David L. Huffman

Engineering Note

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Subject: AC-DC Converter LVPS Controls

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1. Introduction

The general ideas for operation, monitoring and control of AC-DC converters will be applied to all low voltage power supply types.

Examples of these types are the ECAL (48V @ 30 Amps) single output, HCAL (4.8V @ 12Amps and 6.5V @ 9A) triple set of dual outputs and EMU (7.5V one @ 80Amp and one @ 120Amps) dual output.

2. Description of Operation

The converters operate form a 230V 400Hz 3-phase source. This is provided via a motor-generator set operating off the main power grid. The main circuit breaker on the converter controls power to the unit, all power is disabled when the breaker is OFF or OPEN.

When the circuit breaker is CLOSED the control power is applied to the electronics inside the supply. All circuitry for controlling and monitoring the supply become active. At this point high power is not applied to the main transformer.

A reset must be issued to clear any faulted interlocks before the supply can be turned on.

When an ON command is issued the supply soft-starts.

The supply can be locally controlled for manual operation or remotely controlled through the interface module. A local/remote switch overrides all remote control when in the local position.

The converters are self-protected against overloads due to voltage, current, temperature and other faults listed in the next section. These faults are latched and made available for readback.

Thermal switches are connected in series with the input relay. If the normal fault path fails this will provide secondary protection, preventing the supply from operating if to hot.

3. Internal Controls

Faults that cause the converter to trip off ..

Over Voltage

Over Current

Over Temperature

Transformer

Cooling Plate

External Interlock

Water Leak

Control Bits

ON (N.O. closes for 1 second)

OFF (N.C. opens for 1 second)

RESET (N.O. closes for 1 second)

4. External Communications

Analog Readback

Air Temperature

Transformer Temperature

Heatsink Temperature

Output Voltage

Output Current

Overcurrent Trip Setting

Overvoltage Trip Setting

Control Power Voltage

AC Input Voltage each phase (voltage divider from each leg to ground <6mA)

Digital Readback

Over Voltage Trip

Over Current Trip

Transformer Over Temperature Trip

Cooling Plate Over Temperature Trip

Transformer Saturation Fault

External Interlock Fault

Water Leak

DC Output Voltage Valid

All AC Input Power Present

Interlocks Complete