EX-TRAFIRE 65HD

Plasma arc cutting power supply unit

Operating Manual – CE
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THERMACUT®
THE CUTTING COMPANY®

EX-3-907-004
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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 marking. The EX-TRAFIRE® 65HD uses gas or nitrogen to cut almost all electrically conductive metals. The device may be operated only with original Thermacut® parts.

This documentation describes the EXTRAFIRE®65HD cutting power supply unit only.

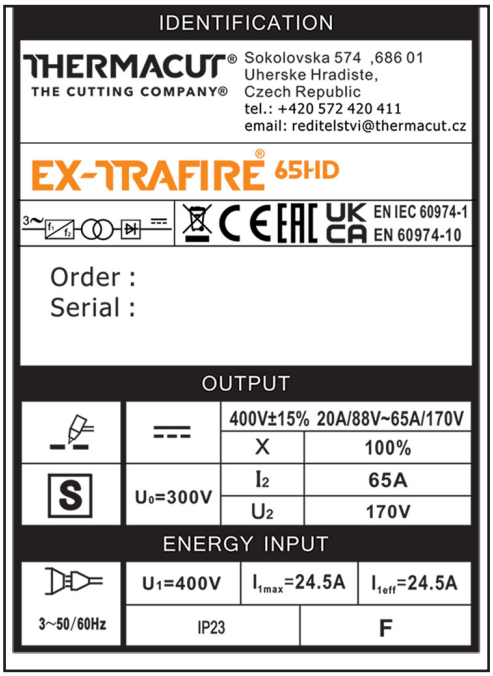
When used in this documentation, the term “device” always refers to the EX-TRAFIRE®65HD cutting power supply.

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 labelled by means of an identification plate on the housing located under the machine.

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

1.3 Signs and symbols used

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

- General instructions.

1 Action(s) to be carried out in succession.

– Lists.

» Cross-reference symbol refers to detailed, supplementary or further information.

A Caption, item description.

1.4 Classification of the warnings

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

⚠ DANGER

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

⚠ WARNING

Describes a potentially dangerous situation. If not avoided, this may result in serious injuries.

⚠ CAUTION

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

NOTICE

Describes the risk of impairing work results or potential material damage to the device or the equipment.

2 SAFETY

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

- Observe the document entitled “Safety Instructions”.

2.1 Designated use

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

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

2.2 Obligations of the operator

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

Authorized personnel are:

– those who are familiar with the basic regulations on occupational safety and accident prevention;

– those who have been instructed on how to handle the device;

– those who have read and understood these operating instructions;

– those who have been trained accordingly;

– those who are able to recognize possible risks because of their special training, knowledge, and experience.

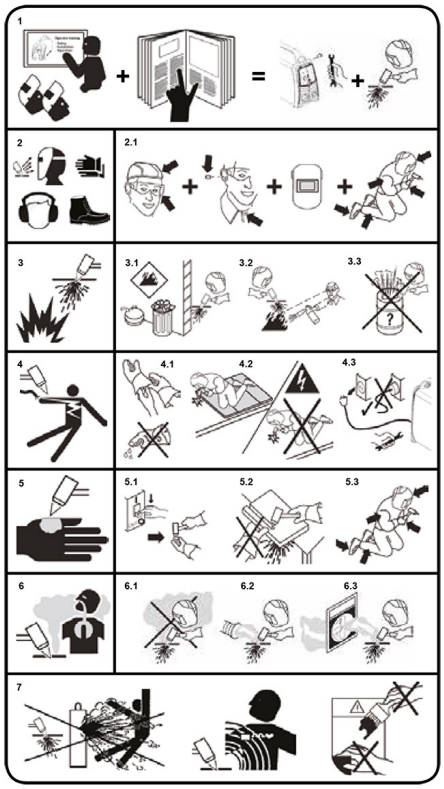
- Keep untrained persons out of the work area.
- Each time the device’s cover plates are opened, have Thermacut or another authorized specialist perform a safety inspection in accordance with DIN IEC 60974 Part 4: “Periodic inspection and testing”.

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

- Do not use the device if you have a pacemaker or an implanted defibrillator.
  This Class A cutting device is not intended for use in residential areas with a public low-voltage power supply system. It can potentially be difficult to guarantee electromagnetic compatibility in these areas due to both conducted and emitted interference.
- The EX-TRAFIRE®65HD may be used only in industrial zones according to DIN EN 61000-6-3.

2.3 Warning and notice signs

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



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

2.4 Product-specific safety instructionsuse

- Do not use or store the device outdoors where it is wet.
- 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 7 Recommended cable extensions** on page EN-15 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 (PPE).
- Ensure that others in close proximity are also wearing personal protective equipment.

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

Tab. 1 Lens shade selector for plasme 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® 105TT cutting torch
- 1x TCS Latch with Key Assembly
- 1× work lead incl. workpiece clamp
- 1× operating instructions
- 1× starter kit

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

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

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

Goods-in inspection

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

Claim process

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

Returns

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

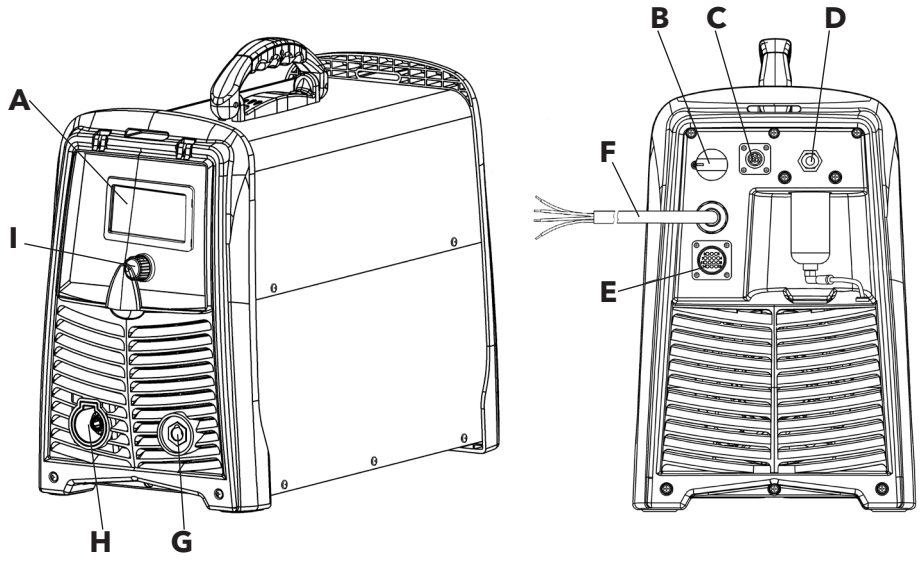
4 PRODUCT DESCRIPTION

4.1 Assembly and use

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

Fig. 2 Control elements and connections

A Display
B <POWER> switch
C Optional BUS interface
D G1/4" 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 device . A fault code is displayed if an error occurs.
POWER switch (B)	Used to switch the device on and off.
Optional BUS interface (C)	For connecting the optional CAN BUS or RS485/422 BUS.
CNC interface connection (E)	This optional interface is used to connect the device to an optional CNC cutting table or robot.
Multi-function button (I)	For toggling between two menus and setting the cutting parameters.

4.2 Technical data

Tab. 2 Power supply specifications

Certification	**CE**	
Idle voltage (U_0)	330 V DC	
Characteristic curve* * The curve is defined as output voltage versus output current	Drooping	
Input voltage (U_1)	3 × 400 V AC ± 15% - 50–60 Hz	
Output current (I_2)	10–65 A	
Nominal output voltage (U_2)	170 V DC	
Maximum power input	17 kVA	
Duty cycle X is the percentage of 10 minutes that the system can cut (Arc-On time) at nominal load (I_2 and U_2) without overheating at rated input voltage.*		
Duty cycle (X*) at 40°C at nominal conditions (U_1, 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 × H × W) [mm]	560 × 400 × 260	
Weight [kg]	20.4	

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

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

Tab. 3 Ambient conditions for transport and storage

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

Tab. 4 Ambient conditions for operation

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

Tab. 5 Gas data

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

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

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

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

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

	FHT-EX® 105TTH / FHT-EX® 105TTM
Flow rate for marking	10, 11, 12, 15, 16 A approx. 39 l/min. at 2.4 bar
Maximum inlet pressure	10 bar
(Dynamic) operating pressure	5.2 bar
Connection type	TCS (torch connection system) – 13 pin
Gas post-flow period delay	approx. 30 seconds
Type of protection	IP23S (EN 60529)
Type of voltage	DC
Standard lengths (other lengths available upon request)	5 m/ 8 m/ 15 m/ 23 m

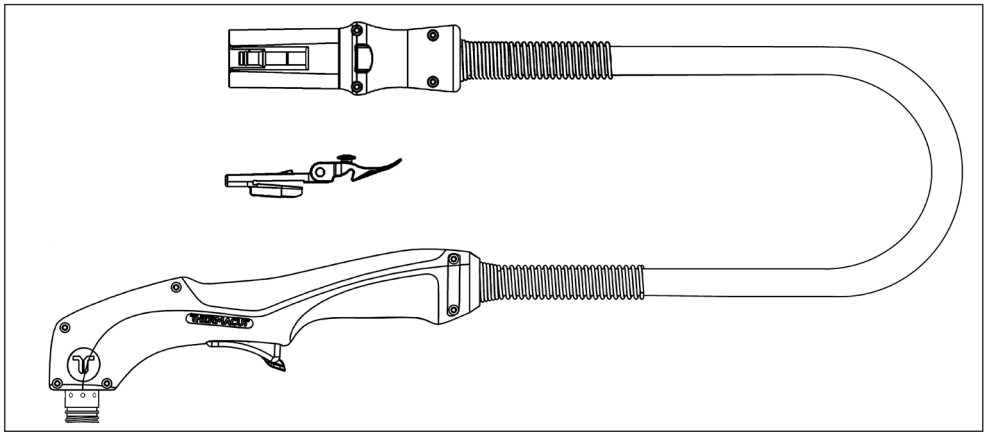
* For setup details see cut charts in **OM of cutting torch FHT-EX®105TT.**

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

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

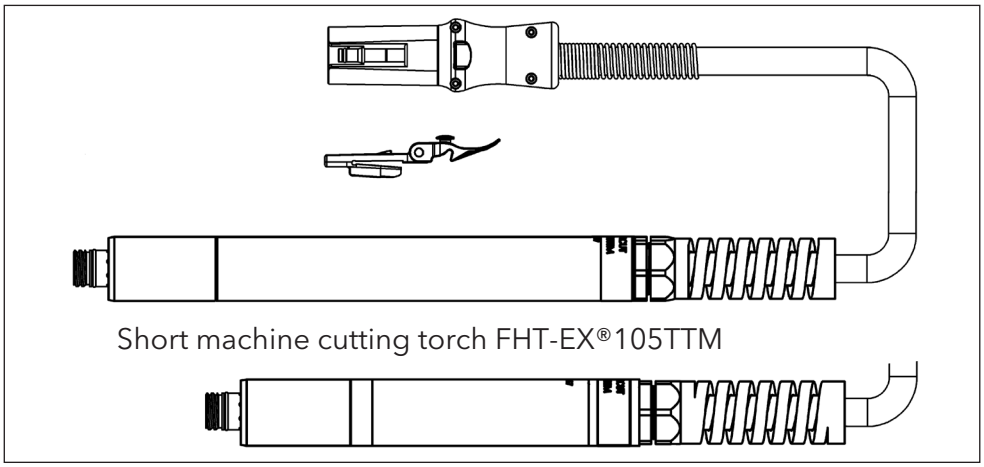
4.3.1 Cutting torch FHT-EX®105TTH

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



4.3.2 Cutting torch FHT-EX®105TTM

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



Short machine cutting torch FHT-EX®105TTM

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. tilt angle of 15°.
- Note the weight of the device when lifting it.
  » **4.2 Technical data** on page EN-11.
- Use an appropriate lifting tool with load handling attachment for transporting and installing the device.
- Avoid abrupt lifting and setting down.
- Do not lift the device over persons or other devices.
- Use the attachment points provided.

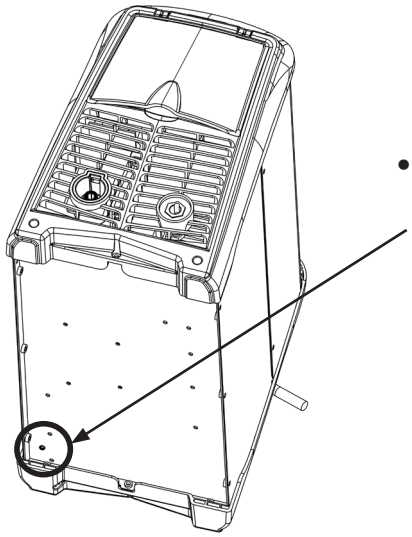
NOTICE

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 to the device.

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

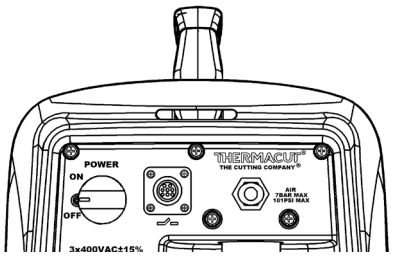
Fig. 5 Drain tube location



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

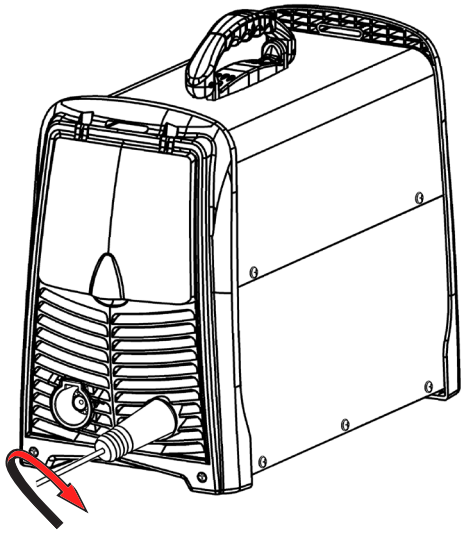
6 SETTING UP THE POWER SUPPLY

6.1 Connecting to the gas supply



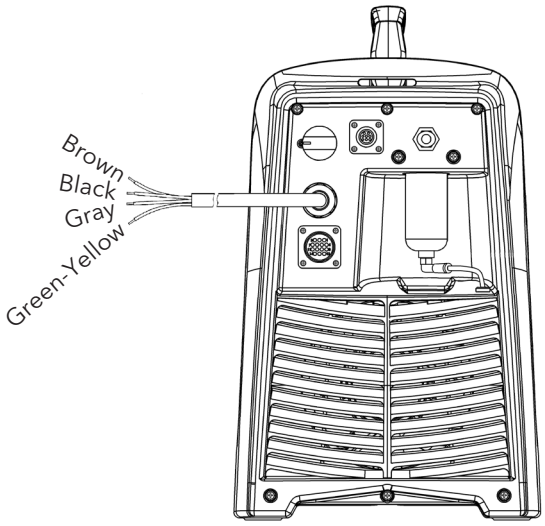
- Connect the gas hose with an inside diameter of at least 6 mm to the gas connection of the device.

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 qualified electrician.
  - L1 -> brown (U)
  - L2 -> black (V)
  - L3 -> gray (W)
  - Grounding -> green-yellow

Tab. 7 Recommended input power cable extention

Input voltage	Wire cross-section	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-7.

⚠ WARNING

Electric shock due to improperly installed electrical power supply

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

- If you want to operate the device in a very humid environment or on conductive material, install a ground fault circuit interrupter (GFCI) in the power supply.
- Use a slow-blow GFCI fuse.
- Protect the power supply line to the device with suitable fuses that comply with regulations.
- Ground the device according to the applicable regulations.
- Do not ground the device together with other devices or machines.

⚠ WARNING

Risk of electric shock due to improperly installed and defective cables

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

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

⚠ WARNING

Risk of injury due to fire

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

- Ensure that the operating voltage specified on the identifcation plate is suitable for the mains voltage.

For the mains voltage and the fuse protection, please refer to:

» **4.2 Technical data** on page EN-11.

- If necessary, have a qualified electrician connect the 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.

Tab. 8 Connection to a generator

Generator motor rating	Current output (I2)	Arc voltage
≥ 13 kW	65 A	U2 = 200 V DC

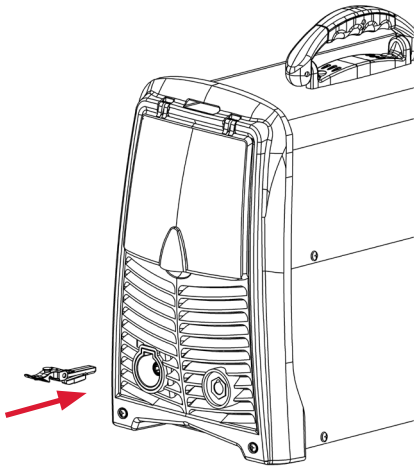
6.5 Connecting the cutting torch

NOTICE

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

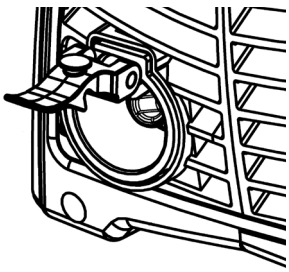
The TCS Latch with Key Assembly is important for the proper working of the device. If used without, the device will be damaged.

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

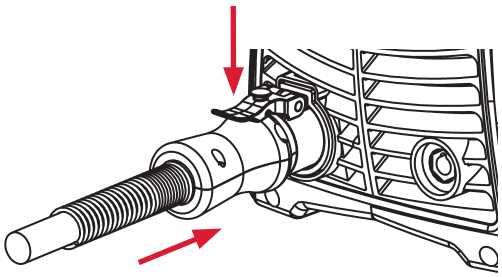


1 Switch off the power supply.

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.

6.6 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.

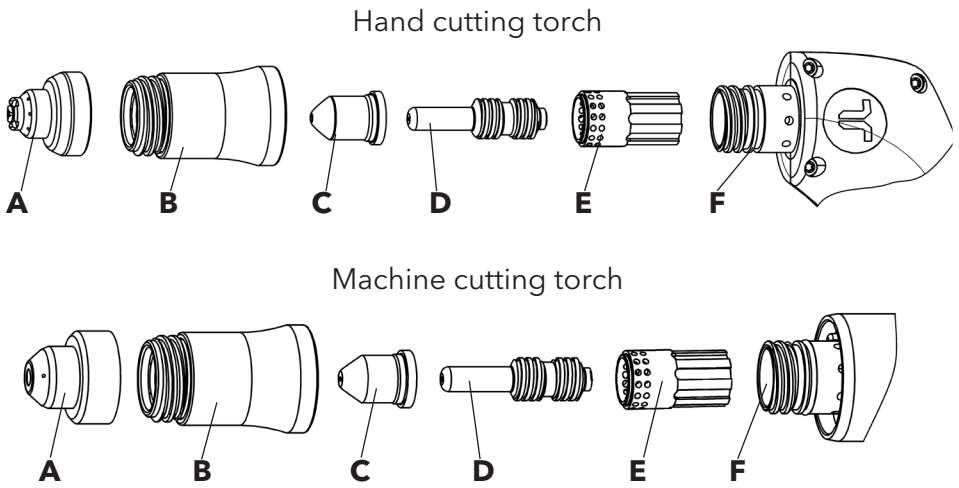
Machine cutting torch

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.

Fig. 6 FHT-EX®105TT Torch consumables

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



NOTICE

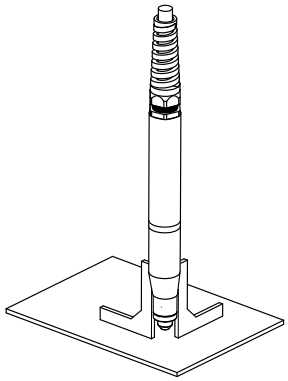
Torches and consumables

More information about torches and sutable consumables you can find in the **FHT-EX®105TT torch manual.**

6.7 Aligning a machine cutting torch

For information on the cutting process see

» **6 Setting up the power supply** on page EN-15



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

⚠ WARNING

Risk of injury when cutting

Plasma cutting can cause serious injury.

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

⚠ CAUTION

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

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

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

NOTICE

Material damage due to exceeding the maximum duty cycle

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

- Only operate the device up to the maximum permissible duty cycle.
  » **4.2 Technical data** on page EN-11
- Observe the maximum duty cycle for cutting components.

NOTICE

Material damage caused by unplugging the mains plug during operation

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

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

NOTICE

Material damage due to switching the output current strength during operation

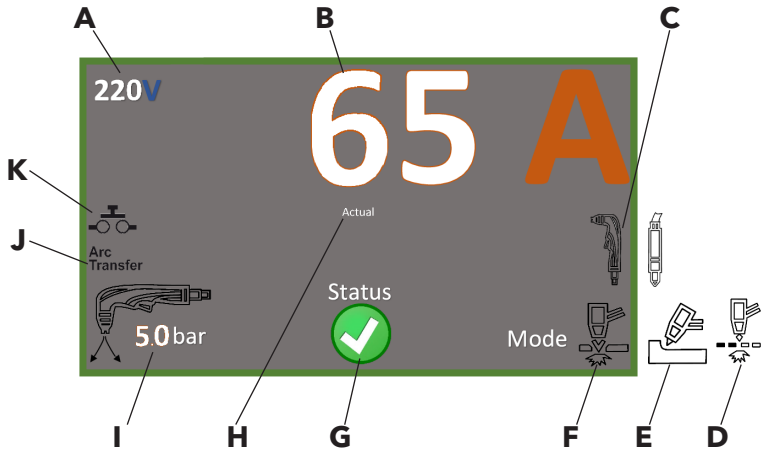
If the output current strength is switched during operation, the unit may be damaged.

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

7.1 LCD description

Fig. 7 LCD description

A Cutting voltage
B Output current
C Torch type
D Grid cutting
E Gouging / Marking
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.



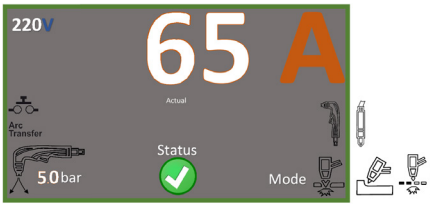
7.1.1 Setting the parameters

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

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

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

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



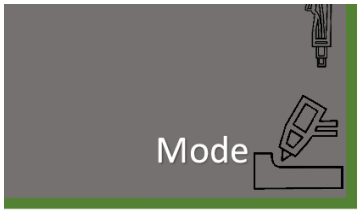
Once all values are set, they are displayed in white and the word "Status" appears with a green and white checkmark.

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.

Marking

(uses same icon as gouging)

The current is 10–16 A.

The pressure of the cutting gas is 2.4 bar.

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

Grid cutting

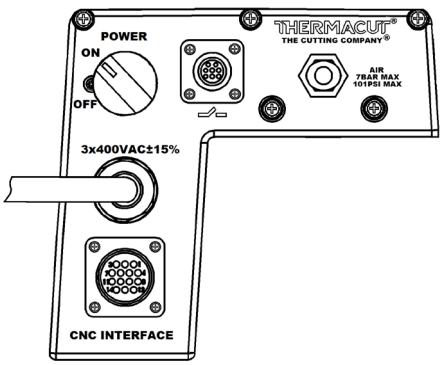
The current is 20–65 A.

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 source (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 device.
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, gouging, marking

1 Switch on the device.

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.

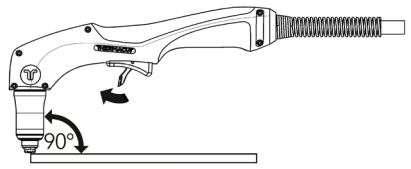
Once the workpiece is detected, the pilot arc switches to a cutting arc.

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.

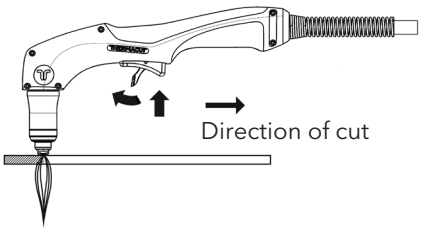
7.5 Cutting – Edge Start



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.

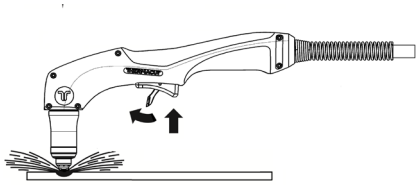
3 Place the cutting torch upright on the edge of the workpiece.



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:

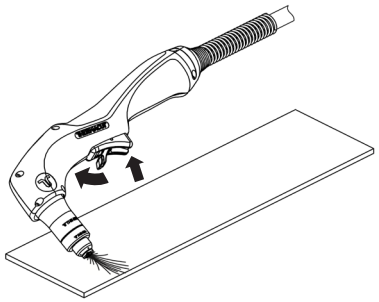
- Hold the cutting torch vertically and observe the arc while cutting.
- Make light contact between the shield and the workpiece and pull the cutting torch in the cutting direction at a constant speed.
- For cutting thin workpieces, reduce output current strength to a minimum to achieve the highest cutting 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 separated. Proceed as follows:

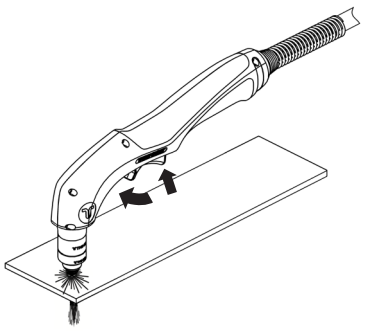
- Reduce the speed at which the cutting torch is pulled.
- Check the setting for the output current.
- Check the compressed air settings.
- Check consumables for wear/ damage.

7.6 Piercing



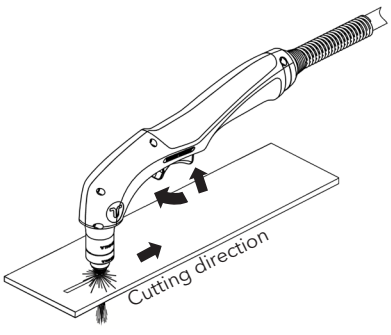
1 Hold the cutting torch at an angle to the workpiece with a max. distance of 3 mm from the nozzle to the workpiece.

2 Press the torch trigger to ignite the arc.



3 Turn the cutting torch slowly in a vertical direction.

4 Hold the cutting torch until the arc emerge from the underside of the workpiece. This indicates the material is completely pierced through.



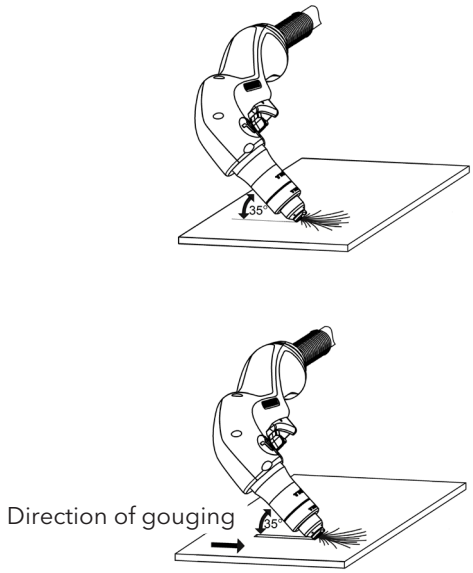
5 Pull the cutting torch in the cutting direction. Sparks must emerge from the underside of the workpiece.

7.7 Gouging

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

Tab. 9 Actions affecting the gouge profile

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.

7.8 Stopping the cutting process

⚠ CAUTION

Risk of injury due to hot parts

Parts may still be hot after the gas post-flow period ends. This may result in burns.

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

- Release the torch trigger to end the cutting process.

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

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

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 EX-TRAFIRE®65HD's maintenance intervals. If the device is operated for more than 8 hours a day, the maintenance intervals should be changed as needed. When using arc cutting equipment, always observe the provisions of EN 60974-4 Inspection and testing, as well as any local laws and regulations.

⚠ WARNING

Electric shock due to missing grounding

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

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

⚠ WARNING

Electric shock due to live parts

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

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

⚠ WARNING

Electric shock due to defective cables

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

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

⚠ CAUTION

Fire hazard due to contamination

Dust deposits inside the EX-TRAFIRE®65HD 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.

Tab. 10 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 device body and have the inside of the device cleaned with a vacuum cleaner or dry, clean compressed air by Thermacut® or a different authorized specialist.
Annually and after each time the housing is opened	• Have a safety inspection performed in accordance with DIN IEC 60974 Part 4: Periodic inspection and testing" by Thermacut® or trained personnel.

Tab. 11 Parts inspection

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

10 FAULTS AND TROUBLESHOOTING

- Verify consumables selection according to the **FHT-EX®105TT torch manual**:
  - » **Tables 13 - 15** FHT-EX®105TTH consumables for hand cutting torch on pages EN-39, 40.
  - » **Tables 19 - 22** FHT-EX®105TTM consumables for machine cutting torch on pages EN-44 - 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.
- Disconnecting the power supply.
- After disconnecting the EX-TRAFIRE®65HD from the input power supply, wait at least five minutes before carrying out any maintenance and cleaning work, especially opening the EX-TRAFIRE®65HD.

Tab. 12 Fault messages in the display

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

Tab. 12 Fault messages in the display

Error code	Cause	Troubleshooting
H06 **<Excess temperature>**	• Fan is defective.	• Ensure that the fan is running freely. • Replace fan or fan motor.
	• Duty cycle has been exceeded.	• Switch off the device and allow it to cool down. • Do not exceed the duty cycle.
	• Components defective.	• Contact service or your retailer.
H07 **<Excess current>**	• Inverter overcurrent.	• Have the output diodes, main transformer, and IGBT on the inverter board checked by an authorized professional.
H08 **<Arc does not ignite when trigger is pressed or 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.	• Check 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, reinstall 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 Thermacut® or a qualified electrician.
H14	• Incorrect cutting torch.	• Verify the proper cutting torch is connected.
H15	• No data communication at the BUS.	• Check the cable. • Replace the CAN BUS PCB. • Replace the Control PCB.
H16	• Data recording failed.	• Check the cable. • Replace the CAN BUS PCB. • Replace the Control PCB.
H17 **<GAS>**	• Gas inlet pressure is below 5 bar (72.5 psi). • Insufficient plasma gas flow.	• Check the gas inlet pressure. • Check the gas pressure and flow. • Verify the gas settings are correct.
	• 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.	• Replace the Control PCB.

Tab. 12 Fault messages in the display

Error code	Cause	Troubleshooting
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.
H23	• Torch trigger is pressed before starting or during initialization.	• Verify that the trigger is not pressed when the power supply is switched on, and during initialization.

Tab. 13 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 an authorized professional.
Gas does not flow when the torch trigger is pressed or the CNC start signal is switched on.	• Gas valve defective or missing power supply.	• Cable to gas valve loose or not connected.	• Contact your retailer.
		• 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.
		• Distance between cutting torch and workpiece is too great.	• Decrease the distance between cutting torch and workpiece.
		• Work lead is defective.	• Have the work lead checked and, if necessary, replaced by an authorized professional.

Tab. 13 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.
		• Distance between cutting torch and workpiece is too great.	• Decrease the distance 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 flow settings. • 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.

Tab. 13 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. » **Cutting tables** in **OM of cutting torch FHT-EX®105TT** on pages EN-49 - 55.
	• 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

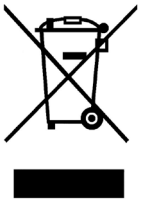
Electric shock due to live parts

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 EN-33
- 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 supplies

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

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

12.3 Packaging

Thermacut® has reduced the transport 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.

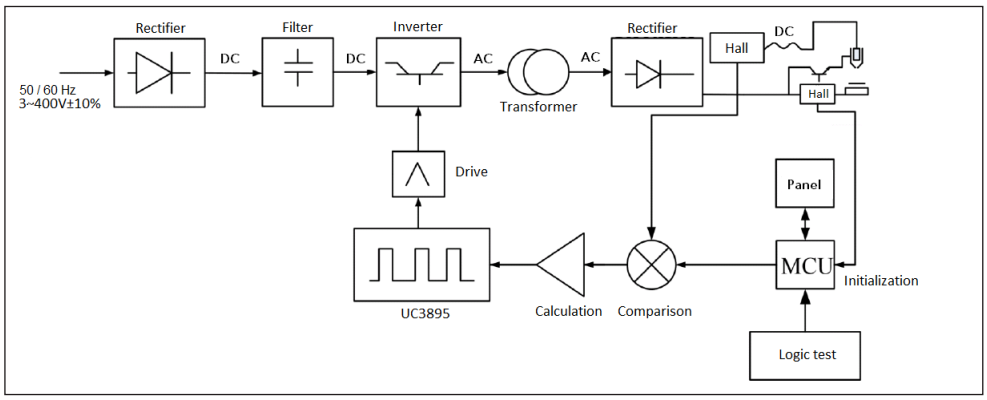
4 The warranty period is:
– Three (3) years for EX-TRAFIRE® brand power supplies.
– One (1) year for cutting torches and cable assemblies.

5 The warranty does not cover normal wear and tear of the goods or their parts as a result of their use, consumables such as nozzles, electrodes, shields, O-rings, vortex rings, etc.

6 The Seller shall not be liable for damage to the goods caused by the Buyer or third parties as a result of incorrect or improper handling of the goods (in particular repair or modification by persons not authorized by the Seller) or their installation, improper use of the goods or insufficient maintenance, in particular use of the goods for a purpose other than the specified purpose or other non-compliance with the operating instructions, use of excessive force or use of unauthorized goods.

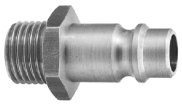
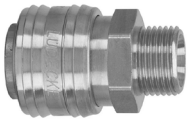
14 BLOCK DIAGRAM

Fig. 8 Block diagram



15 ACCESSORIES

Tab. 14 Accessories

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

Tab. 14 Accessories

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

***Available on request

For more information about accessories, visit our website: *www.thermacut.com*.

16 APPENDIX

16.1 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. The signal types can be found in the table.

» 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-10

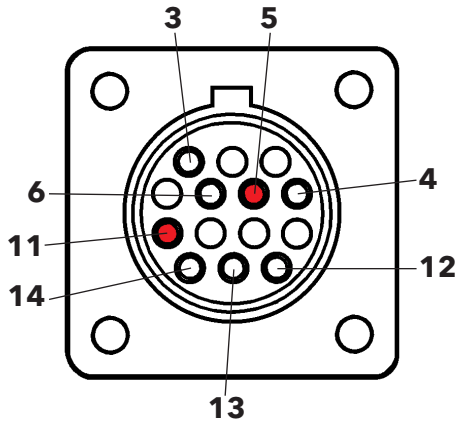
⚠ WARNING

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. 9 Signal and pin assignment for CNC interface



Tab. 15 Signal and pin assignment for CNC interface

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

6.6.1 Setting the voltage divider DIP switches

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

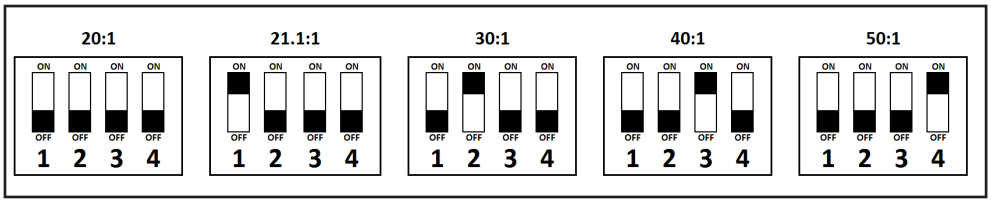
1 Turn off the EX-TRAFIRE®65HD and unplug the power supply prior to opening the housing.

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 DIN IEC 60974 Part 4: "Periodic inspection and testing" by Thermacut® or another authorized specialist.

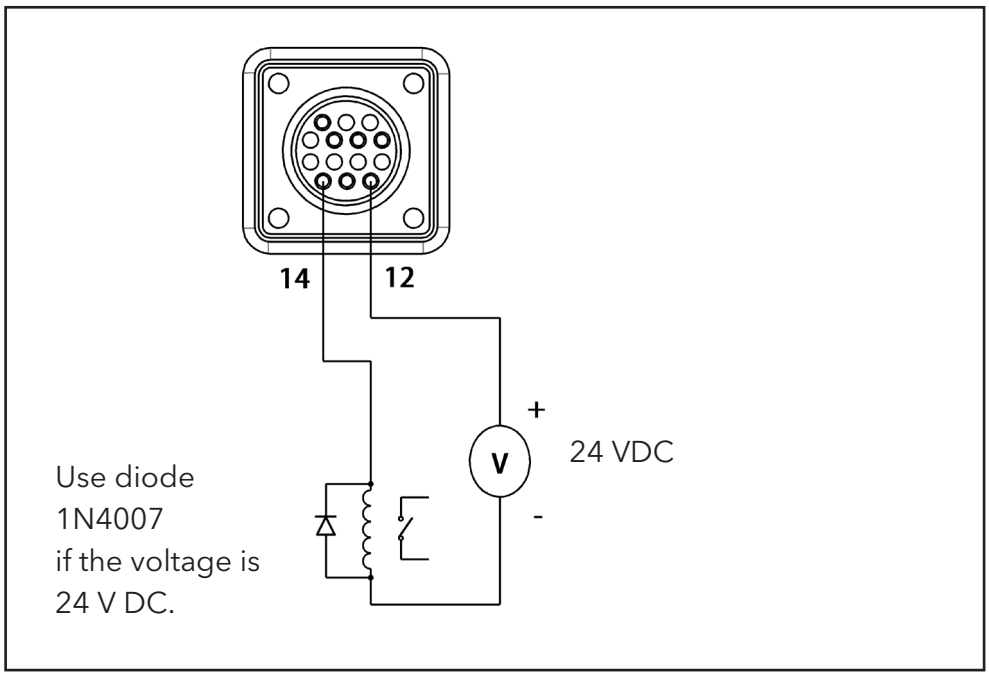
Fig. 10 Voltage divider DIP switch settings



6.6.2 Enabling the external DC coil with an external power supply

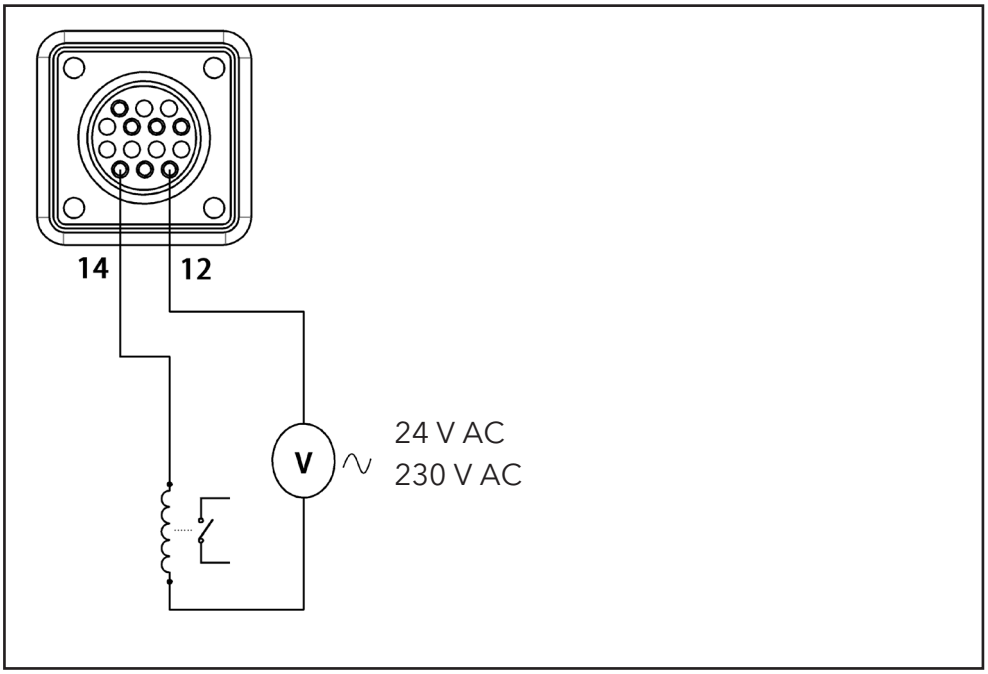
» For 24 V DC, use a 1N4007 diode.

Fig. 11 Enable the external DC coil with an external power supply.



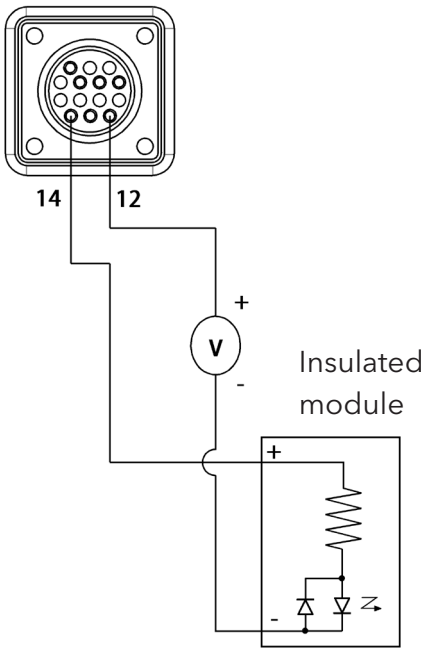
6.6.3 Enabling the external AC coil with an external power supply

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



6.6.4 Enabling the industrially insulated module with an external power supply

Fig. 13 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.

Contact and support

Scan for more information:

Revision history

You can find the latest version of the operator manual on our website:
www.thermacut.com

Revision R1/07_2025

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