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## AUXILIARY SCR FIRING CIRCUITS

### Applications

ENERPRO Auxiliary Firing boards are designed to be used in conjunction with Enerpro Firing Boards. These boards allow us to minimize the firing boards component count while maintaining a high level of flexibility. The auxiliary boards mount, on standoffs, in conjunction with the firing boards in order to minimize the space required for mounting.

These Auxiliary Firing boards expand the range of the firing boards by providing additional thyristor gate pulse transformers and pulse shaping circuitry. Some applications supported by these board combinations include:

- Gating Parallel SCR's.
- Reversing power supplies.
- 12-pulse applications.
- Two speed controllers.
- Remote operations.

### Circuit Boards

Printed circuit boards are fabricated from 2.36 mm. (0.093 in.) thick G10 epoxy-glass laminate by a UL registered fabricator. The circuit boards are conformal coated with polyurethane varnish [MIL-1-46059 (Type UR)]. Creepage distances between circuit board traces are dimensioned to meet the requirements of VDE Regulation 0110/11.72. The ac voltage rating of each circuit board is noted, in parenthesis, by each part number.

Rugged AMP Mate-N-Lok™ connectors and panel mounting simplify board installation and replacement. Boards can be stacked or mounted side-by-side. Board Dimensions are outlined in Table 1.

### Gate Drive Outputs

Isolated hard-firing, picket-fence, thyristor gate pulse outputs are provided. The gate command logic signals, formed by the firing board, are applied to pulse amplifiers which activate pulse transformers through pulse shaping RC networks in series with the primary windings. Specifications for the Gate Drive signals can be found in Table 2 (electrical characteristics).

### FCOAUX60 (600Vac)

#### General Information

The FCOAUX60 is designed to be used with the FCOG6100 firing board. This board extends the firing board applications in order to allow for gating parallel SCR's or forming reversing power supplies. The FCOAUX60 may also be used in conjunction with either the FCOG6101 or FCRO4100 board's to gate parallel SCR's.

The FCOAUX60 is powered directly from the firing board, utilizing the available unregulated +30Vdc.

#### Cable Connector Jacks

The FCOAUX60 auxiliary firing board is provided with four cable connector jacks:

- J1 and J2 are 8-position, vertical or horizontal, Mate-N-Lok™ jacks. Each jack provides the gate drive output for three SCR's (either Load-to-Line or Line-to-Load) and is keyed to prevent incorrect installation of the mating plugs.
- J3 and J4 are 1-row 8-position MTA style jacks with pins on 2.54 mm (0.10 in.) centers. These jacks access the gate delay command logic signals from the firing board, the unregulated +30Vdc, and circuit common. These jacks also allow for connecting multiple FCOAUX60 boards in a daisy-chain fashion.

## **FCOREM60 (900Vac)**

### **General Information**

The FCOREM60 is ideally suited for use in applications where the control circuitry and SCR's are separated by a large distance (remote operations). This board can also be used with the FCOG6100, FCOG6101, or FCOVF6100 boards to provide high output pulses in order to fire parallel SCR's.

The FCOREM60 board requires the use of an external 30Vac 15VA 1Ø power supply. Alternately, a 24Vac source (available from the FCOG6100) may be used to provide board power with a slight reduction in output amplitude and current.

### **Cable Connector Jacks**

The FCOREM60 auxiliary firing board is provided with seven cable connector jacks:

- J1, J2, and J3 are 12-position vertical Mate-N-Lok™ jacks. Each jack provides the gate drive output for two SCR's (+A/-A, +B/-B, or +C/-C)) and is keyed to prevent incorrect installation of the mating plugs.
- J4 and J5 are 12-position vertical Mate-N-Lok™ jacks. These jacks access the gate pulse outputs from the firing board and provide the capability of connecting multiple FCOREM60 boards in a daisy-chain fashion.
- J6 and J7 are 3-position vertical Mate-N-Lok™ jacks. These jacks are used to tie the board common to the firing board, connect the customer's 30Vac power source, and connecting multiple FCOREM60 power supplies in a daisy-chain fashion.

## **FCOABP60 (600Vac)**

### **General Information**

The FCOABP60 is designed to be used with the FCOVF6100 board to provide bipolar operation. In addition, the FCOABP60 provides a polarity transition circuit to ensure that one set of SCR's has commutated off prior to enabling the second set. The

FCOABP60 obtains its power from the regulated +30Vdc and +15Vdc available on the FCOVF6100 board.

### **Cable Connector Jacks**

The FCOABP60 auxiliary firing board is provided with four connector jacks:

- J1 and J2 are 8-position, vertical or horizontal, Mate-N-Lok™ jacks. Each jack provides the gate drive output for three SCR's (either Load-to-Line or Line-to-Load) and is keyed to prevent incorrect installation of the mating plugs.
- J3 is a 2-row 20-position vertical jack with pins on 2.54 mm (0.10 in.) centers. The 20-position ribbon cable, which mates with J3, plugs into J4 on the FCOVF6100 board. This cable accesses the gate drive logic signals, the regulated +30Vdc, the regulated +15Vdc, and the circuit common of the FCOVF6100 board.
- J4 is a 6-position, vertical or horizontal, Mate-N-Lok™ jack. This jack provides for inputting the speed command along with outputting status signals.

## **FCOA1200 (900Vac)**

### **General Information**

The FCOA1200 is designed to be used in conjunction with the DDOG1200 board to form a 12-pulse package capable of handling input voltages up to 900Vac. It can also be used with the FCOG6100 board to provide high output pulses in order to fire parallel SCR's.

The FCOA1200 board requires the use of an external 30Vac 15VA 1Ø power supply. Alternately, a 24Vac source (available from the FCOG6100) may be used to provide board power with a slight reduction in output amplitude and current.

### **Cable Connector Jacks**

The FCOA1200 auxiliary firing board is provided with twelve cable connector jacks:

- J1 - J6 are 8-position vertical Mate-N-Lok™ jacks. Each jack provides the gate output for a pair of oppositely poled thyristors (SCR's) and provides the required phase reference sensing. The six jacks are keyed to prevent incorrect installation of the mating plugs.
- J7 is a 2-row 26-position vertical jack with pins on 2.54 mm (0.10 in.) centers. The 26-position ribbon cable, which plugs into J7, mates with a jack J2 on the DDOG1200 board.
- J8 is a 6-position, vertical or horizontal, Mate-N-Lok™ jack for connecting to the customer provided 30Vac power source. Regulated +24Vdc and circuit common are also available at J8.
- J9 - J12 are 1-row 8-position MTA style jacks with pins on 2.54 mm (0.10 in.) centers. These jacks access the gate delay command logic signals from the DDOG1200 board, thereby permitting connection of multiple FCOA1200 boards for gating as many as eight paralleled thyristors or paralleled converters.

### ADDITIONAL INFORMATION

Applications assistance and additional technical information is available. Please contact our Applications department, Monday through Friday, 7 a.m. to 4 p.m., Pacific.

Board	Envelope			Mounting Pattern		
	Height	Width	Depth	Height	Width	Dia.
FCOAUX60	3.30 in.	7.50 in.	1.25 in.	2.30 in.	6.75 in.	0.19 in.
FCOREM60	5.00 in.	7.50 in.	1.50 in.	4.00 in.	6.75 in.	0.19 in.
FCOABP60	3.30 in.	7.50 in.	1.25 in.	2.30 in.	6.75 in.	0.19 in.
FCOA1200	8.00 in.	7.50 in.	1.50 in.	7.00 in.	6.75 in.	0.19 in.

**Table 1. Physical Dimensions**

Characteristic	Value (600Vac)	Value (900Vac)	Unit	Remarks
first gate pulse short circuit current	1.8	1.2	A	with 30/40Vdc supply voltage and measured with a 1.0 load resistor
first gate pulse gate current - initial rate-of-rise	1.0	1.0	A/μs	with 30/40Vdc supply voltage and measured with a 1.0 load resistor
sustaining gate pulse short circuit current	0.5	0.5	A	with 30/40Vdc supply voltage and measured with a 1.0 load resistor
initial gate pulse open circuit voltage	14	32	V	with 30/40Vdc supply voltage
sustaining gate pulse open circuit voltage	7	15	V	with 30/40Vdc supply voltage
gate pulse width, 50Hz	24 to 26	24 to 26	μs	varies with gate delay angle
gate pulse width, 60Hz	20 to 22	20 to 22	μs	varies with gate delay angle
number of gate pulses (gate burst width)	384 (120)	384 (120)	----- (deg)	optional gate profiles are available

**Table 2. Electrical Characteristics**

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