

## FPA 2020 Orbital



Operating instructions,  
Spare parts list  
TIG power source



# Dear Reader

## Introduction

Thank you for choosing Fronius - and congratulations on your new, technically high-grade Fronius product! This instruction manual will help you get to know your new machine. Read the manual carefully and you will soon be familiar with all the many great features of your new Fronius product. This really is the best way to get the most out of all the advantages that your machine has to offer.

Please also take special note of the safety rules - and observe them! In this way, you will help to ensure more safety at your product location. And of course, if you treat your product carefully, this definitely helps to prolong its enduring quality and reliability - things which are both essential prerequisites for getting outstanding results.





# Safety rules

## DANGER!



“**DANGER!**” indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations. This signal word is not used for property damage hazards unless personal injury risk appropriate to this level is also involved.

## WARNING!



“**WARNING!**” indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. This signal word is not used for property damage hazards unless personal injury risk appropriate to this level is also involved.

## CAUTION!



“**CAUTION!**” indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices that may cause property damage.

## NOTE!



“**NOTE!**” indicates a situation which implies a risk of impaired welding result and damage to the equipment.

## Important!

“**Important!**” indicates practical hints and other useful special-information. It is no signal word for a harmful or dangerous situation.

Whenever you see any of the symbols shown above, you must pay even closer attention to the contents of the manual!

## General remarks



This equipment has been made in accordance with the state of the art and all recognised safety rules. Nevertheless, incorrect operation or misuse may still lead to danger for

- the life and well-being of the operator or of third parties,
- the equipment and other tangible assets belonging to the owner/operator,
- efficient working with the equipment.

All persons involved in any way with starting up, operating, servicing and maintaining the equipment must

- be suitably qualified
- know about welding and
- read and follow exactly the instructions given in this manual.

The instruction manual must be kept at the machine location at all times. In addition to the instruction manual, copies of both the generally applicable and the local accident prevention and environmental protection rules must be kept on hand, and of course observed in practice.

All the safety instructions and danger warnings on the machine itself:

- must be kept in a legible condition
- must not be damaged, must not be removed
- must not be covered, pasted or painted over

For information about where the safety instructions and danger warnings are located on the machine, please see the section of your machine’s instruction manual headed “General remarks”.

**General remarks**  
(continued)

Any malfunctions which might impair machine safety must be eliminated immediately - meaning before the equipment is next switched on.

**It's your safety that's at stake!**

**Utilisation for intended purpose only**



The machine may only be used for jobs as defined by the "Intended purpose".

The machine may ONLY be used for the welding processes stated on the rating plate.

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

- complete reading and following of all the instructions given in this manual
- complete reading and following of all the safety instructions and danger warnings
- performing all stipulated inspection and servicing work.

The appliance must never be used for the following:

- Thawing pipes
- Charging batteries/accumulators
- Starting engines

The machine is designed to be used in industrial and workshop environments. The manufacturer shall not be liable for any damage resulting from use of the machine in residential premises.

likewise the manufacturer will accept no liability for defective or faulty work results.

**Ambient conditions**



Operation or storage of the power source outside the stipulated range is deemed to be "not in accordance with the intended use". The manufacturer shall not be liable for any damage resulting herefrom.

Temperature range of ambient air:

- when operating: - 10 °C to + 40 °C (14 °F to 104 °F)
- when being transported or stored: - 25 °C to + 55 °C (-13 °F to 131 °F)

Relative atmospheric humidity:

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

Ambient air: Free of dust, acids, corrosive gases or substances etc.

Elevation above sea level: Up to 2000 m (6500 ft)

**Obligations of owner/operator**

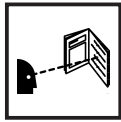


The owner/operator undertakes to ensure that the only persons allowed to work with the machine are persons who

- are familiar with the basic regulations on workplace safety and accident prevention and who have been instructed in how to operate the machine
- have read and understood the sections on "safety rules" and the "warnings" contained in this manual, and have confirmed as much with their signatures
- be trained in such a way that meets with the requirements of the work results

Regular checks must be performed to ensure that personnel are still working in a safety-conscious manner.

## Obligations of personnel

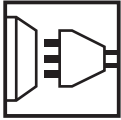


Before starting work, all persons to be entrusted with carrying out work with (or on) the machine shall undertake

- to observe the basic regulations on workplace safety and accident prevention
- to read the sections on “safety rules” and the “warnings” contained in this manual, and to sign to confirm that they have understood these and will comply with them.

Before leaving the workplace, personnel must ensure that there is no risk of injury or damage being caused during their absence.

## Mains connection



High-performance devices can affect the quality of the mains power due to their current-input.

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

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

<sup>\*)</sup> at the interface with the public mains network

see Technical Data

In this case, the plant operator or the person using the device should check whether or not the device is allowed to be connected, where appropriate through discussion with the power supply company.

## Protection for yourself and other persons



When welding, you are exposed to many different hazards such as:

- flying sparks and hot metal particles
- arc radiation which could damage your eyes and skin



- harmful electromagnetic fields which may put the lives of cardiac pace-maker users at risk



- electrical hazards from mains and welding current



- increased exposure to noise



- noxious welding fumes and gases.

Anybody working on the workpiece during welding must wear suitable protective clothing with the following characteristics:

- flame-retardant
- isolating and dry
- must cover whole body, be undamaged and in good condition
- protective helmet
- trousers with no turn-ups



## Protection for yourself and other persons (continued)



“Protective clothing” also includes:

- protecting your eyes and face from UV rays, heat and flying sparks with an appropriate safety shield containing appropriate regulation filter glass
- wearing a pair of appropriate regulation goggles (with sideguards) behind the safety shield
- wearing stout footwear that will also insulate even in wet conditions
- protecting your hands by wearing appropriate gloves (electrically insulating, heat-proof)
- To lessen your exposure to noise and to protect your hearing against injury, wear ear-protectors!



Keep other people - especially children - well away from the equipment and the welding operation while this is in progress. If there are still any other persons nearby during welding, you must

- draw their attention to all the dangers (risk of being dazzled by the arc or injured by flying sparks, harmful welding fumes, high noise immission levels, possible hazards from mains or welding current ...)
- provide them with suitable protective equipment and/or
- erect suitable protective partitions or curtains.

## Information on noise emission values



The device generates a maximum sound power level of <math><80\text{ dB(A)}</math> (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.

## Hazards from noxious gases and vapours



The fumes given off during welding contain gases and vapors that are harmful to health.

Welding fumes contain substances which may cause birth defects and cancers.

Keep your head away from discharges of welding fumes and gases.

Do not inhale any fumes or noxious gases that are given off.  
Extract all fumes and gases away from the workplace, using suitable means.

Ensure a sufficient supply of fresh air.

Where insufficient ventilation is available, use a respirator mask with an independent air supply.

If you are not sure whether your fume-extraction system is sufficiently powerful, compare the measured pollutant emission values with the permitted threshold limit values.



**Hazards from  
noxious gases  
and vapours**  
(continued)

The harmfulness of the welding fumes will depend on e.g. the following components:

- the metals used in and for the workpiece
- the electrodes
- coatings
- cleaning and degreasing agents and the like

For this reason, pay attention to the relevant Materials Safety Data Sheets and the information given by the manufacturer regarding the components listed above.

Keep all flammable vapors (e.g. from solvents) well away from the arc radiation.

**Hazards from  
flying sparks**



Flying sparks can cause fires and explosions!

Never perform welding anywhere near combustible materials.

Combustible materials must be at least 11 meters (35 feet) away from the arc, or else must be covered over with approved coverings.

Have a suitable, approved fire extinguisher at the ready.

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

Do not perform welding in locations that are at risk from fire and/or explosion, or in enclosed tanks, barrels or pipes, unless these latter have been prepared for welding in accordance with the relevant national and international standards.

Welding must NEVER be performed on containers that have had gases, fuels, mineral oils etc. stored in them. Even small traces of these substances left in the containers are a major explosion hazard.

**Hazards from  
mains and weld-  
ing current**



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

Do not touch any live parts, either inside or outside the machine.



In MIG/MAG and TIG welding, the welding wire, the wire spool, the drive rollers and all metal parts having contact with the welding wire are also live.

Always place the wirefeeder on an adequately insulated floor or base, or else use a suitable insulating wirefeeder holder.

Ensure sufficient protection for yourself and for other people by means of a dry base or cover that provides adequate insulation against the ground/frame potential. The base or cover must completely cover the entire area between your body and the ground/frame potential.

All cables and other leads must be firmly attached, undamaged, properly insulated and adequately dimensioned. Immediately replace any loose connections, scorched, damaged or underdimensioned cables or other leads.



## Hazards from mains and welding current

(continued)

Do not loop any cables or other leads around your body or any part of your body.

Never immerse the welding electrode (rod electrode, tungsten electrode, welding wire, ...) in liquid in order to cool it, and never touch it when the power source is ON.

Twice the open-circuit voltage of one single welding machine may occur between the welding electrodes of two welding machines. Touching the potentials of both electrodes simultaneously may be fatal.

Have the mains and the machine supply leads checked regularly by a qualified electrician to ensure that the PE (protective earth) conductor is functioning correctly.

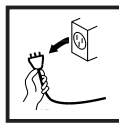
Only run the machine on a mains network with a PE conductor, and plugged into a power outlet socket with a protective-conductor contact.

If the machine is run on a mains network without a PE conductor and plugged into a power outlet socket without a protective-conductor contact, this counts as gross negligence and the manufacturer shall not be liable for any resulting damage.

Wherever necessary, use suitable measures to ensure that the workpiece is sufficiently grounded (earthed).

Switch off any appliances that are not in use.

Wear a safety harness if working at height.



Before doing any work on the machine, switch it off and unplug it from the mains.

Put up a clearly legible and easy-to-understand warning sign to stop anybody inadvertently plugging the machine back into the mains and switching it back on again.

After opening up the machine:

- discharge any components that may be storing an electrical charge
- ensure that all machine components are electrically dead.

If work needs to be performed on any live parts, there must be a second person on hand to immediately switch off the machine at the main switch in an emergency.

## Stray welding currents



If the following instructions are ignored, stray welding currents may occur. These can cause:

- fires
- overheating of components that are connected to the workpiece
- destruction of PE conductors
- damage to the machine and other electrical equipment

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

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

On electrically conductive floors, the machine must be set up in such a way that it is sufficiently insulated from the floor.

## Stray welding currents (continued)

When using current supply distributors, twin head wire feeder fixtures etc., please note the following: The electrode on the unused welding torch/welding tongs is also current carrying. Please ensure that there is sufficient insulating storage for the unused welding torch/tongs.

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

## EMC device classifications



Devices with emission class A:

- are only designed for use in an industrial setting
- can cause conducted and emitted interference in other areas.

Devices with emission class B:

- satisfy the emissions criteria for residential and industrial areas. This also applies to residential areas in which power is supplied from the public low-voltage grid.

EMC device classification as per the rating plate or technical specifications

## 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.

Examine and evaluate any possible electromagnetic problems that may occur on equipment in the vicinity, and the degree of immunity of this equipment, in accordance with national and international regulations:

- safety features
- mains, signal and data-transmission leads
- IT and telecoms equipment
- measurement and calibration devices

Ancillary measures for preventing EMC problems:

### a) Mains supply

- If electromagnetic interference still occurs, despite the fact that the mains connection is in accordance with the regulations, take additional measures (e.g. use a suitable mains filter).

### b) Welding cables

- Keep these as short as possible
- Arrange them so that they run close together (to prevent EMI problems as well)
- Lay them well away from other leads.

### c) Equipotential bonding

### d) Workpiece grounding (earthing)

- where necessary, run the connection to ground (earth) via suitable capacitors.

### e) Shielding, where necessary

- Shield other equipment in the vicinity
- Shield the entire welding installation.



## EMI Precautions



Electromagnetic fields may cause as yet unknown damage to health.

- Effects on the health of persons in the vicinity, e.g. users of heart pacemakers and hearing aids
- Users of heart pacemakers must take medical advice before going anywhere near welding equipment or welding workplaces
- Keep as much space as possible between welding cables and head/body of welder for safety reasons
- Do not carry welding cables and hose pack over shoulder and do not loop around body or any part of body

## Particular danger spots



Keep your hands, hair, clothing and tools well away from all moving parts, e.g.:

- fans
- toothed wheels, rollers, shafts
- wire-spools and welding wires

Do not put your fingers anywhere near the rotating toothed wheels of the wirefeed drive.0

Covers and sideguards may only be opened or removed for as long as is absolutely necessary to carry out maintenance and repair work.

While the machine is in use:

- ensure that all the covers are closed and that all the sideguards are properly mounted ...
- ... and that all covers and sideguards are kept closed.



When the welding wire emerges from the torch, there is a high risk of injury (the wire may pierce the welder's hand, injure his face and eyes ...). For this reason, when feeder-inching etc., always hold the torch so that it is pointing away from your body (machines with wirefeeder).



Do not touch the workpiece during and after welding - risk of injury from burning!


Slag may suddenly "jump" off workpieces as they cool. For this reason, continue to wear the regulation protective gear, and to ensure that other persons are suitably protected, when doing post-weld finishing on workpieces.

Allow welding torches - and other items of equipment that are used at high operating temperatures - to cool down before doing any work on them.



Special regulations apply to rooms at risk from fire and/or explosion. Observe all relevant national and international regulations.



Power sources for use in spaces with increased electrical danger (e.g. boilers) must be identified by the  (for "safety") mark. However, the power source should not be in such rooms.



Risk of scalding from accidental discharge of hot coolant. Before unplugging the connectors for coolant forward flow and return flow, switch off the cooling unit.

**Particular danger spots**  
(continued)



When hoisting the machines by crane, only use suitable manufacturer-supplied lifting devices.

- Attach the chains and/or ropes to **all** the hoisting points provided on the suitable lifting device.
- The chains and/or ropes must be at an angle which is as close to the vertical as possible.
- Remove the gas cylinder and the wirefeed unit (from MIG/MAG and TIG units).

When hoisting the wirefeed unit by crane during welding, always use a suitable, insulating suspension arrangement (MIG/MAG and TIG units).

If a machine is fitted with a carrying strap or carrying handle, remember that this strap is **ONLY** to be used for lifting and carrying the machine by hand. The carrying strap is **NOT** suitable for transporting the machine by crane, fork-lift truck or by any other mechanical hoisting device.



Danger of colourless and odourless inert gas escaping unnoticed, when using an adapter for the inert gas protection. Seal the adapter thread for the inert gas connection using Teflon tape before assembly.

**Danger from shielding-gas cylinders**



Shielding-gas cylinders contain pressurized gas and may explode if they are damaged. As shielding-gas cylinders are an integral part of the overall welding outfit, they also have to be treated with great care.

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

Mount the shielding-gas cylinders in the vertical and fasten them in such a way that they cannot fall over (i.e. as shown in the instruction manual).

Keep shielding-gas cylinders well away from welding circuits (and, indeed, from any other electrical circuits).

Never hang a welding torch on a shielding-gas cylinder.

Never touch a shielding-gas cylinder with a welding electrode.

Explosion hazard - never perform welding on a pressurized shielding-gas cylinder.

Use only shielding-gas cylinders that are suitable for the application in question, together with matching, suitable accessories (pressure regulators, hoses and fittings, ...). Only use shielding-gas cylinders and accessories that are in good condition.

When opening the valve of a shielding-gas cylinder, always turn your face away from the outlet nozzle.

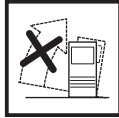
Close the shielding-gas cylinder valve when no welding is being carried out.

When the shielding-gas cylinder is not connected up, leave the cap in place on the shielding-gas cylinder valve.

Observe the manufacturer's instructions and all relevant national and international rules applying to shielding-gas cylinders and accessories.



## Safety precautions at the installation site and when being transported



A machine that topples over can easily kill someone! For this reason, always place the machine on an even, firm floor in such a way that it stands firmly.

- An angle of inclination of up to 10° is permissible.



Special regulations apply to rooms at risk from fire and/or explosion. Observe all relevant national and international regulations.

By means of internal instructions and checks, ensure that the workplace and the area around it are always kept clean and tidy.

The appliance must only be installed and operated in accordance with the protection type stated on the specifications plate.

When installing the appliance, please ensure a clearance radius of 0.5 m (1.6ft.) , so that cool air can circulate freely.

When transporting the appliance, please ensure that the valid national and regional guidelines and accident protection regulations are followed. This applies in particular to guidelines in respect of dangers during transportation and carriage.

Before transportation, completely drain any coolant and dismantle the following components:

- Wire feed
- Wire wound coil
- Gas bottle

Before commissioning and after transportation, a visual check for damage must be carried out. Any damage must be repaired by trained service personnel before commissioning.

## Safety precautions in normal operation



Only operate the machine if all of its protective features are fully functional. If any of the protective features are not fully functional, this endangers:

- the life and well-being of the operator or other persons
- the equipment and other tangible assets belonging to the owner/operator
- efficient working with the equipment.

Any safety features that are not fully functional must be put right before you switch on the machine.

Never evade safety features and never put safety features out of order.

Before switching on the machine, ensure that nobody can be endangered by your doing so.

- At least once a week, check the machine for any damage that may be visible from the outside, and check that the safety features all function correctly.
- Always fasten the shielding-gas cylinder firmly, and remove it altogether before hoisting the machine by crane.
- Owing to its special properties (in terms of electrical conductivity, frost-proofing, materials-compatibility, combustibility etc.), only original coolant of the manufacturer is suitable for use in our machines.
- Only use suitable original coolant of the manufacturer.
- Do not mix original coolant of the manufacturer with other coolants.

## Safety precautions in normal operation

(continued)

- If any damage occurs in cases where other coolants have been used, the manufacturer shall not be liable for any such damage, and all warranty claims shall be null and void.
- Under certain conditions, the coolant is flammable. Only transport the coolant in closed original containers, and keep it away from sources of ignition.
- Used coolant must be disposed of properly in accordance with the relevant national and international regulations. A safety data sheet is available from your service centre and on the manufacturer's homepage.
- Before starting welding - while the machine is still cool - check the coolant level.



## Preventive and corrective maintenance



With parts sourced from other suppliers, there is no certainty that these parts will have been designed and manufactured to cope with the stressing and safety requirements that will be made of them. Use only original spares and wearing parts (this also applies to standard parts).

Do not make any alterations, installations or modifications to the machine without getting permission from the manufacturer first.

Replace immediately any components that are not in perfect condition.

When ordering spare parts, please state the exact designation and the relevant part number, as given in the spare parts list. Please also quote the serial number of your machine.

## Safety inspection



The owner/operator is obliged to have a safety inspection performed on the machine at least once every 12 months.

The manufacturer also recommend the same (12-month) interval for regular calibration of power sources.

A safety inspection, by a trained and certified electrician, is prescribed:

- after any alterations
- after any modifications or installations of additional components
- following repairs, care and maintenance
- at least every twelve months.

Observe the relevant national and international standards and directives in connection with the safety inspection.

More detailed information on safety inspections and calibration is available from your regional or national service centre, who will be pleased to provide you with copies of the necessary documents upon request.

## Disposal



Do not dispose of this device with normal domestic waste!

To comply with the European Directive 2002/96/EC 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 be returned to our agent, or find out about 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 markings

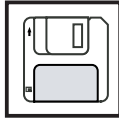


Equipment with CE-markings fulfils the basic requirements of the Low-Voltage and Electromagnetic Compatibility Guideline (e.g. relevant product standards according to EN 60 974). .



Equipment marked with the CSA-Test Mark fulfils the requirements made in the relevant standards for Canada and the USA.

## Data security



The user is responsible for the data security of changes made to factory settings. The manufacturer is not liable, if personal settings are deleted.

## Copyright



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# General

## Principle

The FPA 2020 is a completely digitised, microprocessor-controlled inverter power source for orbital welding. An active power source manager is coupled with a digital signal processor, and together they control and regulate the entire welding process. The actual data are measured continuously, and the device responds immediately to any changes.



Fig. 1 FPA 2020 power source

The control algorithms ensure that the specified target status is maintained at all times. This gives the weld process an unrivalled degree of precision, with exact reproducibility of all results and excellent welding properties. Alongside the welding properties, the high degree of efficiency is another key feature of the new orbital power source.

An intuitive operating concept makes your work much easier. Last but not least, as the tasks of the related control elements are now controlled from the generously proportioned touchscreen, essential functions can be seen at a glance and adjusted as required.

## Device concept

Typical of the new power source is its adaptability to the many demands of orbital welding. The cooling unit, fitted as standard, makes a significant contribution. In addition to the many orbital welding guns available for the most varied applications, the power source also supports manual welding torches. Further convenience is added by a remote control unit that has all the necessary functions for operating the orbital welding system on site.

## Application areas












There are a vast number of applications for the FPA 2020 in trade and industry. At this point the pharmaceutical and foodstuffs industries are well worth mentioning, since they place high demands on the quality of pipelines and containers. As regards suitability for welding different materials, the power source is just as suitable for welding unalloyed and low-alloy steel as it is for welding high-alloy, chrome-nickel steels. These „all-rounder“ qualities are enhanced by the optimised ignition sequence of the device.

For TIG-AC welding, the FPA 2020 takes account not only of the diameter of the electrode, but also of its temperature, calculated with reference to the preceding welding and weld-off times. Moreover, the power source does sterling service when welding aluminium, aluminium alloys, copper alloys, magnesium and titanium. The AC frequency can be adjusted over a very wide range, permitting optimum adaptation to your particular requirements.



**Warning notices  
affixed to the  
device**

A number of safety symbols can be seen on the device's rating plate. The safety symbols must NOT be removed or painted over.

		Type	
A-4600 Wels www.fronius.com		Art.No.	
		Ser.No.	
		IEC 60974-1/-2/-3 EN 50199	
		3 A / 10.1 V - 200 A / 17,9 V	
		X(40°C) 30% 60% 100%	
U <sub>p</sub>	U <sub>0</sub>	I <sub>2</sub>	200 A 150 A 130 A
9.5 kV	44 V	U <sub>2</sub>	18,2 V 14,2 V 12,9 V
		U <sub>1</sub>	 I <sub>1 max</sub> I <sub>1 eff</sub> 230 V 16A 23 A 13 A
IP 23	 50-60Hz	 4.3 bar (0.43 MPa)	P <sub>11min</sub> 850 W
			




Fig. 2 Rating plate

# Controls and connections

## Control panel



**NOTE!** As a result of firmware updates, you may find that there are functions available on your unit that are not described in these operating instructions or vice versa. Certain illustrations may also differ slightly from the actual controls on your unit. However, the functionality of these controls is identical.



**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 all of the following documents:

- These operating instructions
- all operating instructions for the system components, especially the "Safety rules"

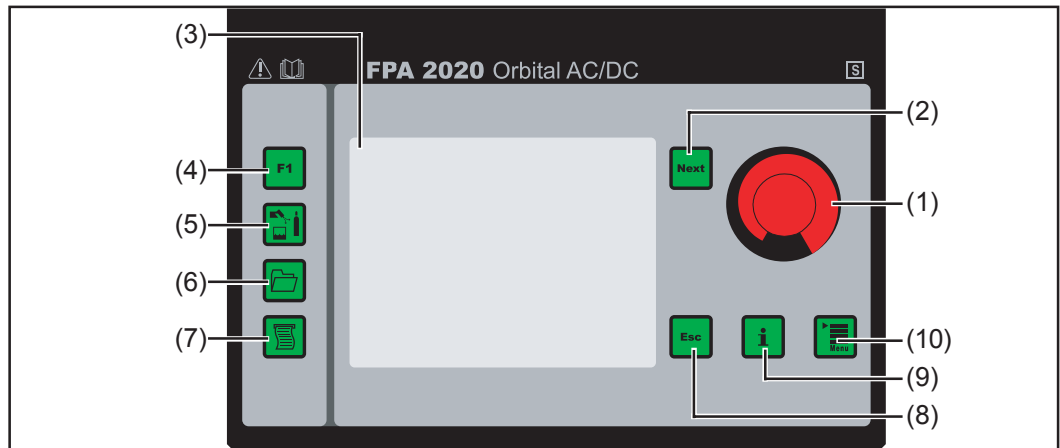


Fig. 3 Control panel

### No. Function

#### (1) Adjusting dial

For selecting a menu item

1. Turn the adjusting dial until the desired menu item is highlighted
2. Press the adjusting dial to select the menu item

For selecting and adjusting a parameter

1. Turn the adjusting dial until the desired parameter is highlighted in blue
2. Press the adjusting dial; the selected parameter now turns violet
3. Turn the adjusting dial to adjust the parameter to the desired value
4. Press the adjusting dial to apply the value; the blue highlighting then moves on to the next parameter

**Important!** If you do not wish to apply the value, press the „Esc“ key (8).

**Important!** These functions are also directly supported by the touchscreen (3).

Simply touch a menu item or parameter. Where applicable this will open a list from which you can select from several values. However, the adjusting dial must be used to enter a numerical value. It is advisable just to use the adjusting dial when working, for example, in dusty environments if the touchscreen is covered with protective foil.

**Control panel**  
(continued)

No.	Function
(2)	<b>„Next“ key</b> for scrolling to the next menu window
(3)	<b>Touchscreen</b> Displays various context-sensitive keypads
(4)	<b>F1 key</b> freely programmable function key (in the „setup and system parameter“ menu)
(5)	<b>Shielding gas and cooling key</b> Opens the „shielding gas and cooling“ menu
(6)	<b>Data exchange key</b> Opens the data transfer menu
(7)	<b>Printer configuration key</b> For setting specific data for printing or saving to the memory stick.
(8)	<b>ESC key</b> <ul style="list-style-type: none"><li>- Returns to the previous menu window</li><li>- Resets alarms</li><li>- Abandons a parameter setting without applying the changed value</li></ul>
(9)	<b>„i“ key</b> Displays versions, alarms and information for service engineers
(10)	<b>Menu key</b> Returns to the main menu

## Symbol bar

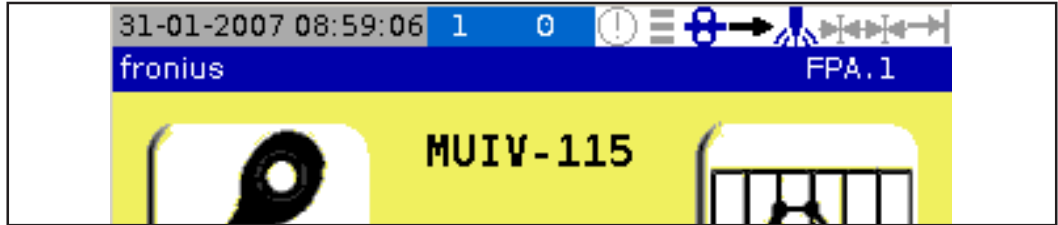
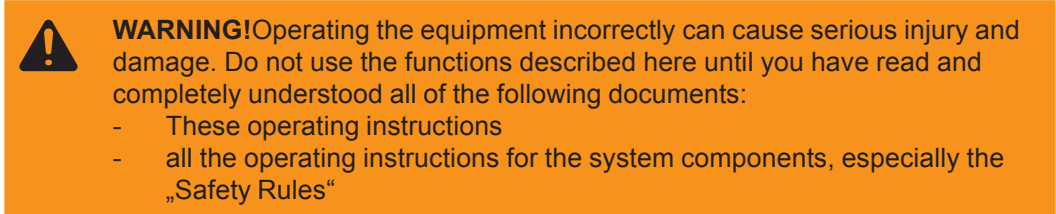


Fig. 4 Display element

**31-01-2007 08:59:06** Time/date


**1** Segment 1-10 indicates the welding path segment in which the orbital welding gun is currently located.




**Important!** More detailed information on „segments“ can be found in the section headed „Parameter settings“.

**0** Page in program sequence - every dialog window in the menu structure has a page number for identification purposes during maintenance work (for example)

**fronius** Name of the currently loaded program

**FPA, 1** User name - more detailed information can be found in the section headed „setup and system parameters“


 Touching the symbol opens the active alarm page

	3: Main current signal
	2: Arc on signal
	1: „Process active“ signal


 Wire-feed unit selected and active (blue)


 Wire-feed unit selected but not active (black)


 Wire-feed unit not selected (black, with blue cross)


 Clockwise welding direction


 Anti-clockwise welding direction


 Welding off/no arc (black - test mode)


 Welding on/with arc (blue)


 Shielding gas valve not active

 Shielding gas valve active (blue)

 Forming gas valve not active

 Forming gas valve active (blue)

 Limit switch for closed orbital welding gun not active

 Limit switch for closed orbital welding gun active (blue)

# Connections, switches and system add-ons



**WARNING!** Operating the device incorrectly can cause serious injury and damage. Do not use the functions described here until you have read and completely understood all of the following documents:

- these Operating Instructions
- all the operating instructions for the system components, especially the “Safety Rules”

## FPA 2020 power source

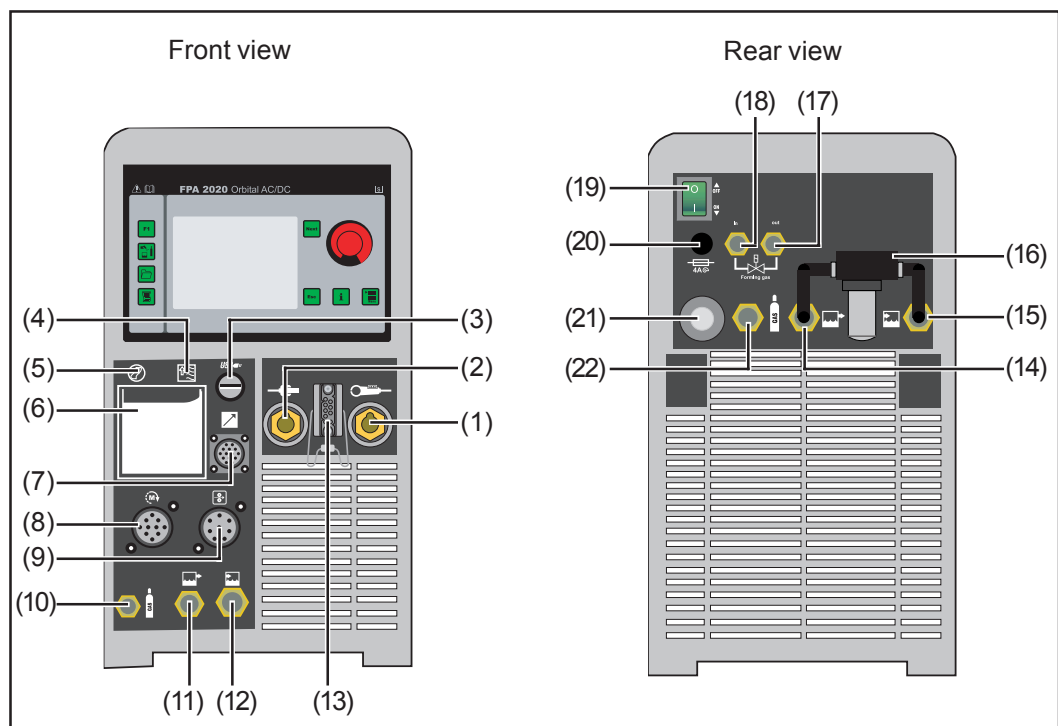


Fig. 5 Connections and switches on the FPA 2020 power source

### No. Function

- |     |  |
|-----|--|
| (1) | <b>Orbital welding gun connection socket</b><br>(-) current socket with bayonet latch, also for a standard TIG welding torch |
| (2) | <b>Earthing (grounding) cable connection</b><br>(+) current socket with bayonet latch  |
| (3) | <b>USB port</b><br>for saving and loading individual welding programs or all power source data to or from a USB stick        |
| (4) | <b>Paper feed key</b><br>for the integral printer  |
| (5) | <b>“Printer ready” indicator</b>   |
| (6) | <b>Printer</b><br>for documenting relevant process parameters and processes  |
| (7) | <b>Remote control connection</b>   |
| (8) | <b>Orbital welding gun control connection</b><br>for data capture, control and motor supply of the orbital welding gun       |



**FPA 2020 power source**  
(continued)

No.	Function
(9)	<b>Wire-feed unit connection</b> for a cold wire feeder or a wire-feed unit incorporated into the orbital welding gun
(10)	<b>Shielding gas output connection</b> for the orbital welding gun or the TIG welding torch
(11)	<b>Water flow connection</b> for the orbital welding gun or the TIG welding torch
(12)	<b>Water return connection</b> for the orbital welding gun or the TIG welding torch
(13)	<b>Torch control connection</b> for a standard TIG welding torch or orbital welding gun with additional controls
(14)	<b>Water flow connection</b> for the water filter (16)
(15)	<b>Water return connection</b> for the water filter (16)
(16)	<b>Water filter</b>
(17)	<b>Forming gas input connection</b> for the pressure regulator
(18)	<b>Forming gas output connection</b> for the orbital welding gun
(19)	<b>Mains switch</b> for switching the power source on and off
(20)	<b>Coolant pump fuse</b>
(21)	<b>Mains cable with strain relief</b>
(22)	<b>Shielding gas input connection</b> for the pressure regulator



**Remote control unit**

**WARNING!** Operating the device incorrectly can cause serious injury and damage. Do not use the functions described here until you have read and completely understood all of the following documents:

- these Operating Instructions
- all the operating instructions for the system components, especially the “Safety Rules”

**WARNING!** Automatically starting machines can cause serious injury and damage. In addition to these operating instructions, the robot and welding system manufacturer’s safety rules must also be observed. For your personal safety, ensure that all protective measures have been implemented and will remain in place for the duration of your stay within the working area of the orbital welding gun.

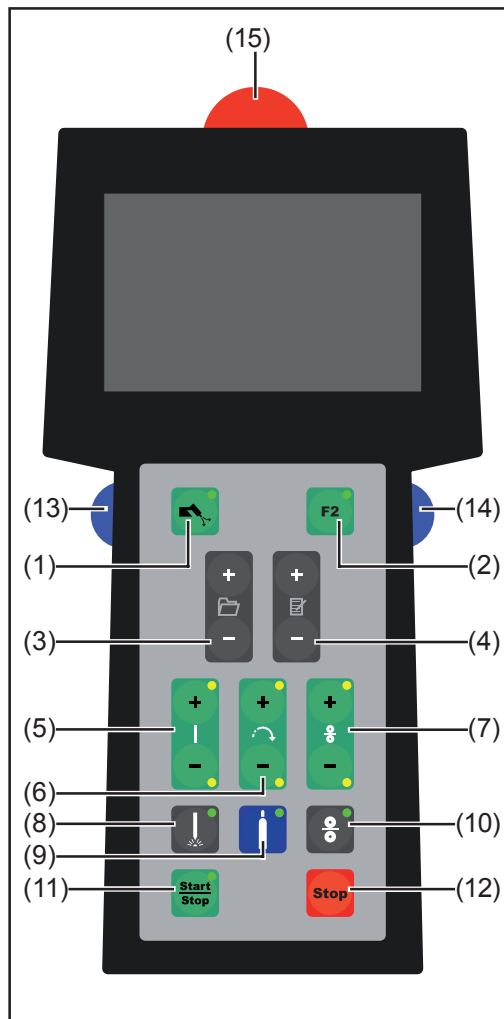
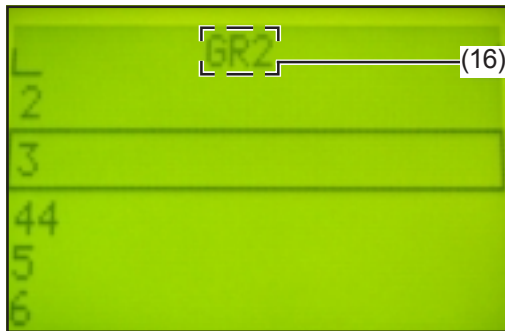


Fig. 6 FPA 2020 remote control unit

**No. Function**

- (1) **Gas-test key**  
for setting the required quantity of shielding gas at the pressure regulator. After you press this key, gas will flow out for 30 s. Press the button again to stop the gas test-flow before the end of this period.
- (2) **F2 function key**  
freely programmable function key (in the “setup and system parameter” menu)

**Remote control unit**  
(continued)



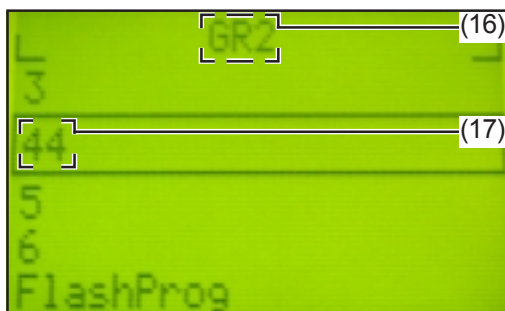
**(3) Group selection key**

Press (+) or (-) to access the selection menu to select the program group.

The previously selected group (16) appears.

Press (+) or (-) again to select the desired group (16) of welding programs.

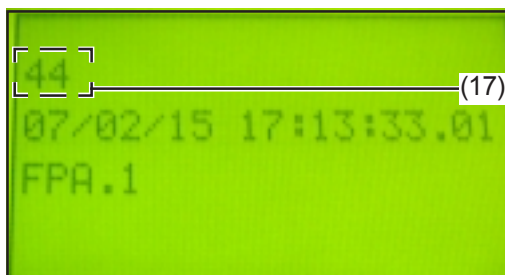
**Important!** To exit the selection menu without changing the original settings, press the „Stop“ key (12).



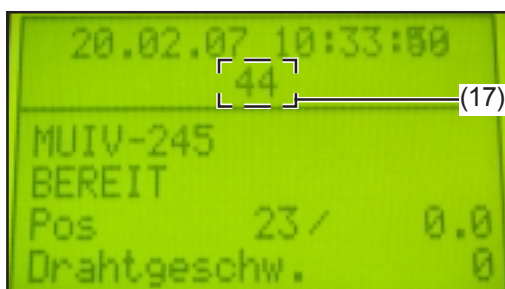
**(4) Program selection key**

Press (+) or (-) to select the desired welding program (17) from the group previously selected (16) using key (3).

Load the selected welding program with the “Start/stop” key (11).



During loading, confirmation of the selected welding program is indicated by its name (17) appearing on the display.



Once loading is complete, the display shows the new program name (17).

**Important!** To exit the selection menu without changing the original settings, press the „Stop“ key (12).

---

**(5) Welding current key**

For changing the current during welding according to the “welding current” parameter in dialog window 233 “value adjustment” as shown in the section headed “setup and system parameters”

---

**(6) Welding speed key**

For changing the welding head rotation speed during welding according to the “v-Rotation” parameter in dialog window 233 “value adjustment” as shown in the section headed “setup and system parameters”.

When not in welding mode, the key (6) is used for positioning the welding head while setting up.

---

**(7) Wire feed speed key**

For changing the wire feed speed during welding according to the “v-Wire” parameter in window 233 “value adjustment” as shown in the section headed “setup and system parameters”.

When not in welding mode, the key (7) is used for positioning the filler wire while setting up.

---

**(8) Arc on/off button**

If the LED in the key (8) lights up, the arc will come on for welding. The arc can also be switched off for setting up purposes. In addition, dialog window 1 in the “Troubleshooting” section shows the relevant entry.

---

**(9) Forming gas key**

Opens the forming gas valve for testing purposes. Press the button (9) again to close the forming gas button.

**Important!** If you do not press key (9) again before the delay expires, the forming gas valve closes again automatically. The delay time corresponds to the “forming gas pre-flow time” parameter in the menu with direct selection “shielding gas and cooling”.

---

**(10) Wire-feed unit on/off button**

For switching the wire-feed unit on or off during welding

---

**(11) Start/Stop button**

For starting and ending the welding process

For closed welding guns with no wirefeed, welding starts immediately the Start/Stop button is pressed. On open welding guns with wirefeeding, the following process applies:


If the “ROLL-UP” parameter in dialog window 221 “Parameters for start point” (see “Parameter settings”) is set to “ACTIVE”, the hosepack is rolled up when the key (11) is first pressed. Once the start point is reached, welding starts when the key (11) is pressed again.

If the “ROLL-UP” parameter in dialog window 221 “Parameters for start point” (see “Parameter settings”) is set to “AUTOSTART”, the welding process can be activated by simply pressing the key (11) once. Welding starts once the hosepack has rolled up automatically and the start point has been reached.

---

## Remote control unit (continued)

If the „ROLL-UP“ parameter in dialog window 221 „Parameters for start point“ (see „Parameter settings“) is set to „INACTIVE“, the welding process can be activated by simply pressing the key (11) once. The defined start position is not moved to and the hosepack is not rolled up. Welding starts from the position last reached.

 **NOTE!** On open orbital welding guns, the hosepack may be damaged if it is not rolled up before welding starts.

If welding is finished with key (11), there is a driving downslope according to the „driving downslope“ parameter in dialog window 221 „parameters for start point“ (see „Parameter settings“).


When not in welding mode, pressing key (11) and the „left“ key (13) moves the orbital welding gun back to the starting position.

---

### (12) Stop button

Pressing key (12) stops welding immediately.

**Important!** Regardless of the settings in the „Parameter settings“ menu, welding stops with no downslope when key (12) is pressed.

 **NOTE!** Risk of damage to orbital welding gun and hosepack. If the „ROLL-UP“ parameter in dialog window 221 „Parameters for start point“ (see „Parameter settings“) is „INACTIVE“, welding starts from the previous position without first rolling up the hosepack.

Only applies to closed orbital welding guns with no wirefeeding: pressing key (12) and the „left“ key (13) at the same time sets the present position of the orbital welding gun to zero.

---

### (13) „Left“ key

Pressing the key (11) and the „left“ key (13) moves the orbital welding gun back to the starting position.

---

### (14) „Right“ key

Pressing key (12) and the „left“ key (13) at the same time sets the present position of the orbital welding gun to zero.

Pressing key (12) and the „right“ key (14) at the same time stops welding immediately, and the previous position is deleted. Welding starts again from the original start position.

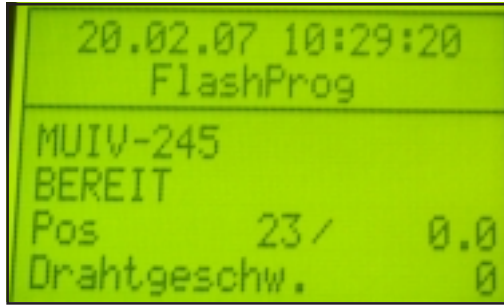
---

### (15) Emergency stop button

Stops welding immediately, without any downslope, for example to prevent an accident

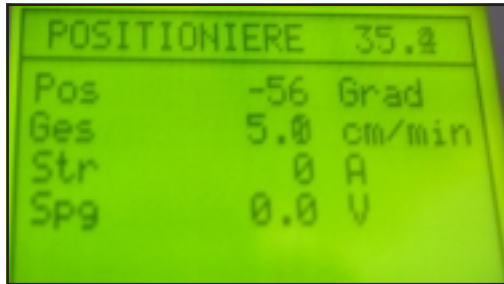
**Important!** Pressing the „left“ (13) and „right“ (14) keys at the same time calibrates the touchscreen in the same way that the „calibrate“ button in dialog window 263 „Date, time and calibrating the touchscreen“ does, as described in the „Setup and system parameters“ section.

**Display idle**



- Date and time
- Name of the currently loaded welding program
- Orbital welding gun type
- READY/NOT READY - power source ready to weld, or error needs to be rectified
- Pos - position of the orbital welding gun [°] / welding speed [cm/min]
- Wire feed speed [cm/min]

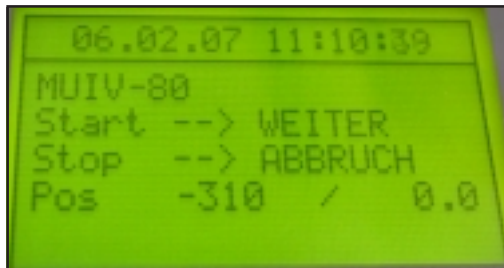
**Display after welding starts, if positioning takes place**



- Number appearing next to „POSITIONING“ is the time elapsed since welding started
- Pos - position of the orbital welding gun [°]
- Spd - welding speed [cm/min]
- Cur - welding current [A]
- Volt - welding voltage [V]

**Display after positioning and before gas pre-flow**

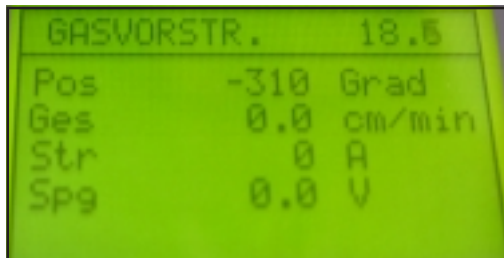
**Important!** If the „ROLL-UP“ parameter in dialog window 221 „Parameters for start point“ (see „Parameter settings“) is set to „AUTOSTART“, the system goes straight from positioning to gas pre-flow.



- Date and time
- Orbital welding gun type
- Start → CONTINUE - press Start/ Stop to start welding
- Stop → CANCEL - press Stop to stop welding immediately
- Pos - position of the orbital welding gun [°] / welding speed [cm/min]

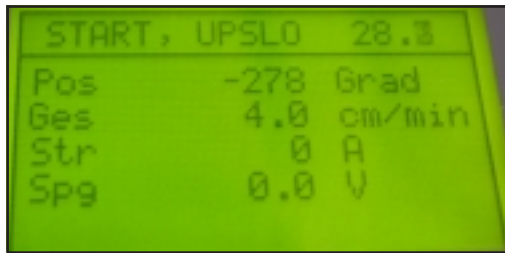
- If filler wire is available and activated while the orbital welding gun is open, then the „Wire Real Value“ also appears for the wire feed speed [cm/min]

**Display during gas pre-flow**



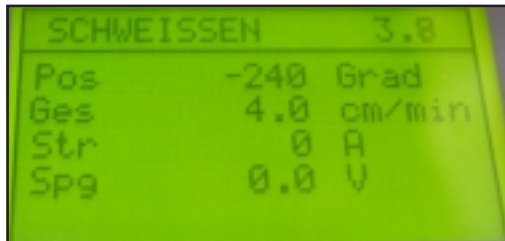
- Number appearing next to „GAS PREFL.“ is the elapsed time since welding started
- Pos - position of the orbital welding gun [°]
- Spd - welding speed [cm/min]
- Cur - welding current [A]
- Volt - welding voltage [V]

**Display during upslope**



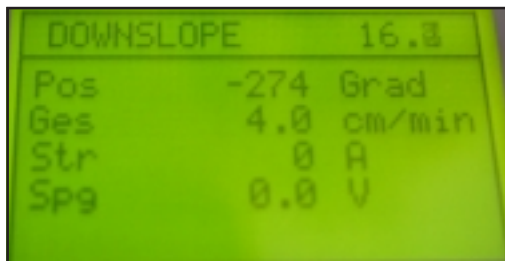
- Number appearing next to „START, UPSLO“ is the time elapsed since welding started
- Pos - position of the orbital welding gun [°]
- Spd - welding speed [cm/min]
- Cur - welding current [A]
- Volt - welding voltage [V]

**Display during welding**



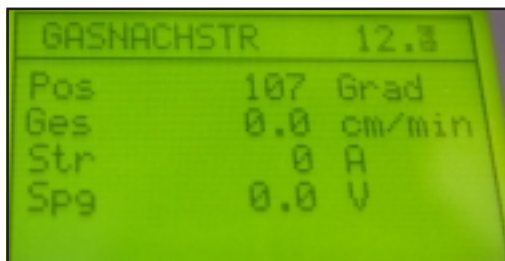
- Number appearing next to „WELDING“ is the time elapsed since welding started
- Pos - position of the orbital welding gun [°]
- Spd - welding speed [cm/min]
- Cur - welding current [A]
- Volt - welding voltage [V]

**Display during downslope**



- Number appearing next to „DOWNSLOPE“ is the time elapsed since welding started
- Pos - position of the orbital welding gun [°]
- Spd - welding speed [cm/min]
- Cur - welding current [A]
- Volt - welding voltage [V]

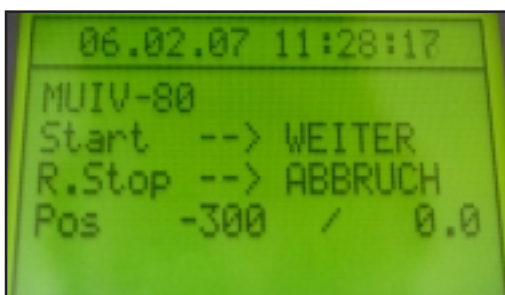
**Display during gas post-flow**



- Number appearing next to „GAS POSTFL“ is the time elapsed since welding started
- Pos - position of the orbital welding gun [°]
- Spd - welding speed [cm/min]
- Cur - welding current [A]
- Volt - welding voltage [V]

**Display after welding is cancelled**

If welding was interrupted because of an alarm, or because Start/Stop, Stop or Emergency stop was pressed, the following appears:



- Date and time
- MUIV-80 - orbital welding gun type
- Start → CONTINUE - press Start/Stop (11) to start welding
- R+Stop → CANCEL - exit the alarm status by pressing the „right“ (14) and „Stop“ (12) keys at the same time
- Pos - position of the orbital welding gun [°] / welding speed [cm/min]



# Before commissioning



**WARNING!** Operating the device incorrectly can cause serious injury and damage. Do not use the functions described here until you have read and completely understood all of the following documents:

- these Operating Instructions
- all the operating instructions for the system components, especially the "Safety Rules"

## Utilisation in accordance with „intended purpose“

The power source is intended exclusively for TIG welding with approved orbital guns and TIG welding torches.

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 in this manual
- Performing all stipulated inspection and servicing work.

## Setup regulations

The power source is tested to IP23, meaning:

- Protection against penetration by solid foreign bodies with diameters > 12.5 mm (.49 in.)
- protection against direct sprays of water up to 60° from the vertical



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

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

## Mains connection

The power source is designed to run on the mains voltage shown on the rating plate. The required mains supply fuse protection can be found in the „Technical data“ section. If there is no network cable or mains plug on your device, fit a network cable or plug according to the national standards.



**NOTE!** Inadequately dimensioned electrical installations can lead to serious damage. The mains lead, and its fuse protection, must be dimensioned in accordance with the local power supply. The technical data shown on the rating plate shall apply.

## Generator-powered operation

The power source is generator-compatible, provided that the maximum apparent power delivered by the generator is at least 10 kVA.



**NOTE!** The voltage delivered by the generator must NEVER fall below or exceed the mains voltage tolerance range. Details of the mains voltage tolerance are given in the section headed „Technical data“.



# Commissioning



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

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

This section describes how to put the power source into service

- for the principal application (orbital welding)
- with reference to a standard configuration for an orbital welding installation.

The standard configuration consists of the following components:

- Power source with integral cooling unit
- Orbital welding gun
- Pressure regulator for shielding gas and forming gas
- Gas cylinders for shielding gas and forming gas

The steps set out below provide an overview of how to put the power source into service. For detailed information on each of these steps, please refer to the instruction manuals for the appliances in question.

## Note regarding the cooling unit

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

## Connecting gas cylinders for shielding gas and forming gas



**CAUTION!** Risk of injury from gas cylinder toppling over.

- Always use a safety strap
- Fix the safety strap at the same height as the top part of the cylinder
- Never fix the safety strap around the neck of the cylinder

1. Fix gas cylinder in place at the desired location
2. To connect the gas cylinder:
  - Take the protective cap off the gas cylinder
  - Briefly turn the gas cylinder valve anti-clockwise to blow off any dust and dirt
  - Inspect the seal on the pressure regulator
  - Screw the pressure regulator onto the gas cylinder and tighten it

If using an orbital welding gun with an integral gas connector:

3. Using the gas hose, connect pressure regulator for shielding gas to the shielding gas input connection
4. Tighten the union nut
5. If available/required, connect pressure regulator for forming gas to the forming gas input connection using the gas hose.

If using an orbital welding gun without an integral gas connector:

3. Connect shielding gas hose to pressure regulator for shielding gas
4. If available/required, connect forming gas hose to pressure regulator for forming gas

**Establishing a connection to the workpiece**

1. Turn the mains switch to the „O“ position
2. Plug the earthing (grounding) cable into the (+) current socket and twist to fasten it
3. With the other end of the earthing (grounding) cable, establish a connection to the workpiece

**Connecting the orbital welding gun**

1. Turn the mains switch to the „O“ position
2. Plug the welding cable of the orbital welding gun into the „minus“ current socket and twist it clockwise to latch it into place
3. Connect orbital welding gun to orbital welding gun control connection
4. If available, plug control plug of the orbital welding gun into the torch control connection and lock in place

**Important!** A TIG welding torch is also connected to the „minus“ current socket in the same way as the orbital welding gun. Plug the control plug of the TIG welding torch into the orbital welding gun control connection socket or torch control connection socket.

5. Tool up the welding torch (see the torch instruction manual)

If using an orbital welding gun with an integral gas connector:

6. Connect shielding gas hose to shielding gas output connection
7. If available, connect forming gas hose to forming gas output connection

Only if using a water-cooled orbital welding gun or water-cooled TIG welding torch:

8. Plug water connections on the orbital welding gun or TIG welding torch into the water flow and water return connections

# Menus with direct selection

## Principle

You can call up individual menus directly using keys on the control panel.

## F1 key



F1 calls up a user-defined function. The following functions are available:

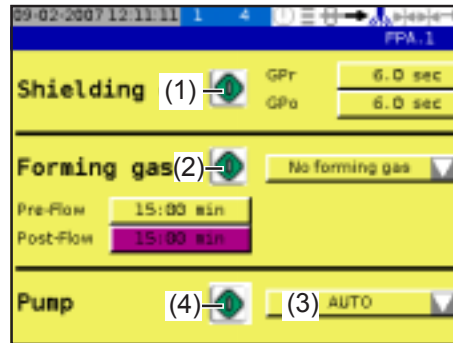
- Active alarm page
- Alarm history
- Move to starting position
- Save screenshot to USB
- Water pump OFF/ON

For more detailed information on how to assign a function to the F1 key, please refer to the "Setup and system parameters" menu, section "User-specific settings"

## „Shielding gas and cooling“ menu



- Open the menu by pressing the „Shielding gas and cooling“ key.



Provide the following information:

### Shielding

- GPr: Shielding gas pre-flow time [s]
- GPa: Shielding gas post-flow time [s]

- To test the shielding gas flow, touch the "Gas test" button (1)

### Forming gas

- No forming gas:  
Forming gas deactivated or not connected
- Gas synchron:  
Forming gas is controlled along with shielding gas according to the previously set shielding gas pre-flow and shielding gas post-flow times
- Pre / Post Flow:  
For the forming gas pre-flow and post-flow, the set forming gas pre-flow and post-flow times apply
- Pre-flow:  
Forming gas pre-flow time [min]
- Post-flow:  
Forming gas post-flow time [min]
- To test the forming gas flow, touch the „forming gas“ button (2)

### Pump

- ON  
Coolant pump permanently ON once power source is switched on
- OFF  
Coolant pump switched OFF
- AUTO  
Coolant pump only switched on when required

**„Shielding gas and cooling“ menu**

(continued)



**Important!** If the „OFF“ setting has been selected, the coolant pump will be in „AUTO“ mode after every power source restart provided that no gas-cooled welding torch is connected.

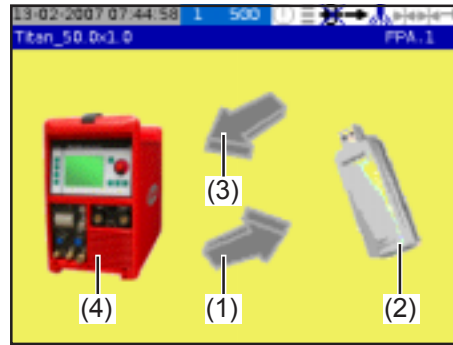
To test the coolant pump

1. Select “AUTO” in window (3)
2. Touch button (4)

**„Data transfer“ menu**



- Open the menu using the „Load export/import“ key (6)



To save all data from the power source to the USB stick:

1. Select arrow symbol (1) pointing towards USB stick (2)
2. Start the save by pressing “OK”

To load all data from the USB stick to the power source:

1. Select arrow symbol (3) pointing towards the power source (4)
2. Start the save by pressing “OK”

To load the selected welding program from the power source internal memory or to save it to the USB stick

1. Select power source symbol (4)



2. Select the welding program to be transferred using the dialog window shown
3. Using the „LOAD“ button, transfer the welding program to the power source memory
4. Transfer the welding program to the USB stick using the „FPA ->USB“ button

To load the selected welding program from the power source internal memory or to save it to the USB stick

1. Select USB stick symbol (2)



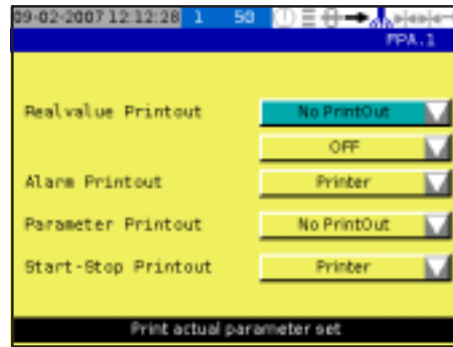
2. Select the welding program to be transferred using the dialog window shown
3. Using the „LOAD“ button, transfer the welding program to the power source memory
4. Transfer the welding program to the power source internal memory using the „USB ->FPA“ button

## „Printer configuration“ menu



- Open the menu by pressing the „Printer configuration“ key

Provide the following information:



1. „Realvalue Printout“ for relevant process data. Options include:
  - No PrintOut
  - Printer  
Prints to paper using the integral printer
  - USB Stick  
No printing occurs. Instead, the relevant data is saved to the USB stick.
  - Printer & USB  
Data is printed and also saved to USB stick.

Every xx degrees - data is printed at the following angle intervals:

- „OFF“ ... do not document
- „5 Deg“ ... document every 5°
- „10 Deg“ ... document every 10°
- „15 Deg“ ... document every 15°
- „20 Deg“ ... document every 20°
- „45 Deg“ ... document every 45°

and only for every xx-th seam, as per the „every xx seams“ entry

2. „Alarm Printout“  
Settings are made in the same way as those for „Realvalue Printout“, but for printing out alarm messages in this case
3. „Parameter Printout“  
Settings made in the same way as those for „Realvalue Printout“, but for printing out relevant process parameters for the loaded program in this case
4. „Start-Stop Printout“  
Settings made in the same way as those for „Realvalue Printout“, but for printing out relevant data for welding start and stop in this case

**Important!** To change the printer paper:

- Remove cover from printer
- Remove remaining paper
- Insert suitable paper roll for thermo sublimation printer
- Replace cover



„Printer configuration“ menu  
(continued)



Example of „Realvalue Printout“ on paper

```

16:54:02.80 | #MM: End of Dist.
*****
Gesamtzeit: 00:29 min
-----
c 374 1 .0 0 0 .0 0
b 372 1 39.6 0 0 .0 0
  360 1 39.4 0 0 .0 0
  315 1 39.6 0 0 .0 0
  270 1 39.6 0 0 .0 0
  225 1 39.0 0 0 .0 0
  180 1 35.0 0 0 .0 0
  135 1 30.6 0 0 .0 0
   90 1 25.1 0 0 .0 0
   45 1 18.1 0 0 .0 0
a 0 1 .0 0 0 .0 0

Pos Seg v-Rot IP IG Spg vDraht
-----
Gasnachstroemung :          2.0 sec
Gasvorstroemung  :          2.0 sec
-----
Kopf      : NU-III 8-34
Naht Nr.  : 5
Programm  : Fronius
Bediener  : FPA.1
Kennung   : Fronius-Automation
Ausdruck am : 06/12/20 16:53:33.69
-----
I S T W E R T E
*****
16:53:30.18 | #MM: Start

```

```

16:42:42.21 | #MM: End of Dist.
*****
Total time: 00:31 min
-----
c 373 1 .0 0 0 .0 0
b 368 1 34.0 0 0 .0 0
  360 1 34.0 0 0 .0 0
  315 1 34.0 0 0 .0 0
  270 1 34.0 0 0 .0 0
  225 1 34.0 0 0 .0 0
  180 1 34.2 0 0 .0 0
  135 1 29.9 0 0 .0 0
   90 1 24.8 0 0 .0 0
   45 1 17.7 0 0 .0 0
a 0 1 .0 0 0 .0 0

Pos Seg v-Rot IP IG Volt vWire
-----
Shielding gas post  :          2.0 sec
Shielding gas pre fl:          2.0 sec
-----
Head      : NU-III 8-34
Seam Nr.  : 3
Programm  : Fronius
Operator  : FPA.1
Identif.  : Fronius-Automation
Printout  : 06/12/20 16:42:11.77
-----
R E A L V A L U E S
*****
16:42:08.94 | #MM: Start

```

Example of „Realvalue Printout“ as a .txt file for USB stick

```

*****
I S T W E R T E
-----
Ausdruck am : 06/12/20 16:53:33.69
Kennung     : Fronius-Automation
Bediener    : FPA.1
Programm    : Fronius
Naht Nr.    : 5
Kopf        : NU-III 8-34
-----
Gasvorstroemung :          2.0 sec
Gasnachstroemung :          2.0 sec
-----
Pos Seg v-Rot IP IG Spg vDraht
a 0 1 .0 0 0 .0 0
  45 1 18.1 0 0 .0 0
  90 1 25.1 0 0 .0 0
  135 1 30.6 0 0 .0 0
  180 1 35.0 0 0 .0 0
  225 1 39.0 0 0 .0 0
  270 1 39.6 0 0 .0 0
  315 1 39.6 0 0 .0 0
  360 1 39.4 0 0 .0 0
b 372 1 39.6 0 0 .0 0
c 374 1 .0 0 0 .0 0
-----
Gesamtzeit: 00:29 min
*****

```

```

*****
R E A L V A L U E S
-----
Printout    : 06/12/20 16:42:11.77
Identif.    : Fronius-Automation
Operator    : FPA.1
Program     : Fronius
Seam Nr.    : 3
Head        : NU-III 8-34
-----
Shielding gas pre fl:          2.0 sec
Shielding gas post  :          2.0 sec
-----
Pos Seg v-Rot IP IG Volt vWire
a 0 1 .0 0 0 .0 0
  45 1 17.7 0 0 .0 0
  90 1 24.8 0 0 .0 0
  135 1 29.9 0 0 .0 0
  180 1 34.2 0 0 .0 0
  225 1 34.0 0 0 .0 0
  270 1 34.0 0 0 .0 0
  315 1 34.0 0 0 .0 0
  360 1 34.0 0 0 .0 0
b 368 1 34.0 0 0 .0 0
c 373 1 .0 0 0 .0 0
-----
Total time: 00:31 min
*****

```

„Printer configuration“ menu  
(continued)



Example of „Parameter Printout“ on paper

```
*****
Identifier : Fronius-Automation
Program   : Ironius
Print as of : 06/12/20 16:43:05.64
Program saved
  Iron   : FPA.1
  on    : 06/12/18 08:52:39.46
*****
```

```
-----
Diameter   : 34.0 mm
Thickness  : 1.5 mm
-----
```

```
Weld mode   : DC-
```

```
-----
Travel Path : 370 Deg
Start delay  : OFF
Back travel  : SET ZERO
-----
```

```
-----
Shielding gas pre fl : 2.0 sec
Starting Curr - A    : 10 A
Starting Curr - time : 0.2 sec
Upslope - time      : 0.5 sec
Downslope - Curr    : 2.0 sec
Downslope - Ret.    : OFF
Endcurrent - A      : 10 A
Endcurrent - time   : 0.5 sec
Shielding gas post   : 2.0 sec
-----
```

**SEGMENT 1**

```
-----
Segment path : 370 Deg
Travel speed  : 9.0 cm/min
Pulsing curr  : 80 A
Background curr : 80 A
I-Pulsing curr : 100 ms
I-Background curr : 300 ms
(Frequency)   : 2.50 Hz
(Duty Cycle)  : 25 %
-----
```

```
*****
Kennung     : Fronius-Automation
Programm    : Ironius
Ausdruck an : 06/12/20 16:54:25.69
Gespeichert
  von       : FPA.1
  am        : 06/12/18 08:52:39.46
*****
```

```
-----
Durchmesser  : 34.0 mm
Wandstaerke : 1.5 mm
-----
```

```
Verfahren    : DC-
```

```
-----
Gesamtweg    : 370 Deg
Anfahrverzögerung : OFF
Rueckfahrt   : SET ZERO
-----
```

```
-----
Gasvorstromung : 2.0 sec
Startstrom - A : 10 A
Startstrom - Zeit : 0.2 sec
Upslope - Zeit : 0.5 sec
Downslope - Strom : 2.0 sec
Downslope - Ret. : OFF
Endstrom - A : 10 A
Endstrom - Zeit : 0.5 sec
Gasnachstromung : 2.0 sec
-----
```

**SEGMENT 1**

```
-----
Segmentweg : 370 Deg
Geschwindigkeit : 9.0 cm/min
Pulsstrom : 80 A
Grundstrom : 80 A
I-Pulsstrom : 100 ms
I-Grundstrom : 300 ms
(Frequenz) : 2.50 Hz
(Duty Cycle) : 25 %
-----
```



„Printer configuration“ menu  
(continued)



Example of „Parameter Printout“ as a .txt file for USB stick

```

*****
(Duty Cycle)      :      25 %
(Frequency)      :      2.50 Hz
t-Grundstrom     :      300 ms
t-Pulsstrom      :      100 ms
Grundstrom       :      80 A
Pulsstrom        :      80 A
Geschwindigkeit  :      9.0 cm/m
Segmentweg       :      370 Deg
□
SEGMENT 1
□
Gasnachstroemung :      2.0 sec
Endstrom - Zeit  :      0.5 sec
Endstrom - A     :      10 A
Downslope - Rot. :      OFF
Downslope - Strom :      2.0 sec
Upslope - Zeit   :      0.5 sec
Startstrom - Zeit :      0.2 sec
Startstrom - A   :      10 A
Gasvorstroemung :      2.0 sec
-----
Rueckfahrt       :      SET ZERO
Anfahrverzoegerung :      OFF
Gesamtweg        :      370 Deg
-----
Verfahren        :      DC-
-----
Wandstaerke     :      1.5 mm
Durchmesser      :      34.0 mm
-----
am              : 06/12/18 08:52:39.46
von             : FPA.1
Gespeichert
Ausdruck am    : 06/12/20 16:54:25.69
Programm      : Fronius
Kennung       : Fronius-Automation
*****

```

```

*****
(Duty Cycle)      :      25 %
(Frequency)      :      2.50 Hz
t-Background curr :      300 ms
t-Pulsing curr   :      100 ms
Background curr  :      80 A
Pulsing curr     :      80 A
Travel speed     :      9.0 cm/m
Segment path     :      370 Deg
□
SEGMENT 1
□
Shielding gas post :      2.0 sec
Endcurrent - time  :      0.5 sec
Endcurrent - A     :      10 A
Downslope - Rot.   :      OFF
Downslope - Curr   :      2.0 sec
Upslope - time     :      0.5 sec
Starting Curr - time :      0.2 sec
Starting Curr - A   :      10 A
Shielding gas pre fl:      2.0 sec
-----
Back travel       :      SET ZERO
Start delay       :      OFF
Travel Path       :      370 Deg
-----
Weld mode         :      DC-
-----
Thickness         :      1.5 mm
Diameter          :      34.0 mm
-----
am              : 06/12/18 08:52:39.46
from            : FPA.1
Program saved
Print as of     : 06/12/20 16:43:05.64
Program        : Fronius
Identifier      : Fronius-Automation
*****

```



„Printer configuration“ menu  
(continued)



Example of „Alarm Printout“ and „Start-Stop Printout“ on paper

```
*****
Fronius-Automation
FPA.1 ADMIN
06/12/20 16:44:04.09
*****

16:43:50.45 | IR: Emergency pressed
16:43:49.65 | Emergency Stop activated
16:43:48.33 | IR: Emergency pressed
16:43:46.25 | #MAN: Start
16:43:39.25 | IR: Stop-Key -> Interrupt
16:43:36.92 | #MAN: Start
16:43:33.11 | IR: Stop-Key -> Interrupt
16:43:30.55 | #MAN: Start

16:43:29.52 | Emergency Stop activated
16:43:19.07 | Emergency Stop activated
16:43:13.21 | Emergency Stop activated
```

Example of „Alarm Printout“ and „Start-Stop Printout“ as .txt file for USB stick

```
18:07:35.06 ³ #MAN: Start (0)
18:07:49.59 ³ AB: Kein Arc_On Signal
18:08:12.35 ³ #MAN: Start (0)
18:08:23.76 ³ AB: EMPF. PS Ready fehlt
18:08:23.85 ³ Stromquelle nicht bereit
18:08:24.33 ³ PS =55 no I IGn
18:08:33.84 ³ Stromquelle nicht bereit
18:08:36.65 ³ #MAN: Start (0)
18:08:48.33 ³ Stromquelle nicht bereit
18:08:48.87 ³ PS =55 no I IGn
18:09:05.13 ³ Stromquelle nicht bereit
18:09:05.73 ³ PS =55 no I IGn
18:09:10.10 ³ #MAN: Start (0)
18:09:21.05 ³ #MAN: Schweiss Ende (0)
18:09:36.48 ³ Notaus aktiviert
18:09:39.39 ³ Notaus aktiviert
18:09:42.12 ³ Notaus aktiviert

18:12:28.79 ³ #MAN: Start (0)
18:12:42.71 ³ IR: No Arc ON
18:19:55.28 ³ Emergency Stop activated
18:19:57.20 ³ IR: No Arc ON
18:19:58.37 ³ Emergency Stop activated
18:19:59.39 ³ IR: No Arc ON
18:20:06.32 ³ #MAN: Start (0)
18:20:18.02 ³ Power Source not ready
18:20:18.47 ³ PS =55 no I IGn
18:20:41.69 ³ Power Source not ready
18:20:58.82 ³ #MAN: Start (0)
18:21:26.25 ³ IR: Stop-Key -> Interrupt
18:21:42.09 ³ #MAN: Start (0)
```

If „Start-Stop Printout“ has been selected, the following is printed every hour:

```
*****
07/02/06 18:31:44.61
Naht: ( 32)
FPA.1 ADMIN
Fronius-Automation
*****

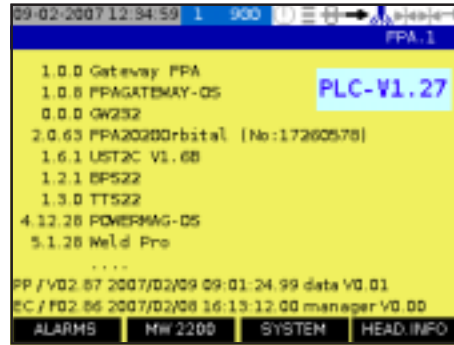
*****
07/02/06 18:31:44.61
Seam: ( 32)
FPA.1 ADMIN
Fronius-Automation
*****
```



**Alarms and device-specific data**



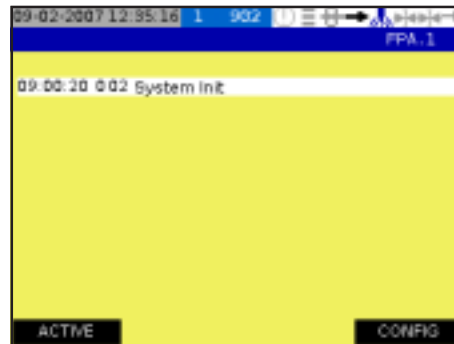
- Open the menu by pressing the „i“ key (9)



Version numbers of the main modules  
 - To display the present alarms, touch the „ALARMS“ button



Current alarms  
 These could be faults or application errors that have not yet been rectified.  
 - To display the saved alarms, touch the „HISTORY“ button



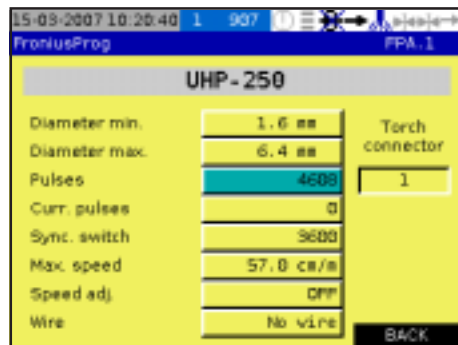
Saved alarms with time and error number  
 These could be rectified or non-rectified faults or application errors.  
 - To obtain a list of present alarms, touch the „CONFIG“ button



1. Use „NEXT“ to scroll through the alarm list
2. Use „ACTIVE“ to return to the present alarms
3. Use „HISTORY“ to return to the saved alarms
4. If required, use „NEXT“ to open the following four windows for additional alarms

## Alarms and device-specific data

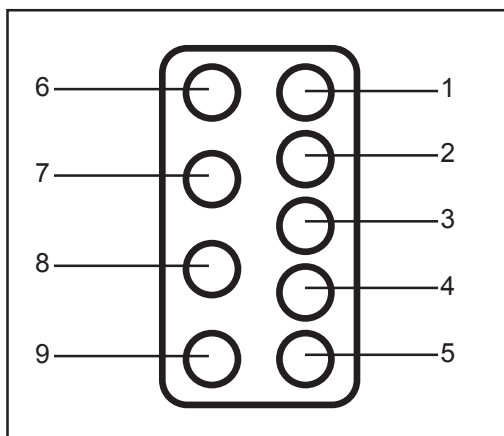
(continued)



1. In the first window, touch the „i“ key on the „HEAD.INFO“ button to call up the orbital welding gun data.

**Important!** The fields contained in this window are not controls and are for display purposes only.

- Diameter min. - minimum diameter of the pipe joins to be welded [mm]
- Diameter max. - maximum diameter of the pipe joins to be welded [mm]
- Pulses
- Curr. pulses - number of pulses counted for the present welding program
- Sync. switch - position in tenths of a degree of the synchronisation switch  
A value of 0 means that no synchronisation switch is connected  
A value of 3600 means, for example, that the limit switch is fitted at the 360 ° position
- Max. speed - highest rotation speed [cm/min]
- Speed adj. - correction factor for the rotation speed  
OFF - no correction factor
- Wire - maximum wire feed speed [cm/min]



The illustration on the left shows the pin assignment for the welding torch connection as seen from the front.

The table illustrated below shows which numbers the „torch plug“ field contains depending on the pin just activated. The table also explains the meaning of the number shown in the „torch plug“ field for a welding torch and an orbital welding gun.

Pin	Indicator	Welding torch Up/Down	Orbital welding gun
2	4	Down	-
2	5	-	Remaining air alarm
3	8	Lower	-
3	9	-	External stop
4	2	Up	-
5	16	Start	-
5	17	-	External start
8	1 / 0 *	Up/Down	-
9	-	GND	GND

\* The value becomes 0 when the Pin 8 - Pin 9 (=GND) contact is closed

- Welding torch Up/Down: contact closed
- Orbital welding gun: contact open

## Alarms and device-specific data

(continued)



**WARNING!** Operating the device incorrectly can cause serious injury and damage. Do not use the functions described here until you have read and completely understood all of the following documents:

- these Operating Instructions
- all the operating instructions for the system components, especially the “Safety Rules”



**WARNING!** Automatically starting machines can cause serious injury and damage.

In addition to these operating instructions, the robot and welding system manufacturer’s safety rules must also be observed. For your personal safety, ensure that all protective measures have been implemented and will remain in place for the duration of your stay within the working area of the orbital welding gun.

The following illustration shows one possible arrangement of keys on the orbital welding gun, and to the right of it, information on which pins are activated by them and which number appears in the display.

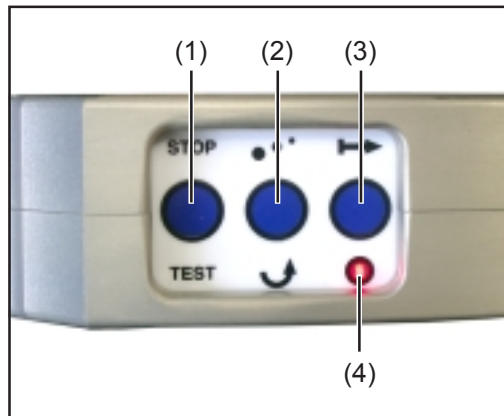
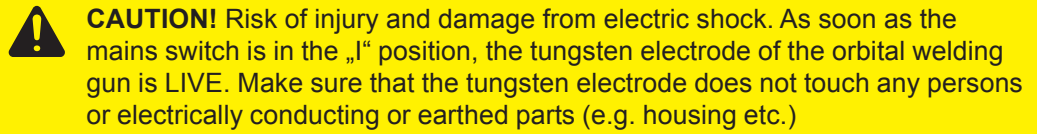


Fig. 7 Controls on the orbital welding gun

No.	Function
(1)	<b>Rotation key</b> <ul style="list-style-type: none"><li>- Pins 3 and 5 together</li><li>- Display 25</li></ul>
(2)	<b>External stop key</b> <ul style="list-style-type: none"><li>- Pin 3</li><li>- Display 9</li></ul>
(3)	<b>External start key</b> <ul style="list-style-type: none"><li>- Pin 5</li><li>- Display 17</li></ul>
(4)	<b>Limit switch LED</b> Limit switch for 360 degree position has tripped

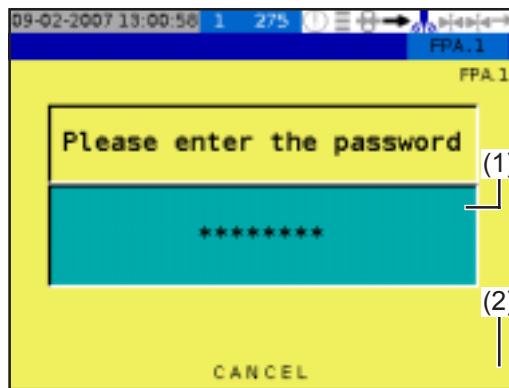
# Main menu

## Safety



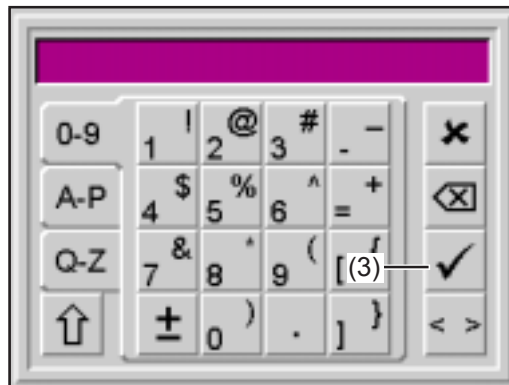
## Entering a password

If the password entry is pre-set in the „Setup and system parameters“ menu, you will be requested to enter a valid password each time you switch on the power source.



1. Turn the mains switch to the „ON“ position
2. A window appears requesting you to enter the password
3. Touch the area marked (1)

**Important!** If you touch the area marked „CANCEL“ (2), the power source will go into „Locked“ status and only the actual welding mode will be supported. You cannot change any settings.



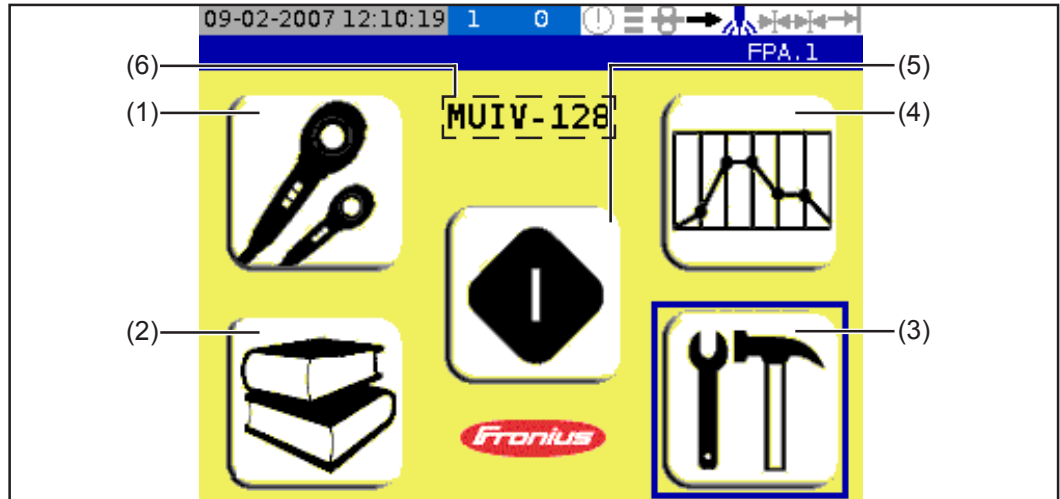
4. A keypad appears
5. Enter the password using this keypad and confirm by pressing the „tick“ key (3)

**Important!** The default password is a full stop „.“. If this default password has been changed and the new password is not recognised, you cannot log on using the full stop „.“.

With the „CANCEL“ button, only the following functions are available:

- „Setup and system parameters“ menu, but for logging on only
- Welding menu
- Loading programs from the power source memory or USB stick
- Printing out process data

## Selection window



The selection window offers the following menus:

- (1) Orbital welding gun/manual welding torch
- (2) Synergic (characteristic)
- (3) Setup and system parameters
- (4) Parameter settings

If a TIG welding torch has been selected instead of the orbital welding gun, the following symbol appears (4) as follows:



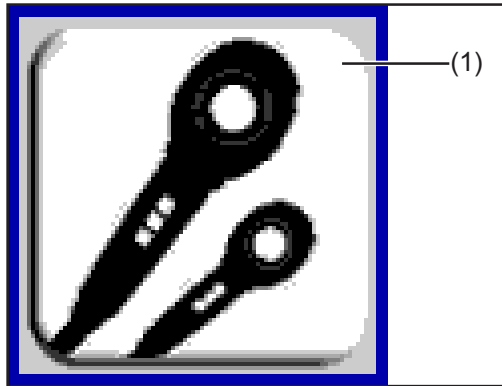
- (5) Weld

Entry (6) shows the currently selected orbital welding gun or manual torch.

A detailed description of the menus is provided in the following sections.

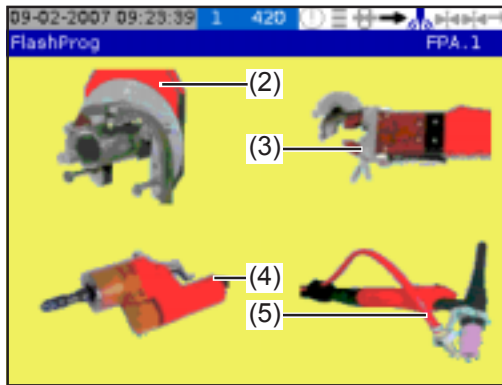
# Orbital welding gun

Calling up the „orbital welding gun“ menu



1. To select an orbital welding gun or welding torch, call up the orbital welding gun menu (1).

Selecting the type of orbital welding gun

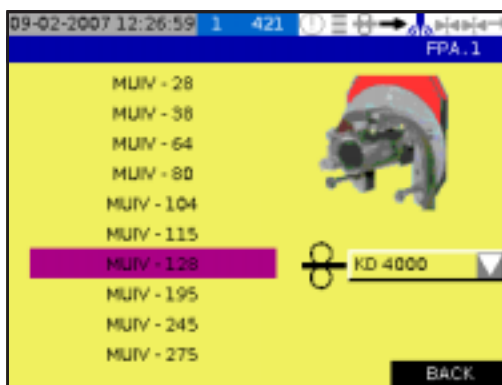


2. Select the desired type of orbital welding gun
  - (2) Open orbital welding gun
  - (3) Closed orbital welding gun
  - (4) Orbital tube sheet welding gun
  - (5) Manual welding torch

If choosing an orbital welding gun, please turn to the section headed „Selecting the type of orbital welding gun and wire-feed unit“.

If selecting a manual welding torch, please turn to the section headed „Selecting the type of manual welding torch“.

Selecting the type of orbital welding gun and wire-feed unit



3. Select the desired orbital welding gun type
4. If available, select the wire-feed unit
  - No wire
  - Wire internal
  - KD 4000 (cold wire feeder for external wire)

5. Use the „BACK“ button to select the orbital welding guns
 

or

Use „Menu“ to go back to the main menu

**Selecting the type of manual welding torch**



3. For gas-cooled welding torches, call up the „GAS M. TORCH“ entry
- For water-cooled welding torches, select the „WATER M. TORCH“ entry

**Important!** For gas-cooled or water-cooled welding torches,

- Gas-cooled: standard setting for coolant pump is “OFF”.
- Water-cooled: standard setting for coolant pump is “AUTO”.

4. Use the „BACK“ button to select the orbital welding guns

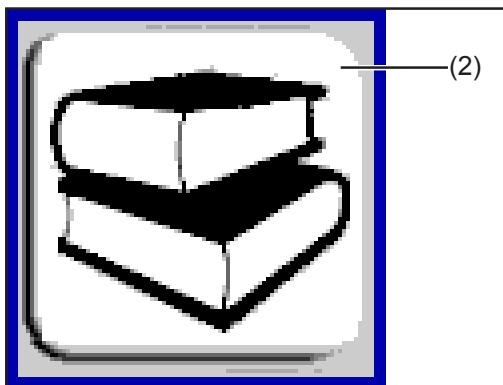
or

Use „Menu“ to go back to the main menu



# Synergic

## Calling up the „Synergic“ menu

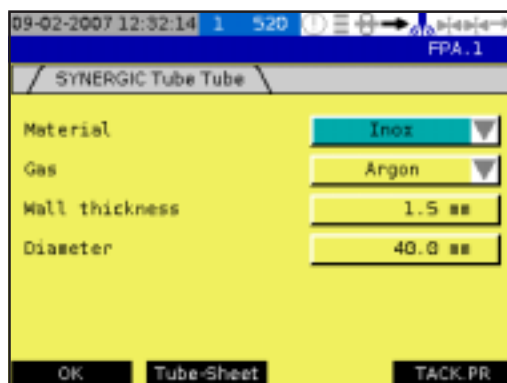


1. Call up the „Synergic“ menu (2)

## Principle

In synergic mode, it is sufficient merely to enter a few well-known settings for the arc process. Using this information, the power source calculates all other settings for an optimum welding result.

## Entering parameters

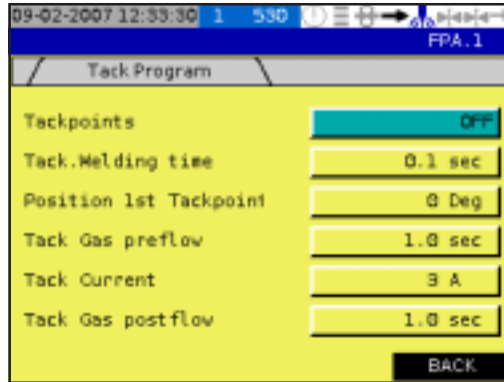


Provide the following information:

2. Type of base material
  - Inox
  - Steel
  - Alu
  - Titan
  - NiBas (in preparation)
  - Duplex (in preparation)
  - Copper (in preparation)
3. Gas - (shielding gas)
  - Argon
  - Argon H<sub>2</sub> (argon hydrogen, in preparation)
  - Argon Helium (in preparation)
  - Helium (in preparation)
4. Wall thickness (of pipe join) [mm]
5. Diameter - outer diameter of pipe join [mm]
6. Confirm settings by pressing OK  
The parameters are calculated

**Important!** To make settings for the tack program, touch the „TACK.PR“ button.

**Entering parameters**  
(continued)



Make the following settings in the „Tack Program“ window:

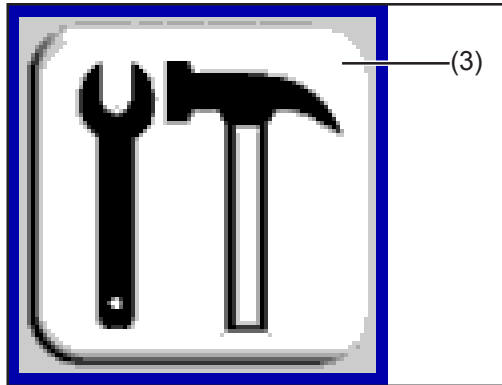
- „Tackpoints“  
OFF - tacking deactivated  
1 .... 20 - number of tack points
- „Tack.Welding time“ - duration of welding current for a tack point [s]
- „Position 1st Tackpoint“ - position of the first tack point [degrees]

- „Tack Gas preflow“ - shielding gas pre-flow before tacking
- „Tack Current“ - welding current for tacking
- Tack Gas postflow - shielding gas post-flow for tacking

**Important!** On closed orbital welding guns, gas pre-flow and gas post-flow only take place at the first and last tack points.

# Setup and system parameters

Calling up the „Setup and system parameters“ menu



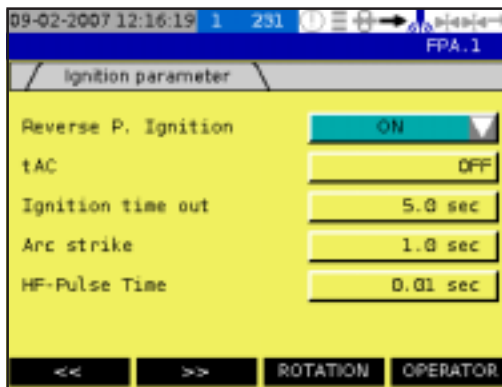
1. Call up the „Setup and system parameters“ menu (3)

A detailed description of the menus is provided in the following sections.

## Principle

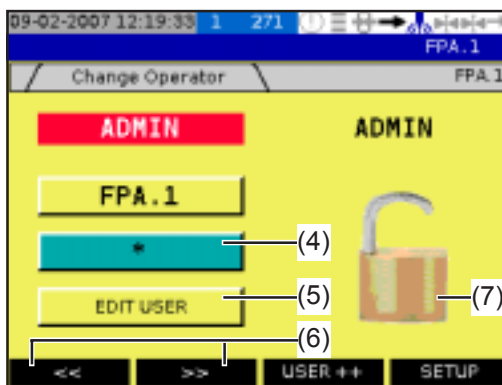
The „Setup and system parameters“ menu allows users to adjust the power source and orbital welding gun specifically to their requirements.

Calling up „OPERATOR“ settings



1. Touch the „OPERATOR“ button in the „Ignition parameter“ window
2. A window appears for user-specific settings

Logging on a different user, and changing the password



- To call up a different pre-saved user in order to log him on under his name, touch the „USER ++“ button.

If the password of the user that has just been logged on is to be changed:

1. Touch button (4)
2. Further details can be found in the section headed “Changing password”

To assign user permissions:

1. Touch „EDIT USER“ button (5)
2. Further details can be found in the section headed “User permissions”

**Logging on a different user, and changing the password**  
(continued)

**Important!** Only an administrator is authorised to assign user permissions. If a user's details have been changed, the user can no longer log on using his original user details.

To protect the power source from parameter changes:

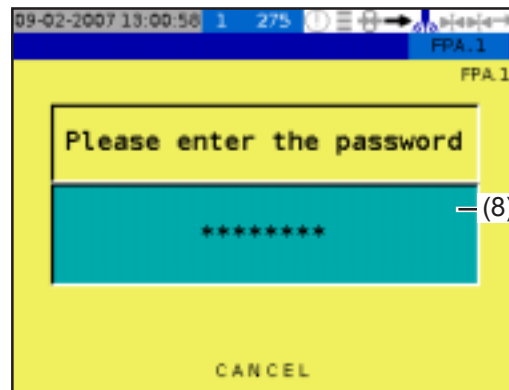
- Lock the power source by touching the padlock symbol (7)

The power source goes immediately into "Locked" status and only the actual welding mode is supported. You cannot change any settings.

To unlock:

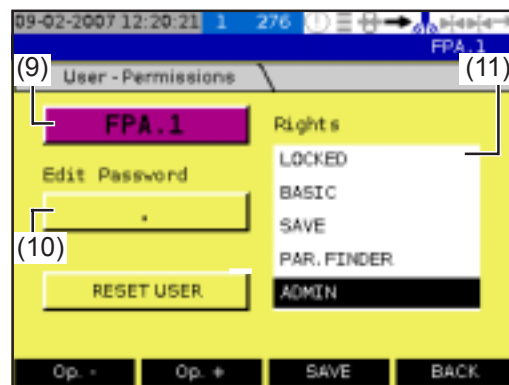
1. Touch the padlock symbol (7) again
2. Click on the request to enter the password. Once the keypad appears, type in the password.

**Changing password**



1. You are requested to enter the new password
2. Touch the button (8) to open a keypad for entering the new password

**User permissions**



- If the user name is to be changed
- Touch button (9) to open the keypad for changing the user name

- If the password needs to be changed:
- Touch button (10) to open the keypad for changing the password

To assign the user's permissions:

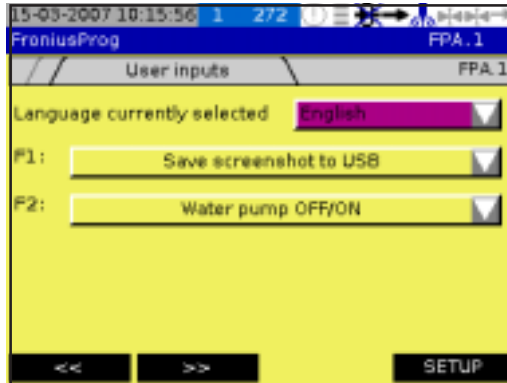
1. Touch the area marked (11) and select one of the following entries:
  - LOCKED ...the power source goes immediately into "Locked" status and only the actual welding mode is supported. You cannot change any settings.
  - BASIC ... The user has no permissions, and may only change welding parameters within the limits specified for him.
  - SAVE ... The user may also save the welding parameters changed by him.
  - PAR. FINDER ... The user may also change the parameters beyond the predefined limits.
  - ADMIN ... The user may also reset parameters and adjust setup and system parameters.



**User permissions**  
(continued)

2. If required, press the „RESET USER“ button to reset the settings to their original status
3. Use the „Op.-“ and „Op. +“ buttons to call up the settings for others users
4. Use the „BACK“ button to go back to the „Change Operator“ window
5. In the „Change Operator“ window, use the „>>“ button to call up the user-specific settings window

**User-specific settings**

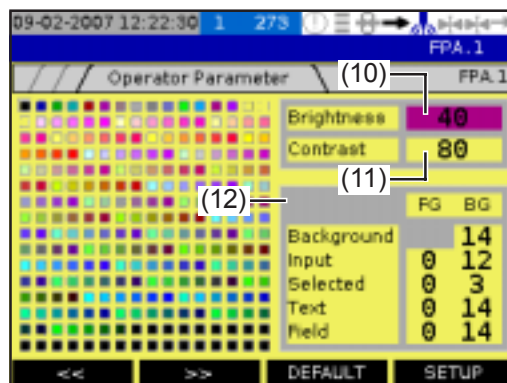


Provide the following information:

1. Language currently selected - select the desired language
2. F1: select a function that has been defined for the F1 key by the user
3. F2: select a function that has been defined by the user for the F2 key on the remote control unit

4. The following user-defined functions are available for the keys:
  - No function
  - Active alarm page
  - Alarm history
  - Move to starting position
  - Save screenshot to USB
  - Water pump OFF/ON
5. Press „>>“ to call up the settings for brightness and contrast

**Brightness and contrast**



1. Using buttons (10) and (11), adjust the brightness and contrast of the touchscreen
2. Make the following settings in the input area (12):

**Important!** „FG“ is the colour of the font in the foreground, and „BG“ is the colour of the text background.

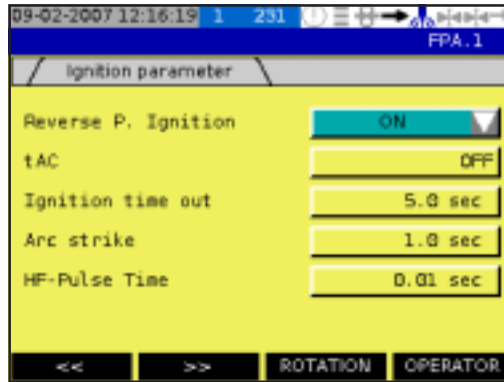
The numeric values to be entered correspond to the sequence of coloured boxes shown on the left. Example:

- „0“ = black
- „16“ = white

- Background - general background colour
- Input - font colour and background colour of selected texts when pressing the adjusting dial
- Selected - font colour and background colour of texts during selection
- Text - font colour and background colour for text - general
- Field - font colour and background colour for text in text fields

**Important!** Use the “Default” button to reset the factory settings if necessary.

## Ignition parameters



Provide the following information:

1. „Reverse P. Ignition“ - reverse polarity ignition
  - ON: activate
  - OFF: deactivate
2. “tAC” - pulsed ignition. Pulsed ignition is activated automatically when selecting a tack program.

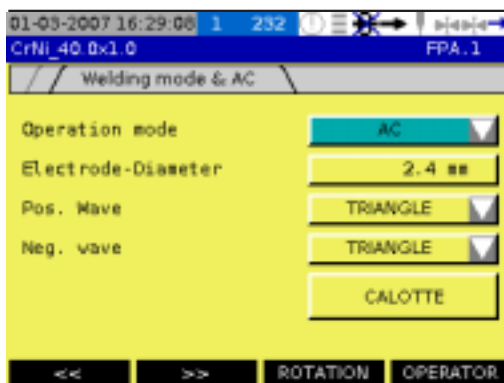
**Important!** For more detailed information on the tack program, please refer to the „Synergic“ section.

- 0.1 - 9.9: Duration of a pulsed welding current when welding starts [s]
  - ON: activate
  - OFF: deactivate

**Important!** The tacking function is only available for the TIG-DC welding process.

3. “Ignition time out” - time until switch-off if no ignition occurs [s]  
To attempt ignition again, welding must be started again
4. “Arc strike” - time until switch-off after the arc has broken [s]  
If the arc-break function is activated, clean the surface of the workpiece and start welding again
5. “HF-Pulse Time” [s]
  - High-voltage pulse duration for the high-voltage ignition
  - Ext-HF: high-voltage ignition with external power source
  - NO HF: high-voltage ignition deactivated
6. Use “>>” button to call up the “Welding mode & AC” window

## Welding mode & AC



Provide the following information:

1. Operation mode
  - AC
  - DC-
2. “Electrode-Diameter” - diameter of the tungsten electrode [mm]
3. AC welding: “Pos. Wave”
  - Triangle
4. AC welding: “Neg. Wave”
  - Triangle ... triangular waveform

- Sinus ... sinusoidal waveform (the standard setting for a low noise, stable arc)
- Soft square ... rectangular waveform with decreased edge steepness, for reducing noise levels compared to those that occur with the 100% rectangular waveform
- Square wave ... 100% rectangular waveform (stable but loud arc)

## Welding mode & AC

(continued)

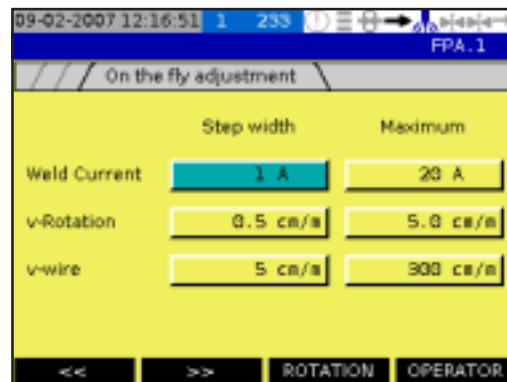
- Use the CALOTTE key to activate tungsten balling (cap shaping)

The automatic cap-shaping function ensures that the optimum shape of electrode tip is formed automatically during the welding start-up. A separate cap-shaping operation on a test workpiece is no longer necessary.

**Important!** No further cap-shaping is needed at the next welding start-up. After the cap-shaping function has been performed once, it is deactivated for every subsequent welding start-up.

- Use ">>" button to call up the "On the fly adjustment" window

## Value adjustment

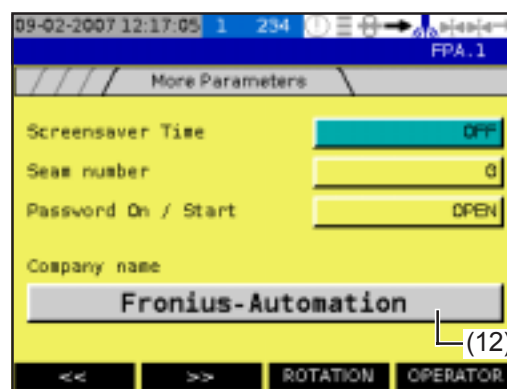


The following values allow you to provide the step width and the maximum value:

- Welding current [A]
- v-Rotation - rotation speed of orbital welding gun [cm/min]
- v-wire - wire feed speed [cm/min]
- Use the ">>" button to open the "More Parameters" window

**Important!** The values are not active if the „PAR. FINDER“ and „ADMIN“ user permissions are selected. More detailed information on the user settings can be found in the „User settings“ section

## More parameters



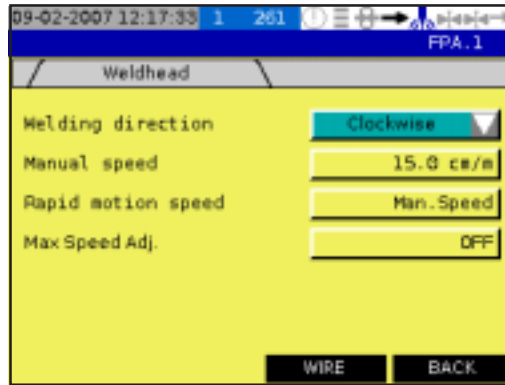
Provide the following information:

- Screensaver Time - time until the touchscreen goes off, counted down from the previous operation [min:s] - If set to OFF, the display goes off after two hours.
- Seam number - allocation of a number for the currently active weld seam
- Password On / Start - OPEN - the user last logged on is automatically logged on once the power source is switched on, without the need to provide a password

PWD INPUT - a password is requested when the power source is switched on  
 LOCKED - when the power source is switched on, no password is requested - the power source goes immediately into „Locked“ status and only the actual welding mode is supported. You cannot change any settings. To unlock, please see the section headed „Logging on a different user and changing the password“

- Touch button (12) to bring up a keypad for entering text
- Use the „ROTATION“ button to call up the window for the rotation and welding speed parameters.

## Welding direction and wirefeeding



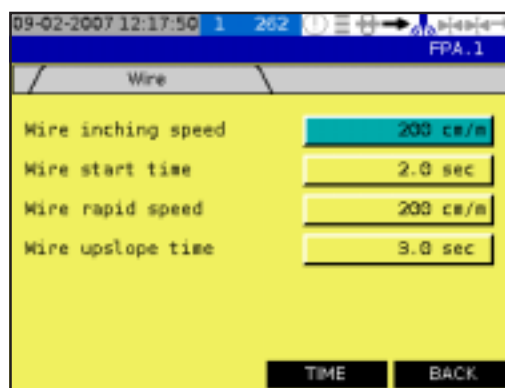
Provide the following information:

1. Welding direction  
Clockwise  
Anti-clockwise

**Important!** Only closed welding guns with no wirefeeding support the anti-clockwise welding direction.

2. Manual speed - welding speed in manual mode [cm/min]
3. Rapid motion speed - high-speed welding [as % of the maximum welding speed of the orbital gun]

## Wire inching



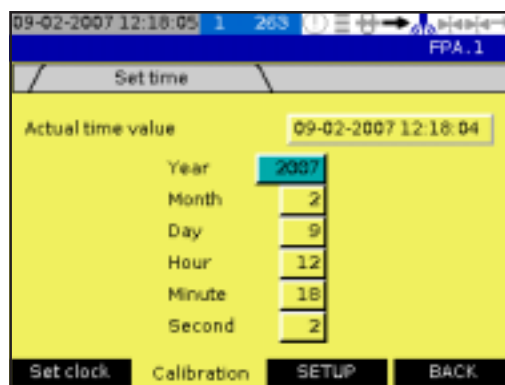
Use the „WIRE“ button to call up the settings for wire inching.

Provide the following information:

1. „Wire inching speed“ - starting speed for wire inching [cm/min]
2. Wire start time - time before start speed changes over to high speed
3. “Wire rapid speed” - high-speed wire inching [cm/min]

4. Wire upslope time - the transition from starting speed to high speed is continuous, and is shown as an upslope. The duration of the transition can be set here.
5. Use the „TIME“ button to call up the settings for date, time and calibrating the touchscreen

## Date, time and calibrating the touchscreen



In the „Set time“ window, you can provide the following information:

1. Year
2. Month
3. Day
4. Hour
5. Minute
6. Second

To start the time synchronously with a time signal for example

7. Touch the “Set clock” button to apply the time set

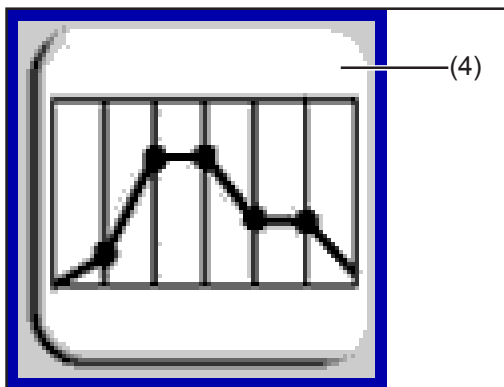
To calibrate the touchscreen

8. Touch the „Calibration“ button
9. Touch the crosshair
10. Repeat this process until the “Set time” window reappears
11. To return to the setup menu, press the “SETUP” button



# Parameter settings

Calling up the „Parameter settings“ menu

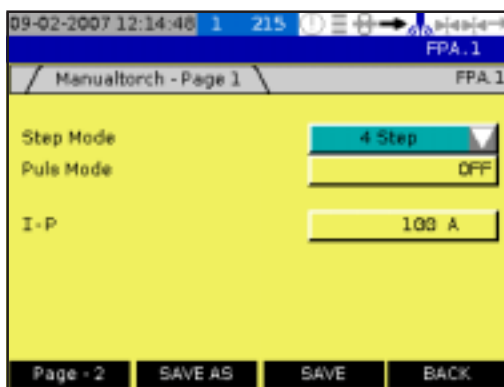


1. Call up the „Parameter settings“ menu (4)

## Principle

The parameter settings allow the user to enter or correct the most important parameters for the orbital welding process.

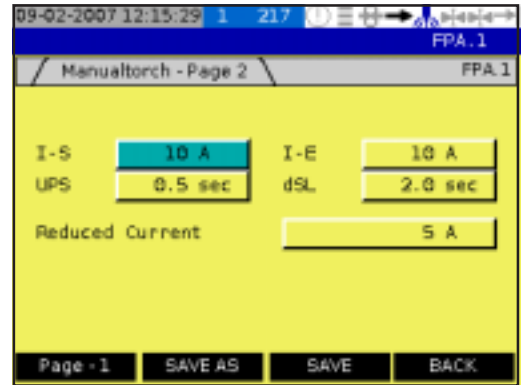
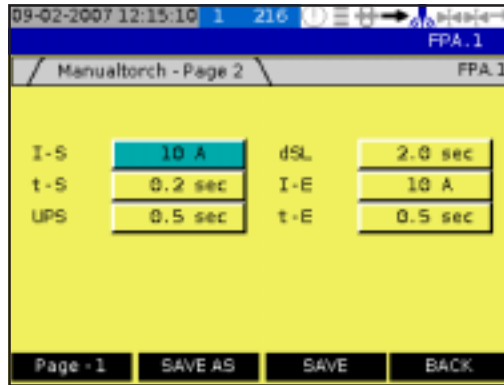
Waveform parameters for TIG manual torch



Provide the following information:

1. „Step Mode“  
2 Step  
4 Step
  2. “Puls Mode” - pulsed arc welding  
ON  
OFF
  3. “I-P” - pulsing current [A]
  4. t-P - pulsing current time [ms]
  5. I-G - background current [A]
  6. t-B - background current time [ms]
7. Touch „Page - 2“ button to call up the window for further settings

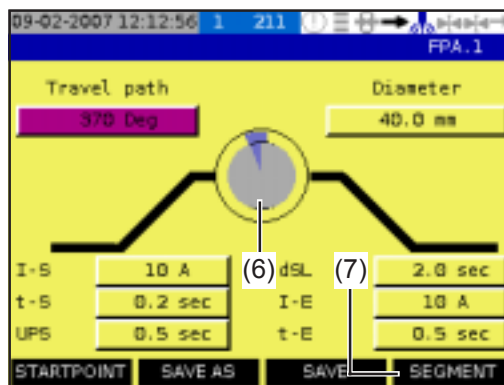
**Waveform parameters for TIG manual torch**  
(continued)



**Important!** If the „2-step mode“ has been set in the previous window, the left-hand window applies. For the „4-step mode“, the right-hand window applies.

1. I-S - starting current [A]
2. t-S - time for starting current [s]
3. UPS - time for upslope [s]
4. dSL - time for downslope [s]
5. I-E - final current [A]
6. t-E - time for final current [s]
7. Reduced Current [A]

**Waveform parameters for orbital welding gun**



Provide the following information:

1. Travel path [degrees]
2. Diameter - outer diameter of pipe join [mm]

**Important!** Entering a figure higher than 360° will mean an overlap of the weld seam at the end of welding.

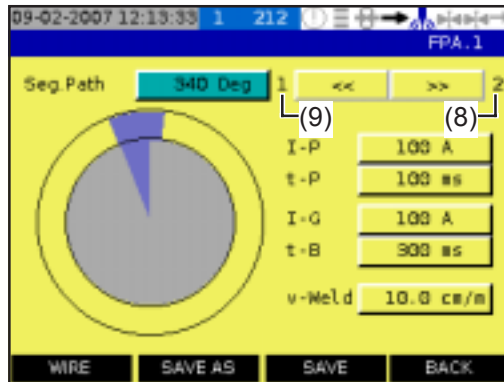
3. I-S - starting current [A]
4. t-S - time for starting current [s]
5. UPS - time for upslope [s]

6. Set main current by selecting the surface (6) or (7)

**Important!** For more detailed information on the settings for the main current, please see the following section „Parameters for pulsing and welding speed“.

7. dSL - time for downslope [s]
8. I-E - final current [A]
9. t-E - time for final current [s]

## Parameters for pulsing and welding speed



This window allows the user to divide the travel path into several segments. For each of these segments, the parameters listed below for pulses and welding speed can be set individually.

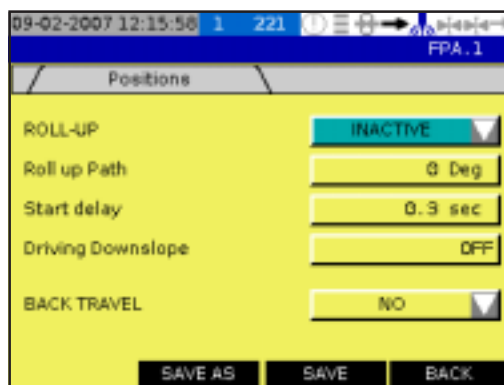
To create several segments, proceed as follows:

1. In the "Seg.Path" input field, enter a segment path that is shorter than the present travel path
  2. An extra segment is automatically created, and completes the remainder of the travel path
  3. Use the arrow keys „<<“ and „>>“ to switch to the new segment
- Important!** The digit (8) shows the number of currently created segments. Digit (9) shows the present segment. The maximum number of segments is 10.
4. If the value for this segment is reduced, another new segment is created, and this new segment extends to the end of the travel path
  5. Continue this process until the desired number of segments is reached
  6. If required, adjust the segment path for each segment once more

The following parameters for the main current can be set individually for the segments:

- "I-P" - pulsing current [A]
  - t-P - pulsing current time [ms]
  - I-G - background current [A]
  - t-B - background current time [ms]
  - v-Weld - welding speed [cm/min]
7. Press the "BACK" button to go back to the remaining parameters for the waveform
  8. Once all the "STARTPOINT" parameters have been set for the waveform, press the "STARTPOINT" button to open the window for setting the start point.

## Parameters for start point



Provide the following information:

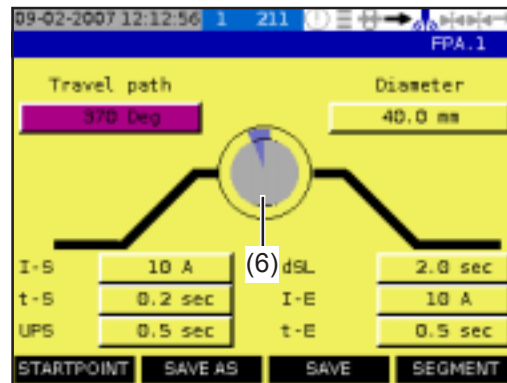
1. ROLL-UP - for rolling up the hosepack on the open orbital welding gun with wire feeding
  - INACTIVE  
The orbital welding gun does not move to the start point
  - ACTIVE  
The orbital welding gun moves to the start point that is defined by the "Roll up Path"
- AUTOSTART  
The orbital welding gun moves to the start point and begins welding immediately

**Parameters for start point**  
(continued)

2. „Roll up Path“ [°] - anti-clockwise roll-up path for the hosepack, in degrees from the vertex
3. „Start delay“ [s] - time between start of welding current and the point when the orbital welding gun starts rotating
4. „Driving Downslope“ [s] - continuous reduction in the welding speed in addition to the downslope already set for the welding current
  - OFF
  - 0.1 to dSL (downslope time for the welding current, set for the parameters for the waveform)
5. BACK TRAVEL
  - NO
  - WITH BACK TRAVEL
    - ES-360 for closed welding guns with no external wirefeeding. After welding finishes, the orbital welding gun moves back to the limit switch.
    - X-360
      - After welding finishes, the orbital welding gun takes the shortest path to the start and sets the angle for the travel path to zero
    - SET ZERO
      - The point where welding stops is where the angle for the travel path is set to zero, producing the start point for the next weld sequence.
6. Press the “BACK” button to return to the parameters for the waveform

**Calling up parameters for wire-feeding or AC welding**

**Important!** If a TIG manual welding torch has been connected instead of the orbital welding gun, the corresponding windows differ slightly from the following illustrations. The parameters however are similar.



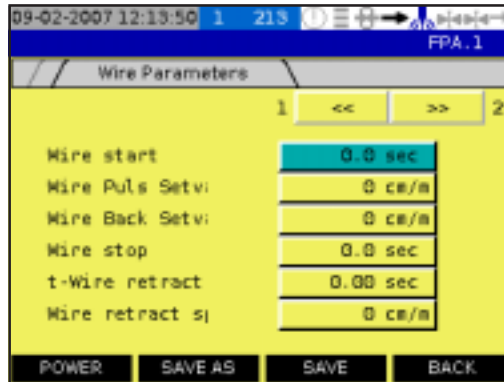
1. Selecting the surface (6) calls up the settings for the main current again



**Important!** Depending on the functions available, one of the buttons below may appear instead of the „POWER“ button:

- „WIRE - parameters for wirefeeding“
- “AC - parameters for AC welding”

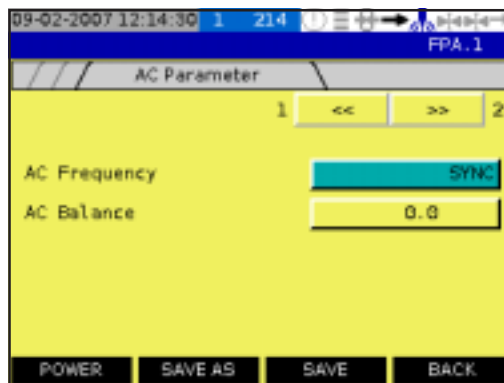
### Parameters for wirefeeding



Provide the following information:

1. „Wire start“ - delay time between start of welding current and start of wire-feeding [s]
2. „Wire Puls Setv;“ - wire feed speed during the pulse phase [cm/min]
3. „Wire Back Setv;“ - wire feed speed during the background current phase [cm/min]
4. „Wire stop“ - delay time between start of the downslope for the welding current and end of wirefeeding [s]
5. „t-Wire retract“ - duration of wire retract after downslope [s]
6. „Wire retract sp“ - wire retract speed after the wire stops for the duration of the wire retract time [cm/min]
7. If required, use the „Next“ key to call up the window for setting the AC parameters

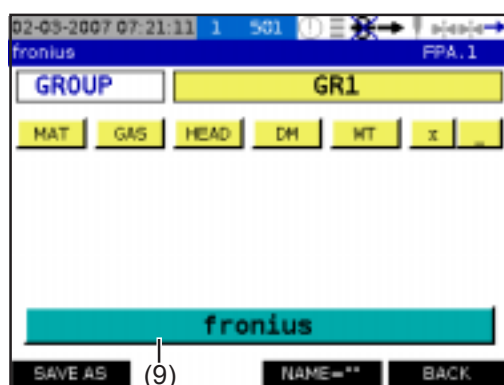
### Parameters for AC welding



Provide the following information:

1. „AC Frequency“ [Hz]  
SYNC for mains synchronisation of two power sources for simultaneous AC welding
2. „AC Balance“  
-5: highest fusing power, lowest cleaning action  
+5: highest cleaning action, lowest fusing power
3. Use the „POWER“ button to call up the settings for the main current again  
Use the „BACK“ button to return to the parameters for the waveform
4. In one of the two named windows, use the „SAVE“ button to call up the „Saving parameters“ window

### Saving parameters



Enter a name to save the previously selected parameters as a welding program.

1. After touching the “NAME=""” button, the buttons arranged above enable a name to be entered from individual items of process data.

**Important!** Selecting the bar (9) displays a keyboard that you can use to enter a name for the program, as well as for deleting or editing the text.

# Orbital and TIG welding

## Safety



**WARNING!** Operating the device incorrectly can cause serious injury and damage. Do not use the functions described here until you have read and completely understood all of the following documents:

- these Operating Instructions
- all the operating instructions for the system components, especially the "Safety Rules"



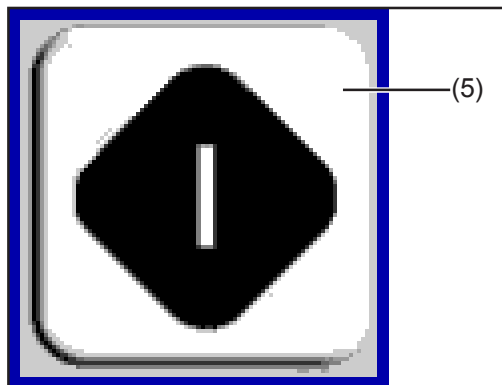
**WARNING!** An electric shock can be fatal. If the device is plugged into the mains electricity supply during installation, there is a high risk of very serious injury and damage. Only carry out work on the device when

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

## Calling up the „Welding“ menu



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



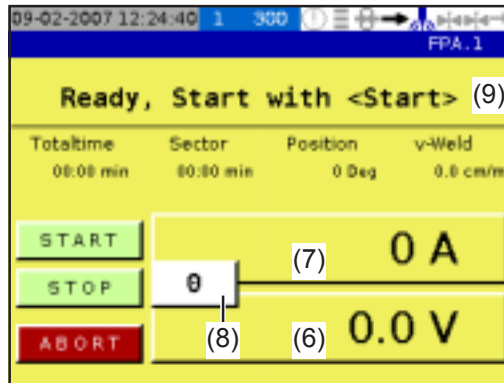
1. Call up the „Welding“ menu
2. The first window for the welding process status appears

## Controlling and monitoring the welding process



**WARNING!** Automatically starting machines can cause serious injury and damage.

In addition to these operating instructions, the robot and welding system manufacturer's safety rules must also be observed. For your personal safety, ensure that all protective measures have been implemented and will remain in place for the duration of your stay within the working area of the orbital welding gun.



1. Click the „START“ button to start welding
2. Click the „STOP“ button to finish welding, with downslope

**Important!** If welding has to be stopped immediately, for safety reasons for example:

- Click the “ABORT” button. Welding stops immediately, with gas post-flow but no downslope

**Important!** If the „not ready“ message appears in the window, touch the text; the next window shows the problematic status.

The following parameters appear:

1. „Totaltime“ - running time since the start of the current welding program [min]
2. “Sector” - actual runtime for the present welding section [min]

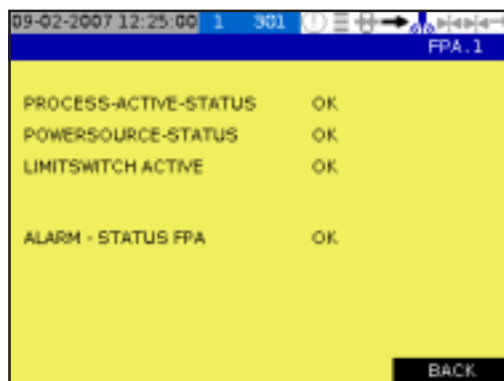
**Important!** A new welding section begins after every event - e.g. gas pre-flow or moving to start point.

3. “Position” - of the electrode [degrees]
4. v-Weld - welding speed [cm/min]
- (6) Actual welding voltage [V]
- (7) Actual welding current [A]
- (8) Seam number

**Important!** The seam number is also part of the file name when the real value is recorded. If the seam number is highlighted orange, the value displayed indicates the number of the currently welded tack point.

With button (9), call up the “welding process status” window

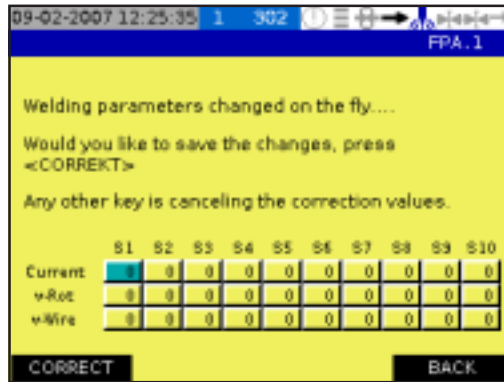
## Welding process status



Status display of the following parameters:

1. PROCESS-ACTIVE-STATUS
2. POWERSOURCE-STATUS
3. LIMITSWITCH ACTIVE
4. ALARM - STATUS FPA

## Correcting the welding process



This window appears when a change is made on the remote control. For every segment, e.g. S1, the latest change to the original value is shown.

For example, if the „current“ for segment „S1“ has been changed by 4 A, the digit „4“ appears here.

If the changed parameters are to be applied:

- Touch the „CORREKT“ button or the Start/Stop key on the remote control unit 11
- Press “BACK” or the Stop key on the remote control unit to close the window without applying any changed values.

**Important!** The parameters are only applied if the “SAVE”, “PAR. FINDER” and “ADMIN” user permissions are selected. More detailed information on the user settings can be found in the “User settings” section.



# Troubleshooting

## General

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



**WARNING!** An electric shock can be fatal. Before opening the device

- Turn the mains switch to the „O“ position
- Disconnect 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 instrument, check to make sure that electrically charged components (e.g. capacitors) have been discharged



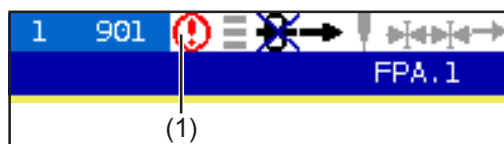
**CAUTION!** Inadequate PE conductor connections can cause serious injury and damage. The housing screws provide a suitable PE conductor connection for earthing (grounding) the housing and must NOT be replaced by any other screws which do not provide a reliable PE conductor connection.

A display showing alarms that have occurred is useful for fault diagnosis purposes.

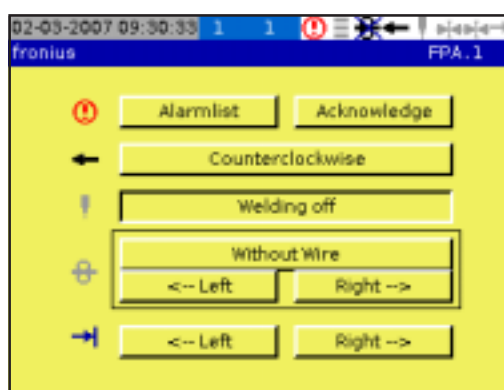


**Important!** For more detailed information on how to assign a function to the F1 key, please refer to the „setup and system parameters“ section.

- Assign the „active alarm page“ function to the F1 key
- Press F1 to call up the active alarm page



- Alternatively, touch button (1) in the symbol bar to call up the tray page



The following actions can be performed from the tray screen:

- Open the active alarm page by touching the „Alarmlist“ button

**Important!** For more detailed information on the alarms, please refer to the section headed „Alarms and error messages“.

- Press the „Acknowledge“ button to reset all alarms
- Press „Clockwise“ or „Counterclockwise“ to enter the welding direction
- Press the „Welding on“ button to start a test (without arc or shielding/forming gas)
- Press the „Left“ or „Right“ button to move the orbital welding gun in the desired direction

**Alarms and error messages**

**Group 001**



- 001 - Alarms are bypassed
- 002 - Internal connection problem
  - Internal communication problem in the processors
- 003 - Gateway Timeout
  - Faulty connection to the gateway

- 004 - USB
  - Problem retrieving data from USB stick

- 005 - Low Gas Pressure
  - Alarm for shielding gas monitor

- 006 - Power supply
  - Power supply alarm

- 007 - Weldhead error
  - Motor controller error

- 008 - Wire error
  - Motor controller error

- 009 - Emergency Stop activated
  - The emergency stop button has activated a safety cut-out

- - SA
  - Alarm as per plain text display

**Group 002**



- 001 - Power Source not ready
  - LocalNet is sending data
- 002 - Limit
  - LocalNet: limit exceeded
- 003 - Torch collision
  - LocalNet: torch collision

- 004 - Gateway not ready
  - LocalNet: gateway not ready

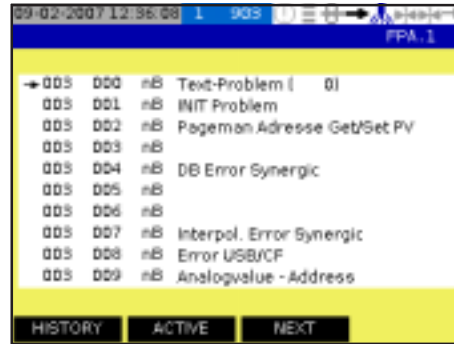
- 005 - Wire sticking
  - Wire stuck fast

- 006 - PS (service codes)
  - For a detailed explanation of the service codes, please see the section headed "Service codes displayed".

- - SA
  - Alarm as per plain text display

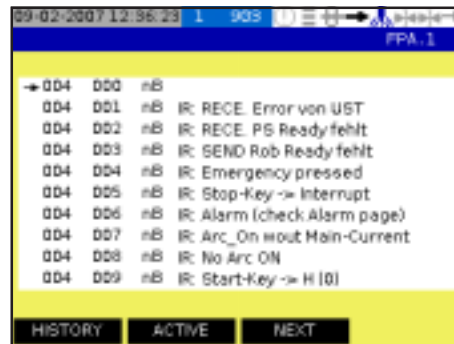
**Alarms and error messages**  
(continued)

Group 003



Alarms and error messages in Group 3 are internal errors that need to be rectified by a service engineer.

Group 004



Alarms and error messages in Group 4 appear when welding is stopped.

- 001 - IR: RECE Error von UST (Error from UST)
  - LocalNet: error number
- 002 - IR: RECE PS Ready fehlt (PS Ready missing)
  - LocalNet: the „Power Source Ready“ signal is missing

- 003 - IR: SEND Rob Ready fehlt (Rob Ready missing)
  - FPA-2020 not ready

- 004 - IR: Emergency pressed
  - The emergency stop button has activated a safety cut-out

- 005 - IR: Stop-Key -> Interrupt
  - Welding was interrupted by the Stop key

- 006 - IR: Alarm (check Alarm page)
  - Miscellaneous alarm

- 007 - IR: Arc\_On wout Main-Current
  - Main current signal missing

- 008 - IR: No Arc ON
  - Arc OK signal missing

- 009 - IR: Start-Key-> H (0)
  - Start key -> Halt is active

- - SA
  - Alarm as per plain text display

**Alarms and error messages**  
(continued)

Group 005



- 001 - Weldhead no rotation
  - No rotation taking place, despite a command being sent
- 002 - Wire Feeder
  - Wire not being transported, despite a command being sent

003 - Motor.Curr.Weldhead

- The analog entry value for the motor current is too high. Check rotation.

004 - Motor.Curr.Wire

- The analog entry value for the motor current is too high. Check wire-feed unit.

005 - Oxygen Alarm

- The welding torch connection supports the connection of the digital signal of an oxygen measuring instrument. An alarm occurs once the input is activated.

006 - Print on USB Problem

- A problem has occurred while printing a file to the USB stick. Check USB stick or change the printout parameters.

007 - IA.7

- Main current signal missing

008 - IA.8

- Arc OK signal missing

009 - IA.9

- Start key -> Halt is active

— - SA

- Alarm as per plain text display

**Alarms and error messages**  
(continued)



To deactivate further error-related alarms:

1. Touch the touchscreen
2. A symbol bar appears (1)
3. Use the arrow keys (2) to select the alarm concerned
4. Select the padlock symbol (3) in the symbol bar (1)
5. The alarm concerned is greyed out

6. To reactivate the alarm, select it again using the arrow keys (2) and touch the „padlock symbol“ (3)



1. In the first „i“ key window, touch the „MW 2200“ button to call up relevant information for the service engineer



1. In the first „i“ key window, touch the „SYSTEM“ button to call up more service-related information
2. Press the „INTERN“ button to call up the window shown below to display additional data



**Displayed service codes**

If an error message that is not described here appears on the displays, then the fault is one that can only be put right by a service engineer. Make a note of the error message shown in the display, and of the serial number and configuration of the power source, and get in touch with our After-Sales Service, giving them a detailed description of the error.

---

**tP1 | xxx, tP2 | xxx, tP3 | xxx, tP4 | xxx, tP5 | xxx, tP6 | xxx**

Cause:       Overtemperature in the primary circuit of the power source  
Remedy:      Allow the power source to cool down

---

**tS1 | xxx, tS2 | xxx, tS3 | xxx**

Cause:       Overtemperature in the secondary circuit of the power source  
Remedy:      Allow the power source to cool down

---

**tSt | xxx**

Cause:       Overtemperature in the control circuit  
Remedy:      Allow the power source to cool down

---

**Err | 051**

Cause:       Mains undervoltage: The mains voltage has dropped below the tolerance range (see „Technical data“)  
Remedy:      Check the mains voltage

---

**Err | 052**

Cause:       Mains overvoltage: The mains voltage has exceeded the upper limit of the tolerance range (see „Technical data“)  
Remedy:      Check the mains voltage

---

**no | IGn**

Cause:       „Ignition time-out“ function is active: No current started flowing before the end of the time specified in the Set-up menu. The safety cut-out of the power source has been triggered.  
Remedy:      Restart welding; clean workpiece surface.

---

**Err | PE**

Cause:       The earth fault current watchdog has triggered the safety cut-out of the power source.  
Remedy:      Switch off the power source, wait for 10 seconds and then switch it on again. If you have tried this several times and the error keeps occurring, contact After-Sales Service.

---

**Err | IP**

Cause:       Primary overcurrent  
Remedy:      Contact After-Sales Service

---

**Err | bPS**

Cause:       Fault in power module  
Remedy:      Contact After-Sales Service

---

**dSP | Axx, dSP | Cxx, dSP | Exx, dSP | Sy, dSP | nSy**

Cause:       Fault in central control and regulation unit  
Remedy:      Contact After-Sales Service

---

## Power source

---

### no | Arc

Cause: Arc-break  
Remedy: Restart welding; clean workpiece surface.

---

### no | H2O

Cause: Cooling unit flow watchdog has been triggered  
Remedy: Check the cooling unit; if necessary, top up the coolant or bleed the water flow as described in "Putting the cooling unit into service"

---

### hot | H2O

Cause: Thermostat on cooling unit has tripped  
Remedy: Wait until the end of the cooling phase, i.e. until "Hot | H2O" is no longer displayed.

---

### -St | oP- (where the power source is being operated with a robot interface or a field bus)

Cause: Robot not ready  
Remedy: Initialise "Robot ready" signal, initialise "Source error reset" signal ("Source error reset" only available in conjunction with ROB 5000 and field bus coupler for robot control)

---

### 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 outlet socket or plug is faulty  
Remedy: Replace faulty components

---

### Power source does not function

Mains switch is ON, but indicators are not lit up

Cause: Mains fuse is faulty  
Remedy: Change the mains fuse

---

### No welding current

Mains switch is ON, overtemperature indicator is lit up

Cause: Overloading; the duty cycle has been exceeded  
Remedy: Do not exceed the duty cycle

Cause: Thermostatic cut-out system has been tripped  
Remedy: Wait until the power source automatically comes back on after the end of the cooling phase

Cause: The fan in the power source is defective  
Remedy: Change the fan

---

### No welding current

Mains switch is ON and indicators are lit up

Cause: Incorrect earth connection  
Remedy: Check the earthing (grounding) connection and clamp for correct polarity

Cause: Break in power cable in the orbital welding gun or welding torch  
Remedy: Replace orbital welding gun or welding torch

---

**Power source**  
(continued)

---

**Nothing happens when welding starts**

Mains switch is ON and indicators are lit up

Cause: The control plug is not plugged in

Remedy: Plug in the control plug

Cause: Orbital welding gun, torch or control line defective

Remedy: Replace orbital welding gun or welding torch

---

**No shielding gas or forming gas**

All other functions are OK

Cause: The gas cylinder is empty

Remedy: Change gas cylinder

Cause: Gas pressure regulator is faulty

Remedy: Change the gas pressure regulator

Cause: The gas hose is not mounted, or is damaged

Remedy: Mount/change the gas hose

Cause: Orbital welding gun or welding torch faulty

Remedy: Replace orbital welding gun or welding torch

Cause: Gas solenoid valve is defective

Remedy: Replace gas solenoid valve

---

**Poor welding properties**

Cause: Incorrect welding parameters

Remedy: Check the settings

Cause: Incorrect earth connection

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

---

**Orbital welding gun or torch gets very hot**

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

Remedy: Observe the duty cycle and loading limits

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

Remedy: See "Water flow too low or non-existent" below

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

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

---



---

**Water flow too low or non-existent**

Cause: Coolant level too low  
Remedy: Top up with coolant

Cause: Constriction or foreign body in cooling circuit  
Remedy: Remove constriction or foreign body

Cause: Coolant pump fuse defective  
Remedy: Replace coolant pump fuse

Cause: Coolant pump defective  
Remedy: Replace coolant pump

Cause: Coolant pump sticking  
Remedy: - Remove coolant pump fuse  
- Insert a suitable slotted screwdriver from outside through the motor shaft bushing  
- Tighten motor shaft  
- Replace coolant pump fuse

Cause: Coolant filter (option) displaced when connecting water return  
Remedy: Clean coolant filter using clean tap water or change filter element

Cause: Flow sensor has tripped (FK 4000 Rob), requesting parameter F3 from the welding system however shows that there is still a small amount flowing through: hoses kinked or coolant filter displaced when connecting water return.  
Remedy: Fix hoses, clean coolant filter using clean tap water or repair filter element

Cause: Flow sensor has tripped, requesting parameter F3 from the welding system shows that there is nothing flowing through: coolant pump defective  
Remedy: Replace coolant pump

Cause: Permitted duty cycle exceeded  
Remedy: Wait until the end of the coolant cooling phase

---

**Insufficient cooling**

Cause: Faulty ventilator  
Remedy: Replace ventilator

Cause: coolant pump defective  
Remedy: Replace coolant pump

Cause: Cooler contaminated  
Remedy: Blow out cooler with dry compressed air

---

**High operating noise level**

Cause: Coolant level too low  
Remedy: Top up with coolant

Cause: coolant pump defective  
Remedy: Replace coolant pump

---



## Power source

(continued)

---

### no | H2O

The cooling unit flow watchdog (option) has been triggered. The error message appears on the power source control panel.

Cause: Coolant flow problem

Remedy: Check the cooling unit; if necessary, top up the coolant or bleed the water flow as described in "Putting the cooling unit into service"

Cause: Coolant filter blocked

Remedy: Clean or replace filter pipe

---

### hot | H2O

Thermostat on cooling unit has tripped. The error message appears on the power source control panel.

Cause: The coolant temperature is too high

Remedy: Wait until the end of the cooling phase, i.e. until "hot | H2O" is no longer displayed.

---

# Care, maintenance and disposal

## General

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



**WARNING!** An electric shock can be fatal. Before opening the device

- Turn the mains switch to the „O“ position
- Disconnect 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 instrument, check to make sure that electrically charged components (e.g. capacitors) have been discharged

## Symbols for care and maintenance of the cooling unit

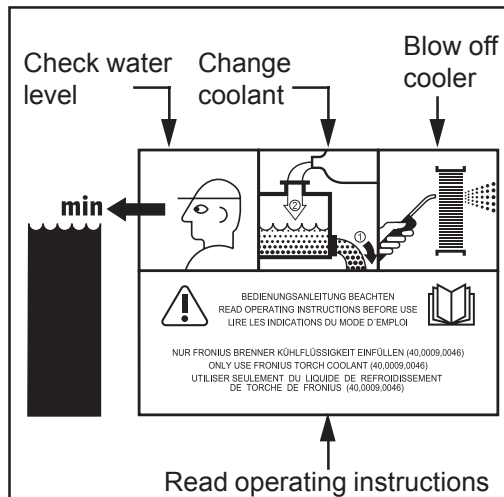


Fig. 8 Explanation of symbols

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

## Every start-up

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



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



**CAUTION!** Risk of scalding from hot coolant. Only check the water connections once the coolant has cooled down.

When using water-cooled torches:

- Check the water connections for leaks
- Monitor the coolant return amount in the coolant container
- If no coolant is returning, check the cooling unit and bleed if necessary



**NOTE!** If water-cooled torches are operated without coolant, this will normally result in a fault in the torch body or hosepack. Fronius shall not be liable for any damage resulting from such action. In addition, no warranty claims will be entertained.

## Every week

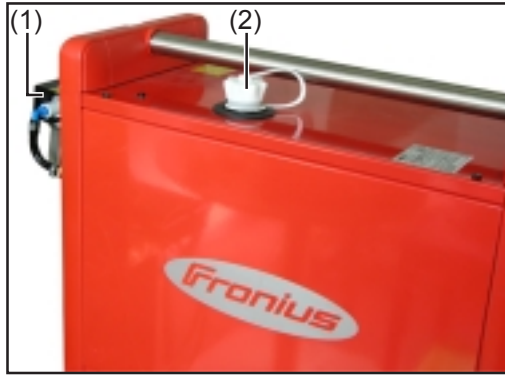


Fig. 9 Coolant filter and fill nozzle

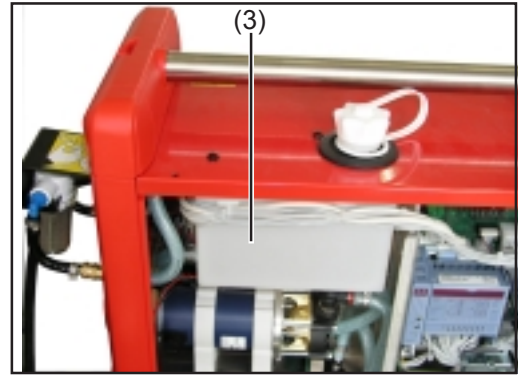


Fig. 10 Coolant container

The illustrations show the following elements of an installed cooling unit:

- (1) Coolant filter
- (2) Fill nozzle for the coolant
- (3) Coolant container

Turn the mains switch to the „O“ position  
Disconnect the device from the mains  
Remove the left side panel

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

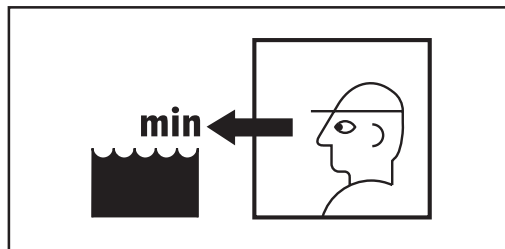


Fig. 11 Symbol for checking coolant level

The coolant level and cleanliness of the coolant must always be checked before starting the cooling unit.

If the coolant level is below the „min“ mark, top up with coolant.



**NOTE!** Use only original Fronius coolant when filling cooling units. Other coolants are not recommended for electrical conductivity or compatibility reasons.

## Every 2 months

- Check the return for dirt and clean if necessary
- If present: check water filter and flow monitor are functioning correctly, check for dirt, and clean them or replace filter pipe
- If present: clean air filter

## Every 6 months

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



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

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

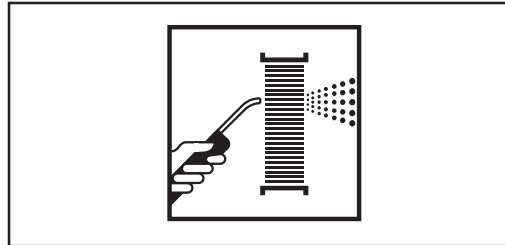


Fig. 12 Blow out cooler symbol

If the welding torch becomes very hot during operation, the cooling power is insufficient. This might be caused by dust contaminating the cooler. The coolant is not being cooled sufficiently.

Remedy: blow out the cooler every 6 months with dry compressed air

## Every 12 months

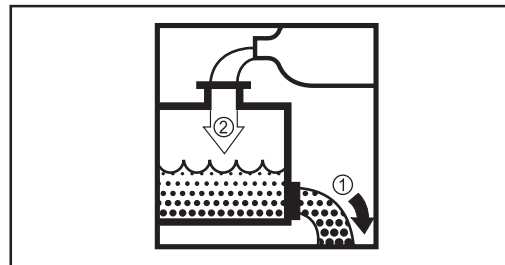


Fig. 13 Change coolant symbol

After 12 months, drain the coolant and dispose of it properly

**Important!** Coolant must not be disposed of in the public sewage system.

Use only original Fronius coolant (item no. 40,0009,0046) when refilling the cooling unit.

## Disposal

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

## Validity of „General Delivery and Payment Conditions“

With regard to cooling units, the „General Delivery and Payment Conditions“ according to the price list only apply under the following conditions:

- Max. 8 h / day operation (operation for a single shift)
- Original Fronius coolant used exclusively (item number 40,0009,0046 or 40,0009,0075)
- Regular maintenance and regular change of coolant

# Technical Data

**Special voltages** For devices designed for special voltages, the technical data on the rating plate applies.

<b>Power source</b>	Mains voltage	230 V	
	Mains voltage tolerance	-20% / +15 %	
	Mains frequency	50 / 60 Hz	
	Mains fuse protection	16 A slow-blow	
	Primary continuous current (100 % d.c.)	13 A	
	Primary continuous power	3 kVA	
	Cos phi	0.99	
	Efficiency	79 %	
	Welding current range	3 - 200 A	
	Welding current at	10 min/40 °C (104°F)	30 % d.c. 200 A 60 % d.c. 150 A 100 % d.c. 130 A
	Welding voltage range according to standard characteristic	10.1 -18.8 V	
	Max. welding voltage	17.9 V	
	Open circuit voltage	44 V	
	Protection	IP 23	
	Marks of conformity	S, CE	
	Safety	S	
	Dimensions l x w x h	650 x 290 x 480 mm 25.6 x 11.4 x 18.9 in.	
	Weight	38 kg 84 lb.	

**Integral cooling unit**

The cooling capacity of a cooling unit depends on

- Pump type
- Ambient temperature
- Delivery head
- Flow rate Q (l/min)

The flow rate Q depends on the length of the hosepack and the diameter of the hose.

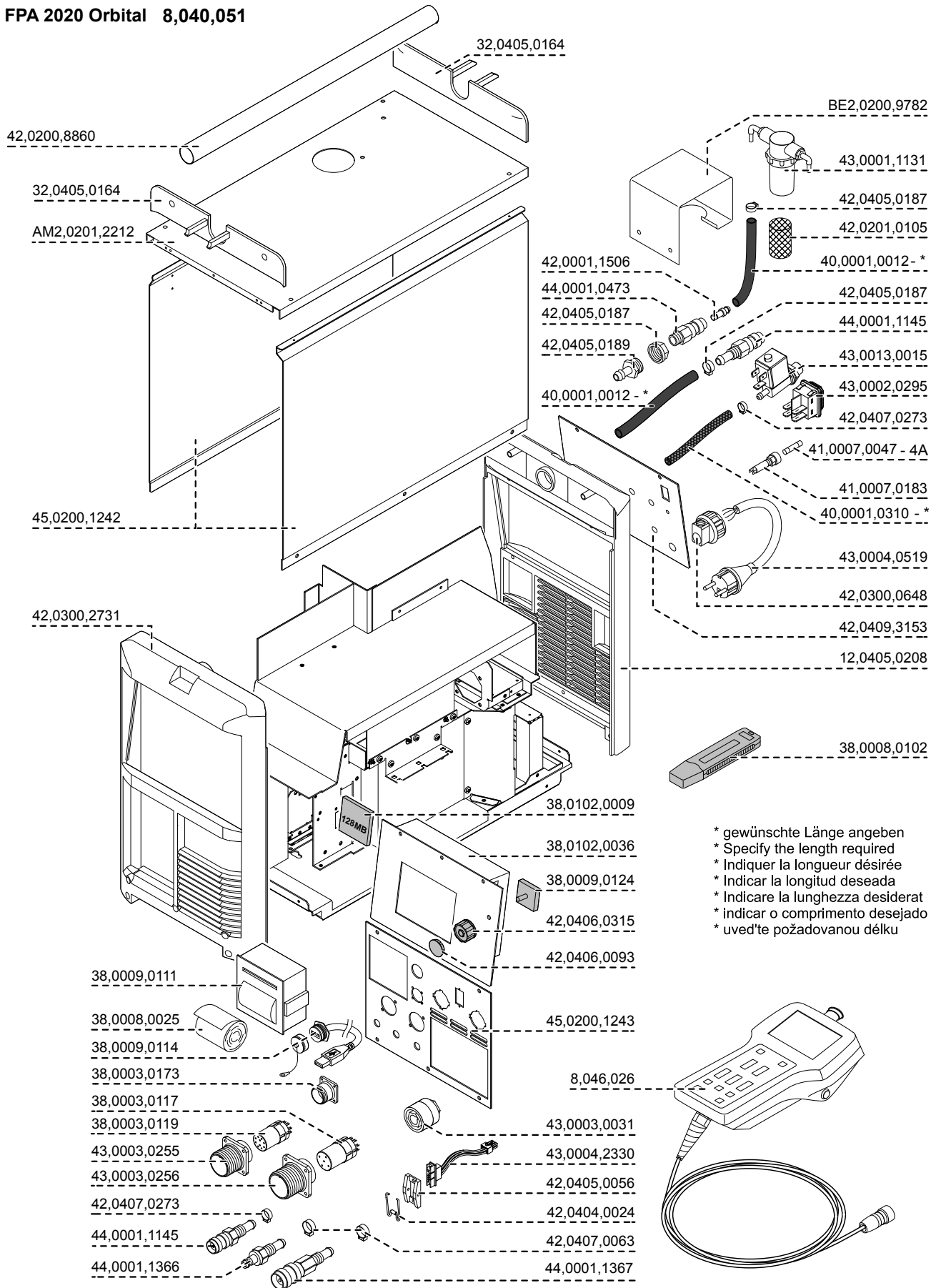
Supply voltage				3 x 230 V
Mains frequency				50 / 60 Hz
Fuse protection				4 A slow-blow
Current input				1.35 A
Feed rate	( $Q_{max}$ )			max. 3.0 l/min
Cooling capacity at	40°C / 104°F	1 l/min	300 W 1024 BTU/h	
Delivery head				max. 30 m max. 98 ft. 5 in.
Pump pressure				max. 4.0 bar max. 57.99 psi
Pump type				Centrifugal pump
Coolant capacity				1.5 l







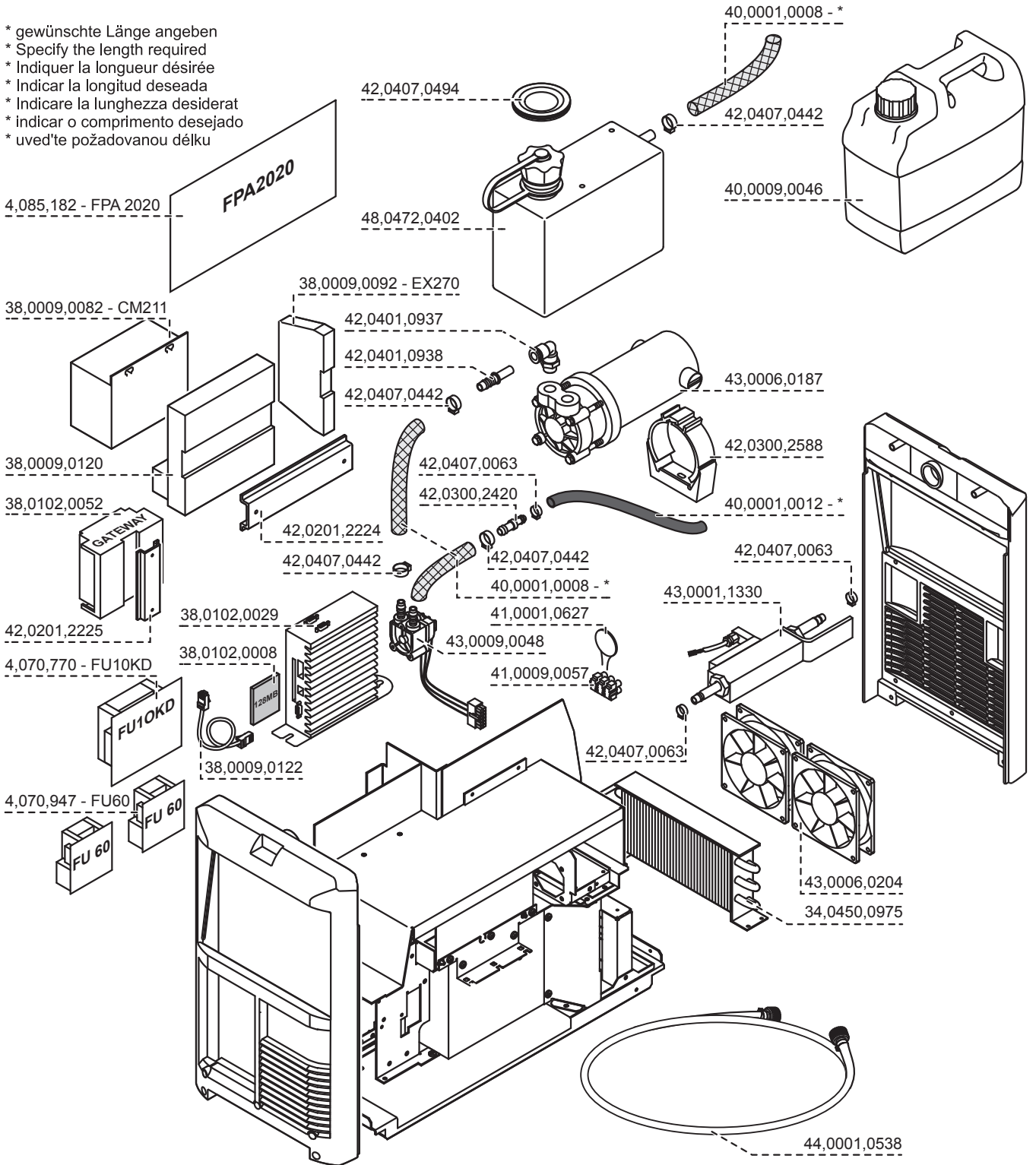
**FPA 2020 Orbital 8,040,051**

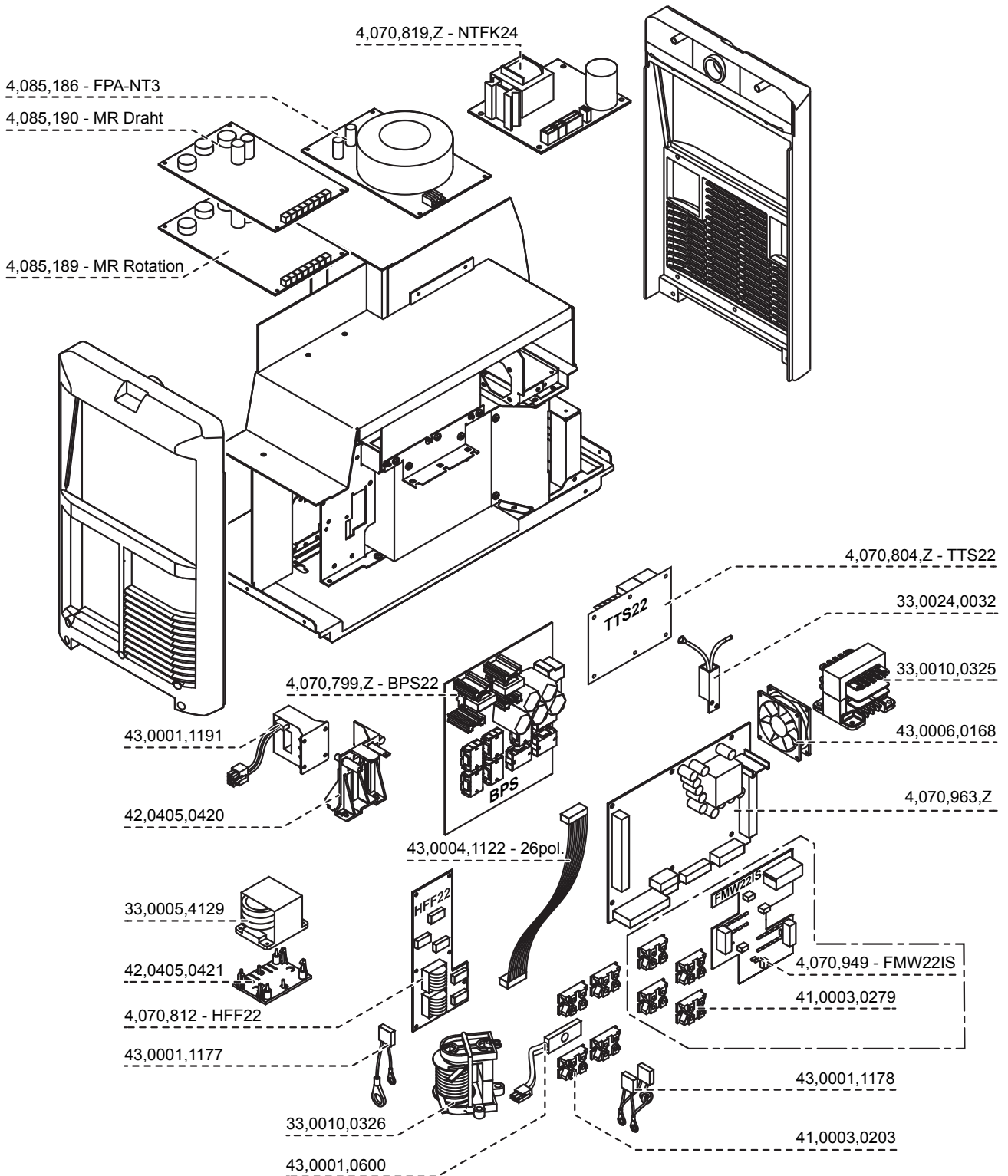


**FPA 2020 Orbital**

Ersatzteilliste / Spare parts list / Listes de pièces de rechange / Lista de repuestos / Lista de peças sobresselentes / Lista dei Ricambi

\* gewünschte Länge angeben  
 \* Specify the length required  
 \* Indiquer la longueur désirée  
 \* Indicar la longitud deseada  
 \* Indicare la lunghezza desiderata  
 \* indicar o comprimento desejado  
 \* uved'te požadovanou délku





**FPA 200 Orbital**

Ersatzteilliste / Spare parts list / Listes de pièces de rechange / Lista de repuestos / Lista de peças sobresselentes / Lista dei Ricambi





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