QUANSER
INNOVATE·EDUCATE

HD² HIGH-DEFINITION HAPTIC DEVICE

High-definition, open-architecture haptic platform for advanced robotics, teleoperation, and human–machine interaction research across real and virtual domains.

The HD² High-Definition Haptic Device* is a high-precision, six degrees of freedom (DOF) haptic interface designed to support advanced research in robotics, teleoperation, human-machine interaction, and dexterous manipulation systems. It provides realistic, programmable force feedback in five DOF (X, Y, Z, Roll, Pitch) with continuous yaw motion, offering responsive control capabilities essential for developing high-performance teleoperated robotic systems and augmented haptic feedback interfaces.

The HD² features a large workspace (X: 800 mm, Y: 250 mm, Z: 350 mm) and very low intervening dynamics. Its parallel mechanism is highly back-drivable with negligible friction, while the heavy-duty capstan drive and high-performance DC motors reduce perceived inertia and maintain structural rigidity. Equipped with high-resolution optical encoders, adjustable brass counterbalances, and six built-in high-bandwidth linear current amplifiers, the HD² achieves stiffness coefficients up to 3,000 N/m. Researchers can leverage its open-architecture design to deploy and validate custom control strategies, human-in-the-loop robotics, and adaptive feedback systems directly through QUARC® Real-Time Control Software for MATLAB®/Simulink®.

Features

High Performance

Six-DOF parallel mechanism with capstan drive delivers high torque, low backlash, and fast response

Open Architecture

Full access to current, velocity, and position loops with flexible I/O integration

Precise and Robust

High-stiffness, low-friction structure with sub-millimeter encoder precision ensures accurate motion tracking

Flexible and Expandable

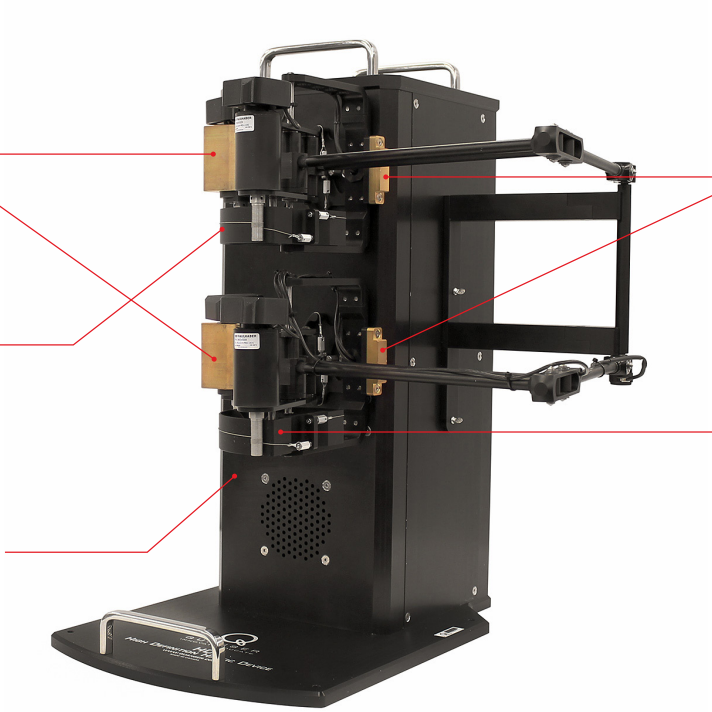
Modular, research-ready design with configurable workspace and seamless integration with third-party hardware

Workstation Components

Control design environment	Quanser QUARC® add-on for MATLAB®/Simulink®
Documentation	User Manual
Real-time targets	Microsoft Windows®
Data acquisition devices	QPID
Amplifier	Built-in linear current amplifier
Sample controller(s) are supplied	Built-in linear current amplifier

* HD2 is also available in configurations with 6 DOF sensed/6 DOF actuated (with actuated roll at end-effector) and 7 DOF sensed/7 DOF actuated (with pincher). For details or to inquire about customization to your specific needs, email sales@quanser.com.

Product Details



Device Specifications*

	X	Y	Z	Roll	Pitch	Yaw
Workspace	800 mm	250 mm	350 mm	180 deg	180deg	Continuous
Tip Inertia	300 g	300 g	300 g	2.29 g·m²	2.29 g·m²	0.79 g·m²
Back Drive Friction	0.353 N	0.353 N	0.353 N	61.775 N/mm	61.775 N/mm	0.5 N/mm
Maximum Force/ Torque at 2 A	19.71 N	19.71 N	13.94 N	1.72 N·m	1.72 N·m	1.72 N·m
Continuous Force/ Torque at 1.1 A	10.84 N	10.84 N	7.67 N	0.948 N·m	0.948 N·m	0.948 N·m
Position Resolution	0.051 mm	0.051 mm	0.051 mm	0.033°	0.033°	0.088°
Stiffness at 10 kHz	3000 N/m	3000 N/m	3000 N/m	3.4 N·m/rad	3.4 N·m/rad	0.05 N·m/rad (torque at 0.6 A)
Dimensions (H x W x L) 0.53 m x 0.3 m x 0.5 m						
Mass, including the amplifiers 22 kg						
Actuators, Six DC motors with capstan-drive transmission for high torque and low inertia.						
Actuators, Six DC motors with capstan-drive transmission for high torque and low inertia.						
Sensors, Seven optical encoders for precise 6-DOF motion tracking.						
Connectivity, Auxiliary analog/digital I/O for external sensors and peripherals.						

* Subject to change

About Quanser:
Quanser is the world leader in education and research for real-time control design and implementation. We specialize in outfitting engineering 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 workstations to teach introductory, intermediate, or advanced controls to students in Electrical, Mechanical, Mechatronics, Robotics, Aerospace, Civil, and various other engineering disciplines.