



SOLA Australia Ltd

**SERIES 200  
POWER CONDITIONERS**

Instruction Manual  
(3 to 22.5kVA)  
6M4522 Revision 1  
Issue Date: 1/7/98

Made in Australia

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## SECTION ONE

### 1.1. INTRODUCTION

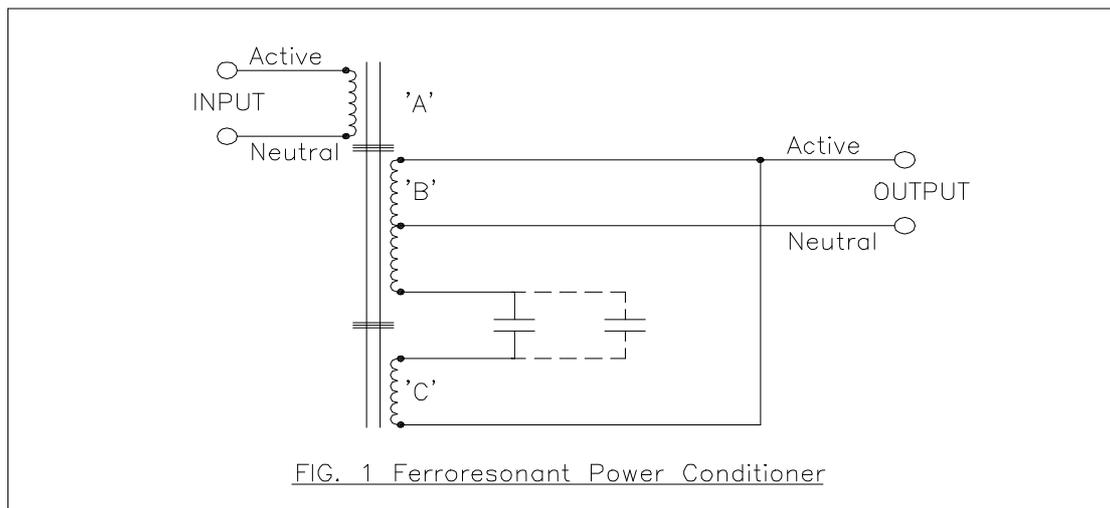
This manual is relevant to the SOLA 200 series of power conditioners. These units require no complicated commissioning or maintenance procedures and will provide many years of trouble-free operation. This manual provides descriptive information and operation and maintenance instructions.

### 1.2 GENERAL DESCRIPTION

These power conditioners comprise one or more ferroresonant core/coil/capacitor assemblies. All functions are performed by these magnetic elements; no electronic components or circuit boards are required. The magnetics assembly is housed in a sheet metal enclosure. Most enclosures are fitted with castors (excluding 22.5kVA model) and jacking pads (excluding 3kVA model).

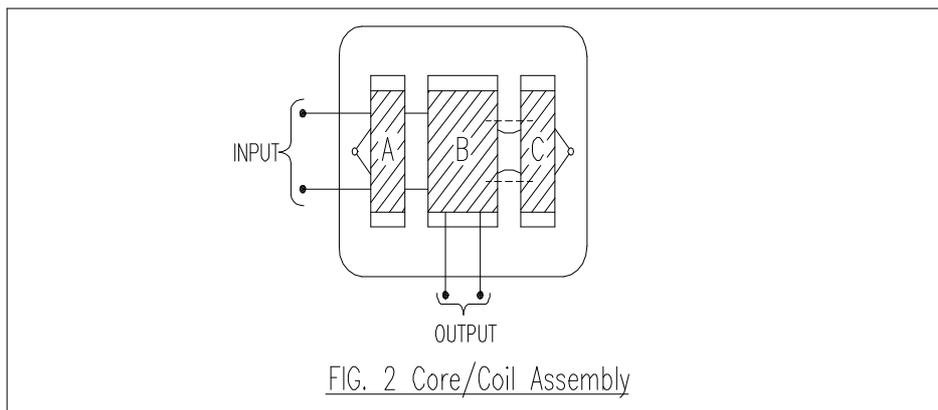
### 1.3 PRINCIPLE OF OPERATION

Each ferroresonant core/coil assembly has 3 separate coils on a special lamination which is punched at the SOLA plant in Dandenong. Connection for each core/coil/capacitor assembly is shown in Figure 1. (See also Figure 2.)



Current flowing in the B coil leads the voltage due to the capacitor(s) being effectively across the load. By properly controlling the reluctance of the various flux paths in the core, this leading load current is used to cause saturation of only that portion of the core under the B coil. Hence output voltage is virtually constant over a large input voltage range. The C coil causes the inverse of any harmonic appearing at the output to be magnetically coupled into the B coil, so limiting the output distortion (with a linear load) to 3% or less, regardless of the input distortion.

Since primary and secondary (A and B coils) are separated by 25mm of earthed core, (see Figure 2), isolation and hence common mode noise attenuation is excellent. The Resonant capacitance/inductance circuit and special core design result in the best available transverse mode noise attenuation.



3 Phase or 1 Phase 415-240V I/P, 230, 240V O/P			3 Phase or 1 Phase 380-220V I/P, 220V O/P		
Part. No.	kVA	Phase	Part. No.	kVA	Phase
200-26-730	3	1	200-44-730	3	1
200-26-730-00	3	1	200-44-750	5	1
200-26-750	5	1	200-44-760	6	1
200-26-750-HO	5	1	200-44-775	7.5	1 or 3
200-26-775	7.5	1 or 3	200-44-790	9	1 or 3
200-26-790	9	1 or 3	200-44-812M	12	1 or 3
200-26-812M	12	1 or 3	200-44-815	15	1 or 3
200-26-815	15	1 or 3	200-44-818	18	1 or 3
200-26-818	18	1 or 3	415/240V I/P, 415/240V O/P		
			200-46-822	22.5	3
			380V I/P, 380V O/P		
			200-24-822	22.5	3

Table 1. Applicable Product Range

#### 1.4 APPLICABLE PRODUCT RANGE

For power conditioners rated greater than 3kVA, 2 or more core/coil assemblies are connected in parallel. Where 3 or 6 core/coil assemblies are used, a link system is provided to enable easy site conversion to 3 Phase Y-Y configuration.

**If 3 Phase configurations other than Y-Y are proposed, you are advised to contact the factory before proceeding.**

A typical connection diagram for 1 or 3 Phase (selectable) units is shown in Figure 3. All units are shipped with an appropriate connection diagram mounted near the terminal panel.

All units are shipped with a 1 Phase configuration, except 22.5kVA with is 3 Phase only.

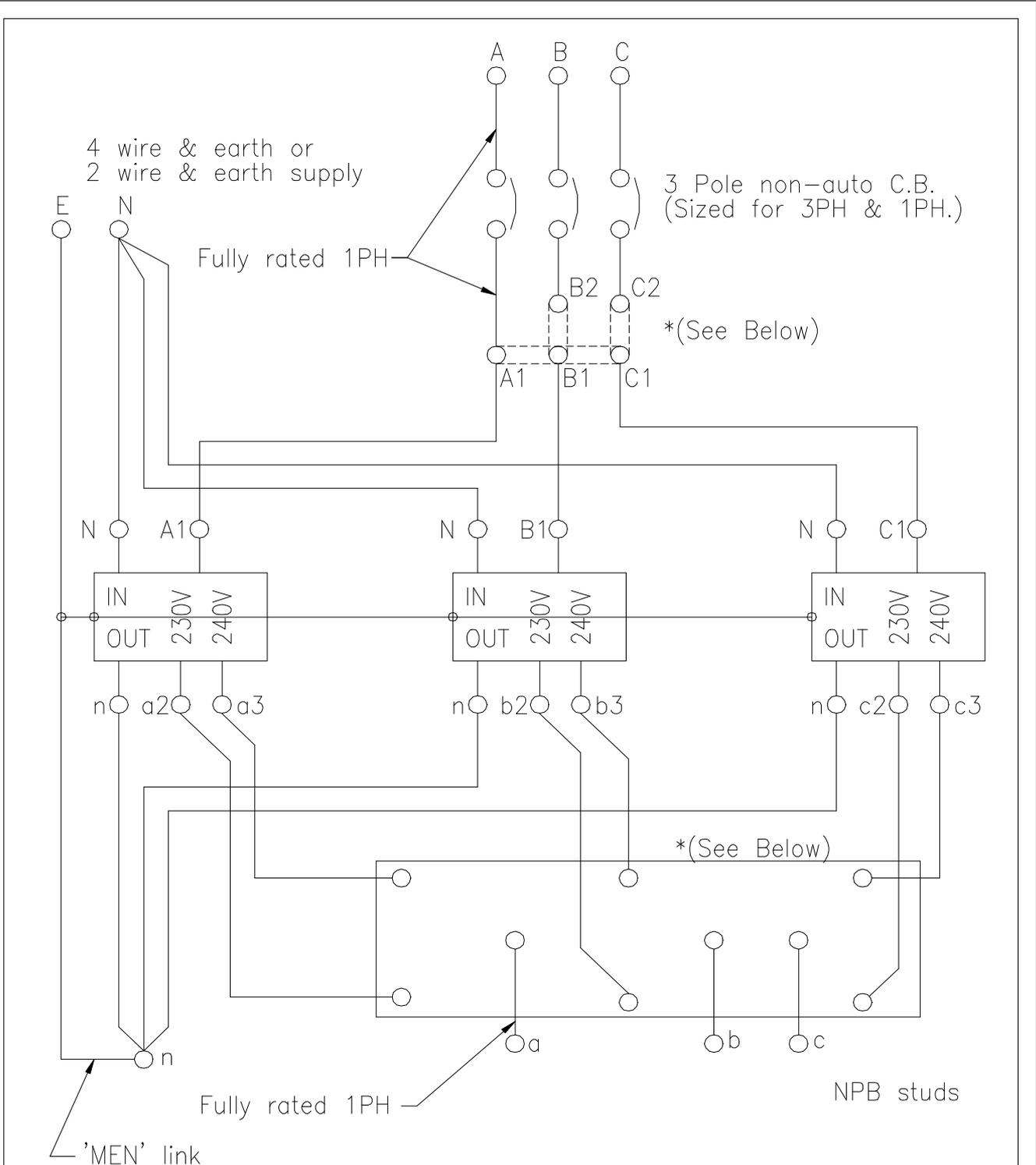


FIG. 3 Typical Schematic Drawing

NOTE 1: Input and output connections must both be for Single Phase or Three Phase \*Refer to Fig 4. for Link Details.

NOTE 2: 22.5kVA can only be configured for Three Phase operation (set at factory).

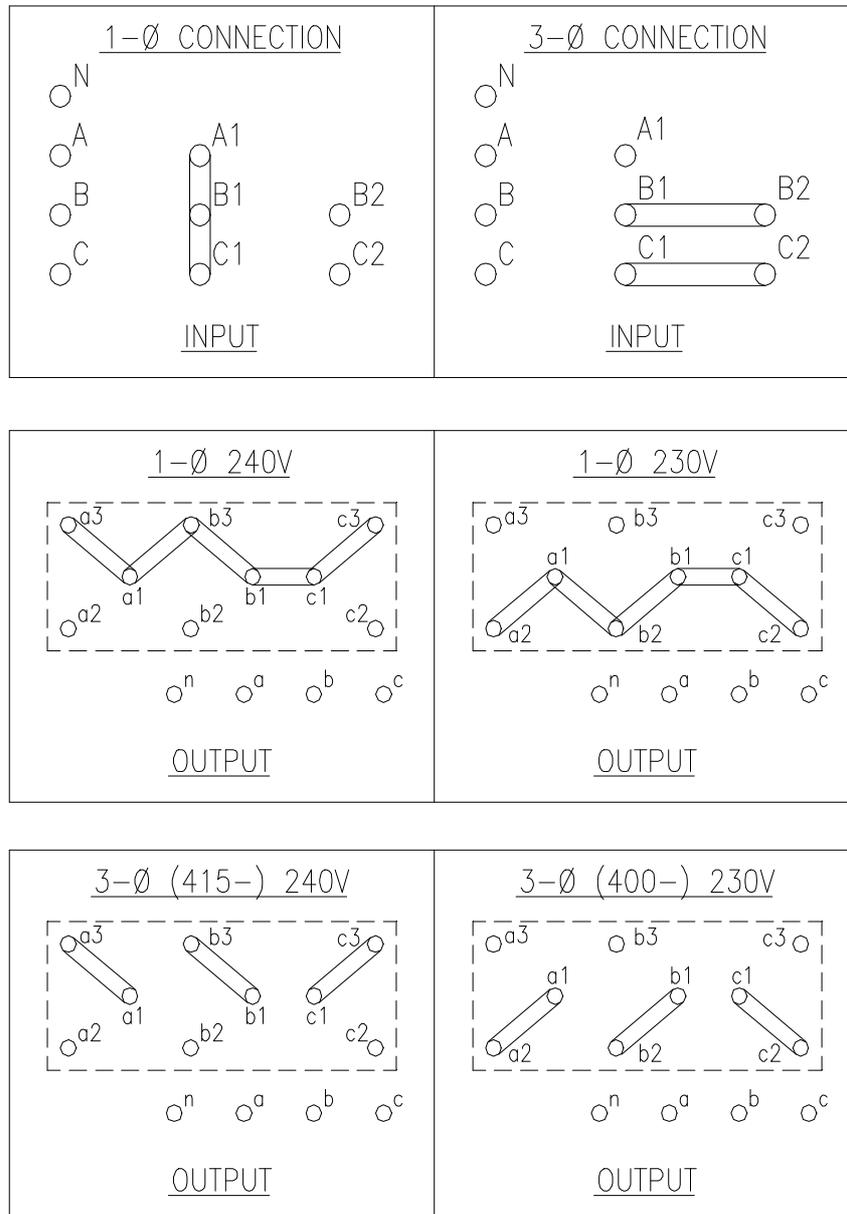


FIG. 4 Selectable Input/Output Link Configurations  
7.5kVA to 18kVA Only (\*Refer to Fig 3)



**SERIES 200 POWER CONDITIONER**

CATALOGUE NO.
---------------

RATING	kVA
--------	-----

NO. OF PHASES	1 / 3
---------------	-------

NOM. INPUT VOLTAGE	V / V
--------------------	-------

MAX. INPUT CURRENT	A / A
--------------------	-------

OUTPUT VOLTAGE	V / V
----------------	-------

MAX. OUTPUT CURRENT	A / A
---------------------	-------

FREQUENCY	50 Hz
-----------	-------

**THIS PRODUCT COMPLIES WITH AS3100**

FOR SERVICE ON THIS PRODUCT CALL:  
9768 3105 (Melbourne Customers)  
1800 034 401 (All Other Customers)

**SOLA AUSTRALIA LTD**

Fig 5. Typical Rating Plate for SOLA 200 PC

## SECTION TWO

### 2.1 SERVICE LOCATION

The power conditioner must be installed in an environment free from conductive dust, water vapour and corrosive gases. Positioning the unit directly beneath a fire detector, sprinkler or air conditioning temperature sensor should be avoided.

Sufficient clearance between power conditioner and walls and other objects must be allowed for unrestricted movement of cooling air, and for installation and service access. The following clearances should be exceeded where possible.

REAR - 100 mm minimum

Rear access is required for wiring and possible service needs. However with jacking pads up, the unit can be easily moved so long as the installer allows sufficient cable slack. Additional space will be required for units with output sockets. Rear mounted input circuit breakers can normally be operated with 100 mm clearance.

SIDES - 300 mm  
FRONT - Provide easy access at all times.  
TOP - 700 mm - do not allow material to be stored on top

The surrounding air must dissipate a heat load in kW equal to 10% of the rated kVA of the power conditioner, without the inlet air (to the power conditioner) exceeding 50°C.

e.g. 5kVA Power Conditioner:  
Heat Load =  $0.1 \times 5 = 0.5\text{kW}$   
or Heat Load =  $0.1 \times 5 \times 3413 = 1707 \text{ BTU/hour}$

### 2.2 CONNECTIONS

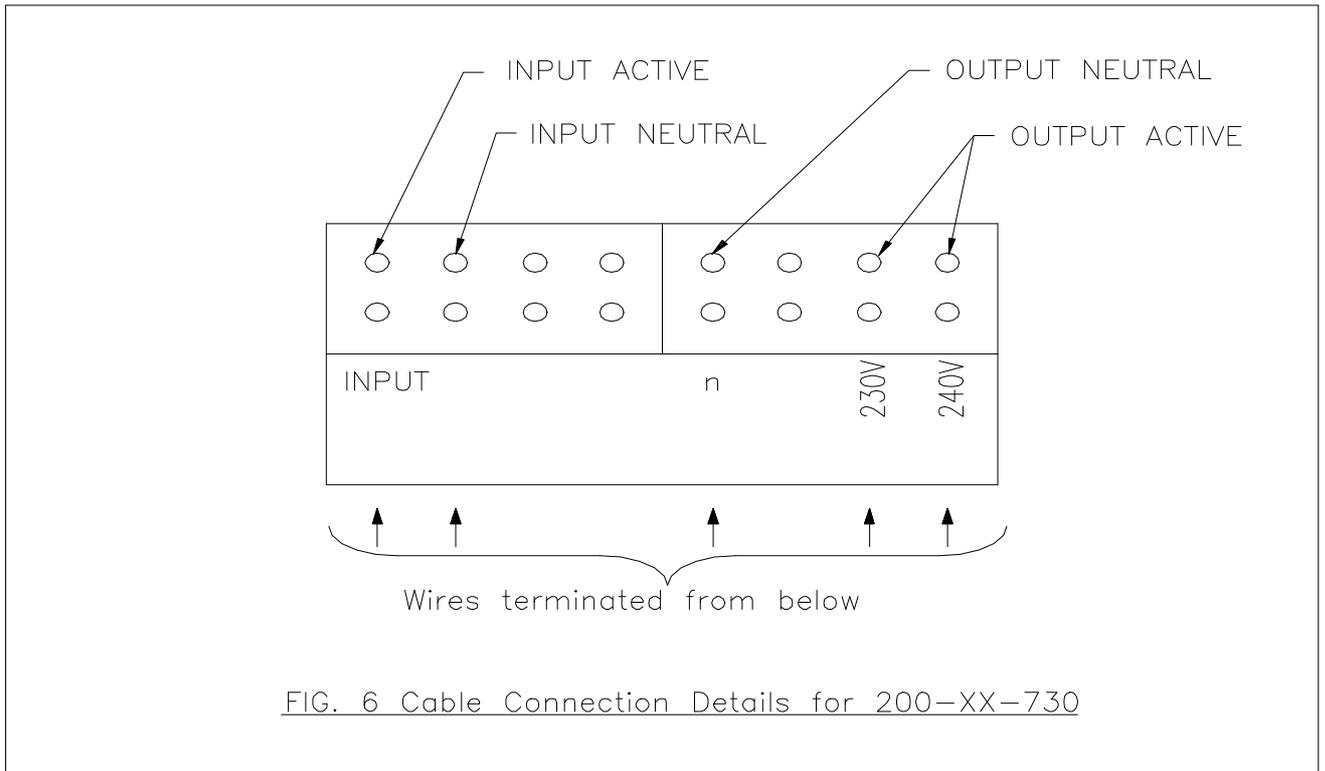
For 200-XX-730, terminals are arranged as in Figure 6; wires are screwed straight into the terminal blocks.

For all larger units, terminals are 1/4", 5/16" and 3/8" diameter nickel-plated brass studs and are clearly marked.

At this stage, it is most important to check the position of selector links as shown in Figure 4. This same link diagram is displayed inside the unit near the terminals. Select either 230V or 240V, and 1 Phase or 3 Phase, where applicable. 380/220V units can be configured as single phase input/output or three phase input/output only.

Since input and output neutrals are isolated by the core/coil assemblies, an MEN link between earth and output neutral is provided. DO NOT CONNECT INPUT OR SYSTEM NEUTRAL TO OUTPUT NEUTRAL.

**IMPORTANT**  
**Jacking pads must be screwed down before use.**



### 2.3 SELECTION OF INPUT CIRCUIT BREAKERS

As with all transformer based equipment, ferroresonant transformers are characterised by an inrush current when switched on. For this reason it is recommended that delayed-trip type circuit breakers are used when switching power conditioner circuits. In Australia the Heinemann CF1 and CF3 (for 1 and 3 phase circuits respectively) breakers are appropriate. These are hydraulic/magnetic type breakers with variable sensitivity. A “Curve 1” type circuit breaker will provide the correct protection characteristics whilst delaying the trip function during the transformer in-rush. Select the breaker appropriate to the next current rating above the nominal rating of the power conditioner.

Table 2 is a guide for cabling between the circuit breaker and power conditioner. The installer must satisfy himself that the cable size is correct for the installation.

Cross Sectional Area (sq. mm.)	Current Rating	
	3 Phase	1 Phase
4	25	25
6	32	32
10	40	50
16	50	63
25	80	80
35	92	105
50	110	125
70	140	155

*Table 2. Cable Selection Guide*

## 2.4 POWER UP

When the installation has been approved by the local power authority, the power conditioner may be energised with load equipment switches in the OFF position. A few seconds after energisation, load equipment may be switched on. Whilst no special commissioning procedure is required, the following may prove useful for future reference:

Using a good quality (preferably True-RMS) voltmeter and current tongs, measure and record all input and output voltages and currents. Also record details of load equipment and running time of the power conditioner from cold. Output voltage will be 1 or 2% higher than normal until the unit has operated for 2 hours or more. Check output voltage against nameplate and performance data - Section 3.1. If output voltage is incorrect, call SOLA Service on 1800 034 401 (Melbourne Callers 9768 3105)

### 3.1 PERFORMANCE

A detailed performance specification is available from SOLA Customer Service Centres. Details given here are those easily measured on site and useful for assessment of proper operation or otherwise.

**Output Voltage** is factory set to the value stated on the rating plate and cannot easily be changed on site. Setting conditions are:

1. Nominal input voltage and frequency.
2. 85% of Full Load - Resistive.
3. Precision, True-RMS voltmeters used.
4. Operation temperature compensated.

So long as input voltage is within rated range, output voltage will be within +/-3% of nominal with normal service variations of the other parameters. Even with input considerably outside rated input range, output is generally maintained within +3%, -8%. This range is maintained for loads in the approximate range of 20% to 120% of rating. With very light loads, output voltage may be as high as +5% under some conditions. The above regulation description when applied to 3 Phase units refers to phase to neutral output voltage and will generally be true for phase to phase voltages if currents are balanced within 15%. **WITH GROSSLY UNBALANCED LOADS, PHASE TO PHASE VOLTAGES MAY BE UNACCEPTABLE FOR SOME LOAD EQUIPMENT DUE TO UNBALANCED PHASE SHIFTS. HOWEVER PHASE TO NEUTRAL VOLTAGES ARE UNAFFECTED BY LOAD UNBALANCE. THE POWER CONDITIONER DOES NOT REGULATE PHASE TO PHASE VOLTAGE.**

Rated Input Range of 200-26-XXX series is 190V to 260V Phase to Neutral (-21%, +8% for 240V, -17%, +13% for 230V). For the 200-44-XXX series, the range is 180V to 240V Phase to Neutral (-18%, +9% for 220V). The range for the 200-46-822 unit, which CAN ONLY be configured for a three phase input, is 329V to 450V phase to phase, i.e. -21%, +8% for 415/240V and -17%, +13% for 400/230V. Useable output voltage is available for limited periods on all units for input deviations as high as +/-40%.

**Operating Temperature** - during normal operation, the internal core(s) and windings of the power conditioner will operate at around 120°C. This is normal, and well within the allowable temperature rating of the insulation system. Operating temperature of the core/coil assembly(ies) when energised, but not loaded, is only slightly less than when fully loaded.

**Overload Protection** - these power conditioners have inbuilt protection against overloads or short circuits on the output. Under normal service conditions, the power conditioner will supply up to 200% of full load for 10 seconds or more without damage or excessive voltage drop. This allows for startup requirements of some computer equipment (up to 500% is possible for very short duration for flash inrush, e.g. capacitor charging currents). If more severe overloads are applied the power conditioner will virtually shut down, preventing damage. Even under direct short circuit, load current is restricted to around 200% of rated full load, which will not damage the unit even if it is in this condition indefinitely.

When the overload is removed the unit will continue to operate in a normal fashion.

### 3.2 ROUTINE OPERATION

No complicated procedures are required - the following simple steps will optimise performance:

- POWER UP:
1. All load equipment switches in OFF position
  2. Power conditioner input circuit breaker to ON position.
  3. Switch ON load equipment in correct sequence - if possible do not power up more than one item of equipment simultaneously.

- POWER DOWN:
1. Power down load equipment in proper sequence.
  2. Switch input circuit breaker to OFF position.

NOTE - The steps above should be followed because:

1. Output voltage of the power conditioner is allowed to stabilise before being applied to load equipment.
2. Possible problems due to overload should be avoided.
3. The power conditioner is switched off when not required. Because the resonant circuit is energised whenever the power conditioner is energised (whether loaded or not) the standing, or no-load losses are significant. Additionally, since MTBF refers to operational hours (whether loaded or not), the already excellent total life expectancy will be increased.

#### 4.1 SERVICING

Since SOLA 200 Power Conditioners are simple, rugged devices without moving parts or printed circuit boards no adjustments, servicing or maintenance is required in the normal sense. If poor performance is suspected, the following should be carried out by a competent electrician or technician:

Measure and record voltages and currents as described in Section 2.3 of this manual. Compare with records of earlier tests if available.

If output voltage is high, probable causes are - very light load, very high input voltage or supply frequency, or a combination of these. Excessive output voltage under rated conditions is most unlikely. Re-test under rated conditions if possible.

If output voltage is low, probable causes are - overload, very low input voltage or frequency, or a combination. Re-test under rated conditions if possible.

#### 4.2 REPAIR OR RETURN FOR SERVICE

If the power conditioner performance is unsatisfactory and outside of specification, contact the Service Centre (details listed on the back page of this Manual) and advise all the results of tests and observations. Servicing arrangements can then be made. If a power conditioner is to be returned to SOLA for any reason, please obtain a Return Authorisation Number first, and after ensuring appropriate packaging, mark the "RA" number on it so that it is clearly visible. Packages without this "RA" number may not be accepted by our Inwards Goods Department.

#### 4.3 PARTS LIST

The following replaceable parts are available:

If your model is not listed below, contact SOLA.

Power Conditioner	SOLA PART NUMBERS						
	QUANTITY OF CORE/COIL/CAP SETS PER UNIT			INDICATOR	CIRCUIT BREAKER	OUTPUT SOCKETS	MAINS LEAD
Part Number	6C3710 (2.0kVA)	6C3712 (2.5kVA)	6C3730 (3.0kVA)	6E1208	6E2524	6E2028 & 6E0842	6E1612
200-26-730	-	-	1	1	1	-	-
200-26-730-00	-	-	1	1	1	4	1
200-26-750	-	2	-	1	1	-	-
200-26-750-HO	-	2	-	1	1	4	1
					6E2575		
200-26-775	-	3	-	1	1	-	-
200-26-790	-	-	3	1	1	-	-
200-26-812M	6	-	-	1	1	-	-
200-26-815	-	6	-	1	1	-	-
200-26-818	-	-	6	1	1	-	-
200-46-822	-	9	-	1	1	-	-
200-44-730	-	-	1	1	1	-	-
200-44-750	-	2	-	1	1	-	-
200-44-760	-	-	2	1	1	-	-
					6E2575		
200-44-775	-	3	-	1	1	-	-
200-44-790	-	-	3	1	1	-	-
200-44-812M	6	-	-	1	1	-	-
200-44-815	-	6	-	1	1	-	-
200-44-818	-	-	6	1	1	-	-
200-44-822	-	9	-	1	1	-	-

Table 3. Replaceable Spare Parts

## Product Warranty Statement

This Warranty is subject to Sola's standard Conditions of Sale which govern all sales of products by Sola Australia Ltd.

1. SOLA products, in general, are warranted against failure due to faulty materials and/or workmanship for a period of two years from despatch date (ex Sola store) as per invoice. The Ferroresonant and 95 Series Power Conditioners and SOLA Dry Type Transformers have an extended warranty - 5 years from date of despatch.
2. If, within the applicable Warranty period, any Sola product does not meet the warranty specified above, and the product was installed and operated in accordance with Australian standards and Sola standard installation procedures, Sola shall thereupon correct any defects due to faulty materials and/or workmanship.
3. Any modification made to the product other than those made by Sola or its authorised representative may cause the Warranty to be void.
4. For units up to 3kVA that are installed as a portable device, the Warranty covers repair or replacement of defective parts at the factory, or other service locations as nominated by Sola Australia, provided the unit has been returned by the user packed adequately to prevent shipping damage, and approval has been obtained from SOLA Australia Ltd before shipment. All costs associated with the return of the product to Sola Australia are at the customer's expense.

For hardwired products 3kVA and above, the Warranty covers on site repair (Metropolitan area, Capital Cities only), during normal working hours, by Sola technicians or appointed agents. For units installed in remote locations, Sola Australia may, at its discretion, request the equipment to be recovered and returned to the factory or other nominated service locations. In this case, it is the customer's responsibility to pack the equipment adequately to prevent shipping damages and pay freight charges to the location nominated by Sola Australia. Approval to return goods must be obtained from SOLA Australia Ltd before the goods are despatched.

5. Units returned for in-warranty repairs, which are found not to be defective, will be subject to an inspection and handling charge, plus transportation charges.
6. High grade batteries, designed for Uninterruptible Power Supply (UPS) applications, are supplied by Sola for use with Sola UPS equipment. These batteries have a finite life expectancy depending on a number of variables, including rate of discharge, depth of discharge, operating temperature, etc.
7. Providing that the batteries are used within the limits as set out in the battery manufacturer's warranty statement and are provided as an integral part of new equipment, they are guaranteed for two years, from despatch date as per invoice. A copy of this warranty statement is available on request. Batteries provided as spare parts or replacements have a one year warranty. Other optional warranty terms for batteries are available on request.
8. Sola reserves the right to charge for replacement batteries if within the one year guarantee period replacement batteries are necessary as a result of misuse or misapplication by the purchaser or end user.

## REPAIR

If poor performance is confirmed (refer SERVICING information on Page 11 of this Manual) you should contact SOLA Australia's National Service operation. If the unit is to be returned to SOLA for any reason, please obtain a "Return Authorisation" (RA) number first, and mark it clearly on the packaging.

Delivery of packages not marked with an "RA" number may not be accepted by our Inwards Goods Department.

## **SOLA AUSTRALIA NATIONAL SERVICE**

### **Phone 1800 034 401**

Prepaid Fastfix and SOLACARE Service Contracts are available for this product.

When ordering replacement parts, always specify:

1. Part Number and Rating.
2. Serial Number of the unit.
3. Part Number, Description and Quantity required.
4. Original Date of Purchase of the Power Conditioner.
5. Any Special Shipping Instructions.

Parts, orders and all correspondence regarding repairs under the warranty should be addressed to SOLA's Service Department at Head Office in Melbourne.

## **SOLA AUSTRALIA LIMITED**

ACN 004 439 178

**Head Office:** 13 Healey Road, Dandenong, Victoria 3175  
Phone: 03-9706 5022      Fax: 03-9794 9150