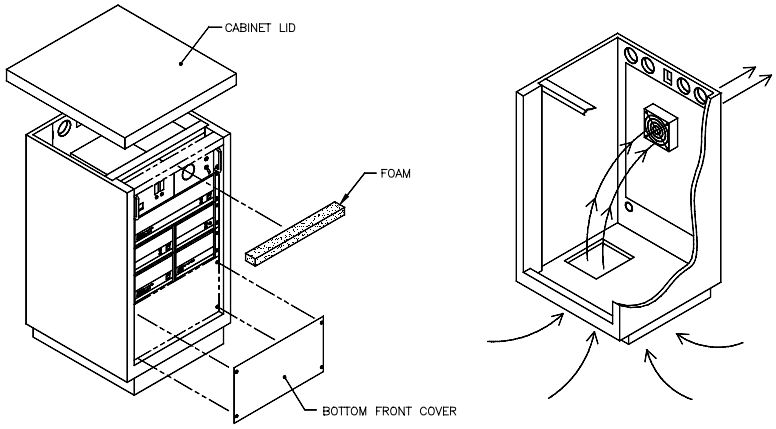
Quantum Design

MPMS Service Note 1048-401

Overheating in the Non-XL MPMS Electronic Cabinet Console

MPMS systems with the non-XL electronic cabinet configuration can exhibit failures, such as electronic failures due to the failure of the ventilation circuit, as a result of excessive heat build up.

The cabinet has a ventilation circuit that maintains the proper operating temperature within the cabinet. The driver for the circuit is a fan mounted on the rear door. The source is a hole found at the bottom of the cabinet. The circuit is comprised of flow inhibitors that maintain only one source into the circuit. These flow inhibitors consist of all the front panels to the rack mounted controller units, the cabinet lid, the lower front cover, and the rear door to the electronic cabinet console.



The driver creates an airflow that draws fresh air from the source and pulls it out of the cabinet. The console units are rack mounted and allow the air to flow through the electronics within the console units, thereby exhausting any heat that accumulates within them. With all the heat sources within the cabinet in the path of the airflow, their heat will be drawn out of the cabinet before it has a chance to accumulate and cause the

system to overheat. Any interruption to this ventilation circuit may cause a failure to the system.

Any of these failures will cause excessive heat build up within the cabinet:

- **Malfunctioning cooling fan** – if the fan is not operating in the ventilation circuit itself, either due to a build up of debris or it's just not functioning at all, there will be no driver to create the airflow necessary for ventilation.
- **Obstruction or redirection of airflow** – if the hole at the bottom of the cabinet is blocked, there will be no source of fresh air for the driver. Also, if you are operating the system without the front panels, the lower front cover, and the cabinet lid in place, or you have the rear door open, the ventilation circuit may be compromised.

Please be aware of these heat sources within the cabinet:

- At the bottom of the cabinet is the rotary vane pump that generates a significant amount of heat. If you use the pump in a high ambient temperature and have a high gas throughput, the temperature of the pump-body can exceed 70 °C.
- The Kepco power supply for the magnet, which is located just above the multi-purpose controller (1822) that contains all of the drive boards. If the magnet is ramped to high fields for long periods of time, the Kepco can reach temperatures of 70°C.
- The AC drive board in the 1822 controller.
- The Model 1802 Digital R/G Bridge, which contains a heat sink located in the rear of the unit.
- The RSO controller.
- The main power distributor (PDU).
- The solenoid valves in the gas tray.

With the heat sources mentioned above ranging in temperatures much greater than 40 °C, this heat will accumulate within the cabinet. Without proper ventilation, the MPMS electronics may overheat and result in system failures.

To avoid overheating

When operating the MPMS, ensure that the following components are in place:

- **Foam Block** – a 1″x1″x36″ foam block with a single-sided adhesive material that attaches to the front bottom side of the counter top. This block helps direct the airflow through the electronic consoles. Ensure that the foam block is securely attached to the cabinet lid.
- **Cabinet Lid** – check that the cabinet lid makes a complete seal on the top of the cabinet. Any gaps between the cabinet lid and the top of the cabinet that expose the top rack components and allow an exit for the airflow, other than the one

designed by the MPMS cabinet, will redirect the airflow and create a failure in the ventilation circuit.

- **Rear Cabinet Door** – operate the system with the cabinet's rear door closed. The fan is located on the rear door and if the door is open then the fan will not be able to generate the airflow.
- **Rear Door Fan** – check the rear door fan for proper operation. The fan should run at all times when the system is on.
- **Front Panels** – all front panels of the rack mounted controller units and the front cover must be in place while operating the MPMS. With out the bottom front cover in place, the airflow will bypass the rotary vane pump and its heat will not be exhausted out the rear of the cabinet.