

Thyristor Power Controllers

Manufactured in the UK by Power Products International



The **Spectral** range of thyristor power controllers are designed for the control of heater batteries in HVAC systems. Available in single and three-phase versions, the units comply with current EMC and safety regulations are CE marked and built to BSEN 50178

Both single and three-phase versions employ the burst-pulse control principle which means that power is switched to the load only in multiples of complete mains cycles, thus keeping supply disturbances and electrical noise to a minimum.

For example, with a control input signal of 5Vdc and with a 50% power demand the unit will switch on for 0.4 seconds and off for a similar period. A pro rata power output would apply to other input voltages.

SEMIKRON

- All solid state design using innovation+service thyristor modules
- Nominal line voltage 240V or 415Vac
- Single and two arm control of load circuit (3 arm available on request)
- 0-10Vdc input (4-20mA available)
- 1.5kW to 18kW single-phase (higher ratings available on request)
- 10kW to 150kW three-phase (higher ratings available on request)
- CE Compliant
- Enclosure to IP20
- BSEN 50178 Build standard

Single Phase Controllers				
Load Circuit	S1-1.5NV	S1-3NV	S1-7NV	S1-12NV
Total kW rating	1.5	3	7	12
Rms Current (A)	6.5	13	30	52
Losses (W)	5	15	46	70
Supply Voltage	230Vac -15 +10%			
Controlled Arms	One			
Cooling	Natural Air Convection			
Fuse Type	None	20LCT	35LET	100FE
Terminal mm ²	1.5	1.5	2.5	10
Dimensions	H	82	150	200
	W	90	90	146
	D	50	65	102

Three Phase Controllers								
Load Circuit	S3-10NV	S3-20NV	S3-28NV	S3-36NV	S3-54NV	S3-86NV	S3-105NV	S3-150NV
Total kW rating	10	20	28	36	54	86	105	150
Rms Current (A)	14	28	39	50	75	120	146	209
Losses (W)								
Supply Voltage	415Vac -15 +10%							
Controlled Arms	Two							
Cooling	Natural Air Convection							
Fuse Type	20CT	50FE	100FE	100FE	100FE	2x 100FE	315FM	315FM
Terminal mm ²	1.5	2.5	4	10	16	25	35	70
Dimensions (mm)	H	150	150	150	150	200	250	230
	W	150	150	150	250	250	250	345
	D	98	98	118	155	155	155	222

Common Characteristics				
Input Circuit	All types		General	All types
Input Vdc	0-10	+ve to IN Term	Cycle Time	0.5 to 8 seconds
Input R (ohms)	47K		Isolation	4Kv line-earth
Optional Input	4-20mA available		Operating Temperature	-10 to +40 Deg C

Notes:

Current ratings given for 40 Deg C ambient air temperature. De-rate 20% @ 50 Deg C

Ensure Units have adequate Ventilation to dissipate internally generated heat. Fit grilles or louvers to top and bottom of enclosures.

Leave 25mm clearance horizontally between units and 100mm vertically.

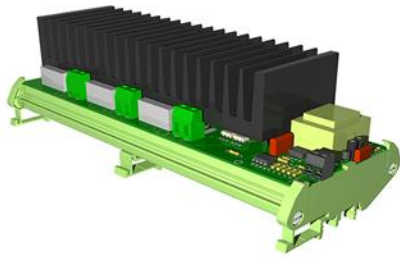
Install units with cooling fins in vertical position.

Load current will be zero with input signal at zero or disconnected

Heater batteries should be protected with an over-temperature cut-out

Semiconductor fuses are fitted solely for protection of the thyristor devices. External fuses or MCBs should be fitted according to normal practice for protection of wiring etc.

DAC3-12 12kW Three Phase Power Controller



The Spectral range of DIN Rail mounting thyristor power controllers are designed for the control of resistive loads in electric furnaces, and heater batteries in HVAC systems.

The DAC3 series, like all Spectral controllers uses zero crossover switching, and burst pulse control ensures the load is switched only in multiples of complete mains half cycles thus keeping supply and electrical disturbance to a minimum and featuring variable frequency PWM for near infinite resolution.

Features

- 0 – 10V Input Control
- 12kW Output
- PWM Control
- Self Powered
- DIN Rail (TS35) Mounting
- CE Compliant

Specifications and Characteristics

BEMS Input:	0 – 10V
Supply Voltage:	380 – 440Vac
Frequency:	50/60Hz
Power Supply:	Line / Self powered
Maximum Heater Duty:	12kW
Maximum Load Per Phase:	16.6A @ 40°C
Dissipated Heat:	43W
Operating Temperature Range:	0 – 55°C
Derating:	10% per 5°C above 40°C
Dimensions:	245 x 90 x 80mm (Nom)
Build Standard:	BSEN50178
Country of Origin:	United Kingdom

OPERATION

This power controller is designed to regulate a resistive load by switching the load on and off in time proportioned bursts according to the incoming dc signal (Factory set 0-10Vdc).

LOCATION

Install power controller with heatsink fins in the vertical plane. Allow a minimum of 100mm clearance top and bottom. Control panels should have sufficient ventilation to maintain the ambient temperature through the thyristor unit to below 40 Degrees C to run unit to specified kW rating.

SAFETY

It is essential to fit a safety device that will disconnect the mains supply from the Spectral controller in case the heating element overheats. This can be a suitably rated contactor or circuit breaker. It is also recommended to fit suitably rated fuses for cable protection. (the on board fuses are for controller protection only)

FUSES

Where power controllers are fitted with ultra-fast fuses to protect the semiconductor replacements should be of exactly the same type and should be purchased via your supplier. External fuses may be fitted where not provided.

INPUT SIGNAL

These power controllers accept 0 – 10Vdc input signal from a BEMS or controller which will regulate the current to the load in order to achieve accurate proportional control. The unit operates on the burst fire zero-voltage switched principle. Zero voltage switching is for minimum RFI. Burst firing for minimum harmonic distortion. The full load is switched on & off in timed bursts and is proportional to the input signal.

INSULATION TESTS

Thyristors can be irreparably damaged by exceeding their specified voltage rating.

It is therefore important to observe proper insulation testing procedures. The thyristors can be effectively isolated from the circuit by shorting together the line and load terminals. This will protect them from damage due to possible over-voltage caused by the insulation test procedure. The insulation test can then be carried out by applying the test voltage between the line terminals and earth.

Please contact Spectral Limited if any additional information on this procedure is required.

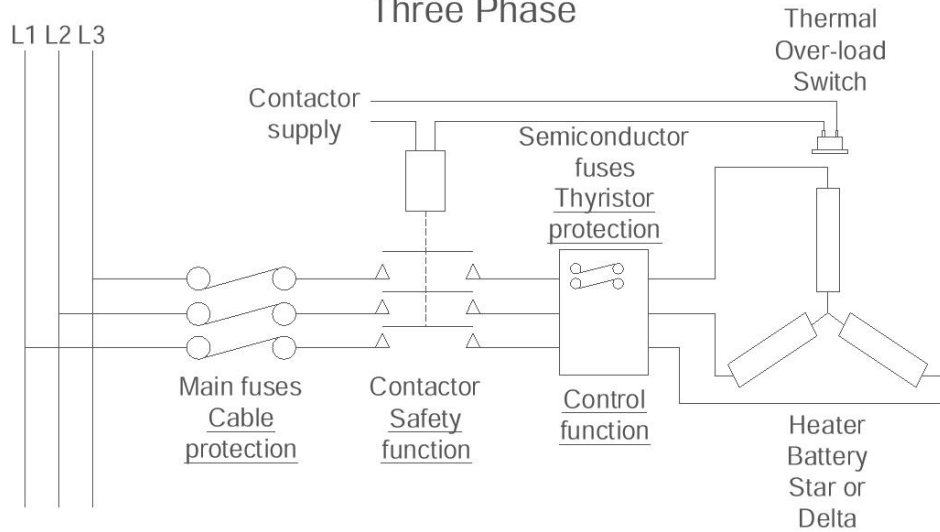
INSTALLATION

Spectral controllers are designed as plug and play. Refer to wiring diagram supplied with the controller for correct installation. Before commissioning ensure that ALL power connections are tightened correctly.

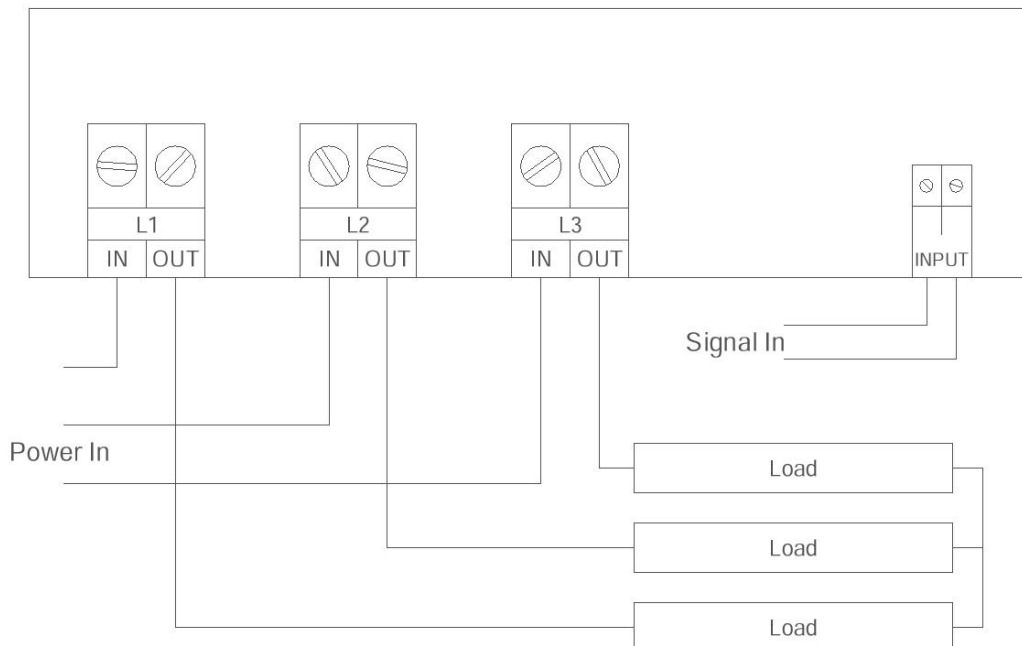
It is highly recommended that only a qualified electrician carry out testing due to potentially lethal high voltages associated with this task

Thyristor Power Controller DAC3

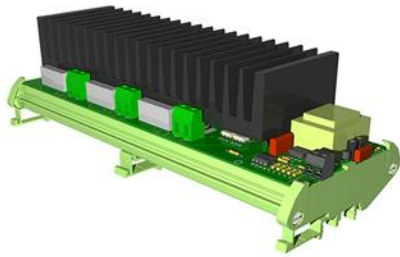
Typical Installation Three Phase



Input Configuration



DAC3-18 18kW Three Phase Power Controller



The Spectral range of DIN Rail mounting thyristor power controllers are designed for the control of inductive loads in electric furnaces, and heater batteries in HVAC systems.

The DAC3 series, like all Spectral controllers uses zero crossover switching, and burst pulse control ensures the load is switched only in multiples of complete mains cycles thus keeping supply and electrical disturbance to a minimum.

Features

- 0 – 10V Input Control
- 18kW Output
- PWM Control
- Self Powered
- DIN Rail (TS35) Mounting
- CE Marked

Specifications and Characteristics

BMS Input:	0 – 10V
Supply Voltage:	380 – 440Vac
Frequency:	50/60Hz
Power Supply:	Line / Self powered
Maximum Heater Duty:	18kW
Maximum Load Per Phase:	26 A @ 40°C
Dissipated Heat:	60 W
Operating Temperature Range:	0 – 55°C
Derating:	10% per 5°C above 40°C
Dimensions:	245 x 90 x 80mm (Nom)
Build Standard:	BSEN50178

Country of Origin: United Kingdom

OPERATION

This power controller is designed to regulate a resistive load by switching the load on and off in time proportioning bursts according to the incoming dc signal (Factory set 0-10Vdc).

LOCATION

Install power controller with heatsink fins in the vertical plane. Allow a minimum of 100mm clearance top and bottom. Control panels should have sufficient ventilation to maintain the ambient temperature through the thyristor unit to below 40 Degrees C to run unit to specified kW rating.

SAFETY

It is essential to fit a safety device that will disconnect the mains supply from the Spectral controller in case the heating element overheats. This can be a suitably rated contactor or circuit breaker. It is also recommended to fit suitably rated fuses at the switchboard if a contactor is fitted.

FUSES

Some power controllers are fitted with ultra-fast fuses to protect the semiconductors. Replacements should be of exactly the same type and should be purchased via your supplier. External fuses may be fitted where not provided.

INPUT SIGNAL

These power controllers accept 0 – 10Vdc input signals from the BEMS to regulate the current flow to electric heaters or other resistive loads in order to achieve accurate proportional control. The unit operates on the burst fire zero-voltage switched principle. Zero voltage switching is for minimum RFI. Burst firing for minimum harmonic distortion. The full load is switched on & off in timed bursts and is proportional to the input signal.

INSULATION TESTS

Thyristors can be irreparably damaged by exceeding their specified voltage rating.

It is therefore important to observe proper insulation testing procedures. The thyristors can be effectively isolated from the circuit by shorting together the line and load terminals. This will protect them from damage due to possible over-voltage caused by the insulation test procedure. The insulation test can then be carried out by applying the test voltage between the line terminals and earth.

Please contact Spectral Limited if any additional information on this procedure is required.

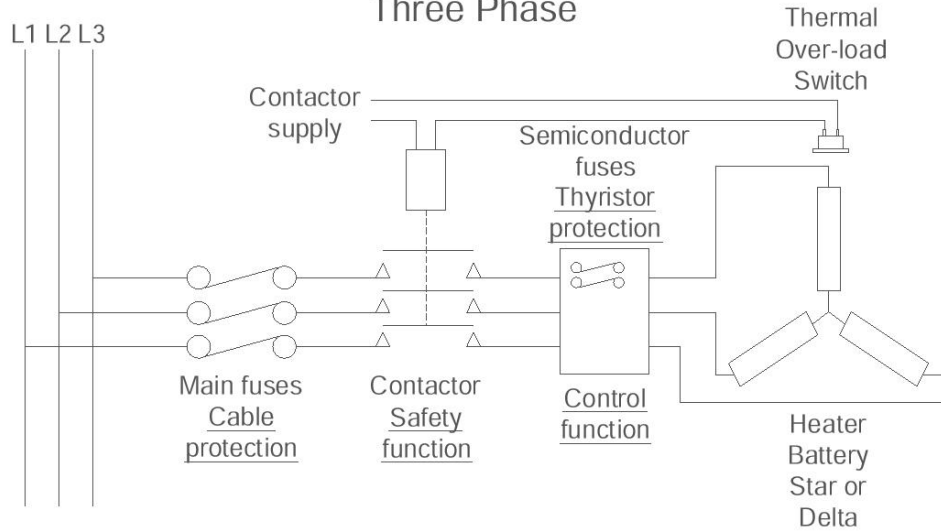
INSTALLATION

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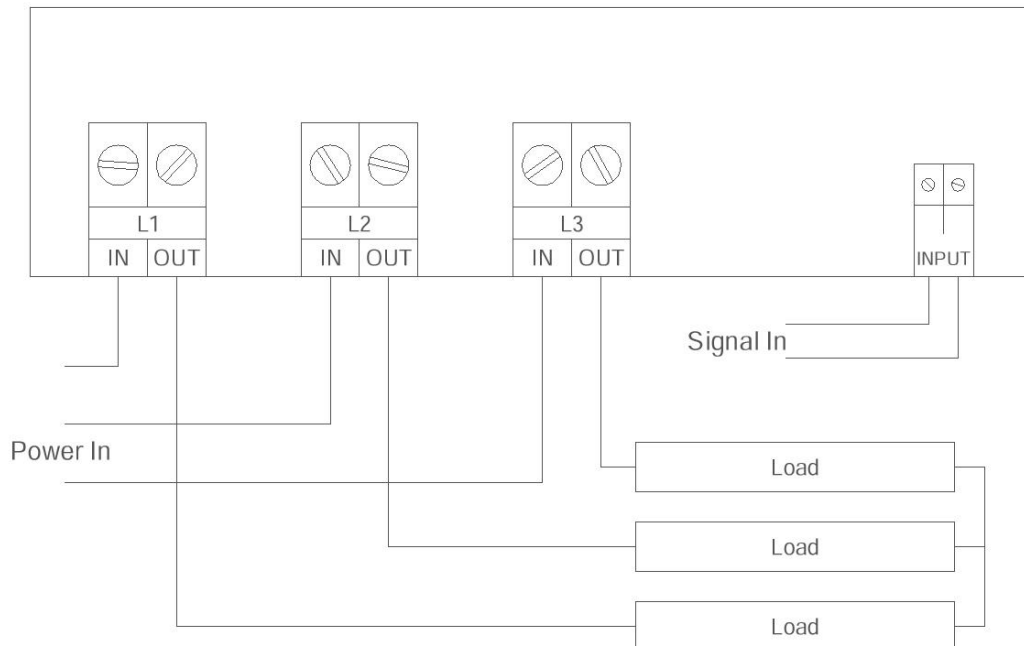
It is highly recommended that only a qualified electrician carry out testing due to potentially lethal high voltages associated with this task

Thyristor Power Controller DAC3

Typical Installation Three Phase



Input Configuration



S3-54NV / S3-86NV 54kW & 86kW Three Phase Power Controller



The Spectral range of S3 thyristor power controllers are designed for the control of resistive loads in electric furnaces, and heater batteries in HVAC systems. The S3 series, like all Spectral controllers uses zero crossover switching, and burst pulse control ensures the load is switched only in multiples of complete mains half cycles thus keeping supply and electrical disturbance to a minimum. Variable frequency PWM provides near infinite resolution.

Features

- 0 – 10V Input Control
- 54W or 86kW
- PWM Control
- Zero Cross Over Switching
- Self Powered
- IP20 Enclosure
- CE Compliant
- BSEN50178 Build Standard

Specifications and Characteristics

Type Number	S3-54NV	S3-86NV
Total Rating (kW)	54	86
Maximum Current rms (A)	75	120
Supply Voltage (Vac)	415 -15+10%	
Frequency (Hz)	50 - 60	
Power Supply	Line / Self Powered	
Controlled Arms	Two	
Cooling	Natural Air Convection	
Fuse Type	100FE	2X100FE
Terminal mm ²	16	25
Input Signal (Vdc)	0-10	
Input Impedence (ohms)	47K	
Cycle Time (S)	0.5 to 8	
Isolation (V)	4000	
Operating Temperature (°C)	-10 to + 40	
De rating	20% at 50°C	
Dimensions (mm) H	200	
W	250	
D	155	

OPERATION

This power controller is designed to regulate a resistive load by switching the load on and off in time proportioned bursts according to the incoming dc signal (Factory set 0-10Vdc).

LOCATION

Install power controller with heatsink fins in the vertical plane. Allow a minimum of 100mm clearance top and bottom. Control panels should have sufficient ventilation to maintain the ambient temperature through the thyristor unit to below 40 Degrees C to run unit to specified kW rating.

SAFETY

It is essential to fit a safety device that will disconnect the mains supply from the Spectral controller in case the heating element overheats. This can be a suitably rated contactor or circuit breaker. It is also recommended to fit suitably rated fuses for cable protection (the on board fuses are for controller protection only

FUSES

Where power controllers are fitted with ultra-fast fuses to protect the semiconductors replacements should be of exactly the same type and should be purchased via your supplier. External fuses may be fitted where not provided.

INPUT SIGNAL

These power controllers accept 0 – 10Vdc input signal from a BEMS or controller which will regulate the current to the load in order to achieve accurate proportional control. The unit operates on the burst fire zero-voltage switched principle. Zero voltage switching is for minimum RFI. Burst firing for minimum harmonic distortion. The full load is switched on & off in timed bursts and is proportional to the input signal.

INSULATION TESTS

Thyristors can be irreparably damaged by exceeding their specified voltage rating.

It is therefore important to observe proper insulation testing procedures. The thyristors can be effectively isolated from the circuit by shorting together the line and load terminals. This will protect them from damage due to possible over-voltage caused by the insulation test procedure. The insulation test can then be carried out by applying the test voltage between the line terminals and earth.

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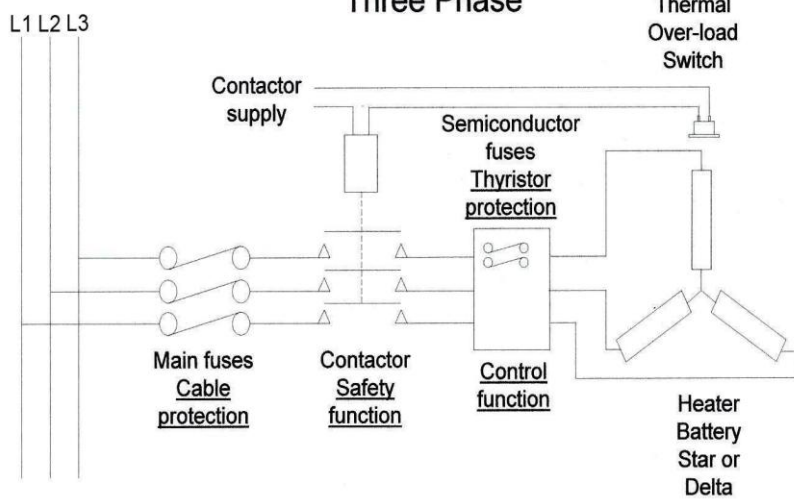
INSTALLATION

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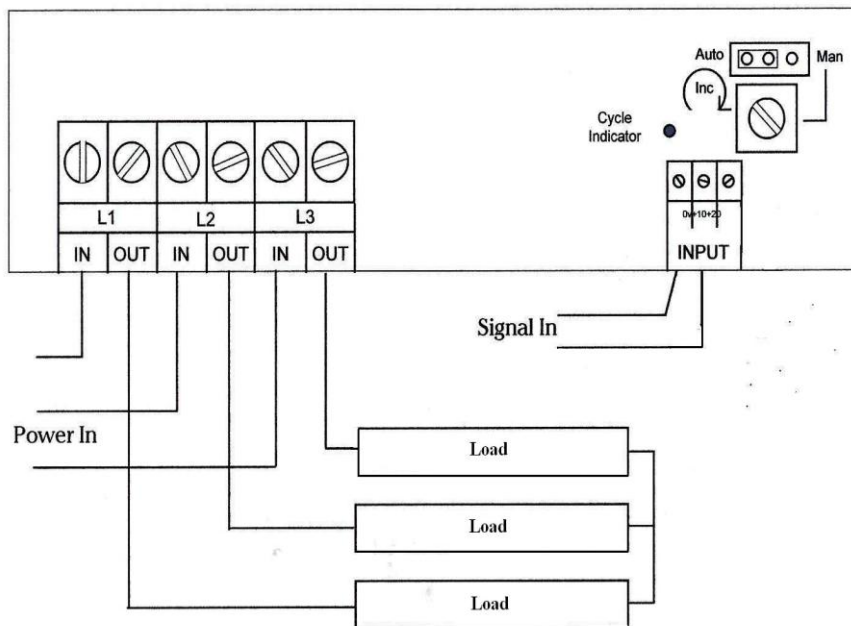
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Spectral S3 Series

Typical Installation Three Phase



Input Configuration



S3-105 /S3-150NV 105kW & 150kW Three Phase Power Controller



The Spectral range of S3 thyristor power controllers are designed for the control of resistive loads in electric furnaces, and heater batteries in HVAC systems. The S3 series, like all Spectral controllers uses zero crossover switching, and burst pulse control ensures the load is switched only in multiples of complete mains half cycles thus keeping supply and electrical disturbance to a minimum. Variable frequency PWM provides near infinite resolution.

Features

- 0 – 10V Input Control
- 105kW & 150kW
- PWM Control
- Zero Cross Over Switching
- Self Powered
- IP20 Enclosure
- CE Compliant
- BSEN50178 Build Standard

Specifications and Characteristics

Type Number	S3-105NV	S150NV
Total Rating (kW)	105	150
Maximum Current rms (A)	146	209
Supply Voltage (Vac)	415 -15+10%	
Frequency (Hz)	50 - 60	
Power Supply	Line / Self Powered	
Controlled Arms	Two	
Cooling	Natural Air Convection	
Fuse Type	315FM	315FM
Terminal mm ²	35	70
Input Signal (Vdc)	0-10	
Input Impedence (ohms)	47K	
Cycle Time (S)	0.5 to 8	
Isolation (V)	4000	
Operating Temperature (°C)	-10 to + 40	
De rating	20% at 50°C	
Dimensions (mm) H	250	230
W	250	345
D	155	222

OPERATION

This power controller is designed to regulate a resistive load by switching the load on and off in time proportioned bursts according to the incoming dc signal (Factory set 0-10Vdc).

LOCATION

Install power controller with heatsink fins in the vertical plane. Allow a minimum of 100mm clearance top and bottom. Control panels should have sufficient ventilation to maintain the ambient temperature through the thyristor unit to below 40 Degrees C to run unit to specified kW rating.

SAFETY

It is essential to fit a safety device that will disconnect the mains supply from the Spectral controller in case the heating element overheats. This can be a suitably rated contactor or circuit breaker. It is also recommended to fit suitably rated fuses for cable protection (the on board fuses are for controller protection only

FUSES

Where power controllers are fitted with ultra-fast fuses to protect the semiconductors replacements should be of exactly the same type and should be purchased via your supplier. External fuses may be fitted where not provided.

INPUT SIGNAL

These power controllers accept 0 – 10Vdc input signal from a BEMS or controller which will regulate the current to the load in order to achieve accurate proportional control. The unit operates on the burst fire zero-voltage switched principle. Zero voltage switching is for minimum RFI. Burst firing for minimum harmonic distortion. The full load is switched on & off in timed bursts and is proportional to the input signal.

INSULATION TESTS

Thyristors can be irreparably damaged by exceeding their specified voltage rating.

It is therefore important to observe proper insulation testing procedures. The thyristors can be effectively isolated from the circuit by shorting together the line and load terminals. This will protect them from damage due to possible over-voltage caused by the insulation test procedure. The insulation test can then be carried out by applying the test voltage between the line terminals and earth.

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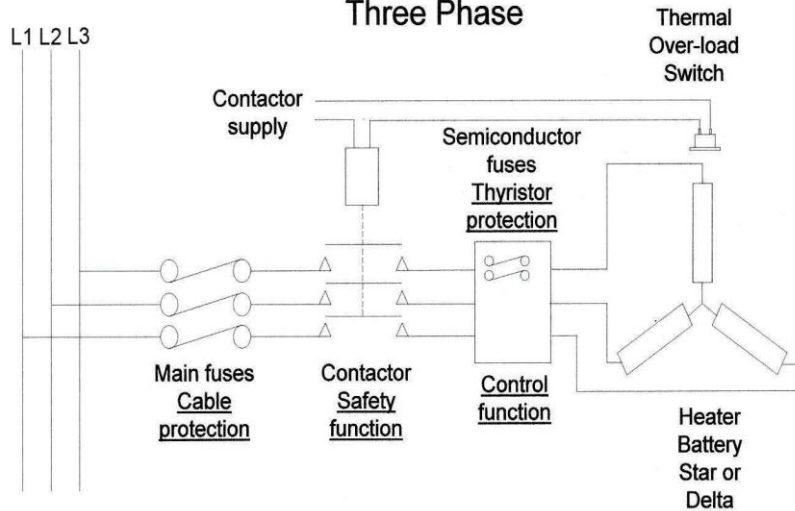
INSTALLATION

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Spectral S3 Series

Typical Installation Three Phase



Input Configuration

