

RT2000



Description

MMA/TIG unit

Processes



Important Information

All persons authorised to use, repair or service the RT2000 Inverter based welding machine 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 08/14

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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 made available to the welder. If in doubt do not proceed.

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 flame retardant 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 breathing apparatus approved for the purpose.

Electric Shock

Note! Electric shocks can be Fatal

- Do not touch live electrical parts.
- Do not work in wet or excessively humid areas and do not site the RT2000 on a wet surface.
- Avoid touching the work piece whilst welding.
- Do not use the RT2000 without it's protective cover.
- Keep your clothing and body dry.

The safe handling of gas cylinders

The RT2000 uses argon gas during TIG welding. This is an inert gases 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.
- Check the gas cylinder, pressure regulator and gas hoses regularly for leaks and discard any suspect item.
- Do not try to directly connect a gas cylinder to the RT2000 without using a pressure-reducing regulator designed for use with argon.
- Do not use gas cylinders whose contents you are unsure of.
- The cylinder must be securely fastened to a wall or placed in a specially designed cylinder carrier.
- Always turn off the valve on the gas cylinder when you have finished welding.
- 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.

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 RT2000 is a 200 amp (150 amp on MMA) constant current TIG welding machine based on IGBT technology. The inverter drive circuitry operates above the audio frequency spectrum making the RT2000 virtually silent in operation.

The high operational frequency also means that the RT2000 is able to respond quickly to changing arc dynamics, making for a very smooth stable arc.

As well as TIG welding the RT2000 is capable of MMA welding with all types of electrodes within the current rating of the machine, normally up to 4mm.

The RT2000 is available in three versions, a 230v only, a 110v only and a 115/230v auto switching Dual Voltage version.

2.2 Advanced Features

Latest generation IGBT technology.

The RT2000 uses the latest generation IGBT power modules, these have lower running losses thereby increasing the duty cycle of the machine and increasing reliability.

Initial soft-start operation.

The output power is inhibited until the reservoir capacitors have charged up to full value. This reduces the stress on the internal components at the crucial switch on period.

Powerful electronic arc ignition

The advanced arc ignition system contains no moving parts or spark gap providing long term reliability even in humid conditions.

2.3 Technical Specification

Technical data		
Rated Supply Voltage		230 volts single phase (230V, or DV version) 115 volts single phase (115V or DV version)
Power Consumption		5.1 KVA
Supply Current	230v	27.5 amps
	115v	44 amps
Mains Input Fuse	230v	28 amp s slow blow or type C MCB
	115v	45 amps slow blow or type C MCB
Mains Cable	230v	3 x 2.5mm ² flexible cable
	115v	3 x 4mm ² flexible cable
Output Current Range	TIG	5-200 amps
	MMA	5-150 amps
Duty Cycle at 40°C	TIG	70%
	MMA	100%
Insulation Class		F
Degree of Protection		IP21
H x W x L (mm)		350 x 150 x 420
Weight (kg)		19

3.1 Siting the RT2000

- Site the RT2000 on a clean dry surface, preferably above ground level.
- Make sure there is at least 20cm clearance at the front, rear and sides 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 are not covered under warranty.

3.2 Connecting to mains supply

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

Note! The Dual Voltage version of the machine is fitted with circuitry that 'senses' the mains voltage it is connected to and automatically configures the machine. This requires no changing of tapping points inside the machine or intervention on the operators part, just fit the relevant type of mains plug for the supply the machine is to be used on.

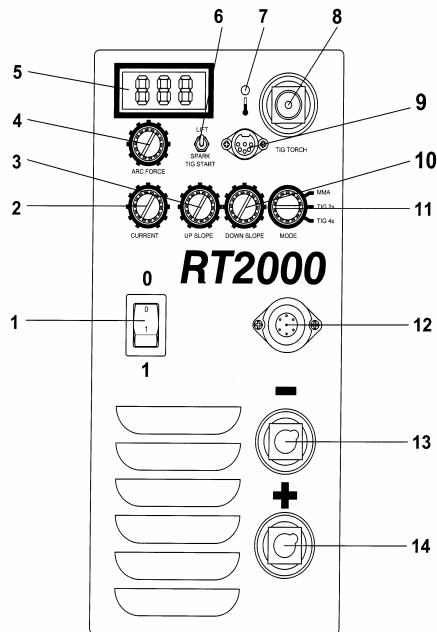
- Make sure that the mains supply is of the correct voltage and current capability for the machine.
- Make sure that the mains cable and any extension cables used are of sufficient current carrying capacity.
- Make sure that the mains plug and socket (if fitted) are in good condition. If the machine 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 extension 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 when you are welding as this will reduce the input voltage to the machine and may cause overheating and degradation of the cable.

4.1 Operational Controls and Connections



4.2 Description of controls

1 On-Off switch

Switches the machine on and off. Upon switching on the overload indicator will light and the machines output will be inhibited, after 15 seconds the overload indicator will extinguish and the machine is ready for use.

Note: Post gas time. For a 5 seconds period after switching on the post gas value is displayed as **P#** (The # value is the set post-gas time) with the possibility to change the post-gas time by repeatedly pressing the torch switch button. Every torch switch press the post gas time is incremented by 1 second (from 0-30 seconds).

This setting is saved therefore it does not need re-setting each time the machine is switched on.

2 Current control

Use this to set the output current of the RT2000.

3 Slope up control

With the slope up control set to minimum the RT2000 will strike at the current set by the current control. With the slope up control set to anywhere but minimum the RT2000 will strike at 5A 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 Arc-force control

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

5 Digital display

Gives an accurate indication of the welding current. Displays **HU** (High voltage) when HF spark start is activated. Display the set value of post-gas **P#**. The display also displays the setting values of slope up & slope down when been adjusted.

6 Lift/Spark start selector switch

Switches the machine into either 'HF start' or 'lift TIG' operation. In HF start the arc is initiated by a high voltage spark at the Tungsten's tip. In lift TIG touch the Tungsten to the work-piece, press the torch switch then lift the Tungsten to the welding position, the arc will initiate.

7 Thermal cut-out indicator

Indicates that the thermal cut-out in the machine has operated. (see paragraph 5.1 in the fault finding and maintenance section for possible reasons).

8 Power/Gas outlet connector.

For connection of a TIG torch with a combined power and gas lead. If a TIG torch with a separate power lead and gas hose is used, an adapter must be used to connect to this outlet.

9 TIG torch switch connector.

For connecting the TIG torch switch lead.

10 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, whereby the current will extinguish, the time this takes is determined by the position of the slope down control.

11 Mode switch

This control switches the RT2000's welding mode.

MMA sets the machine in MMA mode.

TIG 2s sets the machine in 'normal' TIG mode, whereby pressing the TIG torch switch initiates the arc and releasing it will extinguish the arc (at the end of any slope down period set).

TIG 4s sets the machine in 'latch' TIG mode, whereby pressing the torch switch and releasing it initiates the arc, pressing and releasing it again will extinguish the arc (at the end of any slope down period set).

Note: Post gas time. When switching from MMA to TIG modes For a 5 seconds period after switching modes the post gas value is displayed as **P#** (The # value is the set post-gas time) with the possibility to change the post-gas time by repeatedly pressing the torch switch button. Every torch switch press the post gas time is incremented by 1 second (from 0-30 seconds).

This setting is saved therefore it does not need re-setting each time the machine is switched on.

12 Remote control socket

For connecting external remote control units, these are the RC300 remote control, the RPC300 pulse unit and the RFP300 foot pedal. There is no switch for remote operation, plugging an external unit into the socket automatically selects remote operation and disables the internal current control.

13 Negative weld out connector.

Main welding power output connector, negative polarity.

14 Positive weld out connector

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 mode switch to 'MMA', the machine is now in MMA mode.
- Turn the mains switch to the on position, the digital display and the overload indicator will light. After approximately 15 seconds the overload indicator will extinguish and the machine is ready to weld.
- While reading the digital display, adjust the current control to the recommended setting for the size and type of welding electrode to be used.
- When welding, adjust the Arc-force control to achieve the arc condition you require.
- The RT2000 is suitable for welding all types of electrodes within the current rating of the machine, normally up to 3.2 or 4mm depending on the type of rod.

The RT2000 should never be used with arc-air gouging or cutting electrodes.

4.3.2 TIG Welding

- Connect a hose suitable for use with pure Argon at a pressure of up to 10 bar (150psi) between the regulator on the gas cylinder and the gas in connection on the rear panel of the machine. Turn the gas cylinder valve and the regulator on and adjust the regulator to give a working pressure between 3 and 5 bar. (see page 4 for more information).
- Connect the TIG torch power/gas lead to the TIG torch power/gas connector and the switch lead to the torch switch socket.
- Connect the earth return lead to the +ve weld terminal.
- Turn the mode switch to '2s' or '4s'.(see relevant paragraph in section 4.2 Description of controls for more information on the setting of this control).
- Turn the Up slope and Down slope controls to the settings required. (see relevant paragraph in section 4.2 Description of controls for more information on the setting of this control).
- Turn the on/off switch to the on position, the digital display and the overload indicator will light up. After approximately 15 seconds the overload indicator will extinguish and the machine is ready to weld.
- While reading the digital display, adjust the current control to the required setting for the work being undertaken.

5.1 Machine operation

Most problems with the operation of the RT2000 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 turned on.
- Have a competent electrician check that there are no 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.
- If all the above appear satisfactory have a competent maintenance engineer check the fuses inside the machine. The relevant one in this case is on the TIG control PCB. This PCB is located at the top left hand side of the machine. The fuse is located on the bottom of the PCB towards the rear of the machine. The fuse rating is 2 amp, quick blow..

Digital display lit but no output on MMA.

- Make sure the mode switch is in the MMA position.
- Make sure that the overload indicator goes off after 15 seconds. If not see paragraph 'thermal cut-out indicator' below.
- If all the above appear satisfactory, have a competent maintenance engineer check the fuses inside the machine. The relevant one in this case is on the Main control PCB. This PCB is located at the top right hand side of the machine. The fuse is located on the top of the PCB halfway along its length.. The fuse rating is 2 amp, quick blow.

Output on MMA but not on TIG.

- Check to see if gas flows when the torch switch is pressed, if not, check that the torch switch lead is in good condition, that there are no breaks in the cable and the wires in the plug and torch switch are still securely attached. Check that the torch switch plug is connected properly.
- If gas flow is present, check the machine works in 'lift TIG' mode to determine whether the problem is in the TIG welding mode or that just the HF is not working.

No HF operation.

- have a competent maintenance engineer check the fuse on the HF PCB. This PCB is located in the 'U' channel on the top of the machine. The fuse is located near the top of the PCB toward the front of the machine. The fuse rating is 2 amp, quick blow.

Thermal cut-out indicator lit

This indicator must be off for normal operation. If on it indicates that the RT2000 has overheated and the power stages of the RT2000 have been shut down so you will get no current output.

In normal climate conditions (below 25°C) the RT2000 has a 100% duty cycle, so operation of the thermal cut out indicates that the inside of the machine is likely choked with dust and therefore not being cooled properly.

In Hot climates (above 25°C) It indicates that you are exceeding the duty cycle of the RT2000, leave switched on for a few minutes and the RT2000 will return to normal operation. In this circumstance, do not switch the RT2000 off as this will stop the operation of the cooling fan and greatly extend the cool down period. Frequent tripping of the thermal cut-out, especially at low current settings is indicative that the inside of the machine is probably choked with dust.

For information about cleaning the dust out of the RT2000 please refer to the relevant part of section 5.3.2 the three monthly service schedule.

Any operating problems not covered above means the RT2000 must be checked by a trained Newarc service engineer or returned to the factory for repair.

5.2 Welding Problems

MMA Welding Problems

If problems with the RT2000s operation while MMA welding are experienced, first refer to the information in paragraphs 3.2 in the installation section, paragraph 4.3.1 in the operating section and the fault finding procedure earlier in this section.

Most problems with the MMA welding procedure 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 waste material the same type and thickness as the job to be welded.

TIG Welding problems

If problems with the RT2000s operation while TIG welding are experienced, first refer to the information in paragraphs 3.2 in the installation section, paragraph 4.3.2 in the operating section and the fault finding procedure earlier in this 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 RT2000 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 RT2000 checked by a trained maintenance person.

5.3 Maintenance

Note! All Electric shocks are potentially fatal, switch the machine off and disconnect from the power supply before undertaking out any maintenance work.

- It is very important that the RT2000 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, welding output and power in connectors for damage and any sign of over-heating.
- Check the condition of the mains lead and plug.

5.3.2 Three monthly

As per the weekly schedule, plus:-

- Remove the side covers from the machine. Remove the build up of dust and debris from inside the machine, particularly from the Heat-sink extrusion, by use of either compressed air at reduced 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 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.

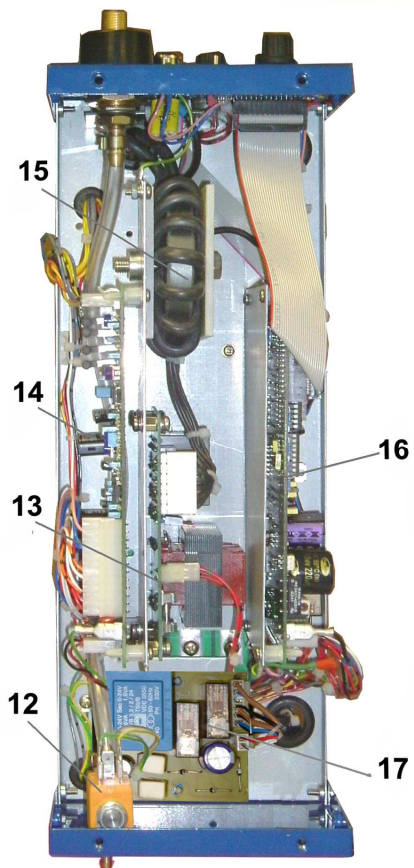
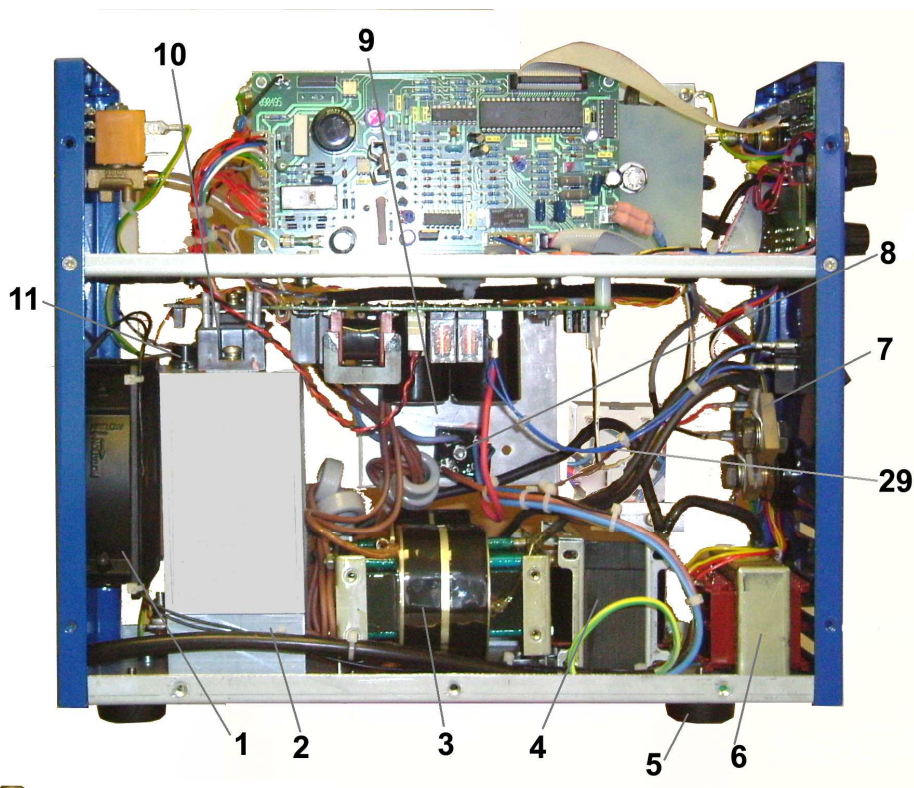
5.3.3 Annually

As per the three monthly schedule, plus :-

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

SECTION 6 — PARTS BREAKDOWN

6.1 Parts Locations



SECTION 6 — PARTS BREAKDOWN

6.2 RT2000 Parts list

Item no.	Description	Part No.
1	Cooling fan (230Vac)	M00311A
2	Diode modules (behind bracket) (2 per machine)	M60121
3	Main Transformer	M90136A
4	Secondary Inductor	M90133
5	Plastic feet (4 per machine)	M00096
6	Auxiliary transformer	M00305
7	200A Shunt	M00309
8	Diode Bridge (2 per machine)	M60079
9	Main Power PCB 230V model only Main Power PCB 110V & Dual voltage models	M90125/1 M90148/1
10	IGBT Module	M60074
11	Thermostat	M00332/80
12	Gas solenoid valve	M00024A
13	HF PCB	M90193-RT2000
14	Control PCB	M90127-RT2000
15	HF Inductor	M90411
16	TIG PCB	M90132/New-RT2000
17	Auto-switching PCB (Dual voltage model only)	M90691
18	Rocker switch	M70069A
19	Control/switch PCB	M90080-RT2000
20	Arc force control potentiometer	M20099
21	Control knobs (5 per machine)	M00033A
22	Digital display assembly	M90003-RT2000
23	Lift/HF selector switch	M70057
24	TIG torch power/gas connector	M00041
25	TIG torch switch socket assembly	M90098/NEWTIG
26	Remote control socket assembly	M90130
27&28	Panel mount Dix type socket (2 per machine)	M00037
29	24v relay (dual voltage model only)	M70026
Misc.	2 amp, 20mm fuse links (Quick blow)	M00274



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