

MINERvA Mtest

Mini_DAQ

Electrical Documentation

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Location: Mtest Highbay

The MINERvA experiment is constructing a Beam Test experiment in the Highbay area of Mtest. A Mini-DAQ consisting of a desk top computer, VME crate, and bench top power supply will be used to test detector panels with standard Minerva readout electronics. We request pORC approval to run this equipment unattended.

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MINERvA Electronics System

1 Introduction

The Minerva experiment is constructing a Test Beam detector in the Highbay area of the Mtest building with the intent of moving the apparatus into the Beam Line hall April 21. While the construction of the full readout electronics racks is taking place, there is a need for a scaled down version of the acquisition system such that detector panels can be tested.

2 VME Crate Electronics

The VME crate consists of a standard VME back plane and a Power One (HDBB-105W-A) power supply. This supply is capable of delivering 5VDC @ 12A, +/- 12VDC @ 1.7A or +/- 15VDC @ 1.5A. Electronics modules used in the VME crate include a commercially available VME Controller (CAEN V2718). Fermilab staff designed modules include a CROC, CRIM, and FEB. These designs have passed the Fermilab Engineering Design Review and are currently also used underground in the Minerva experiment at MINOS.

Specification sheets for all equipment are linked below:

Power One HDBB-105W-A

http://www-ppd.fnal.gov/EEDOffice-w/Projects/CMS/Minerva/Elect/HDBB_105W_A.pdf

CAEN V2718 VME Controller

<http://www.caen.it/getattach.php?mod=V2718&obj=mn&id=2250>

CRIM: Fused for 3A@5V.

<http://www-ppd.fnal.gov/EEDOffice-w/Projects/CMS/Minerva/Elect/CRIM.pdf>

CROC: Fused for 3A@5V.

<http://www-ppd.fnal.gov/EEDOffice-w/Projects/CMS/Minerva/Elect/CROC.pdf>

FEB: Fused for 2A@4V

<http://www-ppd.fnal.gov/EEDOffice-w/Projects/CMS/Minerva/Elect/FEB.pdf>

3 AC Power Distribution

Figure 1 illustrates the AC Power Distribution for the Mini-DAQ rack. A Fermilab stock power strip is used to provide power to the VME crate and bench top supply. The power strip is connected directly to a 120V, 20A service from circuit MP-TT-2. A ½ inch, tinned copper, flat woven braid is used to provide a safety ground from the rack to the AC power conduit (stock number 1168-011500). Power cords for the equipment are 120V/18AWG. The AC line cord for the VME crate Power One power supply is fused at 3A.

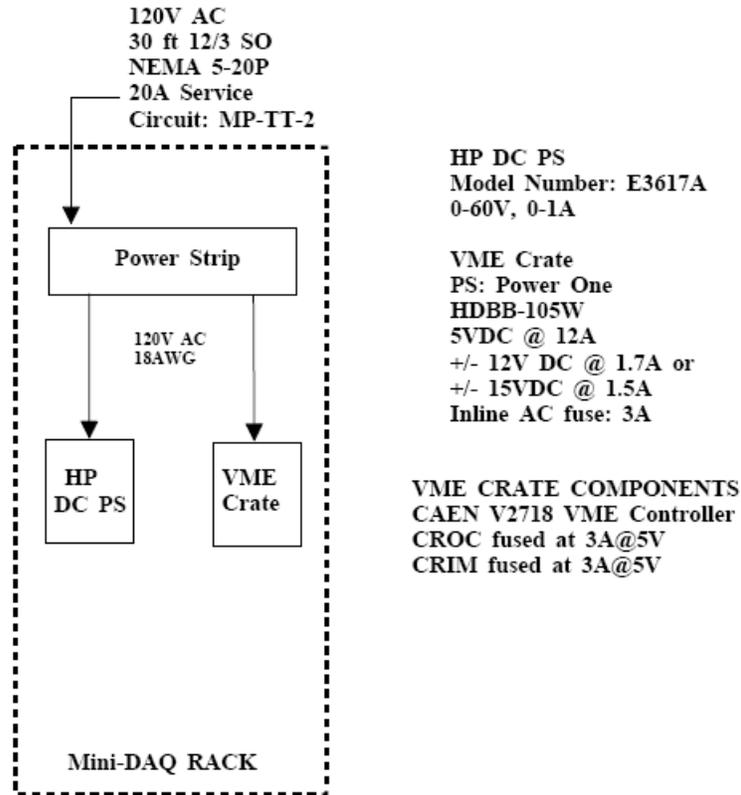


Figure 1: Mini-DAQ AC Distribution

4 DC Power

DC Power for the FEB is provided by a commercially available HP DC bench top power supply capable of delivering 1-60V at 0-1A. The supply is adjusted to provide 48V and limited to 600mA from the front panel.

HP E3617A Bench Top DC Power Supply specification sheet:

<http://cp.literature.agilent.com/litweb/pdf/5959-5310.pdf>

The Cord End calculation and wiring diagram is shown in Figure 2. Belden 9409, 18AWG twisted pair cable is used for the DC power while Belden 7852A CAT6E is used for the LVDS connections. Cord Ends are used to terminate the 18AWG twisted pair in the DC Power Distribution circuit. The ampacity calculation shows that the cord ends comply with the 1000A/in² safety guideline regardless of the blade orientation inside the compression fit connectors on the FESB. The FESB housing is connected to the Mini-DAQ rack via a ½” tinned copper woven flat braid (stock number: 1168-011500). The braid is rated for 53A.

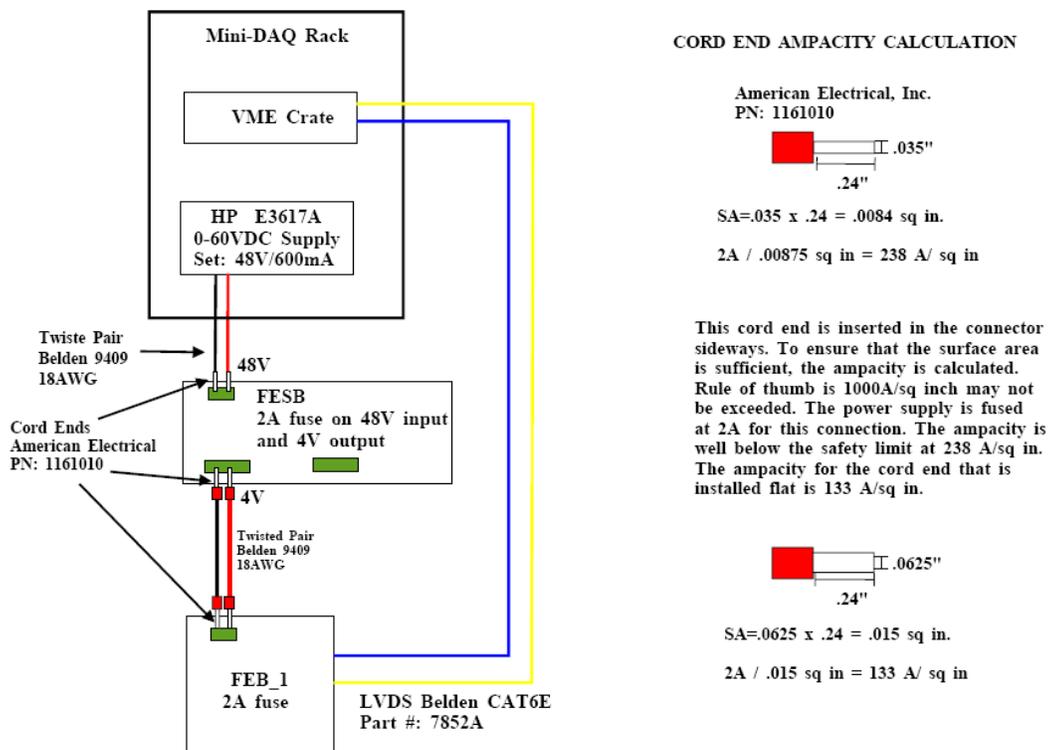


Figure 2: DC Power Distribution

The FESB is described in the following DC distribution document:

http://www-ppd.fnal.gov/EEDOffice-w/Projects/CMS/Minerva/Elect/Power_Dist.pdf