Modular and Scalable Power Controller Family Ideal for a Wide Range of Applications

Watlow's new ASPYRE® power controller family is flexible and scalable, and available with a variety of options allowing one platform to be re-used across a wide range of applications, which can help save time and money. ASPYRE models available include sizes from 35 to 700 amps.

This power controller family features multiple advanced microprocessor-based firing and control mode algorithms. Combined with diagnostics and several communications options the product enables equipment and factory automation.

Controller firing modes include zero cross, burst firing, single cycle, delayed triggering and phase angle. These smart algorithms enable the product to easily control a wide base of heater loads including nichrome, moly, silicon carbide, tungsten quartz and infrared lamps and transformer-coupled loads.

ASPYRE offers a comprehensive list of modular options that deliver space and labor savings including controlled legs (1, 2 or 3), semiconductor fusing, load current measurement, amperage size and user interface.

Features and Benefits

Heater bakeout
- Protects heater on start up
- Eliminates labor and time associated with checking for wet heaters

Integrated semiconductor fusing, current transformer and user interface
- Saves installation time and eases setup and commissioning
- Delivers a user-friendly, intuitive interface

Industry-leading design and serviceability
- Offers a robust SCR design to meet a rugged industrial environment's high quality and reliability needs
- Provides quick and easy access to maintain and service fuses and individual legs in minimal time
- Enables fast troubleshooting by providing helpful thermal system diagnostics

Comprehensive power controller range
- Provides wide range of options from simple single-phase to complex three-phase loads to 690V

100KA short circuit current rating (SCCR)
- Enables greater protection in the event of a short circuit

c-UL® 508 Listed
- Shortens project schedules, agency testing and expenses

Control modes: contactor, voltage, current or power
- Satisfies a wide range of demanding thermal applications

Load firing modes: zero-cross, burst fire, phase angle, soft start, half-cycle, single-cycle, delayed triggering
- Handles a wide range of load types including nichrome, medium and long waveform infrared lamps, moly (Kanthal® Super), transformers, silicon carbide, UV lamps and tungsten
- Protects and extends the life of connected loads

Wide range of communication protocols
- Enable factory and process automation with connectivity access to process and equipment data using Modbus® RTU, Modbus® TCP, EtherNet/IP™, Wi-Fi, Profibus, Profinet, USB device (configuration and data file transfers)

Open heater and shorted SCR indication
- Minimizes production downtime with easy to understand, intelligent, troubleshooting diagnostics

Integrated USB and user interface for configuration
- Easily and safely program configuration settings as the user interface can be powered through USB connection
- Eliminates a user from having to work in a high voltage hazard environment. High voltage to controller or system panel can be turned off while setting controller configuration

Typical Applications

- Furnace and ovens
- Autoclaves
- Kilns
- Heat treatment
- Glass industry
- Semiconductor
- Power generation
- Oil and gas
- HVAC
- Textiles
- Plastics
- Packaging
- Petrochemical
- Dryers and curing

WATLOW®
Powered by Possibility

Specifications

Power Bases
- Single-phase, 1 controlled leg (2 SCRs)
- Three-phase, 2 controlled legs (4 SCRs)
- Three-phase, 3 controlled legs (6 SCRs)

Load Amp Range
- 35A to 700A @ 40°C ambient
- Amperage derating curve for other ambient temperatures

SCR and Amperage Rating
- Latching current 1A min.
- Power dissipation: approximate 1.25 to 1.5 watts per amp per controlled leg
- Leakage current: 15mA
- SCCR rating 100,000A up to 600VAC

Line and Load Voltage Range
- 24 to 480V
- 24 to 600V
- 24 to 690V
  Voltages -/+ 10% min./max.
  690VAC only available on units ≥300A
- Isolation voltage 2500V

Voltage frequency
- 50 to 60Hz
- Automatically compensates for 47 to 70Hz

Controller Operating Supply Voltage

Nominal Line Voltage (VAC) RMS	Max. Operating Range
• 100/120VAC	• 90 to 135VAC
• 200/208/220/230/240VAC	• 180 to 265VAC
• 277VAC	• 238 to 330VAC
• 380/400/415/440/480VAC	• 342 to 528VAC
• 600VAC	• 540 to 660VAC
• 690VAC	• 621 to 759VAC

Control Modes and Load Types
- Voltage, voltage squared, current, current squared, power, open loop and external
  - All control modes available with any firing type combination
  - Normal resistive loads: nichrome, infrared lamps; medium and long waveform
  - Others: Moly (Kanthal® Super), transformers, silicon carbide, UV lamps, tungsten

Output Control Firing Types
- Zero crossing
- Single cycle
- Burst firing with delayed triggering, safety ramp and peak current limit options
- Burst firing with soft start option (phase angle soft start switching over to burst firing)
- Phase angle with soft start option
  - 1-phase models will include phase angle firing
  - 2-phase models are not available with phase angle firing
  - 3-phase models from 60 to 500 amps will include phase angle firing
  - 3-phase models from 35 to 40 amp are not available with phase angle firing
  - All models capable of phase angle firing will include Current Limiting and Heater Bake out functions
  - If a model does not have phase angle firing it cannot do Current Limiting, Heater Bakeout, Start Ramp, Safety Ramp or Delayed Triggering
- Half cycle with start ramp and peak current limit options

Firing Type Combinations Available	1 Phase, 1 Controlled Leg	3 Phase, 2 Controlled Legs	3 Phase, 3 Controlled Legs
Zero Crossing	X	X	X
Zero Crossing + Start Ramp	X		X
Zero Crossing + Start Ramp + Soft Start	X		X
Zero Crossing + Soft Start	X	X	X
Burst Firing	X	X	X
Burst Firing + Soft Start	X	X	X
Burst Firing + Start Ramp	X		X
Burst Firing + Start Ramp + Soft Start	X		X
Single Cycle	X		
Single Cycle + Soft Start	X		
Phase Angle	X		X
Phase Angle + Soft Start	X		X
Half Cycle	X		
Half Cycle + Soft Start	X		
Burst Firing + Delayed Triggering + Soft Start	X		X
Burst Firing + Delayed Triggering	X		X
Burst Firing + Delayed Triggering + Safety Ramp	X		X
Burst Firing + Delayed Triggering + Safety Ramp + Soft Start	X		X
Half Cycle + Safety Ramp	X		
Half Cycle + Safety Ramp + Peak Current Limit	X		

Digital Inputs 1 and 2
- ON >=4VDC, OFF <= 1VDC
- 4-30VDC @ 5mA max.
- Digital input functions: enable, change to V feedback, local/remote set point enable, change firing between phase angle and default firing mode, ref 1 / 2 selection, log enable, bakeout enable
- A switched VDC control output can be connected to the digital input as an open loop control mode command signal

Analog Inputs 1 and 2
- Voltage
  - 0-10VDC
  - 15KΩ impedance
- Current
  - 4-20mA, 0-20mADC
  - 100Ω impedance
- Potentiometer
  - 10KΩ min.

Analog Output 1
- 0 to 20mA or 4 to 20mA into 500Ω max. load with 50µA nominal resolution
- 0 to 10VDC into a 500Ω min. load with 50mV nominal resolution

Analog Output Functions
- Retransmit: Load voltage, current, power or measured input

Electromechanical Relay Output
- Form C, 30VDC max. at 1A resistive load or 0.5A at 125VAC, 6000 cycles at 30VDC, 100,000 cycles at 120VAC

Relay Functions
- Alarm output options for heater open break, SCR short or current limit, heat sink/ambient over-temperature

DC Power Supply for Digital Inputs and Potentiometer remote set point input
- 10VDC @ 10mA max.

Fusing
- Integrated semiconductor fuse
- Refer to amperage chart for I^2T fuse values

Diagnostics Annunciation Messages
- Heater break (open), SCR short circuit (closed), current limit, thermal switch, SD card error, comms watchdog error, bakeout in process, aux. voltage too low or high, voltage line loss

Operator Interface
- 0.96 in. white OLED display with 128 x 64 pixel resolution
- L/R, F UP and DOWN arrow keys
- 4 discrete LED indicators for local/remote mode, enable, communications and alarm

Connectivity
- EIA 485, Modbus® RTU
- Modbus® TCP Ethernet
- EtherNet/IP™
- Wi-Fi
- USB 2.0 device connection
- PROFIBUS DP
- PROFINET

Configuration
- PC software tool and RS485, USB port, or on-board keypad and LED display

Integrated Data Logging
- Storage: 16 GB SD memory card
- .CSV file type
- User programmable logging intervals 1 to 255 seconds
- Up to 10 parameters selectable by user: line frequency, output voltage (RMS), output current (RMS), output power (average), status, commands, set point, current limit set point (RMS), load resistance, input voltage (RMS)

Real Time Clock and Battery Back-up
- Typical battery life: 5 years at 77°F (25°C)
- CR2032 field replaceable battery

Cooling mode
- Forced air (fan)
- 24VDC, 120 or 240VAC, 17 watts per fan used

Control Terminals
- Terminals are touch safe, removable, 12 to 22 AWG

Line and Load Terminals
- Compatible with crimp lug terminals or busbar
- Refer to user manual for wire size, compression and torque requirements

Mounting
- Panel mounting with screws
- Must be mounted with heat sink fins in vertical orientation

Environment
- 0 to 40°C without derating
- 5 to 90% RH (relative humidity), non-condensing
- Up to 2000 meters above sea level max.
- Over 1000 meters of altitude reduce the nominal current by 2% for each 100 meters
- Storage temperature -25 to 70°C max.

Agency Approval and Regulatory
- cULus 508 Listed File E73741
- cUL® Listed to C22.2 No. 14
- CE EMC Directive 2014-30-EU, EN 60947-4-3 Class A Emissions
- CE Safety Directive 2014-35-EU, EN 60947-4-1, -4-3
- IP20 with all covers in place
- RoHS 2011-65-EU
- W.E.E.E 2012-19-EU
- 690VAC units not covered by UL®

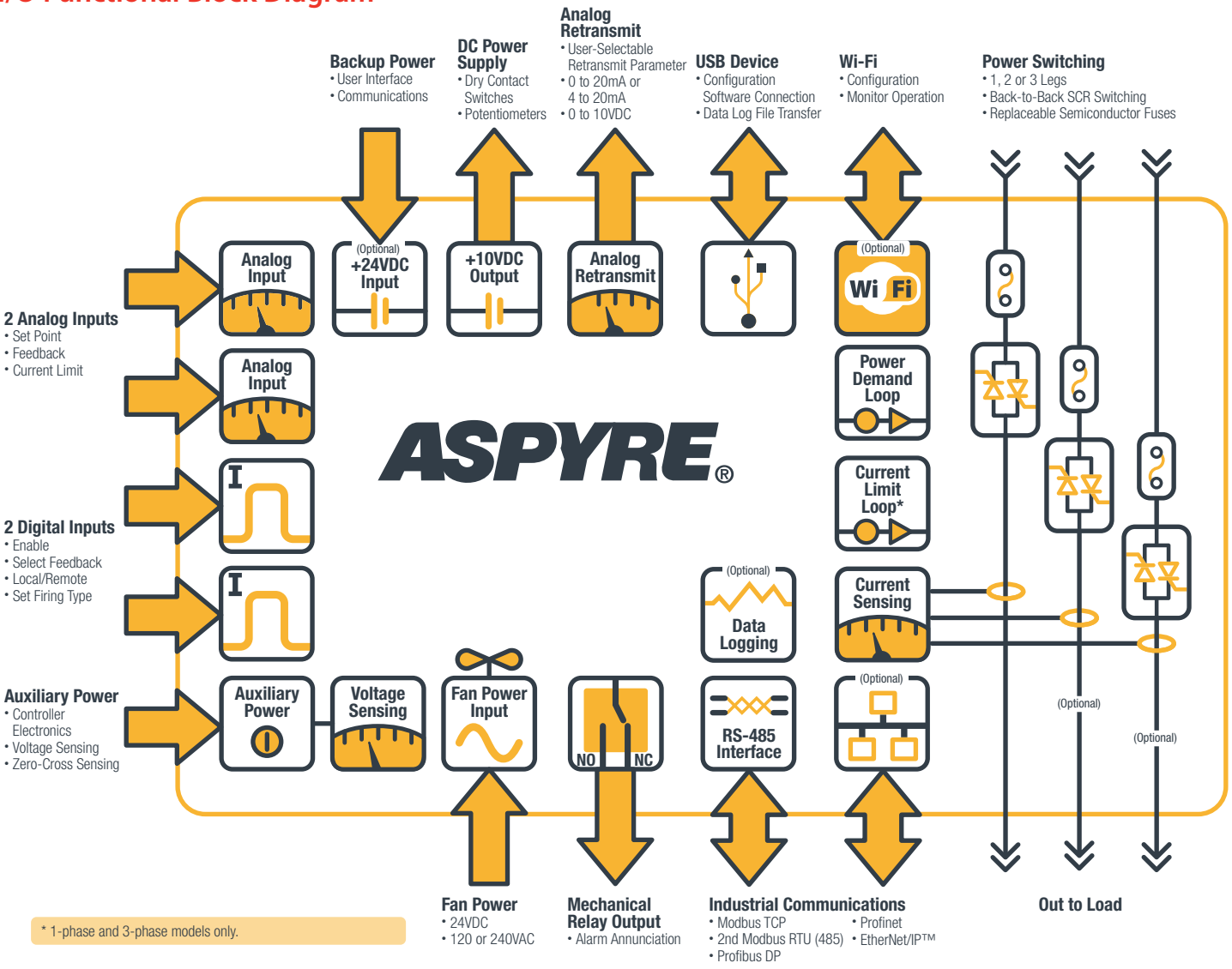
Accessories
- Free Watlow ASPYRE configuration software on the Watlow website at http://www.watlow.com/en/resources-and-support/Technical-Library/Software-and-Demos
- 6 ft USB 2.0 to micro USB device cable 0219-0480-0000
- Fuses - see table below

Fuses

ASPYRE Model Number	Qty. Used Per Unit	Fuse Part Number		
		Watlow	Cooper Bussmann®	Siba
DT_ _ _ - 035 ...	1 to 3*	17-8050	FWP-50A14Fa	
DT_ _ _ - 040 ...				
DT_ _ _ - 060 ...		0808-0363-0160		20 559 20.160
DT_ _ _ - 090 ...				
DT_ _ _ - 120 ...		0808-0363-0180		20 559 20.180
DT_ _ _ - 150 ...		0808-0363-0200		20 559 20.200
DT_ _ _ - 180 ...		0808-0363-0250		20 559 20.250
DT_ _ _ - 210 ...		0808-0363-0315		20 559 20.315
DT1_ _ - 300 ...	1	0808-0362-0000	350FM	
DT1_ _ - 400 ...	1	0808-0358-0000	550FMM	
DT1_ _ - 500 ...	1	0808-0359-0000	700FMM	
DT1_ _ - 600 ...	4	0808-0363-0250		20 559 20.250
DT1_ _ - 700 ...	4			
DT2_ _ - 300 ...	3	0808-0357-0000	450FMM	
DT2_ _ - 400 ...	3	0808-0358-0000	550FMM	
DT2_ _ - 450 ...	6	0808-0360-0000	315FM	
DT2_ _ - 500 ...	6			
DT2_ _ - 600 ...	4	0808-0357-0000	450FMM	
DT2_ _ - 700 ...	4			
DT3_ _ - 300 ...	3			
DT3_ _ - 350 ...	3	0808-0358-0000	550FMM	
DT3_ _ - 400 ...	3			
DT3_ _ - 450 ...	3	0808-0359-0000	700FMM	
DT3_ _ - 500 ...	3			

* One fuse per switched leg.

I/O Functional Block Diagram



Amperage Rating Chart

Number of Controlled Legs	Current (A)	Repetitive Peak Reverse Voltage (Uimp) (480V)	(600V)	Maximum Peak One Cycle (10msec.) (A)	Fuse I^2T Value Suggested A^2s (at 500V) tp = 10msec
1, 2 or 3	35	1200	1600	540	1260
1, 2 or 3	40	1200	1600	700	1260
1, 2 or 3	60	1200	1600	1900	10780
1, 2 or 3	90	1200	1600	1900	10780
1, 2 or 3	120	1200	1600	1900	14280
1, 2 or 3	150	1200	1600	5000	17500
1, 2 or 3	180	1200	1600	5000	30800
1, 2 or 3	210	1200	1600	5000	53900
1 or 2	300	1200	1600	7800	73500
3	300	1200	1600	5250	73500
3	350	1200	1600	7800	150500
1	400	1200	1600	7800	150500
2	400	1200	1600	7800	149000
3	400	1200	1600	8000	150500
2	450	1200	1600	7800	215600
3	450	1200	1600	17800	294000
1 or 3	500	1200	1600	17800	294000
2	500	1200	1600	8000	215600
1	600	1200	1600	17800	246400
2	600	1200	1600	17800	294000
1	700	1200	1600	17800	246400
2	700	1200	1600	17800	294000

Dimensions and Shipping Weight

Current	1-Phase, 1 Controlled Leg	3-Phase, 2 Controlled Legs	3-Phase, 3 Controlled Legs
35 and 40A	 4.77 in. H x 2.84 in. W x 7.28 in. D - 2.6 lbs	 4.77 in. H x 4.25 in. W x 7.28 in. D - 4 lbs	 4.77 in. H x 5.67 in. W x 7.28 in. D - 5.5 lbs
60A	 10.6 in. H x 3.66 in. W x 6.7 in. D - 9 lbs	 10.6 in. H x 7.36 in. W x 6.7 in. D - 18 lbs	 10.6 in. H x 11.1 in. W x 6.7 in. D - 27 lbs
90, 120, 150, 180 and 210A	 10.79 in. H x 3.66 in. W x 6.7 in. D - 9.5 lbs	 10.79 in. H x 7.36 in. W x 6.7 in. D - 19 lbs	 10.79 in. H x 11.1 in. W x 6.7 in. D - 28.5 lbs
1 and 2 leg: 300, 400, 500, 600 and 700A 3 leg: 300, 350, 400, 450 and 500A	 20.47 in. H x 5.4 in. W x 10.63 in. D - 33 lbs	 20.47 in. H x 10.32 in. W x 10.63 in. D - 51 to 63 lbs	 20.47 in. H x 10.32 in. W x 10.63 in. D - 51 to 63 lbs

Ordering Information

Base model includes: two power loops; loop one for open loop, voltage, current or power control, *loop two for maximum current control, two analog inputs (0-10VDC, 4-20mA selectable), two digital inputs, analog retransmit, semiconductor fusing and current transformers for each leg, mechanical relay heater break alarm, RS-485 Modbus® communications, LED user interface and keypad, 10VDC auxiliary power supply
* Loop two maximum current limit available in 1-phase and 3-phase models only.

Part Number

①② Model	③ Phase	④⑤ Max. Line & Load Voltage		⑥⑦⑧ Amperage	⑨ Nominal Voltage Supplied to SCR	⑩ Future Options		⑪ Cooling Fan Voltage	⑫ Add'l Wired Comms.	⑬ Wireless Comm. & Data Logging	⑭⑮ Custom Options - Firmware Overlay, Preset Parameters and Locked Code
DT			–			A	–				

③	Phase
1 =	1-phase, 1 controlled leg
2 =	3-phase, 2 controlled leg
3 =	3-phase, 3 controlled leg

④⑤	Maximum Line and Load Voltage
48 =	480VAC
60 =	600VAC
69 =	690VAC - Only available for 300A and greater models

⑥⑦⑧	Amperage
035 =	35A
040 =	40A
060 =	60A
090 =	90A
120 =	120A
150 =	150A
180 =	180A
210 =	210A
300 =	300A
350 =	350A - Not available for 1-phase, 1 leg or 3-phase, 2 leg models
400 =	400A
450 =	450A - Not available for 1-phase, 1 leg models
500 =	500A
600 =	600A - Not available for 3-phase, 3 controlled leg models
700 =	700A - Not available for 3-phase, 3 controlled leg models

⑨	Nominal Voltage Supplied to SCR	
	Nominal	Maximum Operating Range
1 =	100 or 120VAC	90-135V
2 =	200, 208, 220, 230 or 240VAC	180-265V
3 =	277VAC	238-330V
4 =	380, 400, 415, 440 or 480VAC	342-528V
5 =	600VAC	540-660V
6 =	690VAC*	621-759V

* 690VAC only available with 300A and greater models.

⑩	Future Options
A =	Future Options

⑪	Cooling Fan Voltage
0 =	No fan - option only valid for models ≤60A
1 =	120VAC*
2 =	240VAC*
3 =	24VDC*

* Fan voltage required on models ≥90A, not valid option for models ≤60A.

⑫	Additional Wired Communication (Modbus® RTU-485 Comes Standard in all Models)					
	No Add'l Comms.	Modbus® TCP	2nd Modbus® RTU 485	Profibus DP	Profinet	EtherNet/IP™
0 =	X					
1 =		X				
2 =			X			
3 =				X		
4 =					X	
5 =						X

Note: All additional communication options include auxiliary 24VDC backup power supply for communications.

⑬	Wireless Communications & Data Logging	
	Wi-Fi	*Data Logging With Battery Back-Up and Real Time Clock
A =		
B =	X	
C =		X
D =	X	X

* 40A and lower models do not include battery back-up or real time clock.

⑭⑮	Custom Options - Firmware Overlay, Preset Parameters and Locked Code
AA =	Standard with user manual documentation
AB =	Standard without user manual documentation
RC =	Replacement connector hardware only - for configuration entered above
XX =	Contact factory - custom firmware, preset parameters, locked code

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