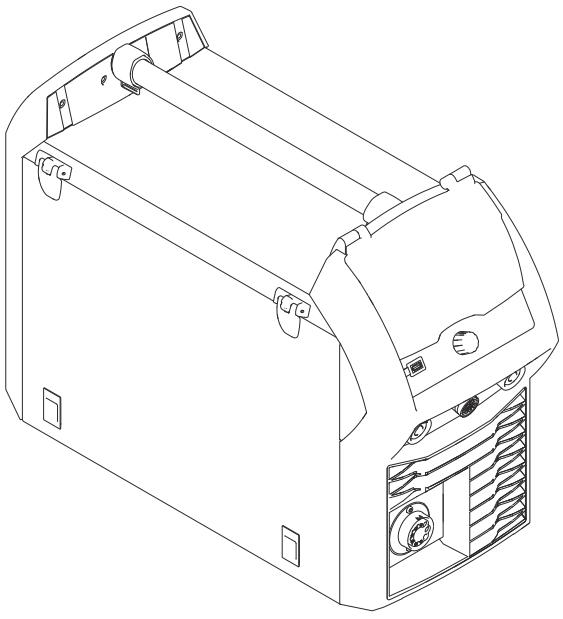
# Operating Instructions

**TPS 320i C**



**EN** | Operating Instructions

42,0426,0113,EN 041-31052023

# Contents

# Safety rules



## Explanation of safety notices

**⚠ DANGER!**

**Indicates immediate danger.**

▶ If not avoided, death or serious injury will result.

**⚠ WARNING!**

**Indicates a potentially hazardous situation.**

▶ If not avoided, death or serious injury may result.

**⚠ CAUTION!**

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

▶ If not avoided, minor injury and/or damage to property may result.

*NOTE!*

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

## General

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

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

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

- be suitably qualified,
- have sufficient knowledge of welding and
- read and follow these operating instructions carefully.

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

All safety and danger notices on the device

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

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, rectify any faults that could compromise safety.

**This is for your personal safety!**

**Proper use**

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

The device is intended solely for the welding processes specified on the rating plate.
Any use above and beyond this purpose is deemed improper. The manufacturer shall not be held liable for any damage arising from such usage.

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

Never use the device for the following purposes:
- Thawing out pipes
- Charging batteries
- Starting engines

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

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

**Mains connection**

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

This may affect a number device types in terms of:
- Connection restrictions
- Criteria with regard to the maximum permissible mains impedance *)
- Criteria with regard to the minimum short-circuit power requirement *)

*) at the interface with the public grid
see "Technical data"

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

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

**Environmental conditions**

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

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

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

The surrounding air must be free from dust, acids, corrosive gases or substances, etc.
Can be used at altitudes of up to 2000 m (6561 ft. 8.16 in.)

**Obligations of the operator**

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

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

**Obligations of personnel**

Before using the device, all persons instructed to do so undertake:
- to observe the basic instructions regarding safety at work and accident prevention
- to read these operating instructions, especially the "Safety rules" section and sign to confirm that they have understood them and will follow them.

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

**Residual current protective device**

Local regulations and national guidelines may require a residual current protective device when connecting equipment to the public grid.
The type of residual current protective device recommended by the manufacturer for the equipment is indicated in the technical data.

**Protecting yourself and others**

Anyone working with the device exposes themselves to numerous risks, e.g.
- flying sparks and hot pieces of metal
- Arc radiation, which can damage eyes and skin
- Hazardous electromagnetic fields, which can endanger the lives of those using cardiac pacemakers
- Risk of electrocution from mains current and welding current
- Greater noise pollution
- Harmful welding fumes and gases

Suitable protective clothing must be worn when working with the device. The protective clothing must have the following properties:
- Flame-resistant
- Insulating and dry
- Covers the whole body, is undamaged and in good condition
- Safety helmet
- Trousers with no turn-ups

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

Keep all persons, especially children, out of the working area while any devices are in operation or welding is in progress. If, however, there are people in the vicinity:
- Make them aware of all the dangers (risk of dazzling by the arc, injury from flying sparks, harmful welding fumes, noise, possible risks from mains current and welding current, etc.)
- Provide suitable protective equipment
- Alternatively, erect suitable safety screens/curtains.

**Noise emission values**

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

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

**Danger from toxic gases and vapours**

The fumes produced during welding contain harmful gases and vapours.

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

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

Keep your face away from welding fumes and gases.

Fumes and hazardous gases
- must not be breathed in
- must be extracted from the working area using appropriate methods.

Ensure an adequate supply of fresh air. Ensure that there is a ventilation rate of at least 20 $m^3$ per hour at all times.

Otherwise, a welding helmet with an air supply must be worn.

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

The following components are responsible, amongst other things, for the degree of toxicity of welding fumes:
- Metals used for the workpiece
- Electrodes
- Coatings
- Cleaners, degreasers, etc.
- Welding process used

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

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

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

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

**Danger from flying sparks**

Flying sparks may cause fires or explosions.

Never weld close to flammable materials.

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

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

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

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

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

**Risks from mains current and welding current**

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

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

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

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

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

All cables and leads must be secured, undamaged, insulated and adequately dimensioned. Replace loose connections and scorched, damaged, or inadequately dimensioned cables and leads immediately.
Use the handle to ensure the power connections are tight before every use.
In the case of power cables with a bayonet connector, rotate the power cable around the longitudinal axis by at least 180° and pretension.

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

The electrode (rod electrode, tungsten electrode, welding wire, etc.) must
- never be immersed in liquid for cooling
- Never touch the electrode when the power source is switched on.

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

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

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

Operation of the device on a mains supply without ground conductor and on a socket without ground conductor contact is only permitted if all national regulations for protective separation are observed.
Otherwise, this is considered gross negligence. The manufacturer shall not be held liable for any damage arising from such usage.

If necessary, provide adequate earthing for the workpiece.

Switch off unused devices.

Wear a safety harness if working at height.

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

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

After opening the device:
- Discharge all live components
- Ensure that all components in the device are de-energised.

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

**Meandering welding currents**

If the following instructions are ignored, meandering welding currents can develop with the following consequences:
- Fire hazard
- Overheating of parts connected to the workpiece
- Damage to ground conductors
- Damage to device and other electrical equipment

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

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

Position the device with sufficient insulation against electrically conductive environments, such as insulation against conductive floor or insulation to conductive racks.

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

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

**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 mains.

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 operator is obliged to take appropriate action to rectify the situation.

Check and evaluate the immunity to interference of nearby devices according to national and international regulations. Examples of equipment that may be susceptible to interference from the device include:
- Safety devices
- Network, signal and data transfer lines
- IT and telecommunications devices
- Measuring and calibrating devices

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

**EMF measures**

Electromagnetic fields may pose as yet unknown risks to health:
- Effects on the health of persons in the vicinity, e.g. those with pacemakers and hearing aids
- Individuals with pacemakers must seek advice from their doctor before approaching the device or any welding that is in progress
- For safety reasons, maintain as large a distance as possible between the welding power-leads and the head/torso of the welder
- Do not carry welding power-leads and hosepacks over the shoulders or wind them around any part of the body

**Specific hazards**

Keep hands, hair, clothing and tools away from moving parts. For example:
- Fans
- Cogs
- Rollers
- Shafts
- Wirespools and welding wires

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

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

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

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

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

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

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

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

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

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

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

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

Use only suitable load-carrying equipment supplied by the manufacturer when transporting devices by crane.
- Hook chains or ropes onto all suspension points provided on the load-carrying equipment.
- Chains and ropes must be at the smallest angle possible to the vertical.
- Remove gas cylinder and wirefeeder (MIG/MAG and TIG devices).

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

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

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

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

**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/m³

Use filters if necessary.

**Danger from shielding gas cylinders**

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

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

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

Keep the shielding gas cylinders well away from any 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 attempt to weld a pressurised shielding gas cylinder.

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

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

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

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

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

**Danger from escaping shielding gas**

Risk of suffocation from the uncontrolled escape of shielding gas

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

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

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

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

- The maximum permissible tilt angle is 10°.

Special regulations apply in rooms at risk of fire or explosion

- Observe relevant national and international regulations.

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

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

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

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

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

Before transporting the device, allow coolant to drain completely and detach the following components:
- Wirefeeder
- Wirespool
- Shielding gas cylinder

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

**Safety measures in normal operation**

Only operate the device when all safety devices are fully functional. If the safety devices are not fully functional, there is a risk of
- injury or death to the operator or a third party
- damage to the device and other material assets belonging to the operator
- inefficient operation of the device

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

Never bypass or disable safety devices.

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

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

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

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

Only use suitable original coolant from the manufacturer.

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

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

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

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

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

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

**Commissioning, maintenance and repair**

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

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

The housing screws provide the ground conductor connection for earthing the housing parts.
Only use original housing screws in the correct number and tightened to the specified torque.

**Safety inspection**

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

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

A safety inspection should be carried out by a qualified electrician

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

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

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

**Disposal**

Waste electrical and electronic equipment must be collected separately and recycled in an environmentally-friendly way, in accordance with the European Directive and national legislation. Used equipment must be returned to the distributor or disposed of via an approved local collection and disposal facility. Correct disposal of used equipment promotes the sustainable recycling of material resources. Failing to dispose of used equipment correctly can lead to adverse health and/or environmental impacts.

**Packaging materials**
Separate collection according to material. Check your local authority regulations. Crush containers to reduce size.

**Safety symbols**

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

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

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

**Data protection**

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

**Copyright**

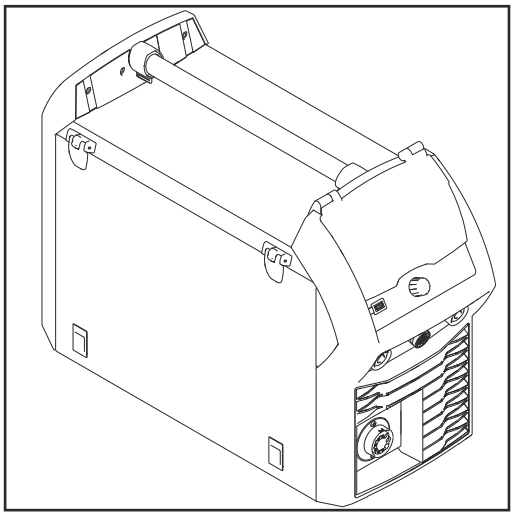


The text and illustrations are all technically correct at the time of printing. We reserve the right to make changes. The contents of the operating instructions shall not provide the basis for any claims whatsoever on the part of the purchaser. If you have any suggestions for improvement, or can point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

# General information

# General

**Device concept**



The TPS 320i C MIG/MAG power source is a completely digitised, microprocessor-controlled inverter power source with integrated 4-roller wire drive.

A modular design and potential for system add-ons ensure a high degree of flexibility.
There is no longer an interconnecting hosepack between the power source and the wirefeeder. Its compact design makes the TPS 320i C particularly suitable for mobile applications.

The power source can be adapted to any specific 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 workshops and industry for manual and automated applications with classical steel, galvanised sheets, chrome/nickel and aluminium.

The integral 4-roller wire drive, high performance and light weight of the TPS 320i C power source makes it the ideal choice for portable applications on building sites or in repair workshops.

**Conformities**

**FCC**
This equipment complies with the limit values for an EMC device class A digital device pursuant to Part 15 of the FCC Rules. These limit values are intended to provide an adequate level of protection against harmful emissions when the device is being used in an industrial environment. This device generates and uses high-frequency energy and can cause interference to radio communications if it is not installed and used according to the Operating Instructions.
The use of this device in residential areas will probably cause harmful interference, in which case the user will be obliged to correct the interference at their own expense.

FCC ID: QKWSPBMCU2

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

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

IC: 12270A-SPBMCU2

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**EU**
**Conformity with Directive 2014/53 / EU - Radio Equipment Directive (RED)**

When installing the antennae to be used for this transmitter, it is essential to maintain a minimum distance of 20 cm from all people. They must not be set up or operated together with another antenna or another transmitter. To comply with exposure to radio frequency guidelines, the operating conditions of the transmitter must be available to OEM integrators and end users.

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**ANATEL / Brazil**
This device is operated on a secondary basis. It has no protection against harmful interference, even from devices of the same type.
This device cannot cause interference in systems operated on a primary basis.
This device complies with ANATEL's specific absorption rate limit values in relation to exposure to high frequency electric, magnetic and electromagnetic fields.

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**IFETEL / Mexico**
Operation of this device is subject to the following two conditions:

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

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**NCC / Taiwan**
In accordance with NCC regulations for low-power radio frequency devices:

Article 12
A certified low-power radio frequency device must not change the frequency, increase the power or alter the characteristics and functions of the original structure without approval.

Article 14
The use of low-power radio frequency devices must not adversely affect flight safety and communications.
A detected malfunction must be deactivated and corrected immediately until no malfunction is present.
The notice in the preceding paragraph refers to radio communications operated in accordance with the provisions of the Telecommunications Act. Low-power ra-

dio frequency devices must withstand interference from legitimate communications or radiological, electrical radio frequency devices for industrial, scientific and medical applications.

**Thailand**


**Bluetooth trademarks**

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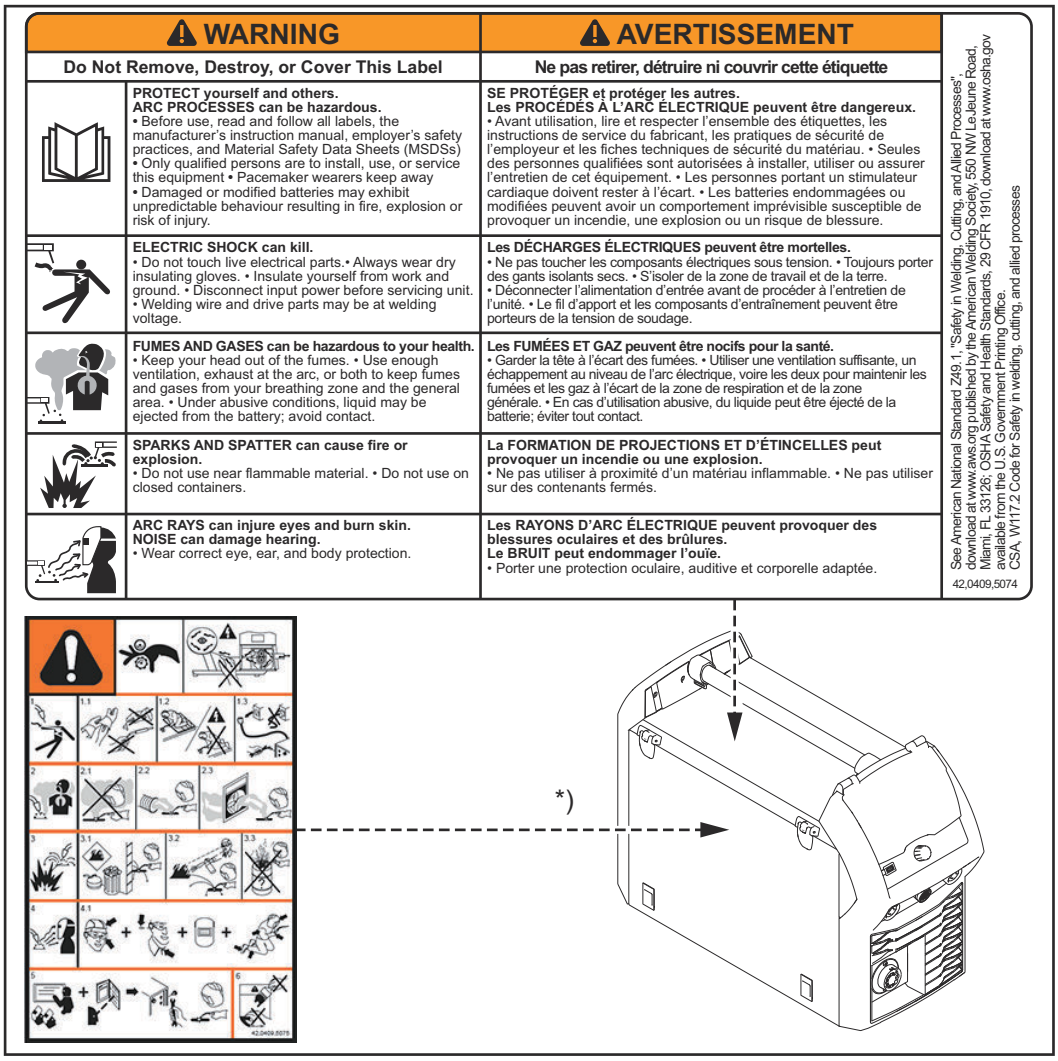
**Warning notices on the device**

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




*) on the inside of the device

Safety symbols on the rating plate:

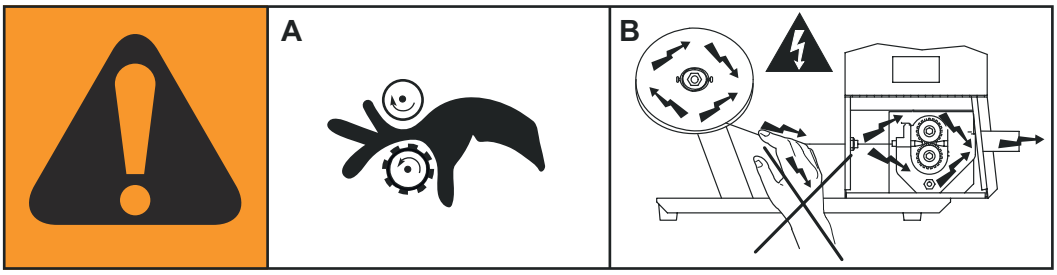
Welding is dangerous. The following basic requirements must be met:
- Welders must be sufficiently qualified
- Suitable protective equipment must be used
- All persons not involved in the welding process must be kept at a safe distance

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

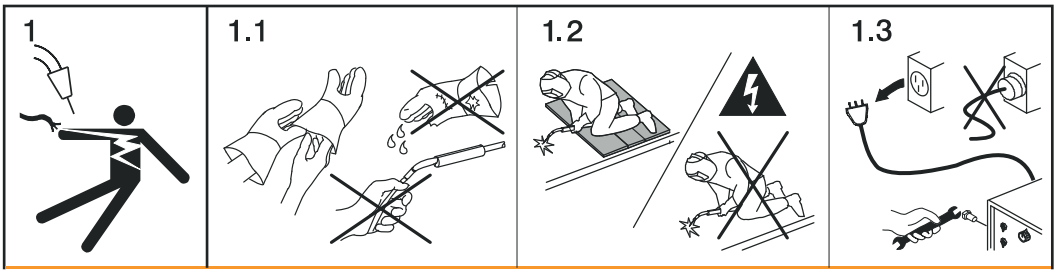
**Description of the warning notices on the device**

For certain device versions, warning notices are affixed to the device.

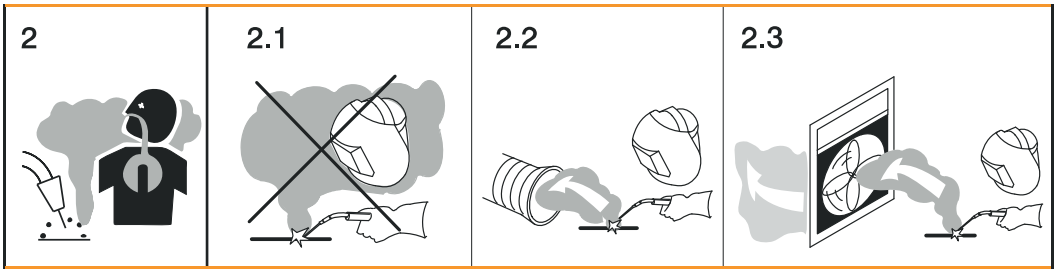
The arrangement of the symbols may vary.




| | |
|---|---|
| ! | **Warning! Attention!**<br>**The symbols represent possible dangers.** |
| A | Drive rollers can injure fingers. |
| B | The welding wire and drive parts are live during operation.<br>Keep hands and metal objects away! |

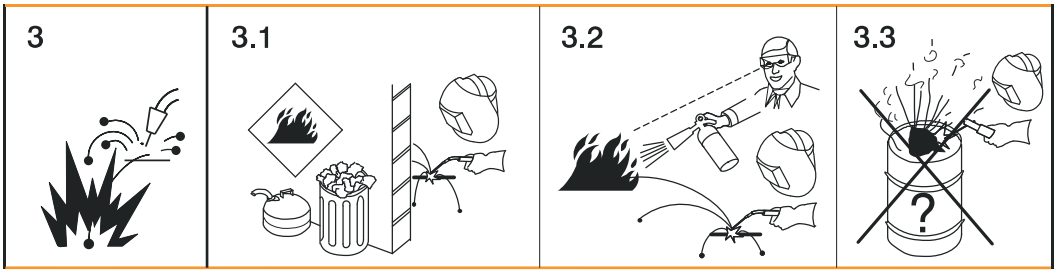



| | |
|---|---|
| 1. | An electric shock can be fatal. |
| 1.1 | Wear dry, insulating gloves. Do not touch the wire electrode with bare hands. Do not wear wet or damaged gloves. |
| 1.2 | Use a base that is insulated from the floor and work area to protect against electric shock. |
| 1.3 | Before working on the device, switch off the device and pull out the mains plug or disconnect it from the power supply. |

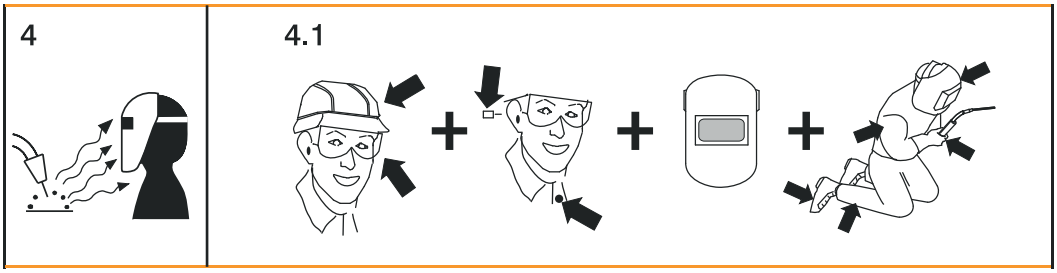



| | |
|---|---|
| 2. | Inhalation of welding fumes can be harmful to health. |
| 2.1 | Keep your face away from any welding fumes. |

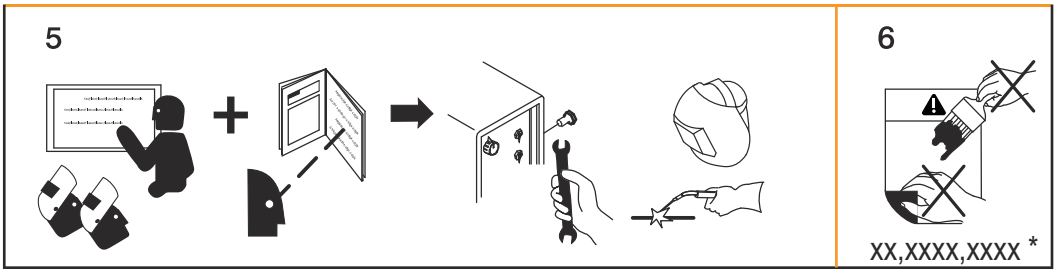
| | |
|---|---|
| 2.2 | Use forced-air ventilation or a local extraction system to remove welding fumes. |
| 2.3 | Remove welding fumes with a fan. |




| | |
|---|---|
| 3 | Welding sparks can cause an explosion or fire. |
| 3.1 | Keep flammable materials away from the welding process. Never weld close to flammable materials**.** |
| 3.2 | Welding sparks can cause a fire. Have fire extinguishers to hand. If necessary, have a supervisor ready who can operate the fire extinguisher. |
| 3.3 | Do not weld on drums or closed containers. |




| | |
|---|---|
| 4. | Arc rays can burn the eyes and injure the skin. |
| 4.1 | Wear headgear and protective goggles. Use ear protection and a shirt collar with button. Use a welding helmet with the correct tinting. Wear suitable protective clothing over the entire body. |



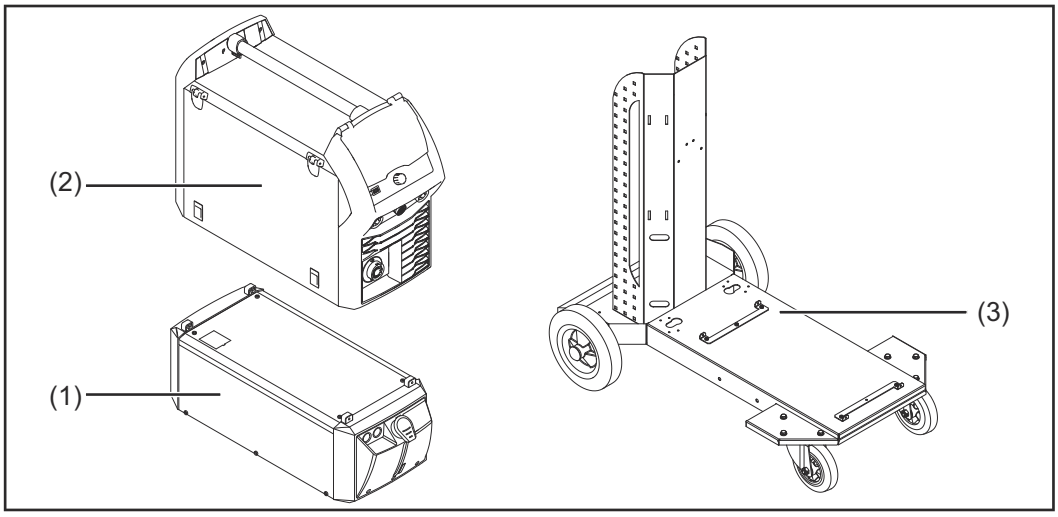

| | |
|---|---|
| 5. | Before working on the system or welding:<br>undertake training on the device and read the instructions! |
| 6. | Do not remove or paint over the warning sticker. |
| * | Manufacturer order number of the sticker |

# System components

**General**

The power sources can be operated with various system components and options. This makes it possible to optimise procedures and to simplify machine handling and operation, as necessitated by the particular field of application in which the power source is to be used.

**Overview**




(1) Cooling units
(2) Power sources
(3) Trolley and gas cylinder holders

also:
- Welding torch
- Grounding cable and electrode cable
- Dust filter
- Additional current sockets

**Options**

| |
|---|
| **OPT/i gas flow rate sensor** |
| **OPT/i gas pressure sensor** |
| **OPT/i TPS 320i C CMT** |
| **OPT/i TPS 320i C TIG TMC** |
| **OPT/i TPS 320i C wire end** |
| **OPT/i TPS 320i C PushPull** |
| **OPT/i TPS C wire feed** |
| **OPT/i TPS C polarity reverser** |
| **OPT/i TPS C QC DFS AD10** |
| **OPT/i TPS C QC DFS Powerliner** |
| **OPT/i TPS VRD** |

**OPT/i Ext. Sensor connector**

**OPT/i TPS 320i C viewing window**

**OPT/i TPS C Ext.Welding Release**
Option for external welding release

**OPT/i TPS C Ethernet**

**OPT/i TPS C SpeedNet Connector**
Optional second SpeedNet connection socket

Factory-installed on the rear of the power source.

**OPT/i TPS dust filter**

**IMPORTANT!** Use of the OPT/i TPS dust filter option shortens the duty cycle.

**OPT/i TPS C 2nd plus socket**
2nd (+) current socket on the rear of the power source (option)

**OPT/i TPS C 2nd earth socket**
2nd (-) current socket on the rear of the power source (option)

**OPT/i Synergic Lines**
Option for enabling all special characteristics available on TPSi power sources; this also automatically enables special characteristics created in future.

**OPT/i GUN Trigger**
Option for special functions in conjunction with the torch trigger

**OPT/i Jobs**
Option to view, create, edit, delete, export and import jobs in SmartManager
For details, see from page **207**.

**OPT/i Documentation**
Option for the documentation function

**OPT/i WebJobEdit**
Option for editing jobs via the SmartManager of the power source

**OPT/i Limit Monitoring**
Option for specifying the limit values for the welding current, welding voltage and wire speed

**OPT/i Custom NFC - ISO 14443A**
Option to use a customer-specific frequency band for key cards

**OPT/i CMT Cycle Step**
Option for adjustable, cyclical CMT welding process

**OPT/i OPC-UA**
Standardised data interface protocol

**OPT/i MQTT**
Standardised data interface protocol

**OPT/i SynchroPulse 10 Hz**
To increase the SynchroPulse frequency from 3 Hz to 10 Hz

**OPT/i WeldCube Navigator**
Software for the creation of digital instructions for manual welding processes to be carried out by welders.
The welder is guided through the welding instructions by WeldCube Navigator.

# Welding packages, welding characteristics and welding processes

# Welding packages



**General**

Various welding packages, welding characteristics and welding processes are available with TPSi power sources that enable a wide range of materials to be effectively welded.

**Welding packages**

The following welding packages are available for TPSi power sources:

Standard Welding Package
4,066,012
(enables MIG/MAG standard synergic welding)

Pulse Welding Package
4,066,013
(enables MIG/MAG pulse synergic welding)

LSC Welding Package *
4,066,014
(enables the LSC process)

PMC Welding Package **
4,066,015
(enables the PMC process)

CMT Welding Package ***
4,066,016
(enables the CMT process)

ConstantWire Welding Package
4,066,019
(enables constant current or constant voltage operation during brazing)

* only in conjunction with the Standard Welding Package

** only in conjunction with the Pulse Welding Package

*** only in conjunction with the Standard Welding Package and the Pulse Welding Package

**IMPORTANT!** A TPSi power source without welding packages only offers the following welding processes:
- MIG/MAG standard manual welding
- TIG welding
- MMA welding

# Welding characteristics

**Welding characteristics**

Depending on the welding process and shielding gas mix, various process-optimised 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 additional designation (*) next to the welding process provides information about the special properties and use of the welding characteristic.
The description of the characteristics is set out as follows:

**Marking**
Welding process
Properties

---

**additive**
CMT

Characteristics with reduced heat input and greater stability at a higher deposition rate for welding bead onto bead in adaptive structures

---

**arc blow**
PMC

Characteristic to avoid arc breaks due to arc blow.

---

**arcing**
Standard

Characteristics for a special type of hardfacing on a wet or dry surface
(e.g. grinding rollers in the sugar and ethanol industries)

---

**base**
standard

Characteristics for a special type of hardfacing on a wet or dry surface
(e.g. grinding 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

Characteristic with constant current or constant voltage curve 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 (stick out changes are not compensated)

---

**CW additive**
PMC, ConstantWire

Characteristic with constant wire speed progression for the additive production 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 fusion 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 flange welds with targeted energy input and high welding speed

---

**galvanized**
CMT, LSC, PMC, Puls, Standard

Characteristics for galvanised 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 the best gap-bridging ability due to very low heat input

---

**hotspot**
CMT

Characteristic with hot start sequence, specifically for plug welds and MIG/MAG spot weld joints

---

**mix** [2) / 3)]
PMC

Also required:
Pulse and PMC Welding Packages

Characteristic for the production of a rippled weld.
The heat input into the component is specifically controlled by the cyclical process change between pulsed and dip transfer arc.

---

**marking**
Characteristics for marking conductive surfaces

Characteristic for marking electrically conductive surfaces.
Marking is performed by low power spark erosion and a reversing wire movement.

---

**mix** [2) / 3)]
CMT

Also required:
CMT drive unit WF 60i Robacta Drive CMT
Pulse, Standard and CMT Welding Packages

Characteristic for the production of a rippled weld.
The heat input into the component is specifically controlled by the cyclical process change between pulsed arc or CMT.

---

**mix drive** [2)]
PMC

Also required:
PushPull drive unit WF 25i Robacta Drive or WF 60i Robacta Drive CMT
Pulse and PMC Welding Packages

Characteristic for the production of a rippled weld by means of a cyclical process interruption of the pulsed arc and an additional wire movement

---

**multi arc**
PMC

Characteristic for components being welded by several arcs each influencing the other. Ideal for increased welding circuit inductance or mutual welding circuit coupling.

---

**open root**
LSC, CMT

Characteristic with powerful arc, especially suitable for root passes with air gap

---

**PCS** [3)]
PMC

The characteristic changes directly from a pulsed arc to a concentrated spray arc above a certain power. The advantages of pulsed and spray arcs are combined in a single characteristic.

---

**PCS mix**
PMC

The characteristic changes cyclically between a pulsed or spray arc to a dip transfer arc, depending on the power range. It is especially suitable for vertical-up welds due to the alternating hot and then cold, supporting process phase.

---

**pin**
CMT

Characteristic for welding brads 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 brads with a spherical end 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 positioning individual dots the size of a welding droplets.

---

**pin spike**
CMT

Characteristic for welding brads with pointed ends onto an electrically conductive surface.

---

**pipe**
PMC, Pulse, Standard

Characteristics for pipe applications and positional welding on narrow gap applications

---

**pipe cladding**
PMC, CMT

Characteristics for overlay welding of outer pipe claddings with little penetration, low dilution and wide weld seam flow

---

**retro**
CMT, Puls, PMC, Standard

The characteristic has the same weld properties as the predecessor TransPuls Synergic (TPS) series.

---

**ripple drive** [2)]
PMC

Also required:
CMT drive unit, WF 60i Robacta Drive CMT

Characteristic for the production of a rippled weld by means of a cyclical process interruption of the pulsed arc and an additional wire movement.
The weld rippling characteristics are similar to that of TIG welds.

---

**root**
CMT, LSC, Standard

Characteristics for root passes with powerful arc

---

**seam track**
PMC, Pulse

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)

---

**universal**
CMT, PMC, Puls, Standard

The characteristic is ideal for all standard welding tasks.

---

**weld+**
CMT

Characteristics for welding with short stick out and Braze+ gas nozzle (gas nozzle with small opening and high flow velocity)

---

1) Only in conjunction with iWave AC/DC Multiprocess power sources
2) Welding characteristics with special properties provided by additional hardware
3) Mixed process characteristics

# Welding methods and processes

**MIG/MAG pulse synergic welding**

MIG/MAG pulse synergic welding is a pulsed-arc process with controlled material transfer.
In the base current phase, the energy supply is reduced to such an extent that the arc is only just stable and the surface of the workpiece is preheated. In the pulsing current phase, a precisely dosed current pulse ensures the targeted detachment of a droplet of welding material.
This principle guarantees low-spatter welding and precise work over the entire power range.

**MIG/MAG standard synergic welding**

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

Dip transfer arc
Droplet transfer takes place during a short circuit in the lower power range.

Intermediate arc
The droplet increases in size on 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 high-speed data processing, precise recording of the process status and improved droplet detachment. Faster welding possible with a stable arc and even penetration.

**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 re-ignition takes place at significantly lower welding current values.

**SynchroPulse welding**

SynchroPulse is available for all processes (standard/pulsed/LSC/PMC).
Due to the cyclical change of welding power between two operating points, SynchroPulse achieves a flaking seam appearance and 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 a droplet detachment with improved dip transfer arc properties.
The advantages of the CMT process are as follows
- Low heat input
- Less spattering
- Reduced emissions
- High process stability

The CMT process is suitable for:
- Joint welding, cladding and brazing – particularly in the case of high requirements in terms of heat input and process stability
- Light-gauge sheet welding with minimal distortion
- Special connections, such as copper, zinc, and steel/aluminium

*NOTE!*

**A CMT reference book is available complete with typical applications; see ISBN 978-3-8111-6879-4.**

**CMT Cycle Step welding process**

CMT Cycle Step is a further development of the CMT welding process. A special CMT drive unit is also required for this process.

CMT Cycle Step is the welding process with the lowest heat input.
The CMT Cycle Step welding process switches cyclically between CMT welding and pauses of an adjustable duration.
These pauses in the welding process lower the heat input; the continuity of the weld seam is maintained.
Individual CMT cycles are also possible. The size of the CMT spot welds 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 symbol.

**Stitch welding**

With stitch welding, all welding processes can be cyclically interrupted. This facilitates targeted control of the heat input.
Welding time, pause time and the number of interval cycles can be set individually (e.g. for producing a rippled weld seam, for tacking light-gauge sheets or for longer pause times for simple, automatic spot welding mode).

Stitch welding is possible with any operating mode.
In special 2-step mode and special 4-step mode, no interval cycles are performed during the start and end phases. The interval cycles are only executed in the main process phase.

**ConstantWire**

ConstantWire is used in laser brazing and other laser welding applications.
The welding wire is fed to the solder or weld pool, and the ignition of an arc is prevented by controlling the wire speed.
Constant current (CC) and constant voltage (CV) applications are possible.
The welding wire can be fed either under current for hot wire applications or currentless for cold wire applications.

# Controls, connections and mechanical components

# Control panel



**General**

Welding parameters can be easily changed and selected using the adjusting dial. The parameters are shown on the display while welding is in progress.

The synergic function ensures that other welding parameters are also adjusted whenever an individual parameter is changed.

*NOTE!*

**As a result of firmware updates, you may find that your device has certain functions that are not described in these operating instructions, or vice versa.**
Certain illustrations may also differ slightly from the actual controls on your device, but these controls function in exactly the same way.

**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 device and all system components.

## Control panel


*43,0001,3547*

| No. | Function |
|---|---|
| (1) | **USB port**<br>For connecting USB flash drives (such as service dongles and licence keys).<br><br>**IMPORTANT!** The USB port is not electrically isolated from the welding circuit. Therefore, devices that establish an electrical connection with another device must not be connected to the USB port. |
| (2) | **Adjusting dial with turn/press function**<br>To select elements, set values and scroll through lists |
| (3) | **Display (touchscreen)**<br>- For operating the power source by touching the display<br>- For displaying values<br>- For navigating in the menu |
| (4) | **Key card reader for NFC keys**<br>- For locking/unlocking the power source using NFC keys<br>- For logging on different users (with active user management and assigned NFC keys) |

NFC key = NFC card or NFC key ring

**(5)** **Wire threading button**
To thread the wire electrode into the torch hosepack with no accompanying flow of gas or current

**(6)** **Gas-test button**
For setting the required gas flow rate on the gas pressure regulator. After pressing this button, gas flows for 30 seconds. Press the button again to stop the gas flow prematurely.

## Input options

### Touch the display

Pressing on (and therefore selecting) an element on the display highlights this element.

### Turn the adjusting dial

- Select elements in the displays
- Change values

For certain parameters, a value changed by turning the adjusting dial is applied automatically without having to press the adjusting dial.

### Press the adjusting dial

- Apply highlighted elements, e.g. to change the welding parameter value.
- Apply certain welding parameter values.

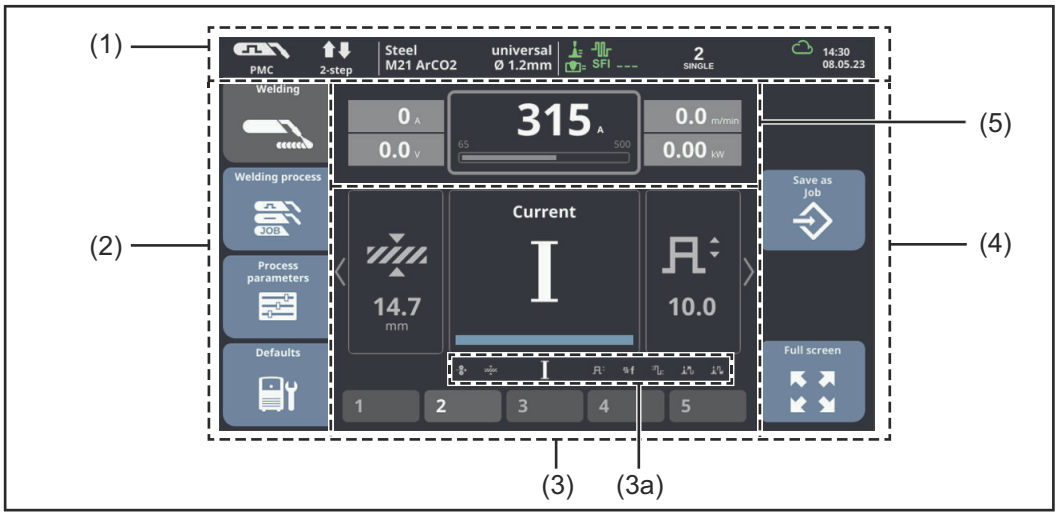
### Press the buttons

Pressing the wire threading button threads the wire electrode into the welding torch hosepack without gas or current.
The display shows an animated graphic with motor current, motor power and wire length fed.

When the gas-test button is pressed, gas will flow out for 30 seconds. Press again to end the process prematurely.
The display shows an animated graphic with the remaining gas flow time.

# Display and status line

**Display**




| No. | Function |
|---|---|
| **(1)** | **Status bar**<br>The status bar provides information on:<br>- Actual welding data<br>- Bluetooth or WLAN status<br>- Logged-on users / power source locked state<br>- Active faults<br>- Time and date<br>- and more<br><br>For details, see from page **49** |
| **(2)** | **Left menu bar**<br>The left menu bar contains the menus:<br>- Welding<br>- Welding process<br>- Process parameters<br>- Defaults<br><br>The buttons in the left bar are actuated by touching the display. |
| **(3)** | **Main area**<br>The welding parameters, graphics, lists or navigation elements are shown in the main area. The structure of the main area and the elements shown in it vary according to the application.<br><br>(3a)<br>Available welding parameters<br><br>The main area is operated via the adjusting dial or by touching the display. |
| **(4)** | **Right menu bar**<br>Depending on the button selected in the left menu bar, the right menu bar may be used as follows: |

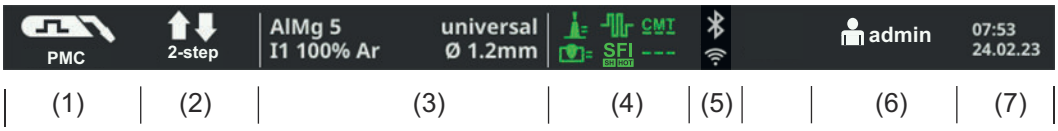
- as a function ribbon containing application and function buttons
- for navigating through the 2nd menu level

The buttons in the right menu bar are actuated by touching the display.

**(5)** **Welding data display**
Welding current, welding voltage, wire speed, welding power (in kW)

Different values are displayed here depending on the situation:
- when setting the standard value
- the actual value during welding
- after welding, the hold value or average value - depending on the setting in the default settings (see also from page **164**)

**Status bar**




The status bar is divided into segments and contains the following information:

The status bar is divided into segments and contains the following information:

**(1)** **Current welding process**

**(2)** **Current operating mode**

**(3)** **Currently set welding program**
(material, shielding gas, characteristic and wire diameter)

(4) **Display of process functions**

| | |
|---|---|
| | Arc length stabilizer |
| | Penetration stabilizer |
| | SynchroPulse |
| SFI | Spatter Free Ignition, SlagHammer, SFI Hotstart |
| CMT | CMT Cycle Step (only in combination with the CMT welding process) |
| --- | Interval |

Symbol lights up green:
Process function is active

Symbol is grey:
Process function is available but is not used for welding

(5) **Bluetooth/WLAN status indicator (certified devices only)**

- Symbol lights up blue:
  active connection to a Bluetooth device
- Symbol is grey:
  Bluetooth device detected, no active connection

or

**intermediate arc indicator**

**(6) Current logged-on user (with active user management)**

**or**

**the key symbol when the power source is locked**
**(e.g. when the "locked" profile/role is active)**


**(7) Time and date**

*NOTE!*

**The following functions can be selected and set directly in the status bar:**
(1) Welding method
(2) Operating mode
(3) Welding characteristic (e.g. dynamic, root, universal, etc.)
(4) SynchroPulse, Spatter Free Ignition, CMT Cycle Step, Stitch

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


Additional information on the welding characteristic (3) and for SynchroPulse, SFI, etc. (4) can be called up using the respective buttons.

**Status bar – Current limit reached**

If the characteristic-dependent current limit is reached while MIG/MAG welding, a corresponding message appears in the status bar.


1 For detailed information, select the status bar

The information appears.

2 Select "Hide information" to exit

3 Reduce the wire speed, welding current, welding voltage or material thickness

or

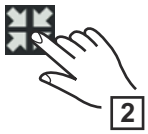
Increase the distance between the contact tip and the workpiece

Further information on the current limit can be found in the Troubleshooting section on page 225

**Switching to full screen**


The display is shown in full screen mode:


2 Exit full screen mode:




*NOTE!*

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

▶ Defaults / View / EasyJobs / EasyJobs Off

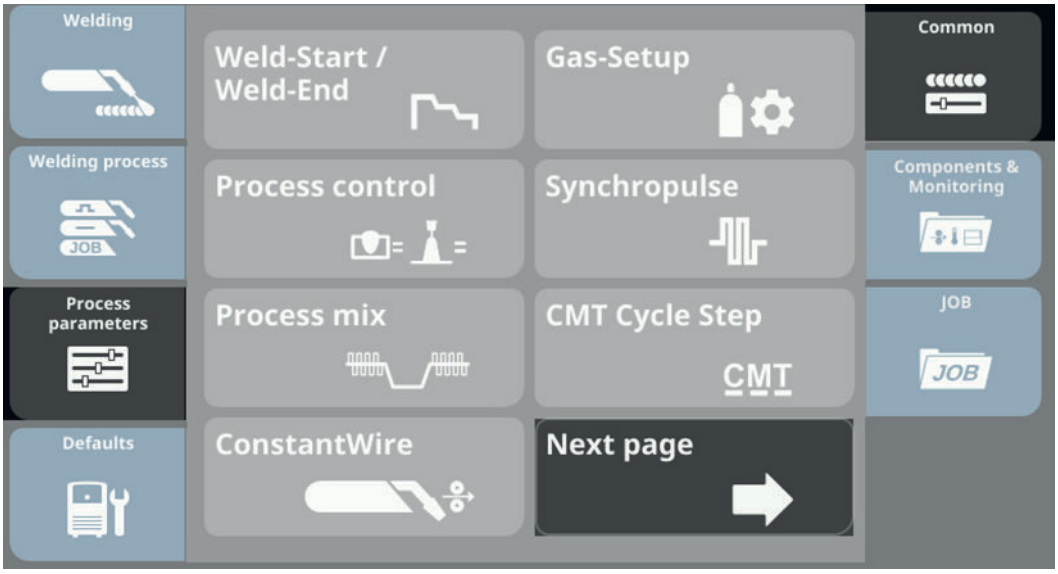
By applying a few defaults and the setting options via the status bar, it is possible to fully operate the power source in manual applications in full-screen mode.

**Next page - Previous page**

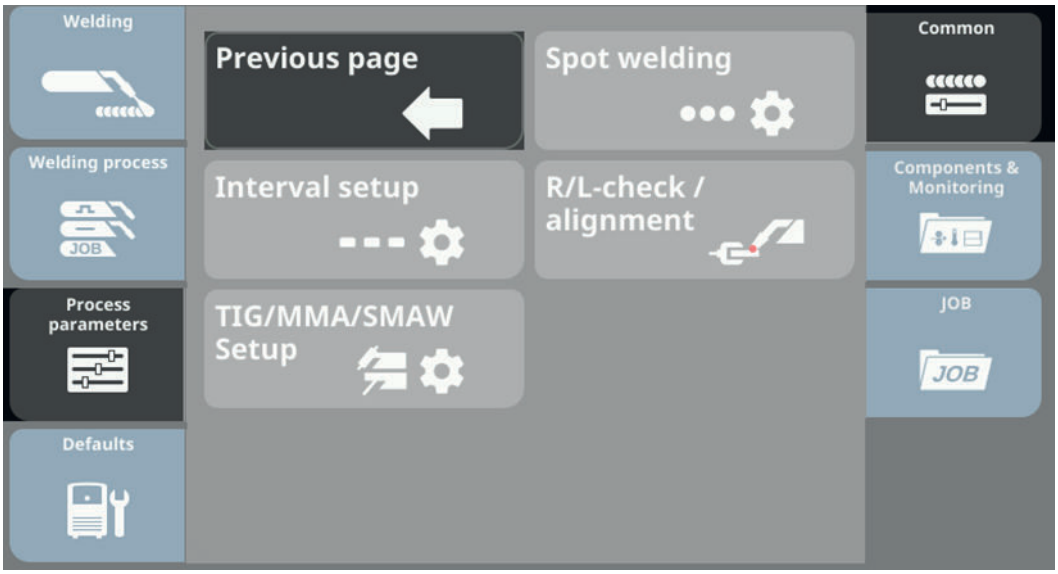
*NOTE!*

**The number and sequence of the displayed parameters may vary depending on the device type, equipment and available Welding Packages.**

If there are more than six parameters in a menu, the parameters are divided into several pages.
Navigate between several pages using the "Next page" and "Previous page" buttons:



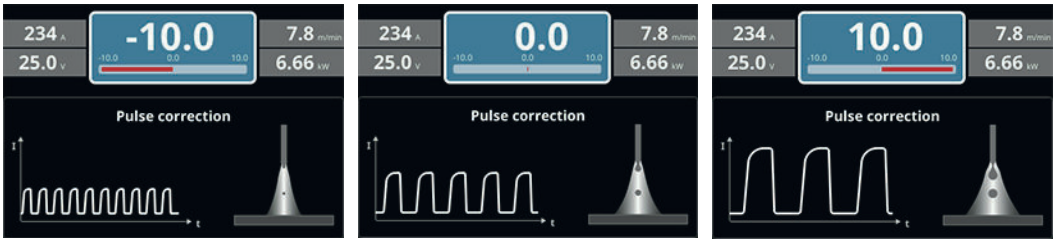

*Example: Process parameters / Common - Next page*



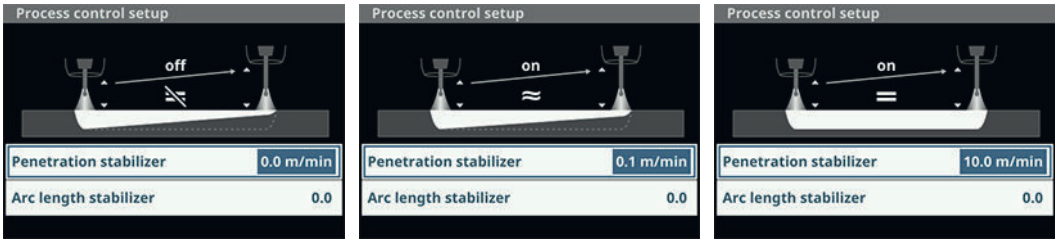

*Example: Process parameters / Common - Previous page*

**Animated graphics**

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




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



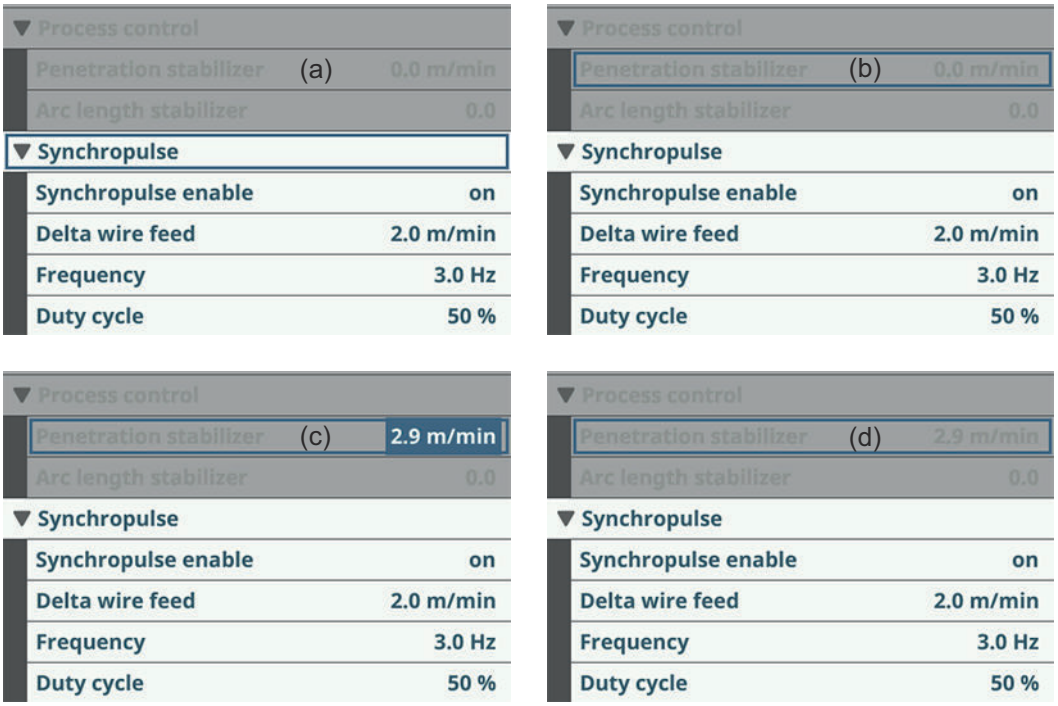

*Example: Process parameters / Process control / Penetration stabilizer 0 / 0.1 / 10.0*

**Greyed out parameters**

*NOTE!*

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

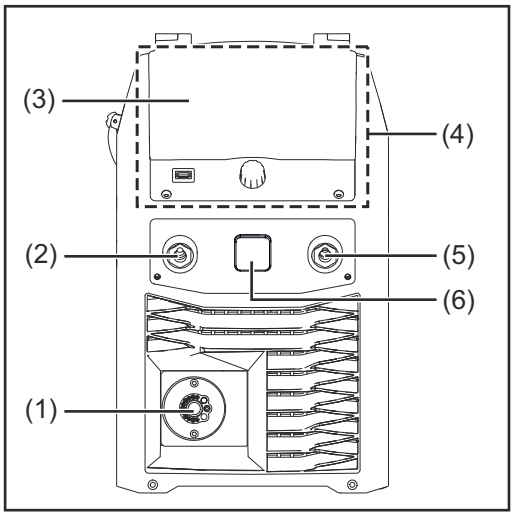
▶ Greyed-out parameters can be selected and changed, but have no influence on the current welding process or the welding result.



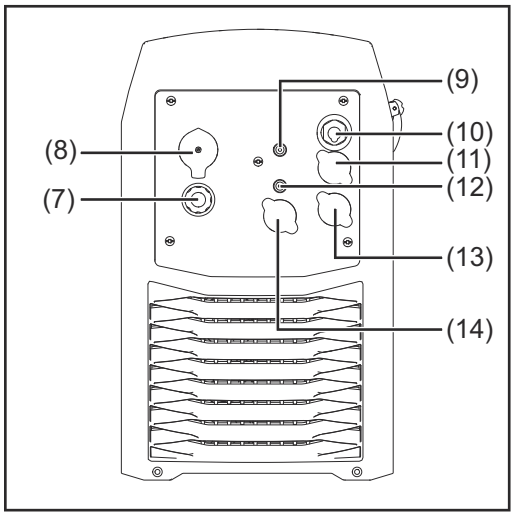

(a) Greyed out parameter (e.g. penetration stabilizer)
(b) Greyed out parameter selected
(c) Value of the greyed out parameter is changed
(d) Greyed out parameter with changed value - no effect with current settings

# Connections, switches and mechanical components

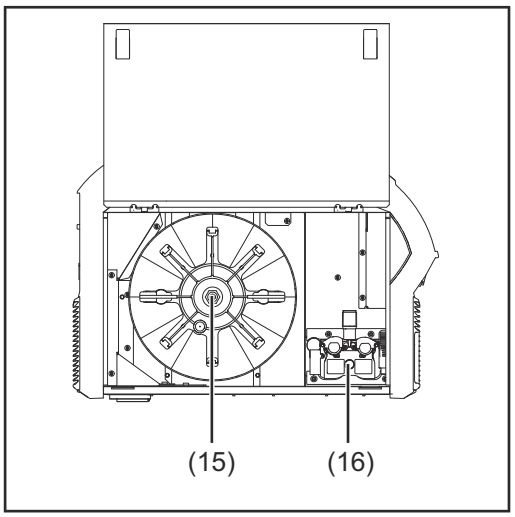
**TPS 320i C power source**




*Front*




*Rear*




*Side view*

| No. | Function |
|---|---|
| (1) | **Welding torch connection**<br>for connecting the welding torch |
| (2) | **(-) current socket with bayonet latch**<br>used to connect the grounding cable during MIG/MAG welding |
| (3) | **Control panel cover**<br>for protecting the control panel |
| (4) | **Control panel with display**<br>for operating the power source |
| (5) | **(+) current socket with bayonet latch** |
| (6) | **Blanking cover**<br>reserved for the TMC connection socket of the TIG option |

| | |
|---|---|
| **(7)** | **Mains cable with strain relief device** |
| **(8)** | **Mains switch**<br>for switching the power source on and off |
| **(9)** | **Blanking cover**<br>reserved for TIG shielding gas connection option |
| **(10)** | **Blanking cover**<br>reserved for optional 2nd (-) current socket or 2nd (+) current socket |
| **(11)** | **Blanking cover**<br>reserved for external sensor option |
| **(12)** | **MIG/MAG shielding gas connection** |
| **(13)** | **Blanking cover**<br>reserved for the Ethernet connection socket |
| **(14)** | **Blanking cover**<br>reserved for optional 2nd SpeedNet connection |
| **(15)** | **Wirespool holder with brake**<br>for holding standard wirespools weighing up to 16 kg (35.27 lbs) and with a max. diameter of 300 mm (11.81 in) |
| **(16)** | **4 roller drive** |

# Installation and commissioning

# Minimum equipment needed for welding task

**General**

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

**MIG/MAG gas-cooled welding**

- Power source
- Grounding (earthing) cable
- MIG/MAG welding torch, gas-cooled
- Shielding gas supply
- Wire electrode

**MIG/MAG water-cooled welding**

- Power source
- Cooling unit
- Grounding (earthing) cable
- MIG/MAG welding torch, water-cooled
- Shielding gas supply
- Wire electrode

**Manual CMT welding**

- Power source
- Standard, Pulse and CMT welding packages enabled on the power source
- Grounding cable
- PullMig CMT welding torch incl. CMT drive unit and CMT wire buffer

  **IMPORTANT!** For water-cooled CMT applications, a cooling unit is also required!

- OPT/i PushPull
- CMT interconnecting hosepack
- Wire electrode
- Gas connection (shielding gas supply)

**TIG DC welding**

- Power source
- Grounding (earthing) cable
- TIG gas-valve torch
- Gas connection (shielding gas supply)
- Filler metal (depending on the application)

**MMA welding**

- Power source
- Grounding (earthing) cable
- Electrode holder with welding cable
- Rod electrodes

# Before installation and commissioning

**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 device and all system components.

**Proper use**

The power source may only be used for MIG/MAG, MMA and TIG welding. Any use above and beyond this purpose is deemed improper. The manufacturer shall not be held liable for any damage arising from such usage.

Proper use also includes:
- following all the information in the operating instructions
- carrying out all the specified inspection and servicing work

**Setup regulations**

The device 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 $S_{1max}$ of the power source must be known in order to select the correct generator output.
The maximum apparent power $S_{1max}$ of the power source is calculated for 3-phase devices as follows:

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

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

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

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

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

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

*NOTE!*

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

---

**Information on system components**

The steps and activities described below include references to various system components, including:
- Trolleys
- Cooling units
- Wire-feed unit holders
- Wire-feed units
- Interconnecting hosepacks
- Welding torches
- etc.

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

# Connecting the mains cable

**General**

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

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

**Stipulated mains cables**

| Power source<br>Mains voltage: USA & Canada * \| Europe |
|---|
| TPS 320i C /nc<br>3 x 380 V, 3 x 400 V, 3 x 460 V: AWG 14 \| 4G 2.5 mm² |
| TPS 320i C /MV/nc<br>3 x 200 V, 3 x 230 V: AWG 10 \| 4G 4.0 mm²<br>3 x 380 V, 3 x 400 V, 3 x 460 V: AWG 14 \| 4G 2.5 mm² |
| TPS 320i C /S/nc **<br>3 x 460 V, 3 x 575 V: AWG 14 \| - |

* Cable type for USA / Canada: Extra-hard usage

** Power source without CE mark; not available in Europe

AWG = **A**merican **w**ire **g**auge

**Safety**

**⚠ WARNING!**

**Danger due to work that has been carried out incorrectly.**
This can result in serious injury and damage to property.
- ▶ The work described below must only be carried out by trained and qualified personnel.
- ▶ Observe national standards and directives.

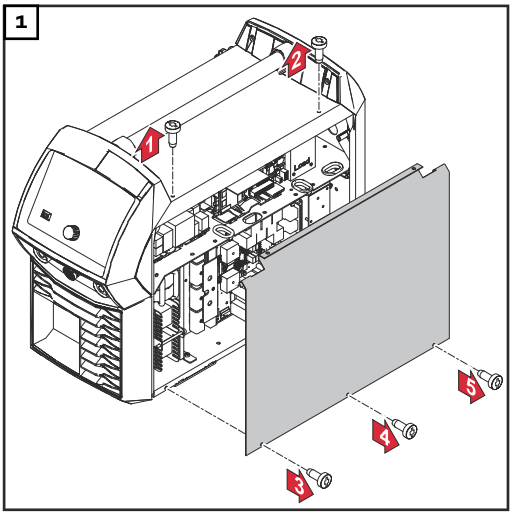
**⚠ CAUTION!**

**Danger due to improperly prepared mains cable.**
This can cause short circuits and damage.
- ▶ Fit ferrules to all phase conductors and the ground conductor of the stripped mains cable.

**Connecting the mains cable - general**

**IMPORTANT!** The ground conductor should be approx. 20 - 25 mm (0.8 - 1 in.) longer than the phase conductors.

1



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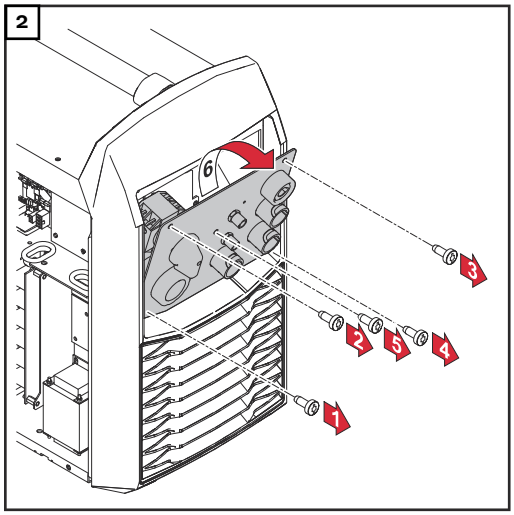

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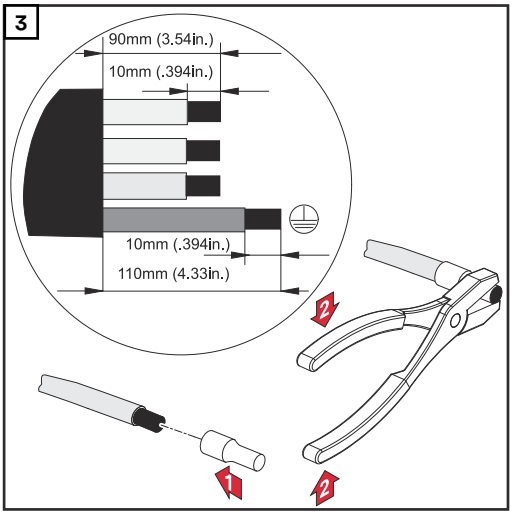


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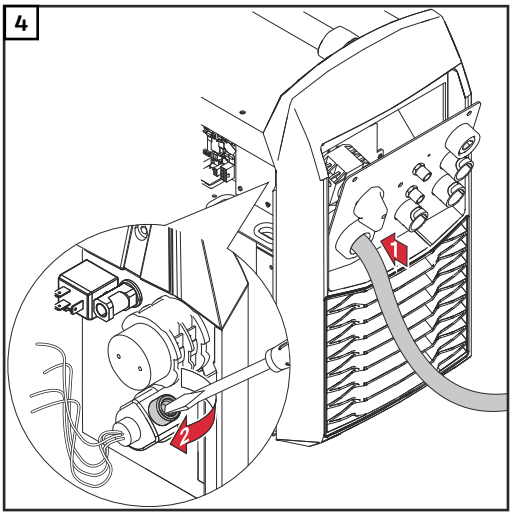
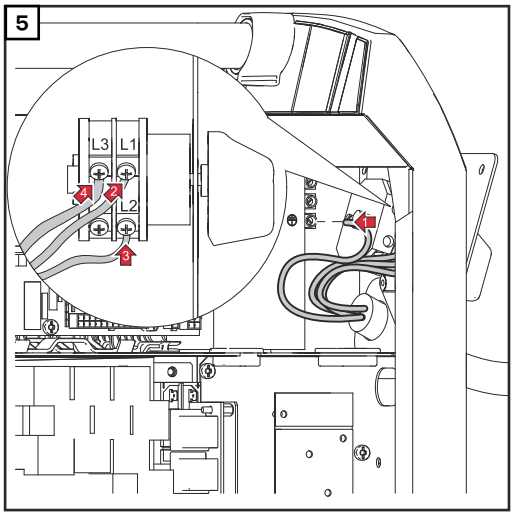


Tightening torque = 1.2 Nm
(TPS 320i C, TPS 320i C /nc,
TPS 320i C /S/nc)

Tightening torque = 3.5 Nm
(TPS 320i C /MV/nc)



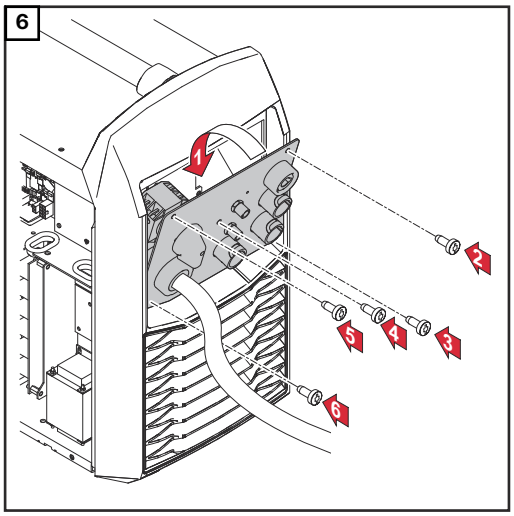

Phase conductor:

Tightening torque = 1.5 Nm, TX 15
(TPS 320i C, TPS 320i C /nc,
TPS 320i C /S/nc)

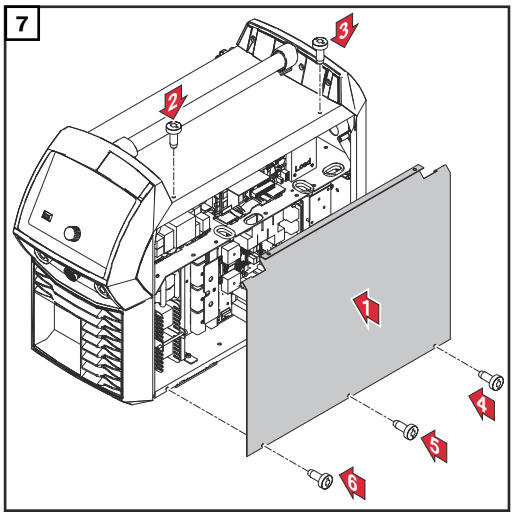
Tightening torque = 1.5 Nm, TX 25
(TPS 320i C /MV/nc)

Ground conductor:

Tightening torque = 1.2 Nm




5 x TX25
Tightening torque = 3 Nm



# Commissioning the TPS 320i C



**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.

**General**

Commissioning the TPS 320i C power source is described by reference to a manual gas-cooled MIG/MAG application.

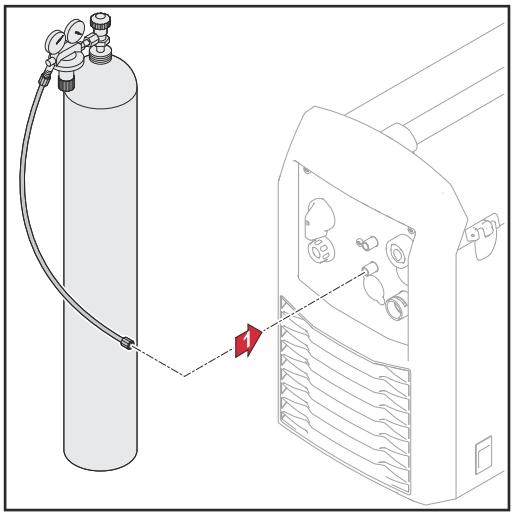
**Recommendation for water-cooled applications**

- Use a PickUp 5000 trolley
- Fit the cooling unit to the PickUp 5000 trolley
- Fit the TPS 320i C power source to the cooling unit
- Use only water-cooled welding torches with an external water connection
- Connect the water connections on the welding torch directly to the cooling unit

**Connecting the gas cylinder**

**⚠ WARNING!**

**Danger from falling gas cylinders.**
This can result in serious injury and damage to property.
- ▶ 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.



*Connecting the gas hose to the TPS 320i C*

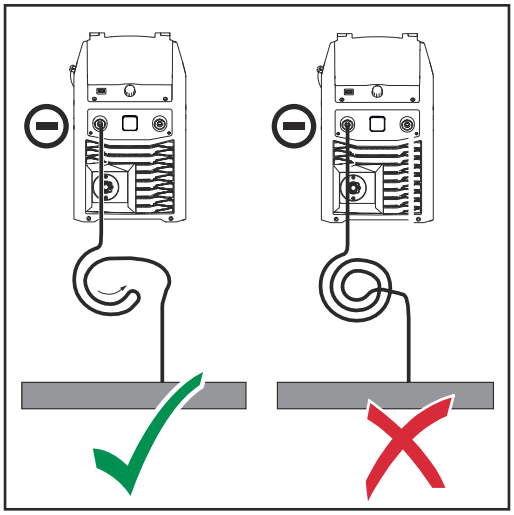
1. Place the gas cylinder on a solid, level surface in such a way that it remains stable
2. Secure the gas cylinder to prevent it from toppling over (but not around the neck of the cylinder)
3. Take the protective cap off the gas cylinder
4. Briefly open the gas cylinder valve to remove any dust or dirt
5. Inspect the seal on the gas pressure regulator
6. Screw the pressure regulator onto the gas cylinder and tighten it
7. Connect the pressure regulator to the shielding gas connection on the power source using the gas hose

**Establishing a ground earth connection**

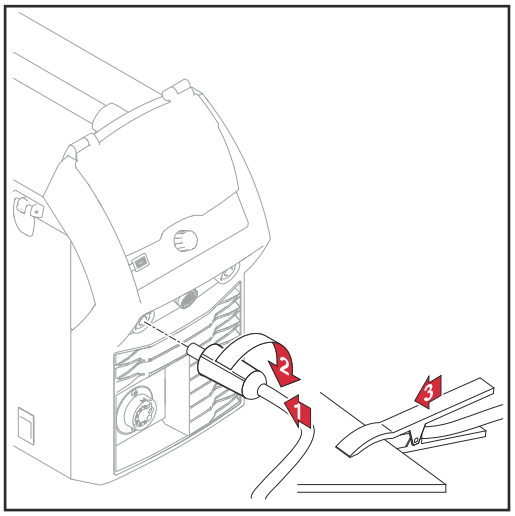
*NOTE!*

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

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



- ▶ Do not route grounding cables in iron pipes, metal cable conduits or on steel rails, avoid cable ducts;
  (routing of plus cables and grounding cables together in an iron pipe does not cause any problems)
- ▶ If there are several grounding cables, separating the grounding points on the component so that they are as far away from one another as possible is recommended, as well as preventing crossed current paths from occurring underneath the individual arcs.
- ▶ Use compensated interconnecting hosepacks (interconnecting hosepacks with integrated grounding cable)




*Connecting the grounding cable to the TPS 320i C*

1 Plug the grounding cable into the (-) current socket

2 Lock the grounding cable in place

3 Use the other end of the grounding cable to establish a connection to the workpiece

**⚠ CAUTION!**

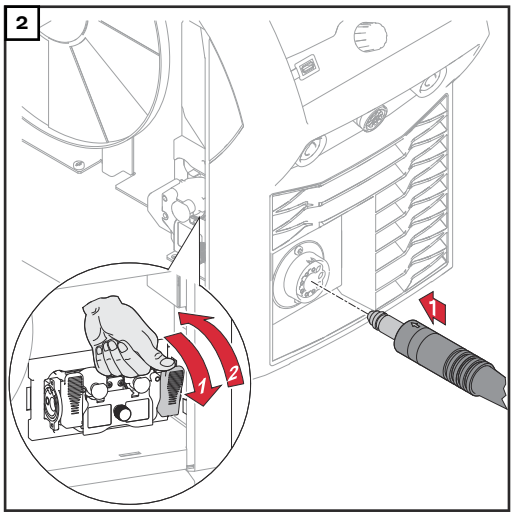
**A shared ground earth connection for multiple power sources will have an adverse effect on welding results!**
If multiple power sources are being used to weld a component, a shared ground earth connection can have a massive impact on the welding results.

- ▶ Separate the welding circuits!
- ▶ Provide a different ground earth connection for each welding circuit!
- ▶ Do not use a single, shared earth (ground) lead!

## Connecting the welding torch

1 Before connecting the welding torch, check that all cables, lines and hosepacks are undamaged and properly insulated.

2



**Inserting/replacing feed rollers**

In order to achieve optimum wire electrode feed, the feed rollers must be suitable for the diameter and alloy of the wire being welded.

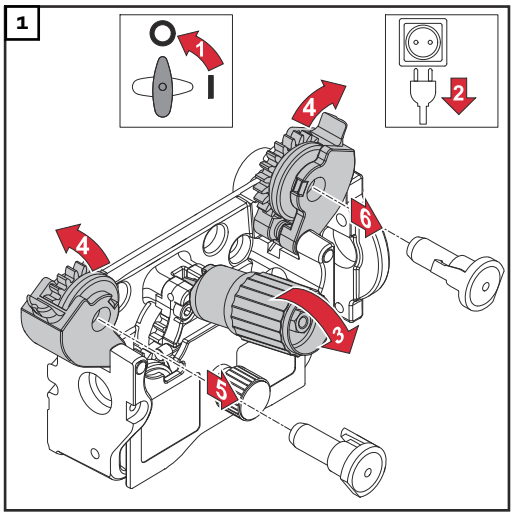
*NOTE!*

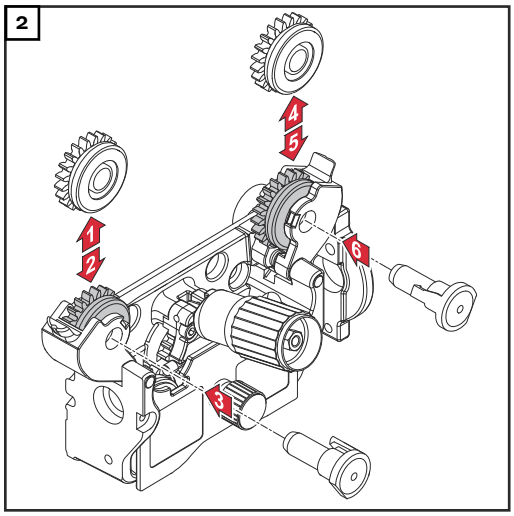
**Only use feed rollers that match the wire electrode.**
An overview of the feed rollers available and their potential application areas can be found in the Spare Parts Lists.

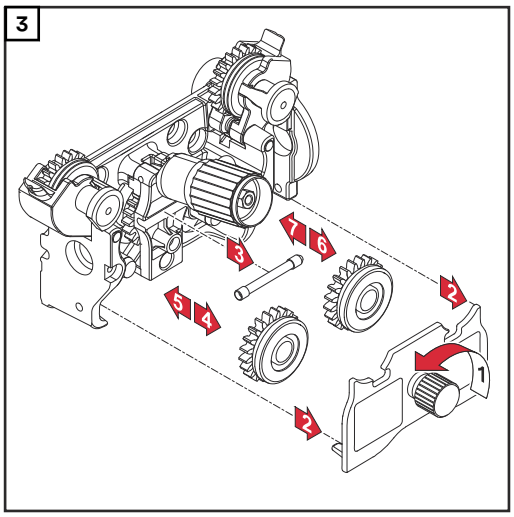
⚠ **CAUTION!**

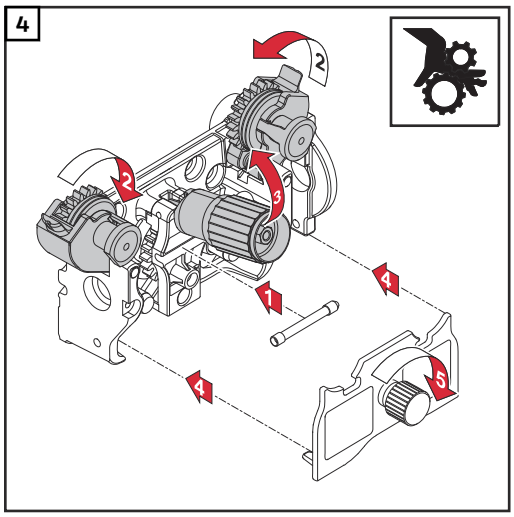
**Danger from feed roller holders flying upwards.**
This can result in injuries.

▶ When unlocking the lever, keep fingers away from the area to the left and right of the lever.



## Inserting the wirespool

**⚠ CAUTION!**

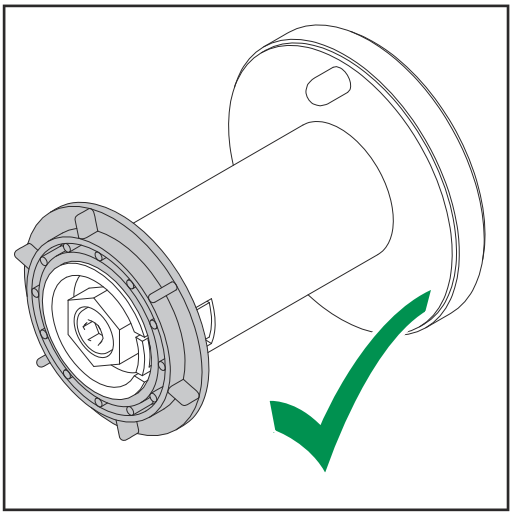
**Danger from springiness of spooled wire electrode.**
This can result in injuries.
▶ While inserting the wirespool, hold the end of the wire electrode firmly to avoid injuries caused by the wire springing back.

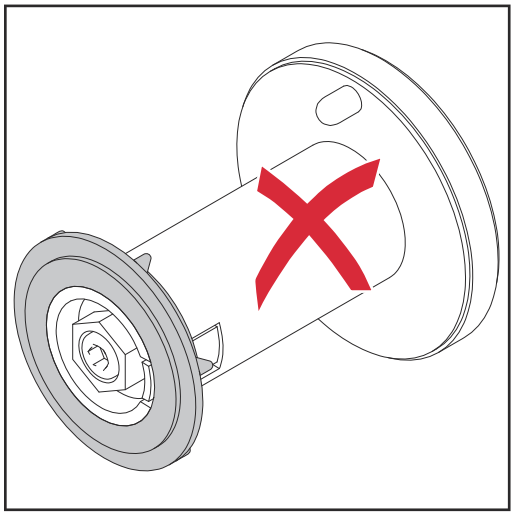
**⚠ CAUTION!**

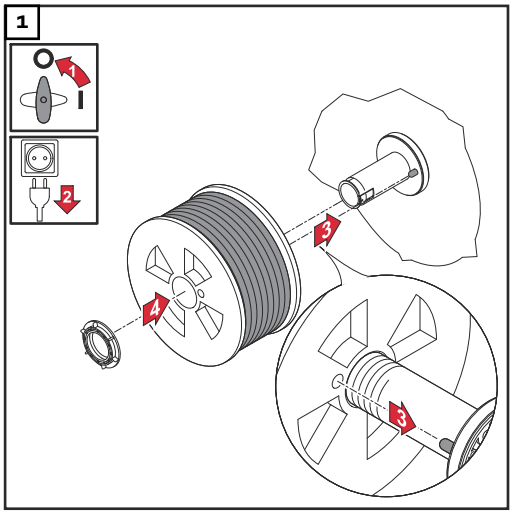
**Danger of injury and damage from falling wirespool.**
This can result in injuries.
▶ Make sure that the wirespool is fitted securely to the wirespool holder.

**⚠ CAUTION!**

**Danger from the wirespool falling because the locking ring has been placed the wrong way around.**
This can result in personal injury and function impairment.
▶ Always position the locking ring as shown in the diagram on the left.







## Inserting the basket-type spool

**⚠ CAUTION!**

**Danger from springiness of spooled wire electrode.**
This can result in injuries.
▶ While inserting the basket-type spool, hold the end of the wire electrode firmly to avoid injuries caused by the wire springing back.

**⚠ CAUTION!**

**Danger from falling basket-type spool.**
This can result in injuries.
▶ Make sure that the basket-type spool and basket-type spool adapter are fitted securely to the wirespool holder.

*NOTE!*

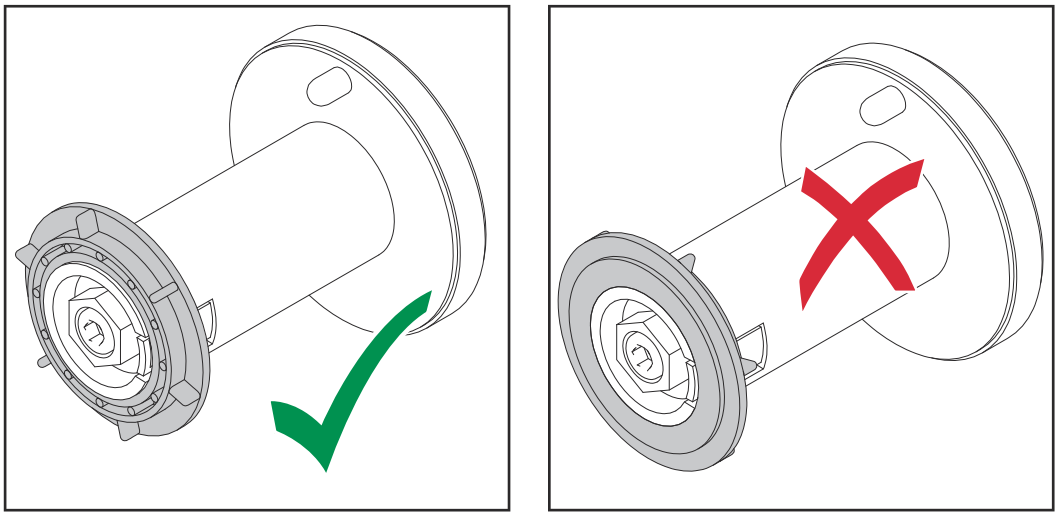
**When working with basket-type spools, only use the basket-type spool adapter included in the scope of supply.**

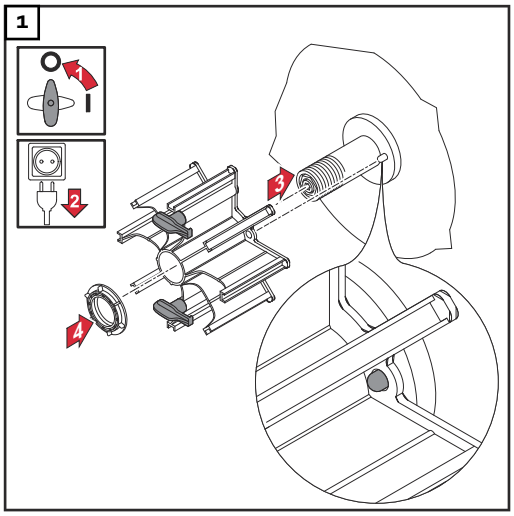
**⚠ CAUTION!**

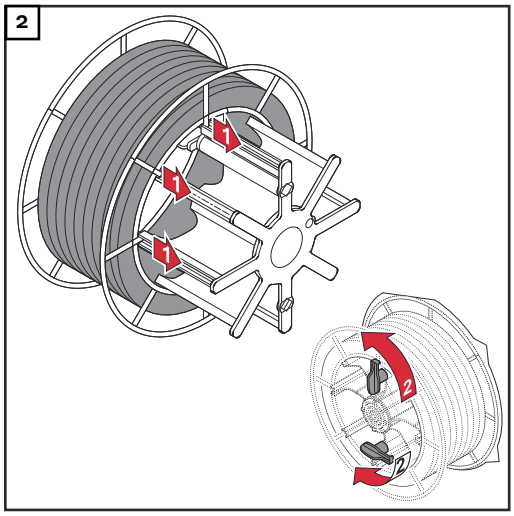
**Danger from falling basket-type spool.**
This can result in injuries.
▶ Place the basket-type spool on the adapter provided in such a way that the bars on the spool are inside the adapter guideways.

**⚠ CAUTION!**

**Danger from the basket-type spool falling because the locking ring has been placed the wrong way around.**
This can result in personal injury and function impairment.
▶ Always position the locking ring as shown in the diagram on the left.






## Feeding in the wire electrode

**⚠ WARNING!**

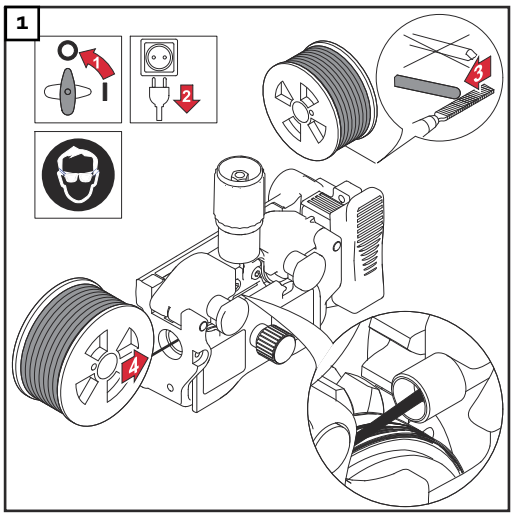
**Danger from springiness of spooled wire electrode.**
This can result in serious personal injuries.

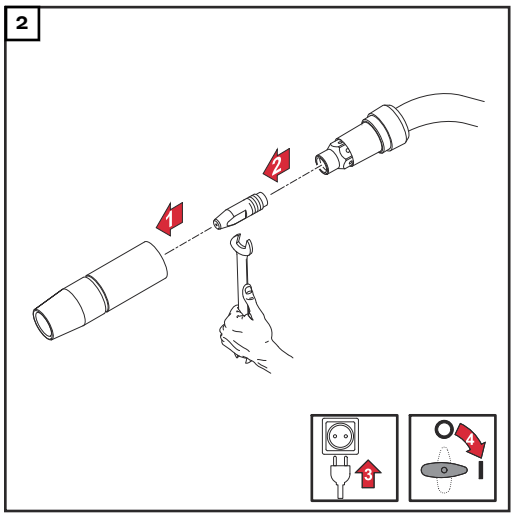
- ▶ Wear safety goggles.
- ▶ When inserting the wirespool/basket-type spool, hold the end of the wire electrode firmly to avoid injuries caused by the wire electrode springing back.

**⚠ CAUTION!**

**Danger from sharp end of wire electrode.**
This can damage the welding torch.

- ▶ Deburr the end of the wire electrode well before threading in.
- ▶ Lay the welding torch hosepack as straight as possible.



**⚠ WARNING!**

**Danger due to emerging wire electrode.**
This can result in serious personal injuries.

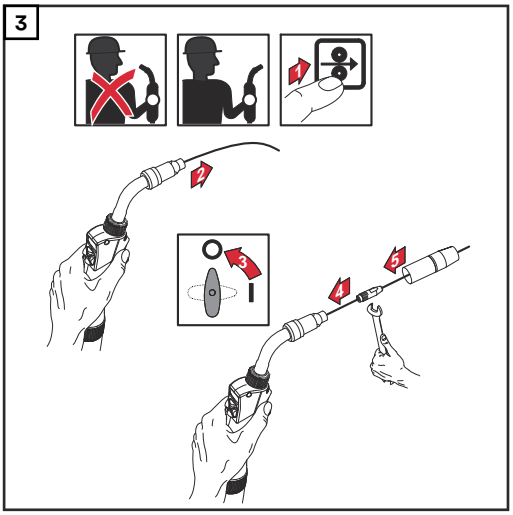
- ▶ Hold the welding torch so that the tip of the welding torch points away from the face and body.
- ▶ Wear suitable protective goggles.
- ▶ Do not point the welding torch at people.
- ▶ Ensure that the wire electrode can only intentionally make contact with electrically conductive objects.

*NOTE!*

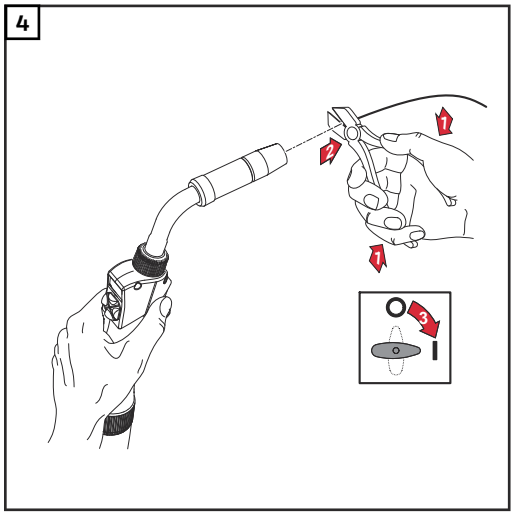
**The wire electrode can be threaded by pressing a wire threading button present in the welding system or by pressing the torch trigger.**

- ▶ The "Wire threading" dialogue window is shown on the display.

3



4



**Notes on wire threading**

If contact is made with the earth during wire threading, the wire electrode is automatically stopped.

When the torch trigger is pressed once, the wire electrode moves forwards 1 mm.

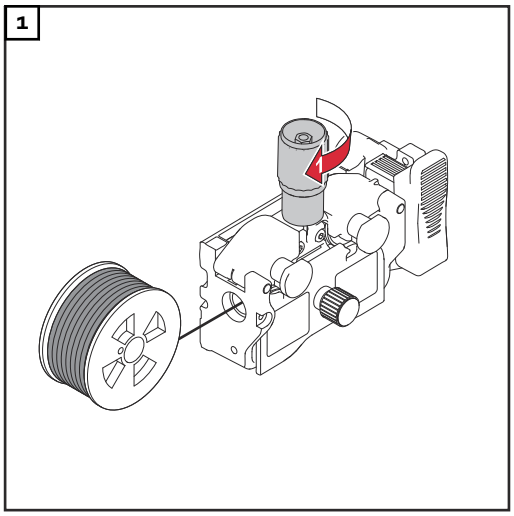
With a push wire feeding system:
If contact is made with the workpiece during threading, the wire play in the inner liner is measured. If the measurement is successful, a wire play value is entered in the event logbook, which is used to control the system.

## Setting the contact pressure

*NOTE!*

**Set the contact pressure in such a way that the wire electrode is not deformed but nevertheless ensures proper wirefeeding.**

1



**Contact pressure standard values for U-groove rollers**

Steel:
4 - 5

CrNi
4 - 5

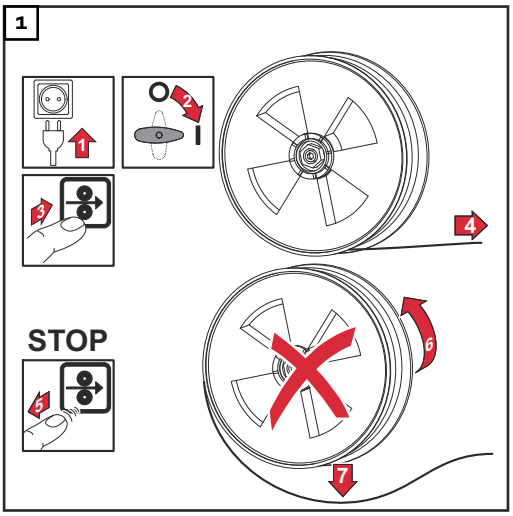
Tubular cored electrodes
2 - 3

## Adjusting the brake

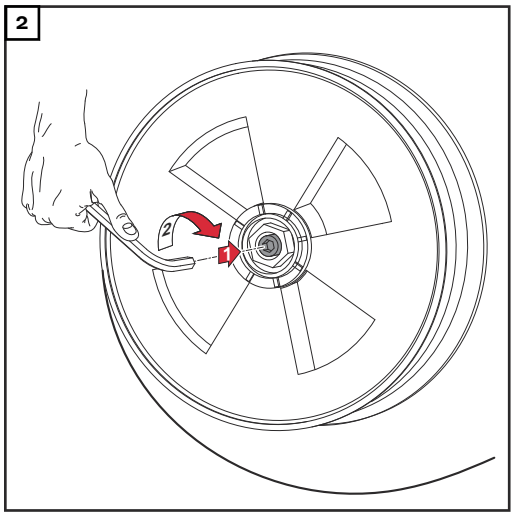
*NOTE!*

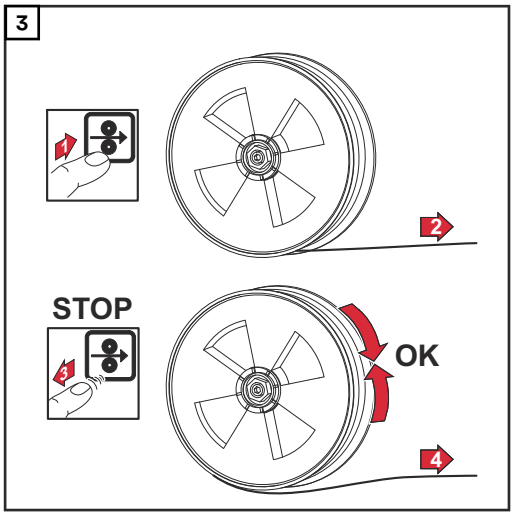
**After releasing the torch trigger the wirespool should stop unreeling.**
Adjust brake if necessary.

1

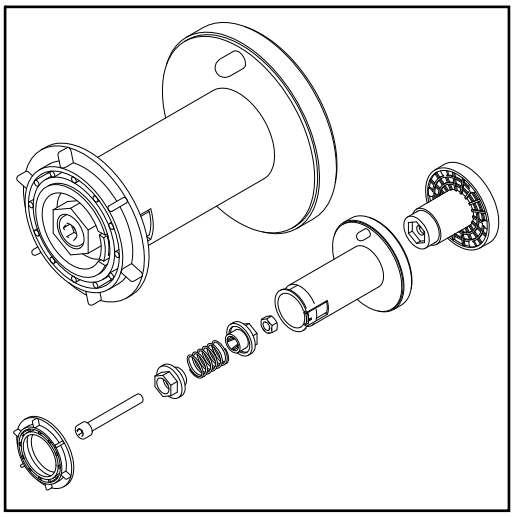



2






**Design of the brake**



**⚠ WARNING!**

**Danger from incorrect installation.**
This can result in severe personal injury and damage to property.

- ▶ Do not dismantle the brake.
- ▶ Maintenance and servicing of brakes is to be carried out by trained, qualified personnel only.

The brake is only available as a complete unit.
This illustration of the brake is for information purposes only.

**Performing R/L alignment**

**IMPORTANT!** For optimum welding results, the manufacturer recommends performing an R/L alignment when starting the device for the first time and when any changes are made to the welding system.
More information about the R/L alignment can be found under "R/L alignment" in the "Process parameters" section of the "Welding mode" chapter (page **141**).

# Locking and unlocking the power source using the NFC key

**General**

NFC key = NFC card or NFC key ring

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

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

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

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

### Locking the power source


1 Hold the NFC key on the NFC key reader

The key symbol appears 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 adjusted using the adjusting dial.

Any attempt to call a locked function will result in a notification being displayed.

**Unlocking the power source**

1 Hold the NFC key on the NFC key reader

The crossed-out key symbol appears on the display.

The key symbol no longer appears in the status bar.
All power source functions are now available again without restrictions.

*NOTE!*

**More information about locking and unlocking the power source can be found in the "Defaults - Administration" section from page 186.**

# Welding

# MIG/MAG modes



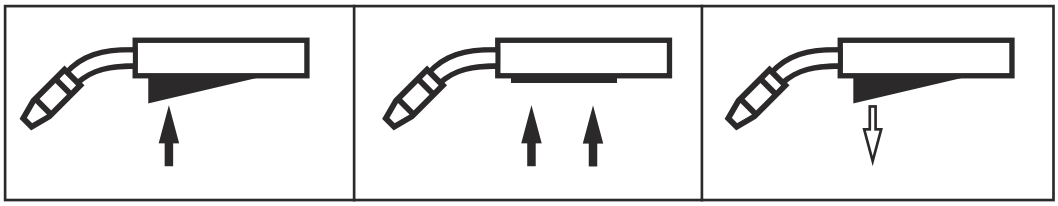
## General

**⚠ 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 their explanations



*Press the torch trigger | Hold the torch trigger | Release the torch trigger*

**GPr**
Gas pre-flow

**I-S**
Starting-current phase: the base material is heated up rapidly, despite the high thermal dissipation that occurs at the start of welding

**t-S**
Starting current time

Start arc length correction

**SL1**
Slope 1: the starting current is steadily lowered until it reaches the welding current

**I**
Welding-current phase: uniform thermal input into the base material, whose temperature is raised by the advancing heat

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

**t-E**
Final current time

E

End arc length correction

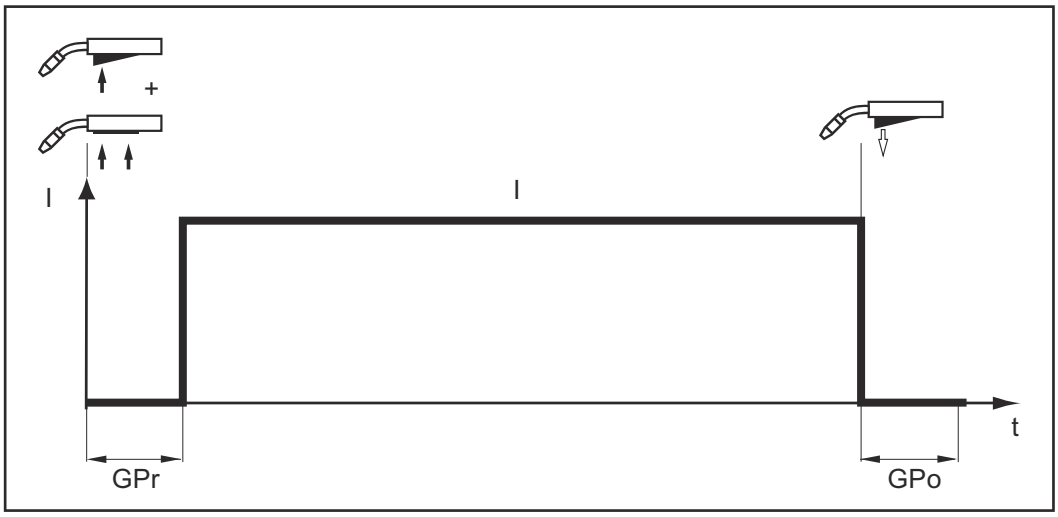
**SL2**
Slope 2: the welding current is steadily lowered until it reaches the final current

**GPo**
Gas post-flow

**SPt**
Spot welding time

A detailed explanation of the parameters can be found in the section headed "Process parameters".

**2-step mode**

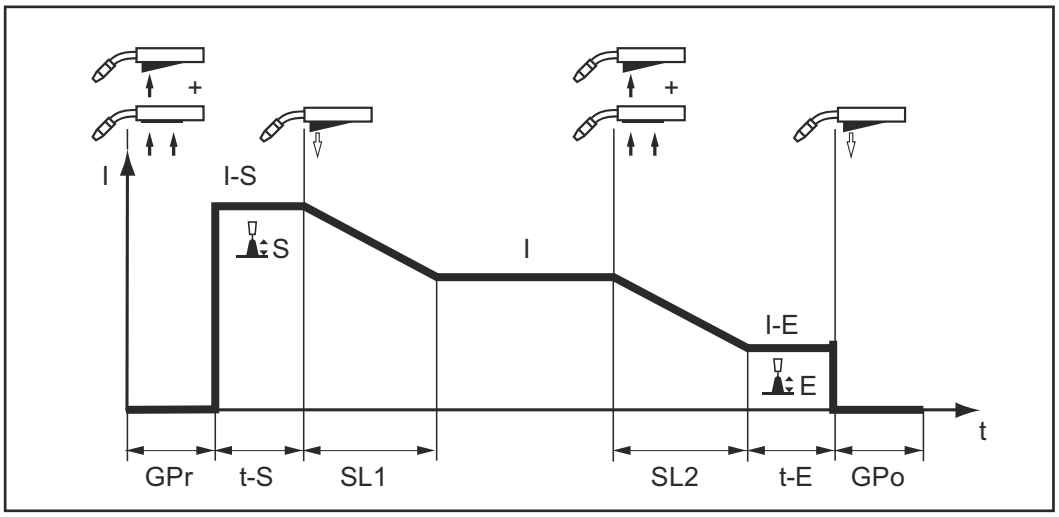



"2-step mode" is suitable for
- Tacking work
- Short weld seams
- Automated and robot welding

**4-step mode**

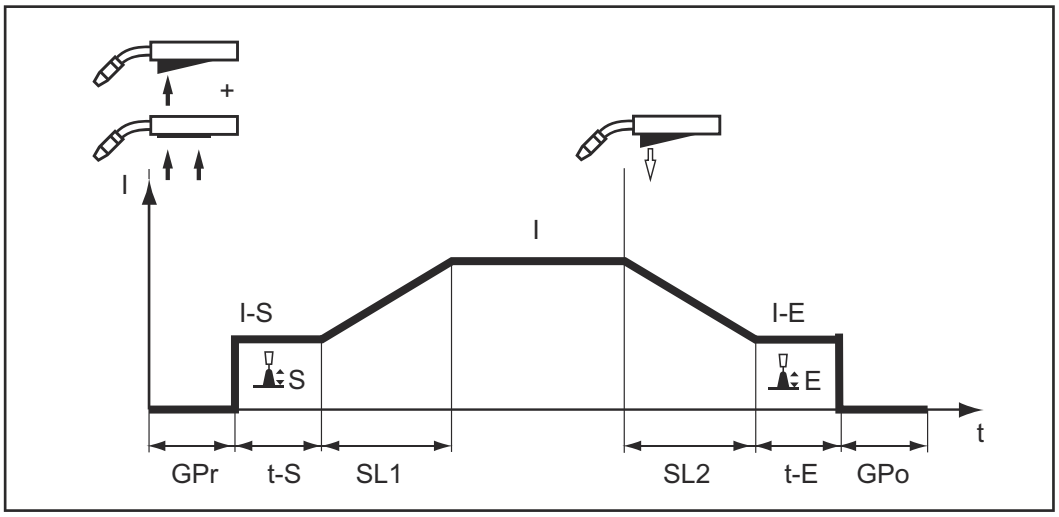

"4-step mode" is suitable for longer weld seams.

**Special 4-step mode**



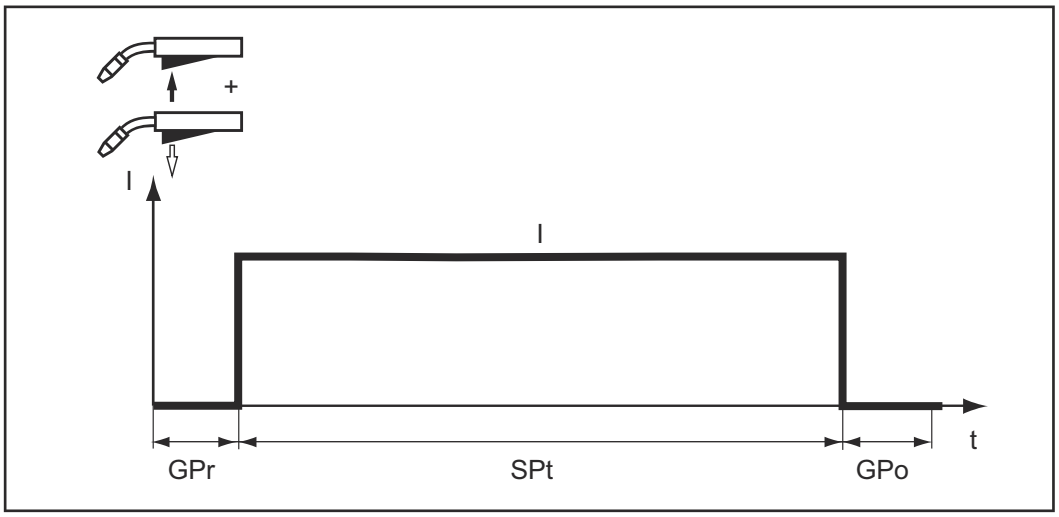

"Special 4-step mode" is particularly suitable for welding aluminium materials. The special slope of the welding current curve takes account of the high thermal conductivity of aluminium.

**Special 2-step mode**




"Special 2-step mode" is ideal for welding in the higher power range. In special 2-step mode, the arc starts at a lower power, which makes it easier to stabilise.

**Spot welding**




The "Spot welding" mode is suitable for welded joints on overlapped sheets.

# 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.

## MIG/MAG and CMT welding – overview

The "MIG/MAG and CMT welding" section comprises the following steps:

- Switching on the power source
- Selecting the welding process and operating mode
- Selecting the filler metal and shielding gas
- Setting the welding and process parameters
- Setting the shielding gas flow rate
- MIG/MAG or CMT welding

*NOTE!*

**If using a cooling unit, follow the safety rules and note the operating conditions in the cooling unit Operating Instructions.**

## Switch on the power source

1 Connect the mains cable

2 Move the mains switch to the "I" position

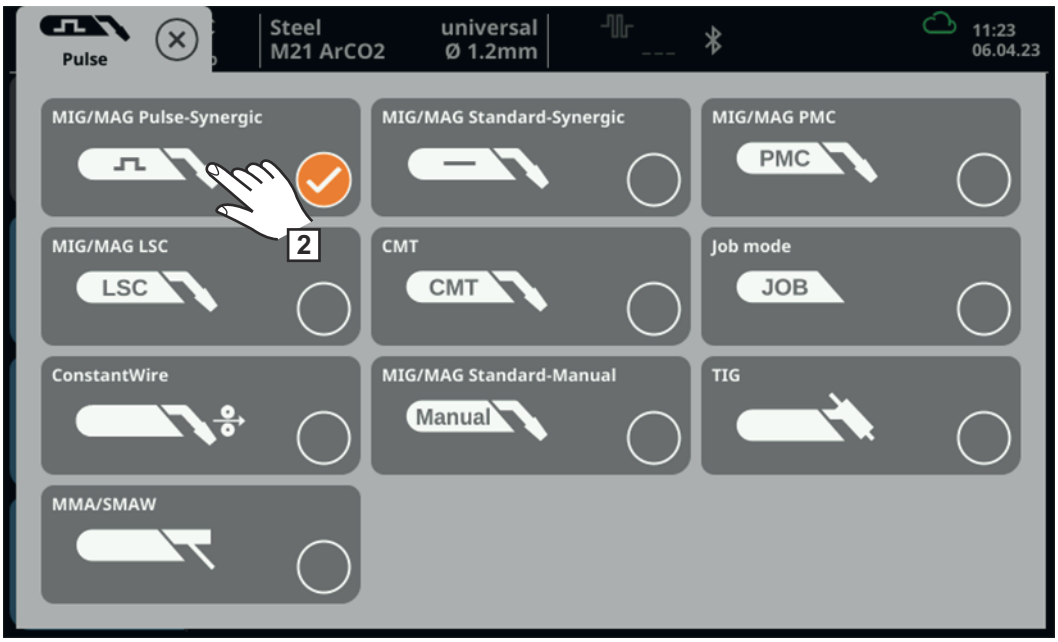
A cooling unit connected to the welding system will begin to operate.

**IMPORTANT!** For optimum welding results, the manufacturer recommends performing an R/L alignment when starting the device for the first time and when any changes are made to the welding system.
More information on R/L alignment can be found under "R/L alignment" in the MIG/MAG process parameters section (page **141**).

**Setting the welding process and operating mode via the status bar**


1 In the status bar, select the symbol for the welding process

An overview of the welding processes is displayed.




2 Select the desired welding process


3 In the status bar, select the symbol for the operating mode

An overview of the operating modes is displayed.

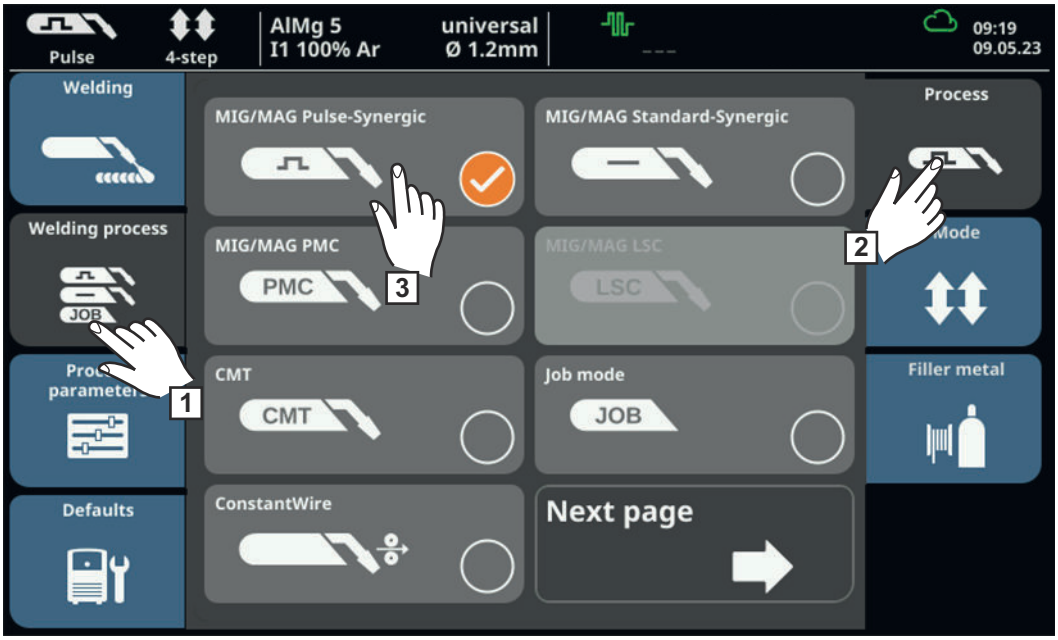

4 Select the desired operating mode

**Setting the welding process and operating mode via the menu bar**

Welding process and operating mode can alternatively be set via the menu bar.

*NOTE!*

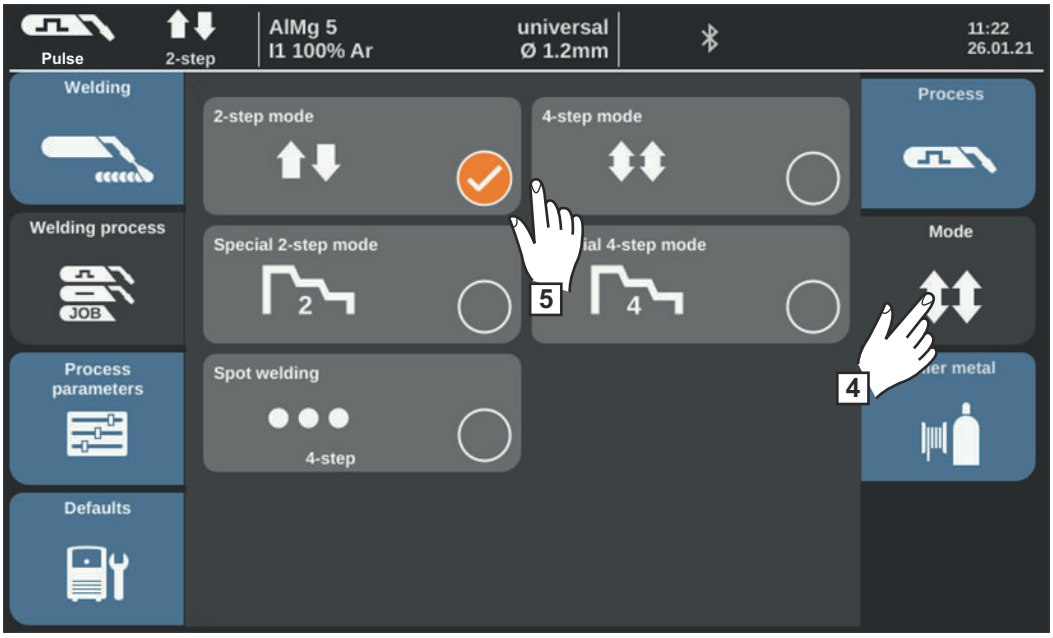
**The number and sequence of the displayed welding processes may vary depending on the device type, equipment and available Welding Packages.**




1 Select "Welding process"
2 Select "Process"

An overview of the welding process is displayed.
Various welding processes are available depending on the power source type or function package installed.

3 Select the desired welding process

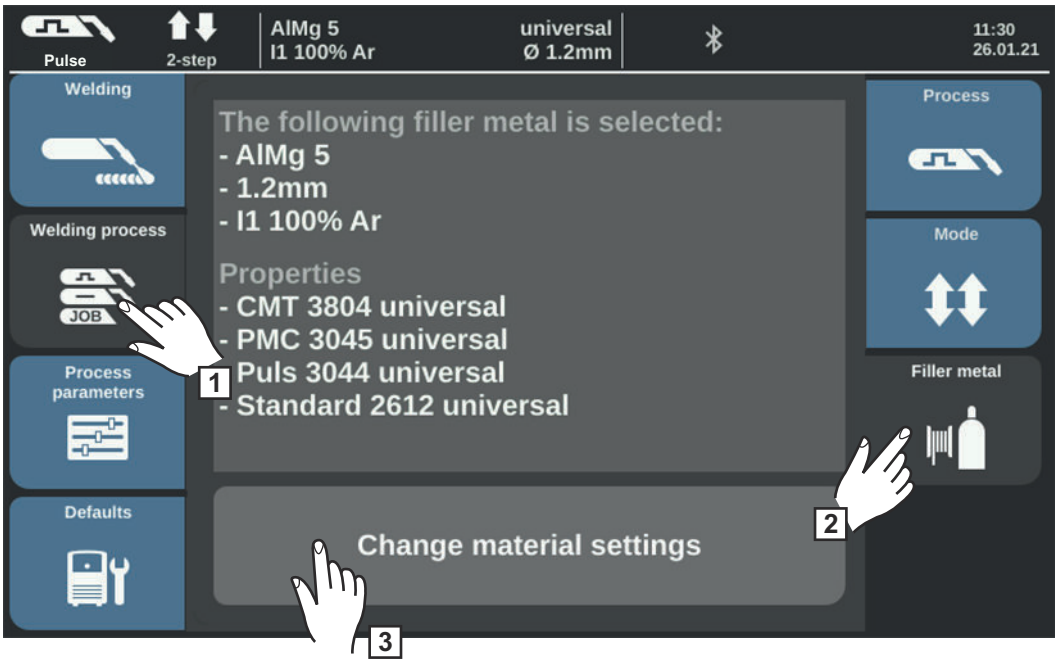



4 Select "Mode"

An overview of the 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 adjusting dial and select the desired filler metal
5 Select "Next" / press the adjusting dial
6 Turn the adjusting dial and select the desired wire diameter
7 Select "Next" / press the adjusting dial
8 Turn the adjusting dial and select the desired shielding gas
9 Select "Next" / press the adjusting dial

*NOTE!*

**The available characteristics per welding process are not displayed if only one characteristic is available for the selected filler metal.**
In this case, the confirmation step of the filler metal wizard follows immediately; steps 10 - 14 do not apply.

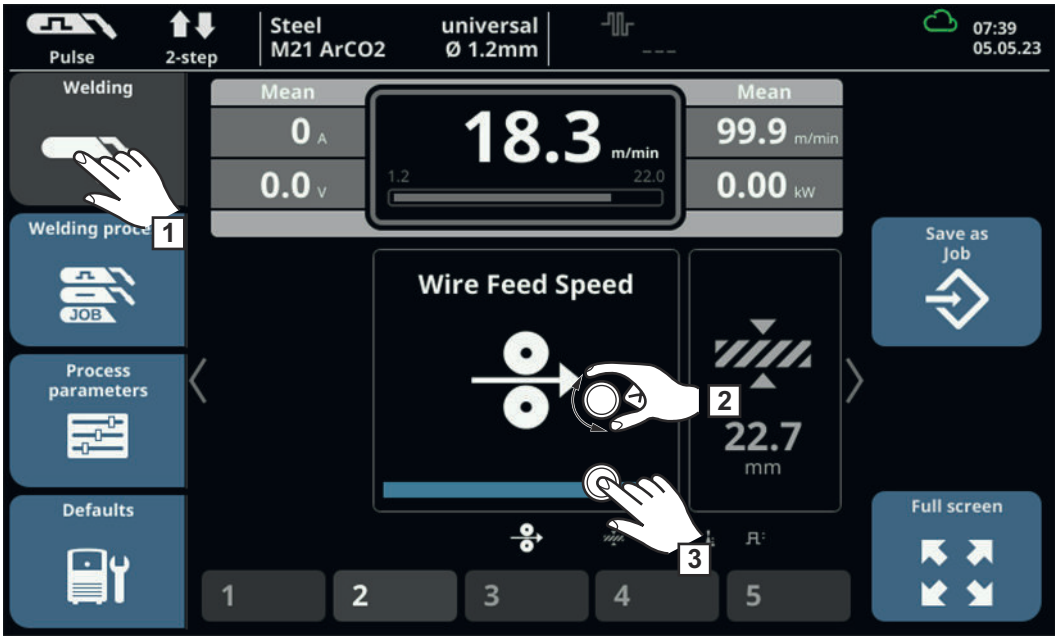
10 Turn the adjusting dial and select the desired welding process
11 To select the desired characteristic, press the adjusting dial (blue background)
12 Turn the adjusting dial and select the desired characteristic
13 Press the adjusting dial and apply the selected characteristic (white background)
14 Select "Next"

The confirmation step of the filler metal wizard is displayed:

15 Select "Save" / press the adjusting dial

The selected filler metal and associated characteristics per welding process will be saved.

**Setting the welding parameters**

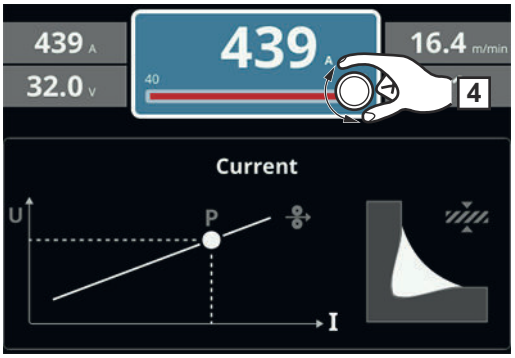



1 Select "Welding"

2 Select the desired welding parameter by turning the adjusting dial

3 Press the adjusting 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. welding current parameter*

The value of the selected parameter can now be changed.

4 Turn the adjusting dial to change the parameter

The adjusted value of the welding parameter is applied immediately.
If one of the "Wire speed", "Material thickness", "Current" or "Voltage" parameters is changed during synergic welding, the other welding parameters are immediately adjusted accordingly.

5 Press the adjusting dial to call up the welding parameters overview

6 Adjust the process parameters accordingly to make user or application-specific settings on the welding system

---

**Set the shielding gas flow rate**

1 Open the gas cylinder valve

2 Press the gas-test button

Gas flows out.
The "Gas purging" dialogue window appears on the display, indicating the remaining gas purging time. 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 underside of the pressure regulator until the pressure gauge shows the required shielding gas flow rate

4 Press the gas-test button
The flow of gas stops.

**MIG/MAG or CMT welding**


1 Select "Welding" to display the welding parameters

**⚠ WARNING!**

**Danger due to emerging wire electrode.**
This can result in serious personal injuries.

- ▶ 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 164).

*NOTE!*

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

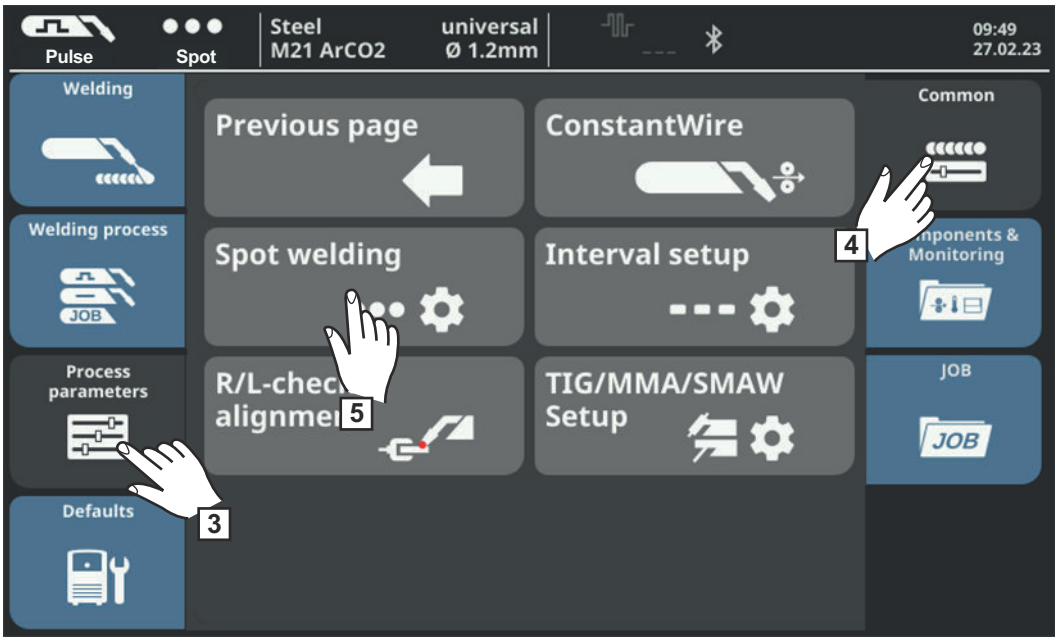
# Spot and stitch welding

**Spot welding**

Spot welding is used on welded joints on overlapped sheets that are only accessible on one side.

1 Select the desired welding process:
- Via the status bar / Operating mode - see from page 88, work step 3
  or
- Via the menu bar - see from page 89

2 Activate spot welding:
1. In the status bar, select the symbol for the operating mode
2. Select spot welding
   or
1. Select Welding process / Operating mode / Spot welding




3 Select "Process parameters"

4 Select "Common"

5 Select "Spot welding"

The spot welding time parameter is displayed.

6 Enter the desired value for the spot welding time: Press and turn the adjusting dial

Setting range: 0.1 - 10.0 s
Factory setting: 1.0 s

7 Apply value by pressing OK

*NOTE!*

**4-step mode is assigned as standard for spot welding.**
Press the torch trigger - Spot welding process runs until the end of the spot welding time - Press again to stop the spot welding time prematurely

▶ The spot welding parameter can be changed to 2-step under Defaults / System / Mode Setup
(more information on 2-step and 4-step mode in spot welding starts on page 174)

8 Select the filler metal, wire diameter and shielding gas

9 Open the gas cylinder valve

10 Set the shielding gas flow rate

⚠ **WARNING!**

**Danger due to emerging wire electrode.**
This can result in serious personal injuries.

▶ 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.

11 Spot welding

**Procedure for producing a welding spot:**

1 Hold the welding torch vertical

2 Press and release the torch trigger

3 Keep the welding torch in the same position

4 Wait for the gas post-flow time

5 Raise the welding torch

*NOTE!*

**Pre-set start of welding and end of welding parameters are also active for spot welding.**

▶ Start of welding / end of welding treatment for spot welding can be assigned under Process parameters / General MIG/MAG / Weld-Start/Weld-End.
▶ If the final current time is active, the end of welding is not after the pre-set spot welding time, but only once the pre-set slope and final current times have ended.

## Stitch welding

1 Select the desired welding process:
- Via the status bar - see from page 88
or
- Via the menu bar - see from page 89

2 Select the operating mode for stitch welding:
- Via the status bar - see from page 88
or
- Via the menu bar - see from page 89

3 Select the filler metal, wire diameter and shielding gas

4 Set the desired welding parameters depending on the selected welding process

5 Activating stitch welding mode:
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 indicator 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 Set the shielding gas flow rate

**⚠ WARNING!**

**Danger due to emerging wire electrode.**
This can result in serious personal injuries.
- ▶ 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 Hold the welding torch vertical

2 Depending on the selected mode:
press and hold the torch trigger (2-step mode)
press and release the torch trigger (4-step mode)

3 Keep the welding torch in the same position

4 Wait for the welding interval

5 Position the welding torch at the next point

6 To end stitch welding, depending on the selected 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**

With PMC characteristics, the setting of the SFI parameter influences the re-ignition behaviour in interval operation:

SFI = on
Re-ignition takes place with SFI.

SFI = off
Re-ignition takes place by means of touchdown ignition.

For aluminium 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**

The following welding parameters for MIG/MAG pulse synergic welding and PMC welding can be set and displayed by selecting "Welding":

**Wire speed** [1)]

0.5 - max. [2) 3)] m/min / 19.69 - max [2) 3)] ipm.

---

**Material thickness** [1)]

0.1 - 30.0 mm [2)] / 0.004 - 1.18 [2)] in.

---

**Current** [1)] **[A]**

Setting range: depends on the welding process and welding program selected

Before the start of welding, 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 pulsing energy of a 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 **49**)
▶ 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**

The following welding parameters for MIG/MAG standard synergic welding, LSC welding and CMT welding can be set and displayed by selecting the "Welding" menu button:

**Wire speed** [1)]

0.5 - max. [2) 3)] m/min / 19.69 - max [2) 3)] ipm.

**Material thickness** [1)]

0.1 - 30.0 mm [2)] / 0.004 - 1.18 [2)] in.

**Current** [1)] **[A]**

Setting range: depends on the welding process and welding program selected

Before the start of welding, 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 break-up

-10 - +10
Factory setting: 0

-10
harder arc (higher current in case of short-circuit break-up, increased welding spatter)

+10
softer arc (lower current in case of short-circuit break-up, less welding spatter forms)

*NOTE!*

**SynchroPulse can be activated via the status bar.**
(See page 49)
▶ If SynchroPulse is activated, the SynchroPulse parameters are also displayed with the welding parameters.

## Welding parameters for MIG/MAG standard manual welding

The following welding parameters for MIG/MAG standard manual welding can be set and displayed by selecting the "Welding" menu button:

**Voltage** [1)] **[V]**

Setting range: depends on the welding process and welding program selected

Before the start of welding, the device automatically displays a standard value based on the programmed parameters. The actual value is displayed during welding.

**Wire speed** [1)]
for setting a harder, more stable arc

0.5 - max. [2] m/min / 19.69 - max [2] ipm.

**Arc-force dynamic**
to influence the short-circuiting dynamic at the instant of droplet transfer

0 - 10
Factory setting: 1.5

0 ... harder and more stable arc
10 ... soft and low-spatter arc

**Explanation of footnotes**

1) Synergic parameter
When a synergic parameter is changed, the synergic function automatically changes all other synergic parameters to match.

The real setting range depends on power source and wire feeder used and on the welding programm.

2) The real setting range depends on the welding program.

3) The maximum value depends on the wire feeder used.

# EasyJob mode



**General**

If EasyJob mode has been activated, 5 additional buttons appear on the display. These enable up to 5 operating points to be saved at the touch of a button. The current welding settings are saved.

**Activating Easy-Job mode**


1 Select Defaults / View / EasyJobs

The overview to activate/deactivate EasyJob mode is displayed.

4 Select "EasyJobs on"

5 Select "OK"

EasyJob mode is activated and the default settings are displayed.

6 Select "Welding"

Five EasyJob buttons are displayed for the welding parameters.

### Storing EasyJob operating points

*NOTE!*

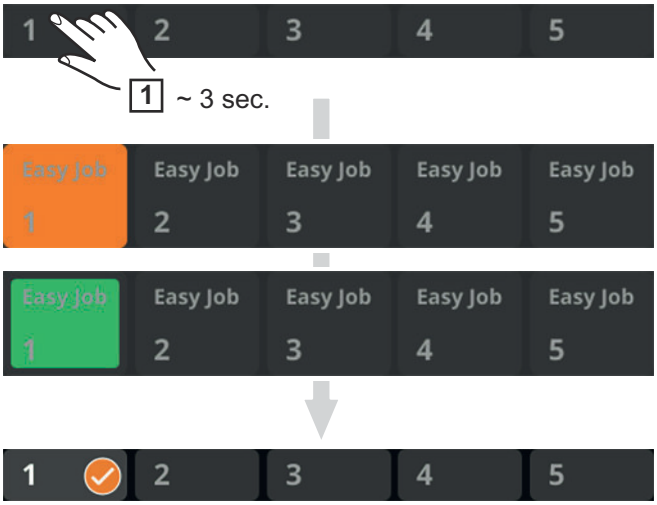
**The EasyJobs are stored under job numbers 1 - 5 and can also be retrieved using "Job mode".**

Storing an EasyJob overwrites any other job saved under the same number!

1 To store the current welding settings, touch one of the EasyJob buttons for about three seconds

The size and colour of the button changes. After about three seconds, the button is displayed green with a frame.

The settings have now been stored. The most recently stored settings will be active. An active EasyJob is shown with a tick on the EasyJob button.
Unoccupied EasyJob buttons are shown in dark grey.
For occupied EasyJobs, the button number is shown in white.




### Retrieving EasyJob operating points

1 To retrieve a saved EasyJob operating point, touch the corresponding EasyJob button briefly (< 3 seconds)

The size and colour of the button changes briefly; it is then displayed with a tick.

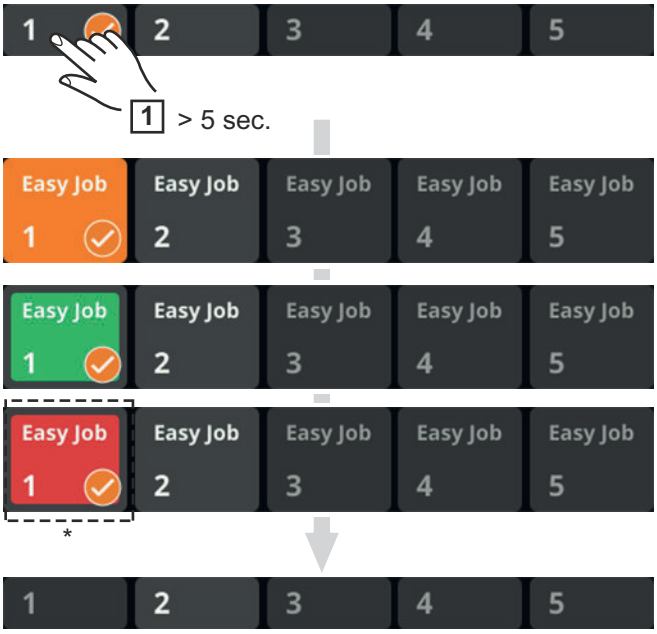

If a tick is not displayed after touching an EasyJob button, this means that there is no operating point saved under this button.

**Deleting Easy-Job operating points**

1 To delete an EasyJob operating point, touch the relevant EasyJob button for approximately 5 seconds

The button
- First changes its size and colour;
- Is displayed with a frame after about 3 seconds;
  The saved operating point is overwritten with the current settings.
- Is highlighted in red (= delete) after a total of 5 seconds.

The EasyJob operating point has been deleted.




* ... highlighted in red

**Loading more EasyJobs**

With this function, any stored job can be loaded as an EasyJob in the welding menu without switching to Job Mode.

1 Select Defaults / View / EasyJobs

The overview to activate/deactivate EasyJob mode is displayed.

2 Select "Load more EasyJobs"

3 Select "OK"

Extended EasyJob mode is activated and the default settings 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 saved jobs is displayed.

6 Use the adjusting dial to select the desired job

7 Select "Load" or press the adjusting dial

The job is loaded in the welding menu, the power source is not in Job Mode.

# Job mode



**General**

Up to 1000 jobs can be stored and retrieved in the power source.
This eliminates the need for manual documenting of the welding parameters.
"Job mode" enhances the quality of automated and manual applications.

Jobs can only be stored when in welding mode. When storing jobs, the process parameters and certain machine defaults are taken into account in addition to the present welding settings.

**Storing settings as a job**

1 Set the parameters that are to be stored as a job:
- Welding parameters
- Welding process
- Process parameters
- Machine defaults (if necessary)


2 Select "Save as Job"

The job list is displayed.

To overwrite an existing job, select it by turning and pressing the adjusting dial (or selecting "Next").
The selected job can be overwritten after acknowledging the confirmation prompt.

Select "Create a new Job" to create a new job

3 Press the adjusting dial / select "Next"

The next free job number is displayed.

4 Turn the adjusting dial and select the desired storage location

5 Press the adjusting dial / select "Next"

The keyboard is displayed.

6 Enter a job name

7 Select "OK" and confirm the job name / press the adjusting dial

The name is saved and a confirmation that the job has been stored is displayed.

8 To exit, select "Finish" / press the adjusting dial

**Job welding - retrieving a job**

*NOTE!*

**Before retrieving a job, make sure that the welding system has been installed and set up for the job.**


1 Select "Welding process"

2 Select "Process"

Alternatively, the welding process can also be selected via the status bar (compare with the selection described from page **88** ).

3 Select "Job mode"

Job mode is activated.
"Job welding" and the data from the most recently retrieved job are displayed.

4 Select "Job welding"

5 Press the adjusting dial twice or touch the job number displayed under the status bar (white background, job number is highlighted in blue)

6 Turn the adjusting dial and select the desired job

7 Press the adjusting dial and apply the selected job (white background)

8 Start welding

**IMPORTANT!** "Job" is the only parameter that can be altered in Job Mode; all the other welding parameters are read-only.

## Renaming a job


1 Select "Save as Job"
(also works in Job Mode)

The job list is displayed.


2 Turn the adjusting dial and select the job to be renamed
3 Select "Rename Job"

The keyboard is displayed.

4 Change the job name using the keyboard
5 Select "OK" and confirm the amended job name / press the adjusting dial

The job name is changed and the job list is displayed.

6 To exit, select "Cancel"

*NOTE!*

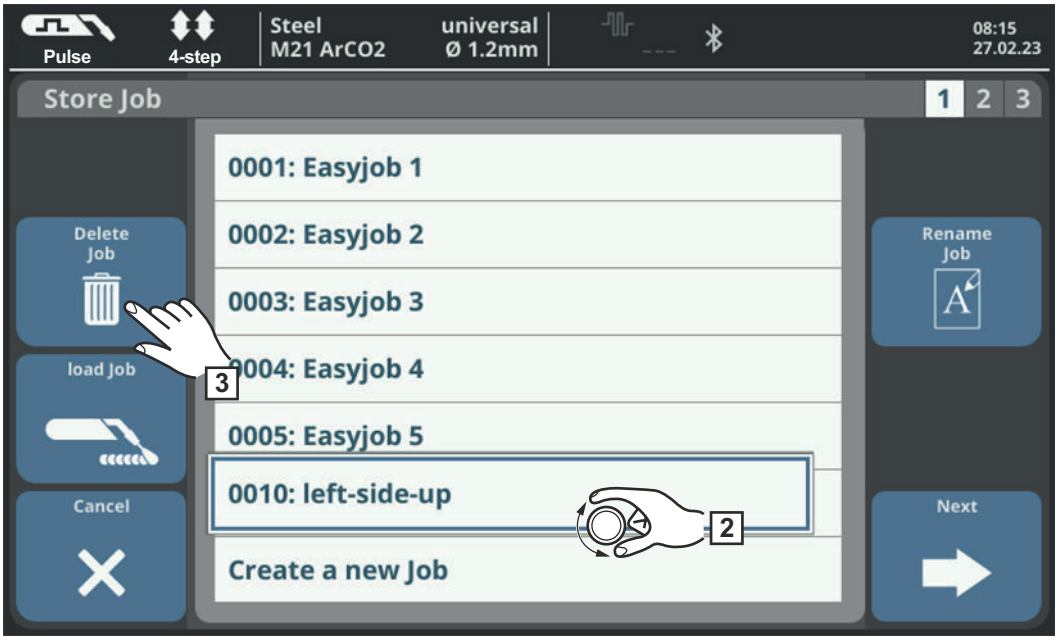
**As an alternative to the procedure described above, the job can also be renamed in the process parameters:**

▶ Process parameters / Job / Optimize job / Rename job

## Deleting a job


1 Select "Save as Job"
(also works in Job Mode)

The job list is displayed.




2 Turn the adjusting dial and select the job to be deleted

3 Select "Delete Job"

A confirmation prompt asking whether you really want to delete the job is displayed.

4 Select "Yes" to delete the selected job

The job is deleted, the job list is displayed.

5 To exit, select "Cancel"

*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**

The load job function can be used to load the data for a saved job or an EasyJob to the welding screen. The relevant data from the job is displayed in the welding parameters and can be changed, saved as a new job or EasyJob, or used to start welding.


1 Select "Save as Job"
(also works in Job Mode)

The job list is displayed.

2 Turn the adjusting dial and select the job to be loaded

3 Select "Load job"

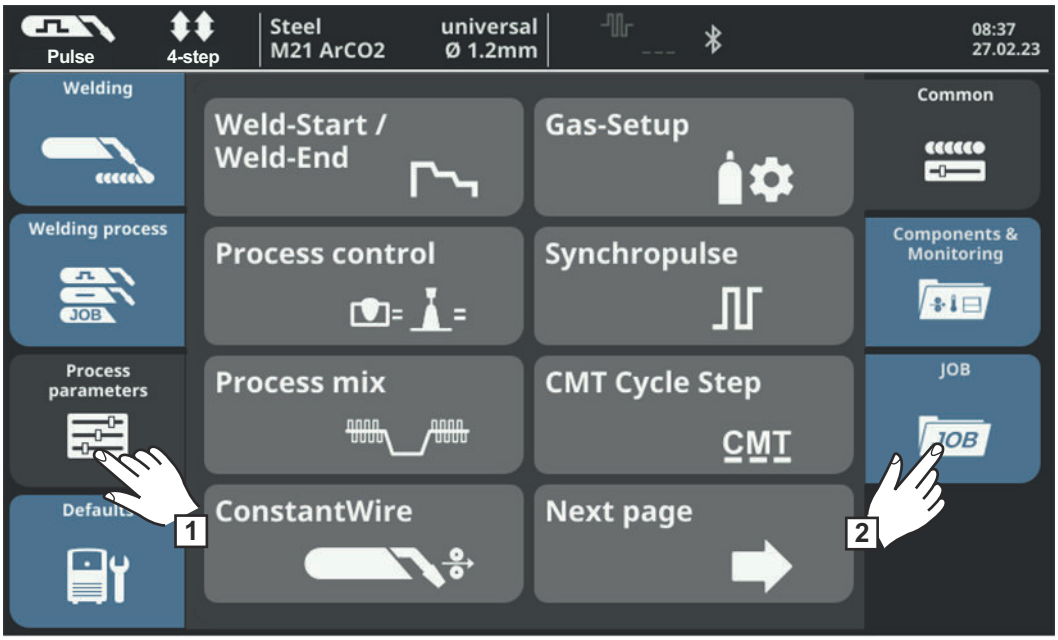
The load job information is shown.

4 Select "Yes"

The data for the selected job is loaded onto the welding screen.

The data for the loaded job can now be used for welding (no job mode), changed, or be saved as a new job or an EasyJob.

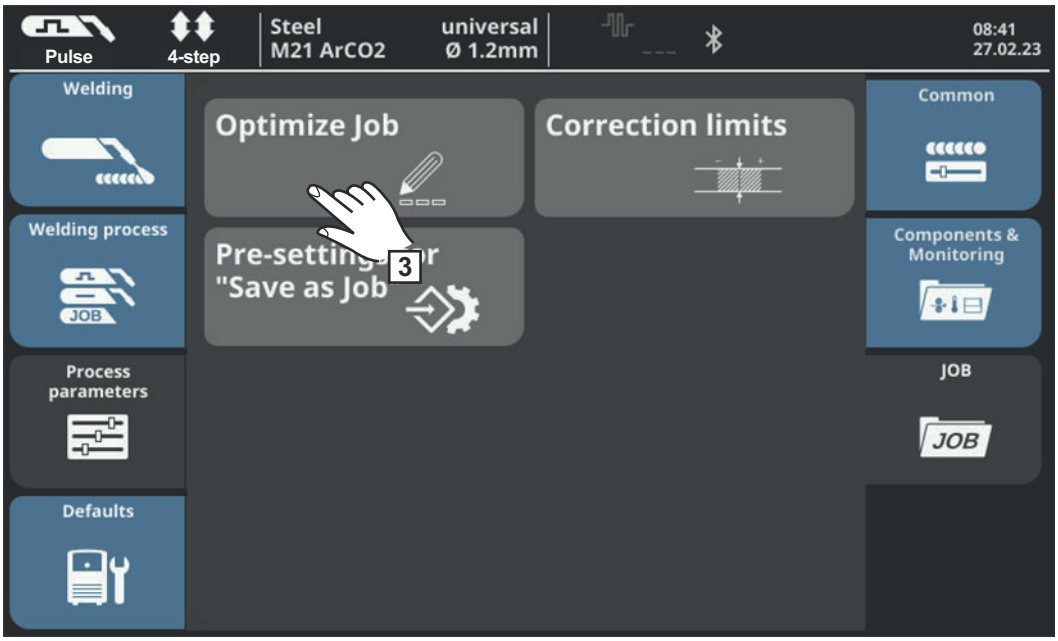
## Optimizing a job




1 Select "Process parameters"

2 Select "JOB"

An overview of the job functions is displayed.




3 Select "Optimize Job"

The overview of the most recently optimised job is displayed.

4 Turn the adjusting dial and select either the job or the job welding parameters to be modified

The choice between the job and the job welding parameters can also be made by touching the "Job number / Job parameter" button.


Select job:
- Press the adjusting dial

  The job number is highlighted in blue and can now be changed.

- Turn the adjusting dial to select the job to be altered
- Press the adjusting dial to change the job

Select job welding parameters:
- Turn the adjusting dial and select the parameter to be changed
- Press the adjusting dial

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

- Turn the adjusting dial; the amended value is applied immediately
- Press the adjusting dial to select other parameters

5 Select "Finish"

---

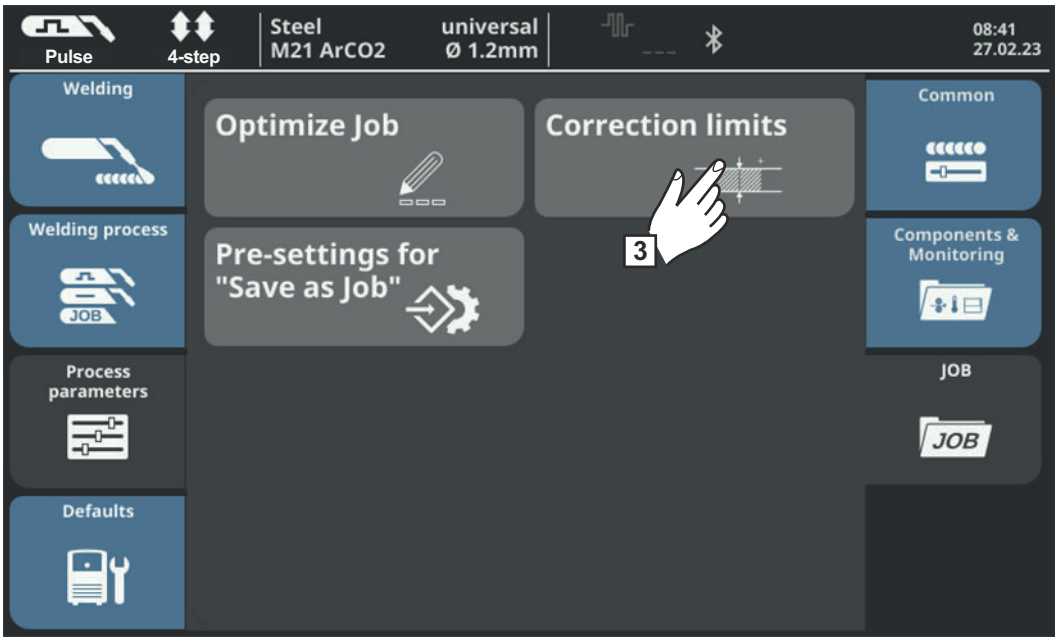
**Setting correction limits for a job**

Individual correction limits for welding power and arc length can be defined for each job.
If correction limits are defined for a job, the welding power and arc length for the job in question can be corrected within the defined limits while welding.


1 Select "Process parameters"

2 Select "JOB"

An overview of the job functions is displayed.




3 Select "Correction limits"

A list of the job correction limits for the last job opened is displayed.

4 Turn the adjusting dial and select either the job or the job limits to be modified

The choice between the job and the job limits can also be made by touching the "Job number / Job parameter" button.


Select job:
- Press the adjusting dial

  The job number is highlighted in blue and can now be changed.

- Turn the adjusting dial to select the job to be altered
- Press the adjusting dial to change the job

Select job limits:
- Turn the adjusting dial and select the desired limit group
- Press the adjusting dial

  The selected limit group opens.

- Turn the adjusting dial and select the top or bottom limit
- Press the adjusting dial

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

- Turn the adjusting dial; the amended value is applied immediately
- Press the adjusting dial to select other limit parameters

5 Select "Finish"

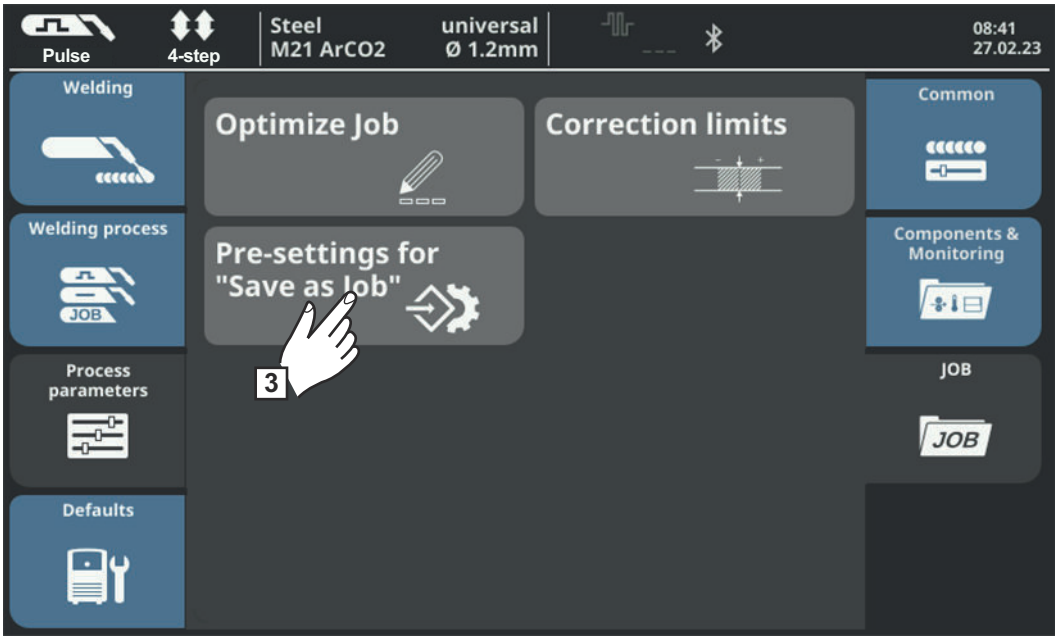
---

**Pre-settings for "Save as Job"**

Pre-settings for "Save as Job" are used to set the default values that are assumed for every newly created job.

1 Select "Process parameters"
2 Select "JOB"

An overview of the job functions is displayed.




3 Select "Pre-settings for "Save as Job""
4 Confirm the displayed information

The default settings for saving new jobs are displayed.

5 Turn the adjusting dial and select the desired parameter
6 Press the adjusting dial
7 Turn the adjusting dial and change the value
8 Press the adjusting dial
9 Select "Finish"

# 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.

## Preparations

1. Move the mains switch to the "O" position
2. Disconnect the mains plug
3. Remove the MIG/MAG welding torch
4. Disconnect the grounding (earthing) cable from the (-) current socket
5. Plug the grounding (earthing) cable into the 2nd (+) current socket and twist to fasten it
6. Use the other end of the grounding (earthing) cable to establish a connection to the workpiece
7. Plug the bayonet current plug on the TIG gas-valve torch into the (-) current socket and twist it clockwise to fasten it
8. Screw the pressure regulator onto the (argon) gas cylinder and tighten it
9. Connect the gas hose of the TIG gas-valve torch to the pressure regulator
10. Plug in the mains plug

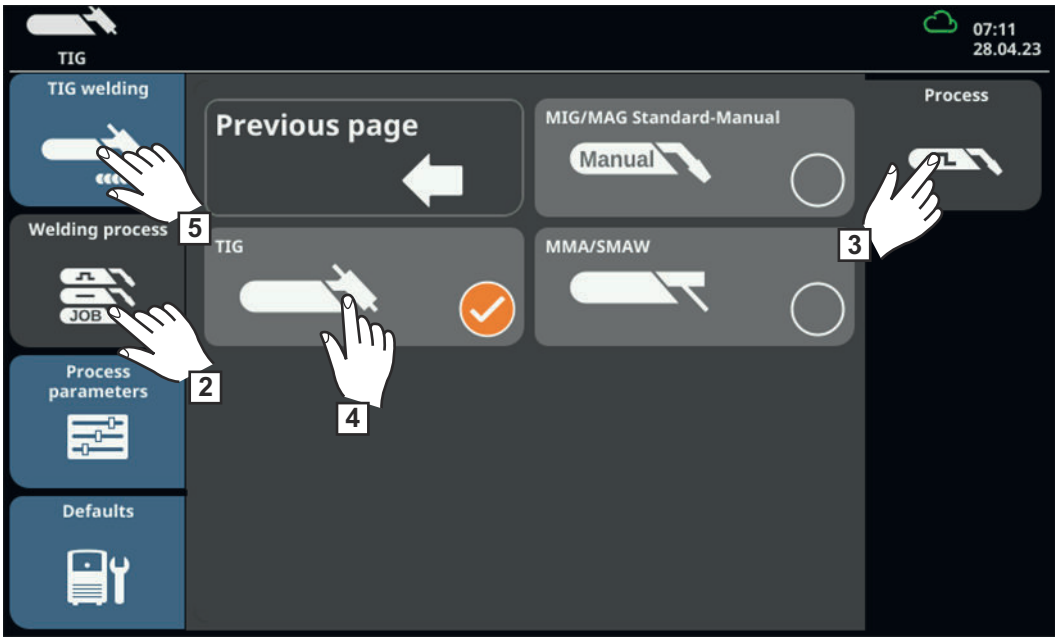
## TIG welding

**⚠ CAUTION!**

**Risk of injury and damage from electric shock.**
As soon as the mains switch is in the "I" position, the tungsten electrode of the welding torch is live.

▶ Ensure that the tungsten electrode does not touch any persons or electrically conductive or earthed parts (e.g. housing, etc.).

1 Move the mains switch to the "I" position




2 Select "Welding process"

3 Select "Process"

Alternatively, the welding process can also be selected via the status bar (compare with the selection described from page **88** ).

An overview of the welding process is displayed.
Various welding processes are available depending on the power source type or function package installed.

4 Select TIG

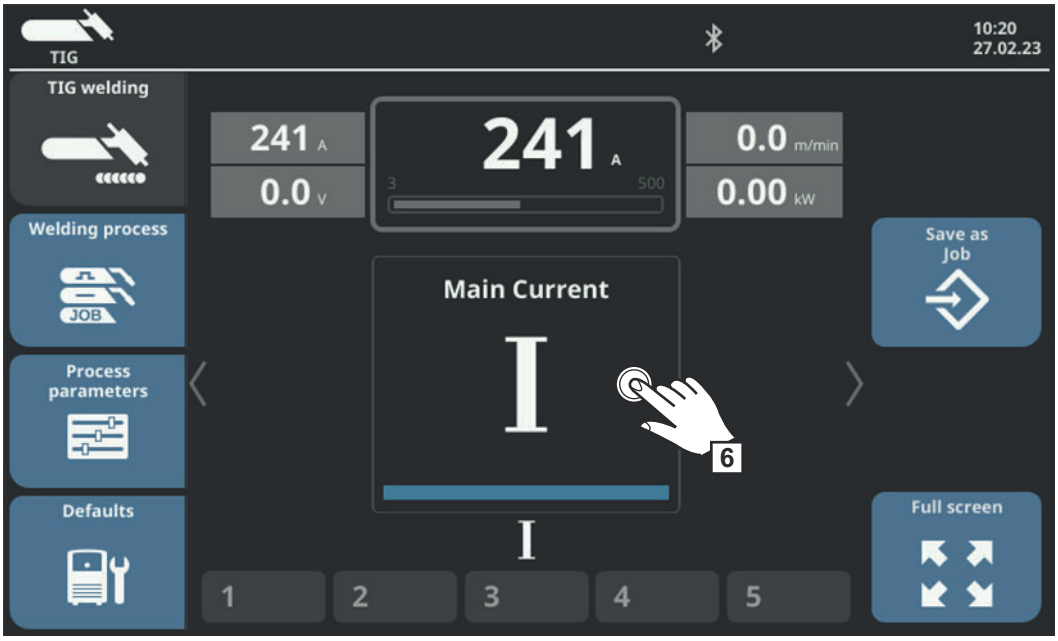
The welding voltage is applied to the welding socket with a three second time lag.

*NOTE!*

**Parameters that have been set on a system component control panel (e.g. wire feed unit or remote control) might not be able to be changed on the power source control panel.**

5 Select "TIG welding"

The TIG welding parameters are shown.




6 Press the adjusting dial to change the parameter

The value of the welding parameter is displayed as a horizontal scale:


The value of the selected parameter can now be changed.

7 Turn the adjusting dial and change the parameter

8 Adjust the process parameters accordingly to make user or application-specific settings on the welding system

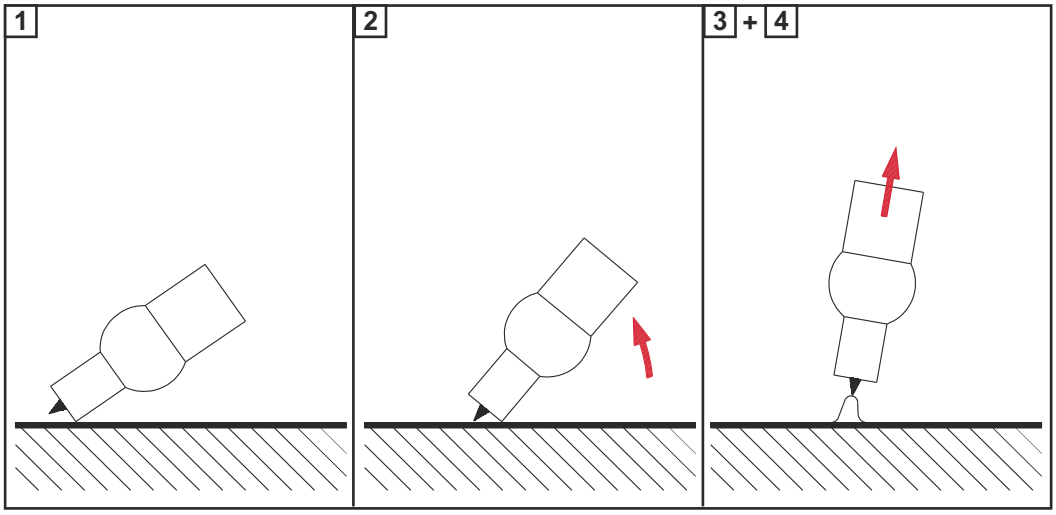
9 Open the gas stop valve on the TIG gas-valve torch

10 Set the desired shielding gas flow rate on the pressure regulator

11 Start welding (ignite the arc)

**Igniting the arc**

The welding arc is ignited by touching the workpiece with the tungsten electrode.




1. Place the gas nozzle on the ignition location so that there is 2-3 mm (0.08 - 0.12 in.) between the tip of the tungsten electrode and the workpiece. Keep a distance
2. Gradually tilt the welding torch up until the tungsten electrode touches the workpiece
3. Raise the welding torch and tilt it into the normal position - the arc now ignites
4. Carry out welding

**Finishing welding**

1. Lift the TIG gas-valve torch away from the workpiece until the arc goes out.

   **IMPORTANT!** To protect the tungsten electrode, ensure that the shielding gas at the end of welding flows for long enough to allow the tungsten electrode to cool sufficiently.

2. Close the gas stop valve on the TIG gas-valve torch

# MMA 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.

## Preparations

1. Move the mains switch to the "O" position
2. Disconnect the mains plug
3. Remove the MIG/MAG welding torch

*NOTE!*

**Check the rod electrode packaging or labelling to determine whether the rod electrodes are for positive pole or negative pole welding.**

4. Plug the grounding (earthing) cable into either the (-) or the (+) current socket depending on the type of electrode, and twist to fasten it
5. Use the other end of the grounding (earthing) cable to establish a connection to the workpiece
6. Plug the bayonet current plug of the electrode holder cable into the free current socket with the opposite polarity, according to the type of electrode, and twist it clockwise to latch it in place
7. Plug in the mains plug

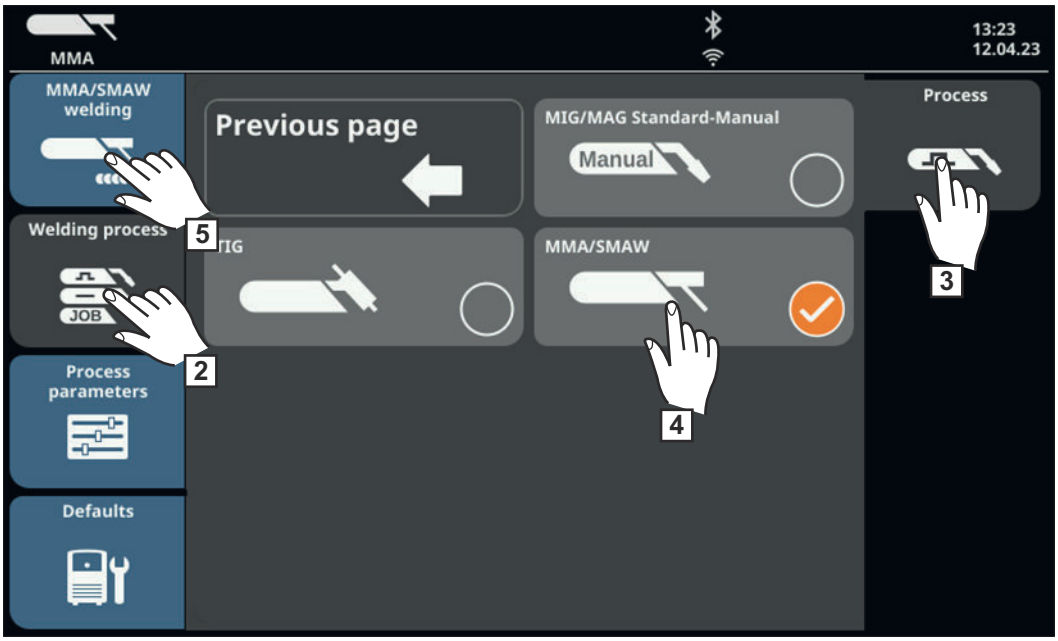
## MMA welding

**⚠ CAUTION!**

**Risk of injury and damage from electric shock.**
As soon as the mains switch is in the "I" position, the rod electrode in the electrode holder is live.

▶ Make sure that the rod electrode does not touch any persons or electrically conductive or earthed parts (e.g. the housing, etc.)

1 Move the mains switch to the "I" position




2 Select "Welding process"

3 Select "Process"

Alternatively, the welding process can also be selected via the status bar (compare with the selection described from page **88** ).

An overview of the welding process is displayed.
Various welding processes are available depending on the power source type or function package installed.

4 Select the MMA/SMAW welding process

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

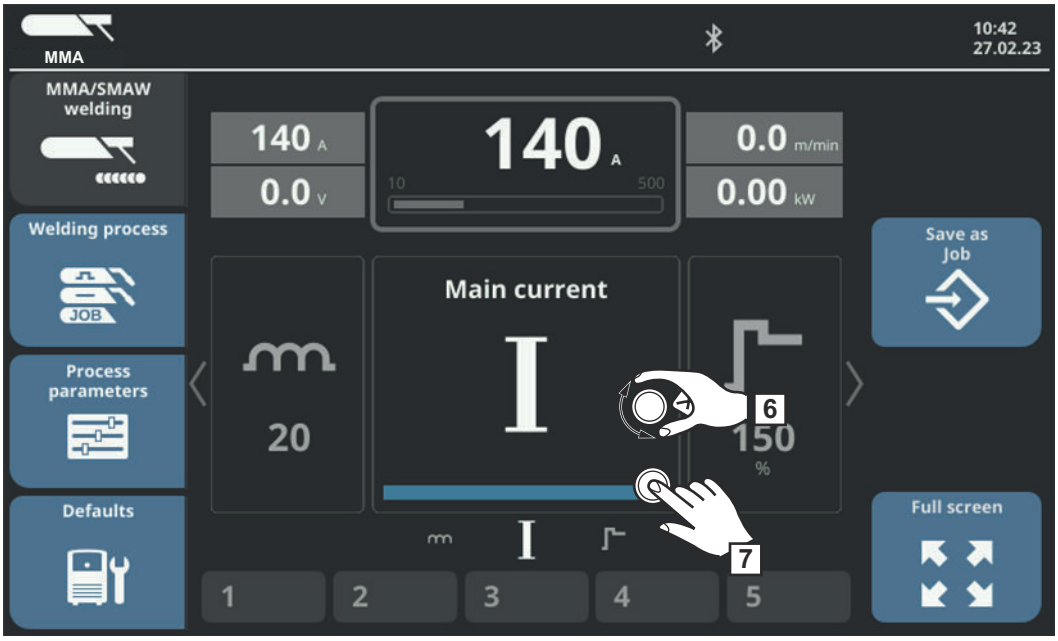
If the MMA/SMAW welding process is selected, any cooling unit present is automatically deactivated. It is not possible to switch it on.

*NOTE!*

**Parameters that have been set on a system component control panel (e.g. wire feed unit or remote control) might not be able to be changed on the power source control panel.**

5 Select "MMA/SMAW welding"

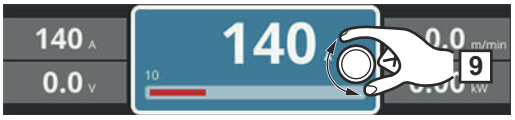
The MMA welding parameters are shown.




6 Turn the adjusting dial and select the desired welding parameter

7 Press the adjusting dial to change the parameter

The value of the welding parameter is displayed as a horizontal scale:




The value of the selected parameter can now be changed.

8 Turn the adjusting dial and change the parameter

9 Adjust the process parameters accordingly to make user or application-specific settings on the welding system

10 Start welding

**Welding parameters for manual metal arc welding**

The following welding parameters for MMA welding can be set and displayed by selecting "Welding":

---

**Arc-force dynamic**
to influence the short-circuiting dynamic at the instant of droplet transfer

0 - 100
Factory setting: 20

0 ... soft and low-spatter arc
100 ... harder and more stable arc

---

**Main current [A]**

Setting range: depends on the power source available

Before the start of welding, the device automatically displays a standard value based on the programmed parameters. The actual value is displayed during welding.

---

**Starting current**
for setting a starting current value in the range 0 - 200% of the set welding current in order to avoid slag inclusions or incomplete fusion.
The starting current depends on the electrode type.

0 - 200%
Factory setting: 150%

The starting current is active for the starting current time set under the process parameters.

# Process parameters

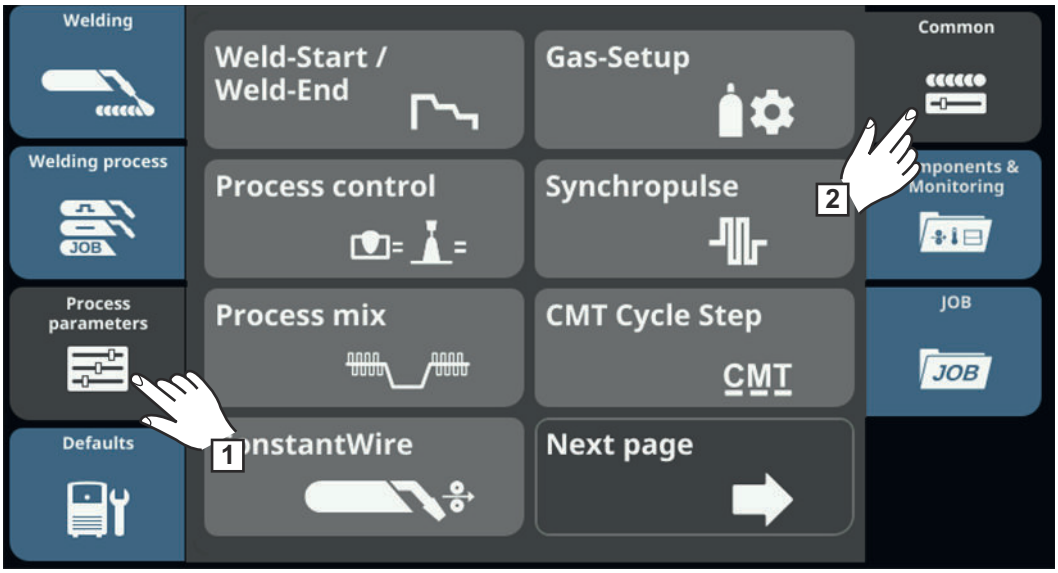
# Overview

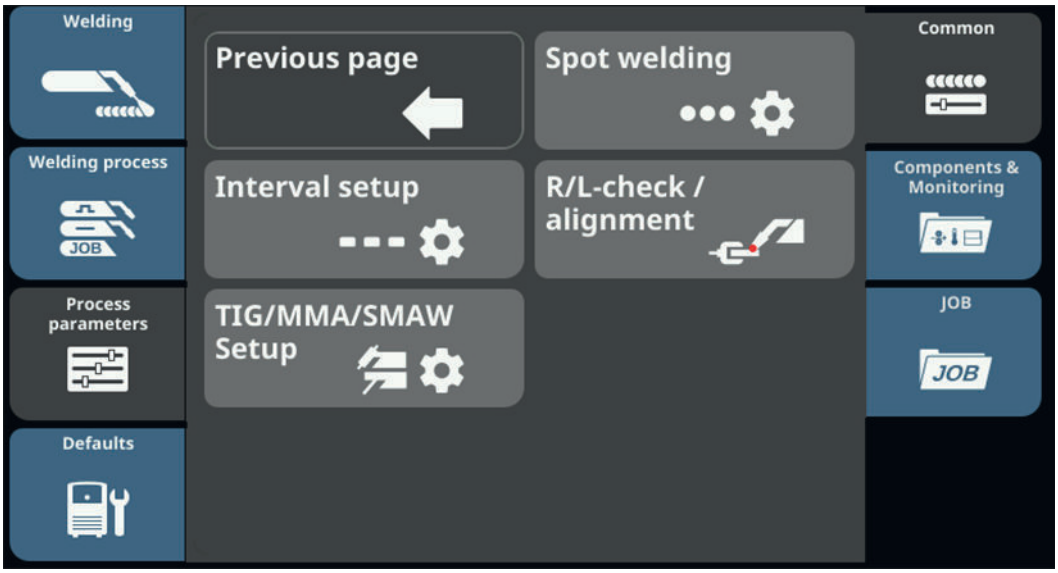
# Process parameters, General

**Common process parameters**

*NOTE!*

**Depending on the device type, equipment or WeldingPackages available, the display and sequence of process parameters may vary.**




**Process parameters for start of welding/end of welding**

The following process parameters can be set and displayed for the start and end of welding:

**Special 2/4 step parameters**

**Starting current**f
or setting the starting current for MIG/MAG welding (e.g. aluminium welding start-up)

0 - 400% (of welding current)
Factory setting: 135%

**Start arc length correction**
or correcting the arc length at the start 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 taken over

**Starting current time**
for setting the length of time the starting current is to be active

off / 0.1 - 10.0 s
Factory setting: off

**Slope 1**
for setting the time during which the starting current is decreased or increased to the welding current

0.0 - 9.9 s
Factory setting: 1.0 s

**Slope 2**
for setting the time during which the welding current is decreased or increased to the final current.

0.0 - 9.9 s
Factory setting: 1.0 s

**Final current**
for setting the final current so that
a) heat build-up towards the end of welding is prevented and
b) the end-crater can be filled when welding aluminium

0 - 400% (of 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 taken over

**Final current time**
for setting the length of time for which the final current is to be active

off / 0.1 - 10.0 s
Factory setting: off

**SFI parameters**

**SFI**
to activate / deactivate the function SFI (Spatter Free Ignition - spatter-free ignition of the arc)

SFI causes an almost spatter-free ignition of the arc due to a controlled starting current curve with synchronised 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 line for SFI, the SlagHammer function is active in addition to SFI.
  SFI and SH cannot be deactivated.

---

**SFI HotStart**
for setting a HotStart time in conjunction with SFI ignition

During SFI ignition, a spray arc phase occurs within the set HotStart time. This increases the heat input irrespective of the mode, thus ensuring deeper penetration right from the very start of welding.

off / 0.01 - 2.00 s
Factory setting: off

---

**Manual parameters**

---

**Ignition current (manual)**
for setting 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 withdrawal (manual)**
for setting the wire withdrawal value (= composite value based on backward movement of wire and a time) for MIG/MAG standard manual welding.
The wire withdrawal depends on the features of the welding torch.

0.0 - 10.0
Factory setting: 0.0

---

**Wire withdrawal**

---

**Wire withdrawal**
For setting the wire withdrawal value (= composite value based on backward movement of wire and a time).
The wire withdrawal depends on the features of 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 Gas-Setup:

**Gas pre flow**
for setting the gas flow time before the arc is ignited

0 - 9.9 s
Factory setting: 0.1 s

**Gas postflow**
for setting the gas flow time after the arc has gone out

0 - 9.9 s
Factory setting: 0.5 s

**Command value gas**
Shielding gas flow rate
(only in conjunction with the OPT/i gas flow rate sensor option)

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

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

**Gas factor**
dependent on the shielding gas used
(only in conjunction with the OPT/i gas flow rate sensor option)

auto / 0.90 - 20.00
Factory setting: auto
(the correction factor is automatically set for standard gases from the Fronius welding database)

In Job Mode, the set values of the parameters listed above can be stored individually for each job.

**Process parameters for process control**

The following process parameters can be set and displayed for the process control:
- Penetration stabiliser
- Arc length stabiliser
- Combination of penetration stabiliser and arc length stabiliser

**Penetration stabilizer**

The penetration stabilizer is used to set the max. permitted change in the wire speed to ensure that the welding current and hence the penetration is kept stable or constant with variable stick out.

The penetration stabilizer parameter is only available when the WP PMC (Welding Process Pulse Multi Control) or WP LSC (Welding Process Low Spatter Control) option has been enabled on the power source.

auto / 0.0 - 10.0 m/min (ipm
)Factory setting: 0 m/min

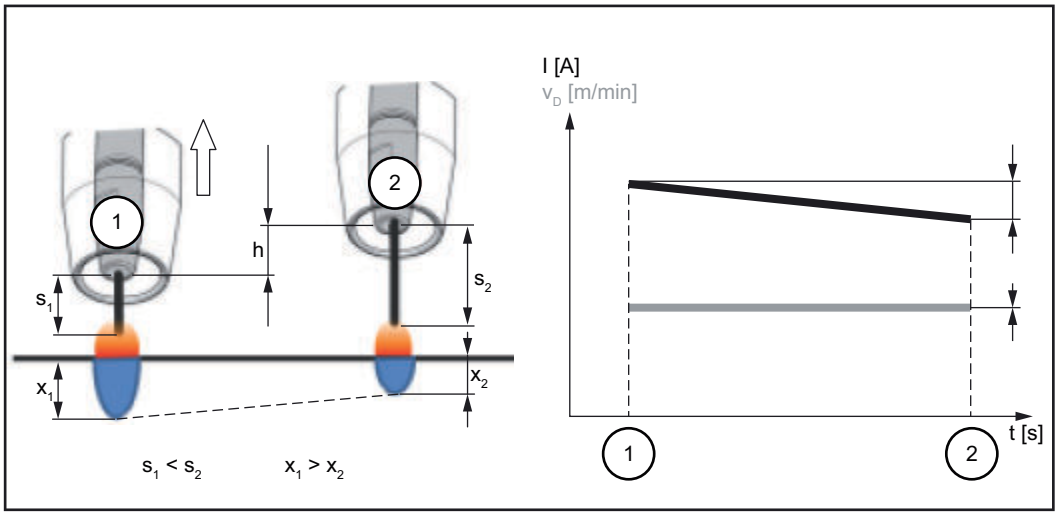
auto
A value of 10 m/min is stored for all characteristics, the penetration stabilizer is activated.

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**

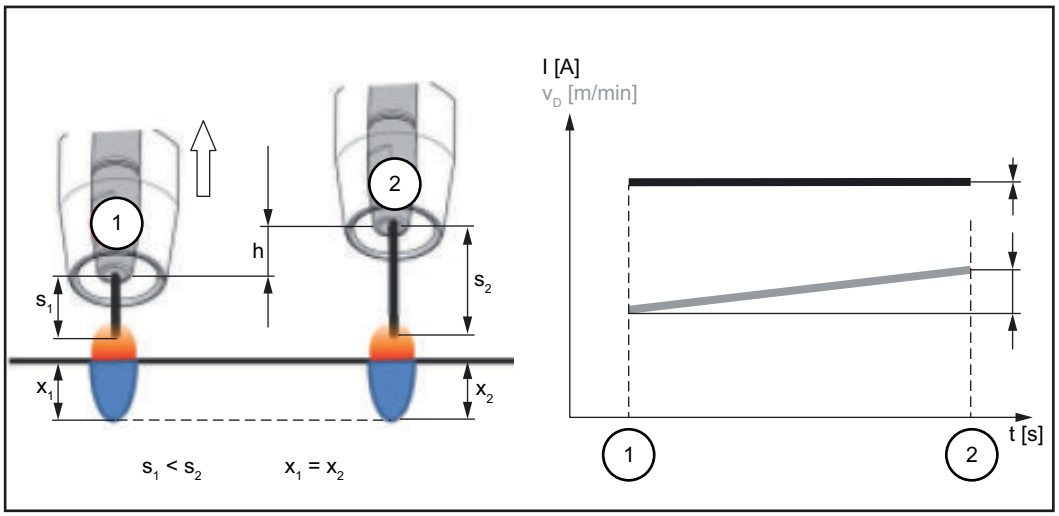
Penetration stabilizer = 0 m/min (not activated)




*Penetration stabilizer = 0 m/min (not activated)*

Changing the contact tube distance (h) alters the resistance in the welding circuit due to the longer stick out ($s_2$).
The constant voltage control for constant arc length causes a reduction in the mean current value and hence a smaller penetration ($x_2$).

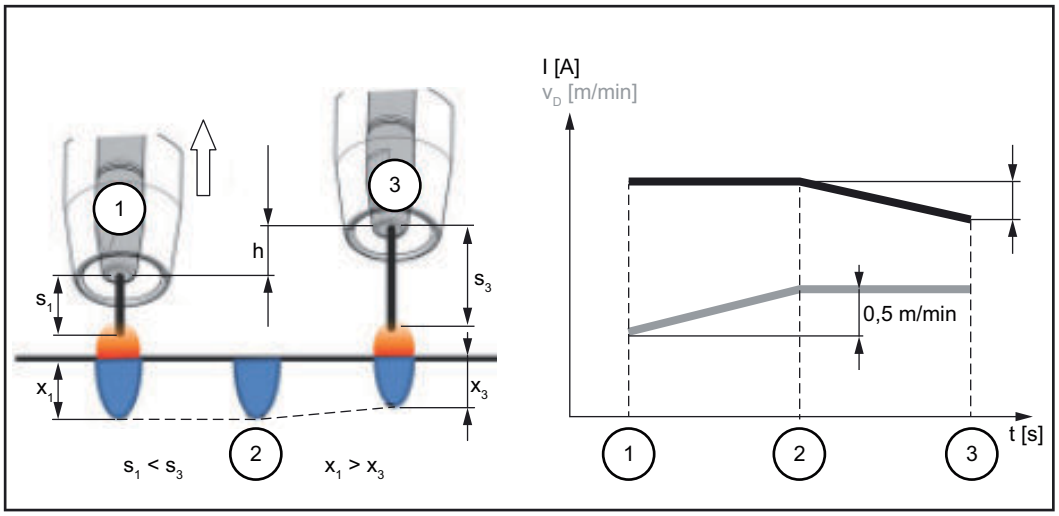
Penetration stabilizer = n m/min (activated)




*Penetration stabilizer = n m/min (activated)*

Specifying a value for the penetration stabilizer ensures a constant arc length without large current variations if the stick out is changed ($s_1$ ==> $s_2$).
The penetration ($x_1$, $x_2$) remains virtually unchanged and stable.

Penetration stabilizer = 0.5 m/min (activated)




*Penetration stabilizer = 0.5 m/min (activated)*

To minimise the change in welding current if the stick out is changed ($s_1$ ==> $s_3$), the wire speed is increased or reduced by 0.5 m/min.
In the example shown, the stabilising effect is obtained without a change in current up to the set value of 0.5 m/min (Position 2).

I ... Welding current $v_D$ ... Wire speed

---

**Arc length stabilizer**

**Arc length stabilizer**
The arc length stabilizer forces short arcs, advantageous for welding, via a short circuit current control and keeps them stable even with a variable stick out or external interference.

The arc length stabilizer welding parameter is only available if the WP PMC (Welding Process Pulse Multi Control) option has been enabled on the power source.

0.0 / auto / 0.1 - 5,0 (effect of 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 deposited

0.1 - 5.0
The arc length stabilizer is activated.
The arc length is decreased until short circuits start to occur.

*NOTE!*

**If the arc length stabilizer is activated, the normal arc length correction is only effective at the start of welding.**

▶ The arc length correction is then no longer displayed in the welding parameters.

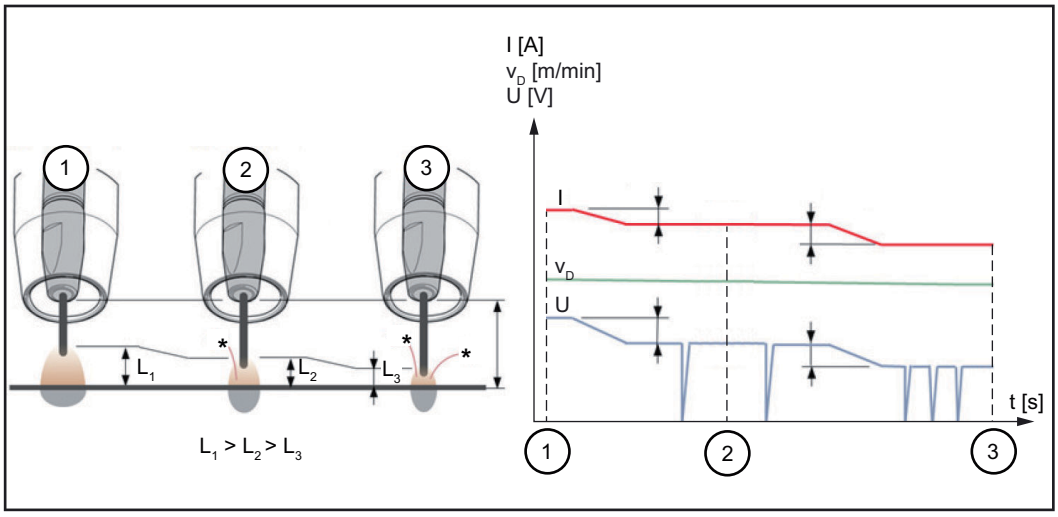
**Application examples**

Arc length stabilizer = 0 / 0.5 / 2.0

①Arc length stabilizer = 0

②Arc length stabilizer = 0.5

③Arc length stabilizer = 2

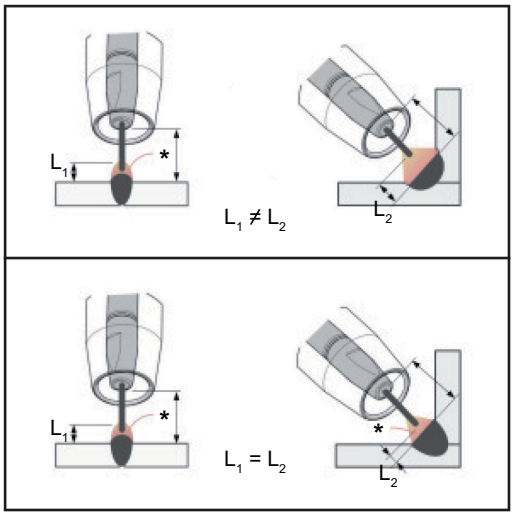



*Arc length stabilizer = 0 / 0.5 / 2.0*

Activating the arc length stabilizer reduces the arc length until short circuits start to occur. In this way, the advantages of a short, stable and controlled arc can be used more effectively.

Increasing the arc length stabilizer causes a further shortening of the arc length (L1 ==> L2 ==> L3). The advantages of a short, stable and controlled arc can be used more effectively.

Arc length stabilizer with change of weld seam profile and position




**Arc length stabilizer not activated**

A change of weld seam profile or welding position can negatively affect the welding result

**Arc length stabilizer activated**

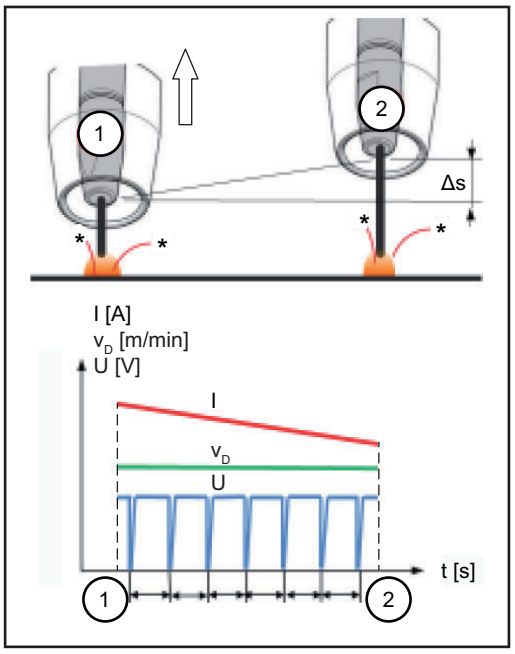
Since the number and duration of the short circuits is controlled, the properties of the arc stay the same if the weld seam profile or welding position is changed.

I ... Welding current $v_D$ ... Wire speed U ... Welding voltage
* ... Number of short circuits

**Combination of penetration stabilizer and arc length stabilizer**

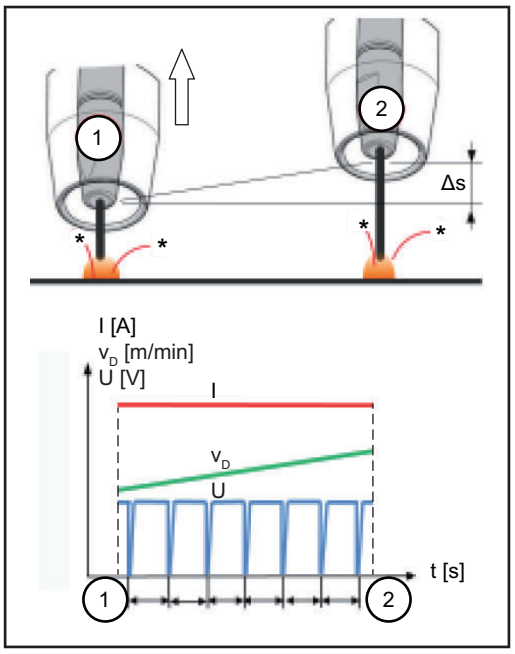
Example: Stick out change

**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 Δs ... 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**
for setting the average wire speed and therefore the welding power for SynchroPulse

e.g. 2 - 25 m/min (ipm)
(depending on wire speed and welding characteristic)
Factory setting: 5.0 m/min

**(3) Delta wire feed**
for setting the Delta wire feed: with SynchroPulse, the set wire speed is alternately increased/decreased by the Delta wire feed. The parameters concerned adapt themselves to this wire speed acceleration/delay accordingly.

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**
for setting the frequency for SynchroPulse

0.5 - 10.0 Hz
Factory setting: 3.0 Hz

*NOTE!*

**In TWIN mode, 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 mode, the setting duty cycle (high) on the lead power source also affects the trail power source.**
The setting duty cycle (high) on the trail power source has no effect.

**(6) Arc correction high**
for correcting the arc length for SynchroPulse in the upper 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!*

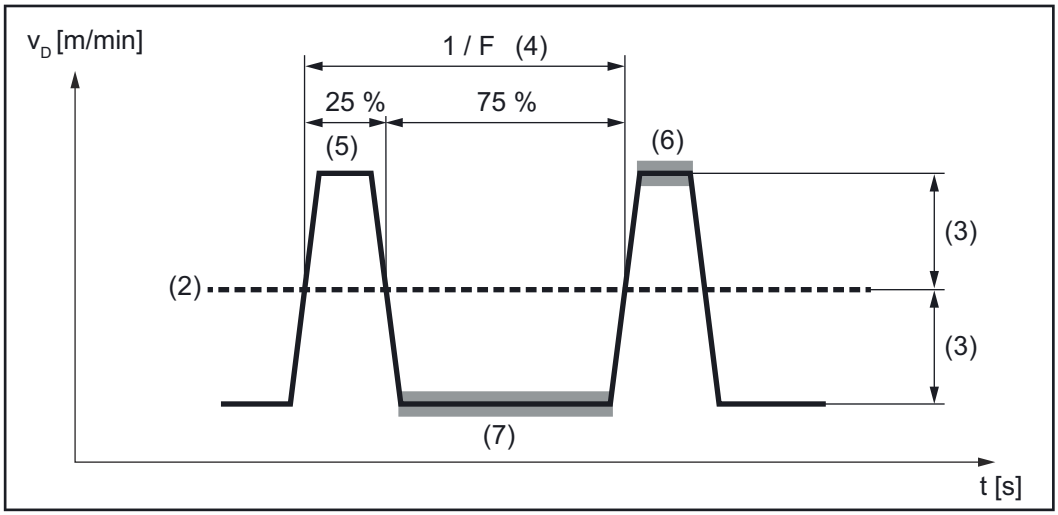
**If SynchroPulse is activated, the normal arc length correction has no effect on the welding process.**

▶ The arc length correction is then no longer displayed in the welding parameters.

**(7) Arc correction low**
for correcting the arc length for SynchroPulse in the lower operating point (= average wire speed less Delta wire speed)

-10.0 - +10.0
Factory setting: 0.0

- .... short arc
0 ... uncorrected arc length
+ ... longer arc




*SynchroPulse example, duty cycle (high) = 25%*

**Process parameters for Process mix**

The following process parameters for mixed processes 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 applied or can be specified and changed in the Process mix parameters.

---

**Arc length correction**

-10.0 - +10.0

The arc length correction value is applied 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 applied 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 hot and cold process phases.

If the upper power time correction is increased, the process frequency reduces and the PMC process phase becomes longer.

If the upper 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 hot and cold process phases.

If the lower power time correction is increased, the process frequency reduces and there is a longer LSC process phase or a longer CMT process phase for CMT mix.

If the lower power time correction is reduced, the process frequency increases and there is a shorter LSC process phase or a shorter CMT process phase for CMT mix.

---

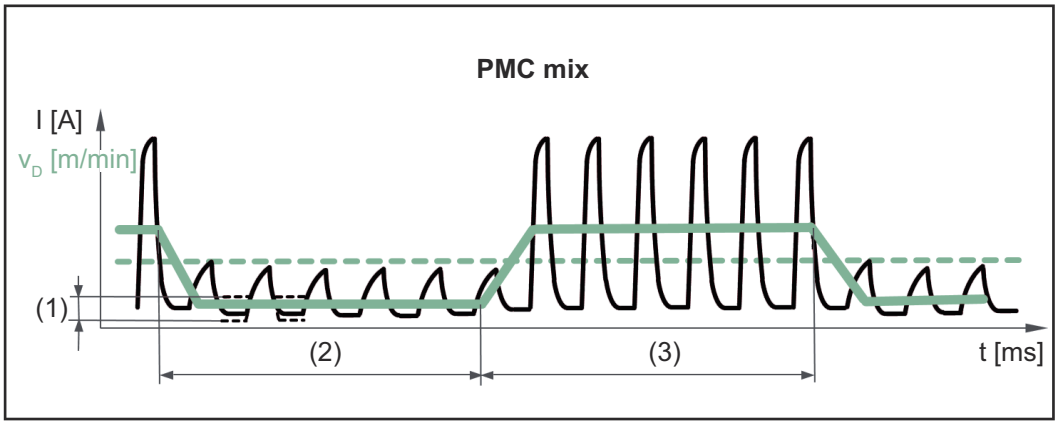
**Lower power correction** (1) *
to set the energy input in the cold process phase in a mixed process

-10.0 - +10.0
Factory setting: 0

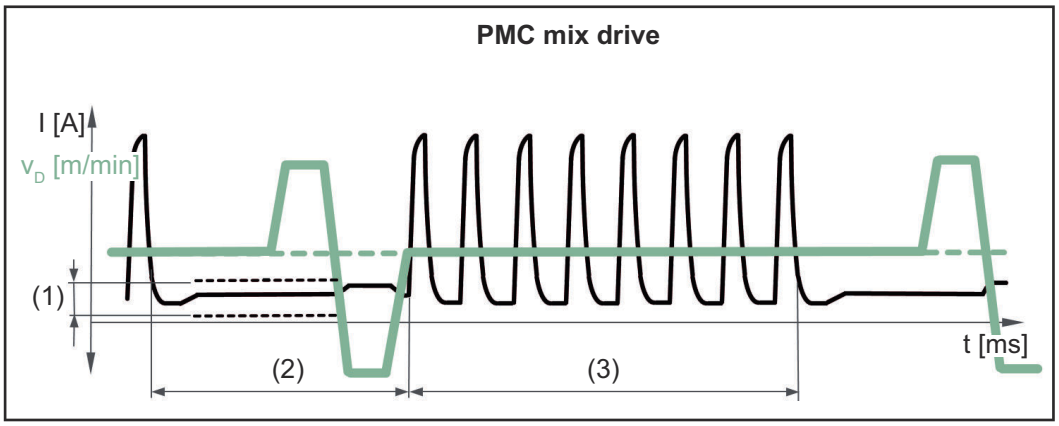
If the lower power correction is increased, this results in a higher wire speed and therefore higher energy input in the cold LSC process phase or in the cold CMT process phase.

---

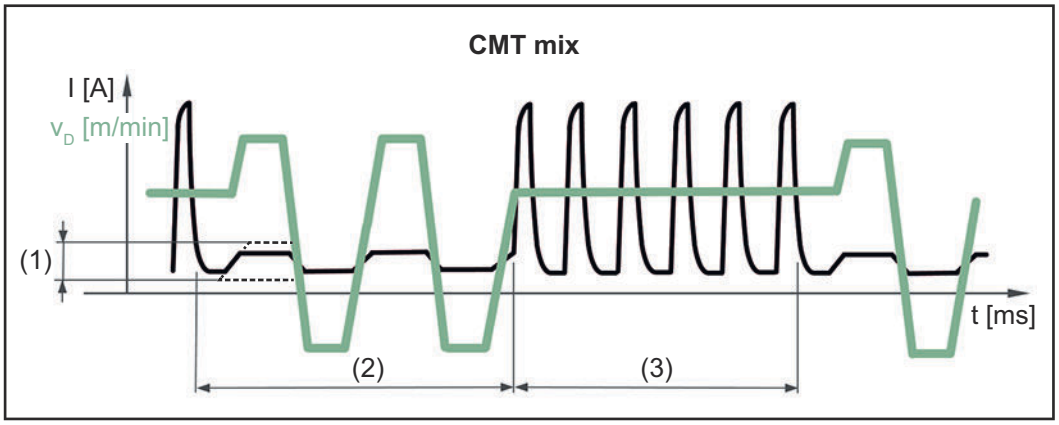
* Representation of the parameters in the following graphics




*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) Low power time corr.
(3) High power time corr.
$v_D$ Wire speed

**Process parameters for CMT Cycle Step**

**CMT Cycle Step**
for activating/deactivating the CMT Cycle Step function

On / Off

---

**Wire speed**
Wire speed, determines the deposition rate during the welding process phase and therefore the size of the welding spot;

Setting range: in m/min (ipm), dependent on the welding characteristic

The wire speed value is applied or can also be specified or changed in the CMT Cycle Step parameters.

---

**Cycles (welding spot size)**
for setting the number of CMT cycles (weld droplets) for a welding spot;
the number of CMT cycles and the set wire speed determine the size of the welding spot.

1 - 2000

---

**Pause time interval**
for setting the time between each welding spot

0.01 - 2.00 s

The higher the value for the pause time interval, the cooler the welding process is (heavier flaking).

---

**Cycles interval**
for setting the number of repeated CMT cycles including pauses until the end of welding

constant / 1 - 2000

constant
The repetitions are carried out continuously;
end of welding, for example using "Arc Off"

---

**Process parameters for spot welding**

**Spot welding time**

0.1 - 10.0 s
Factory setting: 1.0 s

---

**Process parameters for interval**

**Interval**
to activate / deactivate stitch welding

off / on
Factory setting: off

---

**Wire speed**

0.0 - max. m/min (depending on the wirefeeder used)

---

**Stitch welding time**

0.01 - 9.9 s
Factory setting: 0.3 s

**Interval break time**

off / 0.01 - 9.9 s
Factory setting: 0.3 s

**Interval cycles**

constant / 1 - 99
Factory setting: constant

**R/L-check / alignment**

Align the welding circuit resistance (R) and welding circuit inductivity (L) if one of the following components of the welding system is changed:
- Torch hosepacks
- Interconnecting hosepacks
- Grounding 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.

**Performing R/L alignment:**

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

The current welding circuit inductivity and welding circuit resistance values are displayed.

2 Select "Next" / press the adjusting dial / press the torch trigger

The second step of the R/L alignment wizard appears.

3 Follow the displayed instructions

**IMPORTANT!** Contact between the earthing clamp and workpiece must be established on a cleaned area of the workpiece.

4 Select "Next" / press the adjusting dial / press the torch trigger

The third step of the R/L alignment wizard appears.

5 Follow the displayed instructions
6 Select "Next" / press the adjusting dial / press the torch trigger

The fourth step of the R/L alignment wizard appears.

7 Follow the displayed instructions
8 Press the torch trigger / select "Next" / press the adjusting dial

After a successful measurement, the current values are displayed.

9 Select "Finish" / press the adjusting dial

Alternatively, R/L alignment can also be carried out via a Jobmaster welding torch.

**Process parameters for TIG / electrode setup**

The following process parameters can be set and displayed for the TIG and rod electrode welding processes:

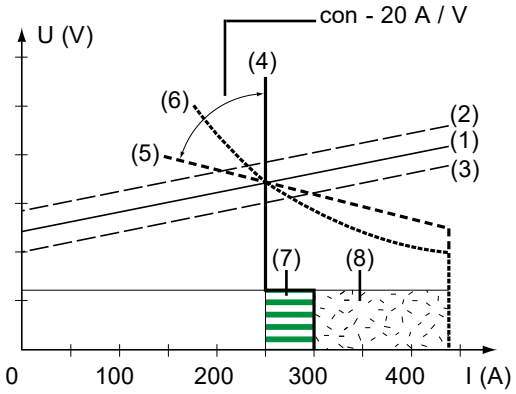
**Process parameters for MMA welding:**

**Starting current time**
for setting the length of time the starting current is to be active

0.0 - 2.0 s
Factory setting: 0.5 s

**Characteristic**
for selecting the electrode characteristic

I-constant / 0.1 - 20.0 A/V / P-constant / arc air gouging
Factory setting: I-constant



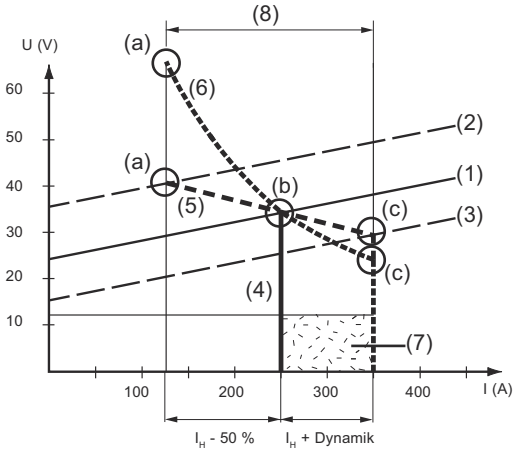

(1) Load line for rod electrode
(2) Load line for rod electrode where arc length is increased
(3) Load line for rod electrode where arc length is reduced
(4) Characteristic where "I-constant" parameter is selected (constant welding current)
(5) Characteristic where "0.1 - 20" parameter is selected (drooping characteristic with adjustable slope)
(6) Characteristic where "P-constant" parameter is selected (constant welding power)
(7) Example of pre-set arc-force dynamic where characteristic (4) is selected
(8) Example of pre-set arc-force dynamic where characteristic (5) or (6) is selected

I-constant (constant welding current)
- If the "I-constant" parameter is set, the welding current will be kept constant, irrespective of the welding voltage. This results in 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)
- Parameter "0.1 - 20" is used to set a drooping characteristic (5). The setting range extends from 0.1 A / V (very steep) to 20 A / V (very flat).
- Setting a flat characteristic (5) is only advisable for cellulose electrodes.

P-constant (constant welding power)
- If the "P-constant" parameter is set, the welding power is kept constant, irrespective of the welding voltage and welding current. This results in 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




(1) Load line for rod electrode
(2) Load line for rod electrode where arc length is increased
(3) Load line for rod electrode where arc length is reduced
(4) Characteristic where "I-constant" parameter is selected (constant welding current)
(5) Characteristic where "0.1 - 20" parameter is selected (drooping characteristic with adjustable slope)
(6) Characteristic where "P-constant" parameter is selected (constant welding power)
(7) Example of pre-set arc-force dynamic where characteristic (5) or (6) is selected
(8) Possible change in the current where characteristic (5) or (6) is selected, as a function of the welding voltage (arc length)

(a) Operating point where arc length is long
(b) Operating point where welding current $I_H$ is set
(c) Operating point where arc length is short

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

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

Where the welding current ($I_H$) is permanently set, the operating point may migrate along the characteristics (4), (5) and (6) according to the welding voltage at a given moment. The welding voltage U is dependent upon the arc length.

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

Applies to characteristics (5) and (6): Depending upon the welding voltage (arc length), the welding current (I) will also become either smaller or larger, even though the value set for $I_H$ remains the same.

---

**Anti-stick**
to activate/deactivate the anti-stick function

off / on
Factory setting: on

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

The anti-stick function prevents the electrode from burning out. If the rod electrode begins to stick, the power source switches the welding current off after 1.5

seconds. After the rod electrode has been lifted off the workpiece, the welding process can be continued without any problems.

**Break voltage**
for setting a voltage, at which the welding process can be ended by slightly lifting the rod electrode.

20 - 90 V
Factory setting: 90 V

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

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

**Process parameters for TIG welding:**

**Break voltage**
for setting a voltage, at which the welding process can be ended by slightly lifting the TIG welding torch.

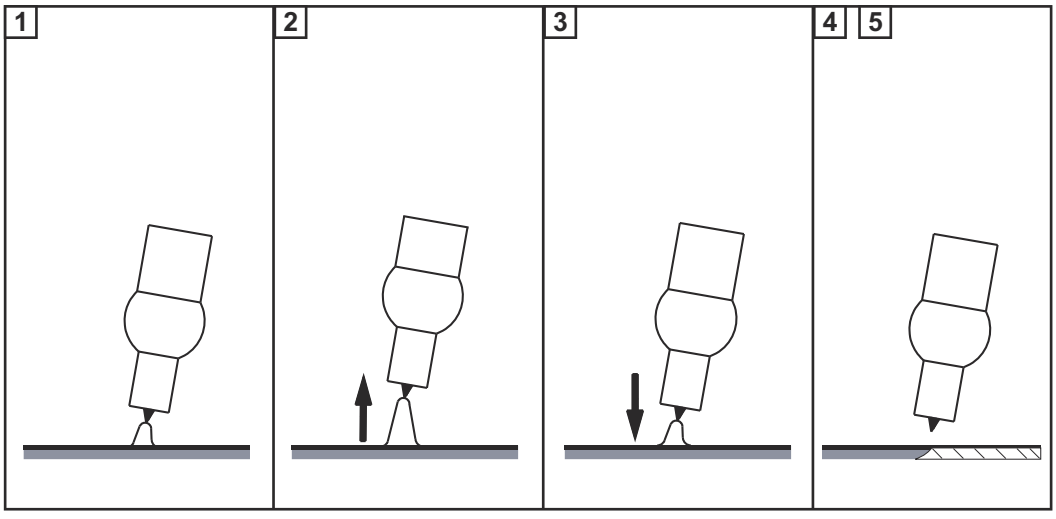
10.0 - 30.0 V
Factory setting: 14 V

**Comfort Stop Sensitivity**
to activate/deactivate the TIG Comfort Stop function

off / 0.1 - 1.0 V
Factory setting: 0.8 V

At the end of the welding operation, the welding current is switched off automatically if the arc length increases by more than a defined amount. This prevents the arc being unnecessarily elongated when the TIG gas-valve torch is lifted off the workpiece.

Sequence:




1 Welding

2 At the end of the welding action, briefly raise the welding torch

The arc length is increased significantly.

3 Lower the welding torch
- The arc length is reduced significantly
- The TIG Comfort Stop function is triggered

4 Keep the welding torch at the same height
- The welding current is continuously decreased (downslope).
- The arc goes out.

**IMPORTANT!** The downslope is pre-set and cannot be adjusted.

5 Raise the welding torch from the workpiece

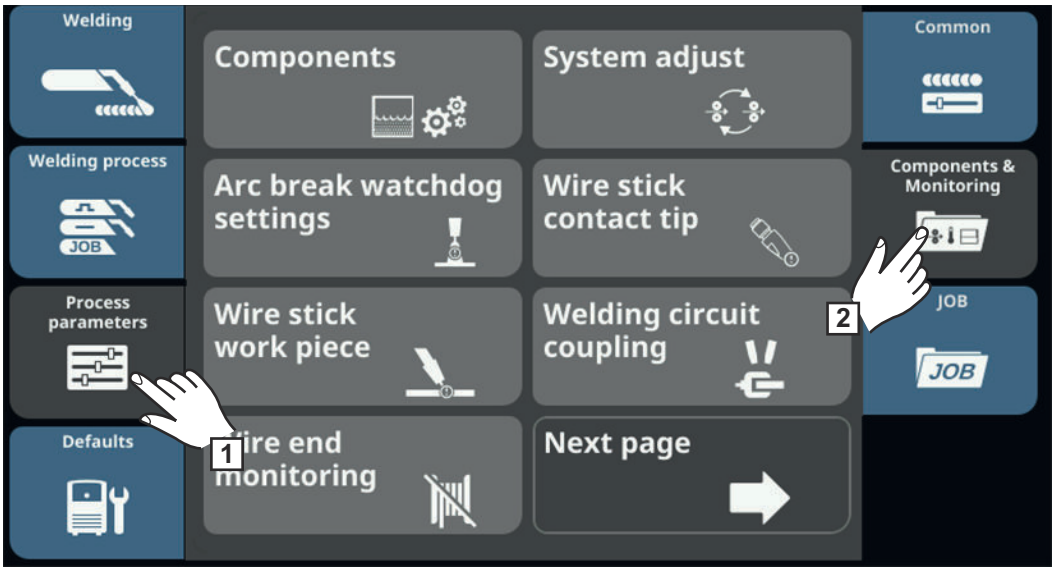
# Components and monitoring process parameters

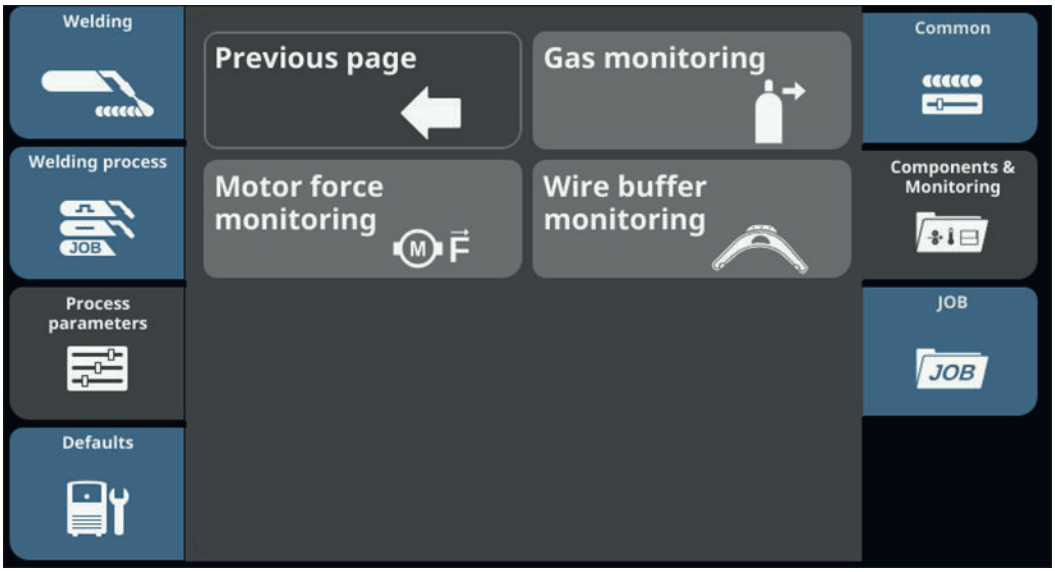


**Process parameters - Components and monitoring**

*NOTE!*

**Depending on the device type, equipment or WeldingPackages available, the display and sequence of process parameters may vary.**




**Process parameters for components**

The following process parameters can be set and displayed for the system components of a welding system:

Cooling unit

**Cooling unit mode**
to determine whether a cooling unit is to be switched on or off, or operated automatically

eco / auto / on / off (depending on the cooling unit)
Factory setting: auto

**Delay time flow sensor**
for setting the time from when the flow sensor responds until a warning message is output

5 - 25 s
Factory setting: 5 s

---

**Coolant flow warning level**
(only if the flow temperature sensor option is present on the cooling unit)
If the parameter is activated, a warning is generated if the value entered is not reached.

off / 0.75 - 0.95 l/min
Factory setting: off

---

Wirefeeder

---

**Inching value**
for setting the wire speed at which the wire electrode is threaded into the torch hosepack

e.g. 2 - 25 m/min / 20 - 3935 ipm
(depending on the 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 button is pressed:**

- ▶ Press feeder inching button
- ▶ Press and turn the adjusting dial to change the value of the feeder inching speed
- ▶ Select "Close" or press the adjusting 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 time-out process parameter is a safety function.**
The length of wire that is fed before the safety cut-out trips may differ from the pre-set wire length, particularly when the wire is being fed at fast wire speeds.

---

How it works:
Once the torch trigger is pressed, gas pre-flow begins immediately. Wirefeeding then begins, followed by ignition. If no current starts flowing before the specified length of wire has been fed, the power source cuts out automatically.
To try again, press the torch trigger again.

---

**Sense lead**
to enable/disable the sense lead function

off / on
Factory setting: on

The sense lead is additional hardware for direct voltage measurement on the workpiece. The function is used to determine the correct actual value when several welding processes are welding on one component at the same time and there is a risk of coupled interference voltages due to unfavourable hosepack routing or common earth leads.

**System adjust**

If two motors are used in a welding system, they need to be calibrated to maintain process stability.

System calibration must be carried out on welding systems with PushPull units or unreeling wirefeeders following successful installation or replacement of a wirefeeder.

A notification will be displayed.

1 Select "OK" and start system calibration

The system calibration wizard starts.

2 Follow the instructions shown

System calibration can also be started manually here.

**Perform system calibration:**

1 Select Process parameters / Components & monitoring / System adjust

If system calibration is required, the system calibration wizard starts. The first step in the system calibration wizard is displayed:

2 Follow the displayed instructions
3 To move to the next step in the wizard, select "Next" / press the adjusting dial

When system calibration has been completed successfully, a confirmation to this effect is displayed.

4 To close the system calibration wizard, select "Finish" / press the adjusting dial

**Arc break watchdog settings**

1 Select Process parameters / Components & Monitoring / Arc break watchdog settings

The "Arc break watchdog settings" overview is displayed.

2 Turn the adjusting dial and select the desired parameter
3 Press the adjusting dial (blue background)

4 Turn the adjusting dial and change the value of the parameter (blue background)

Arc break reaction = ignorieren (deactivated):
The power source remains active and no error message appears on the display.

Arc break reaction = Fehler (activated):
If the arc break fractures off and no current flow is detected within a set arc break period, the system shuts down automatically and an error message appears on the display.

Factory setting = ignorieren

Arc break time = 0 - 2.00 s
An error is output if the set period is exceeded.

Factory setting = 0.2 s

5 Select "OK" to activate arc break monitoring (arc break watchdog)

---

**Wire stick contact tip**

1 Select Process parameters / Components & Monitoring / Wire stick contact tip

The overview "Wire stick contact tip - setup menu" is displayed.

2 Turn the adjusting dial and select the desired parameter

3 Press the adjusting dial (blue background)

4 Turn the adjusting dial and change the value of the parameter (blue background)

Wire stick on contact tip = ignore:
The wire stick check on the contact tip is deactivated.

Wire stick on contact tip = Fehler (activated):
The welding process will be interrupted in the event of wire stick on the contact tip.

**IMPORTANT!** Monitoring is only possible during dip transfer arc processes.

Factory setting = ignorieren

Filter time = 0.5 - 5.0 s
Maximum duration without arc short circuit until welding is interrupted.

Factory setting = 0.5 s

5 Select "OK" to conclude the settings

---

**Wire stick work piece**

1 Select Process parameters / Components & Monitoring / Wire stick work piece

The overview "Wire stick work piece - setup menu" is displayed.

2 Turn the adjusting dial and select the desired parameter

3 Press the adjusting dial (blue background)

4 Turn the adjusting dial and change the value of the parameter (blue background)

Wire stick on workpiece = ignorieren:
Wire stick monitoring on the workpiece is deactivated.

Wire stick on workpiece = Fehler (activated):
The welding process will be interrupted if the wire sticks on the workpiece.

Factory setting = ignorieren

5 Select "OK" to conclude 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 prevented early on during the commissioning of 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 issued by the wizard.

**Measuring results:**

| **Result** | **$R_{coupling}$ (common ground)** | **$K_{coupling}$ (inductive coupling)** |
|---|---|---|
| Very good | 0 mOhm | 0% |
| Good | 1 - 2.5 mOhm | 2-15% |
| 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 HTML under the following link:

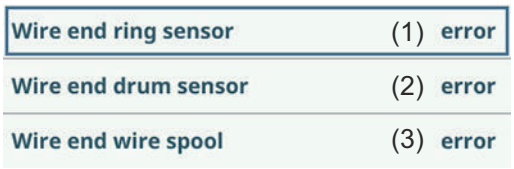
https://manuals.fronius.com/html/4204260420

**Wire end monitoring**

1 Select Process parameters / Components & Monitoring / Wire end monitoring

The overview "Wire end monitoring setup menu" is displayed.

2 Turn the adjusting dial and select the desired parameter, depending on the type of wire end monitoring:




(1) Wire end reaction for OPT/i WF R WE ring sensor 4,100,878,CK
(2) Wire end reaction for OPT/i WF R WE drum 4,100,879,CK
(3) Wire end reaction for OPT/i WF R WE wire end 4,100,869,CK

3 Press the adjusting dial (blue background)
4 Turn the adjusting dial and change the value of the parameter (blue background)

Reaction = error:
Wire end fault, welding will be interrupted immediately. The fault will be shown on the display.

Reaction = after seam end:
The wire end fault will show on the display after the current welding process has ended.

Reaction= ignore (deactivated):
No reaction at the wire end

Factory setting = error

5 Select "OK" to conclude the settings

**Gas monitoring**

The gas monitoring parameters are only available when the optional OPT/i gas flow rate sensor is present.

A lower limit for the gas flow rate can be set using gas monitoring. If the gas flow rate drops below this limit for a defined period of time, an error message is immediately issued and the welding operation is halted.

1 Select Process parameters / Components & Monitoring / Gas monitoring

The "Gas monitoring" overview is displayed.

2 Turn the adjusting dial and select the desired parameter:

Lower gas flow limit
Setting range: 0.5 - 30.0 l/min
Factory setting: 7.0 l/min

Max. time of gas deviation
Setting range: off / 0.1 - 10.0 s
Factory setting: 2.0 s

Gas factor sensor
Setting range: auto / 0.90 - 20.00

Overview of important gas factors:
1.00 - C1 ($CO_2$)
1.52 - M21 ArC-18
1.69 - M12 ArC-2.5
1.72 - I1 (Argon)
11.8 - I2 (Helium)

Factory setting: auto

*NOTE!*

**If the wrong gas factor is set, this can have a massive impact on the gas flow rate and therefore the welding result.**
All the standard gases from the Fronius welding database are considered under the "auto" setting.

▶ Setting the gas factor manually is only advisable for special gases, and only after consultation.

3 Press the adjusting dial (blue background)

4 Turn the adjusting dial to change the parameter value (blue background)

5 Select "OK" to conclude the settings

**Motor force monitoring**

1 Select Process parameters / Components & Monitoring / Motor force monitoring

The "Motor force monitoring" overview is displayed.

2 Turn the adjusting dial and select the desired parameter:

Wire feed force monitoring

Setting range:
Ignore (no response)
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

Max. time of force deviation
Setting range: 0.1 - 10.0 s
Factory setting: 3 s

3 Press the adjusting dial (blue background)

4 Turn the adjusting dial to change the parameter value (blue background)

5 Select "OK" to conclude the settings

**Wire buffer monitoring**

The parameters for wire buffer monitoring are available if there is a wire buffer in the welding system.

1 Select Process parameters / Components & Monitoring / Wire buffer monitoring

It is possible to set the reaction in case of an empty wire buffer:

Error / After seam end / Ignore
Factory setting: Error

Error
If the wire buffer is empty, welding is interrupted and an error message is displayed.

After seam end
An error message is displayed after the current weld is completed, and a further weld start is prevented.

Ignore
No reaction when wire buffer is empty

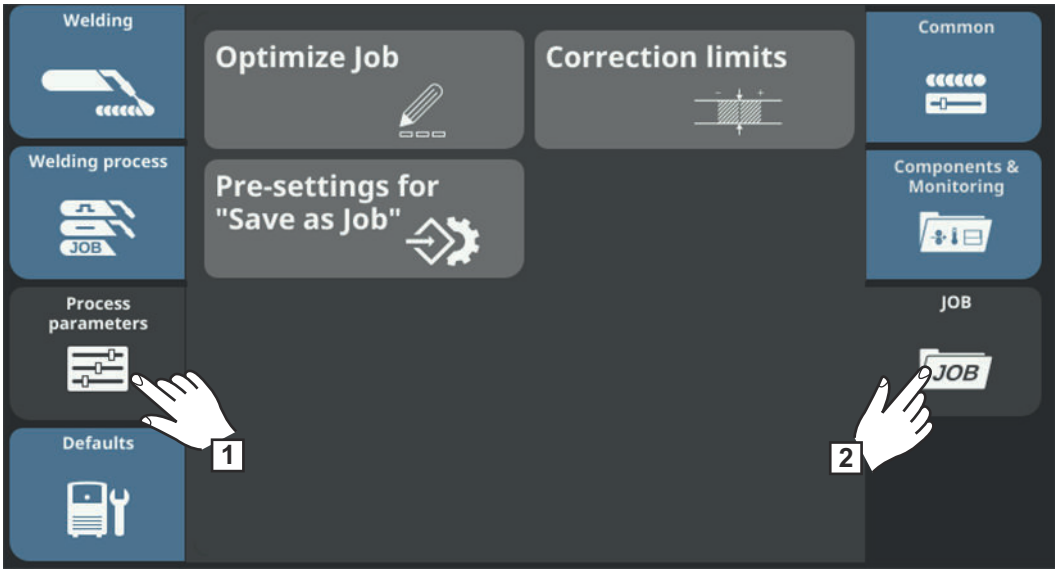
2 Push and turn the adjusting dial and select the desired parameter

3 Select "OK" to conclude the settings

# Process parameters, Job

EN

**Overview – Process parameters, Job**




**Optimising job process parameters**

The following process parameters can be set for job optimisation:

Job parameter

---

**Wire speed**
for adjusting the wire speed

e.g. 2 - 25 m/min (ipm)
(depending on wire speed and welding characteristic)

---

**Arclength correction**
for correcting the arc length

-10.0 - +10.0

- .... short arc
0 ... uncorrected arc length
+ ... longer arc

---

**Pulse correction**
for MIG/MAG pulse synergic welding, PMC welding for correction of the pulse energy

-10.0 - +10.0

- ... lower droplet detachment force
0 ... neutral droplet detachment force
+ ... increased droplet detachment force

Or

**Dynamic correction**
for MIG/MAG standard synergic welding, LSC welding and CMT welding to adjust the short circuit current and the current to short-circuit break-up

-10.0 - +10.0

-10
harder arc (higher current in case of short-circuit break-up, increased welding spatter)

+10
softer arc (lower current in case of short-circuit break-up, less welding spatter forms)

---

Welding process parameters

---

**Change characteristic - current ID: xxxx**
The ID no. of the currently stored characteristic is displayed.

After pressing the dial, the method and property of the characteristic can be changed.

---

**Process**
The process assigned to the characteristic is displayed.

---

**Property**
The property assigned to the characteristic is displayed.

---

**Trigger mode**
for setting the operating mode

2-step / 4-step / S2-step / S4-step / spot welding

---

The other adjustable process parameters correspond to the process parameters already described:

**Weld-Start/ Weld-End** ... see page **126**
- Starting current
- Start arc length correction
- Start current time
- Slope 1
- Slope 2
- Final current
- End Arclength correction
- End current time
- SFI
- SFI HotStart
- Wire withdrawal

**Spot welding** ... see page **140**
- Spot welding time

**Process control** ... see page **129**
- Penetration stabilizer
- Arc length stabilizer

**SynchroPulse** ... see page **135**
- SynchroPulse
- Delta wire feed
- Frequency
- Duty cycle (high)
- Arc length correction high
- Arc length correction low

**Process mix settings** ... see page **137**
- High power time corr.
- Low power time corr.
- Low power corr.

**CMT Cycle Step** ... see page **140**
Only if the OPT/i CMT Cycle Step option is present on the power source.
- CMT Cycle Step
- Cycles (Spot size)
- Interval break time
- Interval cycles

**Gas-Setup** ... see page **129**
- Gas pre-flow
- Gas post-flow
- Command value gas
- Gas factor

**Power**
- Upper power correction limit
- Lower power correction limit

**Arc length correction** ... see page **158**
- Upper arc length correction limit
- Lower arc length correction limit

**Job slope** ... see page **158**
- Job slope

**Documentation** ... see page **184**
- Sampling rate

**Limit monitoring** ... see page **158**
(only in conjunction with the OPT/i Limit Monitoring option)
- Voltage command value
- lower voltage limit
- upper voltage limit
- Max. time of voltage deviation
- Current command value
- lower current limit
- upper current limit
- Max. time of current deviation
- Wfs command value
- lower wfs limit
- upper wfs limit
- Max. time of wfs deviation
- Welding duration command value
- Lower welding duration limit
- Upper welding duration limit
- Welding time monitoring
- Energy command value
- Lower energy limit
- Upper energy limit
- Energy monitoring
- Limit reaction

**Components** ... see page **147**
- Inching value

*NOTE!*

**In addition to setting the parameters, jobs can also be renamed, copied and deleted under "Optimize job" with the help of the corresponding buttons.**

Further information on optimising jobs can be found in the "Welding mode" section, under "Job Mode" on page **105**.

**Process parameters for correction limits**

The following process parameters can be set for the job correction limits:

**Power**

**Upper power limit**
For setting the upper power limit for a job

0 - 20%
Factory setting: 0%

**Lower power limit**
For setting the lower power limit for a job

-20 - 0%
Factory setting: 0%

**Arc length correction**

**Upper arc length correction Limit**
for setting the upper arc length correction limit for a job

0.0 - 10.0
Factory setting: 0

**Lower arc length correction Limit**
for setting the lower arc length correction limit for a job

-10.0 - 0.0
Factory setting: 0

Further information on optimising jobs can be found in the Job correction limits section, under Job Mode on page 111.

**Process parameters for "Save as Job" pre-settings**

After confirming the displayed information, the following process parameters can be set for the "Save as Job" pre-settings:

**Job slope**

**Job slope**
defines the time between the job that is currently selected and the next job

0.0 - 10.0 s
Factory setting: 0 s

**MIG/MAG job correction limit**

Upper power correction limit

0 - 20%
Factory setting: 0%

Lower power correction limit

0 - -20%
Factory setting: 0%

Upper arc length correction limit

0.0 - 10.0
Factory setting: 0.0

---

Lower arc length correction limit

0.0 - -10.0
Factory setting: 0.0

---

**Limit Monitoring**
(only in conjunction with the OPT/i Limit Monitoring option)

---

**Lower voltage limit**
for setting the lower voltage limit as a function of the set value

-10.0 - 0.0 V
Factory setting: 0 V

---

**Upper voltage limit**
for setting the upper voltage limit as a function of the set value

0.0 - 10.0 V
Factory setting: 0 V

---

**Maximum duration of voltage deviation**
for setting the maximum duration of a voltage deviation

off / 0.1 - 10.0 s
Factory setting: off

---

**Lower current limit**
for setting the lower current limit as a function of the set value

-100.0 - 0.0 A
Factory setting: 0

---

**Upper current limit**
for setting the upper current limit as a function of the set value

0.0 - 100.0 A
Factory setting: 0

---

**Maximum duration of current deviation**
for setting the maximum duration of a current deviation

off / 0.1 - 10.0 s
Factory setting: off

---

**Lower wire speed limit**
for setting the lower wire speed limit

-10.0 - 0.0 m/min (ipm)
Factory setting: 0 m/min

---

**Upper wire speed limit**
for setting the upper wire speed limit

0.0 - 10.0 m/min (ipm)
Factory setting: 0 m/min

---

**Maximum duration of wire speed deviation**
for setting the maximum duration of a wire speed deviation

off / 0.1 - 10.0 s
Factory setting: off

---

**Lower welding duration limit**
for setting the lower welding duration limit

0.0 ... -50.0 s
Factory setting: 1.0

---

**Upper welding duration limit**
for setting the upper welding duration limit

0.0 - 50.0 s
Factory setting: 1.0

---

**Welding duration monitoring**
to enable/disable welding duration monitoring

on / off
Factory setting: on

---

**Lower energy limit**
for setting the lower energy limit

0.0 ... -max
Factory setting: -1.0

---

**Upper energy limit**
for setting the upper energy limit

0.0 - max
Factory setting: 1.0

---

**Energy monitoring**
to enable/disable energy monitoring

on / off
Factory setting: on

---

**Limit reaction**
for setting the reaction if the limit values are exceeded or undercut

Ignore / Warning / Error
Factory setting: Ignore

Ignore
Limit values will not be monitored or logged in the logbook

Warning
If the limit values are exceeded or undercut, a warning will show on the display and the welding process will not be interrupted.

Error
If the limit values are exceeded or undercut, the welding process will stop immediately and an error message will show on the display.

# Defaults

# Defaults



## General

*NOTE!*

**As a result of firmware updates, you may find that there are functions available on your device that are not described in these Operating Instructions or vice versa.**
Certain illustrations may also differ slightly from the actual controls on your device, but these controls function in exactly the same way.

⚠ **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 device and all system components.

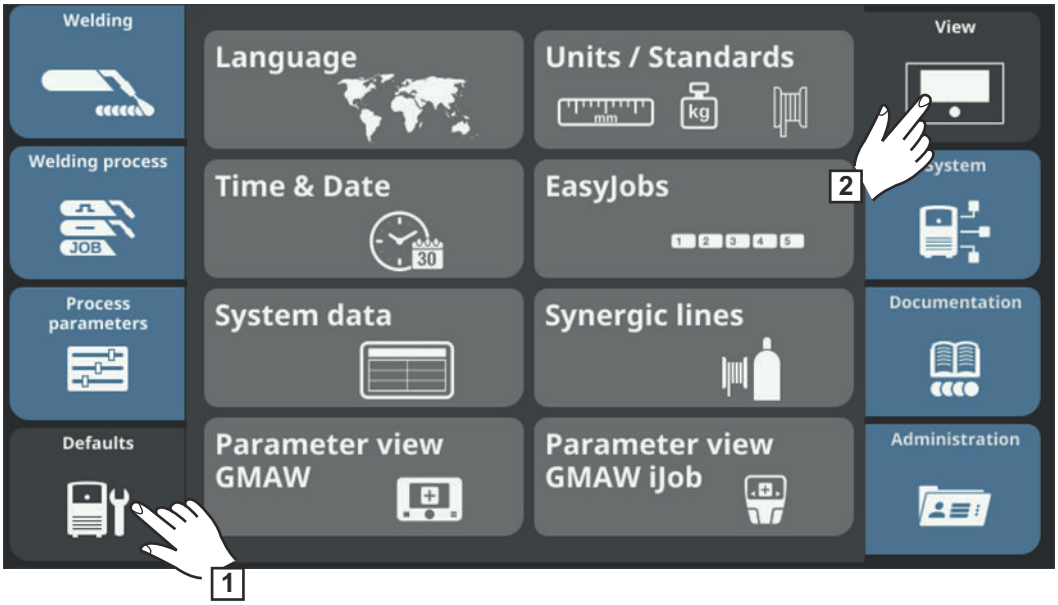
## Overview

"Defaults" contains the following options:

- View
- System
- Documentation
- Administration

# Defaults - view

**Defaults view**




**Setting the language**

1. Select Defaults / View / Language
2. Turn the adjusting dial and select the desired language
3. Select OK / press the adjusting dial

**Setting units / standards**

1. Select Defaults / View / Units / Standards
2. Select the desired unit
3. Select the desired standard:

   EN
   Name of filler metal according to European standards
   (e.g. AlMg 5, CuSi3, Steel, etc.)

   AWS
   Name of filler metal according to 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"

An overview of units and standards is displayed.

**Setting the time and date**

The time and date can either be set using the NTP (Network Time Protocol) or manually.

1 Select Defaults / View / Time & Date

**Setting the time and date using the NTP**
A DNS server must be available, or the network parameters must be configured correctly if setting the time and date manually (see "Setting network parameters manually", page 176).

2 Select "Automatic time & date"

3 Enter the address of the local time server
Ask your IT administrator for the address of the local time server or use the internet (e.g. pool.ntb.org).

4 Enter the time zone
The time zone must correspond to the location of the power source.

5 Select "Time server test" to start the time synchronisation

The power source is synchronised with the time on the NTP server. If the NTP has been set up, the time will be synchronised each time the power source is started, as long as a connection to the time server can be established.

6 Select "Apply"

**Setting the time and date manually**
In order to be able to set the time and date manually, "Automatic Time & Date" must not be selected.

2 Turn the adjusting dial and select the desired parameter:
Year / Month / Day / Hour / Minute
(white background)

3 Press the adjusting dial to change the parameter (blue background)

4 Turn the adjusting dial and set the desired value (blue background)

5 Press the adjusting dial and apply the set value (white background)

6 Select "OK" / press the adjusting dial

The default view settings are displayed.

**Retrieving system data**

1 Select Defaults / View / System data

The current system data is displayed.


Arc power from real-time values in kW

IP delivers the correct mean value of the arc power due to the high sample measuring rate during non-continuous welding processes.

If the welding speed is known, the electrical energy per unit length can be calculated:

E = IP / vs

| | |
|---|---|
| E | Electrical energy per unit length in kJ/cm |
| IP | Arc power in kW |
| vs | Welding speed in cm/s |

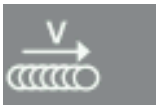

Arc energy in kJ

IE delivers the correct total arc energy due to the high sample measuring rate during non-continuous welding processes.
The arc energy is total arc power during the entire welding time.
If the weld seam 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 the weld seam in cm |

The arc energy is preferably used during manual welding to calculate the energy per unit length.




Current welding speed in cm/min


Job currently set


Current weld seam

Duration of the current weld seam in s


Current motor current in A, wirefeeder 1
(wirefeeder next to the arc)


Current motor current in A, wirefeeder 2
(e.g. the rear wirefeeder in a push-pull system)


Current motor current in A, wirefeeder 3
(e.g. an unreeling wirefeeder in a push-pull system with unreeling wirefeeder)


Current motor force in N, wirefeeder motor 1


Current motor force in N, wirefeeder motor 2


Current motor force in N, wirefeeder motor 3

Current flow rate in l/min on the cooling unit
(with built-in OPT/i CU flow temperature sensor option)

Error output if flow rate < 0.7 l/min

Current shielding gas flow rate
(with OPT/i gas controller option present)

Total shielding gas consumption
(with OPT/i gas controller option present)

Current coolant temperature in °C on the cooling unit
(with built-in OPT/i CU flow temperature sensor option)

Error output if coolant temperature > 70 °C
(measured during coolant return)

Arc time in h

Total power source operating hours in h

2 Select "OK" to exit the system data

The default view settings are displayed.

**Displaying characteristics**

1 Select Defaults / View / Synergic lines

The options for displaying the characteristics are displayed.

2 Select desired display option

Display current characteristics:
Only the current characteristics are displayed in the material settings.

Display replaced characteristics:
Older characteristics that have been replaced are also displayed in the material settings, as well as the current characteristics. These can also be selected while setting the material settings.

3 Select "OK"

The default view settings are displayed.

**MIG/MAG parameter display**

In the case of the MIG/MAG parameters, this function enables additional parameters or settings to be displayed.

| |
|---|
| **Job parameters**<br>Current, voltage, material thickness, power, arc length correction, pulse/dynamic correction |
| **SFI parameters**<br>SFI, SFI Hotstart |
| **Process control**<br>Penetration stabilizer, arc length stabilizer |
| **SynchroPulse settings**<br>SynchroPulse, Delta wire speed, frequency, duty cycle (high), arc correction high, arc correction low |
| **Interval settings**<br>Interval, interval cycles, interval pause time, stitch welding time |
| **Process Mix**<br>Upper power duration correction, lower power duration correction, lower power correction |
| **CycleStep**<br>CMT Cycle Step, cycles (welding spot size), interval pause time, interval cycles |
| **AC settings**<br>AC power balance, AC cycles negative, AC cycles positive |
| **Start/end of welding settings**<br>Starting current, starting arc length correction, starting current time, slope 1, slope 2, final current, end arc length correction, end current time |
| **Spot welding settings**<br>Spot welding time |
| **Gas defaults**<br>Command value gas, gas pre-flow, gas post-flow |

**TWIN process control**
Pulse synchronisation ratio, phase shift lead/trail, ignition delay trail

**Display additional parameters**:

1. Select Defaults / Display / Setup parameter display
2. Turn the adjusting dial and select the desired parameter
3. Press the adjusting dial
4. Select "OK" to exit the parameter display setup

The parameter is displayed in the welding parameters, where it can now also be modified.

**Jobmaster MIG/MAG display**

This function is used to set the functions and parameters available on a Jobmaster welding torch.

**Job 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 wire speed, 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 duration correction, lower power duration 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, end arc length correction, end current time

**Spot welding settings**
Spot welding time

**Gas defaults**
Command value gas, gas pre-flow, gas post-flow

**General settings**
R/L alignment, wire forwards/backwards, gas test

**Setting parameters for the Jobmaster welding torch:**

1. Select Defaults / Display / Jobmaster MIG/MAG display
2. Turn the adjusting dial and select the desired parameter
3. Press the adjusting dial
4. Select OK to exit the iJob parameter display

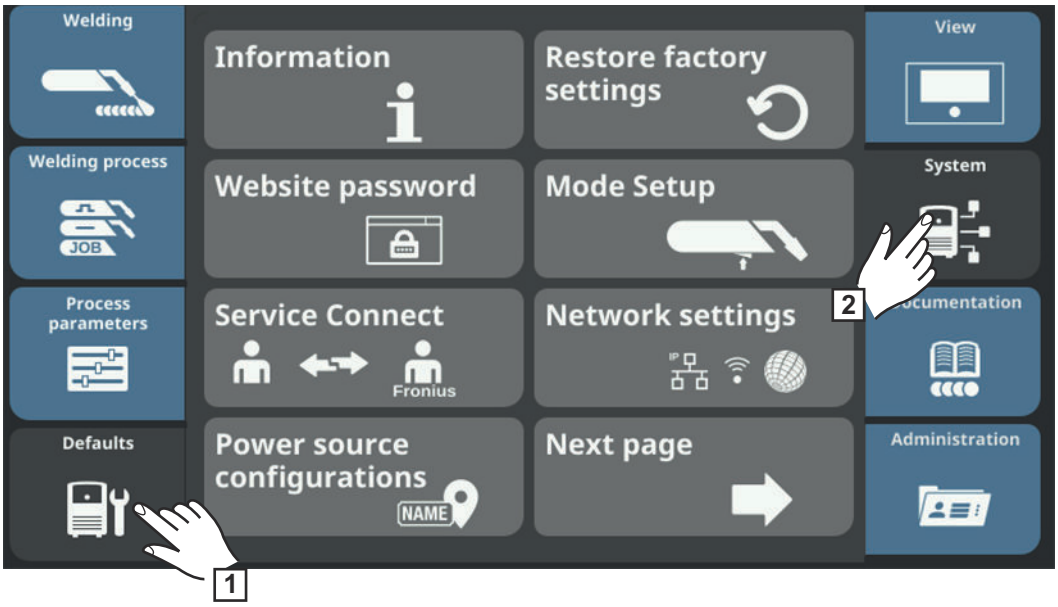
The parameter is displayed on the JobMaster welding torch, where it can now also be modified.

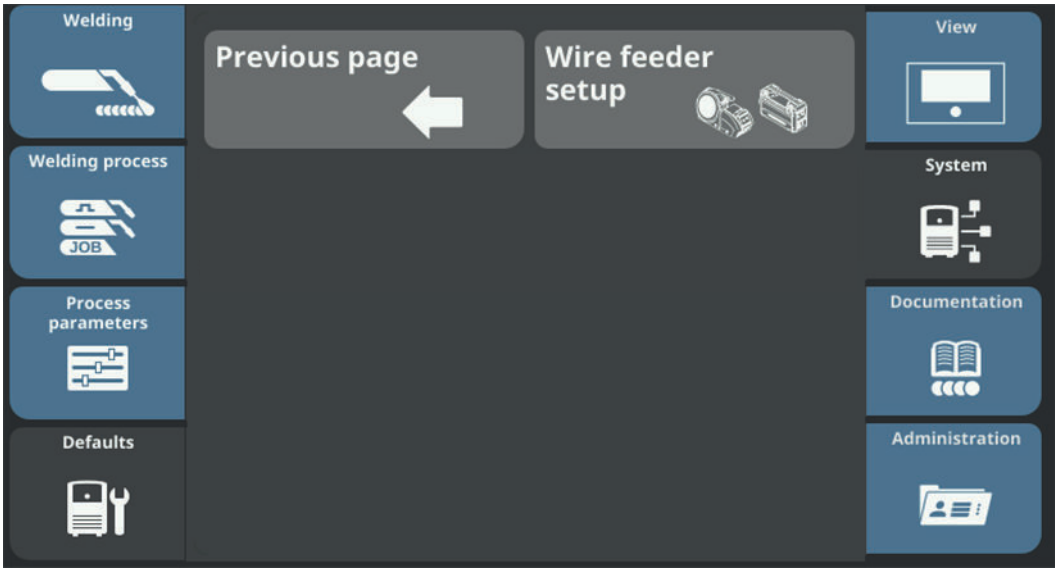
# Defaults - System

**Defaults - System**

*NOTE!*

**Depending on the device type, equipment or WeldingPackages available, the display and sequence of system defaults may vary.**




**Retrieving device information**

1 Select Defaults / System / Information

The device information is displayed.

2 Select "OK"

**Restore factory settings**

1 Select Defaults / System / Restore factory settings

A confirmation prompt for the factory settings is displayed.

2 Select "Yes" to reset the values to their factory settings

The process parameters and machine preset values are reset to the factory settings, an overview of the machine presets is displayed.

**Restoring the website password**

1 Select Defaults / System / Website password

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

2 Select "Yes" to reset the website password

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

The system overview of the default settings is displayed.

**Mode Setup: Setting the special 4-step "Guntrigger", special display for JobMaster, spot welding and torch trigger job selection**

In the default settings, the following special functions can be set under "Mode Setup":
- Special 4-step "Guntrigger" for a JobMaster welding torch *
- JobMaster special display for a JobMaster welding torch *
- 2-step or 4-step mode for spot welding
- Torch trigger job selection for a welding torch

* Only if the OPT/i GUN Trigger option is available on the power source.

1 Select Defaults / System / Mode Setup

2 Turn the adjusting dial and select the desired special function (white background)

3 Press the adjusting dial (blue background)

4 Turn the adjusting dial to activate/deactivate the special function

5 Select "OK"

---

**Special 4-step = Guntrigger**

With a JobMaster welding torch and with special 4-step mode selected, this function allows you to change jobs via the torch trigger during welding. Job changing 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 assigned ==> End of job group 1
Job group 2: Job no. 7 / 8 / 9

- When welding starts, the job with the lowest number within the job group is automatically selected.
- To change to the job with the next highest number within a job group, press the torch trigger briefly (< 0.5 seconds).
- To stop welding, 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.


---

**Special JobMaster display = on**

The following can now be set and carried out 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 / Display / Jobmaster MIG/MAG Display
(see page 170)

---

**Spot welding**

2-step = spot welding in 2-step mode:
The spot welding process runs for as long as the torch trigger is kept pressed and ends no later than at the expiry of the spot welding time.
Releasing the torch trigger stops the spot welding process before the spot welding time expires.

4-step = spot welding in 4-step mode:
The spot welding process starts once the torch trigger is pressed and ends no later than at the expiry of the spot welding time.Press the torch trigger again to stop the spot welding process before the spot welding time expires.

More information on spot welding:
- Page **94** (spot welding in general)
- Page **140** (spot welding time)

---

**Torch trigger job selection = on**

This function allows the user to change to the next job using the torch trigger.
Job changing 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 assigned ==> End of job group 1Job group 2: Job no. 7 / 8 / 9

- When welding starts, the job with the lowest number within the job group is automatically selected.
- To change to the job with the next highest number within a job group, press the torch trigger briefly (< 0.5 seconds).
- To stop welding, press the torch trigger for more than 0.5 seconds.
- To switch to the next job group, press the torch trigger briefly twice (< 0.3 s, 2 x).

You can switch jobs when the device is in standby or during welding.

---

**Service Connect**

Service Connect is a remote maintenance tool for fault diagnosis and troubleshooting, data analysis or process optimisation on a TPSi power source. After accepting the terms of use once directly on the control panel of the power source, a Fronius technician can remotely access the power source.

Procedure when a problem arises on the power source for which remote diagnostics are requested from Fronius:

1 Select Defaults / System / Service Connect

2 Follow the displayed instructions and select "Next"

The power source establishes a secure VPN connection to Fronius.
Once the connection has been successfully established, a code is shown on the display and the green double arrow symbol is shown in the status bar.

3 Pass this code on to Fronius by telephone

4 Select "Finish"

Fronius support can begin.
The remote operation carried out by the Fronius technician is recorded by Fronius using a video log.

End remote operation:

1 Select Defaults / System / Service Connect

The prompt to disconnect the connection is displayed.

2 Select "Next"

The connection is disconnected, the Fronius technician no longer has access to the power source.

A confirmation about the disconnection of the network connection is displayed, the double arrow symbol in the status bar is no longer displayed.

**Network settings**

The network settings contain the following entries:
- Network
- WLAN
- Bluetooth settings
- WeldCube Air
- Client authorization

**Setting network parameters manually**

1 Select Defaults / System / Network settings / Network

If DHCP is enabled, the IP address, Network mask, Standard gateway, DNS Server 1 and DNS Server 2 network parameters are greyed out and cannot be adjusted.

2 Turn the adjusting dial and select "DHCP"

3 Press the adjusting dial

DHCP is disabled, the network parameters can now be set.

4 Turn the adjusting dial and select the desired network parameter

5 Press the adjusting dial

The numerical pad for the selected parameter is displayed.

6 Enter a value for the network parameter

7 Select "OK" and confirm the value for the network parameter / press the adjusting dial

8 Select "Store" to apply changes to the network

The value for the network parameter is applied, the network settings are displayed.

**WLAN**

1 Select Defaults / System / Network settings / WLAN

The WLAN setup overview is displayed.

**Setup country code**

1 Select "Setup country code"
2 Press the adjusting dial
3 Turn the adjusting dial and select the corresponding country
4 Select "OK"

**Activating WLAN**

1 Select "Enable WI-Fi"

When WLAN is enabled, 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 adjusting dial and select the desired WLAN network
3 Press the adjusting dial or select "Insert"
4 Enter data:
- Enable DHCP
  or
- Manually enter IP address, network mask, default gateway, DNS Server 1 and DNS Server 2:
  Turn the dial and select the desired element,
  press the setting dial,
  enter the data using the numeric keypad,
  confirm with "OK"

5 Select "OK" and add as WLAN network

**Deleting a network**

1 Turn the adjusting dial and select the WLAN network to be deleted
2 Select "Delete network"
3 Confirm security prompt

The WLAN network will be deleted.

**Bluetooth settings**

**General**

Each Bluetooth user has its own MAC address. This MAC address can be used to assign the devices to specific power sources, preventing mix-ups.

The power source is able to communicate with the following devices:
- Remote control RC Panel Basic /BT
- Pedal remote control RC Pedal TIG /BT
- Welding helmet Vizor Connect /BT

An active Bluetooth connection is indicated in the status bar on the display when the Bluetooth symbol lights up blue.

For safety reasons, when using Bluetooth devices of the same type, only one device can be actively connected to the power source.
It is possible to establish multiple active Bluetooth connections when using Bluetooth devices of different types.

An existing, active Bluetooth connection cannot be interrupted or influenced by another Bluetooth user.

Bluetooth remote controls have priority over wired remote controls or welding torches with control functions.

If the connection between a wired or Bluetooth remote control and the power source is interrupted during the welding process, the welding process is ended.

**Running Bluetooth setup**

1 Select Defaults / System / Network settings / Bluetooth setting

The overview of the Bluetooth devices is displayed.

**Activating or deactivating the power source Bluetooth function**
- Select the "Activate Bluetooth" button

**Adding a Bluetooth device**
- Switch on the Bluetooth device
- Select the "Add device" button

  All Bluetooth devices detected are displayed in a list along with their names, MAC addresses and additional information.

- Use the adjusting dial to select the desired Bluetooth device
- Compare the MAC address displayed 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 is also displayed, such as the battery status, signal strength, etc. of the Bluetooth device.



Paired
The Bluetooth device has already been actively connected to a power source at least once and appears in the list of the Bluetooth devices.



Inactive
A new Bluetooth device has been detected or the Bluetooth device was removed by the user.

**Deleting the Bluetooth device**
- Use the adjusting dial to select the Bluetooth device to be deleted
- Select the "Delete device" button
- When prompted, confirm that you want to delete the device with "OK"

2 Select "OK" to exit Bluetooth setup

**WeldCube Air**

WeldCube Air is a cloud-based centralised collection of welding data, process metrics and other functionalities.
WeldCube Air is available as an online service.

*NOTE!*

**Knowledge of network technology is required to set up WeldCube Air. Contact your IT department.**
Before connecting to WeldCube Air:

▶ Unlock the following ports and domains
https://dps.prod.air.az.weldcube.com/ Port 443 (HTTPS)
https://stpwwcpcprod001.blob.core.windows.net/ Port 443 (HTTPS)
https://stpwwcashared.blob.core.windows.net/ Port 443 (HTTPS)
Port 8883 (MQTT)

▶ Activate the time server
Select Defaults / Display / Date & Time / Automatic Time & Date
With manual time setting, the time deviation must not exceed 2 minutes.

1 Select Defaults / System / Network settings / WeldCube Air

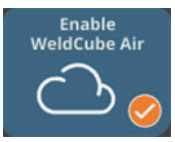
2 Select Enable WeldCube Air


3 Confirm consent for data transfer

The device code and the QR code are displayed:


4 Scan the QR code
or
open the website **air.weldcube.com** and select Add machine / Continue and enter the device machine code

The power source is connected to WeldCube Air.




Disable WeldCube Air
The pairing between the power source and WeldCube Air is maintained, no data is sent.


Unpair device
The power source is disconnected from WeldCube Air - no data transfer, no pairing.

Further information on WeldCube Air is available at:
https://www.weldcube.com

**Client authorization**

**Increased connection security**
To increase the connection security between WeldCube Premium and the welding system, an existing connection to WeldCube Premium can be confirmed under Client authorization.

**Confirm connection:**

1 Select Defaults / System / Network settings / client authorization

The existing connections to WeldCube Premium are displayed with WeldCube Premium ID, URL and the connection security status.

Status of the extended connection unknown

Extended connection pending

Extended connection permitted

2 Select the desired WeldCub Premium connection by turning the adjusting dial
3 Press the adjusting dial or select "OK"
4 Confirm when prompted

**Power source configurations**

1 Select Defaults / System / Power source configurations

The power source configuration is displayed.

2 Turn the adjusting dial and select a configuration location
3 Press the adjusting dial

The keyboard is displayed.

4 Use the keyboard to enter the desired text (max. 20 characters)
5 Select "OK" to confirm the text / press the adjusting dial

The text is applied and the power source configuration is displayed.

6 Select "Store" to apply changes

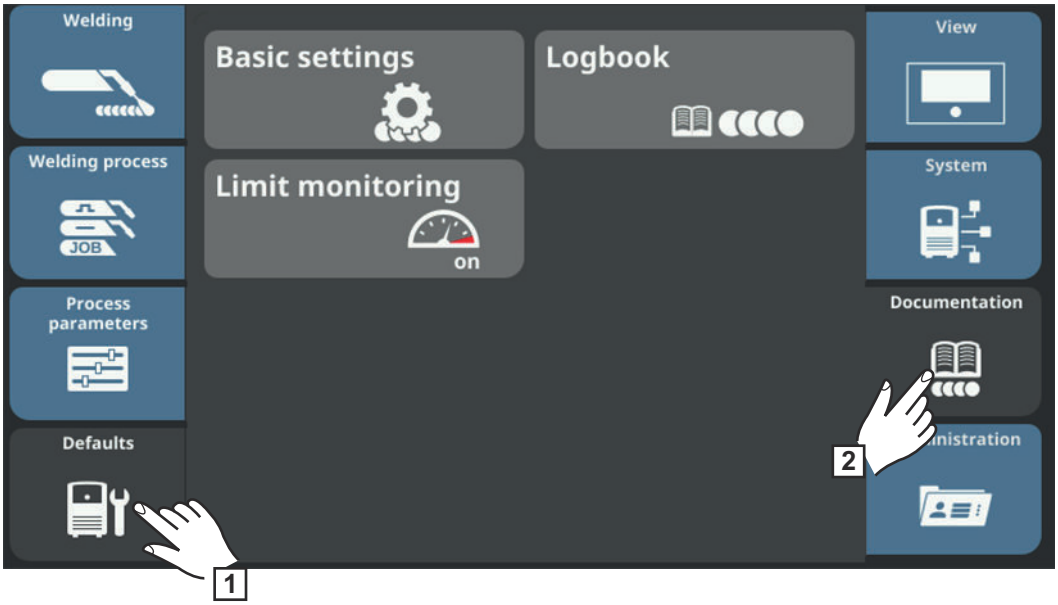
**Wire feeder setup**

Use "Wire feeder setup" to activate or deactivate potentiometers on a wirefeeder.

Not relevant for TPS 320i C.

# Defaults - Documentation

**Defaults - Documentation**




**Setting the sampling rate**

1 Select Defaults / Documentation / Basic settings

2 Press the adjusting dial

3 Turn the adjusting dial and change the sampling rate value:

off
Sampling rate is deactivated; only average values are stored.

0.1–100.0 s
Documentation is stored with the set sampling rate.

4 Select "OK" to confirm the sampling rate

**Viewing the logbook**

1 Select Defaults / Documentation / Logbook

The logbook is displayed.
Welding operations, events, errors, warnings or notifications can be displayed using the respective buttons.

**The following data is also logged:**

| No. | ddmmyy | hhmmss | s | A | V | m/min | kJ | Job No. |
|---|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |

(1) Welding operation number
(2) Date (ddmmyy)
(3) Time (hhmmss)
(4) Welding duration in s

(5) Welding current in A (average value)
(6) Welding voltage in V (average value)
(7) Wire speed in m/min
(8) Arc energy in kJ (for details see page **166**)
(9) Job no.

Turn the adjusting dial to scroll through the list.
Pressing the adjusting dial displays details of a logbook entry.

**Details for welds:**


(10) (11) (12) (13) (14) (15) (16) (17) (18) (19)

(10) Welding section number
(11) Duration of the welding section in s
(12) Welding current in A (average value)
(13) Welding voltage in V (average value)
(14) Wire speed in m/min
(15) Welding speed (cm/min)
(16) Arc power from real-time values in W (for details see page **166**)
(17) Arc energy in kJ (for details see page **166**)
(18) Job no.
(19) Process

2 Select "Close" to exit the detailed view
3 Select "OK" to exit the logbook

---

**Activating/deactivating limit value monitoring**

1 Select Defaults / Documentation / Limit monitoring

The settings for limit value monitoring are displayed.

2 Press the adjusting dial
3 Turn the adjusting dial and change the value for limit monitoring:

off:
The limit value monitoring is deactivated.

on:
The limit values will be monitored according to the settings

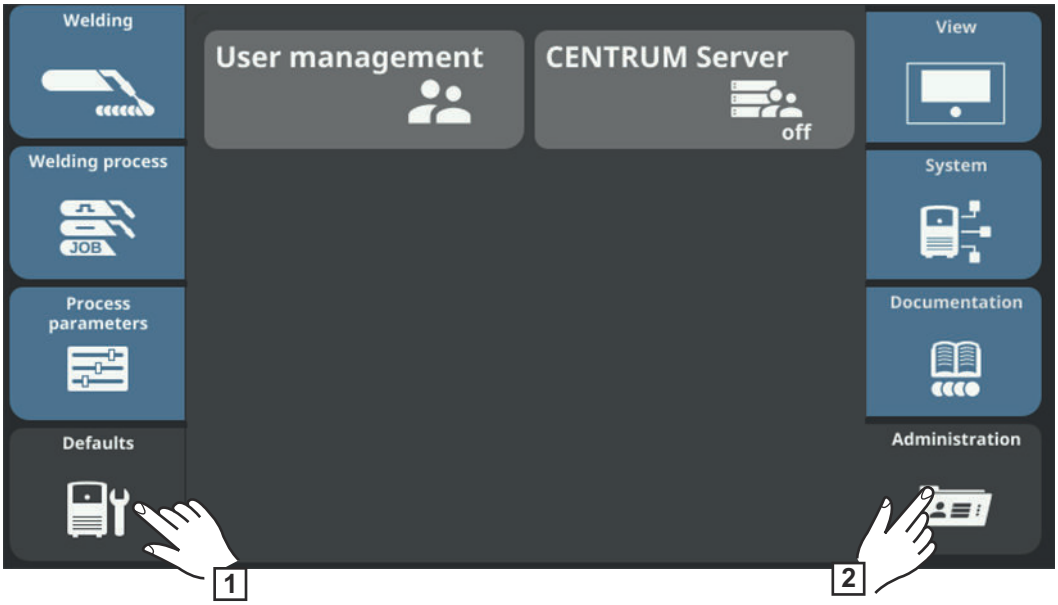
Factory setting:
off

4 Select "OK" to apply the settings for limit value monitoring

The documentation overview is displayed.

# Defaults - Administration

**Defaults - Administration**




**General remarks**

User management is advisable if several users work with the same power source. User management works with different roles and the help of NFC keys.

Users are assigned different roles depending on their level of training or qualifications.

**Explanation of terms**

**Administrator**
An administrator has unlimited access rights to all functions on the power source. The administrator's duties include:
- creating roles,
- editing and managing user data,
- assigning access rights,
- updating the firmware,
- backing up data, etc.

**User management**
User management encompasses all users registered on the power source. Users are assigned different roles depending on their level of training or qualifications.

**NFC card**
An NFC card or an NFC key ring is assigned to a certain user who is registered on the power source.
NFC cards and NFC key rings will both be referred to under the general term NFC key for the purpose of these Operating Instructions.

**IMPORTANT!** Each user should be assigned their own NFC key.

**Roles**
Roles are used for managing registered users (= user management). Users' access rights and permitted activities are defined by their roles.

**Pre-defined roles and users**

Under Defaults / Administration / User management, 2 roles are predefined as factory settings:

**Administrator**
with full rights and options

The "Administrator" role cannot be deleted, renamed or edited.

The "Administrator" role is assigned the pre-defined "Admin" user (which cannot be deleted). The "Admin" user can assign names, languages, units, web passwords and NFC keys.
As soon as "Admin" assigns an NFC key, user management is activated.

**Locked**
Factory-set with access to welding processes, but not to process parameters and defaults

The "Locked" role
- cannot be deleted or renamed
- cannot be edited to approve different functions according to demand

The "Locked" role cannot have any NFC keys assigned to it.

If no NFC key is assigned to the pre-defined user "Admin", every NFC key will work to lock and unlock the power source (no user management, see "Locking and unlocking the power source using the NFC key", page 78).

**User management overview**

User management consists of the following sections:
- Creating the administrator and roles
- Creating a user
- Editing roles / users, deactivating user management

# Administrator and creating roles

**Recommendation for creating roles and users**

Please proceed systematically when creating roles and NFC keys.

Fronius recommends creating one or two administrator keys. Without administrator rights, it may in the worst-case scenario no longer be possible to operate a power source.

**Procedure**

*NOTE!*

**Losing an NFC administrator key can lead to the power source becoming unusable, depending on the settings. Keep one of the two NFC administrator keys in a safe place.**

1 Create two equivalent users in the "Administrator" role

This means that you will still have access to administrative functions should you lose one of the NFC administrator keys.

2 Consider further roles:
- How many roles are needed?
- Which rights will be assigned to each role?
- How many users are there?

3 Create roles

4 Assign users to roles

5 Check that the created users have access to their respective roles with their NFC keys.

## Creating an administrator key

*NOTE!*

**Once an NFC key is assigned to the pre-defined "Admin" user under Defaults / Administration / User management / Administrator, user management becomes active.**

1 Select Defaults / Administration / User management

User management is displayed, "Administrator" is selected.

2 Press the adjusting dial
3 Turn the adjusting dial and select "Admin"
4 Press the adjusting dial
5 Turn the adjusting dial and select "NFC card"
6 Press the adjusting dial

The information to be transferred to the NFC card is displayed.

7 Follow the instructions displayed
(hold the new NFC key on the NFC key reader and wait for confirmation of identification)
8 Select "OK"

A note concerning the activated user management is displayed.

9 Select "OK"

Under Admin / NFC card, the number of the assigned NFC key is displayed.

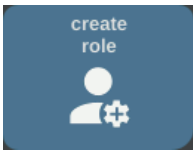
To create a second administrator key:
- Copy "Admin" (to create "new from" see page 191)
- Enter user name
- Assign new NFC card

## Creating roles

1 Select Defaults / Administration / User management

User management appears.

2 Select "create role"




The keyboard is displayed.

3 Use the keyboard to enter the desired role name (max. 20 characters)
4 Select "OK" to apply the role name / press the adjusting dial

The functions that can be executed within a role are displayed.

Symbols:

... hidden

... read only

... read and write

5 Specify the functions that a user can carry out in this role
- Select functions by turning the adjusting dial
- Press the adjusting dial
- Select settings from the list
- Press the adjusting dial

6 Select "OK"

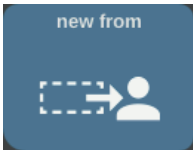
**Copy roles**

1 Select Defaults / Administration / User management

User management appears.

2 Turn the adjusting dial and select the role to be copied

3 Select "new from"




4 Enter a name for the new role using the keyboard

5 Select "OK"

6 Specify executable functions for the role
- Select function by turning the adjusting dial
- Press the adjusting dial
- Select the settings for the functions from the list

7 Select "OK"

# Creating a user



## Creating a user

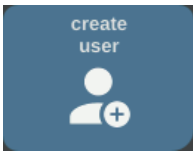
*NOTE!*

**For privacy reasons, only person identity numbers and not full names should be entered when creating users.**

1 Select Defaults / Administration / User management

User management appears.

2 Select "create user"




The keyboard is displayed.

3 Use the keyboard to enter the desired user name (max. 20 characters)

4 Select "OK" to confirm the user name / press the adjusting dial

5 Enter further user data
- Select parameters by turning the adjusting dial
- Press the adjusting dial
- Select role, language, unit and standard (norm) from the list
- Enter first name, last name and web password by using the keyboard

6 Turn the adjusting dial and select "NFC card"

7 Press the adjusting dial

The information to be transferred to the NFC card is displayed.

8 Follow the instructions displayed
(hold the new NFC key on the NFC key reader and wait for confirmation of identification)

## Copying users

*NOTE!*

**For privacy reasons, only person identity numbers and not full names should be entered when creating users.**

1 Select Defaults / Administration / User management

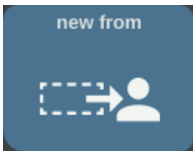
User management appears.

2 Turn the adjusting dial and select the role to which the user to be copied is assigned

3 Press the adjusting dial

4 Turn the adjusting dial and select the user to be copied

5 Select "new from"




6 Enter a name for the new user using the keyboard
7 Select "OK"
8 Specify further user data
9 Assign new NFC key
10 Select "OK"

# Editing roles / users, deactivating user management



**Editing roles**

1 Select Defaults / Administration / User management

User management appears.

2 Turn the adjusting dial and select the desired role

3 Select "Edit user/role"


The role will open, the functions can be adjusted:
- Select function by turning the adjusting dial
- Press the adjusting dial
- Change the role name using the keyboard
- Select the settings for the functions from the list

4 Select "OK"

If no user is assigned to a role, then the it is possible to start editing the role by pressing the adjusting dial.

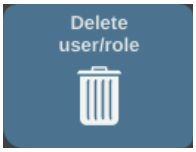
**Deleting roles**

1 Select Defaults / Administration / User management

User management appears.

2 Turn the adjusting dial and select the role to be deleted

3 Select "Delete user/role"




4 Confirm when prompted

The role and all assigned users will be deleted.

**Editing users**

1 Select Defaults / Administration / User management

User management appears.

2 Turn the adjusting dial and select the role to which the user to be edited is assigned

3 Press the adjusting dial

The users assigned to the role are displayed.

4 Turn the adjusting dial and select the user to be edited

5 Select "Edit user/role" (or press the adjusting dial)


- Select parameters by turning the adjusting dial
- Press the adjusting dial
- Change the name and web password using the keyboard
- Select other settings from the list

Replace NFC card:
- Turn the adjusting dial and select "NFC card"
- Press the adjusting dial
- Select "replace"
- Hold the new NFC key on the NFC key reader and wait for confirmation of identification
- Select "OK"

6 Select "OK"

---

**Deleting users**

1 Select Defaults / Administration / User management

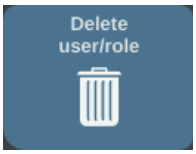
User management appears.

2 Turn the adjusting dial and select the role to which the user to be deleted is assigned

3 Press the adjusting dial

4 Turn the adjusting dial and select the user to be deleted

5 Select "Delete user/role"




6 Confirm when prompted

The user is deleted.

---

**Deactivating user management**

1 Select the pre-defined "Admin" user under Defaults / Administration / User management / Administrator

2 Turn the adjusting dial and select "NFC card"

3 Press the adjusting dial

A confirmation prompt asking whether you want to delete or replace the NFC card is displayed.

*NOTE!*

**If the NFC card is deleted by the predefined "Admin" user, user management is deactivated.**

4 Select "delete"

User management is deactivated, the power source is locked.
The power source can be locked and unlocked again with any NFC key (see page 78).

**Lost NFC administrator key?**

Procedure when
- user management is active,
- the power source is locked
  and
- the NFC administrator key has been lost:

1 Touch the key symbol in the status bar on the display

Information on the loss of the administrator card is displayed.

2 Note the IP address of the power source

3 Open the power source SmartManager (enter the IP address of the power source in a browser)

4 Contact Fronius After-Sales Service

# CENTRUM - Central User Management

**Activating the CENTRUM server**

CENTRUM is a piece of software for the central management of users. Detailed information is available in the CENTRUM Operating Instructions (42,0426,0338,xx).

The CENTRUM server can also be activated using the power source, as follows:

1 Select Defaults / Administration / CENTRUM Server

The Central User Management Server is displayed.

2 Activate the CENTRUM server (press the adjusting dial)

3 Select CENTRUM server, press the adjusting dial and use the keyboard to enter the address of the CENTRUM server

4 Select the verify CENTRUM button

5 Save

# SmartManager - The power source website

# SmartManager - The power source website



**General**

The power source has its own website: SmartManager.
As soon as the power source is connected to a computer using a network cable, or is on a network, the power source's SmartManager can be retrieved using the power source's IP address.
At least IE 10 or a similar modern browser is required to access SmartManager.

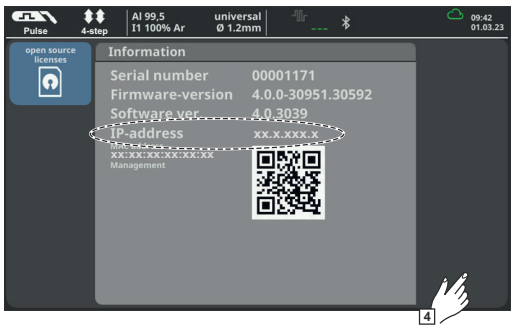
The entries displayed on SmartManager may vary depending on system configuration, software upgrades and available options.

Examples of entries displayed:

- Current system data
- Documentation, logbook
- Job data
- Power source settings
- Backup & restore
- User management
- Signal visualisation
- Overview
- Update
- Function packages
- Characteristics overview
- Screenshot
- Robot interface *

* Depending on the available robot interface, the name of the interface will be displayed as an entry on the website.

**Opening and logging into the power source SmartManager**


1 Defaults / System / Information ==> Note down the IP address for the power source

2 Enter the IP address in the browser search field

3 Enter user name and password

Factory setting:
User name = admin
Password = admin

4 Confirm the displayed message

The power source SmartManager is displayed.

**Help function, should you be unable to log in**

There are two auxiliary functions when logging on to SmartManager:
- Start unlocking function?
- Forgotten password?

**Start unlocking function?**

An unintentionally locked power source can be unlocked with this function and all its functions made available.

1 Click "Start unlocking function"?
2 Create verification file:
click on "Save"

A TXT file with the following name will be saved to the computer's "Downloads" folder:

unlock_SN[serial number]_YYYY_MM_DD_hhmmss.txt

3 Send this verification file to Fronius Technical Support by e-mail:
welding.techsupport@fronius.com

Fronius will respond to each e-mail with a one-time unlocking file named as follows:

response_SN[serial number]_YYYY_MM_DD_hhmmss.txt

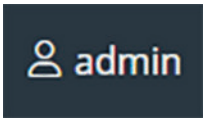
4 Save the unlocking file to your computer
5 Click on "Search unlocking file"
6 Apply unlocking file
7 Click on "Install unlocking file"

This will work just once to unlock the power source.

**Forgotten password?**

After clicking "Forgotten password?" a notice will be displayed explaining that the password can be reset on the power source (see "Resetting the website password", page 173).

**Changing password / logging off**

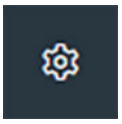



By clicking this symbol
- the user password can be changed
- you can log out of SmartManager

Changing the password for the SmartManager:

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

**Settings**



Clicking on this symbol expands the display of characteristics, material specifications and certain welding parameters for the power source's SmartManager.

The settings depend on which user is currently logged on.

**Language selection**


The languages available for SmartManager can be displayed by clicking on the language abbreviation.

| | | |
|---|---|---|
| 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 one you would like.

**Status indicator**

The current status of the power source is shown between the Fronius logo and displayed power source.

| | |
|---|---|
|  | Attention / Warning |
|  | Fault on the power source * |
|  | Power source is welding |
|  | The power source is ready (online) |
|  | The power source is not ready (offline) |

* In the event of an error, a red error line complete with error number will be displayed above the line with the Fronius logo.
Clicking on the error line will reveal a description of the error.

**Fronius**

A click on the Fronius logo opens the homepage of Fronius: www.fronius.com.

# Current system data



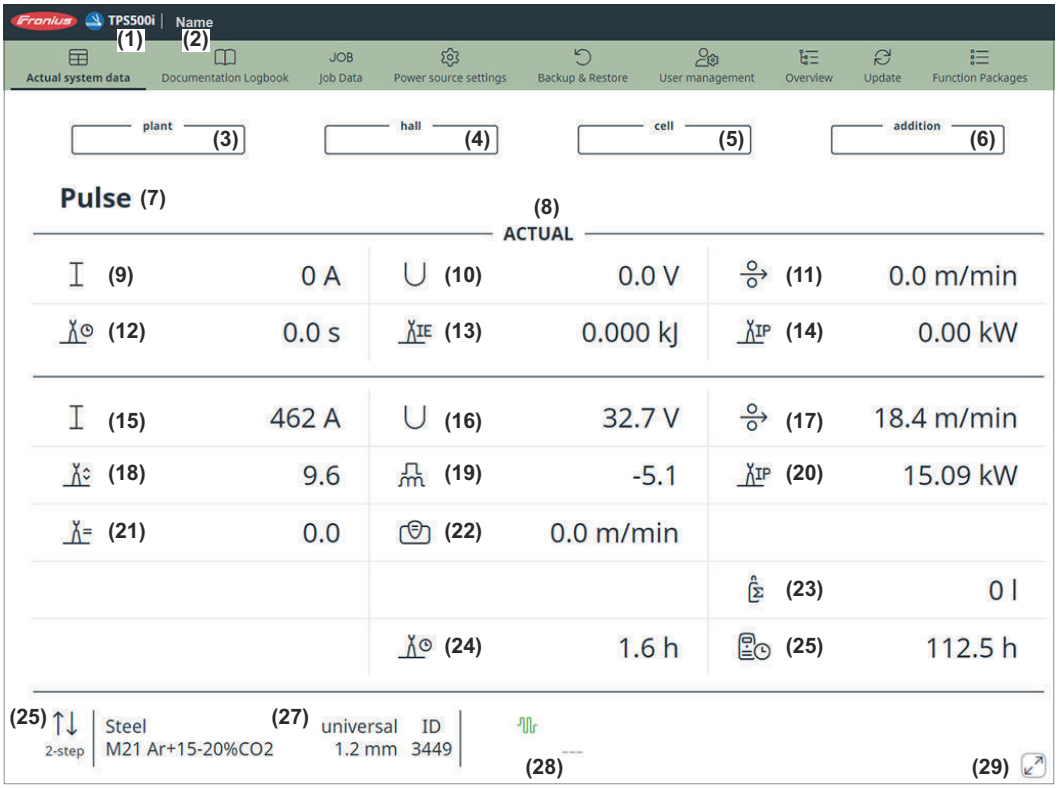
**Current system data**

The welding system's current data is displayed.

*NOTE!*

**The system data displayed will vary depending on the welding process, equipment and existing WeldingPackages.**

▶ e.g. system data for MIG/MAG:



(1) Device type
(2) Device name
(3) Factory
(4) Production building (hall)
(5) Cell
(6) Filler
(7) Welding process
(8) Actual values / HOLD or average values (depending on setting)
(9) Welding current
(10) Welding voltage
(11) Wire speed
(12) Arc time
(13) Arc energy
(14) Arc power
(15) Welding current command value
(16) Welding voltage set value
(17) Wire feed speed set value
(18) Arc length correction
(19) Pulse/dynamic correction
(20) Arc power
(21) Arc length stabilizer
(22) Penetration stabilizer
(23) Total shielding gas consumption
(24) Total arc time
(25) Total power source operating hours
(26) Operating mode
(27) Filler metal, shielding gas, characteristic, diameter, ID
(28) Process functions
(29) Full-screen mode

# Documentation, logbook



**Logbook**

The last 100 logbook entries are shown in the Documentation entry. These logbook entries can be welding operations, errors, warnings, notifications and events.
Press the "Time filter" button to restrict the data to a specific period of time. To do so, the date (yyyy mm dd) and time (hh mm) are entered in the format from – to in each case.
A blank filter loads the latest welding operations again.
The option to show welding operations, errors, warnings, notifications and events can be disabled.

**The following data is displayed:**


(1) (2) (3) (4) (5) (6) (7) (8)

(1) Welding operation number
(2) Start time (date and time)
(3) Welding duration in s
(4) Welding current in A (average value)
(5) Welding voltage in V (average value)
(6) Wire speed in m/min
(7) IP - arc power in W (from real-time values in accordance with ISO/TR 18491)
(8) IE - arc energy in kJ (in total across the entire weld in accordance with ISO/TR 18491)

Robot speed and jobs are also displayed if present in the system.

Clicking on a logbook entry will display details.

**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 value)
(11) Welding voltage in V (average value)
(12) Wire speed in m/min
(13) Welding speed (cm/min)
(14) Arc power from real-time values in W (for details see page **166**)
(15) Arc energy in kJ (for details see page **166**)
(16) Job no.
(17) Process

Further values can be displayed by clicking on the "Insert column" button:

- I max / I min: maximum/minimum welding current in A
- Max power / Min power: 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 available on the power source, individual welding sections can also be displayed.


This documentation can be exported in the desired format using the "PDF" and "CSV" buttons.
In order to create CSV exports, the OPT/i documentation option must be available on the power source.

---

**Basic settings**

In the basic settings, the sampling rate for documentation can be activated and set.
In addition, motor force M1 - M3, gas flow actual value and welding speed can be activated for documentation.

# Job-Data



**Job data**

If the OPT/i Jobs option is available on the power source, the following is possible in the Job data entry:
- Existing welding system jobs can be viewed *
- Existing welding system jobs can be optimised
- Jobs stored externally can be transferred to the welding system
- Existing jobs in the welding system can be exported as a PDF * or CSV file

* Viewing and exporting as PDF also works when the OPT/i limit monitoring option is not available on the power source.

**Job overview**

The job overview lists all jobs stored in the welding system.
Clicking on a job displays the data and parameters stored for this job.
Job data and parameters can only be viewed in the job overview. The column width for parameters and values can be easily dragged and adjusted with the mouse pointer.
Other jobs can easily be added to the list with the data listed by clicking on the "Add column" button.

All added jobs are compared to the job that is currently selected.

**Editing a job**

Existing welding system jobs can be optimised, provided the OPT/i Jobs option is present on the power source.

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

The selected job is opened and the following job data is shown:
- **Parameter**
  The parameter currently stored in the job
- **Value**
  The values of the parameter currently stored in the job
- **Change value to**
  To enter the new parameter value
- **Setting range**
  Possible setting range for the new parameter values

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


As an aid when editing a job, other jobs can be added with ease to the list with the data displayed 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 jobs stored externally to be transferred to the welding system, provided the OPT/i Jobs option is available on the power source.

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

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

3 Click on "Import Job"

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

---

**Exporting a job**

This function allows jobs from the power source to be stored externally, provided the OPT/i Jobs option is available on the power source.

1 Select jobs to be exported
2 Click on "Export Job"

The jobs are exported as an XML file into 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 exports, the jobs OPT/i jobs option must be present on the power source.

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


The PDF or CSV settings are displayed.

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

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

# Power source settings

**Process parameters**

General process parameters and process parameters for power source components and monitoring can be viewed and changed under process parameters.

**Changing process parameters**

1 Click parameter group / welding parameter
2 Alter the parameter value directly in the display field
3 Save changes

**Name & location**

The power source configuration can be viewed and changed under name & location.

**Parameter view**

Welding parameters and special functions for power source and JobMaster welding torch can be set under Parameter view GMAW.

1 Select parameter / function (tick)
2 Save changes

The selected parameters / functions are:
- shown on the display of the power source in the welding parameters,
- available on the JobMaster welding torch.

**Date & time**

The date & time can be set automatically or manually.

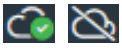
**Network settings**

The following parameters can be set under Network settings:

Management
- MAC address and current IP address are displayed.
- If DHCP is not selected, the IP address, network mask, standard gateway, DNS server 1 and 2 can be set manually.

WLAN
- MAC address and current IP address are displayed.
- The WLAN country code can be set.
- Configured networks are displayed
- Available networks are displayed

WeldCube Air
Connect power source to WeldCubeAir
(alternatively click on the cloud icon at the top right)



**MQTT settings**

Only displayed if the OPT/i MQTT option is installed on the power source.

MQTT - Message Queuing Telemetry Transport
(standardised data interface protocol)

Supported functions:
- Provides the real-time data to be transferred to other systems
- Fixed amount of data
- Reads

**Defining MQTT settings**

1 Activate MQTT
2 Enter broker, port and device topic
3 Select safety certificate
4 Enter authentication
5 Save changes

---

**OPC UA settings**

Only displayed if the OPT/i OPC UA option is installed on the power source.

OPC-UA - Open Platform Communications - Unified Architecture
(standardised data interface protocol)

Supported functions:
- Provides the real-time data to be transferred to other systems
- Possible to copy data from other systems
- Fixed amount of data
- Reads & writes

**Defining OPC UA settings**

1 Activate OPC UA server
2 Select safety directive
3 Enter authentication
4 Save changes

# Backup & Restore

**General remarks**

In the backup & restore entry

- all welding system data can be saved as a backup (e.g. current parameter settings, jobs, user characteristics, defaults, etc.),
- any backups will be restored to the welding system
- You can select which data you would like to be backed up automatically.

**Backup & Restore**

**Starting backup**

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

The data is saved in a selected location in the default format MCU1-YYYYMMDDHHmm.fbc.

YYYY = Year
MM = Month
DD = Day
HH = Hour
mm = Minute

The date and time correspond to the power source settings.

**Searching for a restore file**

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

2 Select the file and click on "Open"

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

3 Click on "Start recovery"

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

**Automatic backup**

1 Enable interval settings

2 Enter the intervals 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 IP address of the destination server
- **Port:**
  Enter port number; if no port number is entered, the default port 22 is automatically used.
  If SMB is set under Protocol, leave the Port field blank.
- **Storage location:**
  This configures the subfolder where the backup will be stored.
  If no storage location is entered, the backup is stored in the root directory of the server.

  **IMPORTANT!** For SMB and SFTB, always enter the storage 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
- Users
- Password

5 Save changes

6 Trigger automatic backup

If you have any questions about the configuration, contact your network administrator.

# User management

**General**

In the user management 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 on the power source. User management data present on the power source is overwritten by importing.
- a CENTRUM server can be activated.

User management is created on a power source and can then be saved with the export/import function and transferred to another power source.

**Users**

Existing users can be viewed, changed and deleted; new users can be created.

**Viewing/changing a user:**

1 Select user
2 Alter the user data directly in the display field
3 Save changes

**Deleting a user:**

1 Select user
2 Click the "Delete user" button
3 When prompted, confirm with OK

**Creating a user:**

1 Click 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 user role
2 Alter the user role directly in the display field
3 Save changes

The "Administrator" role cannot be changed.

**Deleting a user role:**

1 Select user role
2 Click the "Delete user role" button
3 When prompted, confirm with OK

The "Administrator" and "Locked" roles cannot be deleted.

**Creating a user role:**

1 Click 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"

The user management data from the power source will be saved to the "Downloads" folder on the computer.
File format: userbackup_SNxxxxxxxx_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 to a power source**

1 Click on "Search user data file"
2 Select the file and click "Open"
3 Click on "Import"

The user management data will be saved to the power source.

---

**CENTRUM server**

For activating 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 where Central User Management has been installed.

A valid DNS server must be configured in the power source network settings if using a domain name.

3 Click the "Verify server" button

This checks the availability of the specified server.

4 Save changes

# Overview

**Overview**

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

**Expand all groups / Reduce all groups**

Click the "Expand all groups" button to show more details of the individual system components.

Power source example:
- TPSi Touch: item number
  MCU1: item number, version, serial number, production date
  Bootloader: version
  image: Version
  licences: WP Standard, WP Pulse, WP LSC, WP PMC, OPT/i Guntrigger, etc.
- SC2: item number
  firmware: version

Click the "Reduce all groups" button to hide the system component details again.

**Export component overview as ...**

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

# Update



**Update**

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

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

To update the power source firmware:

The update file can be downloaded via the following link, for example:
https://tps-i.com/index.php/firmware

1 Organise and save the update file
2 Click on "Search update file" to start the update process
3 Select update file

Click on "Update"

Once the update has been successfully completed, the power source may need to be restarted.

When an update has been completed successfully, a confirmation to this effect is displayed.

**Searching for an update file (performing the update)**

1 After clicking on "Search update file", select the desired firmware (*.ffw)
2 Click on "Open"

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

3 Click on "Update"

A progress bar is displayed above the update process.
When this reaches 100%, you will be prompted to restart the power source.

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

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

The power source restarts; the display goes black for a short time.
The Fronius logo is shown on the power source display during the restart.

Once the update has been completed successfully, confirmation and the current firmware version are displayed.
Finally, log back on to SmartManager.

**Information on open source licensing**

Clicking on the link displays information on open source licensing.

**Fronius WeldConnect**

The mobile application Fronius WeldConnect can also be called up in the "Update" entry.
WeldConnect is an app for wireless interaction with the welding system.

**The following functions can be performed with WeldConnect:**
- Current unit configuration at a glance
- Mobile access to the SmartManager of the power source
- Automatic determination of the output parameters for MIG/MAG and TIG
- Cloud storage and wireless transmission to the power source
- Part identification
- Logging in and out of the power source without an NFC card
- Saving and sharing parameters and jobs
- Data transfer from one power source to another by means of backup, restore
- Firmware update

Fronius WeldConnect is available in the following forms:
- As an Android app
- As an Apple/IOS app

Further information on Fronius WeldConnect is available at:

*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 ...)
- CFG /i (Robot Interface Configurations)

**Installing a function package**

1 Organise and save a function package

2 Click on "Search function package file"

3 Select the desired function package file (*.xml)

4 Click on "Open"

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

5 Click on "Install function package"

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

# Synergic lines overview

**Characteristics overview**

In the Characteristics overview entry:

- Available characteristics in the welding system can be displayed: Available characteristics button
- Possible characteristics in the welding system can be displayed: Possible characteristics button
- Characteristics for the welding system can be preselected: Characteristic preselection button
- Saved characteristic preselections can be exported and imported: Export & import button

You can search for, sort and filter the displayed characteristics at any time.

The following information is displayed for the characteristics:

- Status
- Materials
- Diameter
- Gas
- Property
- Process
- ID
- Replaced by
- SFI
- SFI HotStart
- Penetration stabilizer
- Arc length stabilizer
- CMT Cycle Step
- Special
- Requirements

To sort the characteristics in ascending or descending order, click on the arrow next to the respective information.

The column widths can be easily dragged and adjusted with the cursor.

**Show filter**

Clicking on the "Show filter" symbol displays the possible filter criteria. With the exception of "ID" and "Replaced by", the characteristics can be filtered by all information.

First selection box = select all

To hide the filter criteria, click on the "Hide filter" symbol.

# Screenshot



**Screenshot**

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

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

A screenshot of the currently displayed settings is created.

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

# Troubleshooting and maintenance

# Troubleshooting



**General**

The 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 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 does not function**

Mains switch is on, but indicators are not lit up

| | |
|---|---|
| Cause: | There is a break in the mains lead; the mains plug is not plugged in |
| Remedy: | Check the mains lead, ensure that the mains plug is plugged in |
| Cause: | Mains socket or mains plug faulty |
| Remedy: | Replace faulty parts |
| Cause: | Mains fuse protection |
| Remedy: | Change the mains fuse protection |
| Cause: | Short circuit on the 24 V supply of SpeedNet connection socket or external sensor |
| Remedy: | Unplug 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**

Mains switch is ON and indicators are lit up

| | |
|---|---|
| Cause: | Grounding (earthing) connection is incorrect |
| Remedy: | Check the grounding (earthing) connection for correct polarity |
| Cause: | There is a break in the power cable in the welding torch |
| Remedy: | Replace the welding torch |

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

Mains switch is on, indicators are lit up

Cause: The control plug is not plugged in
Remedy: Plug in the control plug

Cause: Welding torch or welding torch control line is faulty
Remedy: Replace welding torch

Cause: The interconnecting hosepack is defective or not connected properly (not for power sources with integrated wire drive)
Remedy: Check the interconnecting hosepack

**No protective gas shield**

All other functions are OK

Cause: Gas cylinder is empty
Remedy: Change the gas cylinder

Cause: The gas pressure regulator is faulty
Remedy: Replace the gas pressure regulator

Cause: Gas hose is not fitted or is damaged
Remedy: Fit or change the gas hose

Cause: Welding torch is faulty
Remedy: Change the welding torch

Cause: Gas solenoid valve is faulty
Remedy: Contact After-Sales Service

**Poor weld properties**

Cause: Incorrect welding and/or correction parameters

Remedy: Check the settings

Cause: Poor ground earth connection

Remedy: Ensure good contact to workpiece

Cause: Multiple power sources are welding one component

Remedy: Increase the distance between the hosepacks and the grounding cables;
Do not use a common earth.

Cause: Inadequate or no protective gas shield

Remedy: Check the pressure regulator, gas hose, gas solenoid valve, torch gas connection, etc.

Cause: Welding torch is leaking

Remedy: Change welding torch

Cause: Wrong contact tip, or contact tip is worn out

Remedy: Replace contact tip

Cause: Wrong wire alloy or wrong wire diameter

Remedy: Check the wire electrode that has been inserted

Cause: Wrong wire alloy or wrong wire diameter

Remedy: Check weldability of the base material

Cause: The shielding gas is not suitable for this wire alloy

Remedy: Use the correct shielding gas

**Excessive welding spatter**

Cause: Shielding gas, wirefeeder, welding torch or workpiece is contaminated or magnetically charged

Remedy: Perform R/L alignment;
adjust arc length;
check whether shielding gas, wirefeed, welding torch position or workpiece is contaminated or magnetically charged

**Irregular wire speed**

Cause: Braking force has been set too high

Remedy: Loosen the brake

Cause: Hole in the contact tip is too narrow

Remedy: Use a suitable contact tip

Cause: Faulty inner liner in welding torch

Remedy: Check the inner liner for kinks, dirt, etc. and replace if necessary

Cause: The wirefeeder rollers are not suitable for the wire electrode being used

Remedy: Use suitable feed rollers

Cause: Feed rollers have the wrong contact pressure

Remedy: Optimise the contact pressure

**Wirefeed problems**

when using applications with 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 bends

**Welding torch becomes very hot**

Cause: Welding torch is inadequately dimensioned

Remedy: Observe the duty cycle and loading limits

Cause: Only on water-cooled systems: inadequate coolant flow

Remedy: Check coolant level, coolant flow, for coolant contamination, etc. For further information refer to the cooling unit Operating Instructions

# Care, maintenance and disposal

**General**

Under normal operating conditions, the power source requires only a minimum of care and maintenance. However, it is vital to observe some important points to ensure 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 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 **199**)

4 Transfer the firmware to the power source (see page **217**)

**Disposal**

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

# Appendix

# Average consumption values during welding

**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 |
| Aluminium 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 |
| Aluminium 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 |

**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 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 |

# Technical data

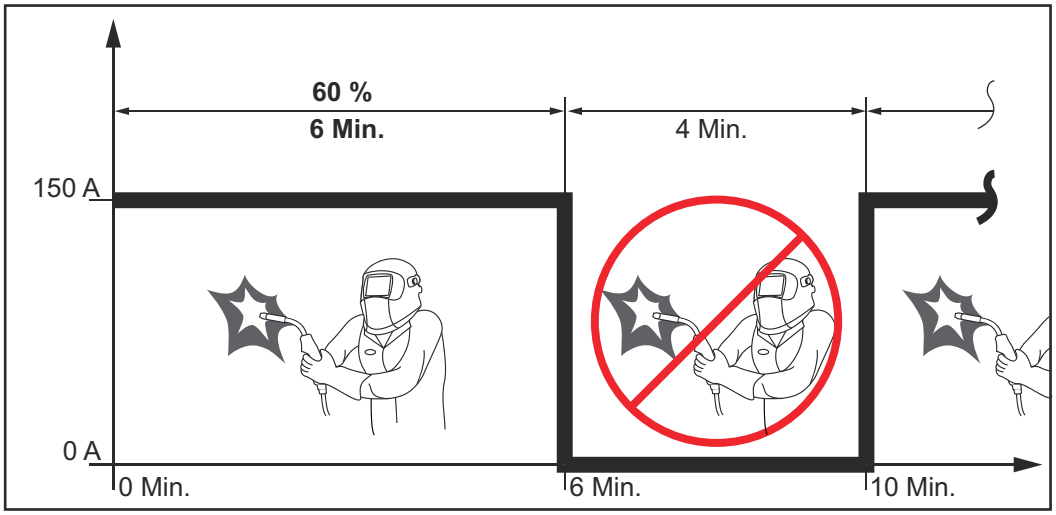
**Explanation of the term "duty cycle"**

Duty cycle (ED) is the proportion of time in a 10-minute cycle at which the device may be operated at its rated output without overheating.

*NOTE!*

**The ED values specified on the rating plate are based on an ambient temperature of 40 °C.**
If the ambient temperature is higher, either the ED or output must be reduced accordingly.

Example: Welding at 150 A at 60% ED
- Welding phase = 60% of 10 minutes = 6 minutes
- Cooling phase = remaining time = 4 minutes
- After the cooling phase, the cycle begins again.




If the device is to be continuously operated without stopping:

1. Look in the technical data for a ED value of 100% for the current ambient temperature.
2. Reduce the output or amperage in line with this value so that the device can remain in use without observing a cooling phase.

**Special voltages**

For devices designed for special voltages, the technical data on the rating plate applies.

For all machines with a permitted mains voltage of up to 460 V: The standard mains plug allows the user to operate with a mains voltage of up to 400 V. For mains voltages up to 460 V fit a mains plug permitted for such use or install the mains supply directly.

**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**.

**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 = **28**020065, calculation of the year of production = **28** - 11 = 17, year of production = 2017

**TPS 320i C**

| | |
|---|---|
| Mains voltage ($U_1$) | 3 x 400 V |
| Max. effective primary current ($I_{1eff}$) | 12.5 A |
| Max. primary current ($I_{1max}$) | 19.7 A |
| Mains fuse protection | 35 A slow-blow |
| Mains voltage tolerance | -15 / +15% |
| Grid frequency | 50/60 Hz |
| Cos phi (1) | 0.99 |
| Max. permitted mains impedance $Z_{max}$ at PCC[1)] | 96 mOhm |
| Recommended residual current circuit breaker | Type B |
| Welding current range ($I_2$) | |
| MIG/MAG | 3 - 320 A |
| TIG | 3 - 320 A |
| MMA | 10 - 320 A |
| Welding current at 10 min/40 °C (104 °F) | 40% / 320 A<br>60% / 260 A<br>100% / 220 A |
| Output voltage range according to standard characteristic ($U_2$) | |
| MIG/MAG | 14.2 - 30.0 V |
| TIG | 10.1 - 22.8 V |
| MMA | 20.4 - 32.8 V |
| Open circuit voltage ($U_0$ peak / $U_0$ r.m.s) | 71 V |
| Protection class | IP 23 |
| Type of cooling | AF |
| Overvoltage category | III |
| Pollution degree according to IEC60664 | 3 |
| EMC device class | A [2)] |
| Safety symbols | S, CE |
| Dimensions L x W x H | 706 x 300 x 510 mm<br>27.8 x 11.8 x 20.1 in. |
| Weight | 35.8 kg / 78.9 lb. |
| Max. noise emission (LWA) | 69 dB (A) |
| Max. shielding gas pressure | 7 bar / 101 psi |
| Coolant | Original Fronius |
| Wire speed | 1 - 25 m/min / 40 - 980 ipm |
| Wire drive | 4-roller drive |
| Wire diameter | 0.8 - 1.6 mm / 0.03 - 0.06 in. |

| | |
|---|---|
| Wirespool diameter | max. 300 mm / max. 11.8 in. |
| Wirespool weight | max. 19.0 kg / max. 41.9 lb. |
| Idle state power consumption at 400 V | 34.7 W |
| Power source efficiency at 320 A / 32.8 V | 89% |

The wirefeeder for the TPS 320i C is integrated in the power source.

1) Interface to a 230/400 V and 50 Hz public grid
2) An emission class A device is not designed for use in residential areas supplied with power from a public low-voltage grid.
   The electromagnetic compatibility can be influenced by conducted or radiated radio frequencies.

**TPS 320i C /nc**

| | |
|---|---|
| Mains voltage ($U_1$) | 3 x 380 / 400 / 460 V |
| Max. effective primary current ($I_{1eff}$) | |
| 3 x 380 V | 12.9 A |
| 3 x 400 V | 12.5 A |
| 3 x 460 V | 11.0 A |
| Max. primary current ($I_{1max}$) | |
| 3 x 380 V | 20.3 A |
| 3 x 400 V | 19.7 A |
| 3 x 460 V | 17.3 A |
| Mains fuse protection | 35 A slow-blow |
| Mains voltage tolerance | -10 / +15% |
| Grid frequency | 50/60 Hz |
| Cos phi (1) | 0.99 |
| Max. permitted mains impedance $Z_{max}$ at PCC[1)] | 96 mOhm |
| Recommended residual current circuit breaker | Type B |
| Welding current range ($I_2$) | |
| MIG/MAG | 3 - 320 A |
| TIG | 3 - 320 A |
| MMA | 10 - 320 A |
| Welding current at<br>10 min / 40 °C (104 °F)<br>$U_1$ = 380 - 460 V | 40% / 320 A<br>60% / 260 A<br>100% / 220 A |
| Output voltage range according to standard characteristic ($U_2$) | |
| MIG/MAG | 14.2 - 30.0 V |
| TIG | 10.1 - 22.8 V |
| MMA | 20.4 - 32.8 V |
| Open circuit voltage<br>($U_O$ peak / $U_O$ r.m.s) | 82 V |
| Protection class | IP 23 |
| Type of cooling | AF |
| Overvoltage category | III |
| Pollution degree according to IEC60664 | 3 |
| EMC device class | A [2)] |
| Safety symbols | S, CE, CSA |
| Dimensions L x W x H | 706 x 300 x 510 mm<br>27.8 x 11.8 x 20.1 in. |
| Weight | 34.7 kg / 78.9 lb. |

| | |
|---|---|
| Max. noise emission (LWA) | 69 dB (A) |
| Max. shielding gas pressure | 7 bar / 101 psi |
| Coolant | Original Fronius |
| Wire speed | 1 - 25 m/min / 40 - 980 ipm |
| Wire drive | 4-roller drive |
| Wire diameter | 0.8 - 1.6 mm / 0.03 - 0.06 in. |
| Wirespool diameter | max. 300 mm / max. 11.8 in. |
| Wirespool weight | max. 19.0 kg / max. 41.9 lb. |
| Idle state power consumption at 400 V | 34.7 W |
| Power source efficiency at 320 A / 32.8 V | 89% |

The wirefeeder for the TPS 320i C /nc is integrated in the power source.

1) Interface to a 230/400 V and 50 Hz public grid
2) An emission class A device is not designed for use in residential areas supplied with power from a public low-voltage grid.
   The electromagnetic compatibility can be influenced by conducted or radiated radio frequencies.

**TPS 320i C /S/nc**

| | |
|---|---|
| Mains voltage ($U_1$) | 3 x 460 / 575 V |
| Max. effective primary current ($I_{1eff}$) | |
| 3 x 460 V | 11.6 A |
| 3 x 575 V | 10.0 A |
| Max. primary current ($I_{1max}$) | |
| 3 x 460 V | 18.3 A |
| 3 x 575 V | 15.7 A |
| Mains fuse protection | 20 A slow-blow |
| Mains voltage tolerance | -10 / +10% |
| Grid frequency | 50/60 Hz |
| Cos phi (1) | 0.99 |
| Recommended residual current circuit breaker | Type B |
| Welding current range ($I_2$) | |
| MIG/MAG | 3 - 320 A |
| TIG | 3 - 320 A |
| MMA | 10 - 320 A |
| Welding current at<br>10 min / 40 °C (104 °F)<br>$U_1$ = 460 - 575 | 40% / 320 A<br>60% / 260 A<br>100% / 220 A |
| Output voltage range according to standard characteristic ($U_2$) | |
| MIG/MAG | 14.2 - 30.0 V |
| TIG | 10.1 - 22.8 V |
| MMA | 20.4 - 32.8 V |
| Open circuit voltage<br>($U_0$ peak / $U_0$ r.m.s) | 85 V |
| Protection class | IP 23 |
| Type of cooling | AF |
| Overvoltage category | III |
| Pollution degree according to IEC60664 | 3 |
| Safety symbols | S, CSA |
| Dimensions L x W x H | 706 x 300 x 510 mm<br>27.8 x 11.8 x 20.1 in. |
| Weight | 33.11 kg / 73.0 lb. |
| Max. noise emission (LWA) | 69 dB (A) |
| Max. shielding gas pressure | 7 bar / 101 psi |
| Coolant | Original Fronius |
| Wire speed | 1 - 25 m/min / 40 - 980 ipm |
| Wire drive | 4-roller drive |

| | |
|---|---|
| Wire diameter | 0.8 - 1.6 mm / 0.03 - 0.06 in. |
| Wirespool diameter | max. 300 mm / max. 11.8 in. |
| Wirespool weight | max. 19.0 kg / max. 41.9 lb. |
| Idle state power consumption at 400 V | 34.7 W |
| Power source efficiency at 320 A / 32.8 V | 89% |

The wirefeeder for the TPS 320i C is integrated in the power source.

**TPS 320i C /MV/nc**

| | |
|---|---|
| Mains voltage ($U_1$) | 3 x 200 / 230 / 380 / 400 / 460 V |
| Max. effective primary current ($I_{1eff}$) | |
| 3 x 200 V | 22.2 A |
| 3 x 230 V | 19.5 A |
| 3 x 380 V | 12.9 A |
| 3 x 400 V | 12.5 A |
| 3 x 460 V | 11.0 A |
| Max. primary current ($I_{1max}$) | |
| 3 x 200 V | 35.1 A |
| 3 x 230 V | 30.7 A |
| 3 x 380 V | 20.4 A |
| 3 x 400 V | 19.8 A |
| 3 x 460 V | 17.3 A |
| Mains fuse protection | |
| 3 x 200 / 230 V | 35 A slow-blow |
| 3 x 380 / 400 / 460 V | 35 A slow-blow |
| Mains voltage tolerance | -10 / +15% |
| Grid frequency | 50/60 Hz |
| Cos phi (1) | 0.99 |
| Max. permitted mains impedance $Z_{max}$ at PCC[1)] | 96 mOhm |
| Recommended residual current circuit breaker | Type B |
| Welding current range ($I_2$) | |
| MIG/MAG | 3 - 320 A |
| TIG | 3 - 320 A |
| MMA | 10 - 320 A |
| Welding current at 10 min/40 °C (104 °F) | |
| $U_1$ = 200 - 230 V | 40% / 320 A<br>60% / 260 A<br>100% / 220 A |
| $U_1$ = 380 - 460 V | 40% / 320 A<br>60% / 260 A<br>100% / 220 A |
| Output voltage range according to standard characteristic ($U_2$) | |
| MIG/MAG | 14.2 - 30.0 V |
| TIG | 10.1 - 22.8 V |
| MMA | 20.4 - 32.8 V |
| Open circuit voltage ($U_0$ peak / $U_0$ r.m.s) | 82 V |

| | |
|---|---|
| Protection class | IP 23 |
| Type of cooling | AF |
| Overvoltage category | III |
| Pollution degree according to IEC60664 | 3 |
| EMC device class | A [2)] |
| Safety symbols | S, CE, CSA |
| Dimensions L x W x H | 706 x 300 x 510 mm<br>27.8 x 11.8 x 20.1 in. |
| Weight | 34.7 kg / 78.9 lb. |
| Max. noise emission (LWA) | 69 dB (A) |
| Max. shielding gas pressure | 7 bar / 101 psi |
| Coolant | Original Fronius |
| Wire speed | 1 - 25 m/min / 40 - 980 ipm |
| Wire drive | 4-roller drive |
| Wire diameter | 0.8 - 1.6 mm / 0.03 - 0.06 in. |
| Wirespool diameter | max. 300 mm / max. 11.8 in. |
| Wirespool weight | max. 19.0 kg / max. 41.9 lb. |
| Idle state power consumption at 400 V | 34.7 W |
| Power source efficiency at 320 A / 32.8 V | 89% |

The wirefeeder for the TPS 320i C nc MV is integrated in the power source.

1) Interface to a 230/400 V and 50 Hz public grid
2) An emission class A device is not designed for use in residential areas supplied with power from a public low-voltage grid.
The electromagnetic compatibility can be influenced by conducted or radiated radio frequencies.

**Radio parameters**

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

The following table contains the frequency ranges and maximum HF transmission power used by Fronius wireless products sold in the EU in accordance with Article 10.8 (a) and 10.8 (b) of the RED.

| **Frequency range**<br>**Channels used**<br>**Power** | **Modulation** |
|---|---|
| 2412 - 2462 MHz<br>Channel: 1 - 11 b ,g, n HT20<br>Channel: 3 - 9 HT40<br>< 16 dBm | 802.11b: DSSS<br>(1Mbps DBPSK, 2Mbps DQPSK, 5.5/11Mbps CCK)<br><br>802.11g: OFDM<br>(6/9Mbps BPSK, 12/18Mbps QPSK, 24/36Mbps 16-QAM, 48/54Mbps 64-QAM)<br><br>802.11n: OFDM<br>(6.5Mbps BPSK, 13/19 Mbps QPSK, 26/39 Mbps16-QAM,52/58.5/65Mbps 64-QAM) |
| 13.56 MHz<br>-14.6 dBµA/m at 10 m | Functions:<br>R/W, card emulation and P2P<br><br>Protocol standards:<br>ISO 14443A/B, ISO15693, ISO18092,<br>NFCIP-2,<br><br>Data rate:<br>848 kbps<br><br>Reader/Writer, Card Emulation, Peer to Peer Modes |
| 2402 - 2482 MHz<br>0 - 39<br>< 4 dBm | GFSK |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