Brief Instruction For Operating Quantum Design's MPMS-XL (draft#1)
(using standard sample transport)

Sample preparation:

1. For solid samples, cut a portion with about 3 mm OD and 3 mm length and record its weight. For liquid samples, use a piece of capillary tube to hold about 3 mm long of solution and seal both ends.
2. Push the sample into a short piece of straw and push it into the middle of a full-length straw.
3. Use Kapton tape to wrap around the end of the sample rod to make it big enough to fit the straw over it, and attach the straw to the sample rod. Wrap with Kapton tape to secure the straw. Also, use the Kapton tape to block the bottom of the straw to avoid the sample being dropped out of the straw.
4. Slide the seal plug over the straw.

Loading sample into the probe:

1. Turn the airlock lever to horizontal "**Closed**" position and wait until the yellow LED stop blinking.
2. Turn the seal clamps of the airlock space to vent the airlock space. Remove the blue plug (make sure the three O-rings are still seated).
3. Insert the sample rod into the airlock space until the seal plug reached the seal clamp area, and turn the seal clamps to seal the airlock space.
4. Press the Purge Airlock button and wait until the yellow LED turns on and then off, with the green LED turned on. (repeat this step 2 or 3 times)
5. Turn the airlock lever to vertical "**OPEN**" position.
6. Slowly lower the sample rod until the black slide clamp on the rod engages the actuator shoe (the lower one) on top of the sample transport.
7. Rotate the sample rod so that the slide clamps hook around the clip screws and tighten the clip screws to secure the sample rod.

Defining sample parameter (Sample → Description)

1. Check Sample Installed
2. Enter sample information
3. Click the OK button

Centering the sample (Center → DC)

1. Click on **Initialize Transport** (you can select autotracking by **Center→DC →Parameters → Autotracking**)
2. Click on **Parameters** (Length of Scan = 6 cm for Center and 12 cm for Full DC Scan, Data Points = 32 for Center and 64 for Full DC Scan, SQUID Measurement Axis = Longitudinal, Use Autoranging)
3. Click **OK**
4. Click either **Center** or **Full DC Scan**. The data will be saved in center.dc.lastscan file.

5. Click on **Adjust Position** if the center.dc.lastscan file shows the sample is not centered, and click **Adjust Manually**. Follow the instruction shown (loosen the thumb knob on top of the sample rod, wait until the rod moves to the correct position, then tighten the knob).

Measuring the Sample:

1. Define the parameters (**Measure → DC**) (Scan length = 6 cm, Scan to Average = 2 to 64, Data point = 32 or 64, select **Autotracking**, **Longtitudinal**, Use **Autoranging**, **Iterative Reg**.
2. Select the data files (change to new data file by clicking on **Change**, check **Include Diagnostics Data and Include Raw data**)
3. Set the field and the temperature as needed by clicking on the Field Status Panel and the Temperature Status Panel on the bottom of the screen and.
4. Click on **Measure** to start the measurement
5. Click on **VIEW** to view the data files.

Ending Experiment:

1. Set the field to 0 and wait until it reaches 0.
2. Set temperature to room temperature and wait until it reaches at least 100K.
3. Follow the procedure in Loading Sample in reverse order, i.e.
    a. Unscrew the clip screws, rotate the sample rod to disengage the clips and slowly pull the sample rod up until the seal plug reaches the seal clamp area.
    b. Turn the airlock lever to horizontal "**CLOSED**" position to isolate the sample chamber from the purge chamber.
    c. Turn the seal clamps of the airlock space to vent the airlock space. Now you can remove the sample rod completely from the probe.
    d. Put the blue plug back on and turn the airlock lever to seal the airlock space.
    e. Remove your sample from the sample rod and place the sample rod in the box.

Using Sequence Commands to Run Experiments:

1. Open an existing sequence by the drop-down menu (**Sequence → Open**), or create a new sequence by using the Sequence Editor (**Sequence → New**).
2. Enter information in the Control Center Panel (**Sample, Sequence, Data File Name**), then click on the **Run** button to start.

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(Select "Magnetometer Sign-Up Sheet.")