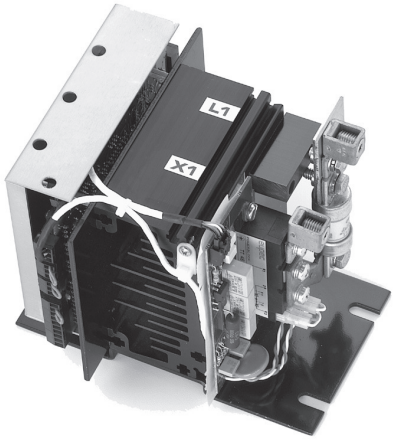
CONTROLS

MiniMax 1
Single Phase SCR Power Pak



- **120-600 VAC @ 30-75 Amp**
- **Automatic 50/60HZ Line Sensing**

User Adjustable Firing Modes Include:

- **On/Off Control Inputs:**

  120VAC, 240VAC, 5-32 VDC Dry Contact Closure

  Proportional Zero Cross or DOT Firing Power Control

Inputs:

  4-20mA, 0-5 VDC, 1-5 VDC, 0-10 VDC

  Remote Manual Adjust, Remote Auto Manual Switch

- **Flexible I/O Power Wiring**
- **Shorted SCR Detection (option)**
- **Easy Customer Interface**
- **Remote Stop**
- **Electronically Protected with Temperature Warning and Shutdown System**
- **Compact Size and Construction**
- **dv/dt Transient Voltage Protection**
- **MOV Protection**
- **DOT Fired with Single or Three Cycle Resolution (Jumper selectable)**

Applications

- Resistive Heaters
- Electric Ovens
- Furnaces
- Kilns
- Environmental Chambers

Description

The MiniMax Series is specifically designed for the OEM market. The plug-in options, flexible I/O power wiring, space saving footprint, I^2t fusing and universal approvals make it an excellent candidate for your product.

The Chromalox Model MiniMax 1 Single Phase Solid State SCR Power Controller is a highly versatile power pak with optional plug-in Shorted SCR Detection Boards. Firing modes can be switched between On/Off and proportional Zero Cross or DOT Firing power control at any time based on process needs.

Chromalox' exclusive DOT (Demand Oriented Transfer) firing switches the fewest number of cycles to provide the most precise zero cross-over control. At 50% output the unit's output alternates between one electrical cycle on and one cycle off. At 51% the output continues with one cycle on / one cycle off and gradually integrates one extra "on" cycle for the additional one percent. With the exception of phase angle firing, DOT firing is the most precise method of SCR control. DOT firing is preferred in many applications because phase angle firing creates unwanted RFI. DOT is excellent for applications where consistent heater/process temperature control is critical.

Mechanical Features

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

Electrical Features

- SCRs PIV 1500V Minimum (1400 Volts on 600 Volt model)
- Isolated Semiconductor Power Blocks are used on all Current Ratings
- I^2t Fusing

Safety Features

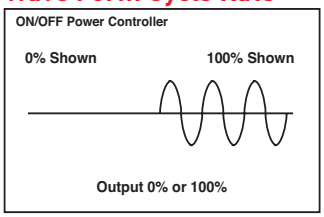
Personnel Safety

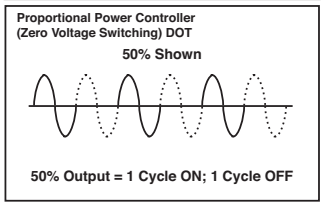
- Ground Potential Heat Sink
- SCR to Heat Sink Isolation

Equipment/Process Safety

- Input to Output Isolation
- dv/dt Transient Voltage Protection
- I^2t Fusing for SCR Protection
- Remote Stop
- Optional Shorted SCR Detection
- MOV

Wave Form Cycle Rate



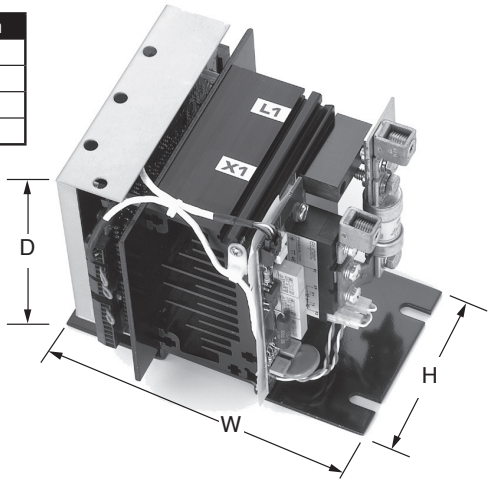


MiniMax 1
Single Phase SCR Power Pak *(cont'd.)*

Mounting Dimensions

MiniMax 1 Open

	Height	Width	Depth
Amps	H	W	D
30	6.25	7.5	6
50	6.25	7.5	6.5
75	6.25	9.5	7.5



Ordering Information

Complete the model number using the matrix provided.

Model	SCR Power Pack
Mmax 1	Single Phase SCR Power Controller Complete with Lugs and I^2T Fusing[1, 2]

Code	Control Configuration
5	Proportional Control, DOT Zero-Crossover Firing, Command Input Signals: 4-20mA, 0-5VDC, 1-5VDC (via Modbus RTU/485 only), 0-10VDC, Remote 0-1000 OHM Potentiometer w/Manual Override, Modbus RTU/RS485 Communications. RTD Heat Sink Temperature Sensor with Two Set-Points, Automatic Line Sensing 50/60HZ, Remote Permissive Shutdown Input, Form "C" Dry Contact Alarm Output, Staged Heating w/Digital Calibration Zero / Span Adjustments(4-8mA, 8-12mA,12-16mA,16-20mA(via Modbus RTU/RS485 only), LED Diagnostics: Command Input, Main/Trigger Boards Running, SCR Status per Phase, Diagnostic Kit via Modbus RTU/RS485: Highest Heat Sink Temperature, Last Heat Sink Temperature, Highest and Lowest Ambient Temperature, Line Frequency Monitoring, Third Party Certifications: UL, cUL, CE, DEMKO (650A and below).

Code	Current at 50˚C (122˚F) Ambient
01	30 Amp
02	50 Amp
03	75 Amp

Code	Line Voltage
1	120 - 480 VAC
2	575/600 VAC[2]
3	50/60 Hz *For CE, 50 Hz Limited to 400V

Code	Instrument Power (10 Va Required)
1	120 to 240 VAC 50/60Hz

Code	Remote Manual Adjust/Auto Manual Switch[3]
0	None
1	Pot with 0 - 100% dial and local/Remote Switch, Single Turn 1K ohm Potentiometer (Proportional control only)

Mmax I -	5	01	1	1	0	Typical Model Number

1) SCR fusing is for semiconductor protection only, not wire protection.
2) Fuses are supplied loose for 575/600 VAC applications.
3) Potentiometer supplied loose for customer mounting.

Note:
Storage Temperature 14˚F to 158˚F (-10˚C to 70˚C).

CE application requires filters.

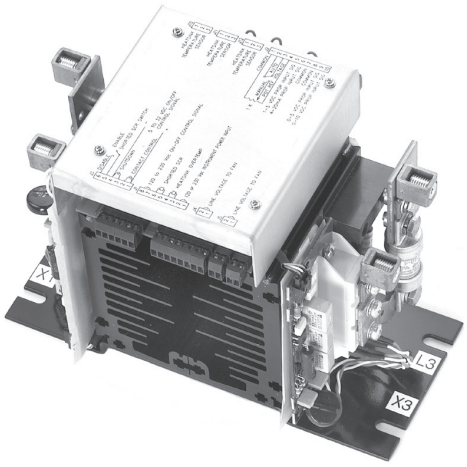
Chromalox Part Numbers
0005-60055 — Line filter, single phase, 230 VAC
0005-60057 — Line filter, 120-230 VAC
CE application requires filter.

SCR COMPONENTS

CONTROLS

MiniMax 2

Three Phase, 2-Leg SCR Power Pak



- **120-600 VAC @ 30-75 Amp**
- **Automatic 50/60HZ Line Sensing**

User Adjustable Firing Modes Include:

- **On/Off Control Inputs:**

  120VAC, 240VAC, 5-32 VDC Dry Contact Closure

  Proportional Zero Cross or DOT Firing Power Control

Inputs:

4-20mA, 0-5 VDC, 1-5 VDC, 0-10 VDC

Remote Manual Adjust, Remote Auto Manual Switch

- **Flexible I/O Power Wiring**
- **Shorted SCR Detection (option)**
- **Easy Customer Interface**
- **Remote Stop**
- **Electronically Protected with Temperature Warning and Shutdown System**
- **Compact Size and Construction**
- **dv/dt Transient Voltage Protection**
- **MOV Protection**
- **DOT Fired with Single or Three Cycle Resolution (Jumper selectable)**

Applications

- Resistive Heaters
- Electric Ovens
- Furnaces
- Kilns
- Environmental Chambers

Description

The MiniMax Series is specifically designed for the OEM market. The plug-in options, flexible I/O power wiring, space saving footprint, I^2t fusing and universal approvals make it an excellent candidate for your product.

The MiniMax 2 is a Solid State, highly versatile power pak with optional plug-in and Shorted SCR Detection Boards. Firing modes can be switched between On/Off and proportional Zero Cross or DOT Firing power control at any time based on process needs.

Chromalox' exclusive DOT (Demand Oriented Transfer) firing switches the fewest number of cycles to provide the most precise zero cross-over 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" cycle for the additional one percent. With the exception of phase angle firing, DOT firing is the most precise method of SCR control. DOT firing is preferred in many applications because phase angle firing creates unwanted RFI. DOT is excellent for applications where consistent heater/process temperature control is critical.

Mechanical Features

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

Electrical Features

- PIV 1200V Min at 480 VAC PIV 1500V Min at 600 VAC
- Isolated Semiconductor Power Blocks are used on all Current Ratings

Safety Features

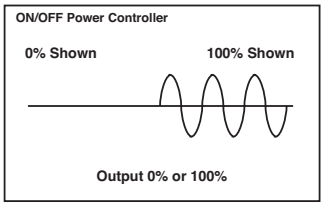
Personnel Safety

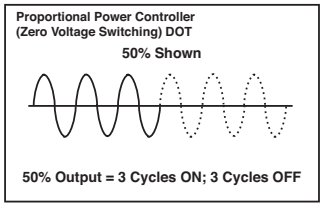
- Ground Potential Heat Sink
- SCR to Heat Sink Isolation

Equipment/Process Safety

- Input to Output Isolation
- dv/dt Transient Voltage Protection
- I^2t Fusing for SCR Protection
- Remote Stop Input
- Optional Shorted SCR Detection

Wave Form Cycle Rate





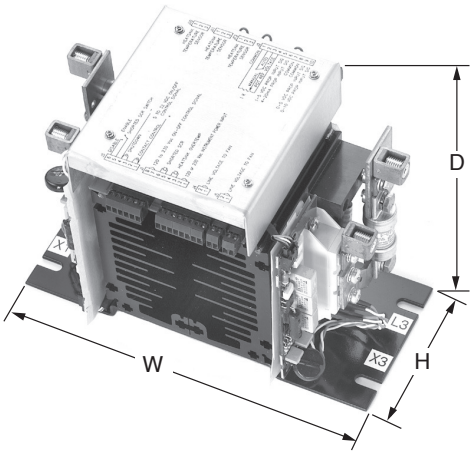
MiniMax 2

Three Phase, 2-Leg SCR Power Pak *(cont'd.)*

Mounting Dimensions

MiniMax 2 Open

	Height	Width	Depth
Amps	H	W	D
30	6.25	9.5	7.25
50	6.25	9.5	7.25
75	5	14	9.5



Ordering Information

Complete the model number using the matrix provided.

Model	SCR Power Pack
Mmax2	3 Phase SCR Power Controller complete with Lugs and I2T Fusing[1, 2]

Code	Control Configuration
5	Proportional Control, DOT Zero-Crossover Firing, Command Input Signals: 4-20mA, 0-5VDC, 1-5VDC (via Modbus RTU/485 only), 0-10VDC, Remote 0-1000 OHM Potentiometer w/Manual Override, Modbus RTU/RS485 Communications. RTD Heat Sink Temperature Sensor with Two Set-Points, Automatic Line Sensing 50/60HZ, Remote Permissive Shutdown Input, Form "C" Dry Contact Alarm Output, Staged Heating w/Digital Calibration Zero / Span Adjustments(4-8mA, 8-12mA,12-16mA,16-20mA(via Modbus RTU/RS485 only), LED Diagnostics: Command Input, Main/Trigger Boards Running, SCR Status per Phase, Diagnostic Kit via Modbus RTU/RS485: Highest Heat Sink Temperature, Last Heat Sink Temperature, Highest and Lowest Ambient Temperature, Line Frequency Monitoring, Third Party Certifications: UL, cUL, CE, DEMKO (650A and below).

Code	Current at 50˚C (122˚F) Ambient
01	30 Amp
02	50 Amp
03	75 Amp

Code	Line Voltage	
1	120 - 480 VAC	
2	575/600 VAC[2]	
3	50/60 Hz	* For CE, 50 Hz Limited to 400V

Code	Instrument Power (10 Va Required)
1	120 to 240VAC 50/60Hz

Code	Remote Man. Adjust/Auto Man. Switch[3]
0	None
1	Pot with 0-100% dial and local/Remote Switch, Single Turn 1K ohm Potentiometer (Proportional control only)

Mmax 2 -	5	01	1	1	0	Typical Model Number

Note:
Storage Temperature 14˚0F to 158˚F (-10˚C to 70˚C).

CE Application requires filters.

Chromalox Part Numbers

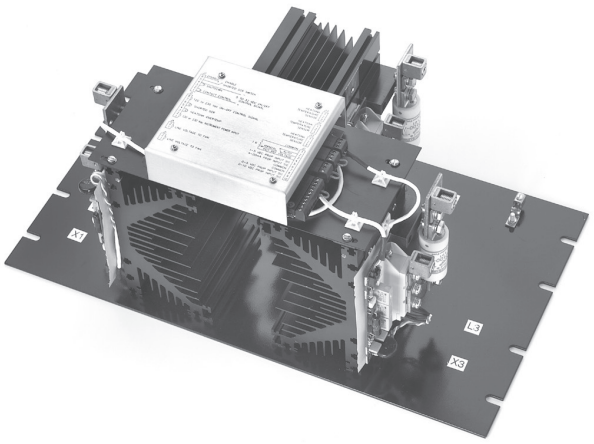
0005-60056 — Line filter, three phase, 440 VAC
0005-60057 — Line filter, 120-230 VAC

CE application requires filter.

1) SCR fusing is for semiconductor protection only, not wire protection.
2) Fuses are supplied loose for 575/600 VAC applications.
3) Potentiometer supplied loose for customer mounting.

MiniMax 3

Three Phase, 3-Leg Power Pak



- 120-600 VAC @ 30-75 Amp
- * Automatic 50/60HZ Line Sensing

User Adjustable Firing Modes Include:

- On/Off Control Inputs:
  - 120VAC, 240VAC, 5-32 VDC Dry Contact Closure
  - Proportional Zero Cross or DOT Firing Power Control

Inputs:

- 4-20mA, 0-5 VDC, 1-5 VDC, 0-10 VDC
- Remote Manual Adjust, Remote Auto Manual Switch

- Flexible I/O Power Wiring
- Shorted SCR Detection (option)
- Easy Customer Interface
- Remote Stop
- Electronically Protected with Temperature Warning and Shutdown System
- Compact Size and Construction
- dv/dt Transient Voltage Protection
- MOV Protection
- Six SCR Full Converter
- MOV Protection
- Three Phase Delta, 3-Wire Wye or 4-Wire Wye Connected Loads
- DOT Fired with Single or Three Cycle Resolution (Jumper selectable)

Applications

- Resistive Heaters
- Electric Ovens
- Furnaces
- Kilns
- Environmental Chambers

Description

The MiniMax Series is specifically designed for the OEM market. The plug-in options, flexible I/O power wiring, space saving footprint, I^2t fusing and universal approvals make it an excellent candidate for your product.

The Chromalox Model MiniMax 3 is a Solid State, highly versatile power pak with optional plug-in Shorted SCR Detection Boards. Firing modes can be switched between On/Off and proportional Zero Cross or DOT Firing power control at any time based on process needs.

Chromalox' exclusive DOT (Demand Oriented Transfer) firing switches the fewest number of cycles to provide the most precise zero cross-over 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" cycle for the additional one percent. With the exception of phase angle firing, DOT firing is the most precise method of SCR control. DOT firing is preferred in many applications because phase angle firing creates unwanted RFI. DOT is excellent for applications where consistent heater/process temperature control is critical.

Mechanical Features

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

Electrical Features

- PIV 1200V Min at 480 VAC PIV 1500V Min at 600 VAC
- Isolated Semiconductor Power Blocks are used on all Current Ratings

Safety Features

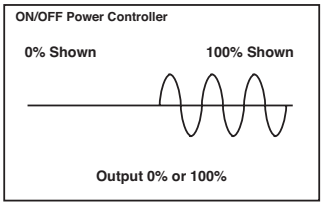
Personnel Safety

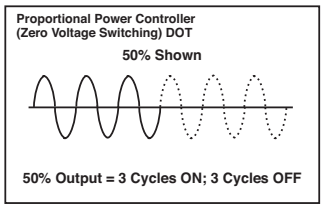
- Ground Potential Heat Sink
- SCR to Heat Sink Isolation

Equipment/Process Safety

- Input to Output Isolation
- dv/dt Transient Voltage Protection
- I^2t Fusing for SCR Protection
- Remote Stop
- Optional Shorted SCR Detection

Wave Form Cycle Rate





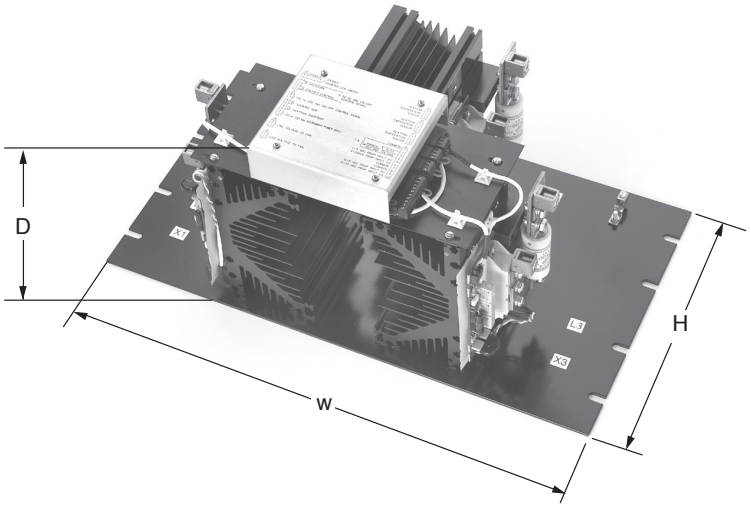
MiniMax 3

Three Phase, 3-Leg Power Pak *(cont'd.)*

Mounting Dimensions

MiniMax 3 Open

	Height	Width	Depth
Amps	H	W	D
30	10	14	7.75
50	10	14	7.75
75	10	14	9.5



Ordering Information

Complete the model number using the matrix provided.

Model	SCR Power Pack
Mmax3	3 Phase, 3 Leg Power Controller Complete with Lugs and I^2T Fusing

Code	Control Configuration
5	Proportional Control, DOT Zero-Crossover Firing, Command Input Signals: 4-20mA, 0-5VDC, 1-5VDC (via Modbus RTU/485 only), 0-10VDC, Remote 0-1000 OHM Potentiometer w/Manual Override, Modbus RTU/RS485 Communications. RTD Heat Sink Temperature Sensor with Two Set-Points, Automatic Line Sensing 50/60HZ, Remote Permissive Shutdown Input, Form "C" Dry Contact Alarm Output, Staged Heating w/Digital Calibration Zero / Span Adjustments(4-8mA, 8-12mA,12-16mA,16-20mA(via Modbus RTU/RS485 only), LED Diagnostics: Command Input, Main/Trigger Boards Running, SCR Status per Phase, Diagnostic Kit via Modbus RTU/RS485: Highest Heat Sink Temperature, Last Heat Sink Temperature, Highest and Lowest Ambient Temperature, Line Frequency Monitoring, Third Party Certifications: UL, cUL, CE, DEMKO (650A and below).

Code	Current at 50˚C (122˚F) Ambient
01	30 Amp
02	50 Amp
03	75 Amp

Code	Line Voltage	
1	120 - 480 VAC	
2	575/600 VAC[2]	
3	50/60 Hz	For CE, 50 Hz Limited to 400V

Code	Instrument Power (10 Va Required)
1	120 to 240 VAC 50/60Hz

Code	Remote Manual Adjust/Auto Manual Switch
0	None
1	Pot with 0-100% dial and local/Remote Switch, Single Turn 1K ohm Potentiometer (Proportional control only)

Mmax3-	5	01	1	1	0	Typical Model Number

1) SCR fusing is for semiconductor protection only, not wire protection.
2) Fuses are supplied loose for 575/600 VAC applications.
3) Potentiometer supplied loose for customer mounting.

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, 440 VAC
0005-60057 — Line filter, 120-230 VAC
CE application requires filter.

SCR COMPONENTS