



EX-TRAFIRE[®] 65HD

Plasma Cutting System

Operating Instructions - EX-3-902-004/N21605 - CE

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THERMACUT[®]
THE CUTTING COMPANY[®]

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1 Identification

The EX-TRAFIRE® 65HD 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 EX-TRAFIRE® 65HD has to be operated only with original Thermacut® consumables and maintenance parts.

This documentation describes the EX-TRAFIRE® 65HD cutting power supply only.

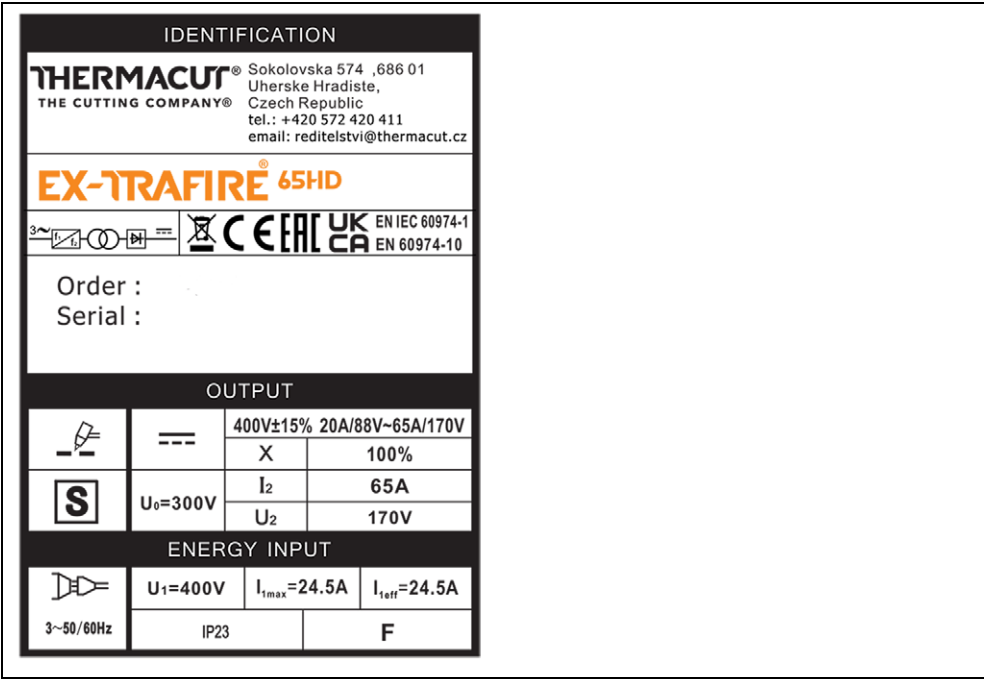
When used in this documentation, the term “device” always refers to the EX-TRAFIRE® 65HD cutting power supply.

1.1 Labeling

This product fulfills the requirements that apply to the market to which it has been introduced. A corresponding marking has been affixed to the product, if required.

1.2 Identification plate

Fig. 1 EX-TRAFIRE® 65HD identification plate



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

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

1.3 Signs and symbols used

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, it may cause severe injury or death.

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.

2.1 Designated use

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

- Do not exceed the maximum electrical load specifications as defined by the document supplied. Overloads could 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 in wet conditions or environments.

2.2 Obligations of the operator

- Ensure that only qualified and trained personnel are permitted to 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 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 EN 61000-6-3.

2.3 Warning and notice signs

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



These markings must always be legible. They should 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-17 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 Personal protective equipment

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

Personal protective equipment consists of protective clothing, safety welding glasses or goggles (see table below), face protection, ear protectors, protective gloves, and safety shoes.

Table 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

The following components are included in the scope of supply:

- 1× EX-TRAFIRE® 65HD cutting power supply
- 1× FHT-EX® 105TTH or FHT-EX® 105TTM cutting torch
- 1× work lead incl. work lead clamp
- 1× operating instructions
- 1× starter kit

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

- 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

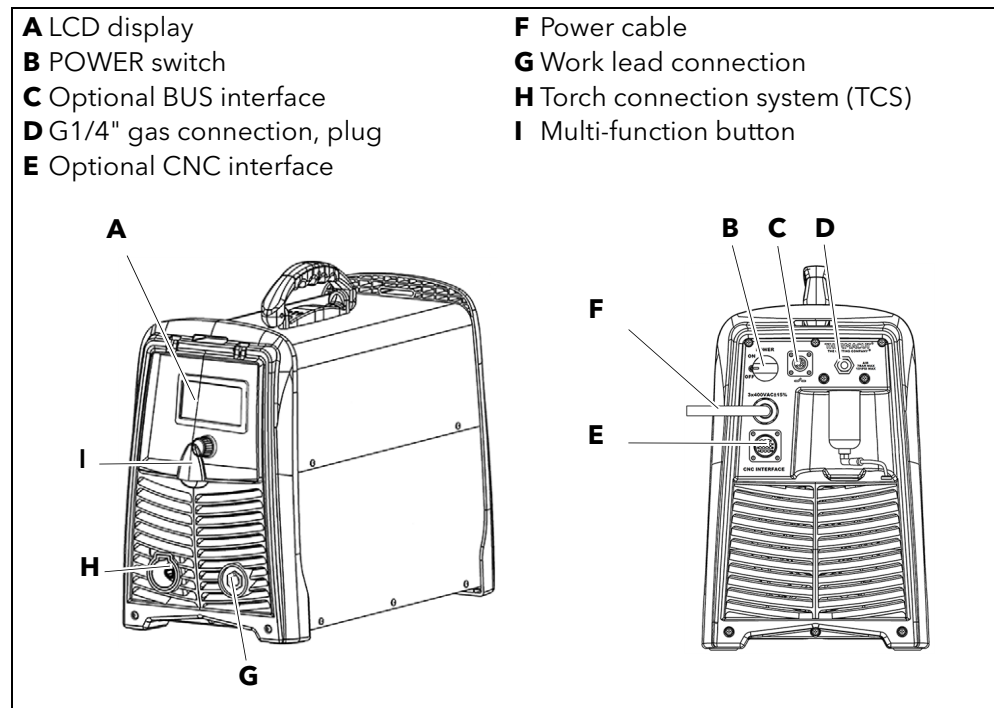
- Use original packaging and packing material for returns.
- If you have questions concerning the packaging or how to secure the device, contact your supplier, carrier, or transport company.

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 device.

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 the connection of 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

Table 2 Power supply specifications

	CE	
Rated open circuit voltage (U ₀)	330 V DC	
Characteristic curve* * The curve is defined as output voltage versus output current	Drooping	
Input voltage (U ₁)	3 x 400 V AC ± 15 % 50-60 Hz	
Output arc current (I ₂)	10-65 A	
Nominal output arc voltage (U ₂)	170 V DC	
Maximum power input	17 k VA	
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*) a 40°C at nominal conditions (U 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}
	24.5 A	24.5 A
	Complies with standards IEC 60974-1, IEC 60974-10	
Protection type	IP23	
Operating tilt angle	Up to 15°	
Dimensions (L x H x W) [mm]	560 x 400 x 260	
Weight [kg]	20.4	

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

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.

Table 3 Ambient conditions for transport and storage

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

Table 4 Ambient conditions for operation

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

Table 5 Gas data

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

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

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

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

The values below refer to the torches!

Table 6 Technical data for FHT-EX® 105TTH, FHT-EX® 105TTM and FHT-EX® 105TTSM cutting torches

	FHT-EX® 105TTH / FHT-EX® 105TTM/ FHT-EX® 105TTSM
Recommended cutting capacity [mm]	35
Max. cutting capacity [mm]	50
Separating cut capacity [mm]	50
Piercing capacity [mm]	25
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	Plasma cutting, gouging, optional marking
Application type	Manual and mechanized
Rated current and duty cycle	105 A/100 %
Permissible gas	Compressed air/Nitrogen/Argon*
Flow rate	55 A/65 A approx. 87 l/min. at 5.2 bar
	45 A approx. 82 l/min. at 5.2 bar
Flow rate for gouging	65 A approx. 195 l/min. at 5 bar
Flow rate for marking	10, 11, 12, 15, 16 A approx. 39 l/min. at 2.4 bar
Maximum inlet pressure	10 bar

Table 6 Technical data for FHT-EX® 105TTH, FHT-EX® 105TTM and FHT-EX® 105TTSM cutting torches

	FHT-EX® 105TTH / FHT-EX® 105TTM/ FHT-EX® 105TTSM
Gas post-flow period delay	≤ 35 seconds
Type of voltage	DC
Protection type for EX-TRAFIRE® 65HD	IP23 (EN 60529)
Connection type	TCS (torch connection system) - 13 pin
Standard lengths (other lengths available upon request)	5 m/8 m/15 m/23 m

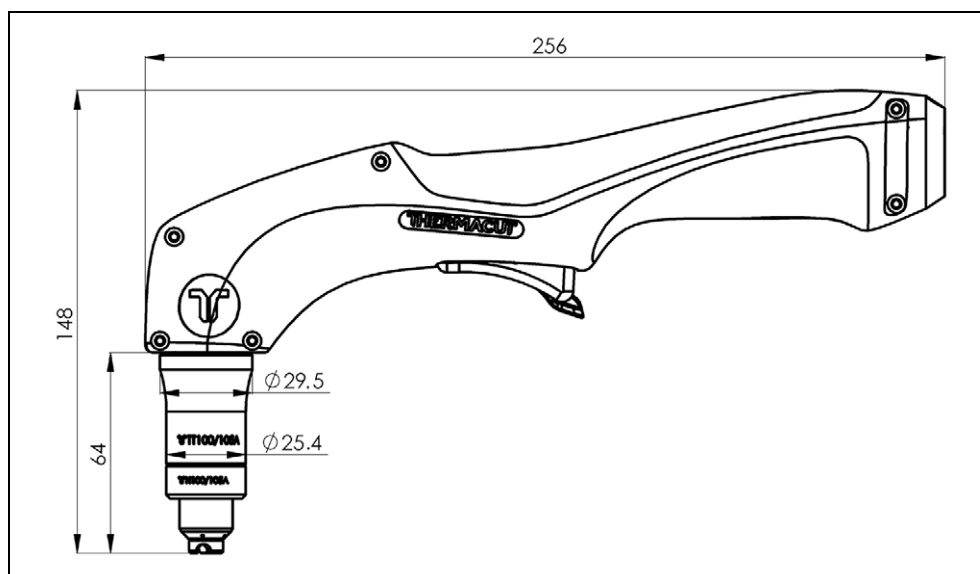
* Nitrogen may be used for cutting stainless steel and aluminum;
argon may be used only in connection with the optional marking kit.

Table 7 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 STD-NR Standard machine cutting torch, without rack	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 / 2.0 kg 8 m / 3.4 kg 15 m / 5.7 kg 23 m / 8.0 kg

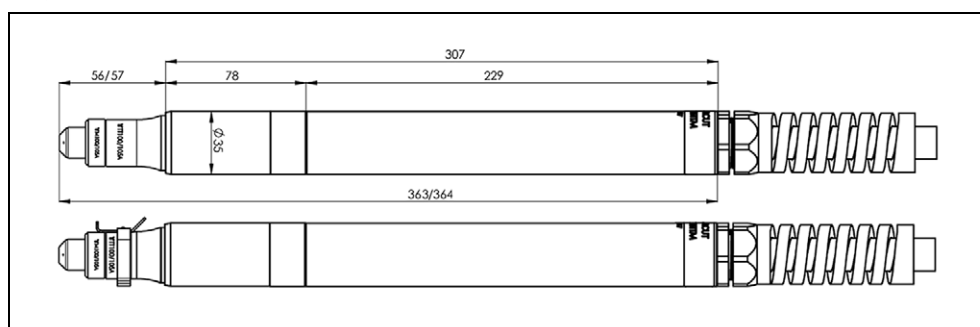
4.3.1 Torch dimensions FHT-EX® 105TTH

Fig. 3 Torch dimensions FHT-EX® 105TTH



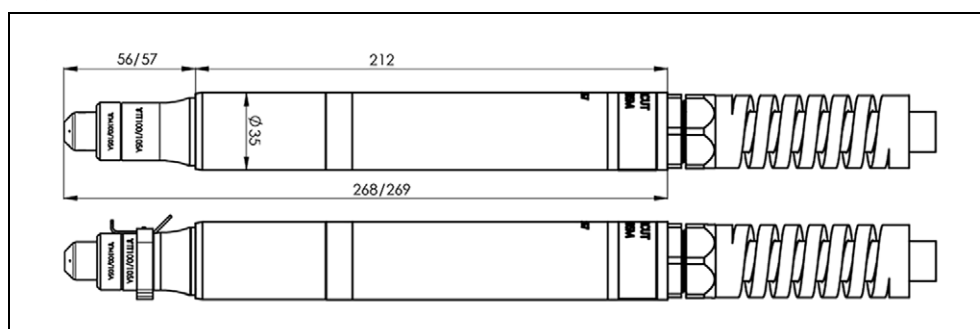
4.3.2 Torch dimensions FHT-EX® 105TTM

Fig. 4 Torch dimensions FHT-EX® 105TTM



4.3.3 Torch dimensions FHT-EX® 105TTSM

Fig. 5 Torch dimensions FHT-EX® 105TTSM



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 equipment 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.

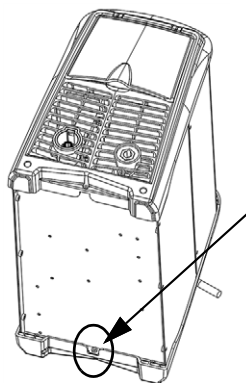
NOTICE

Risk of material damage due to improper transport and installation

Improper transport or installation can cause the device to tip or fall over. This can result in material damage and irreparable damage.

- 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.

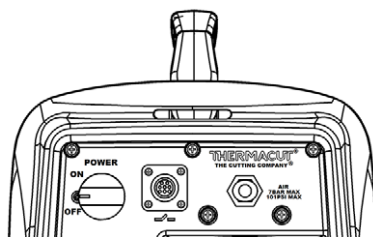
Fig. 6 Drain tube location



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

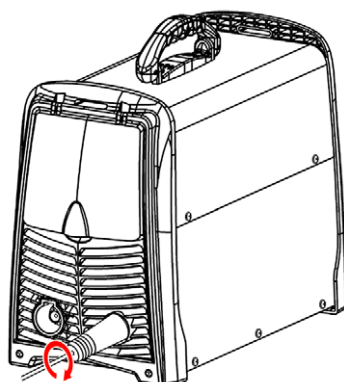
6 Setting up the power supply

6.1 Connecting to the gas supply



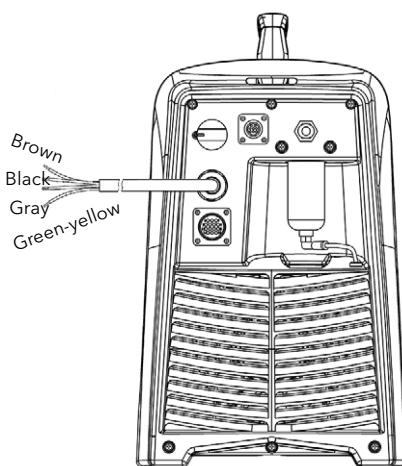
- Connect the gas hose with an inside diameter of at least 6 mm to the gas connection of the device.

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)

PE grounding -> green-yellow

The green grounding wire is exclusively for the grounding and must always be connected!

Table 8 Recommended cable extensions

Input voltage	Wire cross-sections	Length
400 V AC/3 phases	6 mm ²	Up to 15 m
	6 mm ²	15 - 45 m

Any extension cord must have wire sized for the cord length and system voltage in accordance with local and national codes.

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 ground fault circuit breakers (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 or defective cables

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

- Check all live cables and connections for proper installation or 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 input power plug into the socket.
- Set the motor rating as shown in the following table.

Table 9 Connection to a generator

Generator rating	Generator output current (I_2)	Generator output voltage
≥ 13 kW	65 A	$U_2 = 200$ V DC

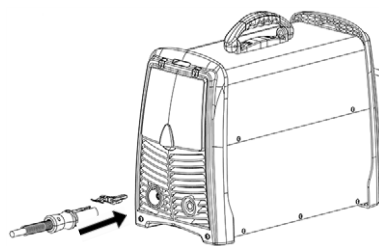
6.5 Connecting the cutting torch

NOTICE

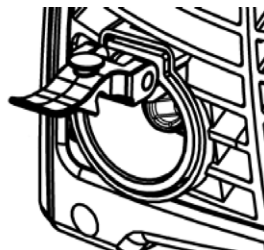
Risk of material damage if used without TCS Latch with Key Assembly

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

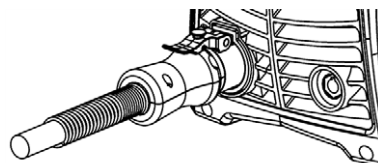
- Only use the device with the TCS Latch with Key assembly installed and properly secured.



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



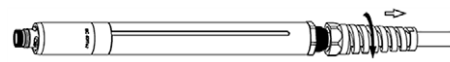
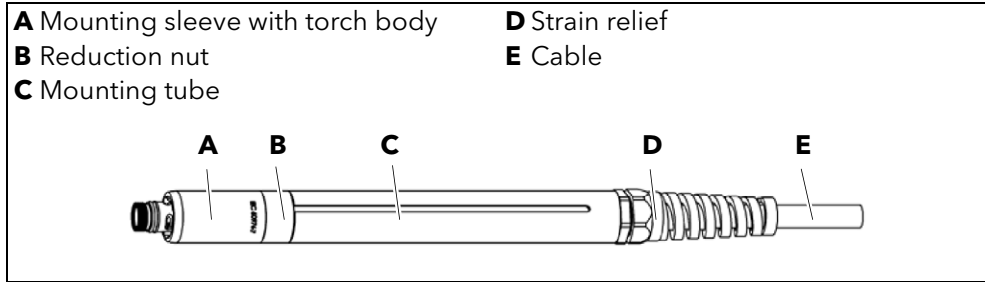
The TCS Latch with Key Assembly must sit firmly in the TCS socket.



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

6.5.1 Installing the cutting torch's gear rack

Fig. 7 Cutting torch



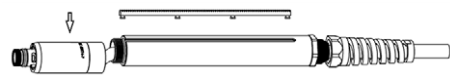
1 Disconnect the machine cutting torch from the cutting power supply.

2 Place on a flat surface.

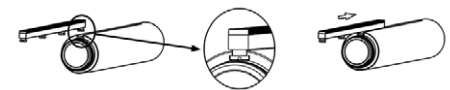
3 Unscrew the strain relief so that it can move freely along the torch cable.



4 Unscrew the mounting tube from the reduction nut. Hold the reduction nut and the mounting sleeve in order not to damage the cables.



5 Carefully hold the reduction nut and mounting sleeve with the torch body to the side.



6 Push the gear rack into the groove of the mounting tube.



7 Screw the mounting tube with gear rack into the reduction nut. Hold the reduction nut and the torch mounting sleeve with torch body in order not to damage the cables.

8 Tighten the mounting tube by hand.



9 Screw in the strain relief. Hold the mounting tube tight to avoid damaging the cables.

10 Tighten the strain relief by hand.

6.6 Installing consumables for the hand and machine cutting torches

⚠ 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.

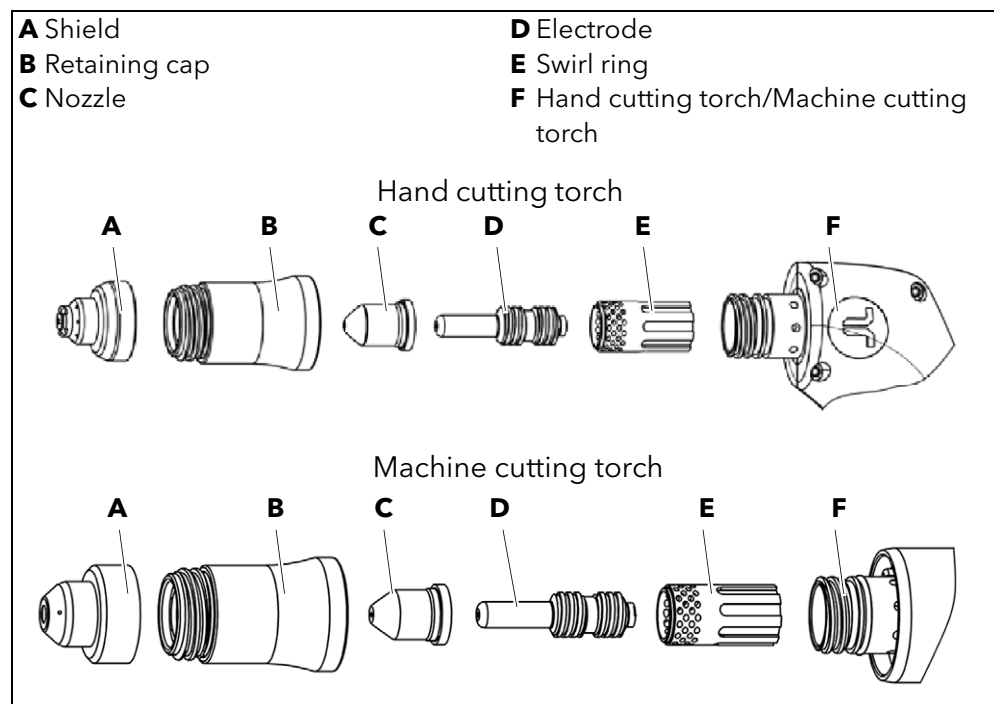
Machine cutting torch:

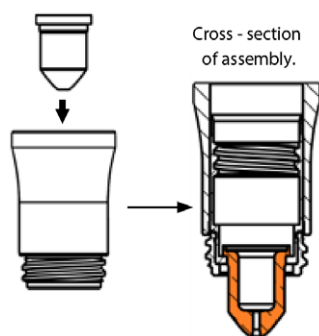
When the input power plug is plugged in, the plasma arc ignites immediately when the CNC start signal is ON. Individuals can be seriously injured if the arc ignites unexpectedly.

- 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.

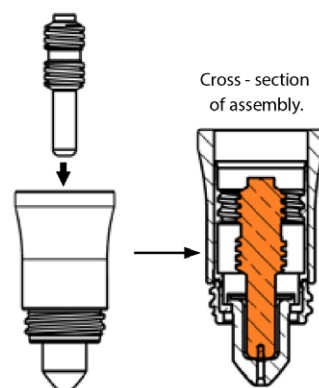
The procedure shown below applies to both the equipment of hand and machine cutting torch.

Fig. 8 Torch consumables

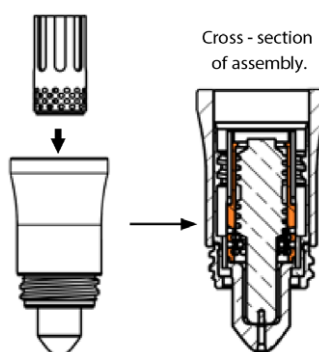




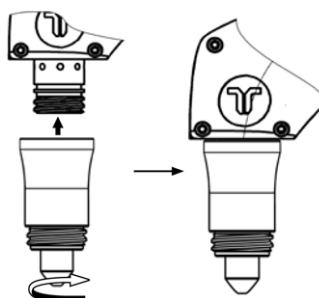
1 Install nozzle into the retaining cap.



2 Insert electrode into retaining cap and nozzle assembly.



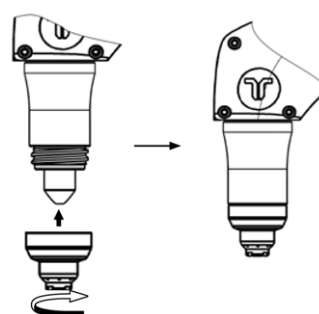
3 Insert the swirl ring.



4 Screw the entire assembly onto the hand cutting torch.

Do not overtighten.

The nozzle must be firmly in place and must not move.

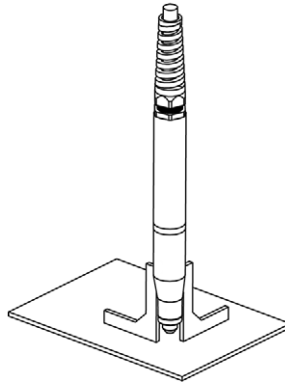


5 Screw on the shield and tighten it by hand.

6.7 Aligning FHT-EX® 105TTM machine cutting torch

For the setup of the torch and the cutting process see

⇒ 6 Setting up the power supply on page EN-17 ff



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

7 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 cutting 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 individuals 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 input power plug during operation

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

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

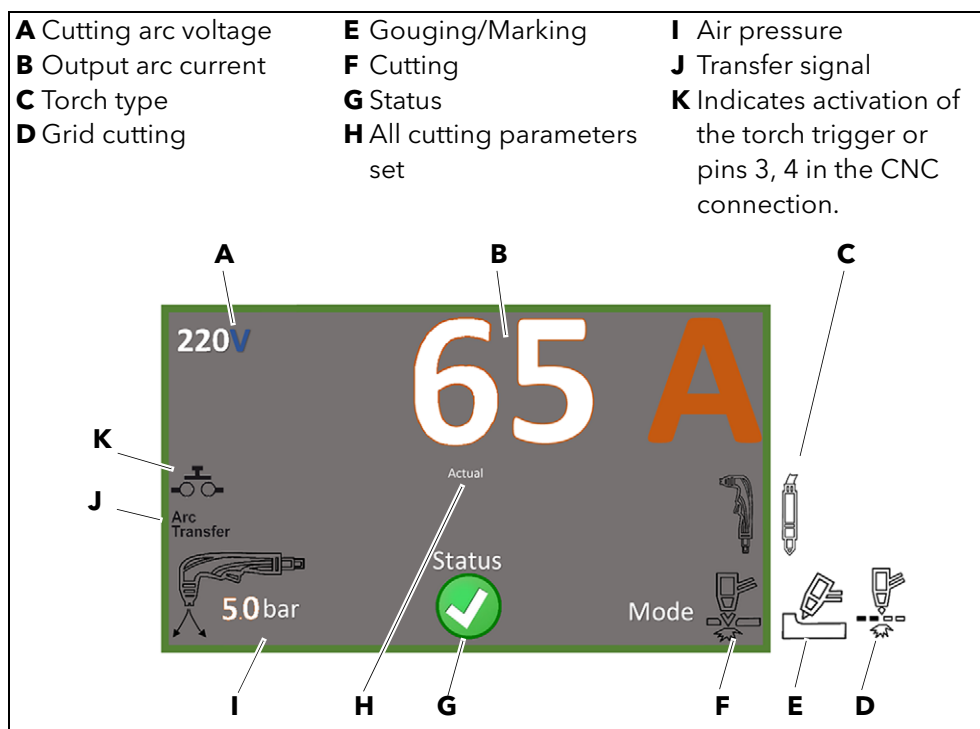
NOTICE**Material damage due to switching the output current strength during operation**

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.

7.1 LCD description

Fig. 9 LCD description



7.1.1 Setting the parameters

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



1 Press the multi-function button for one second.

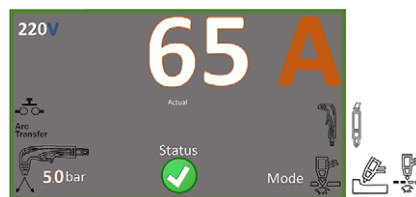
The adjustable values and the word "Set" flash in red.

2 Press the multi-function button briefly to switch between the functions.

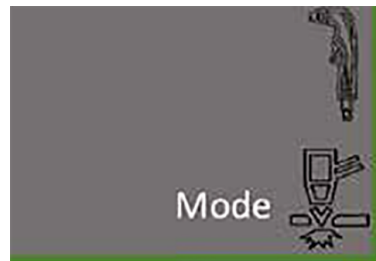
3 Turn the multi-function button to the left or right to increase or decrease the values.

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.



7.1.2 Selecting the cutting mode



Cutting

The current is 20-65 A.

The pressure of the cutting gas is 5.2 bar.



Gouging

The current is 65 A.

The pressure of the cutting gas is 5 bar.

Optional Marking

(uses same icon as gouging)

The current is 10*-20 A.

The pressure of the cutting gas is 2.4 bar.

* Optional light marking



Grid cutting

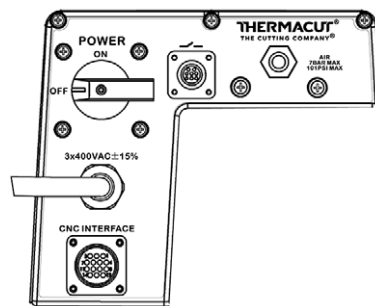
The current is 20-65 A.

The pressure of the cutting gas is 5.2 bar.

7.1.3 Connecting the work lead

- 1 Remove contamination from the workpiece.
- 2 Connect the work lead 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.

7.2 Powering on the machine



➤ Set the POWER switch to ON.



The following is displayed immediately after switching on:

- Type of power supply (65HD)
- Length of torch cable (5, 8, 15, 23 m)
- Type of cutting torch (hand or machine)
- Current firmware

7.3 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.

7.4 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.

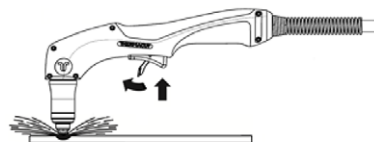
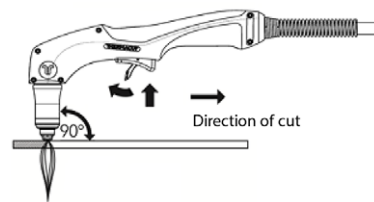
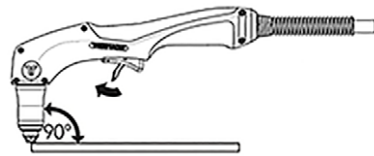
Once the workpiece is detected, the pilot arc switches to a cutting arc.

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.

7.5 Cutting - Edge Start



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.

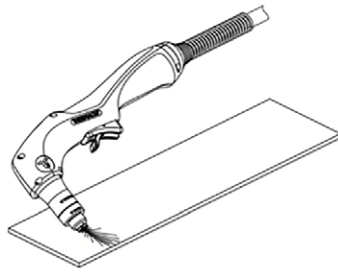
5 Pay attention to the following when cutting:

- 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 severed. Proceed as follows:

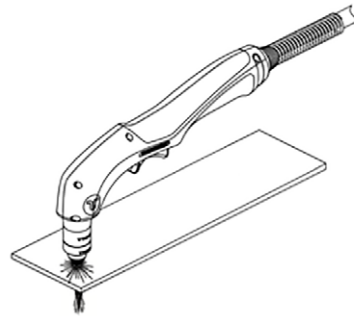
- Reduce the speed at which the cutting torch is pulled.
- Check the setting for the output current.
- Check the compressed air settings.
- Check consumables for wear/damage.

7.6 Piercing



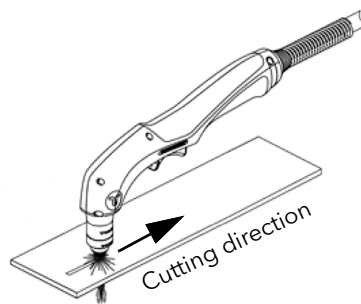
1 Hold the cutting torch at an angle to the workpiece with a max. standoff of 3 mm from the nozzle to the workpiece.

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 emerges from the underside of the workpiece. This indicates the material is completely pierced through.

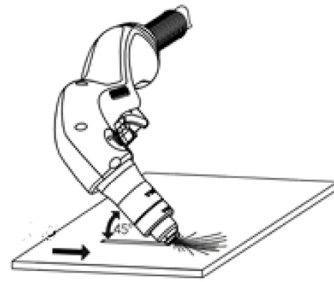
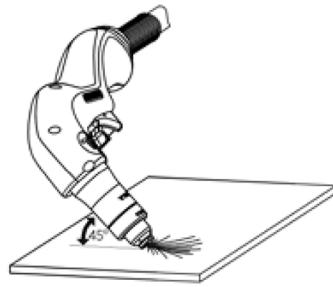


5 Pull the cutting torch in the cutting direction. Sparks must emerge from the underside of the workpiece.

7.7 Gouging

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

Gouge profile	Actions
Narrower and flatter	➤ Reduce current or increase speed.
Narrower and deeper	➤ Reduce the standoff 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 standoff between the cutting torch and workpiece or hold the cutting torch at flatter angle to the workpiece.



Direction of gouging

- 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 so 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.

7.7.1 Table for FHT-EX® 105TT material removal

Table 10 Table for FHT-EX® 105TT material removal

Gouging parameters	
(Dynamic) air pressure	5 bar
Standoff between cutting torch and workpiece	As close as possible
Angle of cutting torch to workpiece	35° to 45 °
Speed	0.6 m/min.
Current	65 A
Removal rate for mild steel	Approx. 4.8 kg/hr
Width of gouge	Approx. 5.5 mm
Depth of gouge	Approx. 4.5 mm

7.8 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 to 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 65 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.

8 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.

9 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 device's maintenance intervals. If it is 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 certified electrician or trained personnel 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 IEC 60974 Part 4: "Periodic inspection and testing" by Thermacut® or another authorized specialist.

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.
- Disconnect 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 certified electrician or trained personnel.

⚠ CAUTION**Fire hazard due to contamination**

Dust deposits inside the device 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.

9.1 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.

Table 11 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 lead clamp for contamination.
Weekly	➤ Check the cutting torch's consumables for wear.
	➤ Check the cap sensor.
	➤ Check the cutting torch for signs of cracks in the torch body and exposed wires.
Every 3 months	➤ Check the gas hose, filter elements and connections for leaks.
	➤ Open the device body and have the inside cleaned with a vacuum cleaner or dry, clean compressed air by Thermacut® or trained personnel.
	➤ Have a safety inspection performed in accordance with IEC 60974 Part 4: "Periodic inspection and testing" by Thermacut® or trained personnel.
Annually and after each time the housing is opened	

Table 12 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 of hafnium is deeper than 1.6 mm.	➤ 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.

10 Faults and troubleshooting

- Verify consumables selection according to:
 - ⇒ 17 FHT-EX®105TTH consumables for hand cutting torch on page EN-44
 - ⇒ 19 FHT-EX®105TTM consumables for machine cutting torch on page EN-47
- 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.
- Disconnect the input power supply from the wall.
- 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.

Table 13 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 when the trigger is pressed.	➤ Have the inverter, transformer, and FRD (Fast Recovery Diodes) 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.

Table 13 Fault messages in the display

Error code	Cause	Troubleshooting
H06 Excess temperature	Fan is defective.	<ul style="list-style-type: none"> ➤ Ensure that the fan is running freely. ➤ Replace the fan or fan motor.
	Duty cycle has been exceeded.	<ul style="list-style-type: none"> ➤ Allow the device to cool down. ➤ Do not exceed the duty cycle.
	Insufficient ventilation.	<ul style="list-style-type: none"> ➤ Verify sufficient space around the device.
	Components defective.	<ul style="list-style-type: none"> ➤ Contact service or your retailer.
H07 Excess current	Inverter overcurrent.	<ul style="list-style-type: none"> ➤ Have the output diodes, main transformer, and IGBT (Insulated Gate Bipolar Transistor) on the inverter board checked by a certified electrician or trained personnel.
H08 Arc does not ignite when trigger is pressed or CNC start signal is on	The cutting torch is missing or not connected.	<ul style="list-style-type: none"> ➤ Verify the proper cutting torch is connected.
	Consumables are loose, incorrectly installed or missing.	<ul style="list-style-type: none"> ➤ 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.	<ul style="list-style-type: none"> ➤ Verify that the retaining cap is correctly installed, re-install correctly and tighten, if needed.
	Consumables used are not Thermacut® original parts.	<ul style="list-style-type: none"> ➤ Use only Thermacut® original consumables.
H11	Missing phase.	<ul style="list-style-type: none"> ➤ Have the issue checked by a certified electrician or trained personnel.
H14	Incorrect cutting torch.	<ul style="list-style-type: none"> ➤ Verify the proper cutting torch is connected.
H15	No data communication at the BUS.	<ul style="list-style-type: none"> ➤ Check the cable. ➤ Replace the CAN and BUS PCB. ➤ Have the control PCB replaced by a certified electrician or trained personnel.
H16	Data recording failed.	<ul style="list-style-type: none"> ➤ Check the cable. ➤ Replace the CAN and BUS PCB. ➤ Have the control PCB replaced by a certified electrician or trained personnel.
H17 GAS	Gas inlet pressure is below 72.5 psi (5 bar).	<ul style="list-style-type: none"> ➤ Check the inlet gas pressure. ➤ Check the gas pressure and flow.
	Insufficient plasma gas flow.	<ul style="list-style-type: none"> ➤ Verify the gas settings are correct.
	Defective torch cable.	<ul style="list-style-type: none"> ➤ Replace the torch cable.
	Pressure sensor is defective.	<ul style="list-style-type: none"> ➤ Have the pressure switch checked and, if necessary, replaced by a certified electrician or trained personnel.

Table 13 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.

Table 14 General faults

Fault	Description	Cause	Troubleshooting
Switch is set to ON, LCD does not illuminate.	No/low input power voltage.	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 a 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.
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 large.	➤ Decrease the standoff between cutting torch and workpiece.
		Work lead is defective.	➤ Replace the work lead.

Table 14 General faults

Fault	Description	Cause	Troubleshooting
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 large.	➤ 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 properly secured.
			➤ Attach the work lead clamp to the workpiece in order to allow maximum electrical conduction.

Table 14 General faults

Fault	Description	Cause	Troubleshooting
Insufficient cutting quality.	Incorrect setting for output current.	Output current (amps) too low/material too thick.	➤ Adjust the output current strength to the thickness of the workpiece.
	Consumables are defective.	Consumables are worn.	➤ Inspect consumables in the cutting torch and replace, if necessary.
	Poor cutting quality.	Incorrect cutting parameters.	➤ 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. ⇒ 7.5 Cutting - Edge Start on page EN-28
	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.

11 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.
- Disconnect 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.

12 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.
 - ⇒ 11 Disassembly on page EN-38
- Collect electrical components 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.

12.1 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.

12.2 Disposal of consumables

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.

12.3 Packaging

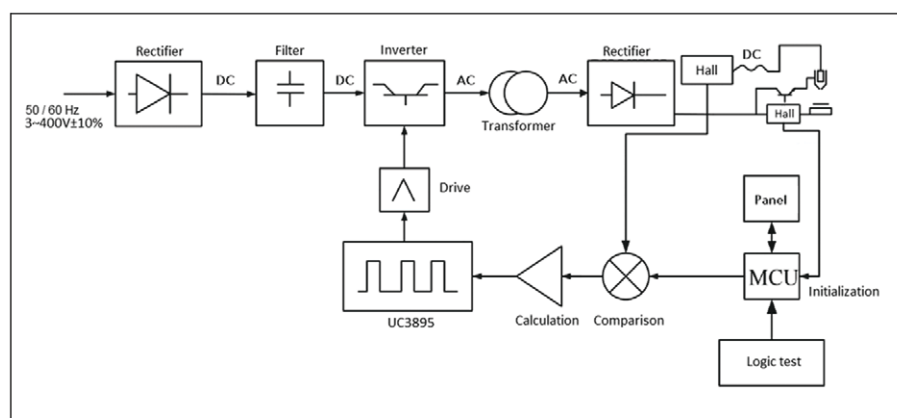
Thermacut® has reduced the packaging to the necessary minimum. The ability to recycle packaging materials is always considered during their selection.

13 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, 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.

14 Block diagram



15 Accessories

Table 15 Accessories

Accessories	Part number	Description
	EX-0-802-001	DN 7.2 ES Quick-connect plug with male thread G 1/4" British standard straight thread
	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-0-803-004	CNC interface connection cable 6 m
	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')
	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.

16 FHT-EX® 105TTH hand cutting torch unit

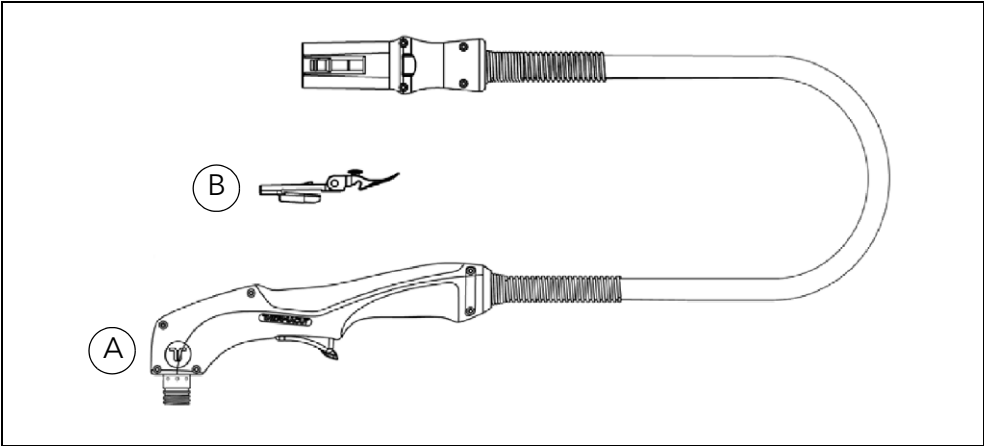


Table 16 FHT-EX® 105TTH hand cutting torch

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

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

17.1 FHT-EX® 105TTH consumables for hand cutting torch 45-65 A

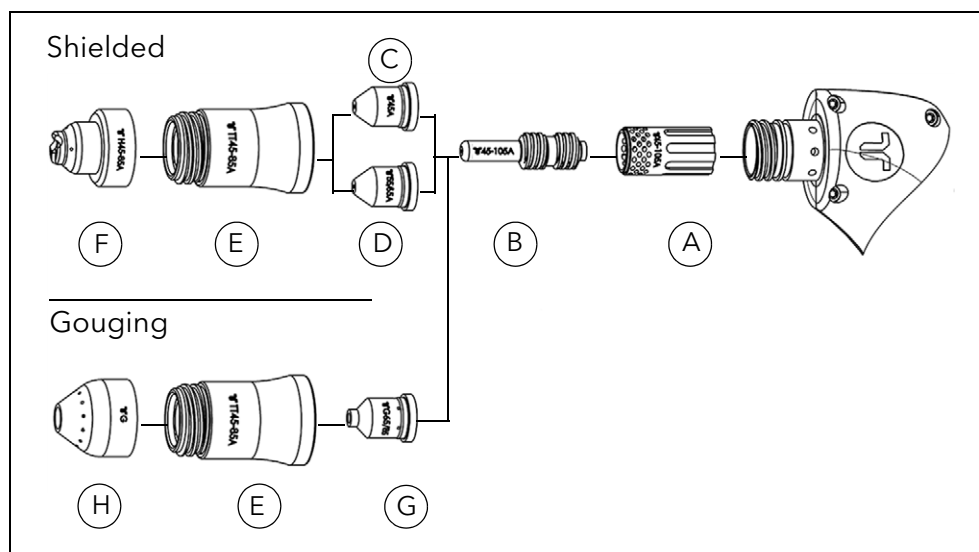


Table 17 Consumables for hand cutting torch 45-65 A

Item	Part number	Description
A	EX-5-404-051	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 55/65 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

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

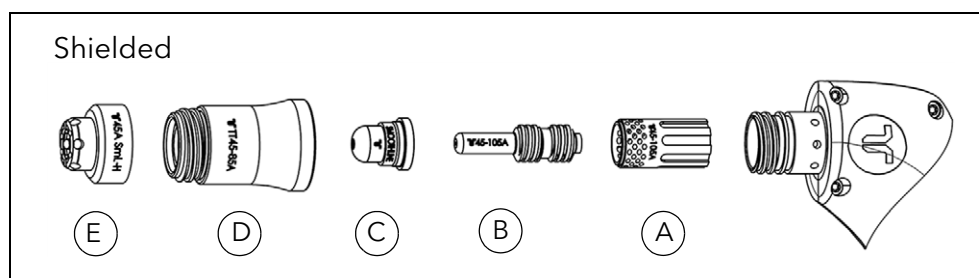


Table 18 FHT-EX® 105TTH consumables for SmoothLine hand cutting torch

Item	Part number	Description
A	EX-5-404-051	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, SmoothLine, hand

18 FHT-EX® 105TTM machine cutting torch unit

18.1 FHT-EX® 105TTM machine cutting torch without gear rack

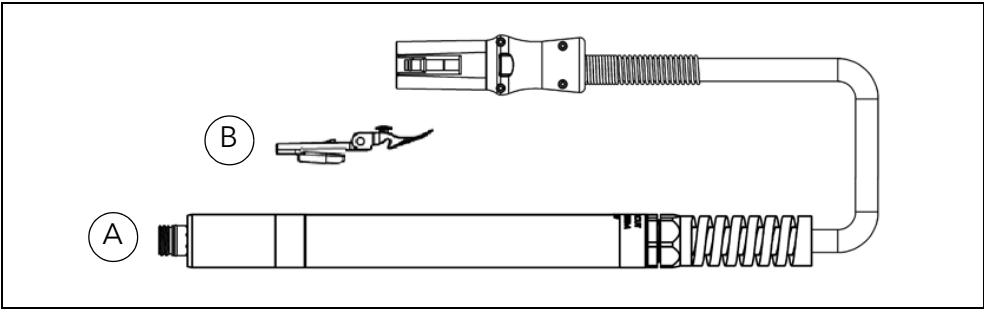


Table 19 FHT-EX® 105TTM machine cutting torch without gear rack

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

18.2 FHT-EX® 105TTSM short machine cutting torch

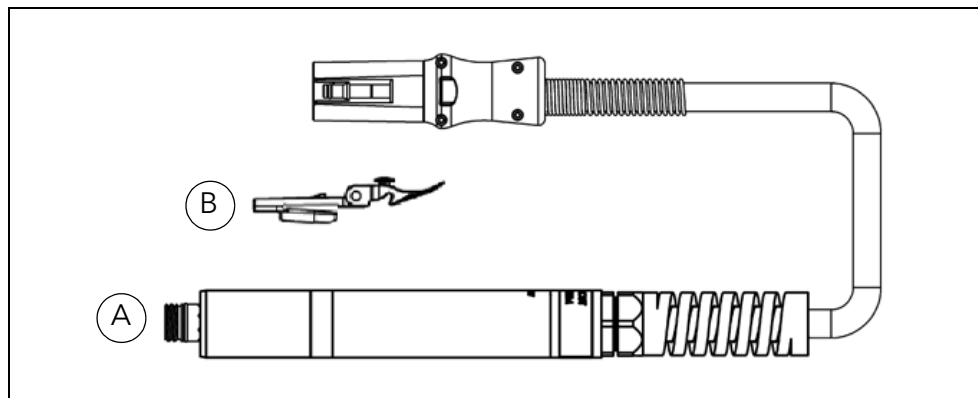


Table 20 FHT-EX® 105TTSM short machine cutting torch

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

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

19.1 FHT-EX® 105TTM consumables for standard machine cutting torch 45-65 A

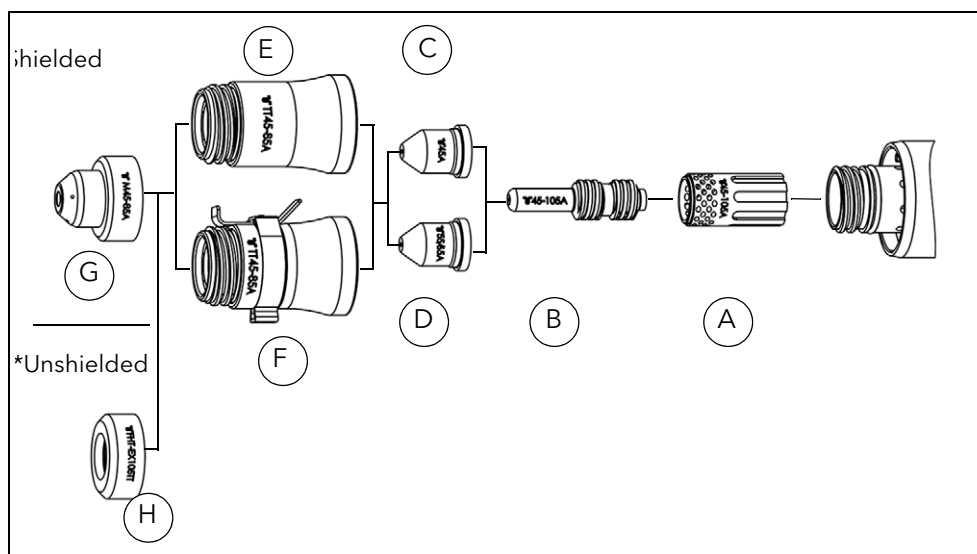


Table 21 FHT-EX® 105TTM consumables for standard machine cutting torch 45-65 A

Item	Part number	Description
A	EX-5-404-051	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 55/65 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.

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

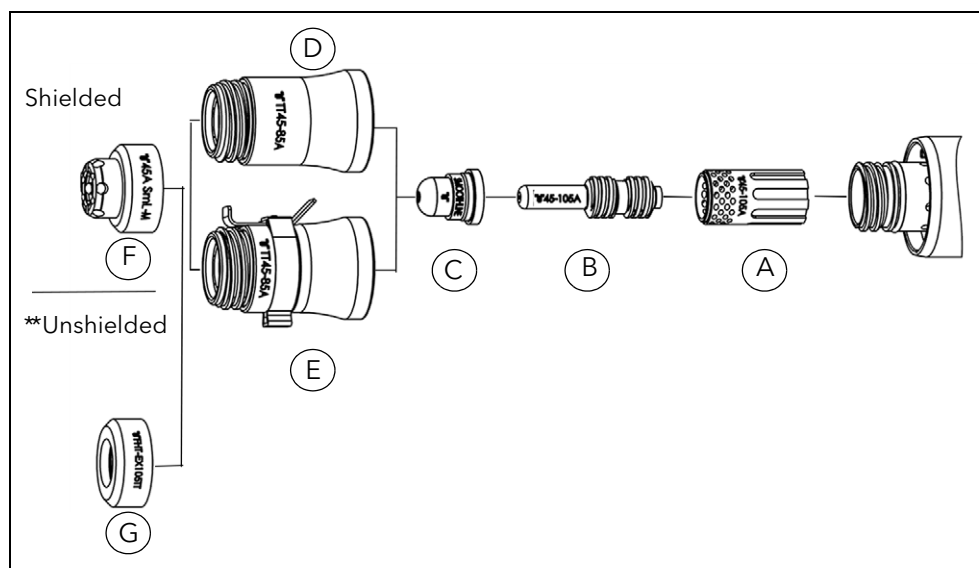


Table 22 FHT-EX® 105TTM consumables for SmoothLine machine cutting torch

Item	Part number	Description
A	EX-5-404-051	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, SmoothLine, machine
G	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.

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

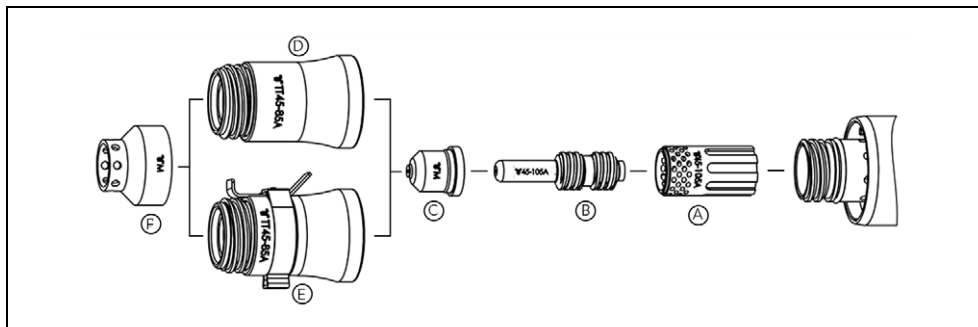


Table 23 FHT-EX® 105TTM consumables for marking machine cutting torch

Item	Part number	Description
A	EX-5-404-051	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.

20 Ordering information on bulk packs and starter kits

Table 24 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 55/65 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.

Table 25 Starter Kits for EX-TRAFIRE® 105TTH and EX-TRAFIRE® 105TTM

Part number	Description
EX-5-432-051	Starter kit 55/65 A for FHT-EX® 105TTH hand torch
EX-5-433-051	Starter kit 55/65 A for FHT-EX® 105TTM machine torch

Each starter kit includes:

4 × shield, hand or machine

4 × nozzle

4 × electrode

1 × swirl ring

1 × O-ring - torch body

21 Cut charts for mechanized cutting

Cut charts serve as a guideline for mechanized cutting. Individual systems can be "fine tuned" to achieve optimum cutting quality.

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:

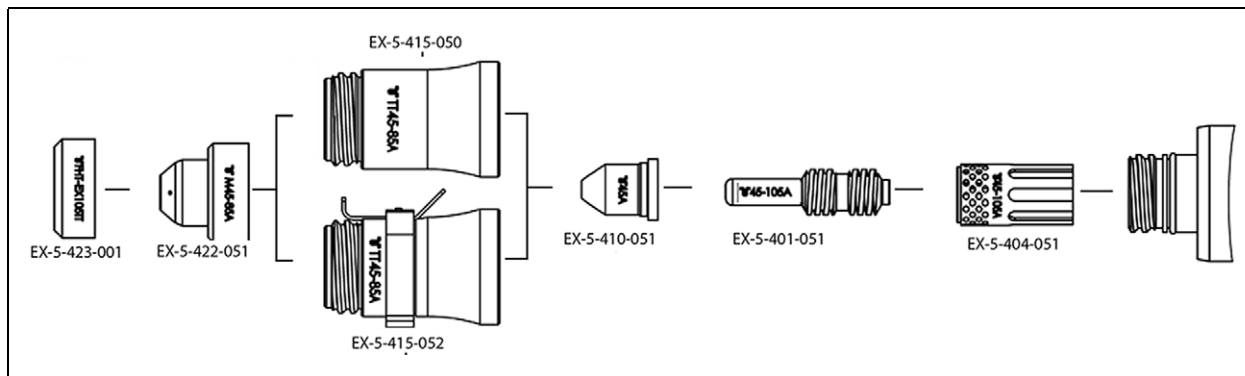
The maximum cutting speeds are the result of in-depth laboratory testing. Actual cutting speeds may vary due to different cutting applications.

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.

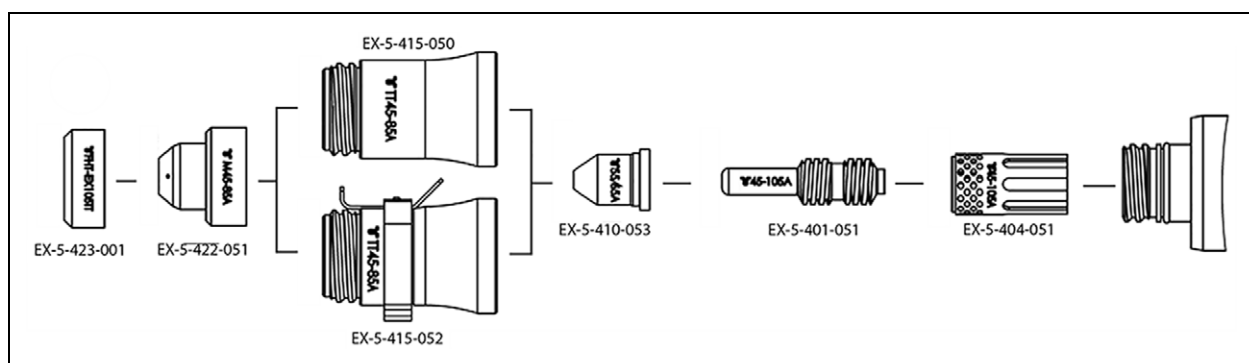
Standoff of torch to workpiece for configuration without shield = distance of nozzle to workpiece +3 mm.

21.1 45 A cutting, shielded, with compressed air



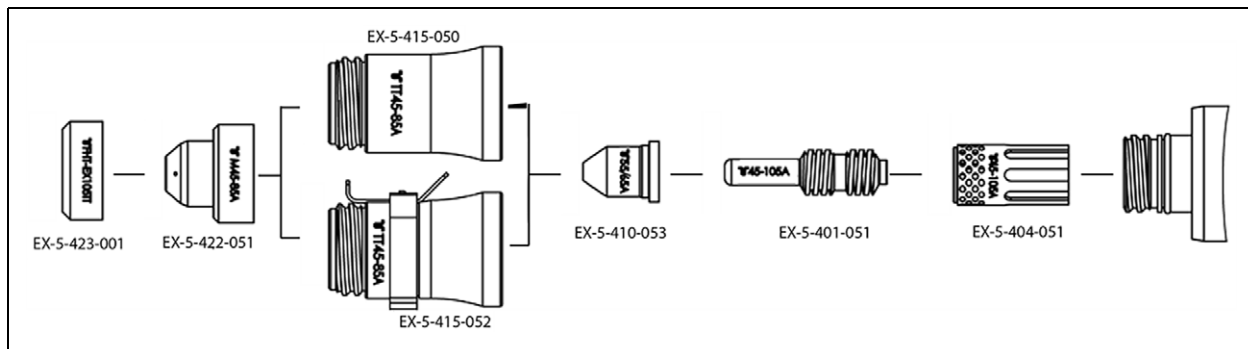
Material thickness	Cut height (shield to work cut height)	Pierce height (shield to workpiece height)	Pierce delay time	Recommended speed		Maximum speed		Kerf width
				Settings for highest quality		Standard quality settings		
				Cutting speed	Voltage	Cutting speed	Voltage	
[mm]	[mm]	[mm]	[Seconds]	[mm/min]	[Volts]	[mm/min]	[Volts]	[mm]
Mild steel								
2	1.9	3.5	0.1	5600	113	6630	107	1.4
3		3.5	0.1	3950	113	4850	109	1.4
4		3.5	0.3	2900	115	3400	113	1.4
6		3.5	0.5	1500	117	1790	116	1.6
8		3.5	0.5	1050	117	1200	119	1.7
10		4	0.6	760	123	850	122	1.8
12		4.5	1	540	128	610	125	1.8
16		Edge start		290	130	340	130	2
20				170	139	210	136	2.2
25				110	146	150	142	2.2
Stainless steel								
2	1.9	3.5	0.1	5300	112	7600	112	1
3		3.5	0.2	3000	120	4400	119	1.3
4		3.5	0.4	1900	120	2900	120	1.4
6		3.5	0.6	1000	126	1600	120	1.6
8		4	0.6	720	128	950	124	1.6
10		4.8	0.8	500	132	750	129	1.6
12		5.2	1.2	320	136	500	132	1.8
16		Edge start		230	139	320	133	2
20				160	140	200	138	2
Aluminum								
2	1.9	3.5	0.1	7850	116	9500	115	1.1
3		3.5	0.2	4800	121	7100	118	1.5
4		3.5	0.4	3600	121	5600	120	1.5
6		3.5	0.5	2000	128	3050	125	1.5
8		3.5	0.6	1300	128	1800	125	1.6
10		4	0.7	860	132	1020	130	1.7
12	Edge start	/	0.5	620	134	745	133	1.7
16		/	0.5	340	134	370	137	1.7

21.2 55 A cutting, shielded, with compressed air



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	5270	104	6375	98	1.6
3		3.5	0.1	4250	106	4845	106	1.6
4		3.5	0.3	3485	107	3900	106	1.6
6		3.5	0.5	1785	109	2455	107	1.7
8		3.5	0.8	1445	109	1660	107	1.7
10		4	1	895	115	1105	114	1.9
12		4	1.2	740	117	825	115	2
16		4.5	1.5	510	128	575	124	2.2
18		Edge start		415	128	475	125	2.2
20				315	128	370	127	2.2
25				170	137	245	132	2.3
Stainless steel								
2	1.9	3.8	0.1	6800	105	8500	104	1.3
3		3.8	0.2	5525	105	6970	104	1.3
4		3.8	0.5	4250	105	5185	108	1.3
6		3.8	0.8	1995	109	2290	108	1.7
8		3.8	1	1190	115	1485	110	1.7
10		5	1.2	765	119	1020	115	2
12		7	1.3	595	121	735	118	2
16		Edge start		400	122	460	121	2
18				315	127	390	125	1.9
20				220	132	310	129	1.9
Aluminum								
2	1.9	3.5	0.1	7395	110	10000+	111	1.4
3		3.5	0.1	6120	112	7480	112	1.4
4		3.5	0.3	5100	113	6200	115	1.4
6		3.5	0.5	2550	116	3740	118	1.8
8		3.5	0.6	1530	120	2210	118	1.9
10		4	1	1020	123	1400	121	1.9
12		4	1	765	128	1100	125	1.9
16		Edge start		550	130	590	128	1.9
18				435	132	530	135	1.8
20				320	136	470	141	1.7

21.3 65 A cutting, shielded, with compressed air



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	106	7500	100	1.6
3		3.5	0.1	5000	108	5700	108	1.6
4		3.5	0.3	4100	109	4590	108	1.6
6		3.5	0.5	2100	111	2890	109	1.7
8		3.5	0.5	1700	111	1950	109	1.7
10		4	0.8	1050	117	1300	116	1.9
12		4	1	870	119	970	117	2
16		4.5	1.3	600	130	680	126	2.2
18		4.5	1.5	490	130	560	127	2.2
20		Edge Start		370	130	440	129	2.2
25				210	139	290	134	2.3
Stainless steel								
2	1.9	3.8	0.1	8000	107	10000	106	1.3
3		3.8	0.2	6500	107	8200	106	1.3
4		3.8	0.5	5000	107	6100	110	1.3
6		3.8	0.5	2350	111	2700	110	1.7
8		3.8	0.8	1400	117	1750	112	1.7
10		5	1	900	121	1200	117	2
12		7	1.2	700	123	870	120	2
16				480	124	550	123	2
18		Edge Start		375	129	460	127	1.9
20				270	134	370	131	1.9
Aluminum								
2	1.9	3.5	0.1	8700	112	10000+	113	1.4
3		3.5	0.1	7200	114	8800	114	1.4
4		3.5	0.3	6000	115	7300	117	1.4
6		3.5	0.4	3000	118	4400	120	1.8
8		3.5	0.5	1800	122	2600	120	1.9
10		4	0.8	1200	125	1650	123	1.9
12		4	1	900	130	1300	127	1.9
16		Edge Start		650	132	700	130	1.9
18				515	135	630	137	1.8
20				380	138	560	143	1.7

21.4 40-45 A cutting, SmoothLine, shielded, 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:

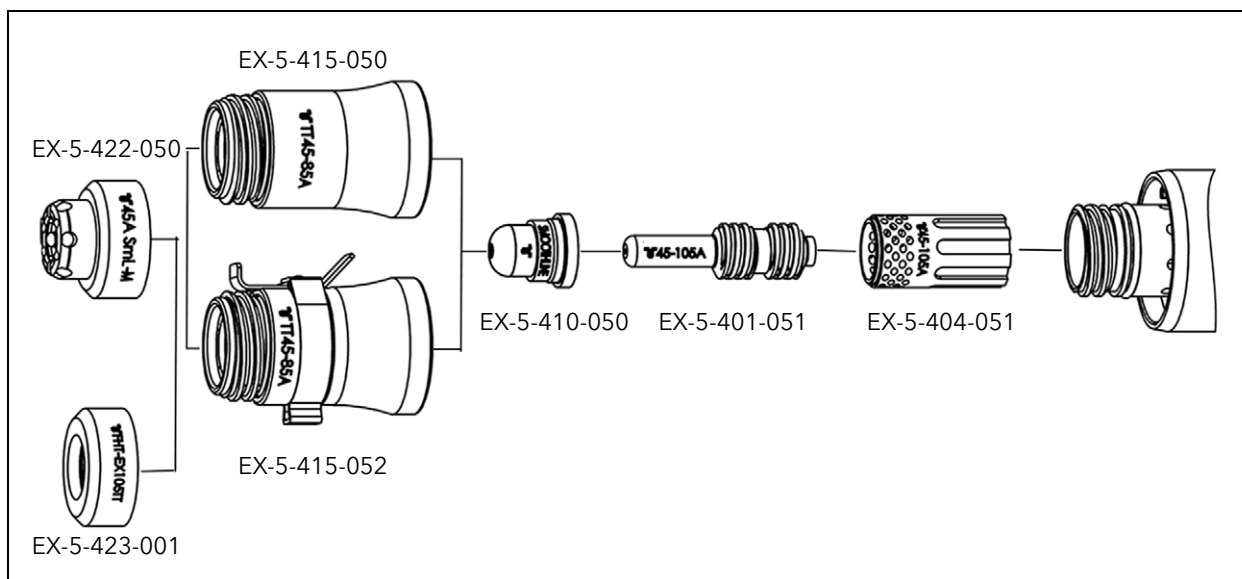
The maximum cutting speeds are the result of in-depth laboratory testing. Actual cutting speeds may vary due to different cutting applications.

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.

Standoff of torch to workpiece for configuration without shield = distance of nozzle to workpiece +2.15 mm.

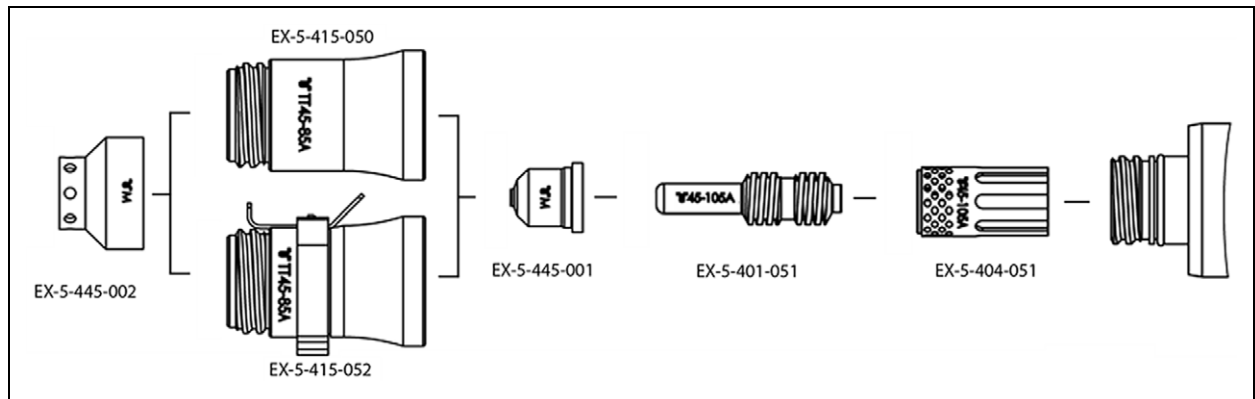
21.4.1 40-45 A cutting, SmoothLine, shielded, with compressed air



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	76	0.7	40
0.6		3	0	8250	76	0.7	
0.8		3	0.1	8250	76	0.7	
1		3	0.2	8250	76	0.7	45
1.5		3	0.4	6400	76	0.95	
2	4	0.4	4800	80	1		
3	Edge start	3	0.5	2750	83	1.25	
4		3	0.6	1900	85	1.35	
Stainless steel							
0.5	2	3	0	8250	70	0.65	40
0.6		3	0	8250	70	0.65	
0.8		3	0.1	8250	70	0.65	
1		3	0.15	8250	70	0.7	45
1.5		3	0.4	6150	75	0.7	
2	3	0.4	4320	82	0.9		
3	Edge start	3	0.5	2085	94	1.1	
4		3	0.6	895	94	1.1	

21.5 Tables for marking

21.5.1 Marking, shielded, with compressed air or argon



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								
Low	10	6.4	6.4	0	2540	127	1.4	<0.02
High	10	4.6	4.6	0	2540	109	1.62	0.02
Stainless steel								
Low	10	5.1	5.1	0	5080	116	1.96	0.02
High	10	6.4	6.4	0	3175	128	2.29	0.05
Aluminum								
	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	Delay	Marking speed	Arc voltage	Kerf width	Kerf depth
	[Amps]	[mm]	[mm]	[Seconds]	[mm/min.]	[Volts]	[mm]	[mm]
Mild steel								
Low	10	2	2	0	3175	41	1.62	<0.02
High	15	1.5	1.5	0	3175	41	1.20	<0.02
Stainless steel								
Low	12	2.5	2.5	0	3175	43	1.40	<0.02
High	12	2.5	2.5	0	2540	43	1.50	<0.02
Aluminum								
	16	0.5	0.5	0	4445	39	0.6	<0.02

22 Appendix

22.1 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 26 Signal and pin assignment for CNC interface on page EN-58. The control elements are located on the control panel. The connections are on the front and rear of the device.

⇒ 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 shock.

➤ Set the POWER switch to OFF and disconnect the input power plug before opening the housing.

Fig. 10 Signal and pin assignment for CNC interface

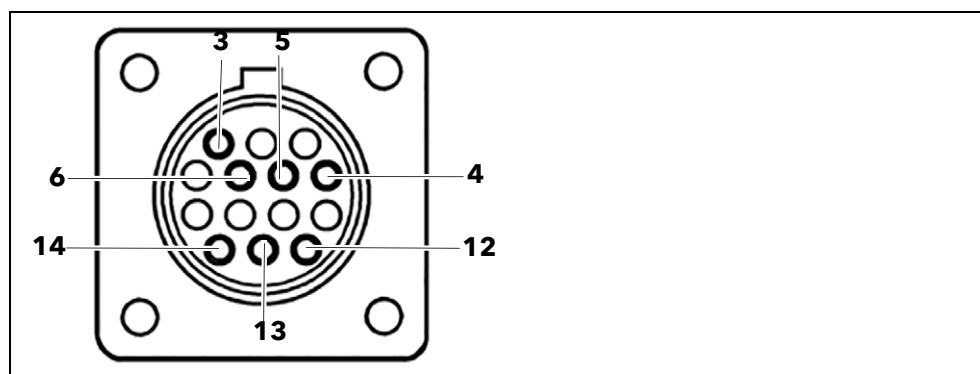


Table 26 Signal and pin assignment for CNC interface

Signal	START Start plasma cutting	Arc Start machine motion	PE	Voltage divider
Type	Input	Output	PE	Output
Notice	Open by default. Requires potential-free contact to close.	Open by default. Potential-free with max. capacity of: 120 V AC/1 A		Reduced arc signal: 20:1 21.1:1 30:1 40:1 50:1 (supplies max. 18 V)
PIN	3, 4	12, 14	13	6 (+), 5 (-)
Internal cable color	Yellow, yellow	White, white	Green/yellow	6 (red), 5 (white)

22.1.1 Setting the voltage divider DIP switches

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

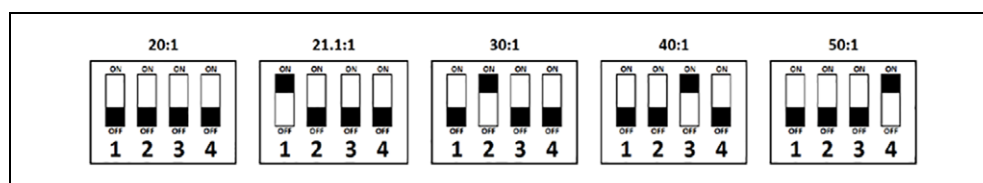
- 1 Turn off the EX-TRAFIRE® 65HD and unplug the power supply prior to opening the housing.

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.

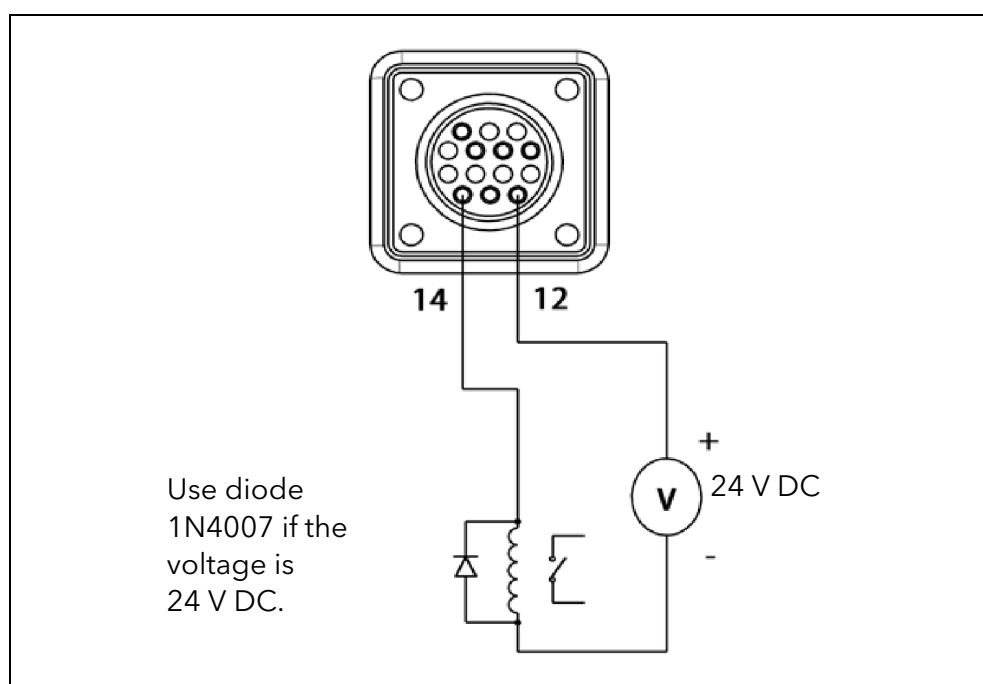
- 2 Have a safety inspection performed in accordance with IEC 60974 Part 4: "Periodic inspection and testing" by Thermancut® or another authorized specialist.

Fig. 11 Voltage divider DIP switch settings



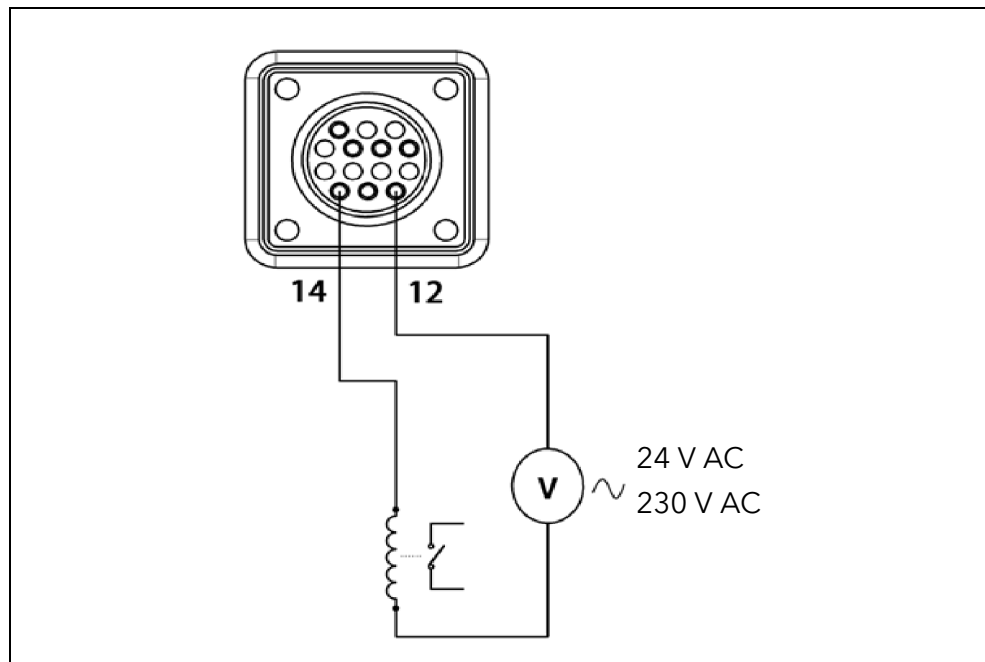
22.1.2 Enabling the external DC coil with an external power supply

Fig. 12 Enable the external DC coil with an external power supply.



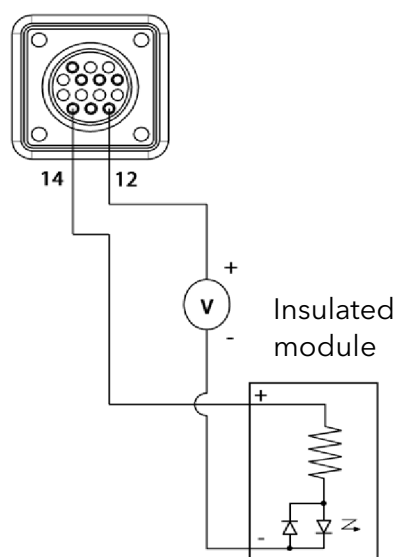
22.1.3 Enabling the external AC coil with an external power supply

Fig. 13 Enable the external AC coil with an external power supply.



22.1.4 Enabling the industrially insulated module with an external power supply

Fig. 14 Industrial insulated user module with 24 V DC power supply



- 1** Switch off the device.
- 2** Remove the interface cover.
- 3** Connect the interface cable with the cutting power supply.

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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 R3/09_2023

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

Revision R4/07_2024

- New accessories added



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