HAKAS®
PLUSMMA 160

OPERATING MANUAL • ENGLISH

HAKAS®

CONTENTS

CONGRATULATIONS OF YOUR NEW HAKAS® WELDING MACHINE

You have made a great choice by selecting a genuine, original HAKAS welding machine. HAKAS portable welding machines are designed for easy, hassle-free, and high-quality welding.

The first HAKAS welding machine was delivered to a customer in 1972. Since then, HAKAS has been known for its welding machines, which combine high-quality welds with excellent performance and durability.

Your HAKAS welding machine comes with the most comprehensive warranty on the market. Review the warranty terms and register your warranty within 30 days of purchasing your welding machine. Our extensive service and dealer network is here to serve you and help keep your welding machine in like-new condition by providing the maintenance and repairs it needs. You can find the location of your nearest service center on our website at www.hakas.fi.

Please read this user manual carefully. It will guide you in the proper use of your welding machine and also highlight the hazards associated with its use. We want to provide you with the best user experience for easy, hassle-free, and high-quality welding work. When used correctly, your new HAKAS welding machine will provide high-quality welds for years to come.

By choosing this HAKAS welding machine, we believe it will meet your welding needs not only now but for years to come.

User Manual

HAKAS PLUSMMA 160

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1. INTRODUCTION

1.1 General

You have made a good choice by selecting a genuine and original HAKAS welding machine. HAKAS welding machines are designed for easy, efficient, and high-quality welding work. When used correctly, your welding machine will provide reliable performance and high-quality results for many years.

This user manual provides important information, general instructions, and safety warnings related to the use, operation, maintenance, and servicing of your new welding machine. Please read this manual carefully before commissioning the equipment and starting welding.

The purpose of this manual is not to train the user to become a welder, nor does it serve as a complete service manual. Instead, it is intended as a reference guide for trained and qualified users of welding equipment

NOTE
Familiarize yourself with this manual before using or maintaining your welding machine. After reading, store it in a dry place near the machine for future reference. The manual must accompany the machine throughout its entire service life.

More information about HAKAS® products, including compatible accessories, spare parts, and consumables for this welding machine, is available at:

www.hakas.fi

To ensure long-term reliability and performance, use only original HAKAS ORIGINAL™ spare parts, accessories, and consumables. Full availability can be found on the website above.

1.2 Equipment Features

The HAKAS PLUSMMA 160 welding machine has been designed to make welding work as simple and effortless as possible. It is intended for MMA (stick) and LIFT TIG DC welding of steel, aluminium, stainless steel, and acid-resistant steel. The machine is designed for operation on a single-phase electrical supply.

Weighing only 4.8 kg, the unit is compact and easy to transport using its integrated carrying handle. An optional accessory, the HAKAS YELLOWTAXI™ two-wheel transport trolley, is available to simplify transportation and storage of both the machine and welding accessories.

The HAKAS PLUSMMA 160 is suitable for most electrodes with diameters ranging from 1.6 mm to 4.0 mm. It provides a stable arc and excellent welding characteristics.

Key features include:

> **HOT START**: An electronically controlled ignition pulse ensures easy arc ignition
> **ARC FORCE**: Stabilizes the arc during welding
> **ANTI-STICK**: Automatically cuts current if the electrode sticks, preventing damage and allowing reuse

The machine is also suitable for generator use. Refer to the technical specifications for generator size requirements based on electrode size. The unit is protected against voltage fluctuations of ±15% and includes overvoltage and undervoltage protection

NOTE
The welding machine is intended for welding purposes only. Use for any other purpose is strictly prohibited and may result in equipment damage or personal injury.

1.3 Intended Use and Welding Basics

When used correctly, the HAKAS PLUSMMA 160 provides high-quality welding results across all supported processes: MMA (stick) and Lift TIG.

The final welding result depends not only on the machine, but also on:

> the operator's experience
> available power supply
> selected consumables and accessories
> correct machine settings and adjustments

Welding is performed by creating an electric arc between the workpiece and the welding electrode. To establish a closed electrical circuit, a grounding cable must be securely attached to the workpiece.

The grounding point must be clean to ensure proper arc formation and consistent weld quality.

1.4 Main Components of the Welding Machine

This section introduces the HAKAS PLUSMMA 160 welding machine.

Illustrations referenced in this section are used throughout the manual. Please note that images are for reference only. The actual contents of purchased welding machine package and appearance of your machine may differ from those shown.

Always verify the contents of your package upon purchase and report possible missing items to the store where machine is purchased.


1
2
3
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5
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PLUSMMA 160
80
120
40
160

Main parts of front panel:

1. Indicator light showing whether the machine is powered on
2. Indicator light showing if the machine is overheating
3. DX50 positive terminal
4. DX50 negative terminal
5. Welding current control

2. SAFETY INSTRUCTIONS

2.1 Explanation of Notes and Warning Symbols

WARNING
Indicates sections of the manual that are particularly important for efficient operation, correct usage, and proper maintenance of the welding machine

WARNING (image-related)
Used in connection with illustrations where safety-related aspects must be carefully observed.

NOTE
Indicates sections of the manual that are particularly important for efficient operation, correct usage, and proper maintenance of the welding machine.

2.2 Instructions for Safe Use of the Device

2.2.1 General Safety Instructions

WARNING
Observe and follow the following general safety guidelines when using the welding machine:

Read this manual carefully before using the welding machine. Keep it accessible — it must accompany the machine throughout its entire service life.

> If you require more detailed instructions than those provided here, contact **Wallius Welding Machines Ltd** service.
> Never use a faulty or damaged welding machine.
> Do not use the machine if it has been dropped or subjected to a strong impact. It must be inspected and approved by an authorized service center before further use.
> Modifying the structure of the welding machine without the manufacturer's permission is strictly prohibited. Unauthorized modifications void product liability.
> Only use original spare parts approved by the manufacturer for repairs and maintenance.

> A clean and organized work area is essential for safe operation. Always inspect the work area before starting work and remove potential hazards.
> Do not weld near sensitive electronic equipment, as electromagnetic interference may cause malfunction or damage.

2.2.2 Safety Instructions for Welding Operation

Follow these safety instructions during operation:

Personal Protection

> Wear protective clothing that covers exposed skin. UV radiation from the welding arc can cause burns.
> Do not wear flammable clothing during welding operations.
> Use protective gloves that provide insulation against heat and sparks.
> Use appropriate hearing protection and other necessary personal protective equipment (PPE).

General Safety During Work

> Handle hot workpieces and welding tools with care. Inform others nearby of potential hazards.
> Ensure that all persons in the vicinity are aware of the welding operation and associated risks.
> Never operate the welding machine without its protective covers in place.
> Never point the welding electrode toward yourself or others.

Electrical Safety

> If you experience an electric shock, stop welding immediately and disconnect the machine from the power supply.
> High current can generate strong electromagnetic fields that may interfere with devices such as pacemakers.
> Always ensure the welding equipment is electromagnetically compatible with other devices in the environment.

Eye and Vision Protection

> Always use a welding helmet with an appropriate shade (DIN 8–13).
> Looking directly at the arc without protection is strictly prohibited.
The arc can cause serious eye damage even from distances up to 15 meters.
> Do not use contact lenses while welding, as they may fuse to the eye due to heat exposure.
> Be aware of reflected arc radiation.

Work Environment Safety

> Isolate the welding area using non-reflective barriers or work in a designated welding space whenever possible.
> Welding fumes may contain hazardous substances. Protect yourself by using:
> fume extraction systems
> ventilated welding masks
> appropriate protective clothing
> Do not inhale welding fumes or gases.
> Weld only clean, untreated, and rust-free materials to minimize harmful emissions.
> Ensure adequate ventilation or use proper respiratory protection.
> Never use oxygen for ventilation.

Fire and Explosion Safety

> Keep children and unauthorized persons away from the work area.
> Follow all local fire safety regulations for hot work.
> Ensure fire extinguishing equipment is readily available.
> Remove flammable materials from the welding area whenever possible.
> Be aware that heat transfer through materials can create hidden fire hazards.
> Sparks, molten metal, and hot surfaces may ignite nearby materials.
> Never weld near flammable or explosive substances.
> Avoid welding in enclosed or confined spaces unless proper safety measures and supervision are in place.
> Welding containers that have held flammable liquids poses a high explosion risk and must be handled with extreme caution.

Machine Placement and Handling

> Place the welding machine on a stable, level surface.
> Ensure that ventilation openings are not blocked.
> Blocking airflow may cause overheating and equipment failure.
> Do not operate the machine on surfaces with a slope greater than 10°.

Electrical Installation and Grounding

> The welding machine is an electrical device. Moisture, damaged cables, or mechanical defects may cause electric shock.
> Ensure all electrical connections comply with regulations.
> The power cable includes a **yellow-green protective conductor**, which must always be connected to protective earth.
> **Never connect the protective conductor to a live circuit.**
> After installation, verify proper grounding functionality.

Cable and Equipment Safety

> Protect cables from sharp edges and falling objects.
> Repair damaged cables immediately.
> Never move the machine by pulling on its cables.

> Keep cables free and untangled — do not wrap them around metal objects, as this may create inductive interference.

Moisture and Storage Safety

> Do not use the machine in wet or damp conditions.
> Store the machine in a dry environment.
> If the machine becomes wet (e.g., rain or condensation), allow it to dry completely before use.

Operational Safety

> Always operate the welding machine under supervision.
> Turn off and disconnect the machine when not in use.
> Prevent foreign objects from entering the machine — they may cause damage or serious hazards.

3. MEASURES BEFORE USE

3.1 Unpacking and Inspection

Carefully remove the welding machine and all included accessories from the transport packaging.

At the same time, inspect the machine to ensure that it has not been damaged during transport.

If any damage is detected:

> Contact the carrier immediately
> File a damage report without delay

NOTE
A damaged welding machine must **not** be connected to the power supply under any circumstances.

If the contents of the delivery do not match your order, contact the supplier or distributor of the device.

3.2 Connection to the Power Supply

The HAKAS PLUSMMA 160 welding machine is designed for operation on a **single-phase 230 V / 50 Hz electrical supply**.

To connect the machine:

> Plug it into a properly grounded electrical outlet
> The outlet must be protected by a **minimum 16 A slow-blow fuse**

If using an extension cable:

> Minimum conductor cross-section: **2.5 mm²**
> Maximum length: **100 meters**
> Ensure that the extension cable includes a functioning **protective earth connection**

NOTE
Before connecting the welding machine, always verify that the supply voltage is correct.

WARNING
The protective conductor insulation is **yellow-green**.
Electrical connections must only be performed by a **qualified electrician**.

The protective conductor insulation is **yellow-green**.
Electrical connections must only be performed by a **qualified electrician**.

WARNING
Incorrect electrical connection may result in **serious injury or death**.

3.3 Positioning the Machine

To ensure safe and efficient operation:
> Keep the machine clean and dry at all times.
> If a rain cover is used:
> Make sure that ventilation openings are not blocked
> Connect the welding and grounding cables to the front panel using quick connectors:
> Insert the connector
> Turn clockwise to secure it

NOTE
The welding cable must be connected according to the polarity specified on the electrode packaging (**+ or –**).

In most cases:
> Electrode cable → **positive (+)**
> Ground cable → **negative (–)**

4. OPERATION

4.1 Starting Welding Work

The HAKAS PLUSMMA 160 welding machine is designed for:

> MMA (stick) welding
> TIG welding with scratch start (Lift TIG)

WARNING
Use of the machine for any purpose other than welding is strictly prohibited.

Follow these steps to begin welding:

1. Connect the welding and grounding cables:
    - Attach the electrode holder cable according to the electrode type
    - Use either the **DX50 positive (+)** or **DX50 negative (–)** connector
    - Most common electrodes are used with **positive polarity (+)**
2. Connect the grounding cable:
    - Attach the clamp securely to the workpiece
    - Ensure firm and reliable contact
3. Prepare the work surface:
    - Remove rust, oil, paint, and other impurities
    - Clean both:
        - the welding area
        - the grounding connection point
4. Connect the machine to the power supply:
    - Plug into a suitable electrical outlet
5. Set the welding current:
    - Adjust using the control on the front panel
    - The machine powers on during adjustment
    - Select current based on electrode size and type

Recommended Welding Current Settings

Electrode Diameter	Welding Current
1.6 mm / 2.0 mm	30–50 A / 40–70 A
2.5 mm	60–100 A
3.2 mm	100–140 A
4.0 mm	130–160 A

6. Strike the arc:: Initiate the arc with a **light scratching motion** against the workpiece

NOTE
Ensure good contact between the grounding clamp and the workpiece

NOTE
Use only **dry and high-quality electrodes**

NOTE
Always set the welding current correctly

4.3 Overload Protection

NOTE
The HAKAS PLUSMMA 160 is equipped with an **automatic overload protection system**.

If the machine becomes overloaded:
> The welding current is automatically cut off
> The machine resumes operation once it has cooled sufficiently

4.4 Welding Support Functions

The machine includes advanced automatic features to improve welding performance:

1. HOT START
   - Provides an ignition current boost at the start of welding
   - Ensures easy arc ignition
2. ARC FORCE
   - Stabilizes the arc during welding
   - Improves weld consistency
3. ANTI-STICK
   - Cuts off welding current if the electrode sticks
   - Prevents electrode damage
   - Allows reuse of the electrode

4.5 Generator Operation

Using a welding inverter with a generator requires proper setup to avoid damage.

The generator must be:

> sufficiently powerful
> equipped with **electronic voltage regulation**

NOTE
Recommended generator specification: Minimum **7.5 kVA (~6 kW)** output

Additional guidelines:
> Values are approximate — using a **larger generator is recommended**
> When using a generator:
> Do **not use electrodes larger than 2.5 mm**
> The machine tolerates voltage variation of **±15%**

If using an extension cable:

> Minimum conductor size: **2.5 mm²**
> Maximum length: **100 m**
> Ensure proper protective grounding

Also ensure:

> The generator is properly grounded
> All electrical safety requirements are met

5. TROUBLESHOOTING

The table below lists common issues that may occur during welding, along with their possible causes and recommended corrective actions.
If you are unable to resolve the problem using the information provided here, contact:

> An authorized service center
> Your welding equipment dealer
> Or a qualified electrical service provider

Troubleshooting Table

Symptom	Possible Cause	Corrective Action
The machine does not produce welding current, even though both indicator lights are on	Overload protection has activated	Wait until the machine has cooled sufficiently
You experience electric shocks during use	Inadequate protective grounding	Have the grounding of extension cables, plugs, and the electrical network checked
The green indicator light is on, but the machine does not weld	Welding current circuit is interrupted	Check connections of the electrode, electrode cable, and grounding cable
Welding quality is poor	Incorrect polarity	Check the correct polarity from the electrode packaging and adjust accordingly
Both indicator lights are off, even though the machine is connected and switched on	Supply voltage is not within 230 V ±15%	Check the mains supply or generator output
The yellow indicator light is on	Worn contact tip or machine overloaded	Replace the worn part and allow the machine to cool with power on

Additional Notes

> Always verify all cable connections before assuming a fault in the machine
> Many issues are caused by:
> poor grounding
> incorrect polarity
> improper current settings
> Regular maintenance helps prevent most operational problems

6. MAINTENANCE

6.1 General

HAKAS welding machines are designed to be reliable and high-quality. However, like all electromechanical devices, they require **regular maintenance** to ensure safe and trouble-free operation.
It is recommended that the machine undergo a **service inspection every six months**.

During maintenance, an authorized HAKAS service technician will:
> inspect the device
> clean internal components
> ensure safe and proper operation

Electrical connections in electromechanical equipment may:
> loosen over time
> oxidize due to environmental conditions

Regular inspection helps prevent these issues.

NOTE
The welding machine may only be serviced by a **qualified professional** familiar with its operation and use.

Warranty service work may only be performed by an **authorized HAKAS service provider**.
A list of authorized service centers is available at:

www.hakas.fi

6.2 Daily Maintenance

Perform the following checks regularly:

> Inspect the machine for visible damage
> Check that grounding cable connections are tight
> Check that electrode cable connections are tight
> Keep the machine clean and dry
> Prevent accumulation of metal dust inside the unit
> Ensure that the power cable and welding cables are intact

WARNING
Stop using the machine immediately if:
> the power cable is damaged
> the welding cables show signs of wear or deterioration

If the maintenance actions described in this manual are not sufficient, contact HAKAS service.

6.3 Cleaning the Power Source Unit

The power source unit must be cleaned **every 6–12 months**.
Cleaning must be carried out by an **authorized service provider**.

Cleaning procedure:

1. Clean the unit using:
    a. a vacuum cleaner
    b. or low-pressure compressed air
2. At the same time:
    a. inspect all cable connections

NOTE
Always disconnect the machine from the power supply before cleaning.

6.4 Replacement of Consumable Parts

Consumable components must be replaced when necessary.
Typical consumable parts include:

> electrode holder cable and its components
> grounding cable and its components

NOTE
Consumable parts are **not covered by warranty** and must be replaced at the owner's expense, even during the warranty period.

6.5 Decommissioning the Device

Do not dispose of the welding machine as household waste.
Electrical and electronic equipment must be:

> returned to an approved collection point
> handled in accordance with local regulations

The owner is responsible for delivering the device to an authorized recycling facility.

Please help protect the environment.

7. STORAGE

The welding machine is an electrical device and must be stored under appropriate conditions to ensure long-term reliability and safety.

Storage Guidelines

- Store the machine in a **dry environment** at all times
  - > Protect the device from:
    - moisture
    - condensation
    - rain exposure
  - > Keep the machine in a location where it is protected from:
    - impacts
    - vibration
    - mechanical stress
  - > Proper storage helps:
    - extend the service life of the machine
    - maintain electrical safety
    - prevent corrosion and internal damage

8. TECHNICAL DATA

Technical Specifications

Parameter	Value
Welding current range (min/max)	10 – 160 A
Maximum welding current	160 A
Duty cycle (40°C)	60% @ 160 A
Duty cycle (40°C)	100% @ 130 A
No-load voltage	70 V (+ ignition pulse)
Supply voltage	230 V / 50 Hz (±15%)
Electrode diameter	1.6 – 4.0 mm
Protection class	IP23S
Dimensions (L × W × H)	120 × 250 × 400 mm
Weight	4.8 kg

Generator Operation Requirements

Welding Current	Electrode Diameter	Generator Size
160 A	4.0 mm	7.1 kVA
130 A	3.2 mm	5.5 kVA
100 A	2.5 mm	4.6 kVA
70 A	2.0 mm	2.3 kVA

9. WARRANTY AND CONTACT INFORMATION

Wallius Welding Machines Ltd provides a warranty covering defects caused by:
> manufacturing faults
> material defects

The warranty **does not cover indirect or consequential damages**.

More detailed information regarding:
> warranty period
> warranty terms and conditions

can be found in the warranty document supplied with the machine or found from **www.hakas.fi** website.

Please read the warranty terms carefully before using the machine.

Important Note on Consumables

Consumable components such as:
> electrode cables
> grounding cable components

must be replaced periodically at the **owner's expense**, even during the warranty period.

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