



TransSteel 3500, TransSteel 5000

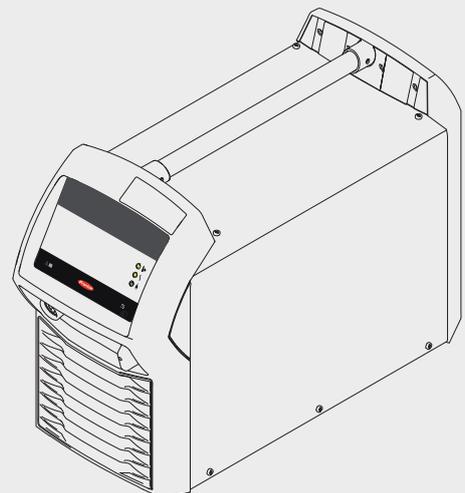
EN

Operating instructions

MIG/MAG power source



42,0426,0076,EN 038-28042021



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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.

Environmental conditions

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

Ambient temperature range:

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

Relative humidity:

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

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

Obligations of the operator

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

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

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

Obligations of personnel

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

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

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

Mains connection

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

This may affect a number 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

Protecting yourself and others

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

- flying sparks and hot pieces of metal
- Arc radiation, which can damage eyes and skin
- Hazardous electromagnetic fields, which can endanger the lives of those using cardiac pacemakers
- Risk of electrocution from mains current and welding current
- Greater noise pollution
- Harmful welding fumes and gases

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

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

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

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

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

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

Danger from toxic gases and vapours

The fumes produced during welding contain harmful gases and vapours.

Welding fumes contain substances that 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 m³ 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
- Irreparable damage to ground conductors
- Damage to device and other electrical equipment

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

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

Position the device with sufficient insulation against electrically conductive environments, e.g. Insulation against conductive floor or insulation to conductive racks.

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

In the case of automated MIG/MAG applications, ensure that only an insulated wire electrode is routed from the welding wire drum, large wirefeeder spool or wirepool to the 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
 - Power, signal and data transfer lines
 - IT and telecommunications devices
 - Measuring and calibrating devices
-

Supporting measures for avoidance of EMC problems:

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

EMF measures

Electromagnetic fields may pose as yet unknown risks to health:

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

Specific hazards

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

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

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

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

During operation

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

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

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

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

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

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

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

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

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

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

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

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

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

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 accessories (straps, handles, chains, etc.) used in connection with the device or its components must be tested regularly (e.g. for mechanical damage, corrosion or changes caused by other environmental factors).

The testing interval and scope of testing must comply with applicable national standards and directives as a minimum.

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 m³/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 conductivity, 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 Do not dispose of this device with normal domestic waste! To comply with the European Directive on Waste Electrical and Electronic Equipment and its implementation as national law, electrical equipment that has reached the end of its life must be collected separately and returned to an approved recycling facility. Any device that you no longer require must either be returned to your dealer or given to one of the approved collection and recycling facilities in your area. Ignoring this European Directive may have potentially adverse effects on the environment and your health!

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

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

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

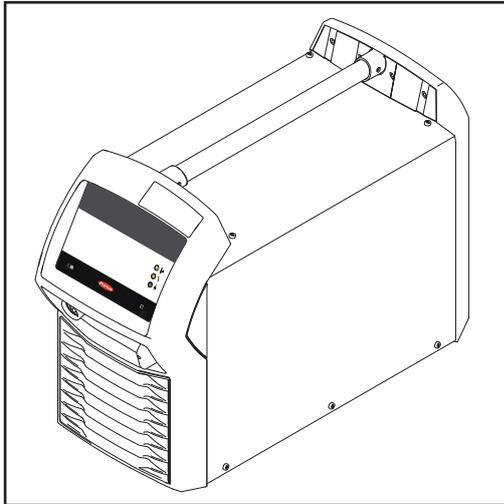
Data protection The user is responsible for the safekeeping of any changes made to the factory settings. The manufacturer accepts no liability for any deleted personal settings.

Copyright Copyright of these operating instructions remains with the manufacturer.

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

General information

Device concept



TSt 3500/5000 power source

The TransSteel (TSt) 3500 and TSt 5000 power sources are completely digitised, microprocessor-controlled inverter power sources.

The modular design and potential for system add-ons ensure a high degree of flexibility. The devices are designed for the welding of steel.

All devices are suitable for:

- MAG welding
- Manual metal arc welding

The device has a "Power limitation" safety feature. This means that the power source can be operated at the power limit without compromising process safety. For more information, see the "Welding mode" section in the operating instructions for the VR 5000 wire-feed unit.

Requirements

The TSt 3500 and TSt 5000 power sources can be used in conjunction with the VR 5000 wire-feed unit.

Functional principle

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

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

The device has a "Power limitation" safety feature. This means that the power source can be operated at the power limit without compromising process safety.

This results in:

- a precise welding process
- a high degree of 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 and galvanised sheets.

The TSt 3500/5000 power sources are designed for:

- Machine and equipment construction
- Steelwork
- Plant and container construction
- Shipyards and the offshore industry
- Metal and gantry construction
- Rolling stock construction

Warning notices on the device

Warning notices and safety symbols are affixed to the power source. These warning notices and safety symbols must not be removed or painted over. They warn against operating the device incorrectly, as this may result in serious injury and damage.

| | | | |
|--|---|--|--|
|  WARNING | |  <p>ARC RAYS can burn eyes and skin; NOISE can damage hearing.</p> <ul style="list-style-type: none"> ● Wear welding helmet with correct filter. ● Wear correct eye, ear and body protection. | <p>Read American National Standard Z49.1, "Safety in Welding and Cutting" From American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126; OSHA Safety and Health Standards, 29 CFR 1910, from U.S. Government Printing Office, Washington, DC 20402 CSA, W117-2 M87 Code for Safety in Welding and Cutting. 42.0409.5074</p> |
| Do not Remove, Destroy, Or Cover This Label | |  <p>EXPLODING PARTS can injure.</p> <ul style="list-style-type: none"> ● Failed parts can explode or cause other parts to explode when power is applied. ● Always wear a face shield and long sleeves when servicing. | |
| <p>ARC WELDING can be hazardous.</p> <ul style="list-style-type: none"> ● Read and follow all labels and the Owner's Manual carefully ● Only qualified persons are to install, operate, or service this unit according to all applicable codes and safety practices. ● Keep children away. ● Pacemaker wearers keep away. ● Welding wire and drive parts may be at welding voltage. | |  <p>ELECTRIC SHOCK can kill; SIGNIFICANT DC VOLTAGE exists after removal of input power</p> <ul style="list-style-type: none"> ● Always wait 60 seconds after power is turned off before working on unit. ● Check input capacitor voltage, and be sure it is near 0 before touching parts. | |
|  <p>ELECTRIC SHOCK can kill.</p> <ul style="list-style-type: none"> ● Always wear dry insulating gloves. ● Insulate yourself from work and ground. ● Do not touch live electrical parts. ● Disconnect input power before servicing. ● Keep all panels and covers securely in place. |  AVERTISSEMENT | | |
|  <p>FUMES AND GASES can be hazardous.</p> <ul style="list-style-type: none"> ● Keep your head out of the fumes. ● Ventilate area, or use breathing device. ● Read Material Safety Data Sheets (MSDSs) and manufacturer's instructions for materials used. |  <p>UN CHOC ELECTRIQUE peut etre mortel. SOUDAGE A L'ARC peut etre hasardeux.</p> <ul style="list-style-type: none"> ● Installation et raccordement de cette machine doivent etre conformes a tous les pertinents. ● Lire le manuel d'instructions avant utilisation. ● Ne pas installer sur une surface combustible. ● Les fils de soudage et pieces conductrices peuvent etre a la tension de soudage. | | |
|  <p>WELDING can cause fire or explosion.</p> <ul style="list-style-type: none"> ● Do not weld near flammable material. ● Watch for fire: keep extinguisher nearby. ● Do not locate unit over combustible surfaces. ● Do not weld on closed containers. | | | |



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 thoroughly read and understood the following documents:

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

System components

General

The 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.

Safety

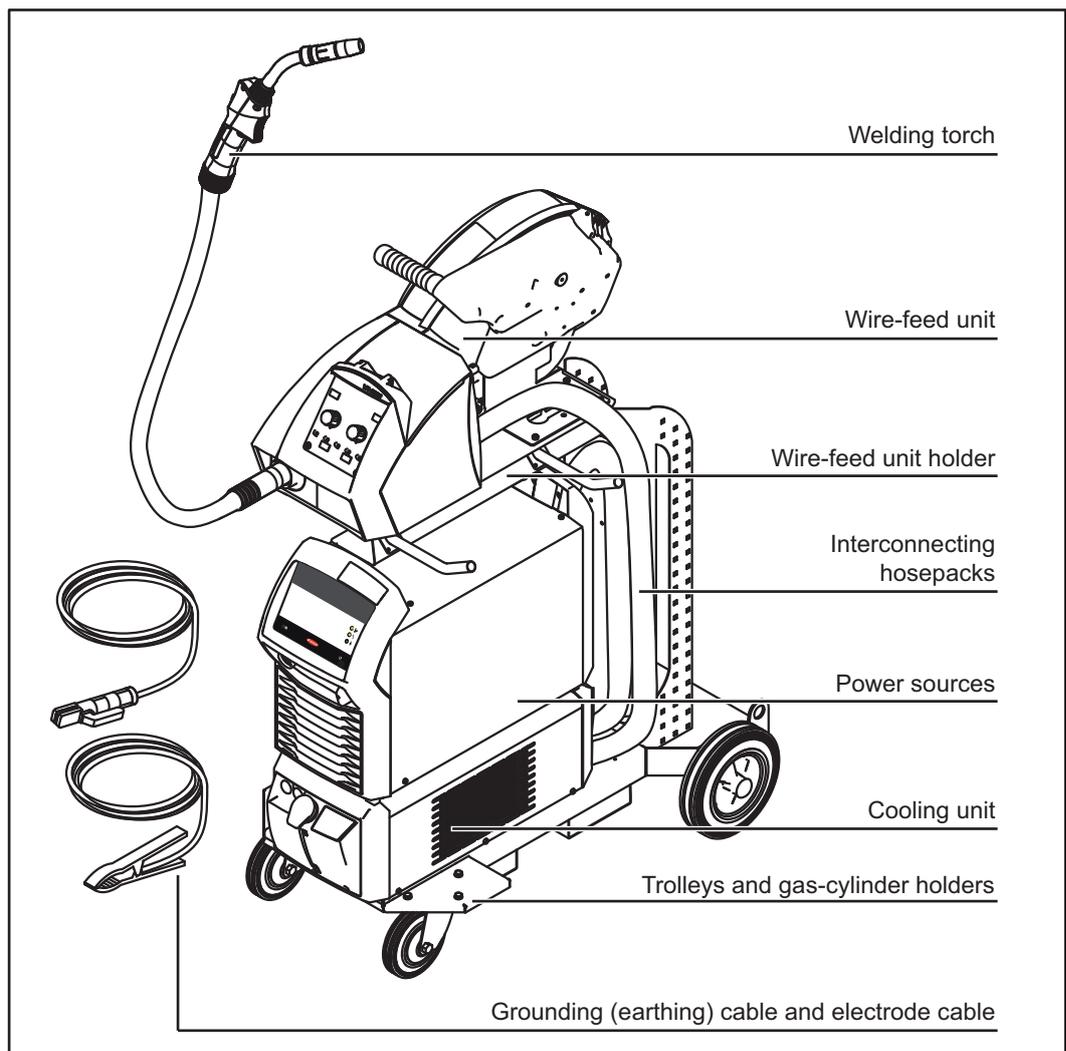
WARNING!

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!

Overview



Options

General The options listed below are available with all power source variants.

Machine interface The machine interface connects the power source to the machine control. The following signals can be transmitted across the machine interface:

Signal input: Start of welding / end of welding

- Signal input for a floating contact (sensor, relay, etc.) between pin X1:1 and pin X1:2
- The machine control signal input is processed by the power source in the same way as a welding torch signal input. Ensure that the correct mode is set (2-step or 4-step)
- Use gold-plated contacts for optimum signal transmission

Signal output: Current flow signal

- Floating contact between pin X1:3 and pin X1:4

NOTE!

The machine interface isolates the welding circuit up to a maximum of 500 V DC. To ensure reliable isolation from the welding circuit, use a relay with an insulation voltage greater than 1500 V DC.

Technical data - start/end of welding signal input

| | |
|---------------|-----|
| $U_{\max AC}$ | 5 V |
|---------------|-----|

| | |
|------------|------|
| I_{\max} | 4 mA |
|------------|------|

Technical data - current flow signal output

| | |
|------------|------|
| U_{\max} | 24 V |
|------------|------|

| | |
|------------|-------|
| I_{\max} | 20 mA |
|------------|-------|

Gas test button The gas test button sets the protective gas flow. The protective gas flow is activated when the gas test button is pressed and is deactivated after 30 seconds or if the button is pressed again. The wire-feed unit remains inactive.

Gas preheater CO2 connection External gas preheaters for gas pressure regulators can be connected to the gas preheater CO2 connection. Gas preheaters have a 36 V supply.

NOTE!

Voltage is only supplied to gas preheaters during welding operations.

The power of the gas preheaters must not exceed 150 W.
The gas preheater supply is protected against overloads and short-circuits.

Technical data

| | |
|---------------|--------------------|
| U_A | 36 V _{AC} |
| $P_{A, \max}$ | 150 W |

VRD: safety function

A Voltage Reduction Device (VRD) is an optional safety device for reducing the voltage. It is recommended for environments in which the risk of an electric shock or electrical accident is increased considerably during arc welding:

- Due to a low human body resistance of the welder
- If the welder is exposed to a clear risk of touching the workpiece or other parts of the welding circuit

A low human body resistance is possible when there is:

- water in the area
- humidity
- heat, particularly ambient temperatures in excess of 32°C (89.6°F)

In wet, damp or hot locations, humidity or sweat can significantly reduce the skin resistance and the insulation resistance of protective equipment and clothing.

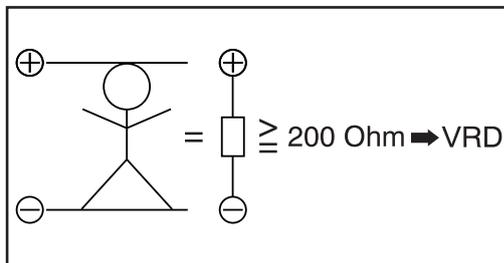
Such environments can include:

- Temporary dams for draining certain areas of a site during construction work (cofferdams)
- Trenches
- Mines
- Rain
- Areas partly submerged by water
- Spraywater areas

The VRD option reduces the voltage between the electrode and the workpiece. In safe conditions, the indicator for the currently selected welding process is permanently lit. A safe condition is defined as follows:

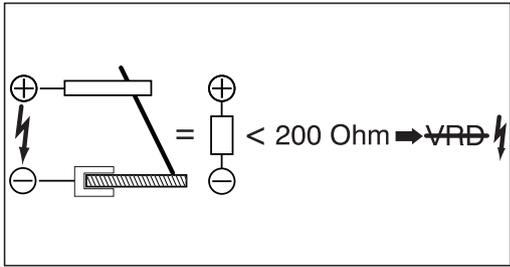
- The output voltage in an open circuit is limited to 35 V.

For as long as the welding operation is active (welding circuit resistance < 200 Ohm), the indicator of the currently selected welding process flashes and the output voltage may exceed 35 V.

VRD: safety principle

The welding circuit resistance is greater than the minimum human body resistance (greater than or equal to 200 Ohm):

- VRD is active
- Open circuit voltage is limited to 35 V
- Unintentional contact with the output voltage does not put the welder at risk



The welding circuit resistance is less than the minimum human body resistance (less than 200 Ohm):

- VRD is inactive
- Output voltage not restricted in order to ensure sufficient welding power
- Example: Welding starts

In MMA welding mode:
Within 0.3 seconds of end of welding:

- VRD is active again
- The output voltage is limited to 35 V once more

Control elements and connections

Description of the control panels

General

The functions on the control panels are all arranged in a logical way. The various welding parameters can easily be selected using buttons and can just as easily be

- altered using buttons or the adjusting dial
- displayed on the digital display during welding

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

NOTE!

Due to software updates, you may find that your device has certain functions that are not described in these operating instructions or vice versa.

Individual illustrations may also differ slightly from the actual controls on your device, but these controls function in exactly the same way.

“Remote” control panel

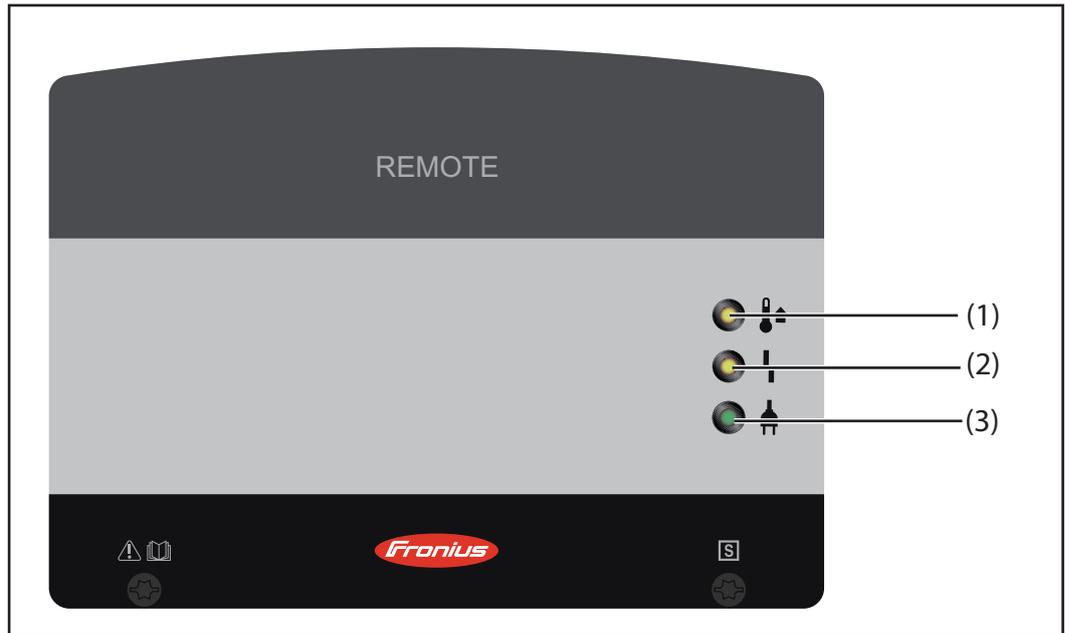
General

The "Remote" control panel is fitted as a standard part of the power source. The power source is operated from the control panel on the wire-feed unit.

The "Remote" power source can be operated via the following system add-ons:

- Remote control units
- Wire-feed unit
- Welding torch

Remote control panel

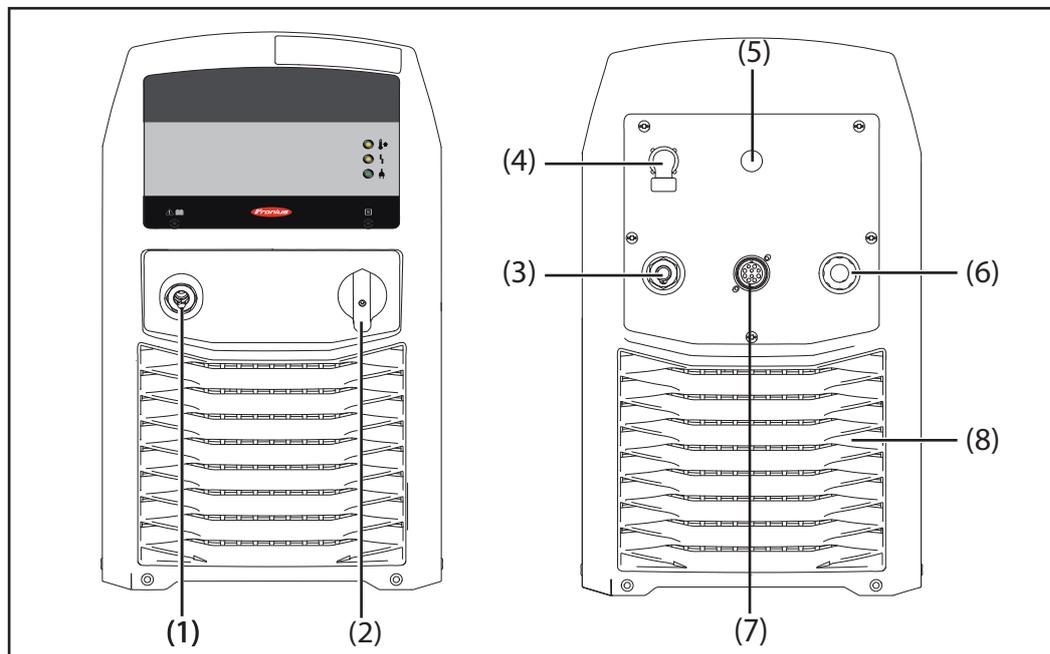


Remote control panel

| No. | Function |
|-----|---|
| (1) | Overtemperature indicator Lights up if the power source overheats (e.g. because the duty cycle has been exceeded). For more information on this, see the "Troubleshooting" section. |
| (2) | Error indicator Lights up if an error occurs. The corresponding service code is displayed on all devices connected to the LocalNet that have a digital display. |
| (3) | Power source ON indicator Lights up when the mains cable is plugged into the mains and the mains switch is in the - I - position |

Connections, switches and mechanical components

TSt 3500/5000
power source



TSt 3500/5000 power source

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

- | | |
|-----|---|
| (1) | <p>(-) - Current socket with bayonet latch used</p> <ul style="list-style-type: none"> - to connect the grounding (earthing) cable when MIG/MAG welding - to connect the electrode cable or grounding (earthing) cable when MMA welding (depending on the type of electrode used) |
| (2) | <p>Mains switch for switching the power source on and off</p> |
| (3) | <p>(+) - Current socket with bayonet latch used</p> <ul style="list-style-type: none"> - to connect the current cable from the interconnecting hosepack when MIG/MAG welding - to connect the electrode cable or grounding (earthing) cable when MMA welding (depending on the type of electrode used) |
| (4) | <p>Gas preheater (option)</p> |
| (5) | <p>Machine interface (option)</p> |
| (6) | <p>Mains cable with strain-relief device</p> |
| (7) | <p>LocalNet connection standardised connection socket for the wire-feed unit (intermediary hosepack)</p> |
| (8) | <p>Air filter remove from the side for cleaning</p> |

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 welding, gas-cooled

- Power source
 - Earth cable
 - MIG/MAG welding torch, gas-cooled
 - Gas connection (protective gas supply)
 - Wire-feed unit
 - Interconnecting hosepack
 - Wire electrode
-

MIG/MAG welding, water-cooled

- Power source
- Cooling unit
- Earth cable
- MIG/MAG welding torch, water-cooled
- Gas connection (protective gas supply)
- Wire-feed unit, water-cooled
- Interconnecting hosepack, water-cooled
- Wire electrode

Before installation and commissioning

Safety



WARNING!

Operating the equipment incorrectly can cause serious injury and damage.

- ▶ 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.
-



WARNING!

An electric shock can be fatal.

If the power source is connected to the mains electricity supply during installation, there is a high risk of very serious injury and damage.

- ▶ Before carrying out any work on the device make sure that the power source mains switch is in the "O" position
 - ▶ Before carrying out any work on the device make sure that the power source is unplugged from the mains
-

Utilisation for intended purpose only

The power source may only be used for MIG/MAG and MMA welding. Any other form of usage is deemed "not in accordance with the intended purpose". The manufacturer shall not be held liable for any damages arising from such usage.

Utilisation in accordance with the "intended purpose" also comprises

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

Setup regulations

The device is tested to IP 23 protection, meaning:

- Protection against penetration by solid foreign bodies with diameters > 12 mm (0.49 in.)
- Protection against spraywater at any angle up to 60° to the vertical

The device can be set up and operated outdoors in accordance with degree of protection IP 23.

Avoid direct wetting (e.g. from rain).



WARNING!

Toppling or falling devices can cause life-threatening injuries.

- ▶ Place devices on a solid, level surface so that they remain stable.
-



WARNING!

Danger from electrical current due to electrically conductive dust in the device.

This can result in serious injury and damage to property.

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

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

Mains connection The devices are designed for the mains voltage specified on the rating plate. If your version of the appliance does not come with mains cables and plugs ready-fitted, these must be fitted in accordance with national regulations and standards. For details of fuse protection of the mains lead, please see the technical data.

**CAUTION!**

An inadequately dimensioned electrical installation can cause serious damage.

- ▶ The mains lead and its fuse must be dimensioned to suit the local power supply. The technical data shown on the rating plate applies.
-

Connecting the mains cable

General

If no mains cable is connected, a mains cable that conforms to the requisite connection voltage must be fitted before commissioning.

A strain-relief device for the following cable cross-sections is installed on the power source:

| Power source | Cable cross-section | |
|--------------|---------------------|--------|
| | Canada/US | Europe |
| TSt 3500 | AWG 12 *) | 4G2.5 |
| TSt 5000 | AWG 10 *) | 4G4 |
| TSt 3500 MV | AWG 10 *) | 4G4 |
| TSt 5000 MV | AWG 6 *) | 4G10 |

*) Canada/US cable type: Extra-hard usage

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

Stipulated mains cables and strain-relief devices

| Power source | Mains voltage | Cable cross-section | |
|--------------|-----------------------------|---------------------|--------|
| | | Canada/US | Europe |
| TSt 3500 | 3 x 380 / 400 V | AWG 12 *) | 4G2.5 |
| | 3 x 460 V | AWG 12 *) | 4G2.5 |
| TSt 5000 | 3 x 380 / 400 V | AWG 8 *) | 4G4 |
| | 3 x 460 V | AWG 10 *) | 4G4 |
| TSt 3500 MV | 3 x 208 / 230 / 400 / 460 V | AWG 10 *) | 4G4 |
| TSt 5000 MV | 3 x 208 / 230 / 400 / 460 V | AWG 6 *) | 4G10 |

*) Canada/US cable type: Extra-hard usage

The item numbers of the different cables can be found in the spare parts list towards the end of the document.

American wire gauge

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

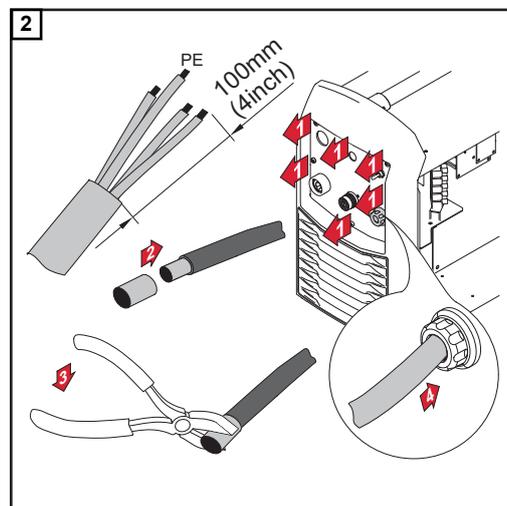
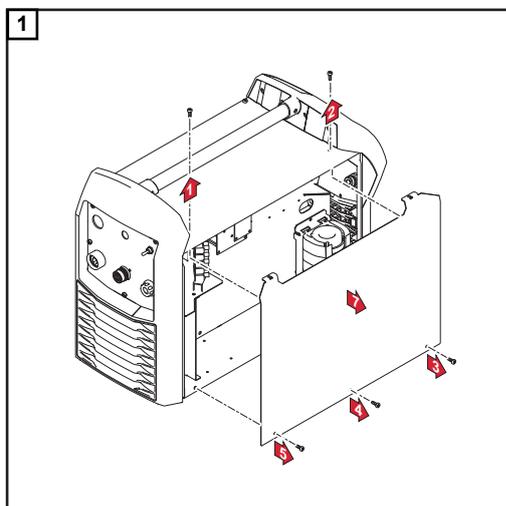
If no mains cable is connected, a mains cable that is suitable for the connection voltage must be fitted before commissioning.

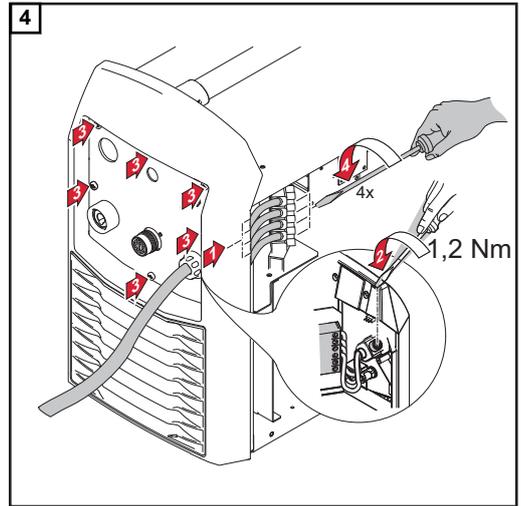
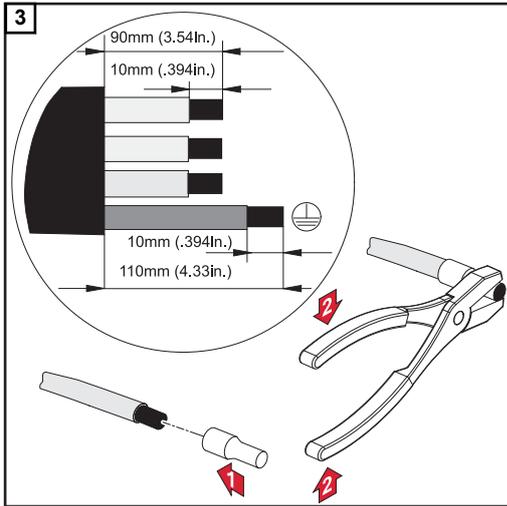
The ground conductor should be approx. 10 - 15 mm (0.4 - 0.6 in.) longer than the phase conductors.

An illustration of the mains cable connection can be found in the following sections: "Fitting the strain-relief device" or "Fitting the strain-relief device for Canada / US". To connect the mains cable, proceed as follows:

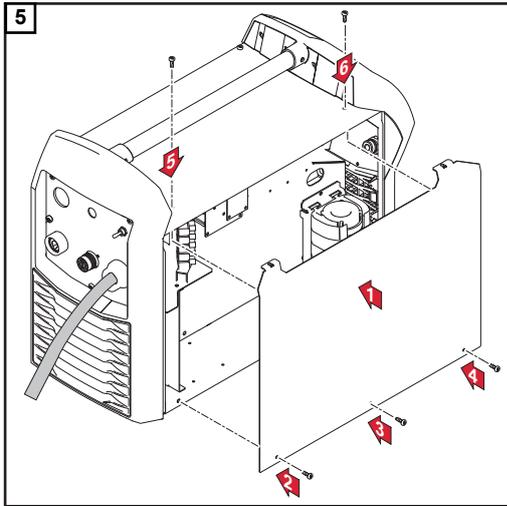
- 1 Remove the side panel from the device
- 2 Push the mains cable in far enough to make it possible to connect the ground conductor and the phase conductors to the block terminal properly.
- 3 Fit ferrules to the ground conductor and phase conductors
- 4 Connect the ground conductor and phase conductors to the block terminal
- 5 Use the strain-relief device to secure the mains cable
- 6 Fit the side panel of the device

Fitting the Europe strain-relief device

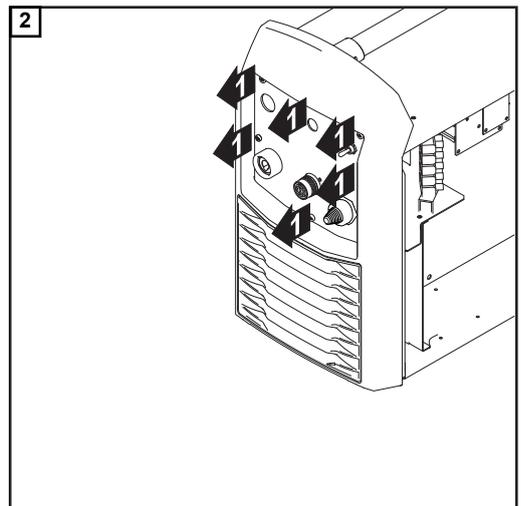
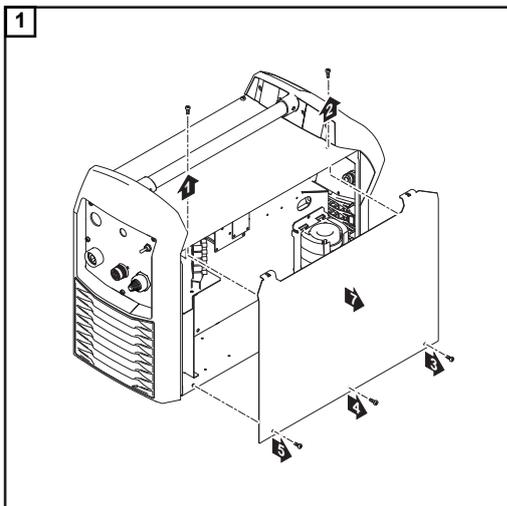


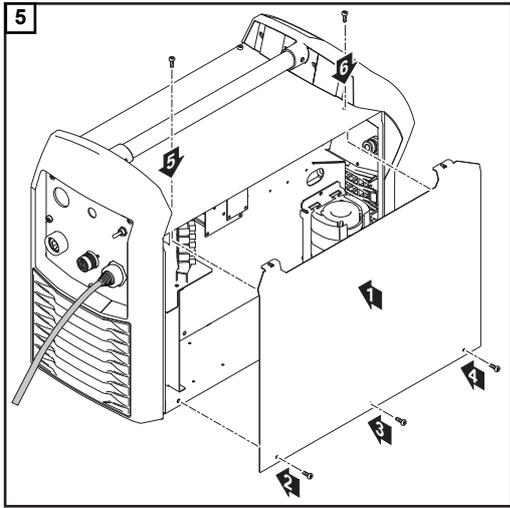
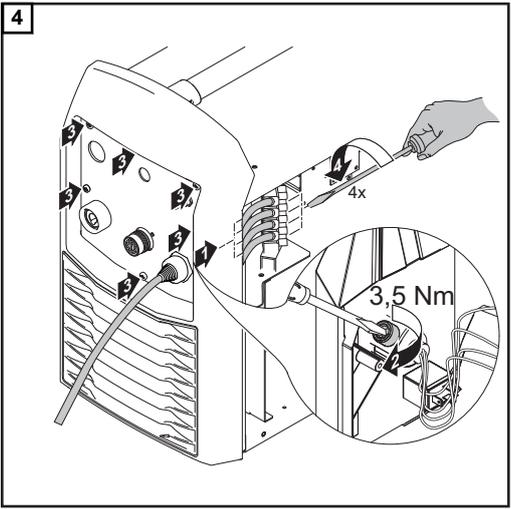
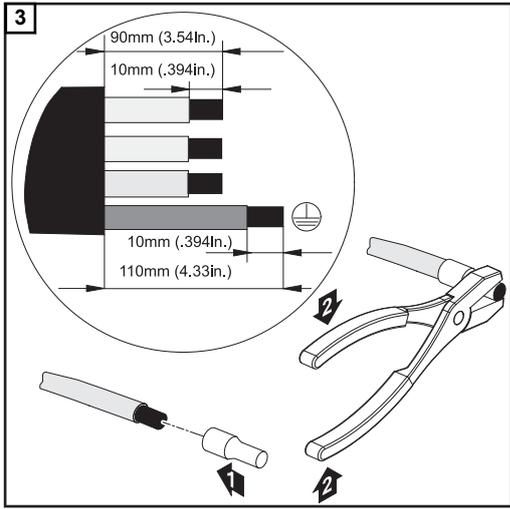


IMPORTANT! Tie the phase conductors near the block terminals using cable ties.



Fitting the strain-relief device for Canada / US and TSt 5000 MV Europe





IMPORTANT! Tie the phase conductors near the luster terminal using cable ties.

Generator-powered operation

Generator-powered operation

The power source is generator-compatible.

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

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

3-phase devices: $S_{1\max} = I_{1\max} \times U_1 \times \sqrt{3}$

Single-phase devices: $S_{1\max} = I_{1\max} \times U_1$

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

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

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

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

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

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

NOTE!

The voltage delivered by the generator must never exceed the upper or lower limits of the mains voltage tolerance range.

Details of the mains voltage tolerance can be found in the "Technical data" section.

Start-up

General

Commissioning a power source is described by reference to a manual water-cooled MIG/MAG application.

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.

Fitting the system components (overview)

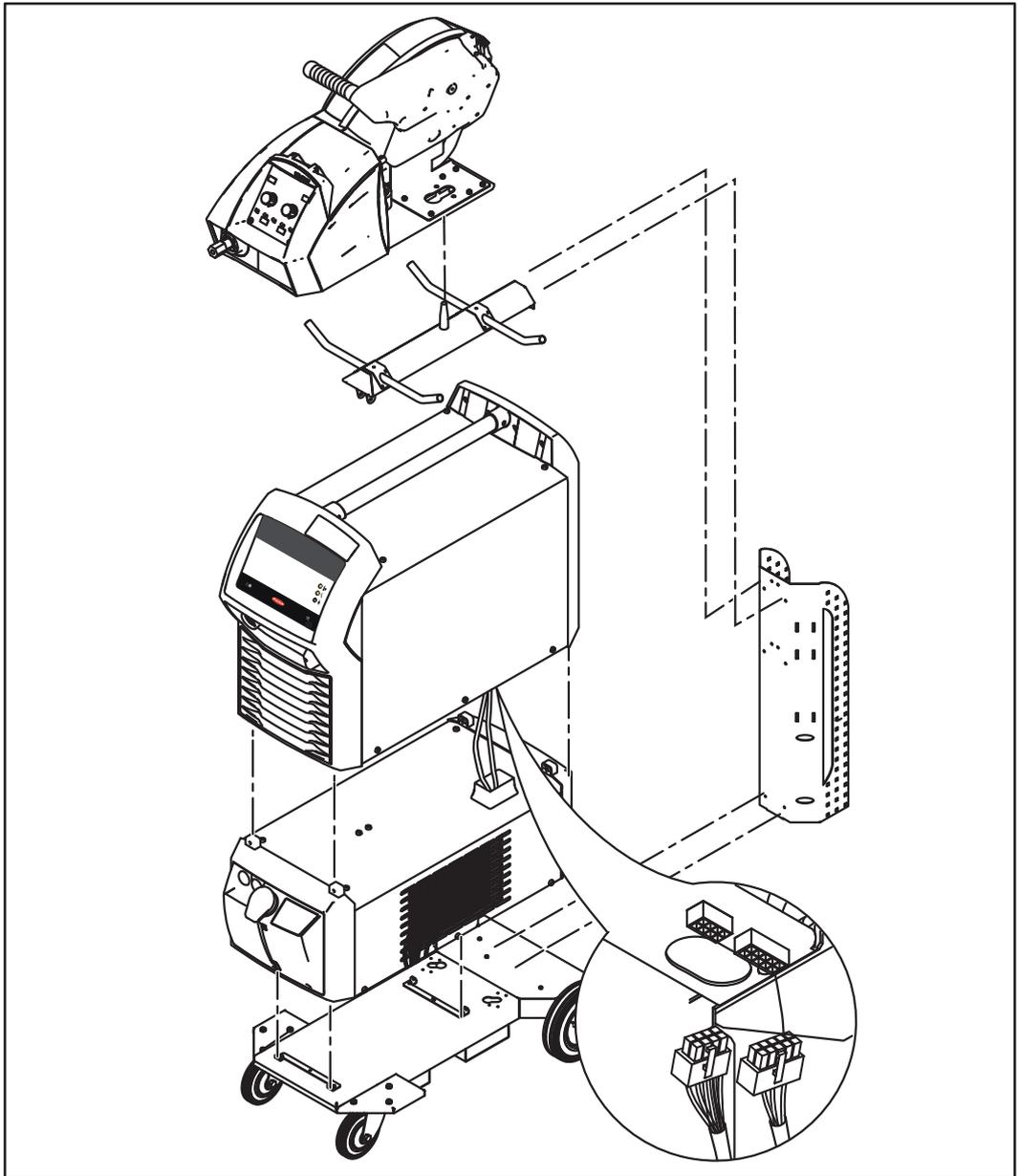


WARNING!

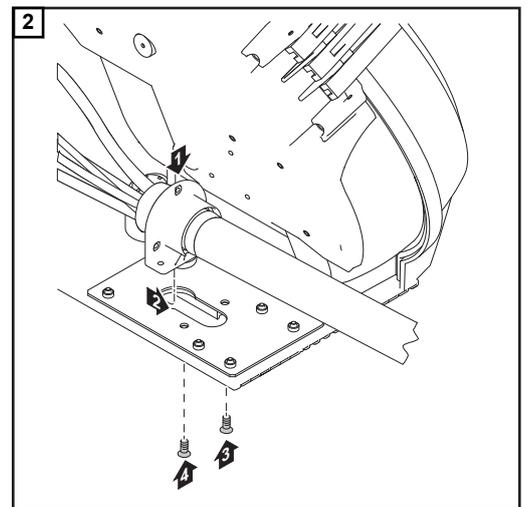
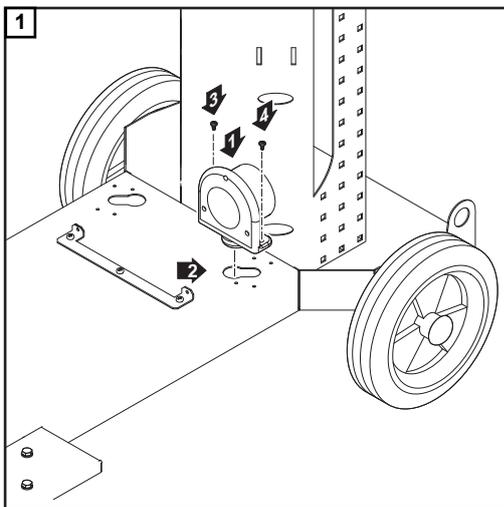
Work that is carried out incorrectly can cause serious injury and damage.

The following activities must only be carried out by trained and qualified personnel. All instructions in the section headed "Safety rules" must be observed.

The diagram below is intended to show you how to fit the individual system components. For detailed information about the individual steps, please refer to the operating instructions for the system components.



Strain-relief device

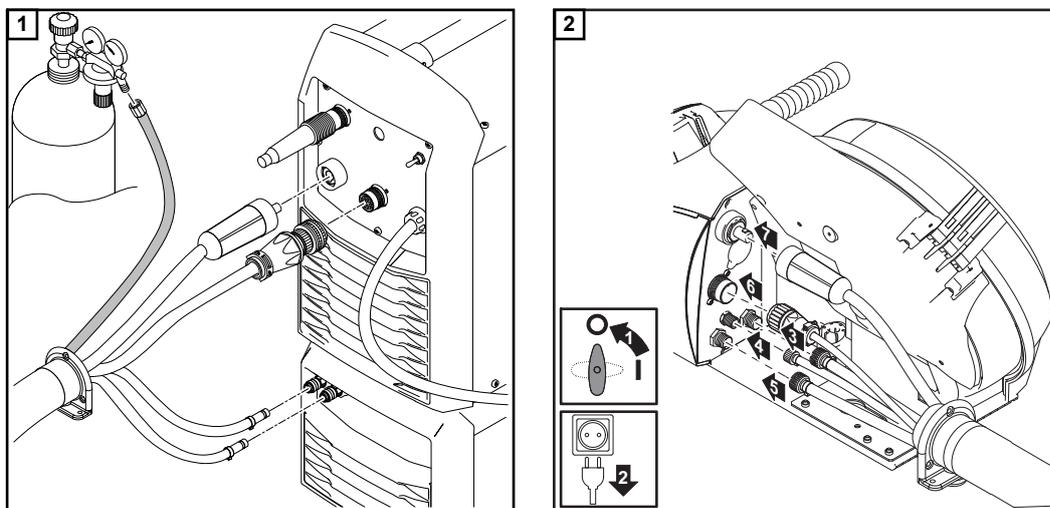


Connecting the interconnecting hosepack

IMPORTANT!

Gas-cooled systems are not fitted with a cooling device.

The water connections therefore do not need to be connected for gas-cooled systems.



Connecting the gas cylinder



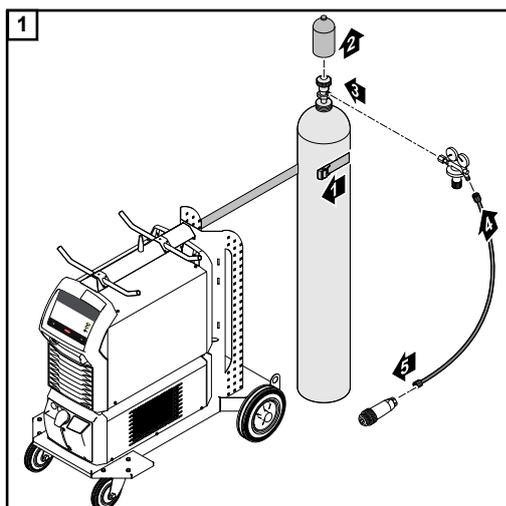
WARNING!

If gas cylinders topple over, there is a risk of very serious injury and damage.

When using gas cylinders

- ▶ Place them on a solid, level surface in such a way that they remain stable
- ▶ Secure the gas cylinders to prevent them from falling over
- ▶ Fit the VR holder option

Follow the gas cylinder manufacturer's safety rules.



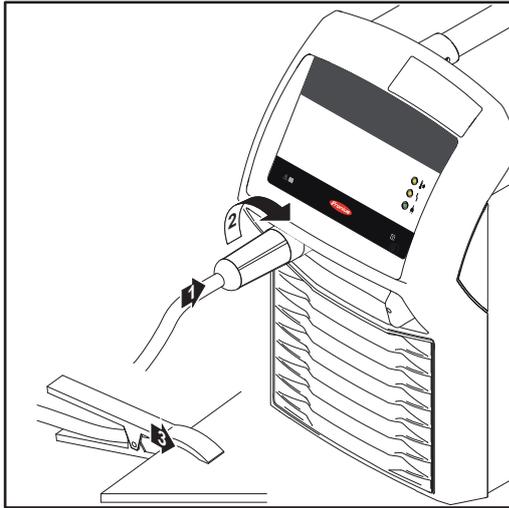
- Briefly open the gas cylinder valve to blow off any dust or dirt
- Check the seal on the pressure regulator

NOTE!

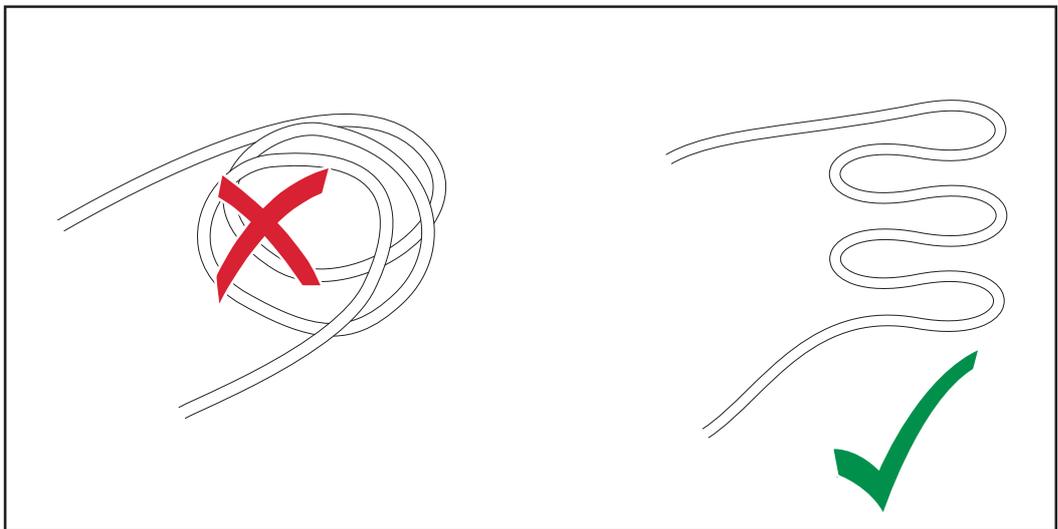
US devices are supplied with an adapter for the gas hose:

- ▶ Seal male thread spacers on the gas solenoid valve using suitable means before screwing on the adapter.
- ▶ Test the adapter to ensure that it is gas-tight.

Creating a grounding (earthing) connection, connecting the welding torch



Laying the hosepacks correctly



Other activities

Carry out the following steps in accordance with the wire-feed unit operating instructions:

- 1** Insert the feed rollers in the wire-feed unit
- 2** Place the wirepool or basket-type spool and basket spool adapter in the wire-feed unit
- 3** Feed in the wire electrode
- 4** Set the contact pressure

Troubleshooting and maintenance

Troubleshooting

General

The power sources are equipped with an intelligent safety system. This means that it has been possible to dispense with melting-type fuses entirely. Melting-type fuses therefore no longer need to be replaced. After a possible malfunction has been remedied, the power source is ready for use again.

Safety



WARNING!

Work that is carried out incorrectly may result in serious injury or damage to property.

- ▶ The activities described below must only be carried out by trained and qualified personnel.
 - ▶ Observe the safety rules in the power source Operating Instructions.
-



WARNING!

An electric shock can be fatal.

Before opening the unit

- ▶ Turn the mains switch to the "O" position
 - ▶ Unplug the device from the mains
 - ▶ Put up an easy-to-understand warning sign to stop anybody inadvertently switching it back on again
 - ▶ Using a suitable measuring device, check to make sure that electrically charged components (e.g. capacitors) have discharged
-



WARNING!

Danger from inadequate ground conductor connection.

Possible serious injury and damage to property.

- ▶ The housing screws provide a suitable ground conductor connection for earthing the housing and must NOT be replaced by any other screws that do not provide a reliable ground conductor connection.
-

Power source - troubleshooting

Make a note of the serial number and configuration of the device and contact our After-Sales Service team with a detailed description of the error, if

- errors occur that are not listed below
 - the troubleshooting measures listed are unsuccessful
-

Over-temperature LED lights up

Cause: Over-temperature in control circuit

Remedy: Leave power source to cool

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, one of the overtemperature service codes "to" is displayed. Detailed information on the service codes "to0" to "to6" can be found in the section "Displayed service codes".

Cause: Overload

Remedy: Take the duty cycle into account

Cause: Thermostatic safety cut-out has tripped

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

Cause: Limited supply of cooling air

Remedy: Remove air filter on the rear of the housing from the side and clean. Ensure that the cooling air ducts are accessible.

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, power source ON indication is lit up, indications on wire-feed unit not lit up

Cause: The interconnecting hosepack is faulty or not connected properly

Remedy: Check 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 parameters

Remedy: Check the settings

Cause: Poor ground earth connection

Remedy: Ensure good contact to workpiece

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 the welding torch

Cause: Wrong contact tip, or contact tip is worn out

Remedy: Replace the 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

The welding torch becomes very hot

Cause: The design dimensions of the welding torch are not sufficient for this task

Remedy: Observe the duty cycle and loading limits

Cause: Inadequate coolant flow

Remedy: Check coolant level, flow rate, contamination, etc., Coolant pump blocked: Tighten the coolant pump shaft

Care, maintenance and disposal

General

Under normal operating conditions, the welding system 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!

An electric shock can be fatal.

Before opening the device

- ▶ Turn the mains switch to the "O" position
 - ▶ Unplug the device from the mains
 - ▶ Ensure the device cannot be switched back on
 - ▶ Using a suitable measuring instrument, check to make sure that electrically charged components (e.g. capacitors) have been discharged
-

WARNING!

Work that is carried out incorrectly can cause serious injury and damage.

- ▶ The following activities must only be carried out by trained and qualified personnel.
 - ▶ All instructions in the section headed "Safety rules" must be observed.
-

At every start-up

- Check mains plug, mains cable, welding torch, interconnecting hosepack and ground earth connection for damage
- Check that the device has an all-round clearance of 0.5 m (1 ft. 8 in.) to ensure that cooling air can flow in and out freely

NOTE!

The air inlets and outlets must never be covered, not even partially.

Every 2 months

CAUTION!

Risk of damage.

- ▶ The air filter must only be fitted when dry.
 - ▶ If required, clean air filter using dry compressed air or by washing it.
-

Every 6 months

CAUTION!

Danger due to the effect of compressed air.

This can result in damage to property.

- ▶ Do not bring the air nozzle too close to electronic components.
-

- 1 Dismantle device side panels and clean inside of device with dry, reduced compressed air
- 2 If a lot of dust has accumulated, clean the cooling air ducts

**WARNING!****An electric shock can be fatal!**

Risk of electric shock from improperly connected ground cables and equipment grounds.

- ▶ When reassembling the side panels, make sure that grounding cables and equipment grounds are properly connected.
-

Disposal

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

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

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.

Explanation of the term "duty cycle"

Duty cycle (D.C.) is the proportion of time in a 10-minute cycle at which the device may be operated at its rated output without overheating.

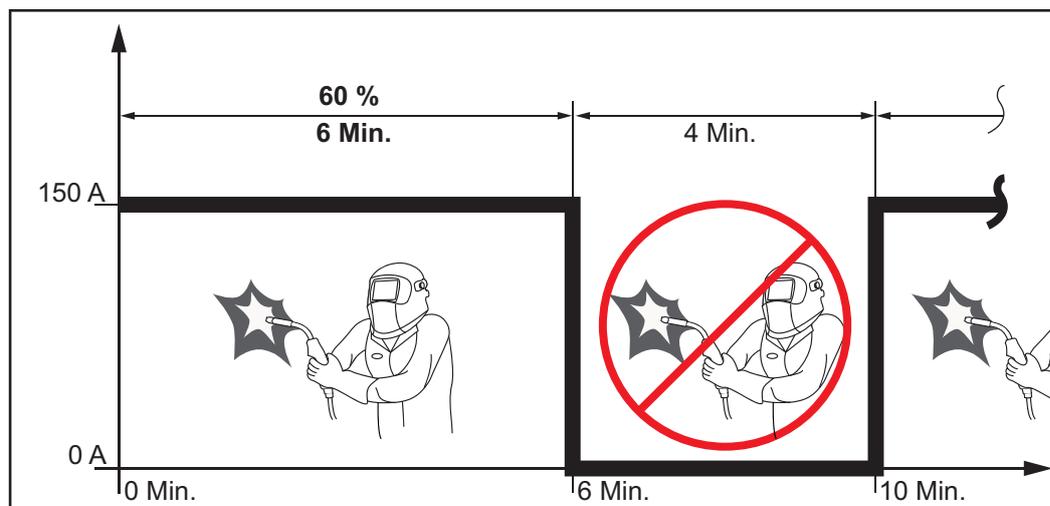
NOTE!

The D.C. values specified on the rating plate are based on an ambient temperature of 40°C.

If the ambient temperature is higher, either the D.C. or output must be reduced accordingly.

Example: Welding at 150 A at 60% D.C.

- Welding phase = 60% of 10 minutes = 6 minutes
- Cooling phase = remaining time = 4 minutes
- After the cooling phase, the cycle begins anew.



If the device is to be continuously operated without stopping:

- 1 look in the technical data for a D.C. value of 100% for the reigning 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.

TSt 3500

| | | | | |
|--|---|--------|--------|--|
| Mains voltage (U_1) | 3 x | 380 V | 400 V | 460 V |
| Max. effective primary current ($I_{1\text{eff}}$) | | 15.0 A | 14.4 A | 12.6 A |
| Max. primary current ($I_{1\text{max}}$) | | 23.6 A | 22.7 A | 19.8 A |
| Mains fuse | | | | 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⁾ | | | | 77 mOhm |
| Recommended earth-leakage circuit breaker | | | | Type B |
| Welding current range (I_2) | | | | |
| MIG/MAG | | | | 10 - 350 A |
| Rod electrode | | | | 10 - 350 A |
| Welding current at | 10 min / 40 °C (104 °F) | 40 % | 60 % | 100 % |
| | | 350 A | 300 A | 250 A |
| Output voltage range according to standard characteristic (U_2) | | | | |
| MIG/MAG | | | | 14.5 - 31.5 V |
| Rod electrode | | | | 20.4 - 35.0 V |
| Open circuit voltage (U_0 peak / U_0 r.m.s) | | | | 60 V |
| Apparent power | at 400 V AC / 350 A / 40 % ED ²⁾ | | | 15,673 kVA |
| Degree of protection | | | | IP 23 |
| Type of cooling | | | | AF |
| Insulation class | | | | B |
| Overvoltage category | | | | III |
| Pollution level according to IEC60664 | | | | 3 |
| EMC device class | | | | A ³⁾ |
| Safety symbols | | | | S, CE, CSA |
| Dimensions l x w x h | | | | 747 x 300 x 497 mm 29.4 x 11.8 x 19.6 in. |
| Weight | | | | 29 kg 63.5 lb. |
| Efficiency at 250 A and 26.5 V | | | | 89 % |
| Max. noise emission (L_{WA}) | | | | 72 dB (A) |

- 1) Interface to a 230/400 V, 50 Hz public grid
- 2) ED = duty cycle
- 3) A device in emissions class A is not intended for use in residential areas in which the electrical power is supplied via a public low-voltage grid.
The electromagnetic compatibility may be influenced by conducted or radiated radio frequencies.

TSt 5000

| | | | | |
|--|---|--|--------|--------|
| Mains voltage (U_1) | 3 x | 380 V | 400 V | 460 V |
| Max. effective primary current ($I_{1\text{eff}}$) | | 27 A | 25.9 A | 23.2 A |
| Max. primary current ($I_{1\text{max}}$) | | 42.7 A | 41.0 A | 36.7 A |
| Mains fuse | | 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⁾ | | 11 mOhm | | |
| Recommended earth-leakage circuit breaker | | Type B | | |
| Welding current range (I_2) | | | | |
| MIG/MAG | | 10 - 500 A | | |
| Rod electrode | | 10 - 500 A | | |
| Welding current at | 10 min / 40 °C (104 °F) | 40 % | 60 % | 100 % |
| | | 500 A | 420 A | 360 A |
| Output voltage range according to standard characteristic (U_2) | | | | |
| MIG/MAG | | 14.3 - 39 V | | |
| Rod electrode | | 20.2 - 40 V | | |
| Open circuit voltage (U_0 peak / U_0 r.m.s) | | 65 V | | |
| Apparent power | at 400 V AC / 500 A / 40 % ED ²⁾ | 28,361 kVA | | |
| Degree of protection | | IP 23 | | |
| Type of cooling | | AF | | |
| Insulation class | | B | | |
| Overvoltage category | | III | | |
| Pollution level according to IEC60664 | | 3 | | |
| EMC device class | | A ³⁾ | | |
| Safety symbols | | S, CE, CSA | | |
| Dimensions l x w x h | | 747 x 300 x 497 mm 29.4 x 11.8 x 19.6 in. | | |
| Weight | | 32.3 kg 71.2 lb. | | |

| | |
|----------------------------------|-----------|
| Efficiency at 360 A and 32 V | 91 % |
| Max. noise emission (L_{WA}) | 74 dB (A) |

- 1) Interface to a 230/400 V, 50 Hz public grid
- 2) ED = duty cycle
- 3) A device in emissions class A is not intended for use in residential areas in which the electrical power is supplied via a public low-voltage grid.
The electromagnetic compatibility may be influenced by conducted or radiated radio frequencies.

TSt 3500 MV

| | | | |
|---|---|----------------|-------------|
| Mains voltage (U_1) | 3 x | 200 V | 230 V |
| Max. effective primary current (I_{1eff}) | | 24.1 A | 20.8 A |
| Max. primary current (I_{1max}) | | 38.1 A | 32.9 A |
| Mains fuse | | 35 A slow-blow | |
| Mains voltage (U_1) | 3 x | 400 V | 460 V |
| Max. effective primary current (I_{1eff}) | | 11.9 A | 10.6 A |
| Max. primary current (I_{1max}) | | 18.7 A | 16.7 A |
| Mains fuse | | 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⁾ | | 122 mOhm | |
| Recommended earth-leakage circuit breaker | | Type B | |
| Welding current range (I_2) | | | |
| MIG/MAG | | 10 - 350 A | |
| Rod electrode | | 10 - 350 A | |
| Welding current at | 10 min / 40 °C (104 °F) | 40 % | 60 % 100 % |
| U_1 : 200 - 460 V | | 350 A | 300 A 250 A |
| Output voltage range according to standard characteristic (U_2) | | | |
| MIG/MAG | | 14.5 - 31.5 V | |
| Rod electrode | | 20.4 - 35 V | |
| Open circuit voltage (U_0 peak / U_0 r.m.s) | | 50 V | |
| Apparent power | at 200 V AC / 350 A / 40 % ED ²⁾ | 13,189 kVA | |

| at 400 V AC / 350 A / 40 % ED ²⁾ | | 12,965 kVA |
|---|--|--|
| Degree of protection | | IP 23 |
| Type of cooling | | AF |
| Insulation class | | B |
| Overvoltage category | | III |
| Pollution level according to IEC60664 | | 3 |
| EMC device class | | A ³⁾ |
| Safety symbols | | S, CE, CSA |
| Dimensions l x w x h | | 747 x 300 x 497 mm 29.4 x 11.8 x 19.6 in. |
| Weight | | 37.3 kg 82 lb. |
| Efficiency at 250 A and 26.5 V | | 87 % |
| Max. noise emission (L _{WA}) | | 74 dB (A) |

- 1) Interface to a 230/400 V, 50 Hz public grid
- 2) ED = duty cycle
- 3) A device in emissions class A is not intended for use in residential areas in which the electrical power is supplied via a public low-voltage grid.
The electromagnetic compatibility may be influenced by conducted or radiated radio frequencies.

TSt 5000 MV

| | | | |
|--|-----|----------------|--------|
| Mains voltage (U ₁) | 3 x | 200 V | 230 V |
| Max. effective primary current (I _{1eff}) | | 39.5 A | 36.3 A |
| Max. primary current (I _{1max}) | | 66.7 A | 57.4 A |
| Mains fuse | | 63 A slow-blow | |
| Mains voltage (U ₁) | 3 x | 400 V | 460 V |
| Max. effective primary current (I _{1eff}) | | 20.6 A | 18.1 A |
| Max. primary current (I _{1max}) | | 32.5 A | 28.6 A |
| Mains fuse | | 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⁾ | | 63 mOhm | |
| Recommended earth-leakage circuit breaker | | Type B | |

| | | | | |
|---|---|--|-------|-------|
| Welding current range (I_2) | | | | |
| MIG/MAG | | 10 - 500 A | | |
| Rod electrode | | 10 - 500 A | | |
| Welding current at | 10 min / 40 °C (104 °F) | 35 % | 60 % | 100 % |
| U ₁ : 200 V | | 500 A | 420 A | 360 A |
| Welding current at | 10 min / 40 °C (104 °F) | 40 % | 60 % | 100 % |
| U ₁ : 208 - 460 V | | 500 A | 420 A | 360 A |
| Output voltage range according to standard characteristic (U ₂) | | | | |
| MIG/MAG | | 14.3 - 39 V | | |
| Rod electrode | | 20.2 - 40 V | | |
| Open circuit voltage (U ₀ peak / U ₀ r.m.s) | | 57 V | | |
| | | | | |
| Apparent power | at 200 V AC / 500 A / 40 % ED ²⁾ | 23,089 kVA | | |
| | at 400 V AC / 500 A / 40 % ED ²⁾ | 22,492 kVA | | |
| Degree of protection | | IP 23 | | |
| Type of cooling | | AF | | |
| Insulation class | | B | | |
| Overvoltage category | | III | | |
| Pollution level according to IEC60664 | | 3 | | |
| EMC device class | | A ³⁾ | | |
| Safety symbols | | S, CE, CSA | | |
| Dimensions l x w x h | | 747 x 300 x 497 mm 29.4 x 11.8 x 19.6 in. | | |
| Weight | | 43.6 kg 96.1 lb. | | |
| Efficiency at 250 A and 26.5 V | | 88 % | | |
| Max. noise emission (L _{WA}) | | 75 dB (A) | | |

- 1) Interface to a 230/400 V, 50 Hz public grid
- 2) ED = duty cycle
- 3) A device in emissions class A is not intended for use in residential areas in which the electrical power is supplied via a public low-voltage grid.
The electromagnetic compatibility may be influenced by conducted or radiated radio frequencies.

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 = 28020065, calculation of the year of production = $28 - 11 = 17$, year of production = 2017

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