Thermal Devices, Inc. Mount Airy, Maryland USA www.thermaldevices.com

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:

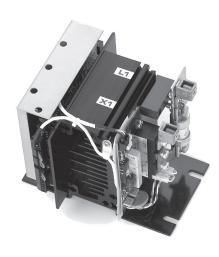
4-20mA, 0-5 VDC, 1-5 VDC, 0-10 VDC

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, I⁴t 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 crossover 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
- I²t Fusing

Safety Features

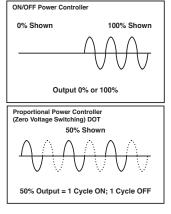
Personnel Safety

- Ground Potential Heat Sink
- · SCR to Heat Sink Isolation

Equipment/Process Safety

- · Input to Output Isolation
- dv/dt Transient Voltage Protection
- I²t Fusing for SCR Protection
- Remote Stop
- · Optional Shorted SCR Detection
- MOV

Wave Form Cycle Rate



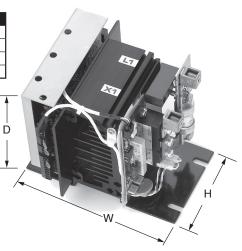


CONTROLS

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

Mounting Dimensions

MiniMax 1 Open								
	Height	Width	Depth					
Amps	Н	W	D					
30	6.25	7.5	6					
50	6.25	7.5	6.5					
75	6.25	9.5	7.5					
	Amps 30 50	Height Amps H 30 6.25 50 6.25	Height Width Amps H W 30 6.25 7.5 50 6.25 7.5					



Ordering Information	Model	SCR F	Power P	ack			
Complete the model number using the matrix provided.	Mmax 1	Single	e Phase	SCR Pov	/er Cont	roller C	omplete with Lugs and I ² T Fusing ^{1, 2}
		Code	Contro	ol Config	uration		
		5	4-20m OHM F RTD H ing 50 Outpu 8-12m Comm nostic Sink T	A, 0-5VE Potentior leat Sink /60HZ, F t, Staged IA,12-16 iand Inpi Kit via N Temperati oring, Th Cu 30 Am 50 Am	DC, 1-5V neter w/ Temper lemote F Heating mA,16-2 ut, Main Aodbus ure, Hig ird Party rrent at p	DC (via I Manual ature Se Permiss y w/Dig y m/Dig 20mA(vi /Trigger RTU/RS hest an v Certific	ero-Crossover Firing, Command Input Signals: Modbus RTU/485 only), 0-10VDC, Remote 0-1000 Override, Modbus RTU/RS485 Communications. ensor with Two Set-Points, Automatic Line Sens- ive Shutdown Input, Form "C" Dry Contact Alarm ital Calibration Zero / Span Adjustments(4-8mA, ia Modbus RTU/RS485 only), LED Diagnostics: Boards Running, SCR Status per Phase, Diag- S485: Highest Heat Sink Temperature, Last Heat d Lowest Ambient Temperature, Line Frequency cations: UL, cUL, CE, DEMKO (650A and below). 22°FJ Ambient
 SCR fusing is for semiconductor protection only, not wire protection. 			03	75 Am	•	altona	
 Fuses are supplied loose for 575/600 VAC ap- plications. 				Code 1		oltage 480 VA	2
 Potentiometer supplied loose for customer mounting. 				2 3	575/6 50/60	00 VAC ² Hz	*For CE, 50 Hz Limited to 400V
Note:					Code	Instru	ment Power (10 Va Required)
Storage Temperature 14°F to 158°F (-10°C to 70°C).					1	120 to	240 VAC 50/60Hz
CE application requires filters.						Code	· · · · · · · · · · · · · · · · · · ·
Chromalox Part Numbers 2005-60055 — Line filter, single phase, 230 VAC 2005-60057 — Line filter, 120-230 VAC CE application requires filter.						0 1 	None 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

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CONTROLS

Description

candidate for your product.

The MiniMax Series is specifically designed for

the OEM market. The plug-in options, flexible I/O

power wiring, space saving footprint, l2t fusing

and universal approvals make it an excellent

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

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 contin-

ues 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 fir-

temperature control is critical.

Mechanical Features

Plug-In Screw Type Terminal Block

Heatsink Mounted Temperature Sensor

LED Indication of Firing

Manual Switch

control at any time based on process needs.

MiniMax 2 Three Phase, 2-Leq 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



Electrical Features

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

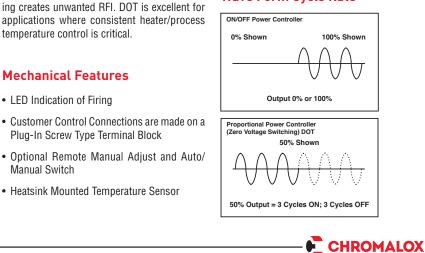
Safety Features

Personnel Safety

- · SCR to Heat Sink Isolation

- dv/dt Transient Voltage Protection
- I²t Fusing for SCR Protection
- · Optional Shorted SCR Detection

Wave Form Cycle Rate





- · Ground Potential Heat Sink

Equipment/Process Safety

- · Input to Output Isolation
- Remote Stop Input

CE

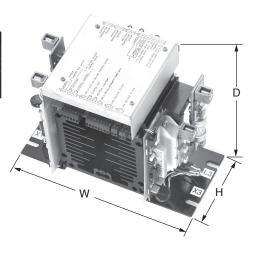
CONTROLS

MiniMax 2 Three Phase, 2-Leg SCR Power Pak

(cont'd.)

Mounting Dimensions

MiniMax 2 Open							
	Height	Width	Depth				
Amps	Н	W	D				
30	6.25	9.5	7.25				
50	6.25	9.5	7.25				
75	5	14	9.5				



Ordering Information SCR Power Pack Model 3 Phase SCR Power Controller complete with Lugs and I2T Fusing^{1, 2} Mmax2 Complete the model number using the matrix provided. Code **Control Configuration** Proportional Control, DOT Zero-Crossover Firing, Command Input Signals: 5 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 120 - 480 VAC 1 575/600 VAC² 2 50/60 Hz * For CE, 50 Hz Limited to 400V 3 Note: Code **Instrument Power (10 Va Required)** Storage Temperature 14°0F to 158°F (-10°C to 70°C). 120 to 240VAC 50/60Hz 1 CE Application requires filters. Code Remote Man. Adjust/Auto Man. Switch³ **Chromalox Part Numbers** 0 None 0005-60056 — Line filter, three phase, 440 VAC 0005-60057 — Line filter, 120-230 VAC Pot with 0-100% dial and local/Remote 1 Switch, Single Turn 1K ohm Potentiometer CE application requires filter. (Proportional control only) Mmax 2 -5 01 0 **Typical Model Number** 1 1

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.



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CONTROLS

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

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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, I²t 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 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" 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

CE

• Isolated Semiconductor Power Blocks are used on all Current Ratings

Safety Features

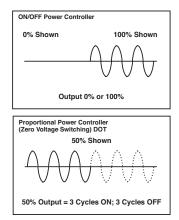
Personnel Safety

- Ground Potential Heat Sink
- SCR to Heat Sink Isolation

Equipment/Process Safety

- · Input to Output Isolation
- dv/dt Transient Voltage Protection
- I²t Fusing for SCR Protection
- Remote Stop
- Optional Shorted SCR Detection

Wave Form Cycle Rate





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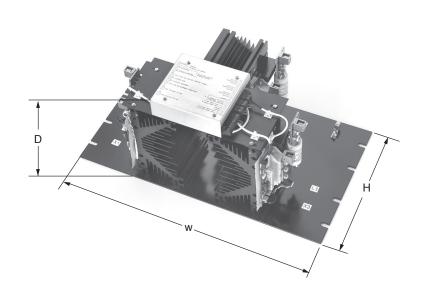
CONTROLS

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

Mounting Dimensions

MiniMax 3 Open

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



Ordering Information

Ordering Information	Model Mmax3	SCR Por 3 Phase			ontroller	Comple	te with Lugs and I ² T Fusing
Complete the model number using the matrix provided.		Code			guration		
		5	4-20n 0-100 munic Dry C Adjus only), SCR S Sink 1 Tempo	nA, 0-5V 0 OHM cations. Line Se ontact A tments(LED Dia Status po Tempera erature,	(DC, 1-5) Potention RTD Hea nsing 50 larm Out 4-8mA, & agnostics er Phase ture, Las Line Free	VDC (via meter w/ t Sink Te /60HZ, F tput, Sta 3-12mA, s: Comm , Diagno t Heat S	o-Crossover Firing, Command Input Signals: Modbus RTU/485 only), 0-10VDC, Remote /Manual Override, Modbus RTU/RS485 Com- emperature Sensor with Two Set-Points, Auto- Remote Permissive Shutdown Input, Form "C" ged Heating w/Digital Calibration Zero / Span 12-16mA, 16-20mA(via Modbus RTU/RS485 and Input, Main/Trigger Boards Running, ostic Kit via Modbus RTU/RS485: Highest Heat ink Temperature, Highest and Lowest Ambient Aonitoring, Third Party Certifications: UL, cUL,
			Code	`		,	^E) Ambient
			01 02 03	30 Am 50 Am 75 Am	ip		
 SCR fusing is for semiconductor protection only, not wire protection. 				Code	Line V	oltage	
 Fuses are supplied loose for 575/600 VAC applications. Potentiometer supplied loose for customer mounting. 				1 2 3		180 VAC 10 VAC ² Hz	For CE, 50 Hz Limited to 400V
ů –					Code	Instrum	nent Power (10 Va Required)
Note: Storage Temperature 14°F to 158°F (-10°C to 70°C).					1	120 to	240 VAC 50/60Hz
CE Application requires filters.						Code	Remote Manual Adjust/Auto Manual Switch
Chromalox Part Numbers 0005-60056 — Line filter, three phase, 440 VAC 0005-60057 — Line filter, 120-230 VAC CE application requires filter.						1	None 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	0	Typical Mod
		(Proportiona

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SCR COMPONENTS