

R5/4000 CCCV



Description

Constant Current / Constant Voltage Power Source

Processes



Important Information

All persons authorised to use, repair or service the R4000/R5000 Inverter welding unit, should read the section on safety, before any work is undertaken. Further information is available in publication HSG118 'Electric safety in arc welding', which may be obtained from the Health & Safety Executive. Please contact your distributor should you not understand any of the information within this document.

INSTRUCTION MANUAL 05/14

Newarc Ltd.
UK's Leading Manufacturer Of Welding Equipment
Newcastle +44 (0) 191 295 0111
Aberdeen +44 (0) 1224 771 063
www.newarc.co.uk

SECTION 1 — SAFETY

1 - General Precautions_____	4
------------------------------	---

SECTION 2 — SPECIFICATION

2.1 - Specification_____	5
--------------------------	---

SECTION 3 — INSTALLATION

3.1 - Siting the R5/4000_____	6
-------------------------------	---

3.2 - Connecting to mains supply_____	6
---------------------------------------	---

3.3 - Setting supply voltage tapping_____	6
---	---

SECTION 4 — OPERATION

4.1 - Operating Controls _____	7
--------------------------------	---

4.2 - Operating _____	8
-----------------------	---

SECTION 5 — FAULT FINDING AND MAINTENANCE

5.1 - Welding Problems_____	9
-----------------------------	---

5.2 - Maintenance_____	10
------------------------	----

SECTION 6 — ELECTRICAL DIAGRAMS

6.1 - System Diagram_____	11
---------------------------	----

SECTION 7—PARTS BREAKDOWN

7.1 - Component Locations_____	12
--------------------------------	----

7.2 - Parts List_____	14
-----------------------	----

Fire and Explosions

Pay attention to fire and safety regulations in force at the welding site.

- Remove all flammable or combustible materials from the welding area and the immediate vicinity.
- Suitable fire fighting equipment must always be present where welding is carried out.
- Be aware that a fire risk is present for a considerable time after welding operations have ceased because of sparks and hot slag etc. Take suitable precautions when you have finished welding.
- Take care when welding containers that have held flammable or combustible material, these should have been specially cleaned before being given to the welder. If in doubt do not weld them.

Burns

Be aware that burns may be the result of the heat involved in the welding process, welding spatter or the Ultra Violet Radiation given off by the arc itself.

- Wear suitable fireproof clothing over all your body.
- Wear protective gauntlets designed for welding use.
- Wear a welding facemask fitted with the correct filter shade suitable for the current at which you will be welding.
- Avoid wearing oily or greasy clothing as a spark may ignite them. Where possible ensure that a suitable first aid kit and a first aid person qualified in the treatment of burns are available nearby.

Fumes

Welding operations give off harmful fumes that are hazardous to your health.

- Make sure the welding area is well ventilated. Use suitable fume extractors or exhaust fans if necessary.
- If the ventilation is not suitable then breathing apparatus may have to be used.
- Do not weld plated metals or metals which contain Lead, cadmium, Zinc, Mercury or Beryllium unless you are wearing suitable breathing apparatus.

Electric Shock

- Do not touch live electrical parts.
- Do not work in wet or excessively humid areas and do not site the unit on a wet surface.
- Avoid touching the work piece whilst welding.
- Do not use the unit without the protective cover.
- Keep your clothing and body dry.

The safe handling of gas cylinders

The R4000/R5000 uses argon when TIG welding using the T300. This is an inert gas and can displace oxygen in the atmosphere leading to asphyxiation.

- Gas cylinders are under pressure and can explode if punctured. Please ensure the cylinder is secured in a stable location, away from any heat source or potential mechanical damage.
- The cylinder must be securely fastened to a wall or placed in a specially designed cylinder carrier.
- Do not use gas cylinders whose contents you are unsure of.
- Do not try to directly connect a gas cylinder to Newarc equipment without using a pressure-reducing regulator designed for use with argon.
- Always install and use pressure regulators in accordance with the manufacturers instructions.
- It is advisable, when attaching the regulator to the gas bottle, to briefly turn on the bottle valve to expel any foreign objects that may be present. These may later block the solenoid valve of the machine if not dealt with. Turn your face away from the bottle valve when undertaking this action.
- Check the gas cylinder, pressure regulator and gas hoses regularly for leaks and discard any suspect item.
- Always turn off the valve on the gas cylinder when you have finished welding.

Further information is available in publication HSG118 'The safe use of compressed gases in welding, flame cutting and allied processes', which may be obtained from the Health & Safety Executive.

Welding and earth return cables

- Earth return and electrode holder cables must have a cross sectional area of at least 35mm².
- Only use copper cables, the use of Aluminium cables may have a detrimental effect on the performance of the machine.
- Regularly inspect welding cables and connectors for wear abrasion and corrosion. Corroded cables and connectors may overheat and become a fire hazard.
- Ensure that all welding connectors are fully mated, the connectors should be pushed fully home and then turned clockwise to lock. If the connectors are not mated fully they may overheat and become a fire hazard.
- If possible, fasten the earth return clamp directly to the job to be welded and ensure that the surface is free from rust and paint.

2.1 - Description

These heavy duty D.C inverter power sources have been designed using the latest developments in power electronics. Electronic parts are enclosed in a separate sealed compartment for protection from the environment.

This portable, versatile inverter power source responds to changes in the welding arc much faster than conventional machines resulting in a more stable and controllable weld pool.

Due to the high efficiency and power factor these units provide energy and cost saving solutions.

The R4000CCCV/R5000CCCV is capable of MIG welding when used with a peripheral wire feed unit.

2.2 - Technical Specification

Technical data	R4000	R5000
Models Available	380-480 Volts 3 Phase 50/60Hz	380-480 Volts 3 Phase 50/60Hz
Input Current at Max Output	24 amps	33 amps
Power Consumption	18.5 KVA	25 KVA
Recommended Mains Fuse	32A slow blow or type C MCB	40A slow blow or type C MCB
Mains Cable	4 x 4.0mm ² flexible cable	4 x 4.0mm ² flexible ca- ble
Power Factor	0.93	0.93
Max Output Current	400 amps	500 amps
Open Circuit Voltage	>80V	>90V
Current Control	20-400A Infinitely Vari- able	20-500A Infinitely Vari- able
Duty Cycle at 40°C	60% @400A 100% @350A	60% @500A 100% @400A
Electrode Size	1.6 – 6.3	1.6 – 6.3
Insulation Class	F	F
H x W x L (mm)	450 x 310 x 570	450 x 310 x 570
Weight (kg)	33	37

3.1 Siting the R4000/R5000

- Site the R4000/R5000 on a clean dry surface, preferable above ground level.
- Make sure there is at least 20cm clearance at the front, rear and right side of the machine to allow good circulation of the cooling air.
- Protect the machine from heavy rain and if used in hot climates, against direct sunlight.
- Ensure that the machine is positioned in such a way that particles created by grinding and cutting operations do not enter the machine.

Note! Damage caused by metal particles and water entering the machine will not be covered under warranty.

3.2 Connecting to mains supply

WARNING! All electric shocks are potentially fatal, a competent electrician should carry out the fitting of the mains plug.

- Make sure that the mains supply is of the correct voltage and current capability for the machine.
- Make sure that any extension cables used are of sufficient current carrying capacity.
- Make sure that the mains plug and socket (if fitted) are in good condition and are of the correct current carrying capacity. If the machine is wired directly to the mains supply then an isolator switch must be fitted.

Note! See the technical specifications page for correct supply information

Primary cable length

Long cable lengths may reduce the performance of the machine, the welding arc may become unstable, especially at higher currents. Ensure the mains cable is not coiled up during welding as this will reduce the input voltage to the machine and may cause overheating and degradation of the cable.

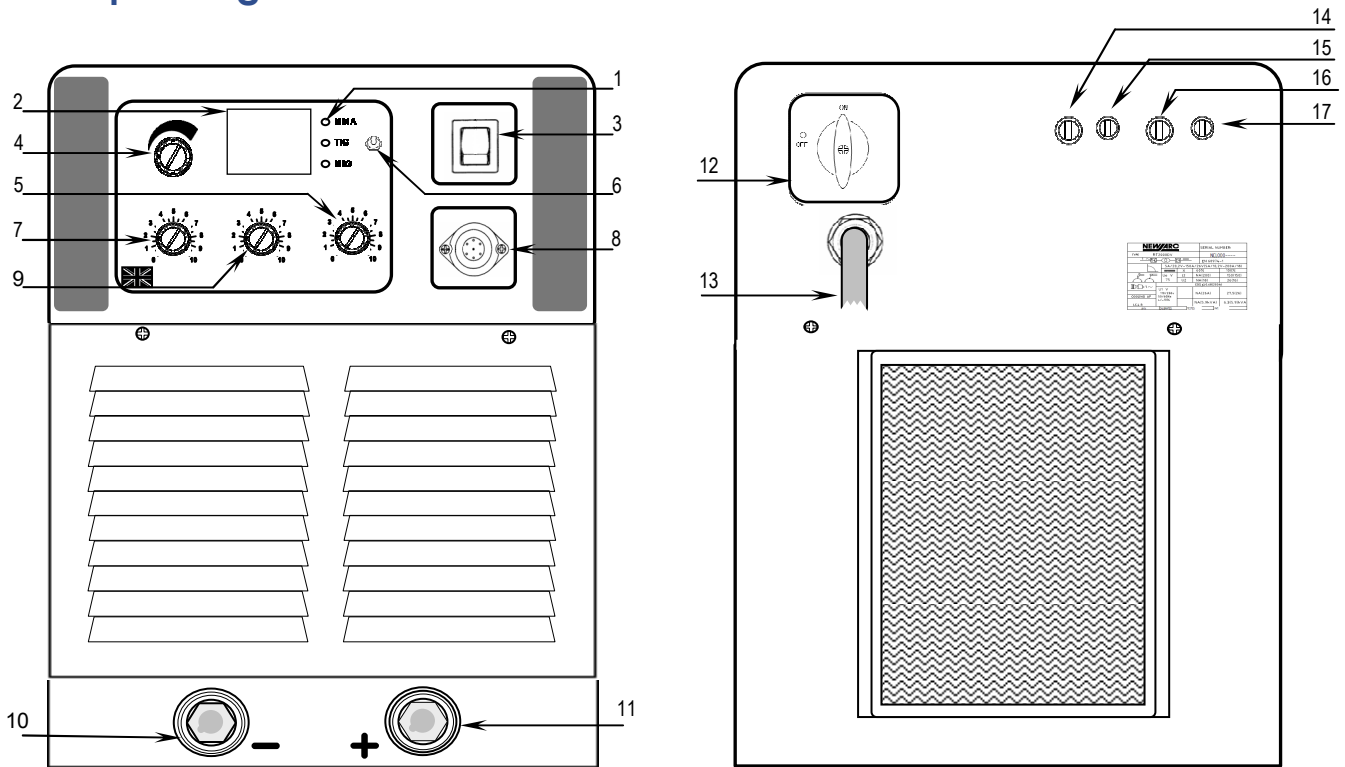
3.3 Setting supply voltage tapping

WARNING! All electric shocks are potentially fatal, a competent electrician should carry out any supply voltage tapping adjustments required.

- To enable the setting of the supply voltage tapping, the front panel display cover of the R4000/R5000 has to be removed.
- The photograph below shows the voltage tapping set to 415V, with the red wire from the fuse holder connected to the 415 terminal.
- This connector can be moved to the required voltage terminal to select the desired input voltage.



4.1 - Operating Controls and Connections



1. **Mode Indication** - LEDs to display welding mode.

2. **Digital Display** - Indicates welding current in Amps, welding voltage in Volts. The display also gives an indication when the machine is over temperature (-OT -), or the optional cooling unit is turned off (-CU-).

3. **Off/On switch** - Switches the machine on and off when the main 3 Phase isolation switched is in the on position. Upon switching on, the display will read "4000" or "5000" and the machines output will be inhibited, after 4 seconds display will clear and the machine is ready to use.

4. **Output Demand Control** - Adjusts the machines output current in CC mode or Voltage in CV mode.

5. **Slope control** - Operates in MIG mode only. This control alters the output voltage(V) to output current(I) relationship. This control is sometimes know as 'Arc Control' or 'Arc Pinch Control' as it regulates the pinch effect of the welding arc.

6. **Mode switch** - Selects welding mode when there is no remote connection.

7. **Arc force control** - Operates in MMA mode only. This control alters the welding dynamics of the machine to facilitate welding with different types of weld- ing electrodes (e.g. general purpose, celulosic, low hydrogen and iron powder). Turning towards maximum will increase penetration at the expense of in- creased welding spatter, turning towards minimum will reduce penetration but the arc will be smoother and less fierce.

8. **Remote control socket** - For connection of external remote control, external TIG control unit or wire feed unit. There is no switch for remote operation, plugging an external unit into the socket automatically selects remote operation and disables the internal control (4).

9. **Inductance control** - Operates in MIG mode only. This control alters the response time of the power source and is generally used in short circuit dip transfer welding. Too little inductance will result in excessive spatter and too much inductance will not allow the welding current to rise fast enough causing the electrode to stub into the base metal.

10. **-ve weld terminal** - Main welding power output connector, negative polarity.

11. **+ve weld terminal** - Main welding power output connector, positive polarity.

12. **Main 3P Isolation switch** - Switches the machine on and off.

13. **Mains Input** - Three phase mains cable.

14. **Auxiliary transformer supply fuse** - Fuse 3.15A slow blow, 32 x 6.3mm ceramic body.

15. **Remote supply fuse** - Protects the auxiliary supply from the remote control socket. Fuse type is 20 x 5mm glass body, 6.3A 'slow blow' rating

16. **Main supply fuse to the cooling unit (Only fitted to cooling unit version)** - Fuse 3.15A slow blow, 32 x 6.3mm ceramic body.

17. **Auxiliary Cooling unit supply fuse (only fitted to cooling unit version)** - protects the auxiliary supply to the cooling unit. Fuse type is 20 x 5mm glass body, 2A 'slow blow' rating.

4.2 Operation

4.2.1 MMA Welding

- For straight polarity welding, connect the electrode holder to the positive weld terminal and the earth return lead to the negative weld terminal. For reverse polarity welding, reverse these connections.
- Turn the mains switch to the on position, the digital will light and after a 4 second delay the machine is ready to weld.
- Adjust the current control to the recommended setting for the size and type of welding electrode to be used.
- Adjust the Arc Force control to your personal preference for the size and type of welding electrode to be used.
- The R4000/R5000 is suitable for welding all types of electrodes within the current rating of the machine (see Technical Data)

4.2.2 MMA Welding with remote control

- Select welding polarity as in paragraph 4.3.1.
- Plug the control cable supplied with the remote control into the remote control socket on the front of the R4000/R5000
- Plug the remote control onto the other end of the control cable.
- Adjust the current control on the remote to the recommended setting for the type and size of welding electrode being used. (The standard Newarc RC300 remote does not have current settings but is marked 1 to 10, for the R4000 allow 40A per division and for the R5000 allow 50A per division).
- Turn the mains switch to the on position, the machine is ready to weld.

4.2.3 TIG Welding with TIG unit

- Connect the TIG unit to the R4000/R5000 and the shielding gas supply as per the diagrams in the TIG unit manual.
- Select welding mode and current by adjusting the controls on the TIG unit with reference to the TIG unit manual.
- Turn the mains switch on the R4000/R5000 to the on position, the digital displays on the R4000/R5000 and the TIG unit will light up, you are now ready to weld.

4.2.4 MIG Welding with Wire Feed Unit

- Connect the WFU to the R4000/R5000 and the shielding gas supply as per the diagrams in the WFU unit manual.
- Select welding mode and current by adjusting the controls on the WFU with reference to the WFU manual.
- Turn the mains switch on the R4000/R5000 to the on position and select MIG on the mode switch, (this will be automatic if a remote connection is being used). The digital displays on the R4000/R5000 and the WFU will now light up, you are now ready to weld.

5.1 Machine Operation Problems

Most problems with the R4000/R5000 can be overcome by following the procedures below.

No Digital Display on switch on.

- Check that the machine is attached to a working mains supply that it is correctly plugged in and any isolator switches are closed.
- Check the condition of the 2A fuse on the rear panel of the machine and replace if necessary.

Note : make sure the fuse is replaced with one of the correct type and rating. It should be a 32 x 6.3mm (1 1/4" x 1/4") ceramic bodied type with a rating of 2A 'slow blow'

- Have a competent electrician check that there are no mains fuses or overload devices interrupted, that the mains plug is fitted correctly and that there are no loose wires or connections, check that there are no breaks in the mains cable.

Digital display lit but no output.

- Make sure that the display is not reading 'OT', if it is, it means that the R4000/R5000 has overheated, normally by exceeding its 'Duty Cycle', and the power stages of the machine have been shut down. In this case, leave the machine switched on until it has cooled down, if you turn the machine off, the cooling fans will be turned off also and the cooling down period will be lengthened considerably.

Note : If the R4000/R5000 is overheating on a regular basis or at current settings below the maximum, this would usually indicate that the inside of the machine is choked with dust and therefore not being cooled correctly. For information about cleaning the dust out of the R4000/R5000 please refer to the relevant part of section 5.3.2, the three monthly service schedule.

TIG unit is not working.

- Check the condition of the 6.3A fuse on the rear panel of the machine and replace if necessary.
- Check interconnection cables are correctly fitted. (Positive to positive, negative to negative).3

MIG Unit is not working.

- Check the condition of the 6.3A fuse on the rear panel of the machine and replace if necessary.

Note : make sure the fuse is replaced with one of the correct type and rating. It should be a 20 x 5mm glass bodied type with a rating of 6.3A 'slow blow'.

Any welding problems not covered above must be brought to the attention of a qualified Welding Engineer, if the problem still persists have the R4000/R5000 checked by a trained Newarc service engineer.

5.2 Welding Problems

MMA

If problems with the R4000/R5000's operation while welding are experienced, first refer to the information in paragraph 3.2 in the installation section and paragraphs 4.3.1 and 4.3.2 in the operating section and the fault finding procedure earlier in this section.

- Most problems with MMA welding are the result of not setting the correct welding parameters for the welding rod being used. All welding rod packets have information on them in symbolic format, giving suitable current range, polarity and type of weld (normally called 'position'). If you are in doubt about what these symbols mean, ask your welding rod supplier to explain them. Choose an initial current setting towards the middle of the quoted range and if necessary practice on a piece of scrap the same thickness as the job to be welded.

TIG

- If problems are experienced whilst TIG welding, please consult the fault finding and maintenance section in the TIG unit instruction manual.
- Any welding problems not covered above must be brought to the attention of a qualified Welding Engineer, if the problem still persists have the R4000/R5000 checked by a trained Newarc service engineer.

•

MIG

If problems are experienced whilst MIG welding, please consult the fault finding and maintenance section of the WFU instruction manual.

Any welding problems not covered above must be brought to the attention of a qualified Welding Engineer, if the problem still persists have the R4000/R5000 checked by a trained Newarc service engineer.

5.3 Maintenance

Note! All Electric shocks are potentially fatal, switch off the machine and unplug from the mains supply before carrying out any maintenance work.

It is very important that the R4000/R5000 is regularly maintained. The amount of use and the working environment must be taken into account when scheduling the maintenance periods.

Careful use and regular preventative maintenance will prolong the life of the machine and ensure trouble free operation.

5.3.1 Weekly

- Clean the exterior of the machine
- Inspect the machines exterior for obvious signs of damage.
- Check the condition of the welding cable, earth clamp and welding output connectors for damage and any sign of over-heating
- Check the condition of the mains cable an plug.

5.3.2 Three monthly

As per the weekly schedule, plus:-

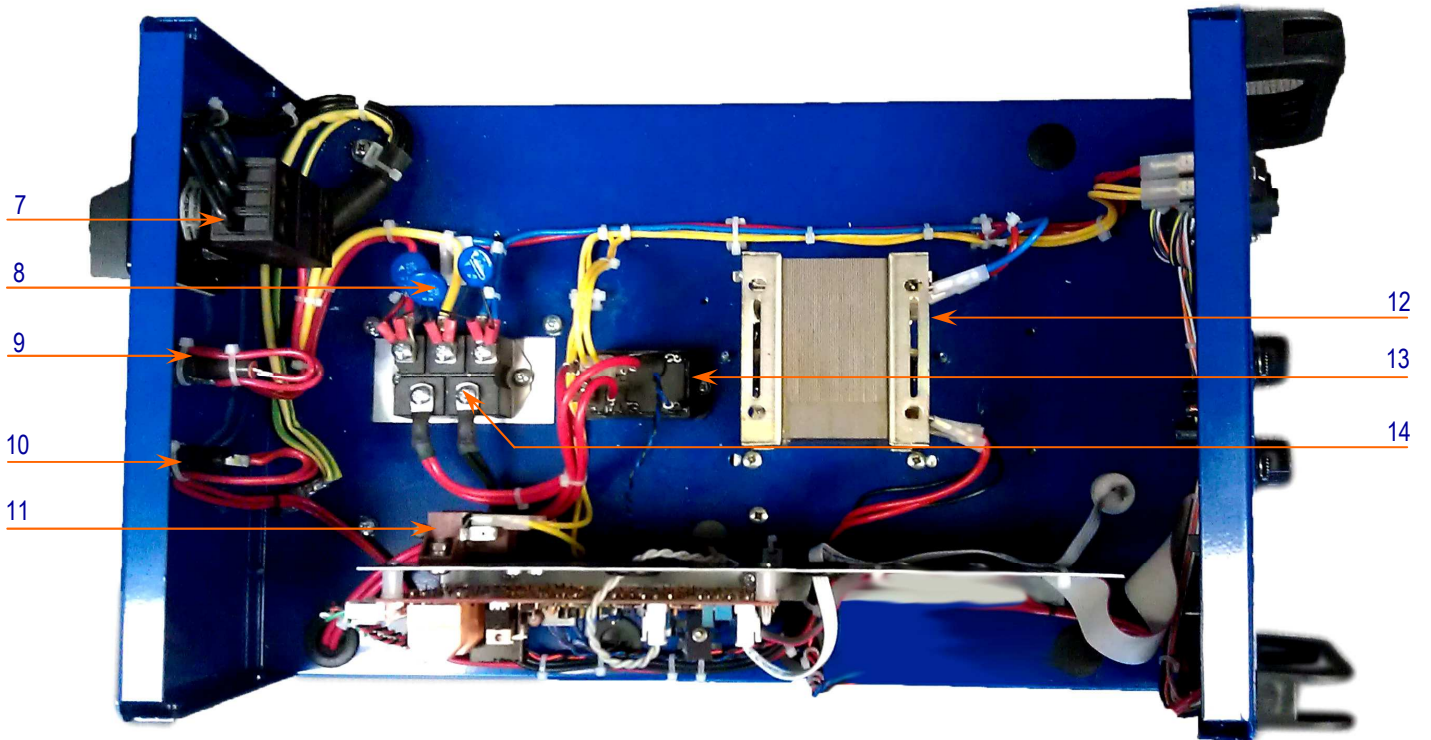
- Remove the lid from the machine and remove the build up of dust and debris from inside the machine using, either, compressed air at low pressure or an industrial type vacuum cleaner.
- Make a thorough visual inspection of the interior of the machine, look particularly for pieces of welding wire, or stubs of old welding rods that may have got through the cooling air intakes.
- Check the condition of the mains input connector, look for loose terminal block screws and make sure the sheath of the mains cable is still clamped securely in the combined cable entry/clamp. Make sure the earth wire is still securely fastened to the earth stud.
- Check the condition of the welding output connectors, look for any signs of discoloration. This could be an indication of overheating and can be a cause of welding set failure.

5.3.3 Annually

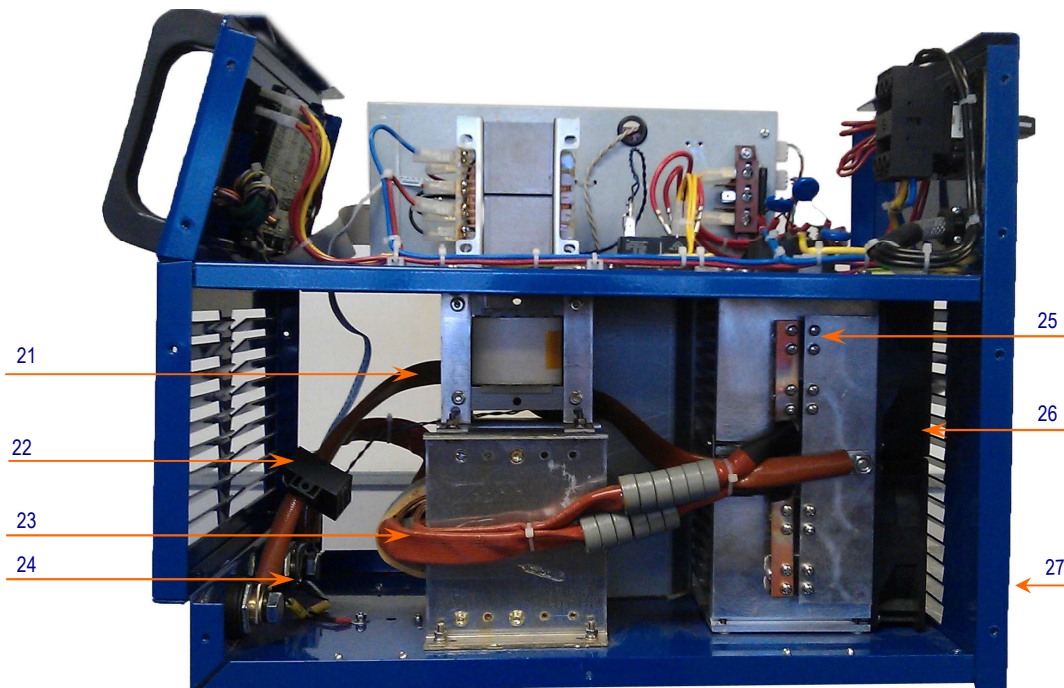
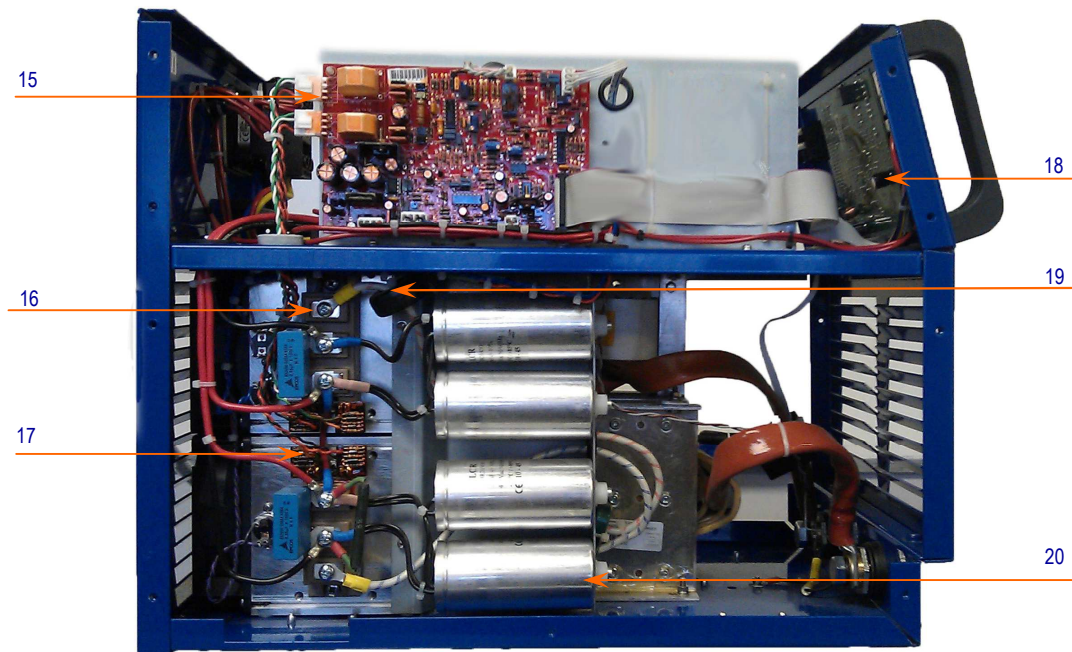
As per the three monthly schedule, plus :-

- Have the machines calibration checked, if necessary have the machine re-calibrated by a Newarc trained technician.

7.1 - Component Locations



7.1 - Component Locations



SECTION 7—PARTS BREAKDOWN

7.2 - Parts list for R4000CCCV/R5000CCCV

Item no.	Description	Part No.
1	Front bridge handles (2 per machine) Lid Bridge handle (2 per machine)	M01393 M01084
2	24mm diameter knob	M00464A
3	20mm diameter knob (3 per machine)	M00033A
4	On/Off switch	M70069A
5	Remote socket assembly	M90762
6	70/90 panel mount Dix socket (2 per machine)	M09916
7	Mains Switch — 3 phase power	M70071
8	Filter Diac assembly	M91123
9	Fuse holder Fuse 3.15A slow blow, 32 x 6.3mm ceramic body	M01088/89 M00020A
10	Fuse holder Fuse 6.3A slow blow, 20 x 5mm glass body	M00273 M00379
11	Soft start resistor assembly	M90765
12	Auxiliary transformer	M01408
13	Soft start relay	M70026
14	Diode bridge	M60057
15	Control PCB R4000CC/CV R5000CC/CV	M90744-R4000CC/CV M90744-R5000CC/CV
16	IGBT (2 per machine) R4000CC/CV R5000CC/CV	M60245 M60229
17	IGBT gate drive assembly (1 per machine)	M90843
18	Display PCB R4000CC/CV R5000CC/CV	M90771-R4000CC/CV M90771-R5000CC/CV
19	Current transducer	M60112
20	Capacitor Assembly	M90456
21	Main inductor (Quote serial number of the machine when ordering for correct part) R4000CC/CV R4000CC/CV R5000CC/CV R5000CC/CV	M01094 M10105 M01094 M10106
22	Current transformer	M01083
23	Main transformer (Quote serial number of the machine when ordering for correct part) R4000CC/CV R4000CC/CV R5000CC/CV R5000CC/CV	M01093 M10102 M00878 M10103
24	De-coupling capacitor	M90818
25	Diode module (4 per machine)	M60121
26	Cooling fan (2 per machine)	M00371
27	Rear filter grill assembly	M91157

When ordering spare components please quote the serial number of the unit for which the parts are intended.



Head Office

Newarc (Newcastle) LTD
6 Wincomblee Road
Walker Riverside
Newcastle upon Tyne
NE6 3PF

Tel: +44 (0)191 295 0111

Fax: +44 (0)191 295 0077

Website: www.newarc.co.uk

e-mail: sales@newarc.co.uk

Aberdeen Office

Newarc (Aberdeen) LTD
4 Howe Moss Drive
Kirkhill Industrial Estate, Dyce
Aberdeen
AB21 0GL

Tel: +44 (0)1224 771063

Fax: +44 (0)1224 724536

e-mail: scotlandsales@newarc.co.uk

Guarantee

Newarc Ltd warrants that its goods and services are guaranteed to meet the specific performance under the stated conditions of use. Newarc cannot be held responsible for general wear and tear or for failure occurring due to misuse or abuse arising out of circumstances outside the stated conditions of use. The stated conditions of use are that considered normal industrial practice and are not exhaustive. Each machine is identified with a unique serial number and accompanied with the guarantee. Newarc reserve the right to a) Repair. b) Replace. c) Authorise the reasonable cost of repair or replacement at an approved Newarc service agent. d) Credit for any purchased equipment (less reasonable depreciation for actual use and condition) at its entire discretion. This in no way affects your rights as a consumer. The guarantee is enclosed with each machine.

Waiver

Whilst every endeavour is made to ensure the details of this document are correct at the date of print. Newarc accepts no liability for correctness in respect of any impending change in legislation or health and safety requirements. Newarc also reserve the right to amend the detail of the document content without any notification to the consumer. If reference is made to Newarc while utilising the document for spare parts purchase or instruction please advise the revision of the document to ensure correctness of information.

