

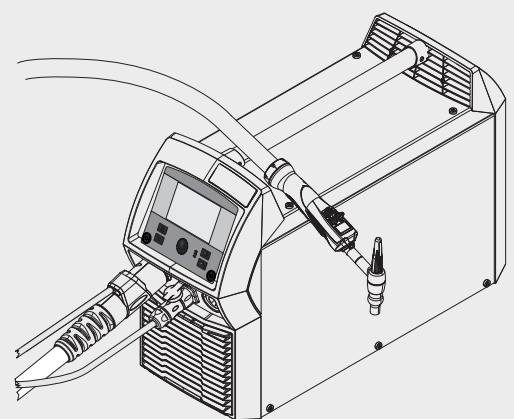


**MagicWave 190**  
**MagicWave 230i**  
**TransTig 230i**

Operating Instructions

EN

TIG Power source



42,0426,0250,EN 003-05032018



# Dear reader,

## Introduction

Thank you for the trust you have placed in our company and congratulations on buying this high-quality Fronius product. These instructions will help you familiarise yourself with the product. Reading the instructions carefully will enable you to learn about the many different features it has to offer. This will allow you to make full use of its advantages.

Please also note the safety rules to ensure greater safety when using the product. Careful handling of the product will repay you with years of safe and reliable operation. These are essential prerequisites for excellent results.

## Explanation of safety symbols



**DANGER!** Indicates immediate and real danger. If it is not avoided, death or serious injury will result.



**WARNING!** Indicates a potentially dangerous situation. Death or serious injury may result if appropriate precautions are not taken.



**CAUTION!** Indicates a situation where damage or injury could occur. If it is not avoided, minor injury and/or damage to property may result.



**NOTE!** Indicates a risk of flawed results and possible damage to the equipment.

**IMPORTANT!** Indicates tips for correct operation and other particularly useful information. It does not indicate a potentially damaging or dangerous situation.

If you see any of the symbols depicted in the "Safety rules" chapter, special care is required.



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# Safety rules

## General



The device is manufactured using state-of-the-art technology and according to recognised safety standards. If used incorrectly or misused, however, it can cause:

- injury or death to the operator or a third party,
- damage to the device and other material assets belonging to the operating company,
- inefficient operation of the device.

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All persons involved in commissioning, operating, maintaining and servicing the device must:

- be suitably qualified,
- have sufficient knowledge of automated welding, and
- read and carefully follow these operating instructions as well as the operating instructions for all system components.

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The operating instructions must always be at hand wherever the device is being used. In addition to the operating instructions, attention must also be paid to any generally applicable and local regulations regarding accident prevention and environmental protection.

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All safety and danger notices on the device

- must be in a legible state,
- must not be damaged,
- must not be removed,
- must not be covered, pasted or painted over.

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For the location of the safety and danger notices on the device, refer to the section headed "General" in the operating instructions for the device. Before commissioning the device, rectify any faults that could compromise safety.

**This is for your personal safety!**

## Proper use



The device is to be used exclusively for its intended purpose.

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The device is intended solely for the welding processes specified on the rating plate.

Any use above and beyond this purpose is deemed improper. The manufacturer shall not be held liable for any damage arising from such usage.

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Proper use includes:

- carefully reading and following all the instructions given in the operating instructions
- studying and obeying all safety and danger notices carefully
- performing all stipulated inspection and maintenance work.

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Never use the device for the following purposes:

- Thawing out pipes
- Charging batteries
- Starting engines

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The device is designed for use in industry and the workshop. The manufacturer accepts no responsibility for any damage caused through use in a domestic setting.

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The manufacturer likewise accepts no liability for inadequate or incorrect results.

## Environmental conditions



Operation or storage of the device outside the stipulated area will be deemed as not in accordance with the intended purpose. The manufacturer shall not be held liable for any damage arising from such usage.

Ambient temperature range:

- during operation: -10 °C to + 40 °C (14 °F to 104 °F)
- during transport and storage: -20 °C to +55 °C (-4 °F to 131 °F)

Relative humidity:

- up to 50% at 40 °C (104 °F)
- up to 90% at 20 °C (68 °F)

The surrounding air must be free from dust, acids, corrosive gases or substances, etc.

Can be used at altitudes of up to 2000 m (6561 ft. 8.16 in.)

## Obligations of the operator

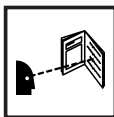


The operator must only allow persons to work with the device who:

- are familiar with the fundamental instructions regarding safety at work and accident prevention and have been instructed in how to use the device
- have read and understood these operating instructions, especially the section "safety rules", and have confirmed as much with their signatures
- are trained to produce the required results.

Checks must be carried out at regular intervals to ensure that operators are working in a safety-conscious manner.

## Obligations of personnel

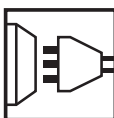


Before using the device, all persons instructed to do so undertake:

- to observe the basic instructions regarding safety at work and accident prevention
- to read these operating instructions, especially the "Safety rules" section and sign to confirm that they have understood them and will follow them.

Before leaving the workplace, ensure that people or property cannot come to any harm in your absence.

## Mains connection



Devices with a higher rating may affect the energy quality of the mains due to their current consumption.

This may affect a number of types of device in terms of:

- connection restrictions
- criteria with regard to the maximum permissible mains impedance <sup>\*)</sup>
- criteria with regard to the minimum short-circuit power requirement <sup>\*)</sup>



<sup>\*)</sup> at the interface with the public grid  
see Technical Data

In this case, the plant operator or the person using the device should check whether the device may be connected, where appropriate by discussing the matter with the power supply company.



**NOTE!** Ensure that the mains connection is earthed properly

**Protecting yourself and others**



Anyone working with the device exposes themselves to numerous risks, e.g.

- flying sparks and hot pieces of metal
- Arc radiation, which can damage eyes and skin



- Hazardous electromagnetic fields, which can endanger the lives of those using cardiac pacemakers



- Risk of electrocution from mains current and welding current



- Greater noise pollution



- Harmful welding fumes and gases

Suitable protective clothing must be worn when working with the device. The protective clothing must have the following properties:

- Flame-resistant
- Insulating and dry
- Covers the whole body, is undamaged and in good condition
- Safety helmet
- Trousers with no turn-ups



Protective clothing refers to a variety of different items. Operators should:

- Protect eyes and face from UV rays, heat and sparks using a protective visor and regulation filter
- Wear regulation protective goggles with side protection behind the protective visor
- Wear stout footwear that provides insulation even in wet conditions
- Protect the hands with suitable gloves (electrically insulated and providing protection against heat)
- Wear ear protection to reduce the harmful effects of noise and to prevent injury



Keep all persons, especially children, out of the working area while any devices are in operation or welding is in progress. If, however, there are people in the vicinity:

- Make them aware of all the dangers (risk of dazzling by the arc, injury from flying sparks, harmful welding fumes, noise, possible risks from mains current and welding current, etc.)
- Provide suitable protective equipment
- Alternatively, erect suitable safety screens/curtains.

**Danger from toxic gases and vapours**



The fumes produced during welding contain harmful gases and vapours.

Welding fumes contain substances that may, under certain circumstances, cause birth defects or cancer.

Keep your face away from welding fumes and gases.

Fumes and hazardous gases

- must not be breathed in
- must be extracted from the working area using appropriate methods.

Ensure an adequate supply of fresh air with a ventilation rate of at least 20 m<sup>3</sup>/hour.

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Otherwise, a protective mask with an air supply must be worn.

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Close the shielding gas cylinder valve or main gas supply if no welding is taking place.

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If there is any doubt about whether the extraction capacity is sufficient, the measured toxic emission values should be compared with the permissible limit values.

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Amongst others, the following components are responsible for the degree of toxicity of welding fumes:

- Metals used for the workpiece
  - Electrodes
  - Coatings
  - Cleaners, degreasers, etc.
- 

The relevant material safety data sheets and manufacturer's specifications for the listed components should therefore be studied carefully.

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Flammable vapours (e.g. solvent fumes) should be kept away from the arc's radiation area.

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### Danger from flying sparks



Flying sparks may cause fires or explosions.

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Never weld close to flammable materials.

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Flammable materials must be at least 11 metres (36 ft. 1.07 in.) away from the arc, or alternatively covered with an approved cover.

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A suitable, tested fire extinguisher must be available and ready for use.

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Sparks and pieces of hot metal may also get into adjacent areas through small gaps or openings. Take appropriate precautions to prevent any danger of injury or fire.

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Welding must not be performed in areas that are subject to fire or explosion or near sealed tanks, vessels or pipes unless these have been prepared in accordance with the relevant national and international standards.

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Do not carry out welding on containers that are being or have been used to store gases, propellants, mineral oils or similar products. Residues pose an explosive hazard.

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### Risks from mains current and welding current



An electric shock is potentially life threatening and can be fatal.

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Do not touch live parts either inside or outside the device.

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During MIG/MAG welding and TIG welding, the welding wire, the wirespool, the feed rollers and all pieces of metal that are in contact with the welding wire are live.

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Always set the wirefeeder up on a sufficiently insulated surface or use a suitable, insulated wirefeeder holder.

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Make sure that you and others are protected with an adequately insulated, dry temporary backing or cover for the earth or ground potential. This temporary backing or cover must extend over the entire area between the body and the earth or ground potential.

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All cables and leads must be secured, undamaged, insulated and adequately dimensioned. Replace loose connections and scorched, damaged or inadequately dimensioned cables and leads immediately.

Use the handle to ensure the power connections are tight before every use. In the case of power cables with a bayonet connector, rotate the power cable around the longitudinal axis by at least 180° and pre-load.

Do not wrap cables or leads around the body or parts of the body.

The electrode (rod electrode, tungsten electrode, welding wire, etc.) must

- never be immersed in liquid for cooling
- Never touch the electrode when the power source is switched on.

Double the open circuit voltage of a power source can occur between the welding electrodes of two power sources. Touching the potentials of both electrodes at the same time may be fatal under certain circumstances.

Arrange for the mains cable to be checked regularly by a qualified electrician to ensure the ground conductor is functioning properly.

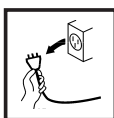
The device must only be operated on a mains supply with a ground conductor and a socket with a ground conductor contact.

Operating the device on a grid without a ground conductor and in a socket without a ground conductor contact will be deemed gross negligence. The manufacturer shall not be held liable for any damage arising from such usage.

If necessary, provide an adequate earth connection for the workpiece.

Switch off unused devices.

Wear a safety harness if working at height.



Before working on the device, switch it off and pull out the mains plug.

Attach a clearly legible and easy-to-understand warning sign to the device to prevent anyone from plugging the mains plug back in and switching it on again.

After opening the device:

- Discharge all live components
- Ensure that all components in the device are de-energised

If work on live parts is required, appoint a second person to switch off the main switch at the right moment.

## Meandering welding currents



If the following instructions are ignored, meandering welding currents can develop with the following consequences:

- Fire hazard
- Overheating of parts connected to the workpiece
- Irreparable damage to ground conductors
- Damage to device and other electrical equipment

Ensure that the workpiece is held securely by the workpiece clamp.

Attach the workpiece clamp as close as possible to the area that is to be welded.

If the floor is electrically conductive, the device must be set up with sufficient insulating material to insulate it from the floor.

If distribution boards, twin-head mounts, etc., are being used, note the following: The electrode of the welding torch / electrode holder that is not used is also live. Make sure that the welding torch / electrode holder that is not used is kept sufficiently insulated.

In the case of automated MIG/MAG applications, ensure that only an insulated wire electrode is routed from the welding wire drum, large wirefeeder spool or wirepool to the wire-feed unit.

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## EMC Device Classifications



Devices in emission class A:

- Are only designed for use in industrial settings
- Can cause line-bound and radiated interference in other areas

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Devices in emission class B:

- Satisfy the emissions criteria for residential and industrial areas. This is also true for residential areas in which the energy is supplied from the public low-voltage mains.

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EMC device classification as per the rating plate or technical data.

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## EMC measures



In certain cases, even though a device complies with the standard limit values for emissions, it may affect the application area for which it was designed (e.g. when there is sensitive equipment at the same location, or if the site where the device is installed is close to either radio or television receivers).

If this is the case, then the operator is obliged to take appropriate action to rectify the situation.

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Check and evaluate the immunity to interference of nearby devices according to national and international regulations. Examples of equipment that may be susceptible to interference from the device include:

- Safety devices
- Power, signal and data transfer lines
- IT and telecommunications devices
- Measuring and calibrating devices

---

Supporting measures for avoidance of EMC problems:

1. Mains supply
    - If electromagnetic interference arises despite correct mains connection, additional measures are necessary (e.g. use a suitable line filter).
  2. Welding power leads
    - must be kept as short as possible
    - must run close together (to avoid EMF problems)
    - must be kept well apart from other leads
  3. Equipotential bonding
  4. Earthing of the workpiece
    - If necessary, establish an earth connection using suitable capacitors.
  5. Shielding, if necessary
    - Shield off other nearby devices
    - Shield off entire welding installation
- 

## EMF measures



Electromagnetic fields may pose as yet unknown risks to health:

- effects on the health of others in the vicinity, e.g. wearers of pacemakers and hearing aids
- wearers of pacemakers must seek advice from their doctor before approaching the device or any welding that is in progress
- for safety reasons, keep distances between the welding cables and the welder's head/torso as large as possible
- do not carry welding cables and hosepacks over the shoulders or wind them around any part of the body

Specific hazards



Keep hands, hair, clothing and tools away from moving parts. For example:

- Fans
- Cogs
- Rollers
- Shafts
- Wirespools and welding wires

Do not reach into the rotating cogs of the wire drive or into rotating drive components.

Covers and side panels may only be opened/removed while maintenance or repair work is being carried out.

During operation

- Ensure that all covers are closed and all side panels are fitted properly.
- Keep all covers and side panels closed.



The welding wire emerging from the welding torch poses a high risk of injury (piercing of the hand, injuries to the face and eyes, etc.).



Therefore always keep the welding torch away from the body (devices with wire-feed unit) and wear suitable protective goggles.



Never touch the workpiece during or after welding - risk of burns.

Slag can jump off cooling workpieces. The specified protective equipment must therefore also be worn when reworking workpieces, and steps must be taken to ensure that other people are also adequately protected.

Welding torches and other parts with a high operating temperature must be allowed to cool down before handling.



Special provisions apply in areas at risk of fire or explosion - observe relevant national and international regulations.



Power sources for work in areas with increased electric risk (e.g. near boilers) must carry the "Safety" sign. However, the power source must not be located in such areas.



Risk of scalding from escaping coolant. Switch off cooling unit before disconnecting coolant flow or return lines.



Observe the information on the coolant safety data sheet when handling coolant. The coolant safety data sheet may be obtained from your service centre or downloaded from the manufacturer's website.



Use only suitable load-carrying equipment supplied by the manufacturer when transporting devices by crane.

- Hook chains and/or ropes onto all suspension points provided on the load-carrying equipment.
- Chains and ropes must be at the smallest angle possible to the vertical.
- Remove gas cylinder and wire-feed unit (MIG/MAG and TIG devices).

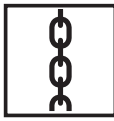
If the wire-feed unit is attached to a crane holder during welding, always use a suitable, insulated wirefeeder hoisting attachment (MIG/MAG and TIG devices).



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If the device has a carrying strap or handle, this is intended solely for carrying by hand. The carrying strap is not to be used if transporting with a crane, counterbalanced lift truck or other mechanical hoist.

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All lifting accessories (straps, handles, chains, etc.) used in connection with the device or its components must be tested regularly (e.g. for mechanical damage, corrosion or changes caused by other environmental factors). The testing interval and scope of testing must comply with applicable national standards and directives as a minimum.

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Odourless and colourless shielding gas may escape unnoticed if an adapter is used for the shielding gas connection. Prior to assembly, seal the device-side thread of the adapter for the shielding gas connection using suitable Teflon tape.

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### Factors affecting welding results



The following requirements with regard to shielding gas quality must be met if the welding system is to operate in a correct and safe manner:

- Size of solid matter particles < 40 µm
  - Pressure dew point < -20 °C
  - Max. oil content < 25 mg/m<sup>3</sup>
- 

Filters must be used if necessary.

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**NOTE!** There is an increased risk of soiling if ring mains are being used

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### Danger from shielding gas cylinders



Shielding gas cylinders contain gas under pressure and can explode if damaged. As the shielding gas cylinders are part of the welding equipment, they must be handled with the greatest of care.

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Protect shielding gas cylinders containing compressed gas from excessive heat, mechanical impact, slag, naked flames, sparks and arcs.

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Mount the shielding gas cylinders vertically and secure according to instructions to prevent them falling over.

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Keep the shielding gas cylinders well away from any welding or other electrical circuits.

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Never hang a welding torch on a shielding gas cylinder.

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Never touch a shielding gas cylinder with an electrode.

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Risk of explosion - never attempt to weld a pressurised shielding gas cylinder.

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Only use shielding gas cylinders suitable for the application in hand, along with the correct and appropriate accessories (regulator, hoses and fittings). Only use shielding gas cylinders and accessories that are in good condition.

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Turn your face to one side when opening the valve of a shielding gas cylinder.

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Close the shielding gas cylinder valve if no welding is taking place.

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If the shielding gas cylinder is not connected, leave the valve cap in place on the cylinder.

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The manufacturer's instructions must be observed as well as applicable national and international regulations for shielding gas cylinders and accessories.

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**Danger from escaping shielding gas**



Risk of suffocation from the uncontrolled escape of shielding gas

Shielding gas is colourless and odourless and, in the event of a leak, can displace the oxygen in the ambient air.

- Ensure an adequate supply of fresh air with a ventilation rate of at least 20 m<sup>3</sup>/hour.
- Observe safety and maintenance instructions on the shielding gas cylinder or the main gas supply.
- Close the shielding gas cylinder valve or main gas supply if no welding is taking place.
- Check the shielding gas cylinder or main gas supply for uncontrolled gas leakage before every start-up.

**Safety measures at the installation location and during transport**



A device toppling over could easily kill someone. Place the device on a solid, level surface such that it remains stable

- The maximum permissible tilt angle is 10°.



Special regulations apply in rooms at risk of fire or explosion

- Observe relevant national and international regulations.

Use internal directives and checks to ensure that the workplace environment is always clean and clearly laid out.

Only set up and operate the device in accordance with the degree of protection shown on the rating plate.

When setting up the device, ensure there is an all-round clearance of 0.5 m (1 ft. 7.69 in.) to ensure that cooling air can flow in and out freely.

When transporting the device, observe the relevant national and local guidelines and accident prevention regulations. This applies especially to guidelines regarding the risks arising during transport.

Do not lift or transport operational devices. Switch off devices before transport or lifting.

Before transporting the device, allow coolant to drain completely and detach the following components:

- Wirefeeder
- Wirespool
- Shielding gas cylinder

After transporting the device, the device must be visually inspected for damage before commissioning. Any damage must be repaired by trained service technicians before commissioning the device.

**Safety measures in normal operation**



Only operate the device when all safety devices are fully functional. If the safety devices are not fully functional, there is a risk of

- injury or death to the operator or a third party
- damage to the device and other material assets belonging to the operator
- inefficient operation of the device

Any safety devices that are not functioning properly must be repaired before switching on the device.

Never bypass or disable safety devices.

Before switching on the device, ensure that no one is likely to be endangered.

Check the device at least once a week for obvious damage and proper functioning of safety devices.

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Always fasten the shielding gas cylinder securely and remove it beforehand if the device is to be transported by crane.

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Only the manufacturer's original coolant is suitable for use with our devices due to its properties (electrical conductivity, anti-freeze agent, material compatibility, flammability, etc.).

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Only use suitable original coolant from the manufacturer.

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Do not mix the manufacturer's original coolant with other coolants.

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Only connect the manufacturer's system components to the cooling circuit.

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The manufacturer accepts no liability for damage resulting from use of other system components or a different coolant. In addition, all warranty claims will be forfeited.

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Cooling Liquid FCL 10/20 does not ignite. The ethanol-based coolant can ignite under certain conditions. Transport the coolant only in its original, sealed containers and keep well away from any sources of ignition.

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Used coolant must be disposed of properly in accordance with the relevant national and international regulations. The coolant safety data sheet may be obtained from your service centre or downloaded from the manufacturer's website.

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Check the coolant level before starting to weld, while the system is still cool.

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## Noise emission values



The device generates a maximum sound power level of > 80 dB(A) (ref. 1pW) when idling and in the cooling phase following operation at the maximum permissible operating point under maximum rated load conditions according to EN 60974-1.

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It is not possible to provide a workplace-related emission value during welding (or cutting) as this is influenced by both the process and the environment. All manner of different welding parameters come into play, including the welding process (MIG/MAG, TIG welding), the type of power selected (DC or AC), the power range, the type of weld metal, the resonance characteristics of the workpiece, the workplace environment, etc.

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## Commissioning, maintenance and repair



It is impossible to guarantee that bought-in parts are designed and manufactured to meet the demands made of them, or that they satisfy safety requirements.

- Use only original spare and wearing parts (also applies to standard parts).
  - Do not carry out any modifications, alterations, etc. to the device without the manufacturer's consent.
  - Components that are not in perfect condition must be replaced immediately.
  - When ordering, please give the exact designation and part number as shown in the spare parts list, as well as the serial number of your device.
- 

The housing screws provide the ground conductor connection for earthing the housing parts.

Only use original housing screws in the correct number and tightened to the specified torque.

---

### Safety inspection



The manufacturer recommends that a safety inspection of the device is performed at least once every 12 months.

The manufacturer recommends that the power source be calibrated during the same 12-month period.

A safety inspection should be carried out by a qualified electrician

- after any changes are made
- after any additional parts are installed, or after any conversions
- after repair, care and maintenance has been carried out
- at least every twelve months.

For safety inspections, follow the appropriate national and international standards and directives.

Further details on safety inspection and calibration can be obtained from your service centre. They will provide you on request with any documents you may require.

### Disposal



Do not dispose of this device with normal domestic waste! To comply with the European Directive on Waste Electrical and Electronic Equipment and its implementation as national law, electrical equipment that has reached the end of its life must be collected separately and returned to an approved recycling facility. Any device that you no longer require must either be returned to your dealer or given to one of the approved collection and recycling facilities in your area. Ignoring this European Directive may have potentially adverse effects on the environment and your health!

### Safety symbols



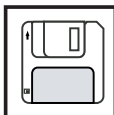
Devices with the CE mark satisfy the essential requirements of the low-voltage and electromagnetic compatibility directives (e.g. relevant product standards of the EN 60 974 series).

Fronius International GmbH hereby declares that the device is compliant with Directive 2014/53/EU. The full text on the EU Declaration of Conformity can be found at the following address: <http://www.fronius.com>



Devices marked with the CSA test mark satisfy the requirements of the relevant standards for Canada and the USA.

### Data protection



The user is responsible for the safekeeping of any changes made to the factory settings. The manufacturer accepts no liability for any deleted personal settings.

---

## Copyright



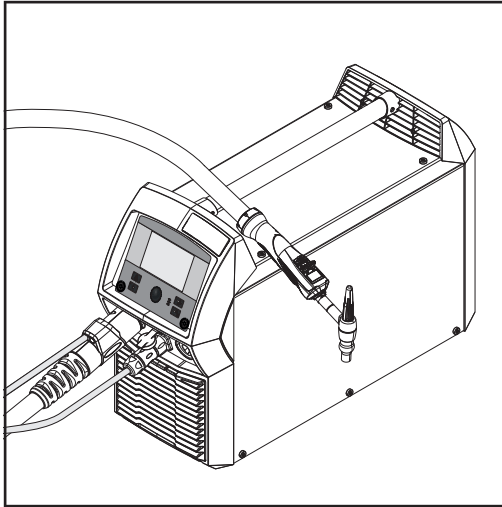
Copyright of these operating instructions remains with the manufacturer.

The text and illustrations are all technically correct at the time of printing. We reserve the right to make changes. The contents of the operating instructions shall not provide the basis for any claims whatsoever on the part of the purchaser. If you have any suggestions for improvement, or can point out any mistakes that you have found in the instructions, we will be most grateful for your comments.

# **General information**



## Device concept



The TransTig (TT) 230i, MagicWave (MW) 190 and MagicWave (MW) 230i TIG power sources are fully digitised, microprocessor-controlled inverter power sources.

Their modular design and potential for system add-ons ensure a high degree of flexibility. The devices can be adapted to any situation.

The power sources are generator-compatible. They are exceptionally sturdy in day-to-day operation thanks to the protected control elements and their powder-coated housings.

The TIG pulsed arc function, with its wide frequency range, is available on both the MagicWave and TransTig.

To optimise the ignition sequence in TIG AC welding, the MagicWave takes account not only of the diameter of the electrode, but also of its temperature, calculated with reference to the preceding welding and welding off-times.

## Functional principle

The central control and regulation unit of the power sources is coupled with a digital signal processor. The central control and regulation unit and signal processor control the entire welding process.

During the welding process, the actual data is measured continuously and the device responds immediately to any changes. Control algorithms ensure that the desired target state is maintained.

This results in:

- a precise welding process,
- exact reproducibility of all results
- excellent weld properties.

## Application areas

The devices are used in workshops and industry for manual TIG applications with unalloyed and low-alloy steel and high-alloy chrome-nickel steels.

The MagicWave power sources perform exceptionally well when it comes to welding aluminium, aluminium alloys and magnesium due to the variable AC frequency.

---

**FCC / RSS Com-  
pliance**



**FCC**

This equipment complies with the limit values for a EMC device class A digital device pursuant to Part 15 of the FCC Rules. These limit values are intended to provide an adequate level of protection against harmful emissions when the device is used in an industrial environment. This device generates and uses high frequency energy and can cause interference in radio communications if it is not installed and used according to the Operating Instructions.

The use of this device in residential areas will probably cause hazardous interference, in which case the user will be obliged to make good any damage at his own expense.

**Industry Canada RSS**

This device complies with the Industry Canada licence-exempt RSS standards. Its use is subject to the following conditions:

- (1) The device must not cause any hazardous interference.
- (2) The device must be able to cope with any interference, including that which could adversely affect its operation.








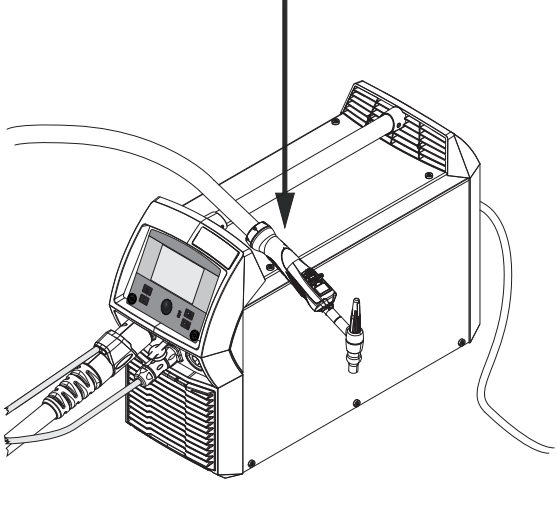
FCC ID: QKWSPBBCU1

IC: 12270A-SPBBCU1




**Warning notices on the device**


Warning notices and safety symbols are affixed to power sources with the CSA test mark for use in North America (USA and Canada). These warning notices and safety symbols must not be removed or painted over. They warn against incorrect operation, as this may result in serious injury and damage.

<b>! WARNING</b>		 <b>ARC RAYS can burn eyes and skin; NOISE can damage hearing.</b> <ul style="list-style-type: none"> <li>Wear welding helmet with correct filter.</li> <li>Wear correct eye, ear and body protection.</li> </ul>	Read American National Standard Z49.1, "Safety In Welding and Cutting" From American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126; OSHA Safety and Health Standards, 29 CFR 1910, from U.S. Government Printing Office, Washington, DC 20402. CSA, W117-2, M87 Code for Safety in Welding and Cutting.
<b>Do not Remove, Destroy, Or Cover This Label</b>			
<b>ARC WELDING can be hazardous.</b> <ul style="list-style-type: none"> <li>Read and follow all labels and the Owner's Manual carefully</li> <li>Only qualified persons are to install, operate, or service this unit according to all applicable codes and safety practices.</li> <li>Keep children away. Pacemaker wearers keep away.</li> <li>Welding wire and drive parts may be at welding voltage.</li> </ul>		 <b>EXPLODING PARTS can injure.</b> <ul style="list-style-type: none"> <li>Failed parts can explode or cause other parts to explode when power is applied.</li> <li>Always wear a face shield and long sleeves when servicing.</li> </ul>	
 <b>ELECTRIC SHOCK can kill.</b> <ul style="list-style-type: none"> <li>Always wear dry insulating gloves.</li> <li>Insulate yourself from work and ground.</li> <li>Do not touch live electrical parts.</li> <li>Disconnect input power before servicing.</li> <li>Keep all panels and covers securely in place.</li> </ul>	 <b>ELECTRIC SHOCK can kill; SIGNIFICANT DC VOLTAGE exists after removal of input power</b> <ul style="list-style-type: none"> <li>Always wait 60 seconds after power is turned off before working on unit.</li> <li>Check input capacitor voltage, and be sure it is near 0 before touching parts.</li> </ul>		
 <b>FUMES AND GASES can be hazardous.</b> <ul style="list-style-type: none"> <li>Keep your head out of the fumes.</li> <li>Ventilate area, or use breathing device.</li> <li>Read Material Safety Data Sheets (MSDSs) and manufacturer's instructions for materials used.</li> </ul>	<b>! AVERTISSEMENT</b>		
 <b>WELDING can cause fire or explosion.</b> <ul style="list-style-type: none"> <li>Do not weld near flammable material.</li> <li>Watch for fire: keep extinguisher nearby.</li> <li>Do not locate unit over combustible surfaces.</li> <li>Do not weld on closed containers.</li> </ul>	 <b>UN CHOC ELECTRIQUE peut etre mortel.</b> <ul style="list-style-type: none"> <li>Installation et raccordement de cette machine doivent etre conformes a tous les perlinents.</li> </ul> <b>SOUDEAGE A L'ARC peut etre hasardeux.</b> <ul style="list-style-type: none"> <li>Lire le manuel d' instructions avant utilisation.</li> <li>Ne pas installer sur une surface combustible.</li> <li>Les fils de soudage et pieces conductrices peuvent etre a la tension de soudage.</li> </ul>		
			

\* MV power sources: 1 ~ 100 - 230 V

Safety symbols on the rating plate:

-  Welding is dangerous. The following basic requirements must be met:
- Welders must be sufficiently qualified
  - Suitable protective equipment must be used
  - All persons not involved in the welding process must be kept at a safe distance

-  Do not use the functions described here until you have fully read and understood the following documents:
- These Operating Instructions
  - All the Operating Instructions for the system components, especially the safety rules



# System components

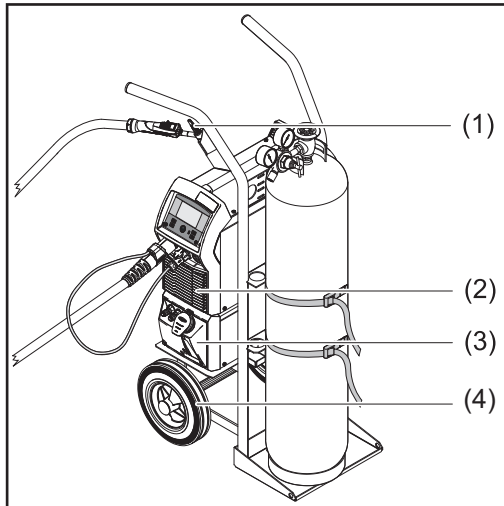
---

## General

The TransTig and MagicWave power sources can be used with a wide variety of system add-ons and options.

---

## Overview



- (1) TIG welding torch
- (2) Power sources
- (3) Cooling unit (only for TT / MW 230i)
- (4) Trolley with gas cylinder holder

### Not illustrated:

- Remote controls
  - Pedal remote controls
  - Electrode cable
  - Grounding cable
- 

## Options

### **OPT/i TIG Ethernet**

(only for TT / MW 230i)

Option for a permanent network connection

---

### **Carrying strap option**

### **FP Pulse Pro**

function package for the extended pulse function (the Base current and Duty cycle parameters can be set, extended pulse frequency range)

---

### **FP Job**

Function package for Job mode (EasyJobs, save and edit jobs)

---

# **Control elements and connections**



# Control panel

## General



**NOTE!** Due to software updates, you may find that your device has certain functions that are not described in these operating instructions or vice versa. Individual illustrations may also differ slightly from the actual controls on your device, but these controls function in exactly the same way.

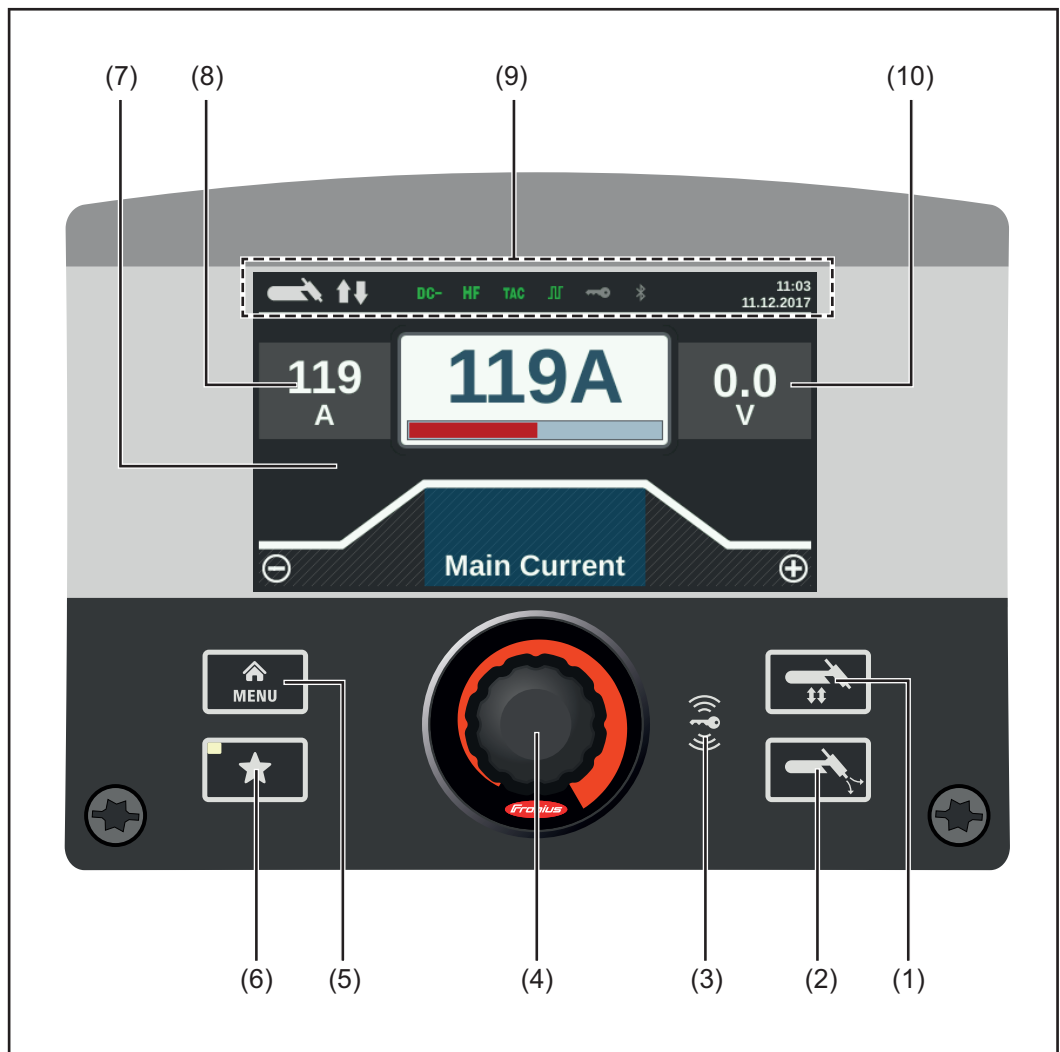
## Safety



**WARNING!** Operating the equipment incorrectly can cause serious injury and damage. Do not use the functions described until you have thoroughly read and understood the following documents:

- these operating instructions
- all the operating instructions for the system components, especially the safety rules

## Control panel



No.	Function
(1)	<b>Welding process / Mode button</b> to select the welding process and operating mode
(2)	<b>Gas-test button</b> to set the required shielding gas flow rate on the gas pressure regulator After pressing this button, gas flows for 30 seconds. Press the button again to stop the gas flow prematurely.
(3)	<b>Reading zone for NFC keys</b> MW / TT 230i only and only in certified countries to lock/unlock the power source using NFC keys  NFC key = NFC card or NFC key ring
(4)	<b>Adjusting dial with turn/press function</b> <ul style="list-style-type: none"> <li>- To select elements, set values and scroll through lists</li> <li>- To save jobs when the FP Job function package is present: if the adjusting dial is pressed for more than 3 seconds, the selected welding parameters are saved as a job. An overview of the most important parameters will be displayed. For more about how to save a job, see Setup settings / the Job menu / Save job starting on page 95</li> </ul>
(5)	<b>Menu button</b> to open the Setup menu
(6)	<b>Favourites button</b> to save / retrieve preferred settings
(7)	<b>Display</b>
(8)	<b>Hold indicator - welding current</b> At the end of each welding operation, the actual values for the welding current and voltage are stored - HOLD lights up.
(9)	<b>Status bar</b> The status bar displays the following information: <ul style="list-style-type: none"> <li>- Current welding process</li> <li>- Current operating mode</li> <li>- Selected current type</li> <li>- Active functions (e.g. high frequency ignition, tacking, pulsing, etc.)</li> <li>- Status of the power source (locked / unlocked)</li> <li>- Time</li> <li>- Date</li> </ul> <p>The information shown in the status bar varies according to which welding process has been selected.</p>
(10)	<b>Hold indicator - welding voltage</b> At the end of each welding operation, the actual values for the welding current and voltage are stored - HOLD lights up.

# The favourites button

## Assigning the Favourites button

The Favourites button can be assigned a parameter from the following Setup menus:



This parameter can then be called up and changed directly on the control panel.

- 1 Select the desired parameter in the Setup menu

More information about the Setup menu can be found from page 77 onwards

- 2 To assign the selected parameter to the Favourites button, press the Favourites button for approx. 5 seconds



A confirmation message is displayed.

- 3 Press the adjusting dial to confirm

The selected parameter is now assigned to the Favourites button.

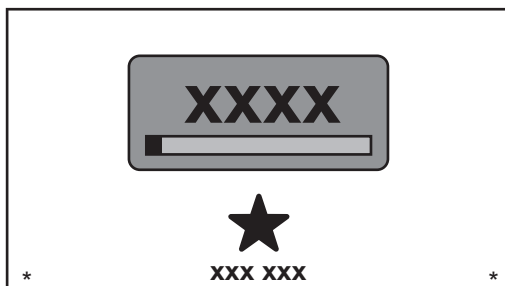
**IMPORTANT!** Saving a favourite overwrites the previously saved favourite without warning.

## Retrieving favourites

- 1 Press the Favourites button briefly



The assigned parameter is displayed:



The retrieved parameter can be changed by turning the adjusting dial (blue background).

The new value takes effect immediately.

Press and turn the adjusting dial to choose from the available welding parameters.

---

## Deleting favourites

- 1 Press the Favourites button for longer than 5 seconds



The assigned parameter is deleted and a message is displayed.

- 2 Press the adjusting dial to confirm

---

## Assigning EasyJobs to the Favourites button

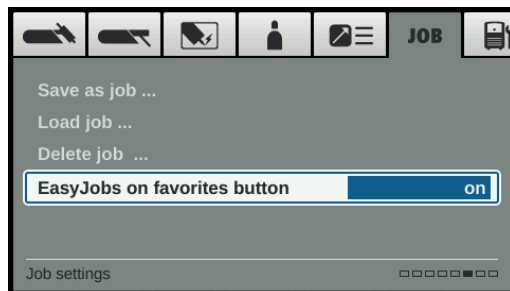
If the FP Job function package is present on the power source, EasyJobs can be assigned to the Favourites button.

**IMPORTANT!** If EasyJobs is assigned to the Favourites button, any previously saved favourite parameter will no longer be accessible using that button.

- 1 Select the Job menu from the Setup menu

More information about the Setup menu can be found from page 95 onwards

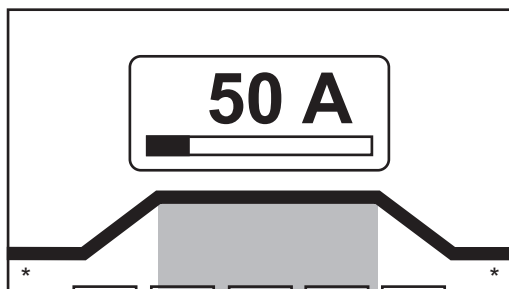
- 2 In the Job menu, set the "EasyJobs to Favourites button" parameter to "on"



- 3 Press the Menu key



Five EasyJob buttons for the welding parameters are displayed as icons.

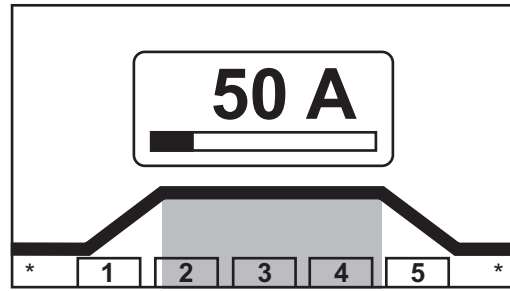


- 4 Press the Favourites button





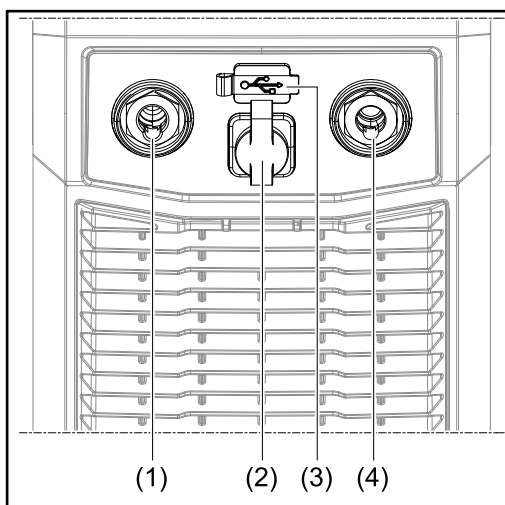
The 5 EasyJob buttons are displayed and can be selected by turning and pressing the adjusting dial.



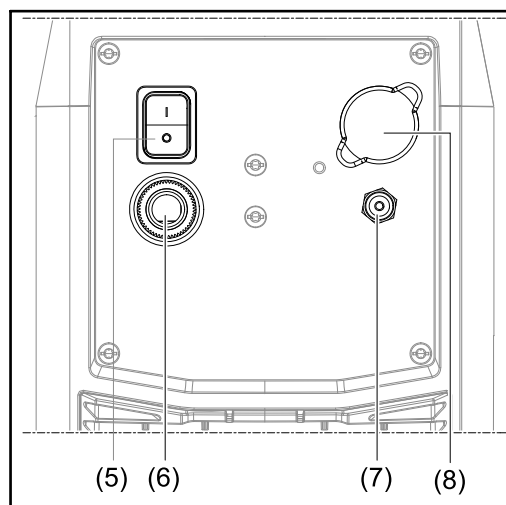
More information about using EasyJobs can be found in the "EasyJob mode" section starting on page 74.

# Connections, switches and mechanical components

## Connections, switches and mechanical components



Front



Rear

---

### No. Function

---

- (1) **(-) current socket with integrated gas connection**  
to connect:
- the TIG welding torch
  - the electrode cable for manual metal arc welding

Symbols on TransTig power sources:



Symbols on MagicWave power sources:



- 
- (2) **TMC connection (TIG Multi Connector)**
- to connect the TIG welding torch control plug
  - to connect pedal remote controls
  - to connect the remote control during MMA welding

- 
- (3) **USB port**  
To connect USB flash drives (such as service dongles, licence keys, etc.).

**IMPORTANT!** The USB port is not electrically isolated from the welding circuit. This means that devices that establish an electrical connection with another device must not be connected to the USB port.

---

---

**No. Function**

---

- (4) **(+) current socket**  
to connect the grounding cable

Symbols on TransTig power sources:

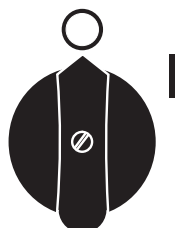


Symbols on MagicWave power sources:



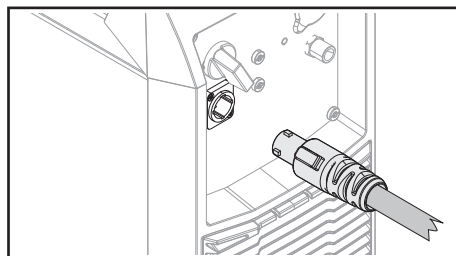
- 
- (5) **Mains switch**  
To switch the power source on and off

Mains switch for MV devices:



- 
- (6) **Mains cable with strain relief device**

for MV devices:  
mains cable connection socket



- 
- (7) **Shielding gas connection**

- 
- (8) **Blanking cover**  
for Ethernet option
-



# **Installation and commissioning**



# Minimum equipment needed for welding task

---

## General

Depending on which welding process you intend to use, a certain minimum equipment level will be needed in order to work with the power source. The welding processes and the minimum equipment levels required for the welding task are then described.

---

## TIG AC welding

- MagicWave power source
  - Grounding (earthing) cable
  - TIG welding torch with rocker switch
  - Gas connection (shielding gas supply), with pressure regulator
  - Filler metals (as required by the application)
- 

## TIG DC welding

- Power source
  - Grounding (earthing) cable
  - TIG welding torch with rocker switch
  - Gas connection (shielding gas supply)
  - Filler metals (as required by the application)
- 

## MMA welding

- Power source
- Grounding (earthing) cable
- Electrode holder
- Rod electrodes (as required by the application)

# Before installation and commissioning

---

## Safety



**WARNING!** Incorrect operation or shoddy workmanship can cause serious injury or damage. All work described in this document must only be carried out by trained and qualified personnel. All functions described in this document must only be used by trained and qualified personnel. Do not carry out any of the work or use any of the functions described until you have fully read and understood the following documents:

- this document
- all the operating instructions for the system components, especially the safety rules

## Utilisation for intended purpose

The power source is intended exclusively for TIG and MMA welding. Utilisation for any other purpose, or in any other manner, shall be deemed to be not in accordance with the intended purpose. The manufacturer shall not be liable for any damage resulting from such improper use.

Proper use also includes:

- following all the information in the operating instructions
- carrying out all the specified inspection and servicing work

## Setup regulations

The device is tested to "Degree of protection IP23", meaning:

- protection against penetration by solid foreign bodies with diameters > 12.5 mm (0.49 in.)
- protection against direct sprays of water up to 60° from the vertical

The device can be set up and operated outdoors in accordance with IP23. Avoid direct wetting (e.g. from rain).



**WARNING!** If one of these machines topples over or falls it could cause serious or even fatal injury. Place device on a solid, level surface in such a way that it remains stable.

The venting duct is a very important safety feature. When choosing the location for the device, ensure that the cooling air can enter and exit unhindered through the air ducts on the front and back of the device. Electrically conductive dust (e.g. from grinding work) must not be allowed to get sucked into the device.

## Mains connection

The devices are designed to run on the mains voltage shown on the respective rating plates. If your version of the device does not come with mains cables and plugs ready-fitted, these must be fitted in accordance with national regulations and standards. For details of fuse protection of the mains lead, please see the Technical Data.



**NOTE!** Inadequately dimensioned electrical installations can cause serious damage. The incoming mains lead and its fuse must be dimensioned to suit the local power supply. The technical data shown on the rating plate applies.



**Generator-powered operation**

The power source is generator-compatible.

In order to dimension the required generator output, the maximum apparent power  $S_{1\max}$  of the power source is required.

The maximum apparent power  $S_{1\max}$  of the power source can be calculated as follows:

$$S_{1\max} = I_{1\max} \times U_1$$

See device rating plate or technical data for  $I_{1\max}$  and  $U_1$  values

The generator apparent power  $S_{\text{GEN}}$  needed is calculated using the following rule of thumb:

$$S_{\text{GEN}} = S_{1\max} \times 1.35$$

A smaller generator may be used when not welding at full power.

**IMPORTANT!** The generator apparent power  $S_{\text{GEN}}$  must always be higher than the maximum apparent power  $S_{1\max}$  of the power source.

When using single-phase devices with a 3-phase generator, note that the specified generator apparent power is often only available as a whole across all three phases of the generator. If necessary, obtain further information on the single-phase power of the generator from the generator manufacturer.



**NOTE!** The voltage delivered by the generator must never exceed the upper or lower limits of the mains voltage tolerance range. Details of the mains voltage tolerance can be found in the "Technical data" section.

**Information on system components**

The steps and activities described below include references to various system components, including:

- Trolley
- Cooling units
- Welding torches, etc.

For more detailed information about installing and connecting the system components, please refer to the appropriate operating instructions.

# Connecting the mains cable

---

## General

If power sources are delivered without a mains cable fitted, a mains cable that is suitable for the connection voltage must be connected to the power source before commissioning. The mains cable is included in the scope of supply of the power source.

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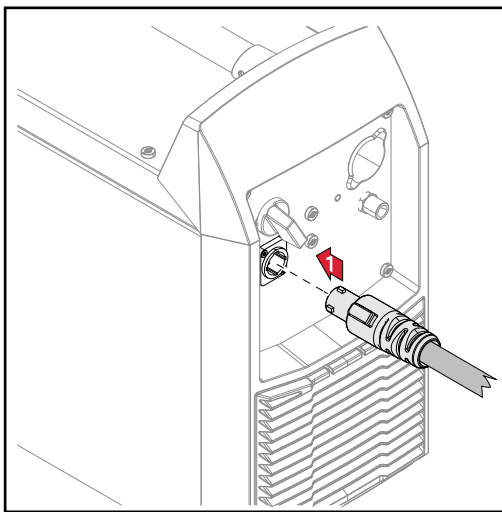
## Safety



**WARNING!** Work that is carried out incorrectly can cause serious injury and damage. The following activities must only be carried out by trained and qualified personnel. Pay particular attention to the "Safety rules" sections in the power source and system component operating instructions.

---

## Connecting the mains cable



- 1 Connect the mains cable:
  - Plug in the mains cable
  - Turn the mains cable 45° to the right until you hear it latch into place

## Safety



**WARNING!** An electric shock can be fatal. If the machine is plugged into the mains electricity supply during installation, there is a high risk of very serious injury and damage. Do not carry out any work on the device unless

- the mains switch is in the "O" position,
- the device is unplugged from the mains.

## Remarks on the cooling unit

The TT / MW 230i power sources can be operated with a cooling unit.

A cooling unit is recommended for the following applications:

- Hosepacks over 5 m long
- TIG AC welding
- In general, where welding is performed in higher power ranges

The cooling unit is powered from the power source. The cooling unit is ready for operation when the mains switch of the power source is in the "I" position.

More information on the cooling unit can be found in the Operating Instructions for the cooling unit.

## General

This section describes how to commission the power source:

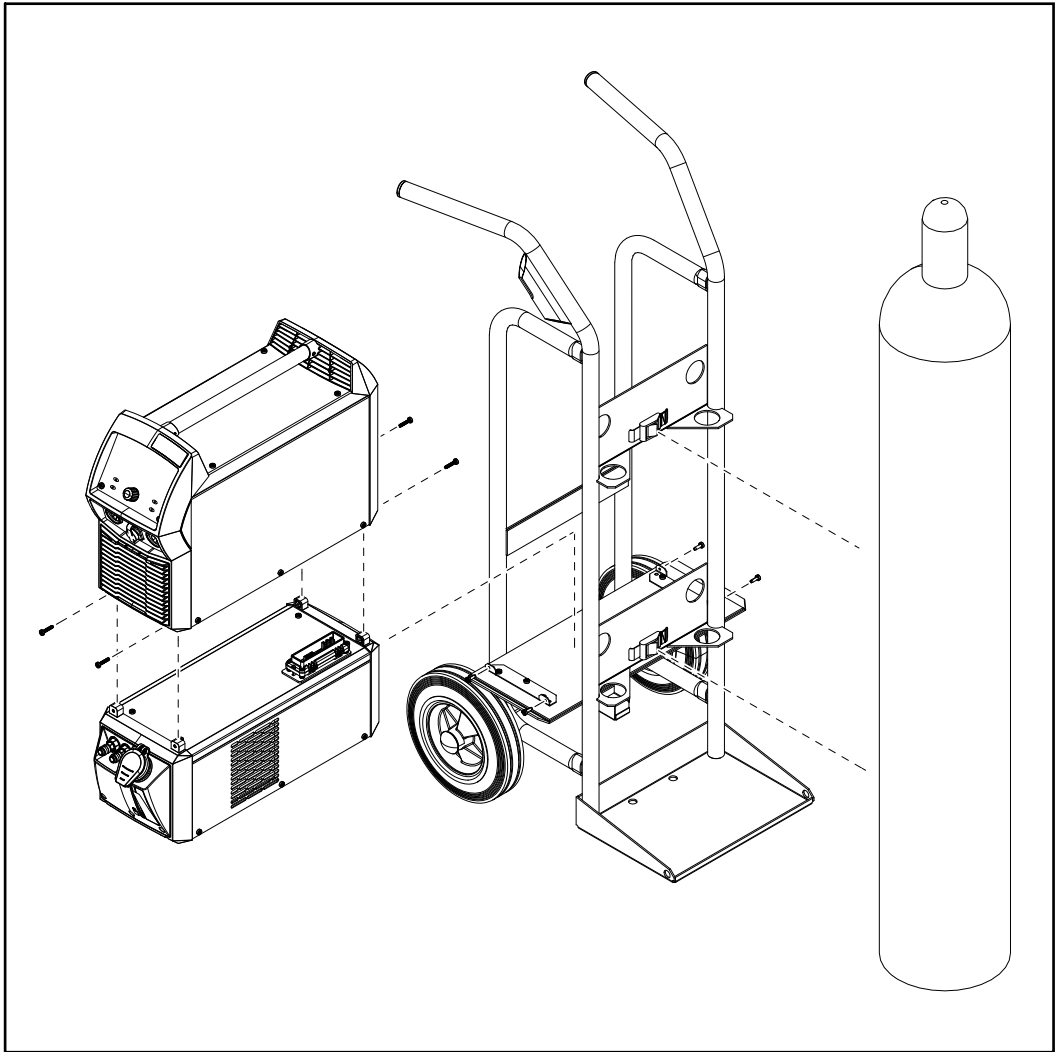
- for the main TIG welding application
- with reference to a standard configuration for a TIG welding device.

The standard configuration consists of the following system components:

- power source
- cooling unit
- TIG manual welding torch
- pressure regulator
- gas cylinder
- gas cylinder holder
- trolley

The steps set out below provide an overview of how to commission the power source. For detailed information about the individual steps, please refer to the operating instructions for the system components.

**Assembling the  
system compo-  
nents (overview)**

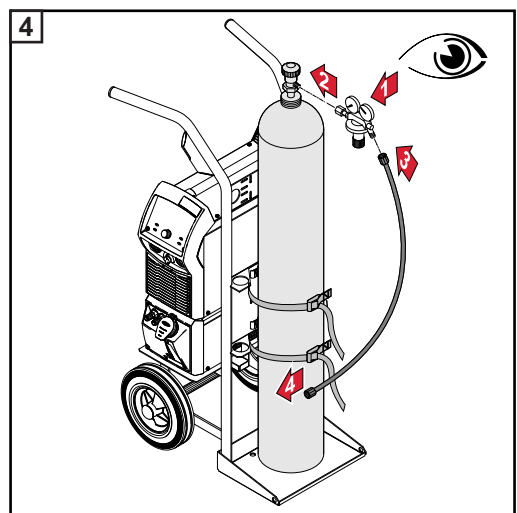
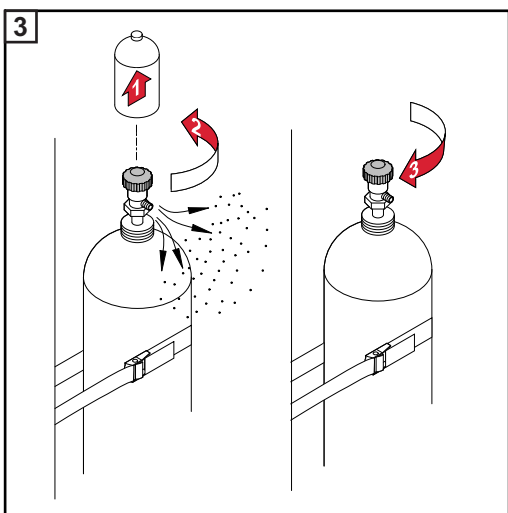
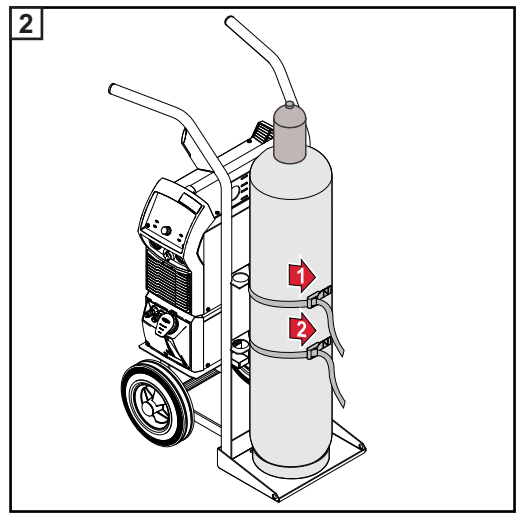
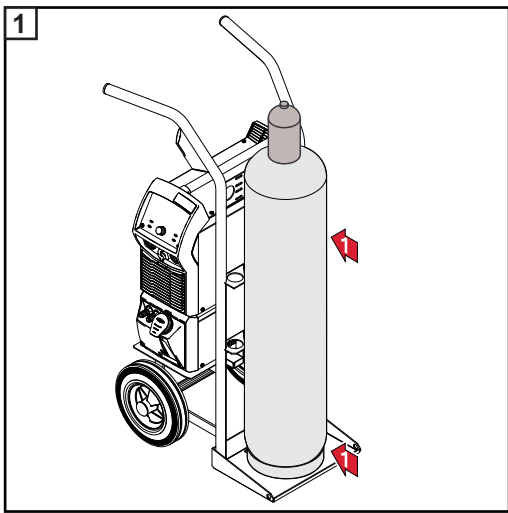


### Connecting the gas cylinder

**WARNING!** There is a high risk of very serious injury and damage if a gas cylinder falls over.

- Place them on a solid, level surface in such a way that they remain stable
- Secure gas cylinders to prevent them from toppling over: fix the safety strap at the same height as the top part of the cylinder
- Never fix the safety strap around the neck of the cylinder

Follow the gas cylinder manufacturer's safety rules.



#### When using a TIG welding torch with an integral gas connection:

- 5** Use the gas hose to connect the pressure regulator to the shielding gas connection on the rear of the power source
- 6** Tighten the union nut on the gas hose

#### When using a TIG welding torch with no integral gas connection:

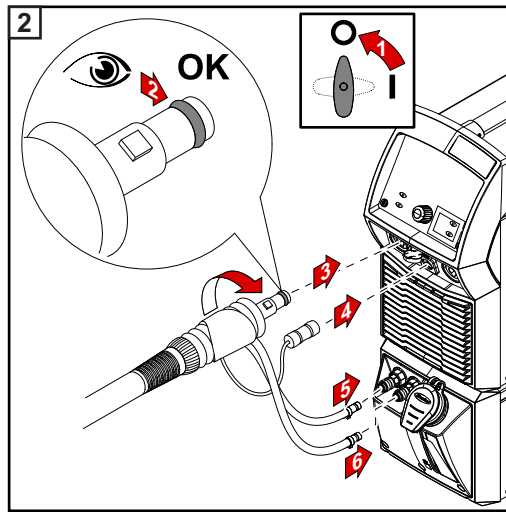
- 5** Connect the TIG welding torch gas hose to the pressure regulator

**Connecting the welding torch to the power source and the cooling unit**



**NOTE!** Do not use pure tungsten electrodes (colour-coded green) on TransTig power sources.

- 1 Set up the welding torch in accordance with the welding torch operating instructions



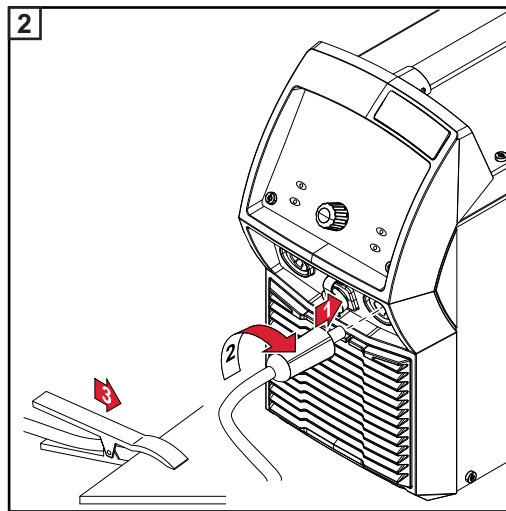
**NOTE!** Always check the following before switching on:

- Sealing ring on welding torch connection
- Coolant level

During welding, check at regular intervals that the coolant is flowing properly.

**Establishing a ground earth connection to the workpiece**

- 1 Turn the mains switch to the "O" position



# Locking and unlocking the power source using the NFC key

---

**General remarks**      NFC key = NFC card or NFC key ring

The power source can be locked using an NFC key, e.g. to prevent unauthorised access or welding parameters being changed without permission.

A contactless system on the control panel allows the power source to be locked and unlocked.

The power source must be switched on before it can be locked or unlocked.

---

**Restrictions**              Locking and unlocking of the power source is only possible with the TT/MW 230i and is only permitted in certified countries.





# **Welding**



# TIG modes

## Safety

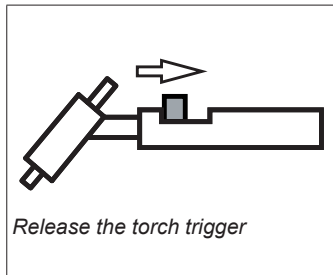
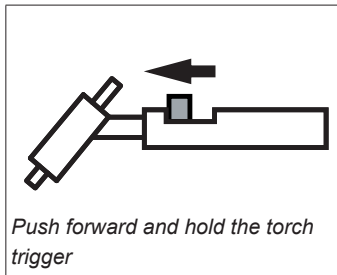
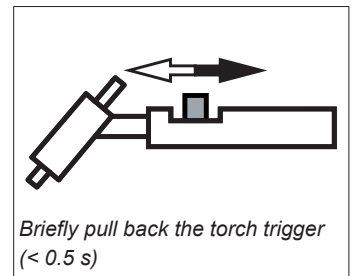
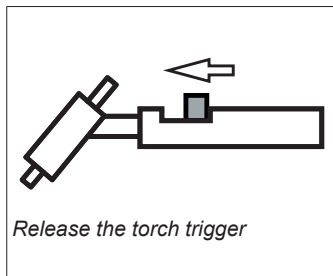
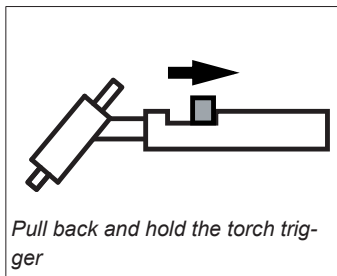


**WARNING!** Operating the equipment incorrectly can cause serious injury and damage. Do not use the functions described until you have thoroughly read and understood the following documents:

- these operating instructions
- all the operating instructions for the system components, especially the safety rules

See the "The Setup menu" section for information on the settings, setting range and units of measurement of the available welding parameters.

## Symbols and their explanations



**GPr**  
Gas pre-flow time

**I<sub>s</sub>**  
Starting-current phase: the temperature is raised gently at a low welding current so that the filler metal can be positioned correctly

**UP**  
Upslope phase: the starting current is steadily increased until it reaches the main current (welding current) I<sub>1</sub>

**I<sub>1</sub>**  
Main current phase (welding-current phase): uniform thermal input into the base material, whose temperature is raised by the advancing heat

**GPo**  
Gas post-flow time

**SPT**  
Spot welding time

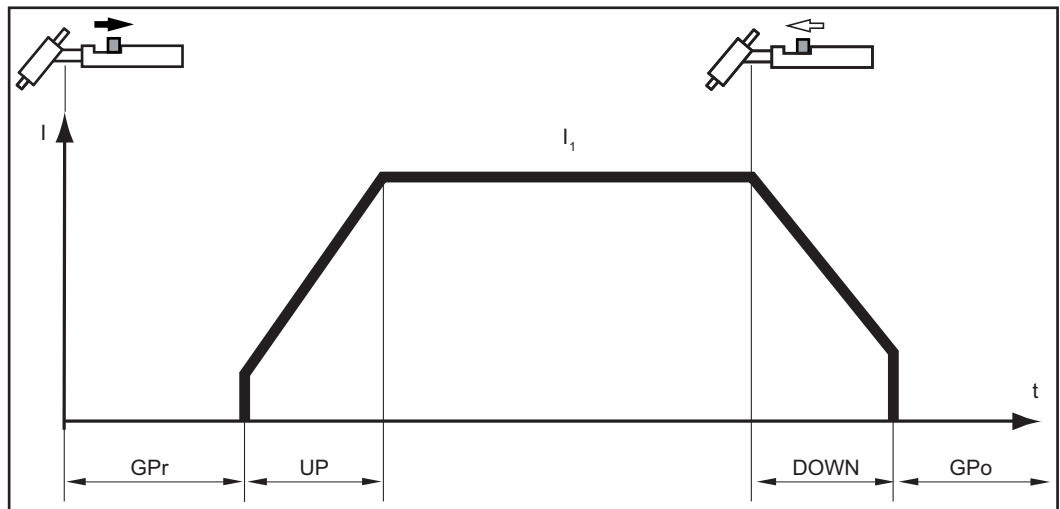
**I<sub>E</sub>**  
Final current phase: to prevent any local overheating of the base material due to heat build-up towards the end of welding. This eliminates any risk of weld seam drop-through.

**DOWN**  
DownSlope phase: the welding current is steadily lowered until it reaches the final current

**I<sub>2</sub>**  
Reduced current phase: intermediate lowering of the welding current in order to prevent any local overheating of the base material

## 2-step mode

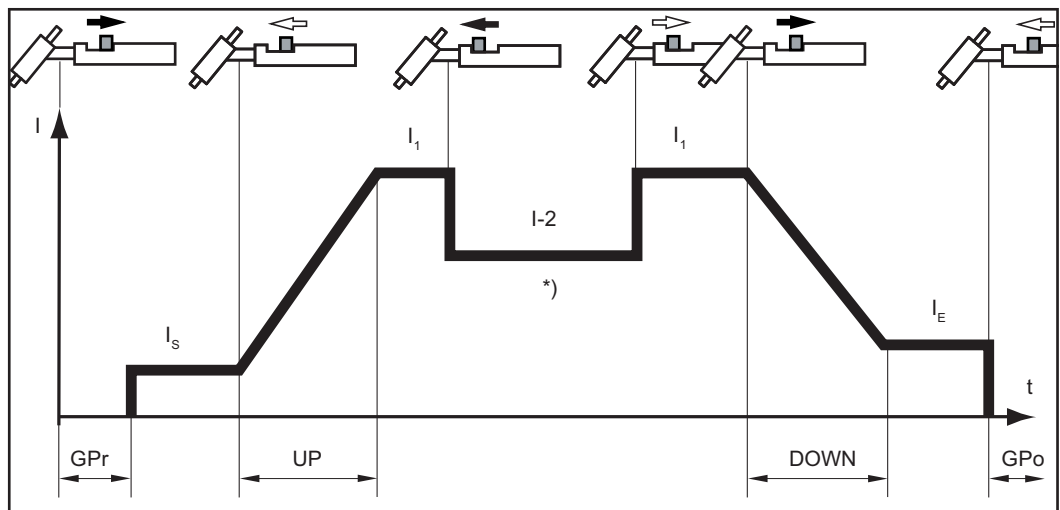
- Welding: Pull back and hold the torch trigger
- End of welding: Release the torch trigger



2-step mode

## 4-step mode

- Start of welding with starting current  $I_s$ : Pull back and hold the torch trigger
- Welding with main current  $I_1$ : Release the torch trigger
- Lowering to final current  $I_E$ : Pull back and hold the torch trigger
- End of welding: Release the torch trigger



4-step mode

\*) Intermediate lowering

Intermediate lowering during the main current phase reduces the welding current to the specified reduced current I-2.

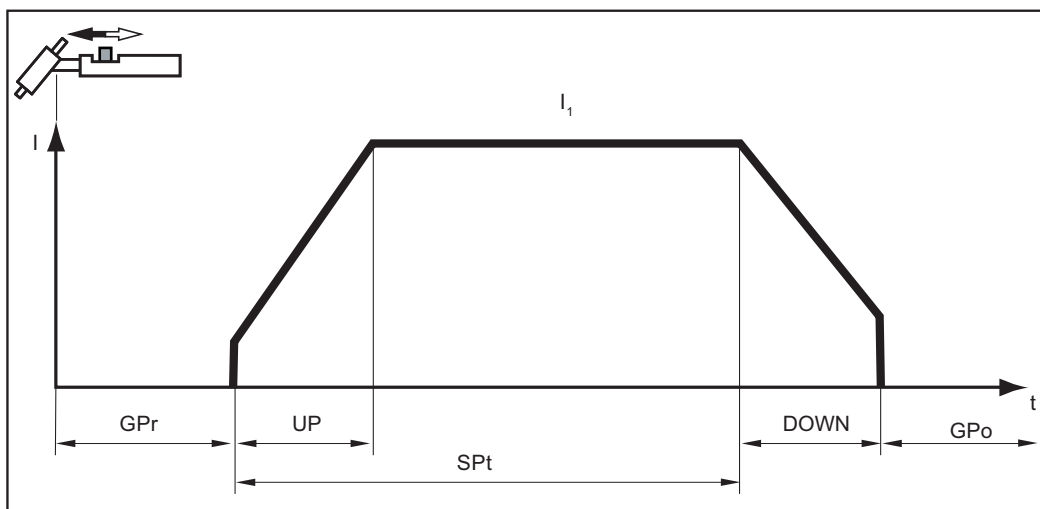
- To activate intermediate lowering, push forward and hold the torch trigger
- To revert to the main current, release the torch trigger

### Spot welding

When the spot welding operating mode is selected, the symbol for spot welding appears on the status display next to the welding process symbol:



- Welding: briefly pull back the torch trigger  
The welding time corresponds to the value set for the spot welding time setup parameter.
- to end the welding process prematurely: pull the torch trigger back again



# TIG welding

## Safety



**WARNING!** Operating the equipment incorrectly can cause serious injury and damage. Do not use the functions described until you have thoroughly read and understood the following documents:

- these operating instructions
- all the operating instructions for the system components, especially the safety rules



**WARNING!** An electric shock can be fatal. If the power source is connected to the mains electricity supply during installation, there is a high risk of very serious injury and damage. Before carrying out any work on the device make sure that:

- the power source mains switch is in the "O" position
- the power source is unplugged from the mains

## Preparations

- 1 Plug in the mains plug



**CAUTION!** Risk of injury and damage from electric shock. As soon as the mains switch is in the "I" position, the tungsten electrode of the welding torch is live. Make sure that the tungsten electrode does not touch any persons or electrically conductive or earthed parts (e.g. housing, etc.).

- 2 Move the mains switch to the "I" position

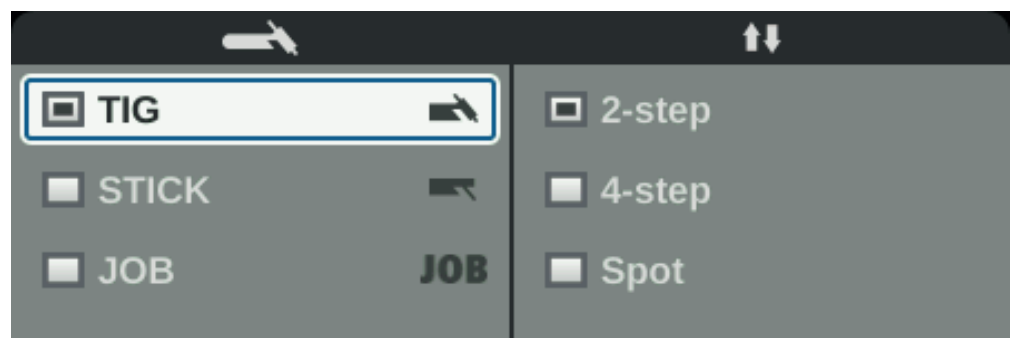
The Fronius logo appears on the display.

## TIG welding

- 1 Press the Welding process / Mode button



The welding process and operating mode are displayed.



- 2 Select the desired welding process by turning the adjusting dial
- 3 Confirm the selection by pressing the adjusting dial
- 4 Select the desired operating mode by turning the adjusting dial
- 5 Confirm the selection by pressing the adjusting dial

The available TIG welding parameters are displayed after a short time or after pressing the Welding process / Mode button.

- 6 Turn the adjusting dial to select the required parameter
- 7 Press the adjusting dial

The value of the parameter is highlighted in blue and can now be changed.

- 8 Turn the adjusting dial to change the value of the parameter
- 9 Press the adjusting dial
- 10 If required, set further parameters in the Setup menu  
(For details, see the "Setup parameters" chapter, starting on page 77)
- 11 Open the gas cylinder valve
- 12 To set the shielding gas flow rate:
  - Press the Gas-test button



The test gas flow lasts for a maximum of 30 seconds. Press the button again to stop the gas flow prematurely.

- Turn the adjusting-screw on the underside of the pressure regulator until the manometer indicates the desired shielding gas flow-rate

**NOTE!** All welding parameter set values that have been set using the adjusting dial remain stored until the next time they are changed. This applies even if the power source is switched off and on again.

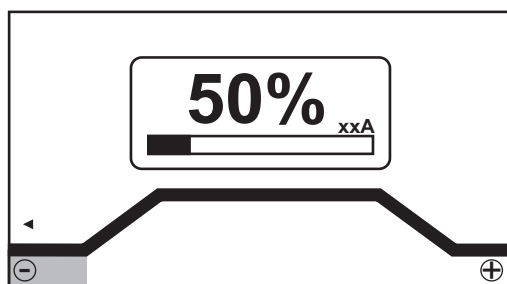
- 13 Start welding (ignite the arc)

**Welding parameters for TIG DC welding**

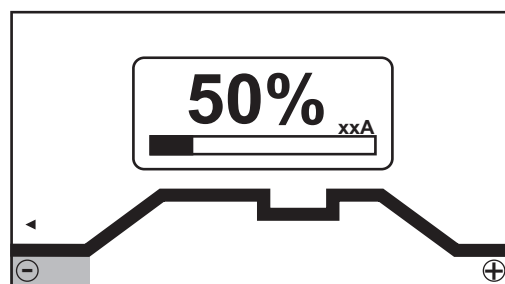
The polarity welding parameter is only available on MagicWave power sources. If the polarity welding parameter is set to DC, the following welding parameters are available:

xxA = actual current value depending on the specified main current

**Starting current**



Starting current, 2-step mode and spot welding

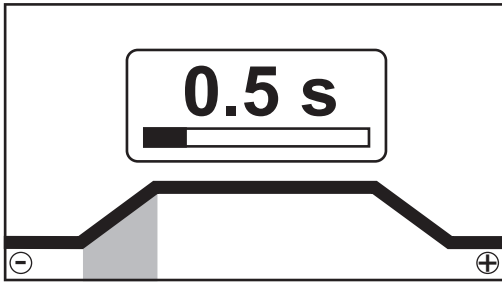


Starting current, 4-step mode

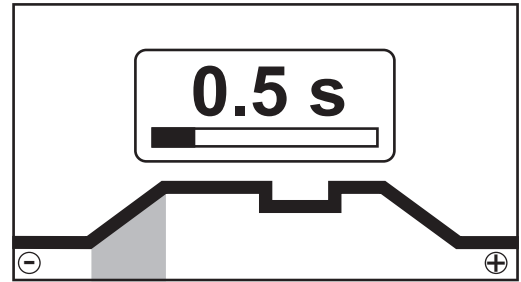
Unit	% (of main current)
Setting range	0 - 200
Factory setting	50

**IMPORTANT!** The starting current is saved separately for TIG AC welding and TIG DC welding.

## UpSlope



*UpSlope, 2-step mode and spot welding*

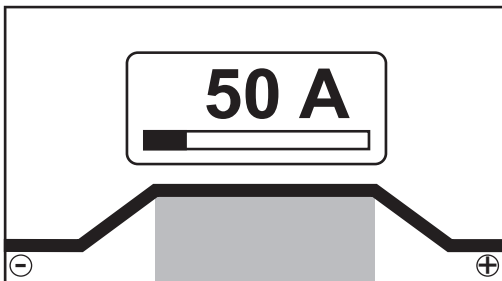


*UpSlope, 4-step mode*

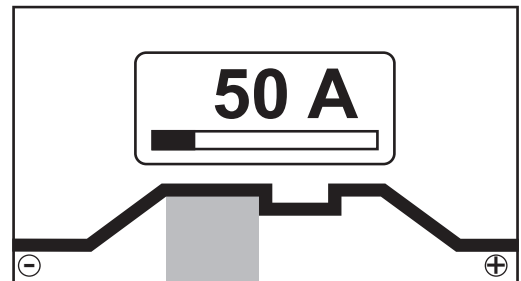
Unit	s
Setting range	off; 0.1 - 30.0
Factory setting	0.5

**IMPORTANT!** The UpSlope is saved separately for 2-step and 4-step modes.

## Main current



*Main current, 2-step mode and spot welding*

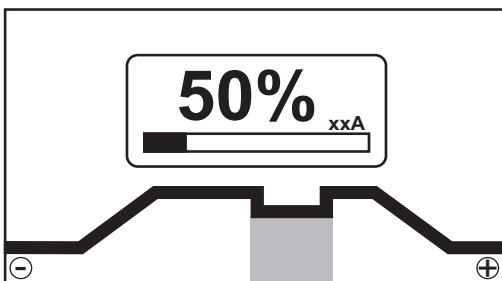


*Main current, 4-step mode*

Unit	A
Setting range	3 - 190 ... MW 190 3 - 230 ... MW / TT 230
Factory setting	-

**IMPORTANT!** On welding torches with the Up/Down function, the entire setting range can be selected while the device is idling.

## Reduced current

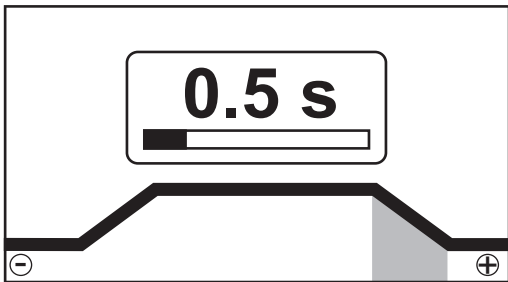


*Reduced current (only in 4-step mode)*

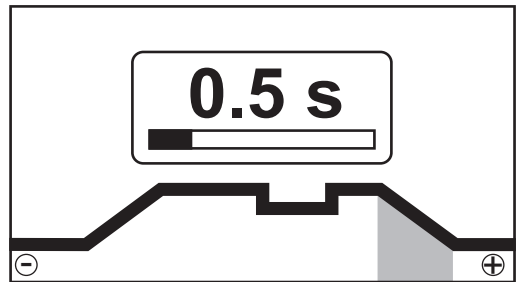
Unit	% (of main current)
Setting range	0 - 100
Factory setting	50



**DownSlope**



*DownSlope, 2-step mode and spot welding*

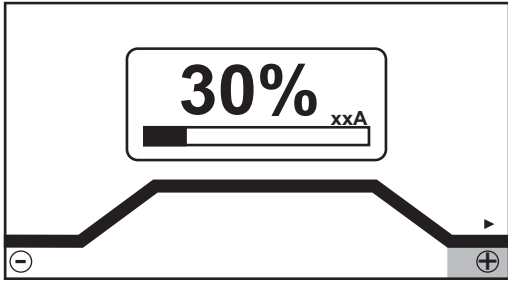


*DownSlope, 4-step mode*

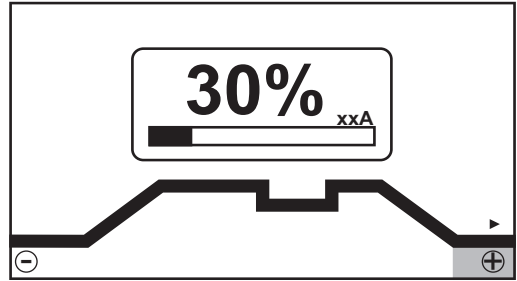
Unit                    s  
 Setting range        off; 0.1 - 30.0  
 Factory setting     1.0

**IMPORTANT!** The DownSlope is saved separately for 2-step and 4-step modes.

**Final current**



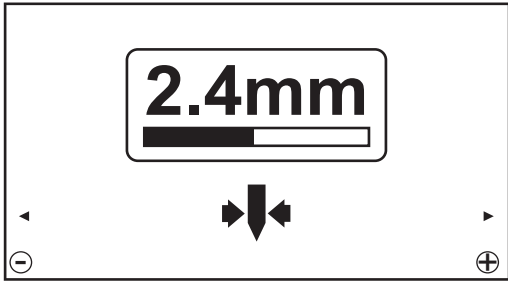
*Final current, 2-step mode and spot welding*



*Final current, 4-step mode*

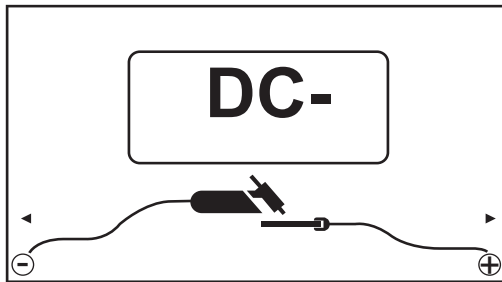
Unit                    % (of main current)  
 Setting range        0 - 100  
 Factory setting     30

**Electrode diameter**



Unit                    mm  
 Setting range        off; 1.0 - 4.0  
 Factory setting     2.4

## Polarity



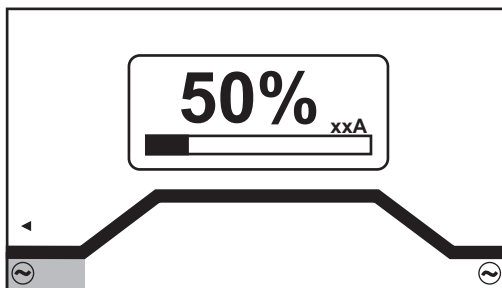
Unit	-
Setting range	DC- / AC
Factory setting	DC-

## Welding parameters for TIG AC welding

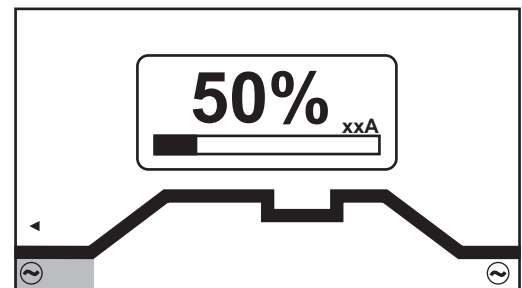
The polarity welding parameter is only available on MagicWave power sources. If the polarity welding parameter is set to AC, the following welding parameters are available:

xxA = actual current value depending on the specified main current

## Starting current



Starting current, 2-step mode and spot welding

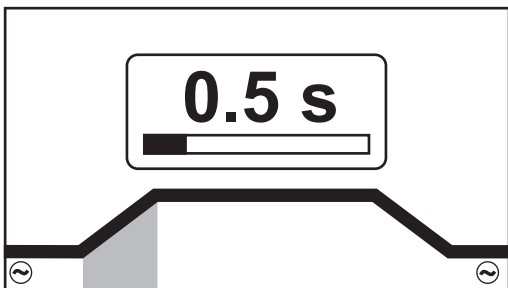


Starting current, 4-step mode

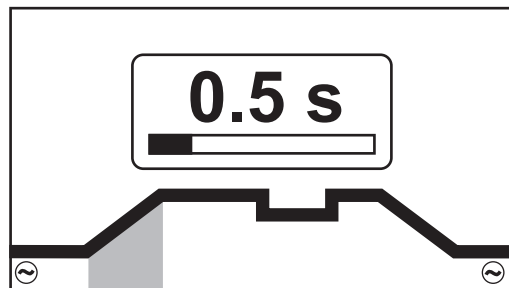
Unit	% (of main current)
Setting range	0 - 200
Factory setting	50

**IMPORTANT!** The starting current is saved separately for TIG AC welding and TIG DC welding.

**UpSlope**



*UpSlope, 2-step mode and spot welding*

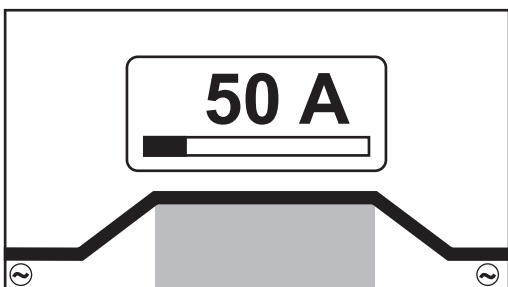


*UpSlope, 4-step mode*

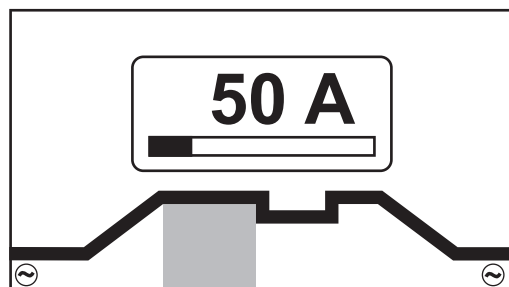
Unit	s
Setting range	off; 0.1 - 30.0
Factory setting	0.5

**IMPORTANT!** The UpSlope is saved separately for 2-step and 4-step modes.

**Main current**



*Main current, 2-step mode and spot welding*

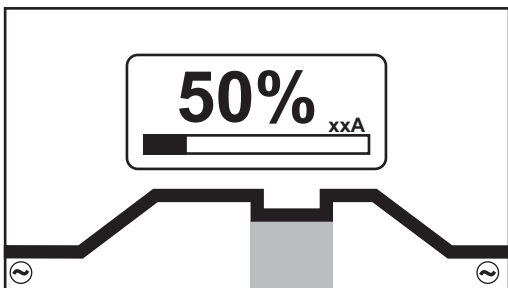


*Main current, 4-step mode*

Unit	A
Setting range	3 - 190 ... MW 190 3 - 230 ... MW / TT 230
Factory setting	-

**IMPORTANT!** On welding torches with the Up/Down function, the entire setting range can be selected while the device is idling. During welding, the main current can be corrected in steps of +/-20 A.

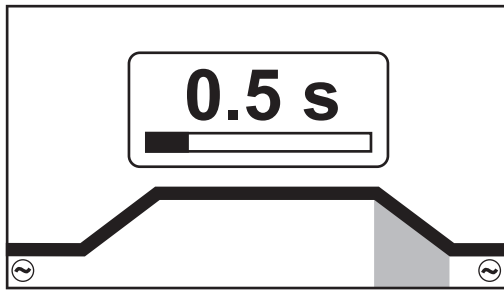
**Reduced current**



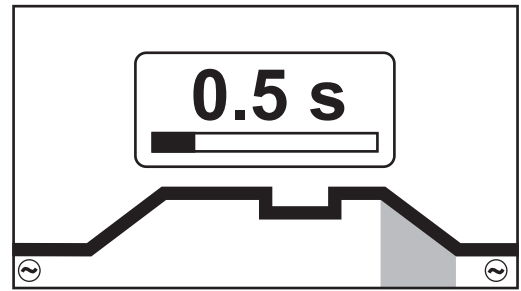
*Reduced current (only in 4-step mode)*

Unit	% (of main current)
Setting range	0 - 100
Factory setting	50

## DownSlope



DownSlope, 2-step mode and spot welding

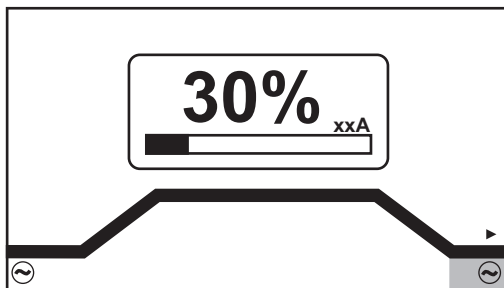


DownSlope, 4-step mode

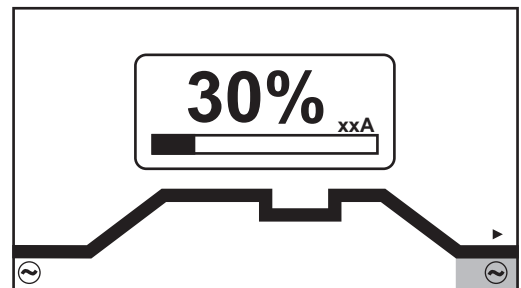
Unit	s
Setting range	off; 0.1 - 30.0
Factory setting	1.0

**IMPORTANT!** The DownSlope is saved separately for 2-step and 4-step modes.

## Final current



Final current, 2-step mode and spot welding

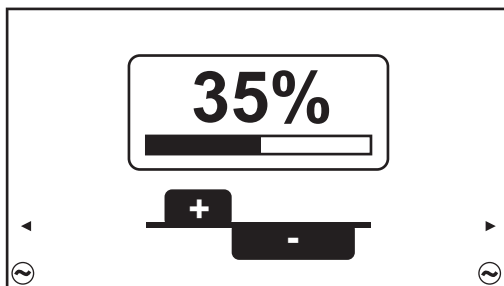


Final current, 4-step mode

Unit	% (of main current)
Setting range	0 - 100
Factory setting	30

## Balance

on MagicWave only

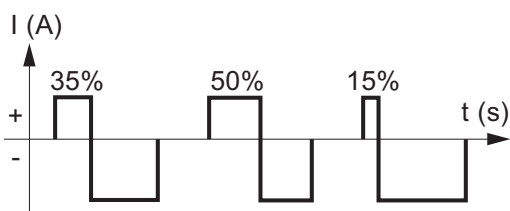


Unit	%
Setting range	15 - 50
Factory setting	35

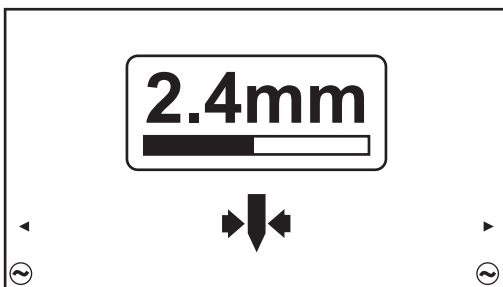
15: highest fusing power, lowest cleaning action

50: highest cleaning action, lowest fusing power

Effect of the balance on the waveshape:

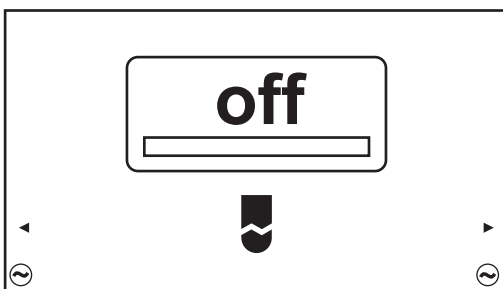


**Electrode diameter**



Unit	mm
Setting range	off; 1.0 - 4.0
Factory setting	2.4

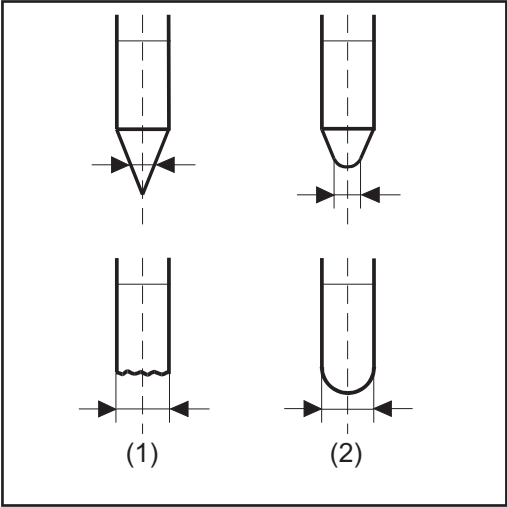
**Cap mode**  
on MagicWave only



Unit	-
Setting range	off / on
Factory setting	off

- off                      Automatic cap-shaping function is deactivated
  
- on                        The ideal cap for the specified diameter of the tungsten electrode is formed during welding start-up. A separate cap-shaping operation on a test workpiece is not necessary.

Afterwards, the automatic cap-shaping function is reset and deactivated.



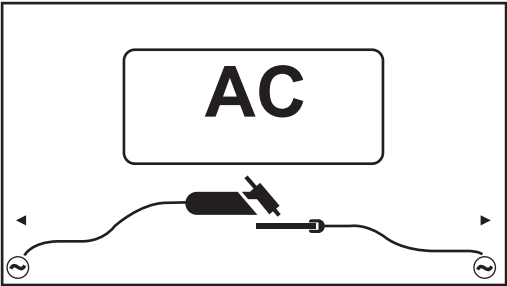
(1) ... before ignition  
(2) ... after ignition

Cap mode must be activated separately for each tungsten electrode.



**NOTE!** The automatic cap-shaping function is not necessary if a sufficiently large cap has already formed at the tip of the tungsten electrode.

**Polarity**



Unit	-
Setting range	DC- / AC
Factory setting	DC-

# Igniting the arc

## General

To ensure the best ignition sequence in the TIG AC welding process, the MagicWave power sources take account of:

- the diameter of the tungsten electrode
- the current temperature of the tungsten electrode with reference to the preceding welding and weld-off times

## Igniting the arc using high frequency (HF ignition)

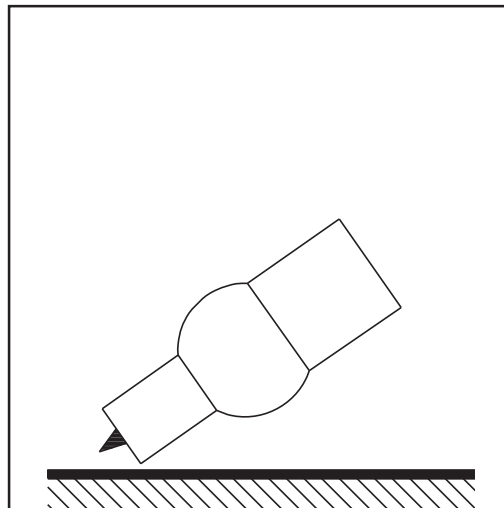
HF ignition is activated when a time value has been set for the ignition timeout setup parameter in the HF menu.

The HF ignition indicator lights up in the status bar on the control panel.

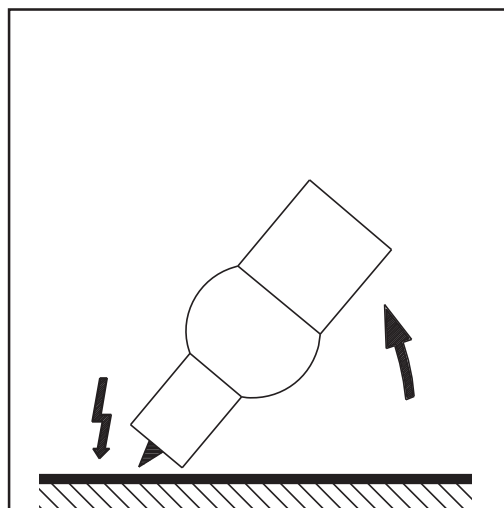


Unlike touchdown ignition, HF ignition eliminates the risk of contamination of the tungsten electrode and the workpiece.

Procedure for HF ignition:

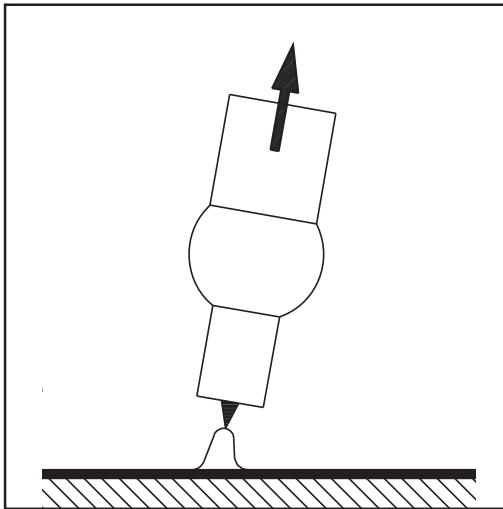


- 1 Place the gas nozzle down on the ignition location, ensuring there is a gap of approx. 2 to 3 mm (5/64 to 1/8 in.) between the tungsten electrode and the workpiece. A gap exists.



- 2 Increase the tilt angle of the torch and actuate the torch trigger according to the mode you have selected

The arc ignites without the electrode touching down on the workpiece.

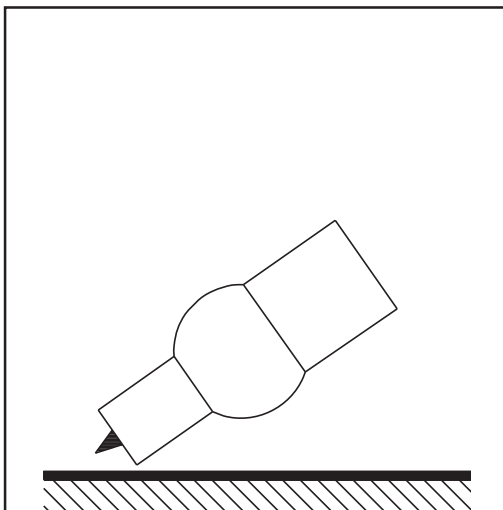


- 3** Tilt the torch back into the normal position
- 4** Carry out welding

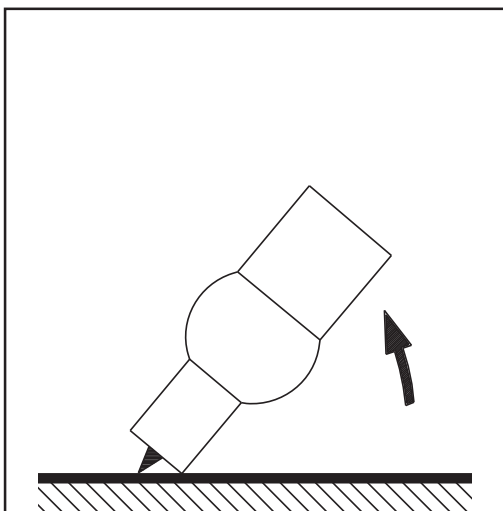
### Touchdown ignition

If the ignition timeout setup parameter is set to off, HF ignition is deactivated. The welding arc is ignited by touching the workpiece with the tungsten electrode.

Procedure for igniting the arc using touchdown ignition:



- 1** Place the gas nozzle down on the ignition location, ensuring there is a gap of approx. 2 to 3 mm (5/64 to 1/8 in.) between the tungsten electrode and the workpiece. Gap exists

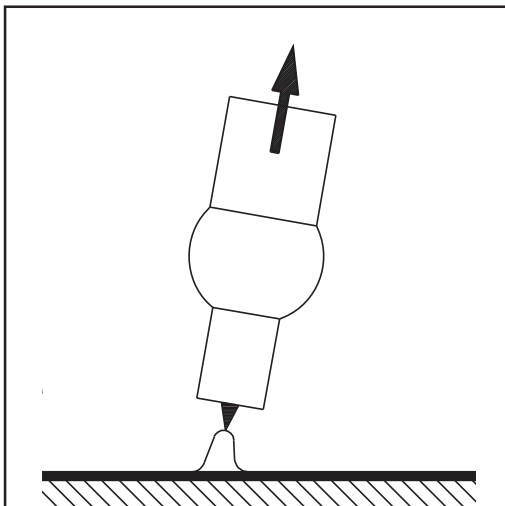


- 2** Actuate the torch trigger

Shielding gas flows

- 3** Gradually tilt the welding torch up until the tungsten electrode touches the workpiece





- 4 Raise the welding torch and rotate it into its normal position

The arc ignites.

- 5 Carry out welding

---

#### End of welding

- 1 Depending on the set mode, finish welding by releasing the torch trigger
- 2 Wait for the set gas post-flow and hold welding torch in position over the end of the weld seam

# Ignition time out, TIG pulsing and tacking function

## Ignition timeout function

The power source has an ignition timeout function.

Once the torch trigger is pressed, gas pre-flow begins immediately. Ignition then begins. If an arc does not appear within the time specified in the Setup menu, the power source cuts out automatically.

The settings for the parameter Ignition timeout are described in the section "The HF menu" from page 91 onwards.

## TIG pulsing

The welding current set at the start of welding is not always ideal for the welding process as a whole:

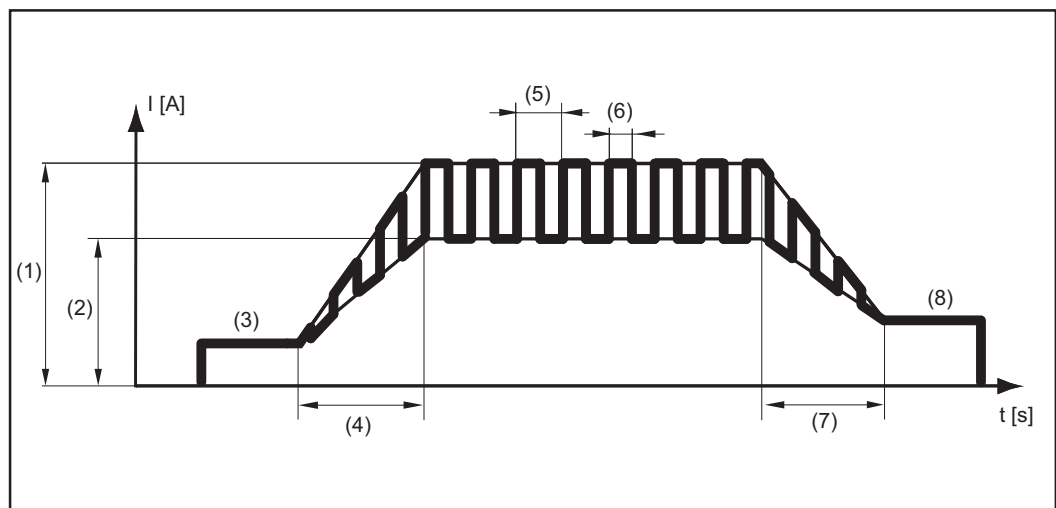
- if the amperage is too low, the base material will not melt sufficiently
- if overheating occurs, the liquid weld pool may drip.

The TIG pulsing function (TIG welding with pulsing welding current) offers a remedy: a low base current (2) rises steeply to the significantly higher pulse current and, depending on the set duty cycle (5), drops back to the base current (2). In TIG pulsing, small sections of the welding location melt quickly and then solidify again quickly.

In manual applications using TIG pulsing, the welding wire is applied in the maximum current phase (only possible in the low frequency range: 0.25 - 5 Hz). Higher pulse frequencies are mainly used in automatic mode to stabilise the arc.

TIG pulsing is used for out-of-position welding of steel pipes or when welding thin sheets.

Mode of operation of TIG pulsing when TIG DC welding is selected:



TIG pulsing - welding current curve

Legend:

(1)	Main current	(5)	Pulse frequency *
(2)	Base current	(6)	Duty cycle
(3)	Starting current	(7)	DownSlope
(4)	UpSlope	(8)	Final current

\*)  $(1/F-P)$  = time interval between two pulses)

**Tacking function** The tacking function is available for the TIG DC welding process.

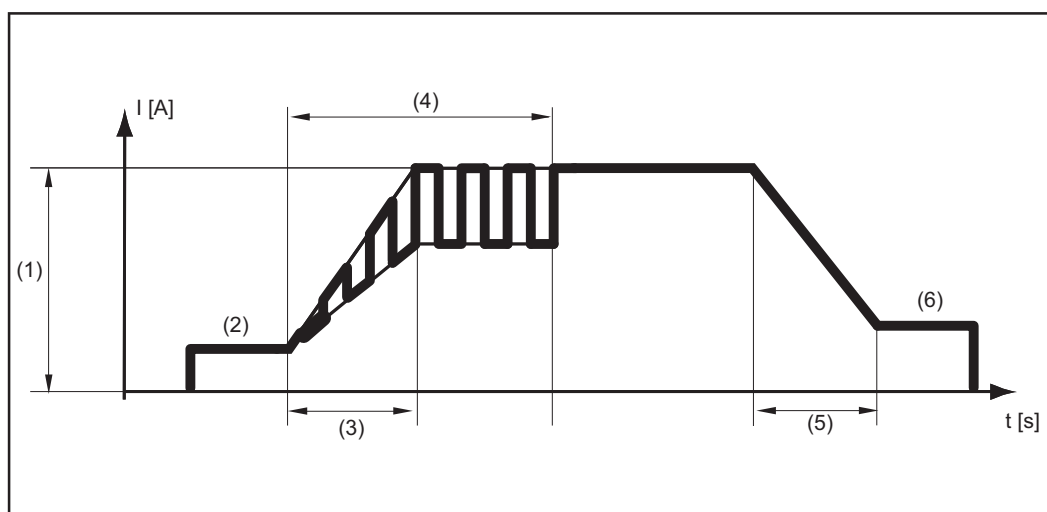
When a time period is specified for the tacking setup parameter (4), the tacking function is assigned to 2-step mode and 4-step mode. The operating sequence of the modes remains unchanged.

The tacking (TAC) indicator lights up in the status bar on the display:



During this period, there is a pulsed welding current that makes the weld pool run together better when two parts are being tack-joined.

Mode of operation of tacking function for TIG DC welding:



Tacking function - welding current curve

Legend:

- (1) Main current
- (2) Starting current
- (3) UpSlope
- (4) Duration of pulsed welding current for the tacking process
- (5) DownSlope
- (6) Final current



**NOTE!** The following points apply to the pulsed welding current:

- The power source automatically regulates the pulsing parameters depending on the specified main current (1).
- There is no need to set any pulsing parameters.

The pulsed welding current begins

- after the end of the starting-current phase (2)
- with the UpSlope phase (3)

Depending on what tacking period has been set, the pulsed welding current may continue up to and including the final current phase (6) (tacking setup parameter (4) set to "on").

After the tacking time has elapsed, welding continues at a constant welding current, and any pulsing parameters that may have been set continue to be available.

# MMA welding

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## Safety



**WARNING!** Operating the equipment incorrectly can cause serious injury and damage. Do not use the functions described until you have thoroughly read and understood the following documents:

- these operating instructions
- all the operating instructions for the system components, especially the safety rules



**WARNING!** An electric shock can be fatal. If the power source is connected to the mains electricity supply during installation, there is a high risk of very serious injury and damage. Before carrying out any work on the device make sure that:

- the power source mains switch is in the "O" position
- the power source is unplugged from the mains

---

## Preparations

- 1 Switch off cooling units (in the components menu, set the cooling unit control setup parameter to OFF)
- 2 Move the mains switch to the O position
- 3 Disconnect the mains plug
- 4 Remove the TIG welding torch

**IMPORTANT!** Observe the instructions on the packaging of the rod electrode when selecting the appropriate type of current and for correctly connecting the electrode cable.

- 5 Plug in and latch the grounding cable:  
in the (+) current socket ... for DC- welding (=/-)  
in the (-) current socket ... for DC+ welding (=/+)
- 6 Use the other end of the grounding cable to establish a connection to the workpiece
- 7 Plug in the electrode cable and turn it clockwise to latch it in place:  
in the (-) current socket ... for DC- welding (=/-)  
in the (+) current socket ... for DC+ welding (=/+)
- 8 Plug in the mains plug



**CAUTION!** Risk of injury and damage from electric shock. As soon as the mains switch is in the "I" position, the rod electrode in the electrode holder is live. Make sure that the rod electrode does not touch any persons or electrically conducting or earthed parts (e.g. the housing, etc.).

- 9 Move the mains switch to the "I" position

The Fronius logo appears on the display.

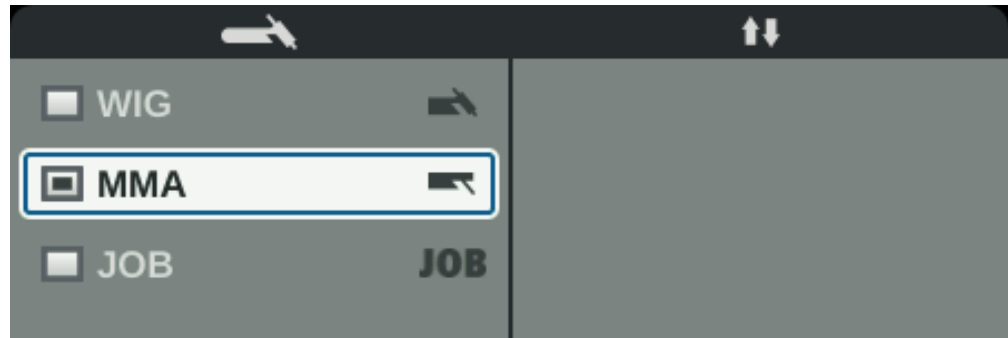
## MMA welding

- 1 Press the Mode button



The welding process and operating mode are displayed.

- 2 Select MMA (rod electrode) welding process (turn adjusting dial and press)



- 3 Turn the adjusting dial to select the Polarity parameter
- 4 Press the adjusting dial
- 5 Set the polarity for the rod electrode to be used by turning the adjusting dial
- 6 Confirm the selection by pressing the adjusting dial
- 8 Turn the adjusting dial to select further welding parameters
- 9 Press the adjusting dial

The value of the parameter is highlighted in blue and can now be changed.

- 10 Turn the adjusting dial to change the value of the parameter
- 11 Press the adjusting dial
- 12 If required, set further parameters in the Setup menu  
(For details, see the "Setup parameters" chapter, starting on page 77)



**NOTE!** All welding parameter set values that have been set using the adjusting dial remain stored until the next time they are changed. This applies even if the power source is switched off and on again.

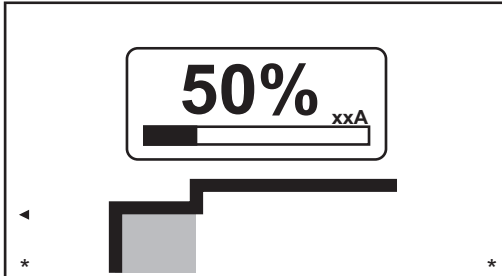
- 13 Start welding

**Welding parameters for manual metal arc welding**

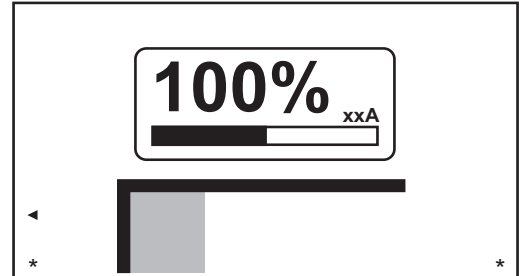
\* Depending on the selected current type, (+), (-) or the alternating current symbol is displayed here.

xxA = actual current value depending on the specified main current

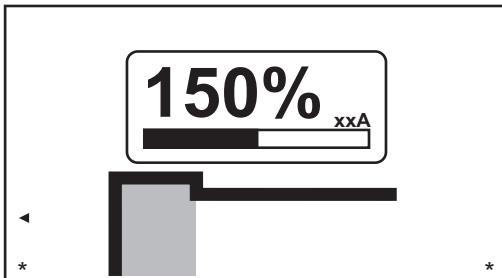
**Starting current**



Starting current: starting current < main current ("SoftStart")



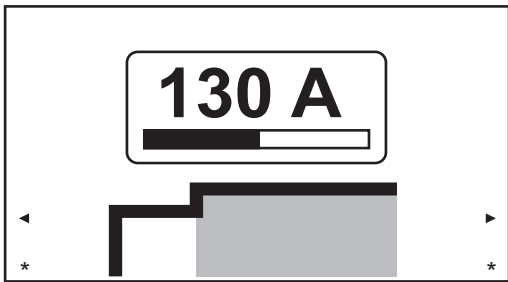
Starting current: starting current = main current



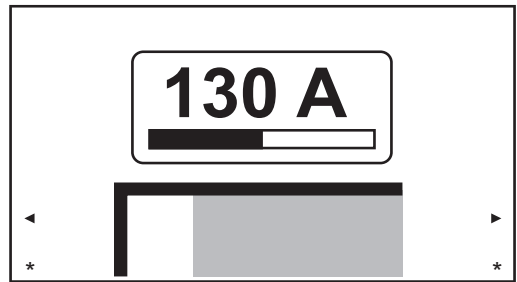
Starting current: starting current > main current ("HotStart")

Unit	% (of main current)
Setting range	0 - 200
Factory setting	150

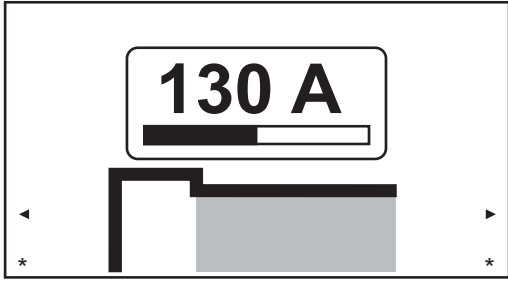
**Main current**



Main current: starting current < main current ("SoftStart")



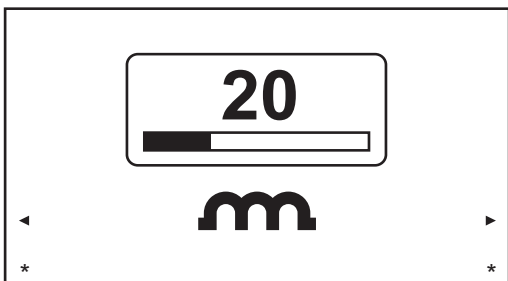
Main current: starting current = main current



Main current: starting current > main current ("Hot-Start")

Unit	A
Setting range	0 - 190 ... MW 190 0 - 230 ... MW / TT 230
Factory setting	-

**Arc-force dynamic**

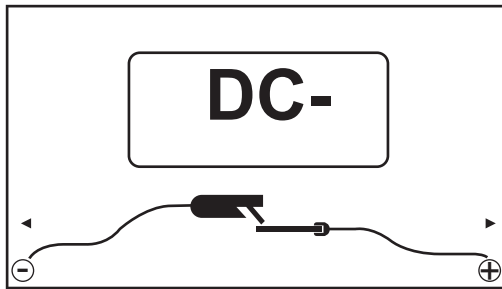


To obtain optimum welding results, it will sometimes be necessary to adjust the arc-force dynamic.

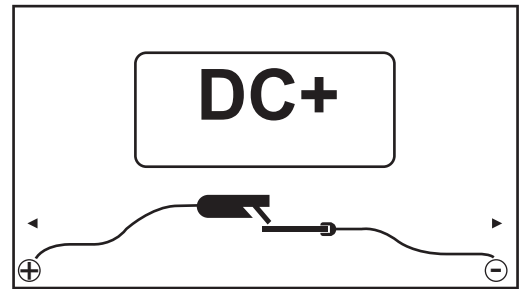
Unit	% (of main current)
Setting range	0 - 100
Factory setting	20
0	soft, low-spatter arc
100	harder, more stable arc

Functional principle:  
 at the instant of droplet transfer or in the event of a short circuit, there is a momentary rise in amperage. In order to obtain a stable arc, the welding current is temporarily increased. If the rod electrode threatens to sink into the weld pool, this measure prevents the weld pool solidifying, as well as preventing more prolonged short circuiting of the arc. This largely prevents the rod electrode from sticking.

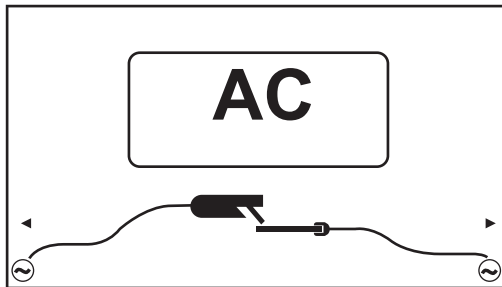
## Polarity



Polarity, set to DC-



Polarity, set to DC+



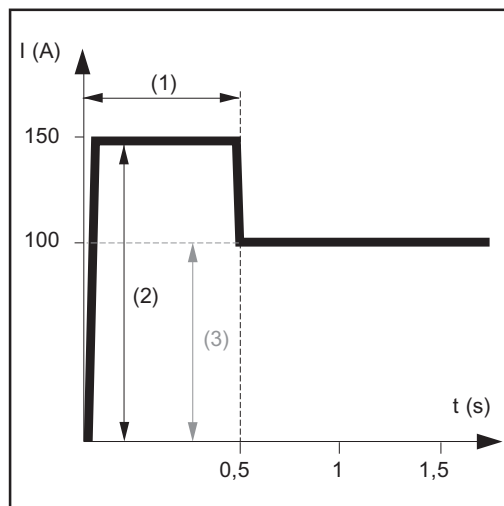
Polarity, set to AC

Unit	-
Setting range	DC- / DC+ / AC
Factory setting	DC-

## Starting current > 100 % (Hot-Start)

### Benefits

- Improved ignition properties, even when using electrodes with poor ignition properties
- Better fusion of the base material in the start-up phase, meaning fewer cold-shut defects
- Largely prevents slag inclusions



Example with a starting current > 100% (HotStart)

### Legend

- (1) Starting current time  
0-2 s, factory setting 0.5 s
- (2) Starting current  
0-200%, factory setting 150%
- (3) Main current = pre-set welding current  $I_1$

### Mode of operation

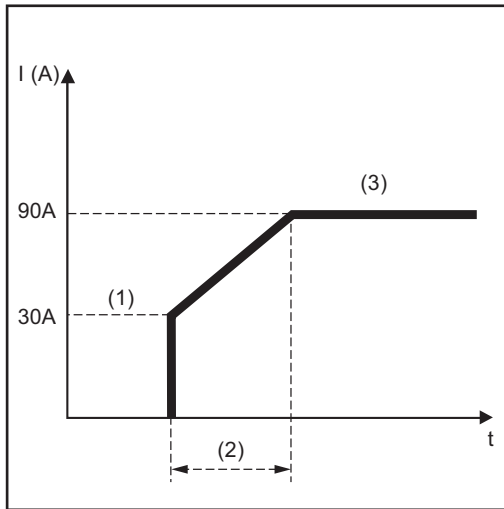
during the specified starting current time (1), the welding current  $I_1$  (3) is increased to the starting current (2).

The starting current time is set in the Setup menu.



**Starting current < 100 % (SoftStart)**

A starting current < 100% (SoftStart) is intended for basic electrodes. Ignition takes place at a low welding current. Once the arc is stable, the welding current continues to rise until it reaches the welding current command value.



Example with a starting current < 100% (SoftStart)

Benefits:

- Improved ignition properties for electrodes that ignite at low welding currents
- Largely prevents slag inclusions
- Reduces welding spatter

- (1) Starting current
- (2) Starting current time
- (3) Main current

The starting current time is set in the rod electrodes menu.

**Anti-stick function**

As the arc becomes shorter, the welding voltage may drop so far that the rod electrode will tend to stick. This may also cause the rod electrode to burn out.

Electrode burn-out is prevented by activating the anti-stick function. If the rod electrode begins to stick, the power source immediately switches the welding current off. After the rod electrode has been detached from the workpiece, the welding process can be continued without any problems.

The anti-stick function can be activated and deactivated in the rod electrodes menu.

# EasyJob mode

## Storing EasyJob operating points



**NOTE!** EasyJobs are saved under job numbers 1 - 5 and can also be called up in the Job menu.  
Storing an EasyJob overwrites any other job saved under the same number!

Prerequisite:

EasyJobs must be assigned to the Favourites button (see "Assigning EasyJobs to the Favourites button", starting on page 32).

- 1 Set the welding process, mode and welding parameters
- 2 Press the Favourites button

The 5 EasyJob buttons are opened.

- 3 Turn the adjusting dial and select the desired storage location



- 4 To save the current welding settings, press and hold the adjusting dial for about 3 seconds

The size and colour of the button changes.



After about 3 seconds, the button is displayed in green.



The settings have now been stored. The most recently stored settings will be active. An active EasyJob is indicated by a flag on the EasyJob button.



An occupied storage location is displayed in black, e.g.:

Storage location 1 ... occupied and active

Storage location 2 ... selected

Storage location 3 ... free

Storage location 4 ... free

Storage location 5 ... free

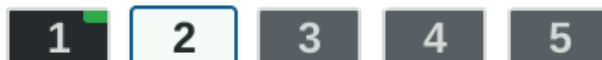


### Retrieving EasyJob operating points

- 1 Press the Favourites button

The 5 EasyJob buttons are opened.

- 2 Turn the adjusting dial and select the desired storage location



- 3 To retrieve a saved EasyJob operating point, press the adjusting dial briefly (< 3 seconds)

The size and colour of the button changes.



The EasyJob buttons are then minimised and the active EasyJob is indicated by a flag.



### Deleting EasyJob operating points

- 1 Press the Favourites button

The 5 EasyJob buttons are opened.

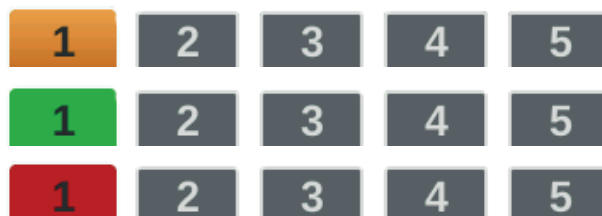
- 2 Turn the adjusting dial and select the storage location to be deleted



- 3 To delete an EasyJob operating point, press and hold the adjusting dial for about 5 seconds

The button

- first changes its size and colour;
- it changes to a green colour after about 3 seconds;  
The saved operating point is overwritten with the current settings.
- is highlighted in red (= delete) after a total of 5 seconds.



The EasyJob operating point has been deleted.

# Welding job

## Safety



**WARNING!** Operating the equipment incorrectly can cause serious injury and damage. Do not use the functions described until you have thoroughly read and understood the following documents:

- these operating instructions
- all the operating instructions for the system components, especially the safety rules



**WARNING!** An electric shock can be fatal. If the power source is connected to the mains electricity supply during installation, there is a high risk of very serious injury and damage. Before carrying out any work on the device make sure that:

- the power source mains switch is in the "O" position
- the power source is unplugged from the mains

## Preparatory work

- 1 Set up and install the power source in accordance with the welding job
- 2 Plug in the mains plug



**CAUTION!** Risk of injury and damage from an electric shock.

As soon as the mains switch is in the "I" position, the tungsten electrode in the welding torch is live. Ensure that the tungsten electrode does not touch any persons or electrically conductive or earthed parts (e.g. housing, etc.).

- 3 Move the mains switch to the "I" position

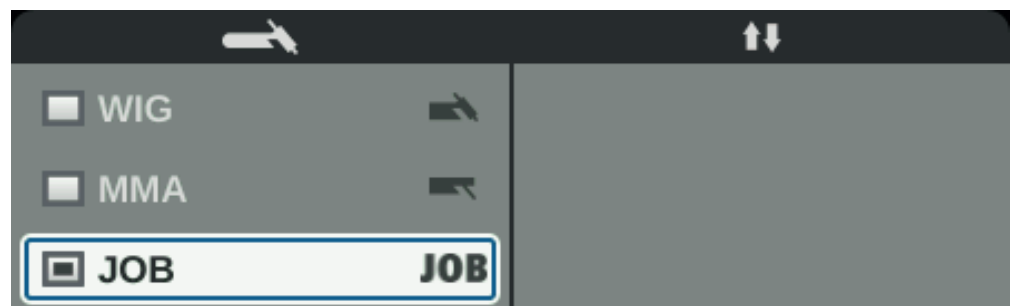
## Welding a job

- 1 Press the Mode button



The welding process and operating mode are displayed.

- 2 Select "JOB" (turn adjusting dial and press)



The welding parameters of the previously opened job are displayed after a short time. The job number is selected.

- 2 Press the adjusting dial  
The job number can now be modified.
- 3 Select the job number of the welding job (turn adjusting dial and press)  
The welding parameters of the selected job are displayed and the job can now be welded.

# Setup settings



# The Setup menu

## General

The Setup menu provides easy access to the knowledge base in the power source and to additional functions. The Setup menu can be used to make simple adjustments to the welding parameters to suit the various job settings.

The following can be found in the Setup menu:

- all setup parameters that have an immediate effect on the welding process,
- all setup parameters needed for making the preliminary settings on the welding system.

The display of the parameters and the ability to change them depends on the selected menu and the current settings for the welding process and operating mode. Parameters that are not relevant to the current settings are greyed out and cannot be selected.

## Accessing the Setup menu



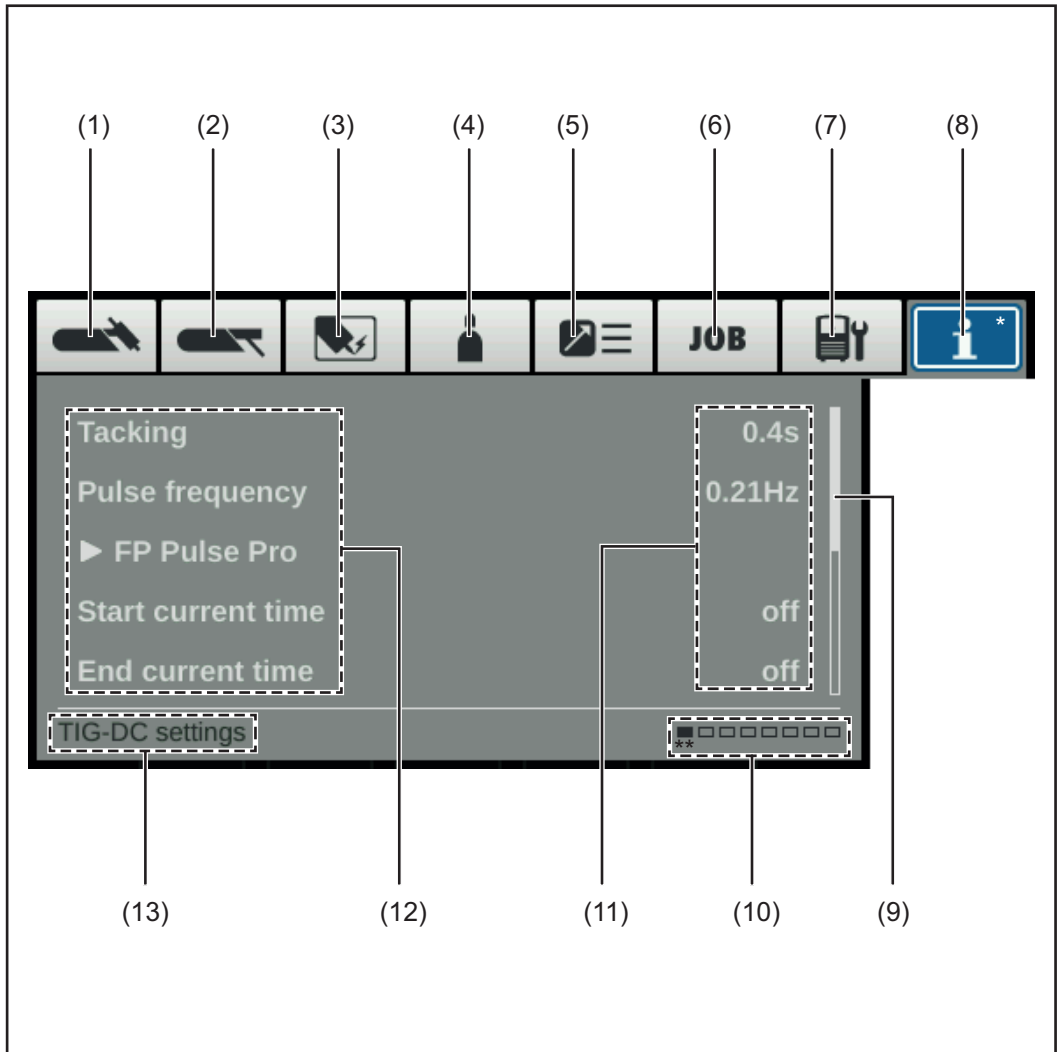
- 1** Press Menu key







The Setup menu appears.

- 2** To leave the Setup menu, press the Menu key again



The current welding parameters will be displayed.

Overview



Item	Designation	
(1)	<b>TIG menu</b> to set the TIG parameters for TIG DC and TIG AC	
(2)	<b>Rod electrode menu</b> to set the rod electrode parameters	
(3)	<b>Ignition settings</b> to set the TIG arc ignition parameters	
(4)	<b>Gas menu</b> to set the shielding gas parameters	
(5)	<b>Component settings</b> to set the cooling unit operating mode	
(6)	<b>Job menu</b> (only if FP Job function package is present) - to save, load and delete jobs - to assign EasyJobs to the Favourites button	



Item	Designation	
(7)	<b>Defaults</b> to - Display: set display backlighting, languages, date & time, display additional parameters - System: restore factory settings, reset website password, perform R/L alignment	
(8)	<b>System information</b> to display device information such as software version or IP address (assuming the power source is on a network)	
(9)	<b>Scroll bar</b> (for multiple parameters)	
(10)	<b>Available menus</b> the number of available menus can vary depending on the firmware version and available options.	
(11)	<b>Value, unit</b>	
(12)	<b>Setup parameters</b> depending on the selected menu and the current settings for the welding process and operating mode, parameters that are not relevant are greyed out and cannot be selected.	
(13)	<b>Display of the currently selected menu</b> taking into account the current settings for welding process and operating mode	

\* Menu currently being adjusted (blue background)

\*\* Position of the currently selected menu

### Changing menus and parameters



Selected menu



Selected parameter



Change the menu



Set the parameter

### Selecting a menu

If a parameter is selected (blue frame, white background):

- 1 Turn the adjusting dial until the parameter's higher-level menu is selected
- 2 Press the adjusting dial  
The background of the selected menu becomes blue.
- 3 Turn the adjusting dial and select the desired menu (blue background)

## Setting parameters

- 4 Press the adjusting dial in the selected menu

The first parameter in the menu is selected.

- 5 Turn the adjusting dial and select the desired parameter

- 6 Press the adjusting dial to change the parameter

The background of the parameter value becomes blue.

- 7 Turn the adjusting dial and set the value of the parameter

The change in the parameter value takes effect immediately

- 8 Press the adjusting dial to select other parameters

# The TIG menu

## Parameters in the TIG DC menu

### Tacking

Tacking function – duration of the pulsed welding current at the start of tacking

Unit	s
Setting range	Off / 0.1 - 9.9 / On
Factory setting	Off

On The pulsed welding current remains in effect until the end of the tacking operation

0.1 - 9.9 s The set time begins with the UpSlope phase. After the end of the pre-set time period, welding continues with a constant welding current; any pulsing parameters that have been set are available.

Off The tacking function is deactivated



The tacking indicator (TAC) in the status bar on the display lights up provided that a value has been set.

### Pulse frequency

Unit	Hz
Setting range	Off / 0.20 - 2000 (10000 with FP Pulse Pro option)
Factory setting	Off

**IMPORTANT!** If the pulse frequency is set to "Off", the Base current and Duty cycle parameters cannot be selected.

The set pulse frequency is also used for the reduced current.



The pulse indicator in the status bar on the display lights up provided a value has been specified for the pulse frequency.

### FP Pulse Pro

to set the Base current and Duty cycle parameters

### Base current

Unit	% (of main current $I_1$ )
Setting range	0 - 100
Factory setting	50

---

**Duty cycle**

Ratio of pulse duration to base current duration in cases where a pulse frequency has been set

Unit	%
Setting range	10 - 90
Factory setting	50

---

**Starting current time**

The starting current time specifies the duration of the starting-current phase.

Unit	s
Setting range	Off / 0.01 - 30.0
Factory setting	Off

---

**IMPORTANT!** The starting current time only applies to 2-step mode and spot welding. In 4-step mode, the duration of the starting-current phase is controlled using the torch trigger.

**Final current time**

The final current time specifies the duration of the final current phase.

Unit	s
Setting range	Off / 0.01 - 30
Factory setting	Off

---

**IMPORTANT!** The final current time only applies to 2-step mode and spot welding. In 4-step mode, the duration of the final current phase is controlled using the torch trigger (see "TIG operating modes").

**Spot-welding time**

Unit	s
Setting range	0.02 - 120
Factory setting	5.0

---

---

**Parameters in the TIG AC menu**

---

**Pulse frequency**

Unit	Hz
Setting range	Off / 0.20 - 2000 (10000 with FP Pulse Pro option)
Factory setting	Off

**IMPORTANT!** If the pulse frequency is set to "Off", the Base current and Duty cycle parameters cannot be selected.

The set pulse frequency is also used for the reduced current.



The pulse indicator in the status bar on the display lights up provided a value has been specified for the pulse frequency.

---

---

**FP Pulse Pro**to set the Base current and Duty cycle parameters

---

**Base current**

Unit	% (of main current $I_1$ )
Setting range	0 - 100
Factory setting	50

---

**Duty cycle**

Ratio of pulse duration to base current duration in cases where a pulse frequency has been set

Unit	%
Setting range	10 - 90
Factory setting	50

---

**Starting current time**

The starting current time specifies the duration of the starting-current phase.

Unit	s
Setting range	Off / 0.01 - 30.0
Factory setting	Off

**IMPORTANT!** The starting current time only applies to 2-step mode and spot welding. In 4-step mode, the duration of the starting-current phase is controlled using the torch trigger.

---

**Final current time**

The final current time specifies the duration of the final current phase.

Unit	s
Setting range	Off / 0.01 - 30
Factory setting	Off

**IMPORTANT!** The final current time only applies to 2-step mode and spot welding. In 4-step mode, the duration of the final current phase is controlled using the torch trigger (see "TIG operating modes").

---

**AC frequency**

Unit	Hz
Setting range	40 - 250
Factory setting	60

Low frequency	soft, distant arc with shallow heat input
High frequency	focused arc with deep heat input

Effect of the AC frequency on the waveshape:

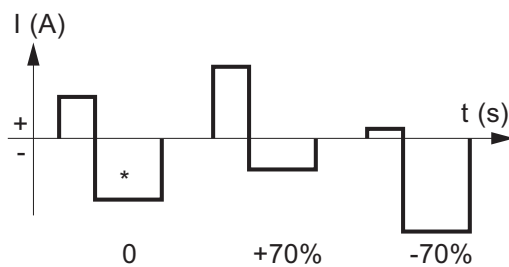



---

**AC current offset**

Unit	%
Setting range	-70 to +70
Factory setting	0
+70	distant arc with shallow heat input
-70	narrow arc, deep heat input, faster welding speed

Effect of the AC current offset on the waveshape:



\* Factory setting: 20% shift to the negative

---

**Positive half-wave waveform**

Unit	-
Setting range	Hard rectangle / Soft rectangle / Triangle / Sine
Factory setting	Hard rectangle
Hard rectangle	100% rectangular waveform (stable but loud arc)
Soft rectangle	Rectangular waveform with decreased edge steepness, for reducing noise levels compared to those that occur with the 100% rectangular waveform
Triangle	Triangular waveform
Sine	Sinusoidal waveform (standard setting for a low-noise, stable arc)

---

---

**Negative half-wave waveform**

Unit	-
Setting range	Hard rectangle / Soft rectangle / Triangle / Sine
Factory setting	Hard rectangle
Hard rectangle	100% rectangular waveform (stable but loud arc)
Soft rectangle	Rectangular waveform with decreased edge steepness, for reducing noise levels compared to those that occur with the 100% rectangular waveform
Triangle	Triangular waveform
Sine	Sinusoidal waveform (standard setting for a low-noise, stable arc)

---

# The MMA menu

## Parameters in the rod electrode menu

### Starting current time

HotStart

Unit	s
Setting range	0.0 - 2.0
Factory setting	0.5

To obtain optimum welding results, it will sometimes be necessary to adjust the HotStart function.

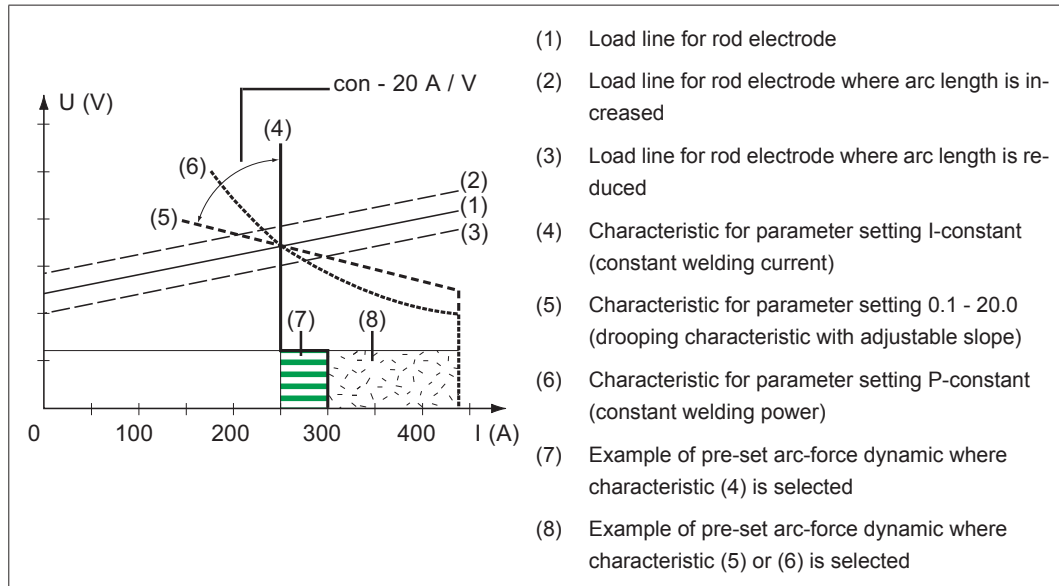
Benefits:

- Improved ignition properties, even when using electrodes with poor ignition properties
- Better fusion of the base material in the start-up phase, meaning fewer cold-shut defects
- Largely prevents slag inclusions

### Char

To select characteristics

Unit	- / A/V / -
Setting range	I-constant / 0.1 - 20.0 / P-constant
Factory setting	I-constant



Adjustable characteristics

### I-constant (constant welding current)

- If the I-constant characteristic is set, the welding current will be kept constant, irrespective of the welding voltage. This results in a vertical characteristic (4).
- This setting is particularly suited to
  - rutile electrodes,
  - basic electrodes,
  - arc air gouging (set the arc-force dynamic to 100 for arc air gouging).



**0.1 - 20.0 (drooping characteristic with adjustable slope)**

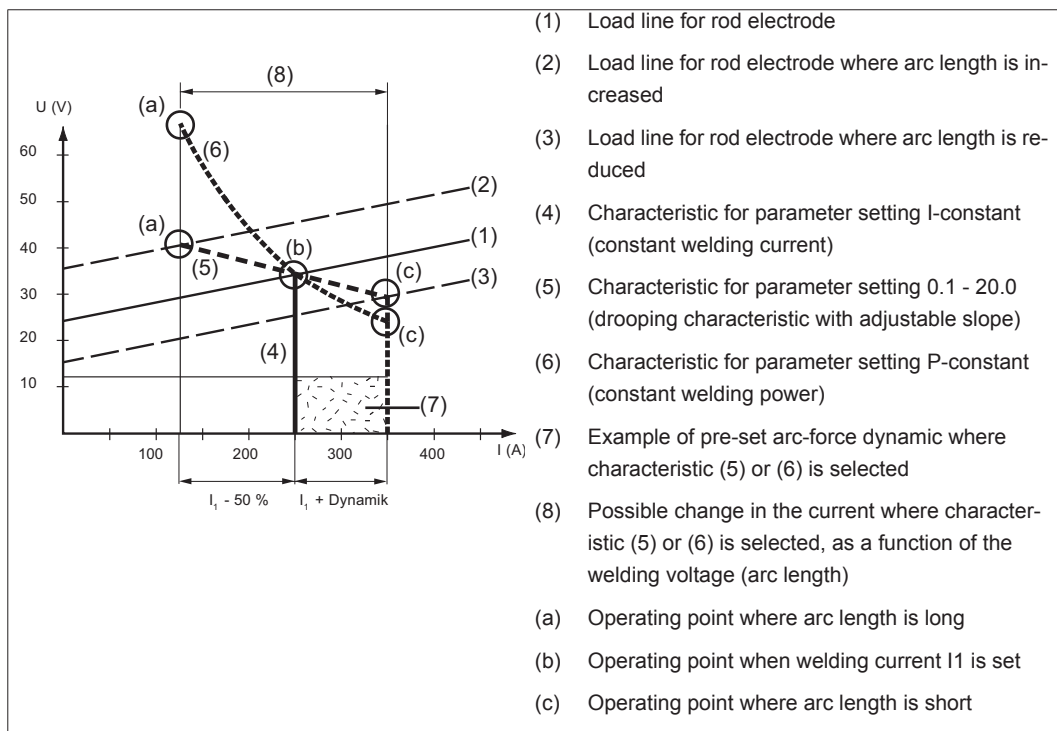
- Setting 0.1 - 20.0 is used to set a drooping characteristic (5). The setting range extends from 0.1 A / V (very steep) to 20 A / V (very flat).
- Setting a flat characteristic (5) is only advisable for cellulose electrodes.

**NOTE!** When setting a flat characteristic (5), set the arc-force dynamic to a higher value.

**P-constant (constant welding power)**

- If the P-constant characteristic is set, the welding power is kept constant, irrespective of the welding voltage and welding current. This results in a hyperbolic characteristic (6).
- This setting is particularly suitable for cellulose electrodes.

**NOTE!** If there are problems with a rod electrode tending to "stick", set the arc-force dynamic to a higher value.



Settings example:  $I_1 = 250 \text{ A}$ , arc-force dynamic = 50

The characteristics (4), (5) and (6) shown here apply when using a rod electrode whose characteristic corresponds to the load line (1) at a given arc length.

Depending on what welding current (I) has been set, the point of intersection (operating point) of characteristics (4), (5) and (6) will be displaced along the load line (1). The operating point provides information on the current welding voltage and the current welding current.

Where the welding current ( $I_1$ ) is permanently set, the operating point may migrate along the characteristics (4), (5) and (6) depending on the welding voltage at that moment in time.

The welding voltage U is dependent upon the arc length.

If the arc length changes (e.g. in accordance with the load line (2)) the resulting operating point will be the point where the corresponding characteristic (4), (5) or (6) intersects with the load line (2).

For characteristics (5) and (6), if a constant value is set for  $I_1$ , the welding current (I) will also become smaller or larger depending on the welding voltage.

---

### **Break-voltage**

Welding voltage limitation

Unit	V
Setting range	20 - 90
Factory setting	20

The arc length depends on the welding voltage. To end the welding process, it is usually necessary to significantly lift the rod electrode away from the workpiece. With this parameter, the welding voltage can be limited to a value that makes it possible to end the welding operation simply by slightly lifting the rod electrode.



**NOTE!** If, during welding, you often find that the welding operation is ended unintentionally, increase the value of the break-voltage parameter.

---

### **Anti-stick**

Unit	-
Setting range	On / Off
Factory setting	On

As the arc becomes shorter, the welding voltage may drop so far that the rod electrode will tend to stick. This may also cause the rod electrode to burn out.

Electrode burn-out is prevented by activating the anti-stick function. If the rod electrode begins to stick, the power source immediately switches the welding current off. After the rod electrode has been detached from the workpiece, the welding process can be continued without any problems.

---

### **AC frequency**

only for MMA AC welding (welding parameter polarity = AC)

Unit	Hz
Setting range	40 - 250
Factory setting	60

---

# Ignition settings

## Ignition setting parameters

### HF ignition

Unit	-
Setting range	On / Off / External
Factory setting	On
On	High frequency ignition at start of welding is activated
Off	No high frequency ignition at start of welding. In this case, welding starts with touchdown ignition.
External	Start with external arc starters, e.g. plasma welding



The HF ignition indicator in the status bar on the display lights up as long as HF ignition has been set to On.

### Reversed polarity ignition

(MagicWave power sources only)

To optimise the ignition sequence in TIG DC welding, the polarity is reversed briefly when welding starts. Electrons emerge from the workpiece and strike the tungsten electrode. This results in rapid heating-up of the tungsten electrode - which in itself is an essential precondition for optimum ignition performance.

Unit	-
Setting range	Off / On
Factory setting	Off

**IMPORTANT!** Reversed polarity ignition is not recommended when welding light gauge sheet.

### Ignition timeout

Ignition timeout until safety cut-out after abortive ignition attempt.

Unit	s
Setting range	0.1 - 9.9
Factory setting	5

**IMPORTANT!** Ignition timeout is a safety function and cannot be deactivated. The description of the ignition timeout function can be found in the section "TIG welding".

---

**Arc break time**

Time until safety cut-out following an arc break

If, following an arc break, there is no current flow within the time specified here, the power source cuts out automatically.

To start the welding process again, press any key on the control panel or the torch trigger.

Unit	s
Setting range	0.00 - 2.00
Factory setting	0.20

---

**Arc break message**

Reaction if there is no current flow within the arc break time

Unit	-
Setting range	Ignore / Error
Factory setting	Ignore

Ignore                      The interruption is ignored.

Error                        An error message, which has to be acknowledged, is displayed on the power source.

---

# The gas menu

---

**Parameters in the Gas menu**

---

**Gas pre-flow**

Duration of gas pre-flow

Unit	s
Setting range	0.0 - 9.9
Factory setting	0.1

---

**Gas post-flow**

Duration of gas post-flow

Unit	s
Setting range	0 - 60
Factory setting	0.5

---

# The components menu

---

## Parameters in the Components menu

---

### Cooling unit operating mode for controlling a cooling unit

Unit	-
Setting range	eco / auto / on / off
Factory setting	auto
auto	Cooling unit is switched off 2 minutes after the end of welding
On	Cooling unit is ON all the time
Off	Cooling unit is OFF all the time
eco	<p>The coolant pump starts to run when welding starts and is electronically controlled subject to the coolant return temperature. The fans start up at a coolant return temperature of 40 °C (104 °F) and are electronically controlled subject to the coolant return temperature.</p> <p>After the end of welding, the coolant pump and fans continue to run for another 2 minutes subject to the coolant return temperature.</p> <p>When these 2 minutes have passed, the fans and coolant pump are switched off.</p>

---

# The Job menu

## Save job

When jobs are saved, the welding process and all the settings in the welding parameters and the respective set-up menus are saved.  
When creating jobs you MUST therefore also take into account the welding parameters in the set-up menus.

Jobs can be saved in two ways.

- 1 Set welding process, mode, welding parameters and setup parameters

### Save job via the Job menu

- 2 Press the Menu key



- 3 Turn the adjusting dial and select the Job menu
- 4 Press the adjusting dial
- 5 Turn the adjusting dial and select "Save Job as ..."
- 6 Press the adjusting dial

An overview of the most important parameters is displayed.

- 7 Select "More" (turn adjusting dial and press)
- 8 Turn the adjusting dial:  
Overwrite existing job  
(after pressing the adjusting dial, a confirmation prompt asking whether you really want to overwrite the job is displayed)

or

Create new job

Press the adjusting dial; the first available job number is displayed.

- 9 Select Job number (turn adjusting dial and press)
- 10 Select "More" (turn adjusting dial and press)

The keyboard is displayed.

- 11 Turn and press the adjusting dial to enter a name for the job.
- 12 Select "More" (turn adjusting dial and press)

A message confirming that the job has been saved is displayed.

- 12 Select "Finish" (turn adjusting dial and press)

---

## Loading a job

The Load job function can be used to load the data for a saved job or an EasyJob into the welding parameters.

The relevant data from the job can be changed, saved as a new job or EasyJob, or used to start welding.

- 1 Press the Menu key



- 2 Turn the adjusting dial and select the Job menu
- 3 Press the adjusting dial
- 4 Turn the adjusting dial and select "Load Job ..."
- 5 Press the adjusting dial

The job list is displayed.

- 6 Select the job that you want to load (turn adjusting dial and press)

A message advising that the job is about to be loaded is displayed.

- 7 Select "Yes" (turn adjusting dial and press)

The job is loaded into the welding parameters.

---

## Deleting a job

- 1 Press the Menu key



- 2 Turn the adjusting dial and select the Job menu
- 3 Press the adjusting dial
- 4 Turn the adjusting dial and select "Delete Job ..."
- 5 Press the adjusting dial

The job list is displayed.

- 6 Select the job that you want to delete (turn adjusting dial and press)

A warning that the job is about to be deleted is displayed.

- 7 Select "Yes" (turn adjusting dial and press)

The job is deleted.



# Defaults

## Overview

### Display

- Backlighting
- Languages
- Time & Date
- Display additional parameters

### System

- Reset to factory settings ...
- Reset website password ...
- Perform R/L alignment

## Display - back-lighting

### Backlighting

to set the brightness of the display

Unit	-
Setting range	0 - 10
Factory setting	10

Adjust backlighting:

- 1 Defaults / Display / Backlighting
- 2 Press the adjusting dial
- 3 Select backlighting brightness (turn adjusting dial and press)

## Display - languages

### Language

Unit	-
Setting range	Depends on the version of the software
Factory setting	English

Setting the language:

- 1 Defaults / Display / Language
- 2 Select the desired language (turn adjusting dial and press)

The Globe symbol appears briefly and the language changes.

## Display - Time & Date

### Time & Date

to set the time and date

Unit	-
Setting range	Year / Month / Day / Hour / Minute / Time zone
Factory setting	-

Setting the date & time:

- 1 Defaults / Display / Time & Date
- 2 Select the desired parameter (turn adjusting dial and press)
- 3 Modify parameter by turning the adjusting dial
- 4 Confirm the modified parameter by pressing the adjusting dial
- 5 Press the menu key to exit the date and time settings

---

### Display - Display additional parameters

In the case of welding parameters 1 - 3, this function enables additional parameters or settings to be displayed.

- Not assigned
- Welding process
- TIG welding torch mode
- TIG settings
  - Tacking
  - Pulse frequency
  - Base current
  - Duty cycle
  - Starting current time
  - Final current time
  - Spot welding time
  - AC frequency
  - AC current offset
  - Positive half-wave waveform
  - Negative half-wave waveform
- Electrode settings
  - Starting current time
  - Characteristic
  - Break voltage
  - Anti-stick
  - AC frequency
- Ignition settings
  - HF ignition
  - Ignition timeout
  - Arc break time
  - Arc break message
  - Reversed polarity ignition
- Gas settings
  - Gas pre-flow
  - Gas post-flow
- Component settings
  - Cooling unit mode

Display additional parameters:

- 1 Default / Display / Display additional parameters
- 2 Press the adjusting dial
- 3 Select parameter location P1 - P3 (turn and press adjusting dial)
- 4 Choose which parameter to display in the selected parameter location (turn adjusting dial and press)
- 5 Select Save (turn adjusting dial and press)

The parameter is displayed in the selected parameter location, where it can now also be modified.

---

### System - Reset to factory settings

- 1 Defaults / System / Reset to factory settings
- 2 Press the adjusting dial

A confirmation prompt asking whether you really want to restore the factory settings is displayed.

- 3 Select yes by turning the adjusting dial
- 4 Press the adjusting dial to reset to factory settings

The power source is reset to the factory settings.

**Reset website password**

- 1 Defaults / System / Reset website password
- 2 Press the adjusting dial

A confirmation prompt asking whether you really want to reset the website password is displayed.

- 3 Select yes by turning the adjusting dial
- 4 Press the adjusting dial to reset the website password

The website password is reset to the factory setting:  
User name = admin  
Password = admin

**Performing R/L alignment**



**NOTE!** R/L alignment must be carried out separately for each welding process.

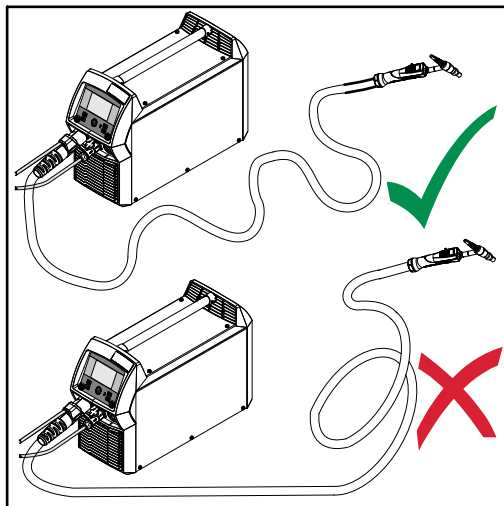
**Welding circuit resistance R [mOhm]**

Measuring the welding circuit resistance "r" provides information on the overall resistance of the torch hosepack, welding torch, workpiece and grounding cable.

If an increased welding circuit resistance is detected, e.g. after changing the welding torch, this may mean that the following components are faulty:

- Torch hosepack
- Welding torch
- Grounding (earthing) connection to the workpiece
- Grounding cable

**Welding circuit inductivity L [μH]**



The way that the hosepack is arranged has a very significant effect on the weld properties.

Particularly with pulsed-arc welding and AC welding, a high welding circuit inductivity may occur, depending on the length of the hosepack and on the way that it is arranged. The result is that the current rise is restricted.

The weld results can be optimised by changing the arrangement of the torch hosepack.

The hosepack must be laid out as shown in the illustration.

## Performing R/L alignment

**1** Defaults / System / Perform R/L alignment

**2** Press the adjusting dial

The current values are displayed

**3** Select "More" (turn and press adjusting dial)

The second R/L alignment screen is displayed.

**4** Follow the instructions displayed on the screen

**5** Select "More" (turn and press adjusting dial)

The third R/L alignment screen is displayed.

**6** Follow the instructions displayed on the screen

**7** Select "More" (turn and press adjusting dial)

The current values are calculated.

After R/L alignment has been completed, a confirmation and the current values are displayed.

# System informations

## Device information

The following data is displayed in device information:

---

**Image version**

---

**Software version**

---

**Hardware version**

---

**IP address(es)**

---

**System run time in h**

---

**Arc time in h**

---

### Open source licences

- Turn the adjusting dial to select open source licences
- Press the adjusting dial

The open source licences used are displayed.

- Select close by turning the adjusting dial
  - Press the adjusting dial
-



# **SmartManager - The power source website**





# SmartManager - The power source website

## General

The power source has its own website: SmartManager.

As soon as the power source is connected to a computer using a network cable, or is on a network, the power source's SmartManager can be retrieved using the power source's IP address.

At least IE 10 or a similar modern browser is required to access SmartManager.

The entries displayed on SmartManager may vary depending on system configuration, software upgrades and available options.

Examples of entries displayed:

- Current system data
- Job data (only if the FP Job function package is present)
- Backup & Restore
- Overview
- Update
- Function packages
- Screenshot

## Calling up the power source SmartManager

- 1 Note down the IP address for the power source in system information
- 2 Enter the IP address in the browser search field
- 3 Enter user name and password

Factory setting:  
 User name = admin  
 Password = admin

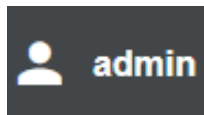
The power source SmartManager is displayed.

## Fronius



Click on the Fronius logo to open the Fronius homepage: [www.fronius.com](http://www.fronius.com)

## Changing password / logging off



By clicking this symbol

- the user password can be changed
- you can log out of SmartManager

Changing the password for the SmartManager:



### NOTE!

User name = admin (predefined, cannot be edited!)  
The password can only be reset on the power source.

- 1 Enter the old password
- 2 Enter the new password
- 3 Repeat the new password
- 4 Click on "Save"

---

## Language



The languages available for SmartManager can be displayed by clicking on this symbol.

The current language selection is displayed next to the symbol.

To change the language, click on the one you would like.

# Current system data

## Current system data

The welding system's current data is displayed, e.g.

Welding process

ACTUAL or HOLD		
Welding current	Welding voltage	
		Current arc power
		Current arc energy
	Shielding gas flow rate	
	Arc time	Total operating hours

Set values are displayed, as well as actual values and hold values for the welding current and welding voltage. Miscellaneous other actual values are displayed as well as general system data.

If a cooling unit is present, the coolant flow and temperature will also be displayed.

# Job-Data

---

## Job data

The Job data entry is only displayed if the FP Job function package is present in the power source.

In the "Job data" entry,

- existing welding system jobs can be viewed
  - existing welding system jobs can be optimised
  - jobs stored externally can be transferred to the welding system
  - existing jobs in the welding system can be exported as a PDF \* or CSV file
- 

## Job overview

The job overview lists all jobs stored in the welding system.

Clicking on a job displays the data and parameters stored for this job.

Job data and parameters can only be viewed in the job overview. The column width for parameters and values can be easily dragged and adjusted with the mouse pointer.

Other jobs can easily be added to the list with the data listed by clicking on the "Add column" button.



This offers a simple way of comparing the values from various jobs.

---

## Editing a job

Existing welding system jobs can be edited.

- 1 Click on "Edit job"
- 2 Click on the job to be amended in the list of available jobs

The selected job is opened and the following job data is shown:

- **Parameter**  
The parameter currently stored in the job
- **Value**  
The values of the parameter currently stored in the job
- **Change value to**  
To enter the new parameter value
- **Setting range**  
Possible setting range for the new parameter values

- 3 Amend the values accordingly
- 4 Save / Delete adjustments, Save as / Delete job



As an aid when editing a job, other jobs can be easily added to the list with the data displayed by clicking on "Add column".



## Creating a new job

- 1 Click on "Create new job"



- 2 Enter job data
- 3 Click on "OK" to apply the new job

## Importing a job

This function enables previously exported jobs to be transferred into the welding system.

- 1 Click on "Search Job-file"
- 2 Select desired job file

Individual jobs can be selected and new job numbers assigned in the preview of the job import list.

- 3 Click on "Import Job"

If the import is successful, a corresponding confirmation is displayed and the imported jobs appear in the list.

## Exporting a job

This function enabled jobs to be exported from the power source and saved externally.

- 1 Select jobs to be exported:
  - Click on the job and the arrow
  - or
  - Double-click on the job
  - or
  - Drag & drop

- 2 Click on "Export Job"

The jobs are exported as an XML file into the computer's Download folder.

## Exporting job(s) as...

Existing jobs in the welding system can be exported as a PDF or CSV file under Job overview and Edit job.

- 1 Click on "Export job(s) as..."



The PDF or CSV settings are displayed.

- 2 Select the job(s) to be exported:  
current job / all jobs / job numbers
- 3 Click on "Save PDF" or "Save CSV"

A PDF or CSV file containing the selected jobs is created and saved according to the settings of the browser in question.

# Backup & Restore

---

## General

In the backup & restore entry

- all welding system data can be saved as a backup (e.g. current parameter settings, jobs, defaults, etc.),
  - any existing backups can be restored to the welding system
- 

## Backup & Restore Starting backup

- 1 Click on "Start backup" to create a backup of the welding system data

The data is saved in the selected location in the default format

Backup\_SNxxxxxxx\_JJJJ\_MM\_TT\_HHmmSS.fbc

.

SNxxxxxxx = Serial number (8 digits)

YYYY = Year

MM = Month

DD = Day

HH = Hour

mm = Minute

SS = Second

The date and time correspond to the power source settings.

### Searching for a restore file

- 1 Click on "Search restore file" to transfer an existing backup to the power source

- 2 Select the file and click on "Open"

The selected backup file is displayed on the power source SmartManager under "Restore".

- 3 Click on "Start recovery"

Once the data has been successfully restored, a confirmation to this effect is displayed.

# Overview

## Overview

In the overview entry, welding system components and options are displayed with all available information, e.g. firmware version, item number, serial number, production date, etc.

## Expanding / reducing all groups



Clicking on the button "Expand all groups" displays further details for the individual system components.

Power source example:

- TT/MW Smart: Item number  
BCU1-COM: Item number, version, serial number, production date  
Bootloader: Version  
Image: Version  
Licences: ...
- SC2: Item number  
Firmware: Version
- etc.



Clicking on the button "Reduce all groups" hides the details for the system components.

## Export component overview as ...



Click the "XML" button to create an XML file of the system component details. This XML file can either be opened or saved.

# Update

---

## Update

The power source firmware can be updated in the "Update" entry.

The current version of the firmware on your power source is displayed.



The update file can be downloaded via the following link, for example:  
<http://www.fronius.com/transtig>  
<http://www.fronius.com/magicwave>

### Updating the power source firmware

- 1 Organise and save the update file
- 2 Click on "Search update file"
- 3 Select and open the update file

The selected update file is displayed on the power source SmartManager under "Update file".

Click on "Update"

A progress bar is displayed above the update process.

When this reaches 100%, you will be prompted to restart the power source.



SmartManager is not available during the restart.  
After the restart, SmartManager may not be available any more.  
If you select "No", the new software functions are activated when you next switch the device on/off.

- 4 To restart the power source, click on "Yes"

The power source restarts; the display goes black for a short time.

The Fronius logo is shown on the power source display during the restart.

Once the update has been completed successfully, a confirmation and the current firmware version are displayed.

- 5 You can now log on to SmartManager again



# Function Packages

---

**Function packages** In the Function Packages entry, the function packages present on the power source are displayed.  
New function packages can be uploaded.

---

## Installing a function package

- 1 Organise and save a function package
- 2 Click on "Search function package file"
- 3 Select the desired function package file (\*.xml)
- 4 Click on "Open"

The selected function package file is displayed on the power source SmartManager under "Install function package".

- 5 Click on "Install function package"

Once the function package has been successfully installed, a confirmation to this effect is displayed.

# Screenshot

---

## Screenshot

In the Screenshot entry, a digital image of the power source display can be created at any time, irrespective of the navigation or set values.

**1** Click on "Create screenshot" to capture a screenshot of the display

A screenshot of the currently displayed settings is created.

Different functions are available for saving the screenshot depending on the browser used; the display may vary.

# **Troubleshooting and maintenance**



# Troubleshooting

## General

The digital power sources are equipped with an intelligent safety system. This means that apart from the fuse for the coolant pump, it has been possible to dispense with fuses entirely. After a possible malfunction or error has been remedied, the power source can be put back into normal operation again without any fuses having to be replaced.

## Safety



**WARNING!** Work that is carried out incorrectly can cause serious injury or damage. All the work described below must only be carried out by trained and qualified personnel. Do not carry out any of the work described below until you have fully read and understood the following documents:

- this document
- all documents relating to the system components, especially the safety rules



**WARNING!** An electric shock can be fatal. Before starting the work described below:

- turn the power source mains switch to the "O" position
- disconnect the power source from the mains
- ensure that the power source remains disconnected from the mains until all work has been completed

After opening the device, use a suitable measuring instrument to check that electrically charged components (e.g. capacitors) have been discharged.



**WARNING!** An inadequate ground conductor connection can cause serious injury or damage. The housing screws provide a suitable ground conductor connection for earthing the housing and must NOT be replaced by any other screws that do not provide a reliable ground conductor connection.

## Power source - troubleshooting

### Power source does not function

Mains switch is on, but indicators are not lit up

Cause: There is a break in the mains lead; the mains plug is not plugged in

Remedy: Check the mains lead, ensure that the mains plug is plugged in

Cause: Mains socket or mains plug faulty

Remedy: Replace faulty parts

Cause: Mains fuse protection

Remedy: Change the mains fuse protection

**No welding current**

Mains switch is ON, overtemperature indicator is lit up

Cause: Overload

Remedy: Check duty cycle

Cause: Thermostatic safety cut-out has tripped

Remedy: Wait until the power source automatically comes back on after the end of the cooling phase

Cause: The fan in the power source is faulty

Remedy: Contact After-Sales Service

---

**No welding current**

Mains switch is on, indicators are lit up

Cause: Grounding (earthing) connection is incorrect

Remedy: Check the grounding (earthing) connection and terminal for correct polarity

Cause: There is a break in the current cable in the welding torch

Remedy: Replace welding torch

---

**Nothing happens when the torch trigger is pressed**

Mains switch is on, indicators are lit up

Cause: The control plug is not plugged in

Remedy: Plug in the control plug

Cause: Welding torch or welding torch control line is faulty

Remedy: Replace welding torch

---

**No protective gas shield**

All other functions are OK

Cause: Gas cylinder is empty

Remedy: Change the gas cylinder

Cause: Gas pressure regulator is faulty

Remedy: Change the gas pressure regulator

Cause: Gas hose is not fitted or is damaged

Remedy: Fit or change the gas hose

Cause: Welding torch is faulty

Remedy: Change the welding torch

Cause: Gas solenoid valve is faulty

Remedy: Contact After-Sales Service

---

**Poor weld properties**

Cause: Incorrect welding parameters

Remedy: Check the settings

Cause: Grounding (earthing) connection is incorrect

Remedy: Check the grounding (earthing) connection and terminal for correct polarity

---

**The welding torch becomes very hot**

Cause: The dimensions of the welding torch are inadequate

Remedy: Observe the duty cycle and loading limits

Cause: Only on water-cooled machines: water flow rate is insufficient

Remedy: Check the water level, water flow rate, cleanliness, etc. If the coolant pump is blocked: use a screwdriver - placed on the bushing - to turn the coolant pump shaft

Cause: Only on water-cooled machines: welding parameter 'Cool. unit ctrl' is set to "OFF".

Remedy: In the set-up menu, set welding parameter 'Cool. unit ctrl' to "Aut" or "ON".

---

**The welding torch becomes very hot**

Cause: The dimensions of the welding torch are inadequate

Remedy: Observe the duty cycle and loading limits

Cause: Only on water-cooled machines: water flow is insufficient

Remedy: Check the water level, water flow rate, cleanliness, etc. If the coolant pump is blocked: use a screwdriver - placed on the bushing - to turn the coolant pump shaft

Cause: Only on water-cooled machines: C-C parameter is set to "OFF".

Remedy: In the set-up menu, set the C-C parameter to "Aut" or "ON".

---

# Care, maintenance and disposal

---

## General

Under normal operating conditions, the power source requires only a minimum of care and maintenance. However, it is vital to observe some important points to ensure it remains in a usable condition for many years.

---

## Safety



**WARNING!** Work that is carried out incorrectly can cause serious injury or damage. All the work described below must only be carried out by trained and qualified personnel. Do not carry out any of the work described below until you have fully read and understood the following documents:

- this document
- all documents relating to the system components, especially the safety rules



**WARNING!** An electric shock can be fatal. Before starting the work described below:

- turn the power source mains switch to the "O" position
- disconnect the power source from the mains
- ensure that the power source remains disconnected from the mains until all work has been completed

After opening the device, use a suitable measuring instrument to check that electrically charged components (e.g. capacitors) have been discharged.



**WARNING!** An inadequate ground conductor connection can cause serious injury or damage. The housing screws provide a suitable ground conductor connection for earthing the housing and must NOT be replaced by any other screws that do not provide a reliable ground conductor connection.

---

## At every start-up

- Check mains plug, mains cable, welding torch, interconnecting hosepack and grounding (earthing) connection for damage
- Check that there is a gap of 0.5 m (1 ft. 8 in.) all around the device to ensure that cooling air can flow and escape unhindered



**NOTE!** Air inlets and outlets must never be covered, not even partially.

---

## Every 2 months

- If present: clean air filter
- 

## Every 6 months

- Dismantle device side panels and clean inside of device with dry reduced compressed air



**NOTE!** Risk of damage to electronic components. Do not bring air nozzle too close to electronic components.

- If a lot of dust has accumulated, clean the cooling air ducts.



---

**Disposal**

Dispose of in accordance with the applicable national and local regulations.



# Appendix



# Technical data

## Special voltages



**NOTE!** An inadequately dimensioned electrical installation can cause serious damage. The mains cable and its fuse must be dimensioned accordingly. The technical data shown on the rating plate applies.

## MagicWave 190

	MW 190	MW 190 MV
Mains voltage $U_1$	1 x 230 V	1 x 120 / 230 V
Mains voltage tolerance	± 15%	± 15%
Mains frequency	50/60 Hz	50/60 Hz
Mains fuse protection (slow-blow)	16 A	16 A ( $U_1 = 230$ V) 20 A ( $U_1 = 120$ V)
Mains connection <sup>1)</sup>	$Z_{max}$ on PCC <sup>3)</sup> = 315 mOhm	$Z_{max}$ on PCC <sup>3)</sup> = 315 mOhm
Cos phi	0.99	0.99
Welding current range		
TIG	3 - 190 A	3 - 190 A
Electrode	10 - 170 A	10 - 170 A
Welding current at		
10 min/40 °C (104 °F) 35% DC <sup>2)</sup>	190 A <sup>4)</sup> 170 A <sup>5)</sup>	190 A <sup>4)</sup> ( $U_1 = 230$ V) 150 A <sup>4)</sup> ( $U_1 = 120$ V) 170 A <sup>5)</sup> ( $U_1 = 230$ V) 100 A <sup>5)</sup> ( $U_1 = 120$ V)
10 min/40 °C (104 °F) 60% DC <sup>2)</sup>	160 A <sup>4)</sup> 140 A <sup>5)</sup>	160 A <sup>4)</sup> ( $U_1 = 230$ V) 120 A <sup>4)</sup> ( $U_1 = 120$ V) 140 A <sup>5)</sup> ( $U_1 = 230$ V) 80 A <sup>5)</sup> ( $U_1 = 120$ V)
10 min/40 °C (104 °F) 100% DC <sup>2)</sup>	140 A <sup>4)</sup> 120 A <sup>5)</sup>	140 A <sup>4)</sup> ( $U_1 = 230$ V) 100 A <sup>4)</sup> ( $U_1 = 120$ V) 120 A <sup>5)</sup> ( $U_1 = 230$ V) 70 A <sup>5)</sup> ( $U_1 = 120$ V)
Open circuit voltage	100 V	100 V
Working voltage		
TIG	10.1 - 17.6 V	10.1 - 17.6 V
Electrode	20.4 - 26.8 V	20.4 - 26.8 V
Striking voltage ( $U_p$ )	9.6 kV	9.6 kV
The arc striking voltage is suitable for manual operation.		
Degree of protection	IP 23	IP 23
Type of cooling	AF	AF
Overvoltage category	III	III
Pollution degree according to IEC 60664	3	3
EMC Emissions class	A <sup>6)</sup>	A <sup>6)</sup>
Insulation class	B	B
Dimensions L x W x H (with handle)	558 / 210 / 369 mm 22.0 / 8.3 / 14.5 in.	558 / 210 / 369 mm 22.0 / 8.3 / 14.5 in.
Weight	17.0 kg 37.5 lb.	16.5 kg 36.4 lb.

	<b>MW 190</b>	<b>MW 190 MV</b>
Marks of conformity	S, CE	S, CE
Max. shielding gas pressure	6 bar 87.02 psi	6 bar 87.02 psi
Noise emission (L <sub>WA</sub> )	68 dB(A)	68 dB(A)

**MagicWave 230i**

	<b>MW 230i</b>	<b>MW 230i MV</b>
Mains voltage $U_1$	1 x 230 V	1 x 120 / 230 V
Mains voltage tolerance	± 15 %	± 15 %
Mains frequency	50 / 60 Hz	50 / 60 Hz
Mains fuse protection (slow-blow)	16 A	16 A ( $U_1 = 230$ V) 20 A ( $U_1 = 120$ V)
Mains connection <sup>1)</sup>	$Z_{\max}$ on PCC <sup>3)</sup> = 273 mOhm	$Z_{\max}$ on PCC <sup>3)</sup> = 273 mOhm
Cos phi	0.99	0.99
Welding current range		
TIG	3 - 230 A	3 - 230 A
Electrode	10 - 190 A	10 - 190 A
Welding current at		
10 min/40 °C (104 °F) 35% DC <sup>2)</sup>	230 A <sup>4)</sup> 190 A <sup>5)</sup>	230 A <sup>4)</sup> ( $U_1 = 230$ V) 170 A <sup>4)</sup> ( $U_1 = 120$ V) 190 A <sup>5)</sup> ( $U_1 = 230$ V) 120 A <sup>5)</sup> ( $U_1 = 120$ V)
10 min/40 °C (104 °F) 60% DC <sup>2)</sup>	195 A <sup>4)</sup> 150 A <sup>5)</sup>	195 A <sup>4)</sup> ( $U_1 = 230$ V) 140 A <sup>4)</sup> ( $U_1 = 120$ V) 150 A <sup>5)</sup> ( $U_1 = 230$ V) 105 A <sup>5)</sup> ( $U_1 = 120$ V)
10 min/40 °C (104 °F) 100% DC <sup>2)</sup>	165 A <sup>4)</sup> 120 A <sup>5)</sup>	165 A <sup>4)</sup> ( $U_1 = 230$ V) 120 A <sup>4)</sup> ( $U_1 = 120$ V) 120 A <sup>5)</sup> ( $U_1 = 230$ V) 85 A <sup>5)</sup> ( $U_1 = 120$ V)
Open circuit voltage	100 V	100 V
Working voltage		
TIG	10.1 - 19.2 V	10.1 - 19.2 V
Electrode	20.4 - 27.6 V	20.4 - 27.6 V
Striking voltage ( $U_p$ )	9.6 kV	9.6 kV
The arc striking voltage is suitable for manual operation.		
Degree of protection	IP 23	IP 23
Type of cooling	AF	AF
overvoltage category	III	III
pollution degree according IEC 60664	3	3
EMC emission class	A <sup>6)</sup>	A <sup>6)</sup>
Insulation class	B	B
Dimensions L x W x H (with handle)	558 / 210 / 369 mm 22.0 / 8.3 / 14.5 in.	558 / 210 / 369 mm 22,0 / 8,3 / 14,5 in.
Weight	17.0 kg 37.5 lb.	16.5 kg 36.4 lb.
Marks of conformity	S, CE	S, CE
maximum shielding gas pressure	6 bar 87.02 psi	6 bar 87.02 psi
sound power level ( $L_{WA}$ )	68 dB(A)	68 dB(A)

**TransTig 230i**

	<b>TT 230i</b>	<b>TT 230i MV</b>
Mains voltage $U_1$	1 x 230 V	1 x 120 / 230 V
Mains voltage tolerance	± 15 %	± 15 %
Mains frequency	50 / 60 Hz	50 / 60 Hz
Mains fuse protection (slow-blow)	16 A	16 A ( $U_1 = 230$ V) 20 A ( $U_1 = 123$ V)
Mains connection <sup>1)</sup>	$Z_{\max}$ am PCC <sup>3)</sup> = 273 mOhm	$Z_{\max}$ am PCC <sup>3)</sup> = 273 mOhm
Cos phi	0,99	0,99
Welding current range		
TIG	3 - 230 A	3 - 230 A
Electrode	10 - 190 A	10 - 190 A
Welding current at		
10 min/40 °C (104 °F) 35% DC <sup>2)</sup>	190 A <sup>5)</sup>	190 A <sup>5)</sup> ( $U_1 = 230$ V) 120 A <sup>5)</sup> ( $U_1 = 120$ V)
10 min/40 °C (104 °F) 45% DC <sup>2)</sup>	230 A <sup>4)</sup>	230 A <sup>4)</sup> ( $U_1 = 230$ V) 170 A <sup>4)</sup> ( $U_1 = 120$ V)
10 min/40 °C (104 °F) 60% DC <sup>2)</sup>	205 A <sup>4)</sup> 155 A <sup>5)</sup>	205 A <sup>4)</sup> ( $U_1 = 230$ V) 155 A <sup>4)</sup> ( $U_1 = 120$ V) 155 A <sup>5)</sup> ( $U_1 = 230$ V) 105 A <sup>5)</sup> ( $U_1 = 120$ V)
10 min/40 °C (104 °F) 100% DC <sup>2)</sup>	170 A <sup>4)</sup> 125 A <sup>5)</sup>	170 A <sup>4)</sup> ( $U_1 = 230$ V) 130 A <sup>4)</sup> ( $U_1 = 120$ V) 125 A <sup>5)</sup> ( $U_1 = 230$ V) 85 A <sup>5)</sup> ( $U_1 = 120$ V)
Open circuit voltage	97 V	97 V
Working voltage		
TIG	10.1 - 19.2 V	10.1 - 19.2 V
Electrode	20.4 - 27.6 V	20.4 - 27.6 V
Striking voltage ( $U_p$ )	9.6 kV	9.6 kV
The arc striking voltage is suitable for manual operation.		
Degree of protection	IP 23	IP 23
Type of cooling	AF	AF
overvoltage category	III	III
pollution degree according IEC 60664	3	3
EMC emission class	A <sup>6)</sup>	A <sup>6)</sup>
Insulation class	B	B
Dimensions L x W x H (with handle)	558 / 210 / 369 mm 22.0 / 8.3 / 14.5 in.	558 / 210 / 369 mm 22.0 / 8.3 / 14.5 in.
Weight	16.4 kg 36.2 lb.	15.9 kg 35.1 lb.
Marks of conformity	S, CE	S, CE
maximum shielding gas pressure	6 bar 87.02 psi	6 bar 87.02 psi
sound power level ( $L_{WA}$ )	68 dB(A)	68 dB(A)



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**Explanation of footnotes**

- 1) connected to public mains supply with 230 / 400 V and 50 Hz
- 2) D.C. = Duty cycle
- 3) PCC = interface to the public grid
- 4) TIG welding
- 5) MMA welding
- 6) An emission class A device is not designed for use in residential areas supplied with power from a public low-voltage grid.  
The electromagnetic compatibility can be influenced by conducted or radiated radio frequencies.







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