

***OZtherm***<sup>TM</sup>

Solid State Contactor

**F-200**

**SOLID STATE CONTACTOR**

\*

**FEATURING  
FASTCYCLEON/OFFSWITCHING  
FORCONTROL OFACOUTPUT**

\*

DESIGNED  
and  
MANUFACTURED  
by

***Fastron***  
TECHNOLOGIES PTY. LTD.

**Fastron** first released their " X " Series of S.C.R. Power Controllers in 1980, progressively developing over 20 different models and selling over 1000 controllers worldwide.

These controllers were primarily designed as custom built, open frame, OEM assemblies sold directly to equipment manufacturers.

The **OZtherm™** range of controllers capitalize on our experience in this field to provide a reliable and robust design housed in a series of standard assemblies and enclosures.

- F100 SERIES** ..... Contactors utilizing CRYDOM solid state relays mounted on a Heat Sink Assembly with fuses and transient suppressors.
- F200 SERIES** ..... Solid State Contactors utilizing S.C.R.'s and control card mounted in standard enclosures.
- F300 SERIES** ..... Phase Angle Controllers utilizing S.C.R.'s and control card mounted in standard enclosure's
- F400 SERIES** ..... Burst Controllers, similar to F300 in construction, featuring fast cycle, zero cross switching.

### BENEFITS OF THE **OZtherm™** F200 SOLID STATE CONTACTOR

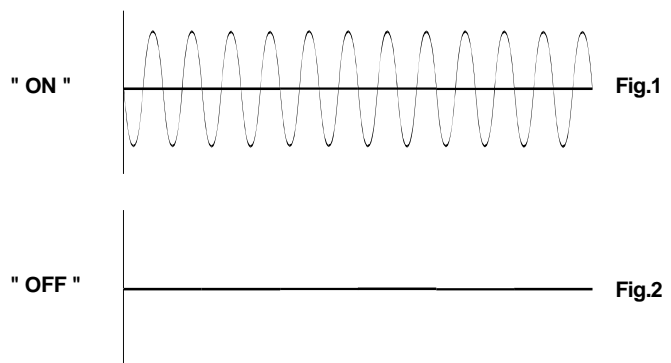
- Digital Control and random switching eliminates problems with inductive loads
- High speed and chatterless electronic switching offers superior performance over mechanical systems
- Wide range of standard options to suit many applications
- Proudly Australian Designed and Manufactured in our Melbourne factory enabling us to provide complete local support for customer applications, engineering and service.

### FAST ELECTRONIC SWITCHING

The firing of the thyristors is determined by the controller circuitry which causes the thyristors to conduct for as long as the control signal is present. **Fig.1** shows the voltage waveform at 100% ( on ) and **Fig.2** 0% ( off ) for A.C loads.

Solid State Contactors can be used for heating, motors (when contactor is suitably derated), and virtually anywhere a mechanical contactor is used.

Please note that electrical isolation is not provided by the Solid State Contactor in the "off" state.



## MODEL DESIGNATION / ORDER CODE

F210		-	-	-	DESCRIPTION	Fuse Rating	Case Size	Weight KG	Cable Termination mm <sup>2</sup>	Dissipation Watts	I <sup>2</sup> t Thyristor Rating
Line Voltage	1				110 volt A.C line input ( 1 phase )						
	2				240 volt A.C line input ( 1 phase )						
	4				415 volt A.C line input ( 1 phase )						
Rated Current at 50 deg. Celcius.	20				20 amperes A.C line current	25AF	fig.4	5	2.5 - 6.	33	610
	40				40 amperes A.C line current	45AF	fig.4	5	2.5 - 6.	62	1,060
	50				50 amperes A.C line current	55AF	fig.4	5	4 - 10.	66	2,300
	65				65 amperes A.C line current	75AF	fig.4	5	4 - 10.	82	5,000
	75				75 amperes A.C line current	90AF	fig.4	5	4 - 10.	87	9,100
	85				85 amperes A.C line current	90AF	fig.4	5	4 - 10.	95	9,800

F220		-	-	-	DESCRIPTION	Fuse Rating	Case Size	Weight KG	Cable Termination mm <sup>2</sup>	Dissipation Watts	I <sup>2</sup> t Thyristor Rating
Line Voltage	1				110 volt A.C line input ( 2 phase )						
	2				240 volt A.C line input ( 2 phase )						
	4				415 volt A.C line input ( 2 phase )						
Rated Current at 50 deg. Celcius.	30				30 amperes A.C line current	35AF	fig.4	5	2.5 - 6.	83	1,060
	40				40 amperes A.C line current	45AF	fig.4	5	2.5 - 6.	96	2,300
	50				50 amperes A.C line current	55AF	fig.4	5	4 - 10.	115	5,000
	60				60 amperes A.C line current	75AF	fig.4	5	4 - 10.	122	9,800
	70				70 amperes A.C line current	75AF	fig.4	5	4 - 10.	135	16,200
	80				80 amperes A.C line current	90AF	fig.4	5	4 - 10.	152	24,000

F230		-	-	-	DESCRIPTION	Fuse Rating	Case Size	Weight KG	Cable Termination mm <sup>2</sup>	Dissipation Watts	I <sup>2</sup> t Thyristor Rating
Line Voltage	1				110 volt A.C line input ( 3 phase )						
	2				240 volt A.C line input ( 3 phase )						
	4				415 volt A.C line input ( 3 phase )						
Rated Current at 50 deg. Celcius.	30				30 amperes A.C line current	35AF	fig.4	5	2.5 - 6.	101	2,300
	40				40 amperes A.C line current	45AF	fig.4	5	2.5 - 6.	131	5,000
	50				50 amperes A.C line current	55AF	fig.4	5	4 - 10.	168	16,200
	60				60 amperes A.C line current	75AF	fig.4	5	4 - 10.	170	24,000

### Options.

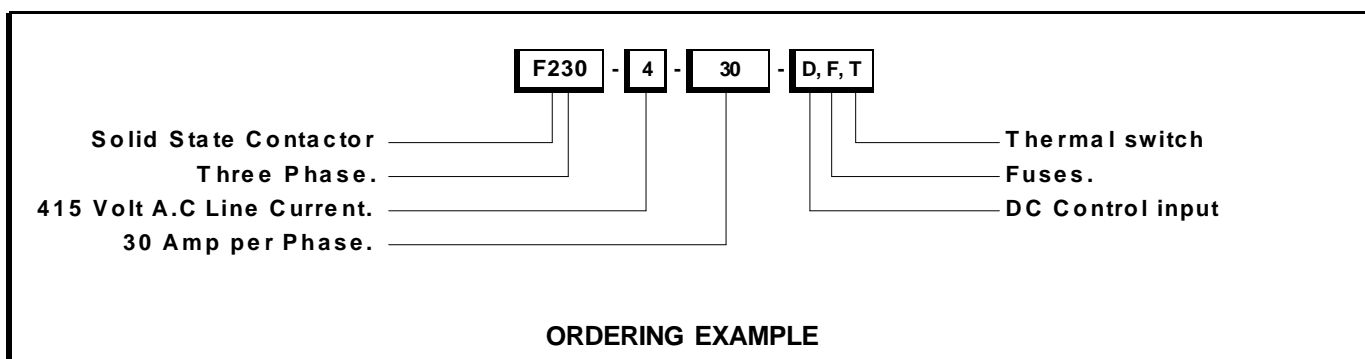
D	DC Control voltage input	3-32VDC, 4-20mA, relay and open collector
DN	DC Control voltage input - normally closed	
F	High speed fuses.	Supplied loose
A4	415 VAC control input	
A2	240 VAC control input	
T	Thermal cutout.	Automatic reset upon cool down

## STANDARD SPECIFICATIONS ( Table 1 )

Control Mode	On / off
Maximum Current	25 - 85 amperes ( higher currents available on request )
Power Supply	110/240/415 volts A.C . 50 HZ. +/- 10% (60 HZ. and other voltages available on request )
Transient Protection	MOV ( varistor )
Control Input	4 - 20 milliamps ( receiving impedance 220 ohms ) 3 - 32 volts ( receiving impedance 33K ohms ) Open collector / relay contact ( receiving impedance 33K ohms ) 415 VAC (7VA) 240 VAC (7VA)
Temperture Range	0 - 50 degs. celcius
Ambient Humidity	0 - 85% relative humidity
Power Factor	Unity

## DESCRIPTION OF OPTIONS ( Table 2 )

OPTION	DESCRIPTION	NOTES
D	DC Control voltage input - normally open	3-32VDC, 4-20mA, relay, open collector
DN	DC Control voltage input - normally closed	3-32VDC, 4-20mA, relay, open collector
F	Supplied loose with isolated stand-offs for external mounting.	
A4	415 VAC Control input	
A2	240 VAC Control input	
T	Thermal switch is mounted on the heatsink to ensure the controller is shut off, and automatically resets when an over temperature condition is reached within the unit. Reset is automatic when temperature falls below the trip level.	



**PLEASE NOTE;-** If your application requires the Solid State Contactor to function differently to our standard specifications or you are uncertain about the choice of options please contact the factory.

## DIMENSIONS / MOUNTING DETAILS

Shown mounted vertically in cabinet

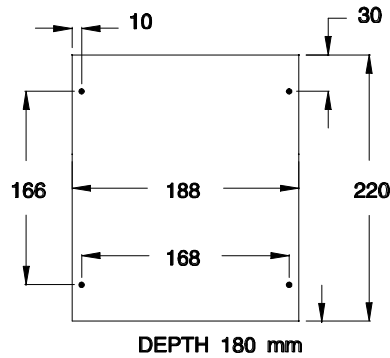
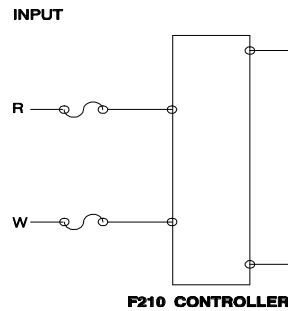
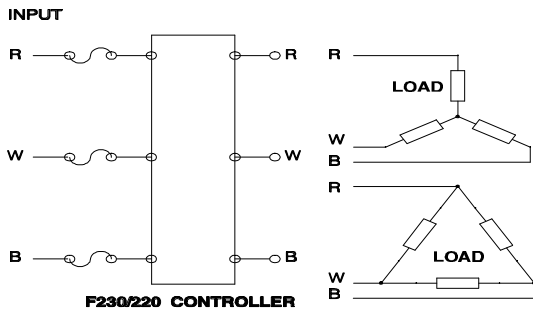
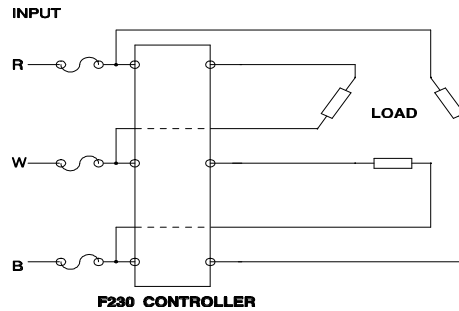
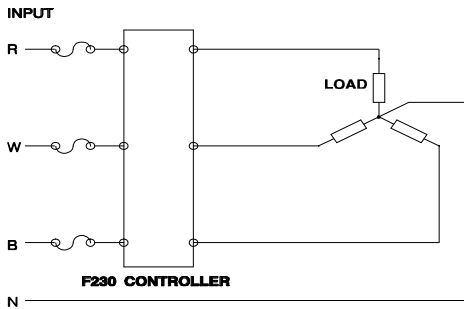


Fig.3

## CIRCUIT CONFIGURATION



## APPLICATION LOAD / OPTION SELECTION

( Table 3 )

Series Name	Primary Control of Transformer	Number	Applicable Load	Option Selection
F200	NO	1	Load where resistance does not change. ( Nichrome, Iron-chrome, Kanthal, etc. )	Control input as required
		2	Load which has peak in rush current. ( Far infrared lamp, motor etc.) ( Contactor should be derated - contact factory )	



## OZTHERM POWER PRODUCTS

Thyristor based power controllers offer numerous benefits.

They are a reliable replacement for electromechanical contactors , being virtually maintenance free.

Thyristor based power controllers are ideal for controlling complex loads , such as heating elements that change resistance over time or temperature , transformer coupled loads , plating rectifiers and fast systems.

### PRINCIPLE OF OPERATION

Oztherm power controllers consist of two main parts , the control electronics and the power switching electronics.

Thyristors , also known as SCRs , are used as the power switching devices.

A thyristor functions like a diode that can be “turned on” by a momentary pulse to its gate. When a thyristor has been turned on via its gate and its anode is positive relative to its cathode it will conduct.

The thyristor turns itself off when there is near zero current through it.

To control full wave AC over the positive and negative half cycle two thyristors arranged in inverse parallel are required.

The control electronics provide the firing impulses for the thyristor gates. The control input signal is measured and the timing of the gate firing impulses are varied in response to it.

Three types of firing mode are available on Oztherm power controllers.

Phase angle control works by varying the conduction angle of the AC sine wave.

Burst control modulates power by turning the thyristors on and off for AC cycles. The control electronics turn the thyristors on at a position determined by the control signal and off at zero current. The output is the ratio of OFF time to ON time.

On/ Off control is similar to burst control and is like an “electronic relay” in operation.

F100 and F200 series power controllers use the on/ off firing mode

F300 series power controllers use the phase angle firing mode.

F400 series power controllers use the burst firing mode.

### SELECTING THE CORRECT CONTROLLER FOR HEATING ELEMENT TYPES

Heating elements can be broadly divided into three categories:-

#### CLASS A

These elements have negligible resistance variation with either temperature or time. Examples include: Nickel/ Chromium or similar alloys.

#### CLASS B

These elements have a low cold temperature resistance that increases greatly at operating temperature.

Examples include: Molybdenum Disilicide, Platinum and Molybdenum Tungsten

Class B elements usually require current limit on start up, as their low cold resistance results in high currents at the operating supply voltage. These elements may also require a stepdown transformer to match the supply voltage to the rated element voltage.

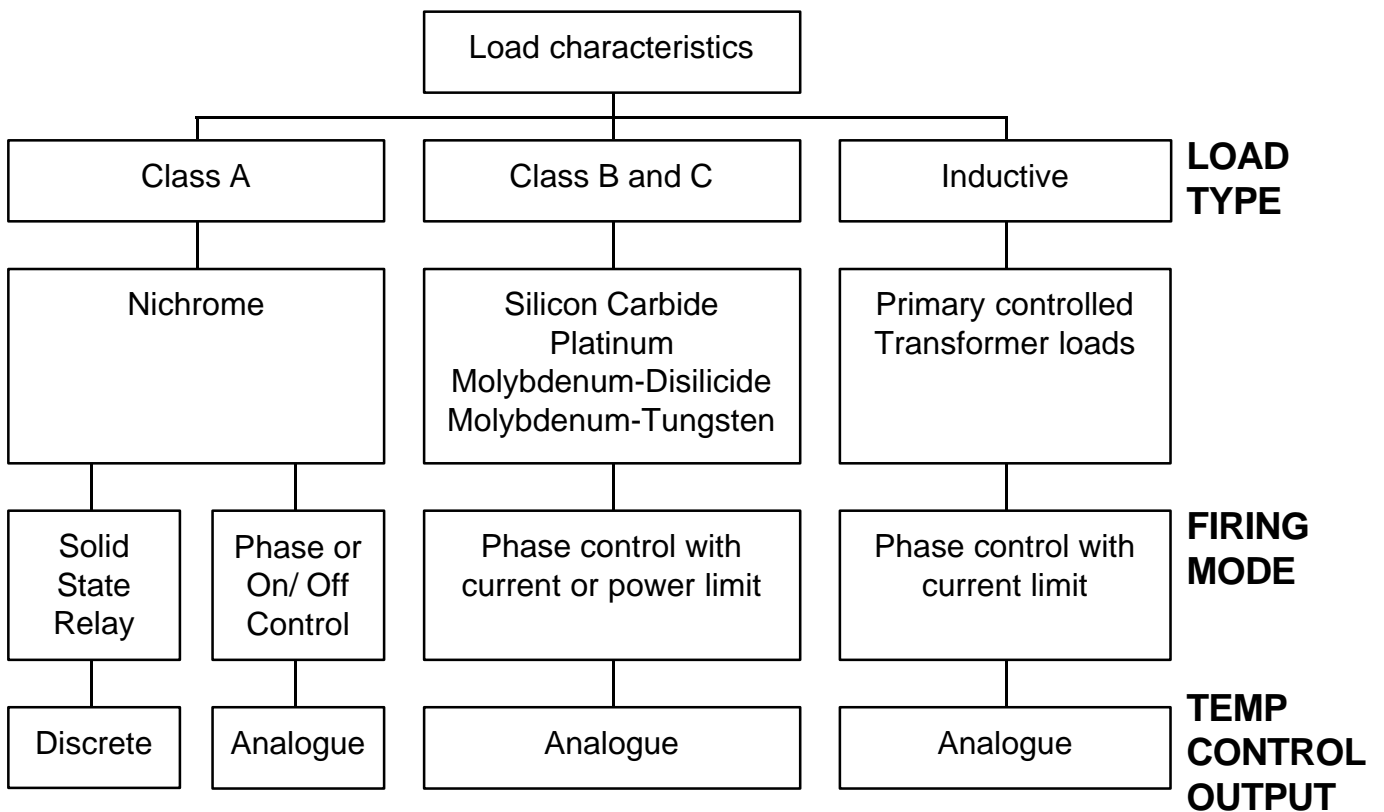
Because current limit is required, and the element voltage ratings are less than line voltage, phase angle control (F300 series controllers) is the recommended firing mode.

#### CLASS C

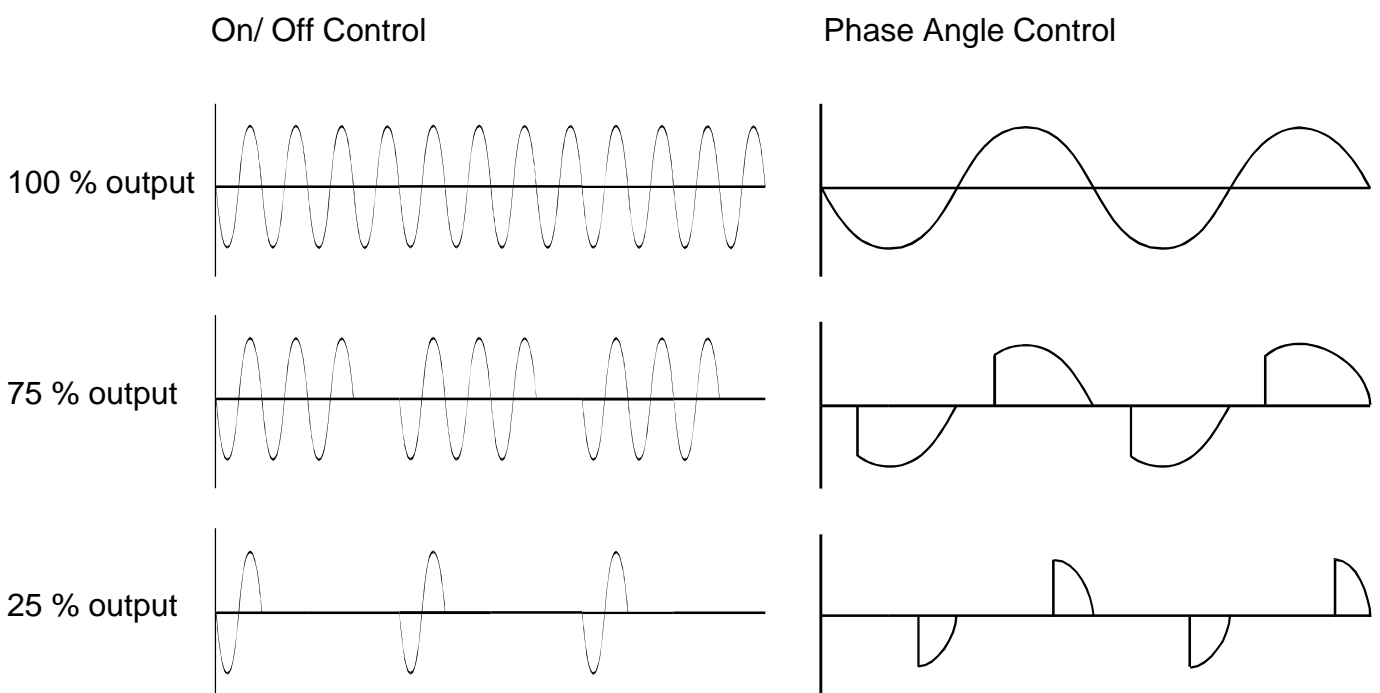
The resistance of these elements increases greatly with time in use (typically 2 to 4 times) and with temperature. Silicon carbide is a common example. The power controller must be sized so that it can deliver the higher currents required to maintain the desired power when the elements are new. If the elements are sized correctly the use of a stepdown transformer may be avoided.

The power limit (PW) option is recommended for this class of element as it compensates for element ageing and limits the maximum load power. Phase angle (F300 series controllers) is the recommended firing mode.

## CONTROLLER SELECTION AND ELEMENT TYPE



## VOLTAGE WAVEFORMS FOR ON/ OFF AND PHASE ANGLE CONTROL





HEAD OFFICE  
25 Kingsley Close  
Rowville 3178  
Victoria Australia

Tel: 61- 3 9763 5155 Fax: 61-3 9763 5166  
Email;- fastron@ozemail.com.au