EX-TRAFIRE 85HD

Plasma Cutting System

Operating Instructions – EX-4-902-007/N-23448 – CSA

Revision 4, 31st January, 2024

THERMACUT®
THE CUTTING COMPANY®

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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 materials. The EX-TRAFIRE®85HD has to be operated only with original Thermacut® consumables and maintenance parts.

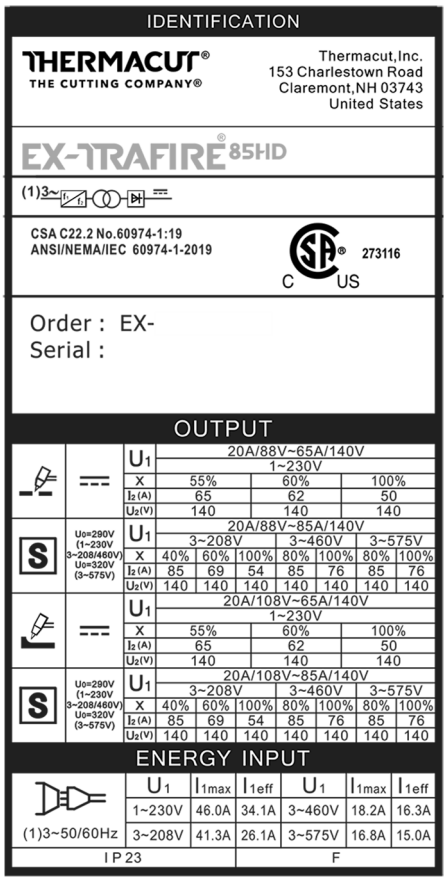
This documentation describes the EX-TRAFIRE®85HD cutting power supply.

1.1 Labeling

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



The EX-TRAFIRE®85HD 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 power supply 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 power supply may be used only for the purpose and manner described. The power supply 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 power supply to thaw pipes.
- Do not use or store the power supply in wet conditions or environments.

2.2 Obligations of the operator

- Ensure that only qualified and trained personnel are permitted to work on the power supply.

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 power supply;
- 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.

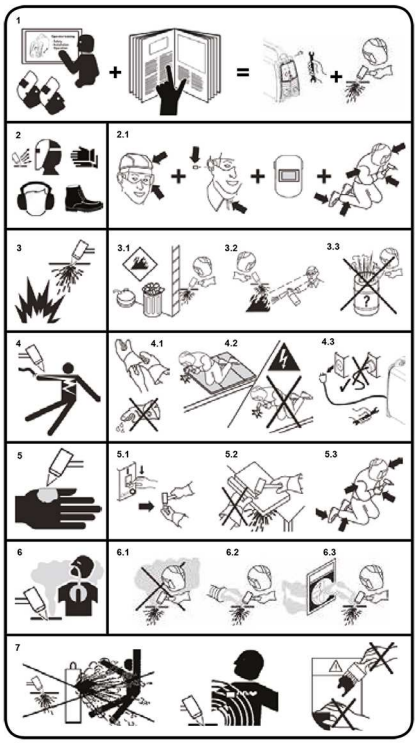
- Keep untrained persons out of the work area.

The EX-TRAFIRE®85HD can produce electromagnetic fields that could impact the proper function of cardiac pacemakers and implanted defibrillators.

- Do not use the EX-TRAFIRE®85HD if you have a pacemaker or an implanted defibrillator.

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 should not be covered, obscured, painted over, or removed.

2.4 Product-specific safety instructions

- Do not use or store the power supply in wet conditions or environments.
- Do not operate the power supply when 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 9 Recommended cable extensions on page 19 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 power supply 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 laws 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 (PPE).
- 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 AWS F2.2:2001 R2019

Cutting current	Minimum shade
40 to 60	6
60 to 80	8
80 to 300	8 or 9

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 x EX-TRAFIRE® 85HD 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.ex-trafire.us*.

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 power supply, contact your supplier, carrier, or transport company.

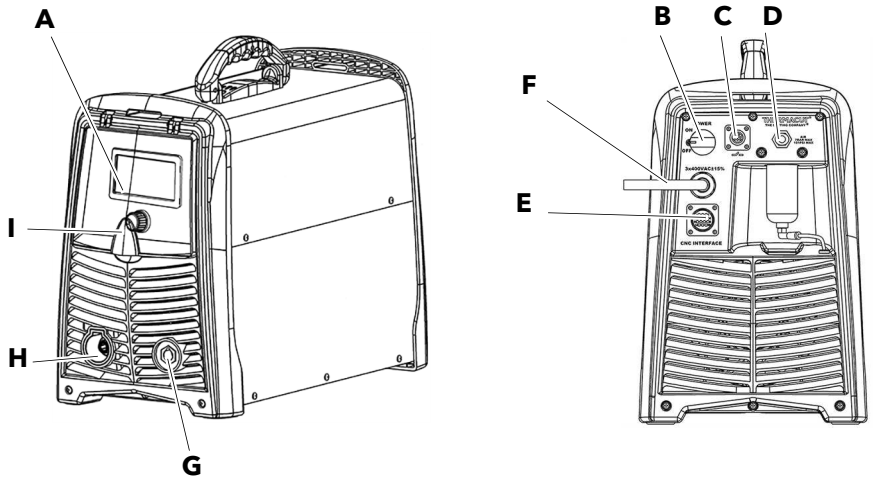
4 Product description

4.1 Assembly and use

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

Fig. 2 Control elements and connections

A LCD display
B POWER switch
C Optional BUS interface
D G 1/4" gas connection, plug
E Optional CNC interface
F Power cable
G Work lead connection
H Torch connection system (TCS)
I Multi-function button



LCD display (A)	Displays the status of the power supply. A fault code is displayed if an error occurs.
POWER switch (B)	Used to switch the power supply 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 power supply 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

There are two EX-TRAFIRE® 85HD systems:

– single-phase and

– three-phase

Table 2 Power supply specifications, single-phase

	CSA	
Rated open circuit voltage (U_0)	290 V DC	
Characteristic curve* * The curve is defined as output voltage versus output current	Drooping	
Input voltage (U_1)	230 V AC ± 15 % 1PH/50-60 Hz	
Output arc current (I_2)	20 – 65 A	
Nominal output arc voltage (U_2)	140 V DC	
Maximum power input	16.7 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 104 °F (40 °C) at nominal conditions (U_1, U_2, I_2)	55 % at 65 A, U_1 – 230 V AC 60 % at 62 A, U_1 – 230 V AC 100 % at 50 A, U_1 – 230 V AC	
Ambient temperature	14 °F (-10 °C) to 104 °F (+40 °C)	
Rated input current (I_{1rms}) and effective input current (I_{2eff}) at rated output power eff = effective rms = root mean square	I_{1rms}	I_{1eff}
	46.0 A	34.1 A
	Complies with standards CSA C22.2 No. 60974-1:19 ANSI/NEMA/IEC60974-1-2019	
Protection type	IP23	
Operating tilt angle	Up to 15°	
Dimensions (L × H × W) [in]	22 x 15.7 x 10.2 (560 × 400 × 260 mm)	
Weight [lb]	66 (30 kg)	

*

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

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

Table 3 Power supply specifications, three-phase

	CSA	
Rated open circuit voltage (U_0)	290 V DC	
Characteristic curve* * The curve is defined as output voltage versus output current	Drooping	
Input voltage (U_1)	208 - 460 - 575 V AC ± 15 % 3PH/50-60 Hz	
Output arc current (I_2)	20 – 85 A	
Nominal output arc voltage (U_2)	140 V DC	
Maximum power input	16.7 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 104 °F (40 °C) at nominal conditions (U_1, U_2, I_2)	40 % at 85 A, U_1 – 208 V AC 60 % at 69 A, U_1 – 208 V AC 100 % at 54 A, U_1 – 208 V AC 80 % at 85 A, U_1 – 460 V AC 100 % at 76 A, U_1 – 460 V AC 80 % at 85 A, U_1 – 575 V AC 100 % at 76 A, U_1 – 575 V AC	
Ambient temperature	14 °F (-10 °C) to 104 °F (+40 °C)	
Rated input current (I_{1rms}) and effective input current (I_{2eff}) at rated output power eff = effective rms = root mean square	I_{1rms}	I_{1eff}
	208 V - 41.3 A 460 V - 18.2 A 575 V - 16.8 A	26.1 A 16.3 A 15.0 A
	Complies with standards CSA C22.2 No. 60974-1:19 ANSI/NEMA/IEC60974-1-2019	
Protection type	IP23	
Operating tilt angle	Up to 15°	
Dimensions (L × H × W) [in]	22 x 15.7 x 10.2 (560 × 400 × 260 mm)	
Weight [lb]	66 (30 kg)	

*

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

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

Table 4 Ambient conditions for transport and storage

Ambient temperature	-4 °F (-20 °C) to 131 °F (+55 °C)
Relative humidity	< 50 % at 104 °F (+40 °C) < 90 % at 68 °F (+20 °C)

Table 5 Ambient conditions for operation

Ambient temperature	14 °F (-10 °C) to 104 °F (+40 °C)
Relative humidity	< 50 % at 104 °F (+40 °C) < 90 % at 68 °F (+20 °C)
Installation above sea level	Max. 6 562 ft (2000 m)

Table 6 Gas data

Permissible gas	Compressed air/nitrogen/argon*
Gas inlet pressure, cutting	90 to 145 psi (6.2 to 10 bar)
Recommended compressed air quality **Recommended nitrogen/argon quality**	ISO 8573-1 class 1.2.2. clean, and free from moisture and oil Purity: ≥ 99.99 %
Needed flow rate	6 CFM (170 l/min.) at 101.5 psi (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 and FHT-EX®105TTM

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

	FHT-EX®105TTH / FHT-EX®105TTM
Recommended cutting capacity	$1^{3/8}$ in (35 mm)
Max. cutting capacity	2 in (50 mm)
Separating cut capacity	2 in (50 mm)
Piercing capacity	1 in (25 mm)
Permissible ambient temperature during operation	14 °F (-10 °C) to 104 °F (+40 °C)
Permissible ambient temperature during transport and storage	-13 °F (-25 °C) to 131 °F (+55 °C)
Relative humidity	< 90 % at + 68 °F (20 °C)
Sub-menu item	Plasma cutting, gouging, optional marking
Application type	Manual and mechanized

Table 7 Technical data for FHT-EX®105TTH and FHT-EX®105TTM cutting torches

	FHT-EX®105TTH / FHT-EX®105TTM
Rated current and duty cycle	105 A/100 %
Permissible gas	Compressed air/nitrogen/argon*
Flow rate	75 A-85 A approx. 3.5 CFM (101 l/Min.) at 75 psi (5.2 bar)
	55 A-65 A approx. 2.9 CFM (82 l/Min.) at 75 psi (5.2 bar)
	45 A approx. 3.0 CFM (87 l /Min.) at 75 psi (5.2 bar)
Flow rate for gouging	65 A-85 A approx. 6.9 CFM (195 l/Min.) at 72.5 psi (5 bar)
Flow rate for marking	10, 11, 12, 15, 16 A approx. 1.3 CFM (39 l/Min.) at 35 psi (2.4 bar)
Maximum inlet pressure	125 psi (8.5 bar)
Gas post-flow period delay	≥ 20 seconds
Type of voltage	DC
Protection type for EX-TRAFIRE®85HD	IP23 (EN 60529)
Connection type	TCS (torch connection system) – 13 pin
Standard lengths (other lengths available upon request)	16.5 ft (5 m) / 26 ft (8 m) / 50 ft (15 m) / 75 ft (23 m)

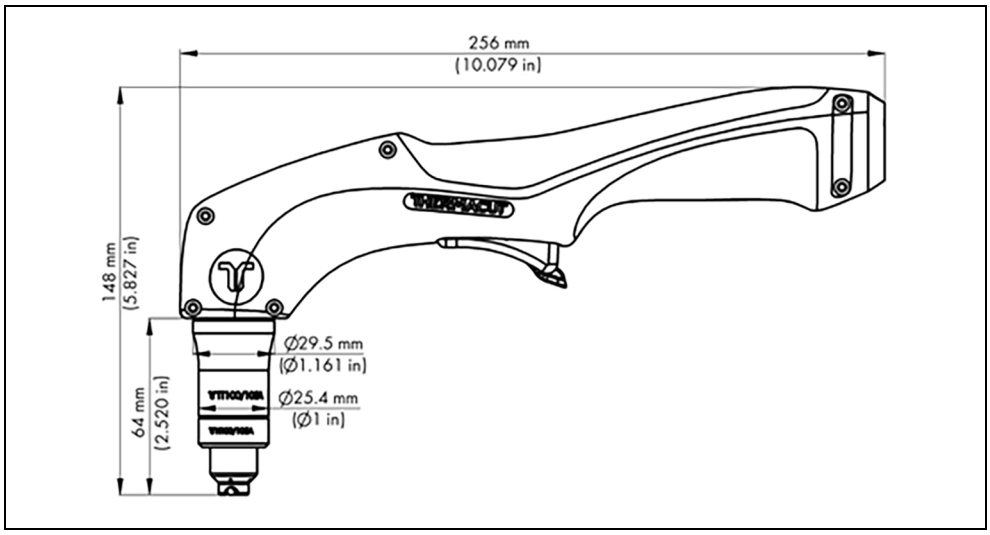
* Nitrogen may be used for cutting stainless steel and Aluminum; Argon may be used only in connection with the optional marking kit.

Table 8 Cutting torch weights and cable lengths

Cutting torch	**Weight and cable lengths**
FHT-EX®105TTH Standard hand cutting torch	16.5 ft (5 m) /5.5 lb (2.5 kg) 26 ft (8 m) /7.3 lb (3.3 kg) 50 ft (15 m) /11 lb (5.0 kg) 75 ft (23 m) /17.4 lb (7.9 kg)
FHT-EX®105TTM STD-NR Standard machine torch, without rack	16.5 ft (5 m) / 4.6 lb (2.1 kg) 26 ft (8 m) / 7.5 lb (3.4 kg) 50 ft (15 m) /12.6 lb (5.7 kg) 75 ft (23 m) / 17.6 lb (8.0 kg)
FHT-EX®105TTSM Short machine torch	16.5 ft (5 m) / 4.4 lb (2.0 kg) 26 ft (8 m) / 7.5 lb (3.4 kg) 50 ft (15 m) /12.6 lb (5.7 kg) 75 ft (23 m) / 17.6 lb (8.0 kg)

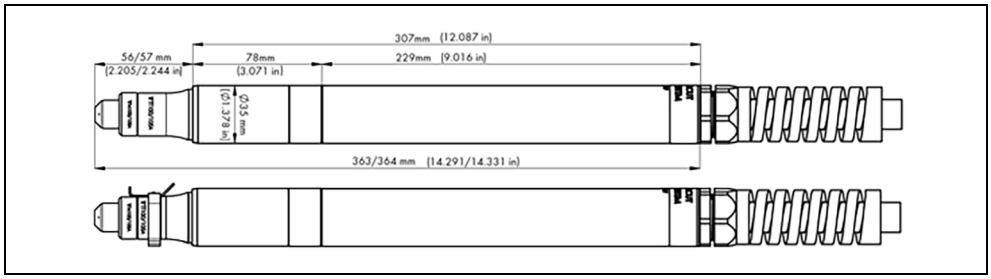
4.3.1 Torch dimensions FHT-EX®105TTH

Fig. 3 Torch dimensions FHT-EX®105TTH



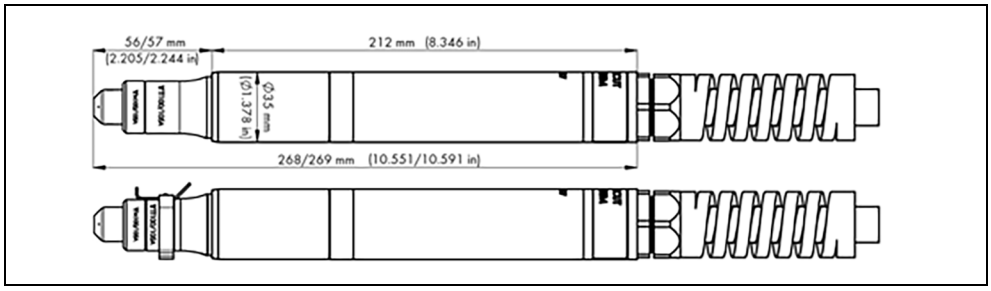
4.3.2 Torch dimensions FHT-EX®105TTM

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 power supply 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 power supply 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 power supply when lifting it. Lift with two persons.
  ⇨ 4.2 Technical data
- ➢ Use an appropriate lifting tool with load handling equipment for transporting and installing the power supply.
- ➢ Avoid abrupt lifting and setting down.
- ➢ Do not lift the power supply over any individuals or other devices.
- ➢ Use the attachment points provided.

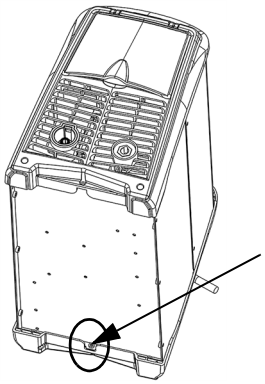
NOTICE

Risk of material damage due to improper transport and installation

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

- ➢ Protect the power supply against weather conditions, such as rain and direct sunlight.
- ➢ Protect the power supply from spatter when cutting.
- ➢ Protect the power supply from direct exposure to sparks when grinding.
- ➢ Use the power supply only in dry, clean, and well-ventilated rooms.
- ➢ Maintain a minimum distance of 3.3 ft (1 m) from the wall when positioning the power supply to ensure that it has sufficient ventilation.

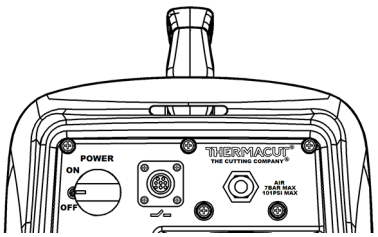
Fig. 6 Drain tube location



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

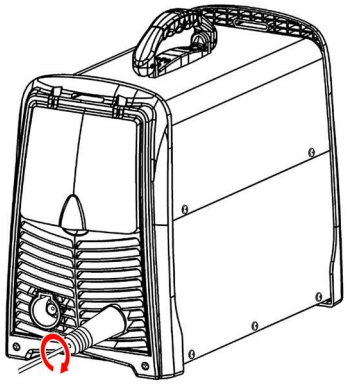
6 Setting up the power supply

6.1 Connecting to the gas supply



➢ Connect the gas hose with an inside diameter of at least ¼" (6 mm) to the gas connection of the power supply.

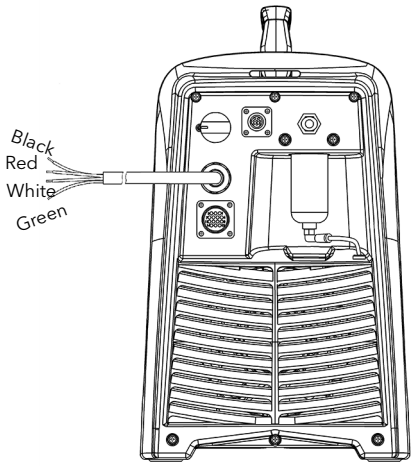
6.2 Connecting the work lead



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

6.3 Connecting the power supply cable

6.3.1 Connecting the single-phase machine



The power supply should be connected by a certified electrician or trained personnel.

L1 -> black

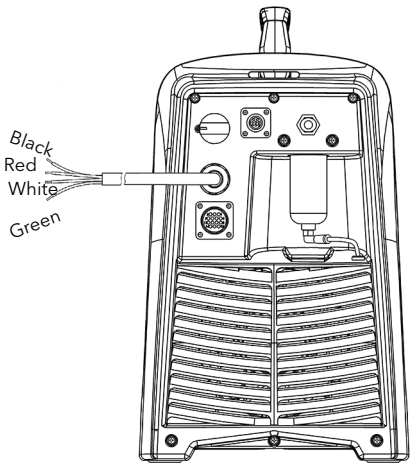
L2 -> red

N -> white

Ground -> green

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

6.3.2 Connecting the three-phase machine



The power supply should be connected by a certified electrician or trained personnel.

L1 -> black

L2 -> red

L3 -> white

Ground -> green

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

Table 9 Recommended cable extensions

Input voltage	Wire gauge/cross-sections	Length
230 V AC, single-phase	8 gauge/0.23 in^2 /16 mm^2	Up to150 ft (45 m)
208 – 575 V AC, three-phase	8 gauge/0.23 in^2 /16 mm^2	Up to 150 ft (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 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 power supply in a very humid environment or on conductive material, install ground fault circuit breakers (GFCI) in the power supply if according to local electric code.

➢ Use slow-blow fuses and/or circuit breakers and GFCI that comply with local regulations and electric codes.

➢ Ground the power supply according to the applicable regulations and laws.

➢ Do not ground the power supply 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 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 generator rating as shown in the following table.

Table 10 Minimum generator rating

Generator rating	Generator output current	Generator output voltage
≥ 20 kW, 3-phase	45 A at 208 V AC 20 A at 460 V AC 20 A at 575 V AC	208 V AC, 460 V AC or 575 V AC (depending on the specific power supply)

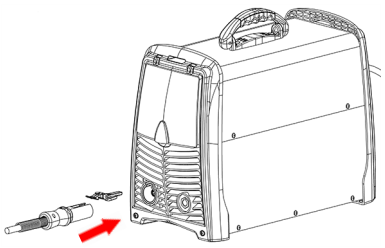
6.5 Connecting the cutting torch

NOTICE

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

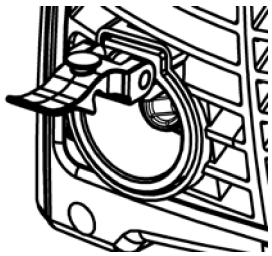
The TCS Latch with Key Assembly is important for the proper working of the EX-TRAFIRE®85HD. If used without, the EX-TRAFIRE®85HD will be damaged. If the TCS Latch with Key Assembly is not used, the connectors will be quickly damaged, as lead sets will detach from the power supply damaging the connectors.

➢ Only use the EX-TRAFIRE®85HD with the TCS Latch with Key assembly installed and properly secured.

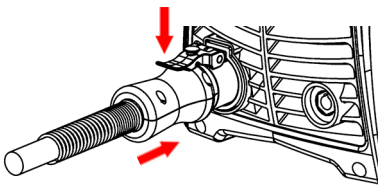


1 Switch off the power supply.

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.

6.6 Installing consumables for the hand and machine cutting torches

⚠ WARNING

Electric shock due to live parts

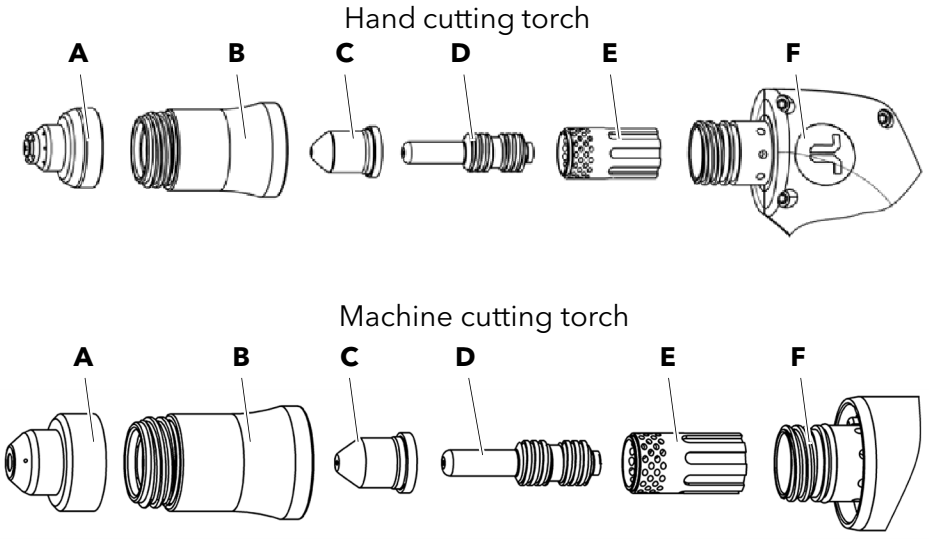
Fatal electric shock can occur if components are live during maintenance and cleaning work.

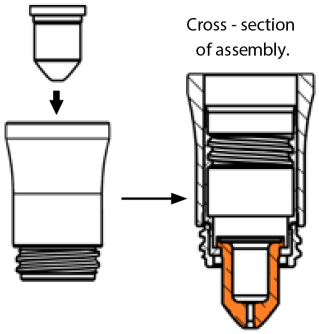
- ➢ Set the POWER switch to OFF before maintenance and cleaning work.
- ➢ Disconnect the input power supply from the wall.
- ➢ Observe the Lock-out/Tag-out procedures.

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

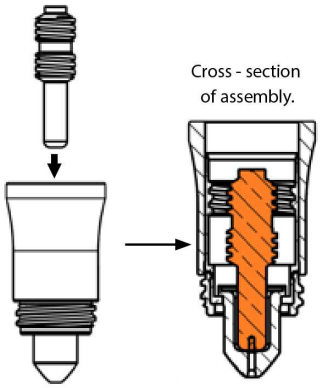
Fig. 7 Torch consumables

A Shield
B Retaining cap
C Nozzle
D Electrode
E Swirl ring
F Hand cutting torch/Machine cutting torch

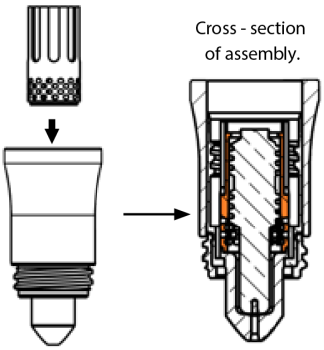




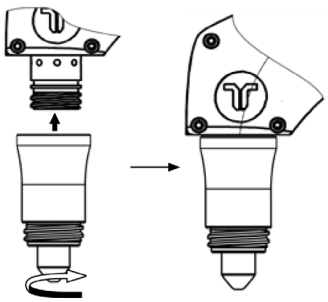
1 Install nozzle into the retaining cap.



2 Insert electrode into retaining cap and nozzle assembly.



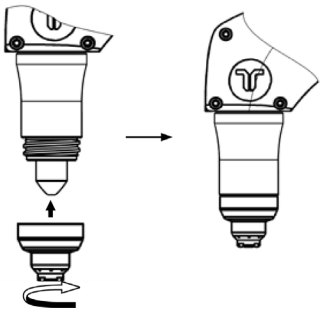
3 Insert the swirl ring.



4 Screw the entire assembly onto the hand cutting torch.

Do not overtighten.

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



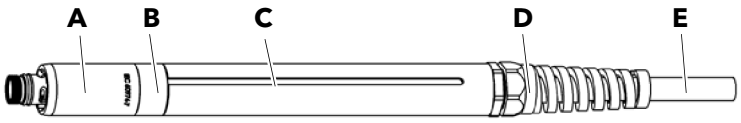
5 Install shield.

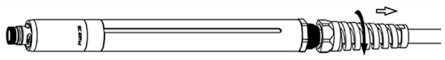
Do not overtighten.

6.6.1 Installing the cutting torch's gear rack

Fig. 8 Cutting torch

A Mounting sleeve with torch body
B Reduction nut
C Mounting tube
D Strain relief
E Cable



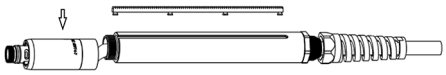


1 Disconnect the machine cutting torch from the cutting power supply.

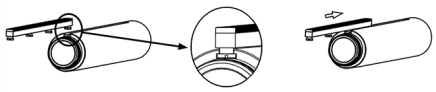
2 Place on a flat surface.

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 (P/N EX-306-004) 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.

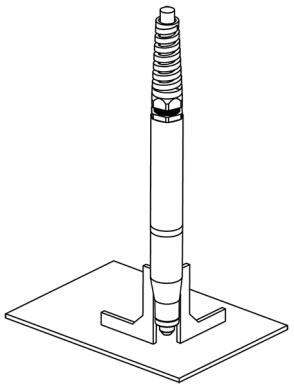
9 Screw in the strain relief. Hold the mounting tube tight to avoid damaging the cables.

10 Tighten the strain relief by hand.

6.7 Aligning FHT-EX®105TTM machine cutting torch

For information on the cutting process see

⇨ 6 Setting up the power supply on page 18



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

7 Operation of the power supply

⚠ WARNING

Risk of injury due to unexpected ignition of the plasma arc
Hand/Machine cutting torch:
Unexpected ignition may occur.
➢ Treat every torch as if it was ready to fire.

⚠ 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 power supply is operated for longer than the maximum duty cycle, it may be overloaded and irreparably damaged.
➢ Only operate the power supply up to the maximum permissible duty cycle.
⇨ 4.2 Technical data on page 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 EX-TRAFIRE® 85HD 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

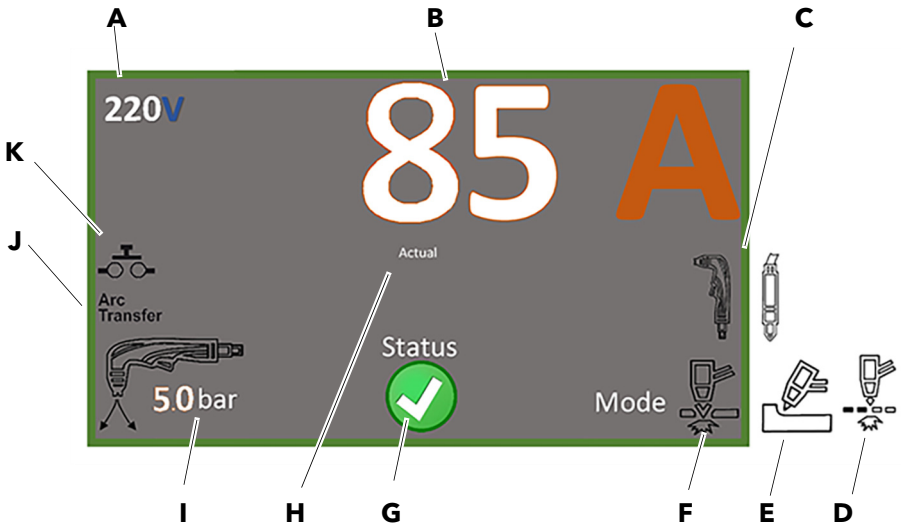
If the output current strength is switched during operation, the power supply may be damaged.

➢ 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

A Cutting arc voltage
B Output arc current
C Torch type
D Grid cutting
E Gouging
F Cutting
G Status
H All cutting parameters set
I Air pressure
J Transfer signal
K Indicates activation of the torch trigger or pins 3, 4 in the CNC connection.



7.1.1 Setting the parameters

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

1 Press the multi-function button for one second.

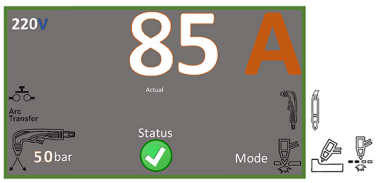
The adjustable values and the word "Set" flash in red.

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.

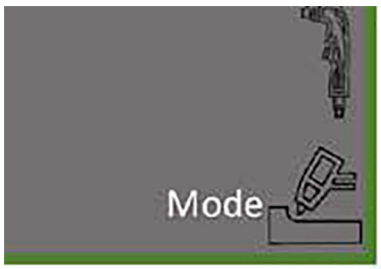


7.1.2 Selecting the cutting mode

Cutting

The current is 20–85 A.

The pressure of the cutting gas is 75 psi (5.2 bar).



Gouging

The current is 65–85 A.

The pressure of the cutting gas is 73 psi (5 bar).

Optional Marking

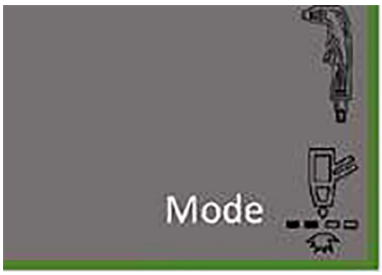
(uses same icon as gouging)

The current is 10*–20 A.

The pressure of the cutting gas is 35 psi (2.4 bar).

The pressure is changed under SETTINGS.

*Optional light marking



Grid cutting

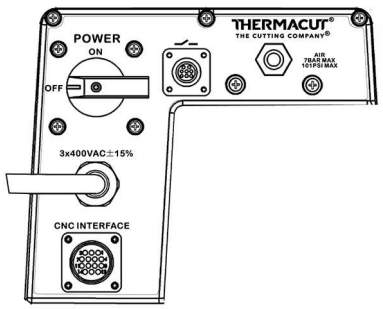
The current is 20–85 A.

The pressure of the cutting gas is 75 psi (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 (85HD)
– Length of torch cable 16.5 ft, 26 ft, 50 ft, 75 ft (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. 20 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.

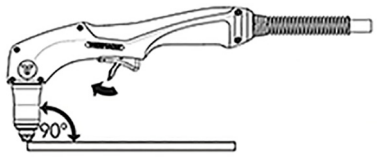
Once the workpiece is detected, the pilot arc switches to a cutting arc.

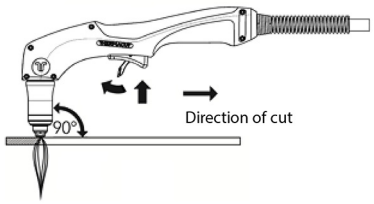
7 Grid cutting or gouging starts depending on the selected process.

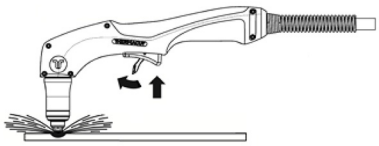
8 Extinguish the arc by releasing the torch trigger.

Gas post-flow period is approx. 20 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.

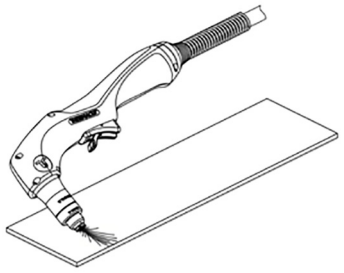
5 Pay attention to the following when cutting:

- ➢ 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:

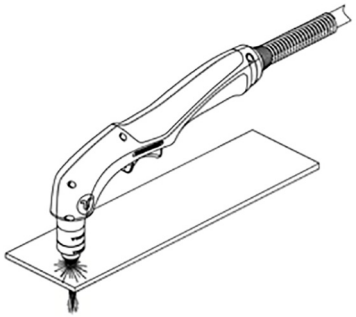
- ➢ Reduce the speed at which the cutting torch is pulled.
- ➢ Check the setting for the output current.
- ➢ Check the compressed air settings.
- ➢ Check consumables for wear/ damage.

7.6 Piercing



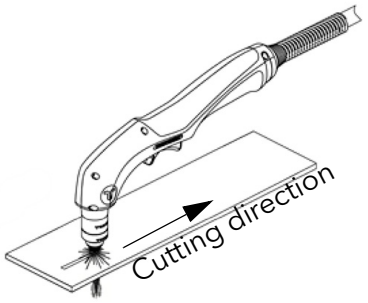
1 Hold the cutting torch at an angle to the workpiece with a max. distance of 0.1 in (3 mm) from the nozzle to the workpiece.

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.

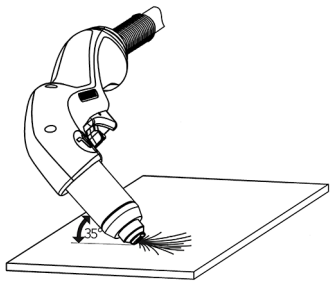


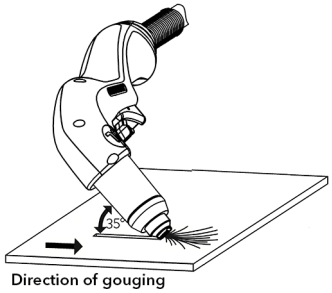
5 Pull the cutting torch in the cutting direction. Sparks must emerge from the underside of the workpiece.

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 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 30° to 35° 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 30° to 35° 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 11 Table for FHT-EX®105TT material removal

Gouging parameters		
(Dynamic) air pressure	75 psi (5.2 bar)	
Distance between cutting torch and workpiece	As close as possible	
Angle of cutting torch to workpiece	30° to 35 °	
Speed	24 in/min. (0.6 m/min.)	
Current	65 A	85 A
Removal rate for mild steel	Approx. 10.6 lb/hr (4.8 kg/h)	Approx. 17 lb)/hr (7.7 kg/h)
Width of gouge	Approx. 0.21 in (5.5 mm)	Approx. 0.22 in (5.7 mm)
Depth of gouge	Approx. 0.17 in (4.5 mm)	Approx. 0.18 in (4.8 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. There is 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 20 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 EX-TRAFIRE® 85HD from the input power supply.
3. Disconnect the EX-TRAFIRE® 85HD 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 EX-TRAFIRE®85HD'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.

⚠ 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.
- ➢ Observe the Lock-out/Tag-out procedure.

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

- ➢ Clean the EX-EX-TRAFIRE®85HD 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 12 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.
	➢ 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 EX-TRAFIRE® 85HD body and have the inside cleaned with a vacuum cleaner or dry, clean compressed air by Thermacut® or trained personnel.
Annually and after each time the housing is opened	➢ Have a safety inspection performed by Thermacut® or trained personnel.

Table 13 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 0.6 in (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 47
⇨ 19 FHT-EX® 105TTM consumables for machine cutting torch on page 51

➢ 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
➢ Observe the Lock-out/Tag-out procedure.

Table 14 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 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.

Table 14 Fault messages in the display

Error code	Cause	Troubleshooting
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.
H06 Excess temperature	Fan is defective.	➢ Ensure that the fan is running freely. ➢ Replace fan or fan motor.
	Duty cycle has been exceeded.	➢ Allow the power supply to cool down. ➢ Do not exceed the duty cycle.
	Insufficient ventilation.	➢ Verify sufficient space around the EX-TRAFIRE®85HD.
	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 a 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.

Table 14 Fault messages in the display

Error code	Cause	Troubleshooting
H15	No data communication at the BUS.	➢ 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.	➢ 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).	➢ Check the inlet gas 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.
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**	The voltage of PFC is incorrect.	➢ Check if the PFC IGBT is damaged.
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 15 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 great.	➢ Decrease the standoff between cutting torch and workpiece.
		Work lead is defective.	➢ Replace the work lead.

Table 15 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 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 properly secured.
			➢ Attach the work lead clamp to the workpiece in order to allow maximum electrical conduction.

Table 15 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 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. ⇨ 7.5 Cutting – Edge Start on page 30
	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 shocks 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 42
- 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

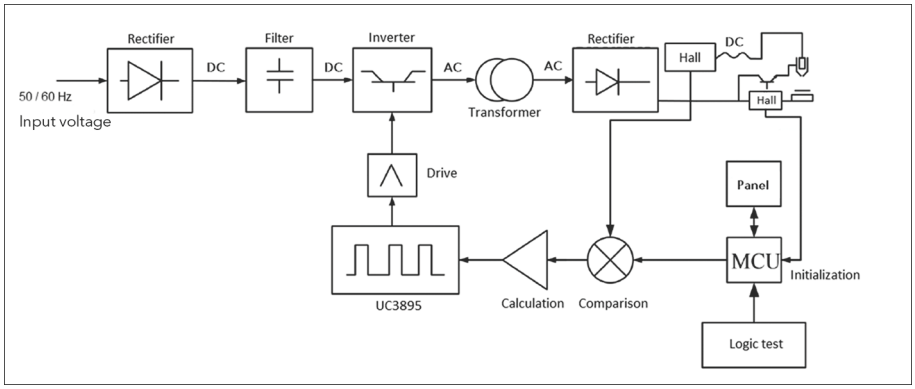
Thermacut® has reduced the packaging to the necessary minimum. The ability to recycle packaging materials is always considered during their selection.

13 Warranty

The goods delivered to buyer under contract with seller may be subject to the terms, conditions, limitations, and restrictions of a warranty, if any, to the extent set forth in seller's standard terms and conditions of sale as of the date of the contract between buyer and seller.

Buyer may access seller's standard terms and conditions of sale on seller's website at www.EX-TRAFIRE.us or your local country, or may obtain a copy by calling seller (see your local contact information under ADDRESSES AND CONTACTS) and requesting a copy of seller's standard terms and conditions of sale.

14 Block diagram



15 Accessories

Table 16 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" British standard straight thread
	EX-0-803-001	CNC interface plug 14-pin kit, incl. 7 pins
	EX-0-803-003 EX-0-803-004	CNC interface connection cable 9.8 ft (3 m) CNC interface connection cable 19.6 ft (6 m)
	EX-0-805-001	O-ring lubricant grease, 25 ml

For more information about accessories, visit our website: *www.ex-trafire.us*.

16 FHT-EX®105TTH hand cutting torch unit

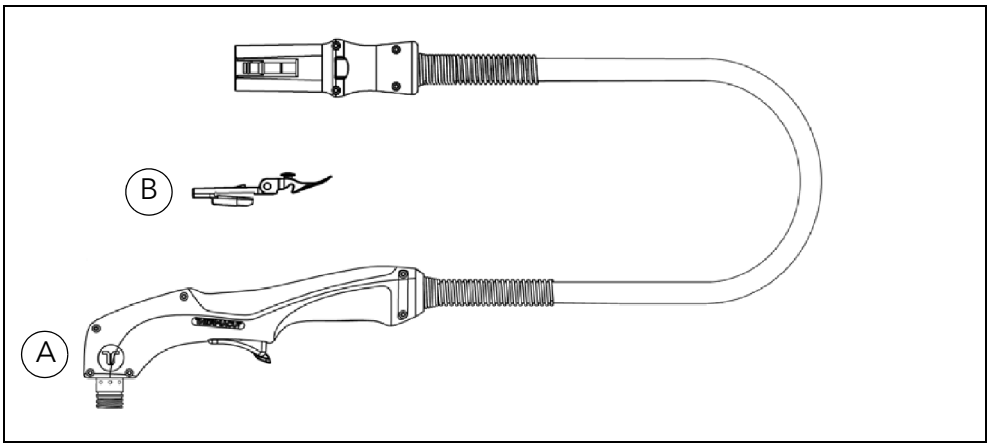


Table 17 FHT-EX®105TTH hand cutting torch

Number	Part number	Description
A	EX-5-139-001	FHT-EX®105TTH hand cutting torch without consumables with 16.5 ft (5 m) cable/TCS13
	EX-5-139-002	FHT-EX®105TTH hand cutting torch without consumables with 26 ft (8 m) cable/TCS13
	EX-5-139-003	FHT-EX®105TTH hand cutting torch without consumables with50 ft (15 m) cable/TCS13
	EX-5-139-004	FHT-EX®105TTH hand cutting torch without consumables with 75 ft (23 m) 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 45–85 A

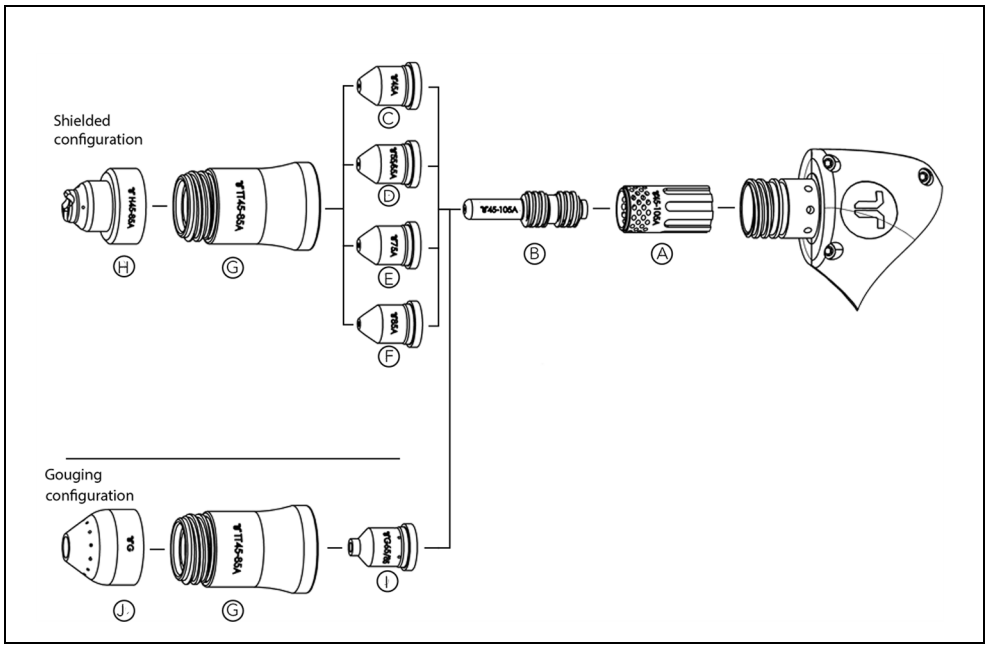


Table 18 Consumables for hand cutting torch 45–85 A

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-5-410-030	Nozzle 75 A
F	EX-5-410-055	Nozzle 85 A
G	EX-5-415-050	Retaining cap 45–85 A
H	EX-5-422-031	Shield 45–85 A, hand
I	EX-5-440-051	Nozzle, gouging 45–85 A
J	EX-5-440-050	Shield, gouging

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

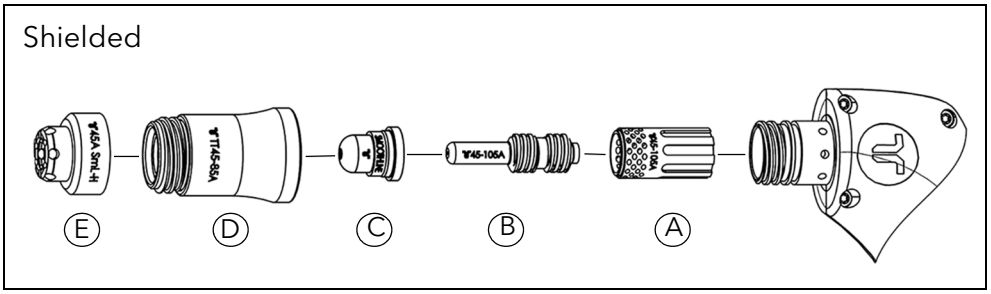


Table 19 FHT-EX®105TTH consumables for SmoothLine hand cutting torch

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

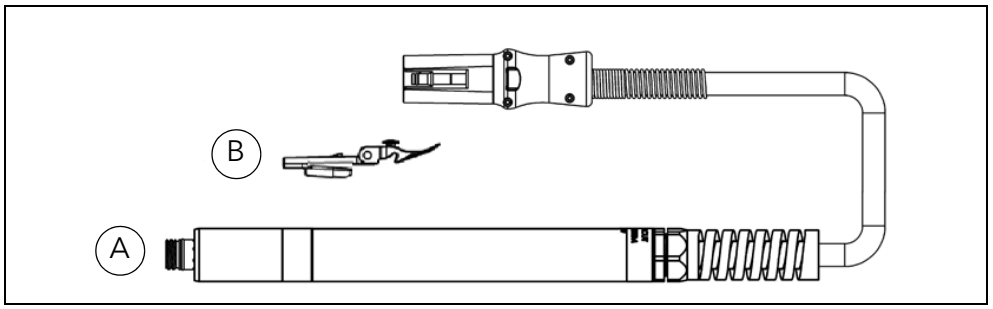


Table 20 FFHT-EX®105TTM machine cutting torch without gear rack

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

18.2 FHT-EX®105TTSM short machine cutting torch

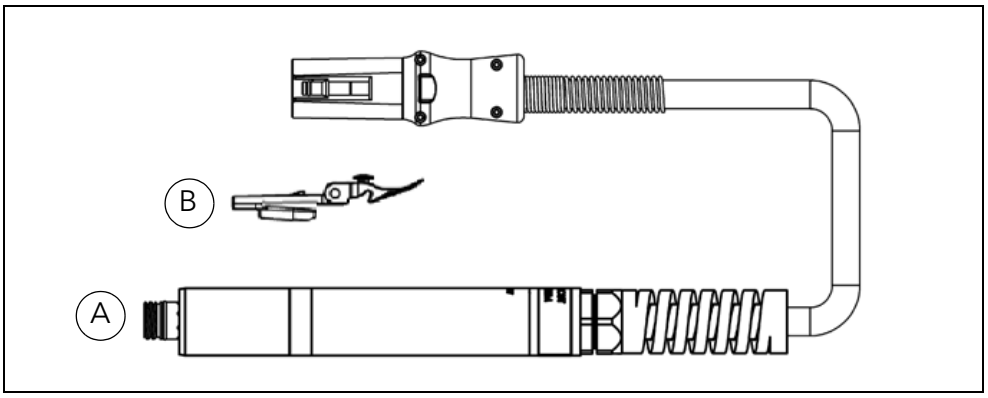


Table 21 FHT-EX®105TTSM short machine cutting torch

Number	Part number	Description
A	EX-5-242-021	FHT-EX®105TTSM short machine cutting torch, without consumables, with 16.5 ft (5 m) cable/ TCS13
	EX-5-244-021	FHT-EX®105TTSM short machine cutting torch, without consumables, with 26 ft (8 m) cable/ TCS13
	EX-5-247-021	FHT-EX®105TTSM short machine cutting torch, without consumables, with 50 ft (15 m) cable/ TCS13
	EX-5-250-021	FHT-EX®105TTSM short machine cutting torch, without consumables, with 75 ft (23 m) 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 45–85 A

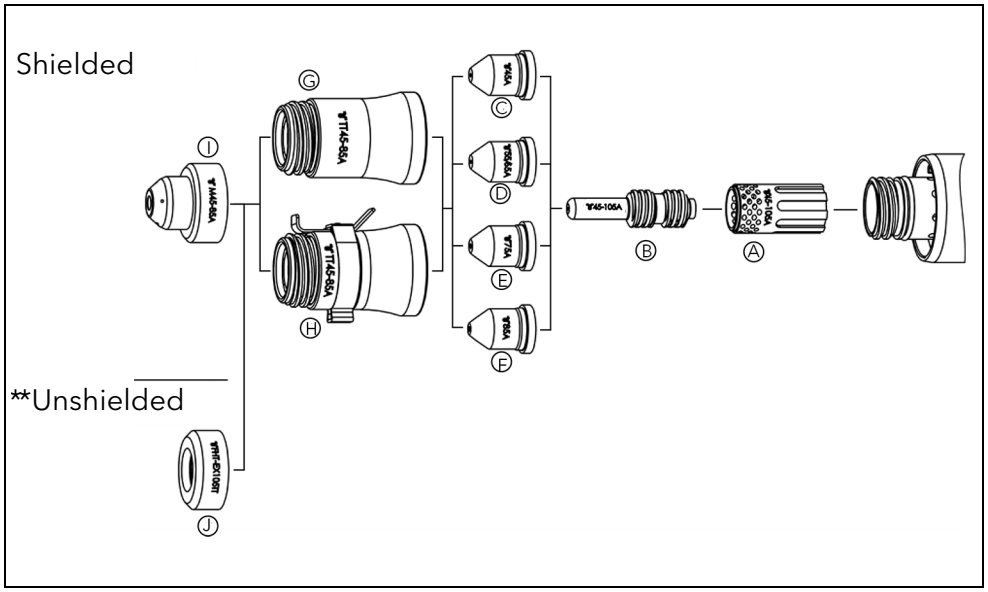


Table 22 FHT-EX® 105TTM consumables for standard machine cutting torch 45–85 A

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-5-410-030	Nozzle 75 A
F	EX-5-410-055	Nozzle 85 A
G	EX-5-415-050	Retaining cap 45–85 A
H	EX-5-415-052	Retaining cap 45–85 A with IHS tab
I	EX-5-422-051	Shield 45–85 A, machine
J	EX-5-423-001	Deflector

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

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

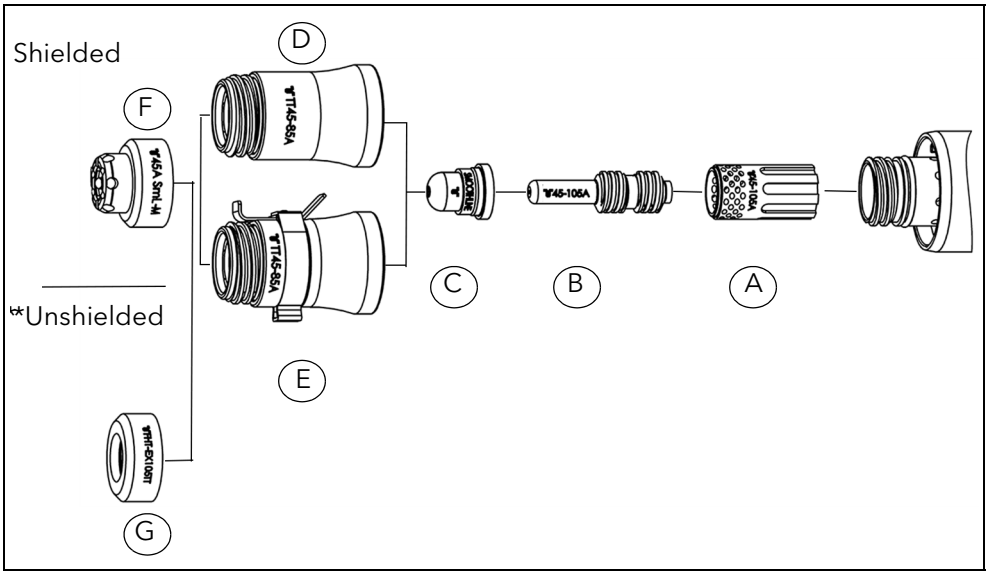


Table 23 FHT-EX®105TTM consumables for SmoothLine machine cutting torch

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.

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

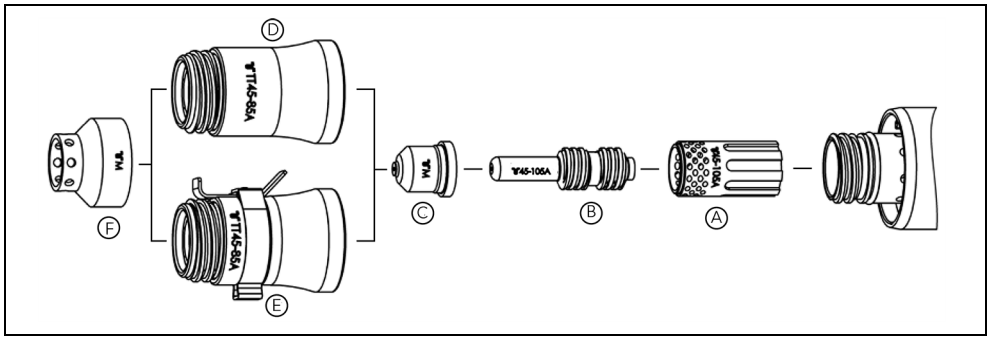


Table 24 FHT-EX® 105TTM consumables for marking machine cutting torch

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, machine

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

20 Cut charts for mechanized cutting

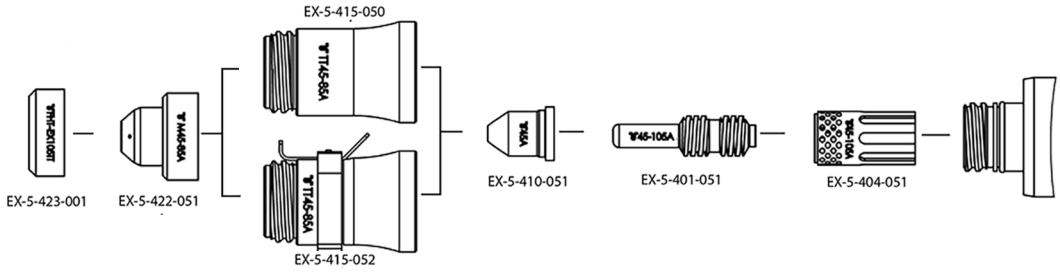
Cut charts serve as a guideline for mechanized cutting. Individual systems can be "fine tuned" to achieve optimum cutting quality.

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.

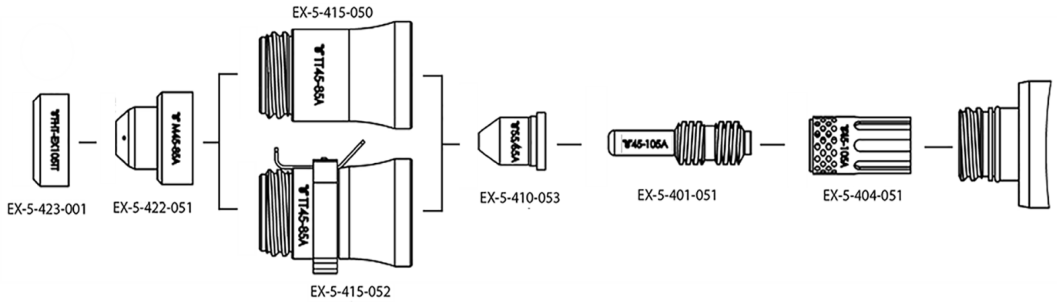
Configuration without shield:
If consumables are used without a shield, either the torch must be manually adjusted to the working height, or the arc voltage control (AVC) settings must be selected to achieve the desired cutting quality.
Distance of torch to workpiece for configuration without shield = distance of nozzle to workpiece 0.12 in (+3 mm).

20.1 45 A cutting, shielded, with compressed air



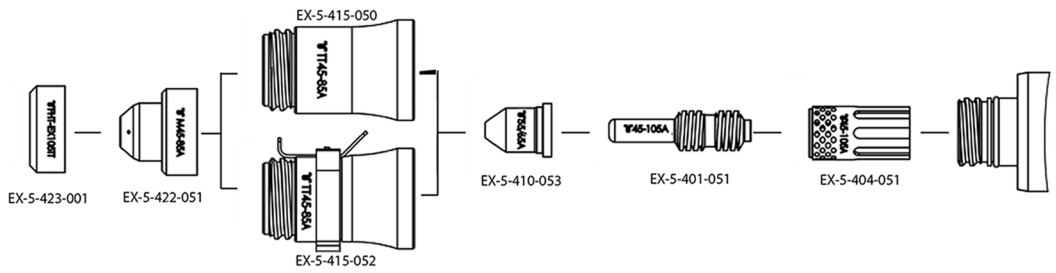
Material thickness	Cut height (shield to work cut height)	Pierce height (shield to workpiece height)	Pierce delay time	Recommended speed		Maximum speed		Kerf width
				Settings for highest quality		Standard quality settings		
				Cutting speed	Voltage	Cutting speed	Voltage	
[in]	[in]	[in]	[Seconds]	[ipm]	[Volts]	[ipm]	[Volts]	[in]
Mild steel								
14 GA	0.075	0.138	0.1	220	113	261	107	0.055
12 GA		0.138	0.1	155	113	191	109	0.055
3/16		0.138	0.3	114	115	134	113	0.055
1/4		0.138	0.5	59	117	70	116	0.063
5/16		0.138	0.5	41	117	47	119	0.067
3/8		0.157	0.6	30	123	33	122	0.071
1/2		0.177	1	21	128	24	125	0.071
5/8		Edge start		11	130	13	130	0.079
3/4				7	139	8	136	0.087
1				4	146	6	142	0.087
Stainless steel								
14 GA	0.075	0.138	0.1	209	112	299	112	0.039
12 GA		0.138	0.2	118	120	173	119	0.051
3/16		0.138	0.4	75	120	114	120	0.055
1/4		0.138	0.6	39	126	63	120	0.063
5/16		0.157	0.6	28	128	37	124	0.063
3/8		0.189	0.8	20	132	30	129	0.063
1/2		0.205	1.2	13	136	20	132	0.071
5/8		Edge start		9	139	13	133	0.079
3/4				6	140	8	138	0.079
Aluminum								
1/16	0.075	0.138	0.1	309	116	374	115	0.043
1/8		0.138	0.2	189	121	279	118	0.059
3/16		0.138	0.4	142	121	220	120	0.059
1/4		0.138	0.5	79	128	120	125	0.059
5/16		0.138	0.6	51	128	71	125	0.063
3/8		0.157	0.7	34	132	40	130	0.067
1/2		Edge start		24	134	29	133	0.067
5/8				13	134	15	137	0.067

20.2 55 A cutting, shielded, with compressed air



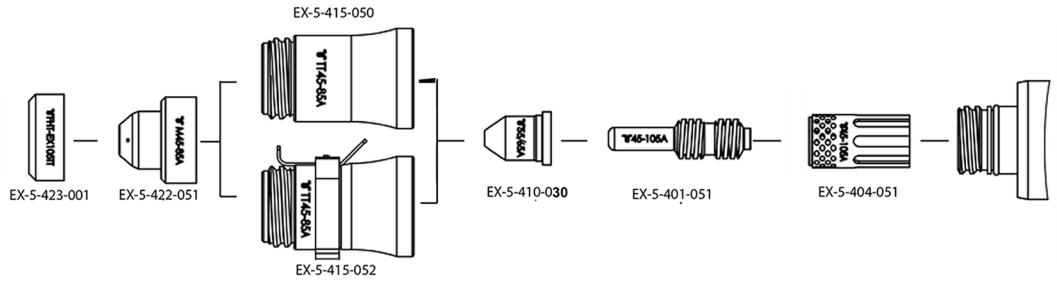
Material thickness	Cut height (shield to work cut height)	Pierce height (shield to workpiece height)	Pierce delay time	Recommended speed		Maximum speed		Kerf width
				Settings for highest quality		Standard quality settings		
				Cutting speed	Voltage	Cutting speed	Voltage	
[in]	[in]	[in]	[Seconds]	[ipm]	[Volts]	[ipm]	[Volts]	[in]
Mild steel								
14 GA	0.075	0.138	0.1	207	104	251	98	0.063
12 GA		0.138	0.1	167	106	191	106	0.063
3/16		0.138	0.3	137	107	153	106	0.063
1/4		0.138	0.5	70	109	97	107	0.067
5/16		0.138	0.8	57	109	65	107	0.067
3/8		0.157	1	35	115	44	114	0.075
1/2		0.157	1.2	29	117	32	115	0.079
5/8		0.177	1.5	20	128	23	124	0.087
3/4		Edge Start		12	128	15	127	0.087
1				7	137	10	132	0.091
Stainless steel								
14 GA	0.075	0.150	0.1	268	105	334	104	0.051
12 GA		0.150	0.2	217	105	274	104	0.051
3/16		0.150	0.5	167	105	204	108	0.051
1/4		0.150	0.8	78	109	90	108	0.067
5/16		0.150	1	47	115	58	110	0.067
3/8		0.197	1.2	30	119	40	115	0.079
1/2		0.276	1.3	23	121	29	118	0.079
5/8		Edge Start		16	122	18	121	0.079
3/4				9	132	12	129	0.075
Aluminum								
1/16	0.075	0.138	0.1	291	110	393+	111	0.055
1/8		0.138	0.1	241	112	294	112	0.055
3/16		0.138	0.3	201	113	244	115	0.055
1/4		0.138	0.5	100	116	147	118	0.071
5/16		0.138	0.6	60	120	87	118	0.075
3/8		0.157	1	40	123	55	121	0.075
1/2		0.157	1	30	128	43	125	0.075
5/8		Edge Start		22	130	23	128	0.075
3/4				13	136	18	141	0.067

20.3 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	
[in]	[in]	[in]	[Seconds]	[ipm]	[Volts]	[ipm]	[Volts]	[in]
Mild steel								
14 GA	0.075	0.138	0.1	244	106	295	100	0.063
12 GA		0.138	0.1	197	108	224	108	0.063
3/16		0.138	0.3	161	109	181	108	0.063
1/4		0.138	0.5	83	111	114	109	0.067
5/16		0.138	0.5	67	111	77	109	0.067
3/8		0.157	0.8	41	117	51	116	0.075
1/2		0.157	1	34	119	38	117	0.079
5/8		0.177	1.3	24	130	27	126	0.087
3/4		Edge Start		15	130	17	129	0.087
1				8	139	11	134	0.091
Stainless steel								
14 GA	0.075	0.150	0.1	315	107	393	106	0.051
12 GA		0.150	0.2	256	107	323	106	0.051
3/16		0.150	0.5	197	107	240	110	0.051
1/4		0.150	0.5	92	111	106	110	0.067
5/16		0.150	0.8	55	117	69	112	0.067
3/8		0197	1	35	121	47	117	0.079
1/2		0.276	1.2	28	123	34	120	0.079
5/8		Edge Start		19	124	22	123	0.079
3/4				11	134	15	131	0.075
Aluminum								
1/16	0.075	0.138	0.1	342	112	393+	113	0.055
1/8		0.138	0.1	283	114	346	114	0.055
3/16		0.138	0.3	236	115	287	117	0.055
1/4		0.138	0.4	118	118	173	120	0.071
5/16		0.138	0.5	71	122	102	120	0.075
3/8		0.157	0.8	47	125	65	123	0.075
1/2		0.157	1	35	130	51	127	0.075
5/8		Edge Start		26	132	28	130	0.075
3/4				15	138	22	143	0.067

20.4 75 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	
[in]	[in]	[in]	[Seconds]	[ipm]	[Volts]	[ipm]	[Volts]	[in]
Mild steel								
12 GA	0.075	0.138	0.1	224	114	264	112	0.055
3/16		0.138	0.2	173	115	224	115	0.063
1/4		0.138	0.3	134	115	169	115	0.063
5/16		0.138	0.3	83	116	98	115	0.071
3/8		0.138	0.5	55	119	63	118	0.075
1/2		0.157	0.8	39	121	47	120	0.083
5/8		0.177	1.2	28	125	31	129	0.087
3/4		Edge Start		16	130	20	129	0.091
1				10	137	13	135	0.091
1-1/8				6	143	8	140	0.098
Stainless steel								
12 GA	0.075	0.138	0.2	268	106	354	104	0.059
3/16		0.138	0.3	216	112	283	107	0.059
1/4		0.138	0.5	118	112	150	114	0.063
5/16		0.138	0.5	87	117	94	114	0.071
3/8		0.157	0.8	55	119	67	114	0.071
1/2		0.170	1.2	33	128	47	122	0.079
5/8		0.170	1.5	24	130	27	129	0.079
3/4		Edge Start		15	139	20	129	0.079
1				9	134	12	132	0.087
Aluminum								
1/8	0.075	0.138	0.1	295	110	374	104	0.063
3/16		0.138	0.2	248	117	307	108	0.071
1/4		0.138	0.3	134	120	185	116	0.071
5/16		0.157	0.3	90	122	130	120	0.071
3/8		0.157	0.5	59	126	94	120	0.075
1/2		0.157	0.7	47	127	71	124	0.075
5/8		0.170	1	31	132	43	130	0.079
3/4		Edge Start		20	133	31	132	0.079
1				12	142	19	135	0.083

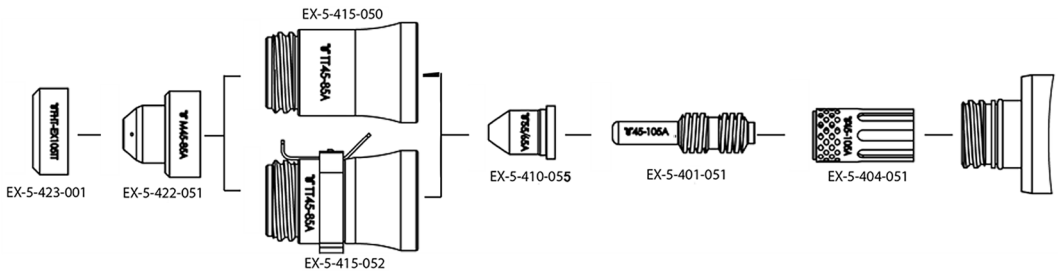
20.5 85 A cutting, shielded, with compressed air

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.
Distance of torch to workpiece for configuration without shield = distance of nozzle to workpiece 0.1 in (+2.75 mm).

20.5.1 85 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	
[in]	[in]	[in]	[Seconds]	[ipm]	[Volts]	[ipm]	[Volts]	[in]
Mild steel								
12 GA	0.083	0.138	0.1	252	112	284	109	0.063
3/16		0.138	0.2	185	106	122	106	0.063
1/4		0.138	0.5	122	112	150	113	0.075
5/16		0.138	0.5	94	114	104	114	0.075
3/8		0.138	0.5	63	114	71	113	0.075
1/2		0.157	0.8	43	120	54	118	0.083
5/8		0.157	1	31	124	33	124	0.083
3/4		0.197	1.8	19	130	21	130	0.087
1		Edge Start		13	134	14	133	0.087
1-1/8				6	141	8	138	0.102
Stainless steel								
12 GA	0.083	0.138	0.2	291	107	362	103	0.055
3/16		0.138	0.5	240	109	295	105	0.055
1/4		0.138	0.5	142	112	181	111	0.059
5/16		0.138	0.5	90	113	110	114	0.063
3/8		0.157	0.8	59	116	75	116	0.075
1/2		0.197	1.2	39	121	51	120	0.071
5/8		0.197	1.4	28	125	30	126	0.079
3/4		Edge Start		19	129	22	127	0.083
1				12	136	15	130	0.083
Aluminum								
1/8	0.083	0.138	0.1	315	113	370	110	0.063
3/16		0.138	0.2	256	116	315	115	0.063
1/4		0.157	0.5	150	118	193	120	0.063
5/16		0.197	0.5	102	120	138	120	0.067
3/8		0.236	0.5	75	124	98	121	0.079
1/2		0.276	0.7	57	128	75	123	0.083
5/8		0.276	1	37	134	47	129	0.091
3/4		Edge Start		24	138	35	133	0.083
1				15	141	21	138	0.083

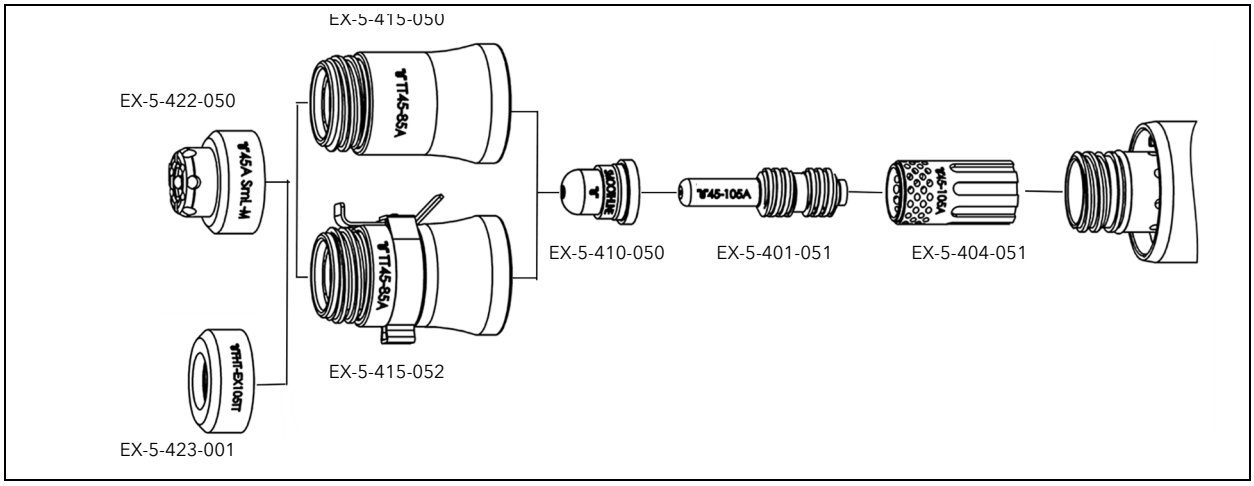
20.6 40–45 A cutting, SmoothLine, shielded, with compressed air

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.
Distance of torch to workpiece for configuration without shield = distance of nozzle to workpiece 0.1in (+2.15 mm).

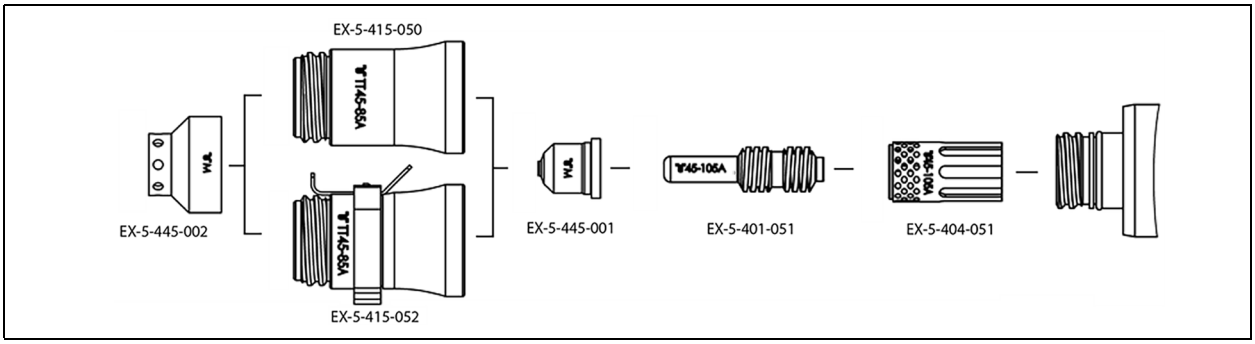
20.6.1 40–45 A cutting, SmoothLine, shielded, with compressed air



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		
[in]	[in]	[in]	[Seconds]	[ipm]	[Volts]	[in]	[A]
Mild steel							
26 GA	0.079	0.118	0	325	76	0.028	40
24 GA		0.118	0	325	76	0.028	
22 GA		0.118	0.1	325	76	0.028	
20 GA		0.118	0.2	325	76	0.028	45
16 GA		0.118	0.4	252	76	0.037	
14 GA		0.118	0.4	189	80	0.039	
12 GA		Edge start		108	83	0.049	
3/16				75	85	0.053	
Stainless steel							
26 GA	0.079	0.118	0	325	70	0.026	40
24 GA		0.118	0	325	70	0.026	
22 GA		0.118	0.1	325	70	0.026	
20 GA		0.118	0.15	325	70	0.028	45
16 GA		0.118	0.4	242	75	0.028	
14 GA		0.118	0.4	170	82	0.035	
12 GA		Edge start		82	94	0.043	
3/16				35	94	0.043	

20.7 Tables for marking

20.7.1 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]	**[in]**	**[in]**	**[Seconds]**	**[ipm]**	**[Volts]**	**[in]**	**[in]**
Mild steel								
Low	10*	0.252	0.252	0	100	127	0.055	<0.001
High	10*	0.181	0.181	0	100	109	0.064	0.001
Stainless steel								
Low	10*	0.201	0.201	0	200	116	0.077	0.001
High	10*	0.252	0.252	0	125	128	0.090	0.002
Aluminum								
	11*	0.039	0.039	0	200	80	0.036	<0.001
With Argon								
Mild steel								
Marking	**Power supply**	**Cut height (shield to work cut height)**	**Initial marking height**	**Delay**	**Marking speed**	**Arc voltage**	**Kerf width**	**Kerf depth**
	[Amps]	**[in]**	**[in]**	**[Seconds]**	**[ipm.]**	**[Volts]**	**[in]**	**[in]**
Low	10*	0.079	0.079	0	125	41	0.064	<0.001
High	15*	0.059	0.059	0	125	41	0.047	<0.001
Stainless steel								
Low	12*	0.098	0.098	0	125	43	0.055	<0.001
High	15*	0.098	0.098	0	100	43	0.059	<0.001
Aluminum								
	16*	0.020	0.020	0	175	39	0.024	<0.001

* with optional marking adapter PCB

21 Appendix

21.1 Connecting the optional CNC interface

The optional CNC interface plug installs onto rear panel of the EX-TRAFIRE®85HD. Control signals can be transmitted via the CNC interface. For signal types see table 26. Control elements are located on the control panel. Connections are on the front and rear of the EX-TRAFIRE®85HD.

⇨ 4.1 Assembly and use on page 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.
- ➢ Use Lock-out/Tag-out according to local regulations.

Fig. 10 Signal and pin assignment for CNC interface

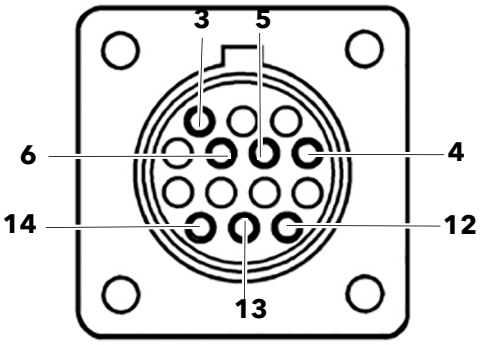


Table 25 Signal and pin assignment for CNC interface

Signal	**START** Start plasma cutting	**Arc** Start machine motion	**Ground**	**Voltage divider**
Type	Input	Output	Ground	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	White, white	Yellow, yellow	Green	6 (red), 5 (black)

21.1.1 Setting the voltage divider DIP switches

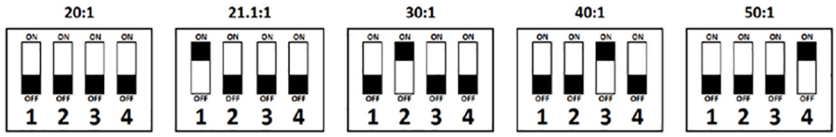
The voltage divider DIP switches are preset to 50:1.

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

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

⇨ Fig. 11 Voltage divider DIP switch settings on page 65

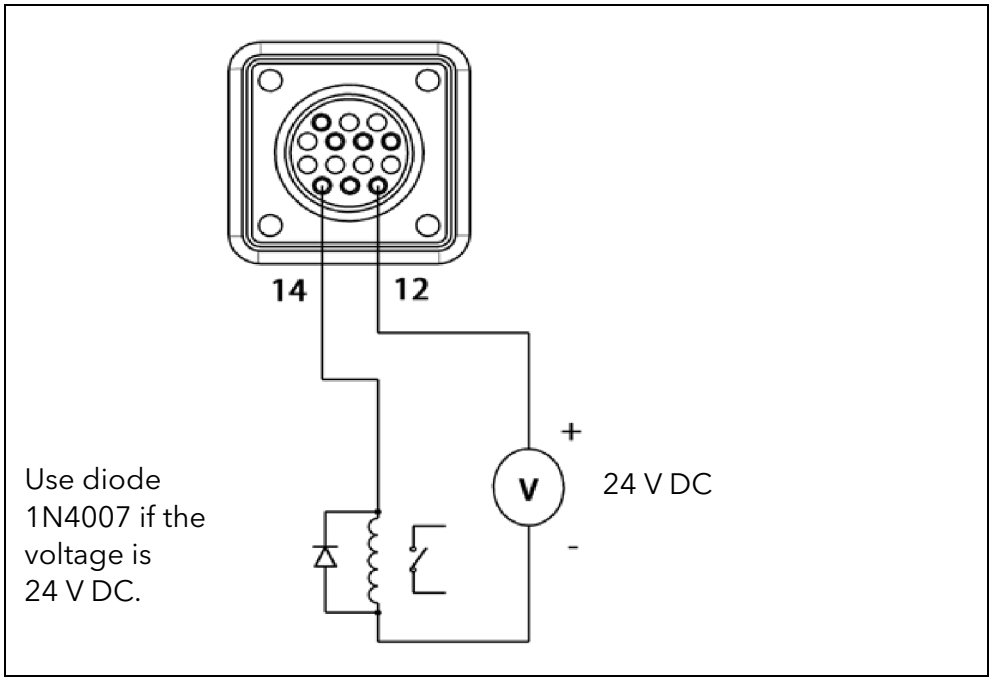
Fig. 11 Voltage divider DIP switch settings



21.1.2 Enabling the external DC coil with an external power supply

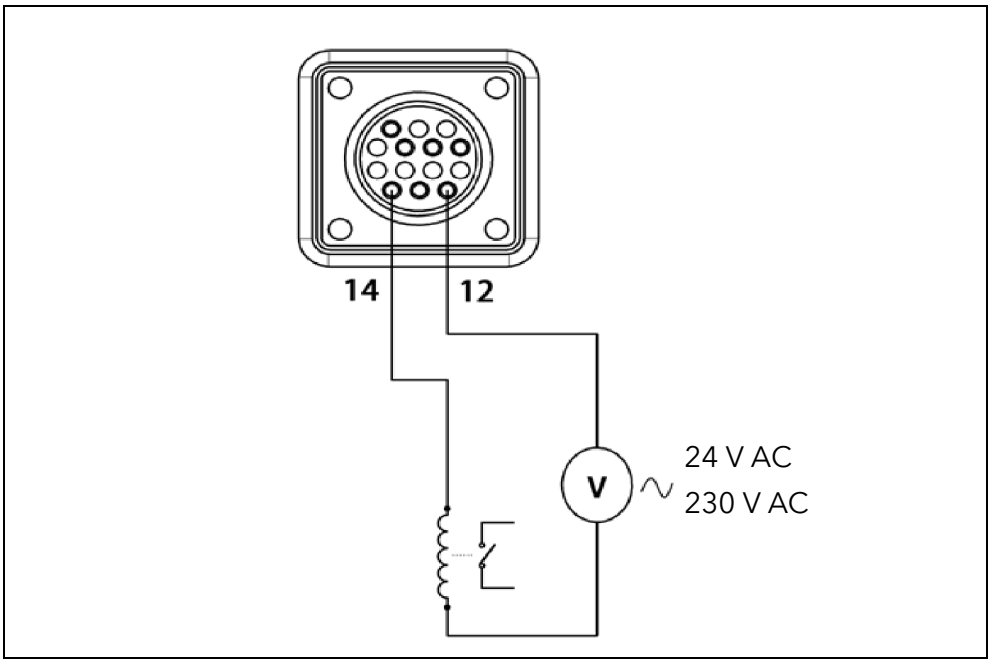
➢ For 24 V DC, use a 1N4007 diode.

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



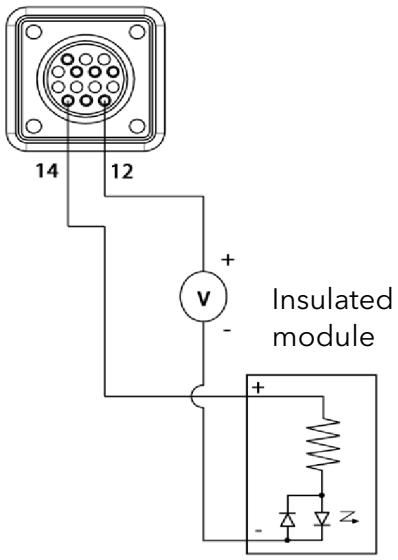
21.1.3 Enabling the external AC coil with an external power supply

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



21.1.4 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 EX-TRAFIRE®85HD.
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 operating manual on our website:

www.ex-trafire.us

Revision R1/10_2022

Revision 2/02_2023

- 4.2 „Technical data“ – Maximum input power changed to 23.8 kVA

Revision 3/2023

- 6.3.1 “Connecting the single-phase machine” – Connection procedure clarified
- 6.3.2 “Connecting the three-phase machine” – Connection procedure clarified

Revision 4/01_2024

- 1.2 “Identification plate” – Location changed
- 4.2 “Technical data” – tables 2, 3, and 6 – Content adjusted; new layout; torch dimensions added
- 6.3 “Connecting the power supply cable” – Single-phase connection changed
- Chapter “CNC connection” converted into appendix.

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