and Chemical Engineering. Quanser plants offer the right mix of features, precision, robustness, and flexibility for a wide range of course variations and budgets. Our range of servomotor based experiment options allows you to select products that best support the fundamental concepts taught in your introductory course, including motor characterization and modeling, velocity control, position control, PID control and more.

Most systems come with comprehensive ready-to-use courseware that allows you to quickly incorporate the plants into your course.



► **QUBE-Servo**
with myRIO Connection, NI Part No. 783472-01
with Direct I/O Connection, NI Part No. 783473-01



► **QNET DC Motor Control Board for NI ELVIS**
NI Part No. 780293-01
For a complete range of QNET-based experiments, see page 4



► **SRV02 Rotary Servo Base Unit**
NI Part No. 782502-01
For a complete range of SRV02-based experiments, see page 6

COMPLETE COURSEWARE RESOURCES

Quanser courseware covers the key topics that you want to teach in your control course. Starting with modeling and system characterization, it follows with a wide range of engaging, hands-on exercises for control analysis and controller design. Depending on the control plant, many courseware collections extend well beyond the undergraduate level and into graduate level advanced control. Some products even feature innovative applications that map traditional control concepts to exciting real-world applications.

OPEN, CUSTOMIZABLE COURSEWARE

Our latest focus in courseware development emphasizes flexibility and open access. For example, the new QUBE-Servo provides a unique, modular, mix and match approach to courseware. Additionally, the courseware documents are provided in several open, editable digital formats to including Word and LaTeX, minimizing the time to adapt the material to your particular course.

ABET-ALIGNED COURSEWARE

Our courseware is developed in partnership with leading experts and universities around the world and many of the collections are aligned with ABET accreditation criteria to ensure quality and relevance to current approaches to engineering education.



QNET

ENGINEERING TRAINERS TO TEACH CONTROLS

With Quanser NI Engineering Trainer (QNET) boards for the NI Educational Laboratory Virtual Instrumentation Suite (NI ELVIS), students can complement their laboratory work through hands-on, practical experience. Covering a wide range of engineering disciplines including electrical, mechanical, mechatronics, aerospace and biomedical, QNET boards are ideal for teaching fundamental control theory.

COMPREHENSIVE RESOURCES AND ABET-ALIGNED COURSEWARE INCLUDED

Each QNET board comes complete with comprehensive digital resources developed by Quanser to enhance your controls curriculum. Starting with basic principles, students can progress to more advanced applications and cultivate a deep understanding of control theories through real-life applications.

QNET MECHATRONICS SENSORS BOARD FOR NI ELVIS II

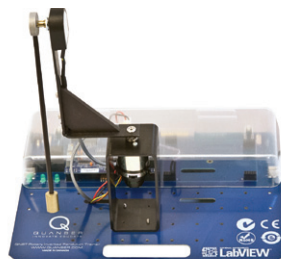
NI Part No. 781032-01



+ ADD-ON BOARDS FOR NI ELVIS



► QNET DC Motor Control Board
NI Part No. 780293-01



► QNET Rotary Inverted Pendulum Board
NI Part No. 780294-01



► QNET HVAC Trainer Board
NI Part No. 780295-01



► QNET VTOL 1DOF Helicopter Board
NI Part No. 781031-01



► QNET Mechatronics Sensors Board
NI Part No. 781032-01



► QNET Myoelectric Board
NI Part No. 781834-01

QUBE™-SERVO

LOW COST, SELF-CONTAINED SERVOMOTOR SOLUTION FOR UNDERGRADUATE LABS

QUANSER QUALITY AND PRECISION AT AN AFFORDABLE PRICE

The Quanser QUBE™-Servo is a fully integrated controls lab designed for teaching students control concepts relevant to real world engineering. With the QUBE-Servo, educators have a self contained, modular controls lab. Built with the same quality and precision that Quanser is renowned for, the QUBE-Servo provides instructors with a state of the art controls lab that will engage students in any engineering discipline. The experiment includes two quick connect experiment modules: an inertia disk and pendulum that provide a platform for teaching practical control concepts from introductory to advanced levels.

QUBE™-SERVO BASE UNIT

with myRIO Connection, NI Part No. 783472-01
with Direct I/O Connection, NI Part No. 783473-01

Tool-less quick
connect interface

Inertia disk module

Encoder angle sensed
inverted pendulum module

HOW IT WORKS

With a compact footprint, the QUBE-Servo may be small in size, but is high in quality. The sleek, integrated rotary servo system has a magnetic tool-less quick connect interface allowing you to quickly change between the two included experiment modules. Inside, the QUBE-Servo has a direct-drive brushed DC motor and two high resolution optical encoders for position feedback. On the back, two panels, are available – Direct I/O and NI myRIO – allowing you complete flexibility in your lab configuration. Fully documented system models and pre built controllers are also provided for LabVIEW™.



The Quanser QUBE-Servo connected to the NI myRIO

MODULAR, DIGITAL MEDIA COURSEWARE

The QUBE-Servo solution comes with a new generation of mix-and-match, rich digital media courseware for easy adaptation of materials to specific course. A comprehensive mapping tool allows you to align courseware sections with specific chapters of the most popular control engineering textbooks, such as Control Systems Engineering by Norman S. Nise; Modern Control Systems by R.C. Dorf, R.H. Bishop and many more. The courseware is also aligned with requirements of ABET* accreditation. All this allows professors to get their labs running faster, saving months of time typically required to develop lab materials and exercises.

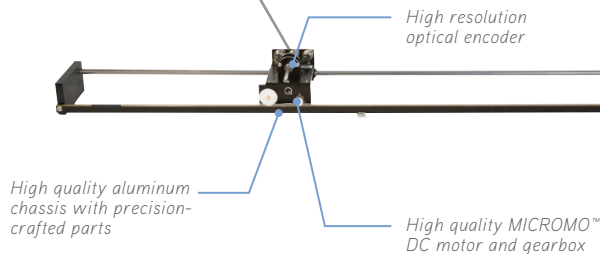
ROTARY AND LINEAR MOTION CONTROL PLATFORMS

The Rotary Servo Base Unit (SRV02) is the heart of the renowned Quanser Rotary Solution, and will offer your undergraduates the best experience in their control courses. Research grade components and a selection of nine modular experiment add-ons with complete courseware constitute a truly flexible, open architecture platform to serve your students in their advanced courses and right into post-graduate research.

For linear systems, Quanser has the Linear Servo Base Unit (IP02) platform. Similar to the rotary solution, the linear platform has a selection of seven modular experiment add-ons with complete courseware.

LINEAR SERVO BASE UNIT IP02

NI Part No. 782489-01



ROTARY SERVO BASE UNIT SRV02

NI Part No. 782502-01



+ ADD-ON MODULES FOR THE SRV02 ROTARY SERVO BASE UNIT



► **Ball and Beam**
NI Part No. 782482-01



► **Rotary Flexible Link**
NI Part No. 782486-01



► **Rotary Flexible Joint**
NI Part No. 782498-01



► **Rotary Inverted Pendulum**
NI Part No. 782499-01



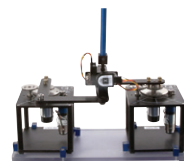
► **Rotary Double Inverted Pendulum**
NI Part No. 782485-01



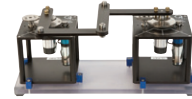
► **Gyro/Stable Platform**
NI Part No. 782488-01



► **Multi-DOF Torsion**
NI Part No. 782504-01



► **2 DOF Inverted Pendulum**
NI Part No. 782474-01

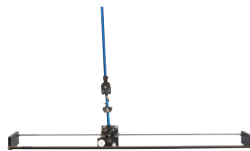


► **2 DOF Robot**
NI Part No. 782476-01

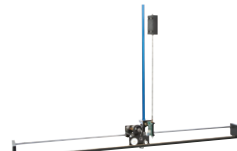
+ ADD-ON MODULES FOR THE IP02 LINEAR SERVO BASE UNIT AND OTHER LINEAR MOTION CONTROL SYSTEMS



► **Linear Pendulum**
NI Part No. 782489-01
Pendulum provided with the Linear Servo Base Unit



► **Linear Double Inverted Pendulum**
NI Part No. 782484-01



► **Linear Flexible Inverted Pendulum**
NI Part No. 782487-01



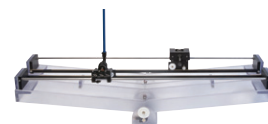
► **Linear Flexible Joint with Inverted Pendulum**
NI Part No. 782491-01



► **Linear Flexible Joint**
NI Part No. 782490-01



► **Seesaw**
NI Part No. 782500-01

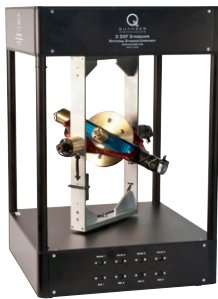


► **Seesaw Pendulum**
Requires 2 NI Part No. 782500-01
2 NI Part No. 782489-01

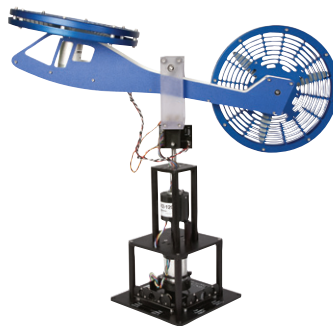
FLIGHT CONTROL SYSTEMS

Quanser's extensive line of control systems plants include experiments and test rigs designed specifically for teaching and research in flight dynamics and control. Most of these systems offer the fidelity and flexibility to move cleanly from an undergraduate course to the graduate level and ultimately to leading edge research.

Using Quanser systems, students can build their knowledge of position control, essential dynamics of flight control and gyroscopic motion. At the graduate level, they can expand this knowledge and explore more advanced control concepts, using the same hardware and software environment. The control challenges stemming from inherent nonlinearities, cross-couplings and uncertainties in the dynamics of the systems involve areas such as adaptive control, nonlinear control, robust control, and optimal control.



► **3 DOF Gyroscope**
NI Part No. 782477-01



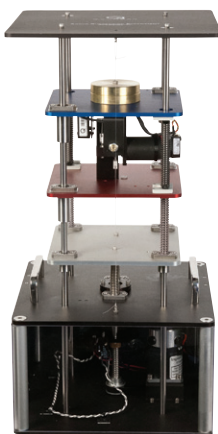
► **2 DOF Helicopter**
NI Part No. 782475-01



► **3 DOF Helicopter**
NI Part No. 782478-01

INDUSTRIAL APPLICATIONS AND PROCESS CONTROL

Today's industrial systems are complex, encompassing all engineering fields, from control systems and mechanisms, to electronics, software and computer architecture. Many of Quanser's experimental plants can emulate complex mechatronic systems. With their precision, robust and open architecture design, they present highly suitable and affordable options for study and research of control-related challenges encountered in industrial technologies and applications, including fluid level control, car suspension control, and more.



► **Active Suspension**
NI Part No. 782479-01


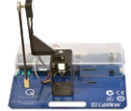









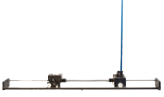


































► **Coupled Tanks**
NI Part No. 782483-01



► **Magnetic Levitation**
NI Part No. 782492-01

QUANSER PRODUCTS AND SOLUTIONS

APPLICATION	PRODUCTS
QNETS	 <p>DC Motor Control Board NI Part No. 780293-01</p>  <p>Rotary Inverted Pendulum Board NI Part No. 780294-01</p>  <p>HVAC Trainer Board NI Part No. 780295-01</p>  <p>VTOL 1DOF Helicopter Board NI Part No. 781031-01</p>  <p>Mechatronics Sensors 1 Board NI Part No. 781032-01</p>  <p>Myoelectric Board NI Part No. 781834-01</p>
Introduction to Control Systems	 <p>QUBE-Servo myRIO Connection, NI Part No. 783472-01 Direct I/O Connection, NI Part No. 783473-01</p>  <p>DC Motor Control Board NI Part No. 780293-01</p>  <p>Rotary Servo Base Unit NI Part No. 782502-01</p>
Linear Motion Control system	 <p>Linear Servo Base Unit NI Part No. 782489-01</p>  <p>Linear Double Inverted Pendulum NI Part No. 782484-01</p>  <p>Linear Flexible Joint with Inverted Pendulum NI Part No. 782491-01</p>  <p>Seesaw NI Part No. 782500-01</p>  <p>Linear Inverted Pendulum NI Part No. 782489-01</p>  <p>Linear Flexible Inverted Pendulum NI Part No. 782487-01</p>  <p>Linear Flexible Joint NI Part No. 782490-01</p>  <p>Seesaw Pendulum NI Part No. 782500-01 NI Part No. 782489-01</p>
Rotary Motion Control System	 <p>Rotary Servo Base Unit NI Part No. 782502-01</p>  <p>Rotary Flexible Joint NI Part No. 782498-01</p>  <p>Rotary Flexible Link NI Part No. 782486-01</p>  <p>Gyro/Stable Platform NI Part No. 782488-01</p>  <p>2 DOF Robot NI Part No. 782476-01</p>  <p>Ball and Beam NI Part No. 782482-01</p>  <p>Rotary Inverted Pendulum NI Part No. 782499-01</p>  <p>Rotary Double Inverted Pendulum NI Part No. 782485-01</p>  <p>2 DOF Inverted Pendulum NI Part No. 782474-01</p>  <p>Multi-DOF Torsion NI Part No. 782504-01</p>
Flight Control System Design	 <p>3 DOF Gyroscope NI Part No. 782477-01</p>  <p>2 DOF Helicopter NI Part No. 782475-01</p>  <p>3 DOF Helicopter NI Part No. 782478-01</p>
Industrial Applications and Process Control	 <p>Active Suspension NI Part No. 782479-01</p>  <p>Coupled Tanks NI Part No. 782483-01</p>  <p>Magnetic Levitation NI Part No. 782492-01</p>
Data Acquisition Devices	 <p>Q2-USB NI Part No. 782494-01</p>  <p>Q8-USB NI Part No. 782495-01</p>  <p>QPiDe with Terminal Board QPiDe, NI Part No. 782497-01</p>  <p>NI-M and X-Series Terminal Board for RCP Toolkit NI Part No. 782493-01</p>  <p>Q1-cRIO module for NI CompactRIO NI Part No. 782689-01</p>  <p>Terminal Board for NI myRIO NI Part No. 783474-01</p>
Power Amplifier	 <p>VoltPAQ-X1 NI Part No. 782505-01</p>  <p>VoltPAQ-X2 NI Part No. 782506-01</p>  <p>VoltPAQ-X4 NI Part No. 782507-01</p>  <p>AMPAQ-L2 NI Part No. 782480-01</p>  <p>AMPAQ-L4 NI Part No. 782481-01</p>

Quanser Inc.
119 Spy Court
Markham, Ontario, L3R 5H6 Canada
Phone: +1 (905) 940 3575
Fax: +1 (905) 940 3576
Email: quanser@ni.com

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WWW.QUANSER.COM

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