Modular SCR Power Controller for Custom Tailoring to the Application

The QPAC SERIES from Watlow® is a modular Silicon Controlled Rectifier (SCR) power controller with plug-in features for flexibility. Bases are rated from 150 to 1000 amperes in one-phase, three-phase, two leg and three-phase, three leg.

A variety of transformers from 120 to 575VAC along with 50/60Hz operation enable the QPAC to operate in applications anywhere. Plug-in control cards set the QPAC’s SCR firing modes; solid state contactor, burst firing (zero cross) or phase-angle models are available with a wide variety of options. This power controller includes 200KA short circuit current rating (SCCR) and high speed fuses to minimize damage in the event of a short circuit.

Features and Benefits

200KA short circuit current rating (SCCR)
• Minimizes damage in the event of a short circuit

Modular power controller
• Unit base can be fitted with a variety of plug-in transformers and control cards

Available in 150 to 1000 ampere ratings
• Handles large or small loads

Available in solid state contactor, burst firing (zero cross) or phase-angle fired mode
• Meets most application requirements

Rugged design for 122°F (50°C) ambient operation
• Full rating of the power controller can be used in industrial applications

Semiconductor fuses and snubber protection included
• Protects the SCR from voltage or current surges or spikes

Open heater or shorted SCR detector option
• Diagnostic capabilities

UL® 508 listed and C-UL® up to 1000 amperes
• For applications requiring agency approvals

Typical Applications

• Furnace and ovens
• Petrochemical
• Heat treating
• Duct heating
• Environmental chambers
• Kilns
Specifications

Operation

Modular controller base with plug-in card and transformer

• Plug-in control cards
  Solid state contactor, dc input
  Burst fire control, fixed or variable time base
  Phase-angle fire control
  Phase-angle control with soft start and current limiting

• Plug-in transformers (50/60Hz)
  120, 208, 240, 380, 415, 480, 575VAC operation

Power bases

• 1-phase (Q01), 1 pair of SCRs
• 3-phase (Q32), 2 leg control, 2 pair SCRs
  Resistive load only, burst firing only
• 3-phase (Q33), 3 pair hybrid SCRs/diodes
  Recommended for phase-angle only with balanced load

Agency Approvals

• UL® 508 and C-UL® listed, 150 to 300A all configurations, File #E73741
• UL® 508 and C-UL® listed, 400 to 1,000A on Q01 and Q32, up to 480VAC

Control Card Inputs

(CD) Solid state contactor, dc input
  On, 4-32VDC; off, 0.5VDC
  Built-in noise reduction network

(BF) Burst firing control fixed time base
  Process input factory set @ 4-20mA DC
  Input impedance 250Ω (clip resistor for 5kΩ impedance voltage input), or manual control input
  Time base 4 seconds (clip resistor for 1 sec)

(BV) Burst firing control, variable time base
  Process input factory set @ 4-20mA DC
  Input impedance 250Ω (clip resistor for 5kΩ impedance voltage input), or manual control input.
  Requires an accessory bias and gain card to calibrate for 0-5VDC input

(AF) Phase-angle control
  Process input factory set @ 4-20mA DC
  Input impedance 250Ω (clip resistor for 5kΩ impedance voltage input), or manual control input
  Soft start approximately 8 seconds upon power-up, 1 second upon set point change

(AL) Phase-angle control with current limit
  Process input factory set @ 4-20mA DC
  Input impedance 250Ω (clip resistor for 5kΩ impedance voltage input), or manual control input
  Soft start approximately 10 seconds upon power-up, 1 to 2 seconds upon set point change

  Current transformer included

Open Heater/Shorted SCR Detector

• Zero cross/burst fire models only
• Triac output
• 24 to 240VAC, 300mA @ 77°F (25°C), 125mA @ 176°F (80°C)
• Energizes on alarm
• Holding current 200µA min.
• Latching current 5mA typical

Outputs

• 120 through 575VAC
• 1, 2 or 3 pole
• 150 to 1000A per pole
• SCCR, 200KA with original equipment specified semiconductor fusing

QPAC Weight Chart

<table>
<thead>
<tr>
<th>Amps</th>
<th>1Ø/Q01 lb (kg)</th>
<th>3Ø, 2-leg/Q32 lb (kg)</th>
<th>3Ø, 3-wire/Q33 lb (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td>15 (6.8)</td>
<td>36 (16.3)</td>
<td>50 (22.7)</td>
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<tr>
<td>200</td>
<td>15 (6.8)</td>
<td>36 (16.3)</td>
<td>50 (22.7)</td>
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<tr>
<td>300</td>
<td>15 (6.8)</td>
<td>36 (16.3)</td>
<td>50 (22.7)</td>
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<tr>
<td>400-600</td>
<td>44 (20.0)</td>
<td>85 (38.5)</td>
<td>100 (45.4)</td>
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<tr>
<td>800-1000</td>
<td>49 (22.2)</td>
<td>120 (54.4)</td>
<td>135 (61.2)</td>
</tr>
</tbody>
</table>

Line Voltage / Power

• 50/60Hz ac line frequency, Q32 and Q33 models are 50/60Hz calibration dependent
• Voltage: ±10%, 120, 208, 240, 277, 380, 415, 480, 575VAC

Line Voltage Compensation

• 10% ∆ in line, 2% ∆ in load in the 30 to 70% power region (AF, AL and BV)

Power Dissipation (Watts)

• 1.5 W/A per controlled leg

Isolation

• Command signal to load 1250VAC min.

Linearity

• 2%, 30 to 70% power region (All units except CD)

Off-State Leakage Current

• 20mA @ 480VAC

SCR Protection

• Semiconductor fuses provided dv/dt 200V/µsec min.
• MOV¹ and RC snubber network standard
• (Q32) 3rd leg fuse kit may be used, but not required, with 3-phase, 2 leg models

Mounting

• Heat sink fins must be mounted in vertical orientation

Operating Environment

• 32 to 122°F (0 to 50°C)
• 0 to 90% RH, non-condensing
• 2,000 meters altitude

Storage Temperature

• -40 to 185°F (-40 to 85°C)

Options

• Manual Control Kit for process input cards (1kΩ potentiometer) #08-5362
• 240VAC and 120VAC cooling fans

¹ MOV comes only on Q33 (3-phase, 3 leg).
In heat treating applications, the QPAC offers modular flexibility. Different heater elements require different control firing modes: i.e., tungsten elements need phase-angle firing, while Nichrome® elements use burst (zero cross) firing.

Shipping the furnace to different countries could require different voltage sources (and thus transformers): i.e., U.S. 240 or 480 volt, Australia 415 volt; Europe 380 or 400 volt. By simply changing plug-in transformers, the OEM can ship anywhere in the world.
### Ordering Information

**QPAC - Modular power controller; phase, burst or solid state contactor, fuse(s) and holder(s) included.**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Operating &amp; Output Voltage</th>
<th>Cooling Fan Voltage</th>
<th>Output Control (Amps)</th>
<th>Input Control Card</th>
<th>Open Heater/Shorted SCR Detector</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>6</td>
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<tr>
<td>Q Phase</td>
<td>Operating &amp; Output Voltage</td>
<td>Cooling Fan Voltage</td>
<td>Output Control (Amps)</td>
<td>Input Control Card</td>
<td>Open Heater/Shorted SCR Detector</td>
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<td>2</td>
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<td>4</td>
<td>5</td>
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<td>7</td>
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<tr>
<td>01</td>
<td>1-phase</td>
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<td>32</td>
<td>3-phase, 2-leg (Optional 3rd leg fuse kit extra)</td>
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<td>33</td>
<td>3-phase, 3-leg</td>
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<td>12 Phase</td>
<td>Operating and Output Voltage</td>
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<td>12</td>
<td>120VAC</td>
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<td>20</td>
<td>208VAC</td>
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<td>240VAC</td>
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<td>27</td>
<td>277VAC</td>
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<td>38</td>
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<td>41</td>
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<td>48</td>
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<td>57</td>
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<td>6 Cooling Fan Voltage</td>
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<td>120VAC; required on all 3-phase models</td>
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<td>2</td>
<td>240VAC; required on all 3-phase models</td>
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<tr>
<td>Notes:</td>
<td>Customer to supply wiring and hook-up.</td>
<td>All cooling fans rated at 20 W each, must be wired by customer.</td>
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<tr>
<td>7 Operating and Output Voltage</td>
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<td>150</td>
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</table>

**Notes:**
- The open heater/shorted SCR detector is for burst fire operation only.
- Includes one current transformer for 1-phase and two current transformers for 3-phase.

### Wiring Example

![Wiring Diagram](image)

**Accessories**

<table>
<thead>
<tr>
<th>08-5362 Manual Control Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>150A : 5A Current Transformer</td>
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<tr>
<td>200A : 5A Current Transformer</td>
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<tr>
<td>300A : 5A Current Transformer</td>
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<td>600A : 5A Current Transformer</td>
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<tr>
<td>800A : 5A Current Transformer</td>
</tr>
<tr>
<td>1,000A : 5A Current Transformer</td>
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<tr>
<td>5A : 20mA Interstage Transformer</td>
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</tbody>
</table>

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