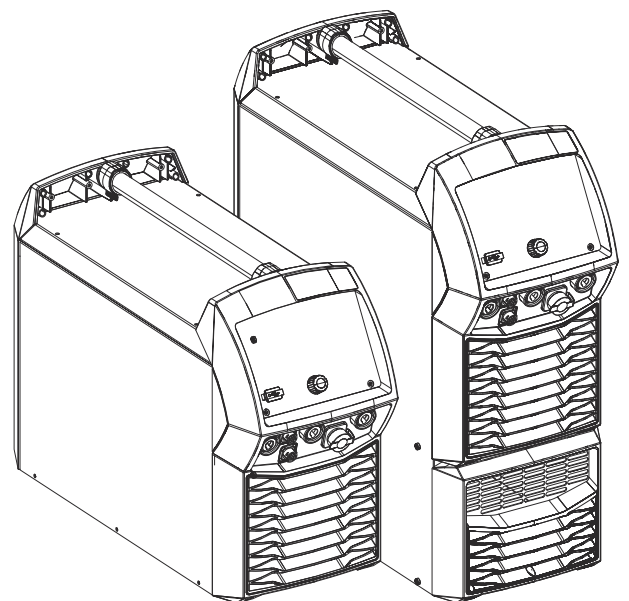


# Operating Instructions

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**iWave 300i / 400i / 500i DC**

**iWave 300i / 400i / 500i AC/DC**



**EN-US** | Operating instructions



42,0426,0360,EA

005-19062023



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# Safety Instructions

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## Explanation of Safety Instructions



### **DANGER!**

**Indicates an immediate danger.**

- Death or serious injury may result if appropriate precautions are not taken.
- 



### **WARNING!**

**Indicates a possibly dangerous situation.**

- Death or serious injury may result if appropriate precautions are not taken.
- 



### **CAUTION!**

**Indicates a situation where damage or injury could occur.**

- Minor injury or damage to property may result if appropriate precautions are not taken.
- 

### **NOTE!**

**Indicates the possibility of flawed results and damage to the equipment.**

---

## General

The device has been manufactured using state-of-the-art technology and according to recognized 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 equipment
- 

All persons involved in the commissioning, operation, maintenance, and servicing of the device must

- Be suitably qualified
  - Have knowledge of welding
  - Have completely read and followed these Operating Instructions
- 

The Operating Instructions must always be at hand wherever the device is being used. In addition to the Operating Instructions, all applicable local rules and regulations regarding accident prevention and environmental protection must also be followed.

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All safety and danger notices on the device must

- Be kept in a legible state
  - Not be damaged/marked
  - Not be removed
  - Not be covered, pasted, or painted over
- 

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 switching on the device, remove any faults that could compromise safety.

**Your personal safety is at stake!**

<b>Intended Use</b>	<p>The device is to be used exclusively for its intended purpose.</p> <hr/> <p>The device is intended exclusively for the welding process specified on the rating plate.</p> <p>Utilization for any other purpose, or in any other manner, shall be deemed to be "not in accordance with the intended purpose." The manufacturer is not responsible for any damage resulting from improper use.</p> <hr/> <p>Proper use also means</p> <ul style="list-style-type: none"> <li>- Completely reading and obeying all instructions in the Operating Instructions</li> <li>- Completely reading and obeying all safety instructions and danger notices</li> <li>- Carrying out all the specified inspection and servicing work</li> </ul> <hr/> <p>Never use the device for the following applications:</p> <ul style="list-style-type: none"> <li>- Thawing pipes</li> <li>- Charging batteries</li> <li>- Starting motors</li> </ul> <hr/> <p>The device is designed for operation in industry and business. The manufacture shall not be liable for any damage resulting from use in a living area.</p> <hr/> <p>The manufacture shall also not be liable for faulty or incorrect work results.</p>
<b>Grid Connection</b>	<p>Devices with a high output can influence the energy quality of the grid due to their current consumption.</p> <hr/> <p>This may affect a number of device types in terms of:</p> <ul style="list-style-type: none"> <li>- connection restrictions</li> <li>- criteria regarding maximum permissible grid impedance <sup>*)</sup></li> <li>- criteria regarding the minimum required short-circuit power <sup>*)</sup></li> </ul> <p><sup>*)</sup> both at the interface with the public grid See technical data</p> <hr/> <p>In this case, the operator or the person using the device should check whether or not the device is allowed to be connected, where appropriate through discussion with the power supply company.</p> <hr/> <p><b>IMPORTANT!</b> Ensure secure grounding of the grid connection!</p>
<b>Environmental Conditions</b>	<p>Operation or storage of the device outside the stipulated area will be deemed as not in accordance with the intended purpose. The manufacturer accepts no liability for any damage resulting from improper use.</p> <hr/> <p>Temperature range of the ambient air:</p> <ul style="list-style-type: none"> <li>- During operation: -10°C to +40°C (14°F to 104°F)</li> <li>- During transport and storage: -20°C to +55°C (-4°F to 131°F)</li> </ul> <hr/> <p>Relative humidity:</p> <ul style="list-style-type: none"> <li>- Up to 50% at 40°C (104°F)</li> <li>- Up to 90% at 20°C (68°F)</li> </ul> <hr/> <p>Ambient air: free of dust, acids, corrosive gases or substances, etc. Altitude above sea level: up to 2000 m (6561 ft. 8.16 in.)</p>

---

**Obligations of the Operating Company**

- The operating company must only allow persons to work with the device if they
- Are familiar with the basic occupational safety and accident prevention regulations and are trained in handling the device
  - Have read and understood these Operating Instructions, especially the section "Safety Rules," and have confirmed this with their signature
  - Are trained according to the requirements for the work results

---

The safety-conscious work of the personnel must be checked regularly.

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**Obligations of Personnel**

- All persons who are assigned to work with the device must do the following before beginning the work:
- Follow the basic regulations for occupational safety and accident prevention
  - Read these Operating Instructions, especially the section "Safety Rules," and confirm that they have understood and will follow them by signing

---

Before leaving the workplace, ensure that no personal injury or property damage can occur in one's absence.

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**Residual current circuit breaker**

Local regulations and national guidelines may mean that a residual current circuit breaker is required when connecting a device to the public grid. The residual current circuit breaker recommended for the device by the manufacturer can be found in the technical data.

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**Personal Protection and Protection of Others**

- You are exposed to numerous hazards while handling the device, for example:
- Flying sparks and pieces of hot metal
  - Arc radiation that poses a risk of injury to the eyes and skin
  - Hazardous electromagnetic fields that pose a risk of death for individuals with pacemakers
  - Electrical risks from grid current and welding current
  - Increased noise exposure
  - Harmful welding fumes and gases

---

Wear suitable protective clothing when dealing with the device. The protective clothing must have the following properties:

- Flame resistant
- Insulating and dry
- Covering the entire body and in good condition with no damage
- Safety helmet
- Cuffless pants

---

Protective clothing involves the following:

- Protecting the face and eyes from UV radiation, heat and flying sparks with a face guard featuring a regulation-compliant filter
  - Wearing regulation-compliant protective goggles with side protection behind the face guard
  - Wearing rigid, wet-insulating footwear
  - Protecting hands with appropriate gloves (featuring electrical insulation and thermal protection)
  - Wearing ear protection to reduce noise exposure and protect against injury
-



Keep persons, especially children, away during the operation of the devices and during the welding process. If persons are in the vicinity, however:

- Instruct them about all hazards (blinding hazard due to arcs, risk of injury from flying sparks, welding fumes hazardous to health, noise exposure, possible hazard due to grid current or welding current, etc.)
- Provide suitable protective equipment or
- Construct suitable protective walls and curtains.

#### **Data on noise emission values**

The device produces a maximum noise level of <80 dB(A) (ref. 1pW) when idling and in the cooling phase following operation in relation to the maximum permitted operating point at standard loading in accordance with EN 60974-1.

A workplace-specific emission value for welding (and cutting) cannot be specified because this value depends on the welding process and the environmental conditions. It is influenced by a wide range of parameters, such as the welding process itself (MIG/MAG, TIG welding), the selected current type (direct current, alternating current), the power range, the type of weld metal, the resonance properties of the workpiece, the workplace environment, and many other factors.

#### **Danger from toxic gases and vapors**

The fumes produced during welding contain toxic gases and vapors.

Welding fumes contain substances that cause cancer, as stated in monograph 118 from the International Agency for Research on Cancer.

Use at-source extraction source and a room extraction system.  
If possible, use a welding torch with an integrated extraction device.

Keep your head out of the welding fumes and gases.

Take the following precautionary measures for fumes and harmful gases:

- Do not breathe them in.
- Extract them from the work area using appropriate equipment.

Ensure that there is a sufficient supply of fresh air. Ensure that there is a ventilation flow rate of at least 20 m<sup>3</sup> per hour.

Use a welding helmet with air supply if there is insufficient ventilation.

If there is uncertainty as to whether the extraction capacity is sufficient, compare the measured toxic emission values against the permissible limit values.

The following components are factors that determine how toxic the welding fumes are:

- The metals used for the workpiece
- Electrodes
- Coatings
- Cleaning agents, degreasers, and the like
- The welding process used

Consult the corresponding material safety data sheets and manufacturer's instructions for the components listed above.

Recommendations for exposure scenarios, risk management measures and identifying working conditions can be found on the European Welding Association website under Health & Safety (<https://european-welding.org>).

Keep flammable vapors (such as solvent vapors) out of the arc radiation range.

When no welding is taking place, close the valve of the shielding gas cylinder or the main gas supply.

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**Danger from Flying Sparks**

Flying sparks can cause fires and explosions.

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Never undertake welding near flammable materials.

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Flammable materials must be kept at least 11 meters (36 ft. 1.07 in.) from the arc or protected with a certified cover.

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Keep suitable, tested fire extinguishers on hand.

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Sparks and pieces of hot metal may also get into surrounding areas through small cracks and openings. Take appropriate measures to ensure that there is no risk of injury or fire.

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Do not undertake welding in areas at risk of fire and explosion, or on sealed tanks, drums, or pipes if these have not been prepared in accordance with corresponding national and international standards.

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Do not undertake welding on containers in which gases, fuels, mineral oils, and the like are/were stored. Residues pose a risk of explosion.

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**Risks from grid current and welding current**

An electric shock can be fatal.

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Do not touch voltage-carrying parts inside or outside the device.

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

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Always place the wirefeeder on a sufficiently insulated base or use a suitable insulating wirefeeder holder.

---

Ensure suitable personal protection with dry temporary backing or cover with sufficient insulation against the ground potential. The temporary backing or cover must completely cover the entire area between the body and the 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.

Before every use, check power connections for secure fit by hand.

In the case of power cables with bayonet connectors, turn the power cable by at least 180° around the longitudinal axis and pretension.

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

---

Concerning the electrode (rod electrode, tungsten electrode, welding wire, etc.)

- Never immerse it in liquids to cool it
- Never touch it when the power source is switched on.

---

The open circuit voltage of a welding system may double, for example, between the electrodes of two welding systems. Touching the potentials of both electrodes at the same time may be life-threatening in some cases.

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Have the grid and device supply lead regularly inspected by an electrician to ensure that the ground conductor is functioning properly.

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Protection class I devices require a grid with a ground conductor and a connector system with ground conductor contact for proper operation.

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Operation of the device on a grid without a ground conductor and on a socket without a ground conductor contact is only permitted if all national regulations for protective separation are observed.

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Otherwise, this is considered gross negligence. The manufacturer accepts no liability for any damage resulting from improper use.

Use suitable equipment to ensure that the workpiece is sufficiently grounded if necessary.

Switch off unused devices.

When working at elevated heights, wear a safety harness to prevent falls.

Before working on the device, switch off the device and remove the grid plug.

Secure the device to prevent the grid plug from being connected and switched on again by applying a clearly legible and understandable warning sign.

After opening the device:

- Discharge all electrically charged components
- Ensure that all components are disconnected from the power supply.

If work is needed on voltage-carrying parts, bring in a second person who will switch off the main switch at the correct time.

### Stray welding currents

If the following instructions are not observed, stray welding currents may occur, which pose a risk of the following:

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

Ensure that the workpiece clamp is securely connected to the workpiece.

Secure the workpiece clamp as close to the spot to be welded as possible.

Position the device with sufficient insulation against electrically conductive environments, e.g., insulation against electrically conductive floors or electrically conductive mounts.

Observe the following when using power distribution boards, twin-head mounts, etc.: Even the electrode of the welding torch/electrode holder not in use carries electric potential. Ensure that there is sufficient insulation when the unused welding torch/electrode holder is stored.

In automated MIG/MAG applications, only guide the wire electrode from the welding wire drum, large spool, or wirepool to the wirefeeder with insulation.

### 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

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 grid.

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

### 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 operating company is obliged to take appropriate action to rectify the situation.

---

Test and assess the immunity of equipment in the vicinity of the device in accordance with national and international provisions. Examples of interference-prone equipment that could be affected by the device:

- Safety devices
- Grid power lines, signal lines, and data transfer lines
- IT and telecommunications equipment
- Devices for measuring and calibrating

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Supporting measures to avoid EMC problems:

1. Grid power supply
  - If electromagnetic interference occurs despite a grid connection that complies with regulations, take additional measures (e.g., use a suitable grid filter).
2. Welding power-leads
  - Keep them as short as possible
  - Route them close together (also to avoid EMF problems)
  - Route them far from other lines
3. Equipotential bonding
4. Workpiece grounding
  - If necessary, establish grounding using suitable capacitors.
5. Shield, if necessary
  - Shield other devices in the vicinity
  - Shield the entire welding installation

---

#### **EMF measures**

Electromagnetic fields may cause health problems that are not yet known:

- Effects on the health of persons close by, e.g., those with pacemakers and hearing aids
- Persons with pacemakers must seek advice from their doctor before staying in the immediate vicinity of the device and the welding process
- Keep distances between welding power-leads and the head/torso of the welder as great as possible for safety reasons
- Do not carry welding power-leads and hosepacks over your shoulder or wrap them around your body or body parts

---

#### **Particular hazard areas**

Keep hands, hair, loose clothing, and tools away from moving parts, such as:

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

---

Do not reach into rotating gears of the wire drive or into rotating drive parts.

---

Covers and side panels must only be opened/removed during maintenance and repair work.

---

During operation

- Ensure that all covers are closed, and all side parts have been mounted properly.
- Keep all covers and side parts closed.

---

The protrusion of welding wire from the welding torch represents a high risk of injury (cuts to the hand, facial and eye injuries, etc.).

---

Therefore, always hold the welding torch away from the body (devices with wirefeeder) and use suitable protective goggles.

---

Do not touch the workpiece during or after welding – risk of burns.

---

Slag may fly off cooling workpieces. Therefore, also wear regulation-compliant protective equipment when reworking workpieces and ensure that other persons are sufficiently protected.

---

Leave the welding torch and other parts with a high operating temperature to cool before working on them.

---

Special regulations apply in areas at risk of fire or explosion  
– follow the appropriate national and international regulations.

---

Power sources for work in areas with increased electrical hazard (e.g., boilers) must be labeled with the symbol (Safety). However, the power source may not be located in such areas.

---

Risk of scalding due to leaking coolant. Switch off the cooling unit before disconnecting connections for the coolant supply or return.

---

When handling coolant, observe the information on the coolant safety data sheet. The coolant safety data sheet can be obtained from your service center or via the manufacturer's website.

---

Only use suitable load-carrying equipment from the manufacturer to transport devices by crane.

- Attach chains or ropes to all designated attachments of the suitable load-carrying equipment.
  - Chains or ropes must be the smallest angle possible from vertical.
  - Remove gas cylinder and wirefeeder (MIG/MAG and TIG devices).
- 

In the event of crane attachment of the wirefeeder during welding, always use a suitable, insulating wirefeeder hoisting attachment (MIG/MAG and TIG devices).

---

If the device is equipped with a carrier belt or handle, then this is used exclusively for transport by hand. The carrier belt is not suitable for transport by crane, counterbalanced lift truck, or other mechanical lifting tools.

---

All lifting equipment (belts, buckles, chains, etc.), which is used in association with the device or its components, must be checked regularly (e.g., for mechanical damage, corrosion, or changes due to other environmental influences). The test interval and scope must at least comply with the respective valid national standards and guidelines.

---

There is a risk of colorless, odorless shielding gas escaping without notice if an adapter is used for the shielding gas connection. Use suitable Teflon tape to seal the thread of the shielding gas connection adapter on the device side before installation.

---

#### **Requirement for the shielding gas**

Especially with ring lines, contaminated shielding gas can cause damage to equipment and reduce welding quality.

Meet the following requirements regarding shielding gas quality:

- Solid particle size < 40 µm
  - Pressure condensation point < -20 °C
  - Max. oil content < 25 mg/m<sup>3</sup>
- 

Use filters if necessary.

---

---

**Danger from  
Shielding Gas  
Cylinders**

Shielding gas cylinders contain compressed gas and may explode if damaged. Shielding gas cylinders are an integral part of the welding equipment, so they must be handled very carefully.

---

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

---

Mount the shielding gas cylinders vertically and secure them in accordance with instructions so they cannot fall over.

---

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

---

Never hang a welding torch on a shielding gas cylinder.

---

Never touch a shielding gas cylinder with an electrode.

---

Risk of explosion: Never weld on a compressed shielding gas cylinder.

---

Always use suitable shielding gas cylinders for the application in question and the correct matching accessories (controller, hoses, and fittings, etc.) Only use shielding gas cylinders and accessories that are in good condition.

---

If a valve on a shielding gas cylinder is open, turn your face away from the outlet.

---

When no welding is taking place, close the valve of the shielding gas cylinder.

---

Leave the cap on the valve of the shielding gas cylinder when the cylinder is not connected.

---

Follow the manufacturer's instructions and applicable national and international provisions for shielding gas cylinders and accessories.

---

**Danger Posed by  
Shielding Gas  
Leak**

Risk of asphyxiation due to uncontrolled shielding gas leak

---

Shielding gas is colorless and odorless and may suppress the oxygen in the ambient air in the event of leakage.

- Ensure there is a sufficient supply of fresh air with a ventilation flow rate of at least 20 m<sup>3</sup> per hour.
  - Please observe the safety and maintenance information for the shielding gas cylinder or the main gas supply.
  - When no welding is taking place, close the valve of the shielding gas cylinder or the main gas supply.
  - Always check the shielding gas cylinder or main gas supply for uncontrolled gas leakage before each start-up.
- 

**Safety Measures  
at the Setup  
Location and  
During Transport**

A toppling device can be deadly! Set up the device securely on an even, solid surface

- The maximum permitted tilt angle is 10°.
- 

Special regulations apply in areas at risk of fire or explosion

- Follow the appropriate national and international regulations.
- 

Use instructions and checks within the company to ensure that the vicinity of the workplace is always clean and organized.

---

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

---

When setting up the device, ensure that there is an all-round clearance of 0.5 m (1 ft. 7.69 in.) to allow cooling air to circulate unhindered.

Take care to ensure that the applicable national and regional guidelines and accident prevention regulations are observed when transporting the device, especially guidelines concerning hazards during transport and shipment.

Do not lift or transport any active devices. Switch off devices before transport or lifting.

Before transporting the device, completely drain the coolant and dismantle the following components:

- wirefeeder
- wirepool
- shielding gas cylinder

It is essential to conduct a visual inspection of the device to check for damage after it has been transported but before commissioning. Have any damage repaired by trained service technicians before commissioning the device.

### **Safety Measures in Normal Oper- ation**

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

- 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

Safety devices that are not fully functional must be repaired before the device is switched on.

Never bypass or disable safety devices.

Before switching on the device, ensure that no one can be put in danger.

The device must be examined at least once a week for externally detectable damage and functionality of the safety devices.

Always secure the shielding gas cylinder well and remove before transporting by crane.

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

Only use appropriate original coolant from the manufacturer.

Do not mix original coolant from the manufacturer with other coolants.

Only connect system components from the manufacturer to the cooling unit circuit.

If there is damage due to use of other system components or other coolants, the manufacturer accepts no liability for this and all warranty claims are forfeited.

Cooling Liquid FCL 10/20 is not flammable. The ethanol-based coolant is flammable in certain conditions. Only transport the coolant in closed original containers and keep away from sources of ignition.

Properly dispose of used coolant according to national and international regulations. The coolant safety data sheet can be obtained from your service center or via the manufacturer's website.

When the system is cool, always check the coolant level before starting welding.

---

**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 be performed at least every 12 months.

---

The manufacturer recommends calibrating power sources within the same 12-month interval.

---

A safety inspection by a certified electrician is recommended:

- After changes
- After alterations
- After repair, care, and maintenance
- At least every 12 months

---

For the safety inspection, follow the appropriate national and international standards and guidelines.

---

You can obtain more information about the safety inspection and calibration from your service center. The service center will provide the necessary documents upon request.

---

**Disposal**

To comply with European directives and national law, waste electrical and electronic equipment must be collected separately and sent for environmentally-friendly recycling. Used devices must be returned to a distributor or an approved collection and recycling facility in your area. Proper disposal of used devices promotes the sustainable recycling of material resources. Ignoring this may have potentially adverse effects on the environment and your health.

**Packaging materials**

Materials collected separately. Check the regulations in your area. Reduce the volume of cardboard.

---

**Safety symbols**

Devices with the CE label satisfy the essential requirements of the low-voltage and electromagnetic compatibility directive (e.g., relevant product standards of the EN 60974 series).

Fronius International GmbH declares that the device complies with Directive 2014/53/EU. The full text of the EU Declaration of Conformity is available on the following website: <http://www.fronius.com>

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



---

**Data backup**      The user is responsible for backing up 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.

---

Text and illustrations were accurate at the time of printing. Fronius reserves 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 Operating Instructions, we will be most grateful for your comments.

---

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

---

The device is intended exclusively for the welding process specified on the rating plate and in the Operating Instructions. Utilization for any other purpose, or in any other manner, shall be deemed to be "not in accordance with the intended purpose." The manufacturer accepts no liability for any damage resulting from improper use.

---

Intended use also means

- Reading and adhering to all instructions in the Operating Instructions
- Carefully reading and obeying all safety instructions and danger notices
- Carrying out all the specified inspection and maintenance work.

---

Never use the device for the following applications:

- Thawing pipes
- Charging batteries
- Starting motors

---

The device is designed for operation in commercial applications. The manufacturer shall not be liable for any damage resulting from use in a living area.

---

The manufacturer shall also not be liable for faulty or incorrect work results.

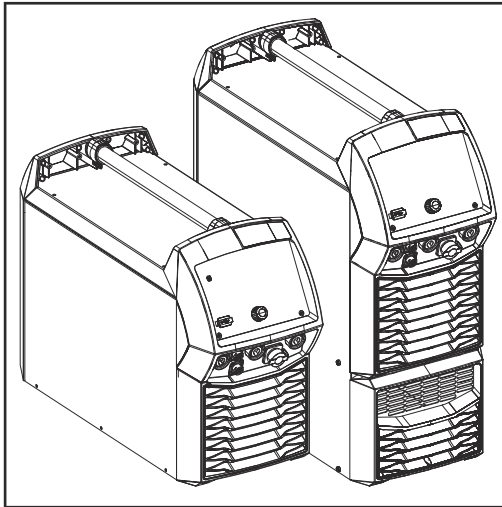
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# **General information**



## Device concept



The iWave 300i / 400i / 500i DC and iWave 300i / 400i / 500i AC/DC power sources are fully digitized, microprocessor-controlled inverter power sources.

A modular design and easy ability to extend the system guarantee a high degree of flexibility. The devices can be adapted to any situation.

## 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 the 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 commercial and industrial applications for manual and automated TIG and MIG/MAG welding of unalloyed and low-alloyed steel, high-alloyed chrome/nickel steel, aluminum, aluminum alloys, and magnesium. The power sources are designed for:

- Automotive and supply industry,
- Mechanical engineering and rail vehicle manufacturing,
- Chemical plant construction,
- Machine construction,
- Shipyards,
- etc.

---

## Conformities

### FCC

This device conforms to the limit values for an EMC device class A digital device, pursuant to Part 15 of the FCC regulations. These limit values are designed to provide reasonable protection against harmful interference when operating in a commercial environment. This device generates and uses high-frequency energy and, if not installed and used in accordance with the Operating Instructions, may interfere with radio communications.

Operation of this device in residential areas is likely to cause harmful interference, in which case the user is required to correct the interference at his own expense.

FCC ID: QKWSPBMCU2

---

### Industry Canada RSS

This device complies with Industry Canada license-exempt RSS standards. Operation is subject to the following conditions:

- (1) The device must not cause any harmful interference.
- (2) The device must not be affected by external sources of interference, including interference that may impair operation.

IC: 12270A-SPBMCU2

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### EU

#### Compliance with Directive 2014/53/EU - Radio Equipment Directive (RED)

The antennas used for this transmitter must be installed in such a way that a minimum distance of 20 cm from all persons is maintained. They must not be installed or operated in conjunction with another antenna or transmitter. OEM integrators and end users must ensure the operating conditions of the transmitter comply with radio frequency exposure guidelines.

---

### ANATEL / Brazil

This device is operated on a secondary basis. It does not claim to offer protection against harmful interference, even from devices of the same type.

This device can not cause interference in primarily operated systems.

This device complies with ANATEL's specific absorption rate limit values for exposure to high-frequency electrical, magnetic, and electromagnetic fields.

---

### IFETEL / Mexico

Operation of this device is subject to the following two conditions:

- (1) The device must not cause any harmful interference;
  - (2) The device must accept any interference, including interference that may cause undesired operation.
- 

### NCC / Taiwan

According to the NCC regulations for low-power equipment that generates radio frequency radiation:

#### Article 12

Certified low-power equipment that generates radio frequency radiation shall not change frequency, increase power or alter the characteristics and functions of the original design without approval.

#### Article 14

The use of low-power equipment that generates radio frequency radiation shall not adversely affect flight safety and legally operated communication equipment.

An identified malfunction must be deactivated and corrected immediately. All malfunctions must be eliminated.

The legal notice in the preceding paragraph refers to radio communications equipment operated in accordance with the provisions of the Telecommunications Act. Low-power equipment that generates radio frequency radiation must be able to withstand interference from legally operated communication channels or radiological, radiation electrical devices used in industrial, scientific and medical applications.

### Thailand



### Bluetooth trademarks

The word mark Bluetooth® and the Bluetooth® logos are registered trademarks and property of Bluetooth SIG, Inc. and are used by the manufacturer under license. Other trademarks and trade names are the property of their respective owners.

### Warning notices on the device

Warning notices and safety symbols can be found on power sources with the CSA test mark for use in the North American region (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 property damage.





## Options

**WP TIG DynamicWire**

The Welding Package enables the TIG DynamicWire process.

**OPT/i TIG gas regulator****OPT/i TIG 4 Switch SpeedNet**

Option if more than one additional SpeedNet connection is required.

**OPT/i TIG Gas flow rate sensor****OPT/i TIG external sensor****OPT/i TIG PowerConnector**

2. Current socket on the rear of the power source

**OPT/i TIG Gas changeover****OPT/i TIG 2nd SpeedNet**

Second SpeedNet connection

**OPT/i TIG DC MultiProzess PRO****OPT/i TIG AC MultiProzess PRO****OPT/i TIG 2nd NT242**

When using a CU 1400 cooling unit, the OPT/i TIG 2nd NT242 option must be installed in the power sources.

**OPT/i TIG NT601****OPT/i TPS dust filter**

**IMPORTANT!** The use of the OPT/i TPS dust filter option on iWave power sources will reduce the duty cycle!

**OPT/i CycleTIG**

Advanced TIG stitch welding

**OPT/i Synergic Lines \***

Option to enable all available special characteristics of TPSi power sources; any special characteristics created in the future are thus automatically enabled.

**OPT/i GUN Trigger \***

Option for special functions in connection with the torch trigger

**OPT/i Jobs**

Option for Job Mode

**OPT/i Documentation**

Option for the documentation function

**OPT/i Puls Pro****OPT/i Interface Designer \***

Option for individual interface configuration

**OPT/i WebJobEdit**

Option to edit jobs via the SmartManager of the power source

**OPT/i Limit Monitoring**

Option to set limit values for welding current, welding voltage, and wire speed

**OPT/i Custom NFC - ISO 14443A**

Option to use a custom frequency band for key cards

**OPT/i CMT Cycle Step \***

Option for adjustable, cyclic CMT welding process

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**OPT/i OPC-UA**

Standardized data interface protocol

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**OPT/i MQTT**

Standardized data interface protocol

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**OPT/i SpeedNet Repeater**

Signal amplifier if interconnecting hosepacks or connections from power source to wirefeeder exceed 50 m

---

**KRIS 13 Gouging Machine**

Electrode holder with compressed air connection for arc air gouging

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**OPT/i Wire Sense \***

Seam tracking / edge detection using wire electrode for automated applications only in conjunction with CMT hardware

---

**OPT/i Synchropulse 10 Hz \***

To increase the SynchroPulse frequency from 3 Hz to 10 Hz

---

\* MIG/MAG options - only in conjunction with the options **OPT/i TIG DC MultiProzess PRO** or **OPT/i TIG AC MultiProzess PRO**

---

**OPT/i Safety  
Stop PL d option**

**IMPORTANT!** The OPT/i Safety Stop PL d safety function was developed as Category 3 according to EN ISO 13849-1:2008 + AC:2009.

A two-channel feed-in of the input signal is required for this.

Bridging the two-channel capability (e.g. by means of a short-circuit bracket) is not permitted and results in the loss of the PL d.

**Function overview**

The OPT/i Safety Stop PL d option ensures a safety stop of the PL d power source with a controlled end of welding in less than a second.

Each time the power source is switched on, the Safety Stop PL d safety function performs a self-test.

**IMPORTANT!** This self-test must be performed at least once a year to check the function of the safety shutdown.

If the voltage drops at least one of two inputs, the Safety Stop PL d stops the current welding operation; the wirefeeder motor and the welding voltage is switched off.

The power source outputs an error code. Communication via the robot interface or bus system continues.

In order to restart the welding system, the voltage must be applied again. An error must be acknowledged via the torch trigger, display or interface and the start of welding must be executed again.

A non-simultaneous shutdown of the two inputs (> 750 ms) is output by the system as a critical, non-acknowledgeable error.

The power source remains permanently switched off.

A reset is performed by switching the power source off/on.

# **Operating controls, connections and mechanical components**



# Control Panel

## General

### NOTE!

**Because of firmware updates, certain functions may be available for your device but not described in these Operating Instructions or vice versa.**

In addition, individual figures may also differ slightly from the operating elements of your device. These operating elements function in exactly the same way, however.



### WARNING!

**Operating the device incorrectly can cause serious injury and damage to property.**

- ▶ Do not use the functions described here until you have fully read and understood the Operating Instructions.
- ▶ Do not use the functions described here until you have fully read and understood all of the Operating Instructions for the system components, especially the safety rules.

## Control panel



43,0001,3547

No.	Function
(1)	<b>USB port</b> For connecting USB thumb drives (service dongle, license key, etc.). <b>IMPORTANT!</b> The USB port is not electrically isolated from the welding circuit. Devices that make an electrical connection to another device must therefore not be connected to the USB port!
(2)	<b>Selection dial with rotary/push button function</b> For selecting elements, setting values, and scrolling through lists
(3)	<b>Display (with touch function)</b> <ul style="list-style-type: none"> <li>- For direct operation of the power source by touching the display</li> <li>- For displaying values</li> <li>- For navigating through the menu</li> </ul>
(4)	<b>Reading zone for NFC keys</b> <ul style="list-style-type: none"> <li>- For locking/unlocking the power source using NFC keys</li> <li>- For logging in different users (with active user management and assigned NFC keys)</li> </ul> NFC key = NFC card or NFC key fob
(5)	<b>Wire-threading button</b> For threading the wire electrode / welding wire into the torch hosepack without gas or current
(6)	<b>Gas-test button</b> To set the required quantity of gas on the gas pressure regulator. After pressing the gas-test button, gas flows for 30 s. Pressing the button again ends the process early.

## Input options

### Touch the display



When you touch and thus select an element on the display, the element is highlighted.

### Turn the selection dial



- Select items on the display
- Change values

For some parameters, a value that has been changed by turning the selection dial is automatically applied without having to press the selection dial.

### Press the selection dial



- Apply selected elements, e.g., to change the value of a welding parameter.
- Apply values of specific parameters.

## Press the button



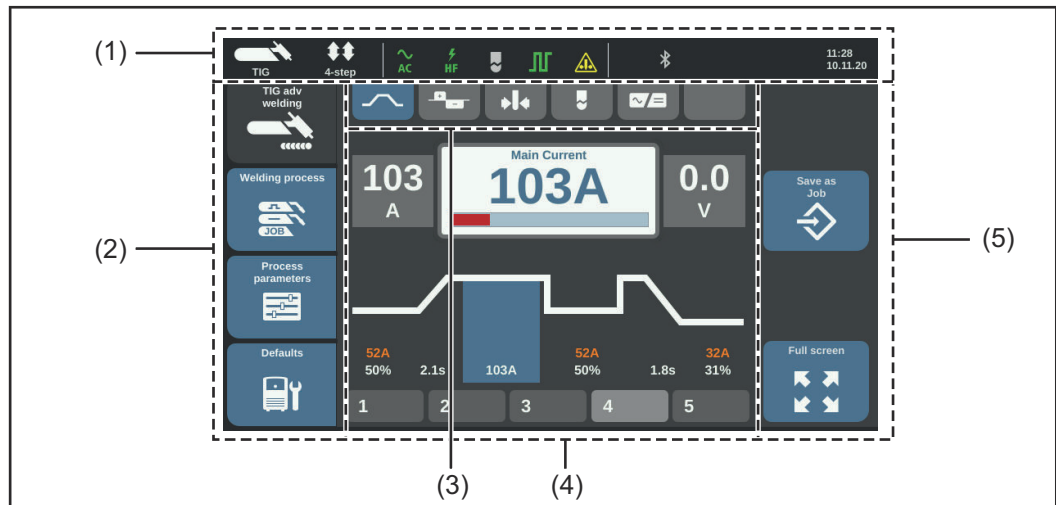
By pressing the wire threading key, the wire electrode or the welding wire is threaded into the torch hosepack without gas or current. An animated graphic with motor current, motor power, and wire length conveyed is shown on the display.



Pressing the gas-test button releases gas for 30 s. Pressing it again ends the process prematurely. The display shows an animated graphic with the remaining gas flow duration.

# Display

## Display



No.	Function
-----	----------

(1)	<b>Status bar</b>
-----	-------------------

Contains information about:

- Currently selected welding process
- Currently selected operating mode
- Currently selected polarity
- Currently selected ignition procedure
- Cap mode
- Pulse mode
- Electrode overload
- Bluetooth status indicator
- Currently logged in user (when user management is activated)  
or  
the key symbol when the power source is switched off (e.g., if profile/  
role "locked" is activated)
- Time and date

The content of the status bar varies according to the selected welding process.



**NOTE!**

The following functions can be selected and set directly in the status bar:

Welding process

Operating mode

- Touch the desired function in the status bar and set it in the window that opens.



## (2) Left menu bar

The left menu bar contains the menus:

- Welding
- Welding process
- Process parameters
- Defaults

The left menu bar is operated by touching the display.

## (3) Indicator bar

Overview of the currently available welding parameters; the individual welding parameters can be selected directly by touching the display. The currently selected parameter is highlighted in blue.



Welding current curve



Balance <sup>(1)</sup>



Electrode diameter



Cap mode <sup>(1)</sup>



Polarity <sup>(1)</sup>

(1) only with iWave AC/DC power sources

(2) only with iWave AC/DC power sources and if polarity is set to AC.

---

**(4) Main area**

The main area displays welding parameters, EasyJobs, graphics, lists or navigation elements. The main area is divided up differently depending on the application and populated with elements.

The main area is operated

- via the selection dial
- by touching the display

---

**(5) Right menu bar**

The right menu bar can be used as follows, depending on the menu selected in the left menu bar:

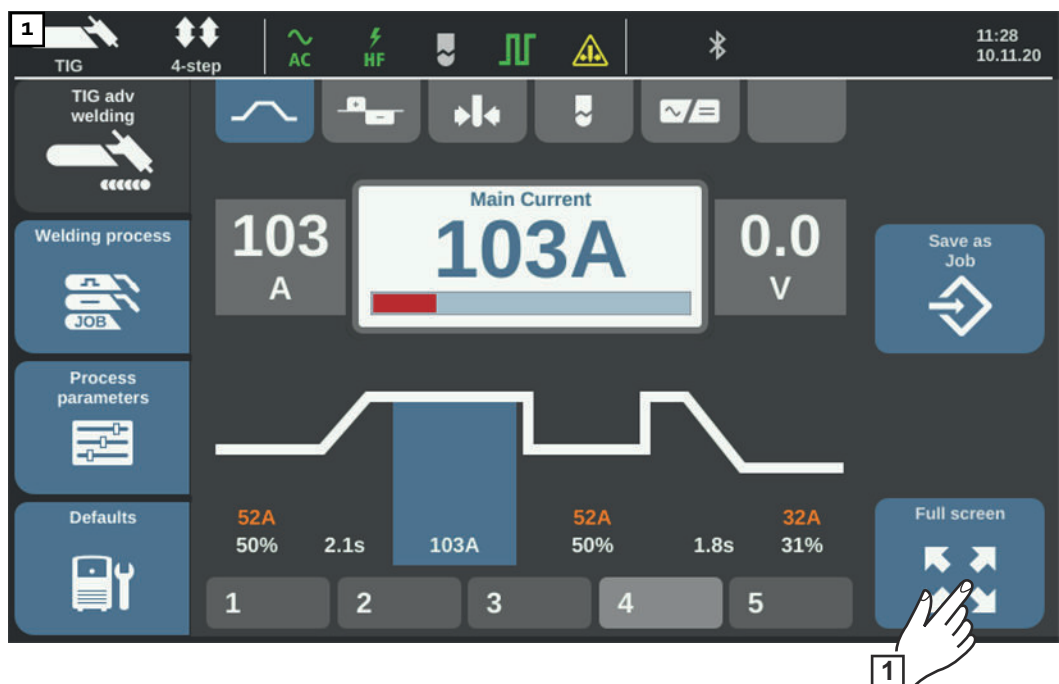
- As a function bar, consisting of application and function buttons
- To navigate to the 2nd menu level

The right menu bar is operated by touching the display.

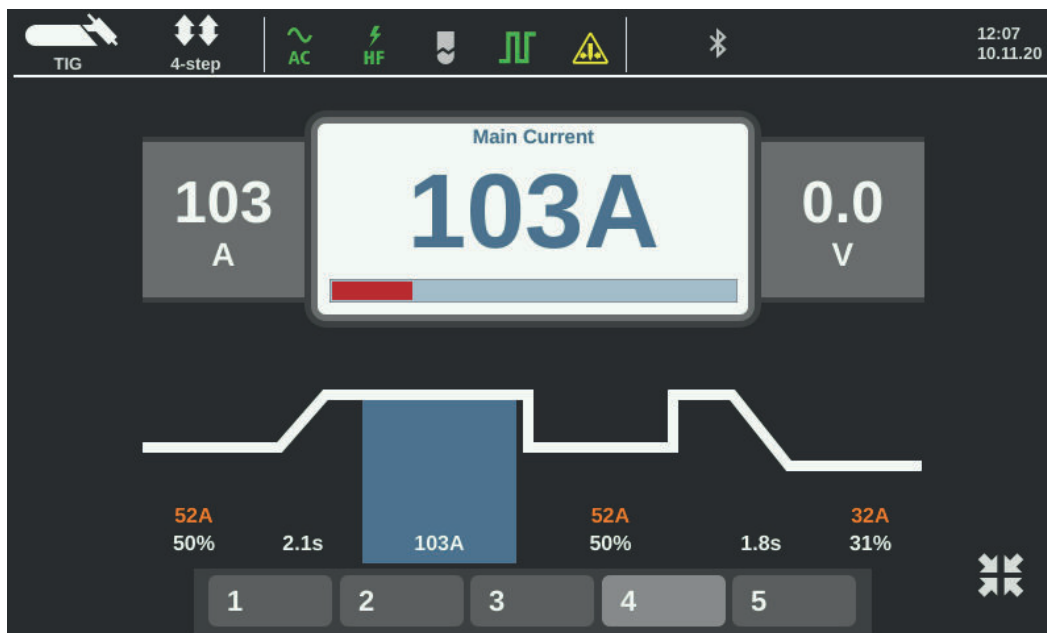
---

---

**Switching to full screen**



The display is shown in full screen mode:



**2** Exit full screen mode:



#### NOTE!

**Hiding the EasyJobs realizes the optimal full-screen display:**

► Defaults / View / EasyJobs / EasyJobs Off

With a few defaults and the setting options via the status bar, the power source can be fully operated in manual applications in full-screen mode.

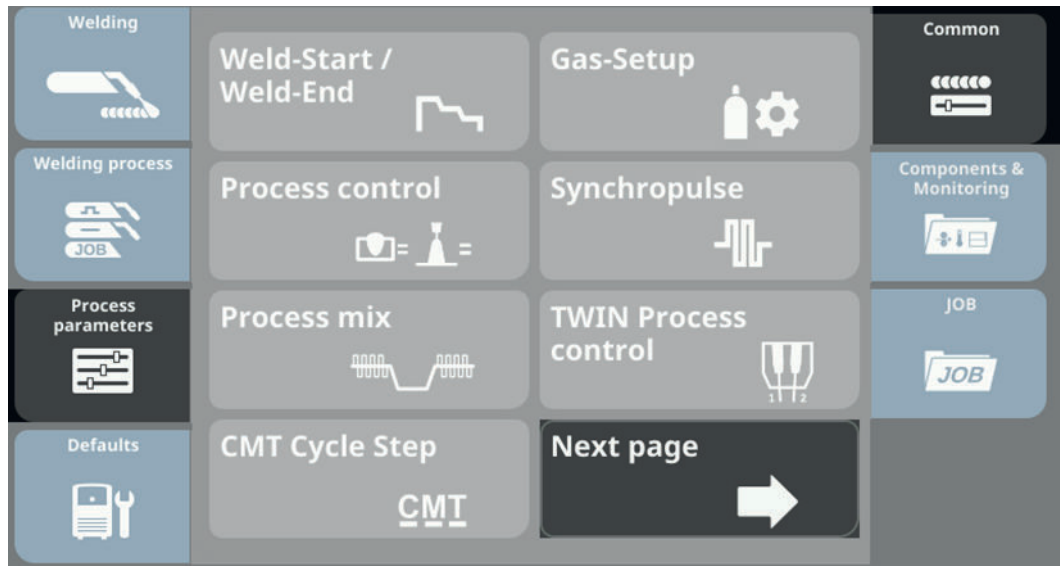
Next page - previous page

#### NOTE!

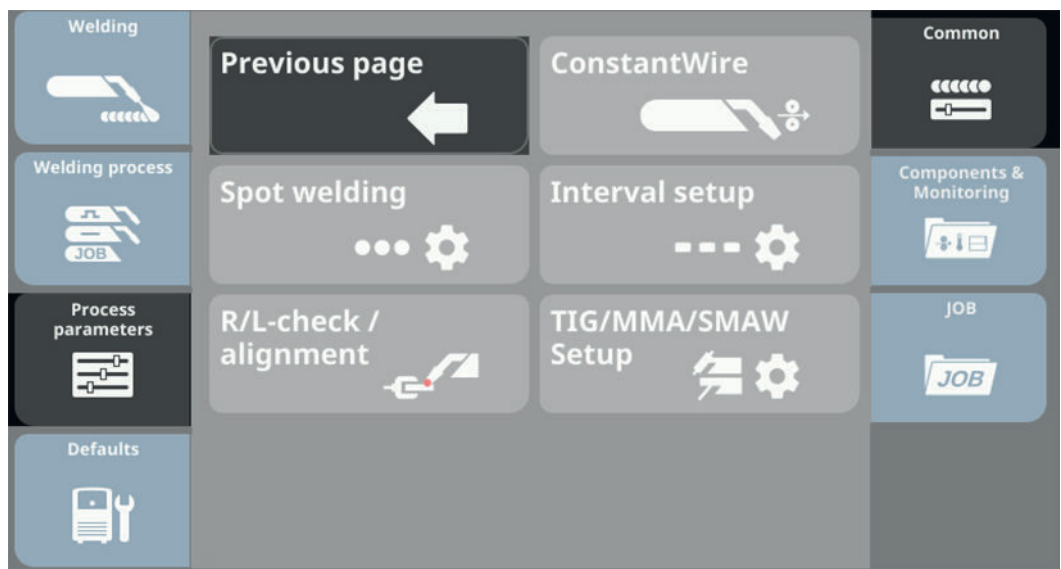
**Depending on the device type, equipment, and available WeldingPackages, the number and sequence of the displayed parameters may vary.**

If there are more than six parameters in a menu, the parameters are divided into several pages.

Navigation between several pages is done using the "Next page" and "Previous page" buttons:



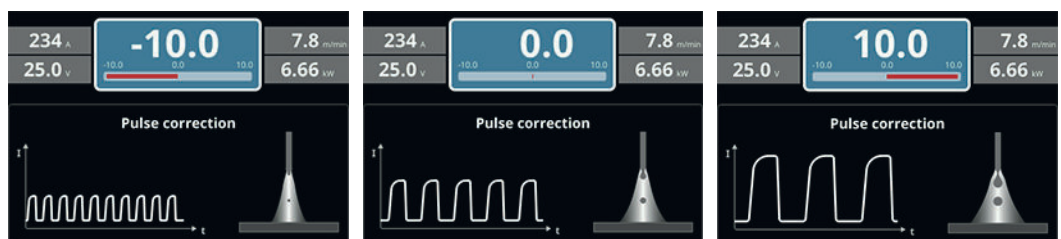
Example: Process parameters / Common - Next page



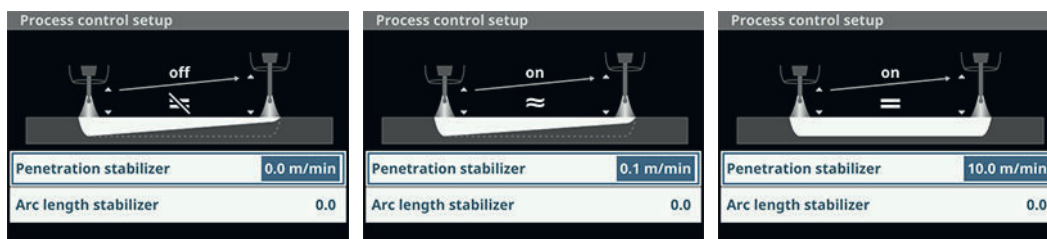
Example: Process parameters / Common - Previous page

## Animated graphics

For certain parameters, animated graphics are shown on the display. These animated graphics change when the value of the parameter is changed.



Example: Welding parameters for pulse correction -10 / 0 / +10



Example: Process parameters / Process control / Penetration stabilizer 0 / 0.1 / 10.0

## Grayed-out welding parameters

### NOTE!

In the menus, certain parameters are grayed out because they have no function with the currently selected settings.

- Grayed-out welding parameters can be selected and changed, but have no influence on the current welding process or the welding result.

▼ Process control		
Penetration stabilizer (a)	0.0 m/min	
Arc length stabilizer	0.0	
▼ Synchropulse		
Synchropulse enable	on	
Delta wire feed	2.0 m/min	
Frequency	3.0 Hz	
Duty cycle	50 %	

▼ Process control		
Penetration stabilizer (b)	0.0 m/min	
Arc length stabilizer	0.0	
▼ Synchropulse		
Synchropulse enable	on	
Delta wire feed	2.0 m/min	
Frequency	3.0 Hz	
Duty cycle	50 %	

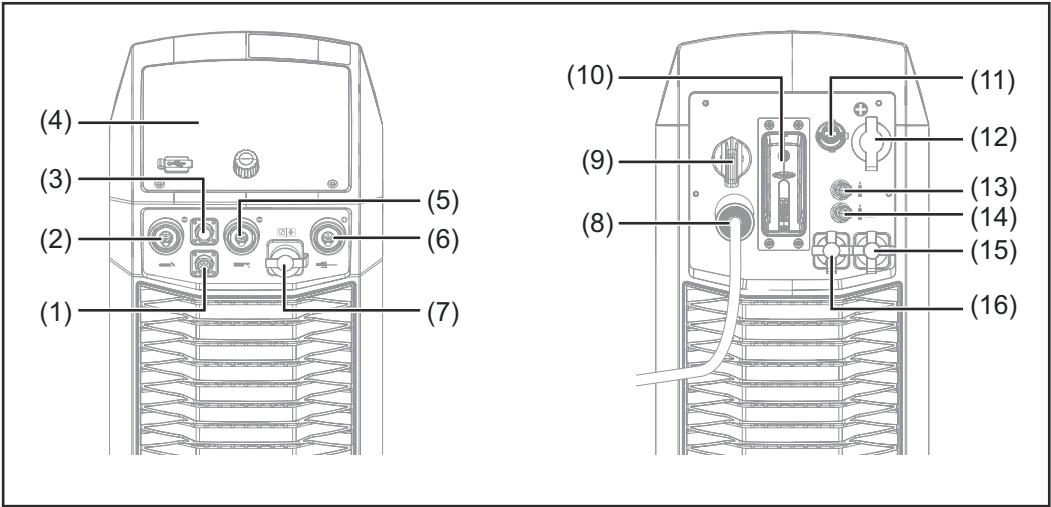
▼ Process control		
Penetration stabilizer (c)	2.9 m/min	
Arc length stabilizer	0.0	
▼ Synchropulse		
Synchropulse enable	on	
Delta wire feed	2.0 m/min	
Frequency	3.0 Hz	
Duty cycle	50 %	

▼ Process control		
Penetration stabilizer (d)	2.9 m/min	
Arc length stabilizer	0.0	
▼ Synchropulse		
Synchropulse enable	on	
Delta wire feed	2.0 m/min	
Frequency	3.0 Hz	
Duty cycle	50 %	




- (a) Grayed-out parameter (e.g. penetration stabilizer)
- (b) Grayed-out parameter selected
- (c) Value of the grayed-out parameter is changed
- (d) Grayed-out parameter with changed value - no effect with current settings

# Connections, Switches, and Mechanical Components

## Connections and mechanical components



Front/back

No.	Function
(1)	<b>TMC connection</b> <ul style="list-style-type: none"><li>- For connecting the control plug of the TIG welding torch</li><li>- For connecting foot-operated remote controls</li><li>- For connecting remote controls</li></ul>
(2)	<b>(-) current socket with integrated gas connection</b> <p>For connecting the TIG welding torch</p> <p>Symbols:</p> <div><p>iWave DC                      iWave AC/DC</p></div>
(3)	<b>TMC 4-pin connection</b> <p>To connect a CrashBox line</p>
(4)	<b>Control panel with display and control panel cover</b> <p>For operating the power source</p>

- 
- (5) **(-) current socket with bayonet latch**  
HF-free current socket for manual metal arc welding

Symbols:



- 
- (6) **(+) current socket**  
For connecting the TIG return lead cable

Symbols:



- 
- (7) **SpeedNet connection**  
For connecting
- remote controls and external sensors
  - wirefeeders (for automated applications)

Symbol:



- 
- (8) **Mains cable with strain relief**  
Depending on version

- 
- (9) **Power switch**  
For switching the power source on and off

- 
- (10) **Dummy cover / Robot interface RI FB Inside /i or SpeedNet connections or External sensor options**

- 
- (11) **Ethernet connection**

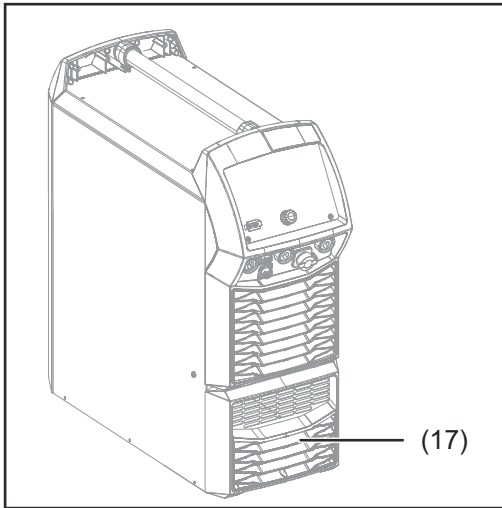
- 
- (12) **Dummy cover/second (-) current socket with bayonet latch (option)**  
MIG/MAG ground to wirefeeder

- 
- (13) **TIG shielding gas connection socket**  
Main gas solenoid valve

- 
- (14) **Dummy cover/auxiliary gas connection**  
Additional gas solenoid valve

- 
- (15) **Dummy cover/second SpeedNet connection (option) or external sensor (option)**

- 
- (16) **Dummy cover/second SpeedNet connection (option) or external sensor (option)**
-



*iWave 300i - 500i AC/DC*

---

**(17) AC inverter**  
(only with iWave AC/DC power sources)

---



# **Before installation and initial operation**



# Before installation and initial operation

## Safety



### WARNING!

#### **Danger from incorrect operation and work that is not carried out properly.**

This can result in serious personal injury and damage to property.

- ▶ All the work and functions described in this document must only be carried out by technically trained and qualified personnel.
- ▶ Read and understand this document in full.
- ▶ Read and understand all safety rules and user documentation for this equipment and all system components.

## Intended use

The power source is only intended for TIG welding, MIG/MAG welding and MMA welding. Any other use is deemed to be "not in accordance with the intended purpose." The manufacturer shall not be liable for any damage resulting from such improper use.

Intended use also means

- Following all the instructions in these Operating Instructions
- Carrying out all the specified inspection and maintenance work

## Setup regulations

The device has been tested according to degree of protection IP23. This means:

- Protection against solid foreign bodies larger than Ø 12.5 mm (0.49 in.)
- Protection against spraywater at any angle up to 60° from the vertical

The device can be set up and operated outdoors in accordance with protection class IP23. Direct moisture (e.g., from rain) must be avoided.



### WARNING!

#### **Danger from machines toppling over or falling.**

This can result in serious personal injury and damage to property.

- ▶ Set up the device securely on an even, solid surface.
- ▶ Check all screw connections are tightly fastened after installation.

The ventilation channel is a very important safety device. When selecting the setup location, ensure that the cooling air can enter or exit unhindered through the vents on the front and back. Any electrically conductive dust (e.g., from grinding work) must not be allowed to be sucked directly into the system.

## Mains connection

- The devices are designed for the mains voltage specified on the rating plate.
- Devices with a nominal voltage of 3 x 575 V must be operated on three-phase systems with earthed star point.
- If your version of the appliance does not come with mains cables and mains plugs ready-fitted, these must be fitted by a qualified person in accordance with national standards.
- The fuse protection for the mains lead is indicated in the technical data.



### CAUTION!

**An inadequately dimensioned electrical installation can cause serious damage.**

- The mains lead and its fuse protection 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.

The maximum apparent power  $S_{1\max}$  of the power source must be known in order to select the correct generator output.

The maximum apparent power  $S_{1\max}$  of the power source is calculated for 3-phase devices as follows:

$$S_{1\max} = I_{1\max} \times U_1 \times \sqrt{3}$$

$I_{1\max}$  and  $U_1$  according to the device rating plate and technical data

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 can be used when not welding at full power.

**IMPORTANT!** The generator apparent power  $S_{\text{GEN}}$  must not be less than the maximum apparent power  $S_{1\max}$  of the power source!

#### NOTE!

**The voltage delivered by the generator must never fall outside of the mains voltage tolerance range.**

The mains voltage tolerance is specified in the "Technical data" section.

# Connecting the Mains Cable

## General

If no mains cable is connected, a mains cable that is suitable for the connection voltage must be fitted before start-up.  
A universal strain-relief device for cable diameters of 12 - 30 mm (0.47 - 1.18 in.) is mounted on the power source.

Strain-relief devices for other cable cross-sections must be designed accordingly.

## Safety



### WARNING!

#### **Danger from work that is not carried out properly.**

This can result in severe personal injury and damage to property.

- ▶ The work described below may only be performed by trained specialist personnel.
- ▶ Follow national standards and guidelines.



### CAUTION!

#### **Danger from improperly prepared mains cable.**

Short circuits and damage to property may result.

- ▶ Fit ferrules to all phase conductors and the ground conductor of the stripped mains cable.

## Specified mains cable

Europe:

Power source Mains voltage	Mains cable
iWave 300i /nc DC 3 x 400 V 3 x 460 V	HO7RN-F 4G4 HO7RN-F 4G4
iWave 300i /MV/nc DC 3 x 200 - 230 V 3 x 400 - 575 V	HO7RN-F 4G6 HO7RN-F 4G4
iWave 300i /nc AC/DC 3 x 400 V 3 x 460 V	HO7RN-F 4G4 HO7RN-F 4G4
iWave 300i /MV/nc AC/DC 3 x 200 - 230 V 3 x 400 - 575 V	HO7RN-F 4G6 HO7RN-F 4G4
iWave 400i /nc DC 3 x 400 V 3 x 460 V	HO7RN-F 4G4 HO7RN-F 4G4
iWave 400i /MV/nc DC 3 x 200 - 230 V 3 x 400 - 575 V	HO7RN-F 4G10 HO7RN-F 4G4

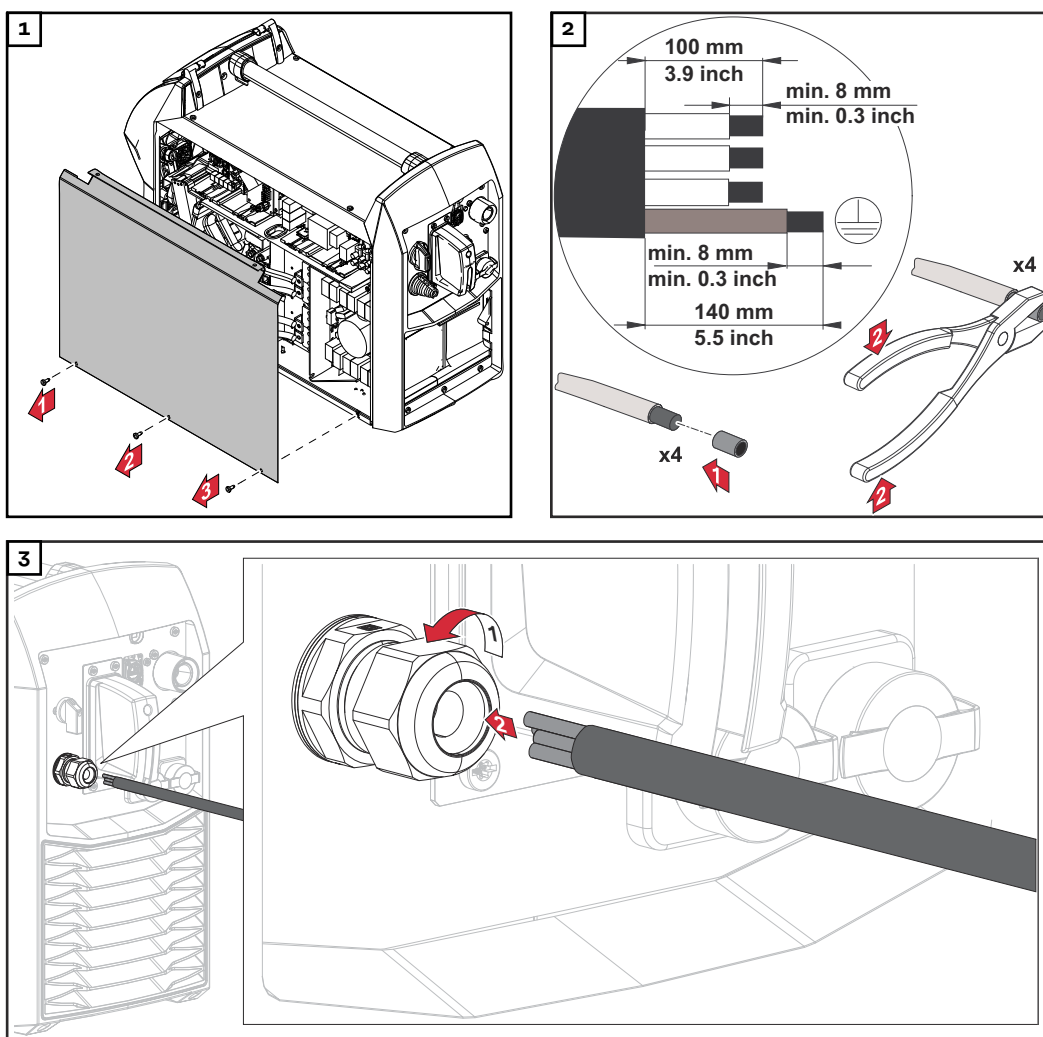
<b>Power source Mains voltage</b>	<b>Mains cable</b>
iWave 400i /nc AC/DC 3 x 400 V 3 x 460 V	HO7RN-F 4G4 HO7RN-F 4G4
iWave 400i /MV/nc AC/DC 3 x 200 - 230 V 3 x 400 - 575 V	HO7RN-F 4G10 HO7RN-F 4G4
iWave 500i /nc DC 3 x 400 V 3 x 460 V	HO7RN-F 4G4 HO7RN-F 4G4
iWave 500i /MV/nc DC 3 x 200 - 230 V 3 x 400 - 575 V	HO7RN-F 4G10 HO7RN-F 4G4
iWave 500i /nc AC/DC 3 x 400 V 3 x 460 V	HO7RN-F 4G4 HO7RN-F 4G4
iWave 500i /MV/nc AC/DC 3 x 200 - 230 V 3 x 400 - 575 V	HO7RN-F 4G10 HO7RN-F 4G4

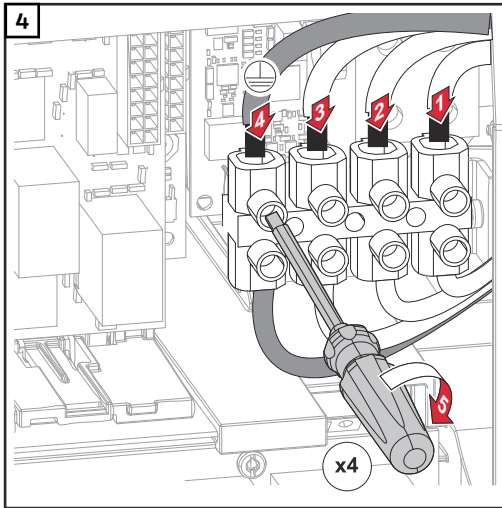
USA & Canada:

<b>Power source Mains voltage</b>	<b>Mains cable</b>
iWave 300i /nc DC 3 x 400 V 3 x 460 V	4 x AWG 10 4 x AWG 10
iWave 300i /MV/nc DC 3 x 200 - 230 V 3 x 400 - 575 V	4 x AWG 8 4 x AWG 10
iWave 300i /nc AC/DC 3 x 400 V 3 x 460 V	4 x AWG 10 4 x AWG 10
iWave 300i /MV/nc AC/DC 3 x 200 - 230 V 3 x 400 - 575 V	4 x AWG 8 4 x AWG 10
iWave 400i /nc DC 3 x 400 V 3 x 460 V	4 x AWG 10 4 x AWG 10
iWave 400i /MV/nc DC 3 x 200 - 230 V 3 x 400 - 575 V	4 x AWG 6 4 x AWG 10
iWave 400i /nc AC/DC 3 x 400 V 3 x 460 V	4 x AWG 10 4 x AWG 10
iWave 400i /MV/nc AC/DC 3 x 200 - 230 V 3 x 400 - 575 V	4 x AWG 6 4 x AWG 10
iWave 500i /nc DC 3 x 400 V 3 x 460 V	4 x AWG 8 4 x AWG 8

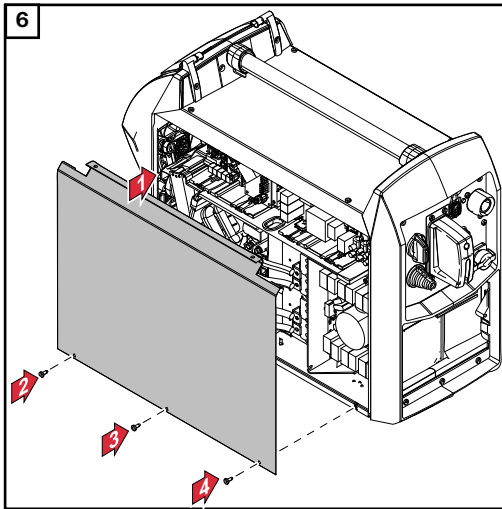
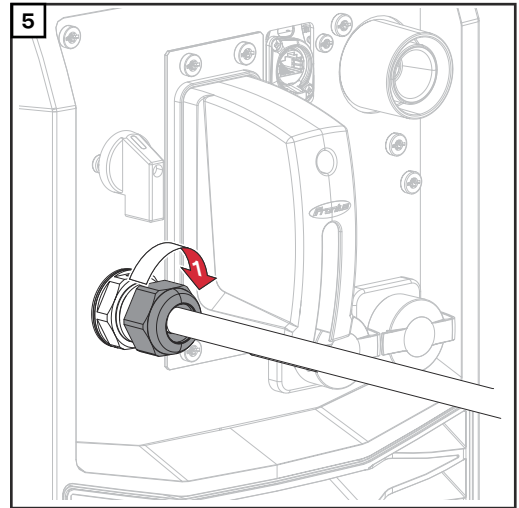
Power source Mains voltage	Mains cable
iWave 500i /MV/nc DC 3 x 200 - 230 V 3 x 400 - 575 V	4 x AWG 4 4 x AWG 8
iWave 500i /nc AC/DC 3 x 400 V 3 x 460 V	4 x AWG 8 4 x AWG 8
iWave 500i /MV/nc AC/DC 3 x 200 - 230 V 3 x 400 - 575 V	4 x AWG 4 4 x AWG 8

### Connecting the mains cable for nc power sources

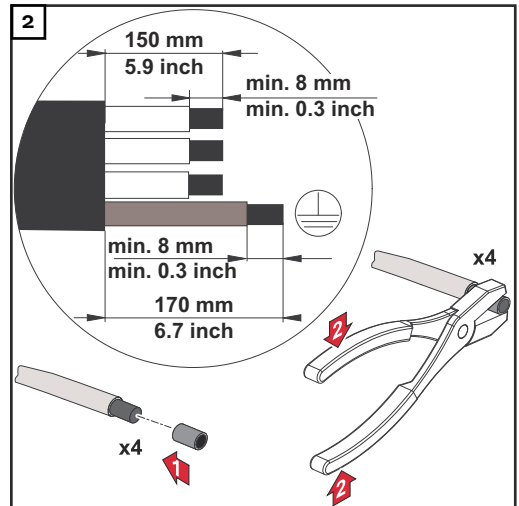
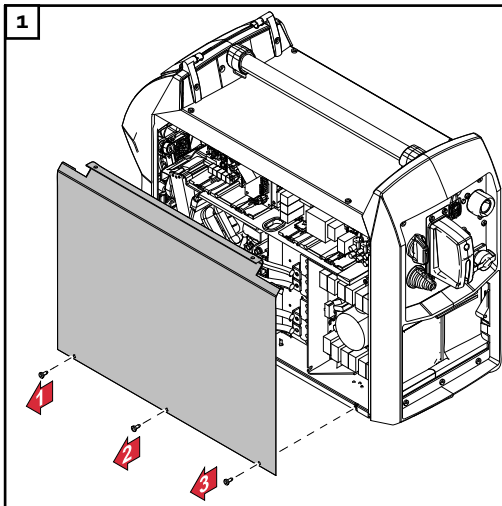




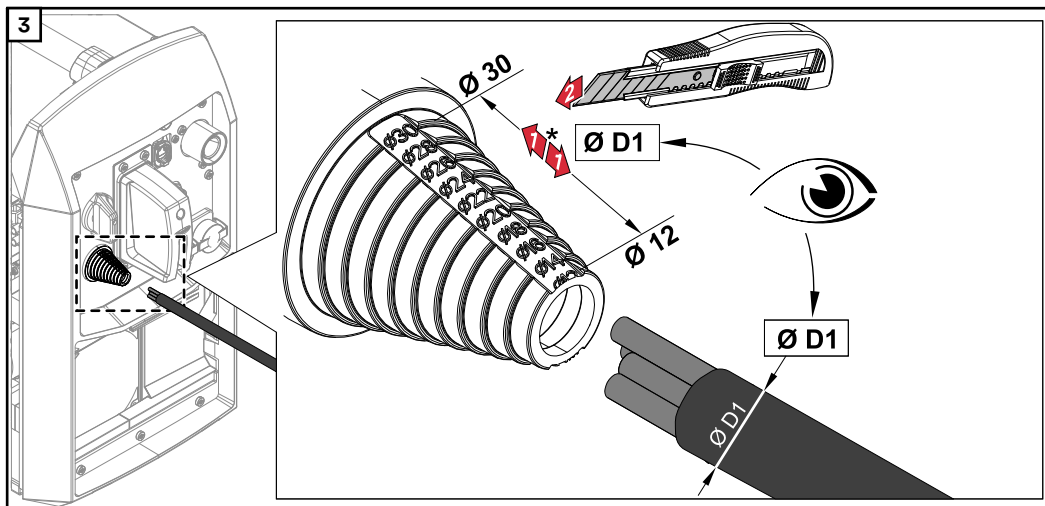
GND - L1 - L2 - L3; 4x TX20, 1.5 Nm / 1.11 lb-ft



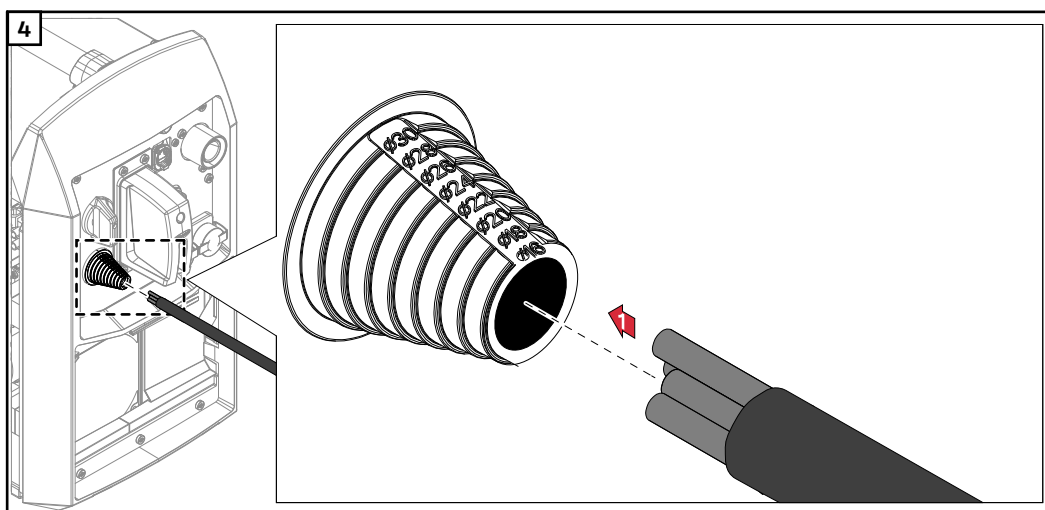
## Connecting the mains cable for MV power sources



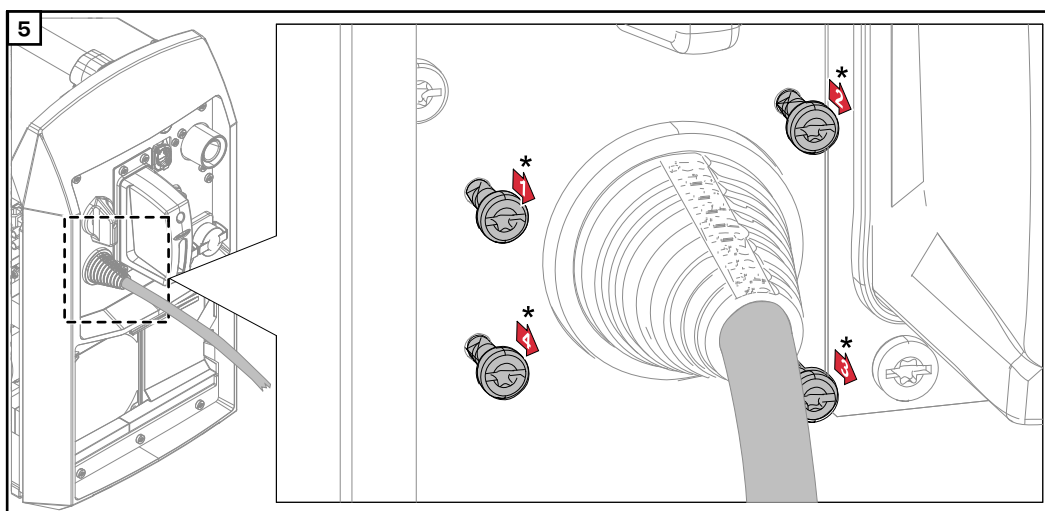




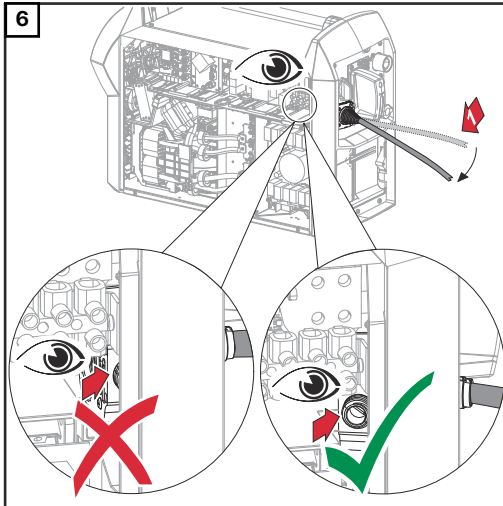
Cut the strain-relief device to length according to the outer diameter of the mains cable



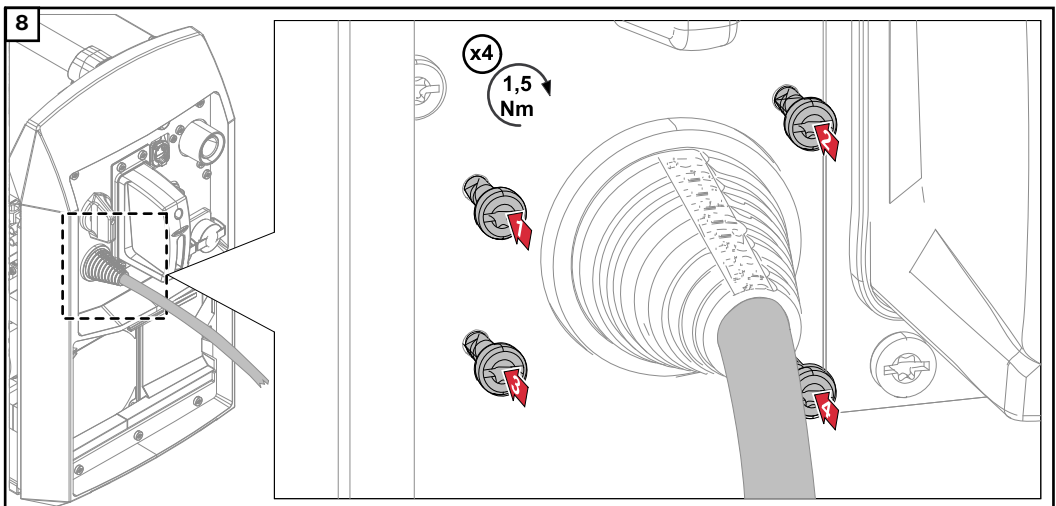
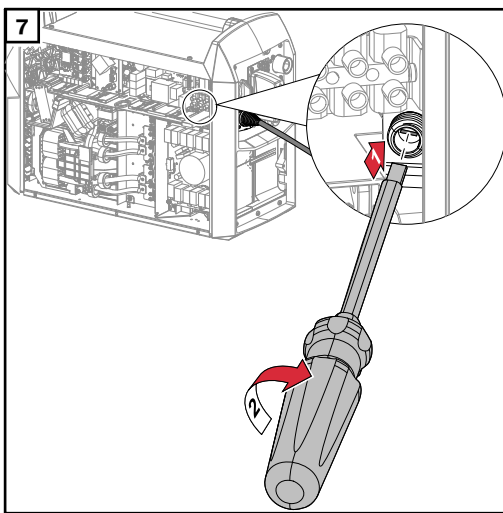
**IMPORTANT!** When inserting the mains cable, ensure that the cable sheath protrudes approx. 5 - 10 mm beyond the strain-relief device into the device.

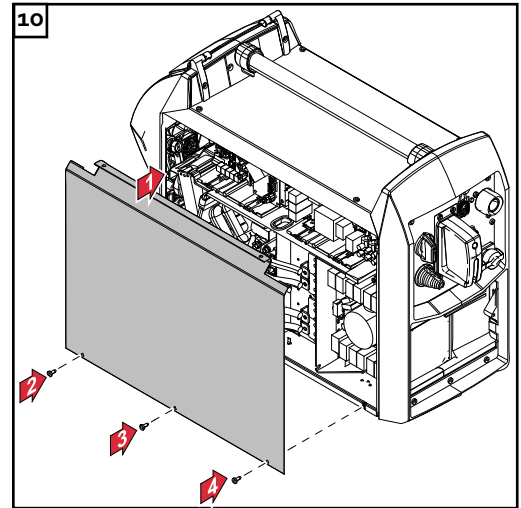
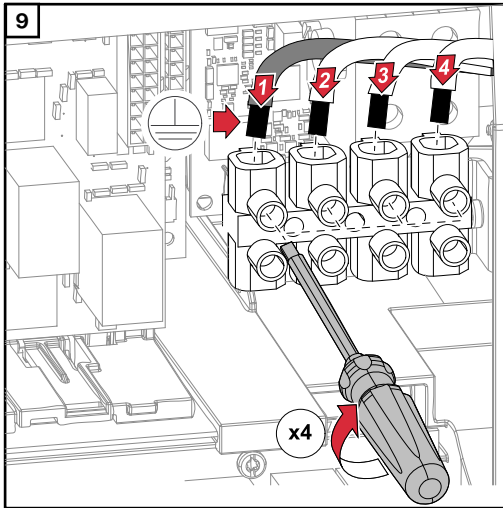


\* Only loosen the 4 TX20 screws, do not remove them



Push the mains cable toward the open side in order to access the strain-relief device clamping screw.





# Locking and unlocking the power source using the NFC key

## General

NFC key = NFC card or NFC key fob

The power source can be locked by means of an NFC key, e.g., to prevent unauthorized access or the modification of welding parameters.

Locking and unlocking is a contactless operation on the power source control panel.

To lock and unlock the power source, the power source must be turned on.

## Locking and unlocking the power source using the NFC key

### Lock the power source



- 1 Hold the NFC key over the reading zone for NFC keys

The key symbol appears briefly on the display.

The key symbol is then displayed in the status bar.



The power source is now locked.  
Only the welding parameters can be viewed and set using the selection dial.

If the operator attempts to access a locked function, a corresponding message is displayed.

### Unlock the power source

- 1 Hold the NFC key over the reading zone for NFC keys

The crossed-out key symbol appears briefly on the display.

The key symbol is no longer displayed in the status bar.  
All power source functions are available again without restriction.

### NOTE!

**Further information on locking the power source can be found in under "Defaults - Administration" starting on page [249](#).**



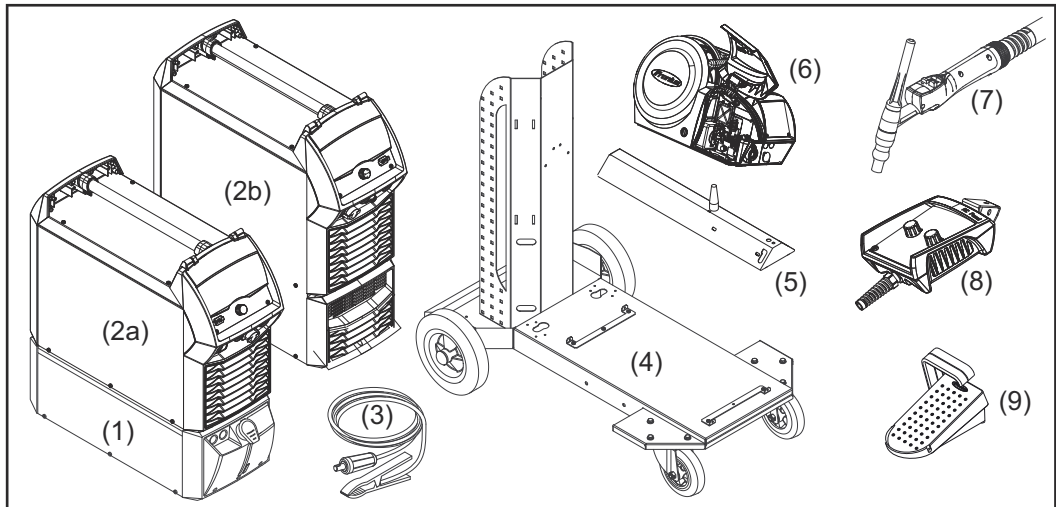
**TIG**





# System components

## System components



- (1) Cooling unit
- (2a) iWave DC power source
- (2b) iWave AC/DC power source
- (3) Return lead cable
- (4) Trolley and gas cylinder holder
- (5) Swivel pin holder
- (6) Cold wire feeder
- (7) Welding torch
- (8) Remote controls
- (9) Foot-operated remote controls

### Other system components (not shown):

- Cold-wire feed
- MIG/MAG wirefeeder
- MIG/MAG welding torch
- Twin-head wirefeeder holder
- Interconnecting hosepacks
- Extension hosepacks
- Robot interface

## Notes on the cooling unit

A cooling unit is recommended for the following applications:

- JobMaster TIG welding torch
- Robot mode
- Hosepacks over 5 m in length
- TIG AC welding
- General welding in the higher power range

The cooling unit is supplied with power via the power source. If the power source's power switch is switched to position - I -, the cooling unit is ready for operation.

For more information on the cooling unit, refer to the Operating Instructions for the cooling unit.

# Minimum equipment for TIG welding

---

- |   |   |
|---|---|
| <b>Minimum equipment for TIG AC welding</b> | <ul style="list-style-type: none"><li>- iWave AC/DC power source</li><li>- Return lead cable</li><li>- TIG welding torch</li><li>- Shielding gas supply with gas pressure regulator</li><li>- Filler metal depending on application</li></ul> |
|---|---|
- 

- |   |   |
|---|---|
| <b>Minimum equipment for TIG DC welding</b> | <ul style="list-style-type: none"><li>- Power source</li><li>- Return lead cable</li><li>- TIG welding torch</li><li>- Shielding gas supply with gas pressure regulator</li><li>- Filler metal depending on application</li></ul> |
|---|---|

## **TIG DynamicWire**

With TIG DynamicWire, the voltage between the workpiece and the welding wire is measured, allowing the wirefeeder to be actively controlled. The wire speed automatically adapts to the amperage, arc length, weld seam profile, or to the air gap to be bridged.

TIG DynamicWire works in Synergic operation. Current and wire speed do not have to be set separately. The wire speed can be optimized via the "TIG wire correction" process parameter.

The Welding Package TIG DynamicWire provides characteristics for the most common filler metals.

# Commissioning

---

## Safety



### WARNING!

#### **Danger from electrical current.**

This can result in serious personal injury and damage to property.

- ▶ Before starting work, switch off all devices and components involved, and disconnect them from the grid.
  - ▶ Secure all devices and components involved so they cannot be switched back on.
  - ▶ After opening the device, use a suitable measuring instrument to check that electrically charged components (such as capacitors) have been discharged.
- 



### WARNING!

#### **Danger of electrical current due to electrically conductive dust in the device.**

This can result in severe personal injury and damage to property.

- ▶ Only operate the device if an air filter is fitted. The air filter is a very important safety device for achieving IP 23 protection.
- 

## General

The start-up of the power sources for TIG welding is described on the basis of a manual, water-cooled TIG application.

The following diagrams show an overview of how the individual system components are put together.

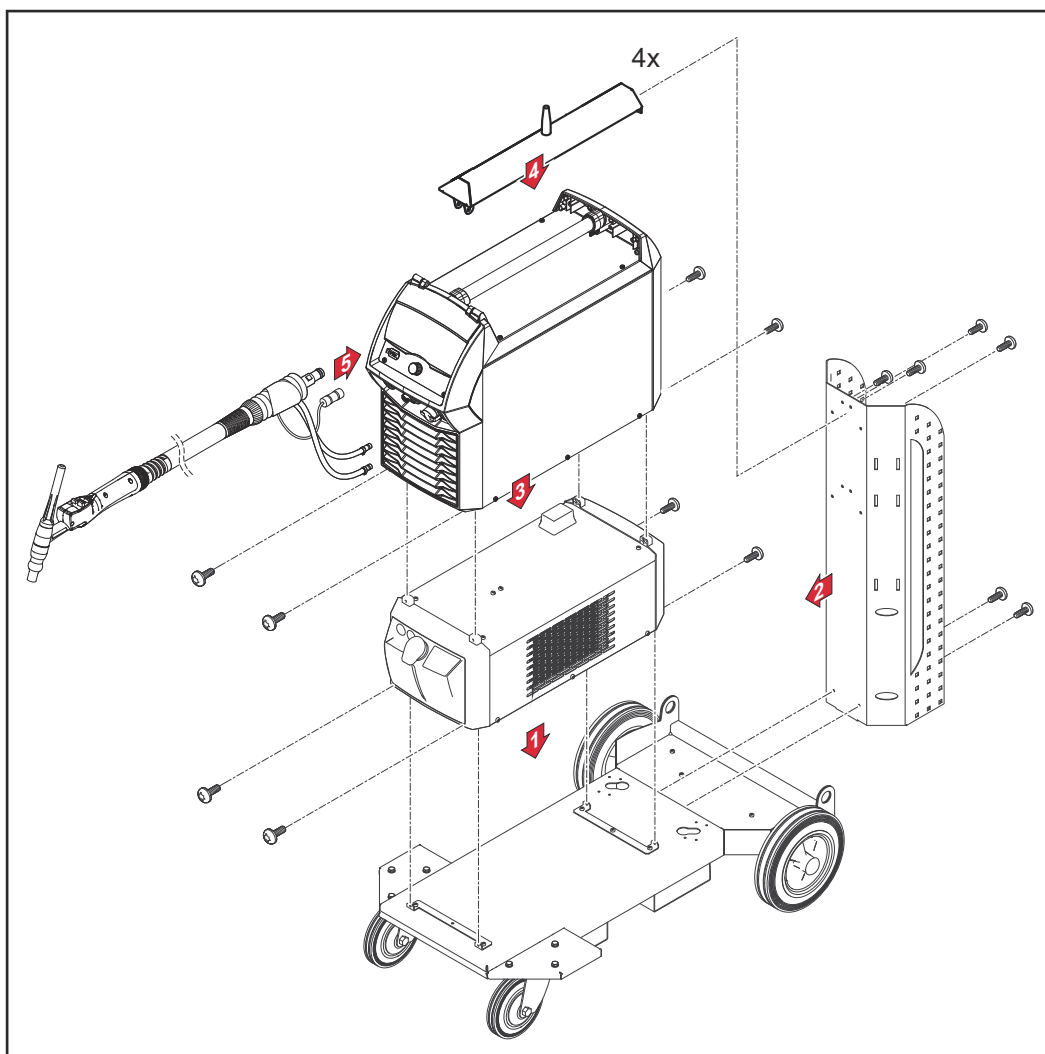
For detailed information about the individual steps, please refer to the corresponding Operating Instructions for the system components.

## Assembling the system components (overview)

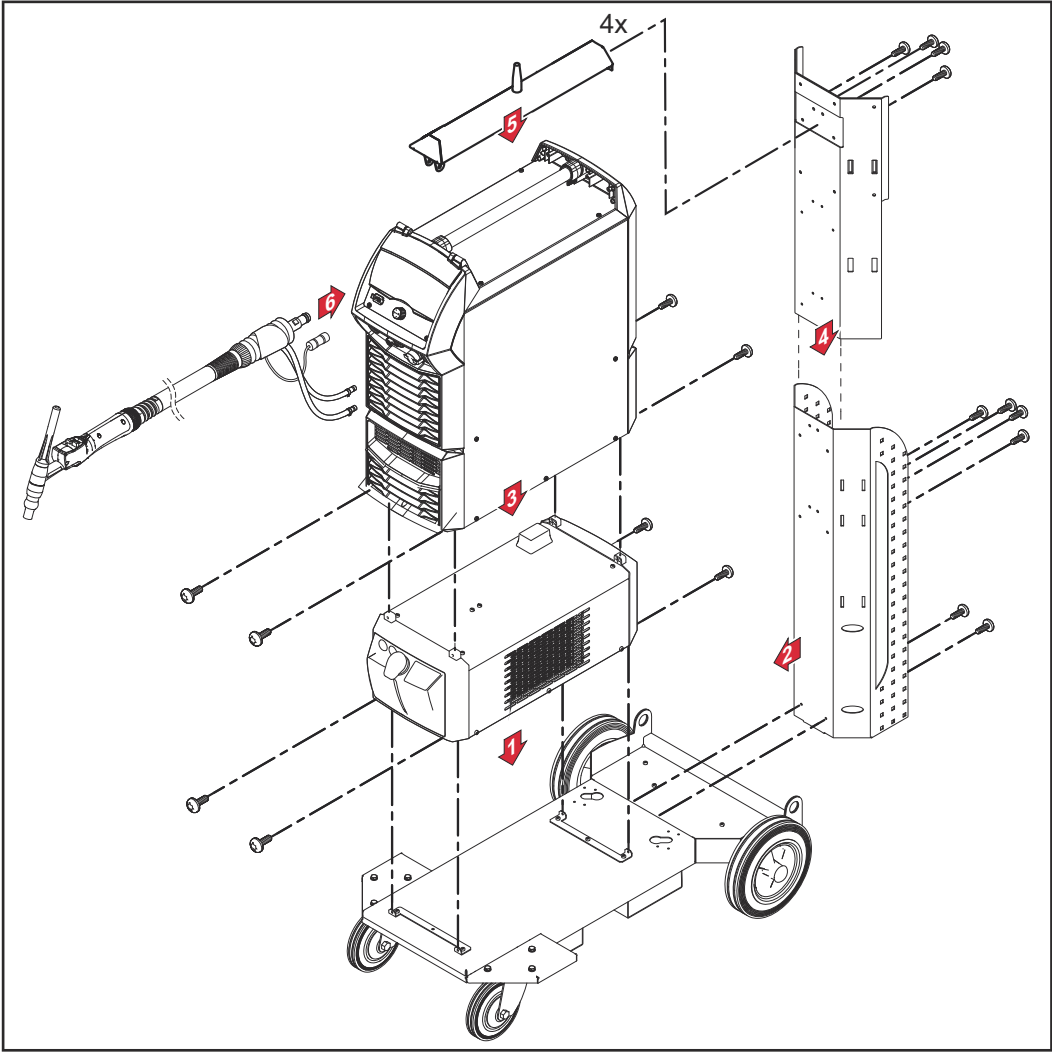
### NOTE!

For more detailed information about installing and connecting the system components, please refer to the corresponding Operating Instructions for the system components.

### iWave DC power sources



iWave AC/DC power sources



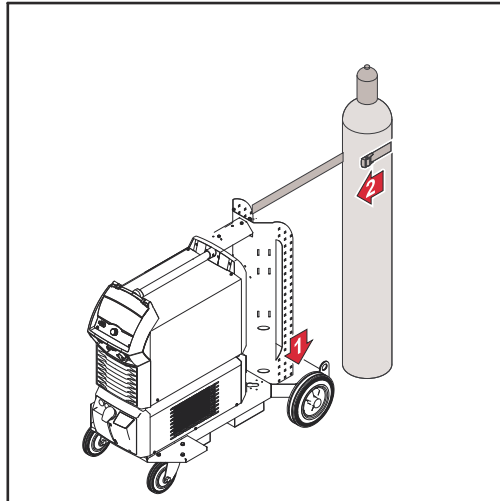
## Connecting the gas cylinder

### **WARNING!**

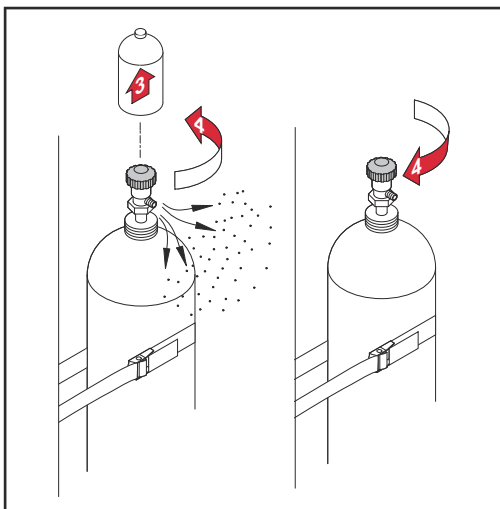
#### **Danger from falling gas cylinders.**

This can result in severe personal injury and damage to property.

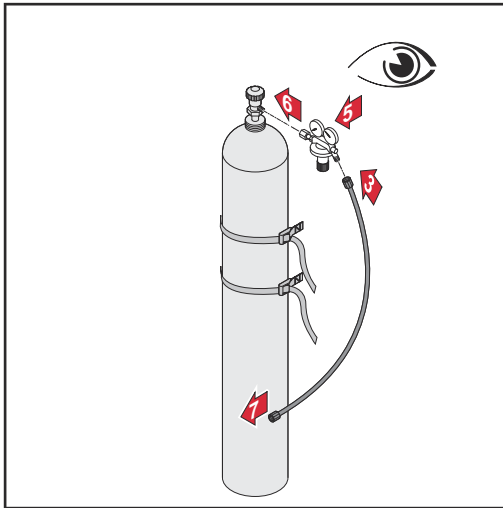
- ▶ Place gas cylinders on a solid, level surface so that they remain stable.
- ▶ Secure the gas cylinders to prevent them from falling over: Secure the safety strap at the height of the upper part of a gas cylinder.
- ▶ Never secure the safety strap to the neck of the cylinder.
- ▶ Observe the safety rules of the gas cylinder manufacturer.



- 1** Place the gas cylinder on the base of the trolley
- 2** Attach the cylinder strap to the upper part of the gas cylinder (but not to the neck of the cylinder) to prevent the cylinder from falling over



- 3** Remove the protective cap from the gas cylinder
- 4** Briefly open the gas cylinder valve to remove any dirt



- 5 Inspect the seal on the gas pressure regulator
- 6 Screw the pressure regulator onto the gas cylinder and tighten it

**When using a TIG welding torch with integrated gas connection:**

- 7 Use a gas hose to connect the gas pressure regulator and shielding gas connection to the rear of the power source
- 8 Tighten the union nut of the gas hose

**When using a TIG welding torch without integrated gas connection:**

- 6 Connect the gas hose of the TIG welding torch to the gas pressure regulator

**NOTE!**

The gas connection when using a MultiControl (MC) cooling unit is described in the Operating Instructions for the cooling unit.

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

**NOTE!**

Do not use pure tungsten electrodes for TIG DC power sources (color code: green).

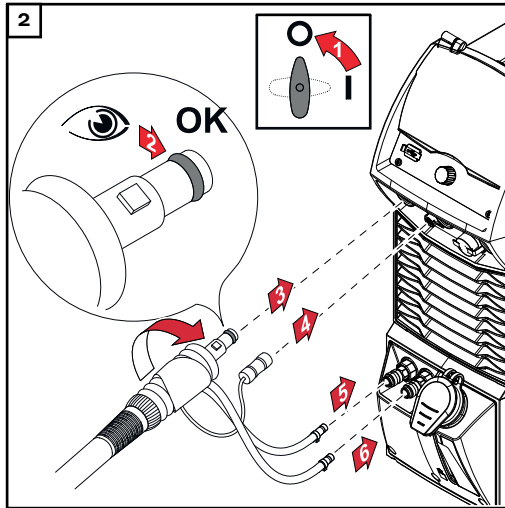
**NOTE!**

**Before every start-up:**

- Check the O-ring at the welding torch connection,
- Check the coolant level

- 1 Fit parts to the welding torch according to the Operating Instructions for the welding torch





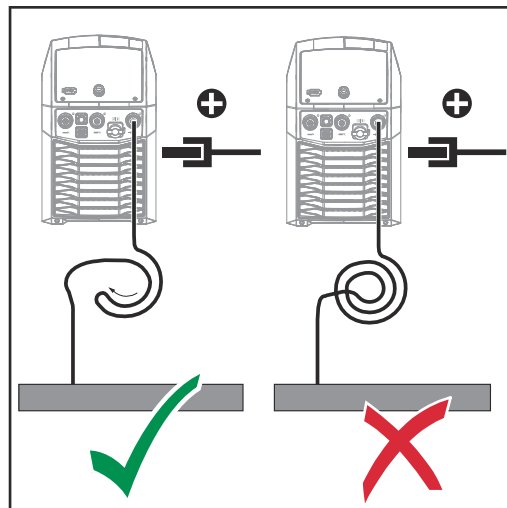
**IMPORTANT!** Check the coolant flow at regular intervals during welding.

## Establishing a ground earth connection to the workpiece

### NOTE!

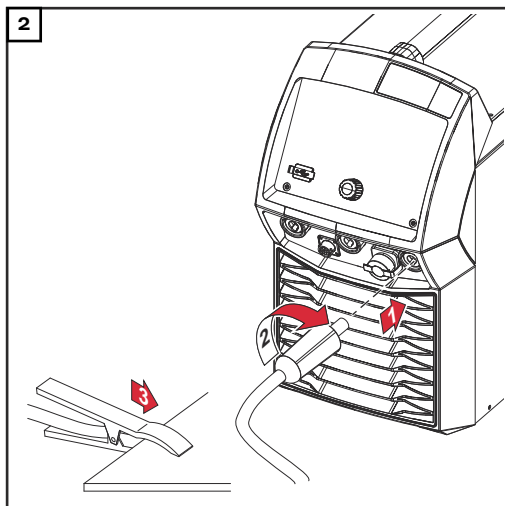
**When establishing a ground earth connection, observe the following points:**

- ▶ Use a separate return lead cable for each power source
- ▶ Keep the torch hosepack and return lead cable as close together as possible for as long as possible
- ▶ Physically separate the welding circuits of individual power sources
- ▶ Do not route several return lead cables in parallel; if parallel routing cannot be avoided, keep a minimum distance of 30 cm between the welding circuits
- ▶ Keep the return lead cables as short as possible and use cables with a large cross-section
- ▶ Do not cross over return lead cables
- ▶ Avoid ferromagnetic materials between the return lead cables and the interconnecting hosepack
- ▶ Do not reel up long return lead cables - coil effect!  
Route long return lead cables in loops



- ▶ Do not route return lead cables in iron pipes, metal cable trays, or along steel beams, avoid cable ducts; (routing positive cables and return lead cables together in an iron pipe does not cause any problems)
- ▶ If several return lead cables are being used, separate the grounding points on the component as far as possible and do not allow crossed current paths between the individual arcs.
- ▶ Use compensated interconnecting hosepacks (interconnecting hosepacks with integrated return lead cable)

**1** Set the power switch to - O -



### Other activities

#### For a TIG cold wire feeder

- 1** Set up the components required for TIG welding on the trolley (e.g., swivel pin holder, etc.)
- 2** Connect the control line to the wirefeeder
- 3** Connect the control line to the TMC socket on the front of the power source
- 4** Only if the OPT/i CWF TMC welding torch option is present on the wirefeeder:  
Connect the wirefeeder to the power source using the interconnecting hosepack
- 5** Set up cold-wire feed on TIG welding torch
- 6** Connect wirefeeding hose to wirefeeder
- 7** Insert suitable feed rollers for the TIG application into the wirefeeder
- 8** Set up suitable wear parts for the TIG application on the welding torch
- 9** Insert wirepool or basket-type spool and its adapter into the wirefeeder

#### NOTE!

**For details on mounting or connecting the TIG components, refer to the Installation Instructions and Operating Instructions of the respective system components.**

- 10** Connect the power source to the grid and switch on
- 11** Feed in the welding wire
- 12** Set the contact pressure
- 13** Adjust the brake
- 14** Perform R/L adjustment  
For details, see from page [108](#).

# TIG Operating Modes

## Safety



### WARNING!

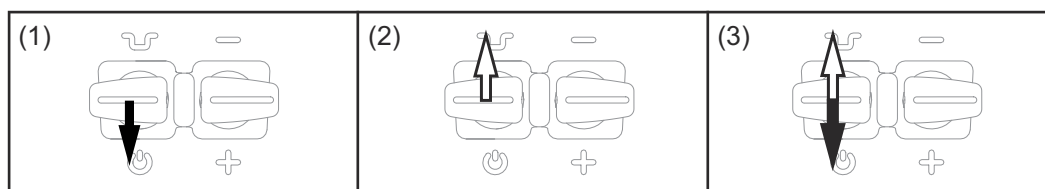
#### Danger due to incorrect operation.

This can result in severe personal injury and damage to property.

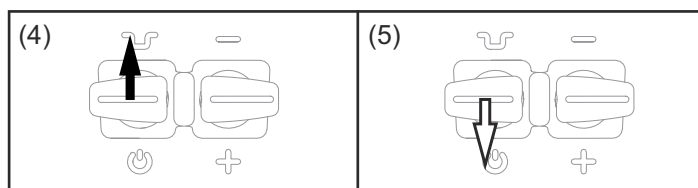
- ▶ Do not use the functions described here until you have fully read and understood the Operating Instructions.
- ▶ Do not use the functions described here until you have fully read and understood all of the Operating Instructions of the system components, especially the safety rules.

Follow the guidelines referring to setting, setting range, and units of measurement for the available parameters in the "Setup Menu" section.

## Symbols and explanations



(1) Pull back and hold the torch trigger (2) Release the torch trigger (3) Briefly pull back the torch trigger (< 0.5 s)



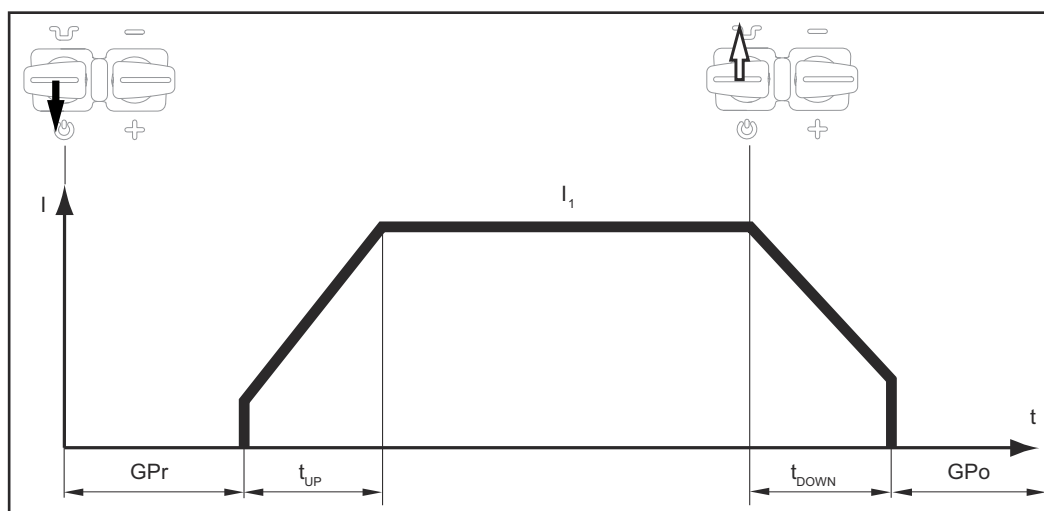
(4) Push the torch trigger forward and hold (5) Release the torch trigger

GPr	Gas pre-flow
SPT	Spot welding time
I <sub>S</sub>	Starting current: the temperature is raised gently at low welding current, so that the filler metal can be positioned correctly
I <sub>E</sub>	Final current: to avoid local overheating of the parent material caused by heat accumulation at the end of welding. This prevents possible sagging of the weld seam.
t <sub>UP</sub>	UpSlope: steady rise of the starting current to the main current (welding current) I <sub>1</sub>
t <sub>DOWN</sub>	DownSlope: steady lowering of the welding current until it reaches the final current
I <sub>1</sub>	Main current (welding current): uniform thermal input into the parent material, whose temperature is raised by the advancing heat

$I_2$	Lowering current: intermediate lowering of the welding current to avoid local overheating of the parent material
GPO	Gas post-flow

### 2-step mode

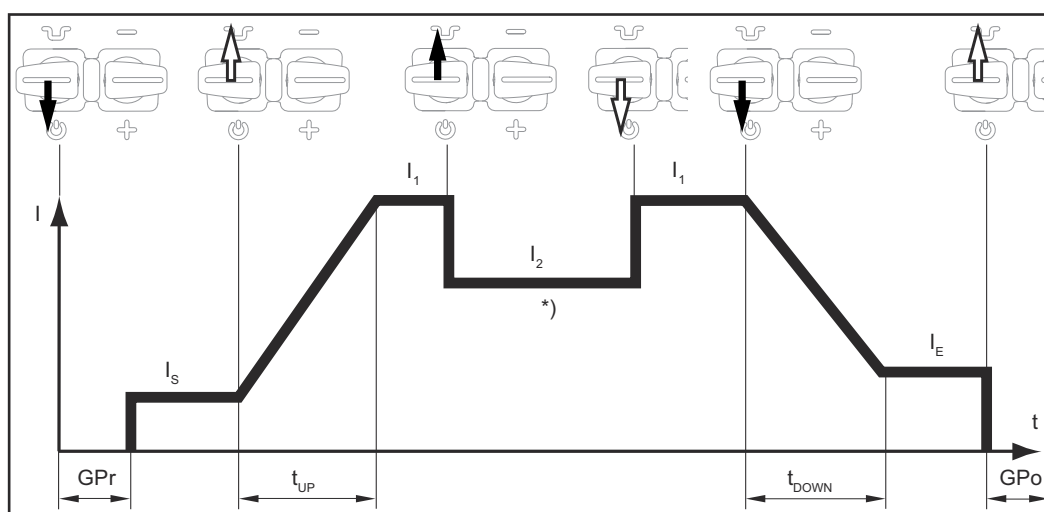
- Welding: Pull back the torch trigger and hold it in this position
- End of welding: Release the torch trigger



2-step mode

### 4-step mode

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



4-step mode

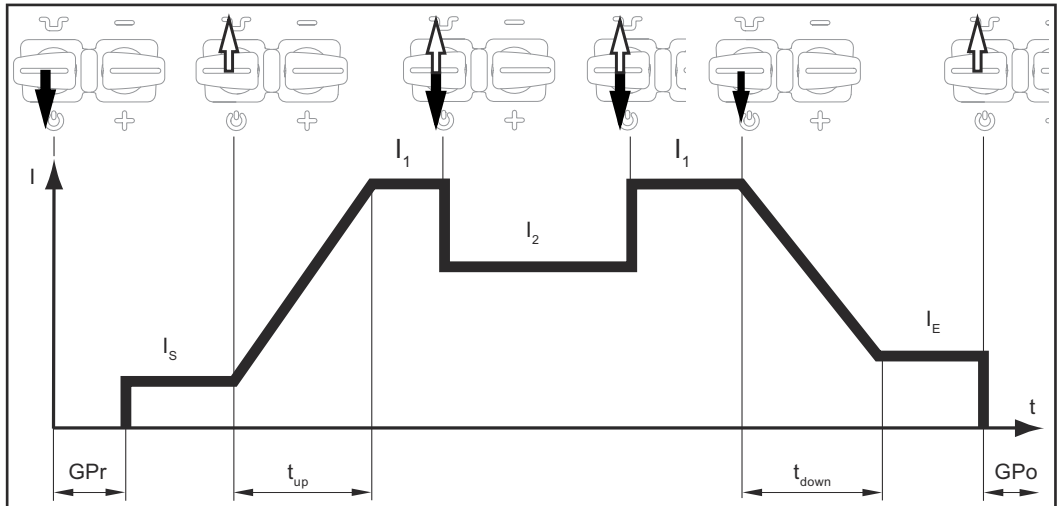
\*) Intermediate lowering

With intermediate lowering, the welding current is lowered to the set lowering current  $I_2$  during the main current phase.

- To activate intermediate lowering, push the torch trigger forward and hold it in this position
- Release the torch trigger to resume the main current

**Special 4-step mode:  
Version 1**

Intermediate lowering to the set lowering current  $I_2$  is effected by briefly pulling back the torch trigger. Briefly pull back the torch trigger again to return to the main current  $I_1$ .



*Special 4-step mode: Version 1*

Version 1 of special 4-step mode is activated by the following parameter setting:

Process parameters / General / 2-step settings

- Starting current time = off
- Final current time = off

Process parameters / General / 4-step settings

- Lowering current slope 1 = off
- Lowering current slope 2 = off

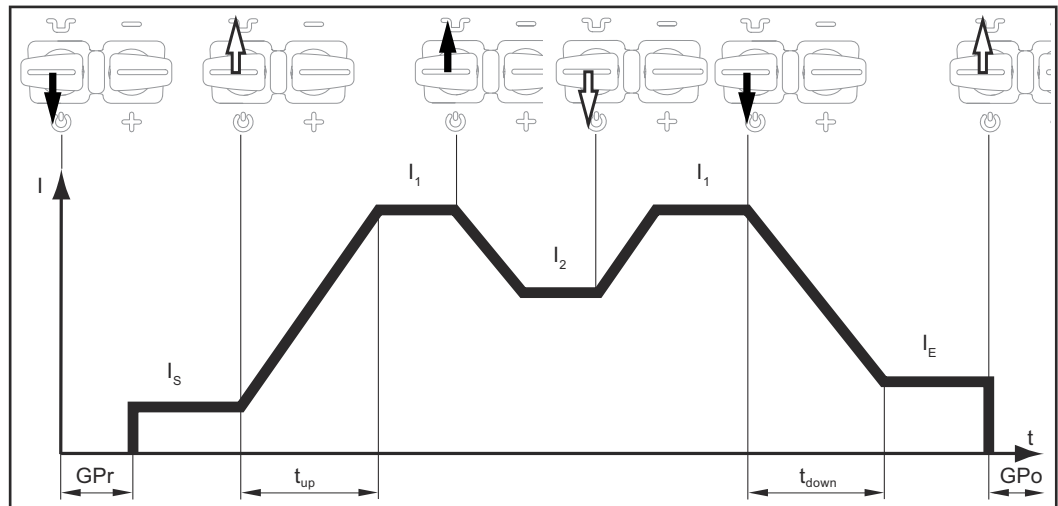
Process parameters / Ignition & operating mode / Operating mode settings

- $I_2$  via torch trigger = on
- Lowering current button function =  $I_2$

**Special 4-step  
mode:  
Version 2**

In version 2, intermediate lowering is also carried out using the set lowering current slope 1/2 values:

- Push the torch trigger forward and hold it in this position: the welding current steadily falls using the set lowering current slope 1 to the set lowering current value  $I_2$ . The lowering current  $I_2$  continues until the torch trigger is released.
- After releasing the torch trigger: the welding current rises to the main current  $I_1$  using the set lowering current slope 2.



*Special 4-step mode: Version 2*

Version 2 of special 4-step mode is activated by the following parameter setting:

Process parameters / General / 2-step settings

- Starting current time = off
- Final current time = off

Process parameters / General / 4-step settings

- Lowering current slope 1 = on
- Lowering current slope 2 = on

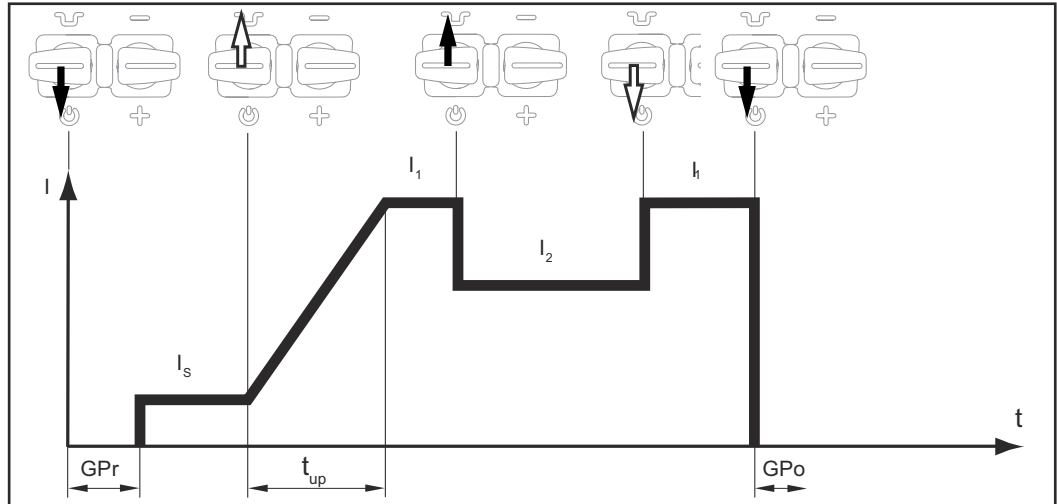
Process parameters / Ignition & operating mode / Operating mode settings

- $I_2$  via torch trigger = off
- Lowering current button function =  $I_2$

**Special 4-step  
mode:  
Version 3**

Intermediate lowering of the welding current in version 3 is triggered by pushing the torch trigger forward and holding it in this position. Following the release of the torch trigger, the main current  $I_1$  is once again available.

Pull back the torch trigger to immediately end welding without a downslope and final current.



*Special 4-step mode: Version 3*

Version 3 of special 4-step mode is activated using the following parameter setting:

Process parameters / General / 2-step settings

- Starting current time = off
- Final current time = 0.01 s

Process parameters / General / 4-step settings

- Lowering current slope 1 = off
- Lowering current slope 2 = off

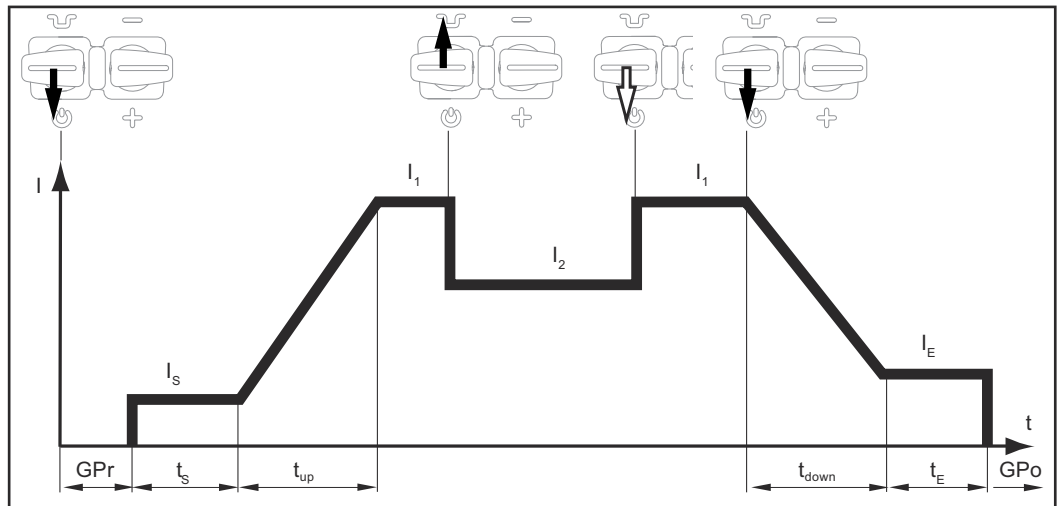
Process parameters / Ignition & operating mode / Operating mode settings

- I2 via torch trigger = off
- Lowering current button function = I2



**Special 4-step  
mode:  
Version 4**

- Start of welding and welding: Briefly pull back the torch trigger and release - the welding current rises from the starting current  $I_s$  to the main current  $I_1$  using the set UpSlope.
- Push forward the torch trigger and hold it in this position for intermediate lowering
- Following the release of the torch trigger, the main current  $I_1$  is once again available
- End of welding: Quickly pull back the torch trigger and release



Special 4-step mode: Version 4

Version 4 of special 4-step mode is activated using the following parameter setting:

Process parameters / General / 2-step settings

- Starting current time = on
- Final current time = on

Process parameters / General / 4-step settings

- Lowering current slope 1 = off
- Lowering current slope 2 = off

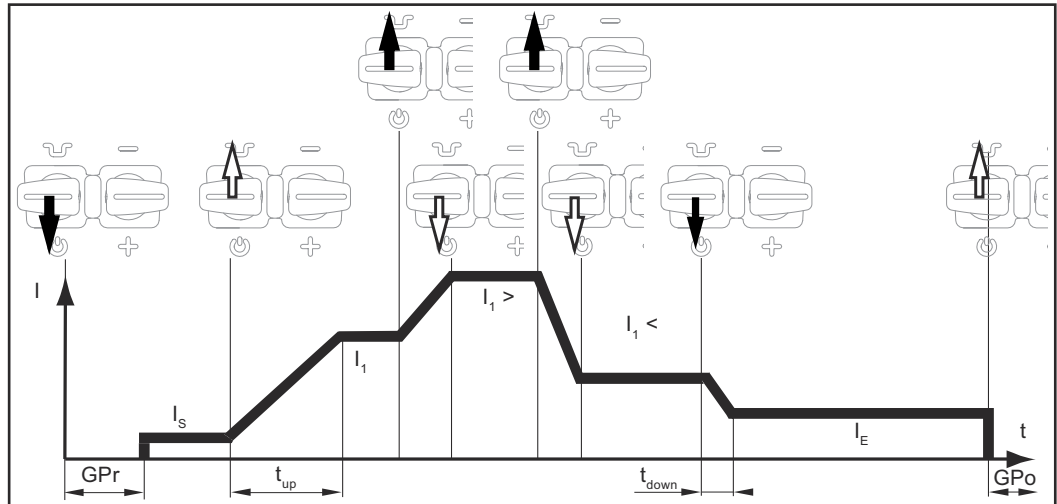
Process parameters / Ignition & operating mode / Operating mode settings

- I2 via torch trigger = off
- Lowering current button function = I2

**Special 4-step mode:**  
**Version 5**

Version 5 allows the welding current to be increased and decreased without an Up/Down torch.

- The longer the torch trigger is pressed forward during welding, the further the welding current increases (up to the maximum).
- After releasing the torch trigger, the welding current remains constant.
- The longer the torch trigger is pressed forward again, the further the welding current is reduced.



Special 4-step mode: Version 5

Version 5 of special 4-step mode is activated using the following parameter setting:

Process parameters / General / 2-step settings

- Starting current time = off
- Final current time = off

Process parameters / General / 4-step settings

- Lowering current slope 1 = off
- Lowering current slope 2 = off

Process parameters / Ignition & operating mode / Operating mode settings

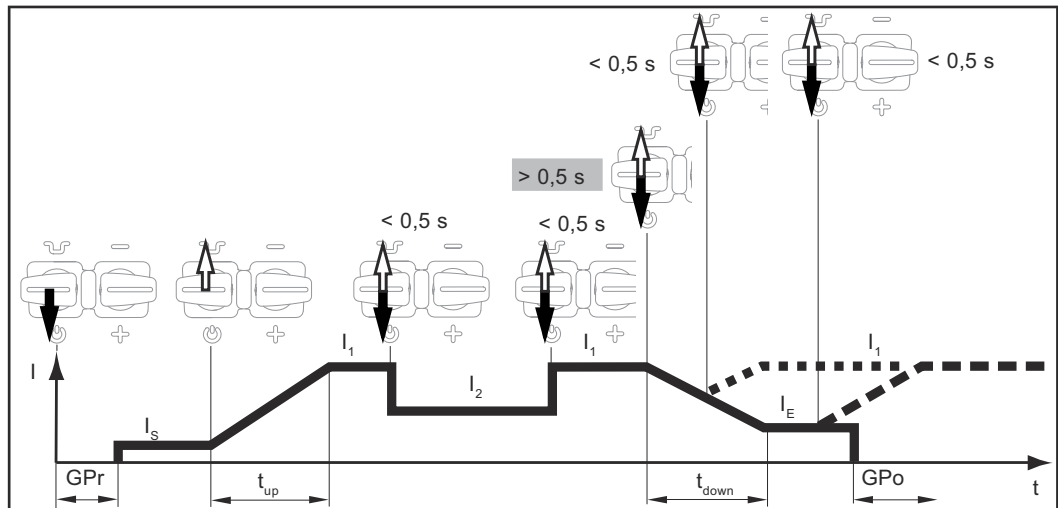
- I2 via torch trigger = off or on
- Lowering current button function = I1

**Special 4-step  
mode:  
Version 6**

- Start of welding with starting current  $I_S$  and UpSlope: Pull back the torch trigger and hold it in this position
- Intermediate lowering to  $I_2$  and change from  $I_2$  back to main current  $I_1$ : briefly press ( $< 0.5$  s) and release torch trigger
- End the welding process: long press ( $> 0.5$  s) and release the torch trigger.

The process is automatically terminated after the DownSlope phase and the final current phase.

If the torch trigger is pressed briefly ( $< 0.5$  s) and released during the DownSlope or final current phase, an UpSlope to the main current is initiated and the welding process continues.



Special 4-step mode: Version 6

Version 6 of special 4-step mode is activated by the following parameter setting:

Process parameters / General / 2-step settings

- Starting current time = off
- Final current time = on

Process parameters / General / 4-step settings

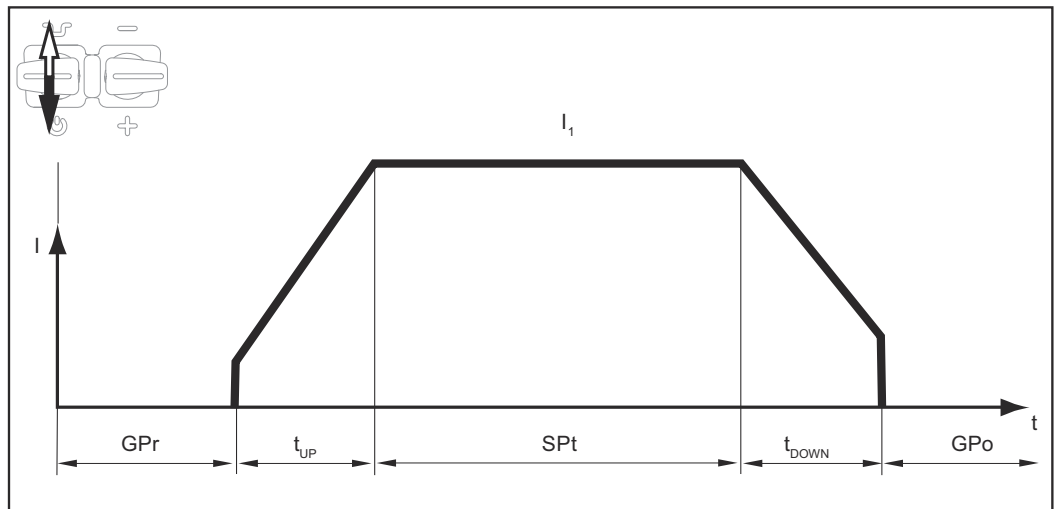
- Lowering current slope 1 = off
- Lowering current slope 2 = off

Process parameters / Ignition & operating mode / Operating mode settings

- I2 via torch trigger = on
- Lowering current button function = I2

## Spot welding

- Welding: Briefly pull back the torch trigger  
The duration of welding corresponds to the value that was entered for the "Spot welding time" setup parameter.
- Premature ending of the welding process: Pull the torch trigger back again



# TIG welding

## Safety

### **WARNING!**

#### **Danger from incorrect operation and work that is not carried out properly.**

This can result in serious personal injury and damage to property.

- ▶ All the work and functions described in this document must only be carried out by technically trained and qualified personnel.
- ▶ Read and understand this document in full.
- ▶ Read and understand all safety rules and user documentation for this equipment and all system components.

### **WARNING!**

#### **Danger from electrical current.**

This can result in serious personal injury and damage to property.

- ▶ Before starting work, switch off all the devices and components involved and disconnect them from the grid.
- ▶ Secure all devices and components involved so they cannot be switched back on.
- ▶ After opening the device, use a suitable measuring instrument to check that electrically charged components (such as capacitors) have been discharged.

## TIG welding

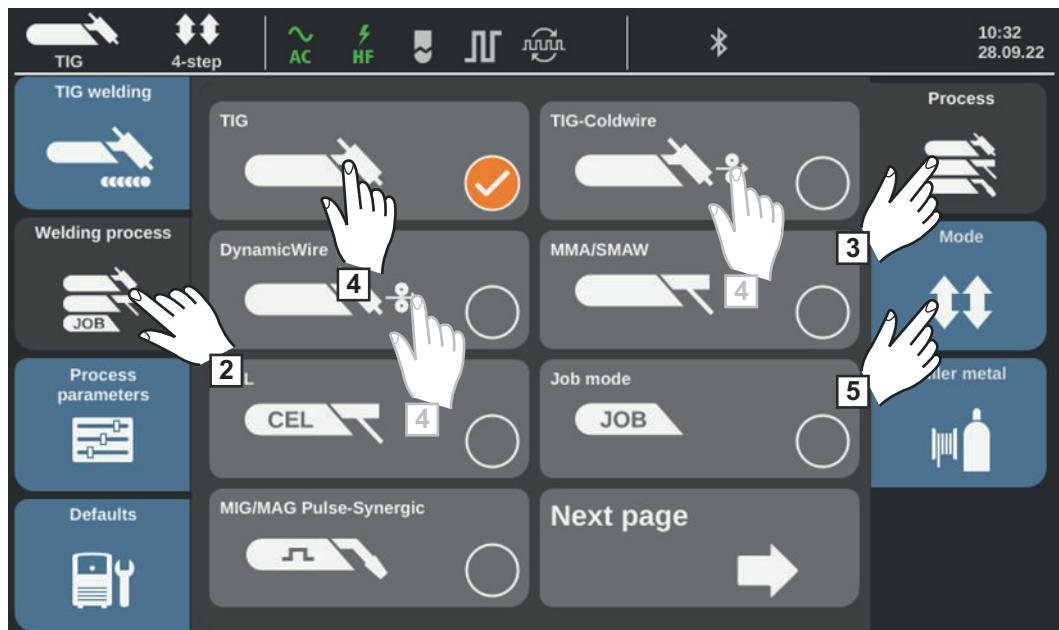
### **CAUTION!**

#### **Danger of injury and damage from electric shock.**

When the power switch is switched to position - I -, the tungsten electrode of the welding torch is live.

- ▶ Ensure that the tungsten electrode is not touching anyone or any electrically conductive or grounded parts (housing, etc.).

- 1** Set the power switch to - I -



**2** Select "Welding process"

**3** Select "Process"

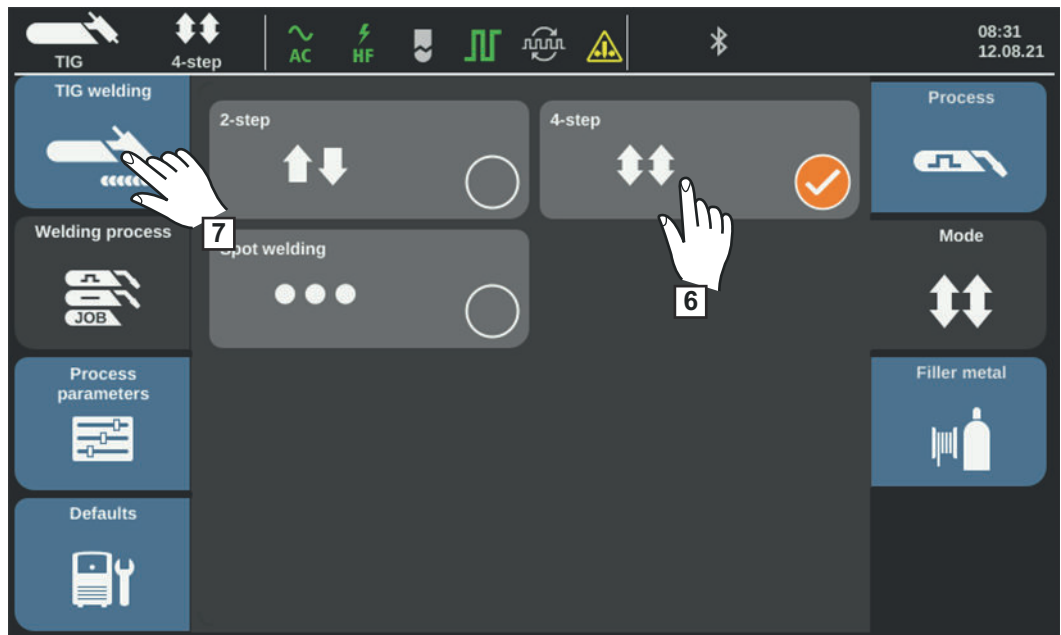
Alternatively, the welding process can also be selected via the status bar (compare with the procedure described from page 36).

An overview of available welding processes is displayed.

**4** Select "TIG" or "TIG-Coldwire" or "DynamicWire"

**5** Select "Mode"

An overview of operating modes is displayed.



**6** Select the desired operating mode

**7** Only for cold wire and DynamicWire applications:  
Select and set the "Filler metal"

**8** Select "TIG welding"

Alternatively, the operating mode can also be selected via the status bar (compare with the procedure described from page 36).

The TIG welding parameters are displayed.

**9** Turn the selection dial (or touch the welding parameters symbol in the indicator bar): select welding parameter

**10** Press the selection dial

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

**11** Turn the selection dial: change the value of the parameter

**12** If necessary, set the process parameters for user- or application-specific settings on the welding system

**13** Open the gas cylinder valve

- 14 Press the gas-test button



The gas pre-flow test lasts for 30 seconds at the most. Press again to end the process prematurely.

The "Gas purging" dialog box appears on the display, indicating the remaining gas purging duration.

If there is a gas regulator or gas sensor in the welding system, the actual gas value is also displayed.

- 15 Turn the adjusting screw on the bottom of the gas pressure regulator until the manometer displays the desired quantity of gas
- 16 Commence the welding process (ignite arc)

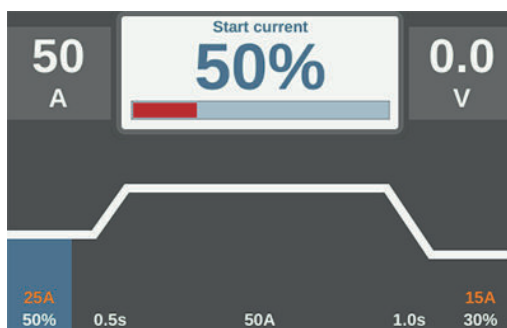
#### NOTE!

**Under certain circumstances, it may not be possible to change the set welding parameters of a system component - such as wirefeeder or remote control - on the control panel of the power source.**

#### Welding parameters for TIG welding

- AC Welding parameters for TIG AC welding
- DC- Welding parameters for TIG DC- welding

#### Start current (AC / DC-)



Start current: 2-step mode / 4-step mode

Setting range: 0 - 200% (of the main current)

Factory setting: 50 %

**IMPORTANT!** The start current is stored separately for TIG AC welding and TIG DC- welding.

### Up-Slope (AC / DC-)



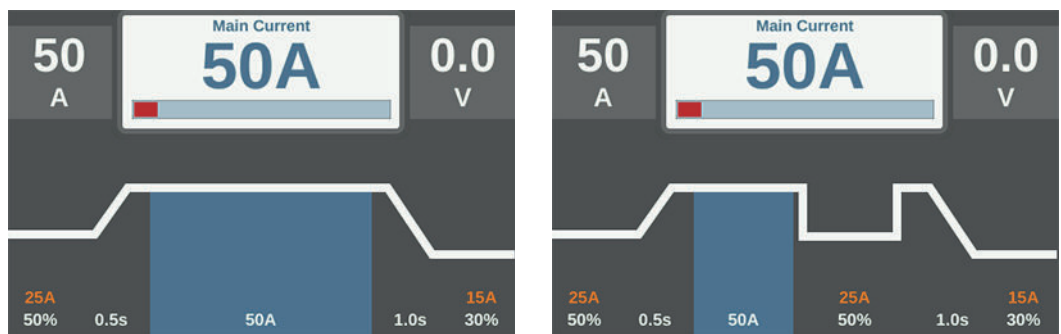
Up-Slope: 2-step mode and spot welding / 4-step mode

Setting range: off; 0.1 - 30.0 s

Factory setting: 0.5 s

**IMPORTANT!** The stored UpSlope value applies to the 2-step and 4-step modes.

### Main Current $I_1$ (AC / DC-)



Main current: 2-step mode and spot welding / 4-step mode

Setting range:

iWave 300i DC, iWave 300i AC/DC: 3 - 300 A

iWave 400i DC, iWave 400i AC/DC: 3 - 400 A

iWave 500i DC, iWave 500i AC/DC: 3 - 500 A

Factory setting: -

**IMPORTANT!** For welding torches with Up/Down Function, the full setting range can be selected while the device is on standby.

### Drop current $I_2$ (AC / DC-)

only in 4-step mode



Drop current  $I_2 < \text{Main current } I_1$  / Drop current  $I_2 > \text{Main current } I_1$

Setting range: 0 - 250 % (of the main current  $I_1$ )

Factory setting: 50 %

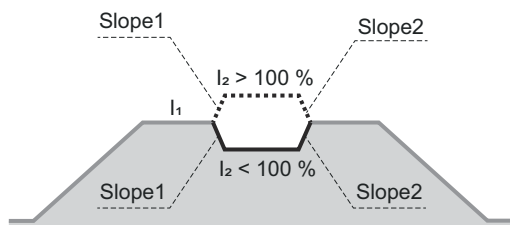


$I_2 < 100\%$

Brief, adapted reduction of the welding current  
(e.g., when changing the welding wire during the welding process)

$I_2 > 100\%$

Brief, adapted increase in the welding current  
(e.g., for welding over tacking points with a higher power level)



The values for Slope1 and Slope2 can be set in the process parameters.

### Down-Slope (AC / DC-)



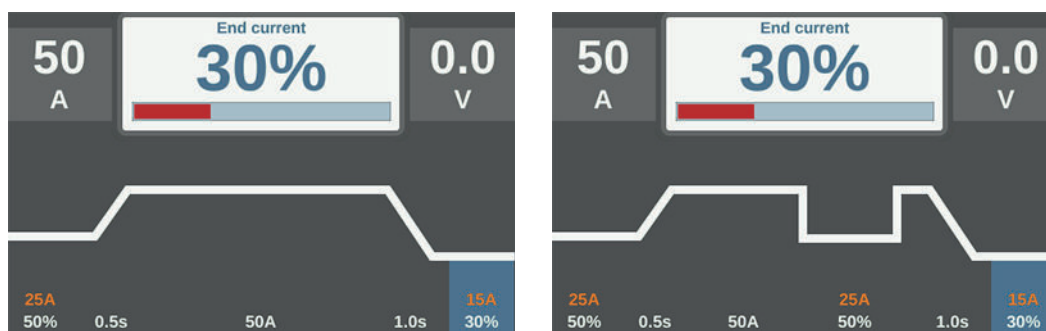
Down-Slope: 2-step mode and spot welding / 4-step mode

Setting range: off; 0.1 - 30.0 s

Factory setting: 1.0 s

**IMPORTANT!** The stored Down-Slope value applies to the 2-step and 4-step modes.

### End current (AC / DC-)



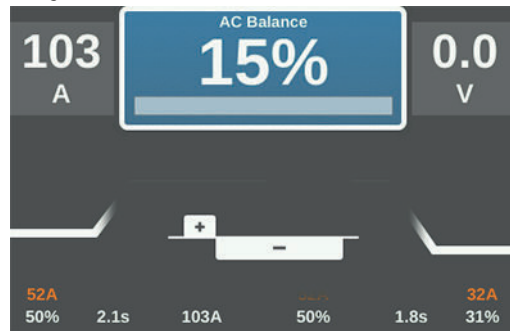
End current: 2-step mode and spot welding / 4-step mode

Setting range: 0 - 100 % (of the main current)

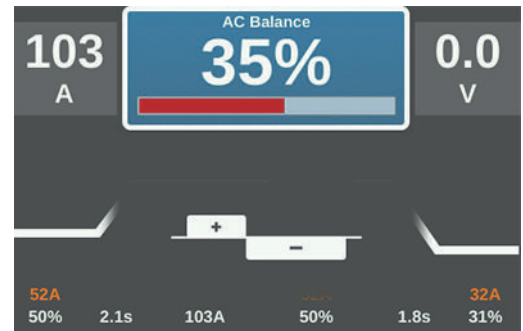
Factory setting: 30 %

## AC Balance (AC)

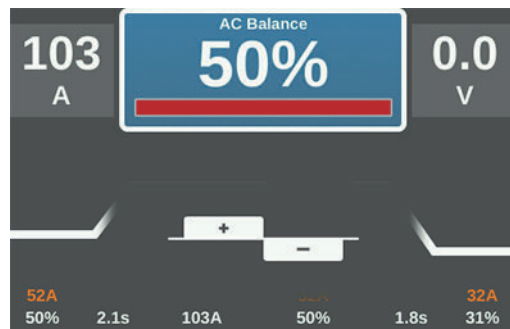
only with iWave AC/DC



Balance = 15%



Balance = 35 %



Balance = 50 %

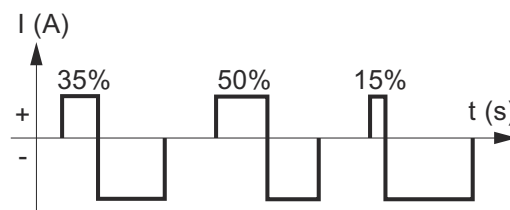
Setting range: 15 - 50 %

Factory setting: 35 %

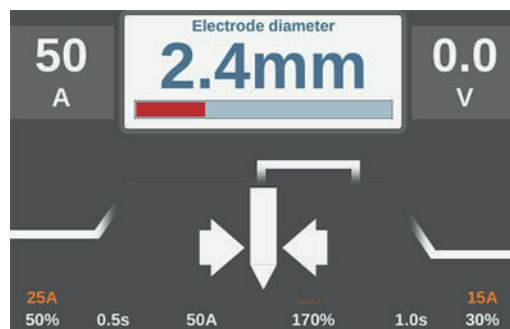
15: Highest melting capacity, lowest cleaning effect

50: Highest cleaning effect, lowest melting capacity

Effect of balance on current flow:



## Electrode diameter (AC / DC-)



DC-



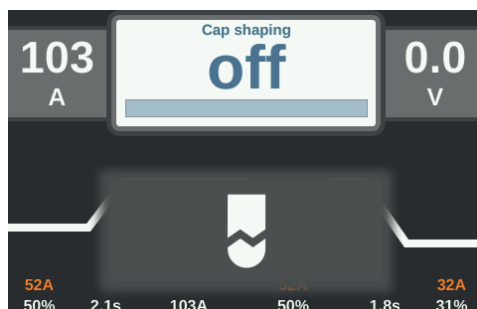
AC

Setting range: off; 1.0 - 6.4 mm

Factory setting: 2.4 mm

## Cap shaping (AC)

only with iWave AC/DC



Setting range: off / on

Factory setting: off

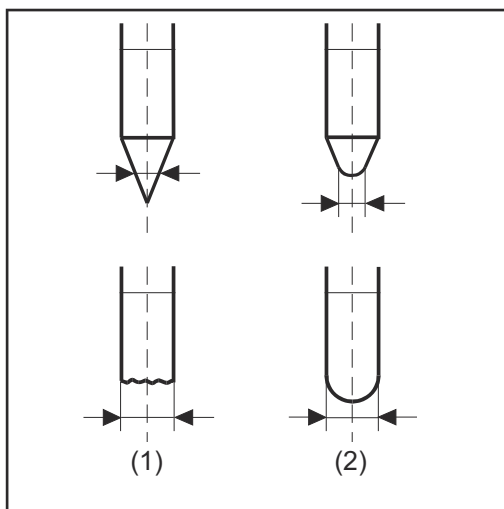
off

Automatic cap-shaping function is deactivated

on

The optimum cap for the entered diameter of the tungsten electrode is shaped during the start of welding.

The automatic cap-shaping function is then reset and deactivated.



(1) ... before ignition

(2) ... after ignition

Cap shaping must be activated separately for each tungsten electrode.

### NOTE!

**The automatic cap-shaping function is not required if a sufficiently large cap is formed on the tungsten electrode.**

## Polarity (AC)

only with iWave AC/DC



### WARNING!

**Danger due to applied welding potential with MultiProzess-PRO power sources and with existing dual-head wirefeeder WF 25i Dual!**

This can result in serious personal injury and damage to property.

- Disconnect the dual-head wirefeeder from the welding system before setting the polarity to AC!



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

*Polarity*

#### **NOTE!**

**To add more parameters to the welding parameters, go to Defaults / View / Parameter view setup.**

► More information can be found from page [234](#) onwards.

# Igniting the arc

## General

In order to ensure an optimal ignition sequence during TIG AC welding, the TIG AC/DC power sources take into account:

- The diameter of the tungsten electrode
- The current temperature of the tungsten electrode, taking into account the previous welding time and break

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



### CAUTION!

#### Risk of injury due to an electric shock

Although Fronius devices comply with all the relevant standards, high-frequency ignition can transmit a harmless but noticeable electric shock under certain circumstances.

- ▶ Use prescribed protective clothing, especially gloves!
- ▶ Only use suitable, completely intact and undamaged TIG hosepacks!
- ▶ Do not work in damp or wet environments!
- ▶ Take special care when working on scaffolding, work platforms, in tight, difficult to access or exposed places, or when welding out-of-position!

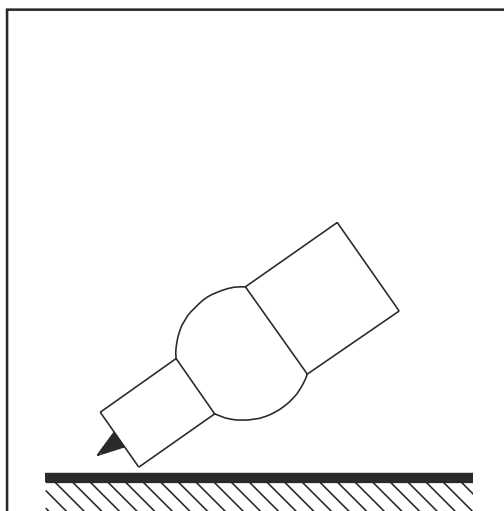
HF ignition is activated when the "HF ignition" setup parameter is set to "on" under process parameters/ignition parameters.

The HF ignition indicator lights up on the status bar.

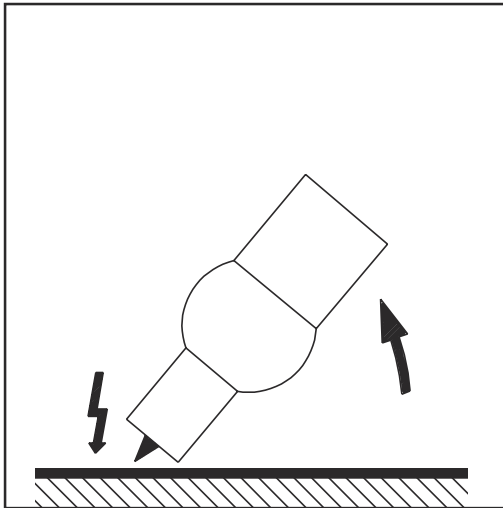


Unlike contact ignition, there is no risk of contaminating the tungsten electrode and workpiece during HF ignition.

Procedure for HF ignition:

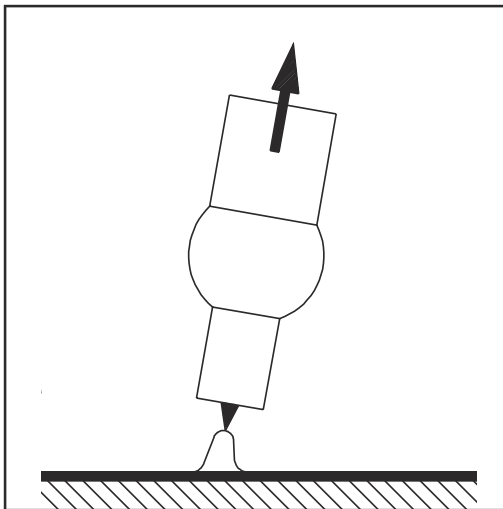


- 1 Position the gas nozzle at the ignition point so that there is a gap of approximately 2 to 3 mm (5/64 - 1/8 in.) between the tungsten electrode and the workpiece. A gap exists.



- 2 Increase the tilt angle of the welding torch and press the torch trigger according to the selected operating mode

The arc ignites without coming into contact with the workpiece.

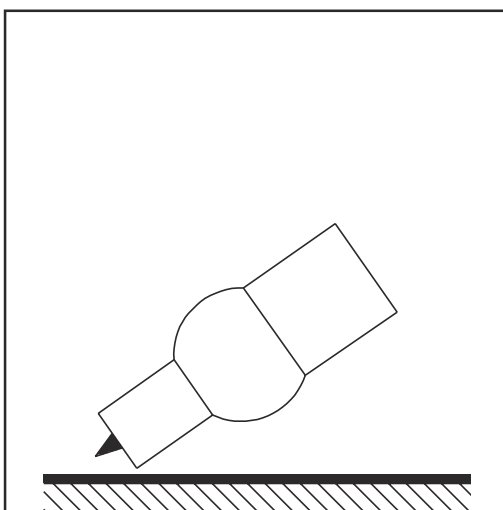


- 3 Tilt the welding torch to the normal position
- 4 Carry out welding

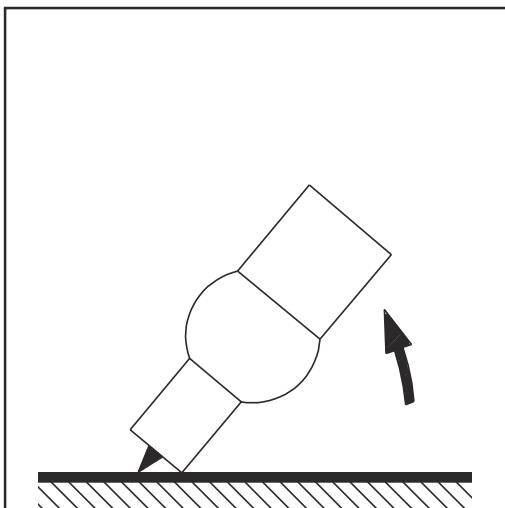
### Contact ignition

When the "HF ignition" setup parameter is set to "off", HF ignition is deactivated. The arc ignites when the workpiece makes contact with the tungsten electrode.

Procedure for igniting the arc using contact ignition:



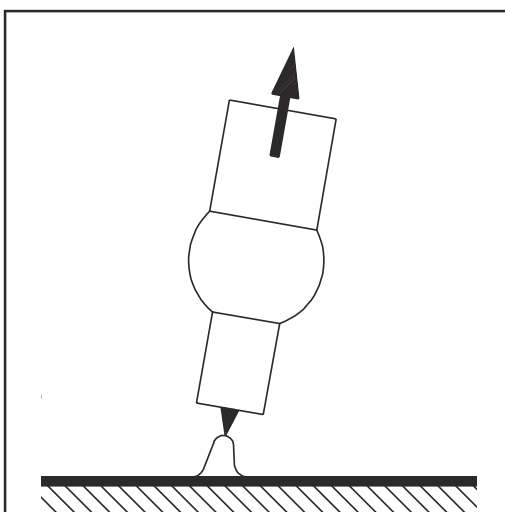
- 1 Position the gas nozzle at the ignition point so that there is a gap of approximately 2 to 3 mm (5/64 to 1/8 in.) between the tungsten electrode and the workpiece. A gap exists



**2** Press 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

### Igniting the arc using high-frequency contact (Touch-HF)



#### CAUTION!

#### Risk of injury due to an electric shock

Although Fronius devices comply with all relevant standards, the high-frequency ignition can transmit a harmless but noticeable electric shock under certain circumstances.

- Use prescribed protective clothing, especially gloves!
- Only use suitable, completely intact and undamaged TIG hosepacks!
- Do not work in damp or wet environments!
- Take special care when working on scaffolds, work platforms, in forced positions, in tight, difficult to access or exposed places!

The welding process is initiated by briefly touching the workpiece with the tungsten electrode. The high-frequency ignition is performed after the set HF ignition delay time has elapsed.

---

### Electrode over-load

If the tungsten electrode is overloaded, this can result in material detachment on the electrode, which can cause contamination to enter the weld pool.



If the tungsten electrode is overloaded, the "Electrode overloaded" indicator lights up on the status bar of the control panel. The "Electrode overloaded" indicator depends on the set electrode diameter and the set welding current.

---

### End of welding

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



# TIG special functions

## Ignition timeout function

The power source has an ignition timeout function.

If the torch trigger is pressed, gas pre-flow begins immediately and the ignition procedure is then initiated. If no arc forms during one of the time periods specified under the ignition parameters, the power source automatically switches off.

The setting of the "Ignition timeout" parameter is described in the Process parameters/ignition and operating mode settings section starting on page [101](#).

## TIG pulsing

The welding current set at the start of welding may not always be ideal for the entire welding process:

- If the amperage is too low, the parent material will not be sufficiently melted,
- If overheating occurs, there is a danger that the liquid weld pool may drip.

The TIG pulsing function is able to help with this (TIG welding with a pulsing welding current):

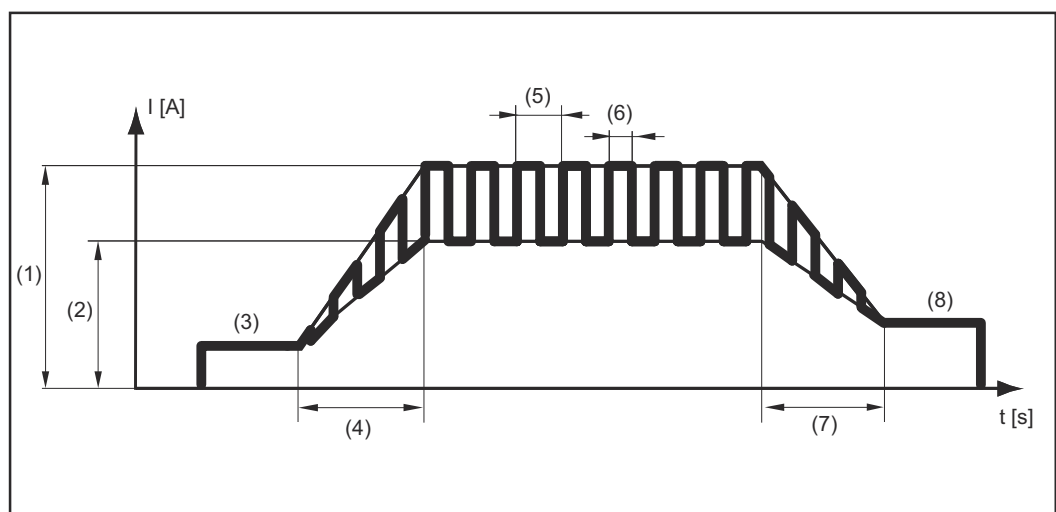
A low base current (2) rises steeply to a significantly higher pulse current and falls again in line with the set duty cycle (5) to the base current (2).

During TIG pulsing, small sections of the welding area are quickly melted and then allowed to quickly solidify again.

During manual applications, the welding wire is applied in the maximum current phase during TIG pulsing (only possible in the low-frequency range from 0.25 - 5 Hz). Higher pulse frequencies are mostly used in automated applications and mainly serve to stabilize the arc.

TIG pulsing is used to weld steel pipes when welding out-of-position or to weld thin sheet metal.

TIG pulsing in operation with TIG DC welding selected:



TIG pulsing - welding current curve

Key:

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

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

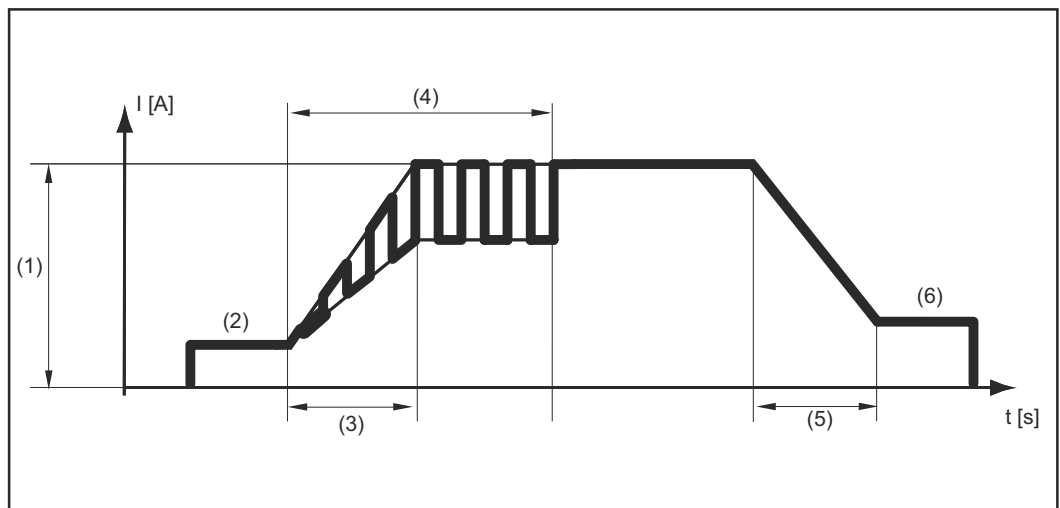
**Tacking function** The tacking function is used for the TIG DC welding process.

Whenever a period of time is set for the "Tacking" (4) parameter under process parameters/TIG DC settings, the tacking function is assigned to the 2-step and 4-step modes. The sequence of operating modes remains unchanged. The Tacking (TAC) indicator lights up on the status bar:



During this time, a pulsed welding current is available, which optimizes the merging of the weld pool when tacking two components.

How the tacking function works during TIG DC welding:



Tacking function - welding current curve

Key:

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

#### NOTE!

##### When using a pulsed welding current:

The power source automatically controls the pulse parameters according to the set main current (1).

No pulse parameters need to be set.

The pulsed welding current starts

- After the starting-current phase (2) has finished
- With the UpSlope phase (3)

Depending on the set tacking duration, the pulsed welding current can be stopped up to and including the final current phase (6) ("Tacking" (4) TIG DC parameter to "on").

After the tacking time has passed, further welding is carried out at a constant welding current. Set pulse parameters are available if applicable.

## CycleTIG

The CycleTIG interval welding process is available for TIG DC welding. The welding result is influenced and controlled by different parameter combinations.

The main advantages of CycleTIG are easy control of the weld pool, targeted heat input and fewer temper colors.

### CycleTIG variants

#### CycleTIG + low base current

- For out-of-position welding, edge build-up and orbital welding
- Well suited for thick/light-gage sheet connections
- Excellent weld characteristics
- HF ignition only at start of welding
- Long electrode service life
- Good control of the weld pool
- Targeted heat input

#### CycleTIG + RPI = on + base current = off

- For repair work (e.g., edge build-up)
- Targeted heat input
- Biggest advantage in combination with HF ignition setting = touch HF
- HF ignition at every cycle (!)
- Very short electrode service life (!)

Recommendation: iWave AC/DC with reversed polarity ignition setting = auto

#### CycleTIG + Tacking

- For tacking light gage sheets, orbital applications and for thick/light gage sheet joints
- HF ignition only at start of welding
- Long electrode service life
- Good control of the weld pool
- Targeted heat input
- Excellent seam appearance
- Tacking function generates automatic pulse setting

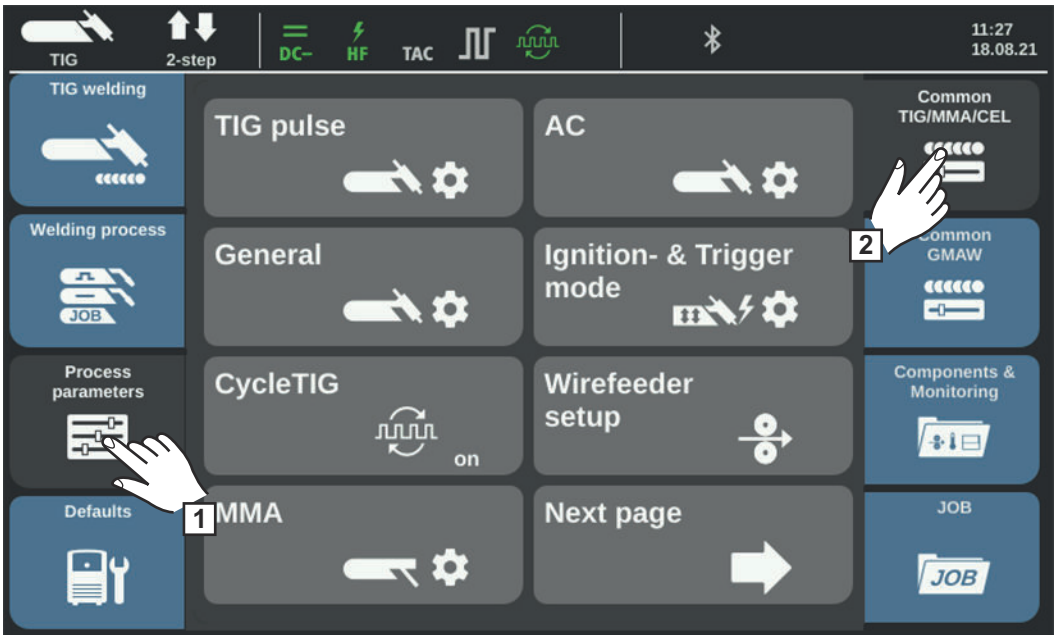
#### CycleTIG + Pulse

CycleTIG can be used individually with all pulse settings. This allows pulsing in both the high current and low current phases.

- For tacking light gage sheets and for cladding applications
- For thick/light gage sheet joints
- HF ignition only at start of welding
- Long electrode service life
- Good control of the weld pool
- Targeted heat input
- Excellent seam appearance
- Individual pulse settings possible
- More welding parameters to set

# TIG process parameters

## TIG process parameters



### TIG process parameters:

TIG pulse, AC, General, Ignition & trigger mode, CycleTIG, Wirefeeder setup, Gas, R/L-check / alignment

Process parameters for Components and Monitoring see page [212](#).

## Process parameters for TIG pulse

### Tacking

Tacking function - duration of the pulsed welding current at the start of the tacking process

off / 0.1 - 9.9 s / on  
Factory setting: off

off  
Tacking function is switched off

0.1 - 9.9 s  
The selected time begins with the UpSlope phase. After the selected time has passed, further welding is carried out at a constant welding current. The set pulse parameters are available if applicable.

on  
The pulsed welding current remains present until the end of the tacking process



The Tacking (TAC) indicator lights up in the status bar on the if a value has been set.

## Pulse frequency

off / 0.20 - 2000 Hz (10,000 Hz with OPT/I-Puls 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 selected pulse frequency is also used for the lowering current.



The Pulsing indicator lights up in the status bar if a value for the pulse frequency has been entered.

---

### Base current \*

0 - 100% (of the main current I<sub>1</sub>)

Factory setting: 50%

---

### Duty cycle \*

Relationship between pulse duration and base current duration at the set pulse frequency

10 - 90%

Factory setting: 50%

---

### Pulse waveform \*

For optimizing the arc pressure

Hard rectangle/Soft rectangle/Sine

Factory setting: Hard rectangle

Hard rectangle:

Purely rectangular curve;

Slightly louder arc noise, rapid current changes

Used, for example, in orbital welding

Soft rectangle:

Rectangular curve with reduced edge steepness, for reduced noise in comparison with the purely rectangular curve;

universal use

Sine:

Sinusoidal shape (default setting for low-noise and stable arc);

Used, for example, for corner seams and cladding applications

Optimizing the arc pressure results in:

- A better flow out of the weld pool (improved welding of butt welds or corner seams)
- A slow rise or fall in current (for fillet welds, high-alloy steels or cladding applications in particular, the filler material or weld pool is not pushed away)
- A reduction in the noise level during welding thanks to rounded waveforms

---

### Base current waveform \*

For optimizing arc pressure

Hard rectangle/Soft rectangle/Sine

Factory setting: Hard rectangle

Hard rectangle:  
Purely rectangular curve;  
Slightly louder arc noise, rapid current changes  
Used, for example, in orbital welding

Soft rectangle:  
Rectangular curve with reduced edge steepness, for reduced noise in comparison with the purely rectangular curve;  
universal use

Sine:  
Sinusoidal shape (default setting for low-noise and stable arc);  
Used, for example, for corner seams and cladding applications

---

\* The parameters are available if the OPT/I-Puls Pro option is present on the power source.

---

## Process parameters for TIG AC

---

### AC frequency

Syn/40 - 250 Hz  
Factory setting: 60 Hz

#### Syn

Setting for synchronous welding (double-side, simultaneous welding with 2 power sources)

For synchronous welding, the AC frequency must be set to "Syn" for both power sources.

Synchronous welding is used for thick materials, to achieve a high deposition rate and to minimize inclusions during welding.

**IMPORTANT!** Due to the phasing of the input voltage, in some cases the synchronization of the two power sources cannot be carried out correctly. In this case, disconnect the mains plug of the power sources, turn 180°, and reconnect to the grid.

#### Low frequency

Soft, wide arc with shallow heat input

#### High frequency

Focused arc with deep heat input

Effect of AC frequency on current flow:



---

### AC current offset

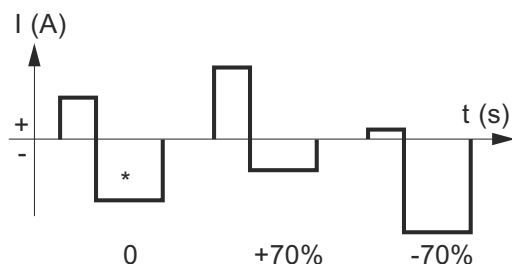
-70 to +70%  
Factory setting: 0 %

+70%  
Wide arc with shallow heat input

-70%

Narrow arc, deep heat input, higher welding speed

Effect of AC current offset on current flow:



\* Factory setting: 0 (corresponds to a 10% shift to negative)

---

### Positive half-wave waveform

Hard rectangle/Soft rectangle/Triangle/Sine

Factory setting: Sine

Hard rectangle

Purely rectangular curve (stable but loud arc)

Soft rectangle:

Rectangular curve with reduced edge steepness, for reduced noise in comparison with the purely rectangular curve

Triangle

Triangular curve

Sine

Sinusoidal curve (default setting for low-noise arc)

---

### Negative half-wave waveform

Hard rectangle/Soft rectangle/Triangle/Sine

Factory setting: Soft rectangle

Hard rectangle

Purely rectangular curve (stable but loud arc)

Soft rectangle:

Rectangular curve with reduced edge steepness, for reduced noise in comparison with the purely rectangular curve

Triangle

Triangular curve

Sine

Sinusoidal curve (default setting for low-noise and stable arc)

---

### Phase synchronization

Synchronizes two AC power sources (simultaneously on both sides)

0 - 5

Factory setting: 0

**Welding start / welding end settings**

---

**Starting current time**

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

The setting of the Starting current time parameter also influences versions 1 - 6 of special 4-step mode (see page [74](#) onwards).

off / 0.01 - 30.0 s  
Factory setting: off

**IMPORTANT!** The starting current time is only valid for 2-step mode and spot welding. In 4-step mode, the duration of the starting-current phase is determined by the torch trigger.

---

**Final current time**

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

The setting of the Final current time parameter also influences versions 1 - 6 of special 4-step mode (see page [74](#) onwards).

off / 0.01 - 30 s  
Factory setting: off

**IMPORTANT!** The final current time is only valid for 2-step mode and spot welding. In 4-step mode, the duration of the final current phase is determined by the torch trigger (section "TIG operating modes").

---

**4-mode settings**

---

**Lowering current Slope 1**

The setting of the Lowering current slope 1 parameter also influences versions 1 - 6 of special 4-step mode (see page [74](#) onwards).

off / 0.01 - 30 s  
Factory setting: off

If a time value has been entered for the Lowering current Slope 1 parameter, the brief current reduction or current increase is not abrupt, but slow and adapted. This reduces negative influences on the weld and part, especially with aluminum applications.

---

**Lowering current Slope 2**

The setting of the Lowering current slope 2 parameter also influences versions 1 - 6 of special 4-step mode (see page [74](#) onwards).

off / 0.01 - 30 s  
Factory setting: off

If a time value has been entered for the Lowering current Slope 2 parameter, the adaptation from the lowering current to the welding current is not abrupt, but slow and adapted.



In the case of a current increase, for example, the weld pool is heated slowly and not abruptly. This facilitates outgassing of the weld pool and reduces pores during aluminum welding.

## Spot welding settings

### Spot welding time

(only if the mode is set to spot welding)

0.02 - 120 s

Factory setting: 5.0 s

## Process parameters for ignition and operating mode

### Ignition parameters

#### HF ignition

on/off/Touch-HF/external

Factory setting: on

on

High-frequency ignition at the start of welding is activated

off

No high-frequency ignition at the start of welding.

In this case, welding is started by means of contact ignition.

Touch-HF

The welding process is initiated by briefly touching the workpiece with the tungsten electrode. The high-frequency ignition is performed after the set HF ignition delay time has elapsed.

External

Start with an external ignition device, e.g., plasma welding



The HF ignition indicator lights up in the status bar if HF ignition has been set to on.



### CAUTION!

#### Risk of injury due to an electric shock

Although Fronius devices comply with all the relevant standards, high-frequency ignition can transmit a harmless but noticeable electric shock under certain circumstances.

- ▶ Use prescribed protective clothing, especially gloves!
- ▶ Only use suitable, completely intact, and undamaged TIG hosepacks!
- ▶ Do not work in damp or wet environments!
- ▶ Take special care when working on scaffolding, work platforms, in tight, difficult to access or exposed places, or when welding out-of-position!

### **HF ignition delay time**

Time after touching the workpiece with the tungsten electrode after which high-frequency ignition takes place.

0.1 - 5.0 s

Factory setting: 1.0 s

---

### **Reversed polarity ignition**

(only with iWave AC/DC power sources)

To ensure an optimum ignition sequence during TIG DC welding, the polarity is reversed briefly at the start of the welding process. Electrons emerge from the workpiece and hit the tungsten electrode. This results in rapid heating of the tungsten electrode - an essential prerequisite for optimum ignition properties.

off/on/auto

Factory setting: off

Reversed polarity ignition is recommended for welding light-gauge sheets.

---

### **Arc monitoring**

---

#### **Ignition timeout**

Period of time until the safety cut-out following failed ignition.

0.1 - 9.9 s

Factory setting: 5 s

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

---

#### **Arc break filter time**

Period of time until the safety cut-out following an arc break

If no current flows during the set period of time following an arc break, the power source automatically switches off.

Press any button on the control panel or the torch trigger to restart the welding process.

0.00 - 2.00 s

Factory setting: 0.20 s

---

#### **Arc break watchdog**

Reaction if no current flows within the arc break time

ignore/error

Factory setting: ignore

ignore

The interruption is ignored.

error

An error message is displayed on the power source and must be acknowledged.

---

### **Operating mode settings**

---

**Torch trigger**

Start welding by pressing the torch trigger

on/off

Factory setting: on

on

Welding is started using the torch trigger

on

Welding is started by touching the workpiece with the tungsten electrode; especially suitable for welding torches without torch triggers, ignition sequence depends on ignition parameters

The symbol for the deactivated torch trigger is shown in the status bar of the display, the option of selecting the operating mode is deactivated.

**I2 using torch trigger**

to activate/deactivate whether it is possible to switch over to the drop current  $I_2$  using the torch trigger

The setting of the I2 using torch trigger parameter also influences versions 1 - 6 of special 4-step mode (see page 74 onwards).

on / off

Factory setting: off

**Drop current button function**

The setting of the drop current button function parameter also influences versions 1 - 6 of special 4-step mode (see page 74 onwards).

I1 / I2

Factory setting: I2

**Arc break voltage**

To set a voltage value at which the welding process can be ended by lifting the TIG welding torch slightly.

The higher the break voltage value, the higher the arc can be lifted.

The arc break voltage values for 2-step mode, 4-step mode and operation with a foot-operated remote control are all stored together.

If the "Torch trigger" parameter is set to "off", the values are stored separately.

off / 6.0 - 90.0 V

Factory setting: off

**Comfort stop sensitivity**

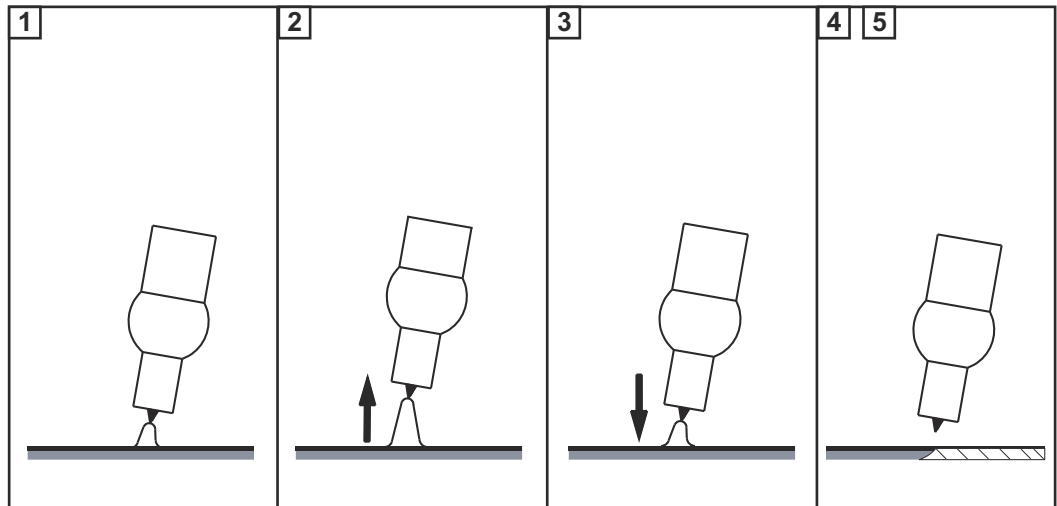
The parameter is only available if the "Torch trigger" parameter is set to "off".

off / 0.1 - 10.0 V

Factory setting: off

At the end of the welding process, an automatic shutdown of the welding current follows a significant increase of the arc length. This prevents the arc from having to be unnecessarily lengthened when lifting the TIG welding torch.

Process:



- 1** Welding
- 2** Briefly lift the welding torch at the end of welding

The arc lengthens significantly.

- 3** Lower the welding torch
  - The arc shortens significantly
  - The Comfort stop function has been activated

- 4** Maintain height of the welding torch
  - The welding current ramps down continuously (DownSlope).
  - The arc goes out.

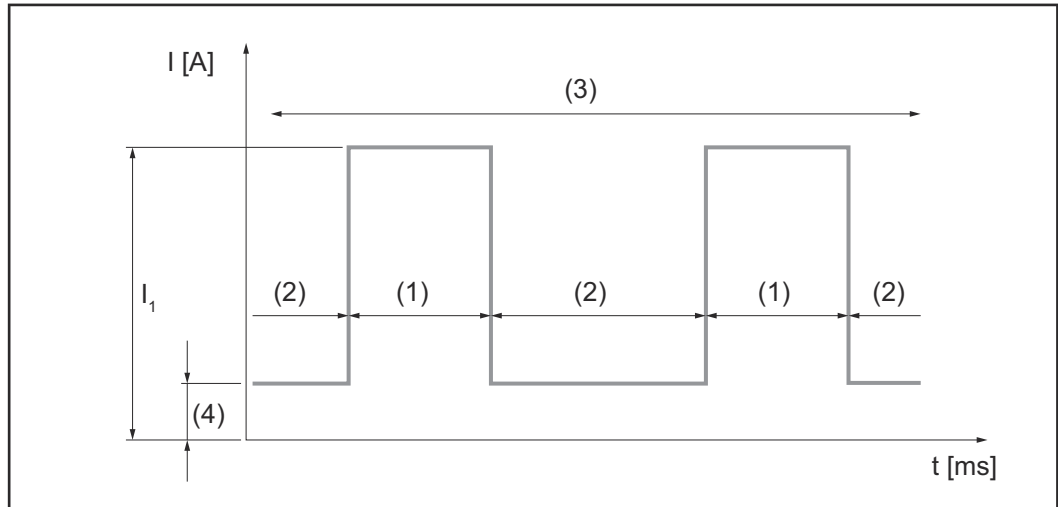
**IMPORTANT!** The DownSlope is fixed and cannot be adjusted.

- 5** Lift the welding torch from the workpiece
-

## CycleTIG

### CycleTIG

to activate / deactivate the CycleTIG function  
(extended interval welding process for DC welding)



Setting range: on / off

Factory setting: off

#### (1) Interval time

To set how long the welding current  $I_1$  is active

Setting range: 0.02 - 2.00 s

Factory setting: 0.5 s

#### (2) Interval pause time

To set how long the base current (4) is active

Setting range: 0.02 - 2.00 s

Factory setting: 0.5 s

#### (3) Interval cycles

to set how many cycles are to be repeated

Setting range: Constant / 1 - 2000

Factory setting: Constant

#### (4) base current (DC-)

To set the interval base current (4) to which the current is reduced during the interval pause time (2)

Setting range: off / 3 - max. A

Factory setting: off

### NOTE!

For more details on CycleTIG, see page 95 onwards.

---

**Wire speed setting**

---

**Wire speed correction**

For fine adjustment of the wire speed with TIG DynamicWire

The correction value indicates how quickly the welding wire re-enters the weld pool after the short circuit is broken.

-10 - +10

Factory setting: 0

-10 = slow immersion, +10 = fast immersion

---

**Wire speed 1**

Set value for wire speed

off / 0.1 - 50.0 m/min

Factory setting: 5 m/min

---

**Wire speed 2**

Wire speed 2

0 - 100% (of wire speed 1)

Factory setting: 50 %

If a value is set for each of the "Wire speed 2" and "Pulse frequency" setup parameters, the wire speed changes between wire speed 1 and wire speed 2 synchronously with the pulse frequency of the welding current.

---

**Main current**

Welding current  $I_1$

iWave 300i DC, iWave 300i AC/DC: 3 - 300 A

iWave 400i DC, iWave 400i AC/DC: 3 - 400 A

iWave 500i DC, iWave 500i AC/DC: 3 - 500 A

Factory setting: -

---

**Pulse frequency**

off / 0.20 - 5000 Hz, 5000 - 10,000 Hz

Factory setting: off

---

**Wire start-up delay**

Feed delay of welding wire from start of main current phase

off / 0.1 - 9.9 s

Factory setting: 5.0 s

---

**Wire end delay**

Feed delay of welding wire from end of main current phase

off / 0.1 - 9.9 s

Factory setting: 5.0 s

---

**Wire retraction end**

How far the welding wire is retracted after the end of welding

off / 1 - 50 mm

Factory setting: 3 mm

---

**Wire position start**

How far the welding wire is from the workpiece before welding starts

off / 1 - 50 mm  
Factory setting: 3 mm

---

### Feeder inching speed

0.5 - 100.0 m/min  
Factory setting: 5.0 m/min

---

## TIG gas settings

---

### Gas pre-flow

To set the gas flow time before the arc is ignited

0.0 - 9.9 s  
Factory setting: 0.4 s

---

### Gas post-flow

To set the gas flow time after the arc has gone out

auto / 0 - 60 s  
Factory setting: auto

auto

Depending on the electrode diameter and welding current, the power source calculates and automatically adjusts the optimal gas post-flow time.

---

### TIG gas switching

for individual gas shield selection

auto / 1 / 2  
Factory setting: auto

auto:

- The shielding gas (gas 1) is used during the starting-current phase and during the UpSlope.
- When the main current phase is reached, shielding gas (gas 2) is used.
- When the welding process is finished, the shielding gas (gas 1) is used during the DownSlope and the final current phase.

1:

Shielding gas (gas 1) is used for the entire welding process.

2:

Working gas (gas 2) is used for the entire welding process.

---

### Gas regulator 1

---

#### Gas set value 1 - TIG shielding gas

Shielding gas flow  
(only in conjunction with option OPT/i TIG gas flow sensor)

off / 0.5 - 30.0 l/min  
Factory setting: 15.0 l/min

**IMPORTANT!** If the set value for the shielding gas flow rate is high (e.g., 30 l/min), ensure that the gas line is adequately dimensioned!

---

#### Gas factor 1 - TIG shielding gas

depends on the shielding gas used  
(only in connection with the OPT/i TIG gas regulator option)

auto / 0.90 / 20.0  
Factory setting: auto

---

### Gas regulator 2

---

#### Gas set value 2 - TIG working gas

off / 0.5 - 30.0 l/min  
Factory setting: 15.0 l/min

---

#### Gas factor 2 - TIG working gas

0.90 - 20.0  
Factory setting: 11.82

---

## Conducting an R/L alignment

### NOTE!

The R/L alignment must be carried out separately for each welding process.

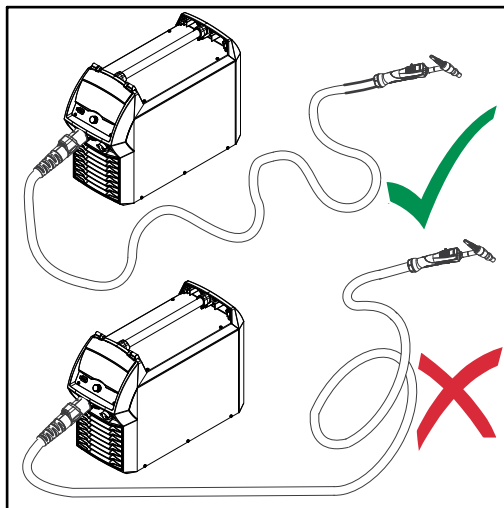
### Welding circuit resistance R [mOhm]

The welding circuit resistance is calculated to provide information about the total resistance of the torch hosepack, welding torch, workpiece and grounding cable.

If, for example, the welding circuit resistance increases after the welding torch has been changed, the following components may be faulty:

- Torch hosepack
- Welding torch
- Ground earth connection to the workpiece
- Grounding cable

### Welding circuit inductance L [ $\mu$ H]



The routing of the hosepack has a significant impact on the weld properties. A high degree of welding circuit inductance can occur, especially during pulsing and AC welding, depending on the length and routing of the hosepack. The increase in current is limited.

The welding result can be optimized by changing the routing of the torch hosepack. The hosepack must always be routed as shown.

### Perform R/L alignment

- 1 Process parameters / General / R/L-check / alignment

The current values are displayed.



- 2** Select Next

The 2nd R/L alignment screen is displayed.

- 3** Follow the instructions on the screen

- 4** Select Next

The 3rd R/L alignment screen is displayed.

- 5** Follow the instructions on the screen

- 6** Select Next

The current values are determined.

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



# **Manual Metal Arc Welding, CEL, Arc air gouging**



# Minimum equipment for MMA and CEL welding and for arc air gouging

---

**Minimum equipment for MMA and CEL welding**

In addition to the iWave power source, the following components are required for MMA and CEL welding:

- Return lead cable
- Electrode holder with welding power-lead
- Stick or cellulose electrodes

---

**Minimum equipment for arc air gouging**

In addition to the iWave power source, the following components are required for arc air gouging:

- OPT/i TIG PowerConnector option installed on the power source
- Return lead cable 120i PC
- PowerConnector - Dinse adapter
- KRIS 13 arc air gouging torch
- Compressed air supply

# Commissioning

## Preparation

### NOTE!

**All TIG components connected to and set up on the power source can remain on the power source.**

The TIG components do not have to be isolated for MMA welding.

### NOTE!

**Check the packaging or labeling on the stick electrode to determine whether the stick electrodes are to be welded on the positive pole (+) or the negative pole (-)**

- ▶ iWave AC/DC power sources can reverse polarity automatically.
- ▶ For iWave DC power sources, the current socket for MMA welding is always polarized to DC-.

- 1 Set the power switch to - O -
- 2 Unplug the mains plug
- 3 Insert the bayonet connector of the electrode holder cable into the current socket for manual metal arc welding and twist it clockwise to lock



iWave DC



iWave AC/DC

- 4 Insert the mains plug

# Manual Metal Arc Welding

## Safety

### **WARNING!**

#### **Danger from incorrect operation and work that is not carried out properly.**

This can result in serious personal injury and damage to property.

- ▶ All the work and functions described in this document must only be carried out by technically trained and qualified personnel.
- ▶ Read and understand this document in full.
- ▶ Read and understand all safety rules and user documentation for this equipment and all system components.

### **WARNING!**

#### **Danger from electrical current.**

This can result in serious personal injury and damage to property.

- ▶ Before starting work, switch off all the devices and components involved and disconnect them from the grid.
- ▶ Secure all devices and components involved so they cannot be switched back on.
- ▶ After opening the device, use a suitable measuring instrument to check that electrically charged components (such as capacitors) have been discharged.

## Manual metal arc welding

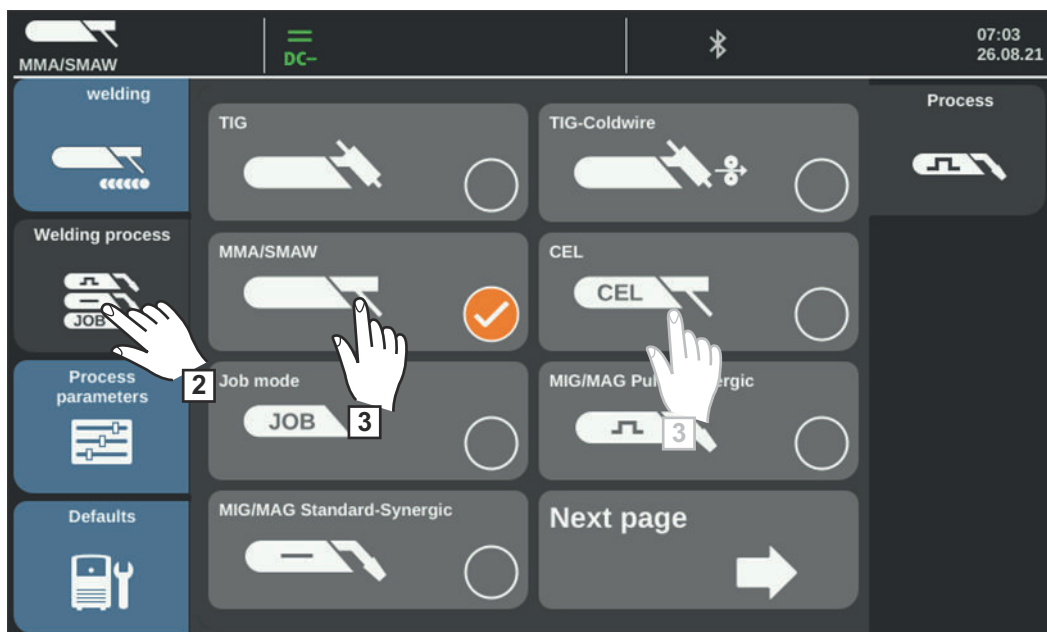
### **CAUTION!**

#### **Danger of injury and damage from electric shock.**

When the power switch is in position - I -, the stick electrode in the electrode holder is live.

- ▶ Ensure that the stick electrode is not touching anyone or any electrically conductive or grounded parts (housing, etc.)

- 1** Set the power switch to - I -



**2** Select "Welding process"

Alternatively, the welding process can also be selected via the status bar (compare with the procedure described from page 36).

An overview of the welding processes is displayed.

Various welding processes are available depending on the type of power source or the function package installed.

**3** Select the MMA or CEL welding process

The welding voltage is applied to the welding socket with a three second delay.

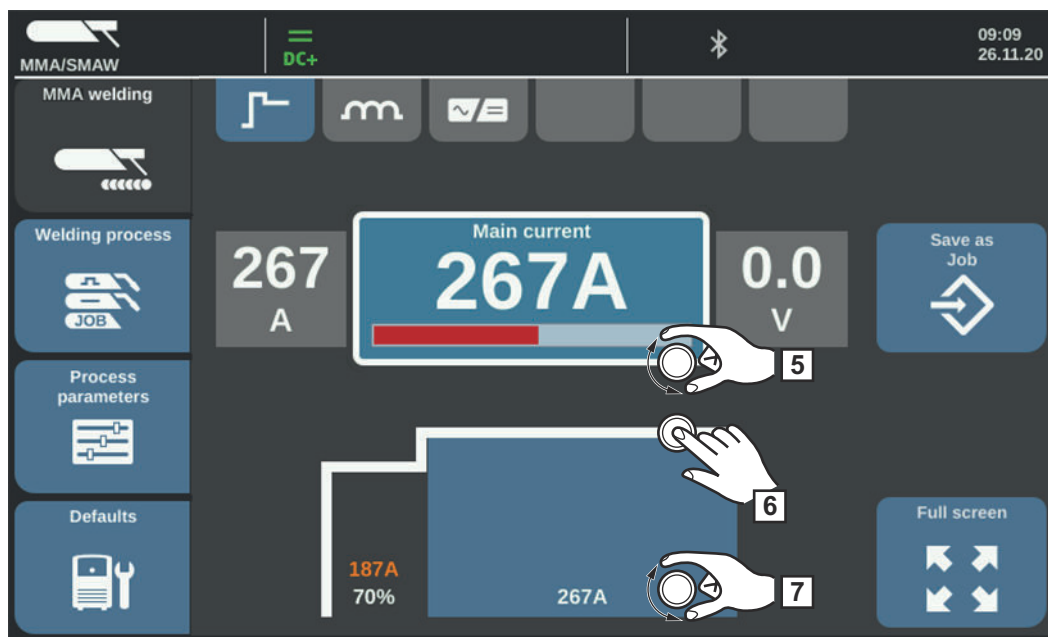
If the MMA or CEL welding process is selected, a cooling unit, if present, is automatically deactivated. It is not possible to turn it on.

**NOTE!**

**Under certain circumstances, it may not be possible to change the set welding parameters of a system component - such as wirefeeder or remote control - on the control panel of the power source.**

**4** Select "MMA welding"

The MMA welding parameters are displayed.



**5** Turn the selection dial and select the desired welding parameter

**6** Press the selection dial to change the parameter

**7** Turn the selection dial and adjust the parameter

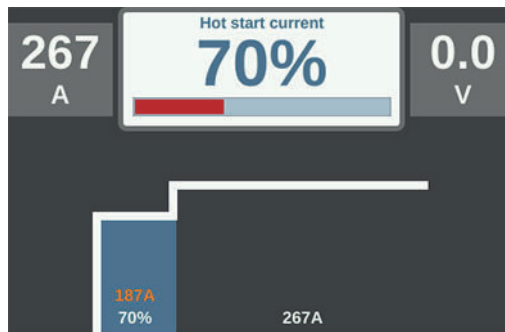
**8** If necessary, set the process parameters for user- or application-specific settings on the welding system

**9** Initiate welding process



**Welding parameters for manual metal arc welding and CEL welding**

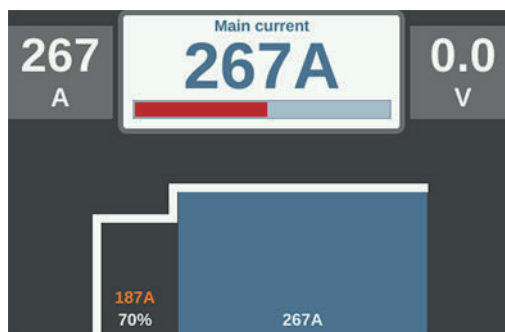
### Hot start current



Setting range: 0 - 200% (of the main current)

Factory setting: 150%

### Main current



Setting range:

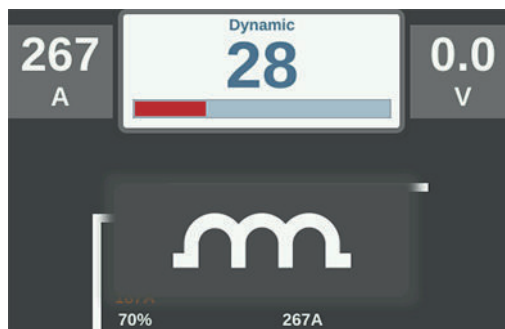
iWave 300i DC, iWave 300i AC/DC:  
3 - 300 A

iWave 400i DC, iWave 400i AC/DC:  
3 - 400 A

iWave 500i DC, iWave 500i AC/DC:  
3 - 500 A

Factory setting:-

### Dynamic



To obtain the best possible welding results, the arc-force dynamic will sometimes need to be adjusted.

Setting range: 0 - 100% (of the main current)

Factory setting: 20

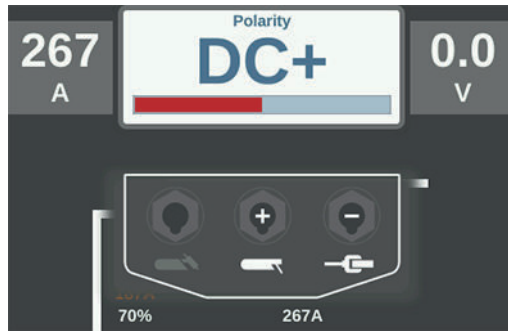
0 ... soft and low-spatter arc

100 ... harder and more stable arc

### Functional principle:

At the moment of droplet transfer or in event of a short circuit, a short-term increase in the amperage will occur. To maintain a stable arc, the welding current temporarily rises. If the stick electrode is at risk of sinking into the weld pool, this action prevents the weld pool from solidifying, as well as reducing the duration of the arc's short circuit. The risk of the stick electrode sticking is therefore largely ruled out.

## Polarity



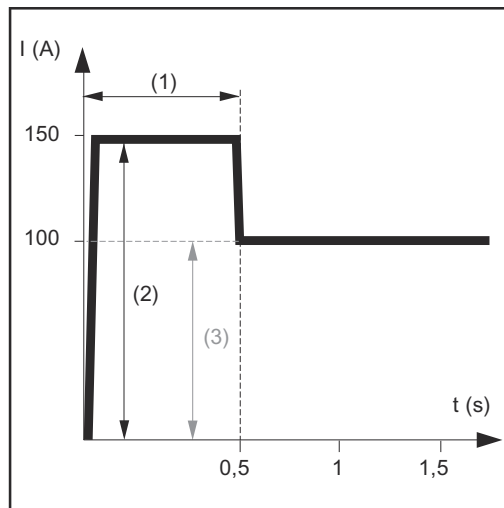
Setting range: DC- / DC+ / AC  
Factory setting: DC-

# Hot-Start, Soft-Start, Anti-Stick Functions

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

### Advantages

- Improved ignition properties, even when using electrodes with poor ignition properties
- Better fusion of parent material in the start phase, therefore less neutralization
- Slag inclusions largely avoided



Example of a starting current > 100% (HotStart)

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

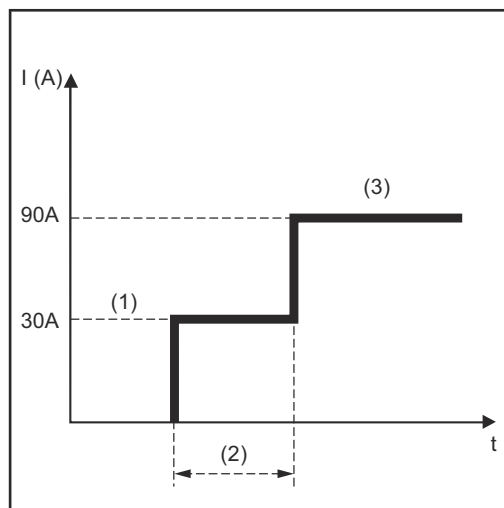
### Operation

During the set starting current time (1), the welding current  $I_1$  (3) rises to the starting current (2).

The starting current time is set in the Setup menu.

## Starting current < 100 % (SoftStart)

A starting current of < 100% (SoftStart) is suitable for basic electrodes. Ignition is carried out with a low welding current. As soon as the arc is stable, the welding current increases until it reaches the set welding current command value.



Example of a starting current < 100% (SoftStart)

### Advantages:

- Improvement of ignition properties with electrodes that ignite at a low welding current
- Slag inclusions largely avoided
- Reduction of welding spatter

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

The starting current time is set in the MMA menu.

---

**Anti-stick function**

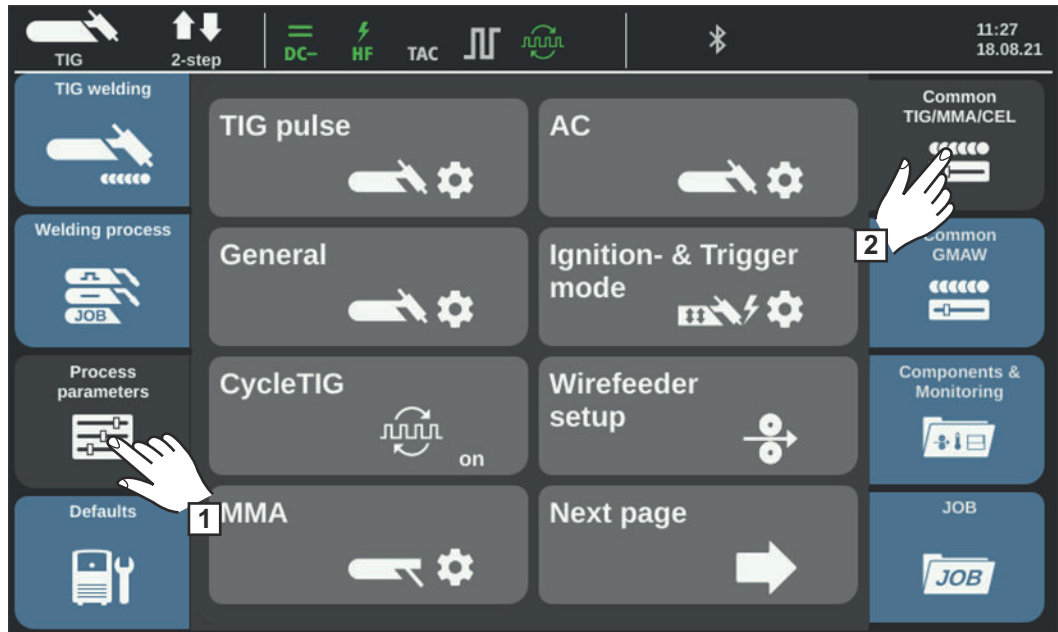
As the arc becomes shorter, the welding voltage may also fall so that the stick electrode is more likely to stick to the workpiece. This may also cause the stick electrode to burn out.

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

The anti-stick function is activated and deactivated under:  
Process parameters / Common TIG/MMA/CEL / Electrode.

# Stick electrode / CEL Process parameters

## Stick electrode / CEL Process parameters



### Stick electrode / CEL Process parameters:

Electrode, CEL

Process parameters for Components and Monitoring see page [212](#).

## Process para- meters for stick electrode

### Starting current time

HotStart

0.0 - 2.0 s

Factory setting: 0.5 s

To obtain the best possible welding result, the HotStart function will sometimes need to be adjusted.

Advantages:

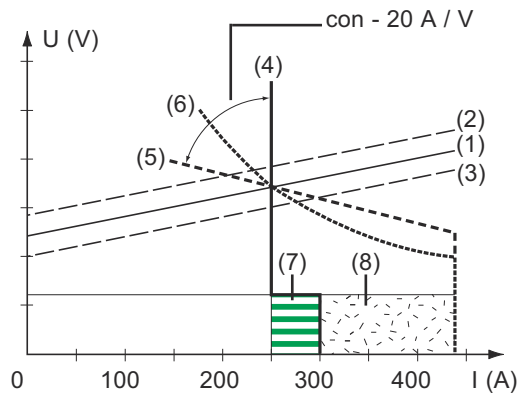
- Improved ignition properties, even when using electrodes with poor ignition properties
- Better fusion of parent material in the start phase, therefore less neutralization
- Slag inclusions largely avoided

### Characteristic

For selecting the electrode characteristic

I-constant / 0.1 - 20.0 A/V / P-constant / Arc air gouging (iWave 500 DC and AC/DC only)

Factory setting: I-constant



- (1) Working line for stick electrode
- (2) Working line for stick electrode with increased arc length
- (3) Working line for stick electrode with reduced arc length
- (4) Characteristic for selected parameter "I-constant" (constant welding current)
- (5) Characteristic for selected parameter "0.1 - 20" (drooping characteristic with adjustable gradient)
- (6) Characteristic for selected parameter "P-constant" (constant welding power)

(7) Example of set arc-force dynamic with selected characteristic (4)

(8) Example of set arc-force dynamic with selected characteristic (5) or (6)

#### I-constant (constant welding current)

- If the "I-constant" parameter is set, the welding current is kept constant regardless of the welding voltage. The result is a vertical characteristic (4).
- The "I-constant" parameter is particularly suitable for rutile electrodes and basic electrodes.

#### 0.1 - 20.0 A/V (drooping characteristic with adjustable slope)

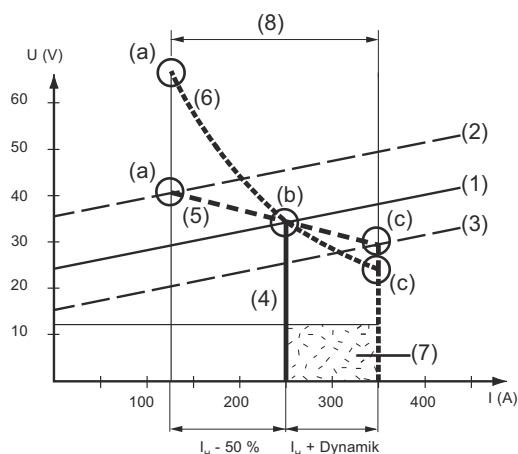
- A drooping characteristic (5) can be set using parameter "0.1 - 20". The setting range is from 0.1 A/V (very steep) to 20 A/V (very flat).
- Setting a flat characteristic (5) is only recommended for cellulose electrodes.

#### P-constant (constant welding power)

- If the "P-constant" parameter is set, the welding power is kept constant regardless of the welding voltage and current. The result is a hyperbolic characteristic (6).
- The "P-constant" parameter is particularly suitable for cellulose electrodes.

#### Arc air gouging

- Special characteristic for arc air gouging with a carbon electrode (for iWave 500 DC and iWave 500 AC/DC only)



- (1) Working line for stick electrode
- (2) Working line for stick electrode with increased arc length
- (3) Working line for stick electrode with reduced arc length
- (4) Characteristic for selected parameter "I-constant" (constant welding current)
- (5) Characteristic for selected parameter "0.1 - 20" (drooping characteristic with adjustable gradient)
- (6) Characteristic for selected parameter "P-constant" (constant welding power)

- (7) Example of set arc-force dynamic with selected characteristic (5) or (6)
- (8) Possible current change with selected characteristic (5) or (6) depending on the welding voltage (arc length)
- (a) Operating point with high arc length
- (b) Operating point with set welding current  $I_H$
- (c) Operating point with low arc length

The characteristics (4), (5) and (6) shown apply when using a stick electrode whose characteristic at a certain arc length corresponds to the working line (1).

Depending on the set welding current ( $I$ ), the intersection (operating point) of the characteristics (4), (5) and (6) is shifted along the working line (1). The operating point provides information about the current welding voltage and current welding current.

With a fixed welding current ( $I_H$ ), the operating point can travel along the characteristics (4), (5) and (6) depending on the current welding voltage. The welding voltage  $U$  depends on the arc length.

If the arc length changes, e.g., according to the working line (2), the operating point is the point where the corresponding characteristic (4), (5) or (6) intersect the working line (2).

Applies to characteristics (5) and (6): Depending on the welding voltage (arc length), the welding current ( $I$ ) is also lower or higher, with a constant value for  $I_H$ .

---

### Anti-stick

on/off

Factory setting: on

As the arc becomes shorter, the welding voltage may also fall so that the stick electrode is more likely to stick to the workpiece. This may also cause the stick electrode to burn out.

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

---

### Break voltage

Limitation of the welding voltage

20 - 90 V

Factory setting: 20 V

In principle, the arc length depends on the welding voltage. To end the welding process, a significant lifting of the stick electrode is usually required. The parameter allows the welding voltage to be limited to a value, which permits the welding process to be ended by only slightly lifting the stick electrode.

### NOTE!

**If the welding process regularly comes to an unintentional end, set the break voltage parameter to a higher value.**

---

### AC frequency

Only for AC manual metal arc welding ("Polarity" welding parameter = AC)

40 - 250 Hz

Factory setting: 60 Hz

---

### Process parameters for CEL

---

#### Starting current time

HotStart

0.0 - 2.0 s

Factory setting: 0.5 s

To obtain the best possible welding result, the HotStart function will sometimes need to be adjusted.

Advantages:

- Improved ignition properties, even when using electrodes with poor ignition properties
  - Better fusion of parent material in the start phase, therefore less neutralization
  - Slag inclusions largely avoided
- 

#### Anti-stick

on/off

Factory setting: on

As the arc becomes shorter, the welding voltage may also fall so that the rod electrode is more likely to stick to the workpiece. 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. The welding process can be resumed without problems once the rod electrode has been detached from the workpiece.

---

#### Break voltage

Limitation of the welding voltage

20 - 90 V

Factory setting: 20 V

In principle, the arc length depends on the welding voltage. To end the welding process, a significant lifting of the rod electrode is usually required. The parameter allows the welding voltage to be limited to a value, which permits the welding process to be ended by only slightly lifting the rod electrode.

### NOTE!

**If the welding process regularly comes to an unintentional end, set the break voltage parameter to a higher value.**

---



# Arc air gouging (iWave 500 DC and iWave 500 AC/DC)

## Gouging (Arc Air Gouging)

In arc air gouging, an arc is ignited between a carbon electrode and the workpiece; the base material is melted and blown out with compressed air. The operating parameters for arc air gouging are defined in a special characteristic.

Applications:

- Removal of shrink holes, pores, or slag inclusions from workpieces
- Detaching sprues or the processing of entire workpiece surfaces in foundries
- Edge preparation for heavy plates
- Preparation and repair of weld seams
- Finishing of roots or defects
- Production of air gaps

**IMPORTANT!** Arc air gouging is only possible with steel materials!

## Safety



### WARNING!

#### **Danger from incorrect operation and work that is not carried out properly.**

This can result in serious personal injury and damage to property.

- ▶ All the work and functions described in this document must only be carried out by technically trained and qualified personnel.
- ▶ Read and understand this document in full.
- ▶ Read and understand all safety rules and user documentation for this equipment and all system components.



### WARNING!

#### **Danger from electrical current.**

This can result in serious personal injury and damage to property.

- ▶ Before starting work, switch off all the devices and components involved and disconnect them from the grid.
- ▶ Secure all devices and components involved so they cannot be switched back on.
- ▶ After opening the device, use a suitable measuring instrument to check that electrically charged components (such as capacitors) have been discharged.

## Preparation

**IMPORTANT!** A grounding cable with a PowerConnector and a cable cross-section of 120 mm<sup>2</sup> is required for arc air gouging. For other grounding cables, the OPT/i TPS 2. Positive option must be installed at the power source. Furthermore, a Dinse PowerConnector adapter is required for the connection of the gouger.

- 1** Set the power switch to - O -
- 2** Unplug the mains plug
- 3** Remove the MIG/MAG welding torch
- 4** Insert the grounding cable into the (-) current socket and lock
- 5** Connect the other end of the grounding cable to the workpiece

- 6** Attach the Dinse PowerConnector adapter to the (+) current socket
- 7** Insert the bayonet connector of the arc air gouging torch into the (+) current socket and twist it clockwise to lock
- 8** Connect the compressed air connection of the arc air gouging torch to the compressed air supply  
Working pressure: 5 - 7 bar (constant)
- 9** Clamp the carbon electrode so that the electrode tip protrudes approx. 100 mm from the arc air gouging torch;  
the air outlet openings of the arc air gouging torch must be at the bottom
- 10** Insert the mains plug

---

## Arc air gouging

### **CAUTION!**

#### **Danger of injury and damage from electric shock.**

When the power switch is switched to position - I -, the electrode in the arc air gouging torch is live.

- Ensure that the electrode is not touching anyone or any electrically conductive or grounded parts (housing, etc.)

---

### **CAUTION!**

#### **Risk of personal injury due to loud operating noise.**

- Use suitable hearing protection during arc air gouging!

- 
- 1** Set the power switch to - I -
  - 2** Under Process parameters / Common / TIG / Electrode setup, set the "Characteristic" parameter to "Gouging" (last entry)

### **NOTE!**

**The settings for break voltage and starting current time are ignored.**

- 
- 3** Select OK
  - 4** Under Welding process / Process, select Electrode

If the MMA welding process is selected, any cooling unit that is present is automatically deactivated. It is not possible to turn it on.

### **NOTE!**

**Under certain circumstances, it may not be possible to change the set welding parameters of a system component - such as wirefeeder or remote control - on the control panel of the power source.**

- 
- 5** Select "MMA welding"

The arc air gouging parameters are displayed.

- 6** Set the main current depending on the electrode diameter as specified on the electrode packaging

**NOTE!**

**At higher amperages, use both hands to guide the arc air gouging torch!**

- Use a suitable welding helmet.

- 7 Open the compressed air valve on the arc air gouging torch handle
- 8 Initiate the gouging operation

The contact angle of the carbon electrode and gouging speed determine the depth of a groove.

The parameters for arc air gouging correspond to the welding parameters for MMA welding, see page [117](#).



# **Multiprocess PRO - MIG/MAG**



# Multiprocess PRO

## General

If the OPT/i TIG MultiProzess PRO option is installed on the power source, MIG/MAG welding processes are available without restriction in addition to TIG and MMA welding processes.

Switching between the individual welding processes takes place either:

- Using jobs
- On the control panel of the power source
- Using the torch trigger.

## System components

A MultiProzess-PRO-compatible power source can be operated with all iWave system components and, for the MIG/MAG welding process, with all TPSi system components.

### Example:



iWave 500i AC/DC  
 + OPT/i TIG AC MultiProzess PRO  
 + CU 1400i Pro/MC cooling unit  
 + I-set front water connection  
 + Dual head distributor  
 + WF 25i MIG/MAG wirefeeder  
 + MHPi MIG/MAG welding torch  
 + MHP CON interconnecting hosepack  
 + CWF 25i TIG cold wire feeder  
 + SpeedNet control cable  
 + TIGi cold-wire feed  
 + TTB / THP TIG welding torch  
 + Electrode holder with welding power-lead  
 + Return lead cable  
 + TU Car4 Pro trolley  
 + OPT/TU extension cylinder holder TU Car4 Pro

### NOTE!

**For water-cooled welding systems, the coolant connections on the cooling unit must be doubled: 2x flow connections, and 2x return connections.**

- The total hosepack length must not exceed 14 m / 45 feet 11 inches for multiprocess welding systems.

A MultiProzess-PRO welding system requires only one return lead cable. With iWave AC power sources, the polarity is reversed automatically when the welding process is changed.

**IMPORTANT!** For iWave DC power sources, the return lead cable must be reconnected manually when changing processes.



## **WARNING!**

**Danger due to live wire electrode and current sockets!**

**With MultiProzess-PRO units, the wire electrode and current sockets of a connected MIG/MAG wirefeeder are live even during TIG operation!**

If touched this can result in serious personal injury and damage to property.

- ▶ Do not touch the wire electrode and current sockets.
  - ▶ Ensure that the wire electrode and current sockets cannot be touched.
-



# Minimum equipment for MIG/MAG welding

## Minimum equipment for MIG/MAG welding

In addition to the iWave power source, the following components are required for MIG/MAG welding:

- OPT/i TIG MultiProzess PRO
- MIG/MAG wirefeeder
- MHP CON MIG/MAG interconnecting hosepack
- MTG MIG/MAG welding torch
- Wire electrode
- MIG/MAG shielding gas supply
- Return lead cable

Additionally required for CMT applications:

- Standard, Pulse, and CMT Welding Packages enabled on the power source
- CMT welding torch incl. CMT drive unit
- CMT wire buffer
- OPT/i PushPull installed in the MIG/MAG wirefeeder
- CMT interconnecting hosepack

Additionally required for water-cooled applications:

- Cooling unit with double coolant connections

The TIG components can remain connected to the power source during MIG/MAG welding.

# MIG/MAG welding processes

---

## **MIG/MAG pulse synergic welding**

MIG/MAG pulse synergic welding is a pulsed arc process with a controlled material transfer.

In the base current phase, the energy input is reduced to such an extent that the arc barely burns steadily and the surface of the workpiece is preheated. In the pulsing current phase, an accurately timed current pulse guarantees a precise detachment of the weld material droplet.

This principle guarantees low-spatter welding and precise operation throughout the entire power range.

---

## **MIG/MAG standard synergic welding**

MIG/MAG standard synergic welding is a MIG/MAG welding process covering the entire power range of the power source with the following arc types:

Dip transfer arc

Droplet transfer occurs in the lower power range during the short circuit.

Intermediate arc

The droplet increases in size at the end of the wire electrode and is transferred in the mid power range during the short circuit.

Spray arc

A short circuit-free transfer of material in the high power range.

---

## **PMC process**

PMC = Pulse Multi Control

PMC is a pulsed arc welding process with fast data processing, precise process condition detection, and improved droplet detachment. Faster welding with a stable arc and uniform penetration is possible.

---

## **LSC process**

LSC = Low Spatter Control

LSC is a low-spatter dip transfer arc process. Before the short-circuit bridge is broken, the current is lowered and reignition occurs at significantly lower welding current values.

---

## **SynchroPulse welding**

SynchroPulse is available for all process (Standard / Pulse / LSC / PMC).

The cyclic change of the welding power between two operating points with SynchroPulse achieves a finely rippled weld appearance and a non-continuous heat input.

---

## **CMT process**

CMT = Cold Metal Transfer

A special CMT drive unit is required for the CMT process.

The reversing wire movement in the CMT process results in droplet detachment with improved dip transfer arc properties.

The advantages of the CMT process are:

- Low heat input
- Reduced spattering
- Emissions reduction
- High process stability

The CMT process is suitable for:

- Joint welding, overlay welding, and brazing, specifically with high demands in terms of heat input and process stability
- Light gauge sheet welding with low distortion
- Special joints, e.g., copper, zinc, steel/aluminum

#### NOTE!

**A CMT reference book with sample applications is available, ISBN 978-3-8111-6879-4.**

### CMT Cycle Step welding process

CMT Cycle Step is a further development of the CMT welding process. It also requires a special CMT drive unit.

CMT Cycle Step is the welding process with the lowest heat input.

The CMT Cycle Step welding process alternates cyclically between CMT welding and pauses of an adjustable duration.

The welding pauses mean there is less heat input, while the continuity of the weld is maintained.

Individual CMT cycles are also possible. The size of the CMT welding spots is determined by the number of CMT cycles.

### SlagHammer

The SlagHammer function is implemented in all steel characteristics.

In conjunction with a CMT drive unit WF 60i CMT, slag is knocked off the weld seam and wire electrode end by a reversing wire movement without arc before welding.

Knocking off the slag ensures reliable and precise ignition of the arc.

A wire buffer is not required for the SlagHammer function.

The SlagHammer function is automatically executed if a CMT drive unit is present in the welding system.



An active SlagHammer function is displayed in the status bar below the SFI icon.

### Stitch welding

With stitch welding, all welding processes can be interrupted cyclically. As such, the heat input is controlled in a targeted manner.

The welding time, pause time and the number of interval cycles can be set individually (e.g. for producing a rippled weld seam, for tacking thin sheets or, in the case of longer pause times, for simple, automatic spot welding operation).

Stitch welding is possible with every operating mode.

In special 2-step mode and special 4-step mode, no interval cycles are executed during the start and end phases. The interval cycles are only executed in the main process phase.

---

**WireSense**

WireSense is an assistance process for automated applications in which the wire electrode acts as a sensor.

The wire electrode can be used to check the component position before each weld, real sheet edge heights and their position are reliably detected.

Advantages:

- Respond to real component deviations
- No re-teaching means time and cost savings
- No calibration of TCP and sensor necessary

WireSense requires CMT hardware:

WF 60i Robacta Drive CMT, SB 500i R with wire buffer or SB 60i R, WFi REEL unreeling device

The CMT Welding Package is not required for WireSense.

---

**ConstantWire**

ConstantWire is used in laser brazing and other laser welding applications.

The welding wire is fed to the soldering or weld pool, ignition of an arc is prevented by controlling the wire speed.

Applications in constant current (CC) and constant voltage (CV) operation are possible.

The welding wire can be fed either energized for hot wire applications or de-energized for cold wire applications.

# MIG/MAG Welding Packages

## General

The power sources have a number of different Welding Packages, welding characteristics and welding processes so that the broadest range of materials can be effectively processed.

## Welding Packages

The following Welding Packages are available for the iWave power sources:

Welding Package Standard

4,066,012

(enables MIG/MAG standard synergic welding)

Welding Package Pulse

4,066,013

(enables MIG/MAG pulse-synergic welding)

Welding Package LSC \*

4,066,014

(enables the LSC process)

Welding Package PMC \*\*

4,066,015

(enables the PMC process)

Welding Package CMT \*\*\*

4,066,016

(enables the CMT process)

Welding Package ConstantWire

4,066,019

(enables constant current or constant voltage operation during brazing)

\* only in combination with Welding Package Standard

\*\* only in combination with Welding Package Pulse

\*\*\* only in combination with Welding Package Standard and Welding Package Pulse

**IMPORTANT!** On a power source without any Welding Packages, only MIG/MAG standard manual welding is available.

# MIG/MAG welding characteristics

---

## Welding characteristics

Depending on the welding process and shielding gas combination, various process-optimized welding characteristics are available when selecting the filler metal.

Examples of welding characteristics:

- MIG/MAG 3700 PMC Steel 1,0mm M21 - arc blow \*
- MIG/MAG 3450 PMC Steel 1,0mm M21 - dynamic \*
- MIG/MAG 3044 Puls AlMg5 1.2 mm I1 - universal \*
- MIG/MAG 2684 Standard Steel 0.9 mm M22 - root \*

The welding process suffix (\*) provides information about special properties and the use of the welding characteristic.

The characteristics are described as follows:

### Name

Process

Properties

---

### AC additive <sup>1)</sup>

PMC, CMT

Bead to bead welding characteristic for adaptive structures

The characteristic changes polarity cyclically to keep heat input low and achieve more stability with a higher deposition rate.

---

### AC heat control <sup>1)</sup>

PMC, CMT

The characteristic curve changes polarity cyclically to keep the heat input into the component low. The heat input into the component can be additionally controlled by appropriate correction parameters.

---

### AC universal <sup>1)</sup>

PMC, CMT

The characteristic changes polarity cyclically to keep the heat input into the component low and is highly suitable for all common welding tasks.

---

### additive

CMT

Characteristics with reduced heat input and more stability with higher deposition rate for bead to bead welding of adaptive structures

---

### ADV <sup>2)</sup>

CMT

Also required:

Inverter module for an alternating current process

Negatively poled process phase with less heat input and higher deposition rate

---

### ADV <sup>2)</sup>

LSC

Also required:

Electronic switch for current interruption

Maximum current reduction by opening the circuit in any desired process phase

only in connection with TPS 400i LSC ADV

---

### **ADV braze**

CMT

Characteristics for brazing processes (reliable wetting and good flow of braze material).

Hardly any welding spatter is produced in the dip transfer arc area. The characteristic is well suited for long hosepacks and return lead cables.

---

### **arc blow**

PMC

Characteristic for avoiding arc breaks due to arc blow.

---

### **ADV root**

LSC Advanced

Characteristics for root passes with powerful arc

Hardly any welding spatter is produced in the dip transfer arc area. The characteristic is well suited for long hosepacks and return lead cables.

---

### **ADV universal**

LSC Advanced

Characteristic for all common welding tasks, with hardly any welding spatter in the dip transfer arc area. The characteristic is well suited for long hosepacks and return lead cables.

---

### **arcing**

Standard

Characteristics for a special form of hardfacing on dry and wet substrates (e.g., on crushing rollers in the sugar and ethanol industries)

---

### **base**

standard

Characteristics for a special form of hardfacing on dry and wet substrates (e.g., on crushing rollers in the sugar and ethanol industries)

---

### **braze**

CMT, LSC, PMC

Characteristic for brazing processes (reliable wetting and good flow of braze material).

---

### **braze+**

CMT

Characteristic for brazing processes with the special Braze+ gas nozzle and high brazing speed (gas nozzle with narrow opening and high flow rate)

---

### **CC/CV**

CC/CV

Constant current or constant voltage characteristic for power supply operation of the power source, a wirefeeder is not required.

---

**cladding**

CMT, LSC, PMC

Characteristics for overlay welding with low penetration, low dilution, and wide weld seam flow for improved wetting

---

**constant current**

PMC

Constant current characteristic for applications where no arc length control is required (no compensation adjustment for stick out changes)

---

**CW additive**

PMC, ConstantWire

Characteristic with constant wire speed curve for the additive manufacturing process  
With this characteristic, no arc is ignited, the welding wire is only fed as filler metal.

---

**dynamic**

CMT, PMC, Puls, Standard

Characteristic for deep penetration and reliable root formation at high welding speeds

---

**dynamic +**

PMC

Characteristic with short arc length for high welding speeds with arc length control independent of the material surface.

---

**edge**

CMT

Characteristic for welding corner seams with targeted energy input and high welding speed

---

**flanged edge**

CMT

Characteristic for welding flanged welds with targeted energy input and high welding speed

---

**galvanized**

CMT, LSC, PMC, Puls, Standard

Characteristics for galvanized sheet surfaces (low risk of zinc pores and reduced penetration)

---

**galvannealed**

PMC

Characteristics for iron-zinc coated material surfaces

---

**gap bridging**

CMT, PMC

Characteristic for best gap-bridging ability due to very low heat input

---

**hotspot**

CMT



Characteristic with hot start sequence, especially for plug welds and MIG/MAG spot welds

---

**mix** <sup>2) / 3)</sup>  
PMC

Also required:  
Welding Packages Pulse and PMC

Characteristic for the generation of a rippled weld seam.  
The heat input into the component is specifically controlled by the cyclic process change between pulse and dip transfer arc.

---

**LH fillet weld**  
PMC

Characteristics for LaserHybrid fillet weld applications  
(laser + MIG/MAG process)

---

**LH flange weld**  
PMC

Characteristics for LaserHybrid corner weld applications  
(laser + MIG/MAG process)

---

**LH Inductance**  
PMC

Characteristics for LaserHybrid applications with high welding circuit inductance  
(laser + MIG/MAG process)

---

**LH lap joint**  
PMC, CMT

Characteristics for LaserHybrid lap joint applications  
(laser + MIG/MAG process)

---

**marking**  
Characteristics for marking conductive surfaces

Characteristic for marking electrically conductive surfaces.  
Marking is performed by low power spark erosion and reversing wire movement.

---

**mix** <sup>2) / 3)</sup>  
CMT

Additionally required:  
CMT drive unit WF 60i Robacta Drive CMT  
Welding Packages Pulse, Standard and CMT

Characteristic for creating a rippled weld seam.  
The heat input into the component is specifically controlled by the cyclic process change between pulsed arc and CMT.

---

**mix drive** <sup>2)</sup>  
PMC

Additionally required:  
PushPull drive unit WF 25i Robacta Drive or WF 60i Robacta Drive CMT  
Welding Packages Pulse and PMC

Characteristic for producing a rippled weld seam by cyclic process interruption of the pulse arc and an additional wire movement

---

**multi arc**

PMC

Characteristic for components being welded by multiple interacting arcs Well suited for increased welding circuit inductance or mutual welding circuit coupling.

---

**open root**

LSC, CMT

Characteristic with powerful arc, especially suitable for root pass with air gap

---

**PCS** <sup>3)</sup>

PMC

The characteristic changes directly from the pulsed arc to a concentrated spray arc above a certain power. The advantages of pulsed and spray arcs are combined in one characteristic.

---

**PCS mix**

PMC

The characteristic changes cyclically between a pulsed or spray arc and a dip transfer arc, depending on the power range. It is especially suitable for vertical-up seams due to the alternating hot and cold supporting process phase.

---

**pin**

CMT

Characteristic for welding wire pins to an electrically conductive surface  
The retraction movement of the wire electrode and the set current curve progression define the appearance of the pin.

---

**pin picture**

CMT

Characteristic for welding wire pins with spherical ends onto an electrically conductive surface, especially for creating pin pictures.

---

**pin print**

CMT

Characteristic for writing texts, patterns or markings on electrically conductive component surfaces  
Writing takes place by placing individual dots the size of a welding droplet.

---

**pin spike**

CMT

Characteristic for welding wire pins with pointed ends onto an electrically conductive surface.

---

**pipe**

PMC, Puls, Standard

Characteristics for pipe applications and positional welding on narrow gap applications

---

**pipe cladding**

PMC, CMT

Characteristics for the overlay welding of outer pipe claddings with low penetration, low dilution, and wide seam flow

---

**retro**

CMT, Puls, PMC, Standard

The characteristic has the same welding properties as the predecessor TransPuls Synergic (TPS) device series.

---

**ripple drive <sup>2)</sup>**

PMC

Additionally required:

CMT drive unit WF 60i Robacta Drive CMT

Characteristic for producing a rippled weld seam by a cyclic process interruption of the pulsed arc and an additional wire movement.

The seam rippling is similar to that of TIG welds.

---

**root**

CMT, LSC, Standard

Characteristics for root passes with powerful arc

---

**seam track**

PMC, Puls

Characteristic with amplified current control, especially suitable for the use of a seam tracking system with external current measurement.

---

**TIME**

PMC

Characteristic curve for welding with very long stick out and T.I.M.E shielding gases to increase the deposition rate.

(T.I.M.E. = Transferred Ionized Molten Energy)

---

**TWIN cladding**

PMC

MIG/MAG tandem welding characteristics for overlay welding with low penetration, low dilution and wide weld flow for improved wetting

---

**TWIN multi arc**

PMC

MIG/MAG tandem characteristic for components being welded by multiple interacting arcs. Well suited for increased welding circuit inductance or mutual welding circuit coupling.

---

**TWIN PCS**

PMC

The MIG/MAG tandem characteristic changes from the pulsed arc directly to a concentrated spray arc above a certain power. The two arcs are not synchronized.

---

**TWIN universal**

PMC, Puls, CMT

MIG/MAG tandem characteristic for all common welding tasks, optimized for the mutual magnetic interaction of the arcs. The two arcs are not synchronized.

---

**universal**

CMT, PMC, Puls, Standard

The characteristic is very well suited for all common welding tasks.

---

**weld+**  
CMT

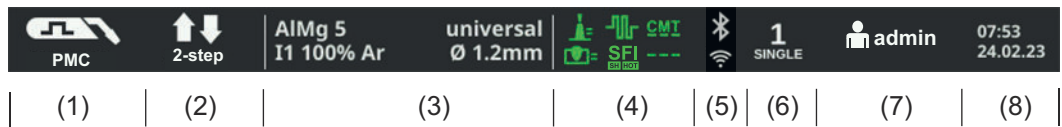
Characteristics for welding with short stick out and the Braze+ gas nozzle (gas nozzle with small orifice and high flow rate)

---

- 1) Only in conjunction with iWave AC/DC MultiProcess power sources
- 2) Welding characteristics with special properties due to additional hardware
- 3) Mixed process characteristics

## Status bar for MIG/MAG welding

## Status bar



The status bar is divided into segments and contains the following information:

- |     |   |
|-----|---|
| (1) | Currently selected welding process  |
| (2) | Currently selected operating mode   |
| (3) | Currently set welding program<br>(material, shielding gas, characteristic, and wire diameter) |
| (4) | Display process functions   |



## Arc length stabilizer



Penetration stabilizer



# SynchroPulse



## Spatter Free Ignition, SlagHammer, SFI Hotstart



CMT Cycle Step (only in conjunction with CMT welding process)



Interval

Symbol lights up green:  
Process function is active

Icon is gray:

Process function is available but not used for welding

- (5) **Bluetooth/WLAN status display (only on certified devices)**
- Symbol lights up blue:  
active connection to a Bluetooth participant
  - Icon is gray:  
Bluetooth participant detected, no active connection

or

### Display intermediate arc



- (6) **only in TWIN mode:**  
**Power source number, LEAD / TRAIL / SINGLE**

**only in operation with a dual-head wirefeeder WF 25i Dual:  
currently selected welding process line**

**With Teachen, Touchsensing, and WireSense:**



Teaching - active operation



Teaching - contact with workpiece detected



TouchSensing - active operation



TouchSensing - contact with workpiece detected



WireSense - active operation



WireSense - edge detected

---

**(7) Currently logged in user (when user management is activated)**

or

**the key symbol when the power source is switched off  
(e.g., if profile/role "locked" is activated)**



---

**(8) Time and date**

---

**NOTE!**

**The following functions can be selected and set directly in the status bar:**

- (1) Welding process
- (2) Operating mode
- (3) Property of the welding characteristic (e.g. dynamic, root, universal, etc.)
- (4) SynchroPulse, Spatter Free Ignition, CMT Cycle Step, Interval

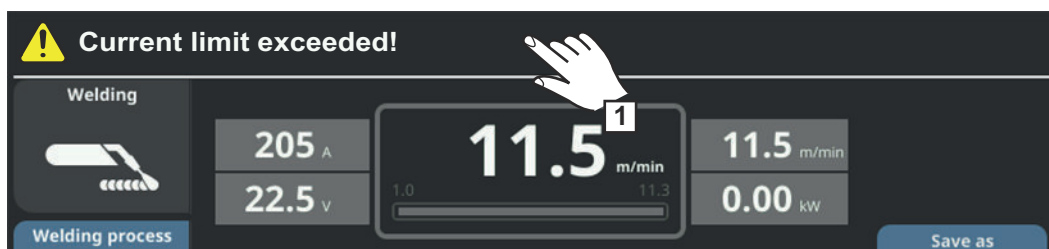
- Touch the desired function in the status bar and set it in the window that opens.
-



For the characteristic of the welding curve (3) and for SynchroPulse, SFI, etc. (4) additional information can be called up via the respective buttons.

### Status bar - current limit reached

If the characteristic-dependent current limit is reached during MIG/MAG welding, a corresponding message is displayed in the status bar.



- 1 Select the status bar for detailed information

The information is displayed.

- 2 Select "Hide information" to exit
  - 3 Reduce wire speed, welding current, welding voltage or material thickness
- or

increase distance between contact tip and workpiece

For more information on the current limit, refer to the section Fault diagnosis / troubleshooting on page [288](#)

# MIG/MAG Operating Modes

## General



### WARNING!

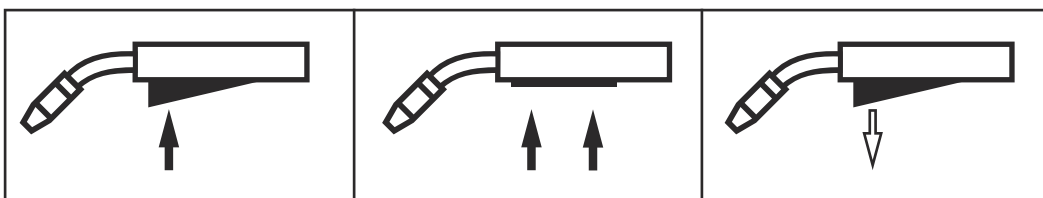
#### **Danger from incorrect operation.**

Possible serious injury and damage to property.

- ▶ Do not use the functions described here until you have read and completely understood these Operating Instructions.
- ▶ Do not use the functions described here until you have fully read and understood all of the Operating Instructions for the system components, in particular the safety rules!

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

## Symbols and explanations



*Press the torch trigger | Hold the torch trigger | Release the torch trigger*

### **GPr**

Gas pre-flow time

### **I-S**

Starting-current phase: rapid heating of the base material despite high heat dissipation at the start of welding

### **t-S**

Starting current duration



Starting arc length correction

### **SL1**

Slope 1: continuous reduction of the starting current to the welding current

### **I**

Welding current phase: even heat input into the base material whose temperature is raised by the advancing heat

### **I-E**

Final current phase: to avoid local overheating of the base material caused by heat accumulation at the end of welding. This prevents possible sagging of the weld seam.

### **t-E**

Final current duration





End arc length correction

**SL2**

Slope 2: continuous reduction of the welding current to the final current

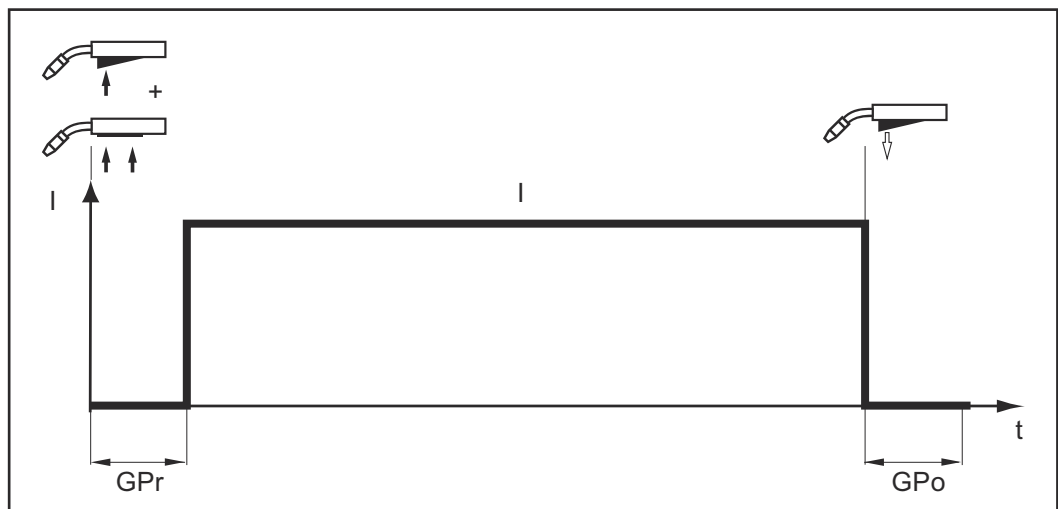
**GPo**

Gas post-flow

**SPt**

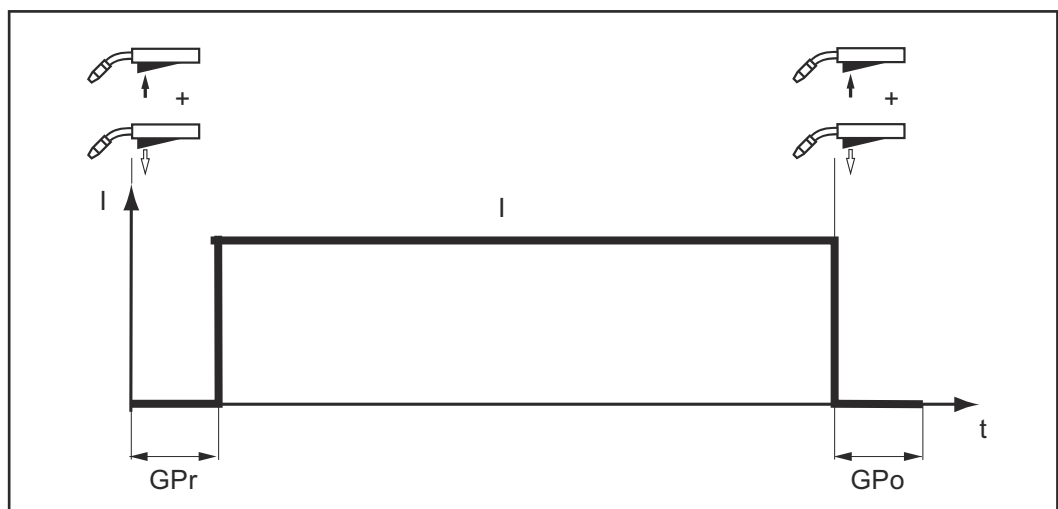
Spot welding time

Detailed explanation of the parameters in the chapter Process parameters.

**2-step mode**

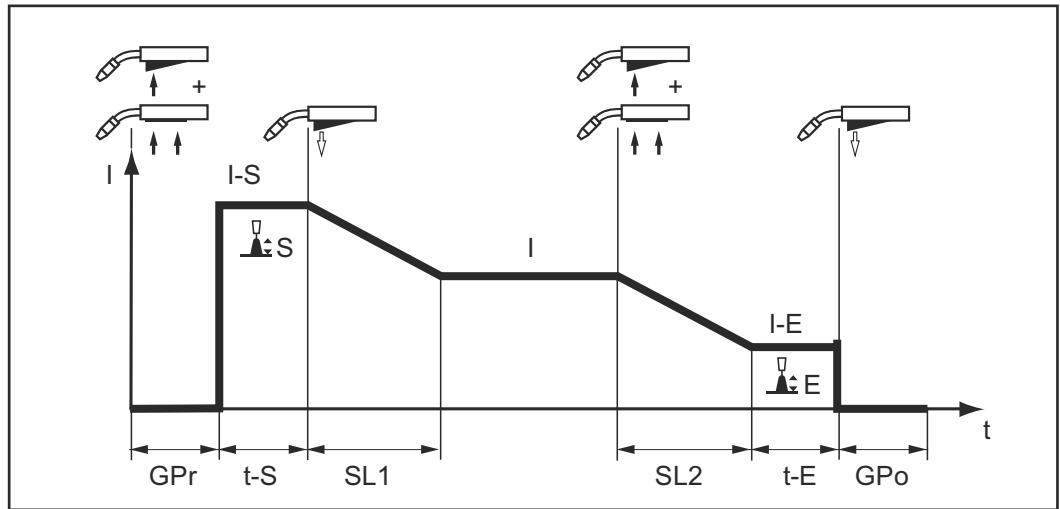
"2-step mode" is suitable for

- Tacking work
- Short weld seams
- Automatic and robot operation

**4-step mode**

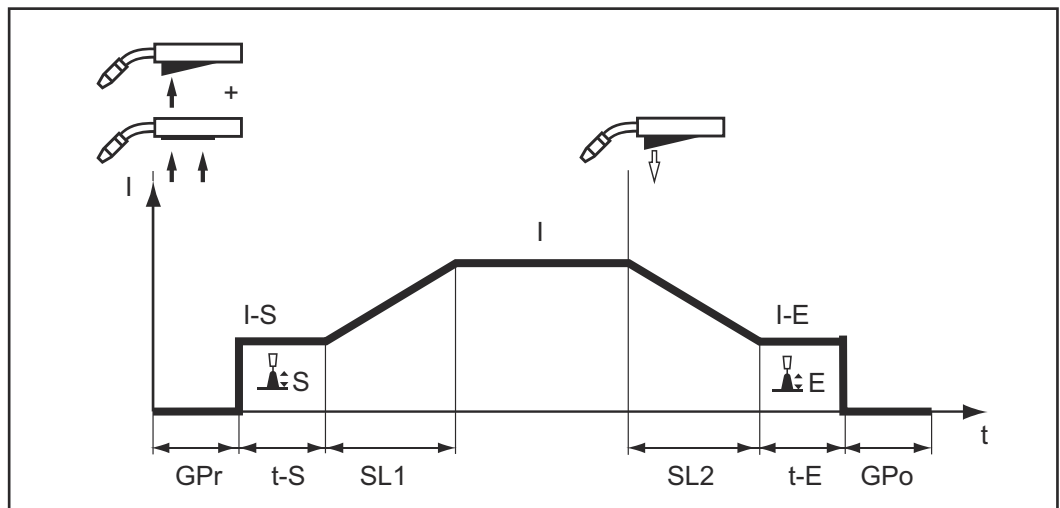
"4-step mode" is suitable for longer weld seams.

### Special 4-step mode



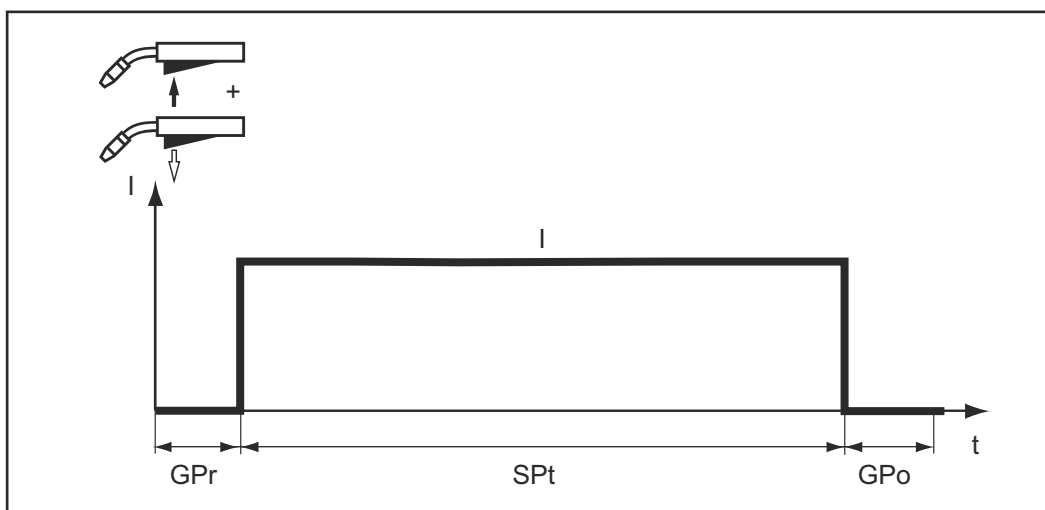
"Special 4-step mode" is ideal for welding aluminum materials. The high thermal conductivity of aluminum is taken into account by the special welding current profile.

### Special 2-step mode



"Special 2-step mode" is ideal for welding in higher power ranges. In special 2-step mode, the arc starts at a lower power, which makes it easier to stabilize.

## Spot welding



The "Spot welding" mode is suitable for welded joints on overlapped sheets.

# Preparing for MIG/MAG welding

---

## Safety



### WARNING!

#### **Danger from electrical current.**

This can result in serious personal injury and damage to property.

- ▶ Before starting work, switch off all the devices and components involved and disconnect them from the grid.
  - ▶ Secure all devices and components involved so they cannot be switched back on.
- 



### WARNING!

#### **Danger of electrical current due to electrically conductive dust in the device.**

This can result in severe personal injury and damage to property.

- ▶ Only operate the device if an air filter is fitted. The air filter is a very important safety device for achieving IP 23 protection.
- 

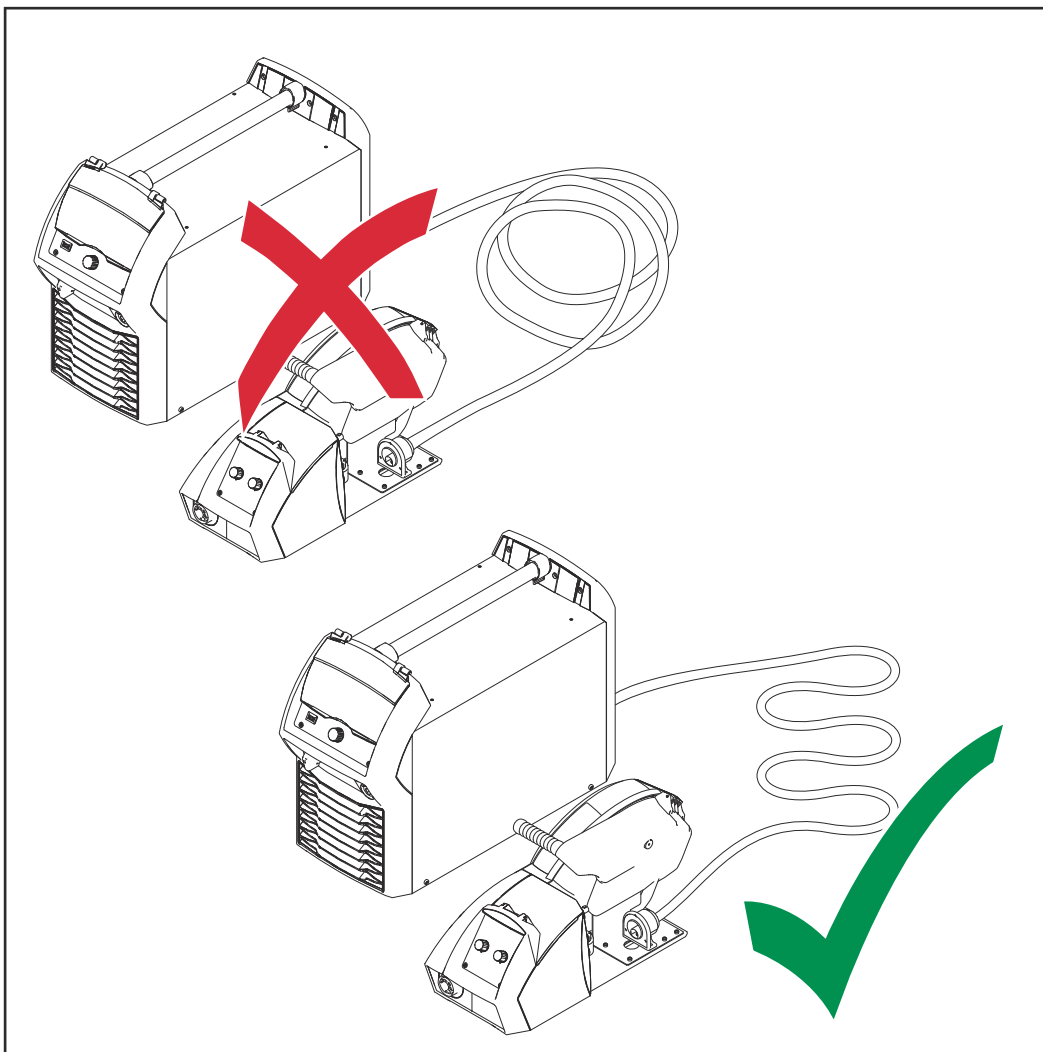
## Correct routing of the interconnecting hosepack



### CAUTION!

#### **Risk of damage to welding system components due to overheating caused by an incorrectly routed interconnecting hosepack.**

- ▶ Do not form any loops when routing the interconnecting hosepack
  - ▶ Do not cover the interconnecting hosepack
  - ▶ Do not wind the interconnecting hosepack as you get near the gas cylinder and do not wrap it around the gas cylinder
-



*Correct routing of the interconnecting hosepack*

#### **IMPORTANT!**

- The duty cycle values (D.C.) of the interconnecting hosepack can only be achieved if the hosepack is correctly routed.
- If the routing of a interconnecting hosepack changes, carry out an R/L alignment (see page [108](#))!
- Magnetically compensated interconnecting hosepacks enable routing changes to be made without changing the welding circuit inductance. Magnetically compensated interconnecting hosepacks are available from Fronius in lengths of 10 m and above.

#### **Context**

The power source is built for TIG welding:

- Cooling unit, power source, and trolley options are assembled on the trolley.
- The TIG welding torch is connected to the power source and to the front of the cooling unit.
- The return lead cable is connected to the power source.
- The TIG shielding gas supply is connected to the power source.

#### **NOTE!**

**All TIG components connected to and set up on the power source can remain on the power source.**

The TIG components do not need to be terminated for MIG/MAG welding.

**NOTE!**

**For details on mounting or connecting the MIG/MAG components, refer to the Installation Instructions and Operating Instructions of the respective system components.**

- 1** Switch off the power source, disconnect it from the grid, and secure it against being switched on again
- 2** Set up components required for MIG/MAG welding on the trolley (e.g., swivel pin holder, Duo gas cylinder holder, etc.)
- 3** Fix the strain-relief devices of the interconnecting hosepack to the trolley and to the wirefeeder
- 4** Connect the MIG/MAG wirefeeder to the power source using the interconnecting hosepack (current, SpeedNet, coolant)

**IMPORTANT!** Observe the correct routing of the interconnecting hosepack! For details see from page [152](#).

- 5** Connect MIG/MAG shielding gas supply to wirefeeder

When using gas cylinders:



**WARNING!**

**Danger of severe injury and damage to property if gas cylinders fall over.**

- Place gas cylinders on a solid, level surface so that they remain stable. Secure gas cylinders to prevent them from falling over.
- Observe the safety rules of the gas cylinder manufacturer.

If the MIG/MAG gas cylinder is to be mounted on the trolley in addition to the TIG gas cylinder, the Duo gas cylinder holder option is required.

- 6** Connect MIG/MAG welding torch to wirefeeder
- 7** Insert feed rollers corresponding to the MIG/MAG application into the wirefeeder
- 8** Set up suitable wear parts for the MIG/MAG application on the welding torch
- 9** Insert wirepool or basket-type spool and its adapter into the wirefeeder

**10** Establish the ground earth connection

For iWave AC/DC power sources, use the connected return lead cable. The power source automatically reverses the polarity of the return lead cable when the welding process is changed.

For iWave DC power sources, manually reconnect the return lead cable to the second current socket on the rear of the power source.

**IMPORTANT!** For optimum weld properties, route the return lead cable as close as possible to the interconnecting hosepack.



**CAUTION!**

**Impaired welding results due to a ground earth connection being shared by several power sources!**

If several power sources are all welding one component, a common ground earth connection can have a significant effect on the welding results.

- ▶ Disconnect welding circuits!
- ▶ Provide a separate ground earth connection for each welding circuit!
- ▶ Do not use a common grounding cable!

Further details on the correct routing of the return lead cable from page [70](#).

**11** Connect the power source to the grid and switch on

**12** Feed in the wire electrode

**13** Set the contact pressure

**14** Adjust the brake

**15** Perform R/L adjustment

For details, see from page [184](#).

# MIG/MAG and CMT welding

## Safety



### WARNING!

#### **Danger from incorrect operation and work that is not carried out properly.**

This can result in serious personal injury and damage to property.

- ▶ All the work and functions described in this document must only be carried out by technically trained and qualified personnel.
- ▶ Read and understand this document in full.
- ▶ Read and understand all safety rules and user documentation for this equipment and all system components.



### WARNING!

#### **Danger from electrical current.**

This can result in serious personal injury and damage to property.

- ▶ Before starting work, switch off all the devices and components involved and disconnect them from the grid.
- ▶ Secure all devices and components involved so they cannot be switched back on.
- ▶ After opening the device, use a suitable measuring instrument to check that electrically charged components (such as capacitors) have been discharged.

## Setting the welding process and operating mode via the status bar



- 1** Select the symbol for the welding process in the status bar

An overview of the welding processes is displayed.

### NOTE!

Depending on the device type, equipment, and available WeldingPackages, the number and sequence of the welding processes displayed may vary.





**2** Select the desired welding process

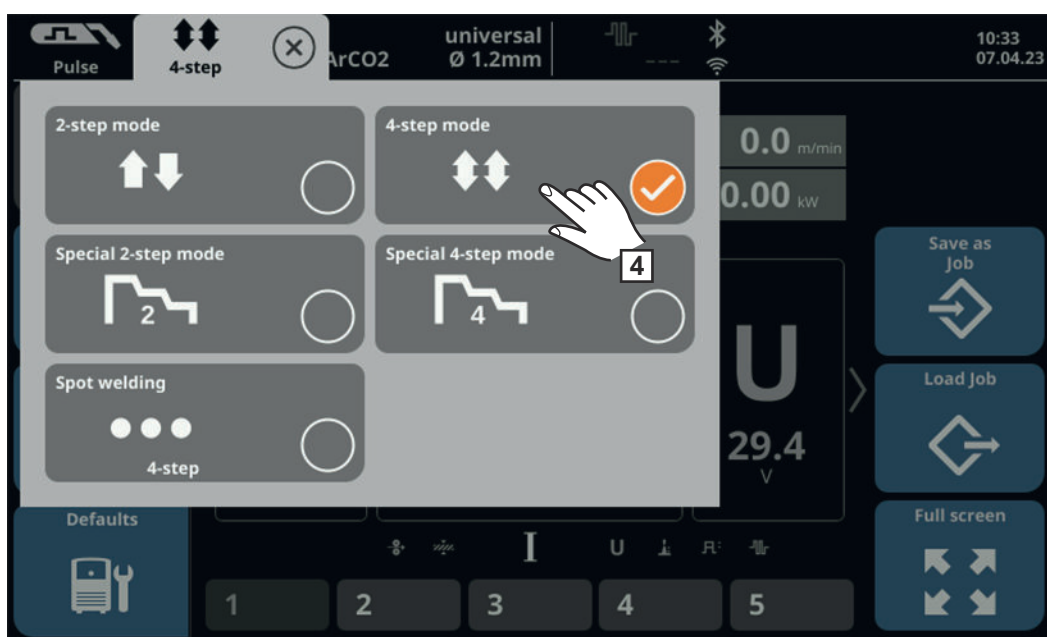


**3** Select the symbol for the operating mode in the status bar

An overview of operating modes is displayed.

#### NOTE!

Depending on the device type, equipment, and available WeldingPackages, the number and sequence of the operating modes displayed may vary.



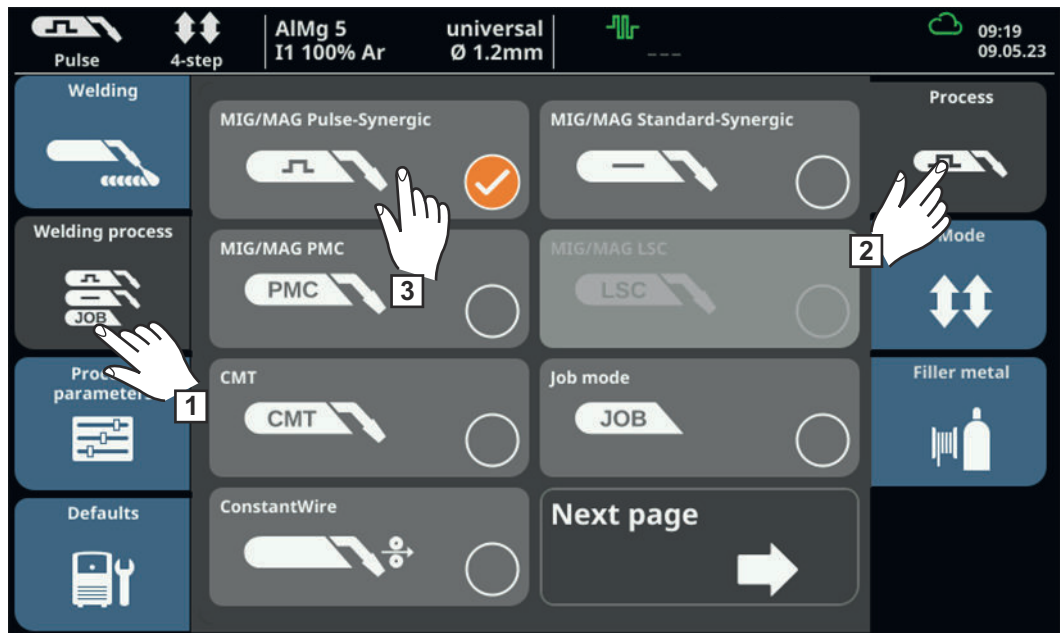
**4** Select the desired operating mode

## Setting the welding process and operating mode via the menu bar

The welding process and operating mode can alternatively be set via the menu bar.

### NOTE!

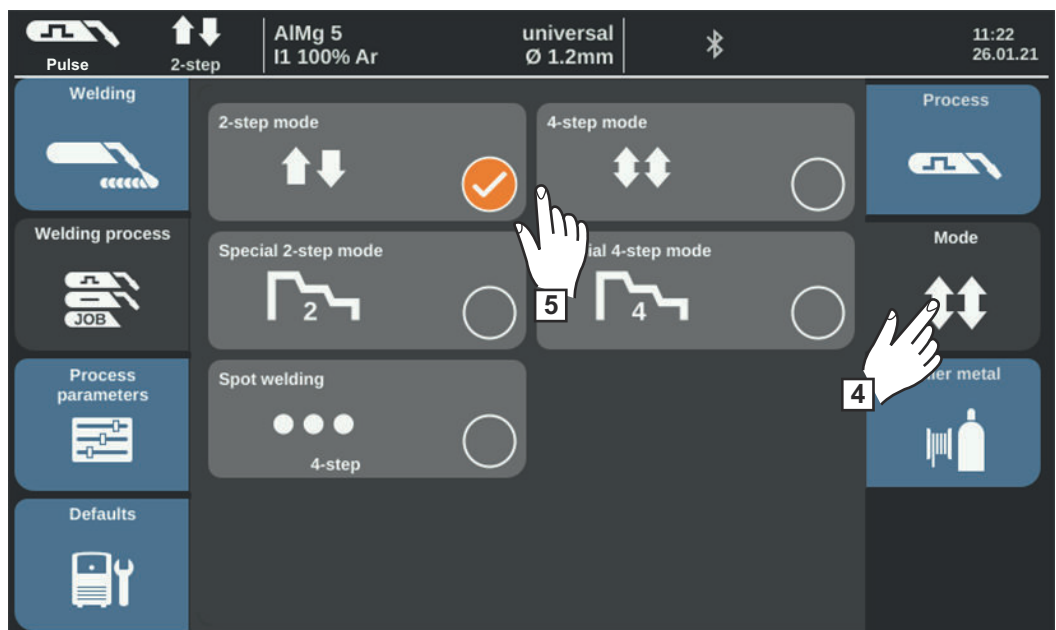
Depending on the device type, equipment, and available Welding Packages, the number and sequence of the welding processes displayed may vary.



- 1 Select "Welding process"
- 2 Select "Process"

An overview of the welding processes is displayed. Various welding processes are available depending on the type of power source or the function package installed.

- 3 Select the desired welding process



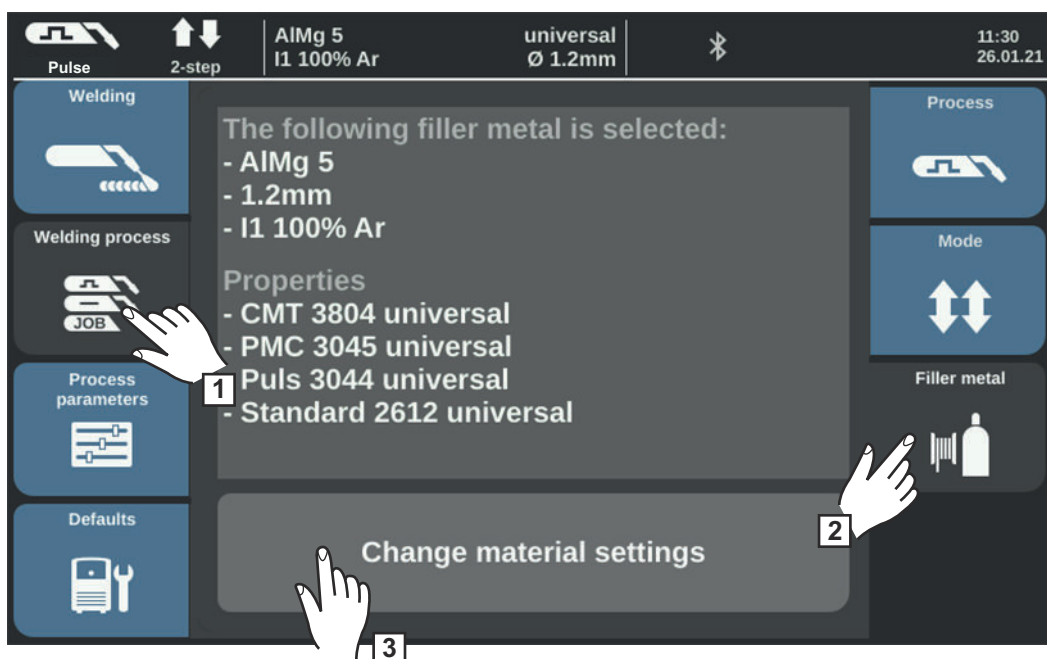
4 Select "Mode"

An overview of operating modes is displayed:

- 2-step mode
- 4-step mode
- Special 2-step mode
- Special 4-step mode
- Spot welding

5 Select the desired operating mode

### Selecting the filler metal and shielding gas



1 Select "Welding process"

2 Select "Filler metal"

3 Select "Change material settings"

4 Turn the selection dial and select the desired filler metal

5 Select "Next"/press the selection dial

6 Turn the selection dial and select the desired wire diameter

7 Select "Next"/press the selection dial

8 Turn the selection dial and select the desired shielding gas

9 Select "Next"/press the selection dial

#### NOTE!

**The available characteristics for each process are not displayed if only one characteristic is available for the selected filler metal.**

The confirmation step of the filler metal wizard follows directly, steps 10 - 14 are omitted.

10 Turn the selection dial and select the desired process

11 Press the selection dial to select the desired characteristic (blue background)

12 Turn the selection dial and select the desired characteristic

13 Press the selection dial and accept the selected characteristic (white background)

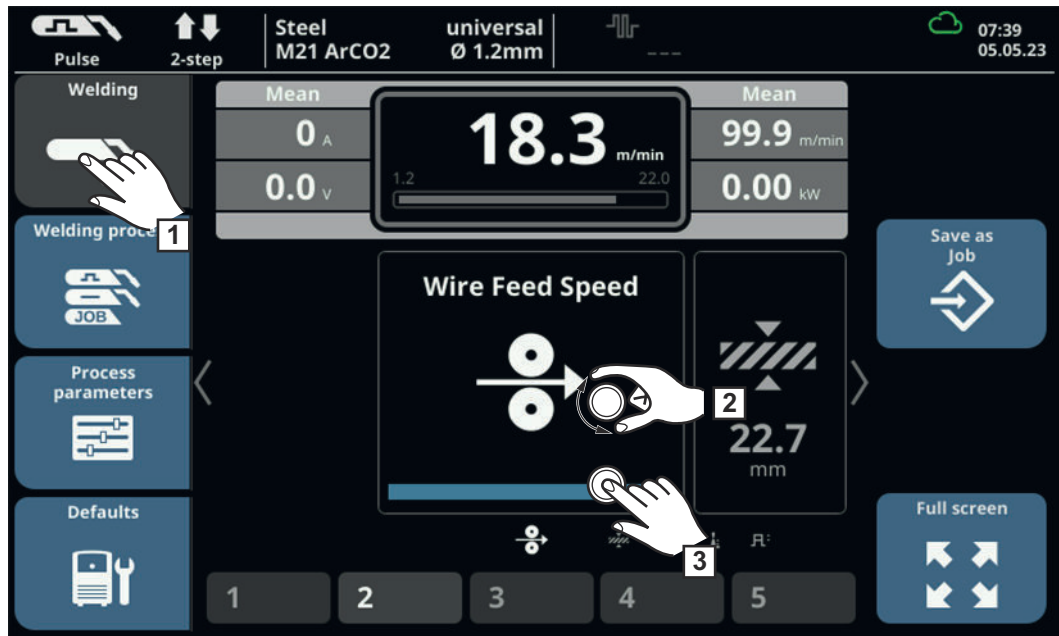
- 14 Select "Next"

The confirmation step of the filler metal wizard is displayed:

- 15 Select "Save"/press the selection dial

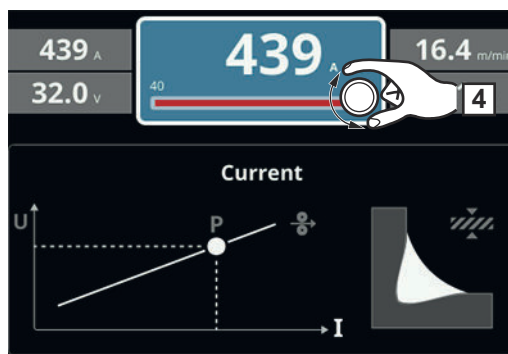
The selected filler metal and associated characteristics for each process are saved.

## Setting the welding parameters



- 1 Select "Welding"
- 2 Turn the selection dial to select the desired welding parameter
- 3 Press the selection dial to change the parameter

The value of the parameter is displayed as a horizontal scale, the parameter is illustrated by means of an animated graphic:



*e.g., parameter welding current*

The selected parameter can now be changed.

- 4 Change the parameter by turning the selection dial

The new parameter value is applied immediately.

If one of the wire feed speed, sheet thickness, welding current, or welding voltage parameters is changed during Synergic welding, all the other parameters are immediately modified accordingly.

- 5 Press the selection dial to access the welding parameters overview
- 6 If necessary, set the process parameters for user- or application-specific settings on the welding system

### NOTE!

**If there is a WF 25i Dual dual-head wirefeeder in the welding system, set the welding parameters and process parameters for both welding process lines separately.**



- 1 Select the currently selected welding process line in the status bar
- 2 Set welding parameters and process parameters for both welding process lines

### Adjusting the quantity of shielding gas

- 1 Open the gas cylinder valve
- 2 Press the Gas-test button

Gas flows out.

The "Gas purging" dialog box appears on the display, indicating the remaining gas purging duration. If there is a gas regulator or gas sensor in the welding system, the actual gas value is also displayed.

- 3 Turn the adjusting screw on the bottom of the gas pressure regulator until the manometer displays the desired quantity of shielding gas
- 4 Press the Gas-test button

The gas flow stops.

## MIG/MAG or CMT welding



- 1 Select "Welding" to display the welding parameters

### **WARNING!**

#### **Danger due to emerging wire electrode.**

Serious personal injuries may result.

- ▶ Hold the welding torch so that the tip of the welding torch points away from the face and body.
- ▶ Wear suitable protective goggles.
- ▶ Do not point the welding torch at people.
- ▶ Ensure that the wire electrode can only intentionally make contact with electrically conductive objects.

- 2 Press the torch trigger and start welding

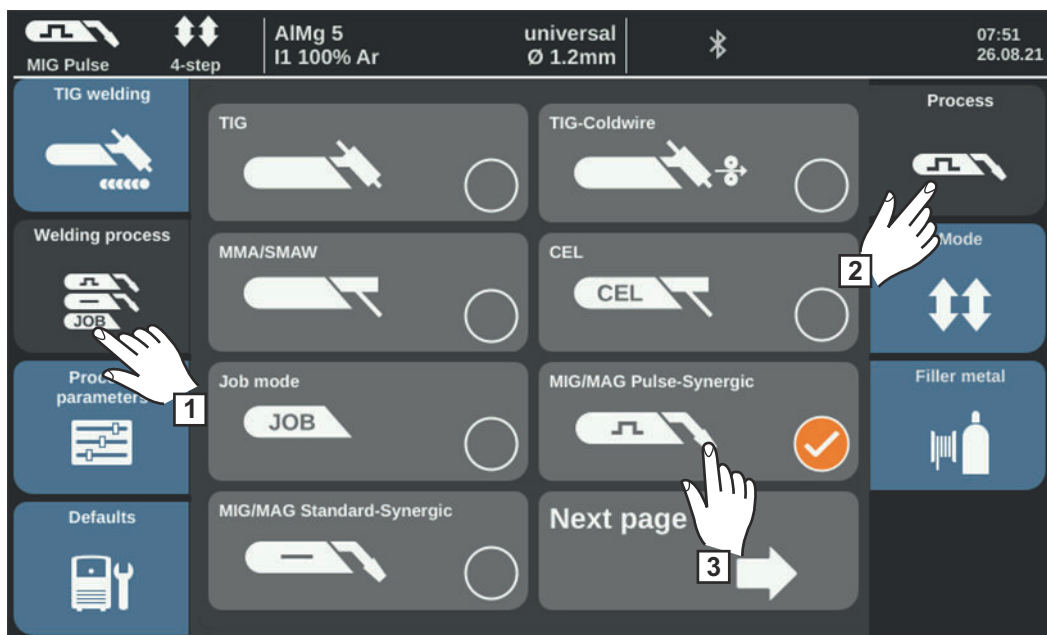
Each time at the end of welding, the welding data are saved depending on the setting; Hold or Mean is shown on the display (see also page 228).

### **NOTE!**

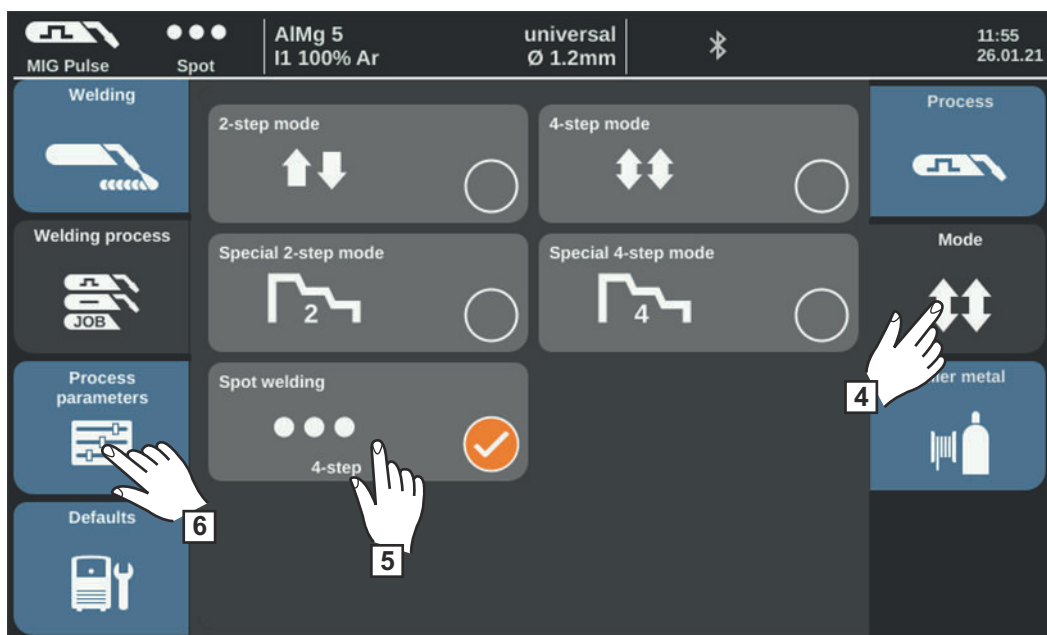
**Under certain circumstances, it may not be possible to change the set welding parameters of a system component - such as wirefeeder or remote control - on the control panel of the power source.**

# Spot welding and stitch welding

## Spot welding

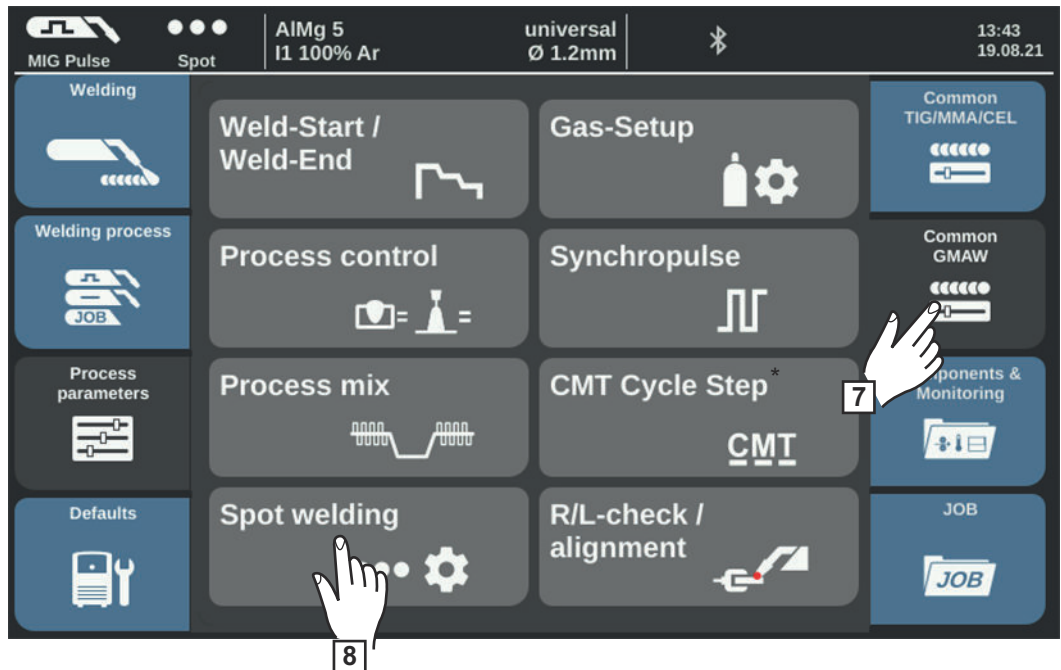


- 1 Select "Welding process"
- 2 Select "Process"
- 3 Select the desired welding process



- 4 Select "Mode"
- 5 Select "Spot welding"
- 6 Select "Process parameters"





\* Displayed only when the OPT/i CMT Cycle Step option is present on the power source. In TWIN mode, the TWIN Process control button is displayed after the Process Mix button. In this case, the Spot welding button is on the next page.

**7** Select "General MIG/MAG"

**8** Select "Spot welding"

The spot welding time parameter is displayed.

**9** Enter the desired value for the spot welding time: Press and turn the selection dial

Setting range: 0.1 - 10.0 s  
Factory setting: 1.0 s

**10** Apply value with OK

#### NOTE!

#### 4-step mode is set by default for spot welding.

Press torch trigger - The spot welding process runs until end of the spot welding time - pressing again stops spot welding prematurely

- The spot welding parameter can be changed to 2-step under Defaults / System / Mode Setup  
(further information on 2-step and 4-step mode for spot welding can be found from page [239](#) onwards)

**11** Select filler metal, wire diameter, and shielding gas

**12** Open the gas cylinder valve

**13** Adjust the quantity of shielding gas



**WARNING!****Danger due to emerging wire electrode.**

Serious personal injuries may result.

- ▶ Hold the welding torch so that the tip of the welding torch points away from the face and body.
- ▶ Wear suitable protective goggles.
- ▶ Do not point the welding torch at people.
- ▶ Ensure that the wire electrode can only intentionally make contact with electrically conductive objects.

**14** Spot welding**Procedure for creating a welding spot:**

- 1** Keep the welding torch vertical
- 2** Press and release the torch trigger
- 3** Maintain the position of the welding torch
- 4** Wait for the gas post-flow time
- 5** Raise the welding torch

**NOTE!****The selected weld start and weld end parameters are also active when spot welding.**

- ▶ Under Process parameters / General MIG/MAG / Weld-Start/Weld-End, a weld start/weld end treatment can thus be stored for spot welding.
- ▶ If final current time is active, the end of welding is not after the set spot welding time, but only after the set slope and final current times have elapsed.

**Stitch welding**

- 1** Select the desired welding process:
  - via the status bar - see from page [156](#)
  - or
  - via the menu bar - see from page [158](#)
- 2** Select the operating mode for stitch welding:
  - via the status bar - see from page [156](#)
  - or
  - via the menu bar - see from page [158](#)
- 3** Select the filler metal, wire diameter, and shielding gas
- 4** Set the desired welding parameters depending on the selected welding process
- 5** Activate stitch welding:
  1. Select the process functions display in the status bar
  2. Select interval
  - or
  1. Under Process parameters / Common / Interval set the Interval parameter to "on"

Stitch welding is activated, the Interval display lights up in the status bar.
- 6** Set the other parameters for stitch welding:
 

Stitch welding time, interval pause time, interval cycles
- 7** Open the gas cylinder valve

- 8 Adjust the quantity of shielding gas



### **WARNING!**

#### **Danger due to emerging wire electrode.**

Serious personal injuries may result.

- ▶ Hold the welding torch so that the tip of the welding torch points away from the face and body.
  - ▶ Wear suitable protective goggles.
  - ▶ Do not point the welding torch at people.
  - ▶ Ensure that the wire electrode can only intentionally make contact with electrically conductive objects.
- 

- 9 Stitch welding

#### **Procedure for stitch welding:**

- 1 Keep the welding torch vertical
- 2 Depending on the set operating mode:  
Press and hold the torch trigger (2-step mode)  
Press and release the torch trigger (4-step mode)
- 3 Maintain the position of the welding torch
- 4 Wait for the welding interval
- 5 Position the welding torch at the next point
- 6 To stop stitch welding, depending on the set operating mode:  
Release the torch trigger (2-step mode)  
Press and release the torch trigger (4-step mode)
- 7 Wait for the gas post-flow time
- 8 Raise the welding torch

#### **Notes on stitch welding**

For PMC characteristics, the setting of the SFI parameter influences the re-ignition behavior in interval operation:

SFI = on

Re-ignition occurs with SFI.

SFI = off

Re-ignition takes place by means of touchdown ignition.

For aluminum alloys, SFI is always used for pulse and PMC ignition. SFI ignition cannot be deactivated.

If the SlagHammer function is stored on the selected characteristic, faster and more stable SFI ignition takes place in conjunction with a CMT drive unit and a wire buffer.

# MIG/MAG and CMT welding parameters

## Welding parameters for MIG/MAG pulse synergic welding and PMC welding

For MIG/MAG pulse synergic welding and PMC welding, the following welding parameters can be set and displayed under "welding":

### Wire speed <sup>1)</sup>

0.5 - max <sup>2)</sup> <sup>3)</sup> m/min / 19.69 - max <sup>2)</sup> <sup>3)</sup> ipm.

### Material thickness <sup>1)</sup>

0.1 - 30.0 mm <sup>2)</sup> / 0.004 - 1.18 <sup>2)</sup> in.

### Current <sup>1)</sup> [A]

Setting range: depends on the selected welding process and welding program

Before welding begins, the device automatically displays a standard value based on the programmed parameters. The actual value is displayed during welding.

### Arc length correction

For correcting the arc length;

-10 - +10

Factory setting: 0

- ... shorter arc length
- 0 ... neutral arc length
- + ... longer arc length

### Pulse correction

For correcting the pulse energy in the pulsed arc

-10 - +10

Factory setting: 0

- ... lower droplet detachment force
- 0 ... neutral droplet detachment force
- + ... increased droplet detachment force

### NOTE!

**SynchroPulse can be activated via the status bar.**

(see page [145](#))

- If SynchroPulse is activated, the SynchroPulse parameters are also displayed with the welding parameters.

---

**Welding parameters for MIG/MAG standard synergic welding, LSC welding, and CMT welding**

For MIG/MAG standard synergic welding, LSC welding, and CMT welding, the following welding parameters can be set and displayed in the "welding parameters" menu item:

**Wire speed <sup>1)</sup>**

0.5 - max <sup>2) 3)</sup> m/min / 19.69 - max <sup>2) 3)</sup> ipm.

---

**Material thickness <sup>1)</sup>**

0.1 - 30.0 mm <sup>2)</sup> / 0.004 - 1.18 <sup>2)</sup> in.

---

**Current <sup>1)</sup> [A]**

Setting range: depends on the selected welding process and welding program

Before welding begins, the device automatically displays a standard value based on the programmed parameters. The actual value is displayed during welding.

---

**Arc length correction**

For correcting the arc length;

-10 - +10

Factory setting: 0

- ... shorter arc length  
0 ... neutral arc length  
+ ... longer arc length

---

**Dynamic correction**

for setting the short circuit current and the current to short-circuit breakup

-10 - +10

Factory setting: 0

-10

harder arc (higher current in case of short circuit breakup, increased welding spatter)

+10

softer arc (lower current in case of short circuit breakup, reduced welding spatter formation)

---

**NOTE!**

**SynchroPulse can be activated via the status bar.**

(see page [145](#))

- If SynchroPulse is activated, the SynchroPulse parameters are also displayed with the welding parameters.
-

## Welding parameters for MIG/MAG standard manual welding

For MIG/MAG standard manual welding, the following welding parameters can be set and displayed in the "Welding" menu item:

### Voltage <sup>1)</sup> [V]

Setting range: depends on the selected welding process and welding program

Before welding begins, the device automatically displays a standard value based on the programmed parameters. The actual value is displayed during welding.

### Wire speed <sup>1)</sup>

To set a harder and more stable arc

0.5 - max <sup>2)</sup> m/min / 19.69 - max <sup>2)</sup> ipm.

### Arc-force dynamic:

For influencing the short-circuiting dynamic at the instant of droplet transfer

0 - 10

Factory setting: 1.5

0 ... harder and more stable arc

10 ... softer and low spatter arc

## Explanation of footnotes

- 1) Synergic parameters  
If a synergic parameter is changed, all other synergic parameters are automatically set as well due to the synergic function.

The actual setting range depends on the power source and wire speed, as well as which welding program was selected.

- 2) The actual setting range depends on the selected welding program.
- 3) The maximum value depends on the actual wire speed.

# MIG/MAG process parameters

## MIG/MAG process parameters



### MIG/MAG process parameters:

Weld start / Weld end, Gas setup, Process control, SynchroPulse, Process mix, CMT Cycle Step, Spot welding, R/L-check / alignment

Process parameters for components and monitoring see page [212](#).

## Process parameters for weld start / weld end

The following process parameters can be set and displayed for the start and end of welding:

### Special 2/4-step mode parameters

#### Starting current

To set the starting current for MIG/MAG welding (e.g., start of welding for aluminum)

0 - 400% (of the welding current)

Factory setting: 135%

#### Start arc length correction

For correcting arc length at weld start

-10 - -0.1 / auto / 0.0 - 10.0

Factory setting: auto

- ... shorter arc length

0 ... neutral arc length

+ ... longer arc length

auto:

The value set in the welding parameters is adopted

#### Starting current time

For specifying how long the starting current is to be active

off / 0.1 - 10.0 s  
Factory setting: off

---

### **Slope 1**

To set the time during which the starting current is reduced or increased to the welding current

0.0 - 9.9 s  
Factory setting: 1.0 s

---

### **Slope 2**

To set the time during which the welding current is reduced or increased to the final current.

0.0 - 9.9 s  
Factory setting: 1.0 s

---

### **Final current**

To set the final current in order to

- a) prevent a build-up of heat at the end of welding and
- b) fill the end-crater in the case of aluminum

0 - 400% (of the welding current)  
Factory setting: 50%

---

### **End arc length correction**

For correcting the arc length at the end of welding

-10 - -0.1 / auto / 0.0 - 10.0  
Factory setting: auto

- ... shorter arc length
- 0 ... neutral arc length
- + ... longer arc length

auto:  
The value set in the welding parameters is adopted

---

### **Final current time**

For specifying how long the final current is to be active

off / 0.1 - 10.0 s  
Factory setting: off

---

### **SFI parameter**

---

#### **SFI**

to activate / deactivate the function SFI (Spatter Free Ignition of the arc)

SFI causes an almost spatter-free ignition of the arc due to a controlled starting current curve with synchronized wire retraction movement.

off/on  
Factory setting: off

#### NOTE!

- ▶ SFI is permanently integrated in certain welding processes and cannot be deactivated.
- ▶ If SH is displayed in the status bar for SFI, the SlagHammer function is active in addition to SFI.  
SFI and SH cannot be deactivated.

#### SFI Hotstart

To set a HotStart time in conjunction with SFI ignition

During SFI ignition, a spray arc phase runs within the set HotStart time. This increases the heat input regardless of the operating mode and thus ensures a deeper penetration from the start of welding.

off / 0.01 - 2.00 s

Factory setting: off

#### Manual welding parameters

##### Ignition current (manual)

To set the ignition current for MIG/MAG standard manual welding

100 - 550 A (TPS 320i)

100 - 600 A (TPS 400i, TPS 400i LASC ADV)

100 - 650 A (TPS 500i, TPS 600i)

Factory setting: 500 A

##### Wire retraction (manual)

To set the wire retraction value (= combined value from wire retraction and a time) during MIG/MAG standard manual welding

The wire retraction depends on the equipment on the welding torch.

0.0 - 10.0

Factory setting: 0.0

#### Wire retraction

##### Wire retraction

To set the wire retraction value (= combined value from wire retraction and a time)

The wire retraction depends on the equipment on the welding torch.

0.0 - 10.0

Factory setting: 0.0

#### Process parameters for gas setup

The following process parameters can be set and displayed for the gas setup:

##### Gas pre-flow

To set the gas flow time before the arc is ignited

0 - 9.9 s

Factory setting: 0.1 s

##### Gas post-flow

To set the gas flow time after the arc has gone out



0 - 60 s  
Factory setting: 0.5 s

### Gas factor

Depends on the shielding gas used  
(only in conjunction with the OPT/i gas controller option)

auto / 0.90 - 20.00  
Factory setting: auto  
(for standard gases from the Fronius welding database, the correction factor is set automatically)

### Gas set value

Shielding gas flow rate  
(only in conjunction with OPT/i gas flow sensor option)

off / auto / 0.5 - 30.0 l/min  
Factory setting: 15.0 l/min

**IMPORTANT!** If the set value for the shielding gas flow rate is high (e.g., 30 l/min), ensure that the gas line is adequately dimensioned!

### Settings for gas set value "auto"

When set to "auto", the gas setpoint automatically adjusts to the current welding current within a set current range.

### Lower current

for setting the lower current range limit

0 - max. A  
Factory setting: 50 A

### Gas set value at lower current

0.5 - 30.0 l/min  
Factory setting: 8.0 l/min

### Lower current

for setting the upper current range limit

0 - max. A  
Factory setting: 400 A

### Gas set value at upper current

0.5 - 30.0 l/min  
Factory setting: 25.0 l/min

In Job Mode, the values of the above parameters can be saved individually for each job.

### Process parameters for process control

The following process parameters can be set and displayed for process control:

- Penetration stabilizer
- Arc length stabilizer
- Combination of penetration stabilizer and arc length stabilizer

---

**Penetration stabilizer**

The penetration stabilizer is used to set the max. permissible wire speed change in order to keep the welding current and thereby the penetration stable or constant with variable stick out.

The penetration stabilizer parameter is only available if the WP PMC (Welding Process Pulse Multi Control) option or the WP LSC (Welding Process Low Spatter Control) option is enabled on the power source.

auto / 0.0 - 10.0 m/min (ipm)  
Factory setting: 0 m/min

auto

A value of 10 m/min is stored for all characteristics, the penetration stabilizer is activated.

0

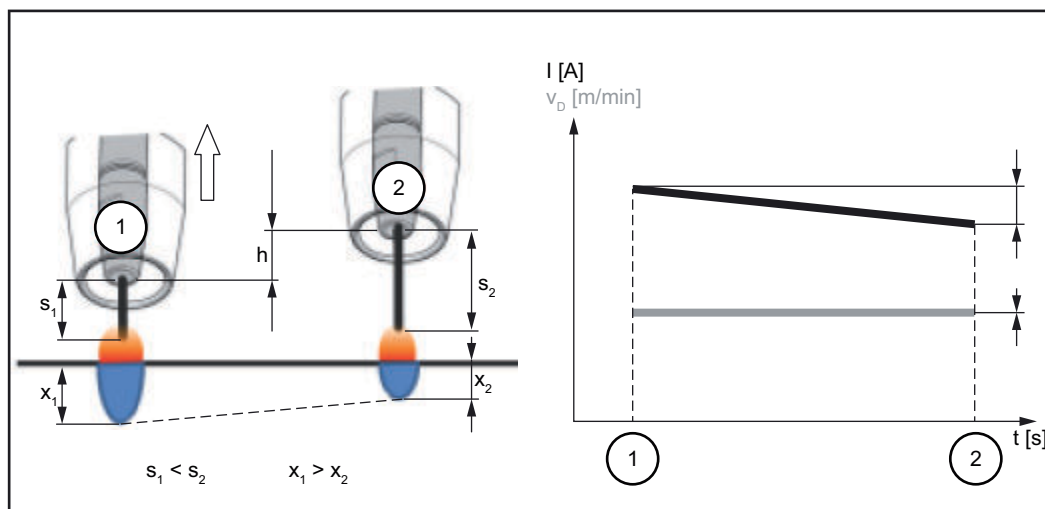
The penetration stabilizer is not activated.  
The wire speed remains constant.

0.1 - 10.0

The penetration stabilizer is activated.  
The welding current remains constant.

## Application examples

Penetration stabilizer = 0 m/min (not activated)

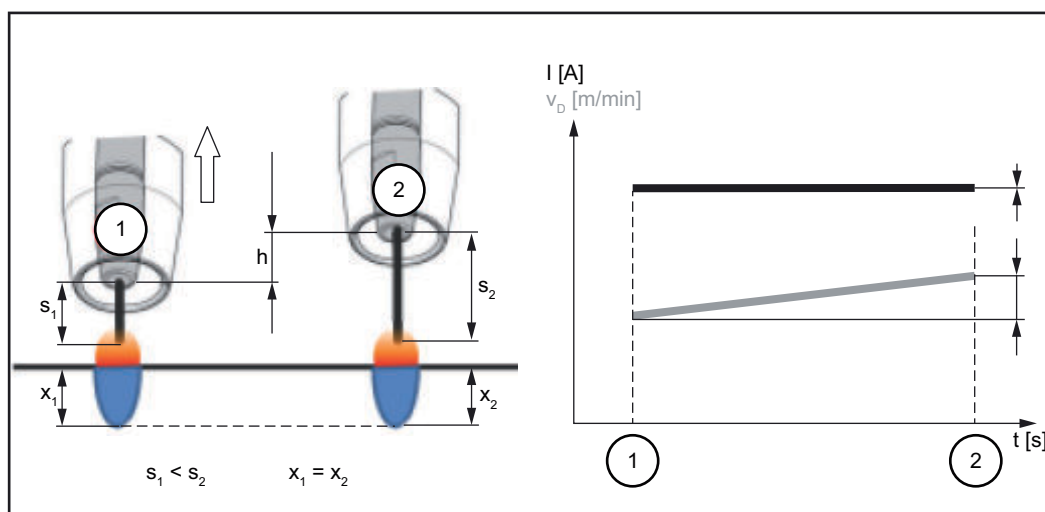


Penetration stabilizer = 0 m/min (not activated)

A change in the contact tube distance ( $h$ ) causes a change in resistance in the welding circuit due to longer stick out ( $s_2$ ).

The constant voltage control for constant arc length causes a reduction of the average current and thus a smaller penetration depth ( $x_2$ ).

Penetration stabilizer =  $n$  m/min (activated)

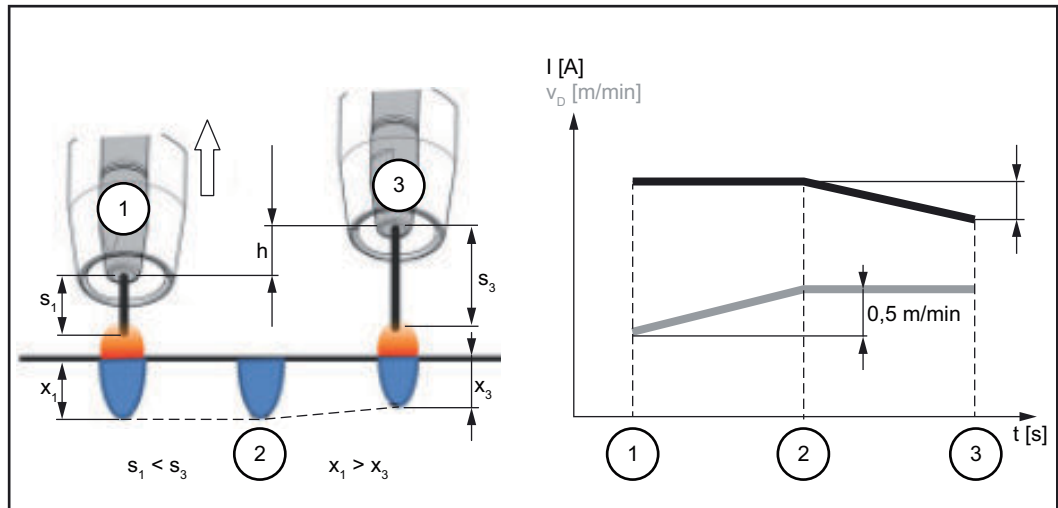


Penetration stabilizer =  $n$  m/min (activated)

Value presetting for the penetration stabilizer causes a constant arc length without large current changes in the event of a stick out change ( $s_1 \Rightarrow s_2$ ).

The penetration ( $x_1, x_2$ ) remains approximately the same and stable.

Penetration stabilizer = 0.5 m/min (activated)



Penetration stabilizer = 0.5 m/min (activated)

In order to keep the change in welding current as low as possible during a stick out change ( $s_1 \Rightarrow s_3$ ), the wire speed is increased or reduced by 0.5 m/min. In the example shown, the stabilizing effect is maintained up to the set value of 0.5 m/min (position 2) without any change in current.

I ... Welding current  $v_D$  ... Wire speed

## Arc length stabilizer

### Arc length stabilizer

The arc length stabilizer uses short-circuit control to force short arcs that are advantageous for welding and keeps them stable even with a variable stick out or in the event of external disturbances.

The arc length stabilizer parameter is only available if the WP PMC (Welding Process Pulse Multi Control) option is enabled on the power source.

0.0 / auto / 0.1 - 5.0 (action of the stabilizer)

Factory setting: 0.0

0.0

The arc length stabilizer is deactivated.

auto

- For inert gases (100% Ar, He, etc.) a value = 0 is stored.
- For the remaining materials / gas combinations, a characteristic-dependent value between 0.2 - 0.5 is stored.
- From a wire speed of 16 m/min a value = 0 is stored

0.1 - 5.0

The arc length stabilizer is activated.

The arc length is reduced until short circuits occur.

### NOTE!

**If the arc length stabilizer is activated, the normal arc length correction is only effective at weld start.**

- The arc length correction is then no longer displayed in the welding parameters.

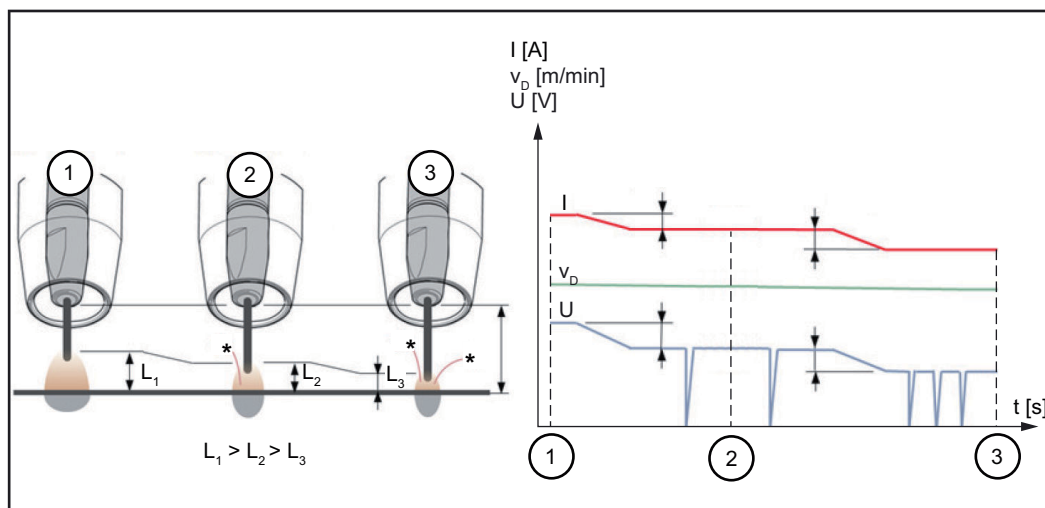
## Application examples

Arc length stabilizer = 0 / 0.5 / 2.0

① Arc length stabilizer = 0

② Arc length stabilizer = 0.5

③ Arc length stabilizer = 2

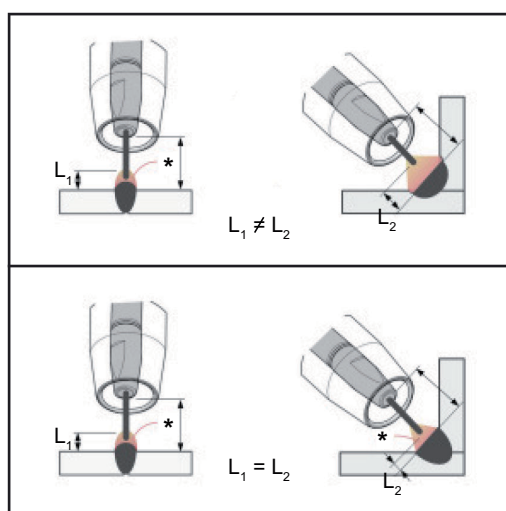


Arc length stabilizer = 0 / 0.5 / 2.0

Activating the arc length stabilizer reduces the arc length until short circuits occur. This allows the advantages of a short, stably controlled arc to be better exploited.

Increasing the arc length stabilizer causes a further shortening of the arc length ( $L_1 \Rightarrow L_2 \Rightarrow L_3$ ). The advantages of a short, stably controlled arc can be better exploited.

Arc length stabilizer for weld seam profile and position changes



### Arc length stabilizer not activated

Weld seam profile or welding position changes can negatively influence the welding result

### Arc length stabilizer activated

Since the number and duration of the short circuits are controlled, the properties of the arc remain the same when the weld seam profile or welding position is changed.

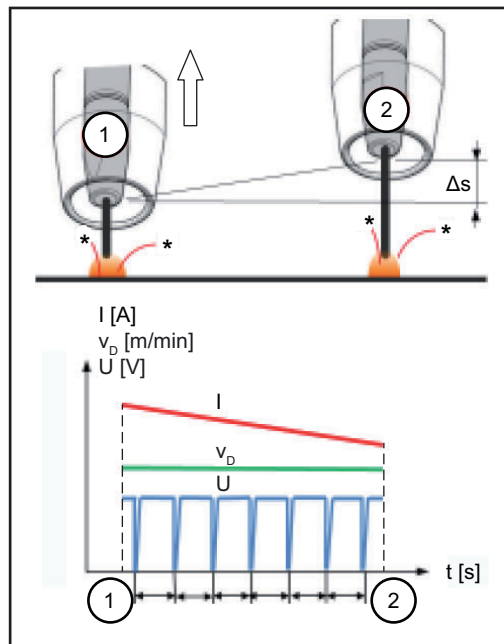
I ... Welding current  $v_D$  ... Wire speed U ... Welding voltage

\* ... Number of short circuits

**Combination of penetration stabilizer and arc length stabilizer**

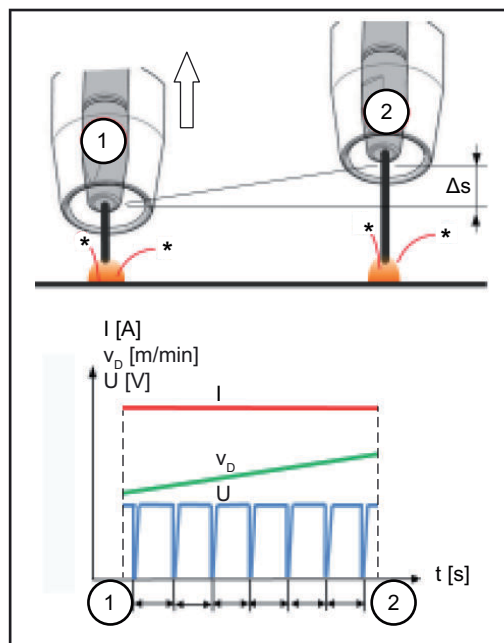
Example: Stick out change

**Arc length stabilizer without penetration stabilizer**



The advantages of a short arc are maintained even if the stick out is changed, since the short-circuit properties stay the same.

**Arc length stabiliser with penetration stabilizer**



If the stick out is changed with the penetration stabilizer activated, the penetration also stays the same. The short circuit behaviour is controlled by the arc length stabilizer.

$I$  ... Welding current  $v_D$  ... Wire speed  $U$  ... Welding voltage  
 $*$  ... Number of short circuits  $\Delta s$  ... Stick out change

## Process parameters for SynchroPulse

The following process parameters can be set for SynchroPulse welding:

### (1) SynchroPulse

To activate/deactivate SynchroPulse

off/on

Factory setting: on

### (2) Wire speed

To set the average wire speed and therefore the welding power for SynchroPulse

For example: 2 - 25 m/min (ipm)

(Depending on wire speed and welding characteristic)

Factory setting: 5.0 m/min

### (3) Delta wire feed

To set the delta wire feed:

With SynchroPulse, the set wire speed is alternately increased/decreased by the delta wire feed. The parameters concerned are modified accordingly to match the acceleration/deceleration of the wire speed.

0.1 - 6.0 m/min / 5 - 235 ipm

Factory setting: 2.0 m/min

#### NOTE!

**The maximum adjustable delta wire feed of 6 m/min (235 ipm) is only possible up to a frequency of approx. 3 Hz.**

In the frequency range of 3 - 10 Hz, the adjustable delta wire feed decreases.

### (4) Frequency

To set the SynchroPulse frequency

0.5 - 10.0 Hz

Factory setting: 3.0 Hz

#### NOTE!

**In TWIN operation, the frequency setting on the lead power source also affects the trail power source.**

Adjusting the frequency on the trail power source has no effect.

### (5) Duty Cycle (high)

For weighting the duration of the higher operating point in a SynchroPulse period

10 - 90%

Factory setting: 50 Hz

#### NOTE!

**In TWIN operation, the Duty Cycle (high) setting on the lead power source also affects the trail power source.**

Setting the Duty Cycle (high) on the trail power source has no effect.

### (6) Arc correction high

For correcting the arc length with SynchroPulse at the higher operating point (= average wire speed plus delta wire feed)

-10.0 - +10.0  
Factory setting: 0.0

- ... short arc  
0 ... uncorrected arc length  
+ ... longer /arc

#### NOTE!

**If SynchroPulse is activated, the normal arc length correction has no effect on the welding process.**

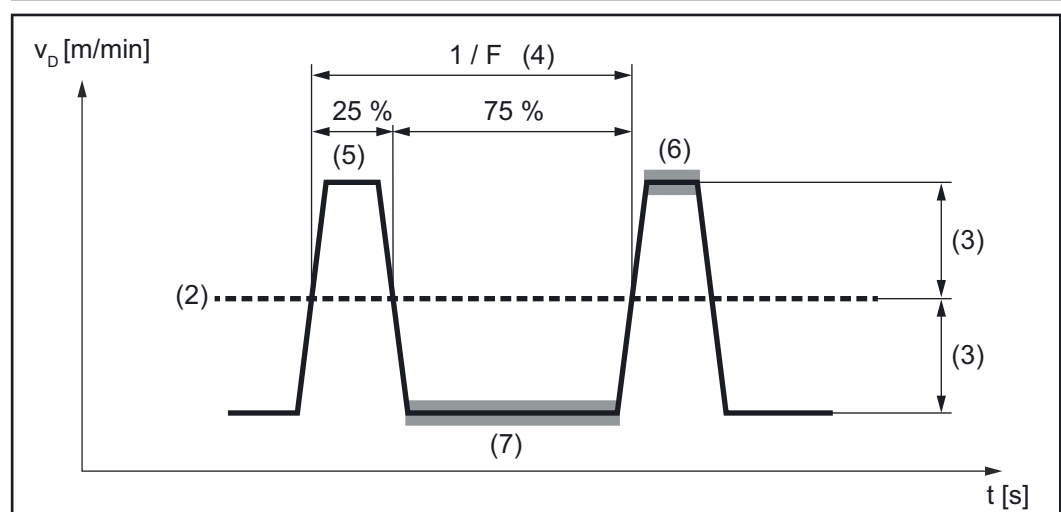
► The arc length correction is then no longer displayed in the welding parameters.

#### (7) Arc correction low,

For correcting the arc length with SynchroPulse at the lower operating point (= average wire speed less delta wire feed)

-10.0 - +10.0  
Factory setting: 0.0

- ... short arc  
0 ... uncorrected arc length  
+ ... longer /arc



Example: SynchroPulse, duty cycle (high) = 25%



## Process parameters for Process Mix

For mixing processes, the following process parameters can be set under Process Mix:

### Wire speed $v_D$ \*

Wire speed

1.0 - 25.0 m/min / 40 - 985 ipm

The wire speed value is taken from the welding parameters or can be specified and changed in the Process Mix parameters.

### Arc length correction

-10.0 - +10.0

The arc length correction value is taken from the welding parameters or can be specified and changed in the Process Mix parameters.

### Pulse correction

For changing the pulse energy in the pulsed arc process phase

-10.0 - +10.0

The pulse/dynamic correction value is taken from the welding parameters or can be specified and changed in the Process Mix parameters.

### Upper power time correction (3) \*

To set the duration of the hot process phase in a mixed process

-10.0 - +10.0

Factory setting: 0

Upper and lower power time correction is used to define the relationship between the hot and cold process phases.

If the lower power time correction is increased, the process frequency reduces and the PMC process phase becomes longer.

If the lower power time correction is reduced, the process frequency increases and the PMC process phase becomes shorter.

### Lower power time correction (2) \*

To set the duration of the cold process phase in a mixed process

-10.0 - +10.0 / 1 - 100 CMT cycles (for CMT mix characteristics)

Factory setting: 0

Upper and lower power time correction is used to define the relationship between the hot and cold process phases.

If the lower power time correction is increased, the process frequency reduces and the LSC process phase becomes longer or, in the case of CMT mix, the CMT process phase becomes longer.

If the lower power time correction is reduced, the process frequency increases and the LSC process phase becomes shorter or, in the case of CMT mix, the CMT process phase becomes shorter.

### Lower power correction (1) \*

To set the energy input in the cold process phase in a mixed process

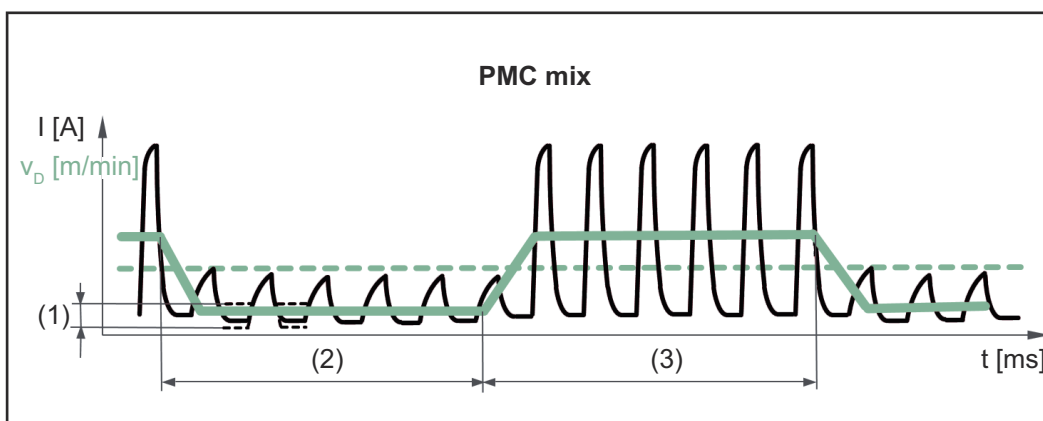
-10.0 - +10.0

Factory setting: 0

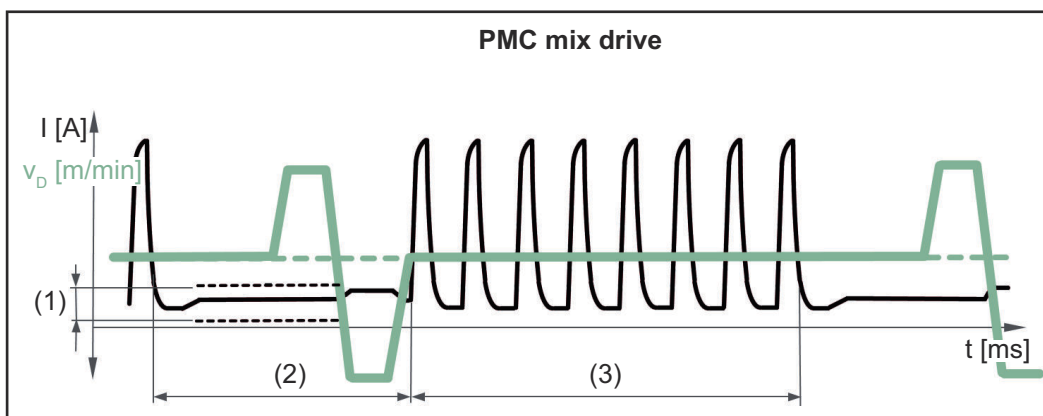
If the lower power correction is increased, this results in a higher wire speed and therefore a higher energy yield in the cold LSC process phase or the cold CMT process phase.

---

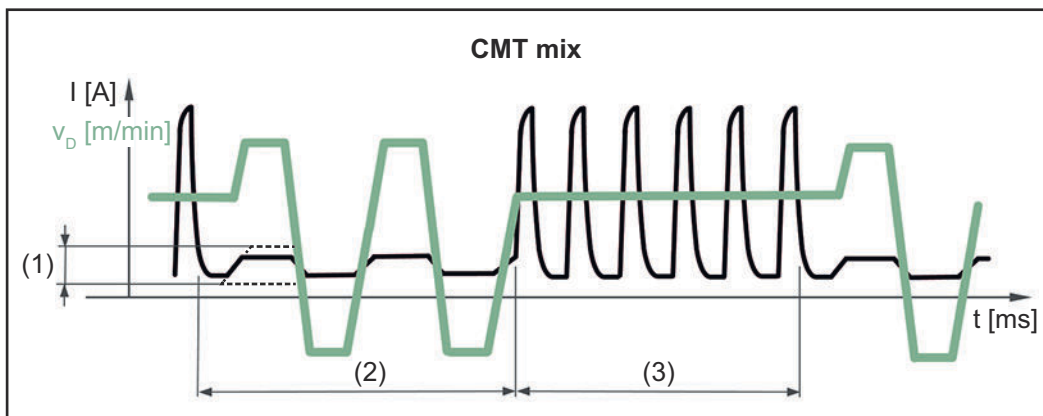
\* Representation of the parameters in the following diagrams



Mixed process between PMC and LSC welding process. A cold LSC process phase follows a hot PMC process phase as part of a cycle.



Mixed process between PMC and wire movement reversal using a PushPull drive unit. A cold low power phase with calibration movement follows a hot PMC process phase.



Mixed process between CMT and PMC welding process. Cold CMT process phases follow hot PMC process phases.

- (1) Lower power correction
- (2) Lower power time correction
- (3) Upper power time correction
- $v_D$  Wire speed

---

**Process parameters for CMT Cycle Step**

**CMT Cycle Step**

To activate / deactivate the function CMT Cycle Step

On/Off

---

**Wire feed**

Wire speed, defines the deposition rate in the welding process phase and thus the size of the welding spot;

Setting range: in m/min (ipm), depending on the welding characteristic

The value for the wire speed is applied; it can also be specified or changed in the CMT Cycle Step parameters.

---

**Cycles (spot size)**

To set the number of CMT cycles (welding droplets) for a spot;

The number of CMT cycles and the set wire speed define the size of the welding spot.

1 - 2000

---

**Interval pause time**

To set the time between the individual welding spots

0.01 - 2.00 s

The higher the value for the interval pause time, the cooler the welding process (coarser rippling).

---

**Interval cycles**

To set the number of CMT cycle repetitions incl. pause until the end of welding

Continuous / 1 - 2000

Continuous

The repetitions are continued continuously; end of welding e.g., via "Arc Off"

---

**Process parameters for spot welding**

**Spot welding time**

0.1 - 10.0 s

Factory setting: 1.0 s

---

**R/L alignment**

Align the welding circuit resistance (R) and inductance (L) if one of the following welding system components is changed:

- Torch hosepacks
- Interconnecting hosepacks
- Return lead cables, welding power-leads
- Wirefeeders
- Welding torches, electrode holders
- PushPull units

**Prerequisites for R/L alignment:**

The welding system must be complete: closed welding circuit with welding torch and torch hosepack, wirefeeders, grounding cable, interconnecting hosepacks.

### Perform R/L alignment:

- 1 Select Process parameters / Common / R/L-check / alignment

The actual values for welding circuit inductance and welding circuit resistance are displayed.

- 2 Select "Next" / press selection dial / press torch trigger

The second step of the R/L alignment wizard is displayed.

- 3 Follow the on-screen instructions

**IMPORTANT!** Contact between the earthing clamp and the workpiece must be made on a cleaned workpiece surface.

- 4 Select "Next" / press selection dial / press torch trigger

The third step of the R/L alignment wizard is displayed.

- 5 Follow the on-screen instructions

- 6 Select "Next" / press selection dial / press torch trigger

The fourth step of the R/L alignment wizard is displayed.

- 7 Follow the on-screen instructions

- 8 Press torch trigger / select "Next" / press selection dial

The actual values are displayed when the measurement is complete.

- 9 Select "End" / press selection dial

Alternatively, the R/L alignment can also be performed via a JobMaster welding torch.



## **Job Mode**



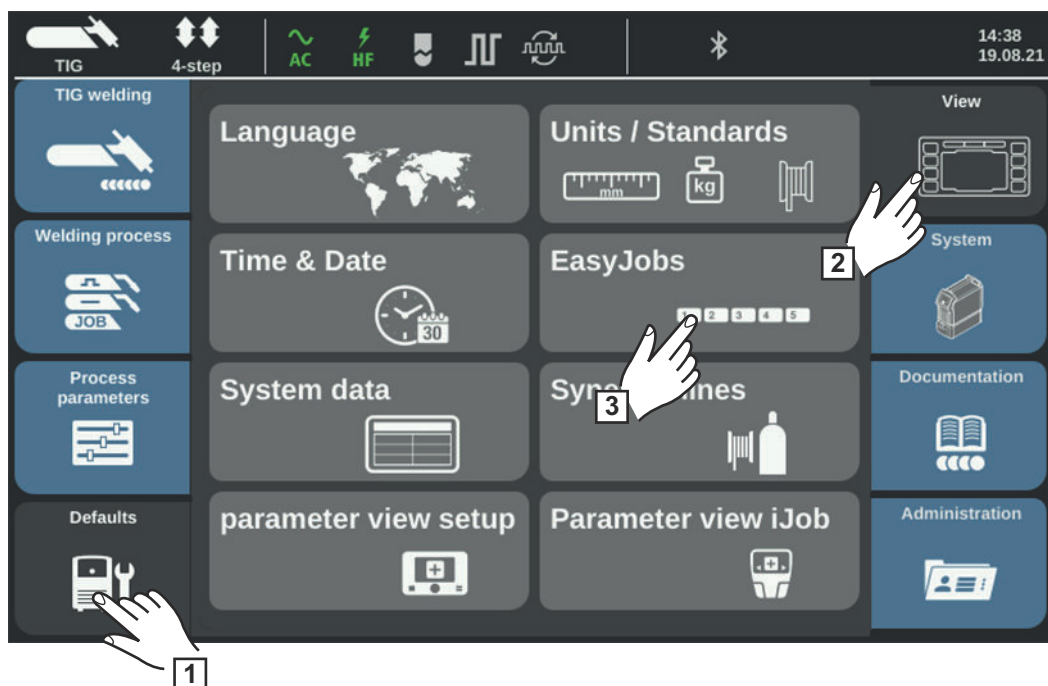


# EasyJob mode

## General

When EasyJob mode is activated, the display shows 5 additional buttons that enable fast saving of up to 5 operating points.  
The current welding-relevant settings are saved.

## Activating EasyJob mode



- 1 Select "Defaults"
- 2 Select "View"
- 3 Select "EasyJobs"

The overview for activating/deactivating EasyJob mode is displayed.

- 4 Select "EasyJobs On"
- 5 Select "OK"

EasyJob mode is activated, the defaults are displayed.

- 6 Select "Welding"

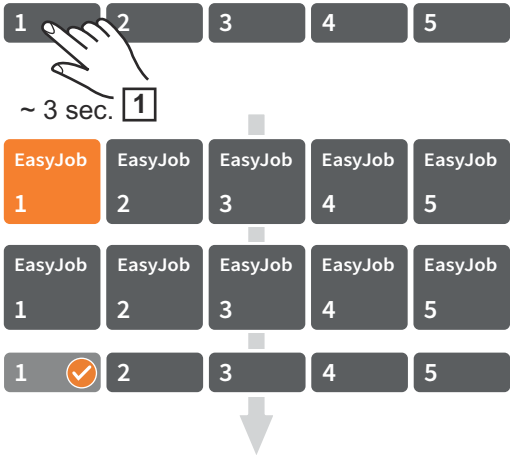
The five EasyJob buttons are displayed with the welding parameters.

Storing EasyJob  
operating points

**NOTE!**

The EasyJobs are stored under job numbers 1 - 5 and can also be retrieved via job mode.

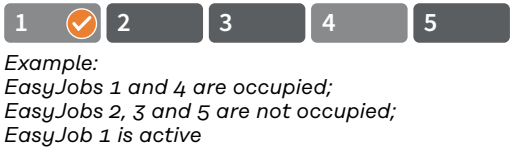
Storing an EasyJob overwrites a job stored under the same job number!



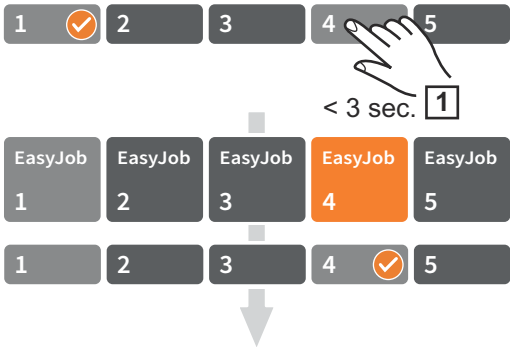
- 1 Touch one of the EasyJob buttons for approx. 3 seconds to store the current welding settings
- The button initially changes in size and color. After approx. 3 seconds, the button changes color again. The settings have now been stored.

The most recently stored settings are enabled. An active EasyJob is displayed by a check mark on the EasyJob button.

Unused EasyJob buttons are shown in dark gray.

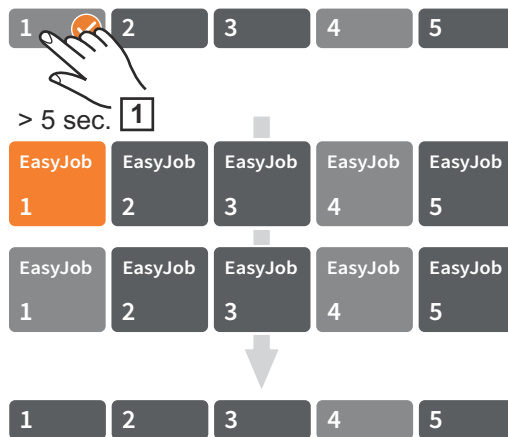


Retrieving Easy-  
Job operating  
points



- 1 To retrieve a stored EasyJob operating point, briefly touch the corresponding EasyJob button (< 3 seconds)
- The button briefly changes in size and color and is then displayed with a check mark:
- If no check mark is displayed after touching an EasyJob button, an operating point is not stored under this button.

## Deleting Easy-Job operating points



- 1 To delete an EasyJob operating point, touch the corresponding EasyJob button for approx. 5 seconds

The button

- initially changes in size and color;
  - color changes again after approx. 3 seconds
- The stored operating point is overwritten with the current settings.
- is highlighted in red after a total of approx. 5 seconds (= delete).

The EasyJob operating point has been deleted.

## Loading more EasyJobs

With this function, any saved job can be loaded as an EasyJob in the welding menu without switching to Job Mode.

- 1 Select Defaults / View / EasyJobs

The overview for activating/deactivating EasyJob mode is displayed.

- 2 "Select "Load more EasyJobs"

- 3 Select "OK"

Advanced EasyJob mode is activated, the defaults are displayed.

- 4 Select "Welding"

In the welding parameters, the "Load job" button is also displayed in the right menu bar.



- 5 Select "Load Job"

The list of stored jobs is displayed.

- 6 Use the selection dial to select the desired job
- 7 Select "Load" or press the selection dial

The job is loaded in the welding menu, the power source is not in Job Mode.

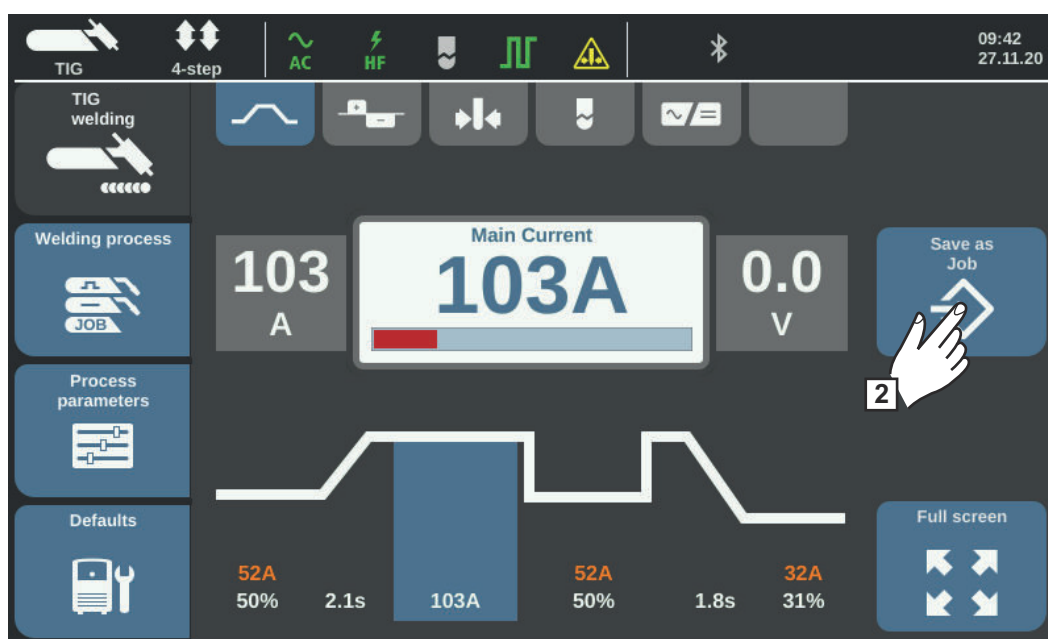
## General

Up to 1000 jobs can be stored and reproduced on the power source. This eliminates the need to manually document the welding parameters. Job mode thereby increases the quality of automated and manual applications.

Jobs can only be saved during welding mode. In addition to the current welding settings, the process parameters and certain machine defaults are also taken into account when saving jobs.

## Saving settings as a job

- 1 Set the parameters to be saved as a job:
  - Welding parameters
  - Welding process
  - Process parameters
  - Machine defaults, if applicable



- 2 Select "Save as Job"

The list of jobs is displayed.

To overwrite an existing job, select the job by turning and pressing the selection dial (or select "Next page"). After a prompt appears, the selected job can be overwritten.

For a new job, select "Create a new Job"

- 3 Press the selection dial/select "Next page"

The next free job number is displayed.

- 4 Turn the selection dial and select the desired storage location

- 5 Press the selection dial/select "Next page"

The keyboard is displayed.

- 6 Enter a job name
- 7 Select "OK" and confirm the job name/press the selection dial

The name is applied and confirmation that the job has been saved is displayed.

- 8 Select "Exit" to exit/press the selection dial

## Welding job - retrieving jobs

### NOTE!

**Before retrieving a job, ensure that the welding system is set up and installed according to the job in question.**



- 1 Select "Welding process"
- 2 Select "Process"
- 3 Select "JOB"

Alternatively, the welding process can also be selected via the status bar (compare with the selection method described from page 36).

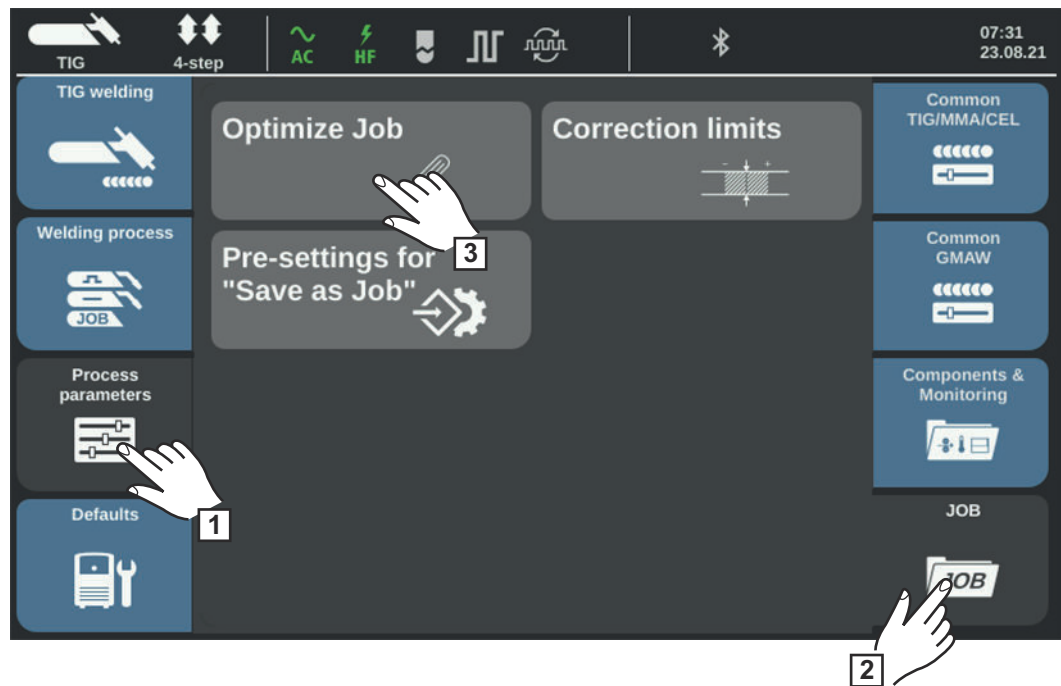
Job mode is activated.

"Welding job" and the data for the last job retrieved are displayed.

- 4 Select "Welding job"
- 5 Turn the selection dial and select "Job number" (white background)
- 6 Press the selection dial to select the desired job (blue background)
- 7 Turn the selection dial and select the desired job number (blue background)  
The name of the selected job is displayed above the actual value display.
- 8 Press the selection dial and accept the selected job number (white background)
- 9 Initiate welding process

**IMPORTANT!** In job mode, only the "Job number" welding parameter can be changed; the remaining welding parameters can only be viewed.

## Optimizing a job

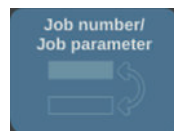


- 1 Select "Process parameters"
- 2 Select "JOB"
- 3 Select "Optimize Job"

The overview of the last optimized job is displayed.

- 4 Turn the selection dial and select either the job or the parameters of the job to be modified

You can also select between job and job parameters by touching the "Job number/Job parameter" button.



Select a job:

- Press the selection dial

The job number is highlighted in blue and can now be changed.

- Turn the selection dial to select the job to be changed
- Press the selection dial to change the job

Select a job parameter:

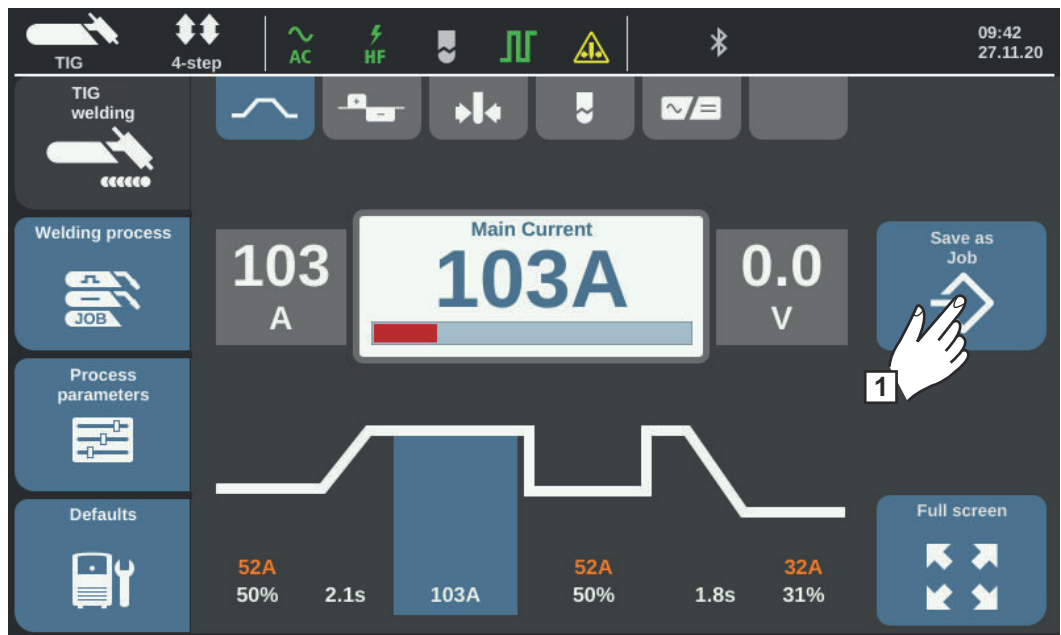
- Turn the selection dial and select the parameter to be changed
- Press the selection dial

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

- Turn the selection dial; the change of value is applied immediately
- Press the selection dial to select other parameters

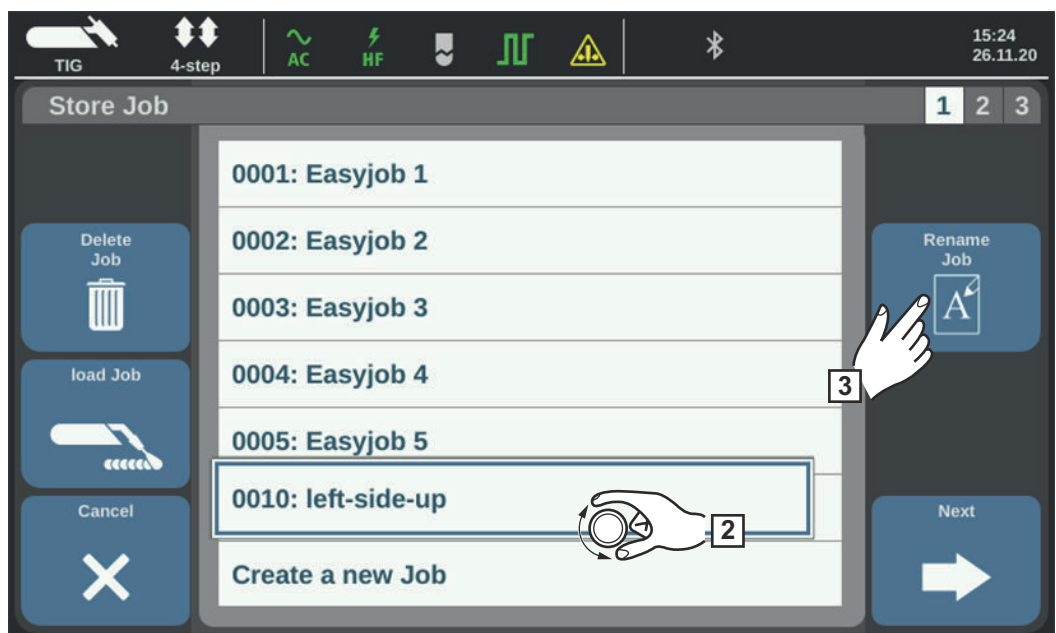
- 5 Select "Exit"

## Renaming a job



- 1 Select "Save as Job"  
(also works in job mode)

The list of jobs is displayed.



- 2 Turn the selection dial and select the job to be renamed
- 3 Select "Rename Job"

The keyboard is displayed.

- 4 Use the keyboard to change the job name
- 5 Select "OK" and confirm the changed job name/press the selection dial

The job name has been changed and the list of jobs is displayed.

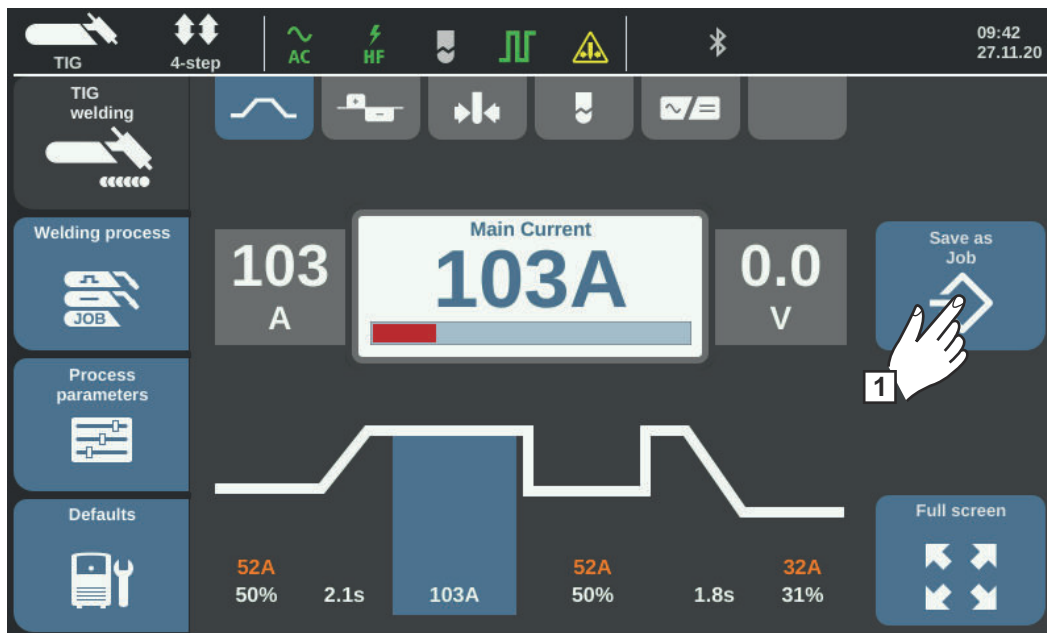
- 6 Select "Cancel" to exit



**NOTE!**

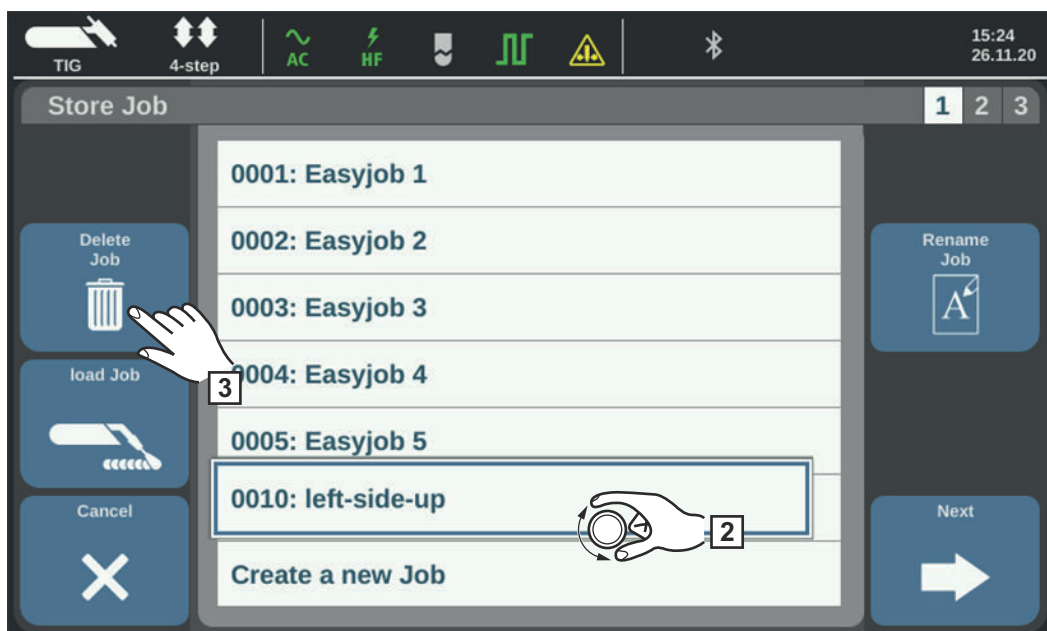
As an alternative to the procedure described above, the job can also be renamed in the process parameters:

- Process parameters / Job / Optimize job / Rename job

**Deleting a job**

- 1 Select "Save as Job"  
(also works in job mode)

The list of jobs is displayed.



- 2 Turn the selection dial and select the job to be deleted
- 3 Select "Delete Job"

The prompt to delete the job is displayed.

- 4 Select "Yes" to delete the selected job

The job has been deleted and the list of jobs is displayed.

- 5 Select "Cancel" to exit

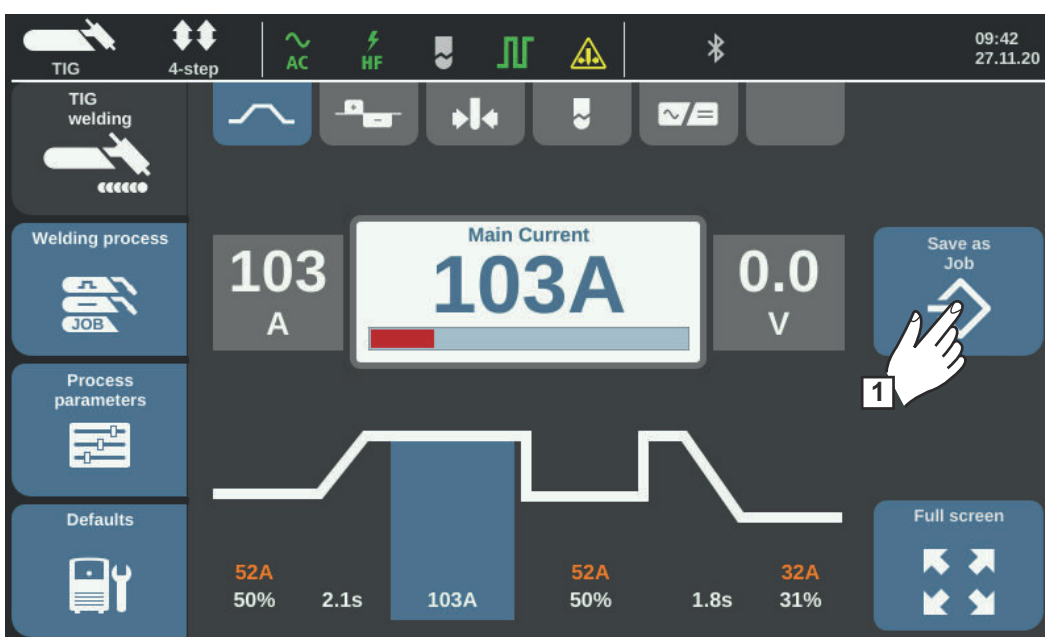
#### NOTE!

**As an alternative to the procedure described above, the job can also be deleted in the process parameters:**

- Process parameters / Job / Optimize job / Delete job

## Loading a job

Use the Load Job function to load the data for a stored job or EasyJob into the Welding area. The corresponding data for the job is displayed in the welding parameters and can be welded, modified or saved as a new job or EasyJob.



- 1 Select "Save as Job"  
(also works in job mode)

The list of jobs is displayed.

- 2 Turn the selection dial and select the job to be loaded
- 3 Select "Load Job"

The Load Job information is displayed.

- 4 Select "Yes"

The data for the selected job is loaded in the Welding area.

The data for the loaded job can now be welded (no job mode), modified or saved as a new job or EasyJob.

## Job Mode with WF 25i Dual

If a WF 25i Dual dual-head wirefeeder is in the welding system, the following parameters are also available:

- Welding process line  
Process parameters / Job / Optimize job / Welding process parameters
- Ignore welding process line  
Process parameters / Job / Pre-settings for "Save as job" / Dual-head wirefeeder

### Welding process line

The parameter assigns a welding process line to the job:

1

The job can only be welded on welding process line 1.

2

The job can only be welded on welding process line 2.

ignore

The job can be used by both welding process lines.

The welding process line is selected using the torch trigger, status bar, keys on the WF Dual or remote control.

Selecting a job automatically activates the associated welding process line.

The job can be selected from both welding process lines.

For jobs created on a firmware version < 4.0.0, the parameter is automatically set to "ignore" during a firmware update.

If another robot dual-head option is in the system instead of the WF Dual in automated applications, the parameter is not available.

The welding process line is selected via the robot interface.

### Ignore welding process line

The parameter specifies which default value is used for the weld process line when creating a job.

No

The welding process line is taken from the currently active welding process line when a job is created (can be changed).

Yes

The welding process line is initially filled with "ignore" when a job is created (can be changed).

The parameter is set to "No" by default; when a job is created, the currently active welding process line is always adopted.

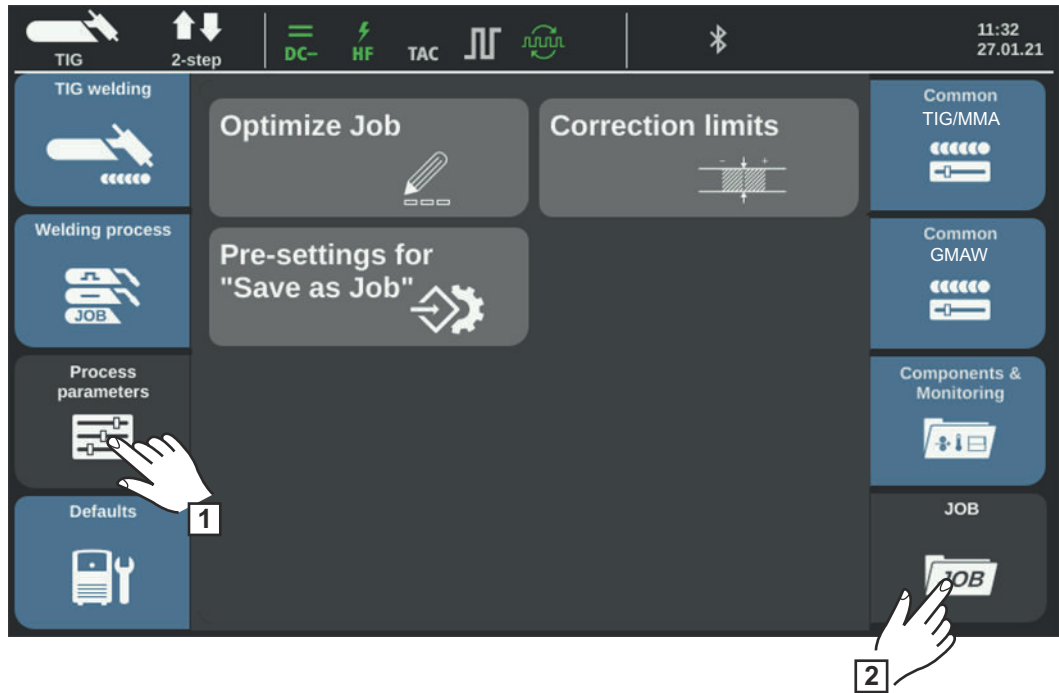
The parameter is not displayed for automated welding systems and has no effect.

### NOTE!

**A JobMaster welding torch is recommended for Job Mode with a WF 25i Dual.**

# Job process parameters

## JOB process parameters



Process parameters for Components and Monitoring see page [212](#).

## Process parameters for "Optimize Job"

The following process parameters can be set for "Optimize Job":

### Working parameters

Starting current [% of main current]	see page <a href="#">83</a>
UpSlope [s]	see page <a href="#">84</a>
Main current [A]	see page <a href="#">84</a>
Lowering current for 4-step mode [% of main current]	see page <a href="#">84</a>
DownSlope [s]	see page <a href="#">85</a>
Final current [% of main current]	see page <a href="#">85</a>
AC Balance iWave AC/DC power sources only [%]	see page <a href="#">86</a>
Electrode diameter [mm]	see page <a href="#">83</a>

## Welding process settings

Polarity [DC-/AC]	see page
TIG welding torch mode [2-step mode/4-step mode/spot welding]	see page <a href="#">73</a>

## TIG pulse settings

Tacking [s]	see page <a href="#">96</a>
Pulse frequency [Hz]	see page <a href="#">96</a>
Base current [% of main current]	see page <a href="#">96</a>
Duty cycle [%]	see page <a href="#">96</a>
Pulse waveform [rectangle/triangle/sine]	see page <a href="#">96</a>
Base current waveform [rectangle/triangle/sine]	see page <a href="#">96</a>

## TIG AC Settings

(iWave AC/DC power sources only)

AC frequency [Hz]	see page <a href="#">98</a>
AC current offset [%]	see page <a href="#">98</a>
Positive half-wave waveform [rectangle/triangle/sine]	see page <a href="#">98</a>
Negative half-wave waveform [rectangle/triangle/sine]	see page <a href="#">98</a>

## Wire speed settings

TIG wire correction	-10 - 10 Factory setting: 0
Wire speed 1 [m/min]	see page <a href="#">106</a>
Wire speed 2 [%]	see page <a href="#">106</a>
Start-up delay wire [s]	see page <a href="#">106</a>
End delay wire [s]	see page <a href="#">106</a>
Wire retraction end [mm]	see page <a href="#">106</a>
Wire position Start [mm]	see page <a href="#">106</a>

Feeder inching speed [m/min]	see page <a href="#">106</a>
<b>Ignition &amp; operating mode settings</b>	
HF ignition [on/off/Touch-HF/external]	see page <a href="#">101</a>
HF ignition delay [s]	see page <a href="#">101</a>
Reversed polarity ignition [off/on]	see page <a href="#">83</a>
<b>Arc monitoring</b>	
Ignition timeout [s]	see page <a href="#">101</a>
Arc break filter time [s]	see page <a href="#">101</a>
Arc break watchdog [ignore/error]	see page <a href="#">101</a>
Lowering current for 4-step mode [% of main current]	see page <a href="#">83</a>
DownSlope [s]	see page <a href="#">83</a>
Final current [% of main current]	see page <a href="#">83</a>
AC Balance iWave AC/DC power sources only [%]	see page <a href="#">86</a>
Electrode diameter [mm]	see page <a href="#">83</a>
<b>Operating mode defaults</b>	
Arc break voltage [V]	see page <a href="#">101</a>
Comfort stop sensitivity [V]	see page <a href="#">101</a>
<b>TIG - General settings</b>	
Starting current time [s]	see page <a href="#">100</a>
Final current time [s]	see page <a href="#">100</a>
Lowering current Slope 1 [s]	see page <a href="#">100</a>
Lowering current Slope 2 [s]	see page <a href="#">100</a>
Spot welding time [s]	see page <a href="#">100</a>

Gas pre-flow [s]	see page <a href="#">107</a>
Gas post-flow [s]	see page <a href="#">107</a>

### TIG job correction limits

Upper main current limit [%]	0 - 50% Factory setting: 0%
Lower main current limit [%]	-50 - 0% Factory setting: 0%
Job slope Defines the time between the currently selected job and the next job [s]	0.0 - 10.0 s Factory setting: 0 s

### CycleTIG

CycleTIG activated	see page <a href="#">105</a>
Interval time [s]	see page <a href="#">105</a>
Interval pause time [s]	see page <a href="#">105</a>
Interval cycles	see page <a href="#">105</a>
Base current [A]	see page <a href="#">105</a>

### Limit Monitoring

Voltage setpoint [V]	0.0 - 100.0 V Factory setting: 100.0 V
Lower voltage limit [V]	-10.0 - 0.0 V Factory setting: -1.0 V
Upper voltage limit [V]	0.0 - 10.0 V Factory setting: 1.0 V
Maximum time of voltage deviation [s]	off / 0.1 - 10.0 s Factory setting: off
Current setpoint [A]	0.0 - 1000.0 A Factory setting: -
Lower current limit [A]	-100 - 0 A Factory setting: - 10 A
Upper current limit [A]	0 - 100 A Factory setting: 10 A
Maximum time for current deviation [s]	off / 0.1 - 10.0 s Factory setting: off
Wire speed setpoint [m/min]	see page <a href="#">106</a>
Lower wire speed limit [m/min]	-10.0 - 0.0 m/min Factory setting: -1.0 m/min

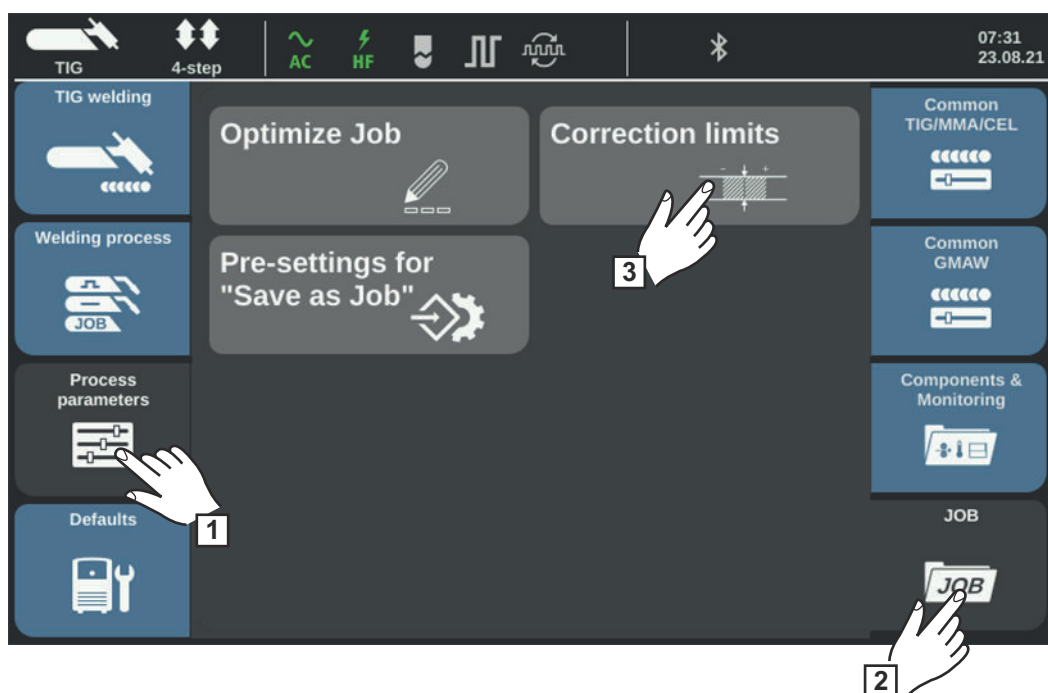
Upper wire speed limit [m/min]	0.0 - 10.0 m/min Factory setting: 1.0 m/min
Maximum time of wire feed deviation [s]	off / 0.1 - 10.0 s Factory setting: off
Welding time setpoint [s]	0.0 - 999.9 s Factory setting: 5.0 s
Lower welding time limit [s]	-50.0 - 0.0 s Factory setting: -1.0 s
Upper welding time limit [A]	0.0 - 50.0 s Factory setting: 1.0 s
Monitor welding time	off/on Factory setting: off
Energy setpoint [kJ]	0.0 - max. kJ Factory setting: 1.0 kJ
Lower energy limit [kJ]	-100.0 - 0.0 kJ Factory setting: 0.0 kJ
Upper energy limit [kJ]	0.0 - 100.0 kJ Factory setting: 1.0 kJ
Monitor energy	off/on Factory setting: off
Reaction if exceeded	ignore/warning/error Factory setting: ignore



## Setting correction limits for a job

For each job, individual correction limits can be set for welding power and arc length.

If correction limits are set for a job, the welding power and arc length of the job can be corrected within the specified limits.

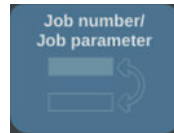


- 1 Select "Process parameters"
- 2 Select "JOB"
- 3 Select "Correction limits"

An overview of job correction limits for the most recently accessed job is displayed.

- 4** Turn the selection dial and select either the job or the limits of the job to be modified

You can also select between job and job limits by touching the "Job number/Job parameter" button.



Select a job:

- Press the selection dial

The job number is highlighted in blue and can now be changed.

- Turn the selection dial to select the job to be changed
- Press the selection dial to change the job

Select job limits:

- Turn the selection dial and select the desired limit group
- Press the selection dial

The selected limit group is opened.

- Turn the selection dial and select the upper or lower limit
- Press the selection dial

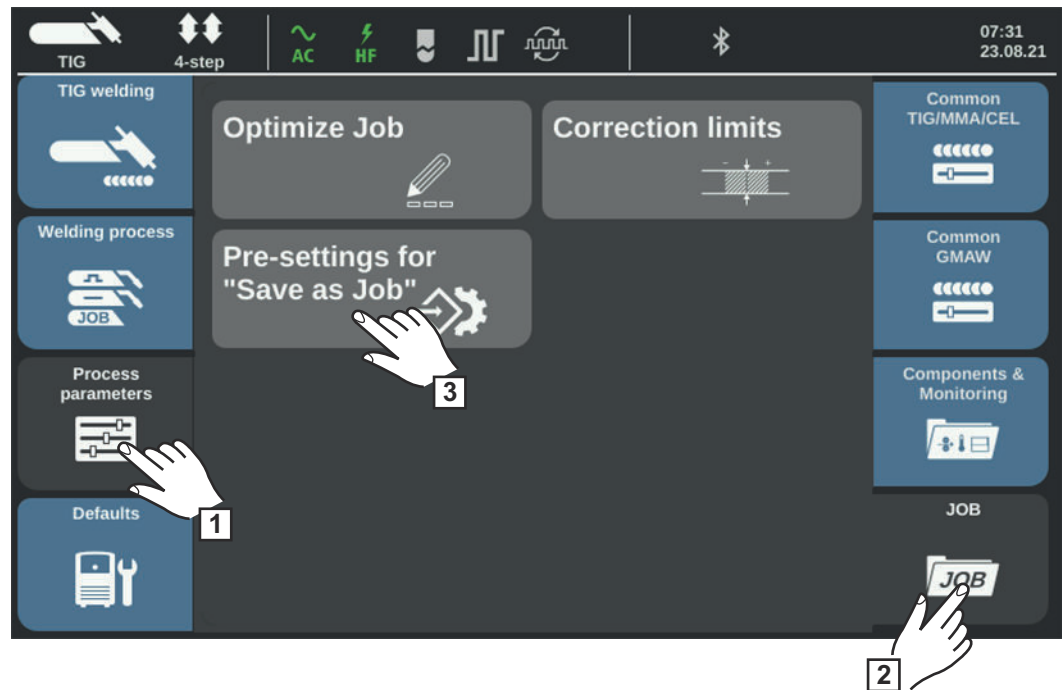
The value of the limit parameter is highlighted in blue and can now be changed.

- Turn the selection dial; the change of value is applied immediately
- Press the selection dial to select other limit parameters

- 5** Select "Exit"

## Pre-settings for "Save as Job"

Under "Pre-settings for "Save as Job", you can set default values that are applied to each new job you create.



- 1 Select "Process parameters"
- 2 Select "JOB"
- 3 Select "Pre-settings for "Save as Job"
- 4 Confirm the displayed information

The pre-settings for saving new jobs are displayed.

- 5 Turn the selection dial and select the desired parameter
- 6 Press the selection dial
- 7 Turn the selection dial and adjust the value
- 8 Press the selection dial
- 9 Select "Exit"



# **Process parameters**



## Overview

Process parameters / Common TIG/MMA/CEL ... see page [96](#)

Process parameters / Common MIG/MAG ... see page [170](#)

Process parameters / Components & Monitoring ... see page [212](#)

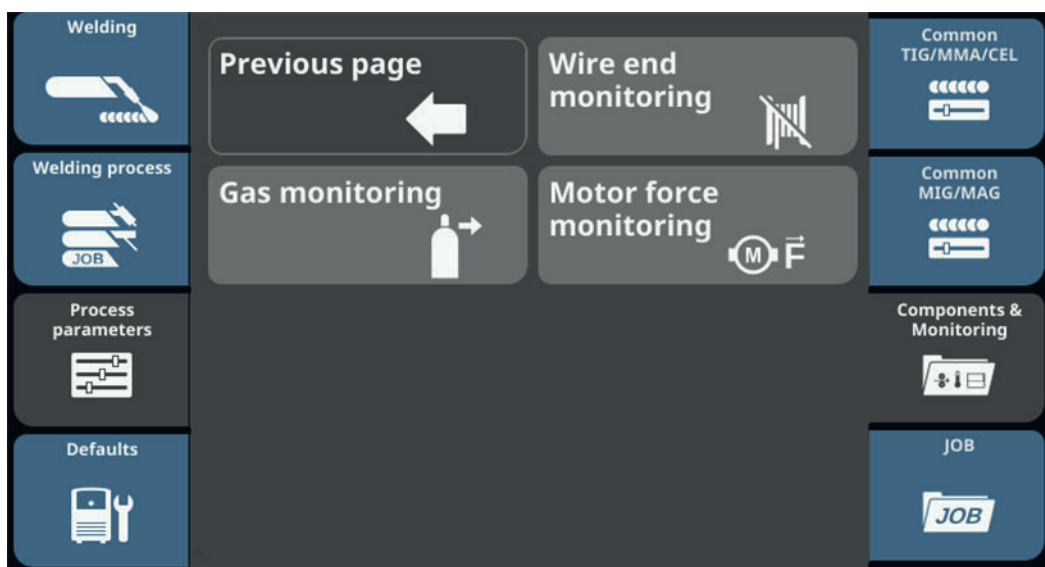
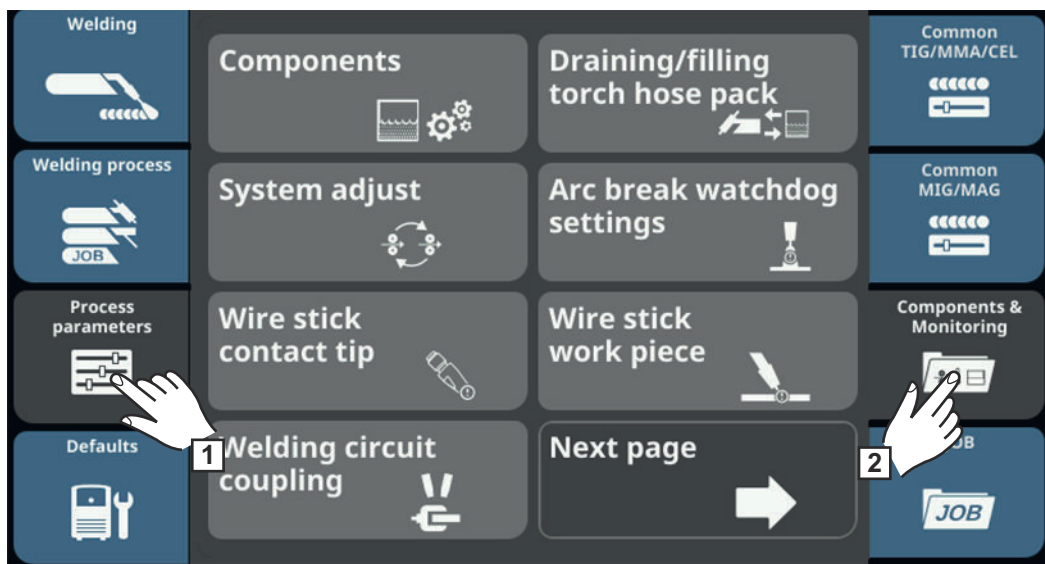
Process parameters / JOB ... see page [200](#)

# Process parameters - Components & monitoring

## Process parameters - Components & Monitoring

### NOTE!

Depending on the device type, equipment, and available Welding Packages, the display and the sequence of the process parameters may vary.



## Process parameters for components

### Cooling unit

#### Cooling unit operating mode

For controlling a cooling unit

eco / auto / on / off  
Factory setting: auto

auto

When welding starts, the cooling unit starts to operate (fan and coolant pump running).



After the end of welding, the cooling unit continues to operate for 2 minutes. When the 2 minutes have elapsed, the cooling unit also switches off.

on

Continuous operation

As soon as the power source is switched on, the cooling unit starts to operate (fan and coolant pump running continuously)

off

No operation, even when welding starts

eco

The coolant pump starts to operate when welding starts.

The fan starts to operate from a coolant return temperature of 40 °C (104 °F) (only in conjunction with the flow temperature sensor option).

When filling the torch hosepack, the coolant pump will run for 10 seconds as soon as the flow reaches > 0.7 l/min.

After the end of welding, the cooling unit continues to operate for at least 15 seconds. As soon as the coolant return temperature reaches < 40 °C the cooling unit shuts down.

The maximum after-run time is 2 minutes.

---

#### **Flow sensor filter time**

(only if the flow temperature sensor option is available on the cooling unit)

To set the time from when the flow sensor is triggered until a warning message is output

5 - 25 s

Factory setting: 10 s

---

#### **Cooler flow warning limit**

(only if the flow temperature sensor option is available on the cooling unit)

If the parameter is activated, a warning is generated when the value entered is undershot.

off / 0.75 / 0.8 / 0.85 / 0.9 / 0.95

Factory setting: off

---

#### **Wirefeeder**

---

##### **Feeder inching speed**

To set the wire speed at which the wire electrode or welding wire is fed into the torch hosepack

For example: 2 - 25 m/min / 20 - 3935 ipm

(depending on wire speed)

Factory setting: 10 m/min

#### **NOTE!**

**The feeder inching speed can also be set in the window that opens when the wire threading key is pressed:**

- ▶ Press the wire threading key
  - ▶ Press and turn the selection dial to change the feeder inching speed value
  - ▶ Select "Close" or press the selection dial to accept the value
- 

---

#### **Power source**

---

### Ignition timeout

Length of wire that is fed before the safety cut-out trips

off / 5 - 100 mm (0.2 - 3.94 in.)

Factory setting: off

#### NOTE!

#### The Ignition timeout process parameter is a safety function.

At high wire speeds in particular, the length of wire fed until the safety cut-out trips can deviate from the set wire length.

How it works:

If the torch trigger is pressed, the gas pre-flow begins immediately. Wire feeding and the ignition process then begin. If there is no current flow within the specified fed wire length, the system switches off automatically.

Press the torch trigger again for a further attempt.

### Sense line

To enable/disable the sense line function

off/on

Factory setting: on

The sense line is additional hardware for direct voltage measurement on the workpiece. The function is used for correct determination of the actual value when several welding processes are welding simultaneously on one component and there is a risk of coupled interference voltages due to unfavorable hosepack routing or common grounding cables.

### Robot settings

#### TouchSensing sensitivity

For setting the sensitivity during TouchSensing in connection with the OPT/i WF gas nozzle position search option installed in the wirefeeder for different component surfaces and external interference

Setting the TouchSensing sensitivity has no effect on the OPT/i Touch Sense Adv option.

TouchSensing = Locating the seam position by means of applied sensor voltage during automated welding

TouchSensing is performed via the gas nozzle or the wire electrode.

TouchSensing by means of gas nozzle only works if:

- the OPT/i WF gas nozzle position search option is installed in the robot wirefeeder,
- or
- the OPT/i Touch Sense Adv. option is installed in the robot wirefeeder or power source.
- With existing robot interface.

0 - 10

Factory setting: 1

0

for bare surfaces, long and dead short circuit, robust and immune to interference

10

for scaled surfaces, high measurement-related interference sensitivity

Not suitable for welding with multiple power sources on one component!

Insulated surfaces cannot be detected.

Procedure for determining TouchSensing sensitivity:

- Start with the factory-set value 1
- If no trigger signal is generated, increase TouchSensing sensitivity

**IMPORTANT!** A higher TouchSensing sensitivity also increases the susceptibility to interference!

---

### Edge detection "WireSense"

To activate / set edge detection using WireSense (option)

off / 0.5 - 20.0 mm

Factory setting: off

"WireSense" edge detection only works

- On automated applications
- If the OPT/i WireSense is present on the power source (software enable)
- In combination with the CMT system components WF 60i Robacta Drive CMT, SB 500i R with wire buffer or SB 60i R and WFi Reel.

WireSense is usually activated via a robot controller. As soon as a value > 0.5 mm is specified by the robot controller, the value set manually on the power source is overwritten.

If the Ignition timeout parameter is activated, this also applies to WireSense.

For higher-level robot controllers with a small signal range (e.g., linear trolleys), WireSense can be set manually on the power source.

Example Economy-Image:

- Start / Stop comes from the controller.
  - The edge height is specified on the power source.
-

## Draining/filling the torch hosepack

Requirements for draining/filling the torch hosepack:

- The OPT/i Torch Deflate option must be available on the cooling unit
- Cooling unit operating mode = eco or auto
- Power source must not be in welding mode
- The torch hosepack must not be filled at this time
- The torch body must be assembled
- The torch hosepack must be correctly connected

### NOTE!

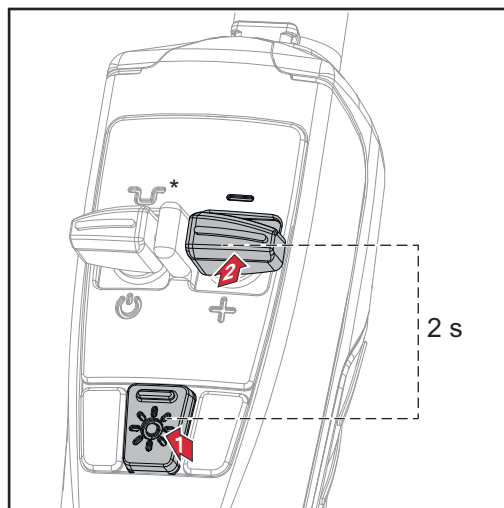
**When draining long hosepacks > 4 m, a fully filled coolant tank can overflow - risk of slipping!**

- Observe the Operating Instructions and safety instructions for the cooling unit!

### Draining the torch hosepack

- 1 Select Process parameters / Components / Drain/fill torch hosepack
- 2 Follow the on-screen instructions
- 3 Select "Start" and follow the on-screen instructions

or



\* Press the intermediate lowering button to stop the process

- 3 Press and hold the LED button on the welding torch
- 4 Press the Down (-) button and hold for 2 seconds
- 5 Follow the on-screen instructions

If the coolant temperature is too high, a cooling phase is executed. During the cooling phase, the LED on the welding torch flashes approx. 2 x per second.

The draining process is then started. The draining process takes approx. 30 seconds. During the draining process, the LED on the welding torch flashes approx. 1 x per second

A confirmation is displayed after the draining process has been completed. The torch body can now be changed.

If the torch hosepack is to be changed, the power source must be switched off first.

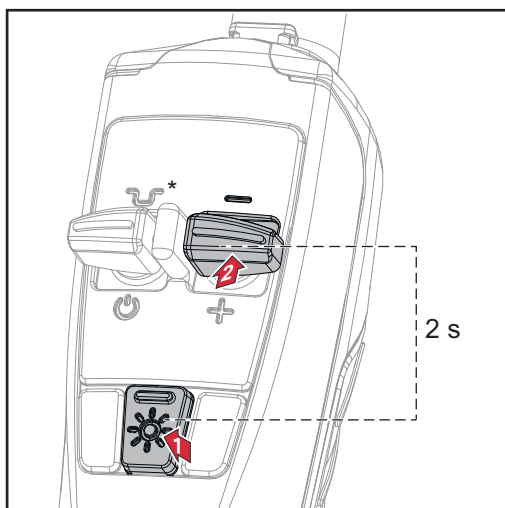
**IMPORTANT!** Welding is not possible if the torch hosepack has been drained.

## Filling the torch hosepack

- 1 Press the gas-test button and follow the on-screen instructions



or



- 1 Press and hold the LED button on the welding torch
- 2 Press the Down (-) button and hold for 2 seconds
- 3 Follow the on-screen instructions

A confirmation is displayed after the filling process has been successfully completed.

- 4 Complete filling process by pressing OK

## System adjustment

If two motors are being used in a welding system, they must be calibrated to maintain process stability.

For welding systems with PushPull units or unreeling wirefeeders, a system adjustment must be carried out whenever the wirefeeders are installed or replaced.

A corresponding message is displayed.

- 1 Select "OK" and start the system adjustment

The System adjustment wizard is started.

- 2 Follow the on-screen instructions

The system adjustment can also be started manually.

### Perform system adjustment:

- 1 Select Process parameters / Components & Monitoring / System adjust

If a system adjustment is required, the System adjustment wizard is started. The first step of the System adjustment wizard is displayed:

- 2 Follow the on-screen instructions

- 3 To call up each step of the System adjustment wizard in sequence, select "Next page" / press the selection dial

A confirmation message is displayed once the system adjustment has finished.

- 4 To exit the System adjustment wizard, select "Exit" / press the selection dial

---

### **Arc break watchdog**

- 1 Select Process parameters / Components & Monitoring / Arc break watchdog settings

The "Arc break watchdog" overview is displayed.

- 2 Turn the selection dial and select the desired parameter
- 3 Press the selection dial (blue background)
- 4 Turn the dial and change the value of the parameter (blue background)

Arc break reaction = ignorieren (deactivated):

The power source remains in operation and no error message is displayed.

Arc break reaction = Fehler (activated):

If the arc breaks and there is no current flow within a set arc break time period, the system switches off automatically and an error message is displayed.

Factory setting = ignorieren

Arc break time = 0 - 2.00 s

If the set time period is exceeded, an error is displayed.

Factory setting = 0.2 s

- 5 Select "OK" to activate the arc break watchdog

---

### **Wire stick contact tip**

- 1 Select Process parameters / Components & Monitoring / Wire stick contact tip

The "Wire stick contact tip - Setup menu" is displayed.

- 2 Turn the selection dial and select the desired parameter
- 3 Press the selection dial (blue background)

- 4 Turn the selection dial and change the value of the parameter (blue background)

Wire stick on contact tip = ignore:

Monitoring of a wire stick on the contact tip is deactivated.

Wire stick on contact tip = Fehler (activated):

If the wire is sticking to the contact tip, the welding process is interrupted.

**IMPORTANT!** Monitoring is only possible with dip transfer arc processes.

Factory setting = ignorieren

Filter time = 0.5 - 5.0 s

Maximum period without arc short circuit until the welding process is interrupted.

Factory setting = 0.5 s

- 5 Select "OK" to confirm the settings

### Wire stick workpiece

- 1 Select Process parameters / Components & Monitoring / Wire stick workpiece

The "Wire stick workpiece - Setup menu" is displayed.

- 2 Turn the selection dial and select the desired parameter

- 3 Press the selection dial (blue background)

- 4 Turn the selection dial and change the value of the parameter (blue background)

Wire stick on workpiece = ignorieren:

Monitoring of a wire stick on the workpiece is deactivated.

Wire stick on workpiece = Fehler (activated):

If the wire is sticking to the workpiece, the welding process is interrupted.

Factory setting = ignorieren

- 5 Select "OK" to confirm the settings

### Welding circuit coupling

This function can be used to measure the inductances present in the welding circuit.

Inductances can lead to welding problems, for example when several systems weld on one component.

With the help of inductance measurement and appropriate cable management, welding problems can be promptly prevented when commissioning a welding system.

Selecting the "Welding circuit coupling" button starts a corresponding wizard.

- 1 To measure the inductances in the welding circuit, follow the instructions provided by the Wizard.

**Measurement results:**

<b>Result</b>	<b><math>R_{\text{coupling}}</math> (common ground)</b>	<b><math>K_{\text{coupling}}</math> (inductive coupling)</b>
Very good	0 mOhm	0%
Good	1 - 2.5 mOhm	2 - 15%
On average	3 - 15 mOhm	16 - 30%
Poor	16 - 100 mOhm	31 - 100%

The measurement results are stored in the logbook.



Details on the welding circuit coupling are described in the Operating Instructions "Cable Management Guide" - 42,0426,0420,xx.  
The Operating Instructions are available as an HTML file under the following link:



<https://manuals.fronius.com/html/4204260420>

## Wire end monitoring

- 1 Select Process parameters / Components & Monitoring / Wire end monitoring

The "Wire end monitoring setup menu" overview is displayed.

- 2 Turn the selection dial and select the desired parameter depending on the existing wire end monitoring:

Wire end ring sensor	(1) error	(1)	Wire end reaction for OPT/i WF R WE ring sensor 4,100,878,CK
Wire end drum sensor	(2) error	(2)	Wire end reaction for OPT/i WF R WE drum 4,100,879,CK
Wire end wire spool	(3) error	(3)	Wire end reaction for OPT/i WF R wire end 4,100,869,CK

- 3 Press the selection dial (blue background)
- 4 Turn the selection dial and change the value of the parameter (blue background)

Reaction = Error:

Wire end error, the welding process is interrupted immediately. The error is shown on the display.

Reaction = After seam end:

The wire end error is shown on the display once the current welding process is complete.

Reaction = Ignore (deactivated):

No reaction on wire end detection

Factory setting = Error

- 5 Select "OK" to confirm the settings

## Gas monitoring

The gas monitoring parameters are only available if the OPT/i gas flow sensor option is present on the wirefeeder or SplitBox.

A lower gas flow limit can be defined for gas monitoring. If the gas flow drops below a specified level for a defined time, an error message is immediately displayed and the welding process stops.

- 1 Select Process parameters / Components & Monitoring / Gas monitoring

The "Gas monitoring" overview is displayed.

- 2 Turn the selection dial and select the desired parameter:

Lower gas flow limit

Setting range: 0.5 - 30.0 l/min

Factory setting: 7.0 l/min

Maximum time of gas deviation

Setting range: off / 0.1 - 10.0 s

Factory setting: 2.0 s

Sensor gas factor

Setting range: auto / 0.90 - 20.00

Overview of important gas factors:

1.00 - C1 (CO<sub>2</sub>)

1.52 - M21 ArC-18

1.69 - M12 ArC-2.5

1.72 - I1 (Argon)

11.8 - I2 (Helium)

Factory setting: auto

### NOTE!

**An incorrectly set gas factor can have a massive influence on the shielding gas quantity and thus on the welding result.**

Under the "auto" setting, all standard gases from the Fronius welding database are taken into account.

- Manual adjustment of the gas factor is only recommended for special gases and only after a discussion with Fronius.

- 3 Press the selection dial (blue background)
- 4 Turn the dial and change the value of the parameter (blue background)
- 5 Select "OK" to confirm the settings

---

## Motor force monitoring

- 1 Select Process parameters / Components & Monitoring / Motor force monitoring

The "Motor force monitoring" overview is displayed.

- 2 Turn the selection dial and select the desired parameter:

Wirefeed force monitoring

Setting range:

Ignore (no reaction)

Warning (a warning is displayed)

Error (welding process is interrupted, an error message is displayed)

Factory setting: Ignore

Maximum force

Setting range: 0 - 999 N

Factory setting: 0 N

Maximum time of force deviation

Setting range: 0.1 - 10.0 s

Factory setting: 3 s

- 3 Press the selection dial (blue background)
- 4 Turn the dial and change the value of the parameter (blue background)
- 5 Select "OK" to confirm the settings

# Defaults



## General

### NOTE!

**Because of firmware updates, certain functions may be available for your device but not described in these Operating Instructions or vice versa.**

In addition, individual figures may also differ slightly from the operating elements of your device. These operating elements function in exactly the same way, however.



### WARNING!

**Danger from incorrect operation and work that is not carried out properly.**

This can result in serious personal injury and damage to property.

- ▶ All the work and functions described in this document must only be carried out by technically trained and qualified personnel.
- ▶ Read and understand this document in full.
- ▶ Read and understand all safety rules and user documentation for this equipment and all system components.

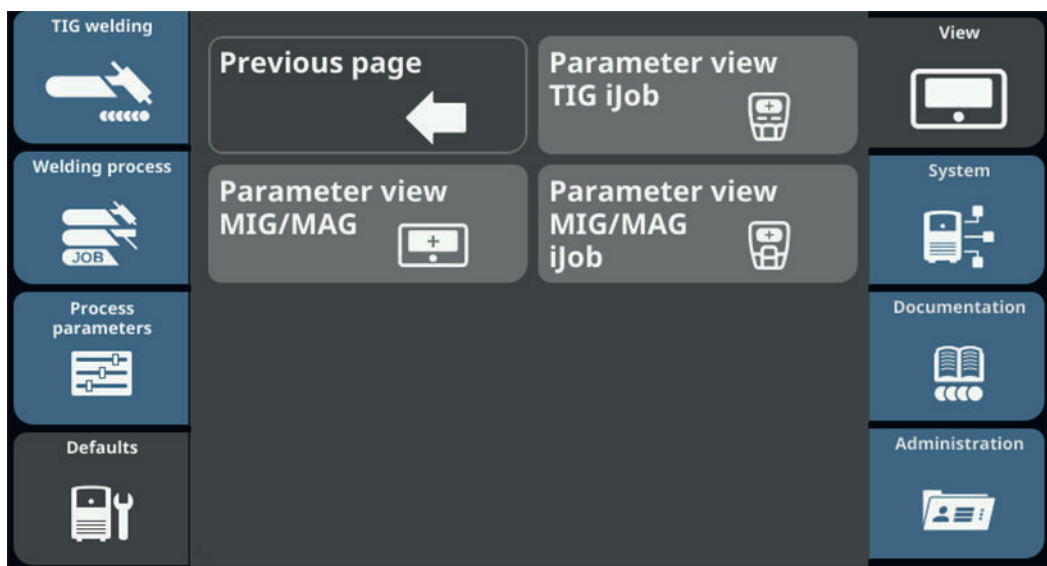
## Overview

The "Defaults" contain the following options:

- Display
- System
- Documentation
- Management

# Defaults - View

## Defaults screen



### Selecting the language

- 1 Select Defaults / View / Language
- 2 Turn the selection dial and select the desired language
- 3 Select "OK"/press the selection dial

### Selecting units/ standards

- 1 Select Defaults / View / Units/Standards
- 2 Select the desired unit



**3** Select the desired standard:

EN

Designation of the filler metal according to European standards  
(e.g., AlMg 5, CuSi3, steel, etc.)

AWS

Designation of the filler metal according to specifications of the American  
Welding Standard  
(e.g., ER 5356, ER CuSi-A, ER 70 S-6, etc.)**4** Select the desired display of the welding data at the end of welding

Hold

The current actual values at the end of welding are displayed.

Mean

The average values over the entire main current phase are displayed.

**5** Select OK

The overview of units and standards is displayed.

**Setting the date and time**

The date and time can be assigned via NTP (Network Time Protocol) or set manually.

**1** Select Defaults / View / Time & Date**Setting the date and time via NTP**A DNS server must be reachable or must be configured when manually setting the network parameters (see Setting network parameters manually, page [241](#)).**2** Turn the selection dial and select "Time & Date Automatic"**3** Enter the address of the local time server

The address of the local time server can be obtained from your IT administrator or via the Internet (e.g., pool.ntb.org).

**4** Enter the time zone

The time zone must match the location of the power source.

**5** Select "Time Server Test" to start time synchronization

The time of the NTP server is synchronized with the power source. If NTP is set, the time is also synchronized after the power source is restarted, provided a connection to the time server can be established.

**6** Select "Transfer"**Setting the date and time manually**

To set the date and time manually, "Time &amp; Date Automatic" must not be selected.

**2** Turn the selection dial and select the desired parameter:Year/Month/Day/Hour/Minute  
(white background)**3** Press the selection dial to change the parameter (blue background)**4** Turn the selection dial and set the desired value (blue background)

- 5

 Press the selection dial and apply the set value (white background)
- 6

 Select "OK"/press the selection dial

The View defaults are displayed.

## Retrieving system data

### 1 Select Defaults / View / System data

The current system data is displayed.



Real-time arc power in kW

IP provides the correct average arc power as a result of the high measurement sampling rate for non-continuous welding processes.

If the welding speed is known, the electrical energy per unit length can be calculated:

$$E = IP / v_s$$

E Electrical energy per unit length in kJ/cm

IP Arc power in kW

vs Welding speed in cm/s



Arc energy in kJ

IE provides the correct total arc energy as a result of the high measurement sampling rate for non-continuous welding processes.

Arc energy is the accumulated arc power over the entire welding time.

If the weld length is known, the electrical energy per unit length can be calculated:

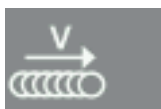
$$E = IE / L$$

E Electrical energy per unit length in kJ/cm

IE Arc energy in kJ

L Length of weld in cm

Arc energy is generally used in manual welding to calculate the energy per unit length.



Current welding speed in cm/min















Currently set job



Current weld



Duration of weld in s

	Present motor current in A, wirefeeder 1 (wirefeeder closest to the arc)
	Present motor current in A, wirefeeder 2 (e.g., the rear wirefeeder in a push/pull system)
	Present motor current in A, wirefeeder 3 (e.g., an unreeling wirefeeder in a push/pull system with an unreeling wirefeeder)
	Present motor force in N, wirefeeder motor 1
	Present motor force in N, wirefeeder motor 2
	Present motor force in N, wirefeeder motor 3
	Present flow rate in l/min at the cooling unit (if OPT/i CU flow temperature sensor option is installed)  Error output if the flow rate is < 0.7 l/min
	Present shielding gas flow (if OPT/i gas regulator option is available)
	Total shielding gas consumption (if OPT/i gas regulator option is available)
	Present coolant temperature in °C at the cooling unit (if OPT/i CU flow temperature sensor option is installed)  Error output if the coolant temperature is > 70 °C (measured at coolant return)
	Arc time in h
	Total operating hours of the power source in h

**2** Select "OK" to exit the system data

The View defaults are displayed.

## Displaying characteristics

**1** Select Defaults / View / Characteristic

The options for displaying the characteristics are displayed.

**2** Select the desired display option

Show current characteristics:

Only the current characteristics are displayed in the material settings.

Show replaced characteristics:

In addition to the current characteristics, replaced, older characteristics are also displayed in the material settings. These can also be selected while completing the material settings.

**3** Select OK

The View defaults are displayed.

---

**Parameter view  
TIG**

This function enables additional parameters or settings for the TIG welding parameters to be displayed.

- Working parameters:  
AC Balance, electrode diameter
- Welding process parameters:  
cap mode, polarity, TIG torch operating mode
- TIG pulse settings:  
tacking, pulse frequency, base current, duty cycle, waveform pulse, waveform base current
- AC settings:  
AC frequency, AC current offset, waveform positive half-wave, waveform negative half-wave
- Ignition parameters:  
HF ignition, HF ignition delay, reversed polarity ignition
- Operating mode - default settings:  
torch trigger, arc break voltage, comfort stop sensitivity
- Start/end settings:  
starting current time, final current time
- 4-step settings:  
lowering current slope 1, lowering current slope 2
- Spot welding settings:  
spot welding time
- Gas defaults:  
gas pre-flow, gas post-flow
- Cycle TIG:  
CycleTIG activated, interval time, interval pause time, interval cycles, base current
- Wirefeeder settings:  
wire speed 1/2, wire start-up delay, wire end delay, wire retract end, wire position start
- Dynamic Wire:  
wire speed correction

**Expand parameter view:**

- 1** Select Defaults / View / Parameter view TIG
- 2** Turn the selection dial and select the desired parameter
- 3** Press the selection dial
- 4** Select "OK" to exit Parameter view TIG setup

The parameter is displayed in the welding parameters, from where it can also be changed.

## Parameter view TIG iJob

This function can be used to define the functions and parameters available on a TIG JobMaster welding torch.

- Working parameters:  
Job number, EasyJobs, starting current, UpSlope, lowering current, DownSlope, final current, AC balance, electrode diameter
- Welding process parameters:  
cap mode, polarity
- TIG pulse settings:  
tacking, pulse frequency, base current, duty cycle, waveform pulse, waveform base current
- AC settings:  
AC frequency, waveform positive half-wave, waveform negative half-wave
- Ignition parameters:  
reversed polarity ignition
- Start/end settings:  
starting current time, final current time
- 4-step settings:  
lowering current slope 1, lowering current slope 2
- Spot welding settings:  
spot welding time
- Cycle TIG:  
CycleTIG activated, interval time, interval pause time, interval cycles, base current
- Wire speed settings:  
Wire speed 1
- Dynamic Wire:  
TIG wire correction

### Expand parameter view TIG iJob:

- 1** Select Defaults / View / Parameter view TIG iJob
- 2** Turn the selection dial and select the desired parameter
- 3** Press the selection dial
- 4** Select "OK" to quit the parameter view iJob setup

The parameter is displayed on the TIG JobMaster welding torch and can also be changed there.

## Parameter view MIG/MAG

This function enables additional parameters or settings for the MIG/MAG welding parameters to be displayed.

### Working parameters

Current, voltage, material thickness, power, arc length correction, pulse/dynamic correction

**SFI parameters**

SFI, SFI Hotstart

**Process control**

Penetration stabilizer, arc length stabilizer

**SynchroPulse settings**

SynchroPulse, delta wirefeed, frequency, duty cycle (high), arc correction high, arc correction low

**Interval settings**

Interval, interval cycles, interval pause time, stitch welding time

**Process Mix**

Upper power time correction, lower power time correction, lower power correction

**CycleStep**

CMT cycle step, cycles (welding spot size), interval pause time, interval cycles

**AC settings**

AC power balance, AC cycles negative, AC cycles positive

**Start/end of welding settings**

Starting current, starting arc length correction, starting current time, slope 1, slope 2, final current, final arc length correction, final current time

**Spot welding settings**

Spot welding time

**Gas defaults**

gas set value, gas pre-flow, gas post-flow

**TWIN process control**

Pulse synchronization ratio, phase shift lead/trail, ignition delay trail

**Expand parameter view:**

- 1** Select Defaults / View / Parameter view MIG/MAG
- 2** Turn the selection dial and select the desired parameter
- 3** Press the selection dial
- 4** Select "OK" to exit Parameter view MIG/MAG setup

The parameter is displayed in the welding parameters, from where it can also be changed.

**JobMaster  
MIG/MAG view**

This function can be used to define the functions and parameters available on a JobMaster welding torch.

**Working parameters**

Job number, EasyJobs, current, wire speed, voltage, material thickness, power, arc length correction, pulse/dynamic correction

**Welding process parameters**

Process, characteristic property, welding torch operating mode

**SFI parameters**

SFI, SFI Hotstart

**Process control**

Penetration stabilizer, arc length stabilizer



---

**SynchroPulse settings**

SynchroPulse, delta wirefeed, frequency, duty cycle (high), arc correction high, arc correction low

---

**Interval settings**

Interval, interval cycles, interval pause time, stitch welding time

---

**Process Mix**

Upper power time correction, lower power time correction, lower power correction

---

**Cycle Step**

CMT cycle step, cycles (welding spot size), interval pause time, interval cycles

---

**AC settings**

AC power balance, AC cycles negative, AC cycles positive

---

**Start/end of welding settings**

Starting current, starting arc length correction, starting current time, slope 1, slope 2, final current, final arc length correction, final current time

---

**Spot welding settings**

Spot welding time

---

**Gas defaults**

gas set value, gas pre-flow, gas post-flow

---

**General settings**

R/L alignment, wire forwards/back, gas test

---

**Setting JobMaster welding torch parameters:**

- 1** Select Defaults / View / JobMaster MIG/MAG view
- 2** Turn the selection dial and select the desired parameter
- 3** Press the selection dial
- 4** Select "OK" to quit the parameter view iJob setup

The parameter is displayed on the JobMaster welding torch, from where it can also be changed.

# Defaults - System

## Defaults - System



### Retrieving device information

- 1 Select Defaults / System / Information

The device information is displayed:  
serial number, image version, software version, IP address

- 2 Select "OK" to quit the device information

### Restoring factory settings

- 1 Select Defaults / System / Restore factory settings

The confirmation prompt for the factory settings appears.

- 2 Select "Yes" to reset the values to their factory settings

The process parameter and machine default values are reset to their factory settings and the overview of system defaults is displayed.

### Restoring the website password

- 1 Select Defaults / System / Website password

The confirmation prompt for resetting the website password appears.

- 2 Select "Yes" to reset the website password

The website password is reset to its factory setting:

User name = admin

Password = admin

The overview of system defaults is displayed.

### Setup mode

- 1 Select Defaults / System / Setup mode

- 2 Turn dial and select  
MIG/MAG welding torch setup  
or

TIG welding torch setup

- 3 Press the selection dial
- 4 Turn the selection dial and select the desired parameter
- 5 Press the selection dial to change the parameter
- 6 Press the selection dial to adjust the value of the parameter
- 7 Press the selection dial to apply the value
- 8 Select OK to accept the setting and to exit Setup mode

#### MIG/MAG welding torch setup

#### Special 4-step = Guntrigger

In conjunction with a JobMaster welding torch and with the special 4-step mode selected, this function enables the torch trigger to be used to switch between jobs during welding. Job switching takes place within defined job groups. A job group is defined by the next non-programmed job.

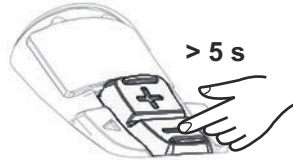
Example:

Job group 1: Job no. 3 / 4 / 5

Job no. 6 is not occupied ==> End of job group1

Job group 2: Job no. 7 / 8 / 9

- When welding is started, the job with the lowest number within the job group is automatically selected.
- Switching within a job group to the job with the next higher number is done by briefly pressing the torch trigger (< 0.5 seconds).
- To end the welding process, press the torch trigger for more than 0.5 seconds.
- To change to the next job group, press the parameter setting button on the Jobmaster welding torch for more than 5 seconds.




---

### Spot welding

2-step = Spot welding in 2-step mode:

The spot welding process runs while the torch trigger remains pressed and ends at the latest after the spot welding time has elapsed.

Releasing the torch trigger stops the spot welding process before the spot welding time has elapsed.

4-step = Spot welding in 4-step mode:

The spot welding process starts when the torch trigger is pressed and ends at the latest when the spot welding time has elapsed.

Pressing the torch trigger again stops the spot welding process before the spot welding time has elapsed.

For more information about spot welding:

- Page [184](#) (spot welding in general)
- Page [184](#) (spot welding time)

---

### Special JobMaster display = on

The following items can now be set and implemented on the Jobmaster welding torch:

- Operating mode
- SynchroPulse
- Gas test

#### NOTE!

**The parameter "special JobMaster display" is no longer available as of firmware version 4.0.0.**

The corresponding settings can be implemented as follows:

- Defaults / View / JobMaster MIG/MAG view  
(see page [236](#))

---

### Torch trigger job selection = on

The function enables the torch trigger to be used to switch to the next job. Switching takes place within defined job groups.

A job group is defined by the next non-programmed job.

Example:

Job group 1: Job no. 3 / 4 / 5

Job no. 6 is not occupied ==> End of job group1

Job group 2: Job no. 7 / 8 / 9

- When welding is started, the job with the lowest number within the job group is automatically selected.
- Switching within a job group to the job with the next higher number is done by briefly pressing the torch trigger (< 0.5 seconds).
- To end the welding process, press the torch trigger for more than 0.5 seconds.
- To switch to the next job group, briefly double-press the torch trigger (< 0.3 s, 2 x).

Switching can take place when idle or during welding.

---

### **TIG welding torch setup**

Activate / deactivate cap mode via torch trigger

Torch trigger I2 - cap mode = on:

Cap mode can be activated by a long press of the torch trigger

Torch trigger I2 - cap mode = off:

Cap mode cannot be activated by a long press of the torch trigger.

---

### **Setting network parameters manually**

**1** Select Defaults / System / Network Settings

**2** Select "Network"

The overview of network settings is displayed.

If DHCP is activated, the IP Address, Network Mask and Default Gateway network parameters are grayed out and cannot be set.

**3** Turn the selection dial and select DHCP

**4** Press the selection dial

DHCP is deactivated and the network parameters can now be set.

**5** Turn the selection dial and select the desired network parameter

**6** Press the selection dial

The numeric keypad for the selected network parameter is displayed.

**7** Enter a value for the network parameter

**8** Select "OK" and confirm the value for the network parameter/press the selection dial

The value for the network parameter is applied and the overview of network settings is displayed.

**9** Select "Save" to apply the changes to the network settings

---

## Setting up WLAN

- 1** Select Defaults / System / Network settings
- 2** Select WLAN

The overview of WLAN settings is displayed.

### Setting the country code

- 1** Select "Set Country Code"
- 2** Press the selection dial
- 3** Turn the selection dial and select the appropriate country
- 4** Select OK

### Activating WLAN

- 1** Select "Activate WLAN"

When WLAN is activated, a check mark appears in the button, and the "Add Network" and "Delete Network" buttons are active.

### Adding a network

- 1** Select "Add Network"

The available WLAN networks are displayed.

- 2** Turn the selection dial and select the desired WLAN network
- 3** Press the selection dial or select "Insert"
- 4** Enter data:
  - Activate DHCP  
or
  - Manual entry of IP address, network mask, default gateway, DNS server 1 and DNS server 2:  
Turn the selection dial and select the desired element,  
press the selection dial,  
enter the data using the numeric keypad,  
confirm by pressing "OK"
- 5** Select "OK" and add the WLAN network

### Deleting a network

- 1** Turn the selection dial and select the WLAN network you want to delete
- 2** Select "Delete Network"
- 3** Confirm the prompt

The WLAN network is deleted.

---

## Bluetooth setup

### General

Each Bluetooth device has its own MAC address. The MAC address allows the device to be assigned to a specific power source, thus preventing any mix-ups.

The power source can communicate with the following Bluetooth devices:

- RC Panel Basic /BT remote control
- RC Pedal TIG /BT foot-operated remote control
- Vizor Connect /BT welding helmet

An active Bluetooth connection is indicated in the status bar of the display by a blue Bluetooth symbol.

In the case of Bluetooth devices of the same type, only one device can be actively connected to the power source for safety reasons.

Active Bluetooth connections to several Bluetooth devices of different types are possible.

An existing, active Bluetooth connection cannot be interrupted or influenced by another Bluetooth device.

Bluetooth remote controls have priority over wired remote controls or manual welding torches.

If the connection between wired or Bluetooth remote controls and the power source is interrupted during the welding process, the welding process is terminated.

### Configuring the Bluetooth setup

- 1 Select Defaults / System / Network Settings
- 2 Select "Bluetooth setting"

The Bluetooth setup screen appears.

### Activating or deactivating the Bluetooth function on the power source

- Select the "Activate Bluetooth" button

### Adding a Bluetooth device

- Turn on the Bluetooth device
- Select the "Add Device" button

A list of all detected Bluetooth devices is displayed with their names, MAC addresses, and other info.

- Use the selection dial to select the desired Bluetooth device
- Compare the displayed MAC address with the MAC address on the device  
Select the "Add" button to establish an active connection to the selected device
- Select the "Save" button

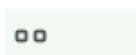
The active connection is displayed under Info.

Symbols displayed under Info:



### Active Bluetooth connection

An active change can be made to the power source via the Bluetooth device. Depending on the availability of the data, additional information such as battery status, signal strength, etc. of the Bluetooth device is displayed.



#### Paired

A Bluetooth device has already been actively connected to a power source and appears in the list of Bluetooth devices.



#### Inactive

A new Bluetooth device was found or the Bluetooth device was removed by the user.

#### **Deleting a Bluetooth device**

- Use the selection dial to select the Bluetooth device to be deleted
- Select the "Delete Device" button
- Confirm the prompt to delete the device by pressing "OK"

**3** Select "OK" to exit the Bluetooth setup



**Power source configuration**

- 1 Select Defaults / System / Power source configuration

The power source configuration is displayed.

- 2 Turn the selection dial and select a configuration point
- 3 Press the selection dial

The keyboard is displayed.

- 4 Enter the desired text using the keyboard (max. 20 characters)
- 5 Select "OK" to apply the text/press the selection dial

The text is applied and the power source configuration is displayed.

- 6 Select "Save" to apply the changes

**Wirefeeder setup**

In the wirefeeder setup, potentiometers present on a wire feeder can be activated or deactivated.

- 1 Select Defaults / System / Wire feeder setup
- 2 Press the selection dial
- 3 Turn dial and activate or deactivate potentiometer
- 4 Select OK

**Interface setup**

The interface setup allows you to define whether the welding parameters are specified externally by the robot controller or internally by the power source.

- 1 Select Defaults / System / Next page
- 2 Select Interface setup
- 3 Set the "Welding parameters" parameter to "External" or "Internal"

External:

All parameter settings are made via the robot controller (including the welding parameters).

Internal:

The welding parameter settings are made via the power source, the control signals run via the robot controller.

Factory setting:

External

- 4 Select OK

---

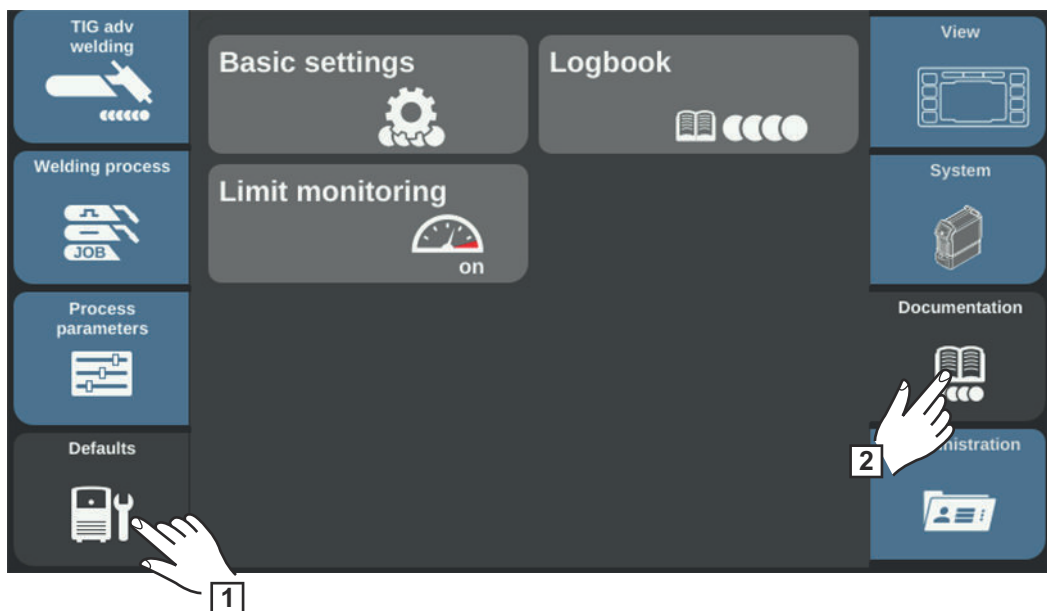
## TWIN Setup

In TWIN Setup, welding lines 1 and 2 are assigned to the power sources.

- 1** Switch on power source 2, leave power source 1 switched off
- 2** Place sticker 2 in a clearly visible location on power source 2
- 3** For power source 2, select Defaults / System / Next page
- 4** Select TWIN Setup
- 5** Change the parameter to 2, select Next
  
- 6** Switch on power source 1
- 7** Place sticker 1 in a clearly visible location on power source 1
- 8** For power source 1, select Defaults / System / Next page
- 9** Select TWIN Setup
- 10** Check that the parameter is set to 1

# Defaults - Documentation

## Defaults - Documentation



### Setting the sample rate

- 1** Select Defaults / Documentation / Basic settings
  - 2** Press the selection dial
  - 3** Turn the selection dial and change the sample rate value:
    - off  
Sample rate is deactivated, only mean values are saved.
    - 0.1 - 100.0 s  
Documentation is saved at the set sample rate.
  - 4** Select "OK" to apply the sample rate
- The documentation overview is displayed.

### Viewing the logbook

- 1** Select Defaults / Documentation / Logbook

The logbook is displayed.

The buttons can be used to display welds, events, errors, warnings or notifications.

The following data is logged:

No.	ddmmyy	hhmmss	s	A	V	m/min	kJ	No.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

- (1) Number of the weld
- (2) Date (ddmmyy)

- (3) Time (hhmmss)
- (4) Duration of welding in s
- (5) Welding current in A (average)
- (6) Welding voltage in V (average)
- (7) Wire speed in m/min
- (8) Arc energy in kJ (for details see page [231](#))
- (9) Job No.

Turn the selection dial to scroll through the list.

- 2** Select "OK" to exit the logbook

---

### **Switching limit value monitoring on/off**

Limit value monitoring is only available in conjunction with the OPT/i LimitMonitoring option.

- 1** Select Defaults / Documentation / Limit monitoring
- 2** Press the selection dial
- 3** Turn the selection dial and change the value for Limit Monitoring:

off:  
Limit value monitoring is deactivated.

on:  
The limit values are monitored according to the settings

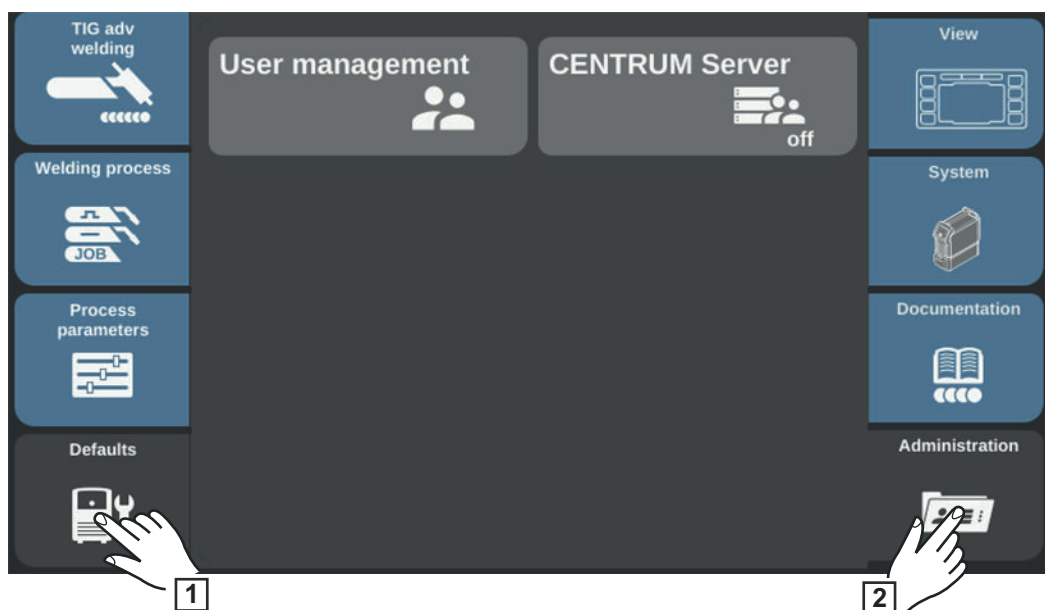
Factory setting:  
off

- 4** Select OK to apply the settings for limit value monitoring

The documentation overview is displayed.

# Defaults Administration

## Defaults Administration



# User management

---

## General

User management is useful if multiple users are working with the same power source.

User management is carried out using different roles and with the help of NFC keys.

Users are assigned different roles depending on their level of training or qualification.

---

## Explanation of terms

### Administrator

An administrator has full access to all power source functions. An administrator's tasks include:

- Creating roles
  - Setting up and managing user data
  - Assigning access rights
  - Updating the firmware
  - Backing up data, etc.
- 

### User management

User management includes all users registered on the power source. Users are assigned different roles depending on their level of training or qualification.

---

### NFC card

An NFC card or and NFC key fob is assigned to a specific user who is registered on the power source.

NFC cards and NFC key fobs are commonly referred to as an NFC key in these Operating Instructions.

---

**IMPORTANT!** Each user should be assigned their own NFC key.

---

### Role

Roles are used to manage registered users (= user management). The roles define access rights and the work activities that users can perform.

---

## Predefined roles and users

Two roles are predefined in the factory under Defaults / Administration / User management:

### Administrator

with all rights and options

The "Administrator" role cannot be deleted, renamed, or edited.

The "Administrator" role contains the predefined "admin" user, which cannot be deleted. The "Admin" user can be assigned a name, language, unit, web password, and NFC key.

Once "admin" has been assigned an NFC key, user management is activated.

### Locked

Preset in the factory with access rights to the welding processes, without process parameters and defaults

The role "Locked":

- Cannot be deleted or renamed,
- Can be edited in order to activate various functions as required,

NFC keys cannot be assigned to the "Locked" role.

If no NFC key is assigned to the predefined "Admin" user, each NFC key functions to lock and unlock the power source (no user management, see also section "Locking and unlocking the power source using an NFC key", page [56](#)).

---

**User administration overview**

User management contains the following sections:

- Creating administrator and roles
- Creating users
- Editing roles/users, deactivating user management

# Create administrator and roles

---

## Recommendation for creating roles and users

A systematic procedure is required when creating roles and NFC keys.

Fronius recommends that you create one or two administrator keys. In the worst case scenario, a power source can no longer be operated without administrator rights.

### Procedure

#### NOTE!

**The loss of an administrator NFC key may affect power source usability, depending on your settings. Store one of the two administrator NFC keys in a safe place.**

---

- 1** In the "Administrator" role, create two equivalent users

This ensures that access to the administrator function is retained even if an administrator NFC key is lost.

- 2** Consider other roles:
  - How many roles are required?
  - Which rights are assigned to the respective roles?
  - How many users are there?

- 3** Create roles

- 4** Assign users to roles

- 5** Check whether the created users have access to the respective roles with their NFC keys.



## Creating an administrator key

### NOTE!

If an NFC key is assigned to the predefined "Admin" user under Defaults / Administration / User management / Administrator, then user management is activated.

- 1 Select Defaults / Administration / User management

User management is displayed, "Administrator" is selected.

- 2 Press the selection dial
- 3 Turn the selection dial and select "Admin"
- 4 Press the selection dial
- 5 Turn the selection dial and select NFC card
- 6 Press the selection dial

The info for transferring the NFC card is displayed.

- 7 Follow the on-screen instructions  
(hold the new NFC key on the reading zone for NFC keys and wait for confirmation that it has been recognized)
- 8 Select OK

The message confirming that user management is activated is displayed.

- 9 Select OK

The number of the assigned NFC key is displayed under Admin / NFC card.

To create a 2nd administrator key:

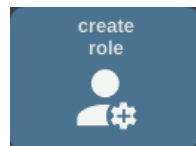
- Copy "Admin" (Create new from selection - see also [page 255](#))
- Enter a user name
- Assign a new NFC card

## Creating roles

- 1 Select Defaults / Administration / User management

User management is displayed.

- 2 Select "Create role"



The keyboard is displayed.

- 3 Enter the desired role name using the keyboard (max. 20 characters)
- 4 Select "OK" to apply the role name/press the selection dial

The functions that can be executed within a role are displayed.

Symbols:



... hidden



... read only



... read and write

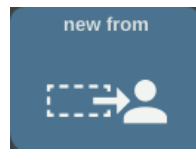
- 5** Specify functions that a user can execute with this role
    - Select functions by turning the selection dial
    - Press the selection dial
    - Select settings from the list
    - Press the selection dial
  - 6** Select OK
- 

## Copying roles

- 1** Select Defaults / Administration / User management

User management is displayed.

- 2** Turn the selection dial and select the role to be copied
- 3** Select "new from"



- 4** Enter the name of the new role using the keyboard
- 5** Select OK
- 6** Specify the functions that can be executed within the role
  - Select the function by turning the selection dial
  - Press the selection dial
  - Select settings for the functions from the list
- 7** Select OK

# Creating users

## Creating users

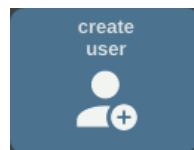
### NOTE!

**For data privacy reasons, only personal ID numbers and no full names should be entered when creating users.**

- 1 Select Defaults / Administration / User management

User management is displayed.

- 2 Select "create user"



The keyboard is displayed.

- 3 Enter the desired user name using the keyboard (max. 20 characters)
- 4 Select "OK" to apply the user name/press the selection dial
- 5 Enter additional user data
  - Select the parameter by turning the selection dial
  - Press the selection dial
  - Select Role, Language, Unit, and Standard from the list
  - Enter first name, last name and web password using the keyboard
- 6 Turn the selection dial and select NFC card
- 7 Press the selection dial

The info for transferring the NFC card is displayed.

- 8 Follow the on-screen instructions  
(hold the new NFC key on the reading zone for NFC keys and wait for confirmation that it has been recognized)

## Copying users

### NOTE!

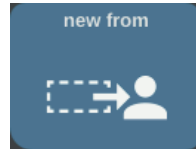
**For data privacy reasons, only personal ID numbers and no full names should be entered when creating users.**

- 1 Select Defaults / Administration / User management

User management is displayed.

- 2 Turn the selection dial and select the role to which the user to be copied is assigned
- 3 Press the selection dial
- 4 Turn the selection dial and select the user to be copied

- 5** Select "new from"



- 6** Enter the name of the new user using the keyboard
- 7** Select OK
- 8** Enter additional user data
- 9** Assign a new NFC key
- 10** Select OK

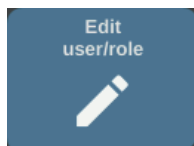
# Editing roles/users, deactivating user management

## Editing roles

- 1 Select Defaults / Administration / User management

User management is displayed.

- 2 Turn the selection dial and select the desired role
- 3 Select "Edit user/role"



The role opens, the functions can be changed:

- Select the function by turning the selection dial
- Press the selection dial
- Change the role name using the keyboard
- Select settings for the functions from the list

- 4 Select OK

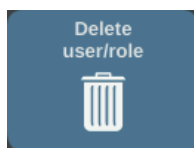
If no user is stored for a role, the editing of the role can also be started by pressing the selection dial.

## Deleting roles

- 1 Select Defaults / Administration / User management

User management is displayed.

- 2 Turn the selection dial and select the role to be deleted
- 3 Select "Delete user/role"



- 4 Confirm the prompt

The role and all assigned users are deleted.

## Editing users

- 1 Select Defaults / Administration / User management

User management is displayed.

- 2 Turn the selection dial and select the role to which the user to be edited is assigned
- 3 Press the selection dial

The users assigned to the role are displayed.

- 4 Turn the selection dial and select the user to be edited
- 5 Select "Edit user/role" (or press the selection dial)



- Select the parameter by turning the selection dial
- Press the selection dial
- Change the name and web password using the keyboard
- Select other settings from the list

Replacing the NFC card:

- Turn the selection dial and select "NFC card"
- Press the selection dial
- Select "Replace"
- Hold the new NFC key on the reading zone for NFC keys and wait for confirmation that it has been recognized
- Select OK

- 6 Select OK

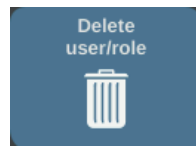
---

## Deleting users

- 1 Select Defaults / Administration / User management

User management is displayed.

- 2 Turn the selection dial and select the role to which the user to be deleted is assigned
- 3 Press the selection dial
- 4 Turn the selection dial and select the user to be deleted
- 5 Select "Delete user/role"



- 6 Confirm the prompt

The user is deleted.

---

## Deactivating user management

- 1 Select the predefined "Admin" user under Defaults / Administration / User management / Administrator
- 2 Turn the selection dial and select NFC card
- 3 Press the selection dial

The prompt to delete or replace the NFC card is displayed.

### NOTE!

**If the NFC card for the predefined "Admin" user is deleted, user management is deactivated.**

---

- 4** Select "Delete"

User management is deactivated, the power source is locked.

The power source can be unlocked and locked again with any NFC key (see also page [56](#)).

---

### Lost administrator NFC key?

Procedure if

- user management is activated
- the power source is locked and
- the administrator NFC key has been lost:

- 1** Touch the key symbol in the status bar on the display

The information regarding the loss of the administrator card is displayed.

- 2** Note down the IP address of the power source

- 3** Open the SmartManager for the power source (enter the IP address of the power source in a browser)

- 4** Contact the Fronius service team

# CENTRUM - Central User Management

---

## Activating the CENTRUM server

CENTRUM is a piece of software used for central user management. For detailed information, refer to the CENTRUM Operating Instructions (42,0426.0338,xx).

THE CENTRUM server can also be activated directly on the power source as follows:

- 1 Select Defaults / Administration / CENTRUM Server

The Central User Management Server is displayed.

- 2 Activate CENTRUM Server (press selection dial)
- 3 Select CENTRUM Server, press the selection dial and enter the address of the CENTRUM server using the keyboard
- 4 Select the Verify CENTRUM button
- 5 Save



# **SmartManager – The Website of the Power Source**



# SmartManager – The Website of the Power Source

## General

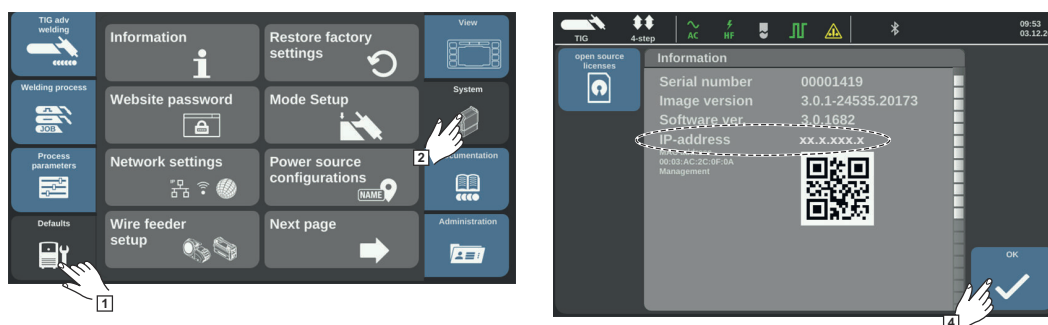
With the SmartManager, the power sources have their own website. Once the power source is connected to a computer via a network cable or is integrated into a network, the SmartManager of the power source can be accessed via the IP address of the power source. IE 10 or higher or another modern browser is required in order to access the SmartManager.

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

Examples of displayed entries:

- Current system data
- Documentation logbook
- Job data
- Power source settings
- Save and restore
- User management
- Overview
- Update
- Function packages
- Screenshot

## Opening and logging into the SmartManager for the power source



**1** Defaults / System / Information ==> note down the IP address of the power source

**2** Enter the IP address into the search field of the browser

**3** Enter user name and password

Factory setting:  
User name = admin  
Password = admin

**4** Confirm the displayed message

The SmartManager for the power source is displayed.

---

**Help functions if logging in does not work**

There are two help functions when logging into the SmartManager:

- Start activation function?
- Forgot your password?

**Start unlock function?**

This feature allows you to unlock an unintentionally locked power source and enable it for all functions.

- 1 Click on "Start unlock function?"
- 2 Create a verification file:  
click on "Store"

A .txt file with the following file name is saved in the computer's download folder:

unlock\_SN[serial number]\_YYYY\_MM\_DD\_hhmmss.txt

- 3 Send this verification file via e-mail to the Fronius tech support team at:  
welding.techsupport@fronius.com

Fronius will reply by e-mail with a one-time unlock file with the following file name:

response\_SN[serial number]\_YYYY\_MM\_DD\_hhmmss.txt

- 4 Save the unlock file to the computer
- 5 Click on "Find unlock file"
- 6 Save the unlock file
- 7 Click on "Load unlock file"

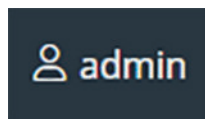
The power source is unlocked once.

**Forgot your password?**

After clicking on "Forgot your password?", a note appears indicating that the password can be reset on the power source (see also "Restoring the website password", page [239](#)).

---

**Changing the password/  
logging out**



Click on this symbol to

- change the user password
- log out of the SmartManager

Changing the password for the SmartManager:

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

## Settings



Click on this symbol to expand the display of characteristics, material specifications and certain welding parameters on the SmartManager for the power source.

The settings depend on the user who is logged in.

## Selecting the language



Click on the language abbreviation to display the languages available for the SmartManager.

Bahasa Indonesia	Čeština	Dansk
Deutsch	Eesti	English
Español	Français	Hrvatski
Íslenska	Italiano	Latviešu
Lietuviškas	Magyar	Nederlands
Norsk	Polski	Português
Română	Slovenščina	Slovenský
Srpski jezik	Suomi	Svenska
tiếng Việt	Türkçe	български език
Русский	Українська	हिन्दी
தமிழ்	ไทย	한국어
中文	日本語	

To change the language, click on the desired language.

---

**Status indicator**

The current status of the power source is displayed between the Fronius logo and the selected power source.

---



Caution/warning

---



Error on the power source

---



Power source is welding

---



Power source is ready for use (online)

---



Power source is not ready for use (offline)

---

\* In the event of an error, a red error line with the error number appears above the line with the Fronius logo.  
After clicking on the error line, an error description is displayed.

---

**Fronius**

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

# Current system data

## Current system data

Current welding system data is displayed.

### NOTE!

Depending on the welding process, equipment, and existing WeldingPackages, the system data displayed will vary.

► e.g. system data for TIG AC:

**Actual system data**

plant: thalheim (3)    hall: bt1 og2 (4)    cell: (5)

**TIG (6)**

		ACTUAL (7)			
I (8)	0 A	U (9)	0.0 V		
$\int I dt$ (10)	0.0 s	$\int U dt$ (11)	0.000 kJ	$\int P dt$ (12)	0.00 kW
$I_1$ (13)	50 A			$\eta$ (14)	35 %
$I_s$ (15)	(25 A) 50 %	$I_E$ (16)	(15 A) 30 %	$\beta$ (17)	2.4 mm
$t_{up}$ (18)	0.5 s	$t_{down}$ (19)	1.0 s	$\square$ (20)	AC
				$\int P dt$ (21)	4.22 kW
				$\hat{I}$ (22)	0 I
		$\int I dt$ (23)	0.2 h	$\int I dt$ (24)	78.0 h

(25)  $\uparrow \downarrow$  2-step | AC HF | (26)(27)(28)(29) | (30)

(1)	Device type	(17)	Electrode diameter
(2)	Device name	(18)	UpSlope
(3)	Factory	(19)	DownSlope
(4)	Hall	(20)	Polarity
(5)	Cell	(21)	Total arc energy
(6)	Welding process	(22)	Total shielding gas consumption
(7)	Actual values / HOLD or Average values (depending on setting)	(23)	Total arc time
(8)	Welding current	(24)	Total operating hours of the power source
(9)	Welding voltage	(25)	Operating mode
(10)	Arc time	(26)	AC or DC
(11)	Arc energy	(27)	HF ignition
(12)	Arc power	(28)	Pulse frequency
(13)	Welding current set value	(29)	CyclTIG
(14)	AC balance	(30)	Full screen mode
(15)	Starting current set value		
(16)	Final current set value		



# Documentation logbook

## Logbook

The documentation entry in the logbook shows the last 100 entries. These logbook entries can be welds, errors, warnings, notifications, and events. The "Time filter" button can be used to filter the displayed data by a specific time period. This is entered with date (yyyy MM dd) and time (hh mm), each from - to. An empty filter reloads the most recent welding operations. The display of welding operations, errors, warnings, notifications, and events can be deactivated.

### The following data is displayed:

		start time (local ...						
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	

- (1) Number of the weld
- (2) Start time (date and time)
- (3) Duration of welding in s
- (4) Welding current in A (average)
- (5) Welding voltage in V (average)
- (6) Wire speed in m/min
- (7) IP - arc power in W (based on real-time values according to ISO/TR 18491)
- (8) IE - arc energy in kJ (as the total throughout the entire welding process according to ISO/TR 18491)

If present in the system, robot speed and jobs are also displayed.

Clicking on a logbook entry will display the details for that entry.

### Details for welds:

Section No.

								
(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)

- (9) Duration of the welding section in s
- (10) Welding current in A (average)
- (11) Welding voltage in V (average)
- (12) Wire speed in m/min
- (13) Welding speed (cm/min)
- (14) Arc power from instantaneous values in W (for details see page [231](#))
- (15) Arc energy in kJ (for details see page [231](#))
- (16) Job No.
- (17) Process



Additional values can be also displayed by clicking on the "Insert column" button:

- I max / I min: maximum/minimum welding current in A
- Power max / Power min: maximum/minimum arc power in W
- Start time (power source time); date and time
- U max / U min: maximum/minimum welding voltage in V
- Vd max / Vd min: maximum/minimum wire speed in m/min

If the OPT/i Documentation option is present on the power source, individual sections of welds can also be displayed.



The documentation can be exported in the desired format using the "PDF" and "CSV" buttons.

For CSV exports, the OPT/i documentation option must be present on the power source.

# Job data

## Job data

If the OPT/i Jobs option is available on the power source, the following can be carried out under the Job data entry:

- Existing jobs in the welding system can be viewed \*
- Existing jobs in the welding system can be optimized
- Externally stored jobs can be transferred to the welding system
- Existing jobs in the welding system can be exported as PDF \* or CSV files

\* Viewing and exporting as a PDF also works if the OPT/i Jobs option is not available on the power source.

## Job overview

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

After clicking on a job, the data and parameters stored for this job are displayed. Job data and parameters can only be viewed in the job overview. The column width for parameters and values can be easily adjusted by dragging with the mouse pointer.

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



All added jobs are compared with the selected job.

## Editing a job

Existing jobs in the welding system can be optimized, provided the OPT/i Jobs option is available on the power source.

- 1 Click on "Edit job"
- 2 In the list of existing jobs, click on the job to be edited.

The selected job opens and the following job data is displayed:

- **Parameters**  
Parameters currently stored in the job
- **Value**  
Parameter values currently stored in the job
- **Change value to**  
For entering the new parameter value
- **Setting range**  
Possible setting range for the new parameter values

- 3 Change the values accordingly
- 4 Save/discard your changes, save job as/delete



To help when editing the job, further jobs can be easily added to the list with the displayed data by clicking on "Add job".



### 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 allows externally stored jobs to be transferred into the welding system, provided the OPT/i Jobs option is available on the power source.

- 1 Click on "Find job file"
- 2 Select the desired job file

In the preview of the job import list, you can select individual jobs and assign new job numbers.

- 3 Click on "Import"

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

---

### Exporting a job

This function allows the power source to store jobs externally, provided the OPT/i Jobs option is available on the power source.

- 1 Select the jobs to be exported
- 2 Click on "Export"

The jobs are exported as an XML file to the computer's download folder.

---

### Exporting job(s) as ...

Under Job overview and Edit job, existing jobs in the welding system can be exported as PDF or CSV files.  
For CSV export, the OPT/i Jobs option must be available on the power source.

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



The PDF settings 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 of the selected jobs is created and saved depending on the settings for the browser used.

# Power source settings

---

## Process parameters

Under Process parameters, you can view and modify general process parameters and process parameters for components & monitoring of a power source.

### Changing process parameters

- 1** Click on Parameter Group/Parameters
  - 2** Change the value of the parameter directly in the display field
  - 3** Save the changes
- 

## Designation & location

The power source configuration can be viewed and modified under Designation & location.

# Save and restore

## General

Under the Save and restore entry

- all welding system data can be saved as a backup (e.g. current parameter settings, jobs, user curves, defaults, etc.)
- existing backups can be saved again in the welding system
- data can be configured for automatic backup

## Save and restore

### Starting a backup

- 1** Click on "Start backup" to save the welding system data as a backup

By default, the data is saved in the format MCU1-YYYYMMDDTHHmm.fbc in the selected location.

YYYY = year  
MM = month  
DD = day  
HH = hour  
mm = minute

Time and date information as per the settings on the power source.

### Finding a recovery file

- 1** Click on "Find recovery file" to transfer an existing backup to the power source
- 2** Select the file and click on "Open"

The selected backup file appears in the SmartManager for the power source under Restore.

- 3** Click on "Start restore"

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

---

## Automatic backup

- 1** Enable interval settings
- 2** Enter the interval settings for the times at which the automatic backup should take place:
  - **Interval:**  
daily/weekly/monthly
  - **at:**  
time (hh:mm)
- 3** Enter the data for the backup destination:
  - **Protocol:**  
SFTP (Secure File Transfer Protocol) / SMB (Server Message Block)
  - **Server:**  
Enter the IP address of the destination server
  - **Port:**  
Enter port number; if no port number is entered, the standard port 22 is automatically used.  
If SMB is set under Protocol, leave the Port field blank.
  - **Storage location:**  
Used to configure the subfolder where the backup will be stored.  
If no location is entered, the backup is stored in the server root directory.  
  
**IMPORTANT!** For SMB and SFTP, always enter the location with a slash "/".
  - **Domain/user, password:**  
User name and password - as configured on the server;  
When entering a domain, first enter the domain, then backslash "\" and then the user name (DOMAIN\USER)
- 4** If a connection via proxy server is required, activate and enter the proxy settings:
  - Server
  - Port
  - User
  - Password
- 5** Save changes
- 6** Activate automatic backup

If you have any questions about configuration, contact your network administrator.



# User management

## General

Under the User administration entry

- users can be viewed, changed and created
- user roles can be viewed, changed and created
- users and user roles can be exported or imported into the power source.  
On import, existing user management data on the power source is overwritten.
- a CENTRUM server can be activated

User management is created on one power source and can then be saved with the export/import function and transferred to other power sources.

## Users

Existing users can be viewed, changed and deleted, new users can be created.

### Viewing/changing a user:

- 1** Select a user
- 2** Change user data directly in the display field
- 3** Save the changes

### Deleting a user:

- 1** Select a user
- 2** Click on the "Delete user" button
- 3** Confirm the prompt with "OK"

### Creating a user:

- 1** Click on the "Create new user" button
- 2** Enter user data
- 3** Confirm with OK

## User roles

Existing user roles can be viewed, changed and deleted, new user roles can be created.

### Viewing/changing a user role:

- 1** Select a user role
- 2** Change user role data directly in the display field
- 3** Save the changes

The "Administrator" role cannot be changed.

### Deleting a user role:

- 1** Select a user role
- 2** Click on the "Delete user role" button
- 3** Confirm the prompt with "OK"

The "Administrator" and "locked" roles cannot be deleted.

### Creating a user role:

- 1** Click on the "Create new user role" button
- 2** Enter a role name, apply values
- 3** Confirm with OK

---

## Export & import

### Exporting users and user roles from a power source

- 1** Click on "export"

User management for the power source is stored in the computer's download folder.

File format: userbackup\_SNxxxxxxx\_YYYY\_MM\_DD\_hhmmss.user

SN = serial number, YYYY = year, MM = month, DD = day  
hh = hour, mm = minute, ss = second

### Importing users and user roles into a power source

- 1** Click on "Find user data file"
- 2** Select the file and click on "open"
- 3** Click on "import"

User management is stored on the power source.

---

## CENTRUM Server

To activate a CENTRUM server  
(CENTRUM = Central User Management)

- 1** Activate CENTRUM Server
- 2** In the input field, enter the domain name or IP address of the server on which Central User Management has been installed.

If a domain name is used, a valid DNS server must be configured under the power source network settings.

- 3** Click on the "Verify server" button.

The availability of the specified server is checked.

- 4** Save changes

# Overview

## Overview

The Overview entry displays the components and options in the welding system with all the available information, e.g. firmware version, item number, serial number, production date, etc.

## Expanding all groups/ collapsing all groups

Click on the "Expand all groups" button to see further details about the individual system components.

Example power source:

- TPSi Touch: Item number  
MCU1: Item number, version, serial number, production date  
Bootloader: Version  
Image: Version  
Licenses: WP Standard, WP Pulse, WP LSC, WP PMC, OPT/i Guntrigger, etc.
- SC2: Item number  
Firmware: Version

Click on the "Collapse all groups" button to hide the details of the system components.

## Export component overview as ...

Click on the "Export component overview as" button to create an XML file from the details of the system components. This XML file can either be opened or saved.

# Update

---

## Update

Under the Update entry, the firmware of the power source can be updated.

The current firmware version on the power source is displayed.

Update the power source firmware:



The update file can be downloaded, for example, from the following link:  
<https://tps-i.com/index.php/firmware>

- 1** Organize and save the update file
- 2** Click on "Find update file" to start the update process
- 3** Select the update file

Click on "Update"

After the update has been completed, the power source may need to be restarted.

After the update has been successfully completed, a confirmation message is displayed.

---

## Finding the update file (performing an update)

- 1** After clicking on "Find update file", select the desired firmware (\*.ffw)
- 2** Click on "Open"

The selected update file appears in the SmartManager for the power source under Update.

- 3** Click on "Update"

The progress of the update process is displayed.  
Once this reaches 100%, the prompt to restart the power source appears.



The SmartManager is not available during the restart.  
After the restart, the SmartManager may no longer be available.  
If you select No, the new software functions will be activated the next time the power is turned on/off.

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

The power source restarts, the display goes dark for a short time.  
During the restart, the power source display shows the Fronius logo.  
After the update has been successfully completed, a confirmation and the current firmware version are displayed.  
Then log into the SmartManager again.

## Fronius Weld-Connect



Under the Update entry, the Fronius WeldConnect mobile application can also be called up. WeldConnect is an app for wireless interaction with the welding system

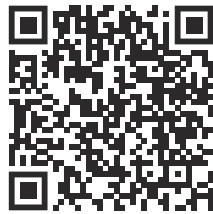
### **WeldConnect can be used to perform the following functions:**

- Current device configuration at a glance
- Mobile access to the SmartManager of the power source
- Automatic determination of output parameters for MIG/MAG and TIG
- Cloud storage and wireless transmission to the power source
- Component identification
- Log on and off the power source without NFC card
- Save and share parameters and jobs
- Data transfer from one power source to another by means of backup, restore
- Firmware update

Fronius WeldConnect is available as follows:

- As an app for Android
- As an app for Apple/iOS

For more information on Fronius WeldConnect, visit:



<https://www.fronius.com/en/welding-technology/innovative-solutions/weldconnect>

# Function packages

---

## Function packages

The following data can be displayed under function packages:

- At the power source, existing Welding Packages (e.g. WP STANDARD, WP PULSE, WP LSC, etc.)
- DB /i (databases)
- Options available on the power source (OPT/i. etc.)
- CFG /i (robot interface configurations)

---

## Welding packages

Under Welding Packages, the welding packages available on the power source are displayed with the respective item numbers, e.g.:

- WP Standard (MIG/MAG standard synergic welding)
- WP Pulse (MIG/MAG pulsed synergic welding)
- WP LSC (Low Spatter Control, low-spatter dip transfer arc process)
- WP PMC (Pulse Multi Control, advanced pulsed arc welding process)

Possible extensions:

- WP CMT
- etc.

---

## Options

Under Options, the options available on the power source are displayed with the respective item numbers and possible extensions, e.g.:

Options

- OPT/i GUN Trigger
- etc.

Possible extensions

- OPT/i Jobs
- OPT/i Interface Designer...
- etc.

---

## Loading a function package

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

The selected function package file appears in the SmartManager for the power source Function package.

- 5 Click on "Load function package"

Once the function package has been successfully loaded, a confirmation is displayed.

## Screenshot

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

- 1 Click on "Take screenshot" to take a screenshot of the display

The screenshot is taken with the settings currently displayed on the display.

Depending on the browser you are using, different functions are available for saving the screenshot, and the display may vary.





# **Troubleshooting and Maintenance**



# Troubleshooting

## General

The power sources are equipped with an intelligent safety system, meaning it has been possible to dispense with nearly all fuses. After a possible malfunction has been remedied, the power source can be used again as normal.

Possible malfunctions, warning notices or status codes are shown on the display as plain text dialogues.

## Safety



### WARNING!

#### **Danger from electrical current.**

This can result in serious personal injury and damage to property.

- ▶ Before starting work, switch off all the devices and components involved and disconnect them from the grid.
- ▶ Secure all devices and components involved so they cannot be switched back on.
- ▶ After opening the device, use a suitable measuring instrument to check that electrically charged components (such as capacitors) have been discharged.



### WARNING!

#### **Danger due to insufficient ground conductor connection.**

This can result in serious personal injury and damage to property.

- ▶ The housing screws provide a suitable ground conductor connection for grounding the housing.
- ▶ The housing screws must not under any circumstances be replaced by other screws without a reliable ground conductor connection.

## MIG/MAG welding – Current limit

“Current limit” is a safety function for MIG/MAG welding, whereby

- it is possible to operate the power source at the power limit
- process safety is ensured

If the welding power is too high, the arc gets smaller and smaller and may be extinguished. To stop the arc from being extinguished, the power source reduces the wire speed and therefore the welding power.

A corresponding message appears in the status bar on the display.

#### **Corrective measures**

- Reduce one of the following welding power parameters:  
Wire speed  
Welding current  
Welding voltage  
Material thickness
- Increase the distance between the contact tip and workpiece

---

**Power Source  
Troubleshooting**

---

**Power source not working**

Power source switched on; displays and indicators do not illuminate

Cause: Mains lead damaged or broken, mains plug not inserted

Remedy: Check mains lead, if necessary insert mains plug

Cause: Mains socket or mains plug faulty

Remedy: Replace faulty parts

Cause: Mains fuse protection

Remedy: Replace mains fuse

Cause: Short circuit on the 24 V power supply of the SpeedNet connection or external sensor

Remedy: Disconnect connected components

---

**No welding current**

Mains switch is on, overtemperature is displayed

Cause: Overload; the duty cycle has been exceeded

Remedy: Check duty cycle

Cause: Thermostatic automatic circuit breaker has been tripped

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

Cause: Limited supply of cooling air

Remedy: Ensure accessibility to cooling air ducts

Cause: The fan in the power source is faulty

Remedy: Contact After-Sales Service

---

**No welding current**

Power source switched on; displays and indicators light up

Cause: Incorrect ground connection

Remedy: Check ground connection and terminal for polarity

Cause: Power cable in welding torch damaged or broken.

Remedy: Replace the welding torch

---

**Nothing happens after pressing torch trigger**

Power source switched on; displays and indicators light up

Cause: Control plug not plugged in

Remedy: Plug in control plug

Cause: Welding torch or welding torch control line faulty

Remedy: Replace the welding torch

Cause: Interconnecting hosepack defective or not correctly connected  
(not in the case of power sources with integrated wire drive)

Remedy: Check interconnecting hosepack

---

**No shielding gas**

All other functions are OK

Cause: Gas cylinder empty

Remedy: Change gas cylinder

Cause: Gas pressure regulator faulty

Remedy: Replace the gas pressure regulator

Cause: Gas hose is not fitted or is damaged

Remedy: Fit or change gas hose

Cause: Welding torch faulty

Remedy: Change welding torch

Cause: Gas solenoid valve faulty

Remedy: Contact After-Sales Service

---

**Poor-quality weld properties**

Cause: Wrong welding parameters, wrong correction parameters

Remedy: Check settings

Cause: Poor ground earth connection

Remedy: Establish good contact with workpiece

Cause: Several power sources welding one part

Remedy: Increase distance between hosepacks and grounding cables;  
Do not use a common ground.

Cause: Too little or no shielding gas

Remedy: Check pressure regulator, gas hose, gas solenoid valve, welding torch  
gas connection, etc.

Cause: Welding torch leaks

Remedy: Change welding torch

Cause: Incorrect or heavily worn contact tip

Remedy: Change contact tip

Cause: Incorrect wire alloy or incorrect wire diameter

Remedy: Check wire electrode in use

Cause: Incorrect wire alloy or incorrect wire diameter

Remedy: Check the weldability of the parent material

Cause: Shielding gas not suitable for wire alloy

Remedy: Use correct shielding gas

---

**Excessive weld spatter**

Cause: Shielding gas, wirefeeder, welding torch or workpiece contaminated  
or magnetically charged

Remedy: Perform R/L alignment;  
Adjust arc length;  
Check shielding gas, wirefeeder, welding torch position or workpiece  
for contamination or magnetic charge

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**Wirefeed problems**

when using long welding torch hosepacks

Cause: Incorrect arrangement of welding torch hosepack

Remedy: Arrange the welding torch hosepack in as straight a line as possible,  
avoiding tight bends

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**Irregular wire speed**

Cause: Braking force has been set too high

Remedy: Loosen the brake

Cause: Contact tip hole too narrow

Remedy: Use suitable contact tip

Cause: Inner liner in the welding torch faulty

Remedy: Check the inner liner for kinks, dirt, etc. and replace if necessary

Cause: Feed rollers not suitable for wire electrode used

Remedy: Use suitable feed rollers

Cause: Feed rollers have the wrong contact pressure

Remedy: Optimize contact pressure

---

**Welding torch gets very hot**

Cause: Welding torch is inadequately sized

Remedy: Observe duty cycle and load limits

Cause: For water-cooled systems only: Coolant flow too low

Remedy: Check coolant level, coolant flow rate, coolant contamination, etc.;  
coolant pump blocked: Switch on the shaft of the coolant pump at  
the gland using a screwdriver

Cause: For water-cooled systems only: The "Cooling unit operating mode"  
setup parameter is set to "off".

Remedy: In the Setup menu, set the "Cooling unit operating mode" parameter  
to "eco", "on" or "auto" in the component settings.

---

# Service, 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 the welding system remains in a usable condition for many years.

## Safety



### WARNING!

#### **Danger from electrical current.**

This can result in serious personal injury and damage to property.

- ▶ Before starting work, switch off all the devices and components involved and disconnect them from the grid.
- ▶ Secure all devices and components involved so they cannot be switched back on.
- ▶ After opening the device, use a suitable measuring instrument to check that electrically charged components (such as capacitors) have been discharged.

## At every start-up

- Check mains plug, mains cable, welding torch, interconnecting hosepack and grounding (earthing) connection for damage
- Check whether the all-round clearance of 0.5 m (1 ft. 8 in.) is kept to ensure that the cooling air can easily flow and escape.

### NOTE!

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

## Every 2 months

- If present: clean air filter

## Every 6 months



### CAUTION!

#### **Danger due to the effect of compressed air.**

This can result in damage to property.

- ▶ Do not clean electronic components with compressed air from a short distance.
- 
- Open the device
  - Blow out the inside of the device with dry and reduced compressed air
  - Also clean the cooling air ducts if there is a large accumulation of dust

## Updating firmware

**IMPORTANT!** To update the firmware you need a PC or laptop that is connected to the power source via an Ethernet network.

- 1** Get latest firmware (e.g. from the Fronius Download Center)  
File format: official\_tpsi\_x.x.x-xxxx.ffw
- 2** Establish Ethernet connection between PC/laptop and power source
- 3** Open the power source SmartManager (see page [263](#))



- 4 Transfer the firmware to the power source (see page [280](#))
- 

## Disposal

Materials should be disposed of according to valid local and national regulations.



# Appendix



# Average consumption values during welding

## Average shielding gas consumption during TIG welding

Gas nozzle size	4	5	6	7	8	10
Average consumption	6 l/min	8 l/min	10 l/min	12 l/min	12 l/min	15 l/min

## Average shielding gas consumption during MIG/MAG welding

Wire electrode diameter	1.0 mm	1.2 mm	1.6 mm	2.0 mm	2 x 1.2 mm (TWIN)
Average consumption	10 l/min	12 l/min	16 l/min	20 l/min	24 l/min

## Average wire electrode consumption during MIG/MAG welding

### Average wire electrode consumption at a wire speed of 5 m/min

	1.0 mm wire electrode diameter	1.2 mm wire electrode diameter	1.6 mm wire electrode diameter
Steel wire electrode	1.8 kg/h	2.7 kg/h	4.7 kg/h
Aluminum wire electrode	0.6 kg/h	0.9 kg/h	1.6 kg/h
CrNi wire electrode	1.9 kg/h	2.8 kg/h	4.8 kg/h

### Average wire electrode consumption at a wire speed of 10 m/min

	1.0 mm wire electrode diameter	1.2 mm wire electrode diameter	1.6 mm wire electrode diameter
Steel wire electrode	3.7 kg/h	5.3 kg/h	9.5 kg/h
Aluminum wire electrode	1.3 kg/h	1.8 kg/h	3.2 kg/h
CrNi wire electrode	3.8 kg/h	5.4 kg/h	9.6 kg/h

# Technical data

## Explanation of the term duty cycle

The duty cycle (ED) is the period of a ten minute cycle in which the device may be operated at the stated power without overheating.

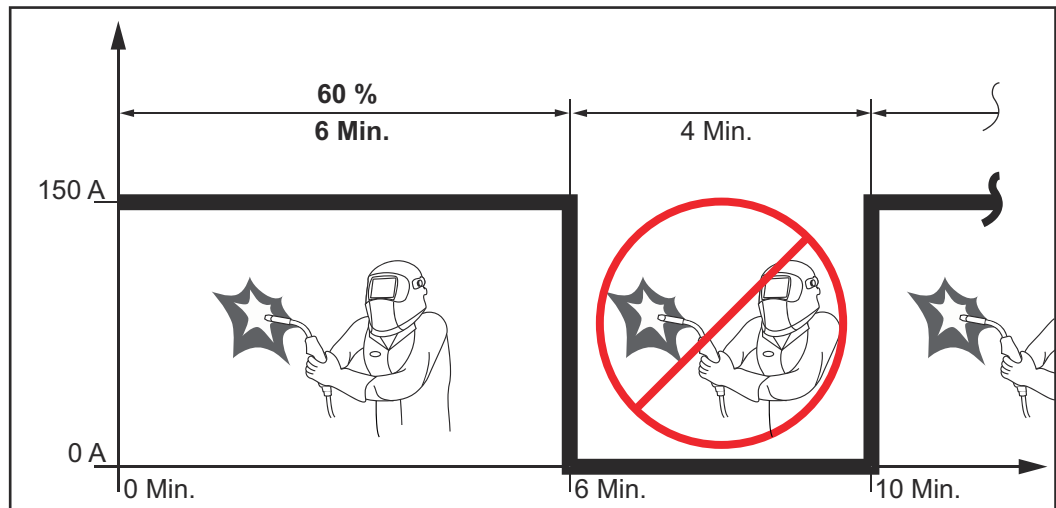
### NOTE!

The ED values cited on the rating plate relate to an ambient temperature of 40 °C.

If the ambient temperature is higher, the ED or power must be lowered accordingly.

Example: Welding with 150 A at 60% ED

- Welding phase = 60% of 10 mins = 6 mins
- Cool-down phase = rest time = 4 mins
- Following the cool-down phase, the cycle begins again.



To use the device without interruptions:

- 1 Search for a 100% ED value in the technical data, which corresponds to the existing ambient temperature.
- 2 Reduce the power or amperage value correspondingly so that the device can operate without a cool-down phase.

## Special Voltage

For devices designed for special voltages, the technical data on the rating plate applies.

The following applies for all devices with a permitted grid voltage of up to 460 V: The standard mains plug allows the user to operate with a grid voltage of up to 400 V. For grid voltages up to 460 V fit a mains plug permitted for such use or install the mains supply directly.

**iWave 300i DC**

Mains voltage ( $U_1$ )	3 x 400 V
Max. effective primary current ( $I_{1\text{eff}}$ )	12.7 A
Max. primary current ( $I_{1\text{max}}$ )	16.9 A
Mains fuse	16 A slow-blow
Mains voltage tolerance	+/- 15%
Mains frequency	50/60 Hz
Cos phi (1)	0.99
Max. permitted grid impedance $Z_{\text{max}}$ on PCC <sup>1)</sup>	156 mOhm
Recommended residual-current circuit breaker	Type B
Welding current range ( $I_2$ )	
TIG	3 - 300 A
MIG/MAG	3 - 300 A
MMA	10 - 300 A
Welding current at 10 min/40 °C (104 °F)	40% / 300 A 60% / 260 A 100% / 240 A
Output voltage range according to standard characteristic ( $U_2$ )	
TIG	10.1 - 26.0 V
MIG/MAG	14.2 - 29.0 V
MMA	20.4 - 32.0 V
Open circuit voltage ( $U_0$ peak / $U_0$ r.m.s)	99 V
Striking voltage ( $U_P$ )	10 kV
	The arc ignition device is suitable for manual operation.
Protection class	IP 23
EMC emission class	A <sup>2)</sup>
Dimensions L x W x H	700 x 300 x 510 mm 27.6 x 11.8 x 20.1 in.
Weight	46.4 kg / 102.29 lb.
Max. noise emission (LWA)	75 dB (A)
Idle state power consumption at 400 V	39.7 W
Power source efficiency at 300 A / 32.0 V	87%
Max. shielding gas pressure	7 bar/102 psi

- 1) Interface to a 230/400-V and 50-Hz public grid
- 2) A device in emissions class A is not intended for use in residential areas in which the power is supplied via a public low-voltage grid.

The electromagnetic compatibility may be influenced by conducted or radiated radio frequencies.



**iWave 300i  
DC /nc**

Mains voltage ( $U_1$ )	3 x 380 / 400 / 460 V
Max. effective primary current ( $I_{1\text{eff}}$ )	
3 x 380 V	13.57 A
3 x 400 V	12.7 A
3 x 460 V	11.2 A
Max. primary current ( $I_{1\text{max}}$ )	
3 x 380 V	18.1 A
3 x 400 V	16.9 A
3 x 460 V	14.8 A
Mains fuse	16 A slow-blow
Mains voltage tolerance	+/- 15%
Mains frequency	50/60 Hz
Cos phi (1)	0.99
Max. permitted grid impedance $Z_{\text{max}}$ on PCC <sup>1)</sup>	156 mOhm
Recommended residual-current circuit breaker	Type B
Welding current range ( $I_2$ )	
TIG	3 - 300 A
MIG/MAG	3 - 300 A
MMA	10 - 300 A
Welding current at 10 min/40 °C (104 °F)	40% / 300 A 60% / 260 A 100% / 240 A
Output voltage range according to standard characteristic ( $U_2$ )	
TIG	10.1 - 26.0 V
MIG/MAG	14.2 - 29.0 V
MMA	20.4 - 32.0 V
Open circuit voltage ( $U_0$ peak / $U_0$ r.m.s)	99 V
Striking voltage ( $U_P$ )	10 kV
	The arc ignition device is suitable for manual operation.
Protection class	IP 23
EMC emission class	A <sup>2)</sup>
Dimensions L x W x H	700 x 300 x 510 mm 27.6 x 11.8 x 20.1 in.
Weight	45.1 kg / 99.43 lb.
Max. noise emission (LWA)	75 dB (A)
Idle state power consumption at 400 V	39.7 W

Power source efficiency at 300 A / 32.0 V	87%
Max. shielding gas pressure	7 bar/102 psi

- 1) Interface to a 230/400-V and 50-Hz public grid
- 2) A device in emissions class A is not intended for use in residential areas in which the power is supplied via a public low-voltage grid.  
The electromagnetic compatibility may be influenced by conducted or radiated radio frequencies.

**iWave 300i  
DC /MV/nc**

Mains voltage ( $U_1$ )	3 x 200/230/240/380/400/460/600 V
Max. effective primary current ( $I_{1\text{eff}}$ )	
3 x 200 V	26.1 A
3 x 230 V	22.5 A
3 x 240 V	20.9 A
3 x 380 V	13.5 A
3 x 400 V	12.7 A
3 x 460 V	11.2 A
3 x 600 V	11.6 A
Max. primary current ( $I_{1\text{max}}$ )	
3 x 200 V	35.2 A
3 x 230 V	30.2 A
3 x 240 V	28.2 A
3 x 380 V	18.1 A
3 x 400 V	16.9 A
3 x 460 V	14.8 A
3 x 600 V	14.8 A
Mains fuse	
3 x 200/230/240 V	35 A slow-blow
3 x 380/400/460/600 V	16 A slow-blow
Mains voltage tolerance	-10 / +6%
Mains frequency	50/60 Hz
Cos phi (1)	0.99
Max. permitted grid impedance $Z_{\text{max}}$ on PCC <sup>1)</sup>	172 mOhm
Recommended residual-current circuit breaker	Type B
Welding current range ( $I_2$ )	
TIG	3 - 300 A
MIG/MAG	3 - 300 A
MMA	10 - 300 A
Welding current at 10 min/40 °C (104 °F)	40% / 300 A 60% / 260 A 100% / 240 A
Output voltage range according to standard characteristic ( $U_2$ )	
TIG	10.1 - 26.0 V
MIG/MAG	14.2 - 29.0 V
MMA	20.4 - 32.0 V
Open circuit voltage ( $U_0$ peak / $U_0$ r.m.s)	104 V

Striking voltage ( $U_P$ )	10 kV The arc ignition device is suitable for manual operation.
Protection class	IP 23
EMC emission class	A <sup>2)</sup>
Dimensions L x W x H	700 x 300 x 510 mm 27.6 x 11.8 x 20.1 in.
Weight	46.5 kg / 102.52 lb.
Max. noise emission (LWA)	75 dB (A)
Idle state power consumption at 400 V	39.7 W
Power source efficiency at 300 A / 32.0 V	87%
Max. shielding gas pressure	7 bar/102 psi

- 1) Interface to a 230/400-V and 50-Hz public grid
- 2) A device in emissions class A is not intended for use in residential areas in which the power is supplied via a public low-voltage grid.  
The electromagnetic compatibility may be influenced by conducted or radiated radio frequencies.

**iWave 400i DC**

Mains voltage ( $U_1$ )	3 x 400 V
Max. effective primary current ( $I_{1\text{eff}}$ )	18.4 A
Max. primary current ( $I_{1\text{max}}$ )	24.9 A
Mains fuse	35 A slow-blow
Mains voltage tolerance	+/- 15%
Mains frequency	50/60 Hz
Cos phi (1)	0.99
Max. permitted grid impedance $Z_{\text{max}}$ on PCC <sup>1)</sup>	~ 92 mOhm
Recommended residual-current circuit breaker	Type B
Welding current range ( $I_2$ )	
TIG	3 - 400 A
MIG/MAG	3 - 400 A
MMA	10 - 400 A
Welding current at 10 min/40 °C (104 °F)	40% / 400 A   60% / 360 A   100% / 320 A
Output voltage range according to standard characteristic ( $U_2$ )	
TIG	10.1 - 26.0 V
MIG/MAG	14.2 - 34.0 V
MMA	20.4 - 36.0 V
Open circuit voltage ( $U_0$ peak / $U_0$ r.m.s)	99 V
Striking voltage ( $U_P$ )	10 kV The arc ignition device is suitable for manual operation.
Protection class	IP 23
EMC emission class	A <sup>2)</sup>
Dimensions L x W x H	706 x 300 x 510 mm 27.8 x 11.8 x 20.1 in.
Weight	49.9 kg / 110.01 lb.
Max. noise emission (LWA)	75 dB (A)
Idle state power consumption at 400 V	40.9 W
Power source efficiency at 400 A / 36.0 V	87%
Max. shielding gas pressure	7 bar/102 psi

- 1) Interface to a 230/400-V and 50-Hz public grid
- 2) A device in emissions class A is not intended for use in residential areas in which the power is supplied via a public low-voltage grid.  
The electromagnetic compatibility may be influenced by conducted or radiated radio frequencies.

**iWave 400i**  
**DC / nc**

Mains voltage ( $U_1$ )	3 x 380 / 400 / 460 V
Max. effective primary current ( $I_{1\text{eff}}$ )	
3 x 380 V	19.3 A
3 x 400 V	18.4 A
3 x 460 V	16.1 A
Max. primary current ( $I_{1\text{max}}$ )	
3 x 380 V	26.2 A
3 x 400 V	24.9 A
3 x 460 V	21.7 A
Mains fuse	35 A slow-blow
Mains voltage tolerance	+/- 15%
Mains frequency	50/60 Hz
Cos phi (1)	0.99
Max. permitted grid impedance $Z_{\text{max}}$ on PCC <sup>1)</sup>	~ 92 mOhm
Recommended residual-current circuit breaker	Type B
Welding current range ( $I_2$ )	
TIG	3 - 400 A
MIG/MAG	3 - 400 A
MMA	10 - 400 A
Welding current at 10 min/40 °C (104 °F)	40% / 400 A 60% / 360 A 100% / 320 A
Output voltage range according to standard characteristic ( $U_2$ )	
TIG	10.1 - 26.0 V
MIG/MAG	14.2 - 34.0 V
MMA	20.4 - 36.0 V
Open circuit voltage ( $U_0$ peak / $U_0$ r.m.s)	99 V
Striking voltage ( $U_P$ )	10 kV
	The arc ignition device is suitable for manual operation.
Protection class	IP 23
EMC emission class	A <sup>2)</sup>
Dimensions L x W x H	706 x 300 x 510 mm 27.8 x 11.8 x 20.1 in.
Weight	48.0 kg / 105.82 lb.
Max. noise emission (LWA)	75 dB (A)
Idle state power consumption at 400 V	40.9 W

Power source efficiency at 400 A / 36.0 V	87%
Max. shielding gas pressure	7 bar/102 psi

- 1) Interface to a 230/400-V and 50-Hz public grid
- 2) A device in emissions class A is not intended for use in residential areas in which the power is supplied via a public low-voltage grid.  
The electromagnetic compatibility may be influenced by conducted or radiated radio frequencies.

**iWave 400i**  
**DC /MV/nc**

Mains voltage ( $U_1$ )	3 x 200/230/240/380/400/460/600 V
Max. effective primary current ( $I_{1\text{eff}}$ )	
3 x 200 V	37.8 A
3 x 230 V	34.1 A
3 x 240 V	30.7 A
3 x 380 V	19.3 A
3 x 400 V	18.4 A
3 x 460 V	16.1 A
3 x 600 V	15.7 A
Max. primary current ( $I_{1\text{max}}$ )	
3 x 200 V	53.3 A
3 x 230 V	45.6 A
3 x 240 V	41.7 A
3 x 380 V	26.2 A
3 x 400 V	24.9 A
3 x 460 V	21.7 A
3 x 600 V	20.8 A
Mains fuse	
3 x 200/230/240 V	63 A slow-blow
3 x 380/400/460 V	35 A slow-blow
3 x 600 V	16 A slow-blow
Mains voltage tolerance	-10 / +6%
Mains frequency	50/60 Hz
Cos phi (1)	0.99
Max. permitted grid impedance $Z_{\text{max}}$ on PCC <sup>1)</sup>	97 mOhm
Recommended residual-current circuit breaker	Type B
Welding current range ( $I_2$ )	
TIG	3 - 400 A
MIG/MAG	3 - 400 A
MMA	10 - 400 A
Welding current at 10 min/40 °C (104 °F)	40% / 400 A 60% / 360 A 100% / 320 A
Output voltage range according to standard characteristic ( $U_2$ )	
TIG	10.1 - 26.0 V
MIG/MAG	14.2 - 34.0 V
MMA	20.4 - 36.0 V



Open circuit voltage ( $U_o$ peak / $U_o$ r.m.s)	104 V
Striking voltage ( $U_P$ )	10 kV
The arc ignition device is suitable for manual operation.	
Protection class	IP 23
EMC emission class	A <sup>2)</sup>
Dimensions L x W x H	706 x 300 x 510 mm 27.8 x 11.8 x 20.1 in.
Weight	49.3 kg / 108.69 lb.
Max. noise emission (LWA)	75 dB (A)
Idle state power consumption at 400 V	40.9 W
Power source efficiency at 400 A / 36 V	87%
Max. shielding gas pressure	7 bar/102 psi

- 1) Interface to a 230/400-V and 50-Hz public grid
- 2) A device in emissions class A is not intended for use in residential areas in which the power is supplied via a public low-voltage grid.  
The electromagnetic compatibility may be influenced by conducted or radiated radio frequencies.

**iWave 500i DC**

Mains voltage ( $U_1$ )	3 x 400 V
Max. effective primary current ( $I_{1\text{eff}}$ )	21.9 A
Max. primary current ( $I_{1\text{max}}$ )	34.4 A
Mains fuse	35 A slow-blow
Mains voltage tolerance	+/- 15%
Mains frequency	50/60 Hz
Cos phi (1)	0.99
Max. permitted grid impedance $Z_{\text{max}}$ on PCC <sup>1)</sup>	55 mOhm
Recommended residual-current circuit breaker	Type B
Welding current range ( $I_2$ )	
TIG	3 - 500 A
MIG/MAG	3 - 500 A
MMA	10 - 500 A
Welding current at 10 min/40 °C (104 °F)	40% / 500 A 60% / 430 A 100% / 360 A
Output voltage range according to standard characteristic ( $U_2$ )	
TIG	10.1 - 30.0 V
MIG/MAG	14.2 - 36.5 V
MMA	20.4 - 40.0 V
Open circuit voltage ( $U_0$ peak / $U_0$ r.m.s)	99 V
Striking voltage ( $U_P$ )	10 kV
The arc ignition device is suitable for manual operation.	
Protection class	IP 23
EMC emission class	A <sup>2)</sup>
Dimensions L x W x H	706 x 300 x 510 mm 27.8 x 11.8 x 20.1 in.
Weight	51.5 kg / 113.54 lb.
Max. noise emission (LWA)	75 dB (A)
Idle state power consumption at 400 V	40.5 W
Power source efficiency at 500 A / 40.0 V	88%
Max. shielding gas pressure	7 bar/102 psi

- 1) Interface to a 230/400-V and 50-Hz public grid
- 2) A device in emissions class A is not intended for use in residential areas in which the power is supplied via a public low-voltage grid.

The electromagnetic compatibility may be influenced by conducted or radiated radio frequencies.

**iWave 500i**  
**DC /nc**

Mains voltage ( $U_1$ )	3 x 380 / 400 / 460 V
Max. effective primary current ( $I_{1\text{eff}}$ )	
3 x 380 V	22.8 A
3 x 400 V	21.9 A
3 x 460 V	19.2 A
Max. primary current ( $I_{1\text{max}}$ )	
3 x 380 V	36.0 A
3 x 400 V	34.4 A
3 x 460 V	30.0 A
Mains fuse	35 A slow-blow
Mains voltage tolerance	+/- 15%
Mains frequency	50/60 Hz
Cos phi (1)	0.99
Max. permitted grid impedance $Z_{\text{max}}$ on PCC <sup>1)</sup>	55 mOhm
Recommended residual-current circuit breaker	Type B
Welding current range ( $I_2$ )	
TIG	3 - 500 A
MIG/MAG	3 - 500 A
MMA	10 - 500 A
Welding current at 10 min/40 °C (104 °F)	40% / 500 A 60% / 430 A 100% / 360 A
Output voltage range according to standard characteristic ( $U_2$ )	
TIG	10.1 - 30 V
MIG/MAG	14.2 - 36.5 V
MMA	20.4 - 40.0 V
Open circuit voltage ( $U_0$ peak / $U_0$ r.m.s)	99 V
Striking voltage ( $U_P$ )	10 kV
	The arc ignition device is suitable for manual operation.
Protection class	IP 23
EMC emission class	A <sup>2)</sup>
Dimensions L x W x H	706 x 300 x 510 mm 27.8 x 11.8 x 20.1 in.
Weight	49.7 kg / 109.57 lb.
Max. noise emission (LWA)	75 dB (A)
Idle state power consumption at 400 V	40.5 W

Power source efficiency at 500 A / 40.0 V	88%
Max. shielding gas pressure	7 bar/102 psi

- 1) Interface to a 230/400-V and 50-Hz public grid
- 2) A device in emissions class A is not intended for use in residential areas in which the power is supplied via a public low-voltage grid.  
The electromagnetic compatibility may be influenced by conducted or radiated radio frequencies.

**iWave 500i**  
**DC /MV/nc**

Mains voltage ( $U_1$ )	3 x 200/230/240/380/400/460/600 V
Max. effective primary current ( $I_{1\text{eff}}$ )	
3 x 200 V	43.1 A
3 x 230 V	38.9 A
3 x 240 V	36.2 A
3 x 380 V	22.8 A
3 x 400 V	21.9 A
3 x 460 V	19.2 A
3 x 600 V	18.4 A
Max. primary current ( $I_{1\text{max}}$ )	
3 x 200 V	68.1 A
3 x 230 V	62.0 A
3 x 240 V	57.3 A
3 x 380 V	36.0 A
3 x 400 V	34.4 A
3 x 460 V	30.0 A
3 x 600 V	27.2 A
Mains fuse	
3 x 200/230/240 V	63 A slow-blow
3 x 380/400/460/600 V	35 A slow-blow
Mains voltage tolerance	-10 / +6%
Mains frequency	50/60 Hz
Cos phi (1)	0.99
Max. permitted grid impedance $Z_{\text{max}}$ on PCC <sup>1)</sup>	71 mOhm
Recommended residual-current circuit breaker	Type B
Welding current range ( $I_2$ )	
TIG	3 - 500 A
MIG/MAG	3 - 500 A
MMA	10 - 500 A
Welding current at 10 min/40 °C (104 °F)	
$U_1 = 200 - 240$ V TIG, MIG/MAG	40% / 500 A 60% / 430 A 100% / 360 A
$U_1 = 200 - 240$ V MMA	40% / 450 A 60% / 390 A 100% / 320 A

$U_1 = 380 - 600 \text{ V}$

40% / 500 A  
60% / 430 A  
100% / 360 A

Output voltage range according to standard characteristic ( $U_2$ )

TIG	10.1 - 30.0 V
MIG/MAG	14.2 - 36.5 V
MMA	20.4 - 40.0 V

Open circuit voltage ( $U_0$ peak / $U_0$ r.m.s)	104 V
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Striking voltage ( $U_P$ )	10 kV
The arc ignition device is suitable for manual operation.	

Protection class	IP 23
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EMC emission class	A <sup>2)</sup>
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Dimensions L x W x H	706 x 300 x 510 mm 27.8 x 11.8 x 20.1 in.
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Weight	51.3 kg / 113.10 lb.
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Max. noise emission (LWA)	75 dB (A)
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Idle state power consumption at 400 V	40.5 W
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Power source efficiency at 500 A / 40.0 V	88%
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Max. shielding gas pressure	7 bar/102 psi
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- 1) Interface to a 230/400-V and 50-Hz public grid
- 2) A device in emissions class A is not intended for use in residential areas in which the power is supplied via a public low-voltage grid.  
The electromagnetic compatibility may be influenced by conducted or radiated radio frequencies.

**iWave 300i**  
**AC/DC**

Mains voltage ( $U_1$ )	3 x 400 V
Max. effective primary current ( $I_{1\text{eff}}$ )	15.5 A
Max. primary current ( $I_{1\text{max}}$ )	18.4 A
Mains fuse	16 A slow-blow
Mains voltage tolerance	+/- 15%
Mains frequency	50/60 Hz
Cos phi (1)	0.99
Max. permitted grid impedance $Z_{\text{max}}$ on PCC <sup>1)</sup>	143 mOhm
Recommended residual-current circuit breaker	Type B
Welding current range ( $I_2$ )	
TIG	3 - 300 A
MIG/MAG	3 - 300 A
MMA	10 - 300 A
Welding current at 10 min/40 °C (104 °F)	40% / 300 A 60% / 260 A 100% / 240 A
Output voltage range according to standard characteristic ( $U_2$ )	
TIG	10.1 - 26.0 V
MIG/MAG	14.2 - 29.0 V
MMA	20.4 - 32.0 V
Open circuit voltage ( $U_0$ peak / $U_0$ r.m.s)	101 V
Striking voltage ( $U_P$ )	10 kV
The arc ignition device is suitable for manual operation.	
Protection class	IP 23
EMC emission class	A <sup>2)</sup>
Dimensions L x W x H	706 x 300 x 720 mm 27.8 x 11.8 x 28.41 in.
Weight	64.4 kg / 141.98 lb.
Max. noise emission (LWA)	77 dB (A)
Idle state power consumption at 400 V	48.5 W
Power source efficiency at 300 A / 32.0 V	83%
Max. shielding gas pressure	7 bar/102 psi

- 1) Interface to a 230/400-V and 50-Hz public grid
- 2) A device in emissions class A is not intended for use in residential areas in which the power is supplied via a public low-voltage grid.



The electromagnetic compatibility may be influenced by conducted or radiated radio frequencies.

**iWave 300i**  
**AC/DC /nc**

Mains voltage ( $U_1$ )	3 x 380 / 400 / 460 V
Max. effective primary current ( $I_{1\text{eff}}$ )	
3 x 380 V	16.3 A
3 x 400 V	15.5 A
3 x 460 V	13.6 A
Max. primary current ( $I_{1\text{max}}$ )	
3 x 380 V	19.4 A
3 x 400 V	18.4 A
3 x 460 V	16.2 A
Mains fuse	16 A slow-blow
Mains voltage tolerance	+/- 15%
Mains frequency	50/60 Hz
Cos phi (1)	0.99
Max. permitted grid impedance $Z_{\text{max}}$ on PCC <sup>1)</sup>	143 mOhm
Recommended residual-current circuit breaker	Type B
Welding current range ( $I_2$ )	
TIG	3 - 300 A
MIG/MAG	3 - 300 A
MMA	10 - 300 A
Welding current at 10 min/40 °C (104 °F)	40% / 300 A 60% / 260 A 100% / 240 A
Output voltage range according to standard characteristic ( $U_2$ )	
TIG	10.1 - 26.0 V
MIG/MAG	14.2 - 29.0 V
MMA	20.4 - 32.0 V
Open circuit voltage ( $U_0$ peak / $U_0$ r.m.s)	101 V
Striking voltage ( $U_P$ )	10 kV
	The arc ignition device is suitable for manual operation.
Protection class	IP 23
EMC emission class	A <sup>2)</sup>
Dimensions L x W x H	706 x 300 x 720 mm 27.8 x 11.8 x 28.41 in.
Weight	63.1 kg / 139.11 lb.
Max. noise emission (LWA)	75 dB (A)
Idle state power consumption at 400 V	48.5 W

Power source efficiency at 300 A / 32.0 V	83%
Max. shielding gas pressure	7 bar/102 psi

- 1) Interface to a 230/400-V and 50-Hz public grid
- 2) A device in emissions class A is not intended for use in residential areas in which the power is supplied via a public low-voltage grid.  
The electromagnetic compatibility may be influenced by conducted or radiated radio frequencies.

**iWave 300i**  
**AC/DC /MV/nc**

Mains voltage ( $U_1$ )	3 x 200/230/240/380/400/460/600 V
Max. effective primary current ( $I_{1\text{eff}}$ )	
3 x 200 V	31.0 A
3 x 230 V	26.7 A
3 x 240 V	23.5 A
3 x 380 V	16.3 A
3 x 400 V	15.5 A
3 x 460 V	13.6 A
3 x 600 V	12.3 A
Max. primary current ( $I_{1\text{max}}$ )	
3 x 200 V	37.9 A
3 x 230 V	32.5 A
3 x 240 V	28.8 A
3 x 380 V	19.4 A
3 x 400 V	18.4 A
3 x 460 V	16.2 A
3 x 600 V	14.9 A
Mains fuse	
3 x 200/230/240 V	35 A slow-blow
3 x 380/400/460/600 V	16 A slow-blow
Mains voltage tolerance	-10 / +6%
Mains frequency	50/60 Hz
Cos phi (1)	0.99
Max. permitted grid impedance $Z_{\text{max}}$ on PCC <sup>1)</sup>	121 mOhm
Recommended residual-current circuit breaker	Type B
Welding current range ( $I_2$ )	
TIG	3 - 300 A
MIG/MAG	3 - 300 A
MMA	10 - 300 A
Welding current at 10 min/40 °C (104 °F)	40% / 300 A 60% / 260 A 100% / 240 A
Output voltage range according to standard characteristic ( $U_2$ )	
TIG	10.1 - 26.0 V
MIG/MAG	14.2 - 29.0 V
MMA	20.4 - 32.0 V
Open circuit voltage ( $U_0$ peak / $U_0$ r.m.s)	102 V

Striking voltage ( $U_P$ )	10 kV The arc ignition device is suitable for manual operation.
Protection class	IP 23
EMC emission class	A <sup>2)</sup>
Dimensions L x W x H	706 x 300 x 720 mm 27.8 x 11.8 x 28.41 in.
Weight	64.5 kg / 142.20 lb.
Max. noise emission (LWA)	77 dB (A)
Idle state power consumption at 400 V	48.5 W
Power source efficiency at 300 A / 32.0 V	83%
Max. shielding gas pressure	7 bar/102 psi

- 1) Interface to a 230/400-V and 50-Hz public grid
- 2) A device in emissions class A is not intended for use in residential areas in which the power is supplied via a public low-voltage grid.  
The electromagnetic compatibility may be influenced by conducted or radiated radio frequencies.

**iWave 400i**  
**AC/DC**

Mains voltage ( $U_1$ )	3 x 400 V
Max. effective primary current ( $I_{1\text{eff}}$ )	22.7 A
Max. primary current ( $I_{1\text{max}}$ )	30.8 A
Mains fuse	35 A slow-blow
Mains voltage tolerance	+/- 15%
Mains frequency	50/60 Hz
Cos phi (1)	0.99
Max. permitted grid impedance $Z_{\text{max}}$ on PCC <sup>1)</sup>	97 mOhm
Recommended residual-current circuit breaker	Type B
Welding current range ( $I_2$ )	
TIG	3 - 400 A
MIG/MAG	3 - 400 A
MMA	10 - 400 A
Welding current at 10 min/40 °C (104 °F)	40% / 400 A 60% / 360 A 100% / 320 A
Output voltage range according to standard characteristic ( $U_2$ )	
TIG	10.1 - 26.0 V
MIG/MAG	14.2 - 34.0 V
MMA	20.4 - 36.0 V
Open circuit voltage ( $U_0$ peak / $U_0$ r.m.s)	101 V
Striking voltage ( $U_P$ )	10 kV
	The arc ignition device is suitable for manual operation
Protection class	IP 23
EMC emission class	A <sup>2)</sup>
Dimensions L x W x H	706 x 300 x 720 mm 27.8 x 11.8 x 28.41 in.
Weight	68.8 kg / 151.68 lb.
Max. noise emission (LWA)	77 dB (A)
Idle state power consumption at 400 V	46.7 W
Power source efficiency at 400 A / 36.0 V	84%
Max. shielding gas pressure	7 bar/102 psi

- 1) Interface to a 230/400-V and 50-Hz public grid
- 2) A device in emissions class A is not intended for use in residential areas in which the power is supplied via a public low-voltage grid.

The electromagnetic compatibility may be influenced by conducted or radiated radio frequencies.

**iWave 400i**  
**AC/DC /nc**

Mains voltage ( $U_1$ )	3 x 380 / 400 / 460 V
Max. effective primary current ( $I_{1\text{eff}}$ )	
3 x 380 V	23.9 A
3 x 400 V	22.7 A
3 x 460 V	19.8 A
Max. primary current ( $I_{1\text{max}}$ )	
3 x 380 V	32.3 A
3 x 400 V	30.8 A
3 x 460 V	27.1 A
Mains fuse	35 A slow-blow
Mains voltage tolerance	+/- 15%
Mains frequency	50/60 Hz
Cos phi (1)	0.99
Max. permitted grid impedance $Z_{\text{max}}$ on PCC <sup>1)</sup>	97 mOhm
Recommended residual-current circuit breaker	Type B
Welding current range ( $I_2$ )	
TIG	3 - 400 A
MIG/MAG	3 - 400 A
MMA	10 - 400 A
Welding current at 10 min/40 °C (104 °F)	40% / 400 A 60% / 360 A 100% / 320 A
Output voltage range according to standard characteristic ( $U_2$ )	
TIG	10.1 - 26.0 V
MIG/MAG	14.2 - 34.0 V
MMA	20.4 - 36.0 V
Open circuit voltage ( $U_0$ peak / $U_0$ r.m.s)	101 V
Striking voltage ( $U_P$ )	10 kV
	The arc ignition device is suitable for manual operation.
Protection class	IP 23
EMC emission class	A <sup>2)</sup>
Dimensions L x W x H	706 x 300 x 720 mm 27.8 x 11.8 x 28.41 in.
Weight	66.9 kg / 147.49 lb.
Max. noise emission (LWA)	77 dB (A)
Idle state power consumption at 400 V	46.7 W



Power source efficiency at 400 A / 36.0 V	84%
Max. shielding gas pressure	7 bar/102 psi

- 1) Interface to a 230/400-V and 50-Hz public grid
- 2) A device in emissions class A is not intended for use in residential areas in which the power is supplied via a public low-voltage grid.  
The electromagnetic compatibility may be influenced by conducted or radiated radio frequencies.

**iWave 400i**  
**AC/DC /MV/nc**

Mains voltage ( $U_1$ )	3 x 200/230/240/380/400/460/600 V
Max. effective primary current ( $I_{1\text{eff}}$ )	
3 x 200 V	45.7 A
3 x 230 V	39.4 A
3 x 240 V	34.6 A
3 x 380 V	23.9 A
3 x 400 V	22.7 A
3 x 460 V	19.8 A
3 x 600 V	18.0 A
Max. primary current ( $I_{1\text{max}}$ )	
3 x 200 V	63.3 A
3 x 230 V	54.5 A
3 x 240 V	47.1 A
3 x 380 V	32.3 A
3 x 400 V	30.8 A
3 x 460 V	27.1 A
3 x 600 V	25.1 A
Mains fuse	
3 x 200/230/240 V	63 A slow-blow
3 x 380/400/460/600 V	35 A slow-blow
Mains voltage tolerance	-10 / +10%
Mains frequency	50/60 Hz
Cos phi (1)	0.99
Max. permitted grid impedance $Z_{\text{max}}$ on PCC <sup>1)</sup>	approx. 90 mOhm
Recommended residual-current circuit breaker	Type B
Welding current range ( $I_2$ )	
TIG	3 - 400 A
MIG/MAG	3 - 400 A
MMA	10 - 400 A
Welding current at 10 min/40 °C (104 °F)	40% / 400 A 60% / 360 A 100% / 320 A
Output voltage range according to standard characteristic ( $U_2$ )	
TIG	10.1 - 26.0 V
MIG/MAG	14.2 - 34.0 V
MMA	20.4 - 36.0 V
Open circuit voltage ( $U_0$ peak / $U_0$ r.m.s)	102 V

Striking voltage ( $U_P$ )	10 kV The arc ignition device is suitable for manual operation.
Protection class	IP 23
EMC emission class	A <sup>2)</sup>
Dimensions L x W x H	706 x 300 x 720 mm 27.8 x 11.8 x 28.41 in.
Weight	68.4 kg / 150.80 lb.
Max. noise emission (LWA)	77 dB (A)
Idle state power consumption at 400 V	46.7 W
Power source efficiency at 400 A / 36.0 V	84%
Max. shielding gas pressure	7 bar/102 psi

- 1) Interface to a 230/400-V and 50-Hz public grid
- 2) A device in emissions class A is not intended for use in residential areas in which the power is supplied via a public low-voltage grid.  
The electromagnetic compatibility may be influenced by conducted or radiated radio frequencies.

**iWave 500i**  
**AC/DC**

Mains voltage ( $U_1$ )	3 x 400 V
Max. effective primary current ( $I_{1\text{eff}}$ )	24.8 A
Max. primary current ( $I_{1\text{max}}$ )	39.2 A
Mains fuse	35 A slow-blow
Mains voltage tolerance	+/- 15%
Mains frequency	50/60 Hz
Cos phi (1)	0.99
Max. permitted grid impedance $Z_{\text{max}}$ on PCC <sup>1)</sup>	50 mOhm
Recommended residual-current circuit breaker	Type B
Welding current range ( $I_2$ )	
TIG	3 - 500 A
MIG/MAG	3 - 500 A
MMA	10 - 500 A
Welding current at 10 min/40 °C (104 °F)	40% / 500 A 60% / 430 A 100% / 360 A
Output voltage range according to standard characteristic ( $U_2$ )	
TIG	10.1 - 30.0 V
MIG/MAG	14.2 - 36.5 V
MMA	20.4 - 40.0 V
Open circuit voltage ( $U_0$ peak / $U_0$ r.m.s)	101 V
Striking voltage ( $U_P$ )	10 kV
	The arc ignition device is suitable for manual operation.
Protection class	IP 23
EMC emission class	A <sup>2)</sup>
Dimensions L x W x H	706 x 300 x 720 mm 27.8 x 11.8 x 28.41 in.
Weight	69.6 kg / 153.44 lb.
Max. noise emission (LWA)	77 dB (A)
Idle state power consumption at 400 V	48.5 W
Power source efficiency at 500 A / 40.0 V	85%
Max. shielding gas pressure	7 bar/102 psi

- 1) Interface to a 230/400-V and 50-Hz public grid
- 2) A device in emissions class A is not intended for use in residential areas in which the power is supplied via a public low-voltage grid.

The electromagnetic compatibility may be influenced by conducted or radiated radio frequencies.

**iWave 500i**  
**AC/DC /nc**

Mains voltage ( $U_1$ )	3 x 380 / 400 / 460 V
Max. effective primary current ( $I_{1\text{eff}}$ )	
3 x 380 V	26.0 A
3 x 400 V	24.8 A
3 x 460 V	21.6 A
Max. primary current ( $I_{1\text{max}}$ )	
3 x 380 V	41.0 A
3 x 400 V	39.2 A
3 x 460 V	34.2 A
Mains fuse	35 A slow-blow
Mains voltage tolerance	+/- 15%
Mains frequency	50/60 Hz
Cos phi (1)	0.99
Max. permitted grid impedance $Z_{\text{max}}$ on PCC <sup>1)</sup>	50 mOhm
Recommended residual-current circuit breaker	Type B
Welding current range ( $I_2$ )	
TIG	3 - 500 A
MIG/MAG	3 - 500 A
MMA	10 - 500 A
Welding current at 10 min/40 °C (104 °F)	40% / 500 A 60% / 430 A 100% / 360 A
Output voltage range according to standard characteristic ( $U_2$ )	
TIG	10.1 - 30.0 V
MIG/MAG	14.2 - 36.5 V
MMA	20.4 - 40.0 V
Open circuit voltage ( $U_0$ peak / $U_0$ r.m.s)	101 V
Striking voltage ( $U_P$ )	10 kV
	The arc ignition device is suitable for manual operation.
Protection class	IP 23
EMC emission class	A <sup>2)</sup>
Dimensions L x W x H	706 x 300 x 720 mm 27.8 x 11.8 x 28.41 in.
Weight	67.8 kg / 149.47 lb.
Max. noise emission (LWA)	77 dB (A)
Idle state power consumption at 400 V	48.5 W

Power source efficiency at 500 A / 40.0 V	85%
Max. shielding gas pressure	7 bar/102 psi

- 1) Interface to a 230/400-V and 50-Hz public grid
- 2) A device in emissions class A is not intended for use in residential areas in which the power is supplied via a public low-voltage grid.  
The electromagnetic compatibility may be influenced by conducted or radiated radio frequencies.

**iWave 500i**  
**AC/DC /MV/nc**

Mains voltage ( $U_1$ )	3 x 200/230/240/380/400/460/600 V
Max. effective primary current ( $I_{1\text{eff}}$ )	
3 x 200 V	44.6 A
3 x 230 V	44.0 A
3 x 240 V	43.1 A
3 x 380 V	26.0 A
3 x 400 V	24.8 A
3 x 460 V	21.6 A
3 x 600 V	18.9 A
Max. primary current ( $I_{1\text{max}}$ )	
3 x 200 V	70.5 A
3 x 230 V	69.9 A
3 x 240 V	65.5 A
3 x 380 V	41.0 A
3 x 400 V	39.2 A
3 x 460 V	34.2 A
3 x 600 V	29.8 A
Mains fuse	
3 x 200/230/240 V	63 A slow-blow
3 x 380/400/460/600 V	35 A slow-blow
Mains voltage tolerance	-10 / +6%
Mains frequency	50/60 Hz
Cos phi (1)	0.99
Max. permitted grid impedance $Z_{\text{max}}$ on PCC <sup>1)</sup>	52 mOhm
Recommended residual-current circuit breaker	Type B
Welding current range ( $I_2$ )	
TIG	3 - 500 A
MIG/MAG	3 - 500 A
MMA	10 - 500 A
Welding current at 10 min/40 °C (104 °F)	
$U_1 = 200 - 240 \text{ V}$ TIG, MIG/MAG	40% / 500 A 60% / 430 A 100% / 360 A
$U_1 = 200 - 240 \text{ V}$ MMA	40% / 450 A 60% / 390 A 100% / 320 A



$U_1 = 380 - 600 \text{ V}$

40% / 500 A  
60% / 430 A  
100% / 360 A

Output voltage range according to standard characteristic ( $U_2$ )

TIG	10.1 - 30.0 V
MIG/MAG	14.2 - 36.5 V
MMA	20.4 - 40.0 V

Open circuit voltage ( $U_0$ peak / $U_0$ r.m.s)	102 V
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Striking voltage ( $U_P$ )	10 kV
The arc ignition device is suitable for manual operation.	

Protection class	IP 23
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EMC emission class	A <sup>2)</sup>
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Dimensions L x W x H	706 x 300 x 720 mm 27.8 x 11.8 x 28.41 in.
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Weight	69.2 kg / 152.56 lb.
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Max. noise emission (LWA)	77 dB (A)
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Idle state power consumption at 400 V	48.5 W
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Power source efficiency at 500 A / 40.0 V	85%
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Max. shielding gas pressure	7 bar/102 psi
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- 1) Interface to a 230/400-V and 50-Hz public grid
- 2) A device in emissions class A is not intended for use in residential areas in which the power is supplied via a public low-voltage grid.  
The electromagnetic compatibility may be influenced by conducted or radiated radio frequencies.

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**Radio parameters**

Compliance with directive 2014/53/EU - Radio Equipment Directive (RED)

The following table provides information on the frequency bands used and the maximum HF transmission power of Fronius wireless radio products sold in the EU, in accordance with Articles 10.8 (a) and 10.8 (b) of the RED.

Frequency range Channels used Power	Modulation
2412 - 2462 MHz Channel: 1 - 11 b, g, n HT20 Channel: 3 - 9 HT40 < 16 dBm	802.11b: DSSS (1 Mbps DBPSK, 2 Mbps DQPSK, 5.5/11 Mbps CCK)  802.11 g: OFDM (6/9 Mbps BPSK, 12/18 Mbps QPSK, 24/36 Mbps 16-QAM, 48/54 Mbps 64- QAM)  802.11n: OFDM (6.5 Mbps BPSK, 13/19 Mbps QPSK, 26/39 Mbps 16-QAM, 52/58.5/65 Mbps 64-QAM)
13.56 MHz -14.6 dBμA/m at 10 m	Functions: R/W, card emulation and P2P  Protocol standards: ISO 14443A/B, ISO15693, ISO18092, NFCIP-2,  Data rate: 848 kbps  Reader/writer, card emulation, peer to peer modes
2402 - 2482 MHz 0 - 39 < 4 dBm	GFSK

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**Overview with critical raw materials, year of production of the device****Overview with critical raw materials:**

An overview of which critical raw materials are contained in this device can be found at the following Internet address.

[www.fronius.com/en/about-fronius/sustainability](http://www.fronius.com/en/about-fronius/sustainability).

**To calculate the year of production of the device:**

- Each device is provided with a serial number
- The serial number consists of 8 digits - for example 28020099
- The first two digits give the number from which the year of production of the device can be calculated
- This figure minus 11 gives the year of production
  - For example: Serial number = 28020065, calculation of the year of production = 28 - 11 = 17, year of production = 2017





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