FCOG61BP

FCOG61BP Three-Phase Bipolar Firing Board

Features:

Industry Standard Digital LSI-Based Design

Fully Connectorized

Soft-Start and Soft-Stop Circuitry

Multiple Configurations Avaliable

Designed for Panel Mounting

Complete SCR Assemblies Also Available

Applications:

Controlled Reversing Rectifier (Four-Quadrant)

Sequence Reversing AC Controller

Introduction

The FCOG61BP Bipolar Thyristor Firing Board represents the most recent addition to the Enerpro family of phase-control technologies. Based on our proven, time-tested FCOG6100 3-phase firing boards (60,000+ shipped), the FCOG61BP provides users the flexibility for polarity switching rectifiers and sequence-switching ac controllers.

Applications

The reversing rectifier is a key application for the FCOG61BP. The polarity transition input allows users to invert the polarity of the rectifier. Upon your specific application, you may select either an instant polarity transition for the DC rectified output, or a timed transition with selectable "dead time" before reversing load polarity. AC controller applications, using either paralleled SCRs or 10-SCR sequence reversing converters are also easily realized using the FCOG61BP.

Operational Features

The FCOG61BP includes similar features to the standard FCOG6100 board, including:

Phase control command signal. A variety of DC control signal ranges are available to control the phase angle delay. Industry-standard ranges of 0-5 V, 0-10 V, 0.85-5.85 V, 1-2 V, and 4-20 mA or other control ranges are available to provide a custom solution for your system.

Power-on reset. No unintentional thyristor gating may occur upon application of board power or mains voltage.



Soft-start and soft-stop. Upon soft-start or soft-stop, the firing delay angle is ramped up or down from the delay angle specified from the input control voltage (or current) command. The time constants associated with soft-start and soft-stop may be tailored to your specific application.

Phase loss inhibit. Thyristor gating is instantly inhibited when a phase loss is sensed on the ac mains; restoration of the mains voltage enables and soft-starts the unit.

Instant inhibit. Thyristor gating may be instantly inhibited with a contact closure (relay, switch, etc.)

Polarity transition. Allows reversal of output voltage polarity via a simple contact closure. Upon ordering, customers may specify an instant polarity transition or a timed polarity transition depending upon specific applications.

Phase sequence insensitivity. SCR gating is unaffected by phase sequence.

Enhanced frequency insensitivity. A frequency compensation circuit reduces gate drive angle variance with respect to frequency. The gate drive angle decreases by approximately 5° for a frequency change from 60 Hz to 50 Hz, whereas older configurations exhibited a gate drive angle decrease of approximately 12.5°.

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FCOG61BP

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Gate Drive Details

The FCOG61BP utilizes the same "picket-fence" gating scheme as our standard FCOG6100: an initial hard-firing 15V (open-circuit) / 1.8 A (short circuit) pulse and a series of sustaining "back-porch" pulses at 7V / 0.5A. The gate pulse burst is 384 times the mains voltage frequency.

These pulses are generated by Enerpro's industry-leading Gate Delay Determinator circuit. Based on the Ainsworth 3-phase phase locked loop and used for decades in HVDC converters and implemented with a proprietary ASIC, the delay determinator adjusts the gate delay angle in negative proportion to the delay command (typically 0-5 V or 4-20 mA). Gate drive phase balance is within $\pm 1^{\circ}$.

PCB Construction

All circuit boards are assembled at the Enerpro plant in Goleta, California and are manufactured by a UL-listed fabricator from 0.093-inch thick FR4 fire-resistant epoxy-fiberglass laminate. All boards are conformal coated

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(MIL-1-46058, Type UR). Allowable ambient operating temperatures range from 0°C to +65°C; forced air cooling (100 CFM across length of board) is required at temperatures greater than 65°C.

Board Configuration

The FCOG61BP is a single-board configuration with power supply, SCR gate delay determinator logic, gate pulse transformers, and associated circuitry. The unit may be powered from 24 Vac or 30 VDC (+/- 10%), and provides regulated +12 V and +5 VDC as well as +30 VDC (unregulated). All units are fully tested at rated voltage in the customer's required configuration.

Enerpro applications engineers are available by e-mail or fax to answer any questions regarding bipolar firing boards or any of our single- and three-phase SCR product line, including complete SCR assemblies.



FCOG61BP utilized in a complete four-quadrant reversing rectifier assembly including TSB-6 Snubber Board, ISOVLCL-3 Isolation/Limiter Board, current transfomers, shunts, over-temperature switches, SCRs, and heat sink.

