

## **QUICK START: PPMS1 PROBE**

This short document gives a quick overview of how to get going quickly with your cryogenic strain cell and customised PPMS probe. If you wish to mount a sample to the cell, do this before attaching the cell to the probe. An application note detailing sample mounting methods is provided with each cell.

# MOUNTING THE CELL

Before assembling the probe, adjust your new puck to the correct fit for your PPMS according to the instructions in the PPMS hardware manual.

The Cell should be mounted to the probe as shown below. CS1x0 series cells mount into a cell holder (supplied with the probe) while FC100 cells mount directly to the probe and use a bump guard (supplied with the FC100) to support the puck

Thread the cables through the thermal link plate and large holes in the PPMS end plate. The copper thermal link plate with its springs is placed at the far end of the cell from the puck, as shown below. The tapered edge faces towards the cell/puck. The thermal link springs make contact with the inside of the PPMS to help cool the cell.

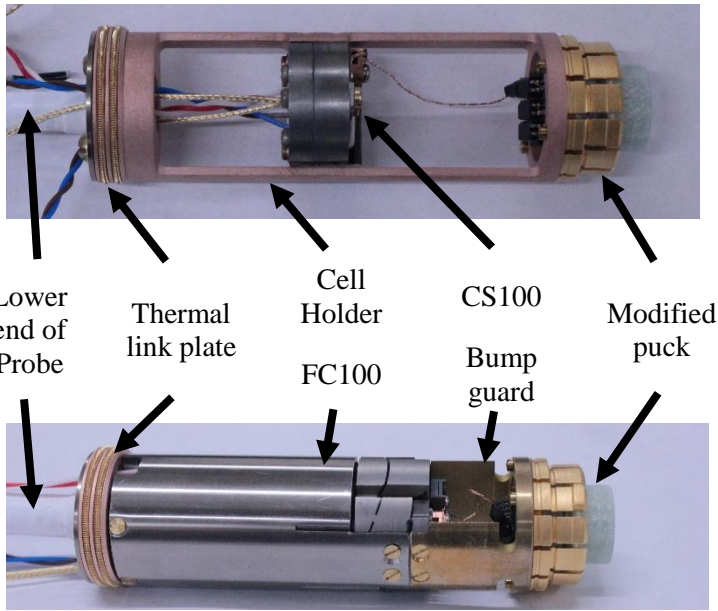


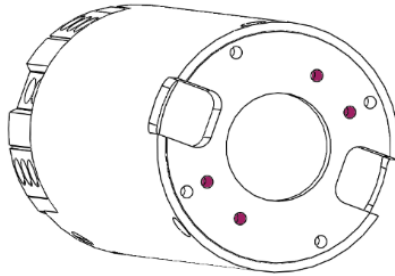
Figure 1. Components of the PPMS probe assembly.

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INSTRUMENTS

The **CS100** can be mounted axially or transversely (shown). Other CS1x0 series cells must be mounted axially. The cell is attached to the cell holder by two M2 countersunk screws and the cell holder to the probe by two 4-40 screws (both provided).

The **FC100** is screwed to the end of the PPMS probe using the M1.6 screws provided. The highlighted M1.6 tapped holes below should be used.



**Figure 2. The Bottom of the FC100 with M1.6 mounting holes highlighted.**

The **modified puck** is attached to the bump guard or cell holder with four 0-80 screws. To minimise the risk of damage to the wiring, we recommend leaving it attached at all times.

## **BOTTOM END WIRING**

**Down-Probe:** Mate the connectors at the probe side of the cell according to the colour codes. The stepped plastic LEMO connectors slip fit, while the gold plated MMCX connectors click into place. Excess wire can be tied to the probe with Teflon tape or similar.

**Puck:** If using a razorbill instruments wiring platform kit, mate the 4-pin connector from the platform to a connector on the puck. Align the chamfered corners as you do so. For standard PPMS systems, the number of the connector corresponds to the

channel in the Model 6000. Take care to handle the connector by the body (e.g. with tweezers) and avoid stressing the magnet wires. If using your own sample wiring, refer to the probe kit user manual for pin allocations.

## INSERTING THE PROBE

The probe can be inserted into the cryostat at this point. If you have not used your PPMS with a probe before, refer to the PPMS documentation on how to do this. The thermal link springs will engage with the sample chamber about 2-3 cm before the probe is fully inserted.

If you wish to operate the device outside the cryostat, attach a ground wire to the probe.

## TOP END WIRING

**RP100 power supply:** Connect the provided power cables from the power supply to the probe head. It is usual to connect channel 1 to tension and channel 2 to compression. The HV cabling should never be left open circuit, especially when operating the cryostat. This is because large pyroelectric voltages build up in the stacks. Always ensure that the power supply or the shorting caps (attached to the probe head) are plugged into the feedthrough.

**Capacitance bridge:** the capacitance measurement system connects to the SMA connectors on the top plate. BNC adapters are included. Connect “high”, “drive” or “excite” to the connector marked high, and “low”, or “sense” to the one marked low. If your capacitance measurement system has four terminals, connect the “force” and “sense” or “current” and “voltage” terminals for each channel together.

# USING THE RP100 POWER SUPPLY

The power supply is primarily designed to be used as part of an automated experiment using text commands sent over USB, generated using a script (See RP100 user guide). For simple operations when you are first using the system, many users find it convenient to use a simple program that has an easy to use user interface that can be downloaded for free from the accessories page of the Razorbill Instruments website.

Observe the temperature-dependent voltage limitations set out in the user guide for your cell. At room temperature, this is  $-20$  to  $+120$  V.

## FIRST-TIME TEMPERATURE CALIBRATION

It can be informative to perform an initial cooldown and warmup without a sample mounted. This can provide temperature calibration information for the capacitance sensor and help determine how long a stable temperature must be maintained for before the cell has equilibrated. Advice on how best to do this is found in the datasheet for each cell.

## MORE INFORMATION

- PPMS1 probe user manual
- RP100 Manual
- AP005 Sample mounting application note
- FC100 or CS1x0 datasheet