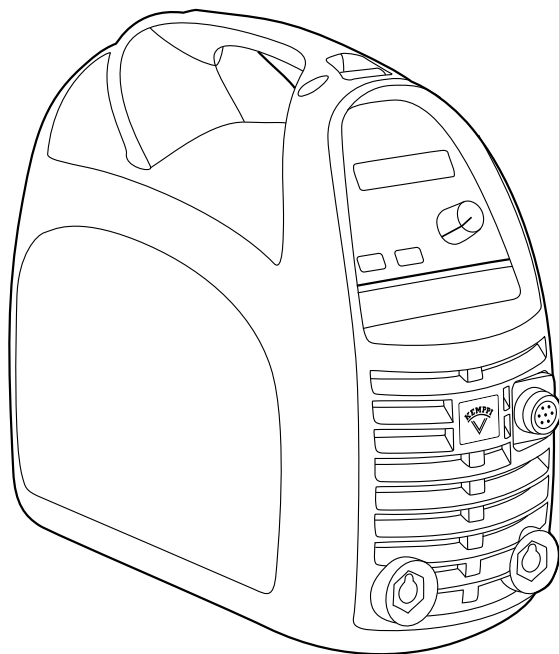


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Käyttöohje • Suomi
Bruksanvisning • Svenska
Bruksanvisning • Norsk
Brugsanvisning • Dansk
Operating manual • English
Gebrauchsanweisung • Deutsch
Gebruiksaanwijzing • Nederlands
Manuel d'utilisation • Français
Manual de instrucciones • Español
Instrukcja obsługi • Polski
Инструкции по эксплуатации • По-русски

MINARC™

220



FI

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KEMPPI
The Joy of Welding

www.kemppi.com

OPERATING MANUAL

English

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1. PREFACE

Congratulations on purchasing the Kemppi Minarc™ 220 welding solution. Minarc™ 220 is a solid and sturdy welding solution designed for professional use. With proper use, it serves you long and reliably.

NOTE! Items in the manual that require particular attention in order to minimise damage and personal harm are indicated with this symbol. Read these sections carefully and follow their instructions.

1.1 SAFETY INSTRUCTIONS

Kemppi welding devices conform to international safety standards. Safety is an important issue in equipment design and manufacturing. Therefore, Kemppi welding solutions are unparalleled in safety. There are, however, always certain hazards involved in using welding equipment. Therefore, to ensure your personal safety and the safety of your working environment, carefully read the safety instructions below and respect them.

Use of personal protective equipment

- The arc and its reflecting radiation damage unprotected eyes. Shield your eyes and face appropriately before you start welding or observe welding. Also note the different requirements for the darkness of the screen in the mask as the welding current changes.
- The arc radiation and spatters burn unprotected skin. Always wear protective gloves, clothing and footwear when welding.
- Always wear hearing protection if the ambient noise level exceeds the allowable limit (e.g., 85 dB(A)).

General operating safety

- Exercise caution when handling parts heated in welding. For example, the tip of the welding torch, the end of the welding rod and the work piece will heat during gouging to a burning temperature.
- Never wear the device on the shoulder during welding and never suspend it by the carrying strap during welding.
- Do not expose the machine to high temperatures, as heat may cause damage to the machine.
- Keep the torch cable and earthing cable as close to each other as possible throughout their length. Straighten any loops in the cables. This minimises your exposure to harmful magnetic fields, which may interfere with a pacemaker, for example.
- Do not wrap the cables around the body.

- In environments classified as dangerous, only use S-marked welding devices with a safe open-circuit voltage level. These work environments include, for example, humid, hot or small spaces where the user may be directly exposed to the surrounding conductive pieces.

Spatter and fire safety

- Welding is always classified as hot work, so pay attention to fire safety regulations during welding and after it.
- Remember that fire can break out from sparks even several hours after the welding work is completed.
- Protect the environment from welding spatter. Remove flammable materials, such as flammable fluids, from the welding vicinity and supply the welding site with adequate fire fighting equipment.
- In special welding jobs, be prepared for hazards such as fire or explosion when welding container-type work pieces.
- Never direct the spark spray or cutting spray of a grinder toward the welding machine or flammable materials.
- Beware of hot objects or spatter falling on the machine when working above the machine.
- Welding in flammable or explosive sites is absolutely forbidden.

General electric safety

- Only connect the welding machine to an earthed electric network.
- Note the recommended mains fuse size.
- Do not take the welding machine inside a container, vehicle or similar work piece.
- Do not place the welding machine on a wet surface and do not work on a wet surface.
- Do not allow the mains cable to be directly exposed to water.
- Ensure cables or welding torches are not squashed by heavy objects and that they are not exposed to sharp edges or a hot work piece.
- Make sure that faulty and damaged welding torches are changed immediately as they can be lethal and may cause electrocution or fire.
- Remember that the cable, plugs and other electric devices may be installed or replaced only by an electrical contractor or engineer authorised to perform such operations.
- Always turn off the welding machine when not used.

Welding power circuit

- Insulate yourself from the welding circuit by using dry and undamaged protective clothing.
- Never touch the work piece and welding rod, welding wire, welding electrode or contact tip at the same time.

- Do not put the welding torch or ground cable on the welding machine or other electric equipment.

Welding fumes

- Ensure proper ventilation and avoid inhaling the fumes.
- Ensure sufficient supply of fresh air, particularly in closed spaces. You can also ensure the supply of clean and sufficient breathing air by using a fresh-air mask.
- Take extra precautions when working on metals or surface-treated materials containing lead, cadmium, zinc, mercury or beryllium.

Transportation, lifting and suspension

- Never pull or lift the machine by the welding torch or other cables. Always use the lift points or handles designed for that purpose.
- Only use a transport unit designed for the equipment.
- Try to transport the machine in an upright position, if possible.
- Never lift a gas cylinder and the welding machine at the same time. There are separate provisions for gas cylinder transportation.
- Never use a welding machine when suspended unless the suspension device has been designed and approved for that particular purpose.
- Do not exceed the maximum allowed load of suspension beams or the transportation trolley of welding equipment.
- It is recommended that the wire coil be removed during lifting or transportation.

Environment

- Protect welding machines from heavy rain and direct sunshine even if it were suitable for outdoor use.
- Always store the machine in a dry and clean space.
- Protect the machine from sand and dust during use and in storage.
- The recommended operating temperature range is -20 to +40 °C. The machine's operation efficiency decreases and it becomes more prone to damage if used in temperatures in excess of 40 °C.
- Place the machine so that it is not exposed to hot surfaces, sparks or spatter.
- Make sure the airflow to and from the machine is unrestricted.
- This electromagnetic compatibility (EMC) of professional equipment is usually designed for industrial use. Such class-A equipment is not intended for use in residential locations where the electrical power is provided by the public low-voltage supply system. The machine may interfere with sensitive home electronic devices.

Gas bottles and pneumatic devices

- Adhere to the instructions for handling pneumatic devices and gas bottles.
- Make sure that gas bottles are used and stored in properly ventilated spaces. A leaking gas bottle may replace the oxygen in the inhaled air, causing suffocation.
- Before use, make sure that the gas bottle contains gas suitable for the intended purpose.
- Always fix the gas cylinder securely in an upright position, against a cylinder wall rack or purpose-made cylinder cart.
- Never move a protective gas bottle when the flow adjuster is in place. Put the valve cover in place during transportation.
- Close the cylinder valve after use.

1.2 MACHINE PROPERTIES

The Minarc™ 220 is intended for use in a three-phase electric network. It is designed to be a compact and efficient direct current MMA/TIG machine. Extremely light in weight for its high 220 A output power, the machine is easy to carry to the work place with either the inbuilt moulded carry handle or the shoulder strap provided.

1.3 ABOUT WELDING

Minarc™ 220 provides high quality welding results time after time provided the correct operational procedures are followed. Welding quality is not only influenced by the machine itself. Personal expertise, ancillary equipment and consumables also play an essential role, as does the correct, fused supply power. Welding is carried out when an electric arc is established between the welding electrode and work piece. Welding is not possible unless the equipment is correctly set-up, including the earthing cable attached to the work piece. This cable creates the welding circuit that allows the welding current to flow. Please check the earthing clamp is on the work piece to be welded, and that the area of the clamps contact is clean and free from paint.

MMA Welding

The MMA is a simple welding process. A coated MMA electrode is short circuited to the work piece and the resulting electric arc creates a molten pool into which the electrode wire melts. The coating around the electrode burns to create a protective gaseous atmosphere and slag, which directly protects the molten weld pool from atmospheric contamination. The slag floats on the molten weld pool and solidifies on the surface of the resulting weld bead, protecting the cooling weld.

The electrode is moved slowly along the weld seam. The travel speed is directly proportional to the size of the electrode and welding current selected. The slag is finally removed with a chipping hammer to reveal the weld (always use eye protection).

TIG Welding

In TIG welding, the welding arc is formed between a non-consumable tungsten electrode and the work piece. The resulting high temperature arc melts the work piece to form a molten pool, into which filler wire of a similar alloy composition is slowly melted. The molten weld pool and filler wire are protected from the harmful effects of atmospheric contamination by an inert shielding gas that flows out from the TIG welding torch's ceramic nozzle at a rate of approximately 8–15 litres per minute. (Gas regulator, flow meter and pure argon shielding gas are not provided in this package.)

2. MACHINE USE

2.1 BEFORE COMMISSIONING THE MACHINE

Minarc™ 220 is packed in sturdy, custom-made packaging. However, always ensure that the equipment has not been damaged in transportation. Even so, make sure that all in-transport damage is reported to the machine supplier. Do not unpack the machine under these circumstances. In addition, before commissioning, check that you have received all of the items you ordered along with their operating instructions.

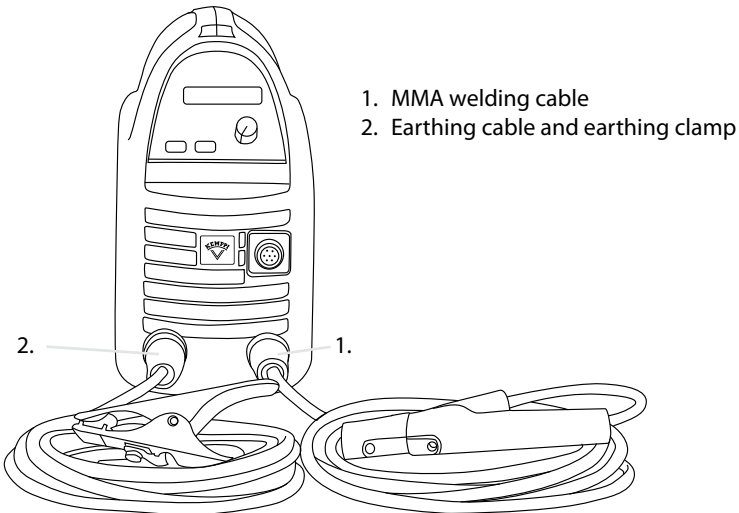
Transportation

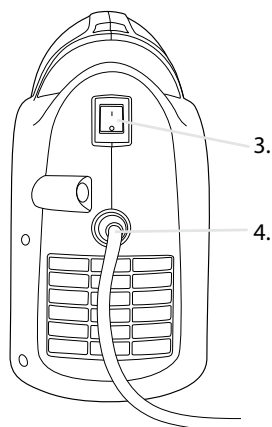
The machine should be transported in an upright position.

Environment

The machine is suitable for both indoor and outdoor use. In outdoor use, protect it from heavy rain and sunshine. Store the machine in a dry and clean environment and protect it from sand and dust during use and storage. The recommended operating temperature range is -20 to +40 degrees centigrade. Site the machine so that it does not come into contact with hot surfaces, sparks and welding spatter. Make sure the airflow to and from the machine is unrestricted.

2.2 GENERAL VIEW OF THE MACHINE





- 3. Main switch
- 4. Mains cable

2.3 CABLE CONNECTIONS

Connection to mains

Minarc™ 220 is delivered with a five-metre mains cable that does not have a plug.

NOTE! Check the fuse size in *Technical specifications*. The plug may be installed only by electrical contractors and installers authorised to perform such operations.

If you use an extension power supply cord, its cross sectional area should be at least as large as the supply voltage cable fitted to the machine. The maximum length for the extension cable is 50 m.

Restrictions on generator type and power may apply in generator use. Fault-free operation of the machine requires a sufficiently high-power generator. The power recommendation is more than 15 kVA.

Earthing cable

Connect the earthing cable to the negative pole in MMA welding, and to the positive pole in TIG welding.

Before you start welding, clean the work piece surface and fix the earth return clamp to the work piece in order to create a closed and interference free welding circuit.

Shielding gas

In TIG welding, shielding gas is used to prevent atmospheric contamination of the molten weld pool and cooling weld. Normally, the shielding gas is argon (Ar). Normally the gas flow rate is approximately 8–15 litres per minute, but this can vary according to the welding current used and the size of gas nozzle.

2.4 WELDING POWER SELECTION AND ELECTRODES

MMA welding electrodes

In MMA welding, the welding electrodes must be connected to the correct pole. Normally, the electrode holder is connected to the positive and the earthing cable to the negative connector.

It is also important to properly adjust the welding current so that the filler material and coating will melt properly and the welding is efficient. The table below presents the electrode sizes available with the Minarc™ 220 welding machine and the corresponding welding current values.

MMA Electrodes and corresponding current settings range

Electrode diameter	1.6 mm	2.0 mm	2.5 mm	3.25 mm	4.0 mm	5.0 mm
Fe-Rutile	30-60 A	40-80 A	50-110 A	80-150 A	120-210 A	170-220 A
Fe-Basic	30-55 A	50-80 A	80-110 A	110-150 A	140-200 A	200-220 A

TIG welding electrodes and gas nozzles

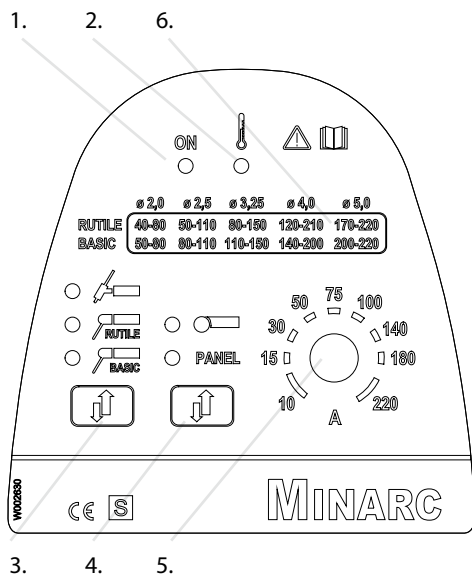
In DC TIG welding we recommend the use of the WC20 (grey) type electrode, however other types are available.

The welding electrode size (diameter) is selected depending on the welding current/power to be used. An electrode with an insufficient diameter compared to the welding current will melt, while excessive electrode size will make it more difficult to ignite the arc.

Generally speaking, a 1.6 mm tungsten electrode will cover currents up to 150 A, and 2.4 mm tungsten electrode up to 250 A DC current.

Before use, grind the tungsten electrode to a sharp point at approximately 1.5 times the diameter of the electrode.

2.5 FUNCTION CONTROLS AND INDICATOR LIGHTS



- 3.
- 4.
- 5.
1. Standby indicator. In the VRD version, a VRD safe indicator (see The VRD feature)
2. Overheating indicator.
3. Welding process selection button (MMA or TIG).
4. Current adjustment selector: panel adjustment or hand-held remote control.
5. Welding current control knob.
6. Welding value table

Switching the machine on

When you power on the machine, the green standby indicator and the main switch are lit.

If the machine overheats or the supply voltage is too high or too low, the welding operation automatically switches off, and the yellow overheating indicator is illuminated. The light switches off again, when the machine is ready for operation. Make sure that there is enough space around the machine to allow the air to freely circulate and flow into and out off the machine.

2.5.1 Welding current regulation and remote control

The welding current can be adjusted steplessly with the control knob, if panel adjustment (PANEL) is selected.

If you want to adjust the welding current with the remote control, connect the remote control to the machine and then select remote control with the current adjustment selector (4). Supported remote control units are the R10 or the RTC10 of the TTV 220 GV TIG torch.

2.5.2 MMA welding settings

MMA welding is selected when the indicator next to either of the electrode symbols is lit. The options are RUTILE or BASIC. If needed, press the process selection button to select the MMA process (3). The machine automatically sets suitable values to the ignition time, ignition pulse and arc dynamics based on the rutile/basic selection.

2.5.3 TIG welding function

Select the TIG welding process by pressing the process selection button (3).

Ignition with switch control (TTC 220 GV torch)

When using the TTC 220 GV torch, the TIG arc can be ignited with switch control. Gently touch the work piece with the electrode, then press the torch switch while quickly lifting the electrode off the work piece. This will ignite the arc quickly and efficiently. To stop welding, release the switch, which will stop the current and turn off the torch voltage.

Ignition by scratch-start (other than TTC 220 GV torch)

You can also ignite a TIG arc with the scratch-start method. Gently touch the work piece with the electrode and quickly lift the electrode from the work piece to a suitable welding distance to ignite the arc. To stop welding, quickly pull the electrode away from the work piece.

NOTE! The torch voltage will remain on.

2.5.4 The VRD feature

The VRD model of the Minarc 220 contains a voltage reduction device, which reduces the open-circuit voltage below 35 V. This reduces the risk of electric shock in particularly dangerous environments, such as closed or damp spaces.

5. MAINTENANCE

All electromechanical devices require routine service maintenance depending on usage. This type of routine maintenance will prevent hazards and malfunctions.

We recommend that you schedule a service inspection of your welding machine every six months. An authorised Kemppi service agent will inspect and clean your machine, ensuring that all power connections are tight and secure. Power connections can become loose and oxidised with frequent and high changes in temperature.

***NOTE!** Disconnect the machine from the mains power supply before handling electric cables.*

5.1 DAILY MAINTENANCE

- Check the welding torch electrode. Sharpen the electrode or replace a damaged one.
- Check the tightness of the earthing cable connections.
- Check the condition of mains and welding cables and replace damaged cables.

5.2 DISPOSAL



Do not dispose of electrical equipment with normal waste!

In observance of European Directive 2002/96/EC on waste electrical and electronic equipment, and its implementation in accordance with national law, electrical equipment that has reached the end of its life must be collected separately and taken to an appropriate environmentally responsible recycling facility.

The owner of the equipment is obliged to deliver a decommissioned unit to a regional collection centre, per the instructions of local authorities or a Kemppi representative. By applying this European Directive you will improve the environment and human health.

6. ORDERING NUMBERS

Product		Part number
Minarc™ 220		6102220
Minarc™ 220 VRD	Reduced open-circuit voltage 30 V	6102220VRD
Cables		
Welding cable	16 mm ² 5 m	6184103
Welding cable	25 mm ² 5 m	6184201
Welding cable	25 mm ² 10 m	6184202
Earthing cable	16 mm ² 5 m	6184113
Earthing cable	25 mm ² 5 m	6184211
Earthing cable	25 mm ² 10 m	6184212
TIG torches		
TTC 220GV	Switch control and RTC10 remote	627022304
TTM 15 BC	Scratch-start	627143201
Remote control units		
R 10	5 m	6185409
R 10	10 m	618540901
RTC10		6185477
Other accessories		
Gas flow gauge AR/clock		6265136
Carrying straps		9592162
Supply voltage cable		W002982

7. TROUBLESHOOTING

Problem	Cause
The main switch indicator will not light up	No electricity connected to the machine <ul style="list-style-type: none">• Check the mains supply fuses.• Check the mains cable and plug.
Poor welding result	Several factors affect the welding quality. <ul style="list-style-type: none">• Check that the earthing clamp is firmly attached, the point of attachment is clean and that the cable and its connectors are intact.• Check that the shielding gas flows out of the torch tip.• Check that the electric voltage is not irregular or too low/high.
Overheating indicator lit	The device has overheated. <ul style="list-style-type: none">• Ensure that cooling air has unrestricted flow.• If the machine's duty cycle has been exceeded, wait for indicator to turn off.• Too low or high supply voltage.

If the machine's malfunction is not eliminated with these measures, contact KEMPPI service.

8. TECHNICAL DATA

The machine complies with the requirements for the CE label.

Minarc™ 220			
Mains voltage			3 ~ 400 V -20 %... +15 %, 50/60 Hz
Rated power	TIG		7.2 kVA (220 A/18,8 V)
	MMA		8.2 kVA (220 A/28,8 V)
Connection cable/fuse			5 × 1.5 mm ² S-5 m /10 A delayed
Load capacity 40 °C	MMA	35 % ED	220 A/28.8 V
		100 % ED	150 A/26.0 V
	TIG	35 % ED	220 A/18.8 V
		100 % ED	160 A/16.4 V
Welding range	MMA		10 A/20.4 V – 220 A/28.8 V
	TIG		10 A/10.4 V – 220 A/18.8 V
Open circuit voltage	MMA		85 V (30 V in the VRD version)
	TIG		60 V (30 V in the VRD version)
Idle power	MMA		40 W
Power ratio at max. current	TIG		0.92
	MMA		0.91
Efficiency at max. current	TIG		0.80
	MMA		0.86
MMA welding electrodes	MMA		Ø 1.5–5.0 mm
External dimensions (L × W × H)			400 × 180 × 340
Weight			9.2 kg (10.2 kg with connector cable)
Temperature class			H (B)
Degree of protection			IP23C
Operating temperature range			-20 °C ... +40 °C
Storage temperature range			-40 °C ... +60 °C
Recommended generator			> 15 kVA

9. WARRANTY POLICY

Kemppi Oy provides a warranty for products manufactured and sold by the company if defects in materials or workmanship occur. Warranty repairs are to be carried out only by an authorised Kemppi Service Agent. Packing, shipping, and insurance are at the orderer's expense.

The warranty starts on the date of purchase. Spoken promises not included in the terms of warranty are not binding on the warrantor.

Limitations of the warranty

The following conditions are not covered under the terms of warranty: defects arising from normal wear and tear, non-compliance with operation and maintenance instructions, overloading, negligence, connection to incorrect or faulty supply voltage (including voltage surges outside equipment specifications), incorrect gas pressure, anomalies or failures in the electric network, transport or storage damage, and fire or damage due to forces of nature. This warranty does not cover direct or indirect travel costs, daily allowances, or accommodation related to warranty service.

The warranty does not cover welding torches and their consumables, feeder drive rolls,

and feeder guide tubes. Direct or indirect damage caused by a defective product is not covered under the warranty.

The warranty becomes void if modifications are made to the machine that are not approved by the manufacturer or if non-original spare parts are used in repairs. The warranty is also voided if repairs are carried out by a repair agent not authorised by Kemppi.

Undertaking warranty repairs

Warranty defects must be reported to Kemppi or an authorised Kemppi Service Agent without delay.

Before a warranty repair is undertaken, the customer must present proof of warranty or otherwise prove the validity of the warranty in writing. The proof must indicate the date of purchase and the manufacturing number of the unit to be repaired. The parts replaced under the terms of this warranty remain the property of Kemppi and must be returned to Kemppi if requested.

After a warranty repair, the warranty of the machine or equipment, repaired or replaced, shall be continued to the end of the original warranty period.

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