



EX-TRAFIRE[®]85HD

Plasma Cutting System

Operating Manual - CE

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1 IDENTIFICATION

The EX-TRAFIRE® 85HD is a portable plasma arc cutting power supply for mechanized and manual plasma cutting, gouging, and optional marking. It uses compressed air or nitrogen to cut almost all electrically conductive metals. The EXTRAIRE®85HD may be operated only with original Thermacut® consumables and maintenance parts.

This documentation describes the EXTRAIRE®85HD cutting power supply system.

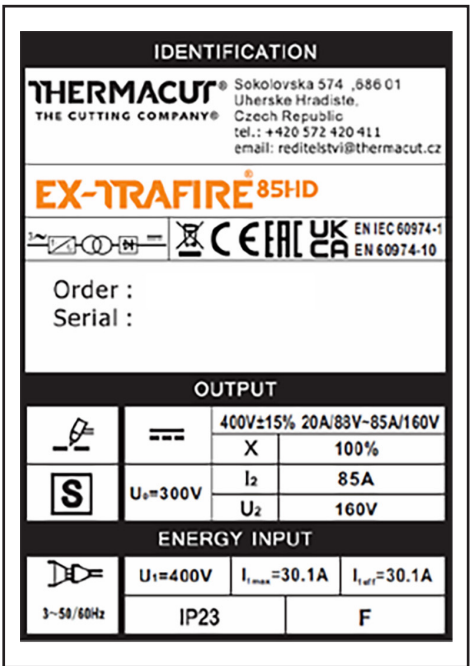
When used in this documentation, the term “device” always refers to the EX-TRAFIRE®85HD cutting power supply unit.

1.1 Marking

This product fulfills the requirements that apply to the market to which it has been introduced. Corresponding labels have been affixed to the product, if required.

1.2 Identification plate

Fig. 1 EX-TRAFIRE® 85HD identification plate (ID nameplate)



The device is labeled by means of an identification plate on the housing located on the side and bottom of the machine.

- For enquiries, please have on hand the order and serial number of the device as seen on the identification plate.

1.3 Signs and symbols used

In the operating instructions, the following signs and symbols are used:

- General instructions.
- 1** Action(s) to be carried out in succession.
- Lists.
- » Cross reference symbol refers to detailed, supplementary or further information.
- A** Caption, item description.

1.4 Classification of the warnings

The warnings are divided into four different categories and are indicated prior to potentially dangerous work steps. The following signal words are used depending on the type of hazard:

DANGER

Describes an imminent threatening danger. If not avoided, this will result in fatal or extremely critical injuries.

WARNING

Describes a potentially dangerous situation. If not avoided, this may result in serious injury or death.

CAUTION

Describes a potentially harmful situation. If not avoided, this may result in slight or minor injury.

NOTICE

Describes the risk of impairing work results or material damage and indicates irreparable damage to the device or equipment.

2 SAFETY

This chapter warns of potential hazards that should be kept in mind to operate the product safely. Non-observance of the safety instructions may result in risks to the life and health of personnel, environmental damage, or material damage.

- Observe the document entitled "Safety Instructions".

2.1 Designated use

The device described in this documentation may be used only for the purpose and in the manner described. The device is used only for the generation and control of the output current required for plasma cutting and gouging. Any other use is considered improper. Unauthorized modifications or changes to enhance the performance are not permitted.

- Do not exceed the maximum load data as defined by the documentation supplied. Overloads lead to destruction.
- Do not make any modifications or changes to this product.
- Do not use the device to thaw pipes.
- Do not use or store the device outdoors where it is wet.

2.2 Obligations of the operator

- Ensure that only qualified personnel are permitted to perform work on the device or system.

Authorized personnel are:

- those who are familiar with the basic regulations on occupational safety and accident prevention;
- those who have been instructed on how to handle the device;
- those who have read and understood these operating instructions;
- those who have been trained accordingly;
- those who are able to recognize possible risks because of their special training, knowledge, and experience.
- Keep untrained persons out of the work area.
- Each time the device's cover plates are opened, have Thermacut or another authorized specialist perform a safety inspection in accordance with DIN IEC 60974 Part 4: "Periodic inspection and testing".

The device can produce electromagnetic fields that could impact the proper function of cardiac pacemakers and implanted defibrillators.

- Do not use the device if you have a pacemaker or an implanted defibrillator.

This Class A cutting device is not intended for use in residential areas with a public low-voltage power supply system. It can potentially be difficult to guarantee electromagnetic compatibility in these areas due to both conducted and emitted interference.

- The device may be used only in industrial zones according to DIN EN 61000-6-3.

2.3 Warning and notice signs

The following warning, notice and mandatory signs can be found on the product:



These markings must always be legible. They may not be covered, obscured, painted over, or removed.

2.4 Product-specific safety instructions

- Do not use or store the device in wet conditions or environments.
- Do not operate the device if the housing is open.

2.5 Safety instructions for the electrical power supply

- Ensure that the input power cable is not damaged, for example, by being driven over, crushed, or torn.
- Check the input power cable for damage and wear at regular intervals.
- If it is necessary to replace the input power cable, only cables specified in **Table 8 Recommended cable extensions** on page EN-18 must be used.
- Only a certified electrician or trained personnel should carry out work on the input power cable and the input power plug.
- Water protection and mechanical stability must be ensured when replacing the input power plug of the input power cable.

2.6 Safety instructions for plasma cutting

- Plasma cutting may cause damage to the eyes, skin, and hearing. Note that other potential hazards may arise when the device is used with other cutting components. Therefore, always wear the prescribed personal protective equipment as defined by local regulations and laws.
- All metal vapors, especially lead, cadmium, copper, and beryllium, are harmful. Ensure sufficient ventilation or extraction. Do not exceed the current occupational exposure limits (OELs).
- To prevent the formation of phosgene gas, rinse workpieces that have been degreased with chlorinated solvents using clean water. Do not place degreasing baths containing chlorine in the vicinity of the cutting area.
- Adhere to the general fire protection regulations and remove flammable materials from the vicinity of the cutting work area prior to starting work. Provide appropriate fire extinguishing equipment in the workplace.

2.7 Product-specific safety instructions

- Wear your personal protective equipment (PPE).
- Ensure that others in close proximity are also wearing personal protective equipment.

Personal protective equipment consists of protective clothing, safety goggles, face protection, ear protectors, protective gloves, and safety shoes.

Tab. 1 Lens shade selector for plasma cutting per ISO 4850:1979

Cutting current	Minimum shade
Up to 150 A	ISO (DIN) 11
150 A to 250 A	ISO (DIN) 12
250 A to 400 A	ISO (DIN) 13
Over 400 A	ISO (DIN) 14

2.8 Emergency information

- In the event of an emergency, immediately disconnect the following supplies:
 - Electrical power supply
 - Gas supply

3 SCOPE OF DELIVERY OF CUTTING SYSTEMS

The following components are included in the scope of supply:

- 1× EX-TRAFIRE® 85HD cutting power supply
- 1× FHT-EX® 105TTH or FHT-EX® 105TTM cutting torch
- 1x TCS Latch with Key Assembly
- 1× work lead incl. workpiece clamp
- 1× operating instructions
- 1× starter kit

The order data and ID numbers for the equipment parts can be found in this manual. The order data and ID numbers for the consumables can be found in operator manual of the torch.

- For more information about points of contact, consultation, and orders, visit www.thermacut.com.

Although the items delivered are carefully checked and packaged, it is not possible to fully rule out the risk of transport damage.

Goods-in inspection

- Check for order completeness by checking the delivery note.
- Check the delivered goods for damage (visual inspection).

Claim process

- If goods are damaged, notify the final carrier immediately.
- Keep the packaging for possible inspection by the carrier.

Returns

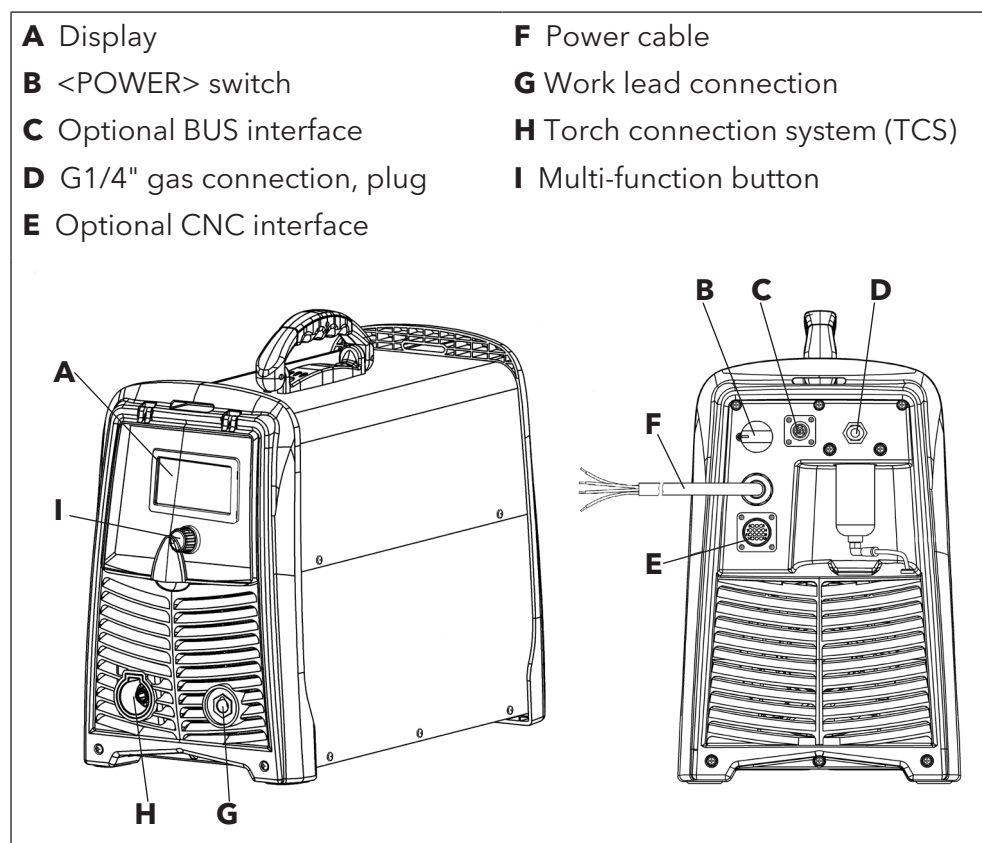
- Use original packaging and packing material for returns.
- If you have questions concerning the packaging or how to secure the device, contact your supplier, carrier or transport company.

4 PRODUCT DESCRIPTION

4.1 Assembly and use

The control elements are located on the control panel. The connections are on the front and rear of the EX-TRAFIRE®85HD.

Fig. 2 Control elements and connections



LCD display (A)	Displays the status of the device. A fault code is displayed if an error occurs.
POWER switch (B)	Used to switch the device on and off.
Optional BUS interface (C)	For connecting the optional CAN BUS or RS485/422 BUS.
Optional CNC interface connection (E)	This optional interface is used to connect the device to an optional CNC cutting table or robot.
Multi-function button (I)	For toggling between two menus and setting the cutting parameters.

4.2 Technical data

Tab. 2 Power source specifications

Certification	CE	
Idle voltage (U ₀)	300 V DC	
Characteristic curve* * The curve is defined as output voltage versus output current	Drooping	
Input voltage (U ₁)	3 × 400 V AC ± 15% 50/60 Hz	
Output arc current (I ₂)	20-85 A	
Nominal output arc voltage (U ₂)	160 V DC	
Maximum power input	21 kVA	
Duty cycle X is the percentage of 10 minutes that the system can cut (Arc-On time) at nominal load (I ₂ and U ₂) without overheating at rated input voltage.*		
Duty cycle (X*) at 40°C at nominal conditions (U ₁ , I ₁ , U ₂ , I ₂)	100%	
Ambient temperature	-10°C to +40°C	
Rated input current (I _{1rms}) and effective input current (I _{1eff}) at rated output power eff = effective rms = root mean square	I _{1rms}	I _{1eff}
	30.1 A	30.1 A
	Complies with standards IEC 60974-1, IEC 60974-10	
Protection type	IP23S	
Tilt angle (with or without wheels)	Up to 15°	
Dimensions (L × H × W) [mm]	560 × 400 × 260	
Weight [kg]	24.4	

$$* \quad X = \frac{\text{Arc-On time (minutes)} * 100}{10 \text{ (minutes)}} = \text{Duty Cycle [\%]}$$

When the Duty Cycle is exceeded, the system may overheat which would cause the power supply to shut down. Wait for the machine to cool down before returning to normal operating conditions.

Tab. 3 Ambient conditions for transport and storage

Ambient temperature	–20°C – +55°C
Relative humidity	< 50% at +40°C < 90% at +20°C

Tab. 4 Ambient conditions for operation

Ambient temperature	–10°C – +40°C
Relative humidity	< 50% at +40°C < 90% at +20°C
Installation above sea level	Max. 2000 m

Tab. 5 Gas data

Permissible gas	Compressed air/nitrogen/argon***
Max. gas inlet pressure	6.2 to 10 bar
Recommended compressed air quality	ISO 8573-1 class 1.2.2. Purity: ≥ 99.99% clean, and free from moisture and oil
Needed gas flow rate/ pressure	170 l/min at 7 bar

4.3 Technical data for cutting torches FHT-EX® 105TTH and FHT-EX® 105TTM

FHT-EX® cutting torches are used for manual and mechanical cutting, gouging, and marking. They use compressed air or nitrogen to cut mild steels, stainless steels, aluminum, and other electrically conductive metals. They are connected to the cutting power source using the Torch Connection System (TCS).

Tab. 6 Technical data for FHT-EX®105TT cutting torches

	FHT-EX® 105TTH / FHT-EX® 105TTM		
Power supplies	65HD	85HD	105HD
Recommended cutting capacity [mm]	18*	20*	20*
Max. cutting capacity [mm]	25*	30*	40*
Separating cut capacity [mm]	30	40	50
Piercing capacity [mm]	18**	20**	20**
Permissible ambient temperature during operation	-10°C to +40°C		
Permissible ambient temperature during transport and storage	-25°C to +55°C		
Relative humidity	< 90% at +20°C		
Sub-menu item	65HD - Plasma cutting, gouging, marking		
	85HD, 105HD - Plasma cutting, gouging, optional marking		
Application type	Manual and mechanized		
Rated current and duty cycle	85 A/100%		
Permissible gas	Compressed air/nitrogen/argon***		
Flow rate	105 A approx. 156 l/min. at 4.8 bar		
	85 A approx. 101 l/min. at 5.2 bar		
	65 A approx. 87 l/min. at 5.2 bar		
	45 A approx. 82 l/min. at 5.2 bar		
Flow rate for gouging	105 A approx. 205 l/min. at 5.2 bar		
	65 / 85 A approx. 195 l/min. at 5.2 bar		
Flow rate for marking	10, 11, 12, 15, 16 A approx. 39 l/min. at 2.4 bar		

Tab. 6 Technical data for FHT-EX®105TT cutting torches

	FHT-EX® 105TTH / FHT-EX® 105TTM
Maximum inlet pressure	10 bar
(Dynamic) operating pressure	5.2 bar
Connection type	TCS (torch connection system) - 13 pin
Gas post-flow period delay	approx. 30 seconds
Type of protection	IP23S (EN 60529)
Type of voltage	DC
Standard lengths (other lengths available upon request)	5 m/8 m/15 m/23 m

* For setup details see cut charts on pages EN-56 - 61.

** Recommended max. piercing capacity allowing optimal consumable lifetime.

*** Nitrogen may be used for cutting stainless steel and aluminum; argon may be used only in connection with the optional marking kit.

Tab. 7 FHT-EX® 105TT cutting torch weights and cable lengths

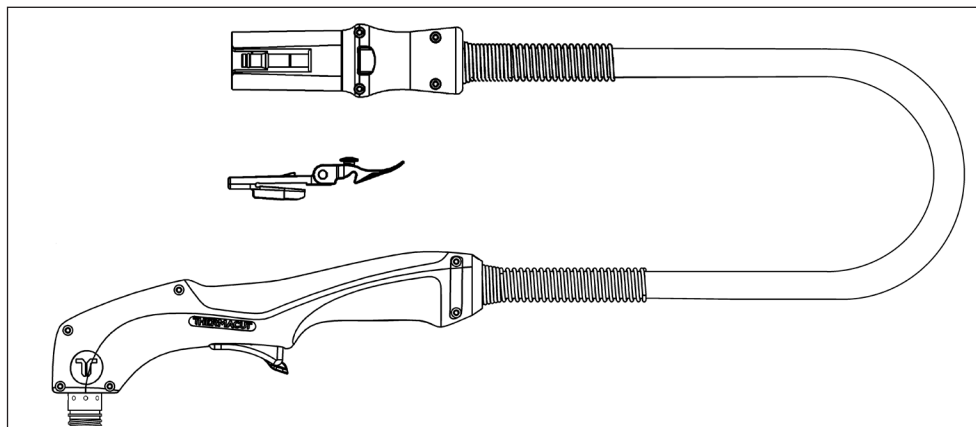
Cutting torch	Weight and cable lengths
FHT-EX® 105TTH Standard hand cutting torch	5 m / 2.5 kg 8 m / 3.3 kg 15 m / 5.0 kg 23 m / 7.9 kg
FHT-EX® 105TTM Standard machine cutting torch	5 m / 2.1 kg 8 m / 3.4 kg 15 m / 5.7 kg 23 m / 8.0 kg
FHT-EX® 105TTSM Short machine cutting torch	5 m / 2 kg 8 m / 3.4 kg 15 m / 5.7 kg 23 m / 8.0 kg

With 23m long cable lead is a pressure drop of 1.2 bar - it is necessary to increase the input pressure about this value when using 23m long cable lead.

It is recommended to unfold the cable, because of bigger heat generation if it's longer than 8m.

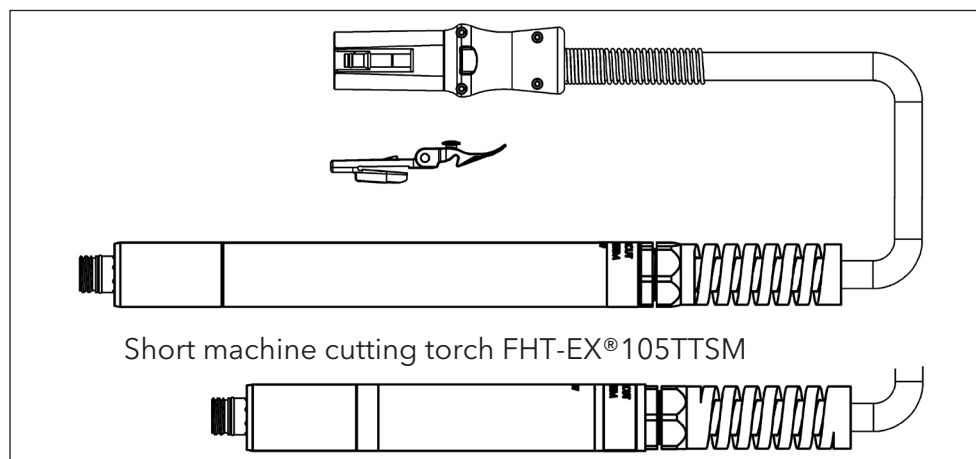
4.3.1 Cutting torch FHT-EX®105TTH

Fig. 3 Hand cutting torch FHT-EX®105TTH



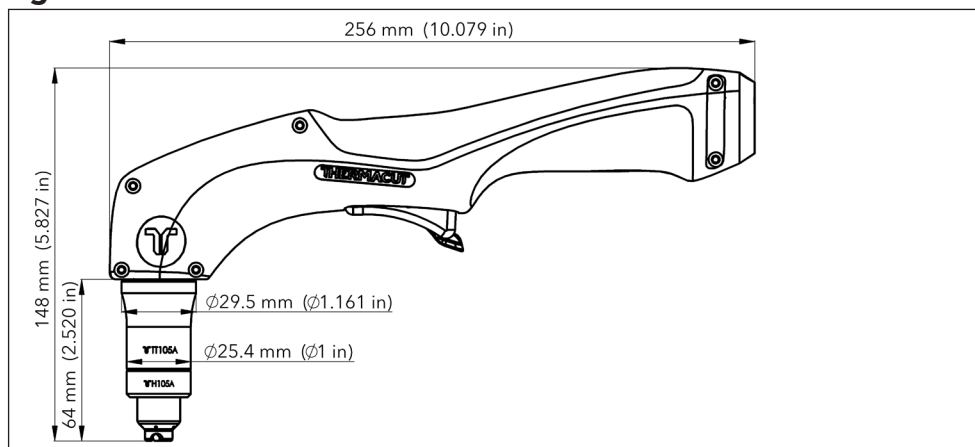
4.3.2 Cutting torch FHT-EX®105TTM

Fig. 4 Standard machine cutting torch FHT-EX®105TTM



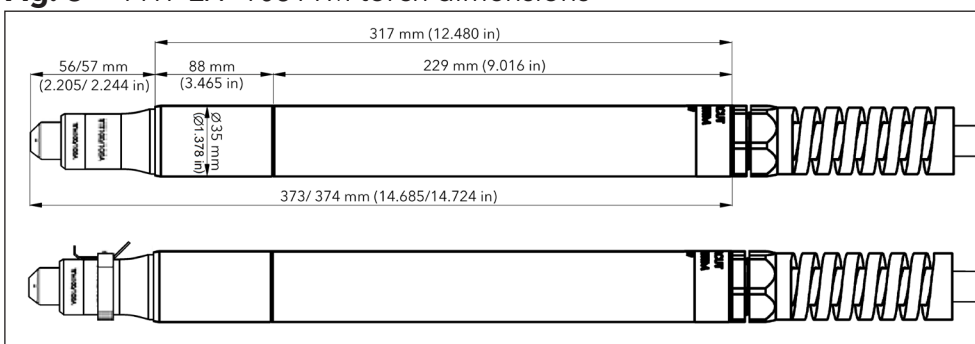
4.3.3 Torch dimensions of the FHT-EX®105TTH

Fig. 5 FHT-EX®105TTH torch dimensions



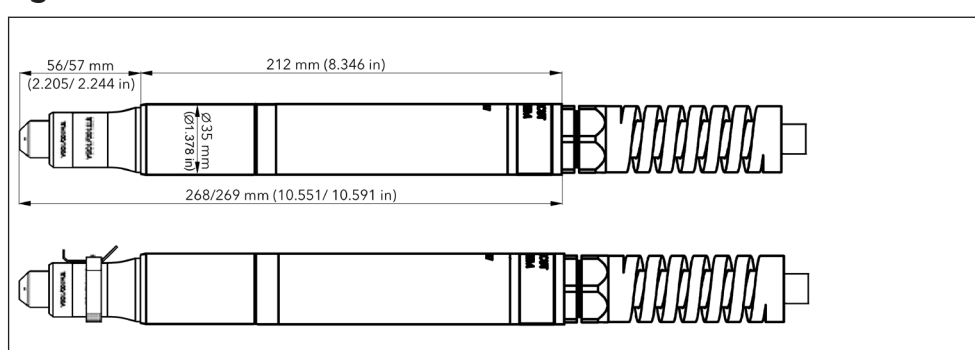
4.3.4 Torch dimensions of the FHT-EX®105TTM

Fig. 6 FHT-EX®105TTM torch dimensions



4.3.5 Torch dimensions of the FHT-EX®105TTSM

Fig. 7 FHT-EX®105TTSM torch dimensions



5 TRANSPORT AND POSITIONING

⚠ WARNING

Risk of injury due to improper transport and installation.

Improper transport and installation can cause the device to tip or fall over. This may result in serious injury.

- Wear your personal protective equipment.
- Ensure that all supply lines and cables do not encroach into the area in which employees are working.
- Place the device on a suitable surface (flat, solid, and dry) on which it will not topple over, taking into account the max. operating tilt angle of 15°.
- Note the weight of the device when lifting it. Lift with two persons.
 - » **4.2 Technical data** on page EN-12.
- Use an appropriate lifting tool with load handling attachment for transporting and installing the device.
- Avoid abrupt lifting and setting down.
- Do not lift the device over individuals or other devices.
- Use the attachment points provided.

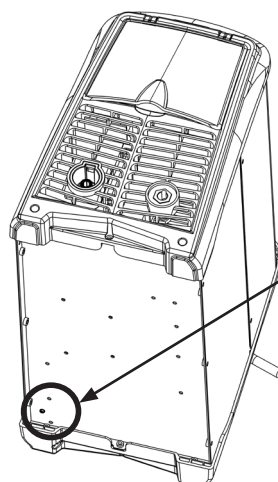
NOTICE

Risk of material damage due to improper transport and installation

Improper transport or installation can cause the EX-TRAFIRE®85HD to tip or fall over. This can result in material damage and irreparable damage to the device.

- Protect the device against weather conditions, such as rain and direct sunlight.
- Protect the device from spatter when cutting.
- Protect the device from direct exposure to sparks when grinding.
- Use the device only in dry, clean, and well-ventilated rooms.
- Maintain a minimum distance of 1 m from the wall when positioning the device to ensure that it has sufficient ventilation.

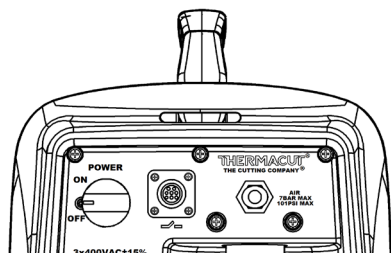
Fig. 8 Drain hole location



- When positioning the device, make sure that the water separator's drain opening (see circle) is not covered.

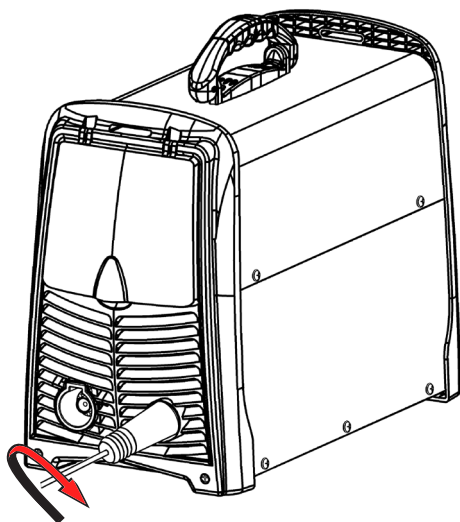
6 SETTING UP THE POWER SUPPLY

6.1 Connecting to the gas supply



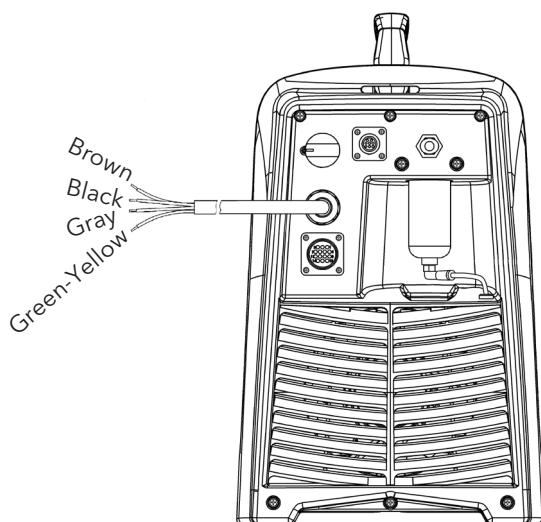
- Connect the gas hose with an inside diameter of at least 6 mm to the gas connection of the device.

6.2 Connecting the work lead



- Connect the work lead to the work lead connecting socket and secure it by rotating clockwise.

6.3 Connecting the power supply cable



- The power supply should be connected by a certified electrician or trained personnel.
L1 -> brown (U)
L2 -> black (V)
L3 -> gray (W)
Grounding -> green-yellow
- The green grounding wire is exclusively for the grounding and must always be connected!

Tab. 8 Recommended input power cable extension

Input voltage	Cable cross-section	Length
400 V AC / 3- phases	6 mm ²	Up to 15 m
	10 mm ²	15-45 m

6.4 Connecting the input power plug

- Note the safety instructions.
 - » **2.5 Safety instructions for the electrical power supply** on page EN-8

⚠ WARNING

Electric shock due to improperly installed electrical power supply

If the electrical power supply and grounding are improperly installed, fatal electric shock may occur.

- If you want to operate the device in a very humid environment or on conductive material, install a ground fault circuit interrupter (GFCI) in the power supply if according to electric code.
- Use slow-blow fuses and/or circuit breakers and GFCI that comply with local regulations and electric codes.
- Ground the device according to the applicable regulations and laws.
- Do not ground the device together with other devices or machines.

⚠ WARNING

Risk of electric shock due to improperly installed and defective cables

Damaged or improperly installed cables can lead to fatal electric shock.

- Check all live cables and connections for proper installation and damage.
- Damaged, deformed or worn parts should only be replaced by a certified electrician or trained personnel.

⚠ WARNING

Risk of injury due to fire

Improper use or connection can result in fire. This may result in serious injury.

- Ensure that the operating voltage specified on the identification plate is suitable for the input voltage.

For the input voltage and the fuse and/or circuit breaker protection, please refer to:

- » **4.2 Technical data** on page EN-12
- If necessary, have a certified electrician or trained personnel connect the input power cable extension in accordance with local regulations.
- Ensure that the power supply is adequately protected by a safety switch.
- Insert the input power plug of the power cable into the corresponding socket.

6.4.1 Connection to a generator (optional)

- Set the generator to three-phase alternating current.
- Plug the mains plug into the socket.
- Set the motor rating as shown in the following table.

Tab.9 Connection to a generator

Generator motor rating	Generator output current (I ₂)	Generator output voltage
≥ 10 kW	85 A	400 V AC

7 TORCH INSTALLATION

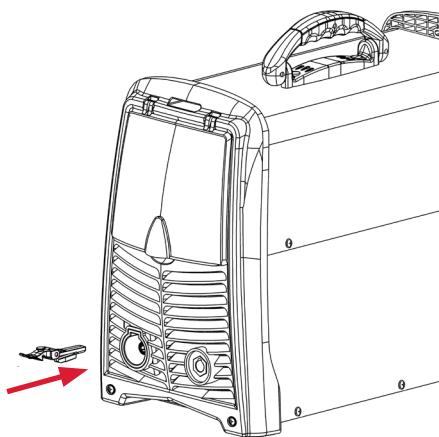
7.1 Connecting the cutting torch

NOTICE

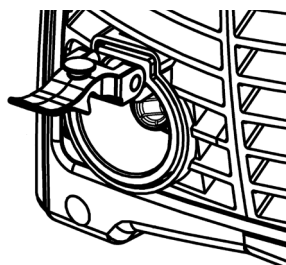
Risk of material damage if used without TCS Latch with Key Assembly

The TCS Latch with Key Assembly is important for the proper working of the device. If used without, the device will be damaged.

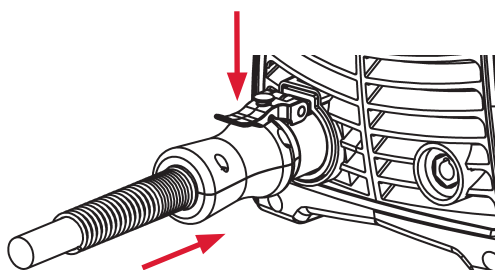
- Only use the device with the TCS Latch with Key assembly installed and properly secured.



- 1 Switch off the power supply.
- 2 Insert the TCS Latch with Key Assembly into the TCS socket.



The TCS Latch with Key Assembly must sit firmly in the TCS socket.



- 3 Insert the TCS plug into the connector.
- 4 Push the plug while simultaneously pressing down the Latch into locked position.

7.2 Installing consumables for the hand and machine cutting torches

⚠ WARNING

Risk of injury due to unexpected ignition of the plasma arc

Hand torch

When the mains plug is plugged in, the plasma arc ignites immediately when the torch trigger is pressed.

Machine torch

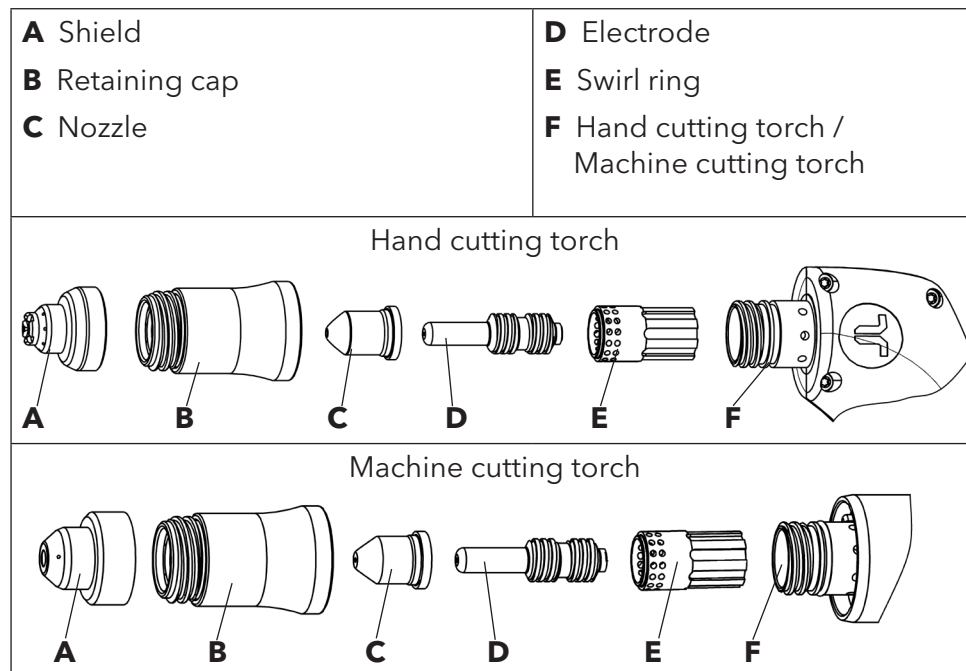
When the mains plug is plugged in, plasma arc is generated immediately when the CNC start signal is ON.

Individuals can be seriously injured if the arc ignites unexpectedly.

- Hold the tip of the torch away from you.
- Do not hold the workpiece to be cut tightly and keep your hands away from the cutting surface.
- Do not point the cutting torch at yourself or other persons.
- Wear your personal protective equipment.

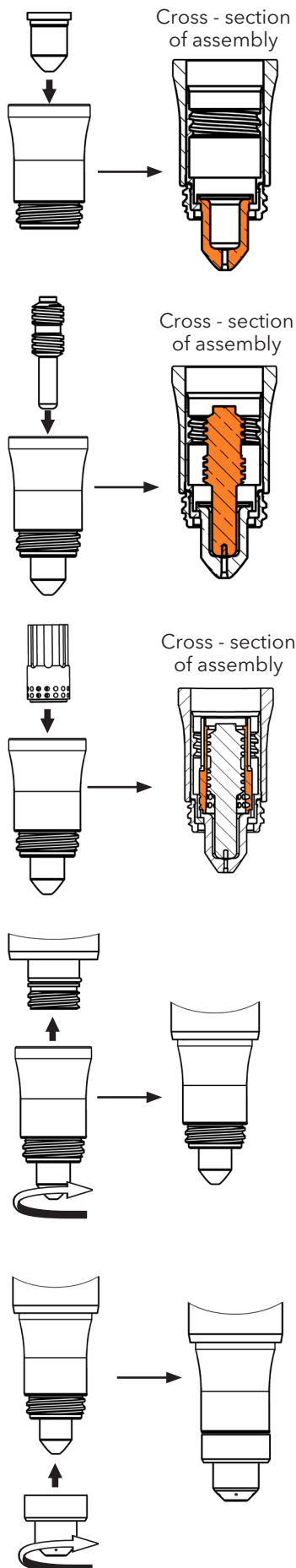
The procedure shown below applies to both the equipment of hand and machine cutting torch.

Fig. 9 FHT-EX®105TT Torch consumables

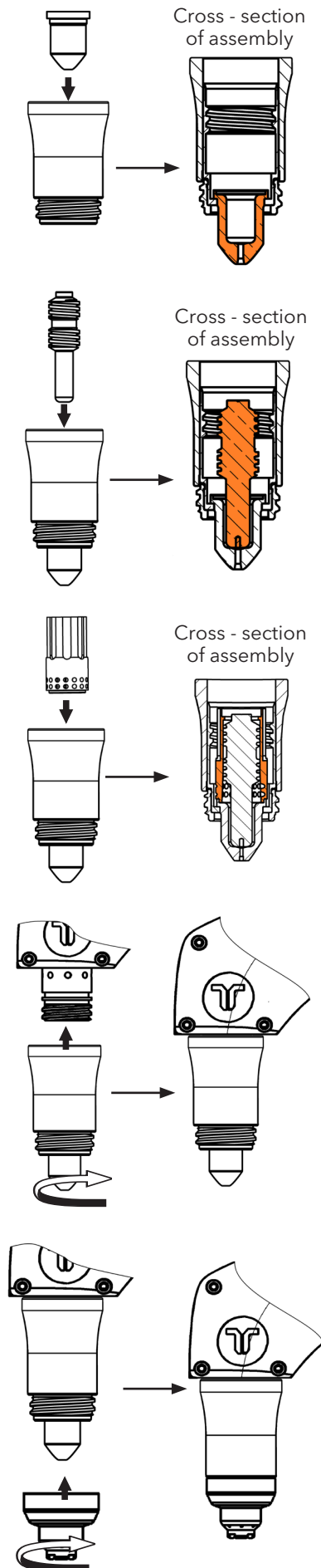


7.2.1 FHT-EX® 105TT cutting torch consumables installation

machine cutting torch



hand cutting torch



1 Install the nozzle into the retaining cap.

2 Insert the electrode into retaining cap and nozzle assembly.

3 Insert the swirl ring.

4 Screw the entire assembly onto the hand cutting torch.

- Do not overtighten.
- The nozzle must be firmly in place and must not move.

5 Install the shield. Do not overtighten.

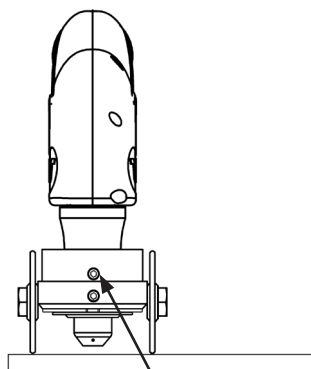
7.3 The circle cutting guide installation



Circle cutting guide

EX-5-801-002

-
- 1 Disconnect the torch from the plasma power supply
 - 2 Insert the hand torch into the cutting guide.
 - 3 Secure the hand torch in the cutting guide with help of the screw with hexagonal head. Use the hexagonal wrench. Tighten by hand. The hand shield defines the required torch to workpiece distance.
 - 4 It's strictly recommended to use the machine shield in order to keep smooth cutting operation. Unscrew the hand shield and replace with the machine shield. The torch to workpiece distance remains the same because the hand torch is clamped in the cutting guide in the place of the retaining cap.

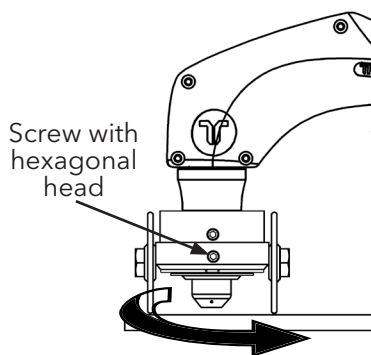


Tighten the screw with hexagonal head with the hexagonal wrench.



- 5** The hand torch clamped in the cutting guide can be used alone or with a radius bar.

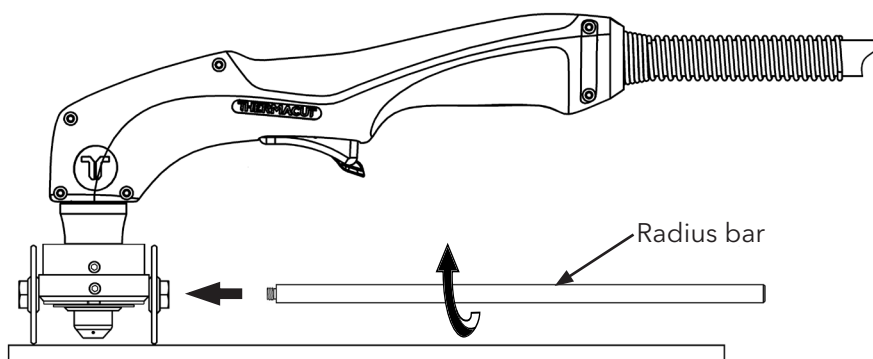
If you don't want use the radius bar, lock the cutting guide in a fixed position by using of the screw with hexagonal head so that the wheels of the cutting guide point in the same direction as the torch handle - see picture below. Now the torch with the cutting guide is ready to cut.



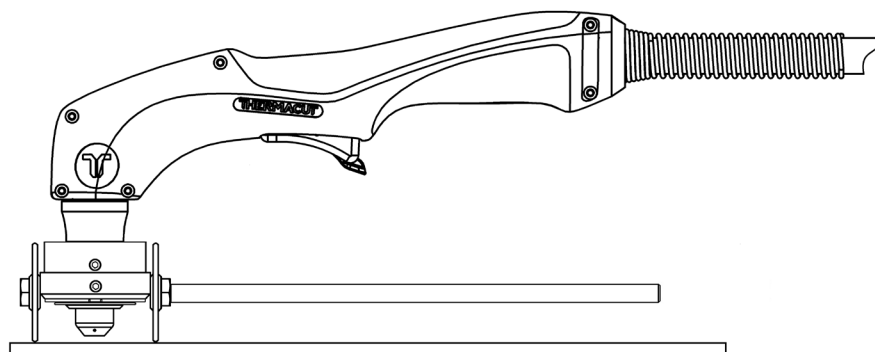
Screw with hexagonal head

- 6** If you want use the radius bar, make sure the screw with hexagonal head isn't tightened so that the cutting guide can rotate freely.

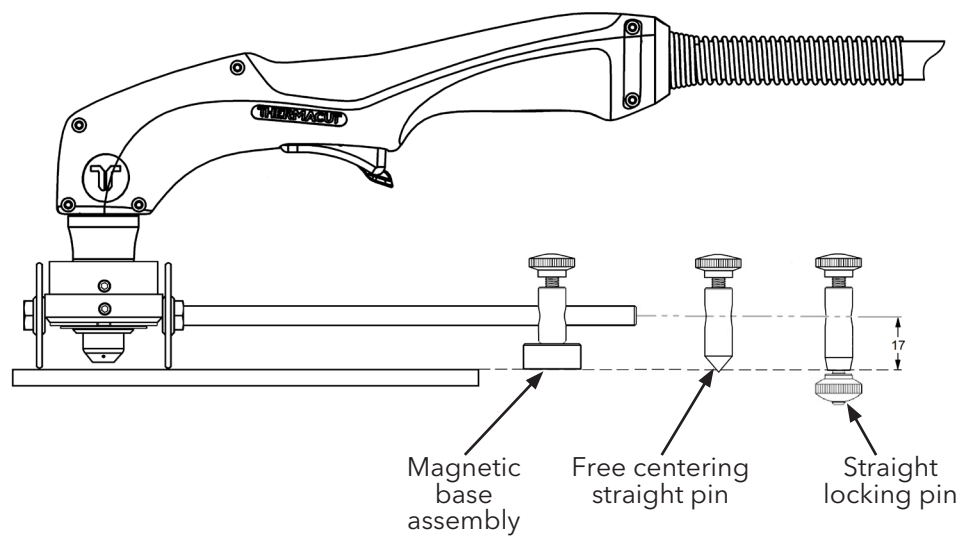
- 7** Screw in the radius bar* into the threaded hole in the cutting guide.
* Lengths of bars are 250 mm or 400 mm.



Radius bar



- 8 Use the following fasteners to anchor the radius bar to the center of the circle:



8 OPERATION

WARNING

Risk of injury due to unexpected ignition of the plasma arc

Hand cutting torch

When the input power plug is plugged in, the plasma arc ignites immediately when the torch trigger is pressed. Individuals can be seriously injured if the arc ignites unexpectedly.

Machine cutting torch

When the input power plug is plugged in, the plasma arc ignites immediately when the CNC start signal is ON. Individuals can be seriously injured if the arc ignites unexpectedly.

- Hold the tip of the torch away from you.
- Do not hold the workpiece to be cut tightly and keep your hands away from the cutting surface.
- Do not point the cutting torch at yourself or other individuals.
- Wear your personal protective equipment.

WARNING

Risk of injury when cutting

Plasma cutting can cause serious injury.

- Do not hold the workpiece in your hands.
- Keep your hands away from the cutting surface.
- Wear your personal protective equipment.

CAUTION

Risk of burns due to flying sparks when angling the cutting torch

When the cutting torch is angled during cutting or piercing, molten metal (sparks) will escape in the direction in which the cutting torch is pointed. This may result in burns.

- Do not point the cutting torch at yourself or other persons when angling it.
- Wear your personal protective equipment.

NOTICE

Material damage due to exceeding the maximum duty cycle

If the device is operated for longer than the maximum duty cycle, it may be overloaded and irreparably damaged.

- Only operate the device up to the maximum permissible duty cycle.
 - » **4.2 Technical data** on page EN-12
- Observe the maximum duty cycle for cutting components.

NOTICE**Material damage caused by unplugging the mains plug during operation**

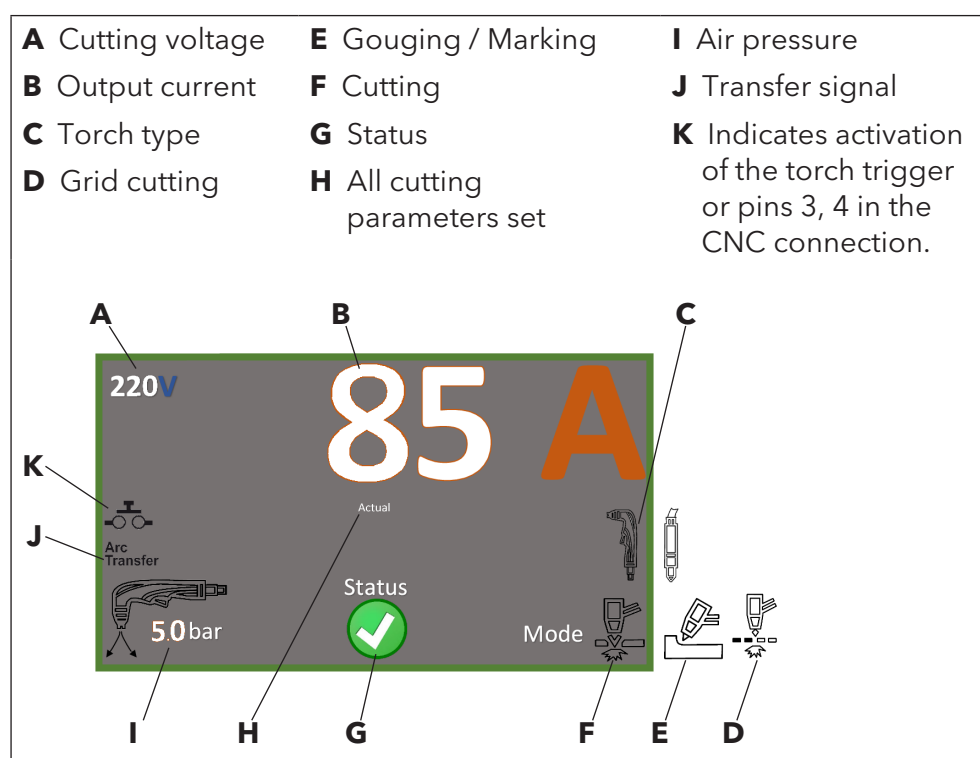
If the mains plug is unplugged during operation, the device may be irreparably damaged.

- Do not unplug the power plug during operation and ensure a constant power supply.

NOTICE**Material damage due to switching the output current strength during operation**

If the output current strength is switched during operation, the unit may be damaged.

- Set the output current strength before starting operation and do not switch it during the cutting process.

8.1 LCD description**Fig. 10** LCD description

8.1.1 Setting the parameters

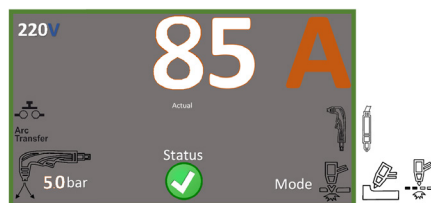
The LCD menu is used to set the cutting current (amps), cutting modes, and pressure in bar, MPa, or psi.



- 1 Press the multi-function button for one second.

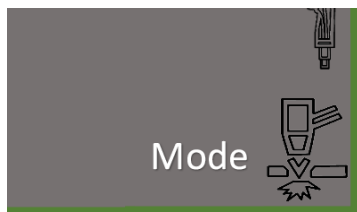
The adjustable values and the word "Set" flash in red.

- 2 Press the multi-function button briefly to switch between the values.
- 3 Turn the multi-function button to the left or right to increase or decrease the values.
- 4 Press the multi-function button briefly to accept the set values.



Once all values are set, they are displayed in white and the word "Status" appears with a green and white checkmark.

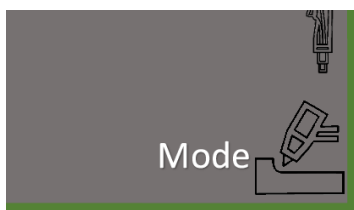
8.1.2 Selecting the cutting mode



Cutting

The current is 20-85 A.

The pressure of the cutting gas is 5.2 bar.



Gouging

The current is 20-85 A.

The pressure of the cutting gas is 5 bar.

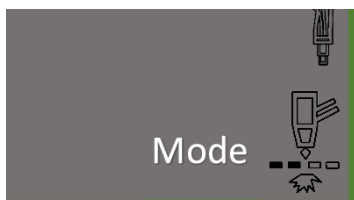
Marking

(uses same icon as gouging - for power supplies equipped with the marking upgrade kit.)

The current is 10-16 A.

The pressure of the cutting gas is 2.4 bar.

The pressure is changed under SETTINGS. For settings use the tables for marking.



Grid cutting

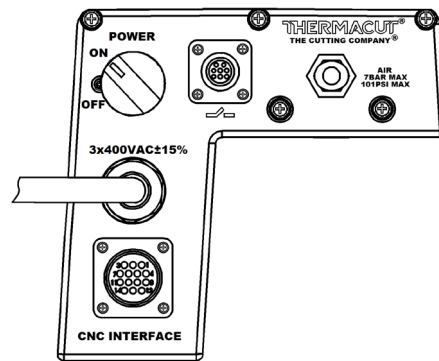
The current is 20-85 A.

The pressure of the cutting gas is 5.2 bar.

8.1.3 Connecting the work lead

- 1 Remove contamination from the workpiece.
- 2 Clamp the work lead with the workpiece clamp to the workpiece in order to allow maximum electrical conduction.
- 3 Do not connect the work lead clamp to the material to be cut off.
- 4 Connect the work lead clamp as close as possible to the cutting area in order to minimize electromagnetic fields.

8.2 Powering on the machine



- Set the POWER switch to ON.



- The following is displayed immediately after switching on:
 - Type of power source (85HD)
 - Length of torch cable (5, 8, 15, 23 m)
 - Type of cutting torch (hand or machine)
 - Current firmware

8.3 Manual cutting process

- 1 Switch on the power supply.
- 2 Automatic gas test (five seconds).
- 3 Automatic system test (five seconds).
- 4 Press torch trigger.
- 5 Generate a pilot arc.

Once the workpiece is detected, the pilot arc switches to a cutting arc.

- 6 The cutting process starts.
- 7 Extinguish the arc by releasing the torch trigger.

Gas post-flow period is approx. 30 seconds depending on the output current and is not adjustable.

8.4 Manual grid cutting and gouging process

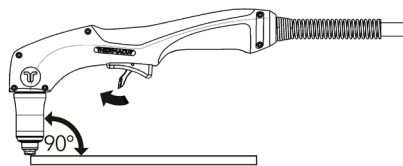
- 1 Switch on the power supply.
- 2 Automatic gas test (five seconds)
- 3 Automatic system test (five seconds)
- 4 Select either grid cutting or gouging mode.
- 5 Press torch trigger.
- 6 Generate a pilot arc.

Once the workpiece is detected, the pilot arc switches to a cutting arc.

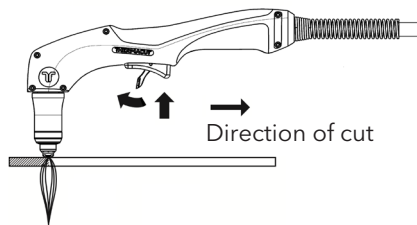
- 7 Grid cutting or gouging starts depending on the selected process.
- 8 Extinguish the arc by releasing the torch trigger.

Gas post-flow period is approx. 30 seconds depending on the output current and is not adjustable.

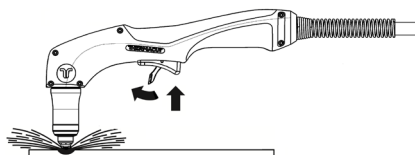
8.5 Cutting



- 1 Start the cutting process at the edge of the workpiece.
- 2 Do not move the cutting torch until the material has been cut through completely.
- 3 Place the cutting torch upright on the edge of the workpiece.



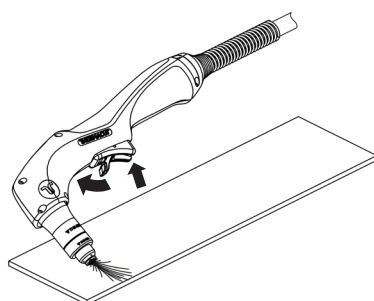
- 4 Pull the cutting torch in the cutting direction. Sparks must emerge from the underside of the workpiece.
- 5 Pay attention to the following when cutting:
 - Hold the cutting torch vertically and observe the arc while cutting.
 - Make light contact between the shield and the workpiece and pull the cutting torch in the cutting direction at a constant speed.
 - For cutting thin workpieces, reduce output current strength to a minimum to achieve the highest cutting quality.
 - For cutting straight lines/bevels, use a straight edge as a guide.
 - For cutting circles, use a template or circle cutting device.



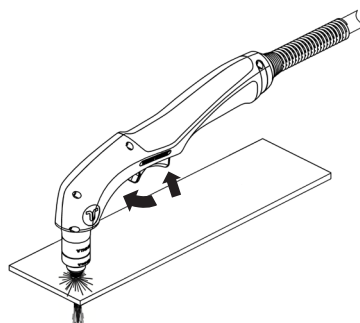
If sparks escape upwards during cutting, the material has not yet been completely separated. Proceed as follows:

- Reduce the speed at which the cutting torch is pulled.
- Check the setting for the output current.
- Check the compressed air settings.
- Check consumables for wear/damage.

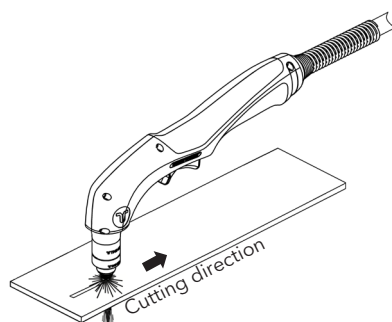
8.6 Piercing



- 1 Hold the cutting torch at an angle to the workpiece with a max. distance of 3 mm from the nozzle to the workpiece.
- 2 Press the torch trigger to ignite the arc.



- 3 Turn the cutting torch slowly in a vertical direction.
- 4 Hold the cutting torch until the arc emerge from the underside of the workpiece. Only then is the hole completely pierced through.



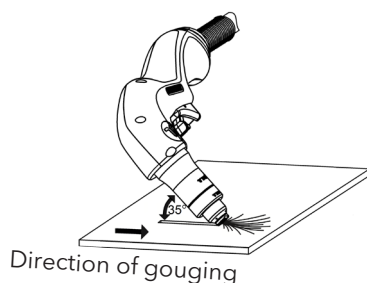
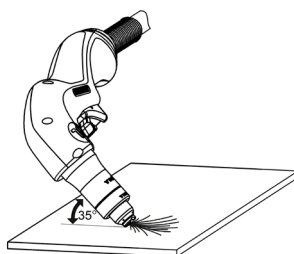
- 5 Pull the cutting torch in the cutting direction. Sparks must emerge from the underside of the workpiece.

8.7 Gouging

Gouging can remove welding seams and achieve a controlled joint profile. The gouging profile can be influenced by the actions in the following table:

Tab. 10 Actions affecting the gouge profile

Gouging profile	Actions
Narrower and flatter	• Reduce current or increase speed.
Narrower and deeper	• Reduce the distance between the torch and workpiece or hold the cutting torch at larger angle to workpiece.
Wider and deeper	• Increase current or reduce the speed.
Wider and shallower	• Increase the distance between the cutting torch and workpiece or hold the cutting torch at flatter angle to the workpiece.



- 1 Use gouging consumables suitable to the cutting torch being used.
- 2 Hold the cutting torch at an angle of 35° to 45° inclined to the workpiece.
- 3 Hold the nozzle close enough to the workpiece that it touches the workpiece.
- 4 Press the torch trigger to ignite the arc.
- 5 Continue to hold the cutting torch at an angle of 35° to 45° to the workpiece and move it in the direction of the material to be removed.

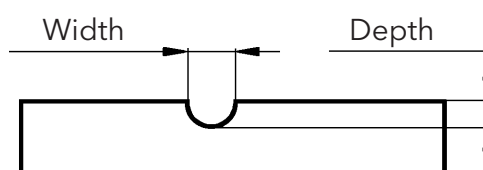
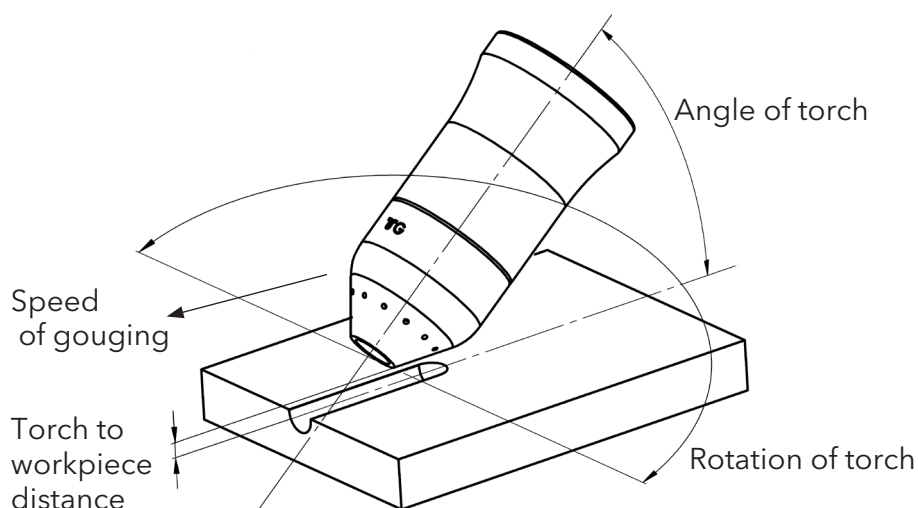
8.7.1 Table for FHT-EX® 105TT material removal

Tab. 11 Table for FHT-EX® 105TT material removal

Gouging parameters			
(Dynamic) air pressure	5 bar (75 psi)		
Distance between cutting torch and workpiece	As close as possible		
Angle of cutting torch to workpiece	35–45 °		
Speed	0.6 m/min (23 in/min)		
Current	65 A	85 A	105 A
Removal rate for mild steels	Approx. 4.8 kg/hr	Approx. 7.7 kg/hr	Approx. 9.0 kg/hr
Width of gouge	Approx. 5.5 mm	Approx. 5.7 mm	Approx. 6.2 mm
Depth of gouge	Approx. 4.5 mm	Approx. 4.8 mm	Approx. 4.1 mm

8.7.2 Gouge profile

The gouge profile can be modified by changing the speed of moving of the torch over the workpiece, changing the angle of the torch to the workpiece, changing the torch to workpiece distance or changing the gouging amperage (the output power) of the power supply.



8.7.3 Modification of the gouge profile

Tab. 12 Table of the modification of the gouge profile

The gouge profile		The actions which affected the gouge profile			
Width	Depth	Gouging amperage of the power supply	Gouging speed of the torch	Torch to workpiece distance	Torch to workpiece angle
decreasing ↓	decreasing ↓	decreasing ↓			
decreasing ↓	decreasing ↓		increasing ↑		
decreasing ↓	increasing ↑			decreasing ↓	
decreasing ↓	increasing ↑				increasing ↑
increasing ↑	increasing ↑	increasing ↑			
increasing ↑	increasing ↑		decreasing ↓		
increasing ↑	decreasing ↓			increasing ↑	
increasing ↑	decreasing ↓				decreasing ↓

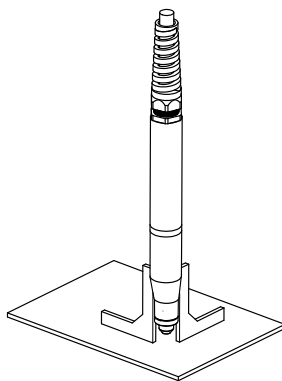
8.8 Operating the machine cutting torch

- » **7.2.1 FHT-EX® 105TT Cutting torch consumables installation** on page EN-22.

8.8.1 Aligning FHT-EX® 105TT machine cutting torch

For information on the cutting process see

- » **6 Setting up the power supply** on page EN-18



- 1** Position the cutting torch perpendicular to the workpiece.
- 2** Use an angle gauge to align the machine cutting torch at 0° and 90°.

8.9 Stopping the cutting process

⚠ CAUTION

Risk of injury due to hot parts

Parts may still be hot after the gas post-flow period ends. People are at a risk of burns.

- Wear your personal protective equipment.
- Allow the cutting torch to cool down for 5-10 minutes before touching the parts.

- Release the torch trigger to end the cutting process.

After releasing the torch trigger, the gas continues to flow for up to 30 seconds, depending on the set output current, in order to cool the cutting torch and the consumables.

- To end the gas post-flow period prematurely, briefly press and release the torch trigger.
- Press the torch trigger again to ignite the pilot arc.

9 DECOMMISSIONING

- 1 Set the POWER switch to OFF.
- 2 Disconnect the device from the input power supply.
- 3 Disconnect the device from the gas supply.
- 4 Apply inward pressure to TCS plug when lifting latch for leads removal.

10 MAINTENANCE AND CLEANING

Scheduled maintenance and cleaning are prerequisites for a long service life and trouble-free operation. The maintenance cycle is determined by the work environment and the EX-TRAFIRE®85HD's maintenance intervals. If it operated for more than eight hours a day, the maintenance intervals should be changed as needed. When using plasma arc cutting equipment, always observe the provisions of EN 60974-4 Inspection and testing, as well as any local laws and regulations.

WARNING

Electric shock due to missing grounding

If the cover plates are improperly mounted, the grounding may not be properly established. There is a risk of life-threatening electric shock.

- The cover plates may be disassembled and assembled only by a qualified electrician for maintenance and cleaning work.
- Verify the grounding has been established correctly.
- Each time the cover plates are opened, have a safety inspection performed in accordance with DIN IEC 60974 Part 4: "Periodic inspection and testing" by Thermacut® or another authorized specialist.

WARNING

Electric shock due to live parts

Fatal electric shocks can occur if components are live during maintenance and cleaning work.

- Set the POWER switch to OFF before maintenance and cleaning work.
- Disconnecting the input power supply.
- After disconnecting the device from the input power supply, wait at least five minutes before carrying out any maintenance and cleaning work, especially opening the device.

WARNING

Electric shock due to defective cables

Damaged or improperly installed cables can lead to fatal electric shock.

- Check all live cables and connections for proper installation and damage.
- Damaged, deformed or worn parts should only be replaced by a qualified electrician or trained personnel.

CAUTION

Fire hazard due to contamination

Dust deposits inside the EX-TRAFIRE®85HD can lead to a reduction in insulation. This can cause short circuits or fires.

- Clean the device annually with dried compressed air to remove dust and cutting fume residue.

10.1 Maintenance and cleaning intervals

The specified intervals are standard values and refer to single-shift operation. We recommend recording the inspections. The date of the inspection, the detected defects and the name of the inspector should be documented.

Tab. 13 Maintenance and cleaning intervals

Daily/every 6 hours of cutting	Check the gas settings.
	Check cables, connector hoses, and connections for tight fit and damage, and replace if necessary.
	Check the work clamp for contamination.
	Check the cutting torch's consumables for wear.
Weekly	Check the cap sensor.
Every 3 months	Check the cutting torch for signs of cracks in the torch body and exposed wires.
	Check the gas hose, filter elements and connections for leaks.
	Open the device body and have the inside of the device cleaned with a vacuum cleaner or dry, clean compressed air by Thermacut® or a different authorized specialist.
Annually and after each time the housing is opened	Have a safety inspection performed in accordance with DIN IEC 60974 Part 4: Periodic inspection and testing" by Thermacut® or trained personnel.

Tab. 14 Parts inspection

Consumable	Check for	Action
Shield	Orifice is not round.	Replace the shield.
	Spatter in the gap between the shield and the nozzle.	Clean the shield and nozzle surface.
Retaining cap	Heat damage, cracks, breaks, damaged threaded connections, clogged gas holes.	Replace the retaining cap.
Nozzle	Orifice is not round.	Replace the nozzle.
Swirl ring	Outer surface is damaged or dirty.	Clean or replace the swirl ring.
	Electrode restriction due to dirt, debris, or damage on interior surfaces.	
	Clogged or damaged gas holes.	
Electrode	Pit depth in hafnium is deeper than 1.6mm.	Replace the electrode.
Cutting torch	Fire or arc damage inside.	Replace the cutting torch.
	Worn or damaged threaded connections.	
	Burned or missing material.	
	Cutting torch is damaged or dirty.	
	Damaged O-ring.	Replace the O-ring.
	Dry O-ring.	Apply a thin layer of silicone grease.

11 FAULTS AND TROUBLESHOOTING

- Verify consumables selection according to:
 - » **Tables 20 - 21** FHT-EX®105TTH consumables for hand cutting torch on page EN-49.
 - » **Tables 25 - 27** FHT-EX®105TTM consumables for machine cutting torch on pages EN-52 - 54.
- Contact your retailer or Thermacut® in the event of questions or problems.

⚠ WARNING

Electric shock due to live parts

Fatal electric shock can occur if components are live during maintenance and cleaning work.

- Set the POWER switch to OFF before maintenance and cleaning work.
- Disconnecting the power supply.
- After disconnecting the EX-TRAFIRE®85HD from the input power supply, wait at least five minutes before carrying out any maintenance and cleaning work, especially opening the EX-TRAFIRE®85HD.

Tab. 15 Fault messages in the display

Error code	Cause	Troubleshooting
H01	Input power voltage is too low.	• Check the input power voltage against the specifications on the identification plate.
H02	Input power voltage is too high.	• Check the input power voltage against the specifications on the identification plate.
H03	No arc or current if the trigger is pressed.	• Have the inverter, transformer, and FRD checked by a certified electrician or trained personnel..
H04 Arc does not ignite when torch trigger is pressed or the CNC start signal is on.	Missing nozzle or electrode.	• Verify that the consumable is installed correctly and, if necessary, re-install it correctly or replace it.
	Dirt or short circuit in the cutting torch.	• Dismantle all consumables, clean the inside of the cutting torch and install correctly.
	Consumables are not Thermacut® original parts.	• Use Thermacut® original consumables.
	Consumable part is loose, incorrectly installed or defective.	• Verify that the consumables are installed correctly and, if necessary, re-install correctly or replace them.
H05	The electrode is not separated from the nozzle during the pilot arc.	• Check for free movement of the electrode and clean or replace parts, if necessary.

Tab. 15 Fault messages in the display

Error code	Cause	Troubleshooting
H06 Excess temperature	Fan is defective.	• Ensure that the fan is running freely. • Replace the fan or fan motor.
	Duty cycle has been exceeded.	• Allow the device to cool down. • Do not exceed the duty cycle.
	Insufficient ventilation.	• Verify sufficient space around the device.
	Components defective.	• Contact service or your retailer.
H07 Excess current	Inverter overcurrent.	• Have the output diodes, main transformer, and IGBT on the inverter board checked by an authorized certified electrician, or trained personnel.
H08 Arc does not ignite when torch trigger is pressed or the CNC start signal is on	The cutting torch is missing or not connected.	• Verify the proper cutting torch is connected.
	Consumables are loose, incorrectly installed or missing.	• Verify that the consumables are installed correctly and, if necessary, re-install them correctly or replace them.
	Retaining cap is incorrectly installed or has been tightened too tightly.	• Verify that the retaining cap is correctly installed, re-install correctly and tighten, if needed.
	Consumables used are not Thermacut® original parts.	• Use only Thermacut® original consumables.
H11	Missing phase.	• Have the issue checked by a certified electrician or trained personnel.
H14	Incorrect cutting torch.	• Verify the proper cutting torch is connected.
H15	No data communication at the BUS.	• Check the cable. • Replace the CAN BUS PCB. • Have the Control PCB replaced by a certified electrician or trained personnel.
H16	Data recording failed.	• Check the cable. • Replace the CAN BUS PCB. • Have the control PCB replaced by a certified electrician or trained personnel.
H17 GAS	Gas inlet pressure is below 5 bar (72.5 psi).	• Check the gas inlet pressure. • Check the gas pressure and flow. • Verify the gas settings are correct.
	Insufficient plasma gas flow.	
	Defective torch cable.	• Replace the torch cable.
	Pressure sensor is defective.	• Have the pressure switch checked and, if necessary, replaced by a certified electrician or trained personnel.

Tab. 15 Fault messages in the display

Error code	Cause	Troubleshooting
H18	Watchdog fault.	Have the Control PCB replaced by a certified electrician or trained personnel.
H19	Incorrect current setting.	Verify the cutting power settings.
H20	Incorrect cutting mode.	Verify the cutting mode.
H21	Gas pressure fault.	Check the gas supply.
H22 NO BUS_V	Incorrect PFC voltage.	Check the PFC IGBT for damage.
H23	Torch trigger is pressed before starting or during initialization.	Verify that the trigger is not pressed when the power supply is switched on and during initialization.

Tab. 16 General faults

Fault	Description	Cause	Troubleshooting
Switch is set to ON, LCD does not illuminate.	No/low input power voltage.	Input power supply is insufficient.	Check the input power voltage.
		Power cable is not connected.	Plug the input power plug into the socket.
		Switch is defective.	Switch must be replaced by an certified electrician or trained personnel.
Gas does not flow when the torch trigger is pressed or the CNC start signal is switched on.	Gas valve defective or gas hose loose.	Hose to gas valve loose or not connected.	- Connect hose to gas valve. - Tighten correctly..
		Gas valve is defective.	Contact your retailer.
Arc does not ignite and there is no fault code when torch trigger is pressed or the CNC start signal is on.	Incorrect cutting torch type is connected.	Cutting torch type is incorrect.	Verify the proper cutting torch is connected.
	Incorrect gas pressure.	Consumables are defective or improperly installed.	Check consumables and replace, if necessary.

Tab. 16 General faults

Fault	Description	Cause	Troubleshooting
No transfer between pilot arc and workpiece.	Poor contact between work lead clamp and workpiece.	No contact between work lead clamp and workpiece.	- Remove contamination and/or oxidation from the workpiece and the work lead clamp. - Attach the work lead clamp to the workpiece in order to allow maximum electrical conduction.
		Standoff between cutting torch and workpiece is too great.	Decrease the standoff between cutting torch and workpiece.
		Work lead is defective.	Replace the work lead.
Output current too low, cannot be controlled	Poor contact between work lead clamp and workpiece.	Connection fault in work lead or cutting torch cable.	Ensure that all cable connections are correctly installed.
		No contact between work lead clamp and workpiece.	- Remove contamination and/or oxidation from the workpiece and the work lead clamp. - Attach the work lead clamp to the workpiece in order to allow maximum electrical conduction.
		Standoff between cutting torch and workpiece is too great.	Decrease the standoff between cutting torch and workpiece.
	Voltage fault	Faulty input voltage.	- Verify the correct input voltage according to the identification plate. - Check consumables and replace if necessary.
Pilot arc ignites with difficulty and switches off.	Consumables are defective.	Consumables are worn or damaged.	Check consumables and replace, if necessary.
	Faulty gas flow.	Gas flow too high. Gas flow too low.	- Check gas compressor. - Check supply lines.
Output current cannot be controlled.	Poor contact between work lead clamp and workpiece.	Connection fault Faulty cable connections.	Ensure that all cable connections are correctly secured.
			Attach the work lead clamp to the workpiece in order to allow maximum electrical conduction.

Tab. 16 General faults

Fault	Description	Cause	Troubleshooting
Insufficient cutting quality.	Incorrect setting for output current.	Output current (amps) too low/material too thick.	Remove contamination and/or oxidation from the workpiece and the work lead clamp.
	Consumables are defective.	Consumables are worn.	Inspect consumables in the cutting torch and replace, if necessary.
	Poor cutting quality.	Incorrect cutting technology.	- Adjust the output current strength to the speed at which the cutting torch is pulled and thickness of the workpiece. - Verify the standoff between cutting torch and workpiece. » Cutting tables on pages EN-56 - 61
	Poor contact between work lead clamp and workpiece.	Workpiece is dirty.	- Remove contamination and/or oxidation from the workpiece and the work lead clamp. - Attach the work lead clamp to the workpiece in order to allow maximum electrical conduction.

12 DISASSEMBLY

WARNING

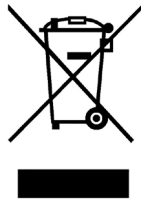
Electric shock due to live parts

Fatal electric shock can occur if components are live during maintenance and cleaning work.

- Set the <POWER> switch to <OFF> before maintenance and cleaning work.
- Disconnecting the power supply.

- 1 Disconnect the power supply.
- 2 Disconnect all supply connections.
- 3 Remove the work lead.
- 4 Disassemble the cutting torch cable assembly by applying inward pressure to TCS plug while lifting TCS latch.

13 DISPOSAL



Equipment marked with this symbol is covered by European Directive 2012/19/EU on waste electrical and electronic equipment (WEEE).

- Do not dispose of electrical and electronic equipment with household waste.
- Disassemble electrical equipment prior to proper disposal.
 - » **12 Disassembly** on page EN-42
- Collect components of electrical separately and recycle in an environmentally responsible manner.
- Observe local regulations, laws, provisions, standards and guidelines.
- Please consult the responsible local authority for information about collection and return of electrical devices.

13.1 Disposal of materials

This product is mainly made of metallic materials that can be melted in steel and iron works and are thus almost infinitely recyclable. The plastic materials used are labeled in preparation for their sorting and separation for later recycling.

13.2 Disposal of supplies

Oil, greases and cleaning agents must not contaminate the ground or enter the sewage system. These substances must be stored, transported and disposed of in suitable containers. Observe the relevant local regulations and disposal instructions in the safety data sheets specified by the manufacturer of the consumables. Contaminated cleaning tools (brushes, rags, etc.) must also be disposed of in accordance with the information provided by the consumables' manufacturer.

- Observe the relevant local regulations and disposal instructions in the safety data sheets specified by the manufacturer of the consumables.

13.3 Packaging

Thermacut® has reduced the transport packaging to the necessary minimum. The ability to recycle packaging materials is always considered during their selection.

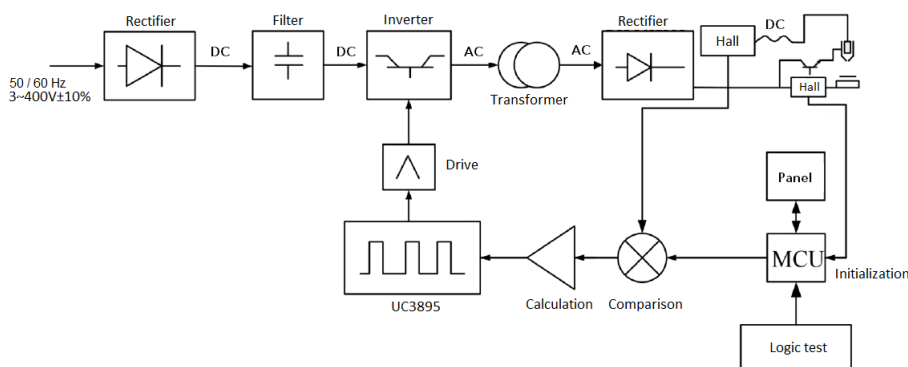
14 WARRANTY

This warranty statement is an integral part of the Terms and Conditions ("T&C") of THERMACUT® (hereinafter "Seller") and applies to deliveries of goods under the contract concluded between the Seller and the other party to the contract as the recipient of the goods (hereinafter "Buyer"); the terms used herein have the same meaning as attributed to them in the T&C.

- 1 The Seller warrants to the Buyer that during the warranty period specified below, the goods delivered under the contract shall retain the properties specified in the technical data sheet for the goods available on the Seller's websites at the time the binding offer is sent (Section 2.2 of the T&C), otherwise in the quality and design suitable for the purpose resulting from the contract, otherwise for the usual purpose.
- 2 The period begins on the day of delivery of the goods to the buyer (Section 5.1, 5.2 of the T&C).
- 3 For the notification (claim) of warranty defects, the assertion of rights arising from the defective performance and other rights and obligations of the Seller and the Buyer, Section 3.4 ff and the following provisions of the T&C apply.
- 4 The warranty period is:
 - Three (3) years for EX-TRAFIRE® brand power supplies.
 - One (1) year for cutting torches and cable assemblies.
- 5 The warranty does not cover normal wear and tear of the goods or their parts as a result of their use, consumables such as nozzles, electrodes, shields, O-rings, vortex rings, etc.
- 6 The Seller shall not be liable for damage to the goods caused by the Buyer or third parties as a result of incorrect or improper handling of the goods (in particular repair or modification by persons not authorized by the Seller) or their installation, improper use of the goods or insufficient maintenance, in particular use of the goods for a purpose other than the specified purpose or other non-compliance with the operating instructions, use of excessive force or use of unauthorized goods.

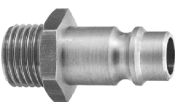
15 BLOCK DIAGRAM

Fig. 11 Block diagram



16 ACCESSORIES

Tab. 17 Accessories

Accessories	Part number	Description
	EX-0-804-001	Filter-EX Compressed Air Filter (Standard package 1 piece)
	EX-0-804-002	Filter-EX Air Filter Cartridge (Standard package 8 pieces)
	EX-0-802-001	DN 7.2 ES Quick-connect plug with male thread G 1/4"
	EX-0-802-002	DN 7.2 ES Quick-connect socket with male thread G 1/4"
	EX-0-803-001	CNC interface plug 14-pin kit, incl. 7 pins
	EX-0-803-003	CNC interface connection cable 3 m (9.8')
	EX-0-803-004	CNC interface connection cable 6 m (19.6')
	EX-0-803-007	CAN bus connection cable 5 m (16.4')
	EX-0-803-006*	CAN bus connection cable 10 m (32.8')
	EX-0-803-009	RS422 bus connection cable 5 m (16.4')
	EX-0-803-008*	RS422 bus connection cable 10 m (32.8')

Tab. 17 Accessories

Accessories	Part number	Description
	EX-0-803-010	Universal connection cable 10 m (32.8')
	EX-0-803-011*	Universal connection cable 5 m (16.4')
	EX-0-803-005	Plasma Arc START/STOP Remote Controller
	EX-0-805-001	Grease, 25 ml

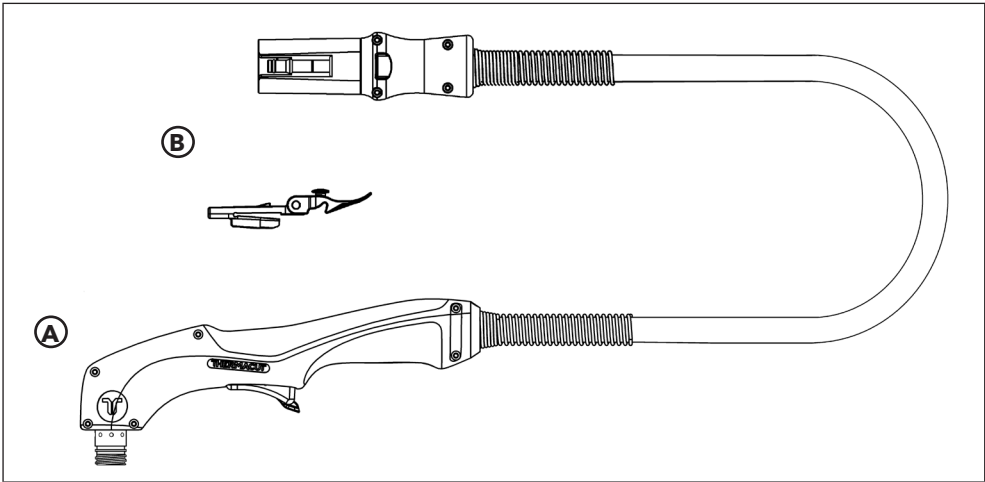
*Available on request

For more information about accessories, visit our website:

www.thermacut.com.

17 TORCHES AND TORCH PARTS

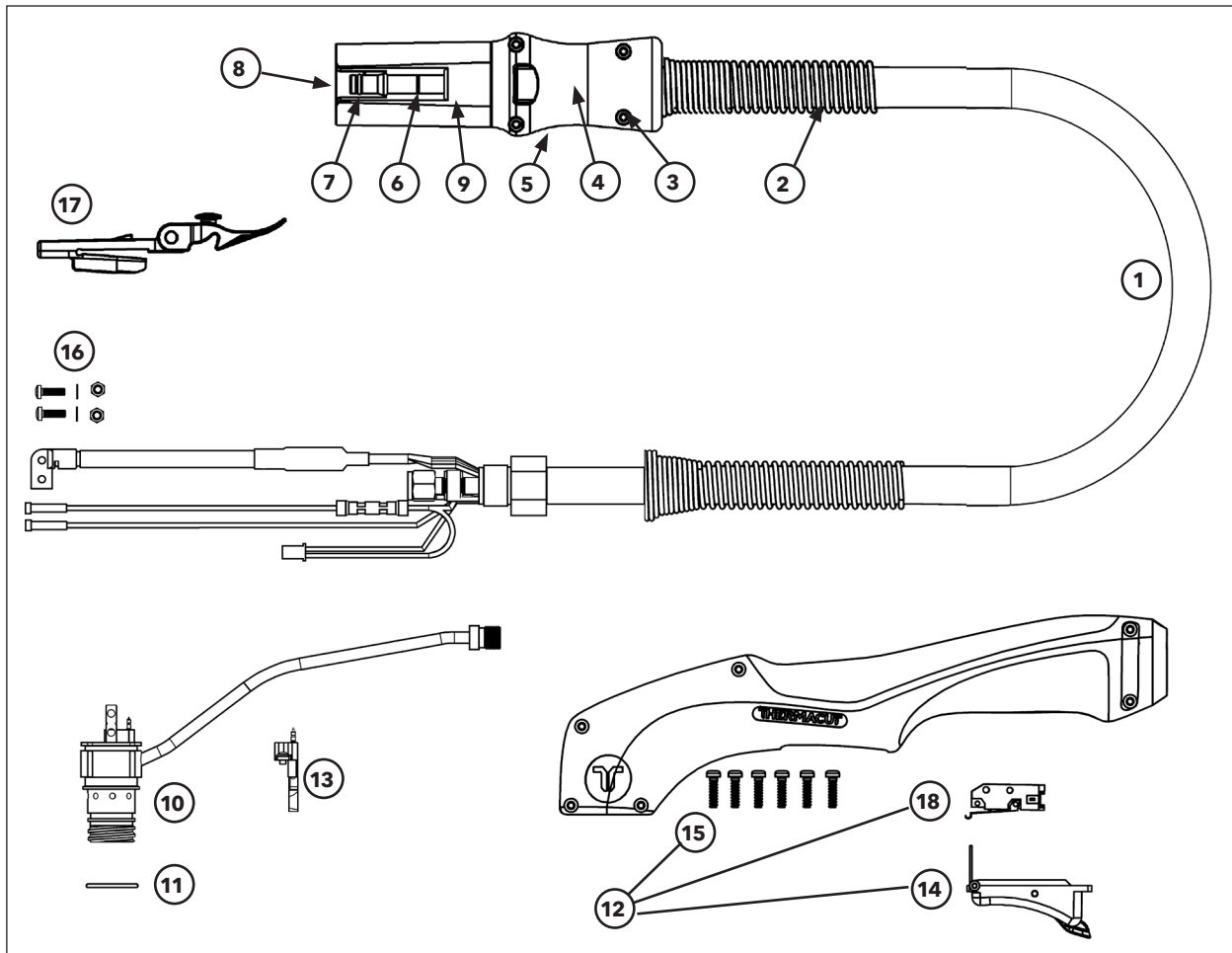
17.1 FHT-EX® 105TTH hand cutting torch unit



Tab. 18 FHT-EX® 105TTH hand cutting torch

Item	Part number	Description
A	EX-5-133-002	DEMO FHT-EX®105TTH Hand Torch Assembly/TCS13
	EX-5-139-001	FHT-EX®105TTH Hand Torch Assembly-w/o consumables w/5m (16.5')Lead/TCS13
	EX-5-139-002	FHT-EX®105TTH hand cutting torch without consumables with 8m (26') cable/ TCS13
	EX-5-139-003	FHT-EX®105TTH hand cutting torch without consumables with 15m (50') cable/ TCS13
	EX-5-139-004	FHT-EX®105TTH hand cutting torch without consumables with 23m (75') cable/ TCS13
B	EX-0-321-003	Latch with Key Assembly

17.2 FHT-EX® 105TTH hand cutting torch components

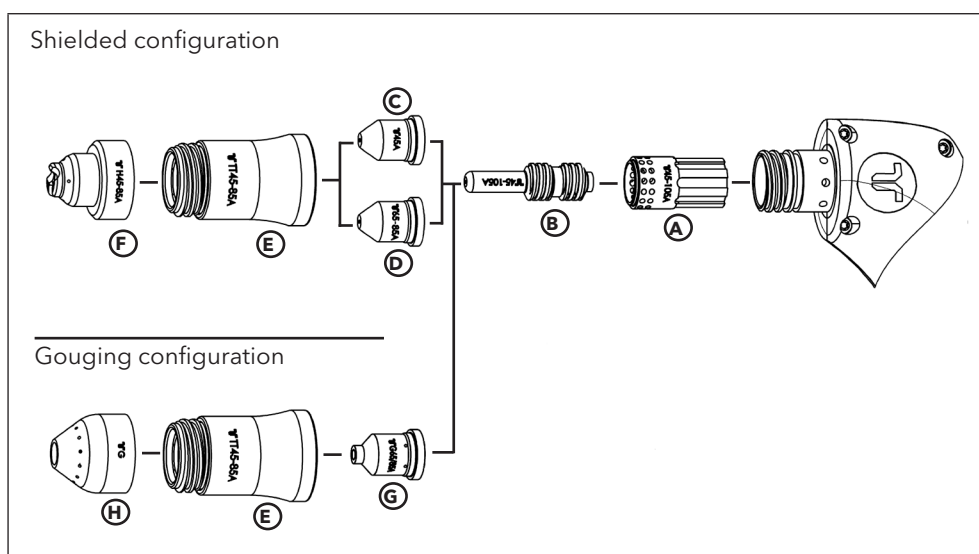


Tab. 19 FHT-EX® 105TTH hand cutting torch components

Item	Part number	DESCRIPTION
1	EX-5-374-010	FHT-EX®105TTH Hand Torch Lead Replacement 5m (16.5')/TCS13
1	EX-5-374-011	FHT-EX®105TTH Hand Torch Lead Replacement 8m (26')/TCS13
1	EX-5-374-012	FHT-EX®105TTH Hand Torch Lead Replacement 15m (50')/TCS13
1	EX-5-374-013	FHT-EX®105TTH Hand Torch Lead Replacement 23m (75')/TCS13
2	EX-5-318-001	TCS Plug Spring Stain Relief
3	EX-0-325-015	TCS Clam Shell Screw Kit (incl. 4 screws)
4	EX-0-325-002	TCS Clam Shell Upper
5	EX-0-325-001	TCS Clam Shell Lower
6	EX-0-325-010	Retaining Ring (Outer circlip ring)
7	EX-0-325-009	O-Ring (fitted in the TCS plug)
8	EX-0-325-005	Male Crimp Pin for TCS Plug
9	EX-0-323-001	TCS13 Plug Body
10	EX-5-302-001	Hand Torch Body FHT-EX®105TTH
11	EX-5-431-050	O-Ring (fitted on the torch body) - 2pcs package
12	EX-5-314-001	Hand Torch Handle Replacement Kit
13	EX-5-305-002	Cap-sensor Replacement Kit with Screws/ Hand Torch
14	EX-5-313-031	Safety Trigger
15	EX-5-308-001	Hand Torch Handle with Screws
16	EX-5-372-010	Cathode mounting kit
17	EX-0-321-003	Latch w/Key Assembly
18	EX-5-313-030	Safety Trigger Micro-Switch

17.3 FHT-EX® 105TTH consumables for hand cutting torch

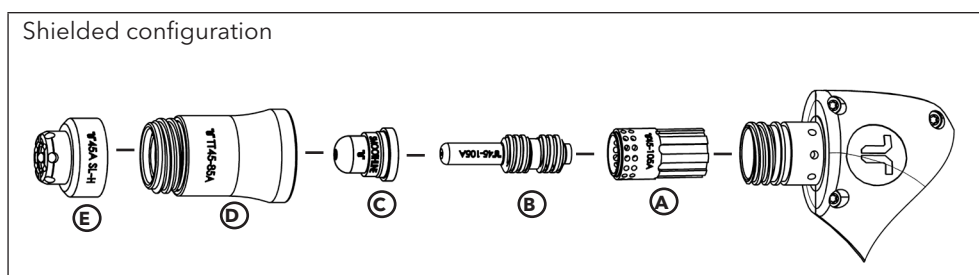
17.3.1 FHT-EX® 105TTH consumables for hand cutting torch 45-85 A



Tab. 20 Consumables for hand cutting torch 45-85 A

Item	Part number	Description
A	EX-5-404-052	Swirl ring 45-105 A
B	EX-5-401-051	Electrode 45-105 A
C	EX-5-410-051	Nozzle 45 A
D	EX-5-410-053	Nozzle 65/85 A
E	EX-5-415-050	Retaining cap 45-85 A
F	EX-5-422-031	Shield 45-85 A, hand
G	EX-5-440-051	Nozzle, gouging 45/85 A
H	EX-5-440-050	Shield, gouging

17.3.2 FHT-EX® 105TTH consumables for SmoothLine hand cutting torch

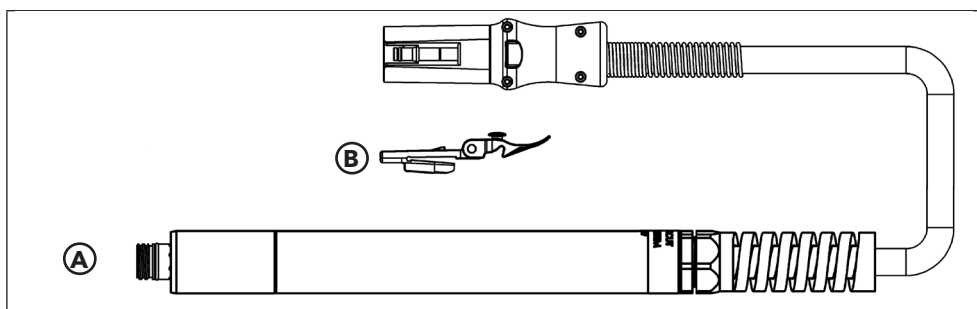


Tab. 21 Consumables for SmoothLine hand cutting torch

Item	Part number	Description
A	EX-5-404-052	Swirl ring 45-105 A
B	EX-5-401-051	Electrode 45-105 A
C	EX-5-410-050	Nozzle, SmoothLine
D	EX-5-415-050	Retaining cap 45/85 A
E	EX-5-420-050	Shield 40/45 A, hand, SmoothLine

17.4 FHT-EX® 105TTM machine cutting torch unit

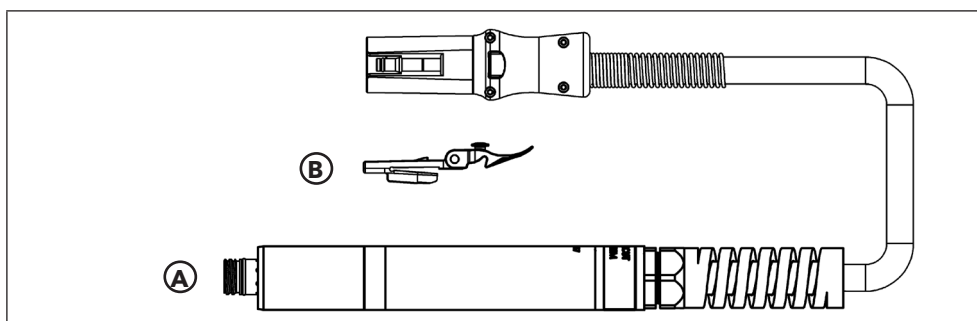
17.4.1 FHT-EX® 105TTM standard machine cutting torch



Tab. 22 FHT-EX® 105TTM machine cutting torch without gear rack

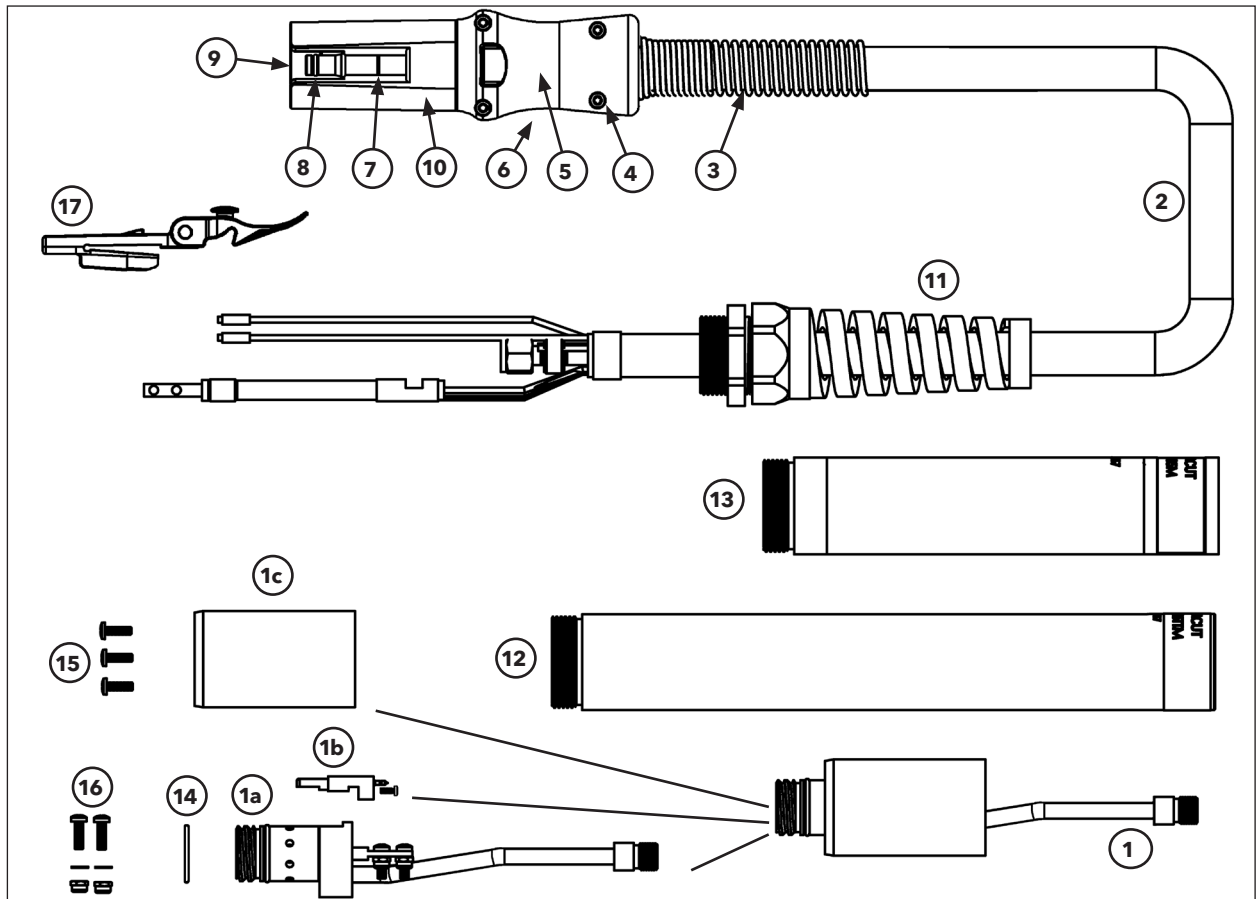
Item	Part number	Description
A	EX-5-202-031	FHT-EX®105TTM machine cutting torch without gear rack, without consumables, with 5m (16.5') cable/ TCS13
	EX-5-204-031	FHT-EX®105TTM machine cutting torch without gear rack, without consumables, with 8m (26') cable/ TCS13
	EX-5-207-032	FHT-EX®105TTM machine cutting torch without gear rack, without consumables, with 15m (50') cable/ TCS13
	EX-5-210-034	FHT-EX®105TTM machine cutting torch without gear rack, without consumables, with 23m (75') cable/ TCS13
B	EX-0-321-003	Latch with Key Assembly

17.4.2 FHT-EX® 105TTM short machine cutting torch



Tab. 23 FHT-EX® 105TTM short machine cutting torch

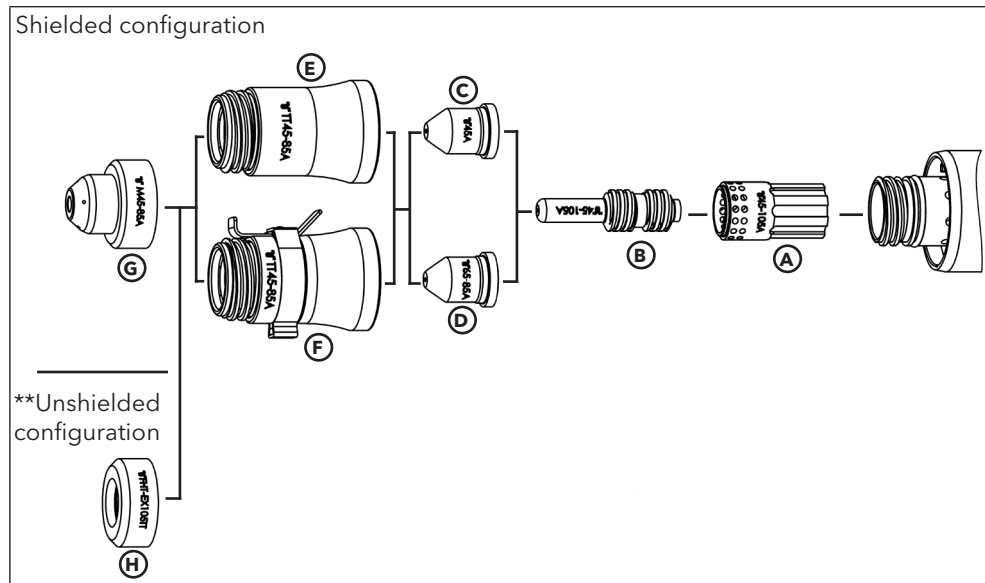
Item	Part number	Description
A	EX-5-242-021	FHT-EX®105TTSM short machine cutting torch without consumables, with 5m (16.5') cable/ TCS13
	EX-5-244-021	FHT-EX®105TTSM short machine cutting torch without consumables, with 8m (26') cable/ TCS13
	EX-5-247-021	FHT-EX®105TTSM short machine cutting torch without consumables, with 15m (50') cable/ TCS13
	EX-5-250-021	FHT-EX®105TTSM short machine cutting torch without consumables, with 23m (75') cable/ TCS13
B	EX-0-321-003	Latch with Key Assembly

17.5 FHT-EX® 105TTM machine cutting torch components**Tab. 24** FHT-EX® 105TTM machine cutting torch components

Item	Part No.	DESCRIPTION
1	EX-5-303-011	Machine Torch Body Assembly FHT-EX®105TTM
1a	EX-5-303-010	Machine Torch Body FHT-EX®105TTM
1b	EX-5-304-001	Cap Sensor Replacement Kit with Screws/Machine Torch
1c	EX-5-306-002	Torch Mounting Sleeve (incl. 3 screws)
2	EX-5-375-010	FHT-EX®105TTM Machine Torch Lead Replacement 5m (16.5')/TCS13
2	EX-5-375-011	FHT-EX®105TTM Machine Torch Lead Replacement 8m (26')/TCS13
2	EX-5-375-012	FHT-EX®105TTM Machine Torch Lead Replacement 15m (50')/TCS13
2	EX-5-375-013	FHT-EX®105TTM Machine Torch Lead Replacement 23m (75')/TCS13
3	EX-5-318-001	TCS Plug Spring Strain Relief
4	EX-0-325-015	TCS Clam Shell Screw Kit (incl. 4 screws)
5	EX-0-325-002	TCS Clam Shell Upper
6	EX-0-325-001	TCS Clam Shell Lower
7	EX-0-325-010	Retaining Ring (Outer circlip ring)
8	EX-0-325-009	O-Ring (fitted in the TCS plug)
9	EX-0-325-005	Male Crimp Pin for TCS Plug
10	EX-0-323-001	TCS13 Plug Body
11	EX-5-317-021	Machine Torch Strain Relief
12	EX-5-306-003	Standard Mounting Tube
13	EX-5-306-009	Short Mounting Tube
14	EX-5-431-050	O-Ring (fitted on the torch body)
15	EX-5-372-005	Torch Mounting Screws Kit (incl. 3 screws)
16	EX-5-372-010	Cathode Mounting Kit
17	EX-0-321-003	Latch w/Key Assembly

17.6 FHT-EX® 105TTM consumables for machine cutting torch

17.6.1 FHT-EX® 105TTM consumables for machine cutting torch 45-85 A



Tab. 25

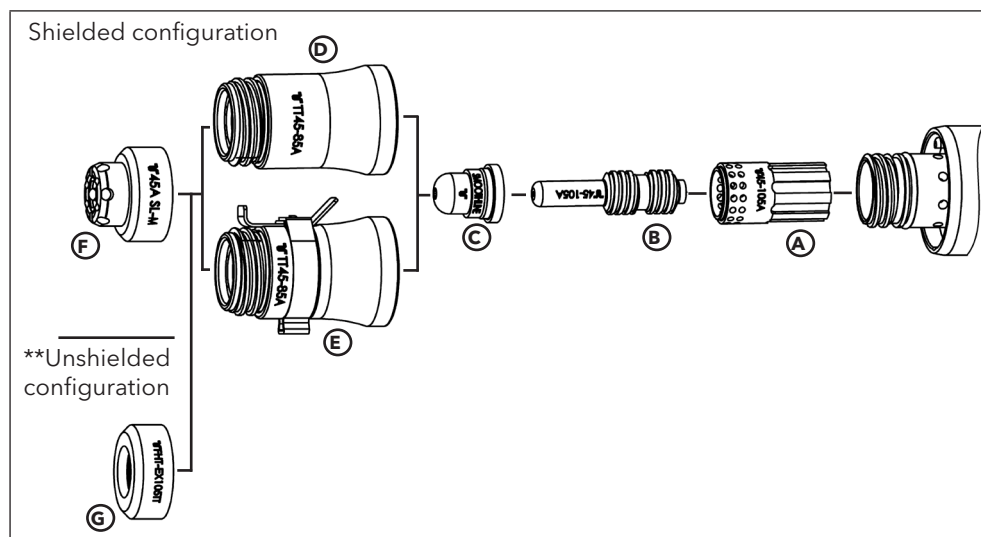
FHT-EX® 105TTM consumables for machine cutting torch 45-85 A

Item	Part number	Description
A	EX-5-404-052	Swirl ring 45-105 A
B	EX-5-401-051	Electrode 45-105 A
C	EX-5-410-051	Nozzle 45 A
D	EX-5-410-053	Nozzle 65-85 A
E	EX-5-415-050	Retaining cap 45-85 A
F	EX-5-415-052	Retaining cap 45-85 A with IHS tab
G	EX-5-422-051	Shield 45-85 A, machine
H	EX-5-423-001	Deflector

- If a torch height controller is used, a retaining cap with IHS (initial height sensing) must be used.

** When used in countries that require CE conformity, the torch must be operated with a shield.

17.6.3 FHT-EX® 105TTM consumables for SmoothLine machine cutting torch



Tab. 26

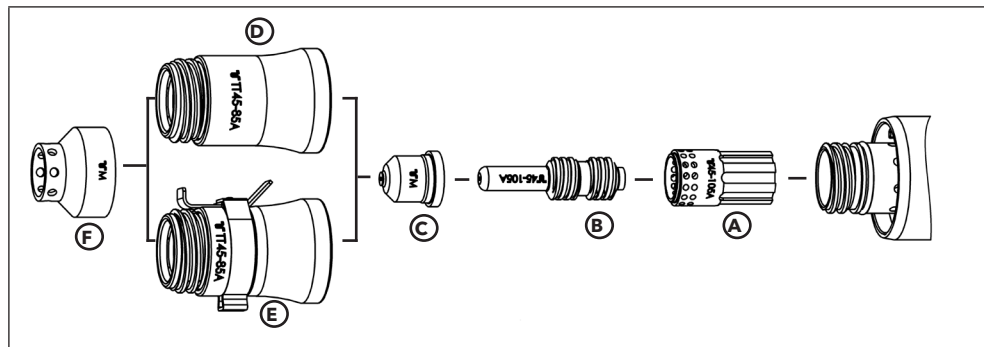
FHT-EX® 105TTM consumables for SmoothLine machine cutting torch

Item	Part number	Description
A	EX-5-404-052	Swirl ring 45-105 A
B	EX-5-401-051	Electrode 45-105 A
C	EX-5-410-050	Nozzle, SmoothLine
D	EX-5-415-050	Retaining cap 45-85 A
E	EX-5-415-052	Retaining cap 45-85 A with IHS tab
F	EX-5-422-050	Shield 40/45 A, machine, SmoothLine
G	EX-5-423-001	Deflector

- If a torch height controller is used, a retaining cap with IHS (initial height sensing) should be used.

** When used in countries that require CE conformity, the torch must be operated with a shield.

17.6.4 FHT-EX® 105TTM consumables for marking machine cutting torch

**Tab. 27**

FHT-EX® 105TTM consumables for marking machine cutting torch

Item	Part number	Description
A	EX-5-404-052	Swirl ring 45-105 A
B	EX-5-401-051	Electrode 45-105 A
C	EX-5-445-001	Nozzle, marking
D	EX-5-415-050	Retaining cap 45-85 A
E	EX-5-415-052	Retaining cap 45-85 A with IHS tab
F	EX-5-445-002	Shield, marking

- If a torch height controller is used, a retaining cap with IHS (initial height sensing) must be used.

18 ORDERING INFORMATION ON BULK PAKS AND STARTER KITS**Tab. 28** Bulk packs for EX-TRAFIRE® 105TTH and EX-TRAFIRE® 105TTM

Part number	Description
EX-5-401-061	Bulk pack - Electrode 45-105 A - 25 pcs.
EX-5-410-060	Bulk pack - nozzle, SmoothLine - 25 pcs.
EX-5-410-061	Bulk pack - nozzle 45 A - 25 pcs.
EX-5-410-063	Bulk pack - nozzle 65-85 A - 25 pcs.
EX-5-422-041	Bulk pack - shield 45-85 A, hand - 18 pcs.
EX-5-422-060	Bulk pack - shield SmoothLine, machine - 18 pcs.
EX-5-422-061	Bulk pack - shield 45-85 A, machine - 18 pcs.

Tab. 29 Starter kits for EX-TRAFIRE® 105TTH and EX-TRAFIRE® 105TTM

Part number	Description
EX-5-432-051	Starter kit 65-85 A for FHT-EX® 105TTH hand torch
EX-5-433-051	Starter kit 65-85 A for FHT-EX® 105TTM machine torch

Each starter kit includes:

- 4 × Hand or machine shield
- 4 × Nozzle
- 4 × Electrode
- 1 × Swirl ring
- 1 × O-ring - torch body

19 CUT CHARTS FOR MECHANIZED CUTTING

Cutting tables serve as a guideline for mechanical cutting. Individual systems can be "fine tuned" to achieve optimum cutting quality.

19.1 45 - 65 A cutting, shielded/ unshielded, with compressed air

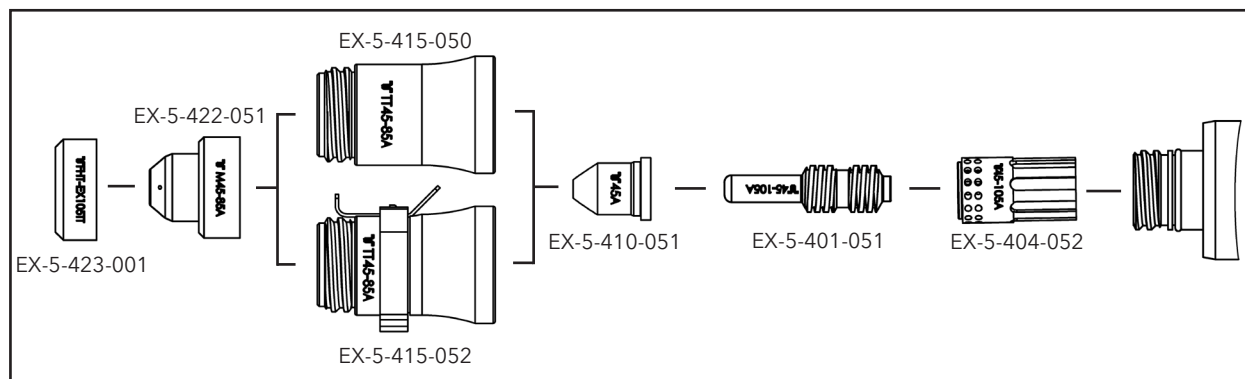
- **Recommended speed:**
Speeds adjusted for cutting capacity do not necessarily represent maximum speeds. They are the speeds that must be achieved for the specified material thickness.
- **Maximum speed:**
The maximum cutting speeds are the result of in-depth laboratory testing. Actual cutting speeds may vary due to different cutting applications.
- **Configuration without shield*:**
If consumables are used without a shield, either the torch must be manually adjusted to the working height, or the arc voltage control (AVC) settings must be selected to achieve the desired cutting quality.

Distance of torch to workpiece for configuration without shield
= distance of nozzle to workpiece.

CONFIGURATION WITHOUT SHIELD	
Cutting	Distance of nozzle to workpiece
45 , 65 A	+3 mm
85 A	+2.75 mm
40 - 45A SmoothLine	+2.15 mm

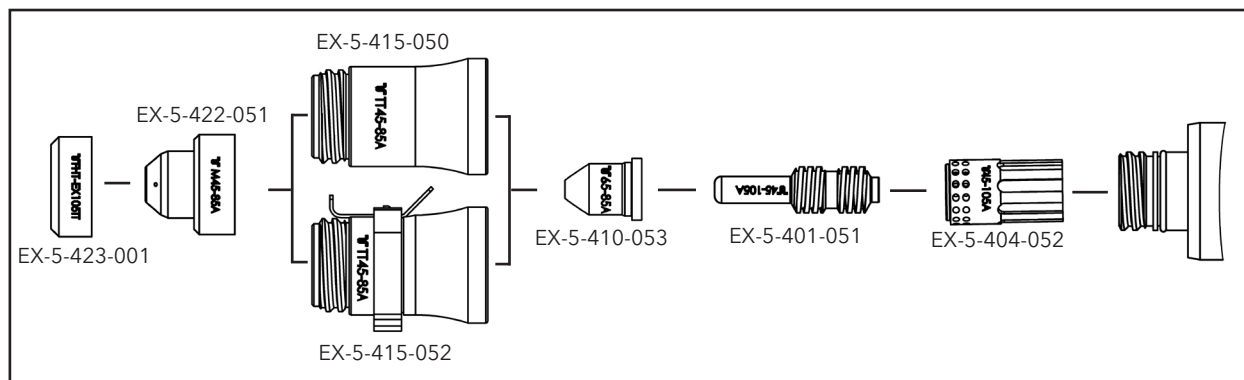
* When used in countries that require CE conformity, the torch must be operated with a shield.

19.1.1 45 A cutting, shielded, with compressed air, dynamic pressure 5.2 bar at approx. 82 l/min gas flow



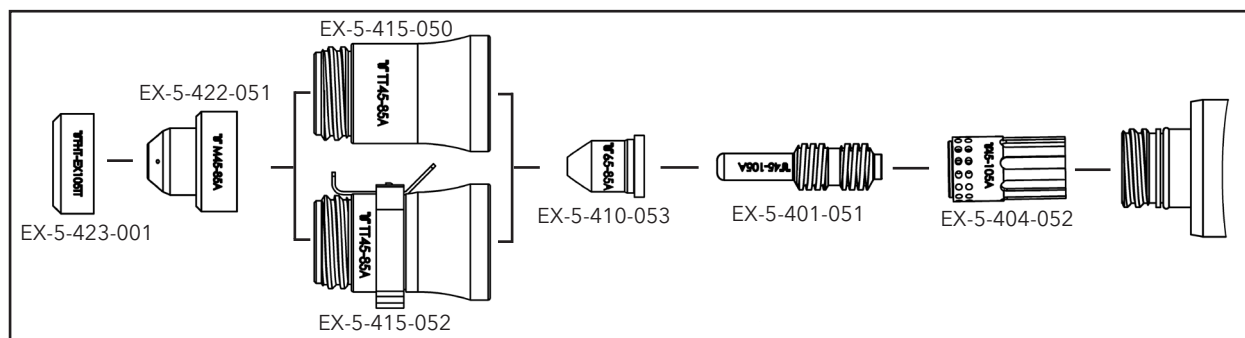
Material thickness	Cut height (shield to work cut height)	Pierce height (shield to workpiece height)	Pierce delay time	Recommended Speed		Maximum Speed		Kerf width
				Settings for highest quality		Standard quality settings		
				Cutting Speed	Voltage	Cutting Speed	Voltage	
[mm]	[mm]	[mm]	[Seconds]	[mm/min]	[Volts]	[mm/min]	[Volts]	[mm]
Mild steel								
2	1.9	3.5	0.1	5600	114	6630	114	1.4
3			0.1	3950	122	4850	123	1.4
4			0.3	2900	126	3400	126	1.4
6			0.5	1500	128	1790	126	1.6
8			0.5	1050	135	1200	134	1.7
10		4	0.6	760	135	850	135	1.8
12		4.5	1	540	139	610	139	1.8
16		Edge start		290	145	340	145	2
20				170	152	210	152	2.2
25				110	155	150	156	2.2
Stainless steel								
2	1.9	3.5	0.1	5300	119	7600	121	1
3			0.2	3000	128	4400	130	1.3
4			0.4	1900	129	2900	131	1.4
6			0.6	1000	134	1600	136	1.6
8		4	0.6	720	139	950	141	1.6
10		4.8	0.8	500	140	750	142	1.6
12		5.2	1.2	320	142	500	144	1.8
16		Edge start		230	148	320	150	2
20				160	150	200	152	2
Aluminium								
2	1.9	3.5	0.1	7850	128	9500	130	1.1
3			0.2	3900	135	6000	137	1.5
4			0.4	3600	131	5600	133	1.5
6			0.5	2000	135	3050	137	1.5
8			0.6	1300	136	1800	138	1.6
10		4	0.7	860	144	1020	146	1.7
12		Edge start		620	148	745	152	1.7
16				340	154	370	156	1.7

19.1.2 65 A cutting, shielded, with compressed air, dynamic pressure 5.2 bar at approx. 87 l/min gas flow



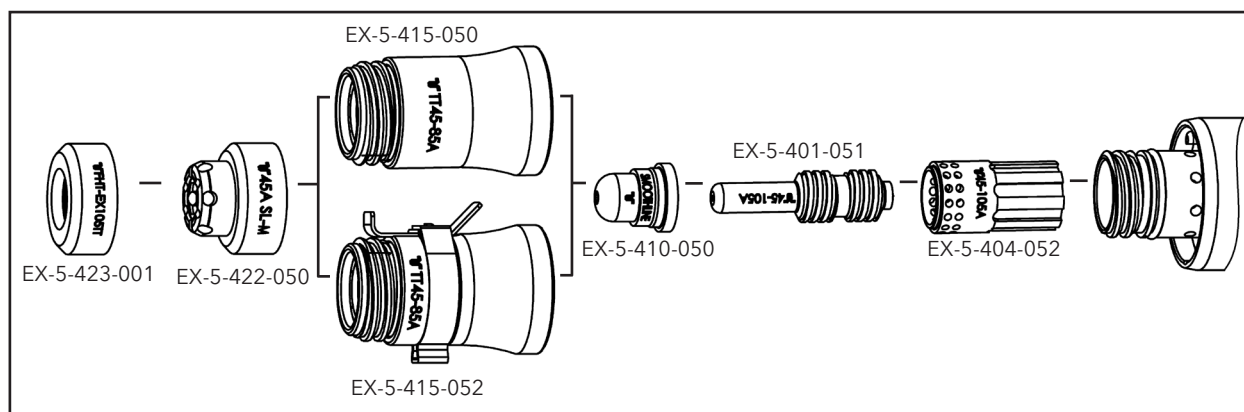
Material thickness	Cut height (shield to work cut height)	Pierce height (shield to workpiece height)	Pierce delay time	Recommended Speed		Maximum Speed		Kerf width
				Settings for highest quality		Standard quality settings		
				Cutting Speed	Voltage	Cutting Speed	Voltage	
[mm]	[mm]	[mm]	[Seconds]	[mm/min]	[Volts]	[mm/min]	[Volts]	[mm]
Mild steel								
2	1.9	3.5	0.1	6200	117	7500	117	1.6
3			0.1	5000	117	5700	117	1.6
4			0.3	4100	122	4590	123	1.6
6			0.5	2100	125	2890	125	1.7
8			0.5	1700	127	1950	128	1.7
10		4	0.8	1050	129	1300	129	1.9
12			1	870	132	970	132	2
16		4.5	1.3	600	141	680	140	2.2
20		Edge start		370	140	440	140	2.2
25				210	150	290	150	2.3
Stainless steel								
2	1.9	3.8	0.1	8000	117	10000	119	1.3
3			0.2	6500	119	8200	121	1.3
4			0.5	5000	122	6100	124	1.3
6			0.5	2350	129	2700	131	1.7
8			0.8	1400	128	1750	130	1.7
10		5	1	900	131	1200	133	2
12		7	1.2	700	136	870	138	2
16		Edge start		480	136	550	138	2
20				270	143	370	145	2
Aluminium								
2	1.9	3.5	0.1	8700	121	10000	123	1.4
3			0.1	7200	122	8800	124	1.4
4			0.3	6000	122	7300	124	1.4
6			0.4	3000	132	4400	134	1.8
8			0.5	1800	134	2600	136	1.9
10		4	0.8	1200	141	1650	143	1.9
12			1	900	146	1300	148	1.9
16		Edge start		650	148	700	150	1.9
20				380	152	560	154	1.9

19.1.3 85 A cutting, shielded, with compressed air, dynamic pressure 5.2 bar at approx. 101 l/min gas flow



Material thickness	Cut height (shield to work cut height)	Pierce height (shield to workpiece height)	Pierce delay time	Recommended Speed		Maximum Speed		Kerf width
				Settings for highest quality		Standard quality settings		
				Cutting Speed	Voltage	Cutting Speed	Voltage	
[mm]	[mm]	[mm]	[Seconds]	[mm/min]	[Volts]	[mm/min]	[Volts]	[mm]
Mild steel								
3	2.1	3.5	0.1	6400	114	7225	115	1.6
4			0.2	4700	122	3100	122	1.6
6			0.5	3100	120	3825	122	1.9
8			0.5	2400	127	2635	126	1.9
10			0.5	1600	128	1800	128	1.9
12		4	0.8	1100	128	1360	127	2.1
16			1	790	132	850	132	2.1
20		5	1.8	490	138	535	140	2.2
25		Edge start		320	145	366	145	2.2
30				160	151	213	150	2.6
Stainless steel								
3	2.1	3.5	0.2	7400	120	9200	122	1.4
4			0.5	6100	122	7500	124	1.4
6			0.5	3600	124	4600	126	1.5
8			0.5	2300	132	2800	134	1.6
10		4	0.8	1500	128	1900	130	1.9
12		5	1.2	1000	132	1300	134	1.8
16			1.4	700	133	760	135	2
20		Edge start		480	141	570	143	2.1
25				300	142	370	144	2.1
Aluminium								
3	2.1	3.5	0.1	8000	128	9400	130	1.6
4			0.2	6500	124	8000	125	1.6
6		4	0.5	3800	125	4900	127	1.6
8		5	0.5	2600	132	3500	134	1.7
10		6	0.5	1900	135	2500	137	2
12		7	0.7	1450	137	1900	139	2.1
16			1	950	141	1200	143	2.1
20		Edge start		600	151	880	153	2.1
25				380	152	540	154	2.1

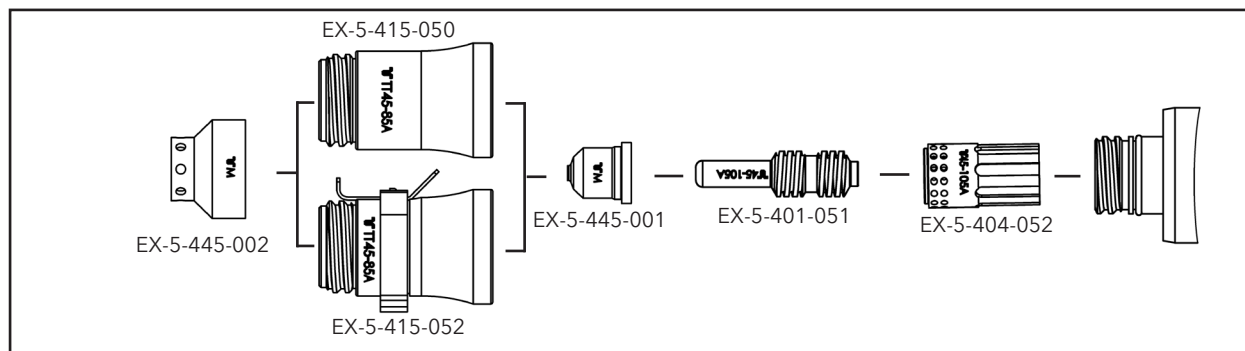
19.1.4 40-45 A cutting, SmoothLine, shielded, with compressed air, dynamic pressure 5.2 bar at approx. 82 l/min gas flow



Material thickness	Cut height (shield to work cut height)	Pierce height (shield to workpiece height)	Pierce delay time	Recommended Speed		Kerf width	Power supply
				Settings for highest quality			
				Cutting Speed	Voltage		
[mm]	[mm]	[mm]	[Seconds]	[mm/min]	[Volts]	[mm]	[A]
Mild steel							
0.5	2	3	0	8250	80	0.7	40
0.6			0	8250	80	0.7	
0.8			0.1	8250	80	0.7	
1			0.2	8250	80	0.7	45
1.5			0.4	6400	80	0.95	
2			0.4	4800	93	1	
3			0.5	2750	95	1.25	
4			0.6	1900	97	1.35	
Stainless steel							
0.5	2	3	0	8250	74	0.65	40
0.6			0	8250	74	0.65	
0.8			0.1	8250	74	0.65	
1			0.15	8250	74	0.7	45
1.5			0.4	6150	75	0.7	
2			0.4	4320	84	0.9	
3			0.5	2085	94	1.1	
4			0.6	895	96	1.1	

19.2 Tables for marking

19.2.1 Marking, shielded, with compressed air or argon, dynamic pressure 2.4 bar at approx. 39 l/min gas flow



With compressed air

Marking	Power supply	Cut height (shield to work cut height)	Initial marking height	Delay	Marking speed	Arc voltage	Kerf width	Kerf depth
	[Amps]	[mm]	[mm]	[Seconds]	[mm/min]	[Volts]	[mm]	[mm]
Mild steel								
Light	10	6.4	6.4	0	2540	127	1.4	<0.02
Heavy	10	4.6	4.6	0	2540	109	1.62	0.02
Stainless steel								
Light	10	5.1	5.1	0	5080	116	1.96	0.02
Heavy	10	6.4	6.4	0	3175	128	2.29	0.05
Aluminium								
	11	1	1	0	5080	80	0.92	<0.02

With argon

Marking	Power supply	Cut height (shield to work cut height)	Initial marking height	Pierce delay time	Marking speed	Arc voltage	Kerf width	Kerf depth
	[Amps]	[mm]	[mm]	[Seconds]	[mm/min]	[Volts]	[mm]	[mm]
Mild steel								
Light	10	2	2	0	3175	41	1.62	<0.02
Heavy	15	1.5	1.5	0	3175	41	1.2	0.02
Stainless steel								
Light	12	2.5	2.5	0	3175	43	1.40	<0.02
Heavy	15	2.5	2.5	0	2540	43	1.50	<0.02
Aluminium								
	16	0.5	0.5	0	4445	39	0.6	<0.02

20 APPENDIX

20.1 Connecting the CNC interface

The optional CNC interface plug installs onto the rear panel of the device. Control signals can be transmitted via the CNC interface. For signal types see Table 30 on this page.

The control elements are located on the control panel. The connections are on the front and rear panel of the power supply.

» **4.1 Assembly and use** on page EN-11

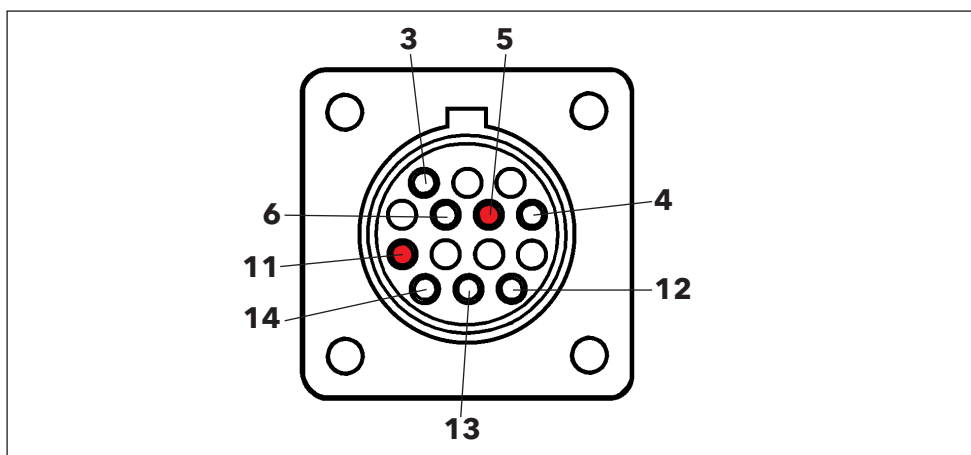
⚠ WARNING

Electric shock due to live parts

Live parts are exposed when the housing is open. This can result in fatal electric shocks.

- Set the POWER switch to OFF and disconnect the mains plug before opening the housing.

Fig. 12 Signal and pin assignment for CNC interface



Tab. 30 Signal and pin assignment for CNC interface

Signal	START (Start plasma cutting)	Arc (Start machine motion)	Ground	BUS activation	Voltage divider
Type	Input	Output	Ground	Input	Output
Note	Open by default. Requires a dry contact to close.	Open by default. Dry contact with max. capacity of: 120 V AC/1 A		Open by default. Requires a dry contact to close.	Divided arc voltage signal of: 20:1 21.1:1 30:1 40:1 50:1 (supplies max. 18 V)
Rear socket connection	3, 4	12, 14	13	5, 11	6 (+), 5 (–)
Internal wire color	white, yellow	yellow, red	green/yellow	black, yellow	6 (red), 5 (black)

20.1.1 Setting the voltage divider DIP switches

The voltage divider DIP switches are preset to 50:1.

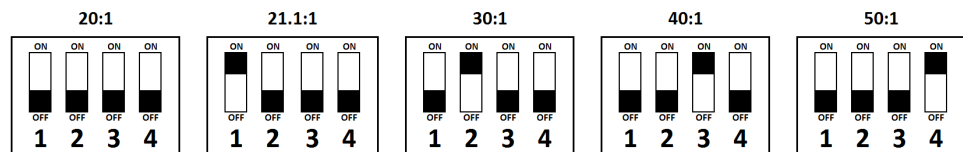
1 Turn off the EX-TRAFIRE®85HD and unplug the power supply prior to opening the housing.

The housing must be opened only by a certified electrician or trained personnel.

The voltage divider DIP switches must be set only by a certified electrician or trained personnel.

2 Have a safety inspection performed in accordance with IEC 60974 Part 4: "Periodic inspection and testing" by Thermacut® or another authorized specialist.

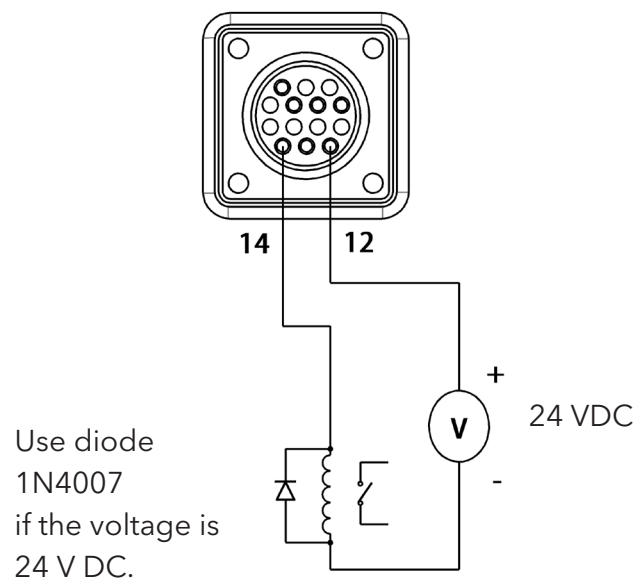
Fig. 13 Voltage divider DIP switch settings



20.1.2 Enabling the external DC coil with an external power supply

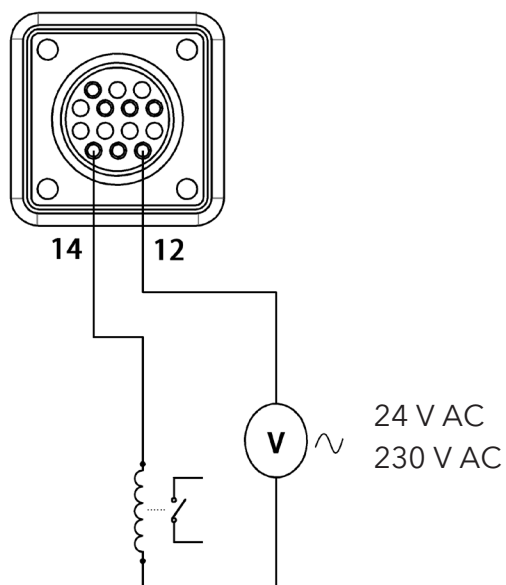
» For 24 V DC, use a 1N4007 diode.

Fig. 14 Enable the external DC coil with an external power supply.



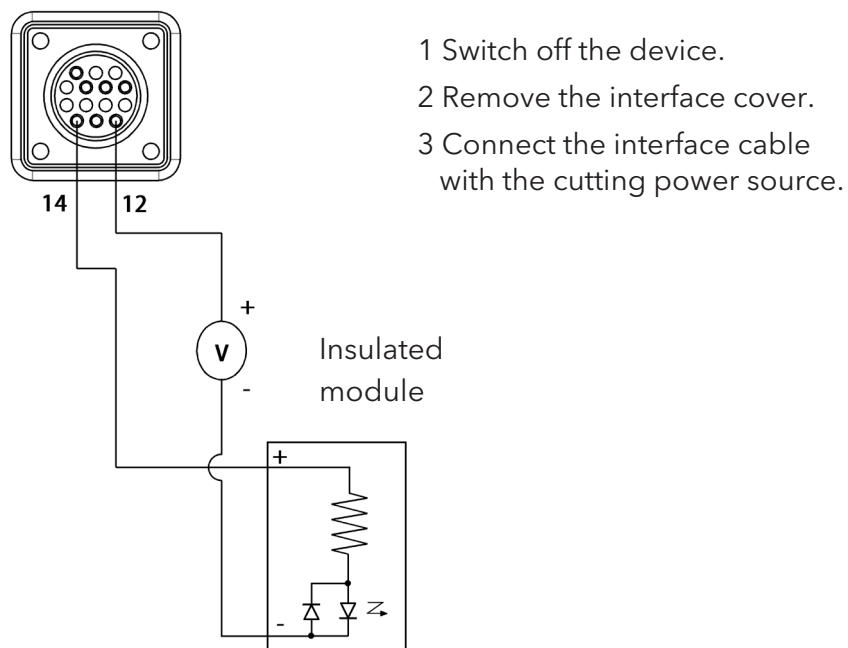
20.1.3 Enabling the external AC coil with an external power supply

Fig. 15 Enable the external AC coil with an external power supply.



20.1.4 Enabling the industrially insulated module with an external power supply

Fig. 16 Industrial insulated user module with 24 V DC power supply.



Contact and support

Scan for more information:



Revision history

You can find the latest version of the operator manual on our website:

www.thermacut.com

Revision R1/10_2022

Revision R2/02_2023

- 4.2 „Technical data”: Maximum input power changed to 17 k VA

Revision R3/12_2023

- 4.3 “Technical data for cutting torches” - Torch dimensions added
- 6.7 „Connecting the optional CNC interface” moved to the end as „Appendix”
- New wording

Revision R4/07_2024

- New accessories added

Revision R5/01_2026

- 4.3 “Technical data for cutting torches” - more information added
- 7.2.1 “FHT-EX® 105TT cutting torch consumables installation” - new graphics
- 8.7.2 “Gouge profile”- more information added
- 8.7.3 “Modification of the gouge profile”- more information added
- 17 „Torches and torch parts”- more information added, new graphics
- 19 „Cut charts for mechanized cutting”- information about dynamic pressure and gas flow added



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