WELD THE WORLD

Voyager 75 Basic
Voyager 105 Basic

Instruction Manual

ENGLISH

Translation of original instructions

Cod.006.0001.2330
04/10/2023 V.1.0

CONTENTS

1 GENERAL OVERVIEW

IMPORTANT!
For your safety

This handbook must be handed over to the user prior to installation and commissioning of the unit.
Read the “GENERAL PRESCRIPTIONS FOR USE" handbook supplied separately from this manual before installing and commissioning the unit.
The meaning of the symbols in this manual and the associated precautionary information are given in the “GENERAL PRESCRIPTIONS FOR USE”.
If the “GENERAL PRESCRIPTIONS FOR USE" handbook is not available, it is mandatory to request a replacement copy from the manufacturer or from your dealer.
Retain these documents for future consultation.

Explanation of symbols

DANGER!
This pictogram warns of danger of death or serious injury.

WARNING!
This pictogram warns of a risk of injury or damage to property.

CAUTION!
This pictogram warns of a potentially hazardous situation.

WARNING!
This pictogram gives important information concerning the execution of the relevant operations.

Information
This pictogram identifies additional information or a reference to a different section of the manual containing the associated information.

- In the illustrations:
  -  press
  -  turn the encoder
  -  press the encoder

- **Note:** The figures in this manual are purely guidelines and the images may contain differences with respect to the actual units to which they refer.

1.1 Introduction

Voyager 75 Basic is an innovative and extremely high-performance plasma cutting generator. Cutting with a maximum definition of 25 mm and separation of 30 mm, maximum breakthrough of 16 mm.
The high duty cycle of 55 Ampere at 100% (40°C) makes this generator very robust and suitable for use in extreme conditions.

Voyager 105 Basic is an innovative and extremely high-performance plasma cutting generator.
Cutting with a maximum definition of 40 mm and separation of 50 mm, maximum breakthrough of 20 mm.
The high duty cycle of 90 Ampere at 100% (40°C) makes this generator very robust and suitable for use in extreme conditions.

Its main features are:
- MANUAL CUTTING and GOUGING processes.
- GRATING mode which facilitates the cutting of grid panels.
- The flexibility of the EASY FIT system of the supplied torch allows very easy management of the length of the torch cable and of the cutting or gouging geometry (maximum 12 metres).
- POWER LIMIT function that enables the available nominal power to be set so as to optimise consumption to protect the generator and fully exploit available power.

Contact your local dealer for an up-to-date list of available accessories and the latest news.

2 INSTALLATION AND ASSEMBLY

DANGER!

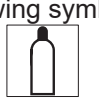
Lifting and positioning

Read the warnings highlighted by the following symbols in the “General prescriptions for use”.

DANGER!

Handling and positioning cylinders

Read the warnings highlighted by the following symbols in the “General prescriptions for use”.



DANGER!

Disconnect the unit from the power mains before performing any assembly operation.
Shutting down the power switch does not guarantee disconnection from the mains.

Preparing the gas supply

The following are the types of gas that can be used with this equipment:

- **Nitrogen :** 99.95% pure
- **Air:** Clean, dry, oil-free according to ISO 8573-1 Class 1.4.2

WARNING! Do not use any gases other than those listed; there is a risk of damage or explosion.

Air can be supplied by a compressor or by high-pressure cylinders. A high-pressure regulator able to deliver gas to the filter on the generator must be used on both types of supply. If the quality of the gas supply is not good, the cutting speed decreases, the cutting quality deteriorates, the cutting thickness diminishes and the service life of consumables is reduced.
For optimum performance, the gas must comply with ISO8573-1:2010 Class 1.4.2, i.e. it must have a maximum number of solid impurities per m^3 of:

- < 20,000 for impurities sized between 0.1 and 0.5 microns
- < 400 for impurities sized between 0.5 - 1 micron
- < 10 for impurities sized between 1 - 5 microns
- The highest dew point of water vapour must be <-3 °C
- The maximum oil content (aerosols, liquids and vapours) must be less than 0.1 mg/m^3

WARNING! DIRTY AND OILY AIR CAN DAMAGE THE AIR FILTER CUP
Lubricants containing synthetic esters that are used in some air compressors can damage the polycarbonates in the air filter cup. Add more gas filters if necessary.
The compressor must be able to provide a higher pressure and gas flow than that required by the torch used. The pressure and flow required by the torch according to the model is shown below.

Torch	Gas pressure	Gas flow
WEcut105	72-80 PSI (5.0-5.5 bar)	240 litres/minute at 105A
WEcut125	72-87 PSI (5.0-6.0 bar)	295 litres/minute at 125A

Connecting the gas supply

WARNING! Connect the gas supply to the generator using an inert gas hose with an internal diameter of 9.5 mm. The recommended supply pressure while the gas is flowing is between 5.9 and 9.3 bar.

WARNING! The machine must be supplied with compressed air with a maximum pressure of 9.3 bar (0.93 MPa); higher pressures can cause the pressure reducer to explode. If the air is supplied by a compressed air cylinder, it must be fitted with an additional pressure regulator.
Do not use hoses with an internal diameter smaller than 10 mm. Hoses that are too small can cause cutting quality and performance problems. Use a gas hose with the correct internal diameter:

- for gas supply hoses up to 15 m long, an internal diameter of at least 10 mm is recommended.
- for gas supply hoses from 15 m up to 30 m long, an internal diameter of at least 13 mm is recommended.

Connecting the earth clamp to the metal sheet

The earth clamp must be connected to the metal sheet while cutting. If a cutting table is used, the earth cable can be connected directly to the table instead of connecting the earth clamp to the metal sheet (see the table manufacturer's instructions).

- Make sure that the metal-to-metal contact between the earth clamp and the metal sheet is adequate.
- Remove rust, dirt, paint, coatings and other debris to ensure proper contact between the generator and the metal sheet.
- For the best cutting quality, connect the earth clamp as close as possible to the area to be cut.

WARNING! Do not connect the earth clamp to the part of the metal sheet that will fall at the end of the cut.

WARNING! Do not connect the earth clamp in the presence of water. If the generator is below the earth clamp, water can enter the generator by capillarity through the earth cable and cause serious damage.

Cutting cables

Cutting cables should be kept as short as possible and placed at or near floor level.

Noise levels

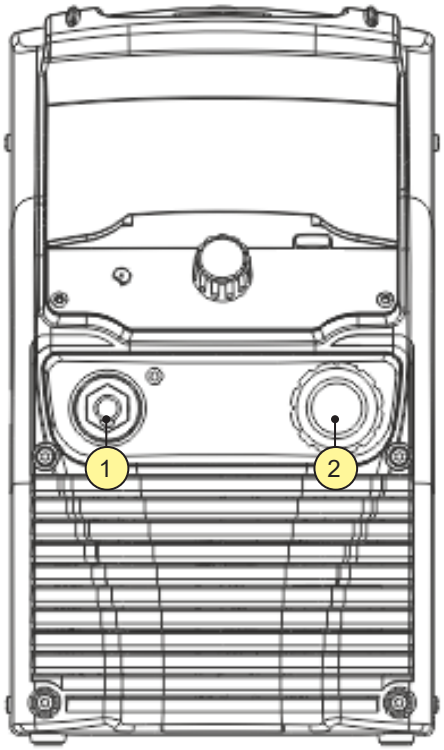
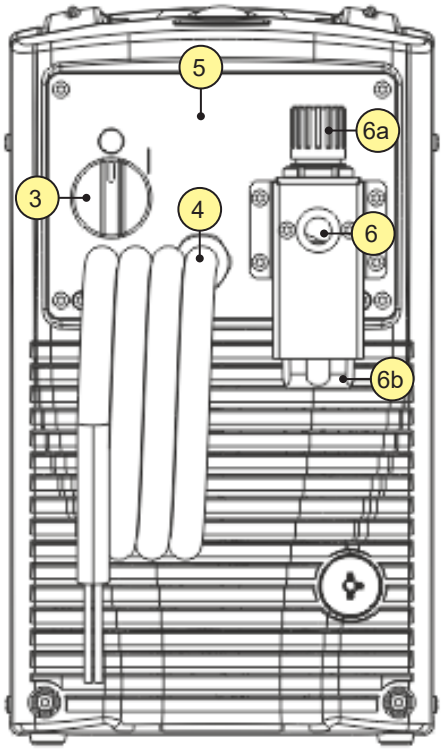
During operation, this plasma system can exceed the acceptable noise levels set by national and local regulations. Always wear appropriate hearing protection when cutting or gouging. All precautions taken against noise depend on the specific environment in which the system is used.

Earthing requirements

In order to ensure personal safety and smooth operation, and to reduce electromagnetic interference (EMI), the electrical connection of the generator must be earthed correctly.

- The generator must be electrically earthed with the power cable in accordance with national and local electrical regulations.
- The three-phase system must have 4 wires with a green or green/yellow cable for safety earthing and comply with national and local regulations.

2.1 CONNECTIONS AND SOCKETS

FRONT VIEW	REAR VIEW
	

- [1] EARTH clamp socket.
- [2] PLASMA TORCH socket.
- [3] Welding power source ON/OFF switch.
- [4] Power cable.
  - Length: 4.4 m
  - Number and cross-section of conductors: 4 x 4 mm^2
  - Power plug type: not supplied
- [5] Back panel;
- [6] Pressure reducer. The pressure reducer is supplied without a quick coupling; the end user must provide an air connection in accordance with system requirements.

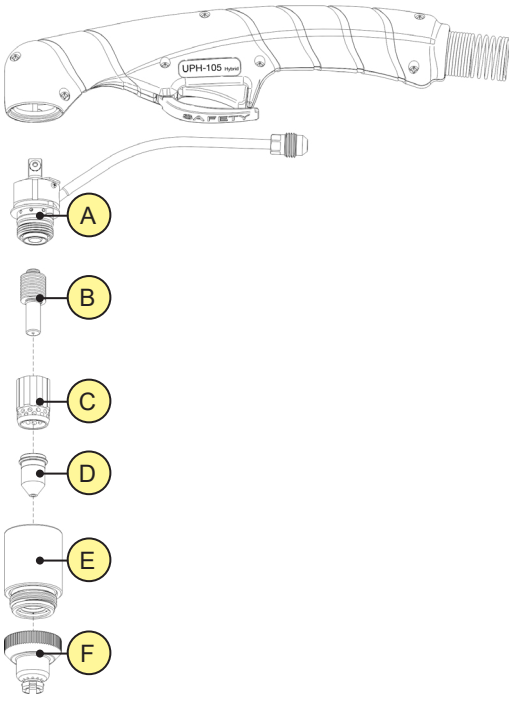
CAUTION! Maintenance or repair of this part must only be carried out by trained and qualified technical staff. Tampering with or incorrect assembly of this part can cause personal injury or damage to property.

- [6a] Pressure reducer knob: used to adjust the compressed air pressure.
- [6b] Pressure reducer cup. It contains the air filter.

Information The condensate drain valve under the cup automatically drains the built-up condensate. However, drainage of said condensate can be stopped by pulling the knob downwards and turning it clockwise (until it clicks); in this position the condensate will build up inside the cup. Should condensate build up in the cup, check the valve to see if it is locked.

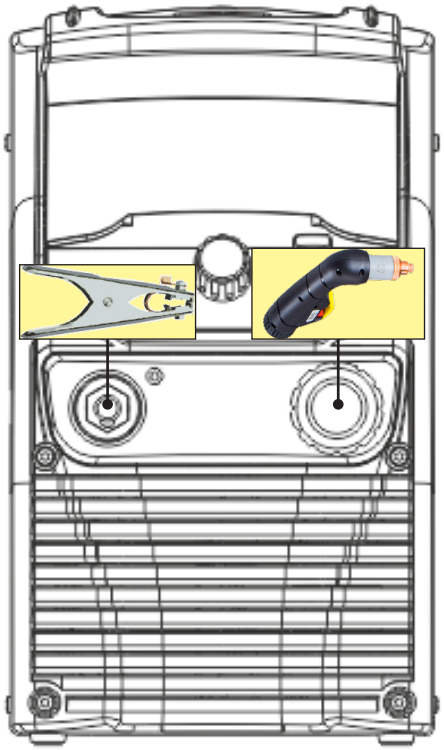
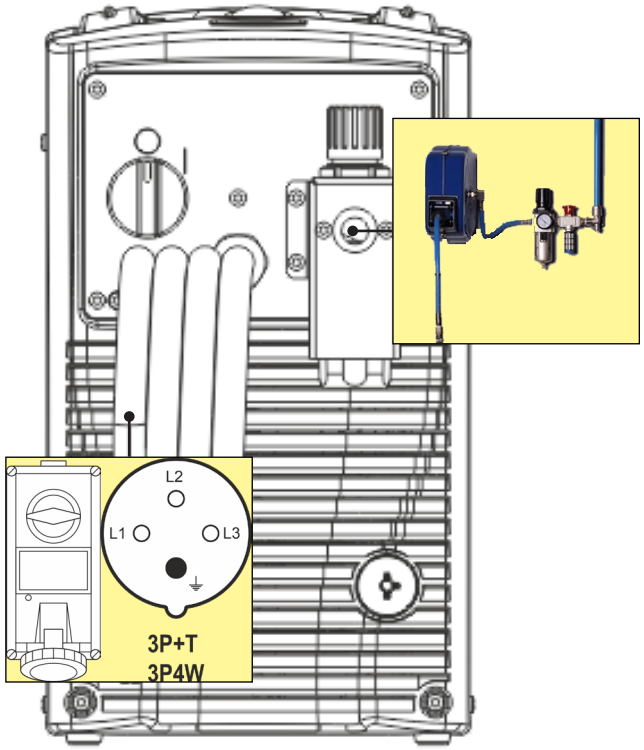
- [7] Plasma torch extension cable.
- [8] Plasma torch for manual cutting.

2.2 PLASMA TORCH



(A) diffusor ring
(B) electrode
(C) diffusor
(D) nozzle
(E) shield cup
(F) shield

2.3 PREPARATION FOR MANUAL CUTTING

FRONT VIEW	REAR VIEW
	

1. Set the welding power source ON/OFF switch to “O” (unit switched off).
2. Connect the air hose from the cylinder or compressed air system to the pressure reducer connector.

WARNING! Connect the gas supply to the generator using an inert gas hose with an internal diameter of 9.5 mm. The recommended supply pressure while the gas is flowing is between 5.9 and 9.3 bar.

WARNING! The machine must be supplied with compressed air with a maximum pressure of 9.3 bar (0.93 MPa); higher pressures can cause the pressure reducer to explode. If the air is supplied by a compressed air cylinder, it must be fitted with an additional pressure regulator.

3. Connect the PLASMA torch plug to the PLASMA TORCH socket.
   The generator has a quick-release system for connecting and disconnecting machine or manual cutting torches.
   When connecting or disconnecting a torch, set the welding power source ON/OFF switch to “O” (unit switched off).
4. Connect the earth clamp plug to the EARTH socket.
5. Connect the earth clamp to the workpiece being processed.
6. Connect the power source mains supply cable to the mains socket outlet.

DANGER!

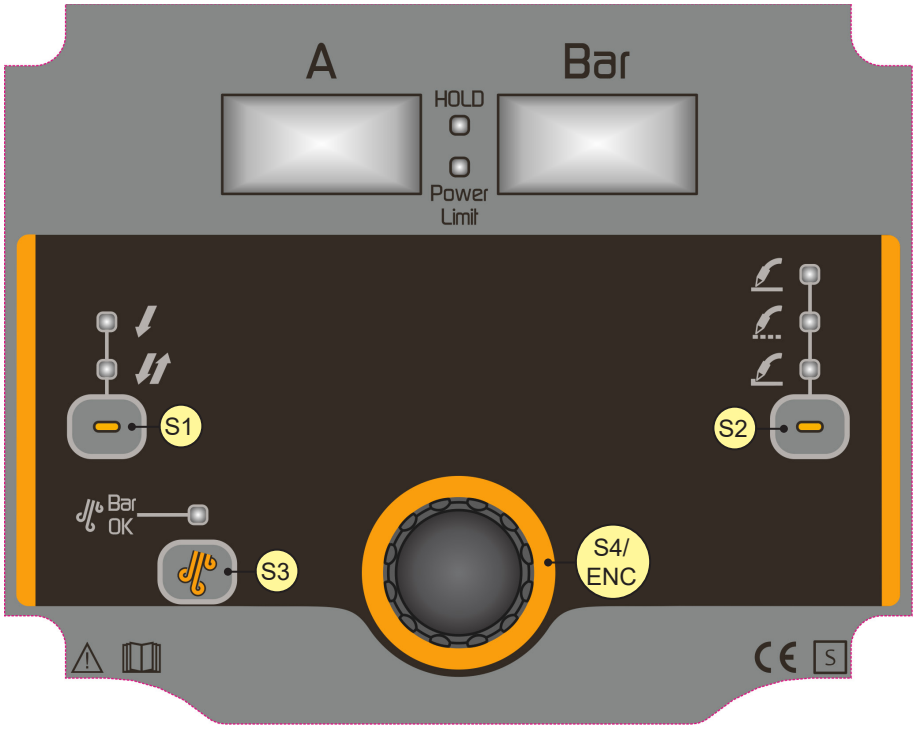
Electric shock hazard!

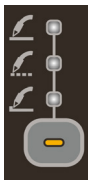
Read the warnings highlighted by the following symbols in the “General prescriptions for use”.

7. Set the welding power source ON/OFF switch to “I” (unit switched on).
8. Set the required cutting parameter values on the user interface.

3 USER INTERFACE

Voyager 75 Basic / Voyager 105 Basic

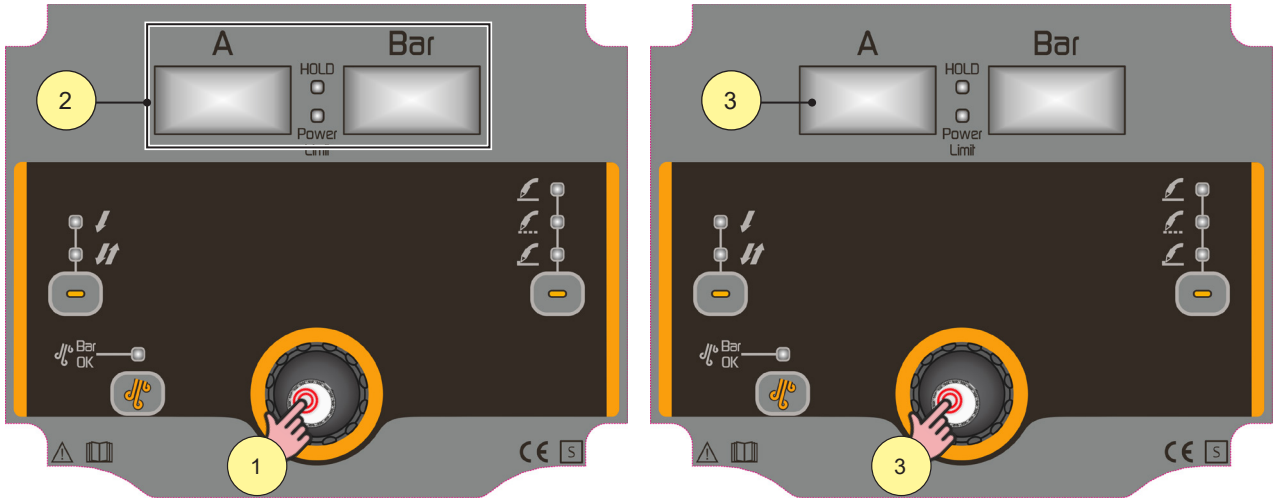


ELEMENT	FUNCTION
S1 	The button selects the torch button mode.
S2 	The button selects the linear, grating or gouging process.
S3 	The key enables the air solenoid valve so that the flow pressure can be adjusted with the regulator on the back of the generator.
S4/ENC 	**ENCODER WITH BUILT-IN KEY** Turning the knob sets the cutting or gouging current. **Setup Menu**: Press for 3 seconds to enter the Setup menu. By using the encoder, the parameters/settings list can be scrolled. By pressing the encoder [ENCODER KEY] the highlighted settings can be selected. **During cutting**: the encoder changes the value of the active parameter**.**
	**Display Current** (Unit of measurement: Ampère.) The display shows the current set via the encoder. **HOLD function** (**at the end of welding**): The display shows the current actually delivered during cutting or gouging.

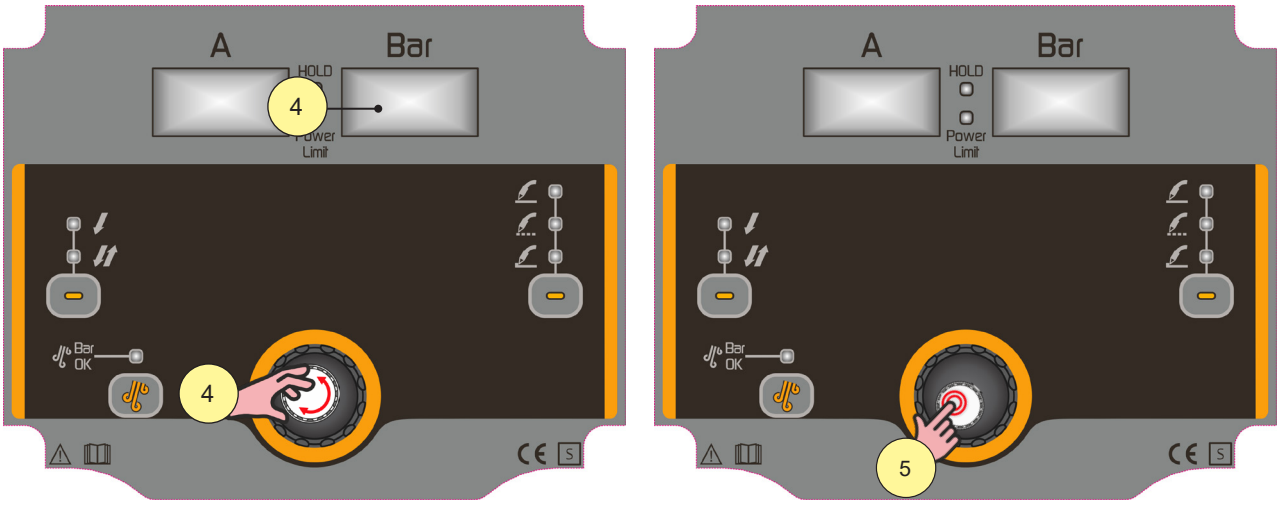
ELEMENT	FUNCTION
	**Pressure display** (Units: 5.3 Bar) The display shows the compressed air pressure inside the machine.
	The lit LED indicates the display of the last current value measured during the cut. The value is displayed in the [CURRENT DISPLAY].
	The lit LED indicates that the compressed air pressure value inside the generator complies with the required values for the selected process.
	The lit LED indicates that the [POWER LIMIT] function is enabled.
	The lit LED indicates that the [LINEAR CUT] procedure is activated.
	The lit LED indicates that the [GRILLED] procedure is activated for sheets with grids or frequent material breaks.
	The lit LED indicates that the [GOUGING] procedure is activated.
	The ignition signals the activation of the 2-stroke mode for the torch button
	Ignition signals the activation of the 4-stroke mode for the torch button.

4 PRELIMINARY SETTINGS

4.1 Generator reset



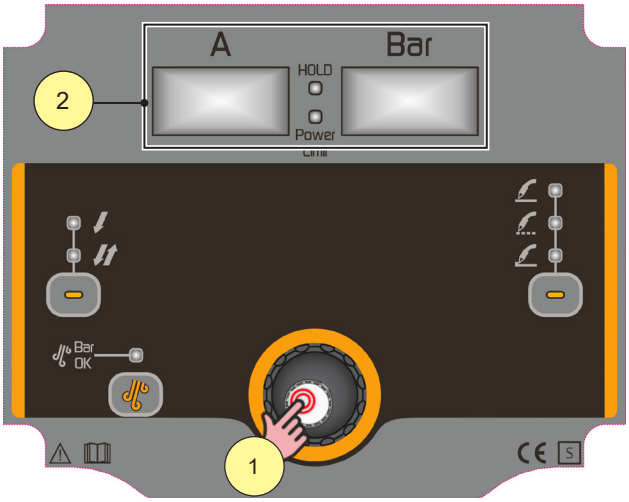
1. Press the [MENU] button for 3 seconds.
2. The setup menu is displayed.
3. Press the [MENU] button to scroll through the parameters.
   Display ‘reS’.

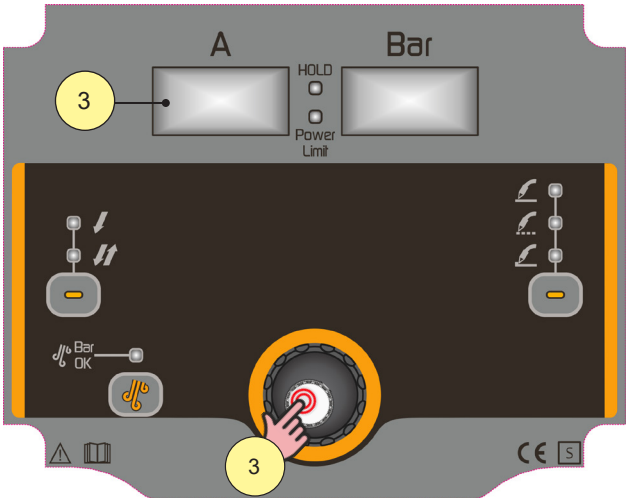


4. Select the desired setting by turning the encoder.
   Select ‘YES’.
5. Press the encoder button for 3 seconds to confirm.

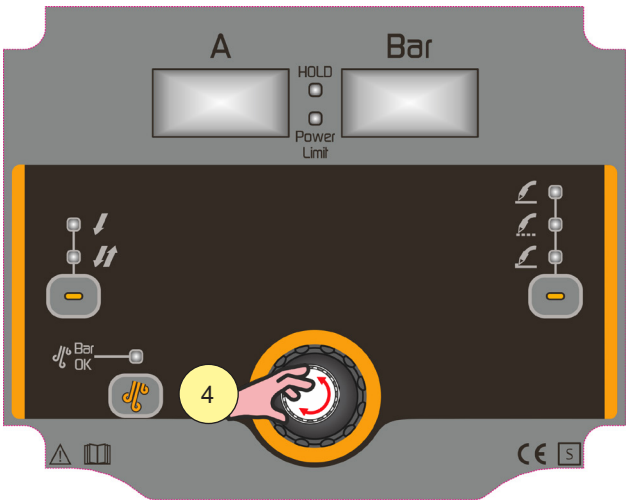
4.2 Setting the Power Limit

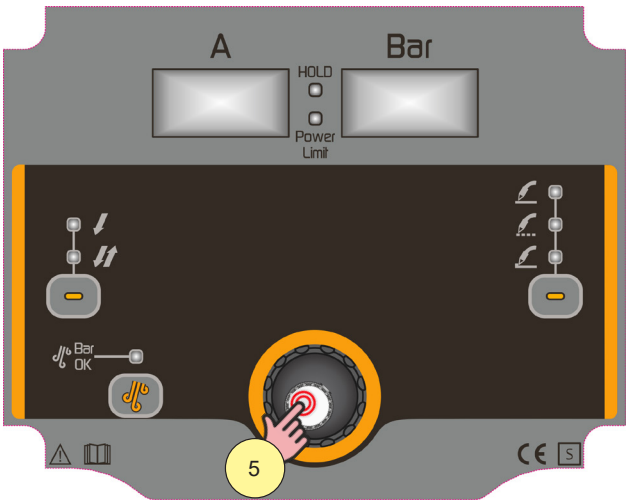
The generator power limit is used to protect the mains supply against overloads due to the power absorbed; this implies a reduction in the power absorbed by the supply line from the generator and a consequent reduction in the maximum current delivered during cutting or gouging. Be aware that a reduced power limit compromises peak cutting performance. Leave this limit at its highest to exploit peak performance.





1. Press the [MENU] button for 3 seconds.
2. Setup menu display.
3. Press the [MENU] button to scroll through the parameters.
   Display ‘Po.l.’.

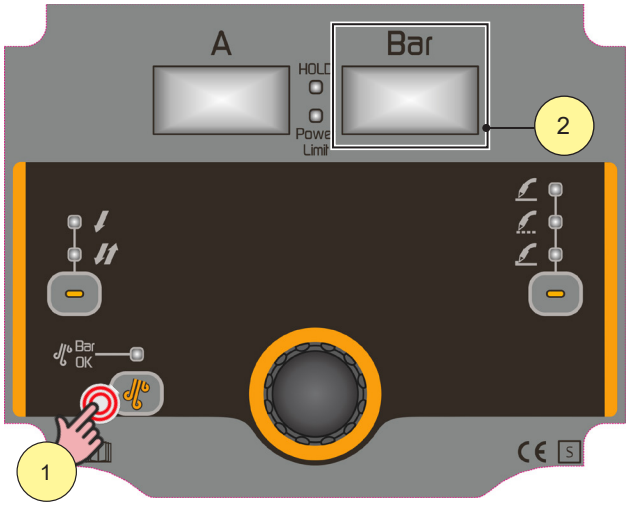




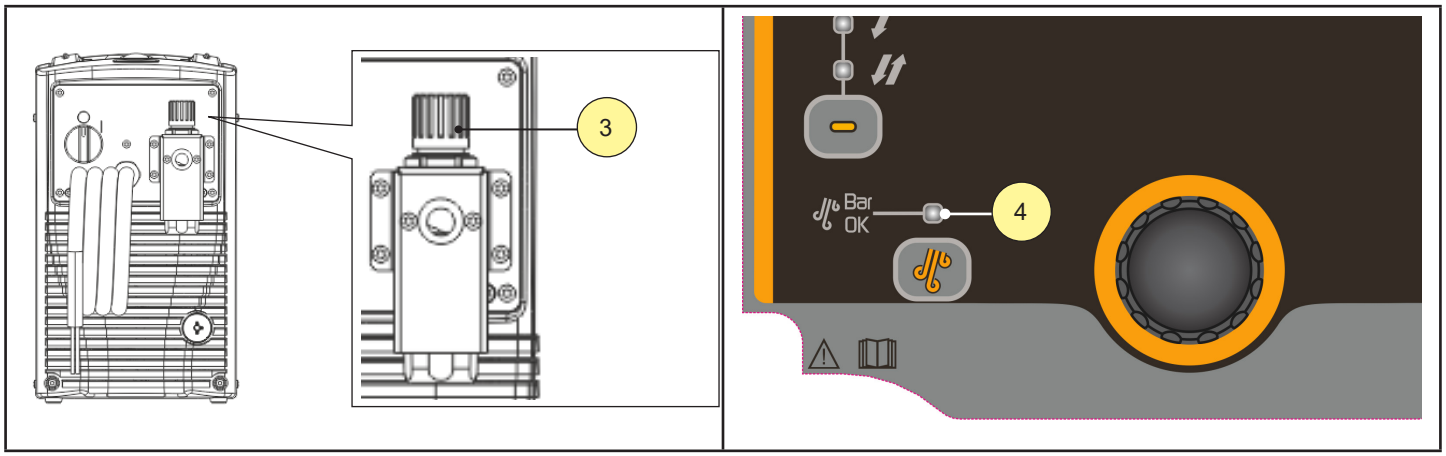
4. Turn the encoder to set the desired value.
   The ‘Power Limit’ LED remains lit when a value other than the maximum value is set.
5. Press the encoder button for 3 seconds to confirm.

5 CUTTING AND GOUGING PROGRAMME

5.1 GAS FLOW REGULATION

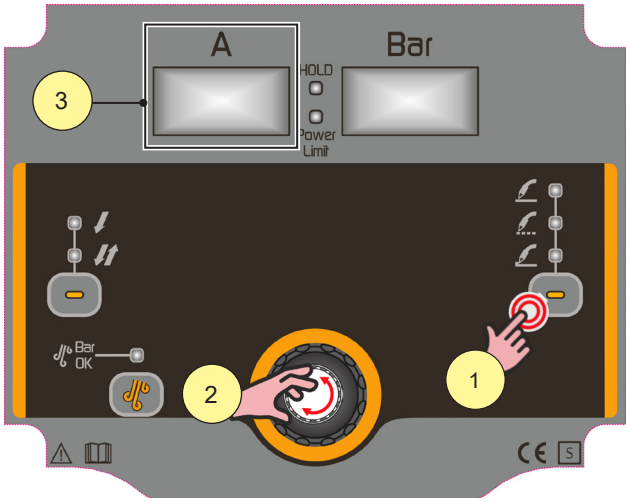


1. Open the gas solenoid valve by pressing and releasing the [BLOW] key.
   Pressing the button again interrupts the air flow.
   The air flow automatically stops after 10 seconds.
2. Display the compressed air pressure inside the generator.



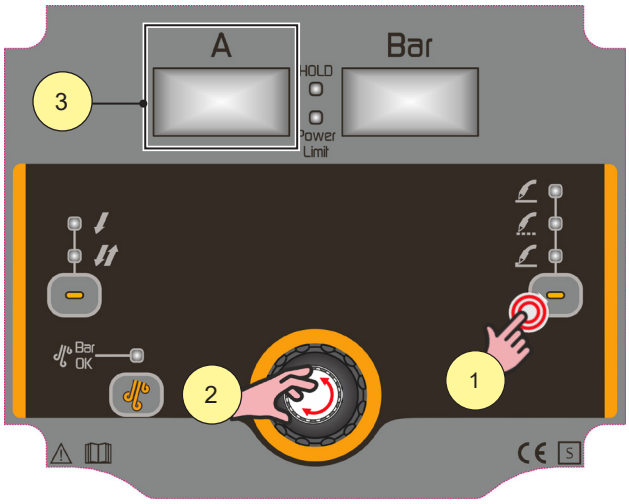
3. Adjust the compressed air pressure by gently pulling up the regulator knob at the back of the generator and turning it until the desired pressure value appears in the display.
4. The ‘Bar OK’ LED should light up.
   Push down the pressure regulator knob to lock it.

5.2 LINEAR CUT SETTING



1. Press the [PROCEDURE] button to select the desired procedure.
   Select  [LINEAR CUT].
2. Turn the encoder to set the desired value.
3. Display of set cutting current.

5.3 SETTING GRID CUT (GRID SHEETS)



1. Press the [PROCEDURE] button to select the desired procedure.
   Select  [GRID CUT].
2. Turn the encoder to set the desired value.
3. Display of set cutting current.

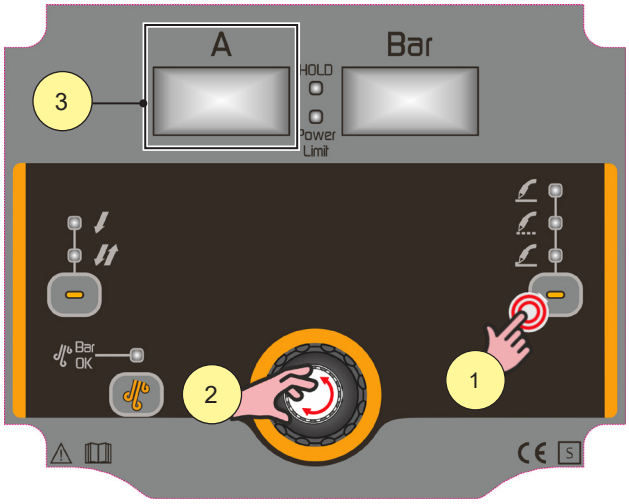
Information When activating the procedure  [GRID] the 4-STROKES mode is automatically disabled as it cannot be activated in this procedure for safety reasons.

5.4 SETTING THE GOUGING PROCESS

Plasma gouging is a process of melting and then removing material using a plasma beam; it is the same cutting machine that performs this function, but in this case, it uses a different torch setup to avoid cutting the material. The torch nozzles and gas diffusors are usually different. They are kept much further away from the workpiece to facilitate the removal of metal to be eliminated. In order to perform this type of processing, thereby ejecting the material easily, the torch must be held at an angle. Furthermore, the gas pressure is usually lower than that used for cutting to prevent the incandescent material from flying too far.

WARNING! Gouging is a process that generates different sparks; it is essential for the operator to be equipped with hand, arm and face protection or stand at a safe distance.

DANGER! Make sure that the flying molten material does not reach flammable or explosive substances. Use protective shields.

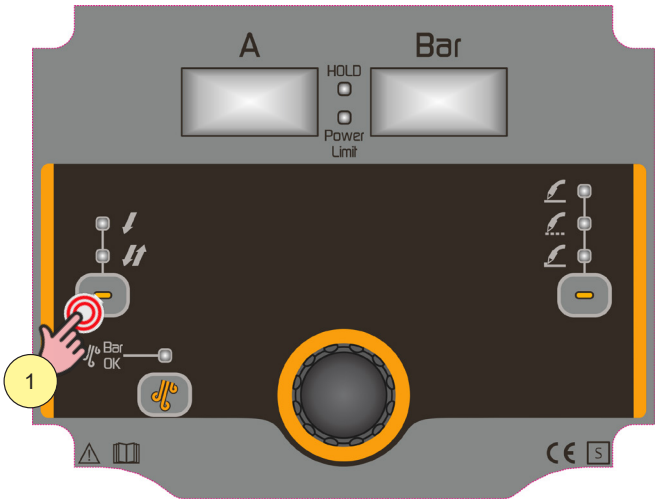


1. Press the [PROCEDURE] button to select the desired procedure.
   Select  [GOUGING].
2. Turn the encoder to set the desired value.
3. Display of set gouging current.

WARNING! Check the correct pressure value for this process (see chapter 5.1).

6 SETTING UP THE TORCH TRIGGER MODE

6.1 2-STROKE OR 4-STROKE MODE



1. Press the [MODE] key.

   Select torch button mode:  [2 STROKE] -  [4 STROKE]

Information When activating the procedure  [GRID] the 4-STROKES mode is automatically disabled as it cannot be activated in this procedure for safety reasons.

7 ALARM MANAGEMENT

E01: CALIBRATION ERROR

- ► The saved calibration parameters have been lost.
- ► Soluzione: qualified technical staff must be called out to carry out the repairs/maintenance operations.

E05: ALARM TORCH BUTTON PRESSED

- ► This indicates that when the generator was switched on, the torch trigger was pressed.
- ► Solution:
  When the problem is solved, the power source will be automatically reset.
  - Make sure the torch trigger is not pressed, jammed, or short circuiting.
  - Make sure the torch and torch connector are intact.

E28: POWER SUPPLY OVERVOLTAGE ALARM

- ► High voltage.
- ► Solution:
  - Make sure the mains power does not exceed the maximum permitted values.

E29: PHASE FAILURE ALARM

- ► A phase is missing.
- ► Solution:
  - Make sure that all three phases reach the equipment from the power mains.
  - Make sure that the line fuses on the power supply panel are intact.
  - If the problem persists qualified technical staff must be called to carry out the repairs/maintenance operations.

E31: POWER BOARD CIRCUIT BREAKER ALARM

- ► Indicates that the welding power generator thermal cut-out switch has tripped.
- ► Solution:
  - Leave the unit running so that the overheated components cool as rapidly as possible. When the problem is solved, the generator will be automatically reset.
  - Make sure that the fans are working correctly.
  - Make sure that the power required by the cutting process is lower than the maximum rated power output.
  - Check that the operating conditions are in compliance with the welding power source data plate specifications.
  - Check for the presence of adequate air circulation around the welding power source.

E38: FAN ALARM

- ► This indicates a possible fault in ventilation or heat dissipation.
- ► Solution:
  - Make sure that both fans are working correctly.
  - If the problem persists qualified technical staff must be called to carry out the repairs/maintenance operations.

E40: CAN BUS COMMUNICATION ALARM

- ► This indicates a communication error between the front panel and the inverter.
- ► Solution:
  - qualified technical staff must be called to carry out the repairs/maintenance operations.

E48: GENERIC COMMUNICATION ALARM

► This indicates an internal communication error.
► Solution:
- qualified technical staff must be called to carry out the repairs/maintenance operations.

E49: DATA LOSS ALARM

► This indicates a loss of data saved in the memory.
► Solution:
- qualified technical staff must be called to carry out the repairs/maintenance operations.

E70: GAS SHORTAGE ALARM

► Indicates that no gas pressure is detected in the gas supply circuit.
► Solution:
- Check that the gas in the system is connected to the device.
- If the problem persists qualified technical staff must be called to carry out the repairs/maintenance operations.

E78: SHIELD CUP ALARM

► Indicates that the torch shield cup is open (which normally occurs when the consumables are being replaced/checked).
► Solution:
- Reassemble the torch and check that the shield cup is fitted correctly.

E89: PILOT ARC ALARM

► This indicates a problem with the pilot arc that could cause abnormal wear of spare parts.
► Solution:
- qualified technical staff must be called to carry out the repairs/maintenance operations.

E90: CONSUMABLE ERROR

► Indicates the detection of a possible wear parts problem.
► Solution:
- Check worn parts and replace if necessary.

8 USING THE TORCH FOR MANUAL CUTTING

Manual cutting torches have a safety trigger to stop them from being ignited accidentally. When you are ready to use the torch, rotate the trigger's safety guard forward (towards the torch head) and press the torch trigger.

⚠ **WARNING!** INSTANT IGNITION TORCHES - A PLASMA ARC CAN CAUSE INJURIES AND BURNS. The plasma arc ignites immediately when the torch trigger is pressed. The plasma arc passes quickly through gloves and skin.

- Wear appropriate devices to protect your head, eyes, ears, hands and body.
- Keep away from the torch tip.
- Do not hold the metal sheet and keep hands away from the cutting path.
- Never point the torch at yourself or other people.

Tips for using the torch for manual cutting

- Drag the torch tip lightly along the metal sheet to ensure a fixed cut.
- When cutting, make sure that sparks escape from the underside of the metal sheet. The sparks must be slightly tilted behind the torch while cutting (15°–30° angle from the vertical position).
- If sparks escape from the top of the metal sheet, move the torch more slowly and set the output current to a higher value.
- With torches for manual cutting, hold the torch nozzle perpendicular to the metal sheet so that the nozzle forms a 90° angle with the cutting surface.
- If the torch is ignited unnecessarily, the service life of the nozzle and electrode will shorten.
- It is easier to pull or drag the torch along the cut than to push it.

Starting a cut from the edge of the metal sheet

1. With the earth clamp attached to the metal sheet, hold the torch nozzle perpendicular (90°) to the edge of the metal sheet.
2. Press the torch trigger to strike the arc. Hold the arc on the edge until it has completely cut the metal sheet.
3. Drag the torch tip lightly along the metal sheet to cut it.

Breaking through a metal sheet

⚠ **WARNING!** SPARKS AND HOT METAL CAN CAUSE INJURY TO EYES AND SKIN. When the torch is ignited at an angle, sparks and hot metal fly from the nozzle. Do not point the torch at yourself or people nearby.

1. With the earth clamp attached to the metal sheet, hold the torch at about 30° to the metal sheet with the torch tip within 1.5 mm from it before igniting the torch.
2. Ignite the torch while forming an angle with the metal sheet. Slowly turn the torch to a perpendicular position (90°).
3. Hold the torch in this position while simultaneously pressing the trigger. When sparks escape under the metal sheet, the arc has broken through the material.
4. When it has broken through, drag the nozzle lightly along the metal sheet to continue cutting.

Gouging a metal sheet

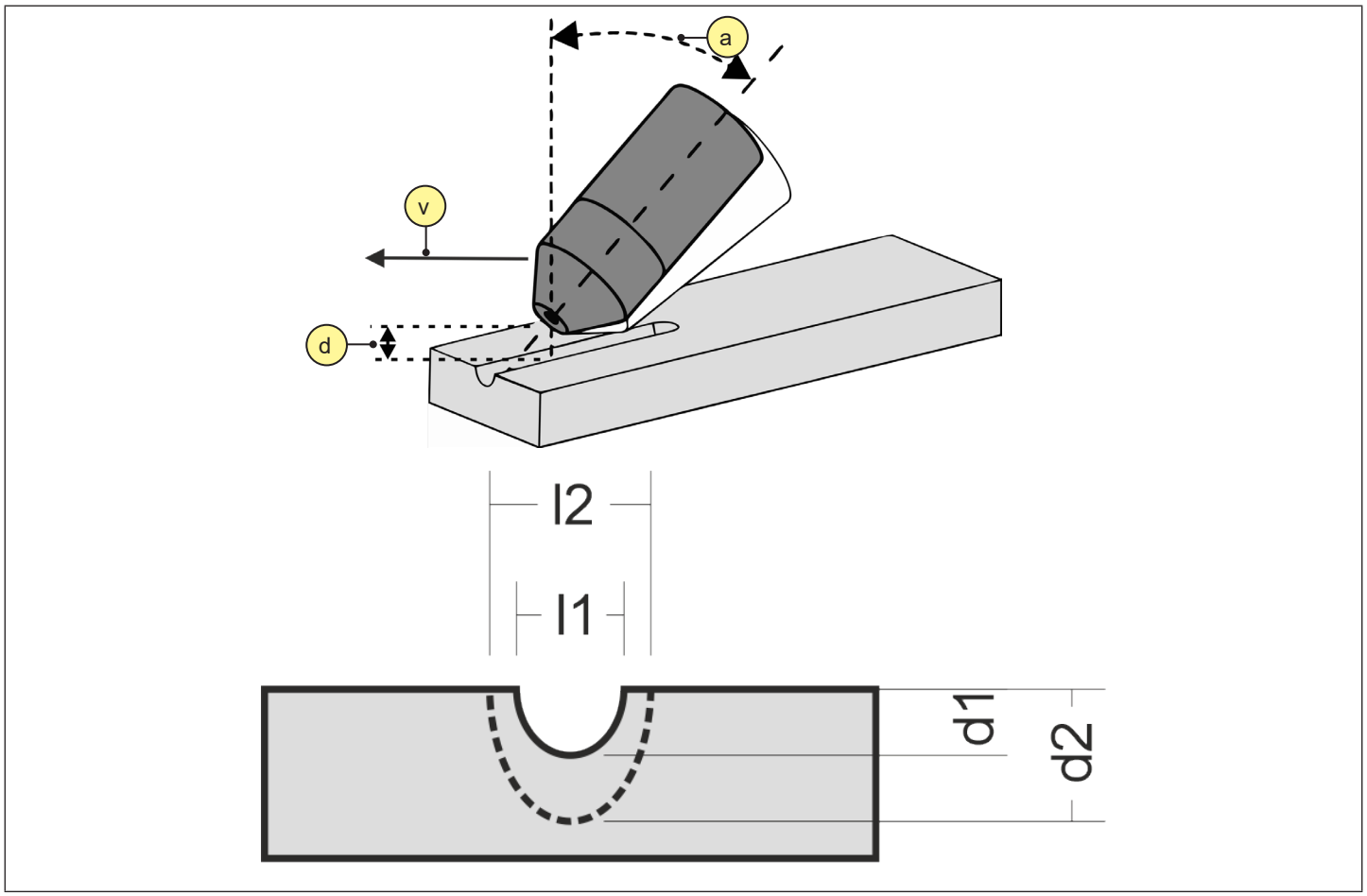
⚠ **WARNING!** SPARKS AND HOT METAL CAN CAUSE INJURY TO EYES AND SKIN. When the torch is ignited at an angle, sparks and hot metal fly from the nozzle. Do not point the torch at yourself or people nearby.

1. Hold the torch so that the torch tip is within 1.5 mm from the metal sheet before igniting the torch.
2. Hold the torch at an angle of 40° on the nozzle at about 6-12 mm from the workpiece. Press the trigger for the pilot arc. Transfer the arc to the workpiece.
3. Pull the torch back and extend the arc to 32 mm. Push the plasma arc in the direction of the gouge you wish to create. Increase the distance to create a deeper and wider gouge. Keep enough distance between the torch tip and the molten metal to avoid shortening the service life of the consumables or damaging the torch. If the torch angle is changed, the size of the gouge also changes.

The gouging profile can be changed by varying the speed (v) of the torch on the metal sheet, by varying the distance (d) between the torch and the metal sheet, by varying the angle (a) between the torch and the metal sheet, and by varying the generator output current.

- Increasing the torch speed reduces the width and depth.
- Reducing the torch speed increases the width and depth.
- Increasing the distance between the torch and the metal sheet increases the width and reduces the depth.
- Reducing the distance between the torch and the metal sheet reduces the width and increases the depth.
- Increasing the angle of the torch (more vertical) reduces the width and increases the depth.
- Reducing the angle of the torch (less vertical) increases the width and reduces the depth.
- Increasing the generator current increases the width and depth.
- Reducing the generator current reduces the width and depth.

Gouging operating parameters and profile



Common manual cutting errors

► The torch does not completely cut the metal sheet.
Possible causes:
- The cutting speed is too high.
- The consumables are worn.
- The metal to be cut is too thick for the voltage selected.
- The wrong consumables are used (e.g. gouging consumables are installed instead of drag cutting consumables).
- The earth clamp is not connected properly to the metal sheet.
- The gas pressure or flow rate is too low.

► The cutting quality is poor.
Possible causes:
- The metal to be cut is too thick for the voltage.
- The wrong consumables are used (e.g. gouging consumables are installed instead of drag cutting consumables).
- The torch is moved too quickly or too slowly.

► The arc bursts and the service life of the consumables is shorter than expected.
Possible causes:
- Moisture in the gas supply.
- Incorrect gas pressure.
- Incorrectly installed consumables.

9 CUT QUALITY

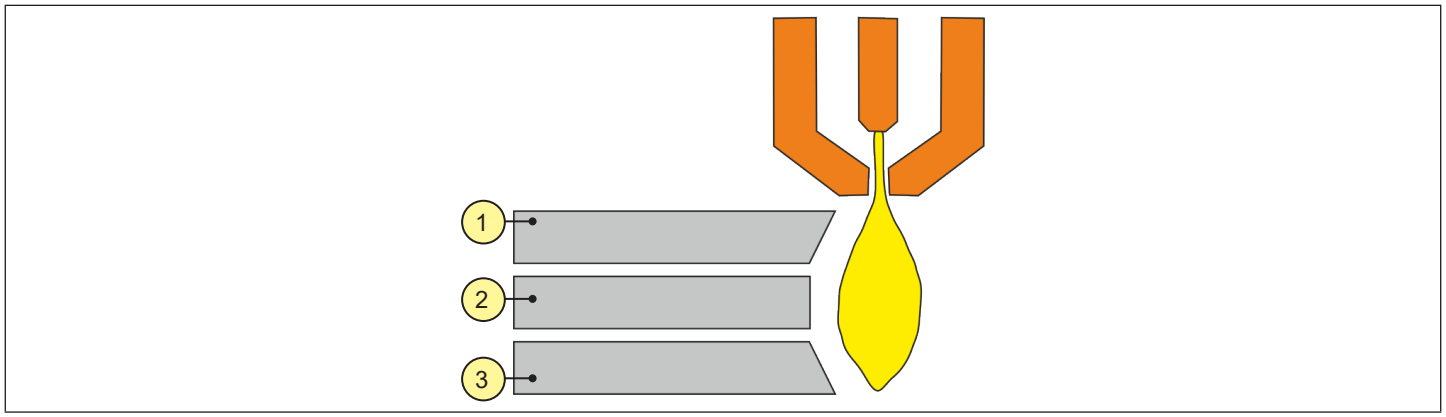
Several factors must be taken into account for quality of the cut:
- Cutting angle: the angle level of the cutting edge.
- Burr: the molten material that solidifies on the top or bottom of the metal sheet.
- Straightness of the cutting surface: the cutting surface can be concave or convex.

Cutting or tilting angle

► A positive cutting angle (1), or tilting angle, is achieved when more material is removed from the top of the cut than from the bottom.
- Cause: The torch is too low.
- Solution: Raise the torch or, if using torch height control, increase the arc voltage.

► A negative cutting angle (3) is achieved when more material is removed from the bottom of the cut.
- Cause: The torch is too high.
- Solution: Lower the torch or, if using torch height control, reduce the arc voltage.

► The cutting angle closest to the right angle (2) will be on the right side when the torch is moved forward. The left side will always have a certain tilting level.



To find out whether a cutting angle problem is caused by the plasma system or by the drive system, perform a test cut and measure the angle of each side. Then rotate the torch 90° in the respective torch holder and repeat the process. If the angles are the same in both tests, the problem is in the drive system. If the cutting angle problem persists even after rectifying the “mechanical causes”, check the distance of the torch from the metal sheet, especially if the cutting angles are all positive or all negative. Also consider the material to be cut: if it is magnetised or hardened, cutting angle problems are more likely to occur.

Burr

When air plasma cutting, some burr will always form. However, the amount and type of burr can be minimised by correctly adjusting the system to the application.
- Excess burrs appear on the top edge of both pieces of metal sheet when the torch is too low (or the voltage is too low, if torch height control is used). Adjust the torch or voltage in small increments (5 V or less) until the burr is reduced.
- Low-speed burr is formed when the torch cutting speed is too low and the arc curves forward. It forms a heavy deposit with bubbles at the bottom of the cut and can easily be removed. Increase the speed to reduce this type of burr.
- High-speed burr is formed when the cutting speed is too high and the arc curves backward. It forms a thin, linear bubble of solid metal attached very close to the cut. It is more firmly stuck to the bottom of the cut than the low-speed burr and is difficult to remove.
  To reduce high-speed burr:
- Reduce the cutting speed.
- Reduce the distance between the torch and the metal sheet.

Breaking through a metal sheet using a machine torch

Like with the torch for manual cutting, a cut can be started on the edge of the metal sheet or by breaking through the metal sheet with the machine torch. Breaking through can lead to a shorter service life of consumables compared to starting from the edge. The cutting charts contain a column for the recommended cutting height when starting a breakthrough; the breakthrough height is usually 2.5 times the cutting height. For technical information, see the cutting charts.
The breakthrough delay must be long enough to allow the arc to break through the material before the torch moves. As consumables wear out, it may be necessary to increase this delay. The breakthrough delay times given in the cutting charts are based on average delays recorded over the entire service life of the consumables.
When breaking through materials close to the maximum thickness for a specific process, the following important factors should be considered:

- To avoid damage to the guard caused by the build-up of molten material created by the breakthrough, do not let the torch drop to the cutting height until the molten metal residues have been removed.
- The chemical properties of different materials can have an adverse effect on the breakthrough capacity of the system. In particular, high-strength steel with a high manganese or silicon content can reduce the maximum breakthrough capacity.

► The metal sheet has not been penetrated completely and there is too much sparking on top of the metal sheet.
Possible causes:

- The metal surface contains rust or paint.
- The consumables are worn and must be replaced. For optimised performance in a mechanised application, replace both the nozzle and the electrode.
- The work cable is not providing good contact with the cutting table or the cutting table is not providing good contact with the metal sheet.
- The voltage is too low.
- The cutting speed is too high.
- The metal being cut exceeds the maximum cutting thickness for the voltage selected.

► Burr formation at the base of the cut.
Possible causes:

- The gas settings are incorrect.
- The consumables are worn and must be replaced. For optimised performance in a mechanised application, replace both the nozzle and the electrode.
- The cutting speed is incorrect.
- The voltage is too low.

► The cutting angle is not perpendicular.
Possible causes:

- The torch is not perpendicular to the metal sheet.
- The gas settings are incorrect.
- The consumables are worn and must be replaced. For optimised performance in a mechanised application, replace both the nozzle and the electrode.
- The torch is moving in the wrong direction. The high-quality cut is always on the right side when the torch is moved forward.
- The distance between the torch and the metal sheet is incorrect.
- The cutting speed is incorrect.

► The service life of consumables is shortened.
Possible causes:

- The gas settings are incorrect.
- The arc current, arc voltage, cutting speed and other variables are not set up as recommended.
- Unnecessarily striking the pilot arc in the air.
- Starting a breakthrough with an incorrect torch height.
- The breakthrough time is incorrect.
- Air quality is poor (oil or water in the air).
- The pilot arc could be defective and could shorten the life of the nozzle.

CARBON STEEL						
KIT OF CONSUMABLES					45A	
COMPRESSED AIR PRESSURE					5.3 Bar	
MATERIAL THICKNESS	CUTTING HEIGHT	INITIAL HEIGHT		BREAKTHROUGH DELAY	RECOMMEND-ED CUTTING SPEED	SEPARATION SPEED
mm	mm	mm	%	seconds	mm/min	mm/min
0.5	1.5	3.8	250	0	9000	12500
1	1.5	3.8	250	0	9000	10800
1.5	1.5	3.8	250	0.1	9000	10200
2	1.5	3.8	250	0.3	6600	7800
3	1.5	3.8	250	0.4	3850	4900
4	1.5	3.8	250	0.4	2200	3560
6	1.5	3.8	250	0.5	1350	2050

STAINLESS STEEL						
KIT OF CONSUMABLES					45A	
COMPRESSED AIR PRESSURE					5.3 Bar	
MATERIAL THICKNESS	CUTTING HEIGHT	INITIAL HEIGHT		BREAKTHROUGH DELAY	RECOMMEND-ED CUTTING SPEED	SEPARATION SPEED
mm	mm	mm	%	seconds	mm/min	mm/min
0.5	1.5	3.8	250	0	9000	12500
1	1.5	3.8	250	0	9000	10800
1.5	1.5	3.8	250	0.1	9000	10200
2	1.5	3.8	250	0.3	6000	8660
3	1.5	3.8	250	0.4	3100	4400
4	1.5	3.8	250	0.4	2000	2600
6	1.5	3.8	250	0.5	900	1020

ALUMINIUM						
KIT OF CONSUMABLES					45A	
COMPRESSED AIR PRESSURE					5.3 Bar	
MATERIAL THICKNESS	CUTTING HEIGHT	INITIAL HEIGHT		BREAKTHROUGH DELAY	RECOMMEND-ED CUTTING SPEED	SEPARATION SPEED
mm	mm	mm	%	seconds	mm/min	mm/min
1	1.5	3.8	250	0	8250	11000
2	1.5	3.8	250	0.1	6600	9200
3	1.5	3.8	250	0.2	3100	6250
4	1.5	3.8	250	0.4	2200	4850
6	1.5	3.8	250	0.5	1500	2800

CARBON STEEL						
KIT OF CONSUMABLES					70A	
COMPRESSED AIR PRESSURE					5.3 Bar	
MATERIAL THICKNESS	CUTTING HEIGHT	INITIAL HEIGHT		BREAKTHROUGH DELAY	RECOMMEND-ED CUTTING SPEED	SEPARATION SPEED
mm	mm	mm	%	seconds	mm/min	mm/min
2	1.5	3.8	250	0.1	5900	10450
3	1.5	3.8	250	0.2	5550	8800
4	1.5	3.8	250	0.5	5375	6800
6	1.5	3.8	250	0.5	2850	3900
8	1.5	3.8	250	0.5	2050	2575
10	1.5	4.5	300	0.7	1300	1650
12	1.5	4.5	300	1.2	1040	1250
16	1.5	6	400	2	625	800
20	1.5	STARTING FROM THE EDGE			380	500
25	1.5				220	400

STAINLESS STEEL						
KIT OF CONSUMABLES					70A	
COMPRESSED AIR PRESSURE					5.3 Bar	
MATERIAL THICKNESS	CUTTING HEIGHT	INITIAL HEIGHT		BREAKTHROUGH DELAY	RECOMMEND-ED CUTTING SPEED	SEPARATION SPEED
mm	mm	mm	%	seconds	mm/min	mm/min
2	1.5	3.8	250	0.1	8450	10650
3	1.5	3.8	250	0.2	6900	9225
4	1.5	3.8	250	0.5	6000	7050
6	1.5	3.8	250	0.5	2270	2850
8	1.5	3.8	250	0.7	1740	2150
10	1.5	4.5	300	0.7	1050	1300
12	1.5	4.5	300	1.2	925	1025
16	1.5	STARTING FROM THE EDGE			638	725
20	1.5				350	390

ALUMINIUM						
KIT OF CONSUMABLES					70A	
COMPRESSED AIR PRESSURE					5.3 Bar	
MATERIAL THICKNESS	CUTTING HEIGHT	INITIAL HEIGHT		BREAKTHROUGH DELAY	RECOMMEND-ED CUTTING SPEED	SEPARATION SPEED
mm	mm	mm	%	seconds	mm/min	mm/min
2	1.5	3.8	250	0.1	9325	10555
3	1.5	3.8	250	0.2	8455	9450
4	1.5	3.8	250	0.5	6945	7945
6	1.5	3.8	250	0.5	2933	3913
8	1.5	3.8	250	0.7	2225	3025
10	1.5	4.5	300	0.7	1300	1800
12	1.5	4.5	300	1.2	1100	1450
16	1.5	STARTING FROM THE EDGE			750	1025
20	1.5				400	600

CARBON STEEL						
KIT OF CONSUMABLES					85A	
COMPRESSED AIR PRESSURE					5.3 Bar	
MATERIAL THICKNESS	CUTTING HEIGHT	INITIAL HEIGHT		BREAKTHROUGH DELAY	RECOMMEND-ED CUTTING SPEED	SEPARATION SPEED
mm	mm	mm	%	seconds	mm/min	mm/min
3	1.5	3.8	250	0.1	6800	9200
4	1.5	3.8	250	0.2	5650	7300
6	1.5	3.8	250	0.5	3600	4400
8	1.5	3.8	250	0.5	2500	3100
10	1.5	3.8	250	0.5	1680	2070
12	1.5	4.5	300	0.7	1280	1600
16	1.5	4.5	300	1	870	930
20	1.5	6	400	1.5	570	680
25	1.5	STARTING FROM THE EDGE			350	450
30	1.5				200	300

STAINLESS STEEL						
KIT OF CONSUMABLES					85A	
COMPRESSED AIR PRESSURE					5.3 Bar	
MATERIAL THICKNESS	CUTTING HEIGHT	INITIAL HEIGHT		BREAKTHROUGH DELAY	RECOMMEND-ED CUTTING SPEED	SEPARATION SPEED
mm	mm	mm	%	seconds	mm/min	mm/min
3	1.5	3.8	250	0.1	7500	9200
4	1.5	3.8	250	0.2	6100	7500
6	1.5	3.8	250	0.5	3700	4600
8	1.5	3.8	250	0.5	2450	3050
10	1.5	4.5	300	0.5	1550	1900
12	1.5	4.5	300	0.7	1100	1400
16	1.5	4.5	300	1	700	760
20	1.5	STARTING FROM THE EDGE			480	570
25	1.5				300	370

ALUMINIUM						
KIT OF CONSUMABLES					85A	
COMPRESSED AIR PRESSURE					5.3 Bar	
MATERIAL THICKNESS	CUTTING HEIGHT	INITIAL HEIGHT		BREAKTHROUGH DELAY	RECOMMEND-ED CUTTING SPEED	SEPARATION SPEED
mm	mm	mm	%	seconds	mm/min	mm/min
3	1.5	3.8	250	0.1	8000	9400
4	1.5	3.8	250	0.2	6500	8000
6	1.5	3.8	250	0.5	3800	4900
8	1.5	3.8	250	0.5	2650	3470
10	1.5	3.8	250	0.5	1920	2500
12	1.5	4.5	300	0.7	1450	1930
16	1.5	4.5	300	1	950	1200
20	1.5	STARTING FROM THE EDGE			600	880
25	1.5				380	540

CARBON STEEL						
KIT OF CONSUMABLES					105A	
COMPRESSED AIR PRESSURE					5.3 Bar	
MATERIAL THICKNESS	CUTTING HEIGHT	INITIAL HEIGHT		BREAKTHROUGH DELAY	RECOMMEND-ED CUTTING SPEED	SEPARATION SPEED
mm	mm	mm	%	seconds	mm/min	mm/min
6	3.2	6.4	200	0.5	4140	5090
8	3.2	6.4	200	0.8	3140	3870
10	3.2	6.4	200	0.8	2260	2790
12	3.2	6.4	200	0.8	1690	2060
16	3.2	6.4	200	1	1060	1310
20	3.2	6.4	200	1	780	940
25	3.2	STARTING FROM THE EDGE			550	580
30	3.2				370	410
32	3.2				350	370
35	3.2				290	320
40	3.2				190	210

STAINLESS STEEL						
KIT OF CONSUMABLES					105A	
COMPRESSED AIR PRESSURE					5.3 Bar	
MATERIAL THICKNESS	CUTTING HEIGHT	INITIAL HEIGHT		BREAKTHROUGH DELAY	RECOMMEND-ED CUTTING SPEED	SEPARATION SPEED
mm	mm	mm	%	seconds	mm/min	mm/min
6	3.2	6.4	200	0.5	4870	6000
8	3.2	6.4	200	0.5	3460	4210
10	3.2	6.4	200	0.5	2240	2670
12	3.2	6.4	200	0.6	1490	1860
16	3.2	6.4	200	0.8	950	1080
20	3.2	8	250	1.3	660	810
25	3.2	STARTING FROM THE EDGE			440	530
30	3.2				340	360
32	3.2				300	320

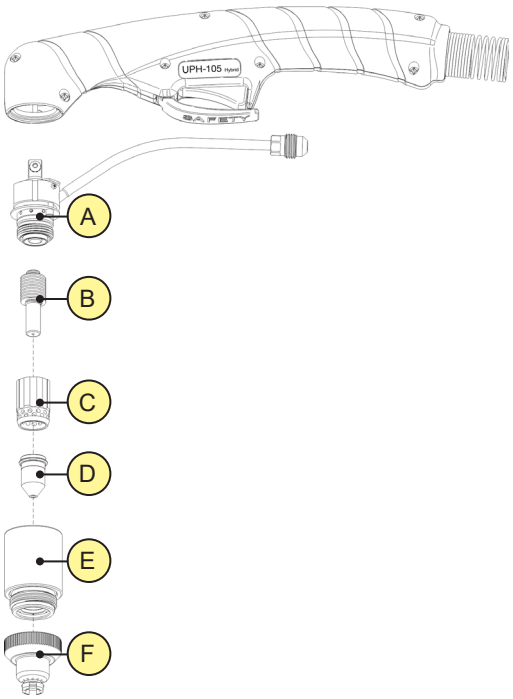
ALUMINIUM						
KIT OF CONSUMABLES					105A	
COMPRESSED AIR PRESSURE					5.3 Bar	
MATERIAL THICKNESS	CUTTING HEIGHT	INITIAL HEIGHT		BREAKTHROUGH DELAY	RECOMMEND-ED CUTTING SPEED	SEPARATION SPEED
mm	mm	mm	%	seconds	mm/min	mm/min
6	3.2	6.4	200	0.5	5980	7090
8	3.2	6.4	200	0.8	4170	5020
10	3.2	6.4	200	0.8	2640	3280
12	3.2	6.4	200	1	1910	2450
16	3.2	6.4	200	1	1290	1660
20	3.2	6.4	200	1.3	1020	1190
25	3.2	STARTING FROM THE EDGE			660	790
30	3.2				430	570
32	3.2				340	490

10 MAINTENANCE

Maintenance of the cutting unit

The cutting unit must be serviced periodically following the manufacturer's recommendations. During operation of the cutting unit, all service and access doors and covers must be closed and secured properly. The cutting unit must not be modified in any way, except for the changes indicated and in accordance with the manufacturer's written instructions. Cutting torches have a quick-release system for removing the torch easily for transport or for switching it should applications require the use of different torches. The torches are cooled by the surrounding air and do not require any special cooling procedures.

Checking consumables



The parts subject to wear are the electrode (B) and the nozzle (D), which must be replaced after unscrewing the shield cup (E). The electrode (B) must be replaced when it has a 1 mm deep crater in the centre. The nozzle (D) must be replaced when its central hole is damaged or bigger than that of the new part. Delayed replacement of the electrode and nozzle causes excessive heating of the parts, which can impair the service life of the diffusor (C).

The frequency with which consumables on the torch need to be changed depends on several factors:

- Cut metal thickness.
- Average cut length.
- Air quality (presence of oil, moisture or other contaminants).
- Breaking through or cutting metal starting from the edge.
- Correct distance between the torch and metal sheet when gouging or cutting with unshielded consumables.
- Correct breakthrough height.

Under normal conditions, the nozzle will wear out first during manual cutting. Torches for manual cutting use shielded consumables. So the torch tip can be dragged along the metal. For the best cutting quality of thin materials (about 4 mm or less), it is preferable to use a 45 A nozzle.

Inspection of consumables

► Torch O-ring (A)
- Inspection: Make sure that the surface is not damaged, worn or not lubricated.
- Action: If the O-ring is dry, lubricate it and the threads with a thin coat of silicone lubricant. If the O-ring is worn or damaged, replace it.

► Electrode (B)
- Inspection: Electrode tip.
- Action: Replace the electrode if the surface is worn or the crater is deeper than 1.6 mm.

► Diffusor ring (C)
- Inspection: Make sure that the inner surface of the diffusor ring is not damaged or worn and the gas holes are not clogged.
- Action: Replace the diffusor ring if the surface is damaged or worn or if the gas holes are clogged.

► Nozzle (D)
- Inspection: Roundness of central hole.
- Action: Replace the nozzle if the central hole is not round.

► Shield cup (E):
- Assess the integrity of the part. Replace if there are evident signs of burns, cracks or other mechanical or heat damage.

► Shield or deflector (F)
- Inspection: Roundness of central hole.
- Action: Replace the shield if the hole is no longer round.
- Inspection: Build-up of debris in the space between the shield and the nozzle.
- Action: Remove the shield and clean off any debris.

Installation of consumables

⚠ **WARNING!** INSTANT IGNITION TORCHES - A PLASMA ARC CAN CAUSE INJURIES AND BURNS. The plasma arc ignites immediately when the torch trigger is pressed. The plasma arc passes quickly through gloves and skin. With the power switch on “O” (off), install the torch consumables. To use the torch for manual cutting, a full set of consumables must be installed: shield, shield cup, nozzle, electrode and diffusor ring.

11 TECHNICAL DATA

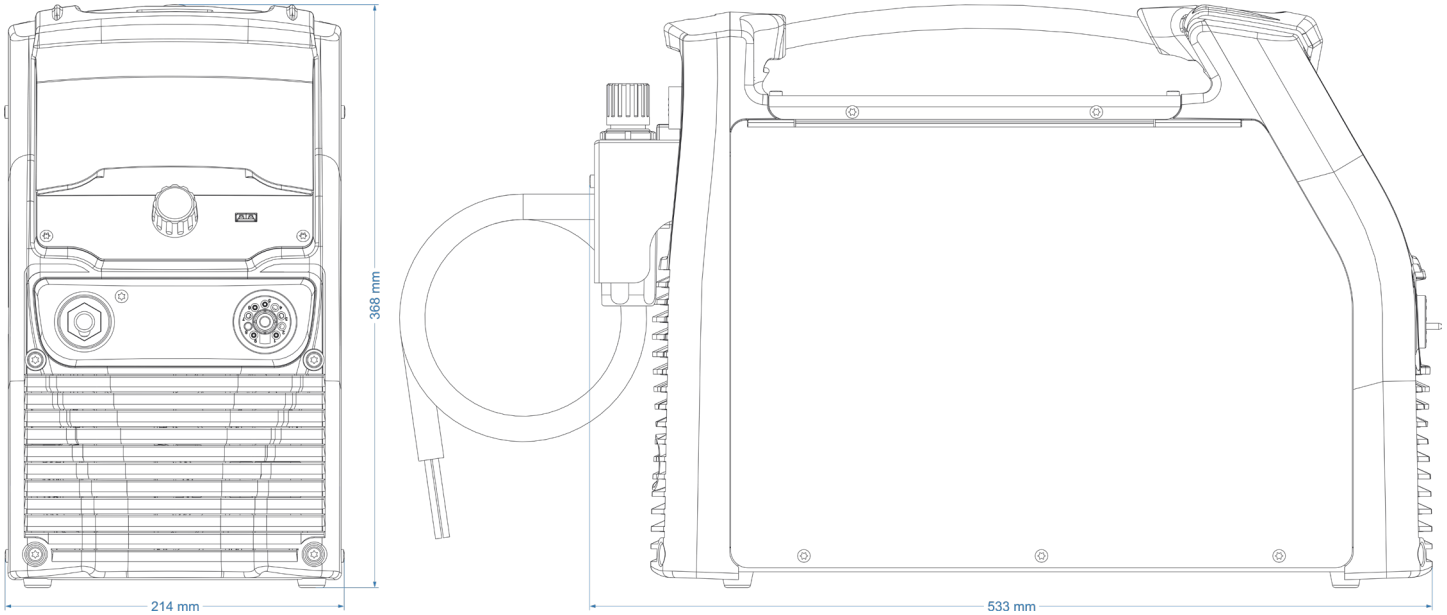
Directives applied	Waste electrical and electronic equipment (WEEE)
	Electromagnetic compatibility (EMC)
	Low voltage (LVD)
	Restriction of the use of certain hazardous substances (RoHS)
	Ecodesign of energy-related products (Eco Design)
Construction standards	EN 60974-1; EN 60974-10 Class A
Conformity markings	CE Equipment compliant with European directives in force
	S Equipment suitable in an environment with increased hazard of electric shock
	Equipment compliant with WEEE directive
	RoHS Equipment compliant with RoHS directive

11.1 Voyager 75 Basic

Supply voltage	3 x 400 Va.c. ± 15% 50/60 Hz		
Mains protection	16 A Delayed		
Zmax	-		
Dimensions	height: 368 mm / width: 214 mm / depth: 533 mm		
Weight	17.8 kg		
Insulation class	H		
Protection rating	IP23S		
Cooling	AF: Forced-air cooling (with fan)		
Maximum gas pressure	0.93 MPa (9.3 bar)		
Cutting mode		CUTTING	GOUGING
Current and voltage adjustment range		10 A - 80.4 V 70 A - 108.0 V	10 A - 100.4 V 70 A - 128.0 V
Cutting current / Work voltage	50% (40° C)	70 A - 108.0 V	70 A - 128.0 V
	60% (40° C)	65 A - 106.0 V	65 A - 126.0 V
	100% (40° C)	55 A - 102.0 V	55 A - 122.0 V
Maximum input power	50% (40° C)	9.3 KVA - 8.7 KW	10.8 KVA - 10.2 KW
	60% (40° C)	8.5 KVA - 7.9 KW	10.0 KVA - 9.3 KW
	100% (40° C)	7.1 KVA - 6.4 KW	8.2 KVA - 7.6 KW
Maximum input current	50% (40° C)	13.4 A	15.6 A
	60% (40° C)	12.3 A	14.4 A
	100% (40° C)	10.3 A	11.8 A
Actual input current	50% (40° C)	9.5 A	11.0 A
	60% (40° C)	8.7 A	10.2 A
	100% (40° C)	7.3 A	8.3 A
No-load voltage (U0)	270 V		
Efficiency of the source of energy	Efficiency (GOUGING @ 70 A / 128 V): 88 %		
	Energy consumption in no-load conditions (U1= 400 VAC): 18.7 W		
Essential raw materials	According to information provided by our suppliers. this product contains no essential raw materials in quantities exceeding 1 g per component.		

11.2 Voyager 105 Basic

Supply voltage	3 x 400 Va.c. ± 15% 50/60 Hz		
Mains protection	25 A Delayed		
Zmax	-		
Dimensions	height: 368 mm / width: 214 mm / depth: 533 mm		
Weight	22.0 kg		
Insulation class	H		
Protection rating	IP23S		
Cooling	AF: Forced-air cooling (with fan)		
Maximum gas pressure	0.93 MPa (9.3 bar)		
Cutting mode		CUTTING	GOUGING
Current and voltage adjustment range		10 A - 80.4 V 105 A - 122.0 V	10 A - 100.4 V 105 A - 142.0 V
Cutting current / Work voltage	-	-	-
	60% (40° C)	105 A - 122.0 V	105 A - 142.0 V
	100% (40° C)	90 A - 116.0 V	90 A - 136.0 V
Maximum input power	-	-	-
	60% (40° C)	15.3 KVA - 14.3 KW	17.5 KVA - 16.5 KW
	100% (40° C)	12.4 KVA - 11.6 KW	14.3 KVA - 13.5 KW
Maximum input current	-	-	-
	60% (40° C)	22.0 A	25.3 A
	100% (40° C)	17.9 A	20.7 A
Actual input current	-	-	-
	60% (40° C)	17.0 A	19.6 A
	100% (40° C)	17.9 A	20.7 A
No-load voltage (U0)	315 V		
Efficiency of the source of energy	Efficiency (GOUGING @ 105 A / 142 V): 90.3 %		
	Energy consumption in no-load conditions (U1= 400 VAC): 19.6 W		
Essential raw materials	According to information provided by our suppliers. this product contains no essential raw materials in quantities exceeding 1 g per component.		


368 mm
214 mm
533 mm

WELD THE WORLD

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