
**INSTALLATION, OPERATION and
MAINTENANCE MANUAL**

**MODEL SCPF1 15, 25, 40 & 65 AMP
SCR POWER CONTROLS**

UL/cUL FILE NUMBER – E151547

CE – See last page of manual for CE Declaration of Conformity.



**AMETEK HDR POWER SYSTEMS
3563 INTERCHANGE ROAD
COLUMBUS, OHIO 43204**

**TEL: 614-308-5500
TOLL FREE: 1-888-PWR-CNTL (797-2685)
FAX: 614-308-5506**



SCR Power Controls/Systems & Power Supplies

Dear Client:

On behalf of all of AMETEK HDR's employees, I want to take this opportunity to "thank you" for purchasing an AMETEK HDR Power Systems' SCR Power Control.

We believe AMETEK HDR represents the best overall solution to your SCR Power Control needs in the industry today. We do this by providing a quality manufactured, reliable unit with fast, on-time delivery and a competitive price.

All of our employees are dedicated to your success. If you have any questions, comments or concerns, please call me toll free at 1-888-PWR-CNTL (797-2685).

Sincerely,

AMETEK HDR POWER SYSTEMS

A handwritten signature in cursive script that reads "George A. Sites".

George A. Sites
Vice President

GAS/be

REVISION PAGE

<u>Page</u>	<u>Change</u>	<u>Revision</u>	<u>Date</u>
All	1	Revised for Scanner.....	11/04/96
Many	2	Revised for CE	2/2002

NOTE: SPECIFICATIONS SUBJECT TO CHANGE WITHOUT PRIOR NOTICE.

COPYRIGHT 2003

AMETEK HDR POWER SYSTEMS

TABLE OF CONTENTS

<u>Para.</u>	<u>Title</u>	<u>Page</u>
Section 1 – DESCRIPTION		
1-1	Models Covered.....	1
1-2	General Description.....	1
1-3	Applications.....	1
1-4	Specifications.....	1
1-5	Options.....	2
1-6	Operation.....	2
Section 2 – INSTALLATION		
2-1	Mounting.....	3
2-2	Line/Load Power Wiring.....	3
2-3	Options.....	3
2-4	Safety Issues.....	3
Section 3 - COMMAND SIGNAL CALIBRATION		
3-1	Zero and Span Adjustments.....	6
3-2	Power on Indicator.....	6
3-3	Command Indicator.....	6
3-4	Remote Manual Control.....	6
3-5	Process Command Signal.....	6
Section 4 - OPTIONS CALIBRATION		
4-1	Current Limit.....	7
4-2	Overcurrent Trip.....	7
4-2	Load Failure Alarm.....	7
Section 5 - MAINTENANCE		
5-1	Environmental Concerns.....	8
5-2	Line/Load Power Connections.....	8
5-3	Troubleshooting Typical Symptoms.....	8

Section 6 - SERVICE AND SPARE PARTS

6-1 Customer Service 9
6-2 Spare Parts..... 9
6-3 Warranty 9

TABLES, ILLUSTRATIONS & DRAWING LIST

<u>Table</u>	<u>Title</u>	<u>Page</u>
1	Specifications SCPF1 15, 25, 40 & 65 Amp Models	1
2	Troubleshooting the SCPF1 15, 25, 40 & 65 Amp Models	8

<u>Figure</u>	<u>Title</u>	<u>Page</u>
1	Line/Load Power Wiring	4
2	Outline and Mounting Dimensions	5

Section 1 - DESCRIPTION

1-1 MODELS COVERED

This manual covers the SCPF1 models rated 15, 25, 40 & 65 amperes and its options.

1-2 GENERAL DESCRIPTION

The SCPF1 is a solid-state, single-phase, phase fired (PF) SCR power control which will operate on line voltages up to 600 VAC. It accepts most all standard process command signals and regulates the output voltage. Zero and Span Multi-turn potentiometers are provided to ease calibration. The PF1 utilizes an isolated base Solid-State-Relay (SSR) Module which contains two SCRs connected back to back. The firing circuit is based on a common phase firing integrated circuit which includes soft-start for loads which are inductive or have a great resistance change due to temperature or start-up. Terminals are provided to ease installation.

1-3 APPLICATIONS

The SCPF1 provides infinitely variable firing angles for precise control of single-phase power to resistive or loads with large resistance change (cold to hot). The PF1 may also be used on straight resistive loads as well, but the lower power factor and higher harmonics may present a problem to other equipment mounted nearby. A zero fired model would be a better choice.

1-4 SPECIFICATIONS

Specifications for the SCPF1 SCR Power Control are given in Table 1.

Table 1
Specifications for the SCPF1 15, 25, 40 & 65 Amp Models

CONTROL METHOD	- Phase firing of back to back SCRs.
VOLTAGE RATING	- Up to 575 VAC, 1 Ph., 50/60 Hz.
CURRENT RATING	- 15, 25, 40 & 65 Arms.
COMMAND SIGNAL	- 4-20 ma, 0-5 VDC/0-10 VDC, Manual Control
ISOLATION	- 2500 Vrms from line/load to command signal to ground.
LINEARITY	- RMS output voltage is linear to command signal.
ADJUSTMENTS	- Zero and Span, multi-turn.
AMBIENT TEMPERATURE	- Operating, 0 - 50 °C; Storage, -10 - 70 °C.
AGENCY LISTING	- UL/cUL Listed, CE Compliant

1-5 OPTIONS

Three options are available for the SCPF1 15, 25, 40 & 65 amp models: RMS Current Limit and a Load Failure Alarm.

Current Limit (Option CL) is available for those loads which may decrease in resistance with time, or for those loads which may have tapped transformers.

Overcurrent Trip (Option OC) can be used on loads which have instantaneous shorts that are self healing; or it may be used as an "Electronic Fuse". A relay output is provided.

Load Failure Alarm (Option LF) should be used when the "Load" is made up of several parallel paths. The load failure alarm will determine when 5% or more of the load has failed. A relay output is provided.

1-6 OPERATION

The SCPF1 controls power by the switching action of two SCRs connected in a back to back configuration. The gating of these SCRs is synchronized with the line frequency (either 50 or 60 HZ) by the Phase Control Integrated Circuit and the 24 VAC control voltage. This IC provides timing pulses along with a soft-start feature. The output may be adjusted by the on-board potentiometers or by a voltage or current signal from a process controller. Zero and Span controls allow the user to calibrate the SCR unit's output to the process command signal. Terminals are also available for connection of a remote manual potentiometer.

WARNING
Hazardous voltages exist at the power controller heat sinks and at the load at all times when the input voltage is connected. This condition exists even when the controller is set to delivery zero output.

Section 2 - INSTALLATION

2-1 MOUNTING

Prior to mounting, verify the voltage and current rating of the SCPF1, the information is provided on the nameplate located on the left side of the unit. Determine the mounting dimensions from the outline drawing located in Figures 2. Mount the SCPF1 with line/load terminals to the top so that air flow is upward through the heat sink fins. Ensure that air flow is unrestricted.

2-2 LINE/LOAD POWER WIRING

Connect the line/load using appropriately sized and insulated wire/cable per NEC based on the voltage and current rating of the SCPF1. Torque the line/load power connections to 25 in-lbs. min. Refer to Fig. 1 for additional connections.

NOTE: 75 °C (minimum) rated wire is required for all power connections to the SCPF1.

WARNING
Branch circuit overcurrent protection is required to be provided in accordance with the national and/or local code of the inspecting authority or equivalent.

2-3 OPTIONS

The Current Limit, the Overcurrent Trip, and the Load Failure Alarm Options have been factory adjusted for nominal ratings. You may want to adjust these for your individual requirements. The Current Limit is adjustable from 50 to 125%, the Overcurrent Trip is adjustable from 25 to 200% and the Load Failure Alarm is adjustable in 5% increments.

The Overcurrent Trip has a Form C relay output and provisions for a remote overcurrent reset push button. A momentarily closed contact resets the trip.

The Load Failure Alarm also includes a Form C relay output.

2-4 SAFETY ISSUES

The rated operational voltage of each power controller is shown on the nameplate, i.e. 120V, 240V, 400V, 480V or 575V. The power controller is designed to operate between +10% and -15% of this rated operational voltage in an Over Voltage Category III environment.

WARNING

Power Control units are not suitable to provide isolation due to the use of semiconductors and other components that allow a small current to flow from line to load even when the unit is in the non-conducting mode.

The voltage drop across the switching semiconductor while in the conducting mode is approximately 1.5 volts and is somewhat a function of current. To calculate the power control's power loss, multiply the load current times 1.5.

The minimum operational current is approximately 1 amp and the maximum off state current is approximately 15 ma.

The power controls described in this instruction manual are designed to operate in a pollution degree 2 environment.



HAZARDS EXIST



DANGEROUS VOLTAGES EXIST

Figure 1
LINE/LOAD POWER WIRING

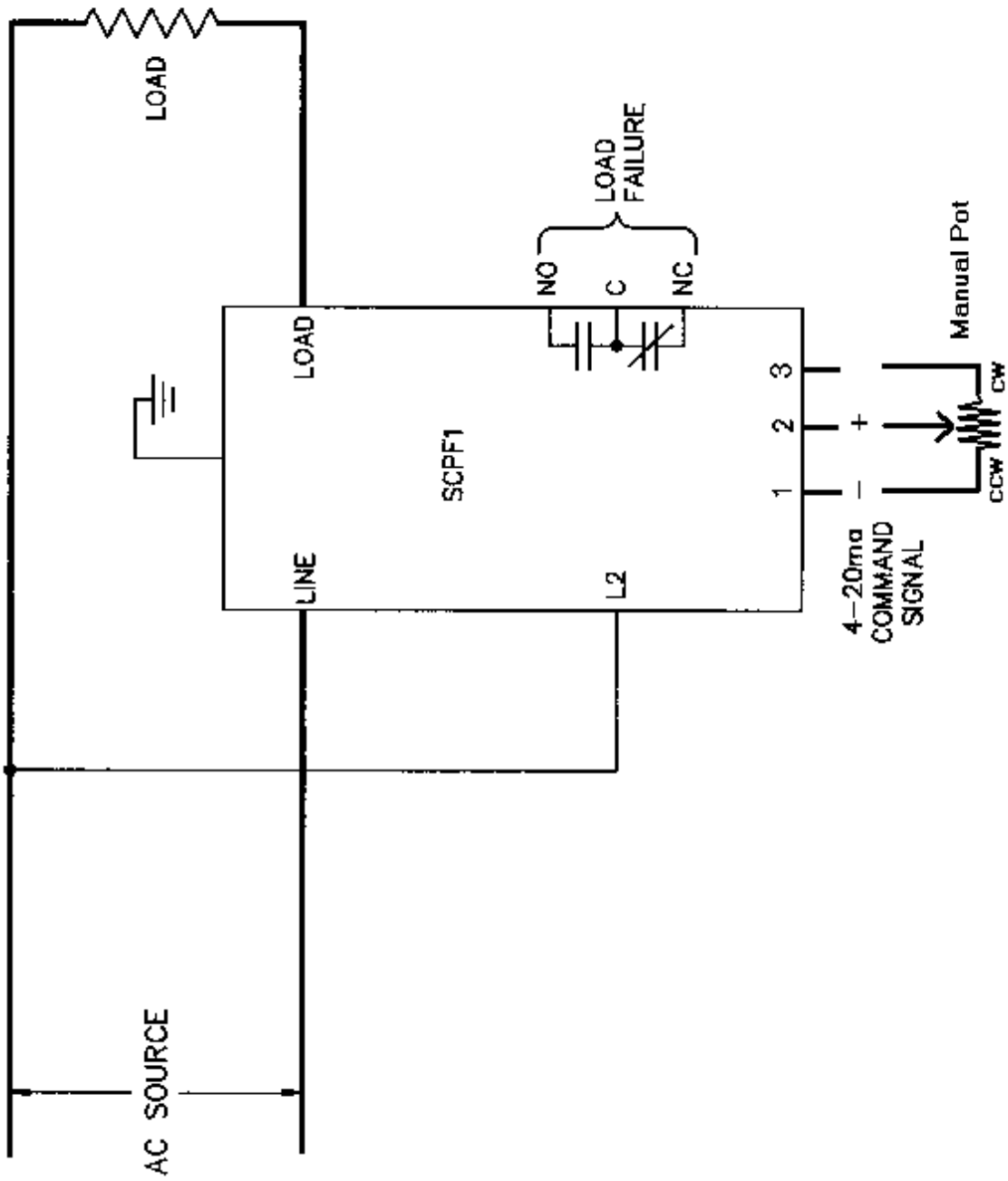
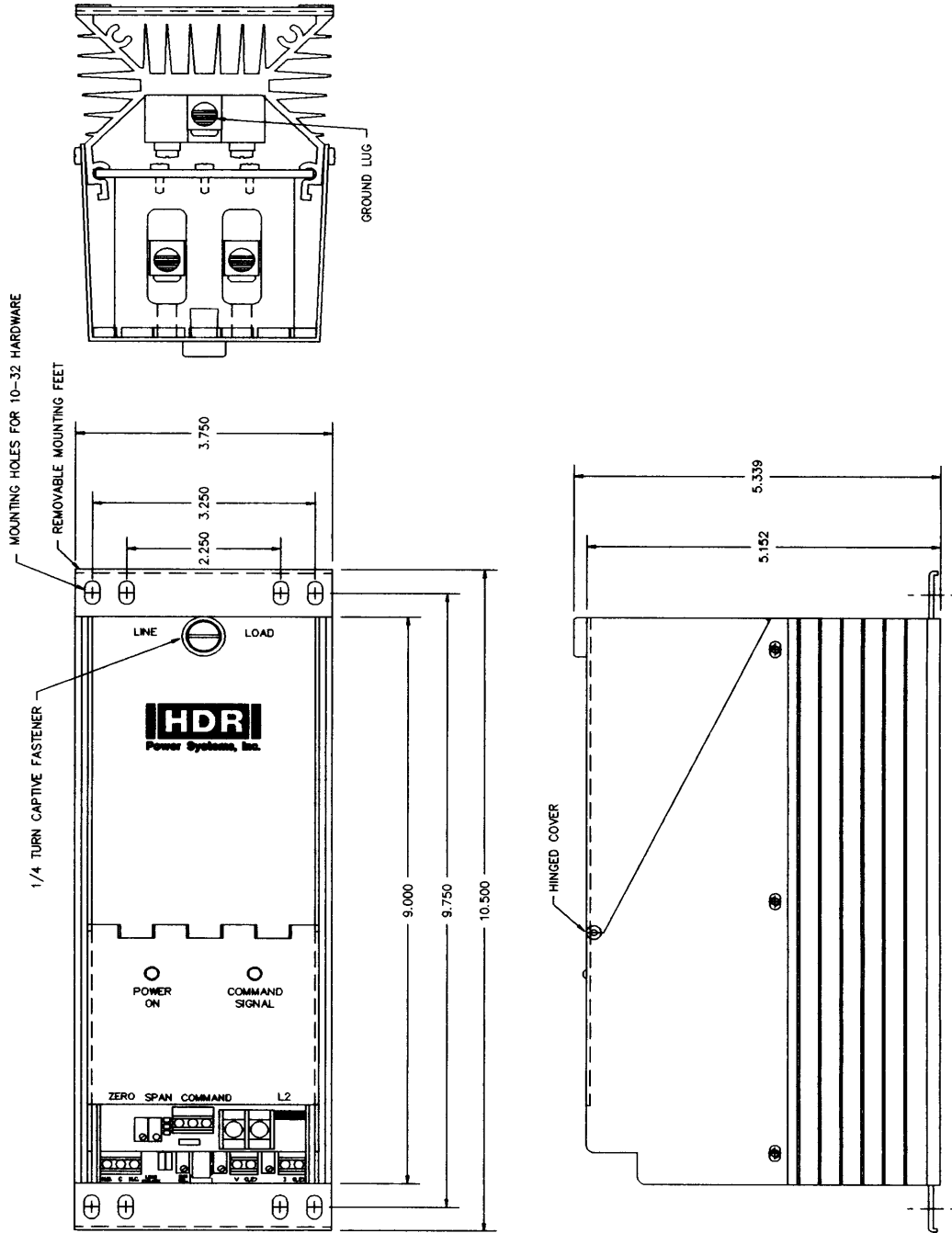


Figure 2
OUTLINE AND MOUNTING DIMENSIONS



Section 3 - COMMAND SIGNAL CALIBRATION

3-1 ZERO AND SPAN ADJUSTMENTS

The Zero potentiometer has both positive and negative voltages available making it usable as a manual or zero control. By turning the Zero control clockwise the unit's output voltage will increase proportionally to the adjustment. Turning it counter-clockwise will decrease or zero the output for any non-zero based command signal.

The Span potentiometer is used to adjust the maximum output. It will adjust for either a remote manual control or a command signal input. Clockwise adjustment increases the output while counter-clockwise adjustment decreases the output. Due to some interaction between controls, it may be necessary to repeat these adjustments.

3-2 POWER INDICATOR

The Power On Indicator is a red light emitting diode (LED) located on the front. The LED lights when power is applied.

3-3 COMMAND INDICATOR

The Command Indicator is a green light emitting diode (LED) located on the front. The intensity of this LED will vary with the output of the unit. The intensity will be brighter with higher outputs and dimmer with lower outputs.

3-4 REMOTE MANUAL CONTROL

Start with the Zero Control set approximately at mid rotation and the Span Control set at minimum (counter-clockwise). Connect a 5K ohm remote manual control as shown in Figure 1. With the unit energized and the manual control fully counter-clockwise, adjust the Zero Control until the unit is just off. Next turn the manual control fully clockwise and adjust the Span Control until the desired output voltage is reached. This procedure may have to be repeated since some interaction between the Zero and Span Controls exist.

3-5 PROCESS COMMAND SIGNAL

This procedure is similar to the Remote Manual Control procedure. Start with the Zero Control set approximately at mid rotation and the Span Control set at minimum. Connect the Command Signal to terminals 1 & 2, (-) on 1 and (+) on 2, and then energize the unit.

With the Command Signal at minimum, adjust the Zero Control so the unit is just off (zero output voltage) then with the Command Signal at full output, adjust the Span Control so the output voltage is at the desired level. Repeating this procedure may be necessary due to some interaction between the Zero and Span Controls.

SECTION 4 - OPTIONS CALIBRATION

4-1 CURRENT LIMIT (OPTION CL)

Prior to energizing the SCPF1, adjust the Current Limit control fully clockwise. Next with the SCPF1 operating at full output and the proper load connected turn the Current Limit control counter-clockwise until the desired maximum output is attained.

4-2 OVERCURRENT TRIP (OPTION OC)

As with the Current Limit, insure that the Overcurrent Trip control is fully clockwise. With the SCPF1 operating at full current adjust the Overcurrent Trip control counter-clockwise until the unit shuts off. Readjust the control clockwise a small amount and press the Reset button. The Overcurrent Trip should be adjusted properly at this point.

Overcurrent relay output (Form C) and a remote reset input is included on the overcurrent trip option. A remote reset pushbutton (N.O.) May be connected to terminals 4 & 5.

NOTE: Use a RMS ammeter to monitor the output current. Some load must be present when making adjustments.

4-3 LOAD FAILURE ALARM

The load failure alarm provides a Form C relay output when the load failure is greater than the preset level.

With the unit operating, place the run/calibrate switch in the calibrate position. Adjust the calibration control for the proper level. Return the switch to the run position.

Section 5 - MAINTENANCE

5-1 ENVIRONMENTAL CONCERNS

Always verify that the SCPF1 is mounted in a clean, dust free environment. Clean the heat sink and printed circuit board periodically so no dust and/or dirt accumulates on the unit. Dust and/or dirt on the heat sink fins can prevent proper airflow causing overheating of the semiconductors. Conductive dust and/or dirt can cause shorts or arcing which can cause damage to the unit.

5-2 LINE/LOAD POWER CONNECTIONS

Periodically turn the power off to the SCPF1 and check for corrosion and tightness of the power connections. If any corrosion is evident, clean the cable and connector and reconnect making sure to tighten to 25 in-lbs.

5-3 TROUBLESHOOTING TYPICAL SYMPTOMS

Any one of the following symptoms usually indicate a problem with the SCPF1:

1. No output.
2. Full output regardless of command signal input.
3. The unit is not variable fro 0 to full output.

Table 2
Troubleshooting the SCPF1 15, 25, 40 & 65 Amp Models

Symptom	Cause	Solution
No output	Open fuse	Disconnect power and check the fuse, replace if faulty - if not, contact the factory.
Full output regardless of command signal.	Shorted SCR Module.	Disconnect power and remove the firing circuits. Re-energize, and, if output is on, replace the SCR module or contact the factory.
The unit is not variable from 0 to full output.	Defective firing circuit.	Order replacement firing circuit or return unit to factory.

Section 6 - SERVICE AND SPARE PARTS

6-1 CUSTOMER SERVICE

If you have operational problems which cannot be resolved using this manual, please contact the Service Department at AMETEK HDR. Our normal work hours are 8 a.m. to 5:00 p.m., U.S.A. EASTERN TIME ZONE, Monday through Friday.

TELEPHONE: 1-888-PWR-CNTL (797-2685) OR 614-308-5500.

Our answering machine at 614-308-5500 will answer after hours and we will return your call the next working day.

FAX: 614-308-5006. 24 hours per day automatic answering.

6-2 SPARE PARTS

Inside Sales should be contacted for any spare parts orders whether routine or emergency during normal working hours. All after hours requirements should be called in on our 614-308-5500 answering machine. Please have as much information available as possible pertaining to the model number, serial number, order number and parts required. A purchase order number should be available.

6-3 WARRANTY

AMETEK HDR warrants that the equipment delivered will be free from defects in workmanship and material for a period of five years from the date of shipment. AMETEK HDR will repair or replace, at AMETEK HDR's option, any part found defective during proper and normal use, provided that written notice of the nature of the defect is received by AMETEK HDR within the five year warranty period and that the customer returns the part to AMETEK HDR freight paid both ways. This warranty is not transferable by the initial end user.

AMETEK HDR MAKES NO OTHER WARRANTIES, EXPRESSED OR IMPLIED (INCLUDING, WITHOUT LIMITATION, MERCHANTABILITY, FITNESS FOR PURPOSE, OR AGAINST INFRINGEMENT OF ANY PATENT) EXCEPT AS EXPRESSLY PROVIDED HEREIN.

THE REMEDY OF REPAIR OR REPLACEMENT IS CUSTOMER'S SOLE AND EXCLUSIVE REMEDY AND WILL SATISFY ALL OF AMETEK HDR'S LIABILITIES, WHETHER BASED ON CONTRACT, NEGLIGENCE, TORT, PRODUCT LIABILITY, STRICT LIABILITY, OR OTHERWISE. IN NO EVENT WILL AMETEK HDR BE LIABLE FOR INCIDENT OR CONSEQUENTIAL DAMAGES, NOR IN ANY EVENT SHALL HDR'S LIABILITY EXCEED THE UNIT PRICE OF ANY DEFECTIVE PRODUCT OR PART.

EC DECLARATION OF CONFORMITY

WE: **AMETEK HDR POWER SYSTEMS**
3563 Interchange Road
Columbus, Ohio 43204 - USA

Declare under our sole responsibility that the products listed below and bearing the CE label:

Type: SCR power controllers with the following model designations and current ratings:

 SCPF1 - 15, 25, 40 and 65A
 All applicable options

To which this declaration relates is in conformity with the technical requirements of the following documents:

Title:	Low-voltage switchgear and control gear	No.	IEC 947-5-1
		Year:	1990-03
	Low Voltage Directive	No.	IEC 73/23/EEC
		Year:	1973-02
	Degrees of protection provided by enclosures (IP Code):	No.	IEC 529-2nd Edition
		Year:	1989-11
	Electromagnetic Compatibility (EMC)	No.	IEC 89/336/EEC
		Year:	1989-05

Warning

All phase-fired (PF) controllers will require line filters and
possibly shielded cables to meet the EMC requirements.

(Environmental protection classification IP00 - for mounting inside an enclosure)

Note: Characteristics are according to mfg specifications.

Name: George A. Sites

Title: Vice President

Date: July 1, 2001

Signature:



Declaration written in accordance with I.S.O. - IEC/22 Guide