

RT5000/4000



Description

Constant Current Power Source
Integrated TIG

Processes



Important Information

All persons authorised to use, repair or service the RT4000/RT5000 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

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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're 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 RT4000/RT5000 on a wet surface.
- Avoid touching the work piece whilst welding.
- Do not use the RT4000/RT5000 without its protective cover
- Keep your clothing and body dry

The safe handling of gas cylinders

The RT4000/RT5000 uses argon when TIG welding. This is an inert gas and can displace oxygen in the atmosphere leading to asphyxiation.

- **Note!** 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 the RT4000/RT5000 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

The RT4000 is a 400A (500A for the RT5000) constant current welding power source based on IGBT technology. The Inverter drive circuitry operates above the audio frequency spectrum making the RT4000/RT5000 virtually silent in operation. The high operational frequency also means that the RT4000/RT5000 is able to respond quickly to changing arc dynamics, making for a very smooth and stable arc.

2.2 - Specification

Technical data	RT4000	RT5000
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 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 cable
Power Factor	0.95	0.95
Max Output Current	400 amps	500 amps
Open Circuit Voltage	>80V	>90V
Current Control	25-400A Infinitely Variable	25-500A Infinitely Variable
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 RT4000/RT5000

- Site the RT4000/RT5000 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.

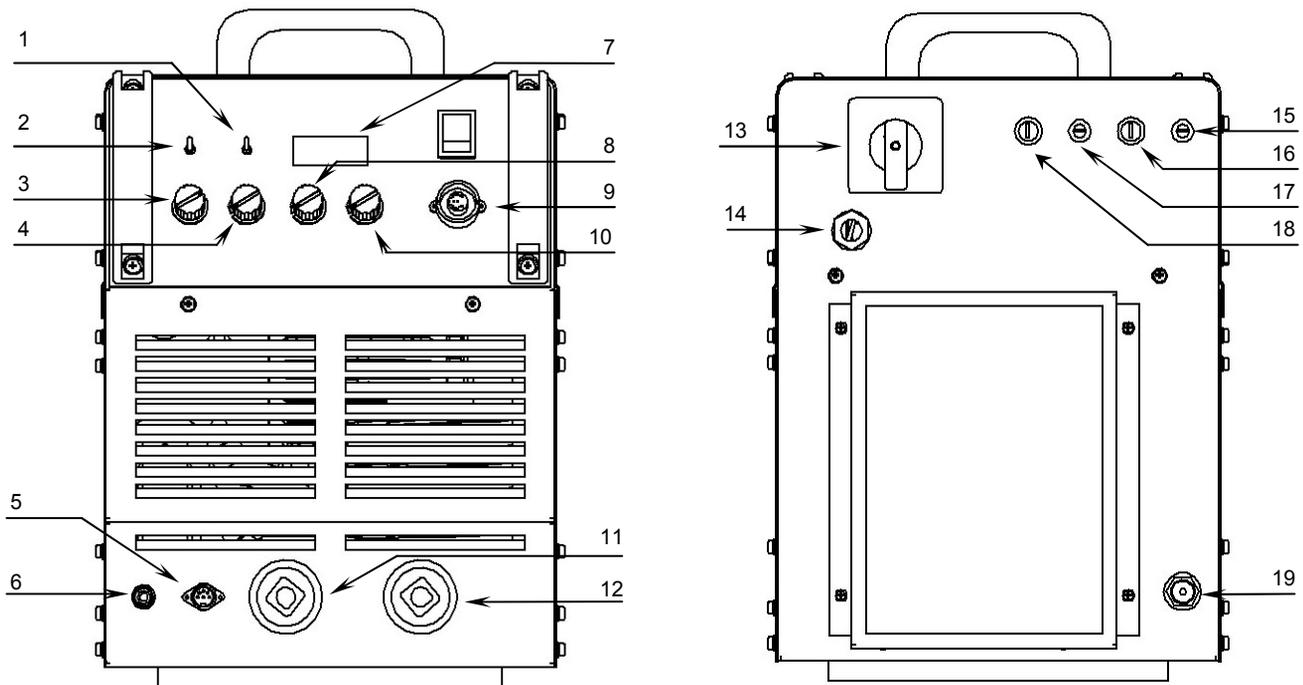
3.3 Setting supply voltage tapping

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 RT4000/RT5000 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



4.2 Description of controls

- 1. TIG2/TIG 4 switch** - This control switches between 2T and 4T operation (normal and latch). In TIG2 position, when the torch switch is pressed the arc ignites, when the switch is released the arc goes out. In TIG4 position, when the torch switch is pressed and released the arc ignites, to extinguish the arc you must press and release the torch switch again.
- 2. TIG/MMA switch** - This control switches the operating mode between MMA and TIG .
- 3. Slope up control** - With the slope up control set to minimum the RT4/5000 will strike at the current set by the current control. With the slope up control set to anywhere but minimum the RT4/5000 will strike at 30A and then gradually increase the current to the setting on the current control, the time this takes is determined by the position of the slope up control.
- 4. Current control** - Adjusts the machines output current.
- 5. Torch switch socket** - For connecting the TIG torch control switch lead using DIN plug.
- 6. Gas out connector** - This is a female quick coupling with an internal shut- off valve.
To connect, push the male connection on the end of the TIG torch adaptor into the coupling until you hear a click. To fully disconnect, push the knurled ferrule on the connector inwards towards the RT4/5000 until it stops.
The shut off valve in the connector automatically closes when the connection is separated.
- 7. Digital Display** - Indicates welding current in Amps, slope up, slope down and post gas times and also gives an indication when the machine is over temperature.
- 8. Slope down control** - With the slope down control set to minimum the current will shut down immediately the torch switch is released. With the slope down control set to anywhere but minimum and the torch switch released, the current will gradually decrease from the setting on the current control to 5 amps, where the current will extinguish, the time this takes is determined by the position of the slope down control.
- 9 Remote control socket** - For connection of external remote control or T300 external TIG control unit. There is no switch for remote operation, plugging an external unit into the socket automatically selects remote operation and disables the internal current control.

4.2 Description of controls (cont..)

- 10 Post Gas time** - This control sets the post gas delay, This is the period of time that the gas will continue flowing after the arc has extinguished. The length of this period is determined by the position of the control.
- 11. -ve weld terminal** - Main welding power output connector, negative polarity.
- 12. +ve weld terminal** - Main welding power output connector, positive polarity.
- 13. Main 3P Isolation switch** - Switches the machine on and off.
- 14. Mains Input** - Three phase mains cable.
- 15: 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.
- 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. 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.
- 18. Auxiliary transformer fuse** - Fuse 3.15A slow blow, 32 x 6.3mm ceramic body.
- 19. Gas in connector** - Must be connected to the pressure regulator on the gas cylinder by means of a suitable hose.

4.3 Operation

4.3.1 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 RT4000/RT5000 is suitable for welding all types of electrodes within the current rating of the machine (see Technical Data)

The RT4000/RT5000 should never be used with arc-air gouging or cutting electrodes.

4.3.2 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 RT4000/RT5000.
- 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 RT4000 allow 40A per division and for the RT5000 allow 50A per division).
- Turn the mains switch to the on position, the machine is ready to weld.

4.3.3 TIG Welding

- Switch the mode switch to 'TIG' and select either 2T or 4T torch mode.
- Connect the TIG torch power cable to the negative output connector.
- Connect the TIG torch gas connector to the gas quick coupler.
- Connect the welding ground to the positive output connector.
- Connect a supply of pure argon to the connector at the rear of the machine.
- Turn the mains switch on the RT4000/RT5000 to the on position, the digital display will indicate current when the machine is ready for use.
- Adjust the slope, current and post gas controls to the required settings, you are now ready to weld.

5.1 Machine operation

Most problems with the RT4000/RT5000 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 3.15A 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 (1¼" x ¼") ceramic bodied type with a rating of 3.15A '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 'HOT', if it is, it means that the RT4000/RT5000 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 and the cooling down period will be lengthened considerably.

Note : If the RT4000/RT5000 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 RT4000/RT5000 please refer to the relevant part of section 5.3.2, the three monthly service schedule.

5.2 Welding Problems

MMA

If problems with the RT4000/RT5000'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 with the RT4000/RT5000's operation while TIG welding are experienced, first refer to the information in paragraph 3.2 in the installation section and paragraph 4.3.3 in the operation section.

The common problems with TIG welding are poor striking, porosity and poor appearance of the weld. If you are experiencing any problems with TIG welding follow the check list below, this will cure most problems :-

- If the unit is suffering from poor striking, check that all power leads are connected properly, check that there is sufficient gas flow and that the correct gas is being used, check that the earth clamp is making a good connection to the work-piece.
- If there is porosity in the weld or the final weld is of poor appearance, check that there is sufficient gas flow and that the correct gas is being used, check the condition of the TIG torch, particularly the gas hose. Make sure that the collet or gas lens in the torch head is not blocked in anyway. Check all gas connections are secure and that there are no leaks, use a leak detecting spray on all connections if necessary.

Any welding problems not covered above must be brought to the attention of a qualified Welding Engineer, if the problem still persists have the RT4000/RT5000 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 RT4000/RT5000 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 and 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 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.

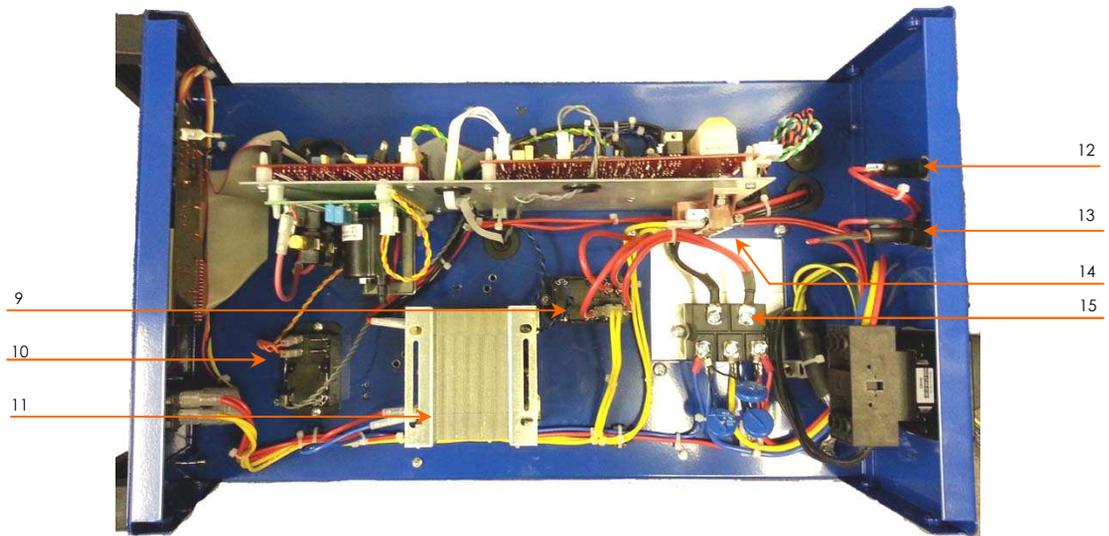
5.3.3 Annually

As per the three monthly schedule, plus :-

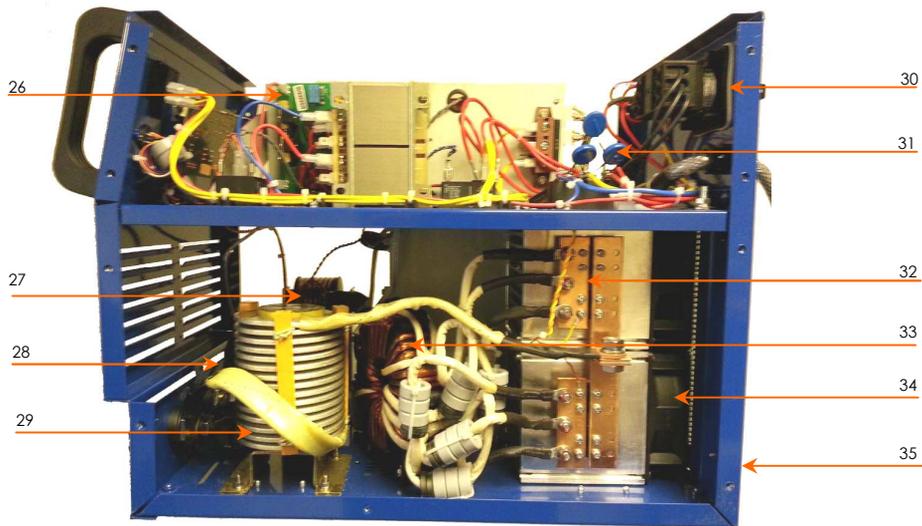
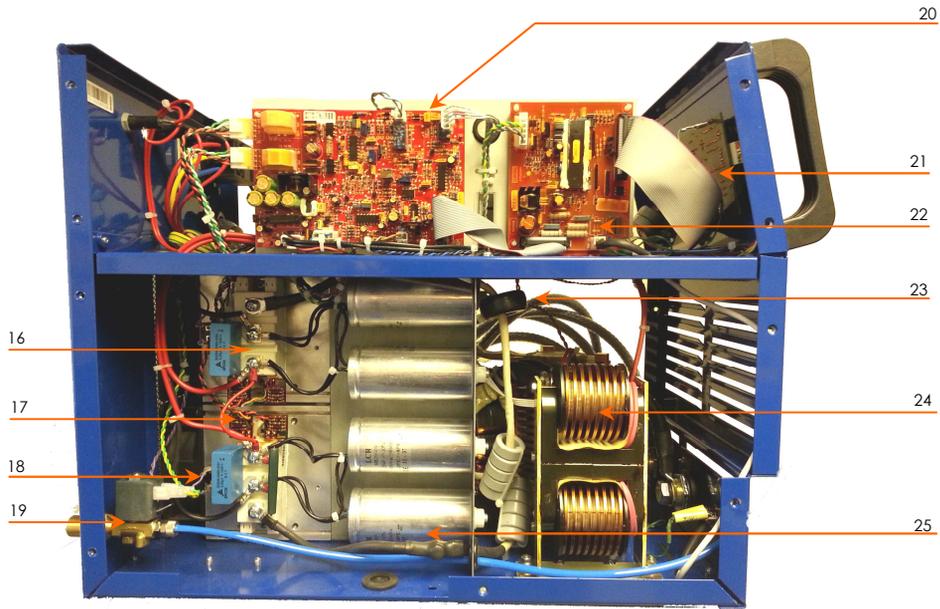
- The machines calibration should be checked, if necessary have the machine re-calibrated by a Newarc trained technician.

SECTION 7—PARTS BREAKDOWN

7.1 - Component Locations



7.1 - Component Locations



SECTION 7—PARTS BREAKDOWN

7.2 - Parts list for RT5000/4000

Item no.	Description	Part Number
1	Bridge handle (2 per machine)	M01084
2	Front panel bridge handle (2 per machine)	M01393
3	20mm diameter knob (4 per machine)	M00033A
4	Torch switch socket assembly	M90790
5	Gas quick connector	M00957
6	Standby switch	M70069A
7	Remote socket assembly	M90762B
8	50 / 70 panel mount Dix socket (2 per machine)	M00547
9	Soft start relay	M70026
10	HF Relay	M70026
11	Auxiliary transformer	M01408
12	Fuse holder Fuse 6.3A slow blow, 20 x 5mm glass body	M00273 M00379
13	Fuse holder Fuse 3.15A slow blow, 32 x 6.3mm ceramic body	M01088/89 M00020A
14	Soft start resistor assembly	M90765
15	Diode bridge	M60057
16	IGBT (2 per machine) RT4000 RT5000	M60245 M60229
17	IGBT gate drive assembly (1 per machine)	M90843
18	Thermostat (2 per machine)	M00332/80V
19	Gas Valve Assembly Up to serial number NCL0009811 From serial number NCL0009812	M90183/TIG M90175
20	Control PCB RT4000 RT5000	M90744-RT4000 M90744-RT5000
21	Display PCB (RT4000 & RT5000)	M90651/RT4000
22	TIG PCB RT4000 RT5000	M90650-RT4000 M90650-RT5000
23	Current Transducer	M01083
24	HF Transformer	M01126
25	Capacitor Assembly	M90456
26	HF PCB	M91154
27	Current transducer	M60112
28	De-coupling capacitor	M90818
29	Main inductor (Quote serial number of the machine when ordering for correct part) RT4000 RT4000 RT5000 RT5000	M01094 M10105 M01094 M10106
30	Mains Switch — 3 phase power	M70071
31	Filter Capacitor assembly (3 per machine)	M91123
32	Diode module (4 per machine)	M60121
33	Main transformer (Quote serial number of the machine when ordering for correct part) RT4000 RT4000 RT5000 RT5000	M01093 M10102 M00878 M10103
34	Cooling fan (2 per machine)	M00371
35	Rear filter grill assembly	M91157

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



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Waiver

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