Q P A C

Modular SCR Power Controller for Custom Tailoring to the Application

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

A variety of transformers from 120 to 575V~(ac) 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 contactors, burst firing (zero cross) or phase-angle models are available with a wide variety of options. High speed fuses are included to protect the SCR from short circuit currents.

Applications

- Furnace and ovens
- Petrochemical
- Heat treating
- Duct heating
- Environmental chambers
- Kilns

Features and Benefits

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

Available in 150 to 1000 amp ratings
- Can handle 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 50˚C (122˚F) 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® 150 to 300 amps
- For applications requiring agency approvals

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ISO 9001
Registered Company
Winona, Minnesota USA

Printed in the USA on Recycled Paper, 15 percent Postconsumer Waste

Specifications

Operation

Modular controller base with plug-in card and transformer

- Plug-in control cards
  - Solid state contactor, ac or 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, 575V~(ac) 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 300 amps, File #E73741

Control Card Inputs

(CA) Solid state contactor, ac input

- 120V~(ac) @ 30mA minimum
- AC signal input sources (i.e., triacs or mechanical relay outputs with noise suppression) require customer supplied resistors across the power controller ac command signal input terminals to prevent false firing
- 24V~(ac) input, 200Ω/10 watts typical;
- 120V~(ac) input, 1kΩ/25 watts typical;
- 240V~(ac) input, two 1kΩ/25 watts in series typical

(CD) Solid state contactor, dc input

- On, 4-10V⎓(dc); off, 0.5V⎓(dc)
- 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 0-5V⎓(dc) 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 6 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 240V~(ac), 300mA @ 25°C (77°F), 125mA @ 80°C (176°F)
- Energizes on alarm
- Holding current 200µA minimum
- Latching current 5mA typical

Outputs

- 120 through 575V~(ac)
- 1, 2 or 3 pole
- 150 to 1000 amps per pole

Line Voltage / Power

- 50/60Hz ac line frequency, Q32 and Q33 models are 50/60Hz calibration dependent
- Voltage: ±10 percent, 120, 208, 240, 277, 380, 415, 480, 575V~(ac)

Line Voltage Compensation

- 10 percent Δ in line, 2 percent Δ in load in the 30 to 70 percent power region (AF, AL and BV)

Power Dissipation (Watts)

- 1.5 watts/amps per controlled leg

Isolation

- Command signal to load 1250V~(ac) minimum

Linearity

- 2 percent, 30 to 70 percent power region (All units except CA and CD)

Off-State Leakage Current

- 20mA @ 480V~(ac)

SCR Protection

- Semiconductor fuses provided dv/dt 200V/µsec minimum
- MOV[①] 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

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

Storage Temperature

- -40 to 85°C (-40 to 185°F)

Options

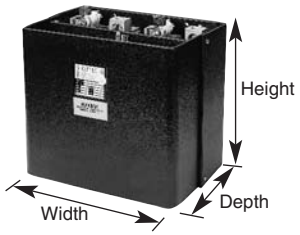
- Manual Control Kit for process input cards (1kΩ potentiometer) #08-5362
- 240V~(ac) and 120V~(ac) cooling fans

QPAC Weight Chart

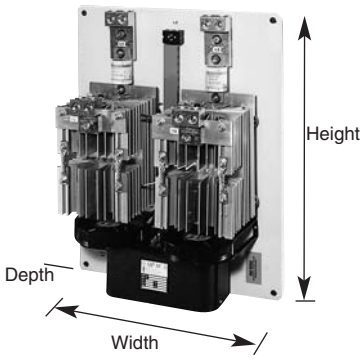
	Phase					
Amps	**1Ø/Q01**		**3Ø,2-leg/Q32**		**3Ø,3 wire/Q33**	
	kg	**(lb)**	**kg**	**(lb)**	**kg**	**(lb)**
150	6.8	(15)	16.3	(36)	22.7	(50)
200	6.8	(15)	16.3	(36)	22.7	(50)
300	6.8	(15)	16.3	(36)	22.7	(50)
400-600	20.0	(44)	38.5	(85)	45.4	(100)
800-1000	22.2	(49)	54.4	(120)	61.2	(135)

① MOV comes only on Q33 (3-phase, 3-leg).

Case Styles



Style C



Style E

QPAC Dimensions

Q01							
Style	Amps	Height (H)		Width (W)		Depth (D)	
		mm	(in.)	mm	(in.)	mm	(in.)
C*	150	330	(13)	175	(6.9)	260	(10.25)
C*	200	330	(13)	175	(6.9)	260	(10.25)
C*	300	330	(13)	175	(6.9)	260	(10.25)
E	400-600	685	(27)	430	(17)	300	(11.7)
E	800-1K	685	(27)	430	(17)	340	(13.3)

Q32							
Style	Amps	Height (H)		Width (W)		Depth (D)	
		mm	(in.)	mm	(in.)	mm	(in.)
C*	150	330	(13)	350	(13.7)	260	(10.25)
C*	200	330	(13)	350	(13.7)	260	(10.25)
C*	300	330	(13)	350	(13.7)	260	(10.25)
E*	400-600	685	(27)	535	(21)	300	(11.7)
E*	800-1K	840	(33)	535	(21)	340	(13.3)

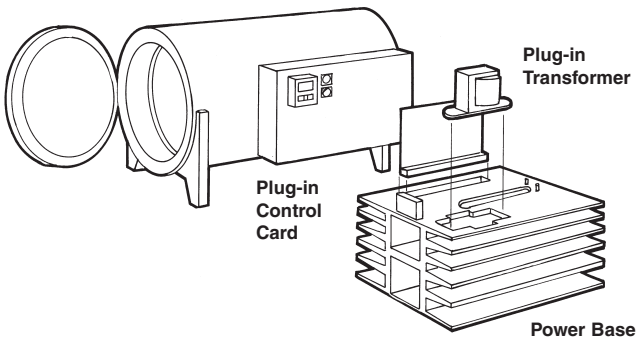
Q33							
Style	Amps	Height (H)		Width (W)		Depth (D)	
		mm	(in.)	mm	(in.)	mm	(in.)
C*	150	330	(13)	525	(20.7)	260	(10.25)
C*	200	330	(13)	525	(20.7)	260	(10.25)
C*	300	330	(13)	525	(20.7)	260	(10.25)
E*	400-600	840	(33)	685	(27)	300	(11.7)
E*	800-1K	840	(33)	685	(27)	340	(13.3)

**Includes fan*

Applications Sketch

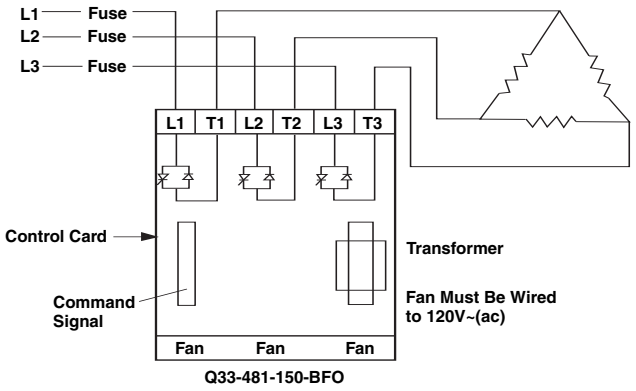
In heat treating applications, the QPAC offers modular flexibility. Different heater elements require different control firing modes: i.e., tungsten elements need phase-angle firing, while Nichrome® elements use burst (zero cross) firing.

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.



Nichrome® is a registered trademark of Driver-Harris Company.

Wiring Example



Q33-481-150-BFO

Accessories

Manual Control Kit			08-5362
150A	: 5A	Current Transformer	16-0008
200A	: 5A	Current Transformer	16-0045
300A	: 5A	Current Transformer	16-0073
400A	: 5A	Current Transformer	0004-0286-0400
500A	: 5A	Current Transformer	0004-0286-0500
600A	: 5A	Current Transformer	0004-0286-0600
800A	: 5A	Current Transformer	0004-0286-0800
1,000A	: 5A	Current Transformer	0004-0288-1,000
5A	: 20mA	Interstage Transformer	16-0176

Your Authorized Watlow Distributor Is:

Ordering Information

To order, complete the code number to the right with the information below:

Q - - -

QPAC = Modular power control; phase, burst or solid state contactor, fuse(s) and holder(s) included

Phase
01 = 1-phase
32 = 3-phase, 2-leg (Optional 3rd leg fuse kit extra)
33 = 3-phase, 3-leg

Operating and Output Voltage

12	= 120V~(ac)	38	= 380V~(ac)
20	= 208V~(ac)	41	= 415V~(ac)
24	= 240V~(ac)	48	= 480V~(ac)
27	= 277V~(ac)	57	= 575V~(ac)

Cooling Fan Voltage[1]
Customer to supply wiring and hook-up
1 = 120V~(ac); required on all 3-phase models
2 = 240V~(ac); required on all 3-phase models

Output Current (Amps)

150	= 150 amps	500	= 500 amps
200	= 200 amps	600	= 600 amps
300	= 300 amps	800	= 800 amps
400	= 400 amps	01k	= 1000 amps

Input Control Card
CA = Solid state ac input (08-5285) contactor
CD = Solid state dc input (08-5286) contactor
BF = Burst fired, fixed time base (08-5289) 4-20mA⎓(dc)
BV = Burst fired, variable time base (08-5342) 4-20mA⎓(dc)
AF = Phase-angle fired, not available on Q32 (08-5288) 4-20mA⎓(dc)
AL = Phase-angle fired w/current limit (08-5411) 4-20mA, not available on Q32. AL option includes one current transformer. Add second CT for 3-phase, 3-leg. Add one interstage transformer, P/N 16-0176

Open Heater/Shorted SCR Detector[2] [3]
0 = None
1 = 1-phase operation
2 = 3-phase operation

[1] All cooling fans rated @ 20 watts each, must be wired by customer.
[2] The open heater/shorted SCR detector is for burst fire operation only.
[3] Includes one current transformer for 1-phase and two current transformers for 3-phase. Also requires one interstage transformer, P/N 16-0176.

To be automatically connected to the nearest North American Technical and Sales Office call:

1-800-WATLOW2

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