

**SCR POWER CONTROLLER
INSTALLATION
AND INSTRUCTION MANUAL
04-5447A**



24100 FRAMPTON AVE. BLDG B, HARBOR CITY, CALIFORNIA 90710
TEL: 310 -517-1769 FAX: 310-517-0875 E'MAIL: dnhind@aol.com
www.dnhindustries.com

reliability by design



**SOLID STATE SCR
POWER CONTROLLERS
120-480 VAC, 10 & 40 AMPERES**

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1.0 DESCRIPTION

- 1.1 THE DIGI-FIRE POWER CONTROLLER IS DESIGNED TO MODULATE THE POWER INTO AN INDUCTIVE, CAPACITIVE OR RESISTIVE AC LOAD.
- 1.2 THE CONTROL IS SUPPLIED IN A DIN RAIL MOUNTING ALUMINUM ENCLOSURE FOR INSTALLING INTO THE USERS ENCLOSURE.
- 1.3 THE DIGI-FIRE CONTROLLER IS SUPPLIED WITH A INTEGRAL LINE INPUT FUSE.
- 1.4 THE CONTROLLER CAN BE SETUP FOR A 0-10VDC, A 4-20 mADC, OR A MANUAL POTENTIOMETER CONTROL INPUT.
- 1.5 AN OUTPUT ENABLE CONTACT, EITHER ISOLATED OR POWERED FROM THE BOARD CAN BE UTILIZED TO TURN THE OUTPUT ON AND OFF.
- 1.6 INDICATOR LIGHTS ON THE BOARD DISPLAY POWER ON (RED) AND ENABLED (GREEN).
- 1.7 THE CONTROLLER CAN BE SETUP FOR VOLTAGE REGULATING, WITH OR WITHOUT CURRENT LIMITING, OR FOR CURRENT REGULATING MODES.
- 1.8 PRECISION RMS VOLTAGE AND CURRENT OUTPUT SIGNALS ARE PROVIDED FOR MONITORING THE CONTROL OR INPUTTING TO A SEPARATE PROCESS CONTROLLER. THE OUTPUT RANGE FOR BOTH SIGNALS IS 0-10VDC.

2.0 SPECIFICATIONS

- 2.1 POWER INPUT: 120, 240OR 480VAC, 1 PHASE, $\pm 5\%$, 50/60HZ
SPECIFY LINE VOLTAGE WITH ORDER
- 2.2 POWER CONSUMPTION: 10VA FOR CONTROL ONLY
TOTAL POWER DEPENDS ON THE UNIT RATING
- 2.3 LINE VOLTAGE STABILITY: A 10% CHANGE IN LINE VOLTAGE WILL NOT SHIFT CONTROL LEVELS MORE THAN 0.1%
- 2.4 RATED OPERATING CONDITIONS:
 - 2.4.1 AMBIENT TEMPERATURE: 0-50°C (32-122°F)
 - 2.4.2 HUMIDITY: 0-90% NON-CONDENSING
 - 2.4.3 MOUNTING POSITION: FOR BEST EFFICIENCY, UNIT SHOULD BE MOUNTED ON A VERTICAL SURFACE WITH THE TERMINALS AT THE BOTTOM

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2.0 SPECIFICATIONS cont.

- 2.5 COMMON MODE REJECTION (CMR): 90 dB
- 2.6 TEMPERATURE STABILITY: 10 MICRO VOLTS MAXIMUM
(5 TYP.) DEVIATION IN
SIGNALS PER °F VARIANCE
FROM A NOMINAL
TEMPERATURE OF 80°F
- 2.7 ISOLATION
- 2.7.1 THE CONTROL IS TRANSFORMER ISOLATED FROM AC LINE
POWER
- 2.7.2 THE FIRING CIRCUITS ARE PULSE TRANSFORMER (2)
ISOLATED FROM THE POWER DEVICES
- 2.7.3 THE PRECISION FEEDBACK SIGNALS ARE ISLOLATED FROM
THE OUTPUT BY CURRENT AND VOLTAGE TRANSFORMERS
- 2.8 INPUT SIGNALS
- 2.8.1 CONTROL INPUT 0 - 10.00 VDC OR 4 - 20
mADC (into 499 OHMS)
- 2.8.2 OUTPUT VOLTAGE 0 - LINE VOLTAGE
- 2.8.3 OUTPUT CURRENT 0 - OUTPUT CURRENT THRU A
1000:1 CURRENT
TRANSFORMER
- 2.8.4 ENABLE CONTACT 12-24 VDC ISOLATED ENABLE
SIGNAL OR DRY CONTACT
CONNECTED BETWEEN
CONTROLLER 24 VDC AND
ENABLE INPUT
- 2.9 OUTPUT SIGNALS
- 2.9.1 OUTPUT VOLTAGE 0-10 VDC EQUIVALENT TO 0-
MAXIMUM RMS OUTPUT
VOLTAGE. MAXIMUM
CURRENT NOT TO EXCEED 10
MILLIAMPERES.
- 2.9.2 OUTPUT CURRENT 0-10 VDC EQUIVALENT TO 0-
RATED RMS OUTPUT
CURRENT. MAXIMUM
CURRENT NOT TO EXCEED 10
MILLIAMPERES.

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3.0 INSTALLATION

3.1 THE CONTROLLER IS PROVIDED WITH A DIN RAIL MOUNTING BRACKET ATTACHED TO THE BACK. SNAP IT TO THE RAIL MOUNTED IN YOUR ENCLOSURE.

CAUTION: ALLOW AT LEAST 1.0 INCH SIDE CLEARANCE BETWEEN CONTROLLERS OR OTHER EQUIPMENT FOR PROPER COOLING.

3.2 MAKE UP CONNECTIONS TO THE UNIT PER SCHEDULE.

TERMINAL	CIRCUIT DESCRIPTION
TB1-1	0-10 VDC VOLTAGE SIGNAL
TB1-2	OUTPUT SIGNALS COMMON
TB1-3	0-10 VDC CURRENT SIGNAL
TB1-4	CHASSIS GROUND
TB1-5	ISOLATED ENABLE DC SIGNAL LOW INPUT
TB1-6	ENABLE INPUT DC SIGNAL HIGH
TB1-7	+24VDC
TB1-8	CONTROL INPUT DC SIGNAL LOW, ALSO CIRCUIT COMMON
TB1-9	CONTROL INPUT DC SIGNAL HIGH
TB1-10	SUPPLY TERMINAL FOR EXTERNAL MANUAL CONTROL (5K POTENTIOMETER)
TB2-1	L1 = AC POWER INPUT (HIGH)
TB2-2	L2 = AC POWER INPUT (LOW)
TB2-3	T2 = AC POWER OUTPUT (LOW)
TB2-4	T1 = AC POWER OUTPUT (HIGH)

3.3 CONNECT AN ISOLATED ENABLE SIGNAL TO TERMINALS TB1-5 (-) AND TB1-6. FOR A NON-ISOLATED INPUT, CONNECT A DRY CONTACT BETWEEN TB1-6 AND TB1-7 AND INSTALL JUMPER J5 IF REMOTE ENABLE IS NOT REQUIRED, DIRECTLY CONNECT TB1-6 TO TB1-7 AND INSTALL JUMPER J5.

NOTE: THE CONTROL DOES NOT RAMP DOWN WHEN THE ENABLE CONTACT IS OPENED. IT SHUTS OFF IMMEDIATELY

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4.0 CONTROL BOARD ADJUSTMENTS, CONTROLS AND INDICATORS

- | | | |
|------|---|---|
| 4.1 | CONTROL SIGNAL
BIAS ADJUST (P1): | ZERO'S OR BIASES THE CONTROL
INPUT SIGNAL |
| 4.2 | CONTROL SIGNAL
GAIN ADJUST (P2): | CALIBRATES THE SIGNAL INPUT TO
THE REQUIRED OUTPUT. TURNING CW
INCREASES THE GAIN. |
| 4.3 | ACC/DEC ADJUST
(P3): | SETS THE RATE OF THE OUTPUT
RESPONSE WHEN THE CONTROL
SIGNAL CHANGES. TURNING CW
INCREASES THE RATE. |
| 4.4. | VOLTAGE FEEDBACK
CALIBRATION (P4): | CALIBRATES THE OUTPUT VOLTAGE
FEEDBACK SIGNAL TO THE CONTROL
AMPLIFIER. FOR VOLTAGE REGULATING
CONTROL MODE.(FACTORY CAL.) |
| 4.5 | CURRENT LIMIT
SETPOINT (P5): | SETS THE CURRENT LIMIT LEVEL,
WHEN REQUIRED, IN THE VOLTAGE
REGULATING CONTROL MODE |
| 4.6 | CURRENT FEEDBACK
CALIBRATION (P6) | CALIBRATES THE OUTPUT CURRENT
FEEDBACK SIGNAL TO THE CONTROL
AMPLIFIER FOR CURRENT REGULATING
CONTROL MODE. (FACTORY CAL) |
| 4.7 | PRECISION VOLTAGE
ZERO ADJUST (P7): | ZERO'S THE PRECISION VOLTAGE
OUTPUT SIGNAL |
| 4.8 | PRECISION VOLTAGE
CALIBRATION (P8): | CALIBRATES THE PRECISION
VOLTAGE OUTPUT SIGNAL |
| 4.9 | PRECISION CURRENT
ZERO ADJUST (P9): | ZERO'S THE PRECISION CURRENT
OUTPUT SIGNAL |
| 4.10 | PRECISION CURRENT
CALIBRATION (P10): | CALIBRATES THE PRECISION
CURRENT OUTPUT SIGNAL |
| 4.11 | POWER ON LED | INDICATES THAT POWER IS
APPLIED TO THE UNIT
AND THE LINE FUSE IS GOOD |
| 4.12 | ENABLE LED | INDICATES THAT THE CONTROL
IS READY TO RUN |

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4.0 CONTROL BOARD ADJUSTMENTS, CONTROLS AND INDICATORS

cont.

- 4.13 DIP JUMPERS:
- J1; INSTALL FOR VOLTAGE REGULATING CONTROL
 - J2; INSTALL FOR CURRENT REGULATING CONTROL
 - J3; INSTALL FOR CURRENT LIMIT CONTROL
 - J4; REMOVE WHEN CURRENT LIMIT CONTROL IS UTILIZED
 - J5; INSTALL FOR NON-ISOLATED ENABLE CIRCUIT
 - J6; INSTALL FOR mA CONTROL SIGNAL INPUT
- 4.14 TEST POINTS
- TPC; TEST POINTS COMMON
 - TP1; VOLTAGE FEEDBACK SIGNAL
 - TP2; CURRENT FEEDBACK SIGNAL
 - TP3; CURRENT LIMIT SETPOINT
 - TP4; PRECISION VOLTAGE OUTPUT
 - TP5; PRECISION CURRENT OUTPUT
 - TP6; FIRING CIRCUIT CLOCK

5.0 CALIBRATION

5.1 VOLTAGE FEEBACK MODE (FACTORY STANDARD SETUP)

NOTE: THE INPUT AMPLIFIER HAS BEEN FACTORY CALIBRATED FOR A 0-10 VDC COMMAND SIGNAL AND CURRENT LIMIT SET AT RATED OUTPUT. STEPS 6.1.1 TO 6.1.8 ARE NOT NORMALLY REQUIRED

- 5.1.1 INSTALL JUMPER J1
- 5.1.2 INSTALL JUMPER J3 IF CURRENT LIMIT IS REQUIRED AND SET P5 FULLY CLOCKWISE
- 5.1.3 SET INPUT CONTROL SIGNAL TO ZERO
- 5.1.4 CLOSE ENABLE CONTACT
- 5.1.5 ADJUST P1 FOR THE REQUIRED MINIMUM VOLTAGE OUTPUT
- 5.1.6 SET CONTROL SIGNAL FOR FULL OUTPUT
- 5.1.7 ADJUST P2 FOR THE REQUIRED MAXIMUM VOLTAGE OUTPUT
- 5.1.8 ADJUST P5 CCW UNTIL THE OUTPUT VOLTAGE JUST STARTS TO DROP AND THEN VERY SLIGHTLY CW. THIS SETS THE CONTROL TO CURRENT LIMIT IF THE LOAD CHANGES FOR SOME REASON.

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5.0 CALIBRATION cont.

5.2 CURRENT FEEDBACK MODE

- 5.2.1 INSTALL JUMPERS J2 AND J4
- 5.2.2 SET P5 FULLY COUNTER CLOCKWISE
- 5.2.3 SET INPUT CONTROL SIGNAL TO ZERO
- 5.2.4 ADJUST P1 FOR THE REQUIRED MINIMUM CURRENT OUTPUT
- 5.2.5 SET CONTROL SIGNAL FOR FULL OUTPUT
- 5.2.6 ADJUST P2 FOR THE REQUIRED MAXIMUM CURRENT OUTPUT

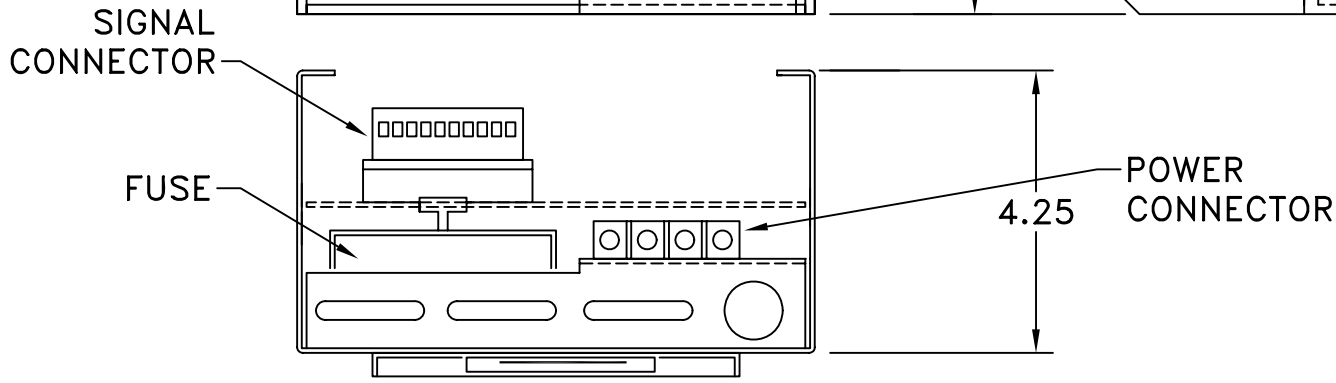
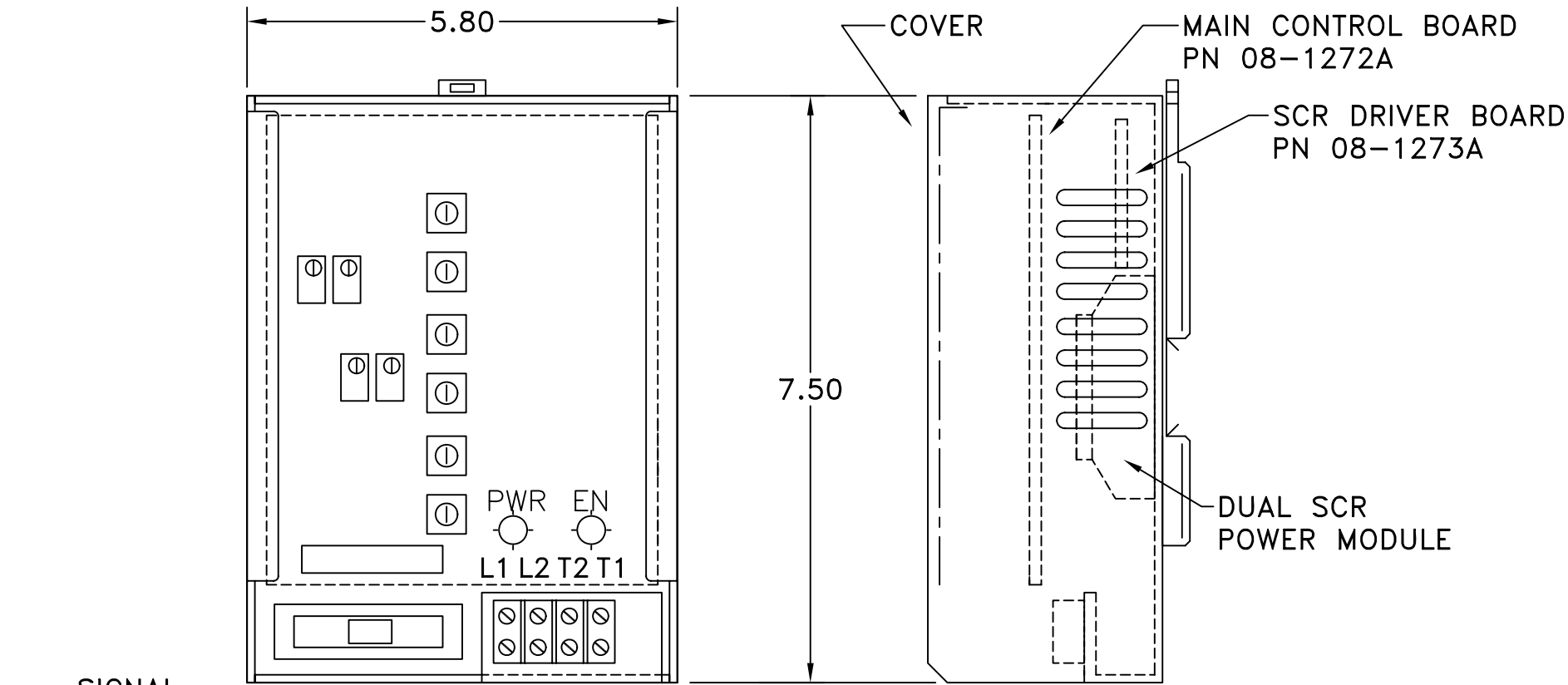
5.3 FACTORY CALIBRATIONS

- 5.3.3 VOLTAGE FEEDBACK (P4) HAS BEEN CALIBRATED FOR -2.50 VDC, AT TP1, WHEN THE OUTPUT VOLTAGE EQUALS THE NOMINAL LINE VOLTAGE.
NOTE: THIS CALIBRATION MUST BE DONE WHILE THE CONTROL IS OPERATING IN THE CURRENT REGULATING MODE.
- 5.3.2 CURRENT FEEDBACK (P6) HAS BEEN CALIBRATED FOR -2.50 VDC, AT TP2, WHEN THE OUTPUT CURRENT EQUALS THE RATED CURRENT.
NOTE: THIS CALIBRATION MUST BE DONE WHILE THE CONTROL IS OPERATING IN THE VOLTAGE REGULATING MODE. P5 MUST BE SET FULLY COUNTER CLOCKWISE.

6.0 SYSTEM DRAWINGS SCHEDULE

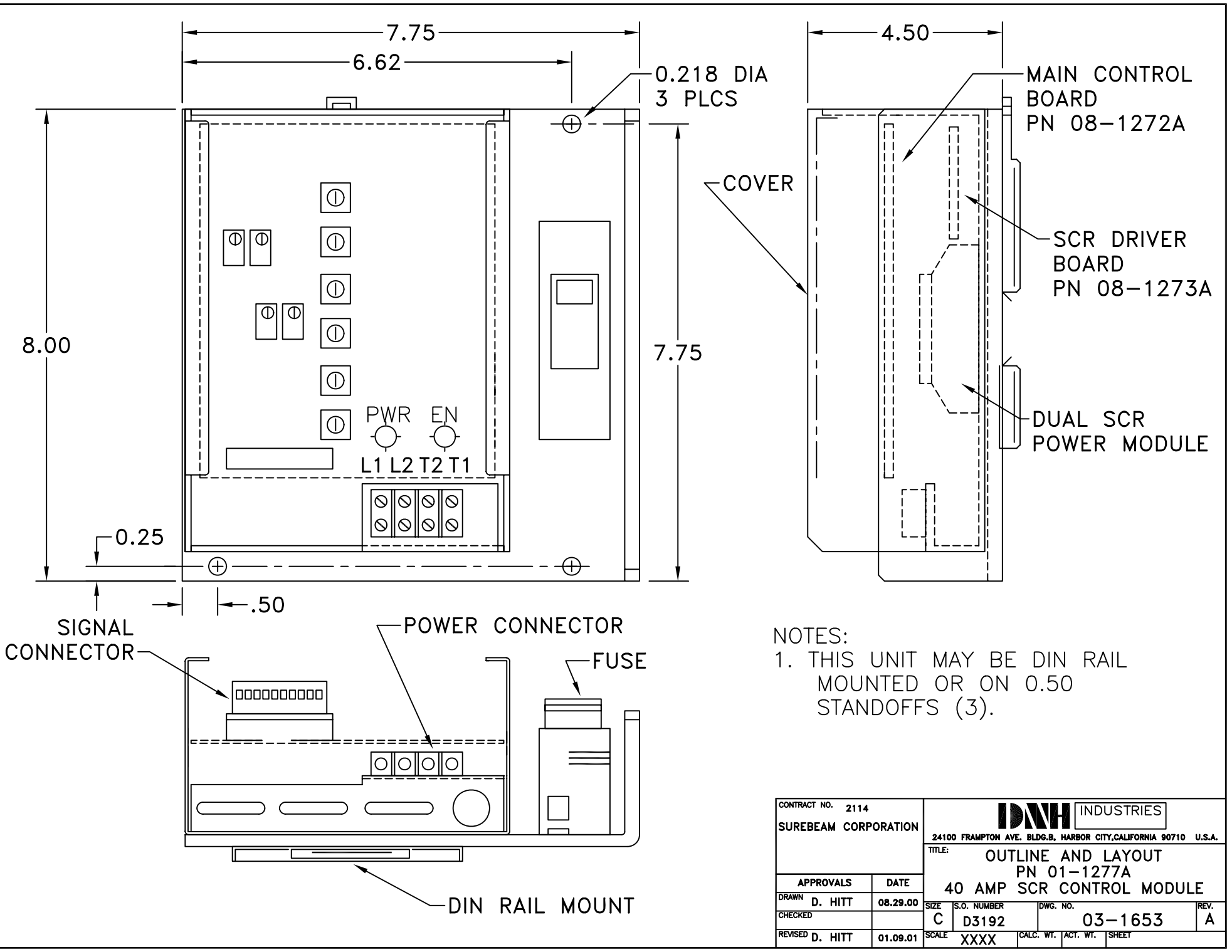
- 6.1 OUTLINE AND LAYOUT DRAWING FOR PN 01-1276A
DRAWING 03-1647B
- 6.2 OUTLINE AND LAYOUT DRAWING FOR PN 01-1277A
DRAWING 03-1653A
- 6.3 MAIN CONTROL BOARD SCHEMATIC DRAWING 02-2121A
- 6.4 SCR DRIVER BOARD SCHEMATIC DRAWING 02-2122A
- 6.5 SCR POWER CONTROLLER DETAILS AND WIRING DIAGRAM
DRAWING 02-2125A

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DIN RAIL MOUNT

CONTRACT NO. 2284		 24100 FRAMPTON AVE. BLDG.B, HARBOR CITY, CALIFORNIA 90710 U.S.A.			
SUREBEAM CORPORATION					
APPROVALS		DATE		TITLE:	
DRAWN D. HITT		06.06.00		OUTLINE AND LAYOUT	
CHECKED				PN 01-1276A	
REVISED D. HITT		01.09.01		10 AMP SCR CONTROL MODULE	
SIZE	S.O. NUMBER	DWG. NO.	REV.		
C	D3244	03-1647	B		
SCALE	XXXX	CALC. WT.	ACT. WT.	SHEET	



CONTRACT NO. 2114		DNH INDUSTRIES			
SUREBEAM CORPORATION					
		24100 FRAMPTON AVE. BLDG.B, HARBOR CITY, CALIFORNIA 90710 U.S.A.			
		TITLE: OUTLINE AND LAYOUT			
		PN 01-1277A			
		40 AMP SCR CONTROL MODULE			
APPROVALS	DATE	SIZE	S.O. NUMBER	DWG. NO.	REV.
DRAWN D. HITT	08.29.00	C	D3192	03-1653	A
CHECKED		SCALE	XXXX	CALC. WT.	ACT. WT.
REVISED D. HITT	01.09.01				SHEET

DIGI-FIRE
SCR CONTROL BOARD
PN 08-1509A

J1 - VOLTAGE FEEDBACK CONTROL
 J2 - CURRENT FEEDBACK CONTROL
 J3 - CURRENT LIMIT CONTROL WHEN
 UTILIZING VFEEDBACK MODE

VOLTAGE OUPUT SIGNAL
 CAL ZERO P8 P7

CURRENT OUPUT SIGNAL
 CAL ZERO P10 P9

P1 INPUT SIGNAL BIAS

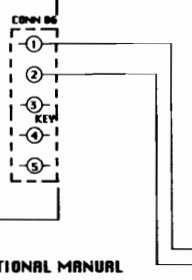
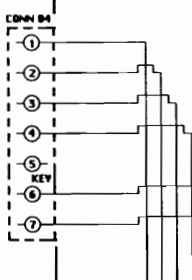
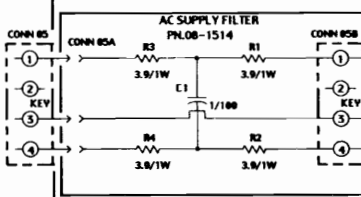
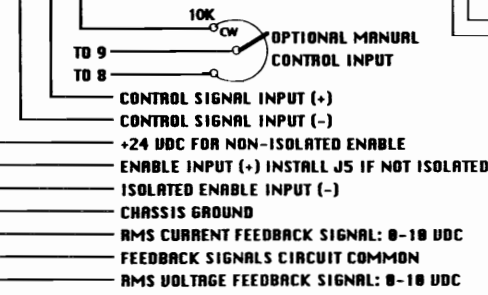
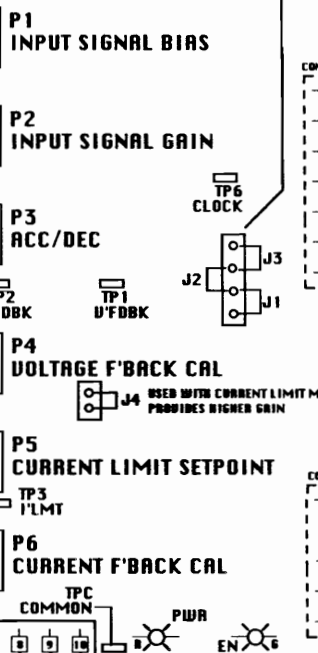
P2 INPUT SIGNAL GAIN

P3 ACC/DEC

P4 VOLTAGE F'BACK CAL

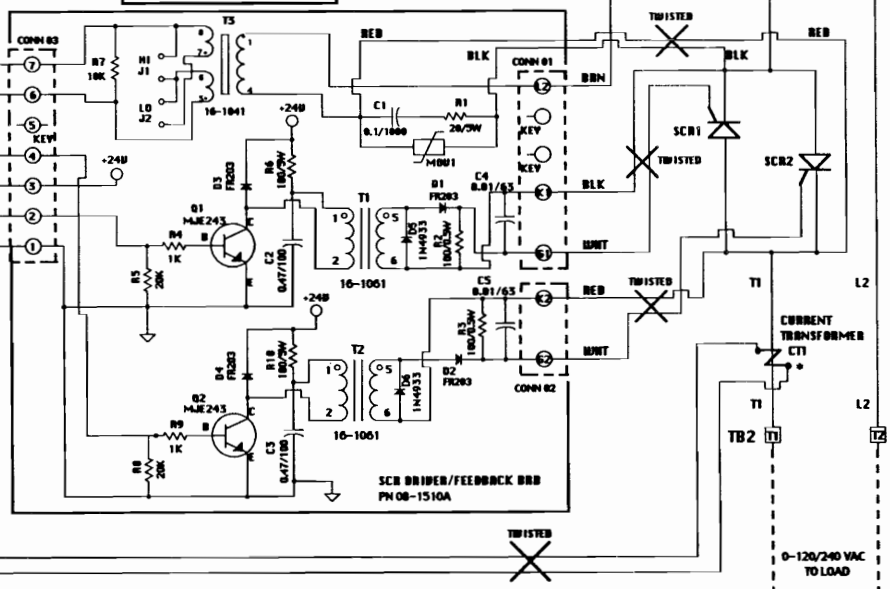
P5 CURRENT LIMIT SETPOINT

P6 CURRENT F'BACK CAL



T5 CONNECTIONS
 120 VAC INPUT: JUMPER 1 TO 3 & 2 TO 4
 240 VAC INPUT: JUMPER 2 TO 3 L2 TO PIN 1, 1L1 TO PIN 4

J1 JUMPER FOR 240 VAC POWER
 J2 JUMPER FOR 120 VAC POWER



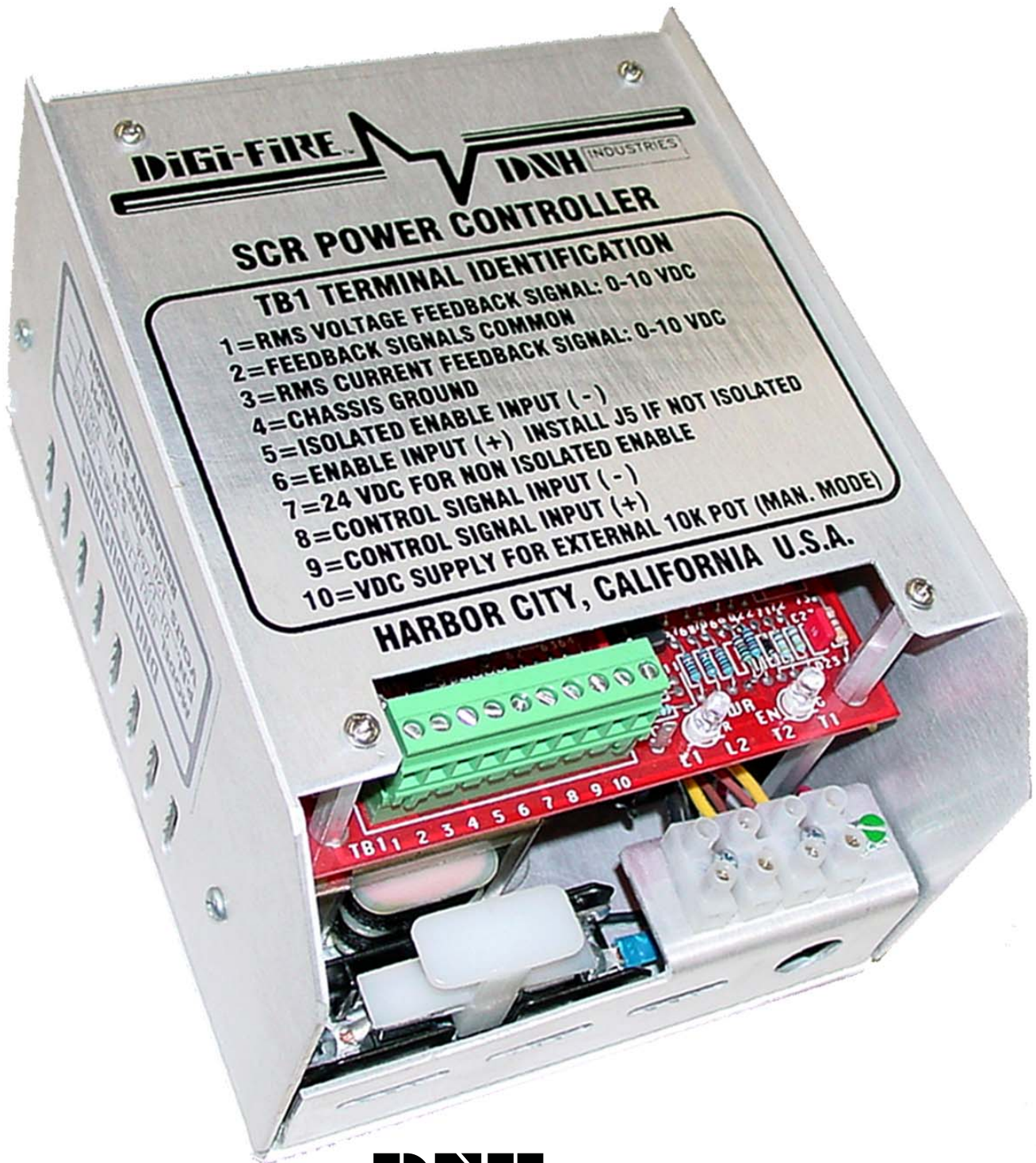
* CT1
 10 AMPERE UNIT = 4 PRIMARY TURNS
 40 AMPERE UNIT = 1 PRIMARY TURN

DNH INDUSTRIES

24100 FRAMPTON AVE. BLDG B, HARBOR CITY, CA. 90710 U.S.A.

CONTRACT NO.		TITLE: SCR POWER CONTROLLER DRIVER BOARD SCHEMATIC AND CONTROL WIRING DIAGRAM			
APPROVALS / DATE		SIZE	S.D. NUMBER	DRG. NUMBER	REV
DRAWN D MITT 07.10.00		D3191	02-2125		C
CHECKED		SCALE	SHEET		
REVISER D MITT 06.25.01			OF		

AC & DC POWER CONTROLS



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