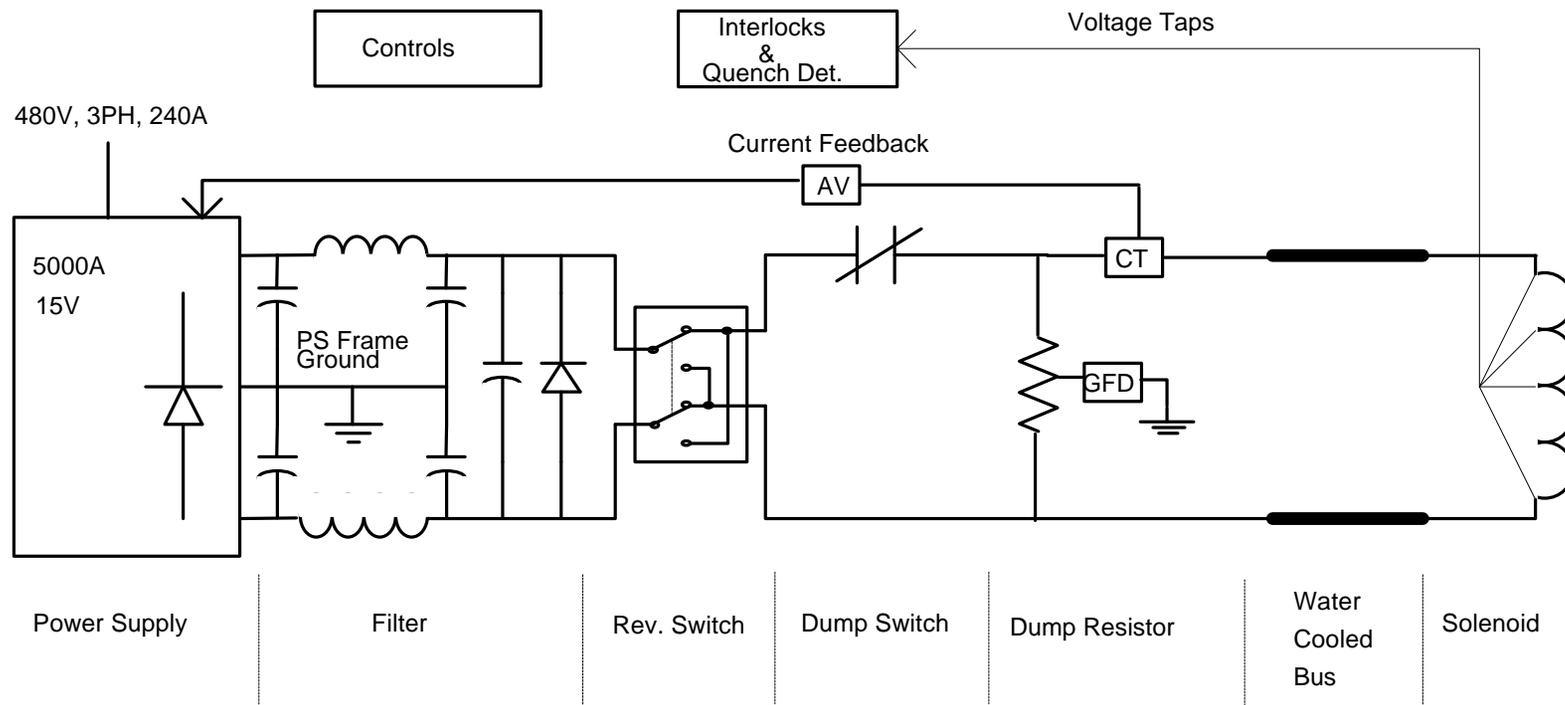

Electrical System Overview

DZERO Solenoid

By Rick Hance

Revised 1/7/97

Block Diagram

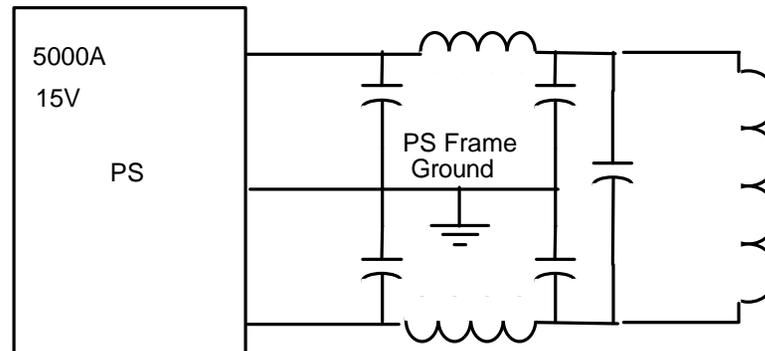


Power Supply

- **Power Energy Industries Model SR-1029**
- **150 kilowatt, 12 phase, unfiltered**
- **5000 amps, 7.5,15,30 volts**
- **Current regulation to less than 0.05% (± 2.5 amps)**
- **Output Ripple $\approx 2.2V_{p-p}$**
- **Input power factor 0.6**
- **Water cooled**

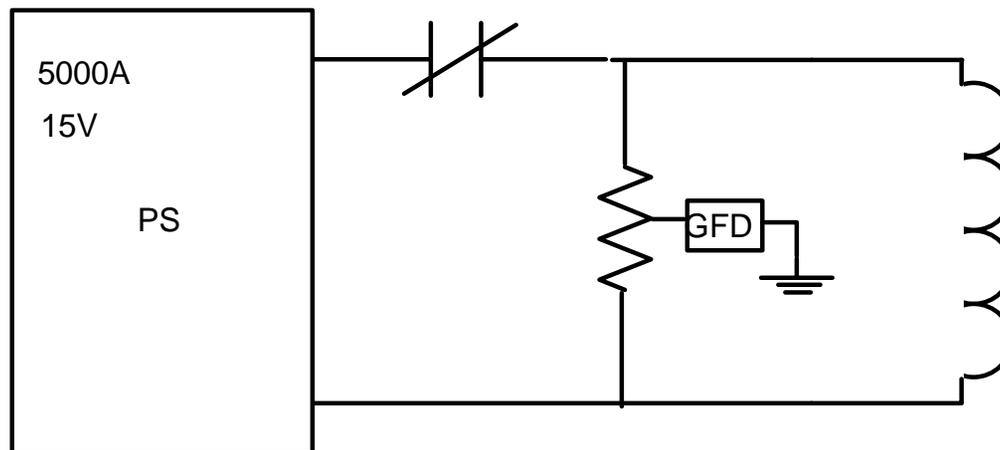
Filter

- **Differential mode for 720 Hz ripple**
- **Common mode for high frequency SCR noise**
- **Air core chokes ($\approx 25 \mu\text{Hy}$) in each bus conductor**
- **Capacitance across for differential mode**
- **Capacitance to PS frame for common mode**
- **Low power loss**



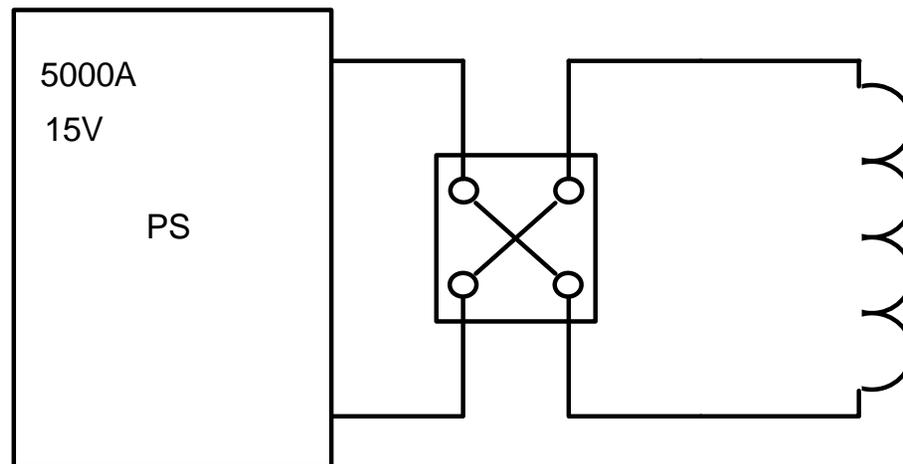
Dump Switch and Resistor

- **Contactor normally connects PS to solenoid**
- **Opens to disconnect solenoid & dump resistor from rest of system to allow graceful discharge**
- **GFD is ground reference for system - monitored by interlocks**



Reversing Switch

- **5000 amp dc mechanical, motorized switch**
- **Reversing expected to take 40 minutes including discharge and recharge**
- **Interlocked to power supply**



Protection Chassis

- **Interlocks, Quench Detection and Protection**
- **Modules in NIM bin**

**Interlock Summation
Interlock First Fault
Ground Fault Detector**

**Vapor Cooled Lead Voltage
Potential Tap Lead Imbalance Detector
Dump Switch Interface**

- **Interlocks may not be over ridden or bypassed**
- **Quench voltages processed conventionally (ISO Amps)**
- **Control systems sees all interlocks**

Control System Features

- **Programmable Logic Controller**
- **Ethernet interface to solenoid operator's console**
- **Process control diagram on operator's console**
- **Programmed charge/discharge profiles possible**
- **Hardwired interlocks**
- **Hardwired quench detection**
- **Solenoid voltage data logging for analysis**
- **Interface to MCR, D0 DAQ, D0 Alarms**