MiniMax™ 3

Three Phase, Six-SCR Power Pak

Features:
• 120-575 Vac @ 30-75 Amp
• Zero Cross-Over Firing
• Isolated Control Circuit
  - On/Off Control Inputs:
    120 Vac, 240 Vac, 5-32Vdc
    Dry Contact Closure
  - Proportional (DOT firing) Inputs:
    4-20mA, 0-5Vdc, 1-5Vdc, 0-10Vdc
• Remote Manual Adjust
• Remote Auto/Manual Switch
• Flexible I/O Power Wiring
• Shorted SCR Detection (option)
• Easy Customer Interface
• Remote Shutdown
• Electronically Protected with Temperature Warning and Shutdown System
• Compact Size and Construction
• dv/dt Transient Voltage Protection
• MOV Protection
• Six SCR Full Converter
• 3-Phase Delta, 3-Wire Wye or 4-Wire Wye Connected Loads
• Dot-Fired with Single or Three Cycle Resolution (Jumper selectable)

Description

The MiniMax Series is specifically designed for the OEM market. The plug-in options, flexible I/O power wiring, space saving footprint and universal approvals make it an excellent candidate for your product.

Typical Applications:
• Resistive Heaters
• Electric Ovens
• Furnaces
• Kilns
• Environmental Chambers

Chromalox’s exclusive DOT (Demand Oriented Transfer) firing switches the fewest number of cycles to provide the most precise zero crossover control. At 50% output the unit’s output alternates between three electrical cycles on and three cycles off. At 51% the output continues with three cycles on / three cycles off and gradually integrates three extra “on” cycles for the additional one percent.

The Chromalox Model MiniMax 3 is a solid state, highly versatile power pak with optional plug-in proportional Firing and Shorted SCR Detection Boards. Firing techniques include: “ON/OFF Power Control” (Contactor) and “Proportional Power Control” (Zero Voltage Switching, DOT fire).

Wave Form Cycle Rate

ON/OFF Power Controller

0% Shown
100% Shown

Output 0% or 100%

Proportional Power Controller

(Zero Voltage Switching) DOT

50% Shown

50% Output = 3 Cycles ON; 3 Cycles OFF
MiniMax 3 Power Pak

Solid State Six SCR Power Controls for Two Types of Applications

ON/OFF Control (Solid State Contactor)

Capable of directly replacing a three-phase mechanical contactor for maintenance-free operation. With true zero voltage switching RFI (Radio Frequency Interference) is virtually eliminated. The MiniMax 3 provides LED’s for visual indication of the controller operation.

Proportional Power Controller

This proportional power controller utilizes the “Zero Voltage Switching” technique to modulate power for a wide range of resistive loads. Output power modulation is accomplished by Chromalox’s exclusive Demand Oriented Transfer (DOT) system which virtually eliminates RFI. Thermal cycling and heater degradation are minimized with the system’s fast response time.
MiniMax 3 Power Pak

Specifications

Control Inputs
Accepts all of the following as standard:

**On/Off Control**
- Signal Input
  - 120 Vac ±10%
  - 230 Vac ±10%
  - 5-32Vdc

Contact Closures

**Proportional Control**
- Signal Input
  - 4-20mA ............................................ 250 Ohms
  - 1-5Vdc .................................. 10k Ohms or greater
  - 0-5Vdc .................................. 10k Ohms or greater
  - 0-10Vdc .................................. 10k Ohms or greater

Optional:
- Remote Manual Adjust
- Auto/Manual Switch

**Instrument Power**
- 120 or 230 Vac
- 50/60 Hz

**Output Voltage**
- 0-99% RMS line voltage
  (Eo=Vsupply -1.5V SCR forward drop)

Resolution (Prop.) ..................... Better than 0.1%

**Line Voltage** ....................... 120-575 Vac

**Load Current Rating** ............. 30, 50, 75 Amp

**Ambient Temperature** .......... 0-50˚C (32-122˚F)

**SCR Capability** .................... Dielectric withstand capability 1500V RMS min.

**Surge Rating** ....................... Typically fifteen (15) times nominal RMS rating for 8.3 milliseconds

**Isolation** ......................... SCR's isolation 2500V

**Heatsink** ........................ Ground potential

**High Temperature** .............. MOSFET Switch

**Indicator Output** ............... 100mA @ instrument power

**Shorted SCR** ...................... MOSFET Switch

**Indicator Output** ............... 100mA @ instrument power

Mechanical Features

- LED Indication of Firing
- Customer Control Connections made on a Plug-In Screw Type Terminal Block
- Optional Remote Manual and Auto/Manual Switch
- Heatsink Mounted Temperature Sensor

Electrical Features

- PIV 1200V Min at 480 Vac
  - PIV 1400V Min at 575 Vac
- Isolated Semiconductor Power Blocks are used an all Current Ratings
- I^2T Fusing

Safety Features

**Personnel Safety**
- Ground Potential Heat Sink
- SCR to Heat Sink Isolation

**Equipment/Process Safety**
- Input to Output Isolation
- Transient Overvoltage Protection, (dv/dt)
- I^2t Fusing for SCR Protection
- Remote Shutdown
- Shorted SCR Detection (optional)
MiniMax 3 Power Pak

Shorted SCR Detection Option

The MiniMax 3, with the shorted SCR detection circuit, will monitor the output of the SCRs. If one fails shorted, the output will be activated and the LED on the circuit board will light. The LED indicates which phase has the shorted SCR.

Mounting Dimensions

<table>
<thead>
<tr>
<th>MiniMax 3 Open</th>
<th>Height</th>
<th>Length</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 Amp</td>
<td>10</td>
<td>14</td>
<td>7.75</td>
</tr>
<tr>
<td>50 Amp</td>
<td>10</td>
<td>14</td>
<td>7.75</td>
</tr>
<tr>
<td>75 Amp</td>
<td>10</td>
<td>14</td>
<td>9.5</td>
</tr>
</tbody>
</table>

Ordering Information

<table>
<thead>
<tr>
<th>Model</th>
<th>SCR Power Pack</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mmax3</td>
<td>3 Phase Six SCR Power Controller Complete with Lugs and I2T Fusing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Control Configuration</th>
<th>Current at 50°C (104°F) Ambient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>On/Off Standard (Accepts: 120 Vac, 240 Vac, 5-32Vdc, Dry Contact Closure)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>On/Off Standard with Shorted SCR Detection</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Proportional Control, DOT Firing (Accepts: 4-20mA, 1-5Vdc, 0-5-Vdc, 0-10Vdc)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Proportional Control, DOT Firing with Shorted SCR Detection</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Current at 50°C (104°F) Ambient</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>30 Amp</td>
</tr>
<tr>
<td>02</td>
<td>50 Amp</td>
</tr>
<tr>
<td>03</td>
<td>75 Amp</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Line Voltage</th>
<th>Instrument Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>120 - 480 Vac</td>
<td>575 Vac²</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>120 to 240 Vac 50/60Hz</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Remote Manual Adjust/Auto Manual Switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>None</td>
</tr>
<tr>
<td>1</td>
<td>Pot with 0-100% dial and local/Remote Switch, Single Turn 1K ohm Potentiometer (Proportional control only)</td>
</tr>
</tbody>
</table>

Note:
Storage Temperature 14°F to 158°F (-10°C to 70°C).
CE Application requires filters.

Chromalox Part Numbers
0005-60056 — Line filter, three phase, 440VAC
0005-60057 — Line filter, 120-230VAC
CE application requires filter.