NI Data Acquisition

Data acquisition (DAQ) is the process of measuring an electrical or physical phenomenon such as voltage, current, temperature, pressure, or sound with a computer. A DAQ system consists of sensors, DAQ measurement hardware, and a computer with programmable software. Compared to traditional measurement systems, PC-based DAQ systems exploit the processing power, productivity, display, and connectivity capabilities of industry-standard computers providing a more powerful, flexible, and cost-effective measurement solution.

Potential uses:

Research and Analysis

- Characterizing and logging behaviors or properties
- Discovering scientific phenomena
- Systematically investigating new products and designs

Design Validation and Verification

- Confirming that a system meets initial design specifications
- Establishing evidence that a product meets its users' needs
- Testing adherence to an industry standard

Manufacturing and Quality Test

- Performing functional and system-level product test
- End-of-line pass/fail quality testing
- Checking for defective products and subsystems

Diagnostics and Repair

- Identifying the cause of failure
- Manual and ad-hoc troubleshooting
- Characterizing malfunctioning systems

Asset Condition Monitoring

- Long-term, continuous monitoring of equipment
- Identifying problems before failure occurs
- Trending, logging, and alarming in the event of error conditions

PC-Based Control and Automation

- Controlling processes without human interaction
- Automating the operation of machinery
- Performing open-loop and closed-loop control, such as PID

WP 300 *Universal Material Tester, 20 kN*

*** Compact, clear universal unit for basic experiments on materials testing**

*** Tensile strength, compressive strength, bending, shear and cupping tests**

*** Brinell hardness testing**

*** Recording of characteristic curves**

*** Can be extended with electronic data acquisition**

Technical Description

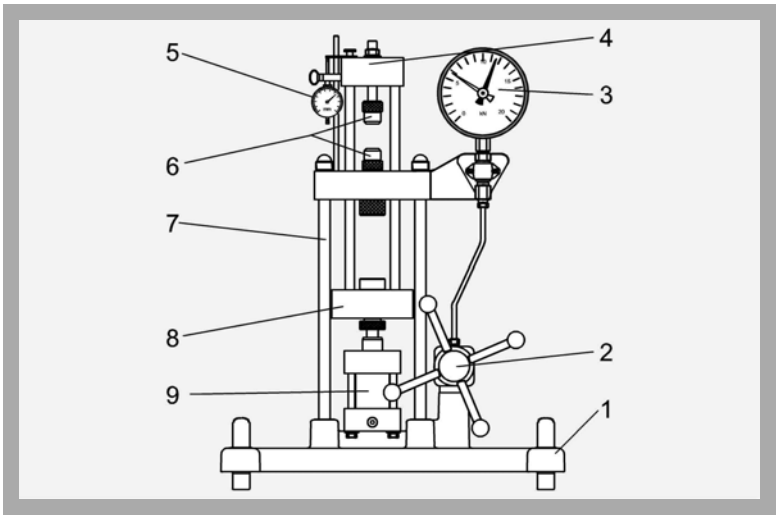
This material tester is a benchtop unit for training purposes. Simple operation and robust construction make the unit suitable for student experiments. The test spectrum for the basis unit covers tensile tests, and also Brinell hardness testing. Using the accessories that are also available, additional bending, shear, cupping and compressive tests can be performed. PC data acquisition and evaluation is also possible.
The basic version of the unit does not require any additional sources of power. The test load is generated using a hand operated hydraulic system. The test load is displayed using a large gauge and a trailing pointer. The elongation of the test specimen is recorded via a mechanical gauge. The unit features a clear layout and the rapid changing of accessories.

Learning Objectives / Experiments

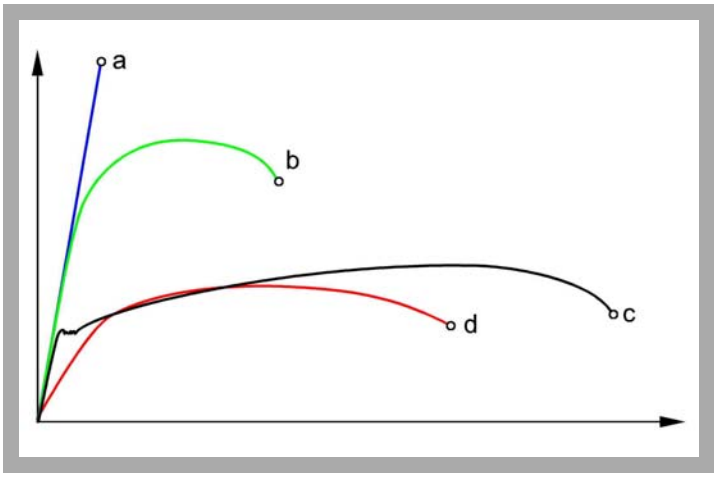
- Tensile tests
- Recording of stress-strain diagrams
- Brinell hardness testing

With accessories available separately:
- Compressive strength tests
- Bending tests
- Cupping tests
- Shear tests
- Testing of disc and helical springs

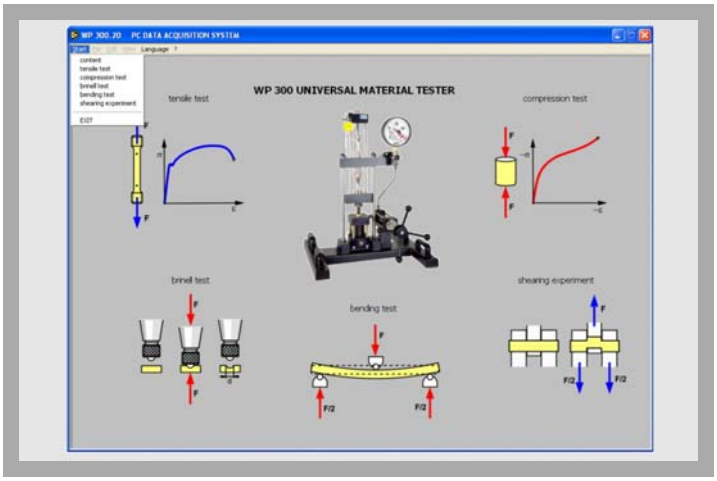
WP 300 Universal Material Tester, 20 kN



1 machine base with rubber feet, 2 hand wheel, 3 load gauge, 4 upper cross-member, 5 gauge for deformation displacement, 6 gripping heads, 7 frame pillars, 8 lower cross-member, 9 main hydraulic cylinder



Load-extension diagram for different specimen materials:
a) hardened steel, b) tempered steel, c) soft annealed steel, d) aluminium alloy



Screenshot of the software WP 300.20

Specification

[1] Universal benchtop unit for materials testing
[2] Cross-member frame with ground steel pillars, compressive and tensile force can be generated
[3] Force generation using hand operated hydraulic system, no power supply necessary
[4] Dynamometer to measure the force, gauge with trailing pointer
[5] Dial gauge to measure the elongation
[6] Test sphere for Brinell hardness test, diameter 10mm
[7] Brinell hardness test specimens made of Al, Cu, St, CuZn
[8] Tensile test specimens according to DIN 50125, made of Al, Cu, St, CuZn

Technical Data

Max. test force: 20kN
Max. stroke: 45 mm
Space available for specimens: 165x65mm
Tensile specimens: B6x30mm, DIN 50125
Hardness specimens: l x w x h 30x30x10mm

Dynamometer
- measuring range: 0...20kN
- graduations: 0.5kN
Dial gauge
- measuring range: 0...10mm
- graduations: 0.01mm

Dimensions and Weight

l x w x h : 610 x 520 x 850 mm
Weight : approx. 51 kg

Scope of Delivery

1 base unit
1 hardness test jig
1 dial gauge
4 sets of tensile specimens
4 sets of hardness specimens
1 set of experiment instructions

Order Details

020.30000 WP 300 Universal Material Tester, 20 kN

WP 300 *Universal Material Tester, 20 kN*

Available Accessories:

Product no.	Order text	
020.30004	WP 300.04	Bending Device
020.30005	WP 300.05	Compression Plates, Set of 2, with fastening elements
020.30006	WP 300.06	Coil Spring Test, 2 Sets
020.30007	WP 300.07	Disk Spring Test
020.30010	WP 300.10	Device for Shearing Experiments
020.30011	WP 300.11	Device for Cupping Experiments
020.30012	WP 300.12	Measuring Magnifier for Brinell Impression
020.30013	WP 300.13	Device for Shear Test Unsymmetrical
020.30014	WP 300.14	Chucks for Flat Tensile Specimen
020.30020	WP 300.20	PC Data Acquisition System
SPECIMEN SETS:		
020.30002	WP 300.02	Set of 4 Tension Test Rods: Aluminium, Copper, Steel, Brass
020.30021	WP 300.21	Set of 4 Tension Rods, Aluminium
020.30022	WP 300.22	Set of 4 Tension Rods, Copper
020.30023	WP 300.23	Set of 4 Tension Rods, Steel
020.30024	WP 300.24	Set of 4 Tension Rods, Brass
020.30025	WP 300.25	Set of 4 Tension Specimens, flat: Aluminium, Copper, Steel, Brass
020.30003	WP 300.03	Set of 4 Brinell Specimens: Aluminium, Copper, Steel, Brass
020.30031	WP 300.31	Set of 4 Brinell Specimens, Aluminium
020.30032	WP 300.32	Set of 4 Brinell Specimens, Copper
020.30033	WP 300.33	Set of 4 Brinell Specimens, Steel
020.30034	WP 300.34	Set of 4 Brinell Specimens, Brass
020.30041	WP 300.41	Set of 5 Cupping Specimens, Aluminium
020.30042	WP 300.42	Set of 5 Cupping Specimens, Copper
020.30043	WP 300.43	Set of 5 Cupping Specimens, Steel
020.30044	WP 300.44	Set of 5 Cupping Specimens, Brass
020.30052	WP 300.52	Set of 5 Shear Specimens, Copper

HM 170 Open Wind Tunnel

*** Open wind tunnel for a variety of aerodynamic experiments**

*** Homogeneous flow through the flow straightener and special nozzle contour**

*** Transparent measuring section**

Technical Description

A wind tunnel is the classic experiment system for aerodynamic flow experiments. The model being studied remains at rest while the flow medium is set in motion, and thus the desired flow around the model is generated.

HM 170 is an "Eiffel" type open wind tunnel used to demonstrate and measure the aerodynamic properties of various models. For this purpose, air is drawn in from the environment and accelerated. The air flows around a model, such as an aerofoil, in a measuring section. The air is then decelerated in a diffuser and pumped back into the open by a fan.

The carefully designed nozzle contour and a flow straightener ensure a uniform velocity distribution with little turbulence in the closed measuring section. The flow cross section of the measuring section is square. The built-in axial fan with guide vane and a variable-speed drive is characterised by an energy-efficient operation at high efficiency. Air velocities of up to 28m/s can be reached in this open wind tunnel. The trainer is equipped with an electronic two-component force sensor. Lift and drag are detected and displayed digitally. The air velocity in the measuring section is displayed on the inclined tube manometer. The HM 170.50 16-Tube Manometer is recommended for measuring the pressure curves in drag bodies.

By using the HM 170.60 System for Data Acquisition, the measured values for pressure, displacement/angle, velocity and force can be transferred to a PC where they can be analysed with the software.

Extensive accessories allow a variety of experiments, for example lift measurements, pressure distributions, boundary layer analysis or visualisation of streamlines.

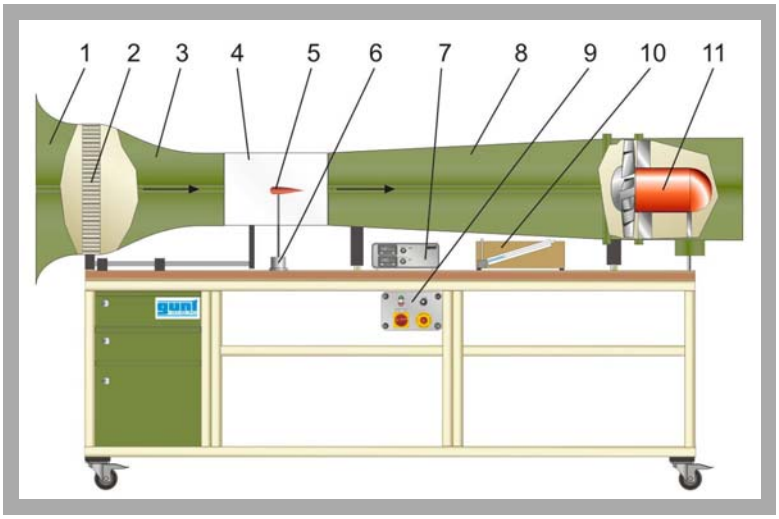
The well-structured instructional material sets out the fundamentals and provides a step-by-step guide through the experiments.

Learning Objectives / Experiments

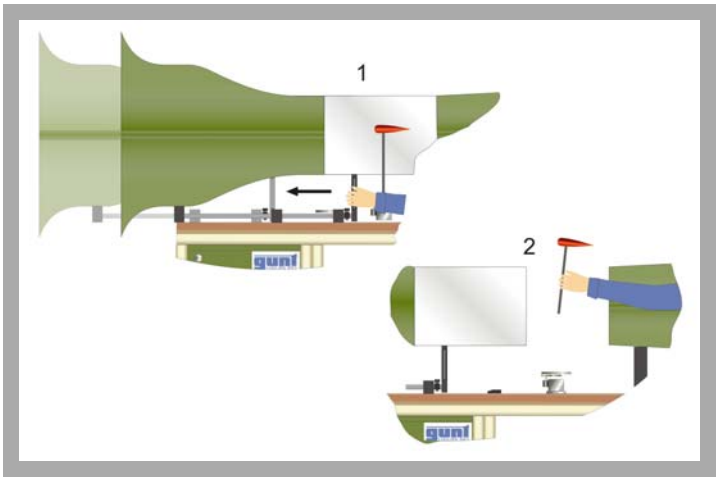
Experiments with accessories
- determine drag and lift coefficients for different models
- pressure distribution when flowing around drag bodies
- boundary layer analysis
- investigation of flutter
- wake measurement

In conjunction with the HM 170.52 Fog Generator
- visualisation of streamlines

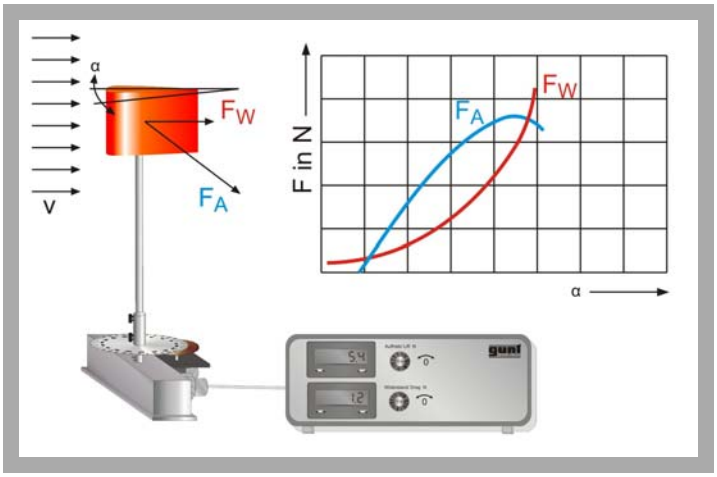
HM 170 Open Wind Tunnel



1 inlet contour, 2 flow straightener, 3 nozzle, 4 measuring section, 5 drag body, 6 force sensor, 7 display and control unit, 8 diffuser, 9 switch cabinet, 10 inclined tube manometer, 11 axial fan



Simple exchange of models: step 1 open lock and slide back measuring section, step 2 remove drag body



Measure lift and drag on an aerofoil as a function of angle of attack
blue: lift force F_A, red: drag F_W, α angle of attack

Specification

[1] experiments from the field of aerodynamics and fluid mechanics with an "Eiffel" type wind tunnel
[2] wide range of accessories available
[3] transparent, closed measuring section
[4] inlet contour, nozzle and diffuser made of GRP
[5] variable-speed fan motor for energy-efficient operation
[6] flow straightener reduces turbulence
[7] electronic two-component force sensor for measuring the flow forces
[8] inclined tube manometer for displaying the air velocity
[9] digital display of drag and lift
[10] display of measured values for pressure, displacement/angle, velocity and force using HM 170.60 System for Data Acquisition

Technical Data

Measuring section
- flow cross section WxH: 292x292mm
- length: 420mm
- wind velocity: 3,1...28m/s

Axial fan
- power consumption: 2,55kW

Measuring ranges
- force: 2x -5...5N
- pressure: 0...5mbar

Dimensions and Weight

LxWxH: 2.860x860x1.700mm
Weight: approx. 250kg

Required for Operation

230V, 50/60Hz, 1 phase or 230V, 60Hz/CSA, 3 phases

Scope of Delivery

1 trainer
1 set of instructional material

Order Details

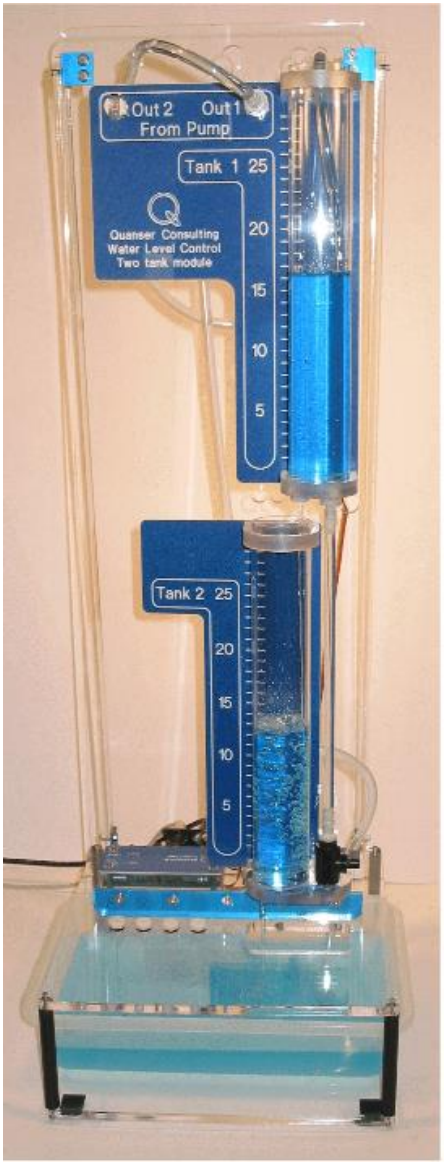
070.17000 HM 170 Open Wind Tunnel

HM 170 Open Wind Tunnel

Available accessories and options:

Product no.	Order text
070.17001	HM 170.01 Drag Body Sphere
070.17002	HM 170.02 Drag Body Hemisphere
070.17003	HM 170.03 Drag Body Circular Disc
070.17004	HM 170.04 Drag Body Circular Ring
070.17005	HM 170.05 Drag Body Square Plate
070.17006	HM 170.06 Drag Body Flag
070.17007	HM 170.07 Drag Body Cylinder
070.17008	HM 170.08 Drag Body Streamlined Shape
070.17009	HM 170.09 Drag Body Aerofoil
070.17010	HM 170.10 Drag Body Paraboloid
070.17011	HM 170.11 Drag Body Concave Shape
070.17021	HM 170.21 Aerofoil with Slat and Slot Flap
070.17052	HM 170.52 Fog Generator
070.17022	HM 170.22 Pressure Distribution on an Aerofoil
070.17023	HM 170.23 Pressure Distribution on a Cylinder
070.17020	HM 170.20 Airofoil, Spring-Mounted
070.17024	HM 170.24 Boundary Layer Analysis with Pitot Tube
070.17025	HM 170.25 Model "Bernoulli"
070.17028	HM 170.28 Wake Measurement
070.17031	HM 170.31 Pitot Tube
070.17032	HM 170.32 Pitot Tube, Small
070.17033	HM 170.33 Pitotstatic Tube
070.17034	HM 170.34 Tube for Static Pressure
070.17040	HM 170.40 Three-Component Force Sensor
070.17050	HM 170.50 16-Tube Manometer, 600mm
070.17060	HM 170.60 System for Data Acquisition
070.17055	HM 170.55 Electronic Pressure Measurement, 18x 0...500Pa
070.17061	HM 170.61 Electronic Displacement Measurement

Coupled Tanks Experiment



Used to investigate basic and advanced control engineering principles, the Coupled-Tank plant is a "Two-Tank" module consisting of a pump with a water basin and two tanks. The two tanks are mounted on the front plate such that flow from the first (i.e. upper) tank can flow, through an outlet orifice located at the bottom of the tank, into the second (i.e. lower) tank. Flow from the second tank flows into the main water reservoir. The pump thrusts water vertically to two quick-connect orifices "Out1" and "Out2". The two system variables are directly measured on the Coupled-Tank rig by pressure sensors and available for feedback. They are namely the water levels in tanks 1 and 2. To name a few, industrial applications of such Coupled-Tank configurations can be found in the processing system of petro-chemical, paper making, and/or water treatment plants.

Potential Learning outcomes:

- Calibration of transducer and actuator circuits
- System dynamics in process systems
- Design and operation of analogue proportional, proportional + integral, or proportional + integral + differential control controllers
- Steady-state errors and closed-loop transient responses
- Ziegler/Nichols controllers tuning rules
- Multivariable control
- Step-change tuning; State feedback
- Flow control

QUBE™-SERVO 2

Low cost, self-contained servomotor solution for undergraduate mechatronics and control labs.

See system specifications on reverse.

QUANSER QUALITY AND PRECISION AT AN AFFORDABLE PRICE

The Quanser QUBE™-Servo 2 is a fully integrated lab experiment, designed for teaching mechatronics and control concepts at the undergraduate level.

Integrating Quanser-developed QFLEX 2 computing interface technology, QUBE-Servo 2 offers educators more flexibility in lab configurations, using a PC, or microcontrollers, such as NI myRIO, Arduino and Raspberry Pi[1]. With the comprehensive course materials included, you can build a state-of-the-art undergraduate teaching lab for your mechatronics or control courses, and engage students in various design and capstone projects.

HOW IT WORKS

The QUBE-Servo 2 experiment consists of a DC motor with an optical encoder providing position and velocity feedback, a built-in amplifier with integrated current sensor, a data acquisition device and a QFLEX 2 computing interface.

The experiment includes two add-on modules - an inertia disk and a pendulum. With a quick-connect interface, you can easily attach the module, or remove it while the controller is running to observe the effect of different inertias on a controller response. Moreover, you can design and 3D print your own add-on modules to expand the scope of the experiment, or to create an engaging student project[2].

The QUBE-Servo 2 also has a user-controllable tri-color LED strip. It can be programmed to indicate state, power, or other control performance parameters of the experiment.

QUBE-SERVO INTERFACE OPTIONS

The QUBE-Servo 2 is available with two different, easily interchangeable interface panels[1]:

- QUBE-Servo 2 USB experiment (with QFLEX 2 USB panel) interfaces to Quanser's control software running on your lab's PC via a standard USB 2.0 connection. The QUBE-Servo 2 USB can be used with MATLAB®/Simulink® and Quanser QUARC software, or with LabVIEW™, using the Quanser RCP software. With the USB version of the experiment, you can take full advantage of the comprehensive course materials and lab experiments for your controls-based courses and projects.
- QUBE-Servo 2 Embedded experiment (with QFLEX 2 Embedded panel) interfaces to your microcontroller (not included with the QUBE-Servo 2 Embedded) via SPI connection. The QUBE-Servo 2 Embedded does not require any additional software. This option is ideal to expose students to various microcontroller techniques, as well as for final (capstone) projects in mechatronics, control, or other and similar programs.

Note: The QUBE-Servo 2 experiment includes one interface panel of your choice. Additional interface panel(s) can be purchased separately.

QUBE-SERVO 2 SOLUTION COMPONENTS

- QUBE-Servo 2 with QFLEX 2 interface panel of your choice *(USB or Embedded)*, inertia disk and pendulum modules
  Optional: Additional QFLEX 2 interface panel
- Quanser control software (required for QUBE-Servo 2 USB experiment): QUARC for MATLAB/Simulink or QRCP for LabVIEW*
- Complete dynamic model and pre-build controllers
- ABET[3]-aligned, flexible digital media courseware (for QUBE-Servo 2 USB experiment)
- Arduino examples and interfacing datasheet (for QUBE-Servo 2 Embedded experiment)

**MATLAB/Simulink and LabVIEW licenses not included*

MODULAR, DIGITAL MEDIA COURSEWARE

The QUBE-Servo 2 solution comes with a 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. The courseware is also aligned with the requirements of ABET[3] accreditation. All this allows professors to get their labs running faster, saving months of time typically required to develop lab materials and exercises.

The QUBE-Servo 2 Embedded experiment is provided with Arduino examples, as well as an interfacing datasheet detailing the connections and protocols used. The courseware resources developed for QUBE-Servo 2 USB experiment are included for reference.

[1] Similar experiment - QUBE-Servo for NI myRIO allows for control using NI myRIO embedded controller via MXP interface. The QUBE-Servo for NI myRIO is available exclusively from National Instruments. For details, visit www.ni.com.
[2] The performance and safety of the experiment is 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.
[3] ABET, Inc. is the recognized accreditor for college and university programs in applied science, computing, engineering, and technology.

SYSTEM SPECIFICATIONS

QUBE-Servo 2

FEATURES

- Compact and integrated rotary servo system
- Tool-less quick connect module interface
- Direct-drive brushed DC motor
- High resolution optical encoder
- Built-in voltage amplifier with integrated current and tachometer sensors
- Integrated data acquisition(DAQ) device
- User-controllable tri-color LED
- Flexible QFLEX 2 computing interface for USB and SPI connections
- Easy-connect cables and connectors
- Open architecture design, allowing users to design their own controller
- Fully compatible with MATLAB®/Simulink® and LabVIEW™
- Fully documented system models and parameters provided for MATLAB®/Simulink®, LabVIEW™
- Microcontroller examples and interfacing datasheet provided for the QUBE-Servo 2 Embedded
- Additional community-created resources available on www.QuanserShare.com

COURSEWARE TOPICS COVERED

Inertia Disk Module:

- Hardware integration
- Step response modeling
- Noise measurement and filtering
- Electromechanical modeling
- Second-order systems
- PD control
- Stability analysis

Inverted Pendulum Module:

- Pendulum modeling
- Moment of inertia
- Balance control
- State-feedback LQR-based control
- State space modeling
- Swing-up control

COURSEWARE TEXTBOOK MAPPING

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

DEVICE SPECIFICATION

Dimensions (W x H x D)	102 mm x 102 mm x 117 mm
Weight	1.2 kg
Pendulum length (pivot to tip)	9.5 cm
Servomotor encoder resolution	512 counts/revolution*
Inverted pendulum encoder resolution	512 counts/revolution*
DC motor nominal voltage	18 V
DC motor nominal current	0.54 A
DC motor nominal speed (no load)	4050 RPM
Interfaces available: QFLEX 2 USB	USB 2.0
QFLEX 2 Embedded	SPI

* Non-quadrature decoding

About Quanser:

Quanser is the world leader in education and research for real-time control design and implementation. We specialize in outfitting engineering control laboratories to help universities captivate the brightest minds, motivate them to success and produce graduates with industry-relevant skills. Universities worldwide implement Quanser's open architecture control solutions, industry-relevant curriculum and cutting-edge work stations to teach Introductory, Intermediate or Advanced controls to students in Electrical, Mechanical, Mechatronics, Robotics, Aerospace, Civil, and various other engineering disciplines.

v. 1.0

Hydraulic Bench

This product supplies a controlled flow of water to a wide variety of laboratory experiment modules (available separately). The body of the bench forms a reservoir or 'Sump Tank' with a submersible pump. Once filled, the bench needs no external water supply.

The top of the bench provides a working surface. This will hold one of a choice of experiment modules from TecQuipment's Fluid Mechanics range. Larger experiments usually stand next to the bench. A rim around the top contains any spilled or excess water. A small recess or 'Trough' in the top works with a removable Drain Valve to trap a small volume of water. It also catches discharged water from some experiments in the fluid mechanics range.

A hand-operated control valve adjusts the water flow rate from the pump. An electrical box on the side of the bench includes the pump switch, circuit protection and a digital display of flow.

Four wheels allow the user to move the bench around the classroom. Two wheels have foot-operated locks to hold the bench in position.

A sight gauge to the lower side of the bench allows the user to check the water level inside the tank.

An electronic flowmeter measures the outlet flow from the submersible pump. The signals from the flowmeter pass to the digital display to show the flow rate. The viewing angle of the display allows the user to see it clearly from a normal standing position.

KEY FEATURES

- Electronic flowmeter and digital display for accurate measurements and quicker experiments
- Made of lightweight fibreglass for strength, easier transport and long life
- Lockable wheels for mobility with stability
- Flat top to hold experiment modules from TecQuipment's Fluid Mechanics range
- Self-contained with recirculating water circuit – needs no external water supply and saves mains water

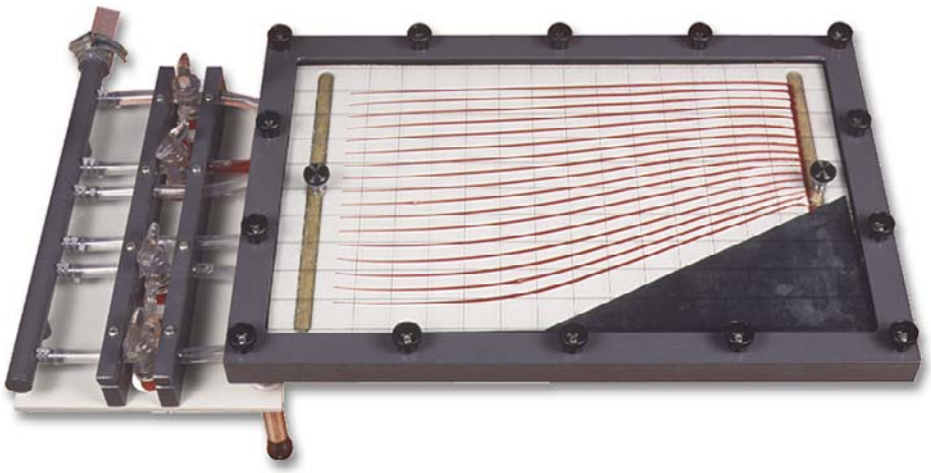
KEY SPECIFICATIONS

- Digital flow display
- 0.001 $L.s^{-1}$ and 0.1 $L.min^{-1}$ resolution
- Electronic flowmeter
- Fibreglass construction
- 160 litres capacity

H9

HELE-SHAW APPARATUS

A powerful method of demonstrating potential flow in fluid dynamics



- Visually effective demonstration of a wide variety of flow patterns around different shapes
- Ideal for individual as well as group work and classroom demonstrations
- Compact and free-standing
- Models easily cut from sheet (included) – almost any shape possible
- Ideal introduction to incompressible potential flow (aerodynamics)
- Source and sink points provided
- Can show soil seepage problems

TECQUIPMENT LTD, BONSALL STREET, LONG EATON, NOTTINGHAM NG10 2AN, UK
TECQUIPMENT.COM +44 115 972 2611 SALES@TECQUIPMENT.COM

TECQUIPMENT

H9

HELE-SHAW APPARATUS

DESCRIPTION

TecQuipment's Hele-Shaw apparatus produces streamlines in a laminar, steady flow. It allows students to study various source and sink arrangements, and look at flow around an unlimited variety of different shaped models. The apparatus can represent water seepage through solids, and can simulate any process satisfying the Laplace equation in two dimensions. Thus lecturers can also use it to represent flow in other branches of engineering, such as aerodynamics or electricity and heat flow.

The apparatus works with a steady, air-free water supply and suitable drain. The equipment consists of a channel formed between two plates. Water flows along the channel at a low Reynolds number, so the inertia forces are not important.

A dye flowing through several small holes at the upstream end produces streamlines. The removable top glass plate has gridlines to help analysis of the flow patterns. The apparatus comes with a rubber sheet from which to cut out various shapes of models. When placed between the two plates, students can see the streamline patterns flowing around the models. Also, valves and a vacuum pump allow students to connect two sources and two sinks (or any combination of both).

To perform experiments, students start the water flow and open a dye valve just enough to produce easily visible streamlines. They then use valves to allow water to flow from a source point or drain into a sink point, or various combinations of flow or sink points. The vacuum pump strengthens the sink points.

To incorporate models into the free stream of the apparatus and study the effect on streamlines, students cut the shapes they need from the rubber sheet (supplied). They then sandwich the model between the two plates of the apparatus and start the flow.

To provide a constant head and smooth, air-free flow from your water supply, TecQuipment offers the optional Header Tank (H9a).

STANDARD FEATURES

- Supplied with a comprehensive user guide
- Five-year warranty
- Manufactured in accordance with the latest European Union directives

RECOMMENDED ANCILLARIES

- Header Tank (H9a) – A wall-mounting tank with a float valve, overflow and a flow control valve and pipework.

LEARNING OUTCOMES

Various flow visualisation experiments in two dimensions, including sink and source points and flow around models, for example:

- Sources and sinks in a uniform stream
- Doublet in a uniform stream
- Flow around a cylinder (disc) and an aerofoil
- Flow through an orifice and a diffuser
- Flow through a heat exchanger
- The momentum equation
- Laminar flow relationship for flow between two parallel plates
- Mean velocity equations (including seepage in soils)
- Potential flow relationships

ESSENTIAL SERVICES

- Clean, air-free water at 1 litre per minute at constant pressure between 1.5 and 2.5 metres head. This can be supplied by the Header Tank (H9a, available separately).
- A suitable drain

OPERATING CONDITIONS

OPERATING ENVIRONMENT:

Laboratory

STORAGE TEMPERATURE RANGE:

–25°C to +55°C (when packed for transport)

OPERATING TEMPERATURE RANGE:

+5°C to +40°C

H9

HELE-SHAW APPARATUS

SPECIFICATIONS H9

NETT DIMENSIONS AND WEIGHT:

720 mm x 520 mm x 470 mm and 18 kg

APPROXIMATE PACKED DIMENSIONS AND WEIGHT:

0.176 m^3 and 28 kg

CHANNEL WORKING SECTION (NOMINAL):

300 mm x 250 mm, depth 0.75 mm

ANCILLARIES (INCLUDED):

- Rubber sheet (from which to cut models)
- All necessary pipe clips, connectors, pipes and tubing
- Dye bottle, clamp and dye
- Water jet vacuum pump
- Retort rod and clamp
- Adaptor
- Spare tap
- Transfusion clips

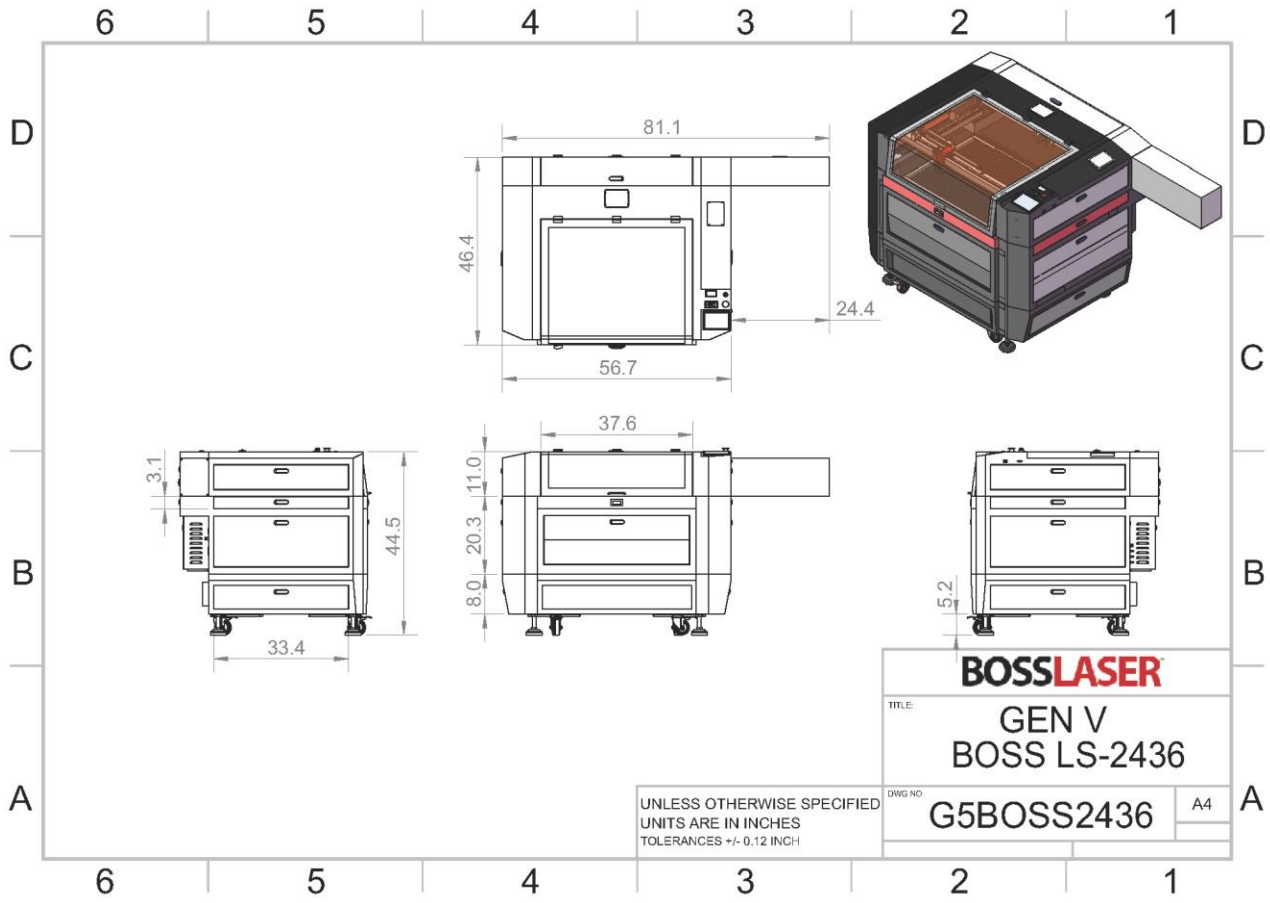
SPECIFICATIONS H9A

NETT DIMENSIONS AND WEIGHT (MAINLY THE TANK):

600 mm wide x 445 mm deep x 430 mm height and 13.5 kg all parts.

APPROXIMATE PACKED DIMENSIONS AND WEIGHT:

0.32 m^3 and 25 kg



“Full” Machine Body Dimensions for LS-2436

- With Base & Feet/Casters: 81.1” x 46.4” x 44.5”
- Without Base & Feet/Casters: 81.1” x 46.4” x 31.3”

Machine Weight

- 760 lbs.

Machine Power Requirement

- **With a 60W Tube**
  - When Idle: 1.02 A / 88.6 W
  - Idle & Movement: 1.4 A / 116 W
  - Machine running @ 100%: 6.6 A / 570 W
- **With a 100W Tube**
  - When Idle: 1.02 A / 93 W
  - Idle & Movement: 1.4 A / 122 W
  - Machine running @ 100%: 7.48 A / 716 W
- **With a 150W Tube**
  - When Idle: 1.03 A / 101 W
  - Idle & Movement: 1.4 A / 129 W
  - Machine running @ 100%: 11.05 A / 1070 W

Water Chiller Power Requirement

- Water Pump: 2.5 A / 86 W
- CW3000 (110V): 0.7 A / 65 W
- CW5000DG (110V): 3.6 A / 398 W

Note: ***CW3000 should only be sold with a 60W tube. For anything above a 60 W tube, a CW5000 is recommended.***

AIR Power Requirement

- Air Pump (Gold/122V): 1.49 A / 148 W
- Air Compressor (Red): 10.5 A / 1100 W

Exhaust Power Requirement

- 500 CFM Blower: 20 A / 1800 W (at start-up), 5.8 A / 667 W (at idle)

Wavelength

- 10.6 microns

Laser Wattage Option

- 60 Watts, 100 Watts, and 150 Watts

Available Lenses

- 2", 2.5", 3", and 4"
- NO 1.5"

Table Size

- 37" x 25"
- This measurement is the ACTUAL table size. Please use this as a reference for the pass-through doors (if the object is larger, it will NOT fit through the pass-through doors; if smaller, it WILL fit through the pass-through doors)

Engraving Overlap

- At 500 mm/s = 45 mm
- At 400 mm/s = 28 mm
- At 300 mm/s = 15 mm
- At 200 mm/s = 6 mm
- At 100 mm/s = 2 mm

Note: ***These numbers are averages and are just for reference. The overlaps can be changed in the controller CFG (to an extend). This may vary so slightly from machine to machine.***

Engraving Area

- 30.5" x 23.5"

Cutting Area

- 35.4" x 23.6" (900 mm x 600 mm)

Maximum "Static" Weight on Worktable

- 300 lbs.

Motorized Z-Axis Lifting Capacity on Worktable

- 200 lbs.

Z-Axis Range

- With Honeycomb: 6.5”
- Without Honeycomb: 7.5”

Rotary Attachment Available

- Long Roller
- Long Chuck

Rotary Capacity

- Roller:
- Chuck:

Laser Platform Interface Panel

- All LS models will consist the following:
    - LCD Controller Panel
    - RDC Controller Card
        - Direct USB connection from PC to Machine
        - External USB connection w/o use of PC

RDC 6442G Controller Card “Highlighted” Functions

- 256MB Large-Capacity File Nonvolatile Storage Onboard
    - A single file size can be up to 256MB (Card Memory will be full; Not Recommended)
- A File Preview that displays the processing path with a progress bar
- Support Power-Off Restart for Engraving
    - Up to 5 mins. of “Power Interruption” (ex. Power Surge)
- Standalone Controller
    - Once you have a file setup on a USB and want to run the same job continuously, there’s no need for a dedicated-direct USB connection from the PC to the Machine (operate using the External USB port).
- Color LCD Panel Display
- Modify “On-the-Fly” Settings Adjustment
    - Need to make Speed/Power adjustments, you’ll be able to do it directly from the LCD Panel
- Jogging Capability
    - Set distance directional movement of the laser head
- Multi-Origin Capability
    - Can set more than one Origin on a single file/job
- Ethernet Data Transfer Capability
    - Instead of using the USB that was provided, you can also do this with an Ethernet Cord (also the use of routing multiple PCs to one Machine)

Computer Requirement

- **Minimum Requirements**
  - Intel Core i3 Processor
  - 4GB DDR3 RAM
  - Windows 7 Home Edition
  - 250 GB HDD
  - Ethernet and/or Wi-Fi Connection (for Tech. Support)

PC Connection

- USB

Optics Protection

- Not Available

High Pressure Air Assist

- Available

Transmission System

- Stepper Motors & Belts Transmission

Accuracy

- Controller Positioning
  - Software Configuration
  - Pulses Generated by the Controller
  - Drivers & Drivers' Setup
  - Motors
  - Transmission

  All the above (cumulated) will be an accuracy of +/- .01"

- Resetting
  - Limit Switch = .002"

  Up to this point, the accuracy will now be +/- .012"

- Cut
  - Kerf of the Laser
  - Tube Size
  - Power & Speed Settings
  - File Intricacy
  - Focus Point & Height
  - Lens Size
  - Airflow
  - Material Type
  - Material Thickness

  Up to this point, the accuracy can NOT be determined because the number of variables

- Repeatability
  - The ability to replicate a part or file including all the above; tolerance and variables