Power Drive Controls
1846 Santo Domingo
Camarillo, CA 93012
U. S. A.
www.pdcontrol.com

Three Phase SCR Controller
Model FC6 (Rev. H5)

Description

FC6 SCR Controller combines a Programmable Logical Device (PLD) with Phase Lock Loop (PLL) technology to achieve small size, low cost and reliable SCR firing circuits. The controller board forms a set of phase-balanced high current SCR gate pulses in response to a voltage or current control inputs. It features high gate isolation, insensitivity to mains voltage distortion, soft and instant start/stop functions, phase loss inhibit, PLL circuit fault inhibit and automatic phase sequence adjustment. It is the ideal SCR firing solution and device for industrial power supply, battery charger, motion control and other power electronics product applications.

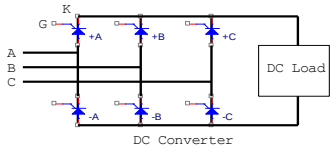
Features

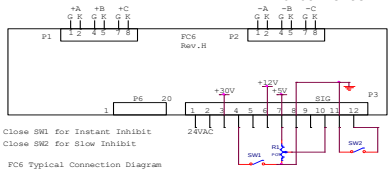
Small size
Low cost, ease of use
3, 6 and 12 pulse gating
Span and bias adjustment
Soft and instant inhibit
Phase loss and PLL fault inhibit
Automatic phase sequence adjustment
PLL pulse logic circuits
50/60 Hz selectable operations
400 Hz and other frequencies
Battery chargers

Applications

Battery chargers
Motor controls
Electrical heaters
DC Converters
Electroplating
Power supplies
Electrical magnetic controls
Generator controls

Dimension 190 x 106 x 30 (mm)





Maximum Ratings

Characteristics	Value	Unit
AC Mains Voltage	550	Vac
Control Signal Voltage, SIG	12	Vdc
Power Supply Voltage	24·	Vac
+30Vdc Available Current	500	mAdc
+12Vdc Available Current	200	mAdc
+5V Available Current	50	mAdc
Operating Temperature	-5 to +85	C
Storage Temperature	-65 to +85	C

Electrical Characteristics

Characteristics	Value	Unit and Note
Control Signal Voltage, SIG	0 - 5	Vdc
Soft Start Time	1.0	S, (or 0.05 to 20 S)
Soft Inhibit Time	0.5	S, (or 0.05 to 10 S)
Control Angle Range	6 - 174	Degree
First Gate Pulse:		
Initial Rate of Rise	1.0	A/uS
Short Circuit Current	1.4	A
Open Circuit Voltage	10	V
Sustaining Gate Pulse:		
Short Circuit Current	0.5	A
Open Circuit Voltage	5	V
Gate Pulse Width:		
50 Hz	26	uS
60 Hz	21	uS

Connectors Notes:
P1, P2: Connect to SCR gates and cathodes. Only one connector needed if used in 3 SCR circuit.
P3: Connect to control signals and power supply.
P5: Connect to 6-pulse output, parallel or switched SCR control circuits
P6: Connect to external control board.
P7: Connect to 3 phase tester or external 3 phase signals.

LED Display Notes:
LED1- RUN: Green, output enabled.
LED1- INHIBIT: Red, output inhibit.
LED2- PL: Green, phase loss display.
LED2- FAULT: Red, PLL circuit fault display.

For 50 Hz mains (R33=R34=R35=R36=150K).
For 60 Hz mains (R33=R34=R35=R36=120K).
For 400 Hz main power, R33=R34=R35=R36=18.2K, and R78 = 20.0K

JP2:

1. Pins 1, 2 and 3 open: 120 degree burst pulses for SCR AC controllers.
2. Jumper pins 1 and 2: 2-30 degree spaced and 30 degree burst pulses.
3. Jumper pins 2 and 3: 30 degree delayed 2-30 degree spaced and 30 degree burst pulses for SCR DC converters.

JP3: Jumper JP3 for 3-pulse +A1, +B1 and +C1 outputs., jumper pins 2 and 3 of JP8 for 3-pulse –A1, -B1 and –C1 outputs. Or jumper JP3 and jumper pins 2 and 3 of JP8 with P control: 3-pulse +A1, +B1 and +C1 outputs when P= High (no connection), or 3-pulse –A1, -B1 and –C1 output when P=Low (connected to ground).

JP4: Jumper JP4 for 2-6 pulse parallel outputs, +A1, +B1, +C1, -A1, -B1, -C1, and +A2, +B2, +C2, -A2, -B2, -C2 from P5. Open JP4, jumper pins 2 and 3 of JP8 for 2-6 pulse polarity controlled output, 6 pulses +A1, +B1, +C1, -A1, -B1, -C1 outputs when P=+5V (no connection), or +A2, +B2, +C2, -A2, -B2, -C2 outputs when P=0V (connected to ground).

JP9: For PLD U62 programming (ISP).

Jumper Table: 1 = jumper closed, 0 = jumper open, NC = no connection

	JP 1	JP2		JP 3	JP 4	JP8		P/INH-FAST
		1, 2	2, 3			1, 2	2, 3	Pin 5 of P3
50 Hz	0							
60 Hz	1							
120 degree 6-pulse for AC controller		0	0					
30 degree delayed 6 pulses for DC converter		0	1					
3 pulses +A1, +B1, +C1				1	0	0	1	Grounded
3 pulses -A1, -B1, -C1				1	0	0	1	NC
Parallel outputs, +A1, +B1, +C1, -A1, -B1, -C1, and +A2, +B2, +C2, -A2, -B2, -C2				0	1	0	0	
P controlled output +A1, +B1, +C1, -A1, -B1, -C1				0	0	0	1	Grounded
P controlled output +A2, +B2, +C2, -A2, -B2, -C2				0	0	0	1	NC

Pin Functions

	Pin	Name	Descriptions	I/O
P1	1	+A Gate	Connect to 3 SCRs	O
	2	+A Cathode		O
	5	+B Gate		O
	6	+B Cathode		O
	9	+C Gate		O
	10	+C Cathode		O
P2	1	-A gate	Connect to 3 SCRs	O
	2	-A Cathode		O
	5	-B Gate		O
	6	-B Cathode		O
	9	-C Gate		O
	10	-C Cathode		O
P3	1	20 –24 Vac	Board power supply, greater than 500 mA	I
	2			
	3	+30 Vdc	For user, or external DC power supply for board	
	4	ENABLE	Instant Inhibit when connected to ground	I
	5	P/INH-FAST	Instant inhibit or pulse polarity control with JP8	I
	6	+12V	For user, 200 mA	O
	7	+5V	Fro user, 50 mA	O
	8	GND	Signal ground	
	9	L	Enable display, open collector, 200mA	
	10	SIG	Signal command input, 0 - 5 V	I
	11	GND	Signal ground	
	12	INH-SLOW	Soft inhibit when connected to ground	I

P5	1	+A2	Additional 6-pulse output for parallel SCR or polarity SCR circuit controls.	O
	2	+B2		O
	3	+C2		O
	4	-A2		O
	5	-B2		O
	6	-C2		O
	7	GND	Signal ground	
	8	+30V	For user, or external DC power supply for board	O

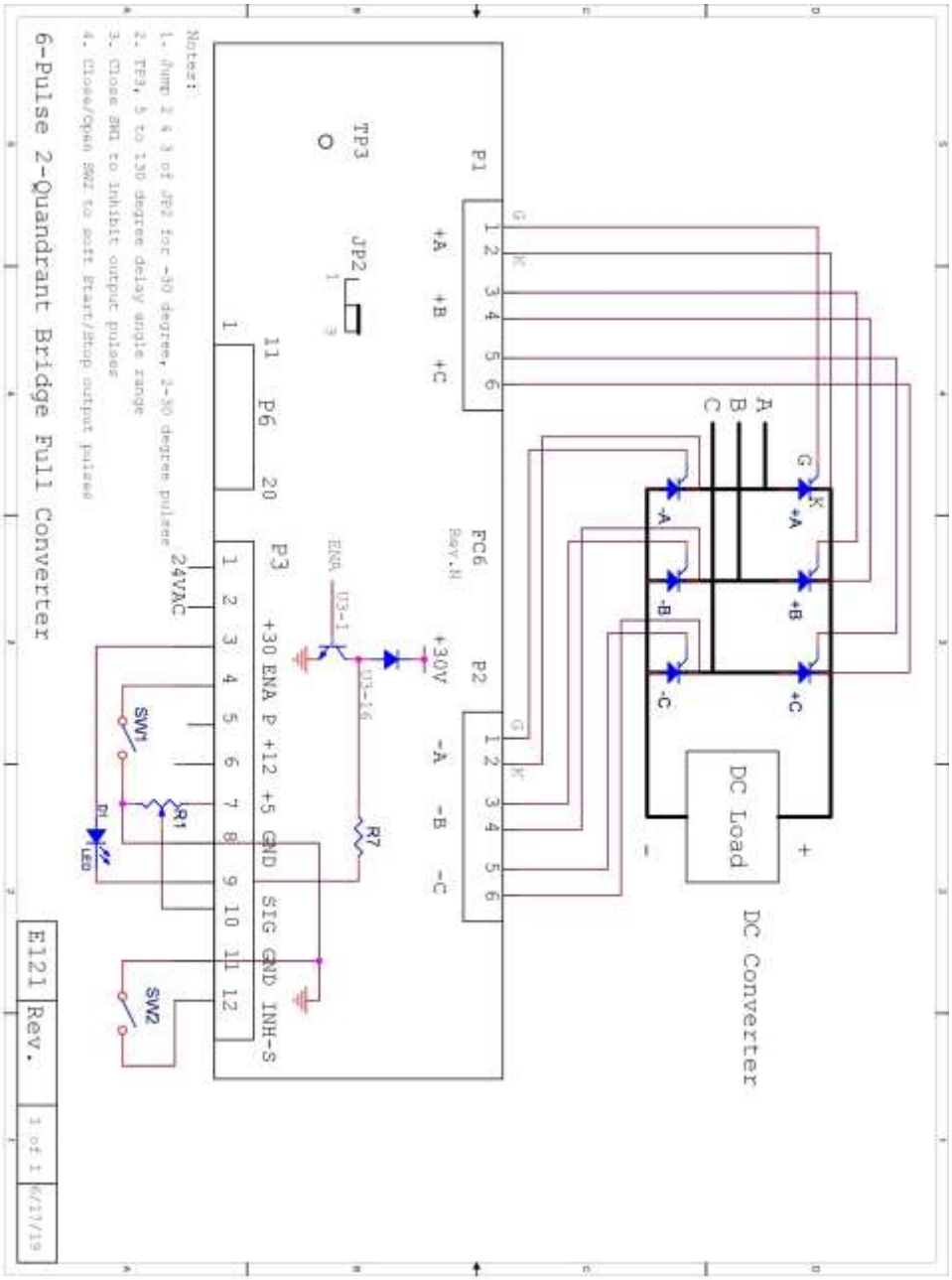
Pin Functions (Continued)

P6	1	INI-DA	Connect external resistor with E-REF to change delay angle	
	2	E-REF	For signal command input	I
	3	FAULT	PLL circuit failure status, 0V when the circuit failed	O
	4	CLK2	Low frequency signal for test or control	O
	5	SIG	Signal command input	I
	6	+5V	For user, 50 mA	O
	7	GND	Signal ground	
	8	ENABLE	Enabled when connected to +12V	I
	9	+12V	For user, 200 mA	O
	10	+30V	For user, or external DC power supply for board	
	11	SOFT-CONTROL	Connect external resistor with ACC-T to change soft start time	
	12	CLK1	Pulse signal for test or control	O
	13	INH-2	Connect external resistor with ACC-T to change soft stop time	
	14	ACC-T	Connect external resistor with INH-2 to change soft stop time	
	15	PLL-R1	For test or control	
	16	INH-SLOW	Soft inhibit when connected to GND	I
	17	EL	Voltage across SCR, feedback signal for AC controller	O
	18	EN	SCR circuit	
	19	P/INH-FAST	Instant inhibit or pulse polarity control with JP8	I
	20	L	Status display, open collect, 200 mA	

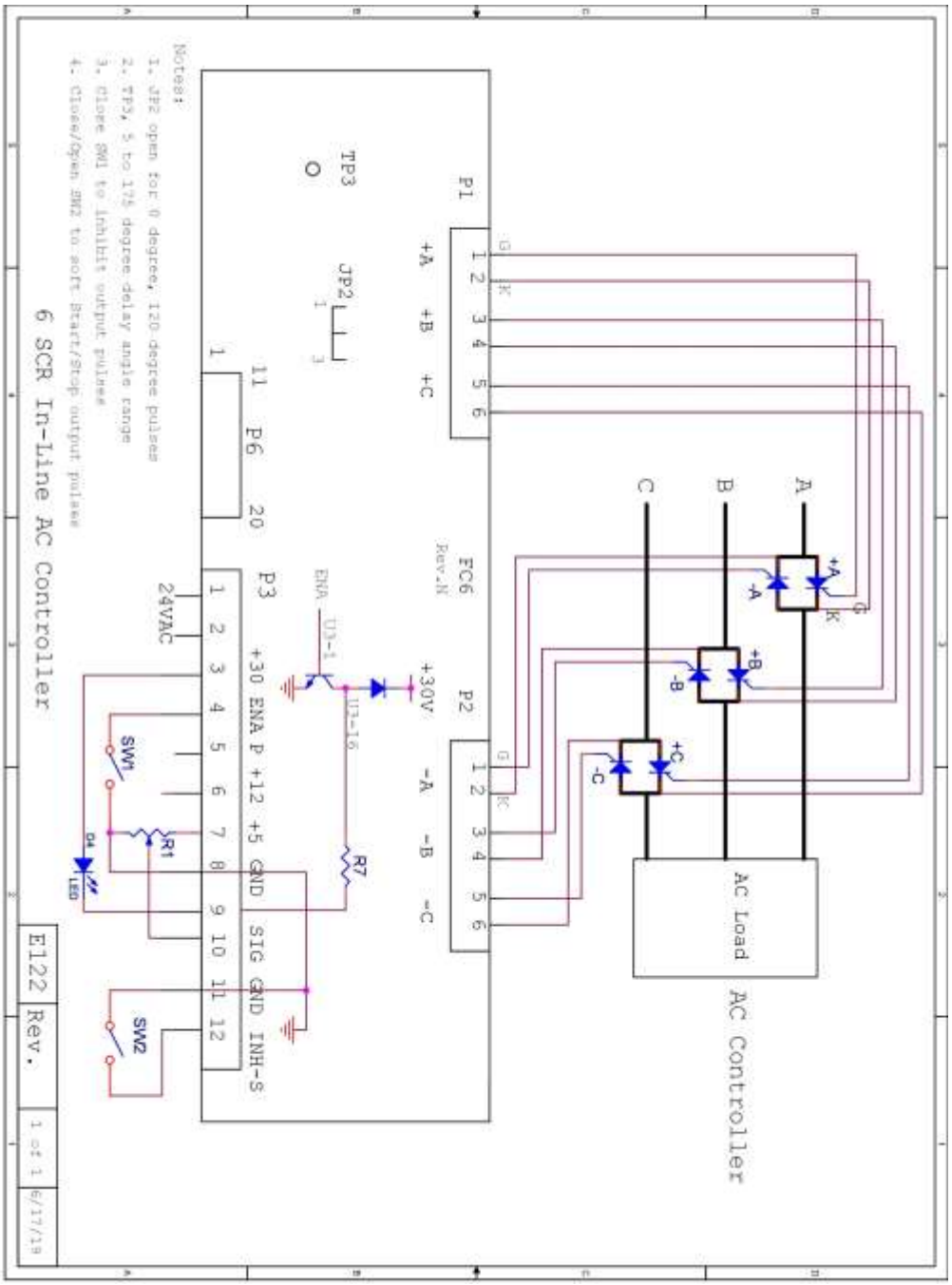
Typical Connection Diagrams

1. E121, “6-Pulse 2-Quandrant Bridge Full Converter Connection Diagram”
2. E122, “6 SCR In-Line AC Controller”
3. E125, “6-Pulse 2-Quandrant Parallel Bridge Converter”
4. E126, “6-Pulse 4-Quandrant Bridge Converter”

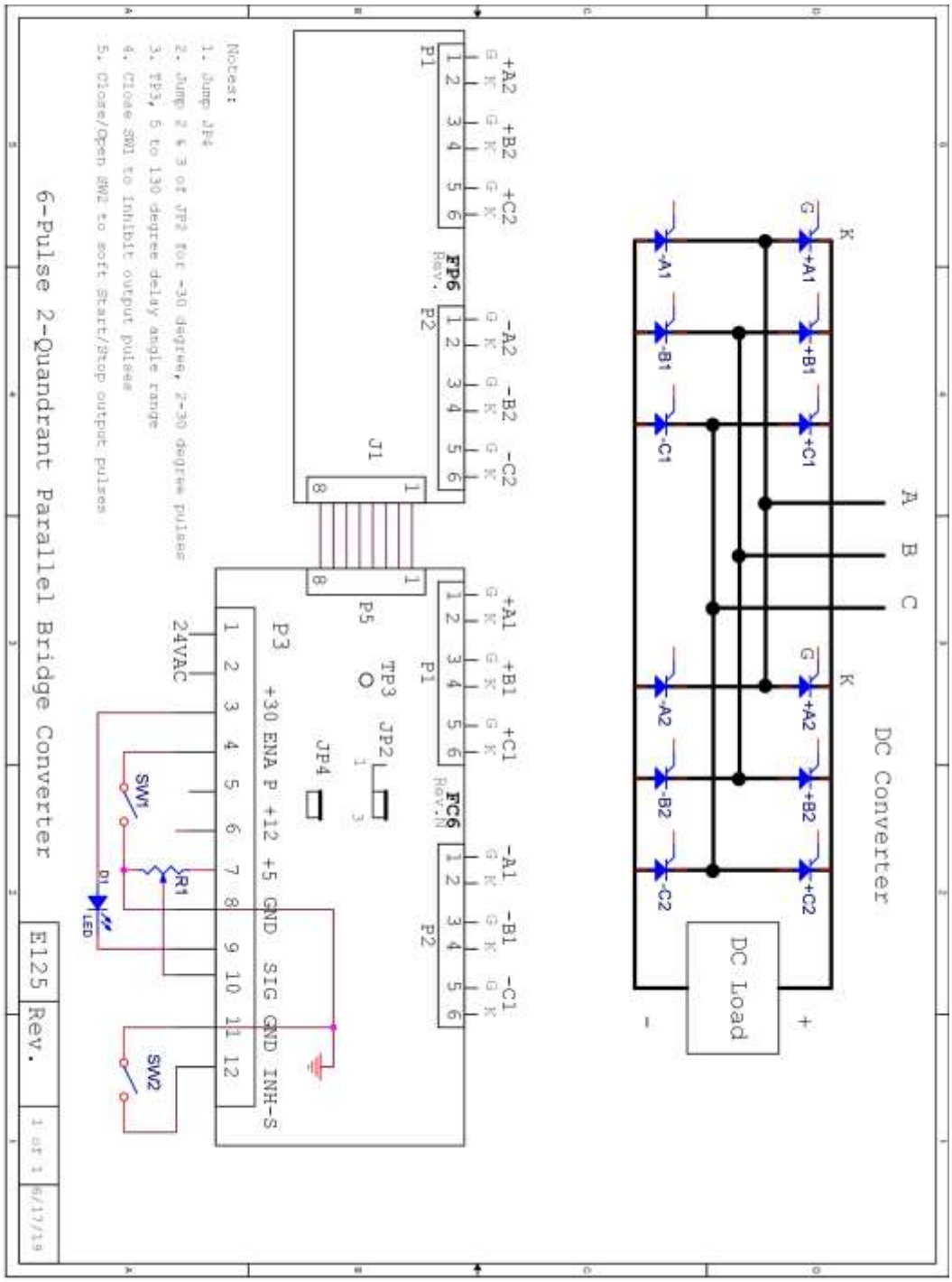
1. E121, “6-Pulse 2-Quandrant Bridge Full Converter ”



2. E122, “6 SCR In Line-Line AC Controller”



3. E125, “6-Pulse 2-Quandrant Parallel Bridge Converter”



4. E126, "6-Pulse 4-Quandrant Bridge Converter"