Design of the Power Supply Chassis for the Hall A Electromagnetic Calorimeter

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This note presents the design of the power supply interface chassis for the Hall A electromagnetic calorimeter (ECAL).

The power supply interface chassis for the ECAL heater controls is designed to offer safe connections for the power supplies and heaters. The chassis has relay controls for over-temperature, sensors for monitoring channel current, over-current protection, and power supply control connections.

Figure 1 shows the locations of the connectors and components needed and defines the number of conductors for each connected cable.

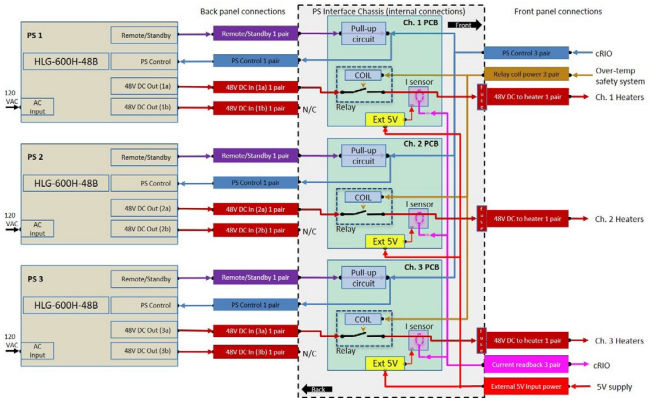

FIG. 1. Power supply interface chassis controls diagram. Power supply inputs are on the left and the interface chassis (dashed-line box) is in the middle. cRIO controls, over-temperature safety, and 5-V input power are on the right.

The chassis connects three 48-V, 600-W power supplies to three heater channels, each of which has a circuit board. Each heater channel supplies power to twelve 50-W heaters. Over-current protection to each channel is via a fuse.

Figure 2 shows details of the circuit board for channel 1.

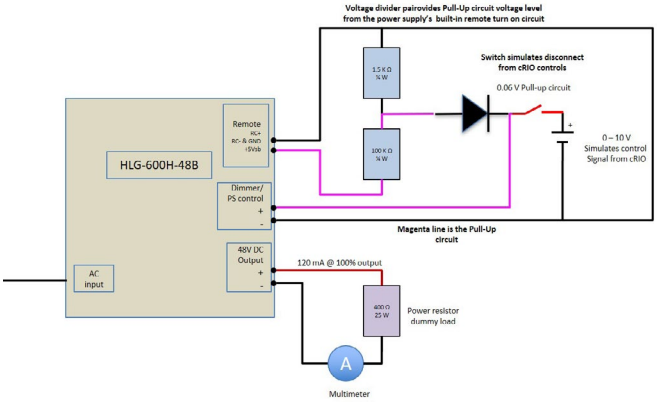

FIG. 2. The pull-up circuit (magenta line) between the power supply's Remote and the PS control provides ~0.06 V to ensure the power supply does not output the full current (12 A) if the 0–10-V control circuit is disconnected.

Each circuit board has a relay to disconnect the power supply from the heaters in case of an over-temperature event and a sensor that measures the current that powers the heaters.

The current sensor requires 5 V, which is provided by the circuit board via a connection to the external power supply.

The pull-up circuit ensures that the power supply does not output full current (12 A) if the control circuit voltage is removed.

In conclusion, the developed diagram details the connections and components needed for an interface chassis that will connect to the ECAL heater power supplies. The chassis design incorporates several safety features.