

E906 Cryogenic Target System Heater Power Supply

The E906 cryogenic target system consists of a liquid hydrogen and a liquid deuterium target. The liquids are contained inside of two 2.2L flasks, which are filled by condensing gaseous hydrogen/deuterium inside of a set of condensers (one for each target). The condensers are cooled using two Cryomech cryocoolers, each of which possesses a cooling power of approximately 25 W at the boiling point of hydrogen and deuterium. In order to prevent the targets from freezing once the flasks are full, a heater is attached to the condensers in order to balance the cooling power of the cryocooler. Each heater consists of four resistors (670 Ohms each) connected in parallel, and attached to an AC power supply. A silicon-controlled rectifier (SCR) is placed between the resistors and the power supply to allow for PID control. The SCR is controlled using a 24VDC, 0-20mA signal provided by a Siemens APACS PLC . This document will describe the power supply used for the heater system.

Heater specifications:

- Four 670 Ohm resistors in series (170 Ohm effective resistance).
- Must be able to provide at least 30 W of heat to target condenser.
- Power input into heaters can be controlled via SCR.

The heater power supply (Figure 1) consists of four transformers (two for each target), each of which can output a maximum of 36VAC. For each target, two transformers will be connected in series. Both the inputs and outputs are fused to limit the current to 1A.

Heater power supply specifications:

- 120VAC input
- 72VAC output, 1A maximum

The power supply can be deemed sufficient to provide power to the heaters.

