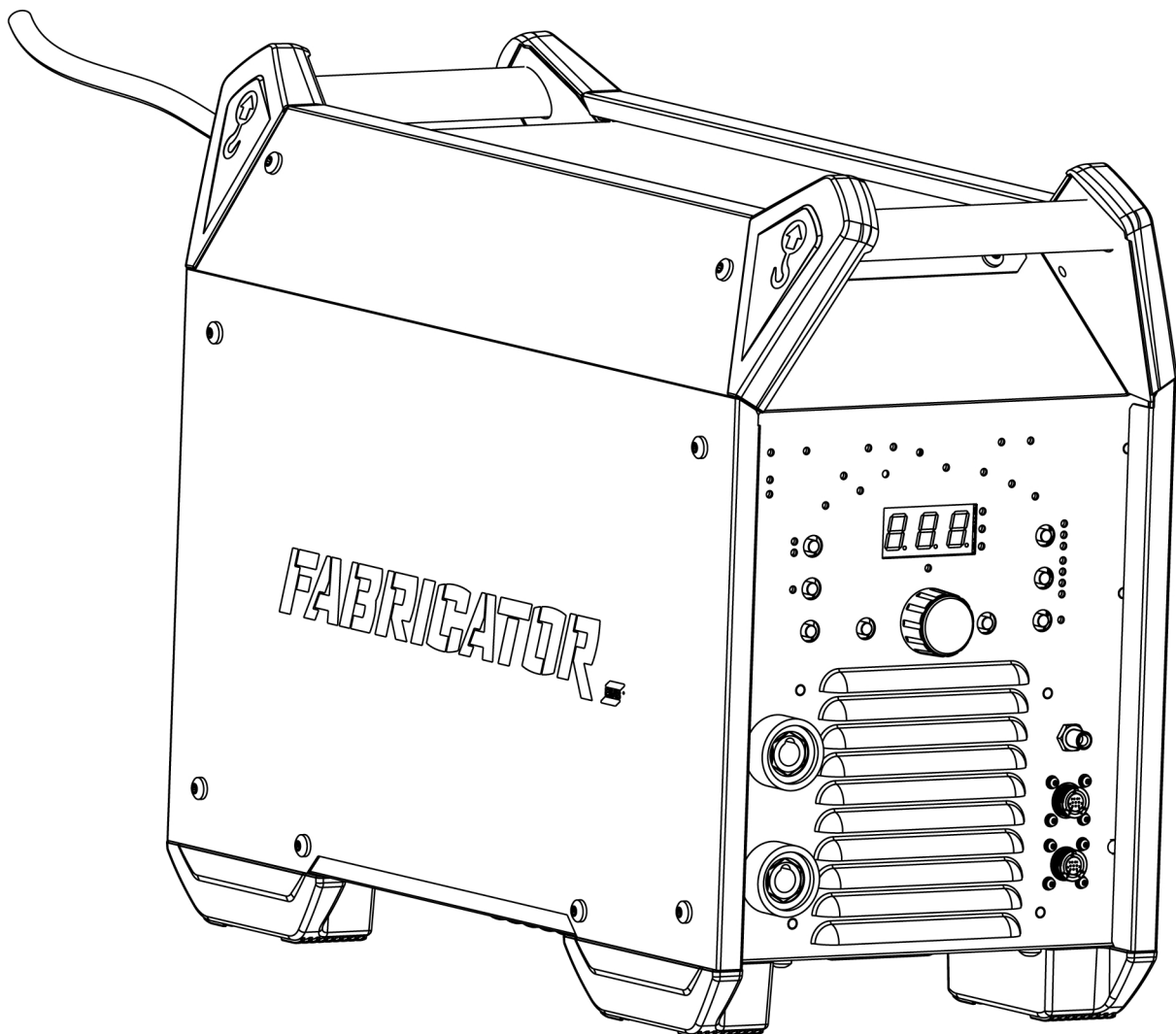


Fabricator ET 410iP

Welding power source TIG 410 A



Instruction manual

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1 SAFETY

1.1 Meaning of symbols

As used throughout this manual: Means Attention! Be Alert!



DANGER!

Means immediate hazards which, if not avoided, will result in immediate, serious personal injury or loss of life.



WARNING!

Means potential hazards which could result in personal injury or loss of life.



CAUTION!

Means hazards which could result in minor personal injury.



WARNING!

Before use, read and understand the instruction manual and follow all labels, employer's safety practices and Safety Data Sheets (SDSs).



1.2 Safety precautions

Users of ESAB equipment have the ultimate responsibility for ensuring that anyone who works on or near the equipment observes all the relevant safety precautions. Safety precautions must meet the requirements that apply to this type of equipment. The following recommendations should be observed in addition to the standard regulations that apply to the workplace.

All work must be carried out by trained personnel well-acquainted with the operation of the equipment. Incorrect operation of the equipment may lead to hazardous situations which can result in injury to the operator and damage to the equipment.

1. Anyone who uses the equipment must be familiar with:
 - its operation
 - location of emergency stops
 - its function
 - relevant safety precautions
 - welding and cutting or other applicable operation of the equipment
2. The operator must ensure that:
 - no unauthorised person is stationed within the working area of the equipment when it is started up
 - no-one is unprotected when the arc is struck or work is started with the equipment
3. The workplace must:
 - be suitable for the purpose
 - be free from drafts
4. Personal safety equipment:
 - always wear recommended personal safety equipment, such as safety glasses, flame-proof clothing, safety gloves
 - do not wear loose-fitting items, such as scarves, bracelets, rings, etc., which could become trapped or cause burns

5. General precautions:

- make sure the return cable is connected securely
- work on high voltage equipment **may only be carried out by a qualified electrician**
- appropriate fire extinguishing equipment must be clearly marked and close at hand
- lubrication and maintenance must **not** be carried out on the equipment during operation



WARNING!

Wire feeders are intended to be used with power sources in MIG/MAG mode only.

If used in any other welding mode, such as MMA, the welding cable between wire feeder and power source must be disconnected, or else the wire feeder becomes live or energized.

If equipped with ESAB cooler

Use ESAB approved coolant only. Non-approved coolant might damage the equipment and jeopardize product safety. In case of such damage, all warranty undertakings from ESAB cease to apply.

Recommended ESAB coolant ordering number: 0465 720 002.

For ordering information, see the "ACCESSORIES" chapter in the instruction manual.



WARNING!

Arc welding and cutting can be injurious to yourself and others. Take precautions when welding and cutting.



ELECTRIC SHOCK - Can kill

- Install and ground the unit in accordance with instruction manual.
- Do not touch live electrical parts or electrodes with bare skin, wet gloves or wet clothing
- Insulate yourself from work and ground.
- Ensure your working position is safe



ELECTRIC AND MAGNETIC FIELDS - Can be dangerous to health

- Welders having pacemakers should consult their physician before welding. EMF may interfere with some pacemakers.
- Exposure to EMF may have other health effects which are unknown.
- Welders should use the following procedures to minimize exposure to EMF:
 - Route the electrode and work cables together on the same side of your body. Secure them with tape when possible. Do not place your body between the torch and work cables. Never coil the torch or work cable around your body. Keep welding power source and cables as far away from your body as possible.
 - Connect the work cable to the workpiece as close as possible to the area being welded.



FUMES AND GASES - Can be dangerous to health

- Keep your head out of the fumes
- Use ventilation, extraction at the arc, or both, to take fumes and gases away from your breathing zone and the general area



ARC RAYS - Can injure eyes and burn skin

- Protect your eyes and body. Use the correct welding screen and filter lens and wear protective clothing
- Protect bystanders with suitable screens or curtains



NOISE - Excessive noise can damage hearing

Protect your ears. Use earmuffs or other hearing protection.



MOVING PARTS - Can cause injuries

- Keep all doors, panels and covers closed and securely in place. Have only qualified people remove covers for maintenance and troubleshooting as necessary. Reinstall panels or covers and close doors when service is finished and before starting engine.



- Stop engine before installing or connecting unit.
- Keep hands, hair, loose clothing and tools away from moving parts.



FIRE HAZARD

- Sparks (spatter) can cause fire. Make sure therefore that there are no inflammable materials nearby
- Do not use on closed containers.



HOT SURFACE - Parts can burn

- Do not touch parts bare handed.
- Allow cooling period before working on equipment.
- To handle hot parts, use proper tools and/or insulated welding gloves to prevent burns.

MALFUNCTION - Call for expert assistance in the event of malfunction.

PROTECT YOURSELF AND OTHERS!



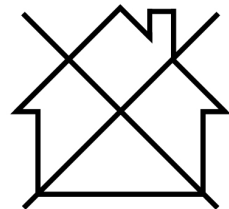
CAUTION!

This product is solely intended for arc welding.



CAUTION!

Class A equipment is not intended for use in residential locations where the electrical power is provided by the public low-voltage supply system. There may be potential difficulties in ensuring electromagnetic compatibility of class A equipment in those locations, due to conducted as well as radiated disturbances.



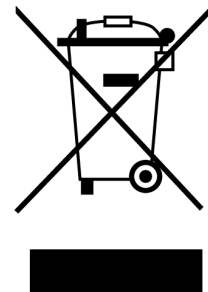
NOTE!

Dispose of electronic equipment at the recycling facility!

In observance of European Directive 2012/19/EC on Waste Electrical and Electronic Equipment and its implementation in accordance with national law, electrical and/or electronic equipment that has reached the end of its life must be disposed of at a recycling facility.

As the person responsible for the equipment, it is your responsibility to obtain information on approved collection stations.

For further information contact the nearest ESAB dealer.



CAUTION!

This equipment does not comply with IEC 61000-3-12:2011. If it is connected to a public low voltage system, it is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator, that the equipment may be connected.

ESAB has an assortment of welding accessories and personal protection equipment for purchase. For ordering information contact your local ESAB dealer or visit us on our website.

2 INTRODUCTION

The **Fabricator ET 410iP** is a welding power source intended for TIG welding and for welding with covered electrodes (MMA).

ESAB accessories for the product can be found in the "ACCESSORIES" chapter of this manual.

2.1 Equipment

The power source is supplied with:

- 4.5 m (14.8 ft) mains cable with CEE plug
- Instruction manual
- Hose with quick connector

3 TECHNICAL DATA

Fabricator ET 410iP	
Mains voltage	400 V \pm 15%, 3~ 50/60 Hz
Primary current I_{max}	
MMA	31 A
TIG	25 A
Idle state power (fan stop running)	
U _{in} 400 V	40 W (VRD OFF) 15 W (VRD ON)
Setting range	
MMA	30 A/21.2 V - 410 A/36.4 V
TIG	5 A/10.2 V - 410 A/26.4 V
Permissible load at MMA	
60 % duty cycle	410 A/36.4 V
100% duty cycle	310 A/32.4 V
Permissible load at TIG	
60 % duty cycle	410 A/26.4 V
100% duty cycle	310 A/22.4 V
Apparent power I₂ at maximum current	21 kVA
Active power I₂ at maximum current	17 kW
Power factor at maximum current	
MMA	0.82
TIG	0.79
Efficiency at maximum current	
MMA	88 %
TIG	86 %
Open-circuit voltage U₀ max	
VRD deactivated	76 V
VRD activated	13.5 V
Operating temperature	-10 to +40 °C (+14 to +104 °F)
Transportation temperature	-20 to +55 °C (-4 to +131 °F)
Constant sound pressure when idling	<70 db (A)
Dimensions l × w × h	525 × 280 × 475 mm
Weight	38.5 kg (84.88 lbs)
Insulation class	F
Enclosure class	IP 23S
Application class	S

Mains supply, $S_{sc\ min}$

Minimum short circuit power on the network in accordance with IEC 61000-3-12.

Duty cycle

The duty cycle refers to the time as a percentage of a ten-minute period that you can weld or cut at a certain load without overloading. The duty cycle is valid for 40 °C / 104 °F, or below.


Enclosure class

The **IP** code indicates the enclosure class, i.e. the degree of protection against penetration by solid objects or water.

Equipment marked **IP21S** is intended for indoor use.

Equipment marked **IP23S** is intended for indoor and may be used outdoors if sheltered during precipitation.

Application class

The symbol  indicates that the power source is suitable for welding in an environment with an increased risk of electric shock.

4 INSTALLATION

The installation must be carried out by a professional.

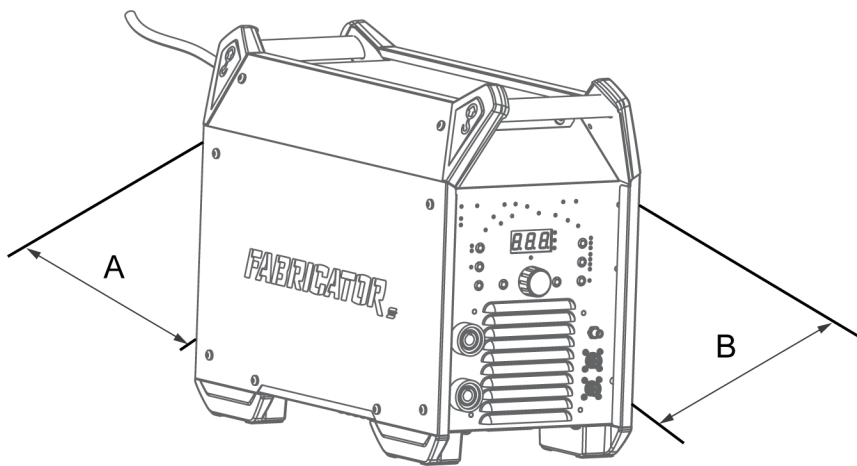


CAUTION!

This product is intended for industrial use. In a domestic environment this product may cause radio interference. It is the user's responsibility to take adequate precautions.

4.1 Location

Position the power source so that its cooling air inlets and outlets are not obstructed.



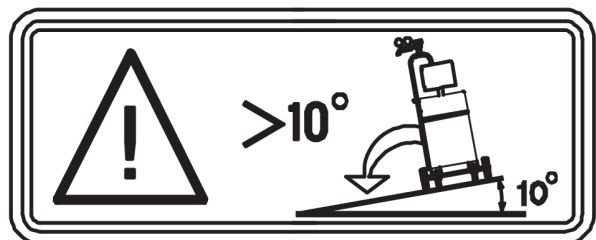
A. Minimum 200 mm (8 in.)

B. Minimum 200 mm (8 in.)



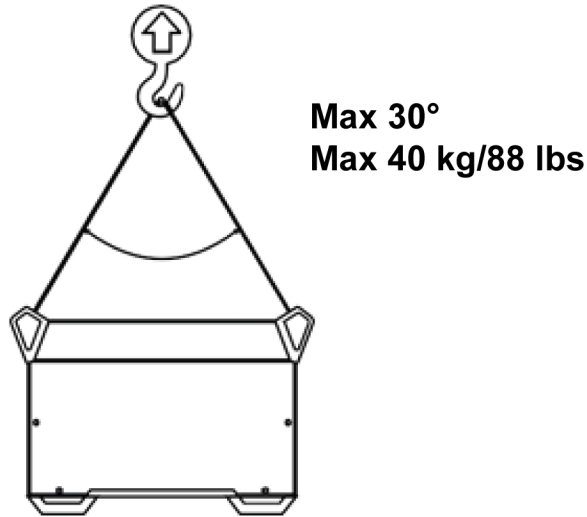
WARNING!

Secure the equipment - particularly if the ground is uneven or sloping.



4.2 Lifting instructions

Mechanical lifting must be done with both outer handles.



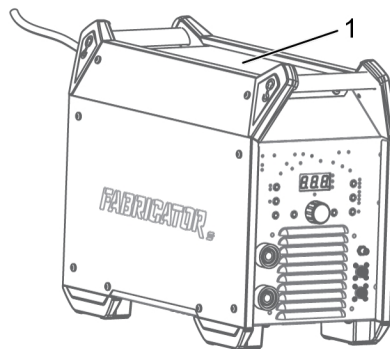
4.3 Mains supply



NOTE! Mains supply requirements

This equipment complies with IEC 61000-3-12 provided that the short-circuit power is greater than or equal to S_{scmin} at the interface point between the user's supply and the public system. It is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment is connected only to a supply with a short-circuit power greater than or equal to S_{scmin} . Refer to the technical data in the TECHNICAL DATA chapter.

Make sure it is protected by the correct fuse rating. A protective earth connection must be made, in accordance with regulations.



1. Rating plate with supply connection data

4.4 Recommended fuse sizes and minimum cable area

Fabricator ES 410iC	
Mains voltage	400 V \pm 15%, 3~50/60 Hz
Mains cable area	4×4 mm ²
Maximal current rating I_{max}	
MMA	31 A
I_{1eff}	
MMA	24 A
Fuse	
Anti-surge	32 A
Type-C MCB	32 A
Maximum recommended extension cord length	100 m/330 ft.
Minimum recommended extension cord size	4×6 mm ²

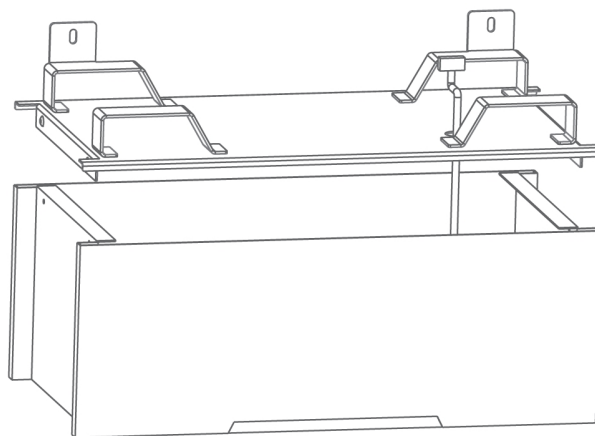
Supply from power generators

The power source can be supplied from different types of generators. However, some generators may not provide sufficient power for the welding power source to operate correctly. Generators with Automatic Voltage Regulation (AVR) or with equivalent or better type of regulation, with rated power 30 kW, are recommended.

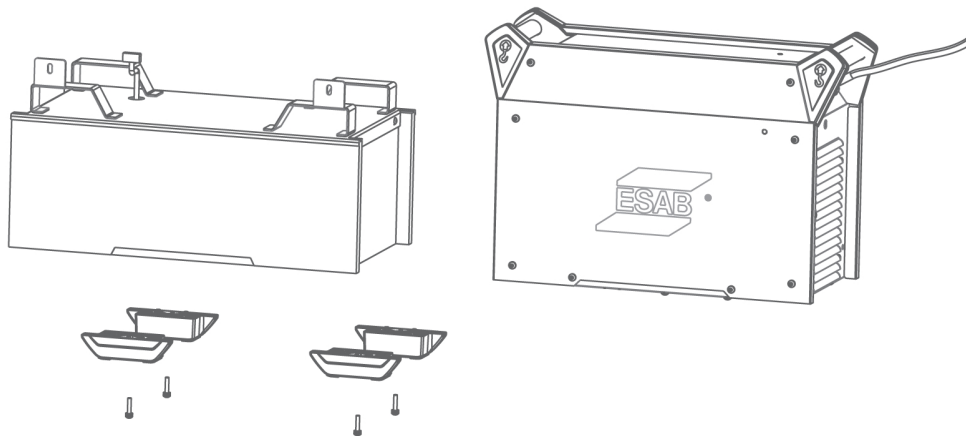
4.5 Connect with Cool 2 using adaptor

Make sure the power source is turned off.

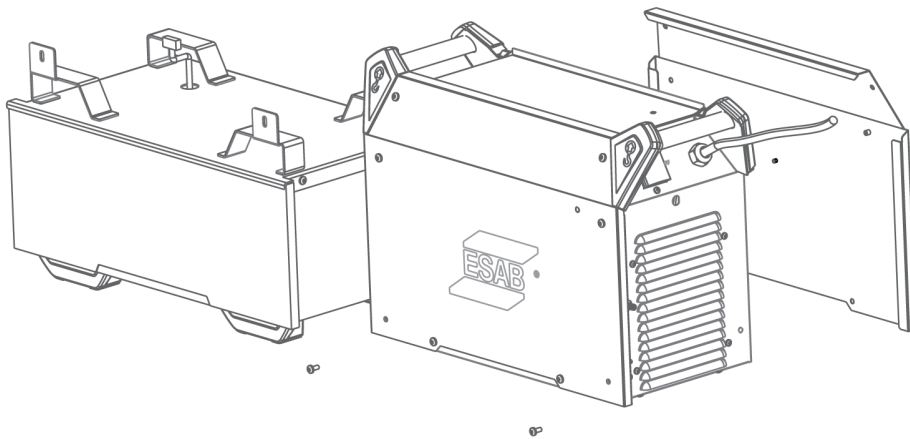
1. Connect the Cool 2 (0465 427 880) with the Cool 2 Adaptor (0447 248 001):
 - a. Pull the cable out of the cooling unit through the adaptor.



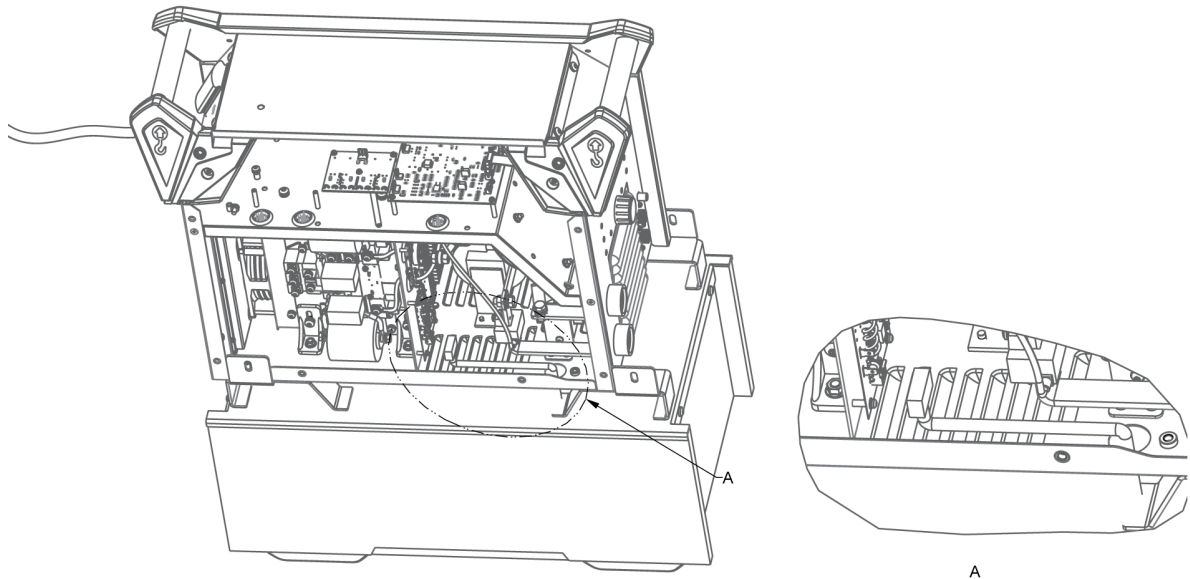
- b. Set the adaptor on the cooling unit.
 - c. Connect the adaptor to the cooling unit by the provided M6×10 screws.
2. Connect the Cool 2 Adaptor to the Fabricator ET 410iP:
 - a. Remove the feet from the power source and install on the cooling unit.



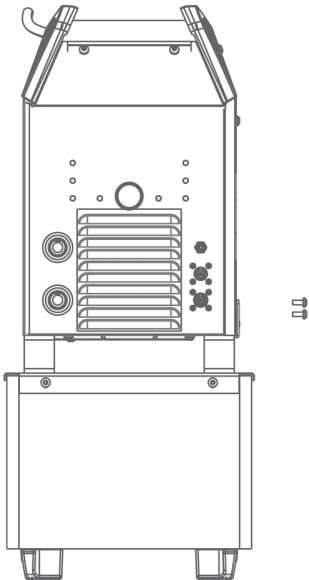
b. Remove the screws holding the left side panel and remove the panel. Remove the two screws holding the right side panel.



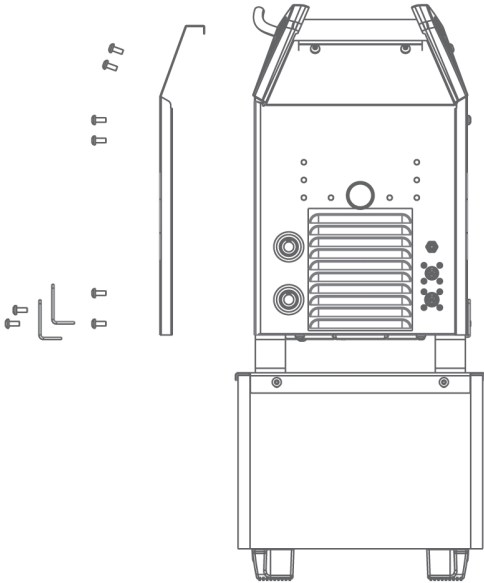
c. Place the power source on the adaptor and connect the cable through the bottom plate to PCBA. Plug the connector into P6.



d. Assemble the power source and the adaptor with the screws.



e. Reattach the side panel of the power source with the screws.



5 OPERATION

General safety regulations for handling the equipment can be found in the "SAFETY" chapter of this manual. Read it through before you start using the equipment!



NOTE!

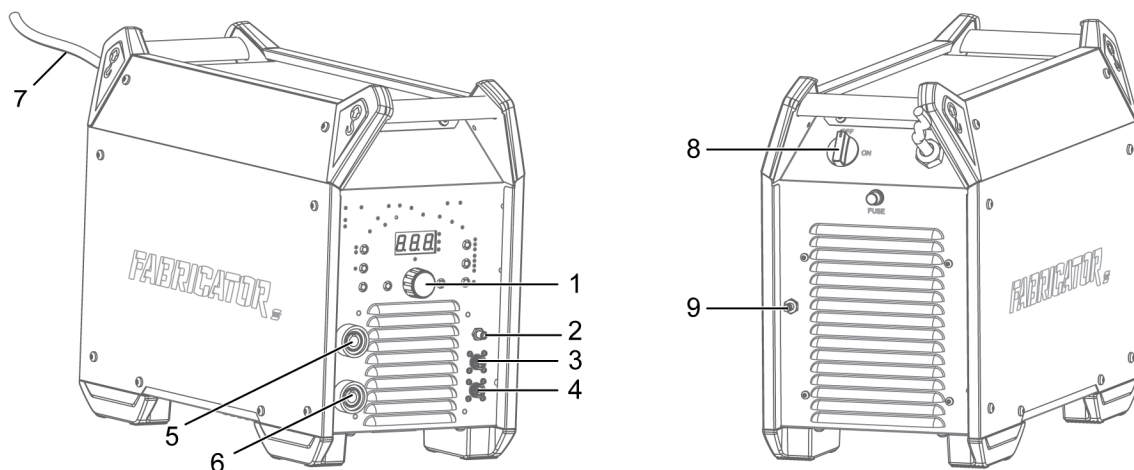
When moving the equipment use intended handle. Never pull the cables.



WARNING!

Electric shock! Do not touch the workpiece or the welding head during operation!

5.1 Connections and control devices



- | | |
|--|--------------------------------------|
| 1. Setting panel | 6. Positive welding terminal |
| 2. Gas valve (outlet) | 7. Mains cable |
| 3. Connection for 2 pin torch | 8. Mains power supply switch, ON/OFF |
| 4. Connection for remote control unit or 8 pin torch connector | 9. Gas valve (inlet) |
| 5. Negative welding terminal | |

5.2 TIG welding



TIG welding melts the metal of the workpiece, using an arc initiated from a non-consuming tungsten electrode. The weld pool and electrode are protected by a shielding gas that usually consists of an inert gas.

For TIG welding, the welding power source shall be supplemented with:

- a TIG torch with gas valve
- an argon gas cylinder
- an argon gas regulator
- tungsten electrode
- return cable (with clamp)

5.3 MMA welding



MMA welding may also be referred to as welding with covered electrodes. The arc melts the electrode as well as a local part of the workpiece. The coverage, when melting, forms a protective slag and creates a shielding gas to protect the weld pool from atmospheric contamination.

For MMA welding, the welding power source shall be supplemented with:

- welding cable with electrode holder
- return cable with clamp

5.4 Connection of welding and return cables

The power source has two outputs, a positive welding terminal (+) and a negative welding terminal (-), for connecting welding and return cables. The output to which the welding cable is connected depends on the welding method or type of electrode used.

Connect the return cable to the other output on the power source. Secure the return cable's contact clamp to the work piece and ensure that there is good contact between the work piece and the output for the return cable on the power source.

- For TIG welding, the negative welding terminal (-) is used for the welding torch and the positive welding terminal (+) is used for the return cable.
- For MMA welding, the welding cable can be connected to the positive welding terminal (+) or negative welding terminal (-) depending on the type of electrode used. The connecting polarity is stated on the electrode packaging.

5.5 Turning the mains power ON/OFF

Turn ON the mains power by turning the switch to the "ON".

Turn the unit OFF by turning the switch to the "OFF" position.

Regardless the mains supply is interrupted abnormally, or the power source is switched off in the normal manner, the welding data will be stored, so it will be available next time the unit is turned ON.



CAUTION!

Do not turn OFF the power source during welding (with load).

5.6 Fan control and Cool 2

The power source has an automatic thermal control. When turning ON the main power switch, the fan will run for 10 seconds and then stop. Once welding start, the fan continues to run for a few minutes after welding has stopped while the power source switches to energy-saving mode. The fan starts again when welding restarts. When Cool 2 is connected to the power source, Cool 2 will be synced with the fan.

5.7 Thermal protection



The power source includes thermal protection against overheating. When temperature is up to 80% limitation, the overheating indicator on the panel will blink; once temperature exceeds the limitation, the welding is stopped and overheating indicator will be lit and an error message shows in the display. The protection is automatically reset when the temperature has been sufficiently reduced.

5.8 Voltage reduction device (VRD)

Voltage Reduction Device (VRD)

VRD The VRD function ensures that the open-circuit voltage does not exceed 15 V when welding is not being carried out. This is indicated by a lit VRD indicator on the panel. When VRD function is on, the green led is lit, when VRD is off the red led is lit.

The power sources with serial numbers from ZG14725330001 to ZG14725330036 and all later power sources have the VRD function set to OFF by default.

5.9 Remote control



Connect the remote control on the front panel of the power source and activate the remote control by pressing the remote control button on the panel (remote control indicator being lit when activated). When the remote control is activated, the welding current is controlled by remote device.

In DC TIG mode the minimum remote current is set by initial current and the maximum remote current is limited by local set current. For example, in local mode set the "initial current" to 50 A and set the "set current" to 200 A then switch to remote mode. The current range in remote mode is changed from 50 A to 200 A. The initial current (minimum current in remote mode) can be set on local mode and remote mode, but the set current (maximum current in remote mode) only can be set in local mode.

In Pulse TIG mode, the ratio between background and set current is the same as local mode, for example, if in local mode, the background current is set to 50 A, the set current is set to 100 A, and the ratio is 0.5, if adjusting the set current or background current in remote mode, the ratio will keep the same. By adjusting either of them, the other one will change accordingly.

5.10 Memory



Ten weld programs can be saved in the memory from Pr0 to Pr9.

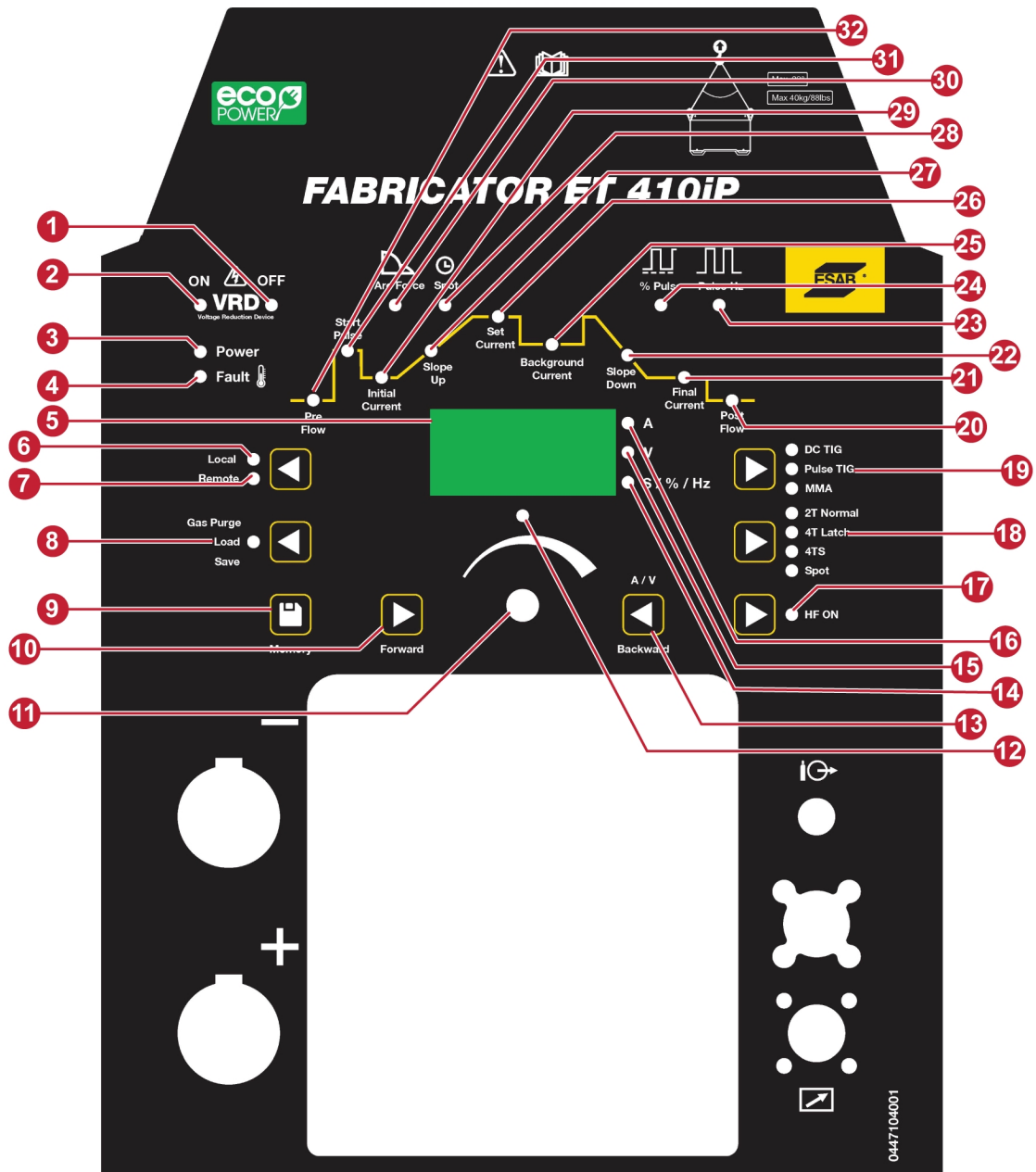
To active the memory function, press the memory button (9) and Pr0 will be displayed. To change memory channel, rotate the control knob (11). Press save button (8) longer than 2 seconds, until the display shows: ---. All the settings of current welding process are saved into this channel, then exits the memory function.

To load a welding process which was saved previously, press memory button (9) to active memory function and Pr0 will be displayed. To change memory channel, rotate the control knob (11). Select the channel you want to load, press the load button (8) shortly, it will load previously saved settings. If this channel did not have any settings before, the display shows: ---, and no settings will be loaded.

To exit memory function, press the memory button (9) shortly.

6 CONTROL PANEL

6.1 Fabricator ET 410iP



1. VRD OFF indicator.
2. VRD ON indicator.
3. Power ON indicator.
4. Fault indicator. It shows over temperature.
5. Display. It shows set or measured value and error codes.
6. Local control indicator. When it is lit the current is controlled by the control knob.
7. Remote control indicator. When it is lit, the current is controlled by the remote device.
8. Gas purge/load/save button and indicator. In DC TIG and Pulse TIG modes, press for gas purge. In memory mode, press once for loading memory and press longer for saving to memory.
9. Memory button. Press to load or save process.
10. Forward button. Press to select the adjustable parameter.
11. Control knob. Press to set data.
12. Set indicator. When it is lit, the value can be adjusted with the control knob.
13. A/V/Backward button. Press to select current or voltage displayed on the display when welding. In setting mode (indicator 13 is lit), press to select the adjustable parameter backward.
14. S%/Hz indicator.
15. Voltage indicator.
16. Amplifier indicator.
17. High frequency arc start mode selection button and indicator. It is used to select high frequency arc start mode or Lift TIG mode.
18. 2T/4T/4TS/Spot mode selection button. Press to select 2T, 4T, 4TS or Spot mode (TIG only).
19. Welding process selection button. Press to select DC TIG, pulse TIG or MMA.
20. Gas post flow indicator.
21. Final current indicator.
22. Slope down indicator.
23. Pulse Hz indicator.
24. Duty of pulse indicator.
25. Background current indicator.
26. Set current indicator.
27. Slope up indicator.
28. Spot time indicator.
29. Initial current.
30. Arc force indicator.
31. Start pulse indicator.
32. Gas pre flow indicator.

6.1.1 Navigation

Parameter selection

By pressing the button (10) different values can be shown and changed. Use the knob (11) to change the values.

Set parameter

The set indicator (13) will be lit when a displayed value can be changed. Trying to change a value while in measured value mode will result in automatically move to set current value mode.

The set indicator (13) is off when measured values are shown.

Weld parameters

The weld parameters are stored for pulse and no pulse respectively. The values are changed when changing between pulse and no pulse.

6.2 TIG settings

Indicator	Function	Setting range	Setting step	Default value	Available mode
HF on	HF on or off	on/off		on	DC TIG/Pulse TIG 2T/4T/4TS/SPOT
Pre flow	Gas preflow time (s)	0.1-2.0	0.1	0.5	DC TIG/Pulse TIG 2T/4T/4TS/SPOT
Start pulse	Start pulse current (A)	0-100	1	30	DC TIG/Pulse TIG 2T/4T/4TS/SPOT HFON
Initial current	Initial current	5-set current	1	15	DC TIG/Pulse TIG 4T/4TS
Slope up	Slope up time (s)	0.0-5.0	0.1	1.0	DC TIG/Pulse TIG 4T/4TS
Set current	Set current (A)	5-410	1	100	DC TIG/Pulse TIG 2T/4T/4TS/SPOT
Background current	Background current (A)	5-set current	1	50	Pulse TIG 4T/4TS
Slope down	Slope down (s)	0.0-5.0	0.1	1.0	DC TIG/Pulse TIG 2T/4T/4TS
Final current	Final current (A)	5-set current	1	20	DC TIG/Pulse TIG 4T/4TS
Post flow	Post flow (s)	0.5-20.0	0.1	3.0	DC TIG/Pulse TIG 2T/4T/4TS/SPOT
% Pulse	Duty cycle of pulse (%)	10-90	1	50	Pulse TIG 2T/4T/4TS/SPOT
Pulse Hz	Frequency of pulse (Hz)	0.5-250	0.1(0.5-20.0); 1(20-250)	1.0	Pulse TIG 2T/4T/4TS/SPOT
Spot	Spot times (s)	0.1-20	0.1	2.0	DC TIG/Pulse TIG SPOT

6.2.1 Measured values

A

Measured current

Measured value in the display for welding current A is arithmetic average value.

V

Measured voltage

Measured value in the display for arc voltage V is arithmetic average value.

6.3 TIG functions explanation

HF ON

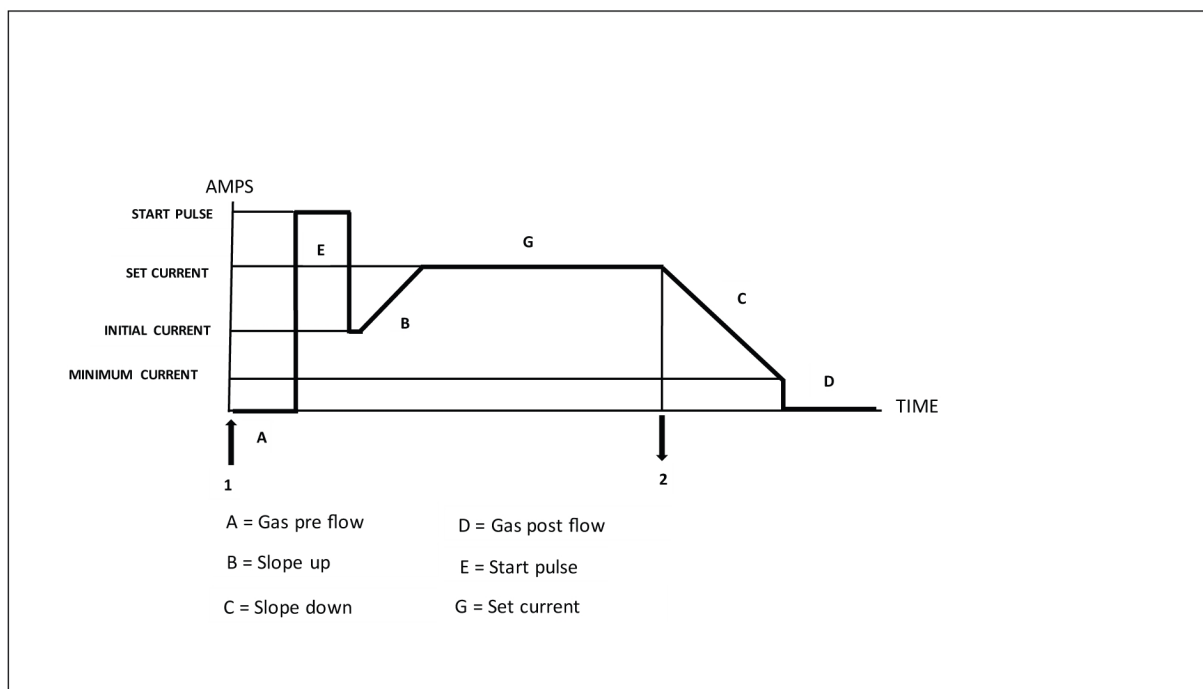
The HF ON function initiates the arc by using a high frequency voltage pilot arc. This will reduce the risk of tungsten contamination in the starts. The high frequency voltage might disturb other electrical equipment in the surrounding area.

HF OFF

When HF is set to OFF, it initiates the arc when the tungsten electrode is brought into contact with the workpiece, the trigger switch is pressed, and the tungsten electrode is lifted away from the workpiece. In order to minimize the risk of tungsten contaminations, the start current is limited to 25 A, and will slope to the set current.

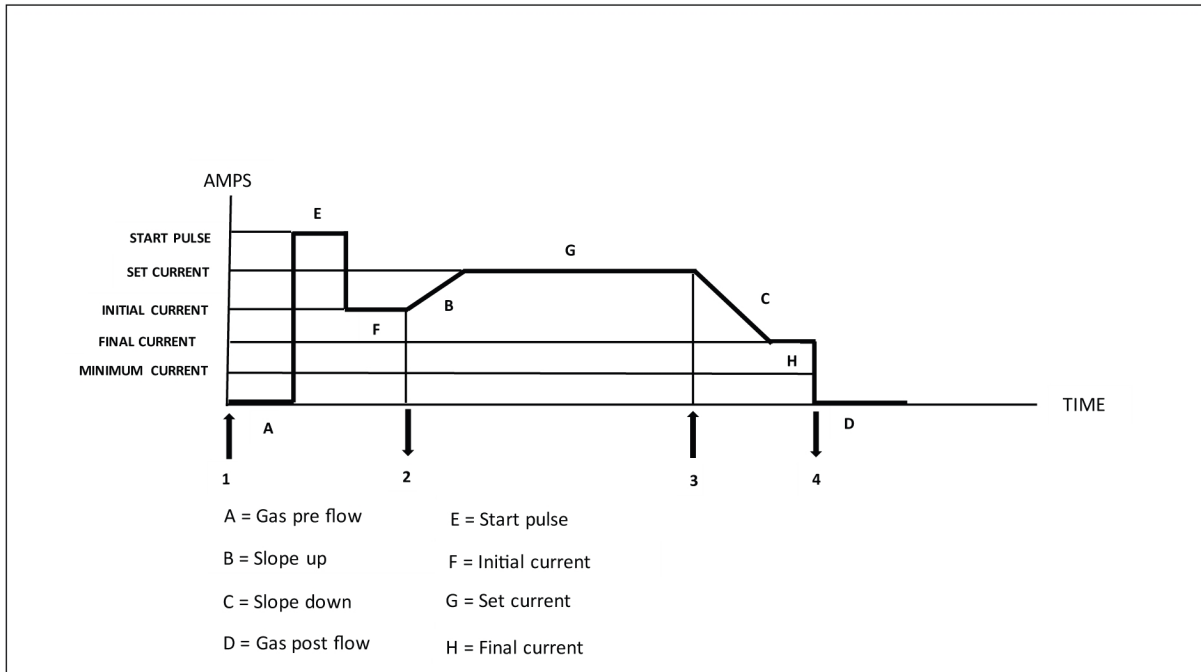
2T NORMAL/DC TIG

In 2T normal DC TIG mode, press the TIG torch trigger switch (1) to start the shielding gas flow and initiate the arc. The current goes to start pulse for 20 ms, then goes to initial current, then slopes up to set current. Release the trigger switch (2) to start to slope down the current and terminate the arc. The shielding gas will continue to flow in order to protect the weld and the tungsten electrode.

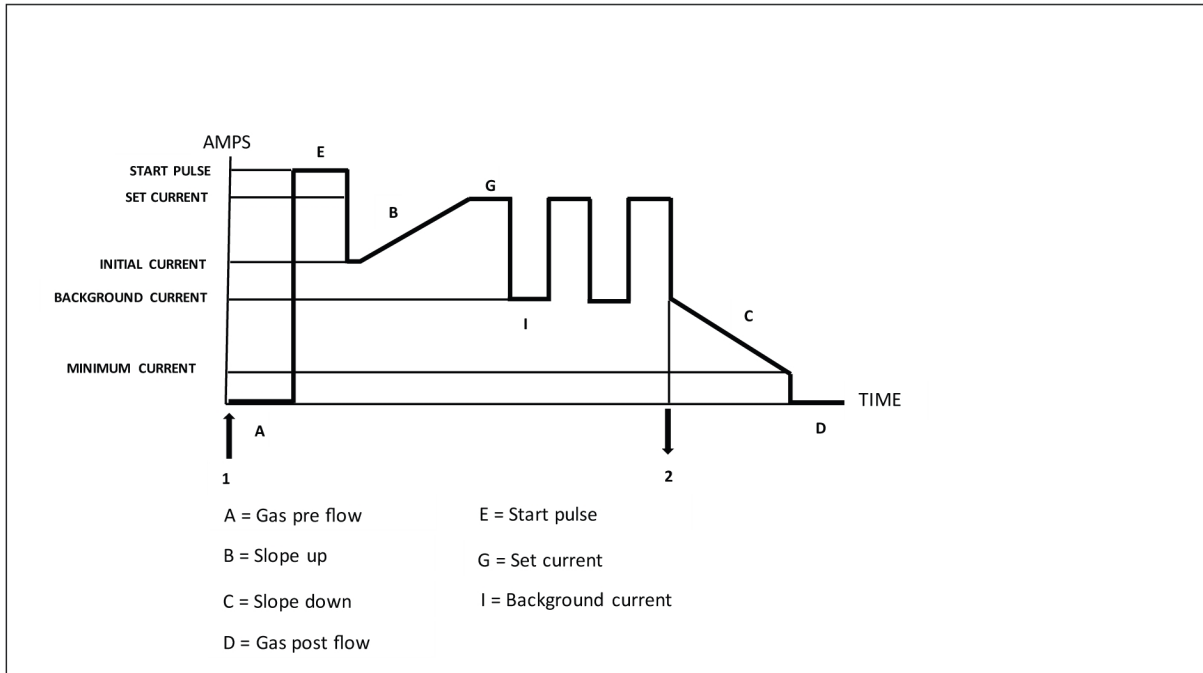


4T LATCH/DC TIG

In 4T latch/ DC TIG mode, press the TIG torch trigger switch (1) to start the shielding gas flow and initiate the arc. The current goes to start pulse for 20 ms, then goes to initial current. Release the trigger switch (2) to slope up the current to set current value. To stop the welding, press the trigger switch again (3), the current will slope down to the final current. Release the trigger switch (4) to terminate the arc. The shielding gas will continue to flow in order to protect the weld and the tungsten electrode.

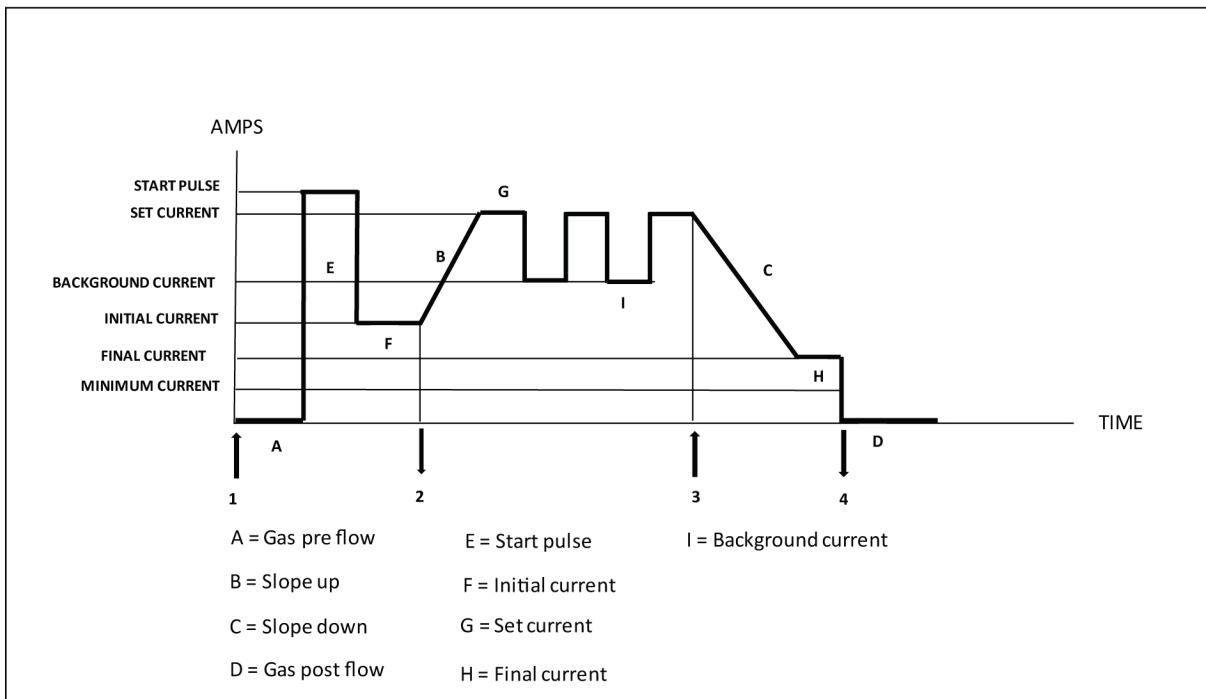
**2T NORMAL/PULSE TIG**

In 2T normal pulse TIG mode, press the TIG torch trigger switch (1) to start the shielding gas flow and initiate the arc. The current goes to start pulse for 20 ms then goes to initial current, then slopes up to set current, the current changes between set current and background current. Release the trigger switch (2) to start to slope down the current and terminate the arc. The shielding gas will continue to flow in order to protect the weld and the tungsten electrode.



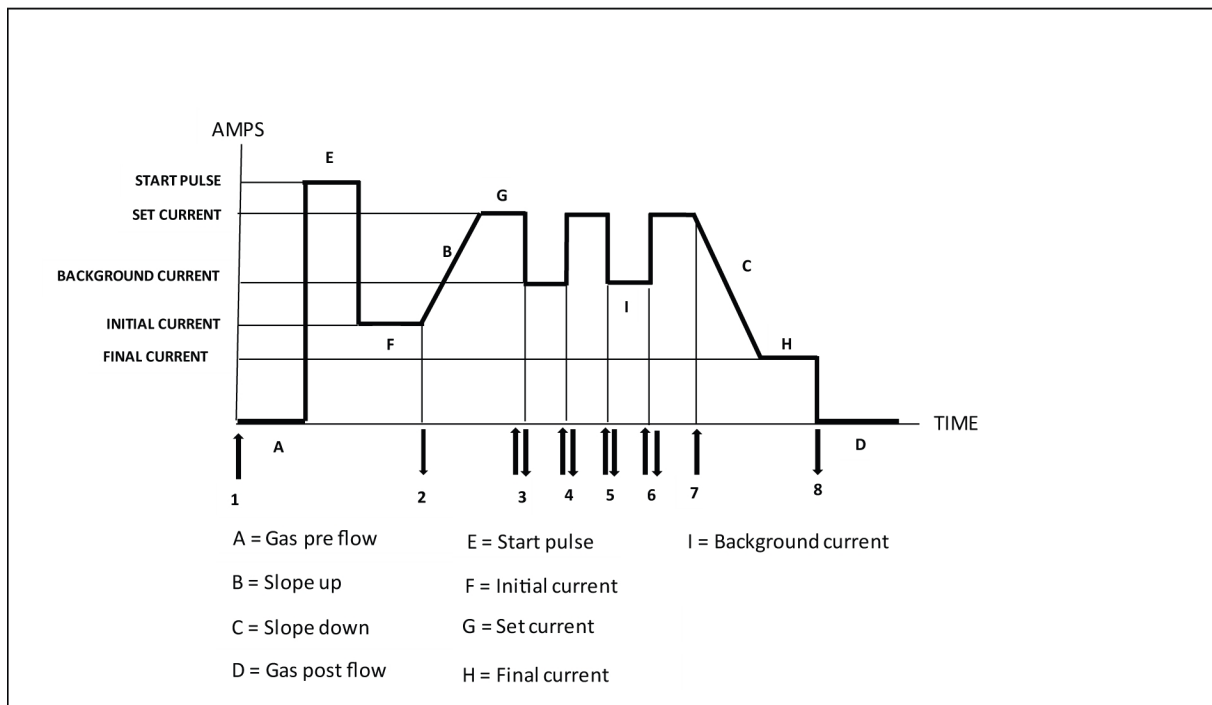
4T LATCH/PULSE TIG

In 4T latch/PULSE TIG mode, press the TIG torch trigger switch (1) to start the shielding gas flow and initiate the arc. The current goes to start pulse for 20 ms then goes to initial current. Release the trigger switch (2) to slope up the current to set current value. The current changes between set current and background current. To stop the welding, press the trigger switch again (3), the current will slope down to the final current. Release the trigger switch (4) to terminate the arc. The shielding gas will continue to flow in order to protect the weld and terminate the arc.



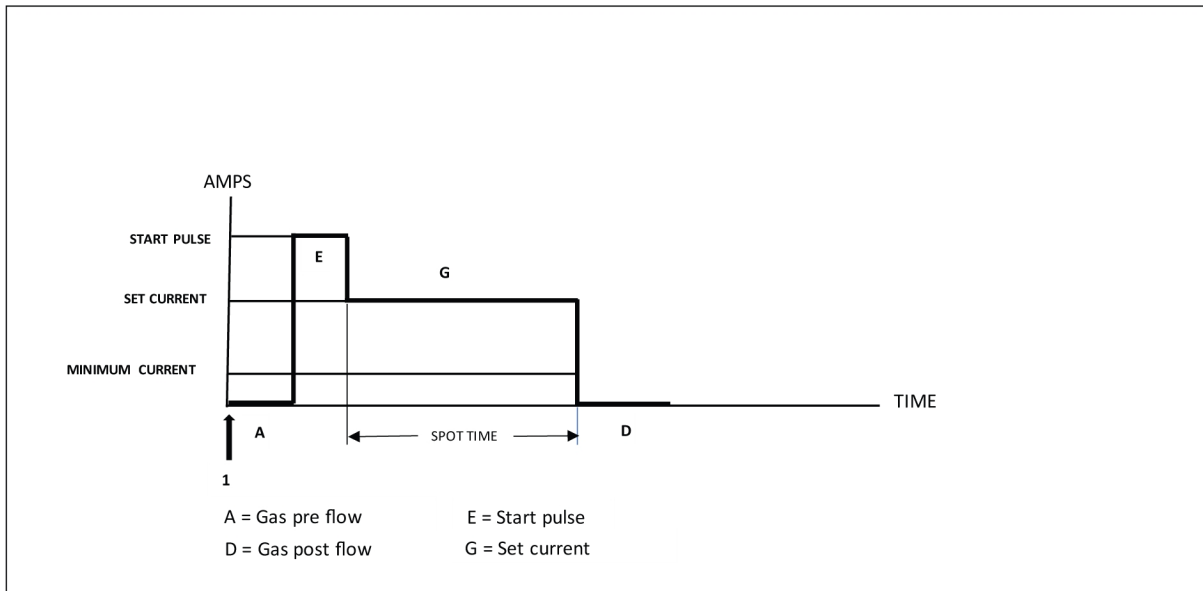
4TS/PULSE TIG

In 4TS/PULSE TIG mode, 4TS mode is a special 4T mode. Press the TIG torch trigger switch (1) to start the shielding gas flow and initiate the arc. The current goes to start pulse for 20 ms then goes to initial current. Release the trigger switch (2) to slope up the current to set current value. Press the switch (3) for less than 0.5 s and release, the current switches from set current to background current. Press the switch less than (4) for 0.5 s and release, the current switches from background current to set current. Press the switch less than (5) for 0.5 s and release, the current switches from set current to background current. Press the switch less than (6) for 0.5 s and release, the current switches from background current to set current. Press the switch (7) for more than 0.5 s, the current slopes down to final current and keeps the current at final current as long as the trigger pressed. Release the trigger switch (8) again to terminate the arc. The shielding gas will continue to flow in order to protect the weld and tungsten electrode.



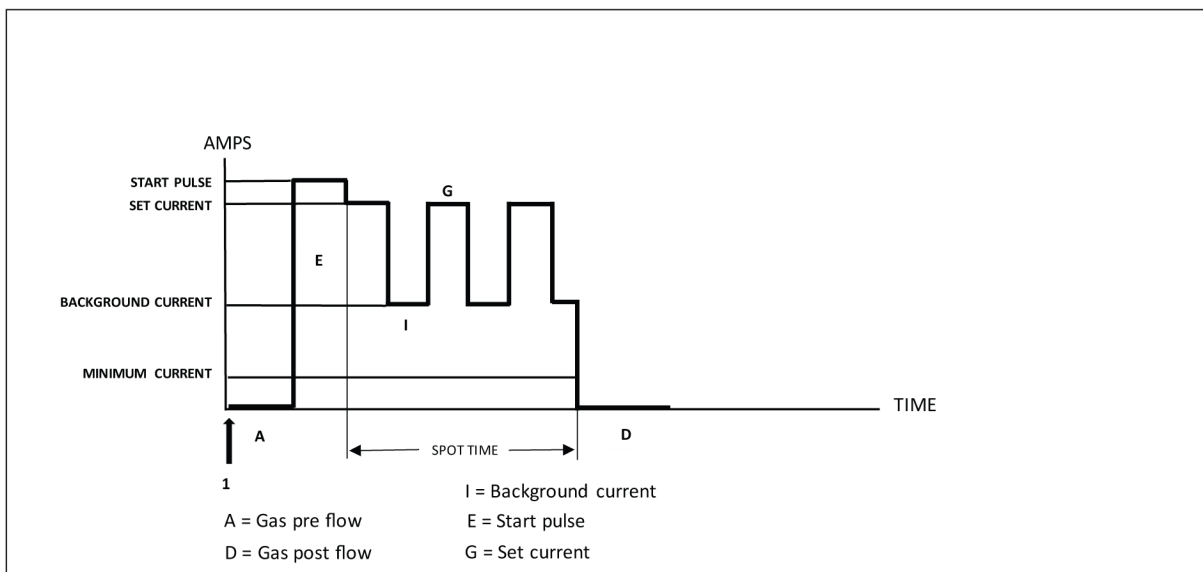
SPOT/DC TIG

In SPOT/DC TIG mode, press the TIG torch trigger switch (1) to start the shielding gas flow and initiate the arc. The current goes to start pulse for 20 ms then goes to set current. Keep pressing the trigger switch, the machine will terminate the arc automatically according to the spot time setting time. The shielding gas will continue to flow in order to protect the weld and the tungsten electrode.



SPOT/PULSE TIG

In SPOT/PULSE TIG mode, press the TIG torch trigger switch (1) to start the shielding gas flow and initiate the arc. The current goes to start pulse for 20 ms then goes to set current. The current change between set current and background current. Keep pressing the trigger switch, the machine will terminate the arc automatically according to the spot time setting time. The shielding gas will continue to flow in order to protect the weld and the tungsten electrode.



Gas pre flow

The gas pre flow function controls the time during which shielding gas flows before the arc is initiated.

Gas post flow

The gas post flow function controls the time during which shielding gas flows after the arc is terminated.

Initial current

It is used to set the start current for TIG, or minimum current range in DC TIG remote mode.

Slope up

The slope up function is used to control the time of the current increase in the weld initiation process to avoid any possible damage to the tungsten electrode.

Slope down

The slope down function is used to control the time of the current decrease in the weld termination process to avoid any pipes and/or cracks.

Pulse TIG

In order to set a pulsed current, four parameters are required: set current, background current, pulse duty cycle and pulse frequency.

Set current

The higher of the two current values when using a pulsed current or the maximum current range in DC TIG remote mode.

Background current

The lower of the two current values when using a pulsed current.

Pulse duty cycle

% Pulse is the ratio between set current and background current in a pulse cycle. In order to control the energy of the arc and the size of the weld pool, pulse duty cycle is adjustable by setting the percentage of the set current in a pulse cycle.

For example: If the pulse duty cycle is set to 50%, the time of the set current and the background current will be distributed equally in the pulse cycle. If the pulse duty cycle is set to 90%, the time of the set current will be 90% of the pulse cycle and the background current will only be 10%.

Pulse frequency

The amount of pulse cycles in a time period. The higher the frequency, the more pulse cycles per time period. When the pulse frequency is set low, the weld pool will have time to partially solidify between each pulse. If the frequency is set high, a more focused arc can be obtained.

Remote current

This is used to set the current for the foot pedal or remote control device.

In DC TIG mode, the minimum remote current is set by initial current and the maximum remote current is limited by local set current. For example, in local mode set the "initial current" to 50 A and set the "set current" to 200 A then switch to remote mode. The current range in remote mode is set from 50 A to 200 A. the initial current (minimum current in remote mode) can be set on local mode and remote mode but the set current (maximum current in remote mode) only can be set in local mode.

In Pulse TIG mode, the ratio between background and set current are the same as in local mode. For example, if in local mode, the background current is set to 50 A, the set current is set to 100 A, and the ratio is 0.5. Adjusting the set current or background current in remote mode, the ratio will keep the same. By adjusting either of them, the other one will change accordingly.

6.4 MMA settings

Indicator	Function	Setting range	Setting step	Default value
Set current	Set current (A)	30-410	1	100
Arc force	Arc force (%)	0-100% of set current	1	30
Start pulse	Start pulse current (A)	0-100	1	30

6.4.1 Measured values

A

Measured current

Measured value in the display for welding current A is arithmetic average value.

V

Measured voltage

Measured value in the display for arc voltage V is arithmetic average value.

6.5 MMA functions explanation

Arc force

The arc force function determines how the current changes in response to variations in arc length during welding. Use a low value of arc force to get a calm arc with little spatter and use a high value to get a hot and digging arc.

Arc force only applies to MMA welding.

START PULSE

The start pulse (similar to hot start) function temporarily increases the current in the beginning of the weld, thus reducing the risk of lack of fusion in the starting point.

7 MAINTENANCE

**WARNING!**

The mains supply must be disconnected during cleaning and maintenance.

**CAUTION!**

Only persons with the appropriate electrical knowledge (authorised personnel) may remove the safety plates.

**CAUTION!**

The product is covered by manufacturer's warranty. Any attempt to carry out repair work by non-authorised service centers or personnel will invalidate the warranty.

**NOTE!**

Regular maintenance is important for safe and reliable operation.

**NOTE!**



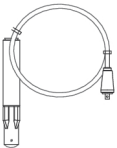

Perform maintenance more often during severe dusty conditions.

Before each use - make sure that:

- Product and cables are not damaged,
- The torch is clean and not damaged.

7.1 Routine maintenance

Maintenance schedule during normal conditions. Check equipment prior to every use.

Interval	Area to maintain		
Every 3 months	 Clean or replace unreadable labels.	 Clean weld terminals.	 Check or replace weld cables.
Every 6 months	 Clean inside equipment. Use dry compressed air with reduced pressure.		

7.2 Cleaning instructions

To maintain the performance and increase the lifetime of the power source it is mandatory to clean it regularly. How often depends on:

- the welding process
- the arc time

- the working environment

**CAUTION!**

Make sure that the cleaning procedure is done in a suitable prepared workspace.

**CAUTION!**

During cleaning, always wear recommended personal safety equipment, such as ear plugs, safety glasses, masks, gloves and safety shoes.

**CAUTION!**

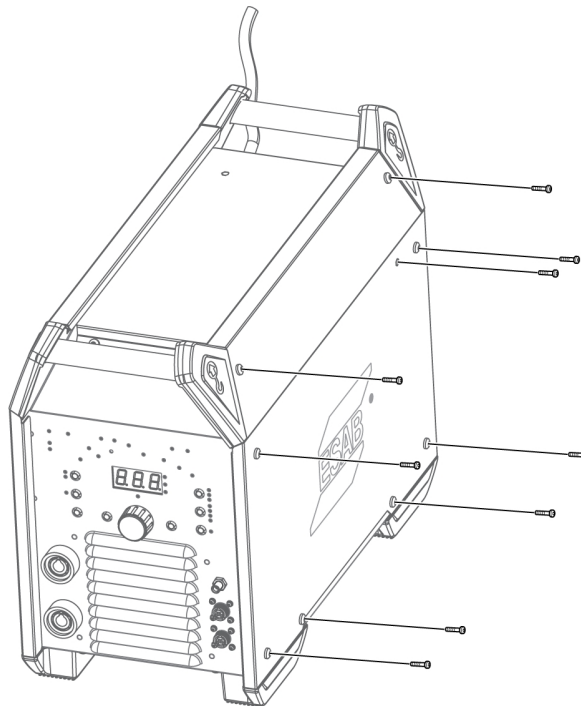
The cleaning procedure should be carried out by authorised service technician.

1. Disconnect the power source from the mains supply.

**WARNING!**

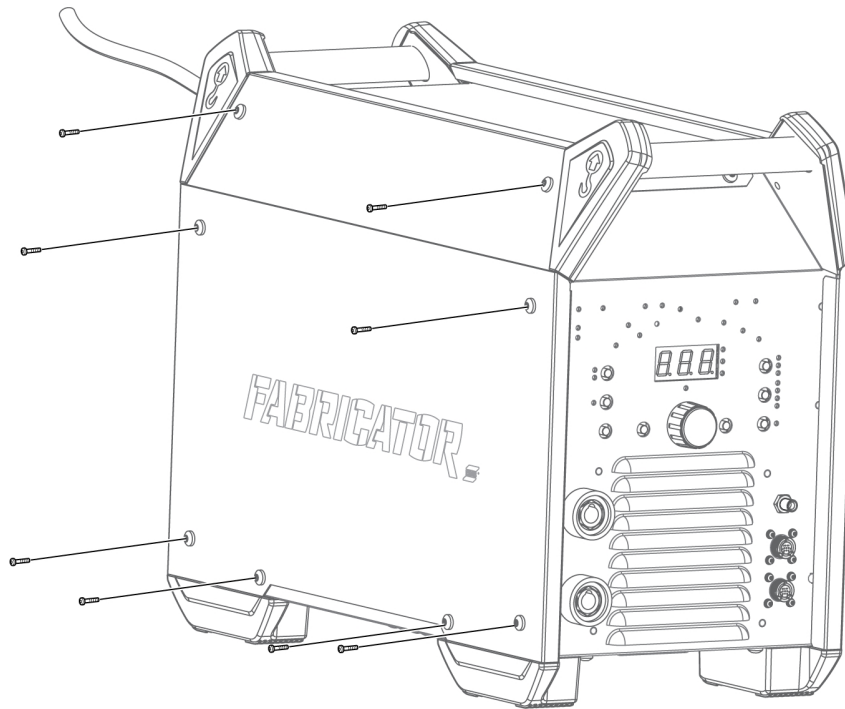
Wait at least 4 minutes for the capacitors to discharge before continuing.

2. Remove the screws holding the right side panel (**R**) and remove the panel.



3. Clean the right side of the power source, using dry compressed air with reduced pressure.

4. Remove the screws holding the left side panel (L) and remove the panel.



5. Clean the left side of the power source, using dry compressed air with reduced pressure.
6. Make sure that there is no dust left on any part of the power source.
7. After having finished cleaning the power source, reattach the power source panels in the reverse order.
8. Tighten the screws on the side panels with $5 \text{ Nm} \pm 0.3 \text{ Nm}$ (44.25 in lb. ± 2.6).

8 TROUBLESHOOTING

Perform these checks and inspections before sending for an authorised service technician.

Type of fault	Corrective action
MMA welding problems	Check that the welding and return cables are correctly connected on the power source.
	Make sure the return clamp has proper contact with the work piece.
	Check that the correct electrodes and polarity are being used. For polarity, check electrode packaging.
	Check that the correct current value is set.
	Adjust Arc Force and Hot start.
TIG welding problems	Check that the welding and return cables are correctly connected on power source.
	Make sure the return clamp has proper contact with the work piece.
	Make sure the TIG torch lead is connected to negative welding terminal.
	Make sure the correct shielding gas, gas flow, welding current, filler rod placement, electrode diameter and welding mode on power source is used.
	Make sure the gas valve on the TIG torch is on.
No arc	Check that display is on to verify that the power source has power.
	Check setting panel display correct values.
	Check that the mains power supply switch is turned on.
	Check that the mains, welding and return cables are correctly connected.
	Check the mains power supply fuses.
Welding current is interrupted during welding	Check whether the thermal protection trip has operated (indicated by LED on Overttemperature indicator on Control panel).
	Check the mains supply fuses.
The thermal protection trips frequently	Make sure the recommended duty cycle for the weld current has not been exceeded.
	See section "Duty cycle" in the TECHNICAL DATA chapter.
	Make sure the air inlets or outlets are not clogged.
	Clean inside machine according to routine maintenance.
	Check and clean the cooler
The maximum current setting can't reach 410 A	Check that the power source is connected to 3-phase mains power supply
	Check the mains power supply fuses.

9 ERROR CODES

9.1 Error codes overview

The error code is used to indicate that a fault has occurred in the equipment. Errors are indicated by the text "E-" followed by the error code number shown in the display.

If several errors have been detected only the code for the last occurring error is displayed.

Error codes that the user can handle are listed below. If any other error code appears, contact an authorised ESAB service technician.

E-0 Power supply phase loss protection

The power supply to the power source loses any phase. One phase is lost during 3-phase operation.

1. Make sure the power supply is stable, all leads are connected, that the mains voltage (all 3 phases) are OK and restart the system. If the error persists, contact a service technician.

E-1 Over voltage protection

The power supply to the power source is too high voltage (more than 480 V).

1. Make sure the power supply is stable, and the input voltage is in the range of 320 V - 480 V.

E-2 Under voltage protection

The power supply to the power source is too low voltage (less than 320 V).

1. Make sure the power supply is stable, and the input voltage is in the range of 320 V - 480 V.

E-3 Temperature fault

The temperature of the power source is too high. A LED indicating temperature fault is also lit on the panel. A temperature fault is indicated by the overheating indicator on the control panel.

1. The error code will automatically disappear and the LED indicating temperature fault will be turned off when the power source has cooled down and it is ready for use again. If the error persists, contact a service technician.

E-4 Output short circuit

When output circuit is short circuit, this error code will display.

1. Check output circuit and make sure there is no short circuit.
2. Turn the main switch off and on again. If the error persists, contact a service technician.

E-5 Temperature high warning

When the temperature of the power source is too high, but still does not trigger the temperature fault, this error code will display. But if the LED indicating temperature fault is not lit on the panel, the power source still can work.

1. The error code will automatically disappear when the power source has cooled down.

E-6 Temperature fault

When the Tig trigger is closed and the main switch is turned on, this error code will display.

1. Make sure the trigger switch is open before turning on the main switch.

10 ORDERING SPARE PARTS



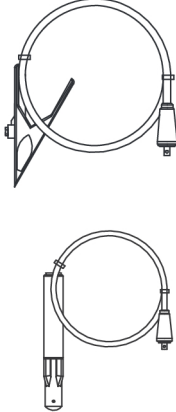


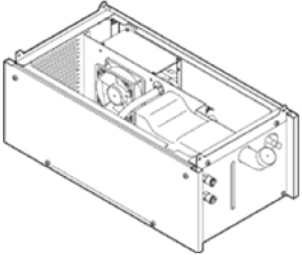
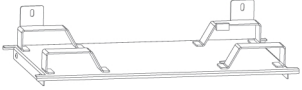
CAUTION!

Repair and electrical work should be performed by an authorised ESAB service technician.
Use only ESAB original spare and wear parts.

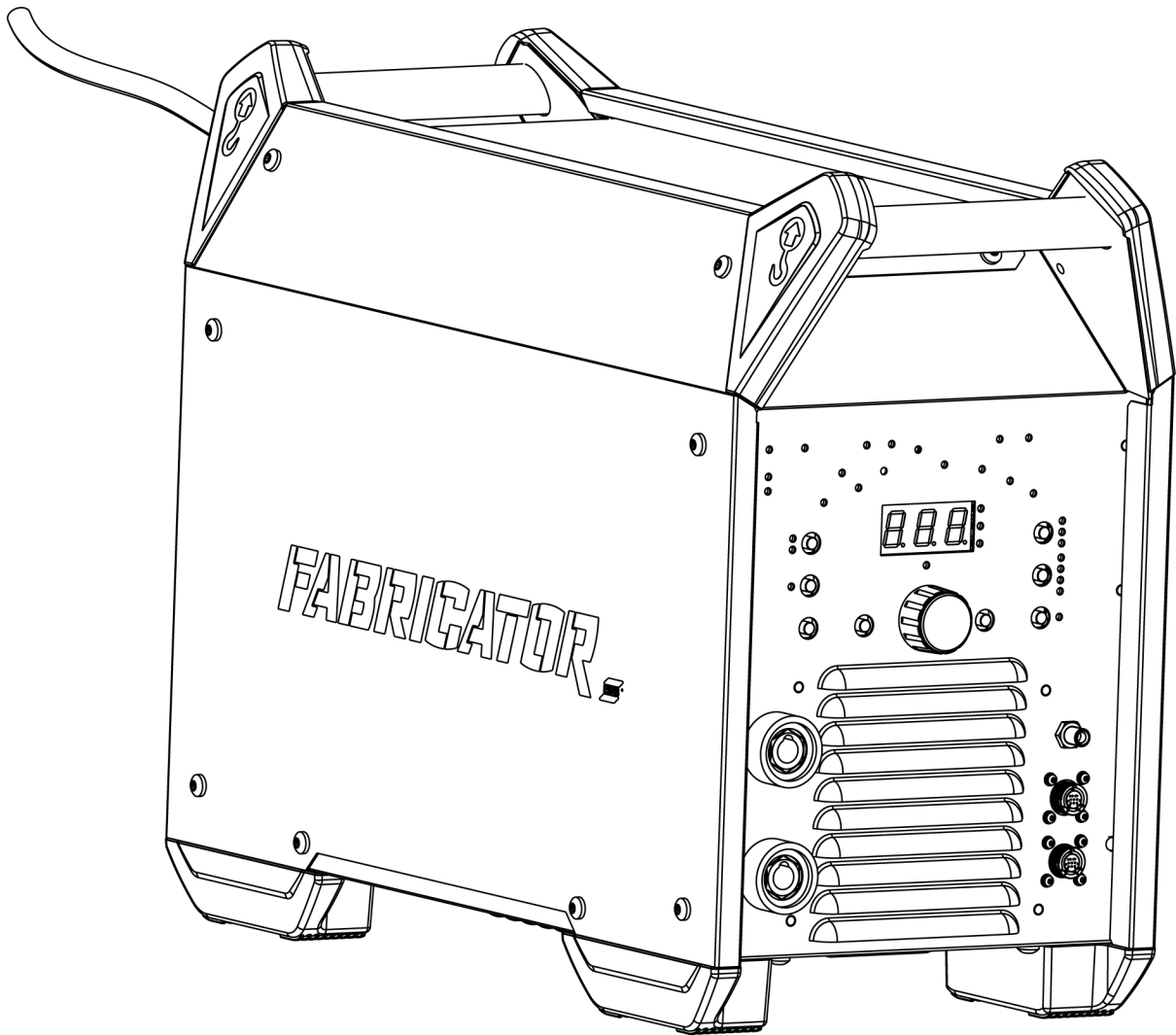
The Fabricator ET 410iP is designed and tested in accordance with the international **IEC 60974-1**.
On completion of service or repair work, it is the responsibility of the person(s) performing the work to ensure that the product still complies with the requirements of the above standards.

Spare parts and wear parts can be ordered through your nearest ESAB dealer, see [esab.com](https://www.esab.com). When ordering, please state product type, serial number, designation and spare part number in accordance with the spare parts list. This facilitates dispatch and ensures correct delivery.

ACCESSORIES

0700 300 910	Return cable with clamp 3 m 50 mm ² Welding cable with electrode holder 5 m 50 mm ²	
0700 025 526	TIG torch, SR-B 26-HD-4 m	
0700 025 527	TIG torch, SR-B 26-HD-8 m	
0700 025 538	TIG torch, SR-B 400-4 m-ED	
0700 025 539	TIG torch, SR-B 400-8 m-ED	
0700 500 084	MMA 4 Analogue Remote Control incl. 10 m cable and 8-pin connector	
0465 427 880	Cool 2	
0447 248 001	Cool 2 Adaptor (Connect Fabricator ET 410iP with Cool 2)	

ORDERING NUMBERS



Ordering number	Denomination	Type	Notes
0447 101 881	Welding power source	Fabricator ET 410iP	CE
0447 209 001	Instruction manual	Fabricator ET 410iP	
0447 219 001	Spare parts list	Fabricator ES 410iC & ET 410iP	
0447 220 001	Service manual	Fabricator ES 410iC & ET 410iP	

Technical documentation is available on the Internet at: www.esab.com



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