/CDF/DOC/PUBLIC/5955

Linear Power Supply

Three Phase, 208Volt, 400Hz Input
One KW / Low Noise / Five Output

for VIPA Subracks on the CDF Calorimeter

Specification # CDF/ SO-21NOV98

Stanley Orr, PE
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Approved : ______________________

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1KW 5 OUTPUT LINEAR POWER SUPPLY
TECHNICAL DESCRIPTION AND SPECIFICATIONS

1. GENERAL

1.1. The 19" rack-mounted, linear power supply is designed referencing the requirements of Fermilab Specification # CDF/SO - 040798 as applicable to the new output ratings.

The Power Supply Input source will be 208VAC, three phase, 400hz.
The Power Supply Outputs will be :

Output 1	+ 5.0 VDC @ 80A
Output 2	+5.0 VDC @ 20A
Output 3	-5.2 VDC @ 25A
Output 4	+15 VDC @ 26A
Output 5	- 15 VDC @ 7A

The Power Supply size will be 19"w * 5.25"h * 19"d

1.2. The Power Supply will comply with the following standards :
- 1.2.1 National Electrical Code
- 1.2.2 NEMA
- 1.2.3 ANSI
- 1.2.4 IEEE Std 1100-1992
- 1.2.5 IEC61000

1.3 The reliability of the Power Supply will approach 200,000 hours MTBF.
1.4 The Power Supply will comply with IEC6100 recommendations for Conducted and Radiated EMI. The input and outputs will be EMI filtered.
1.5 The Power Supply will be standard 19" rack-mount, 5.25" (3U) high and 19" deep. It will be forced air cooled with air inlets on each side (one fan per side) and outlet air on the back.
1.6 RS-485 will be provided for remote monitoring of DC output voltages and power supply status.

2. POWER CIRCUIT DESCRIPTION

2.1 Power circuit design will consist of the following main components :
- 2.1.1 Three phase input circuit breaker with provision for under-voltage release.
- 2.1.2 EMI Filter
- 2.1.3 Three phase isolation transformers with internal shields
- 2.1.4 Three phase rectifiers
- 2.1.5 Symmetrical DC ripple filters
- 2.1.6 Series transistor banks
- 2.1.7 Output HF/EMI filters

2.2 The Power Supply input source will be 208VAC, three phase, 400hz. The operating voltage range will be from 191VAC to 218VAC according to ANSI C84.1-1989 for Voltage Range A.
2.3 Input cable and wire size of #14AWG will be rated for 400hz operation with derating per IEEE Std. 1100-1992, Section 9.12.4. The input cable will be 3 feet long, with 20A plug connector.
2.4 All DC output terminals will be properly sized studs located on the back panel. Remote voltage feedback (sense) will be provided as well.
2.5 Common Mode high frequency filtering to frame/ground will be provided on the three-phase input lines as well as on each DC output busses.

3. PERFORMANCE

3.1	Input Voltage	208VACnom, 3PH, 3W + Gnd
3.2	Input Voltage Range	191-218 VAC
3.3	Input Frequency	400Hz
3.4	Input Power Factor	> 0.90 @ rated output power & nom. AC line voltage
3.5	Inrush current	20-30A for 3 cycles
3.6	Input Isolation	1.5Kv for 1 min.

3.7 OUTPUTS

3.7.1	Output 1	+ 5.0 VDC @ 80A
3.7.2	Output 2	+5.0 VDC @ 20A
3.7.3	Output 3	-5.2 VDC @ 25A
3.7.4	Output 4	+15 VDC @ 26A
3.7.5	Output 5	- 15 VDC @ 7A

3.8	Efficiency	> 50% @ rated output power & nominal input voltage
3.9	Output Isolation :	
3.9.1	Output to Output (Common Mode)	+- 20 VDC to 2.4kHz (continuous rating)
3.9.2	Output to Ground	500 VDC for 1 min.
3.9.3	Input to Output	1.5kV for 1 min.
3.10	Output PARD	< 0.1%
3.11	Line Regulation	< 0.1%
3.12	Load Regulation	< 0.1% for 50% load variation
3.13	Temp Coefficient	< 100 PPM/Deg. C
3.14	Size	19” w * 5.25” h * 19” d
3.15	Cooling	250 CFM minimum
3.16	Operating Temperature :	
3.16.1	For Specified performance	+10C to +40C
3.16.2	Maximum temp range	- 15C to +45C @ rated power

3.17 Front Panel controls and annunciators :
- 3.17.1 Circuit Breaker
- 3.17.2 AC On Light
- 3.17.3 Over-temperature light
- 3.17.4 RS-485 Connector
- 3.17.5 For Each DC Output :
  - 3.17.5.1 DC ON/ Power Good light
  - 3.17.5.2 DC Over/Under Voltage light
  - 3.17.5.3 DC Overcurrent light

4. REMOTE MONITORING

4.1 B&B Data Acquisition Modules will be used on RS-485 interface.

4.2 B&B Data Acquisition Module Model 485SDA12 will provide voltage readouts of Outputs 1 through 5. Input buffers to the 485SDA12 will be differential.

4.3 B&B Model 485SDD16 will be used to monitor the status of the Power Supply. All inputs to the 485SDD16 will be optically isolated.

4.4 Two 9 pin D-subminiature plugs shall be used for RS-485 communication with the Power Supply. They will be located on the front and rear panel and will allow for four-wire communication.