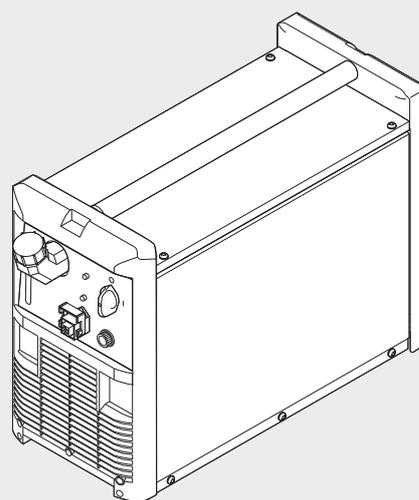


**FK 6000**  
**FK 6000 Pipe**  
**FK 6000 - 400 V**

EN

Operating Instructions  
Spare parts list  
Cooling unit





# Dear reader,

## Introduction

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

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

## Explanation of safety symbols



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



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



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



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

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

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



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# Safety rules

## General



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

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

---

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

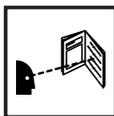


The operator must only allow persons to work with the device who:

- 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

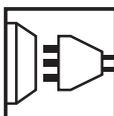


Before using the device, all persons instructed to do so undertake:

- 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 of types of device in terms of:

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



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

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



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

**Protecting yourself and others**



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

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



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



- Risk of electrocution from mains current and welding current



- Greater noise pollution



- Harmful welding fumes and gases

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

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



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

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



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

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

**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 may, under certain circumstances, cause birth defects or cancer.

Keep your face away from welding fumes and gases.

Fumes and hazardous gases

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

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

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

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

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.

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

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

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

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

---

**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 temporary backing or cover for the earth or ground potential. This temporary backing or cover must extend over the entire area between the body and the earth or ground potential.

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

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

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

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

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

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

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

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

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

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

Switch off unused devices.

Wear a safety harness if working at height.



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

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

After opening the device:

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

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

## Meandering welding currents



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

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

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

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

---

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

---

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

---

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

---

## 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.

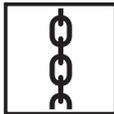


Use only suitable load-carrying equipment supplied by the manufacturer when transporting devices by crane.

- 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.

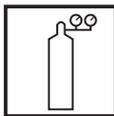


All lifting accessories (straps, handles, chains, etc.) used in connection with the device or its components must be tested regularly (e.g. for mechanical damage, corrosion or changes caused by other environmental factors). The testing interval and scope of testing must comply with applicable national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

## Factors affecting welding results



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

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

Filters must be used if necessary.



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

## 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<sup>3</sup>/hour.
- Observe safety and maintenance instructions on the shielding gas cylinder or the main gas supply.
- Close the shielding gas cylinder valve or main gas supply if no welding is taking place.
- Check the shielding gas cylinder or main gas supply for uncontrolled gas leakage before every start-up.

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



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

- The maximum permissible tilt angle is 10°.



Special regulations apply in rooms at risk of fire or explosion

- Observe relevant national and international regulations.

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

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

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

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

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

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

- Wirefeeder
- Wirespool
- Shielding gas cylinder

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

---

## Safety measures in normal operation



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

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

---

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

---

Never bypass or disable safety devices.

---

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

---

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

---

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



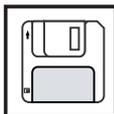
Devices with the CE mark satisfy the essential requirements of the low-voltage and electromagnetic compatibility directives (e.g. relevant product standards of the EN 60 974 series).

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.

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## Copyright

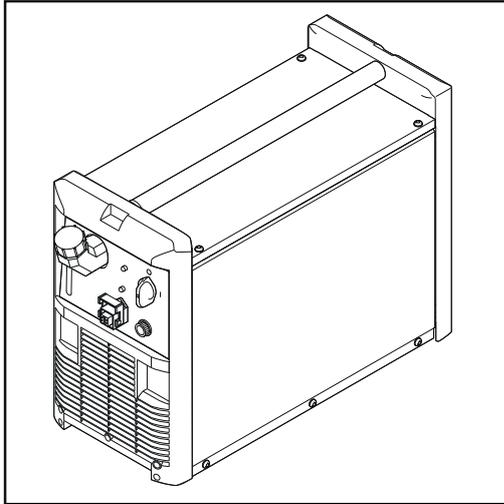


Copyright of these operating instructions remains with the manufacturer.

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

## Appliance concept



The FK 6000 cooling unit is a “use-anywhere” cooling unit with suitability for all welding processes at the high end of the power range. The FK 6000 can be operated independently of a power source. When deployed directly next to the wirefeeder, there is no need for a long interconnecting hosepack.

## Areas of utilisation

The FK 6000 cooling unit is a “use-anywhere” appliance that is suitable for many different welding processes:

- Welding at high ambient temperatures
- High welding power from one power source
- Operating power sources in parallel (power sharing)
- TimeTwin Digital
- Plasma welding
- TIG welding at the high end of the power range

## Information about the coolant



**CAUTION!** Risk of damage.

- Only use coolant available from the manufacturer.
- Do not mix different coolants.
- When changing the coolant, ensure to change all of it.
- When switching from ethanol-based coolant to FCL 10 coolant, Change Kit FCL10 must be used and the instructions provided must be followed.

## Custom versions

### FK 6000 Pipe

The FK 6000 Pipe cooling unit is a special version of the FK 6000 that is designed for deployment under extreme climatic conditions. The FK 6000 Pipe comes with the following additional equipment:

- Special coolant pump and delivery hoses for the low-temperature range
- Special coolant with improved thermal characteristics for low-temperature environments
- Coolant watchdog option with connector for external signal evaluation by the robot control
- Water filter
- Auto-transformer



**NOTE!** Only fill or top up the reservoir of the FK 6000 Pipe cooling unit with original Fronius Pipe coolant. Due to their electrical conductivity and inadequate material compatibility, and to the high thermal stresses encountered in this application, all other antifreeze agents are unsuitable for use here.

**FK 6000 - 400 V**

The cooling unit FK 6000 - 400V has an auto-transformer as standard and can also be operated at following input voltages:

110 / 230 / 400 / 440 / 460 V.

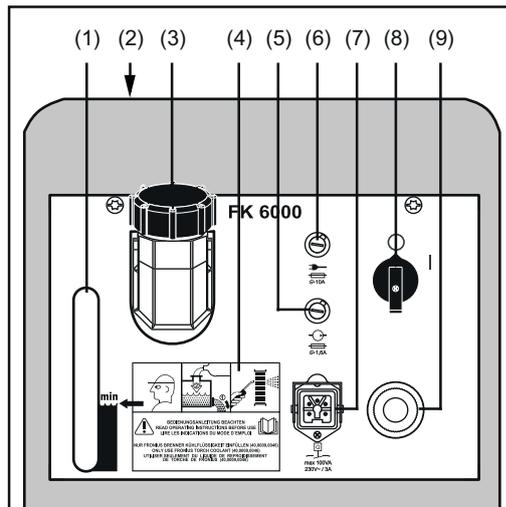
# Control elements and connections

## Safety

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

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

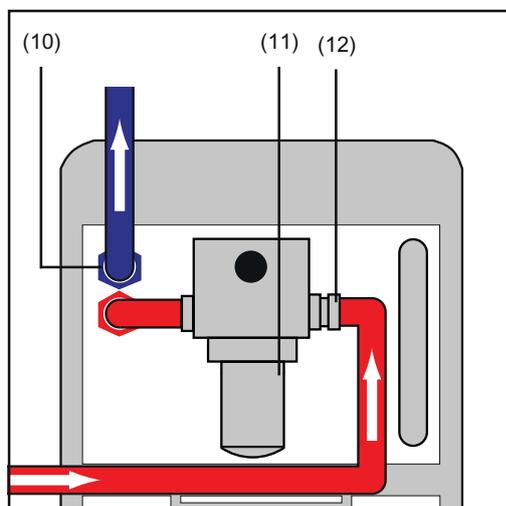
## Front



- (1) **Coolant inspection window**
- (2) **Rating plate**
- (3) **Screw-cap and filler neck**
- (4) **Important notes on maintenance and operation**
- (5) **Fuse for mains power supply**  
is tripped if the wrong mains voltage has been set, or if overvoltage occurs
- (6) **Fuse for coolant pump**  
is tripped if the coolant pump is overloaded or blocked

- (7) **Connection jack for coolant watchdog**  
for signal evaluation by the robot control. The signal evaluation is carried out via pins 3 and 4 of the connection socket.
- (8) **Mains switch**
- (9) **Mains cable / mains cable lead-through**

## Rear



- (10) **Coolant forward-flow connector (blue)**
- (11) **Water filter**
- (12) **Coolant return-flow connector (red)**

**IMPORTANT!** Fit the filter retaining plate using the accompanying screws and insert the filter. The connections are fitted with screw connections as standard. If required, attach the plug connectors provided to the connections.

# Possible configurations

## Safety



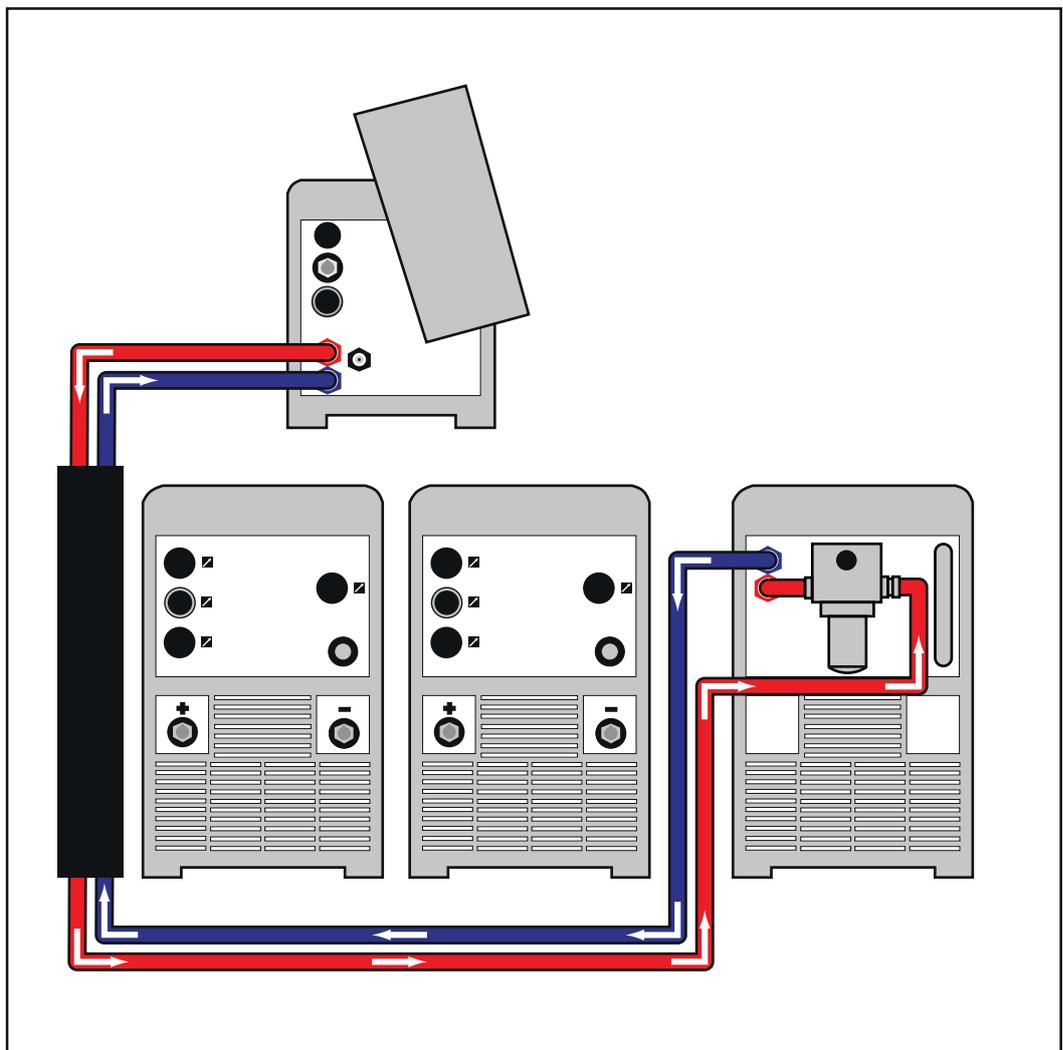
**WARNING!** An electric shock can be fatal. If the unit is plugged into the mains electricity supply during installation, there is a high risk of very serious injury and damage. Only carry out any work on the unit if

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

## Standard configuration using interconnecting hosepack or connection hoses

This configuration should be used for:

- applications with one power source only
- operating power sources in parallel (power sharing)
- plasma applications



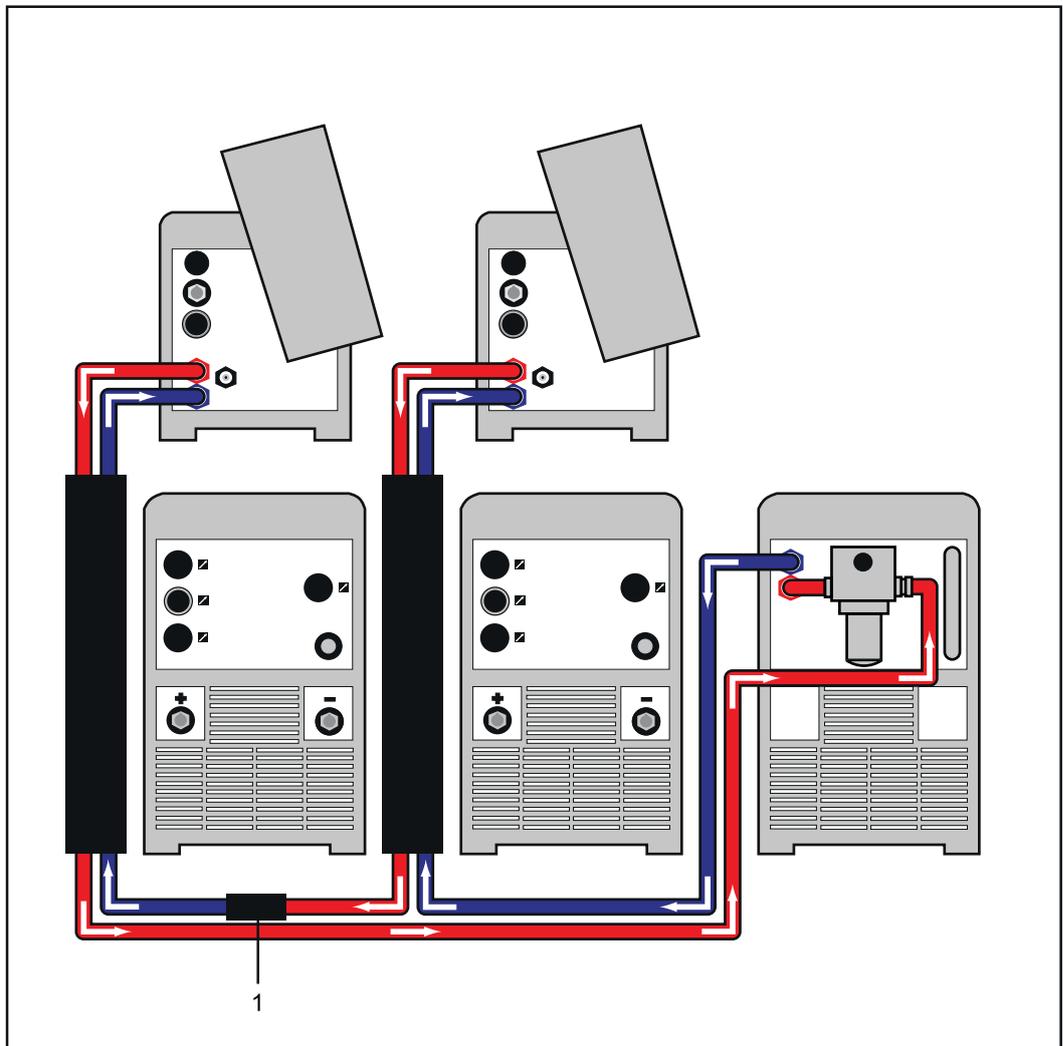
*Standard configuration using interconnecting hosepack or connection hoses*

**Connecting in series using interconnecting hosepack**

This configuration should be used for:

- TimeTwin Digital applications where the wirefeeders are placed near the power sources

Alternatively, a series connection is also possible using connection hoses



*Connecting in series using interconnecting hosepack*

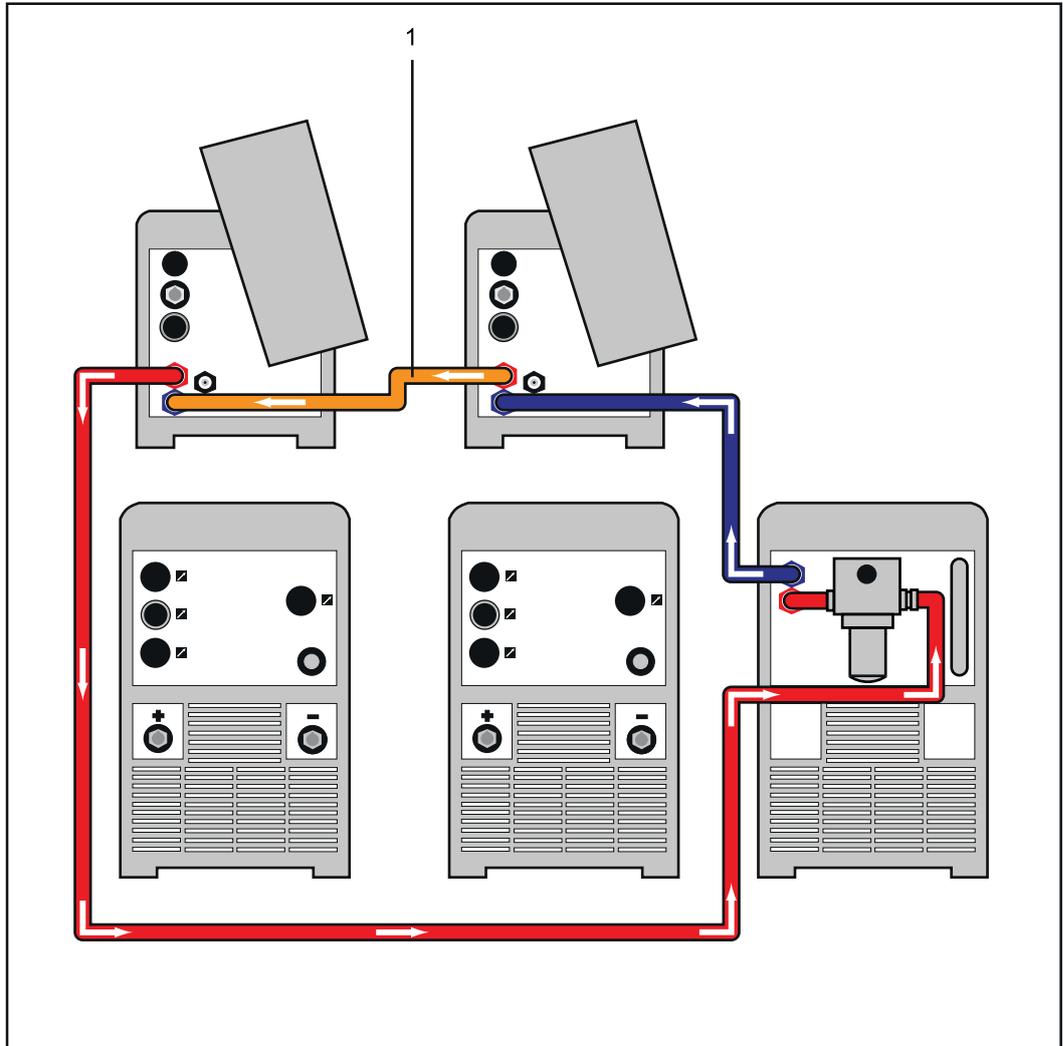
**(1) Double quick-acting coupler**

**Connecting in series using connection hoses**

This configuration should be used for:

- TimeTwin Digital applications where the wirefeeders are placed near the power sources

Alternatively, a series connection is also possible using connection hoses



*Connecting in series using connection hoses*

**(1) Connecting lead**

# Before commissioning

## Safety



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

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

## Utilisation for intended purpose only

The cooling unit may **ONLY** be used for cooling welding system components used in MIG/MAG, TIG, MMA (electrode) or plasma welding.

Utilisation for any other purpose, or in any other manner, shall be deemed to be “not in accordance with the intended purpose”. The manufacturer shall not be liable for any damage resulting from such improper use.

Utilisation in accordance with the “intended purpose” also comprises

- following all the instructions given in this manual
- performing all stipulated inspection and servicing work.

## Setup regulations



**WARNING!** If one of these devices falls or topples over, it could cause serious or even fatal injury. Place all system components on a solid, level surface in such a way that they remain stable.



**WARNING!** An electric shock can be fatal. There is a risk of serious injury and damage if the cooling unit is not insulated correctly. Always ensure that there is no electrically conductive connection between the base plate of the cooling unit and the surface. Before installing the cooling unit, remove all electrically conductive parts between the base plate of the cooling unit and the surface.

The device is tested to IP23 protection, meaning:

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

### Cooling air

The system must be set up in such a way that the cooling air can flow unimpeded through the slots in the side panels. Ensure that there is constantly a 0.5 m (1 ft. 7.69 in.) all-round clearance around the device.



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

### Dust

Ensure that no metallic dust, for example from grinding work, is sucked into the system by the fan.

### Outdoor operation

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

**Mains connection**

The equipment is designed to run on the mains voltage given on the respective rating plates. If your version of the appliance does not come with the mains cables and plugs ready-mounted, these must be mounted in accordance with your national regulations and Standards. For details of fuse protection of the mains supply lead, please see the Technical Data.

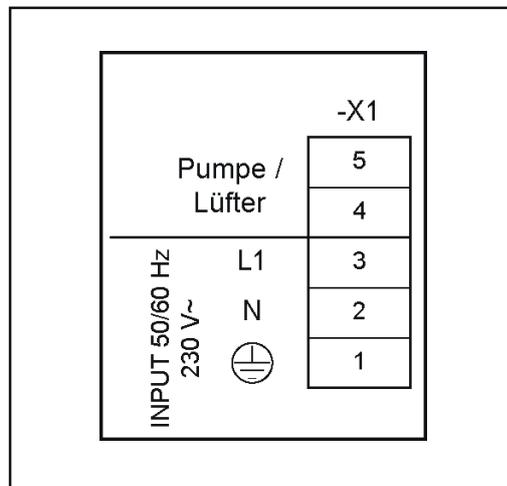


**NOTE!** Inadequately dimensioned electrical installations can lead to serious damage to (or loss of) property. The mains supply lead, and its fuse protection, must be dimensioned accordingly. The technical data shown on the rating plate shall apply.



**CAUTION!** Running the unit on the wrong mains voltage can cause serious damage. The mains voltage that you enter on the rating plate must be the same as the voltage that you have just set.

**Mains voltage of FK 6000**

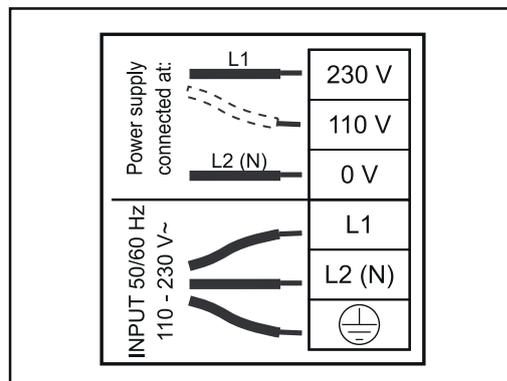


FK 6000: fixed mains voltage

**IMPORTANT!** The FK 6000 cooling unit is fixed at 230 V. It cannot be altered to any other mains voltage.

**Setting the mains voltage of FK 6000 Pipe**

The FK 6000 Pipe cooling unit can be used with different mains voltages. The mains voltage set at the factory is shown on the rating plate.

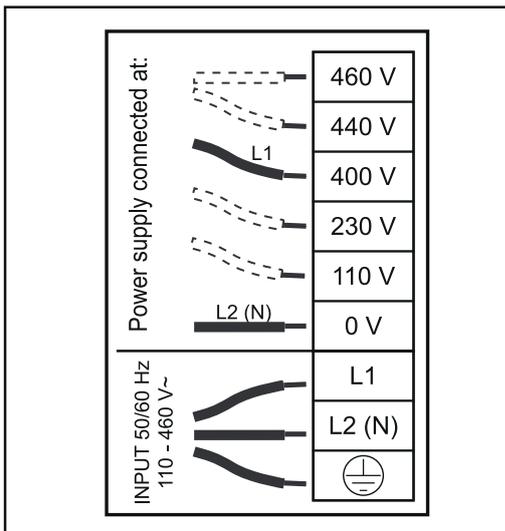


FK 6000 Pipe: Setting the mains voltage

How to set the mains voltage:

- 1 Shift the mains switch into the "O" position
- 2 Unplug or otherwise disconnect the unit from the mains power supply
- 3 Open the housing
- 4 Connect the phase conductor (L1) to the appropriate terminal for your mains voltage
- 5 Check that all cables are fixed firmly
- 6 Close the housing
- 7 Cross out the mains voltage originally entered on the rating plate and - in the empty box - enter the mains voltage that you have just set

**Setting the mains voltage of FK 6000 - 400 V**



FK 6000 - 400 V: Setting the mains voltage

How to set the mains voltage

- 1** Shift the mains switch into the “O” position
- 2** Unplug or otherwise disconnect the unit from the mains power supply
- 3** Open the housing
- 4** Connect the phase conductor (L1) to the appropriate terminal for your mains voltage
- 5** Check that all cables are fixed firmly
- 6** Close the housing
- 7** Cross out the mains voltage originally entered on the rating plate and - in the empty box - enter the mains voltage that you have just set.

# Start-up

---

**General remarks** The cooling units are supplied “dry”, i.e. without any coolant in the reservoir. The coolant is supplied separately, in two 5l canisters. Before using the cooling unit for the first time, fill the reservoir with coolant!

---

**Guarantee provisions regarding the coolant pump** The coolant pump may only be used with original coolant supplied by the manufacturer. Do not allow the coolant pump to run dry (even for a very short time), as this will destroy the coolant pump. The manufacturer accepts no liability for damage caused in such cases.

---

**Information on the coolant** Only use original Fronius coolant for the filling of the cooling unit. Other antifreezers cannot be recommended due to their electric conductivity and compatibility.

---

**Filling / topping up the reservoir with coolant**

- 1 Shift the mains switch of the power source into the “O” position
- 2 Unscrew the screw-cap
- 3 Top up the reservoir with coolant
- 4 Screw the cap back on again - the cooling unit is now ready for operation



**NOTE!** After filling the reservoir of the cooling unit with coolant for the first time, you must vent the cooling unit before starting to use it.

---

**Purge cooling unit** Purge the cooling unit

- after the first filling,
- if there is no coolant circulation although the cooling pump works.

Purge cooling unit:

- 1 Plug in mains plug or connect power supply
- 2 Switch mains switch in position “I” - the cooling unit is ready for operation
- 3 Shift back safety ring on the plug-type connection of water flow - black
- 4 Disconnect water flow hose
- 5 Press in carefully and hold conical nipple in the centre of the plug-type connection of the water flow by means of a wooden or plastic pin
- 6 Release conical nipple as soon as liquid penetrates
- 7 Reconnect water flow hose
- 8 Check water hoses for tightness

Repeat purge until proper return flow to the filler neck is ensured.

---

**Start operation of cooling unit**



**NOTE!** Before any start-up of the cooling unit, check the coolant level as well as the coolant purity.

- 1 Connect supply of power source(s)

- 2 Switch mains switch of the power source(s) in position "1" - the cooling pump starts operation.
- 3 Check coolant flow until proper flow is ensured. If necessary, deairate coolant circulation.



**NOTE!** During welding check coolant flow at regular intervals - a proper return flow must be visible in the filler neck.

---

**Changing the welding torch**



**CAUTION!** Excess pressure will damage the cooling unit. Before blowing out the welding torch with compressed air, undo the screw cap on the fill nozzle.

# Care, maintenance and disposal

**General remarks** Under normal operating conditions the cooling unit requires only a minimum of care and maintenance. However, it is indispensable to follow some important points to ensure the operability of the welding machine for many years.

## Safety

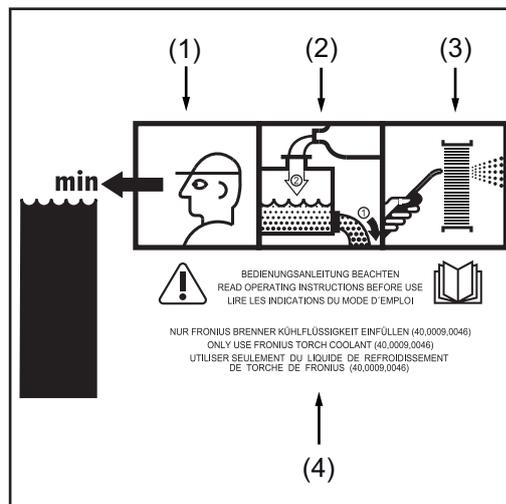
 **WARNING!** An electric shock can be fatal. Before opening up the machine, switch it off, unplug it from the mains and put up a clearly legible and easy-to-understand warning sign to stop anybody inadvertently switching the machine back on again. The casing screws are a suitable protective conductor connection for grounding the casing. The screws must not be replaced by other screws without reliable protective conductor connection.

 **CAUTION!** Danger of scalding from hot coolant fluid. Do not inspect the coolant connection points until the coolant has been allowed to cool.

**IMPORTANT!** The coolant must not be disposed of via the sewerage!

 **NOTE!** For refilling the cooling unit only use coolant of the manufacturer.

## Symbols for care and maintenance of the cooling unit



- (1) Check coolant level
- (2) Change the coolant
- (3) Gas purge the cooler
- (4) Read operating instructions

The relevant maintenance intervals and work are described in detail in the following pages.

## Every start-up

- Check welding torch, interconnection cable assembly and bondings for damage
- Check whether the allround distance of 0.5 m (1.6 ft.) is kept to ensure that the cooling air can easily flow and escape.

 **NOTE!** Furthermore, air inlets and outlets must in no case be covered, not even covered partly.

 **CAUTION!** Danger of scalding from hot coolant fluid. Do not inspect the coolant connection points until the coolant has been allowed to cool.

If water-cooled welding torch is used:

- Check water connections for tightness
- Control water return flowrate in coolant container
- If there is no water return flow, check cooling unit and purge if necessary



**NOTE!** If water-cooled welding torches are operated without cooling water, this mostly causes a defect of the torch body or the hose pack. The manufacturer does not accept responsibility for any consequential damages. Any warranty claims expire.

**Every week**

- 1 Check the coolant level as well as the coolant purity.
- 2 If the coolant level drops below the “min“ mark ... refill coolant.

**Every 2 months**

- 1 Check the coolant level as well as the coolant purity.
- 2 If the coolant level drops below the “min“ mark ... refill coolant.

**Every 6 months**

- 1 Dismantle machine side panels and clean machine inside with dry reduced compressed air



**NOTE!** Risk of damage to electronic components. Clean electronic components from a certain distance only.

- 2 Clean also the water coolers in the case of excessive dust

**Every 12 months**

- 1 Change the coolant
- 2 Dispose of used coolant correctly.

**Applicability of the “General Terms of Delivery and Payment”**

With respect to cooling units, the warranty provisions of the “General Terms of Delivery and Payment” referred to in the pricelist shall only apply where the following conditions are fulfilled:

- max. 8 operating hours per day (single-shift operation)
- only Fronius coolant may be used
- the unit is given regular maintenance and the coolant is changed regularly

**Disposal**

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

# Troubleshooting

---

## Safety



**WARNING!** An electric shock can be fatal. Before opening up the unit:

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



**CAUTION!** Inadequate PE conductor connections can cause serious injury and damage. The housing screws provide a suitable PE conductor connection for earthing (grounding) the housing and must NOT be replaced by any other screws which do not provide a reliable PE conductor connection.

---

## Troubleshooting

### Not enough coolant circulation, or none at all

Cause: Coolant level is too low

Remedy: Top up the reservoir with coolant

Cause: Constriction or foreign body in the cooling circuit

Remedy: Eliminate the constriction or foreign body

Cause: Fuse for coolant pump is faulty

Remedy: Replace the coolant pump fuse, as described in the section headed "Fuse protection of the cooling-unit"

Cause: Coolant pump is faulty

Remedy: Replace the coolant pump

Cause: The coolant filter in the plug-type connector for coolant return-flow is blocked

Remedy: Clean the coolant filter with clean tap water or replace the filter-insert

Cause: Permissible duty cycle exceeded

Remedy: Await cooling-down phase of the coolant pump

---

### Cooling capacity too low

Cause: Fan defective

Remedy: Replace fan

Cause: Cooling pump defective

Remedy: Replace coolant pump

Cause: Cooler contaminated

Remedy: Clean cooler with dry compressed air

Cause: Cooling capacity of cooling unit too low

Remedy: Use cooling unit with higher cooling capacity

---

**High operating noise level**

Cause: Coolant level too low

Remedy: Refill coolant

Cause: Cooling pump defective

Remedy: Replace coolant pump

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# Technical data

## General remarks



**NOTE!** Inadequately dimensioned electrical installations can lead to serious damage to (or loss of) property. The mains supply lead, and its fuse protection, must be dimensioned accordingly. The technical data shown on the rating plate shall apply.

The cooling capacity of a cooling unit will depend upon:

- the ambient temperature
- the maximum rise
- the flow-rate Q (l/min)

The flow-rate Q will depend upon:

- the number of interconnecting hosepacks or connection hoses, and their lengths
- the diameter of the hose

## FK 6000

Storage temperature	-25 °C to +55 °C -13 °F to +131 °F
Operating temperature	-10 °C to +40 °C +14 °F to +104 °F
Mains voltage (auto-transformer)	230 V
Mains voltage tolerance	+/- 10 %
Mains frequency	50 / 60 Hz
Fuse (slow-blow)	
Mains supply fuse	3,15 A
Coolant pump fuse	1,6 A
Current input	1,5 A
Cooling power (as per IEC 60974-2)	
Q = 1 l/min + 25 °C (77 °F)	1770 W
Q = 1 l/min + 40 °C (104 °F)	1120 W
Q = max. + 25 °C (77 °F)	3000 W
Q = max. + 40 °C (104 °F)	2000 W
Max. supply rate (Qmax)	5 l / min 10.71 cfh
Max. pump pressure	4,2 bar / 60.89 psi
Max. supply height	approx. 35 m 114 ft. 10 in.
Pump	magnetically-coupled pump
Flow watchdog switching point	0,8 l / min 0.21 gal / min
Water filter	100 micrometers, CrNi screen
Coolant content	9 l / 2.38 gal.
Degree of protection	IP 23
Dimensions L x W x H	725 x 290 x 480 mm 28.54 x 11.42 x 18.90 in.
Weight (total weight without coolant)	22 kg / 48.5 lb.
Mains cable	yes

\* For factory setting see rating plate

**FK 6000 Pipe**

Storage temperature	-50 °C to +55 °C -58 °F to +131 °F
Operating temperature	-25 °C to +40 °C -13 °F to +104 °F
Mains voltage (auto-transformer)	110* / 230 V
Mains voltage tolerance	+/- 10 %
Mains frequency	50 / 60 Hz
Fuse protection (slow-blow) Fuse for mains power supply Fuse for coolant pump	3,15 A 1,6 A
Power consumption	1,5 - 3,9 A
Cooling capacity (to IEC 60974-2) Q = 1 l/min + 25 °C (77 °F) Q = 1 l/min + 40 °C (104 °F) Q = max. + 25 °C (77 °F) Q = max. + 40 °C (104 °F)	1770 W 1120 W 3000 W 2000 W
Max. delivery rate (Qmax)	5 l / min 10.71 cfh
Max. pump pressure	4,2 bar 60.89 psi
Maximum rise	approx. 35 m 114 ft. 10 in.
Pump	magnetically-coupled pump
Switching point of rate-of-flow watchdog (Option)	0,8 l / min 0.21 gal / min
Water filter	100 micrometre, CrNi sieve
Coolant volume	9 l 2.38 gal.
Degree of protection	IP 23
Dimensions L x W x H	725 x 290 x 480 mm 28.54 x 11.42 x 18.90 in.
Weight (overall weight without coolant)	24 kg 52.91 lb.
Mains cable	no

\* see rating plate for factory setting

**FK 6000 - 400 V**

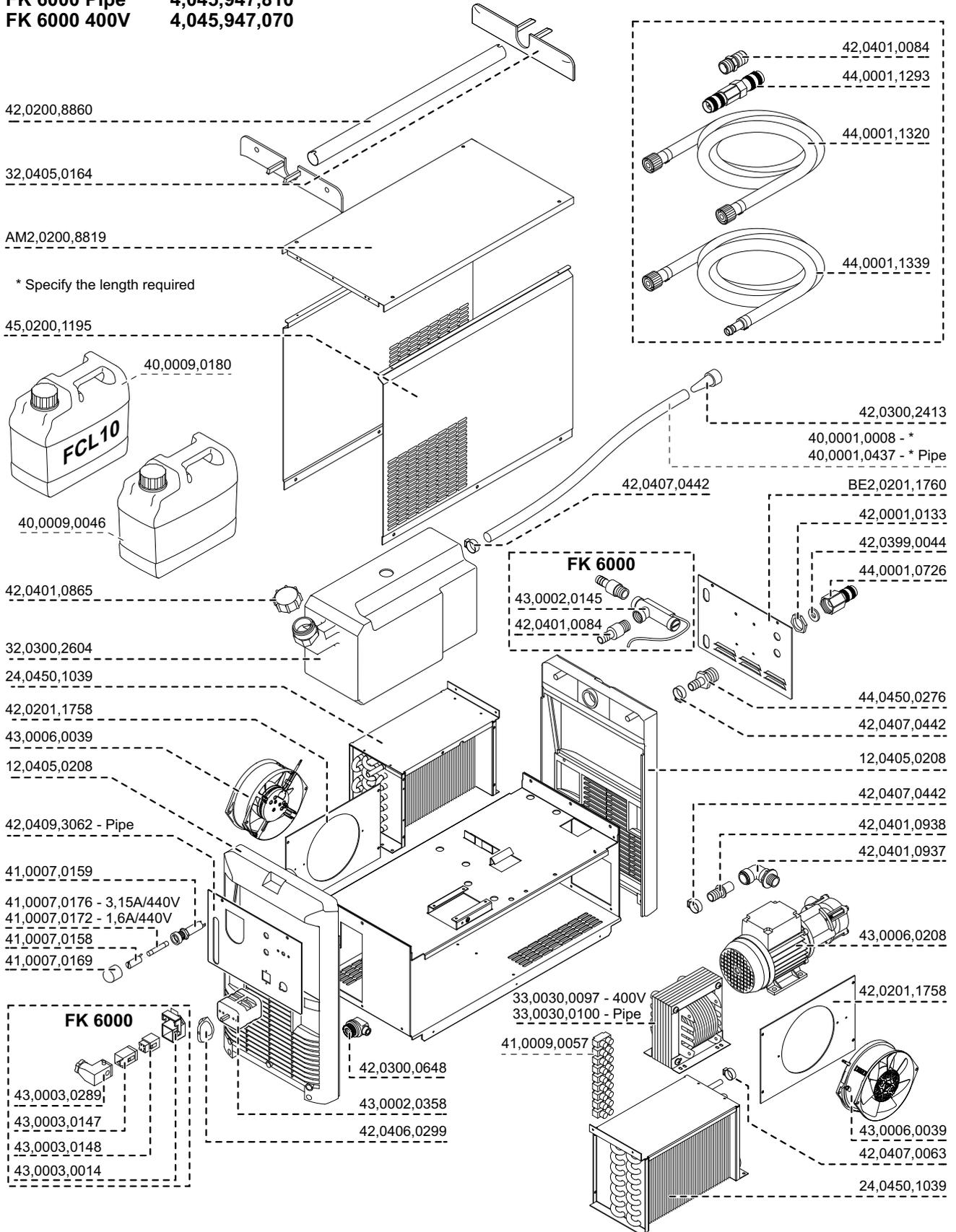
Storage temperature	-25 °C to +55 °C -13 °F to +131 °F
Operating temperature	-10 °C to +40 °C +14 °F to +104 °F
Mains voltage (auto-transformer)	110 / 230 / 400* / 440 / 460 V
Mains voltage tolerance	+/- 10 %
Mains frequency	50 / 60 Hz
Fuse protection (slow-blow) Fuse for mains power supply Fuse for coolant pum	3,15 A 1,6 A
Power consumption	1,5 - 3,9 A
Cooling capacity (to IEC 60974-2) Q = 1 l/min + 25 °C (77 °F) Q = 1 l/ min + 40 °C (104 °F) Q = max. + 25 °C (77 °F) Q = max. + 40 °C (104 °F)	1770 W 1120 W 3000 W 2000 W
Max. delivery rate (Qmax)	5 l / min 10.71 cfh
Max. pump pressure	4,2 bar 60.89 psi
Maximum rise	approx. 35 m 114 ft. 10 in.
Pump	magnetically-coupled pump
Switching point of rate-of-flow watchdog (Option)	0,8 l / min 0.21 gal / min
Water filter	100 micrometre, CrNi sieve
Coolant volume	9 l 2.38 gal.
Degree of protection	IP 23
Dimensions L x W x H	725 x 290 x 480 mm 28.54 x 11.42 x 18.90 in.
Weight (overall weight without coolant)	24 kg 52.91 lb.
Mains cable	no

\* Factory setting 400 V or see rating plate

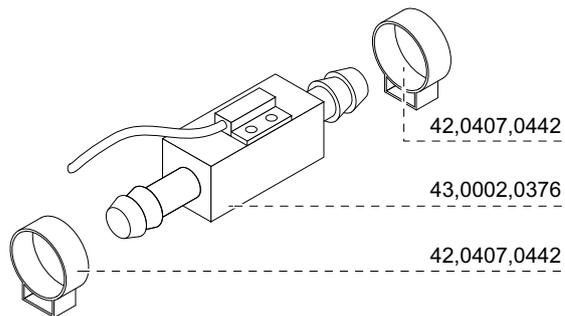
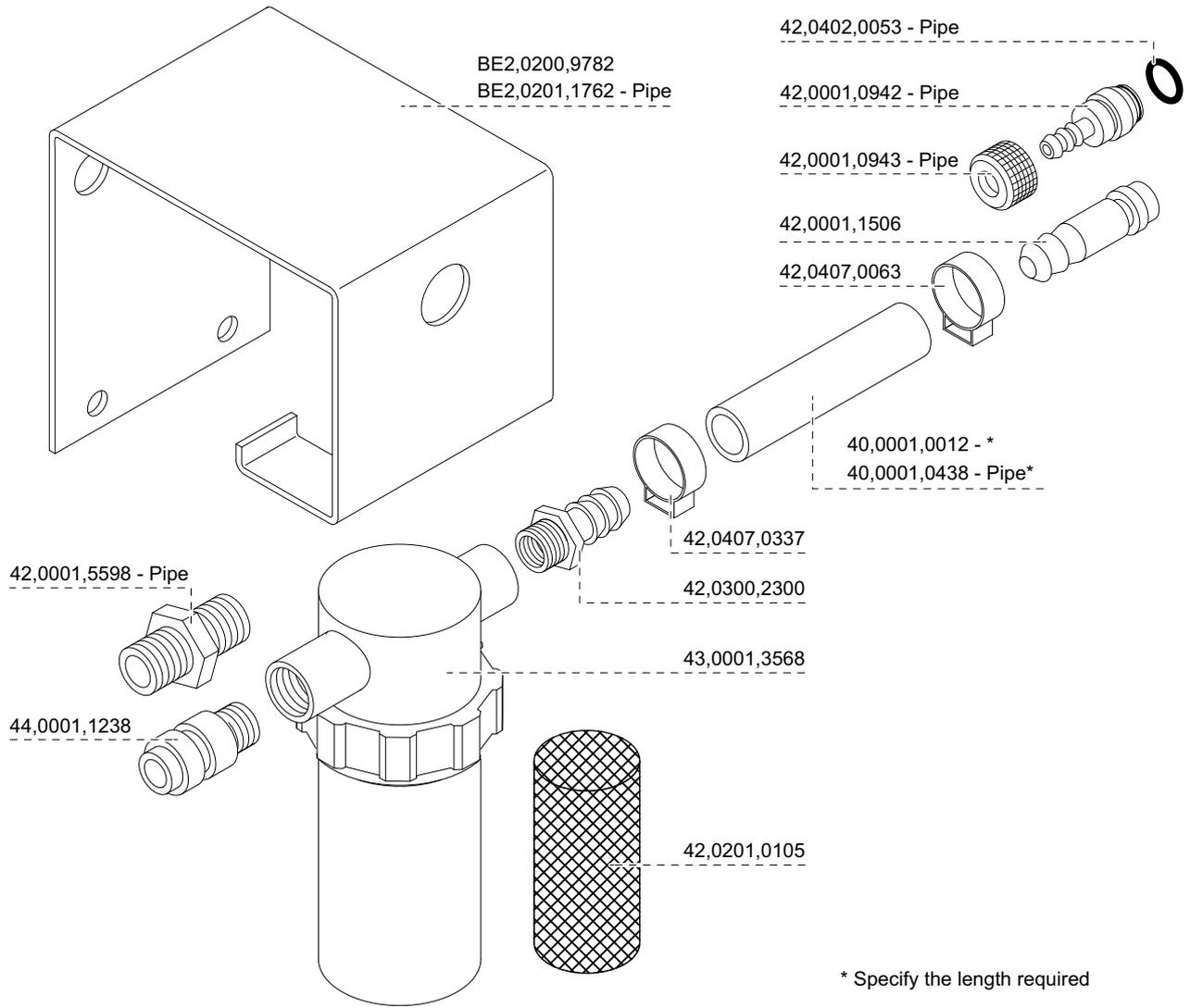
# Appendix

# Spare parts list: FK 6000

FK 6000 4,045,947  
 FK 6000 Pipe 4,045,947,810  
 FK 6000 400V 4,045,947,070



**Flow controller with water filter 4,100,214**





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