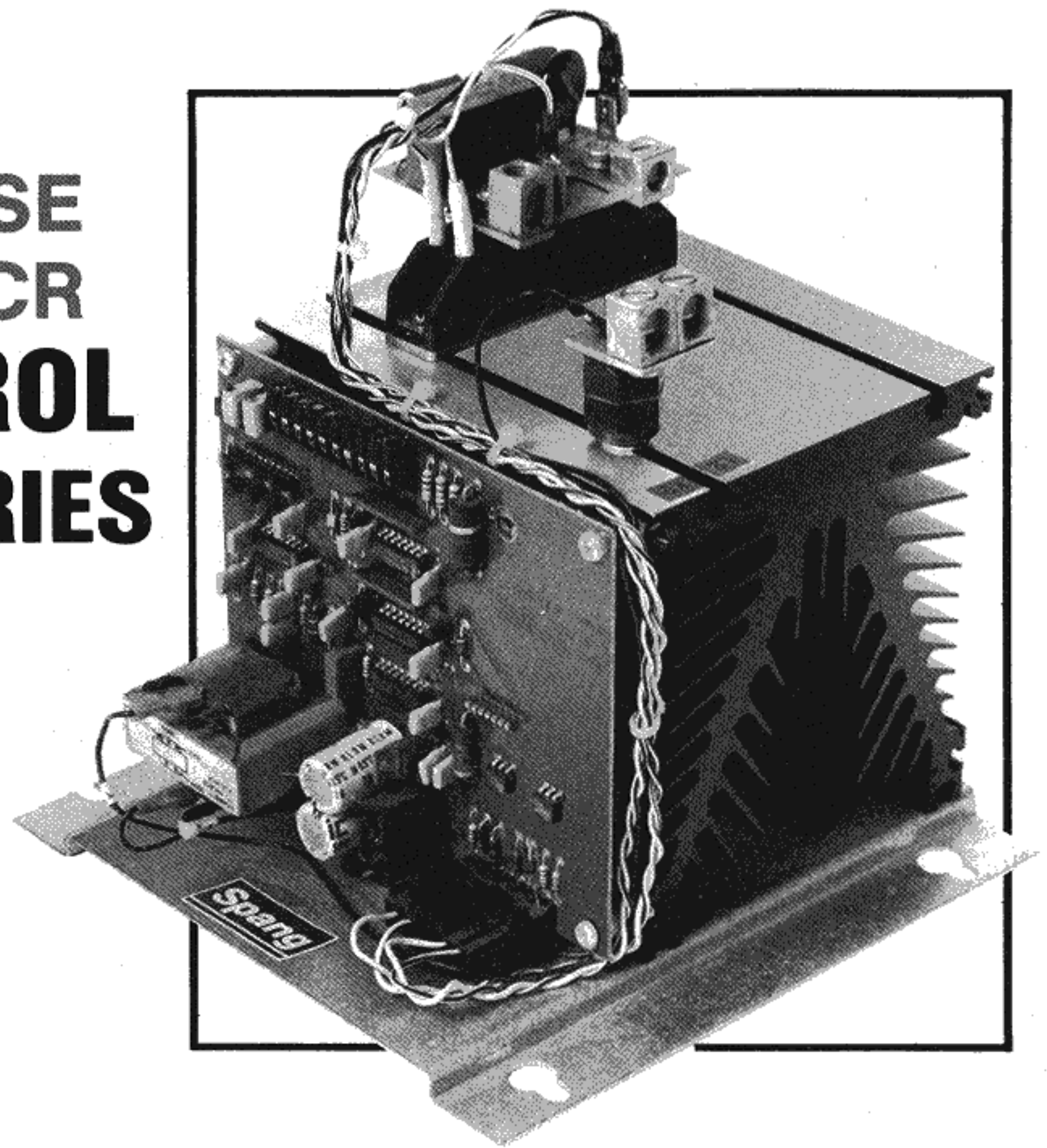


## **Synchronous DEFINITE PURPOSE SINGLE PHASE SCR POWER CONTROL UNITS - 652 SERIES**



### **Compact, Economical Proportional Control of Single Phase AC Power**

Primarily used to control static resistive, non-inductive loads:

- **Small Electric Furnaces**
- **Electric Ovens and Heaters**
- **Extrusion and Forming Equipment**

- Variable ratio synchronous firing
- Standard ratings designed for 50° C maximum ambient
- Stepless control for proportional electric power
- Immunity to line distortions and fluctuations
- Accepts all standard control signals
- All ratings are convection cooled
- Electrically isolated heatsinks
- Optically isolated gate circuit

## General Description

The 652 Series are definite purpose SCR Power Control Units, offering economical synchronous power control in a compact package. The latest advances in integrated circuit technology and power semiconductors have made this possible while maintaining the high quality and reliability that are traditional for Spang Power Electronics products.

The firing circuit utilizes CMOS integrated circuits and digital logic to ensure immunity from power line distortions.

All units in the 652 Series utilize isolated semiconductor power modules. The power module contains two SCRs connected in inverse parallel to control one line of a single phase load. The other line is connected directly through to the load.

These definite purpose units offer the most frequently used options, current limit and voltage regulation. These are available factory installed or in easy-to-add kit form. Where more elaborate control or higher current ratings are required, our KB series units described on pages 15-18 should be considered.

Also available from Spang Power Electronics is a complete line of SCR Power Control Units offering phase angle and synchronous (zero voltage) control in both three phase and single phase configurations.

## Advantages of Variable Frequency Synchronous Firing:

- Conventional voltmeters and ammeters can be used for instrumentation at 50% to 100% voltage range.
- Infinitely variable output.
- Elimination of RFI.
- Power is distributed evenly over time.
- Variable ratio cycling rate provides smoothest most even power distribution over time.

## Specifications for Synchronous Control

**Input Voltage:** The 652 Series units are available in two voltage ranges of 120 through 277 volts or 380 through 575 volts. They are shipped connected for the most popular voltages of 240 or 480 volts. Other voltages may be selected by simply moving a plug-in jumper. On the 277 volt unit input voltages of 120VAC, 208VAC, 240VAC or 277VAC may be selected. On the 575 volt unit input voltages of 380VAC, 416VAC, 480VAC and 575VAC are available.

**Input Frequency:** All units operate on 50 Hertz or 60 Hertz.

**Connections:** U.L. listed compression terminals are provided for both power and control connections.

**Ambient:** All ratings are designed for 50°C maximum operating temperature. For operation at higher temperatures (to 65°C maximum), some derating is necessary; please consult factory.

**Input Signals:** 0-5, 1-5, 2-12, 4-20, 10-50ma inputs (all standard temperature controller outputs) or a manual potentiometer. See Control Connections.

**Adjustments:** High resolution, 20 turn potentiometers are provided for all adjustments.

- a. Gain adjustments provide full output for 50% to 200% standard control signal.
- b. Bias adjustment for manual control to 100% output.

### Voltage Protection:

a. Transient voltage suppression is provided by an R-C snubber network and metal oxide varistor (MOV) which clamps high voltage spikes to within the PRV rating of the semiconductors.

- b. Standard PRV ratings:
  - 380-575 volt units – 1200 volts
  - 120-277 volt units – 800 volts

**Reference Supply:** A 12 volt DC regulated reference supply is available from the firing circuit for connection to a remote potentiometer, from which the Power Control Unit can be controlled manually. This supply is

regulated to within  $\pm 1/2\%$  for line voltage variations. Maximum current rating from this reference source is 10 milliamperes.

**Cooling:** The 652 Series Power Control Units are convection cooled. Use of isolated power modules provides electrical isolation of the heatsinks.

## Options Available

The most frequently used options are available for the 652 Series Power Control Units. These plug-in options can be supplied factory installed or in kit form easily added to an existing unit in the field.

The field installable kits include a plug-in option board, current or voltage transformers and complete installation instructions. They can easily be installed in just a few minutes. The option kits provide for faster delivery and reduced equipment costs. In addition, they allow the user to reduce inventory costs by stocking the basic units and option kits separately, combining them as required for the specific application.

For added convenience the options can be provided factory installed at a nominal extra charge.

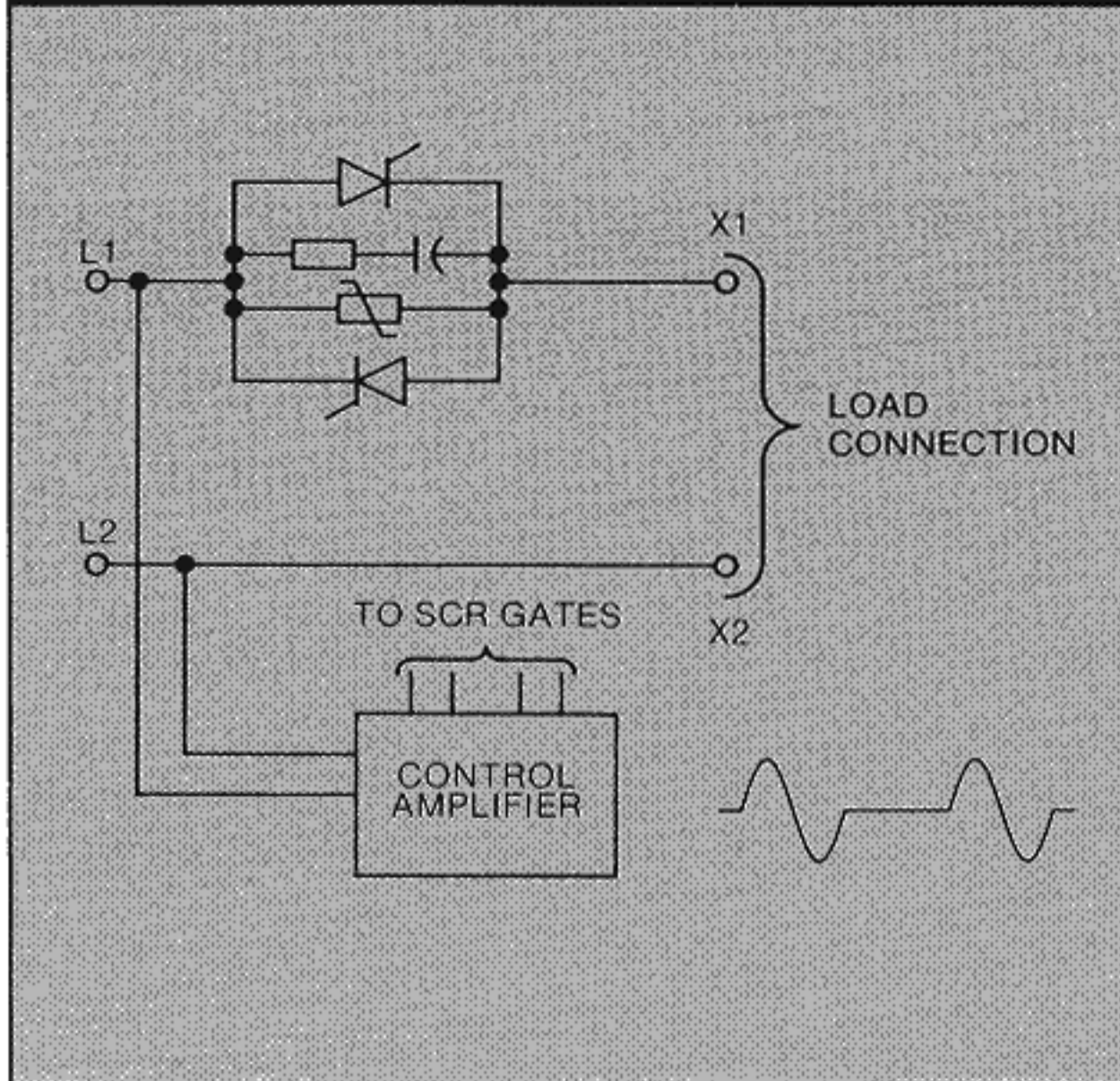
Each 652 Series unit will accept one plug-in option board with either one, or a combination of the options listed below:

**1. Current Limit** senses RMS current and limits output. Current limit adjustment is from 5% to over 100% of rating by a potentiometer on the option card.

**2. Voltage Regulation** adds RMS voltage feedback to the standard model. Voltage regulation is  $\pm 1\%$  for line voltage excursions of +10%, -15% of nominal. This option also improves control linearity to  $\pm 1\%$  from 0 to 100% output.



## Schematic Drawing

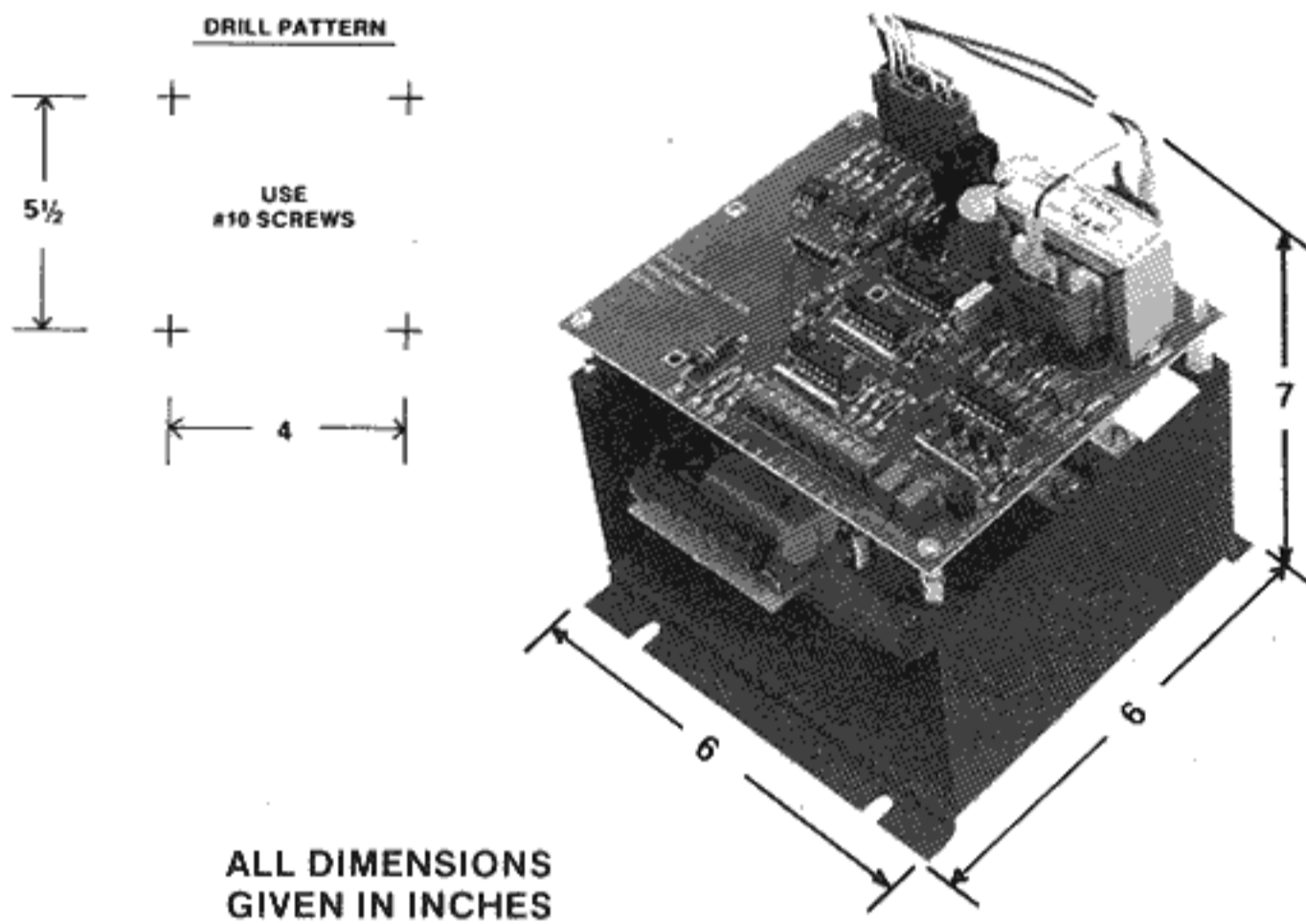


## Control Connections

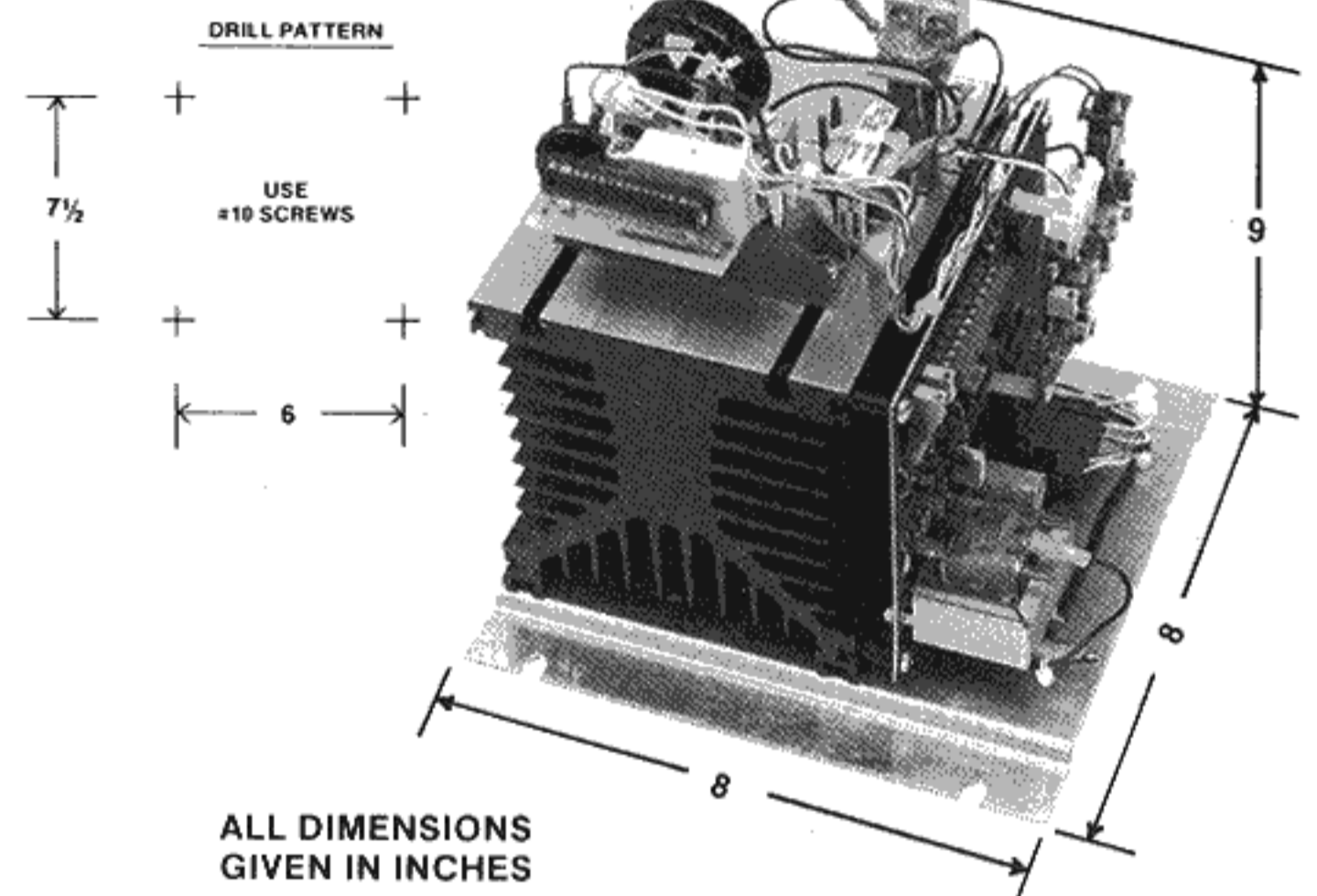
DC Control Signal	Input Control Terminal Points	Input Impedance
0-5 ma	1 (+)-5 (-)	1000 ohms
2-12 ma	2 (+)-5 (-)	400 ohms
4-20 ma	3 (+)-5 (-)	250 ohms
10-50 ma	4 (+)-5 (-)	100 ohms
0-10 v	7 (+)-5 (-)	200K ohms
Contact Closure	6 and 7	Close Contact to turn PCU on
Manual Control: Ends of Pot Slider of Pot	6 and 8 7	Connect a 10K ohm 2 watt potentiometer
Lockout (External shutdown contact)	6 and 10	Close Contact to turn PCU off

## PHYSICAL DIMENSIONS

### 15 To 40 Amp



### 60 To 110 Amp



## ORDERING INFORMATION

Amp Rating	CATALOG NUMBER		OPTIONS		
	120-277 VAC	380-575 VAC	Option	Factory Installed	Field Installable
15	652-277-15-00	652-575-15-00	To order options with the PCU replace last two digits with code shown for desired option.		
40	652-277-40-00	652-575-40-00	Current Limit	1A	1K
60	652-277-60-00	652-575-60-00	Voltage Regulation	2A	2K
80	652-277-80-00	652-575-80-00	Current Limit and Voltage Regulation	3A	3K
110	652-277-110-00	652-575-110-00	Option and Fusing Kits are also available separately. Please refer to next page.		

## Field Installable Options

The option kits allow for field installation of current limit or voltage regulation. Kits include the plug-in accessory board and current or voltage transformers as required.

PCU Amp Rating	Catalog Number		
	Current Limit	Voltage Regulation	Current Limit And Voltage Regulation
15	652-CL-15	652-VR	652-CLVR-15
40	652-CL-40	652-VR	652-CLVR-40
60	652-CL-60	652-VR	652-CLVR-60
80	652-CL-80	652-VR	652-CLVR-80
110	652-CL-110	652-VR	652-CLVR-110

## Fuse Kits

Each Fuse Kit includes one 1<sup>2</sup>t current limiting fuse, fuse holder and wiring lugs. The Catalog Number is determined as follows:

650-FA1-\_\_\_\_\_ - \_\_\_\_\_

PCU Current rating \_\_\_\_\_

\_\_\_\_\_ Maximum voltage (except for 650-FA1-15)

Catalog Number	Fig.	A	B	C
650-FA1-15	2	N/A	N/A	N/A
650-FA1-40-277	1	5	1 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>4</sub>
650-FA1-40-575	1	5 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>4</sub>
650-FA1-60-277	1	5 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>4</sub>
650-FA1-60-575	1	5 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>4</sub>
650-FA1-80-277	1	5 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>4</sub>
650-FA1-80-575	1	5 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>4</sub>	2 <sup>1</sup> / <sub>8</sub>
650-FA1-110-277	1	5 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>4</sub>
650-FA1-110-575	1	5 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>4</sub>	2 <sup>1</sup> / <sub>8</sub>

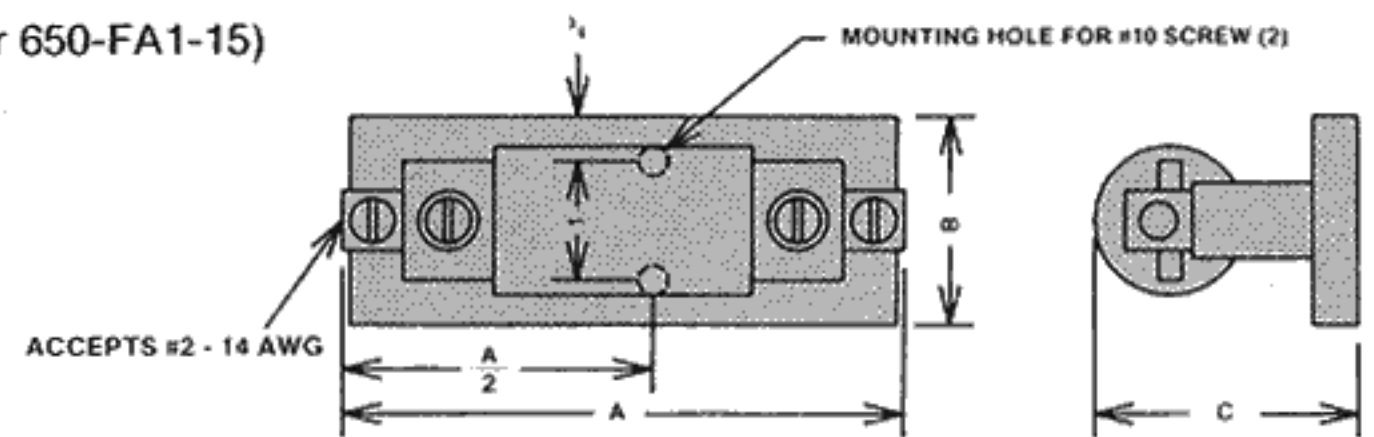


FIG. 1

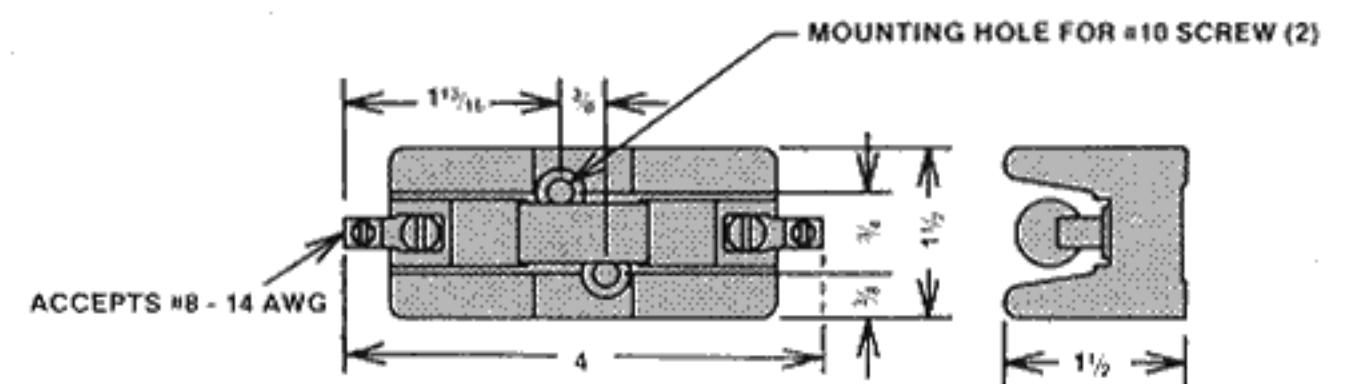


FIG. 2