# PPMS® VersaLab®

Product Description

Cryogen-Free Physical Property Measurement System

**The PPMS VersaLab** is Quantum Design's first portable Physical Property Measurement System. It provides most of the capabilities of the PPMS in a very compact size, and without the need for any liquid cryogens. The system uses a small, two-stage cryocooler for both the superconducting magnet and the temperature control system, providing PPMS measurement versatility with minimal infrastructure requirements.

## Temperature Control

A novel thermal switch design in the PPMS VersaLab cryostat enables a temperature range of 50 K to 400 K without any consumption of helium gas. It does this while providing the fully automated, state-of-the-art temperature control our customers have come to expect. The VersaLab sample chamber enjoys compatibility with PPMS sample "pucks" by offering the same 25mm bore, sample isothermal region, and robust 12-pin sample puck interface but in a shorter overall length of approximately 350mm.

## Magnet Control

The PPMS VersaLab comes equipped with a 3 tesla conduction-cooled switch-less superconducting magnet which is powered by a hybrid digital/analog magnet controller. Designed for precise, quiet control of the magnetic field, the bipolar controller also allows smooth continuous ramping through zero field. System diagnostic software monitors the temperature of the magnet and cryocooler to ensure proper operation of the magnet system.

An integrated magnetic shield maintains the 5 gauss line inside the body of the PPMS VersaLab, allowing these systems to be installed close to other sensitive instruments for better lab space utilization.

## Integrated High-Vacuum

The PPMS VersaLab also comes equipped with an integrated cryopump and vacuum gauge for controlling the sample environment. Equivalent to the High-Vacuum option for PPMS, the cryopump evacuates the sample chamber to less than $10^{-4}$ torr in under 10 minutes. And this feature is fully integrated, allowing you to change the chamber environment during a programmed sequence or script.

## MultiVu Software

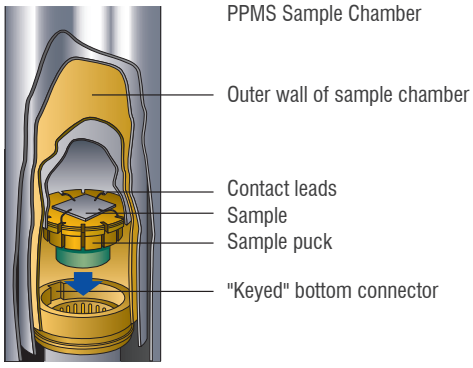
Quantum Design has taken the powerful and already popular MultiVu software found in its other measurement platforms and further improved it for more efficient magnet and temperature control in the PPMS VersaLab. MultiVu comes complete with pre-written sequences for automated measurements as well as the capability to create custom sequences for your individually designed experiments. New on the VersaLab are integrated scripts in MultiVu to simplify routine system maintenance and troubleshooting. This automated control software allows you to spend your valuable time analyzing your data and reporting results, rather than being tied to your experiments as they run. In addition, MultiVu allows you to remotely control and monitor your experiments over any internet connection.


## Open Architecture

The flexibility of the PPMS VersaLab allows you to create your own experiments and easily interface them to the sample chamber using inserts such as the Multi-Function Probe which provides a fully customizable sample interface. Meanwhile, the cryostat functions such that the temperature and magnetic field can be controlled from external programs such as LabVIEW or other third party software.

## Sample Mounting

The PPMS VersaLab uses our innovative style of sample mounting by providing at the bottom of the sample chamber a 12-pin connector pre-wired to the system electronics. This connector allows you to plug in a removable sample insert (or “puck”) for convenient access to electrical leads and sample mounting.



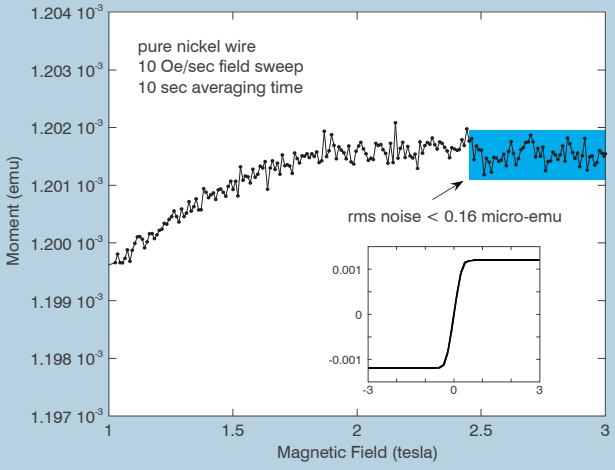




**Figure 1.** The VersaLab VSM achieves high sensitivity even at high fields (rms sensitivity $< 10^{-6}$ emu).

# PPMS® VersaLab®

A History of Innovation
Industry Leading Design
Cryogen Free
Automated Operation
Portable and Compact


## Measurement Options

- AC & DC Electrical Transport
- Horizontal Rotator
- Heat capacity
- Thermal Transport
- Vibrating Sample Magnetometer (VSM)
- VSM Oven – continuous operation up to 1000 K
- Magneto-Optic Measurements (light source and FOSH)
- Torque Magnetometry
- AC Susceptibility
- Broadband Ferromagnetic Resonance (FMR)
- Multi-Function Probes
- Optical Multi-Function Probe (OMFP)

# PPMS® VersaLab® Specifications*

| | |
|---|---|
| **Temperature Control** | |
| Range: | 50 to 400 K |
| Stability: | ± 0.02% (typical) |
| Sample Cool Down Time: | 300 to 50 K (stable) < 120 min. (60 Hz); < 140 min. (50 Hz) |
| System Startup Time: | ~10 hours (typical) |
| **Magnet Options** | |
| Range and Type: | ± 3T; NbTi Superconducting |
| Control Modes: | Driven Mode: Linear, Oscillating |
| Min Time to Full Field: | Less than 2 min (typical) |
| Field Uniformity: | ± 0.1% over 2.5 cm on axis at field center |
| Power Supply: | 20 A |
| **General System Details** | |
| Sample Space Size: | Clear bore 2.5 cm (1 inch) diameter |
| Maintenance Interval: | ~2 years for the Cryocooler compressor (maintenance includes replacement of the adsorber in the compressor unit) and; ~2 years for the G-M cryocooler (designed for maintenance every 20,000 hours |
| Power Requirements*: | System: 190-240V, 50/60 Hz, 16A max (13A typical), single-phase |
| System Dimensions and Weights*: | Cryostat: 61 cm x 45 cm x 107 cm (D x W x H); 111 kg<br>Compressor: 61 cm x 38 cm x 64 cm (D x W x H); 100 kg |


Quantum Design

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*For complete specifications, contact your local Quantum Design office.
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