IHT AUTOMATION

Abstandsregelungssysteme - Clearance Control Systems

User Manual

IHT 3000

Torch Clearance Control System for Plasma and Oxyfuel Cutting Machines

Rev. 2.0 6th February 2007

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1 Preface
Correct Usage

This manual explains the correct usage of the IHT 3000, which will be integrated in a machinery.

Risks caused through other than the described use underlie the responsibility of the user.

WARNING!
To avoid fatal errors and for work safety this manual must always be used in combination with the manuals of the machinery!

Any other than the described use is not intended. Only the use of spare and wear parts recommended by IHT guarantee the correct usage of this system within the machinery.

Only authorized, well informed and qualified personnel who is aware of the dangers is allowed to work with, maintain or repair the machine and the system.

All relevant accident prevention regulations, as well as all other generally known safety-related and job safety regulations must be complied with.

Arbitrary changes on the system exclude the liability of resulting damages. The user/operator of the machines has to make sure that all safety systems are constantly in good working condition. Regular checks are necessary to verify that the equipment is in proper working condition.

This instruction manual does not substitute instructions by service personnel and required training.

Only authorized, well informed and qualified personnel are allowed to work with the machine. Everyone who works with the equipment has to read and understand the safety regulations and all parts of the manual relating to the specific functions in use.

2 Safety instructions

Please read the users manual carefully.

- **This user's manual must always be used in combination with all other manuals of the whole machine.**
- **Installation, getting started and maintenance work may only be executed by trained experts observing the recognised rules of safety and technology.**
- **The electrical safety regulations must be followed when connecting.**
- **In particular the accident prevention regulations, the regulations of DIN VDE 0100 „Directions for the erection of power plants with nominal voltages up to 1000 volts" and the European standard EN 60204-1 "Machine safety-electrical equipment of machines" must be followed.**
- **The protective earth (PE) –terminal of**

  - LINEAR DRIVE 2343

  - SENSOR TORCH CLAMP 6530,

  - POWER SUPPLY 7504

  must be connected to protective earth potential (machine ground potential).

- **Carefully observe all plasma source producer's interconnections wiring instructions.**
- **Thorough care must be taken to ensure proper grounding of the plasma source in order to prevent EMF disturbance paths to the IHT 3000 System.**
- **The main ground (earth) resistance must be kept below 3 Ω for adequate grounding precautions.**

The shielding of the Arc Voltage Cable to the plasma source must not be connected at the plasma source ground, but has to be connected in the control cabinet or the metal housing (PE Potential) with the machine ground in the shortest possible way.

3 IHT 3000 Application and System Description

The height control system IHT 3000 enables a touch less and precise clearance control of plasma and oxyfuel torches on cutting machines.

Using this height control system leads to high quality results when cutting with or without the influence of water.

The IHT 3000 system automatically controls the distance between the plasma or oxyfuel torch and the metal sheet.

Initial position finding of the work piece

Before the system starts cutting IHT 3000 precisely detects the position of the work piece and finds the pre-selected PIERCE HEIGHT (ignition height). This process is called initial position finding.

when cutting with plasma

- tactile, by softly touching the work piece or
- touch less with the nozzle sensor

when cutting with oxyfuel

- capacitive with a ring electrode

Touch less height control

The height control takes place during the cutting process.

when cutting with plasma

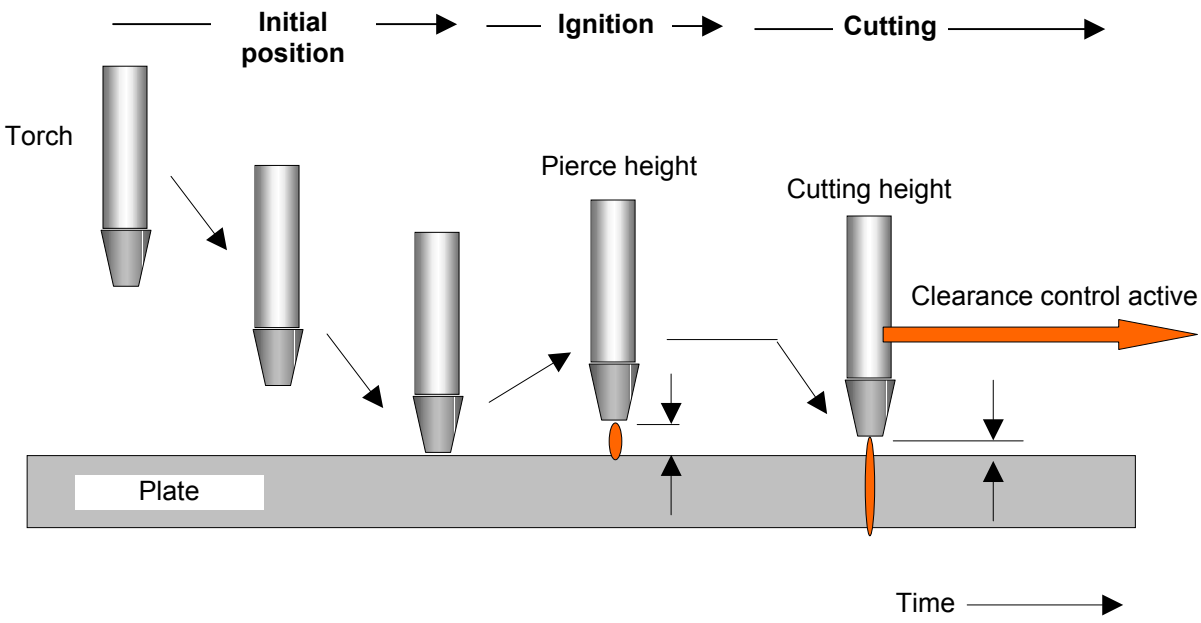
- electrical voltage of the plasma arc

when cutting with oxyfuel

- clearance control of the ring electrode based on the capacitive measuring principle

IHT 3000 Application and System Description

Movement of torch



Note:
Under water cutting or cutting with water table can only be done in tactile mode

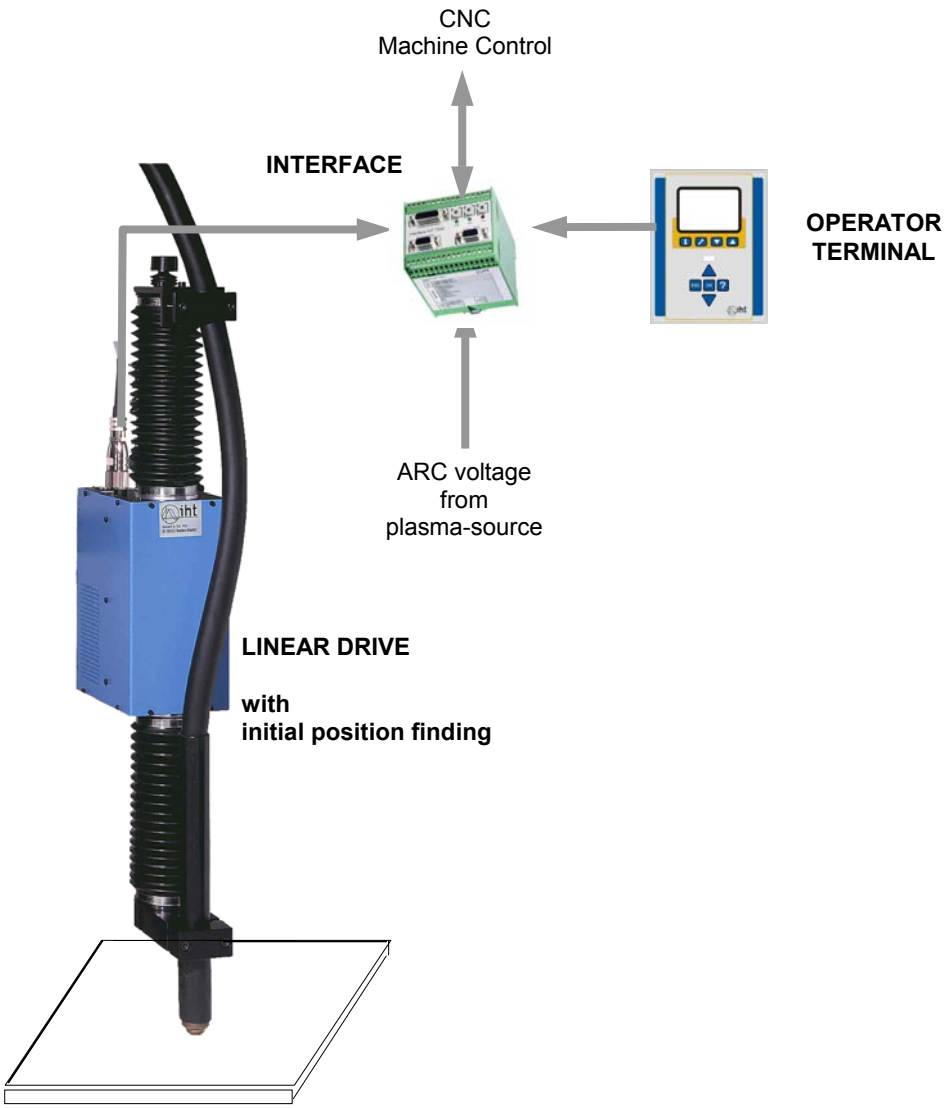
4 System Overview

The vertical torch movement for initial position finding and clearance control is handled using the IHT-LINEAR DRIVE.

The built in electronics in this LINEAR DRIVE processes all control signals from the CNC and the plasma arc voltage for height control.

The INTERFACE connects to the CNC-machine control, to the plasma sources for receiving the plasma arc voltage and connects to the OPERATOR TERMINAL.

System overview



5 System components and technical specifications

5.1 General Technical Data

Power supply .....24 VDC ±10%
Current.....6.5 A max.
Revers voltage protection.....built in

Initial Position Finding.....-tactile or touch less by nozzle sensor for dry cutting with plasma torch

-capacitive clearance control for dry cutting with oxyfuel torch

Clearance control in plasma mode ..... by plasma arc voltage
Accuracy..... appr. ± 0.3 mm

Clearance control in oxyfuel mode..... by capacitive measurement with RING ELECTRODE

Nominal clearance measured between
bottom line RING ELECTRODE and work piece:

RING ELECTRODE 6534 .....8 mm
RING ELECTRODE 6560 .....14 mm
RING ELECTRODE 6575 .....16-18 mm

Accuracy.....approx. ±0.3 mm with Ring Electrode
Depends on the diameter of the Ring Electrode and the mounting conditions of the environment

These parameters / data are guaranteed with IHT components.
This sensor system conforms to CE.

5.2 LINEAR DRIVE

Features

- fast vertical drive for precise clearance control of plasma and oxyfuel torches to metal sheets
- integrated control
- dust proof chamber protects rail and gear
- built-in vertical collision protection
- 3-dimensional collision protection at the torch clamp
- clamp for hoses and cables
- high temperature proof bellows made of silicone rubber
- US Patent No. US 6,239,573 B1 / Euro Patent No. 0997801

General technical data

Motor ..... 24 VDC / max. 6.5A

Power ..... 100 W

Stroke ..... 210 mm

Torch Clamp
for Torch Diameter ..... 35-53 mm (standard) or
30-35 mm (option)

Protective Earth Connector ..... Screw M4

Weight ..... 12 kg

Dimension of Housing ..... approx. 115x226x160 (WxHxD)

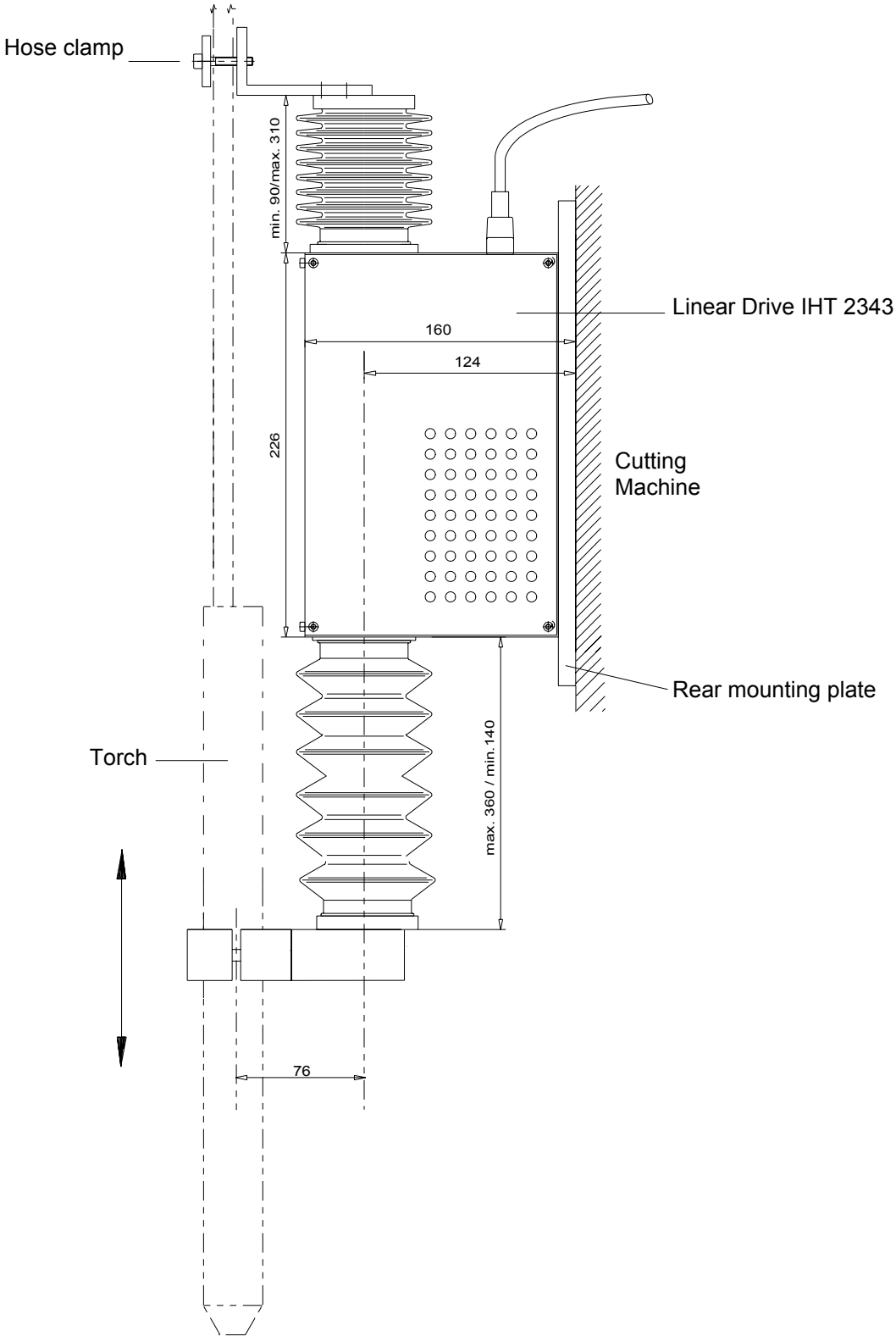
Dimensions overall ..... approx.120x730x250 mm (WxHxD)

Features of versions

	LINEAR DRIVE	
Type	**IHT 2343-1-100**	**IHT 2346-1-100**
IHT part no.	**100354**	**100356**
Stroke	220 mm	200 mm
Speed	80 mm/s	80 mm/s
Load	12 kg	30 kg

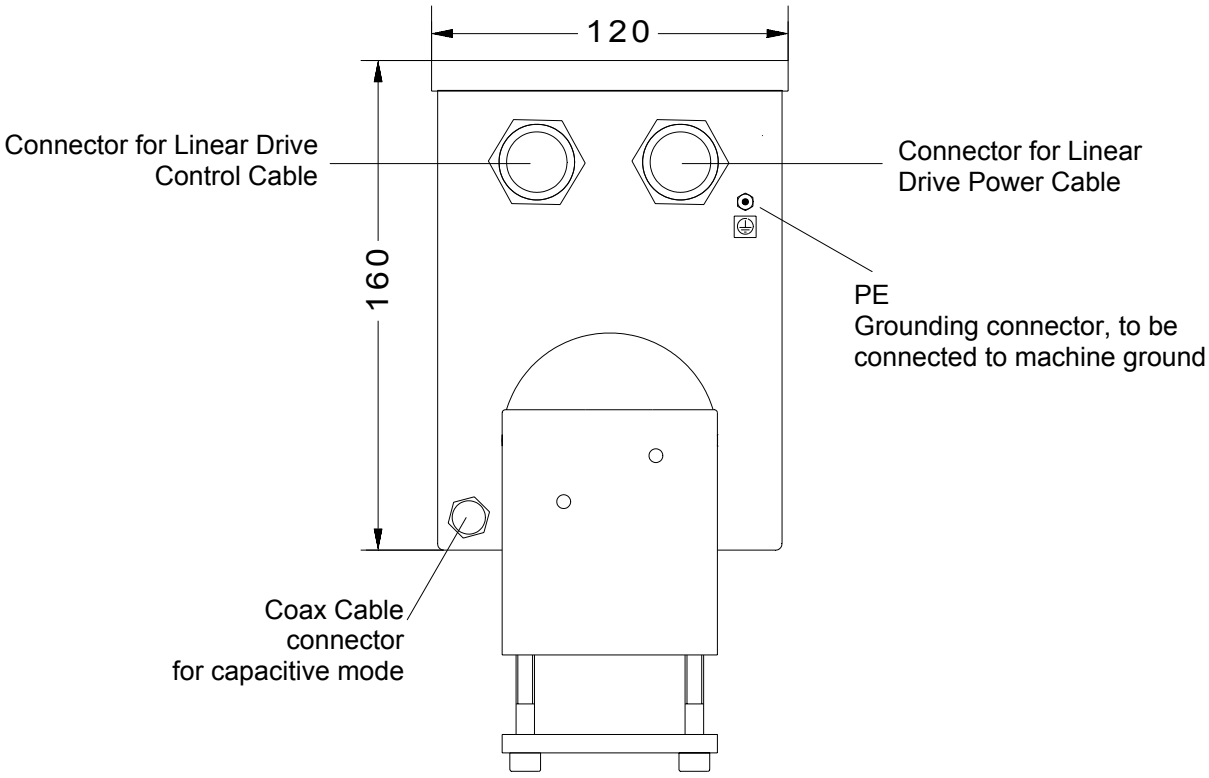
Note: The LINEAR DRIVE can only be used for vertical operation!

Side view of LINEAR DRIVE 2343
View with plasma torch.
Dimensions in millimeters



Top view LINEAR DRIVE IHT 2343

Electrical connectors
Dimensions in Millimeter:



Important Notes for usage

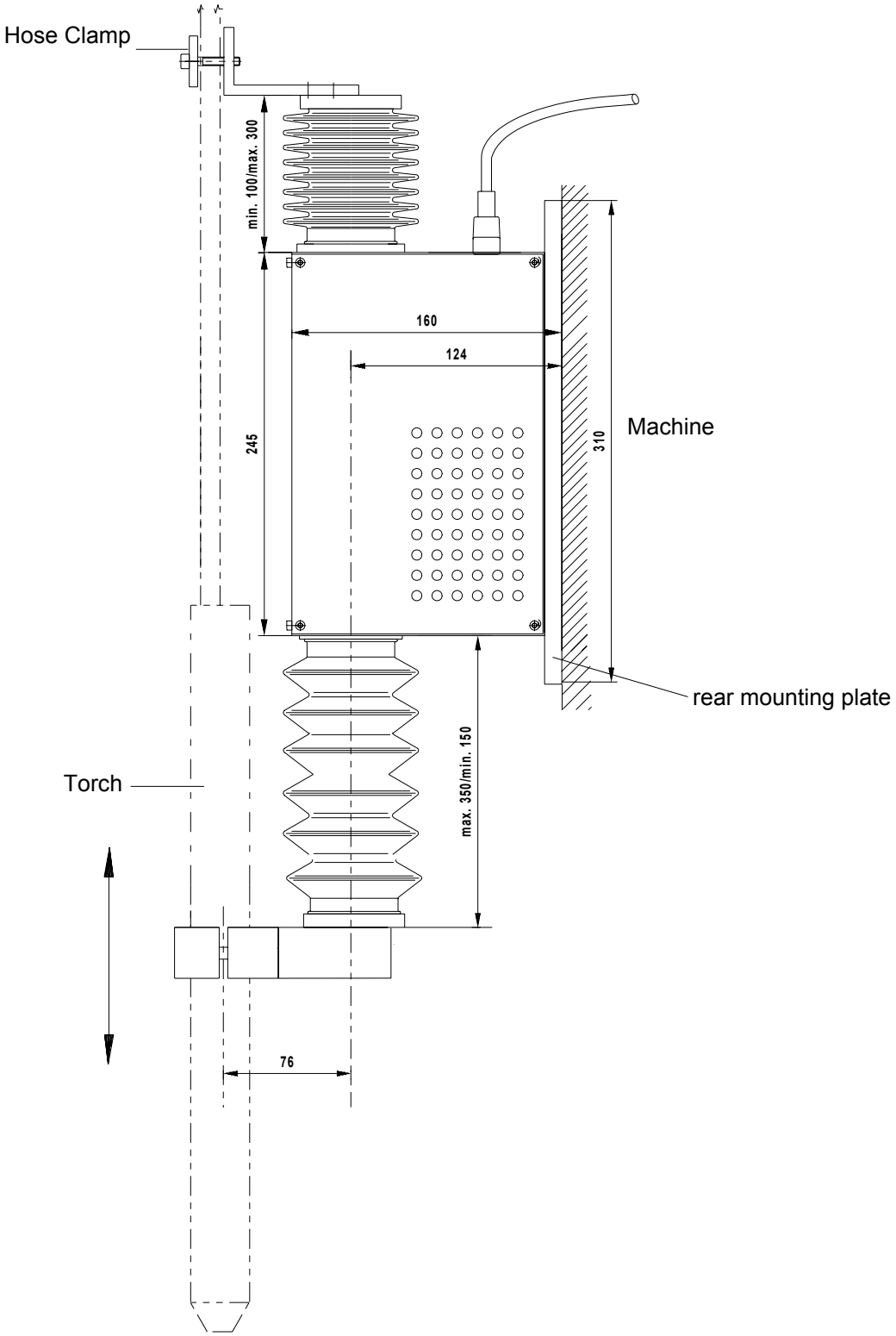
WARNING!

Don't touch the Linear Drive at the bellow!
The bellow could be damaged.

A damaged bellow must be exchanged because infiltrating dust can damage the mechanics.

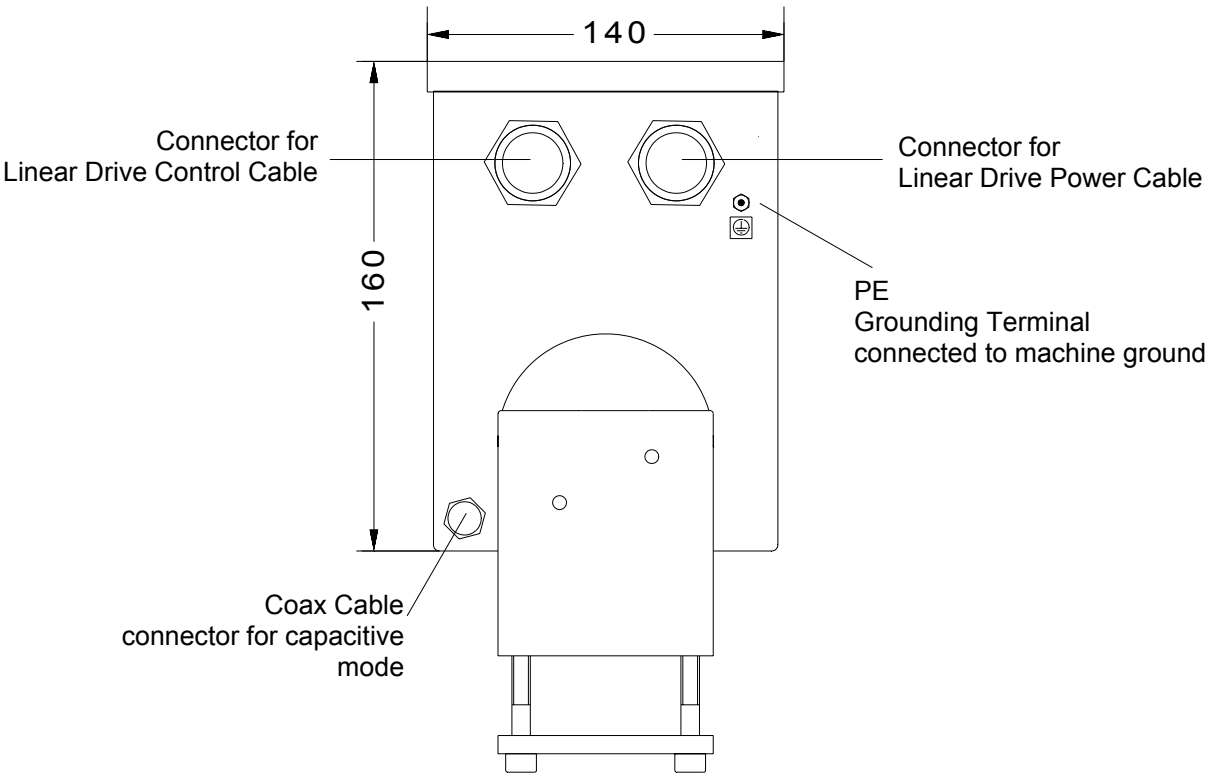
Check the bellow to make sure that the folding is not buckled inwards!

Side view of LINEAR DRIVE 2346 – Heavy Load Version
View with plasma torch.
Dimensions in millimeters



Top view LINEAR DRIVE IHT 2346 – Heavy Load Version

Elektrische Anschlüsse und Abmessungen in Millimeter:



Important Notes for usage

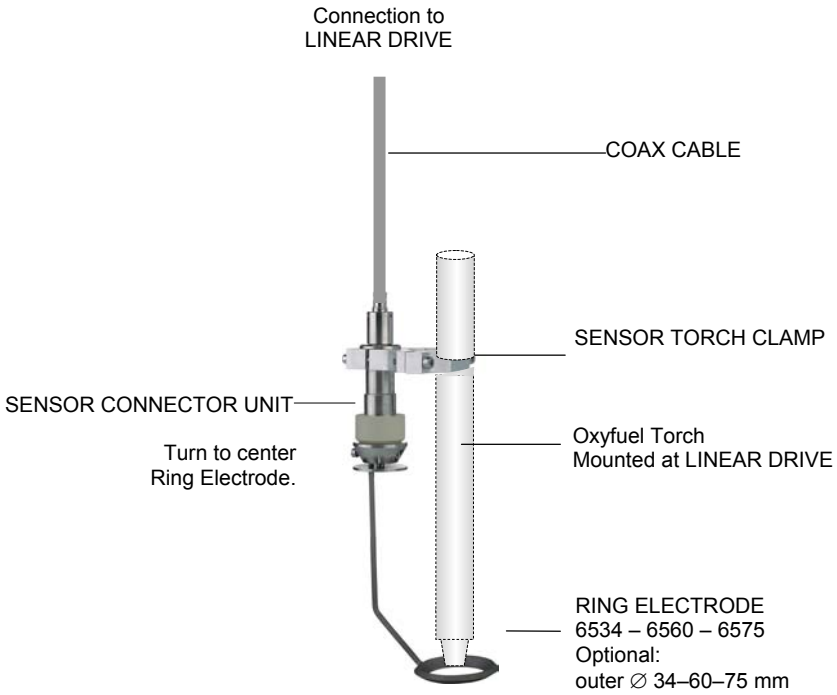
WARNING!

Don't touch the Linear Drive at the bellow!
The bellow could be damaged.

A damaged bellow must be exchanged because infiltrating dust can damage the mechanics.

Check the bellow to make sure that the folding is not buckled inwards!

Capacitive Sensor-Components at LINEAR DRIVE 2343



5.3 RING ELECTRODE IHT 6534 – 6560 – 6575

- Ring Electrodes measure touch less the distance to the metal work piece.
- Ring Electrodes are available for different torches with diameters 34, 60 and 75 mm.
- The nominal clearance between Ring Electrode and work piece is between 8 to 16mm depending on the type of Ring Electrode.

Features

- special spatter protected surface for high reliability
- 3 standard types matching different torch diameters
- special small ring electrode Type 6534 offers high workpiece efficiency for oxy-fuel cutting
- easy installation to SENSOR CONNECTOR UNIT 6531
- useful for precise clearance control up to ±0.3 mm
- suitable for cutting without influence of water

Technical Data

IHT Part No.	Ring Electrode Type	Outer Diameter / mm	Inner Diameter / mm	Nominal Clearance between bottom line of Ring Electrode and work-piece / mm
100269	6534	34	22	8
100270	6560	60	42	14
100271	6575	75	60	16-18

ATTENTION !
The capacitive height control system with Ring Electrode is only suitable for oxyfuel cutting with no influence of water.

Water influences the sensor system and leads to malfunction.

5.4 SENSOR TORCH CLAMP IHT 6530

Features

- clamp for SENSOR CONNECTOR UNIT 6531
- fits to all torches of diameter range from 32 to 59 mm
- hex-wrench for hex screws M4 is attached for ease of ring electrodes adjustments
- Protective earth connector Faston 6.3 mm

ÎHT Part No. 100268

5.5 COAX CABLE IHT 1991

Features

- connects SENSOR CONNECTOR UNIT with LINEAR DRIVE
- coax cable with additional temperature protection
- length 1.2 m

Technical Data

Length	1.2 m
Connector	BNC male
Temperature/splash protection	silicone hose
Stock / Operating Temperature	0-85°C
Relative Humidity	no condensation between 20% to 90%
Weight	60 g
IHT Part No.	100279

5.6 SENSOR CONNECTOR UNIT IHT 6531

Features

- Adaptor for Ring Electrodes Types 6534, 6560 and 6575
- easy assembling of ring electrode by plug-in and fixing by screw
- simple to centre the Ring Electrode to the nozzle tip
- integrated high voltage protection
- thermal radiation- and spatter protection plate

Technical Data

Length	139 mm
Diameter	max. 38 mm
High voltage protection	max 14 kV
Stock / Operating Temperature	0-85°C
Relative Humidity	no condensation between 20% to 90%
Weight	305 g
IHT part No.	100212

5.7 POWER SUPPLY IHT 7504

Features

- Stabilised power supply 24 VDC / 6.5 A;
  Suitable for operating a LINEAR DRIVE
- Operates with supply voltage 110/230 VAC / 50-60 Hz,
  selectable

Technical specifications

Dimensions.....199x110x50 mm (Length x Width x Height)

Input AC Voltage .....88-132VAC / 3.2A or 176-264VAC / 1.6A selectable

Frequency .....50-60 Hz

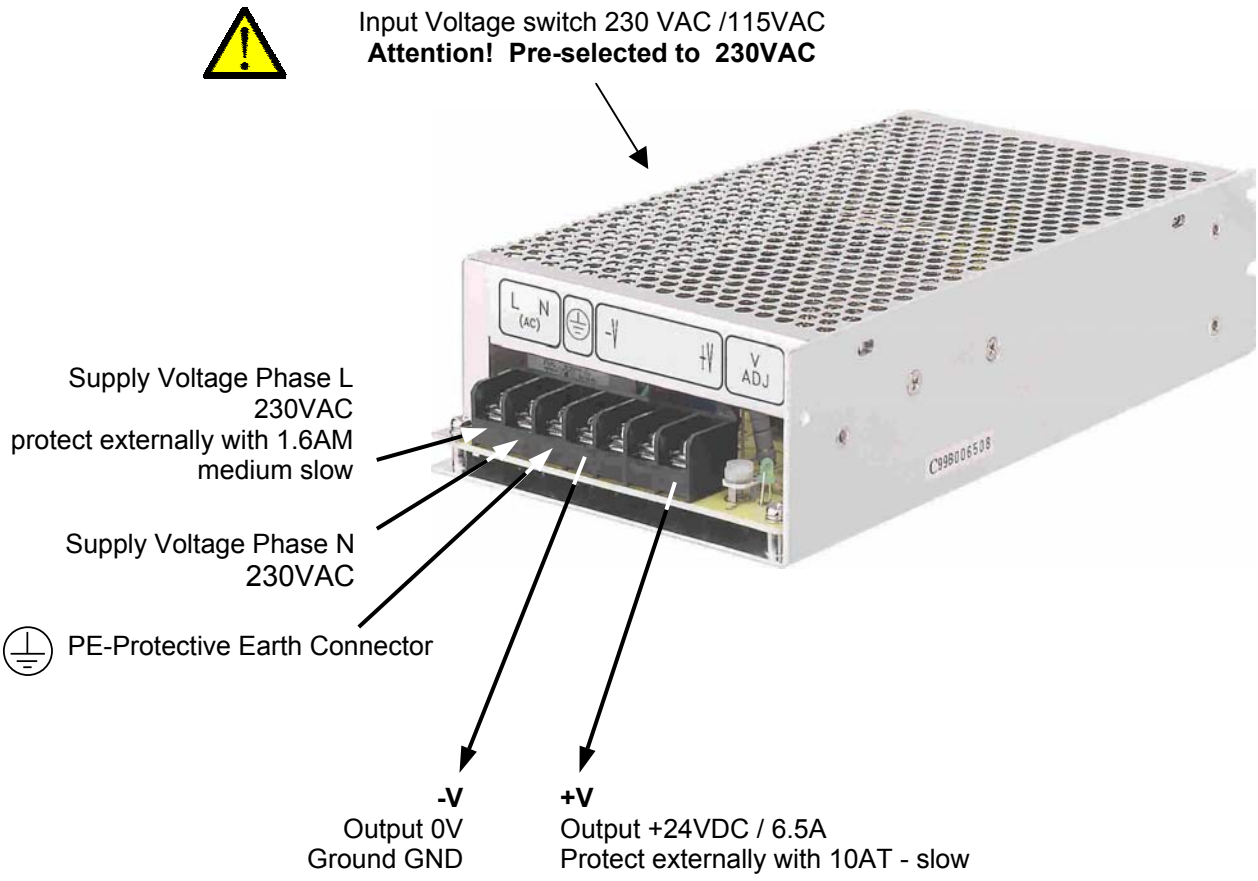
Output DC Voltage .....24VDC / 6,5A max.

Protection class .....IP 20 acc. EN60529/IEC529

Environment conditions .....0-40°C / 20-90% relative humidity

Weight 0.8kg

IHT part no.....100229



5.8 INTERFACE IHT 7250

The Interface IHT 7250 is the central signal distribution point fort the IHT 3000 System.

Features

- Power supply 24 VDC / 0.5A
- Connector to LINEAR DRIVE
- Connector to OPERATOR TERMINAL
- Interface for CUTBUS® used for serial communication to CNC
- Discrete Input / Output terminals 24 VDC to connect IHT 3000 to CNC-machine control system 2x17-removable screw terminal strips. Special coding avoid mix-up.
- Integrated isolation amplifier for ARC voltage 0-10 VDC und 0-300 VDC from the plasma source
- 3 rotating knobs to set
  - Device address of Cutbus
  - Baud rate for Cutbus
  - optional range for ARC voltage
- LED's for Ready, Communication and Fault
- Assembly on top hat rail for installation in a control cabinet

INTERFACE IHT 7250

Technical Specifications

Input Voltage .....24 VDC ±10%, with integrated reverse voltage protection

Input Plasma-ARC Voltage

Switch setting	Input Voltage range	Represents ARC Voltage	Input resistance
0	0 to -300 VDC	0-300 VDC	ca. 3 MOhm
1	0 to +10 VDC	0-300 VDC	ca. 100 KOhm
2	0 to +6 VDC	0-300 VDC	ca. 100 KOhm
3	0 to +10V	0-250VDC	ca. 100 KOhm

Discrete input signals .....24 VDC ±10% / Resistor Ri ≈ 7 kOhm

Discrete output signals .....20VDC / Resistor Ri ≈ 150 Ohm / short circuit proof

Relay contact for "Enable Ignition" .....Load 0.5A at 125VAC / 1A at 24 VDC

Baud rate .....switch setting 0-4: 9600, 14400, 19200 28800, 38400

Address setting.....0 - 3

Screw-on terminals.....for wires max. 2.5 qmm

Dimensions.....90x75x112 mm (Length x Width x Height)

Mounting of Housing .....on symmetric mounting rail according to EN 60715

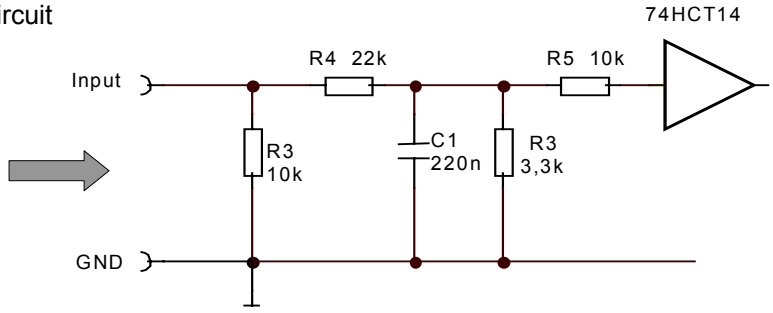
Protection class .....Housing IP40 / Clamps IP 20 according to EN60529/IEC529

Environment conditions .....no condensation at 0-50°C / 20-90% relative humidity

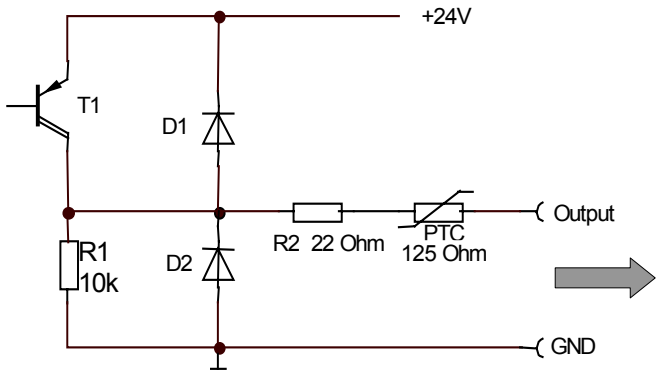
Weight 0.33kg

IHT part no.....100358

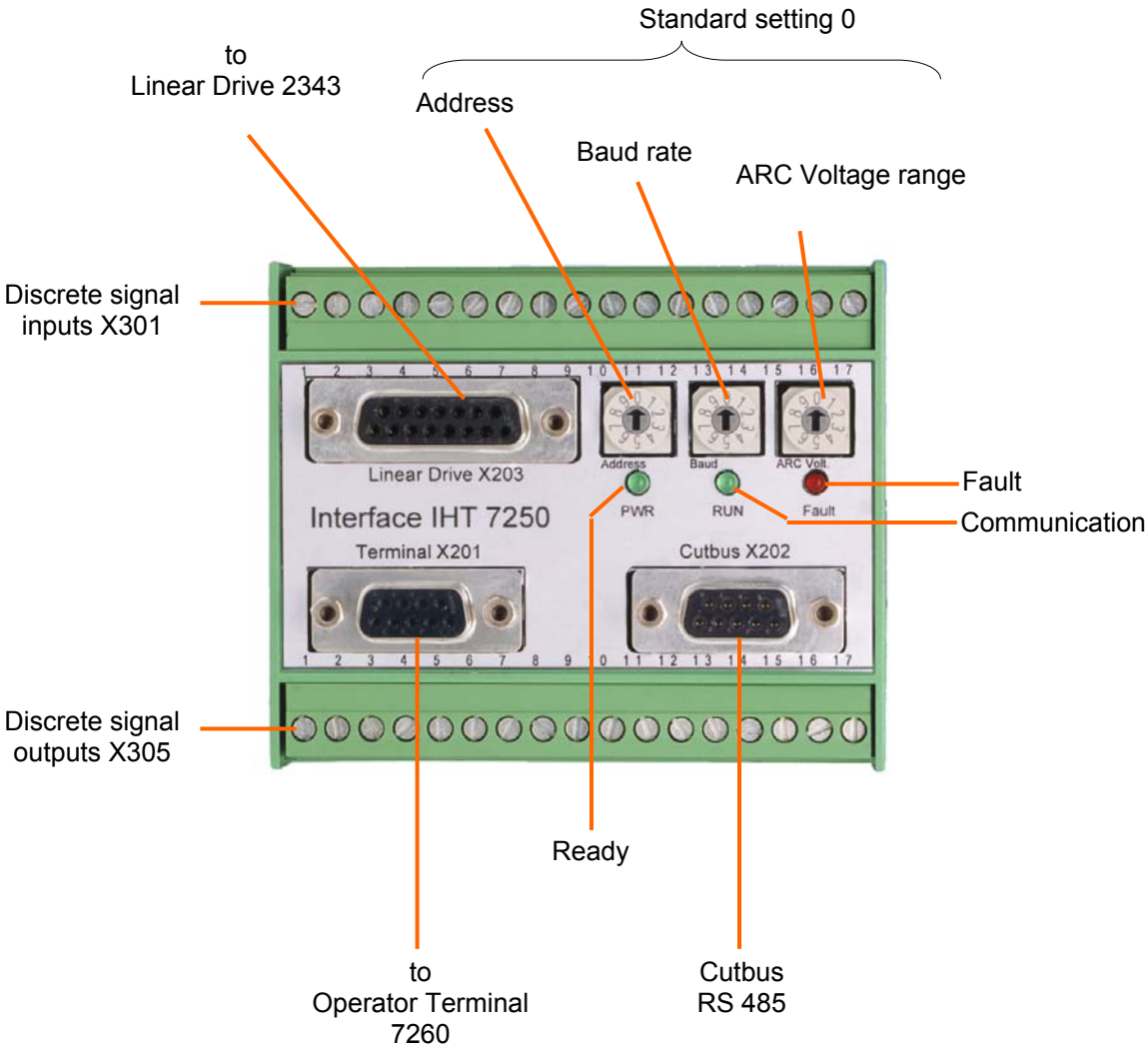
Input circuit



Output circuit



5.8.1 Connections and settings INTERFACE IHT 7250



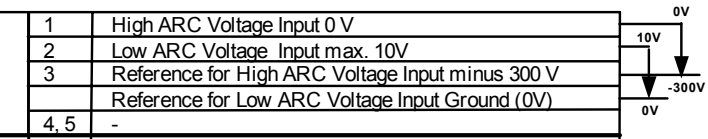
INTERFACE IHT 7250

5.8.2 Input Connector X301

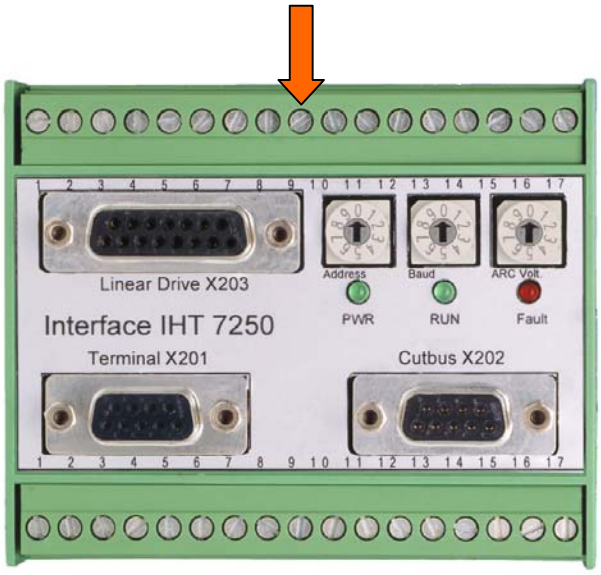
17 pole connector with screw-on clamps

Interface IHT 7250
X301

ARC	1	High ARC Voltage Input 0 V
	2	Low ARC Voltage Input max. 10V
	3	Reference for High ARC Voltage Input minus 300 V
		Reference for Low ARC Voltage Input Ground (0V)
	4, 5	-
Signal Inputs	6	Initial Position Start
	7	Ready (Start XY)
	8	Piercing Height Oxyfuel
	9	Corner
	10	Retract 1
	11	Retract 2
	12	Scrap Cutting
	13	Start Clearance Control Oxyfuel
	14	Manual Up
	15	Manual Down
	16	-
	17	-



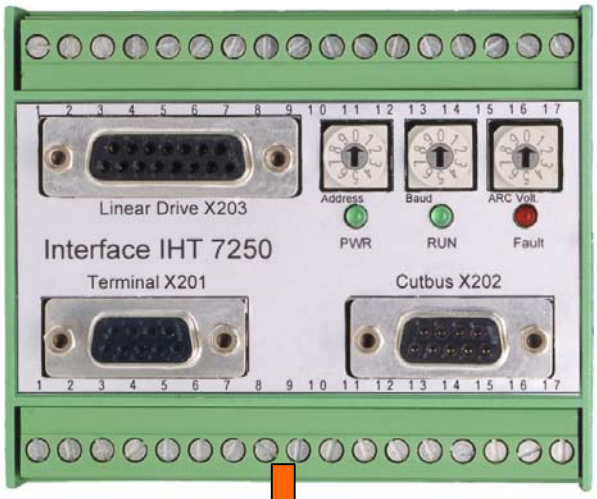
ARC Voltage	Setting	Input Voltage Range	According to Arc Voltage
	0	0 to -300 V	0 to -300 V
	1	0 to +10 V	0 to -300 V
	2	0 to +6 V	0 to -300 V
	3	0 to +10 V	0 to -250 V



INTERFACE IHT 7250

5.8.3 Output Connector X305

17 pole connector with srew-on clamps



Interface IHT 7250
X305

Power	1	Interface Power +24V
	2	Interface Ground
	3	Plasma Start (relay contact input)
	4	Plasma Start (relay contact output)
	5	-
Signal Outputs	6	Ok to Move
	7	Upper Limit
	8	Delay Time
	9	Plasma Start
	10	Control Active
	11	Error
	12	Collision
	13	Enable Ignition Oxyfuel
	14	Reference / Retract Position
	15	Separate Ignition Plasma
	16	-
	17	-

Bus Address		
	0	Address 0
	1	Address 1
	2	Address 2
	3	Address 3
	4	

Baud Rate		
	0	9600
	1	14400
	2	19200
	3	28800
	4	38400

Note:
The detailed description can be found in chapter *Installation*.

INTERFACE IHT 7250

5.8.4 Connector X202 Cutbus

Interface RS 485
Connects to CUTBUS CABLE IHT 7250-1-904/5. Using SUB-D 9-pole Male, with other side open ended to connect CUTBUS with machine control (CNC).

SUB-D 9-polig, female	
Contact	Function
1	Not used
2	Not used
3	Data -
4	Not used
5	GND
6	Data -
7	Not used
8	Data +
9	Not used
Housing	Ground

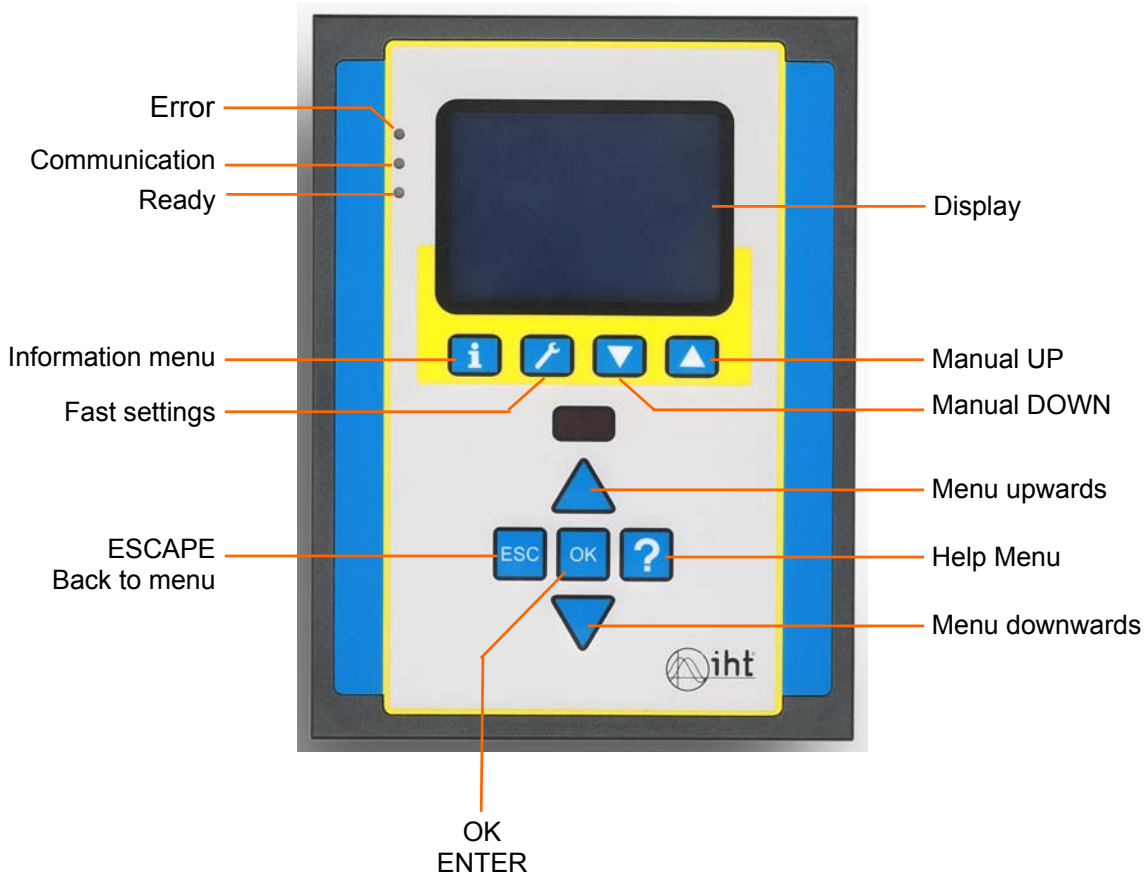
5.8.5 Connector X201, Operator Terminal

Interface RS 485

SUB-D 9-pole, female	
Contact	Function
1	Not used
2	Not used
3	Data -
4	Not used
5	GND
6	Not used
7	Not used
8	Data +
9	Not used
Housing	Ground

Note:
For test and service purposes the Cutbus-Interface X202 can be connected to a personal computer to collect data of the operation.
For this purpose the RS 485 interface with the converter must be converted to the RS 232 interface of the personal computer.
In this case the Terminal connector of the X201 has to be connected to the Cutbus of the machine

5.9 Operator Terminal IHT 7260



Technical Information

Power	24 VDC ±10%, with integrated reverse voltage protection
Consumption	60 mA
Over Voltage protection	30 V
Graphic Display	128x64 pixel blue/white with LED backlight
Serial Interface	RS485
Environment temperature	0 to +50°C
Relative Humidity	98% (non condensing)
Protection class	IP10 EN60529/IEC529 for assembly into operator console
Dimensions	160x120x35 mm
Weight	approx. 0.4 kg
IHT part no.	100363

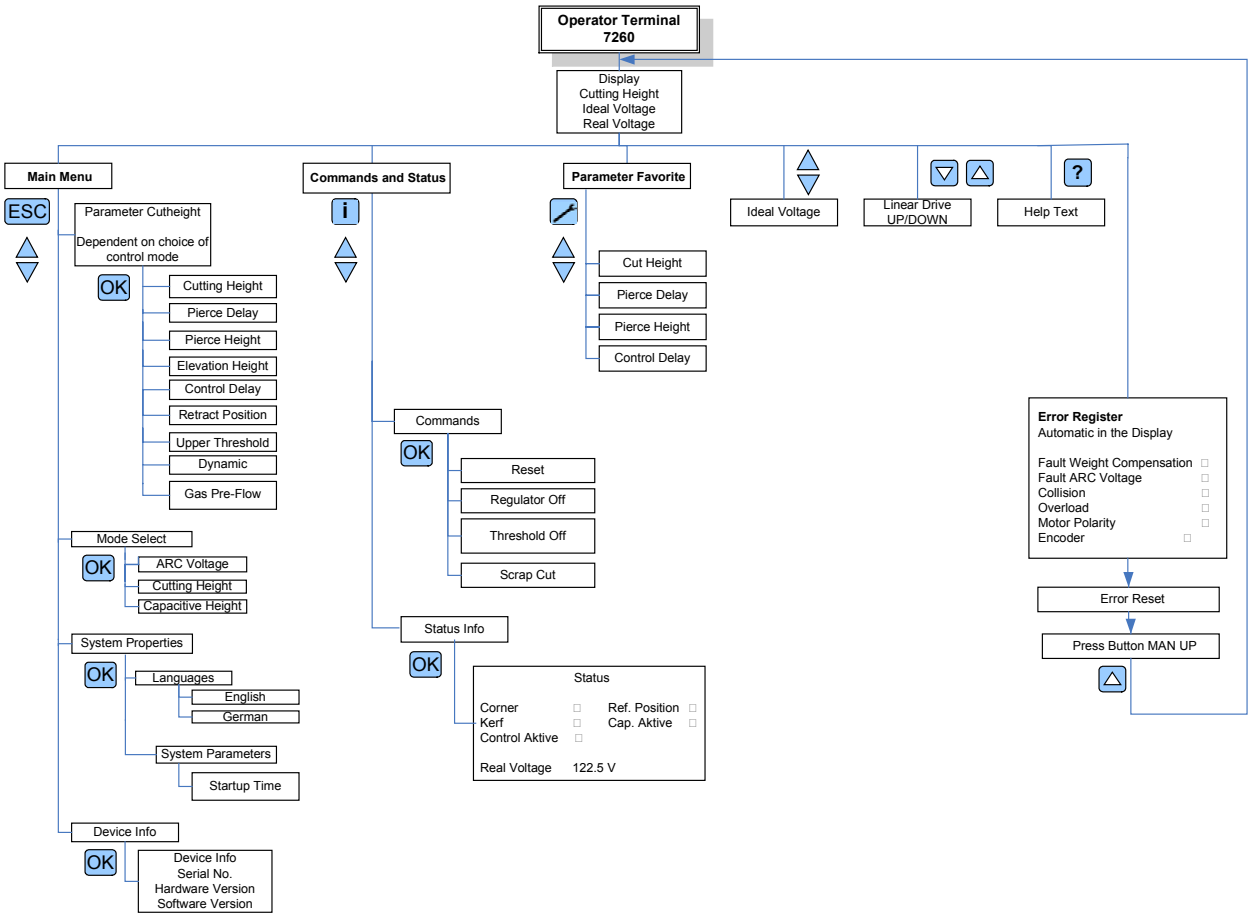
Connecting cables can be found in table / chapter *Devices and spare parts*.

5.10 OPERATOR TERMINAL IHT 7261 Handheld Version

Technical Data

Dimensions of housing.....200x160x61 mm
Weight .....ca. 1,35 kg
IHT part no.....100406 with 5 m connecting cable
IHT part no.....100407 with 10 m connecting cable

5.11 OPERATOR TERMINAL Menu-Overview



5.12 Converter for Serial Interface RS232 / RS485 - Option

Interface converter for connection from the Interface 7250 to a notebook or personal computer.

This converter is only necessary when information is read from or written into the IHT 3000 system, e.g. for service purposes. The converter can also be used for the Cutbus.

Technical Data

Power Supply	10-30 VDC
Power Consumption	0.05 A at 24 VDC
Reverse Voltage Protection	built-in
Communication RS485	2-wire differential input, asynchronous, half-duplex, screwing terminal block with connection for power supply
Communication RS232	automatic adaptation to baud rate of 300 to 115200
	Connector 9-pole D-SUB
Galvanic Isolation	Isolation voltage 3000 VDC
Environment Temperature	–25 to +75°C
Relative Humidity	no condensation between 5 to 95 %
Housing	Plastic housing 111x72x25 mm (Length x Width x Height)
Mounting of Housing	on symmetric mounting rail according to EN 60715
Connection Cable for RS232	1.8 m included in delivery
IHT part no.	100395

Note:

Additional technical data and information for installation are enclosed as a separate user manual for each device.

5.13 Converter for Serial Interface USB / RS485 - Option

Interface converter for connection from the Interface 7250 to a notebook or personal computer equipped with a **USB port**.

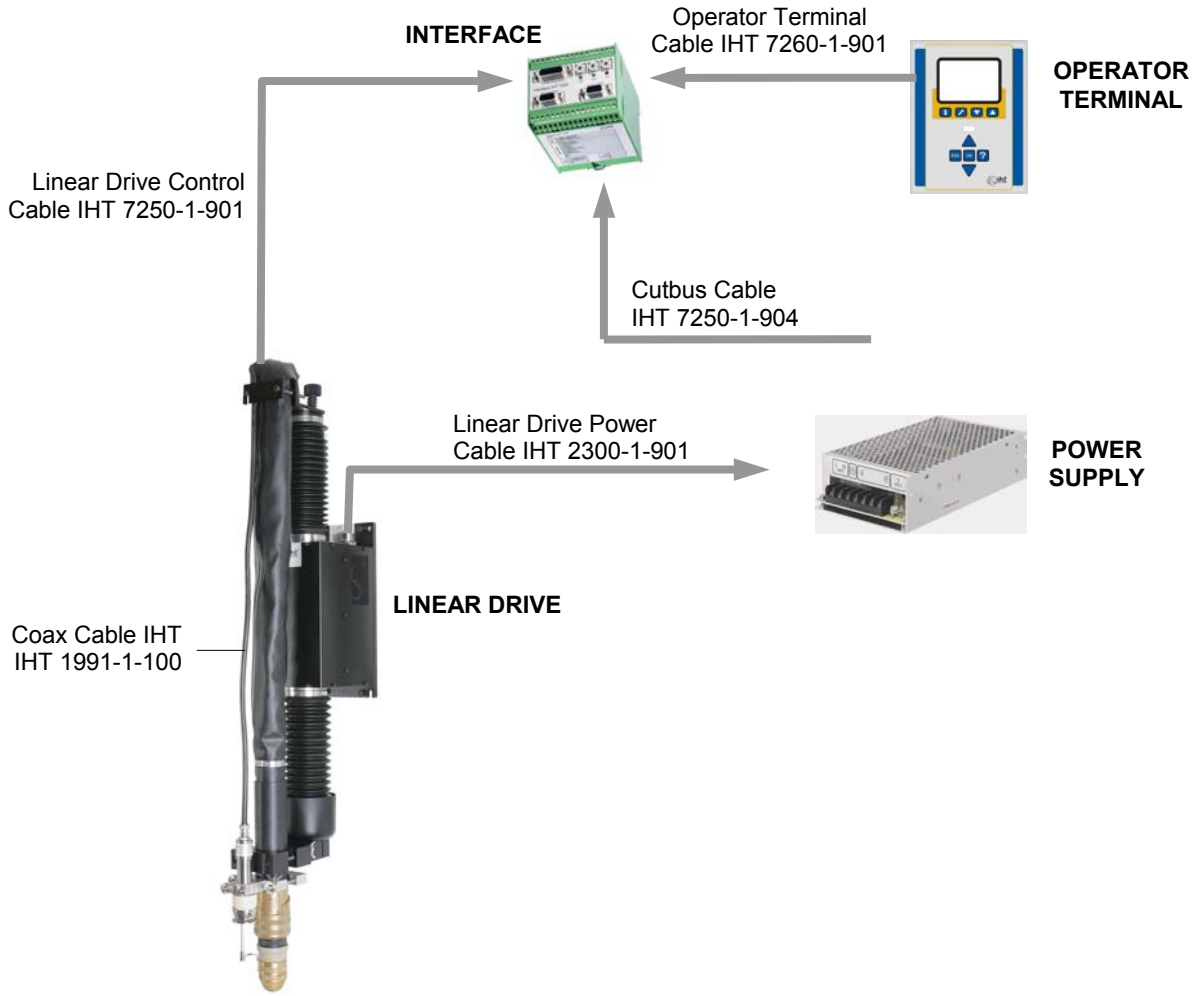
This converter is only necessary when information is read out or written into the IHT 3000 system, e.g. for service purpose. The converter can also be used for the Cutbus.

Technical Data

Power Supply	supplied by USB port of the Host-PC
Communication RS485	2-wire differential input, asynchronous, half-duplex, screwing terminal block with connection for power supply
Communication USB	automatic adaptation to baud rate of 300 to 115200
Compatibility	USB 1.1 and 2.0 standard
Galvanic Isolation	Isolation voltage 3000 VDC
Environment Temperature	–25 to +75°C
Relative Humidity	non-condensing 5 to 95 %
Housing	plastic housing 111x72x25 mm (Length x Width x Height)
Mounting of Housing	on symmetric mounting rail according to EN 60715 or
	mounting provided parts on a mounting plate
Connection Cable for USB	1.8 m included in delivery, USB-connector type A to type B
Driver Supported	Windows98/ME/2000/XP, Linux
IHT part no	100400

Note:
Additional technical data and information for installation are enclosed as a separate user manual for each device

5.14 Connecting Cable



	Description	Type No.	Part No.
1	Linear Drive Control Cable, length 10 m	IHT 7250-1-901/10	100359
2	Linear Drive Control Cable, length 20 m	IHT 7250-1-901/20	100360
3	Linear Drive Power Cable, length 10 m	IHT 2300-1-901/10	100361
4	Linear Drive Power Cable, length 20 m	IHT 2300-1-901/20	100362
5	Operator Terminal Cable, length 5 m	IHT 7260-1-901/5	100364
6	Operator Terminal Cable, length 10 m	IHT 7260-1-901/10	100365
7	Coax Cable for capacitive sensors	IHT 1991-1-100	100279
8	Cutbus Cable, length 5 m	IHT 7250-1-904/5	100368
9	Cutbus Cable, length 10 m	IHT 7250-1-904/10	100369

6 Installation

6.1 LINEAR DRIVE IHT 2343 - Installation

Important handling note for the LINEAR DRIVE

ATTENTION!

Don't touch the bellows of LINEAR DRIVE!

The bellow could be damaged.

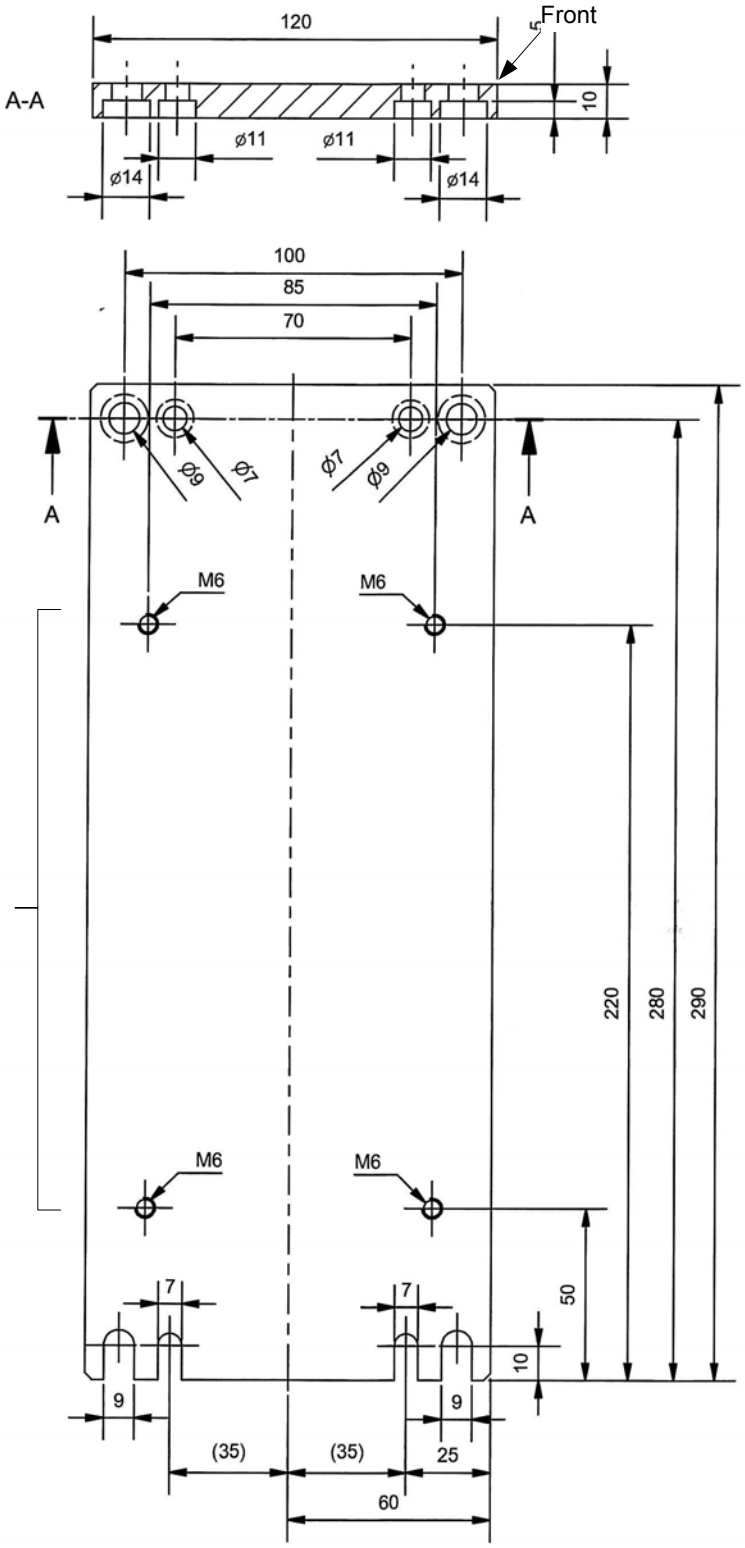
A damaged bellow must be exchanged as infiltrating dust can damage the mechanics.

Check the bellow and make sure that the folding is not buckled inwards!

Pull out inwardly buckled foldings!

Installation

For vertical mounting at the cutting machine.
Optionally 4 screws M6 DIN 912 (drill hole dimensions 70x270 mm) or
4 screws M8 DIN 912 (drill hole dimensions 100x270 mm) can be used to fix the Linear Drive from the front.



alternative
4 x M6 for rear mounting

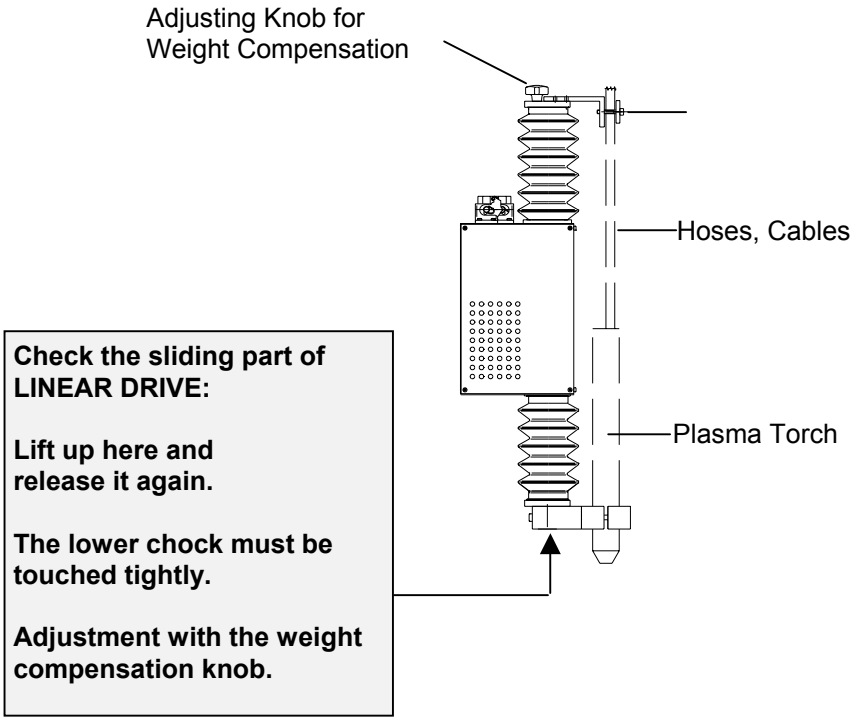
6.2 LINEAR DRIVE - Adjustment of Weight Compensation

This feature enables the adjustment of minimum vertical downward force when the nozzle touches the work piece while getting the initial position.

The plasma torch must be mounted, the cable and the hose package must be clamped. The cable and hoses outside must be held flexible so the sliding part of the LINEAR DRIVE is not hindered.

Note:
Otherwise do not fix the cables and hoses in the clamp. If necessary use an extended bracket.

1. Rotate the knob *Weight Compensation* clockwise until a slight lift up of the torch occurs.
2. Rotate the knob counter clockwise until the the lifter slide on the lower chock safely.
3. Check the weight compensation:



ATTENTION!

Rotate knob "Weight Compensation" counter clockwise only as far as necessary to rest on the lower chock safely .

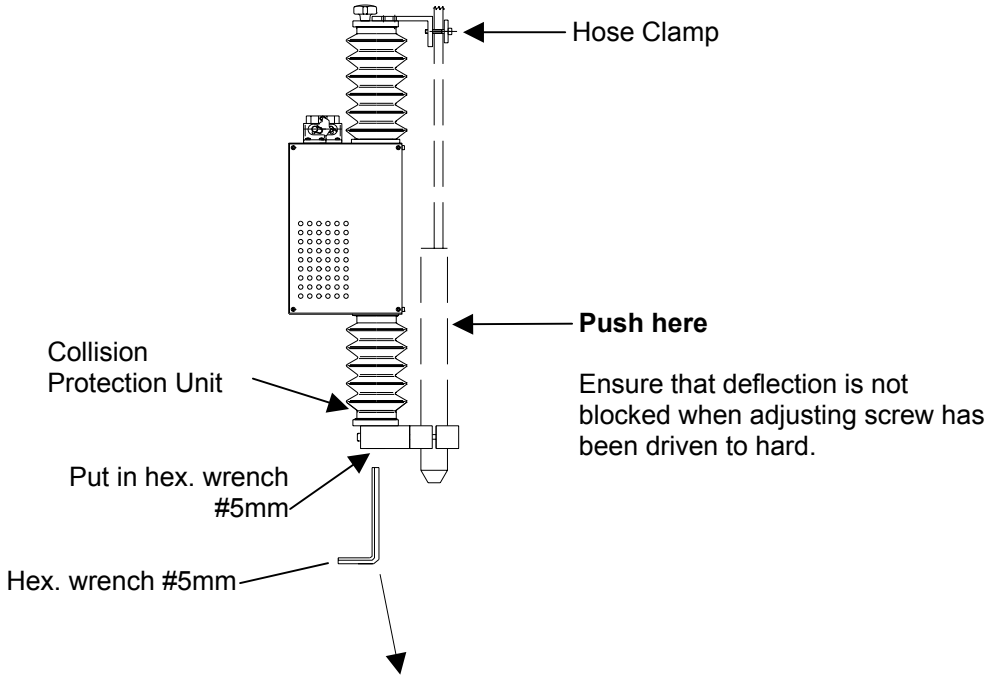
The touching force will be unnecessarily high when the nozzle touches the work piece otherwise.

6.3 LINEAR DRIVE - Check of Collision Protection

Push the torch clamp out of it's normal position until the recess is left and release it again. Check: The torch must return into correct vertical direction.

If the torch doesn't safely return into the vertical direction then check that the hose does not hindered the deflection. If necessary correct the position of the hose.
However the torch do not move exactly to the vertical direction then increase the deflection loading force:

Turn adjusting screw clockwise with a hex-wrench #5mm.



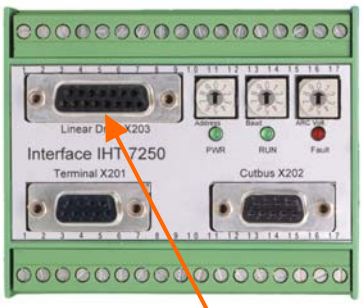
ATTENTION!
Turn clockwise only as far as necessary to maintain sufficient deflection

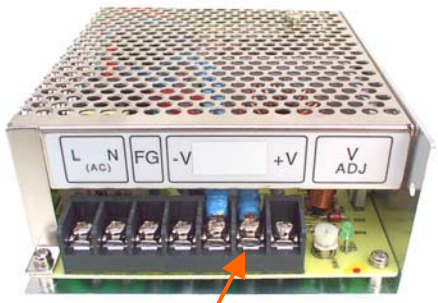
Note: Otherwise the built-in collision switch doesn't function and the unit may be damaged in case of collision.
The adjustment range of the vertical deflection force is from 30 to 120 N.

6.4 LINEAR DRIVE - Electrical Connections

INTERFACE

POWER SUPPLY

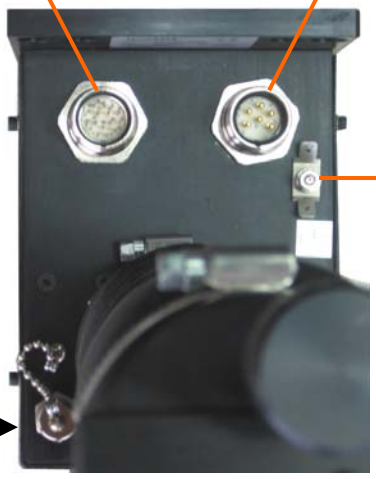




LINEAR DRIVE CONTROL CABLE, IHT 7250-1-901

LINEAR DRIVE POWER CABLE, IHT 2300-1-901

LINEAR DRIVE



PE
Grounding Terminal

Connector 6.3 mm Faston or terminal for M4 screw

Wire minimum 6 qmm/AWG8

Connector for COAX CABLE IHT 1991 for capacitive sensors with nozzle sensor or ring electrode

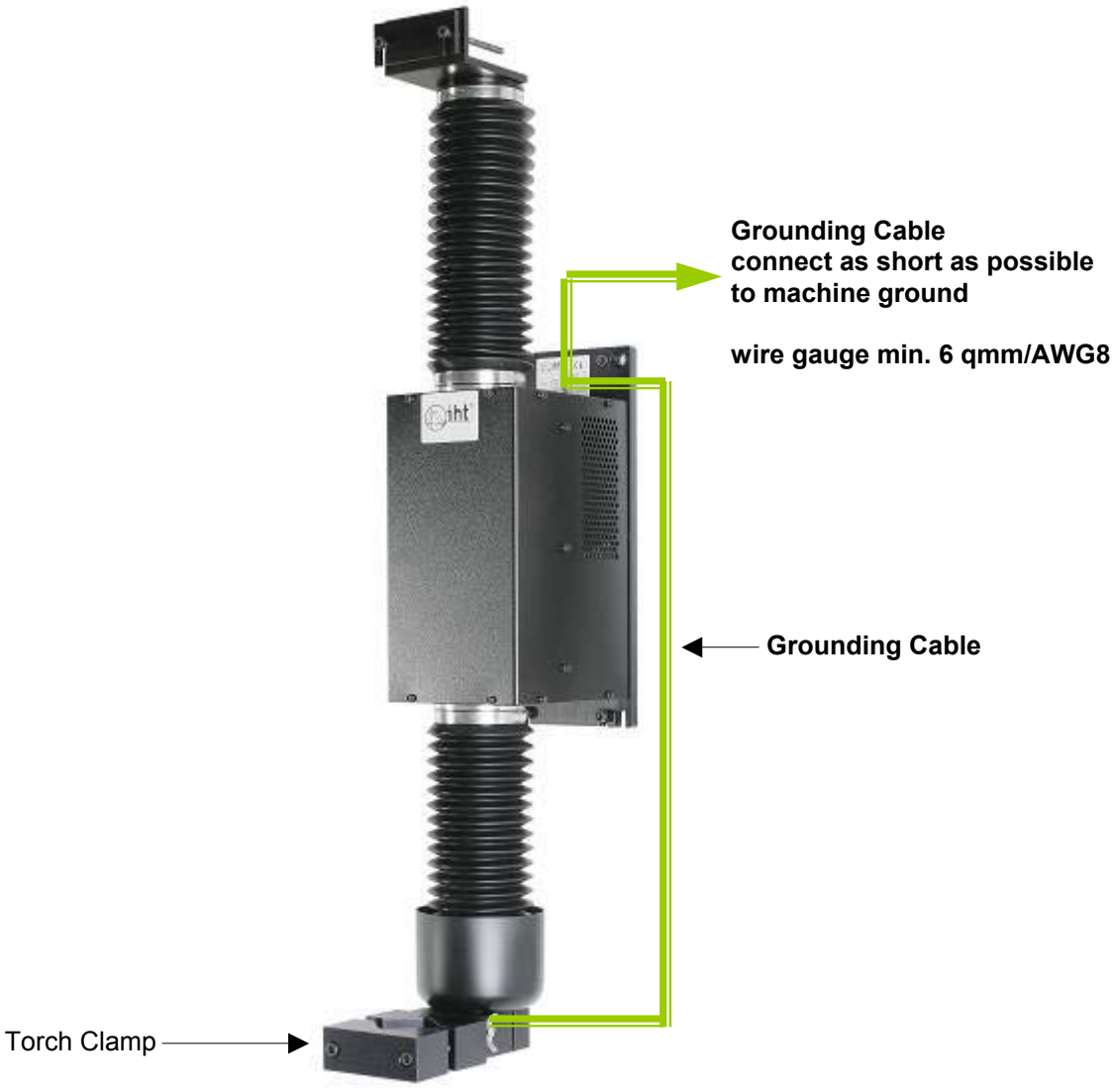
Connect as short as possible to machine ground (less than 0.5 m).

6.5 LINEAR DRIVE – Grounding of Torch Clamp

This cable is required for safe operation!

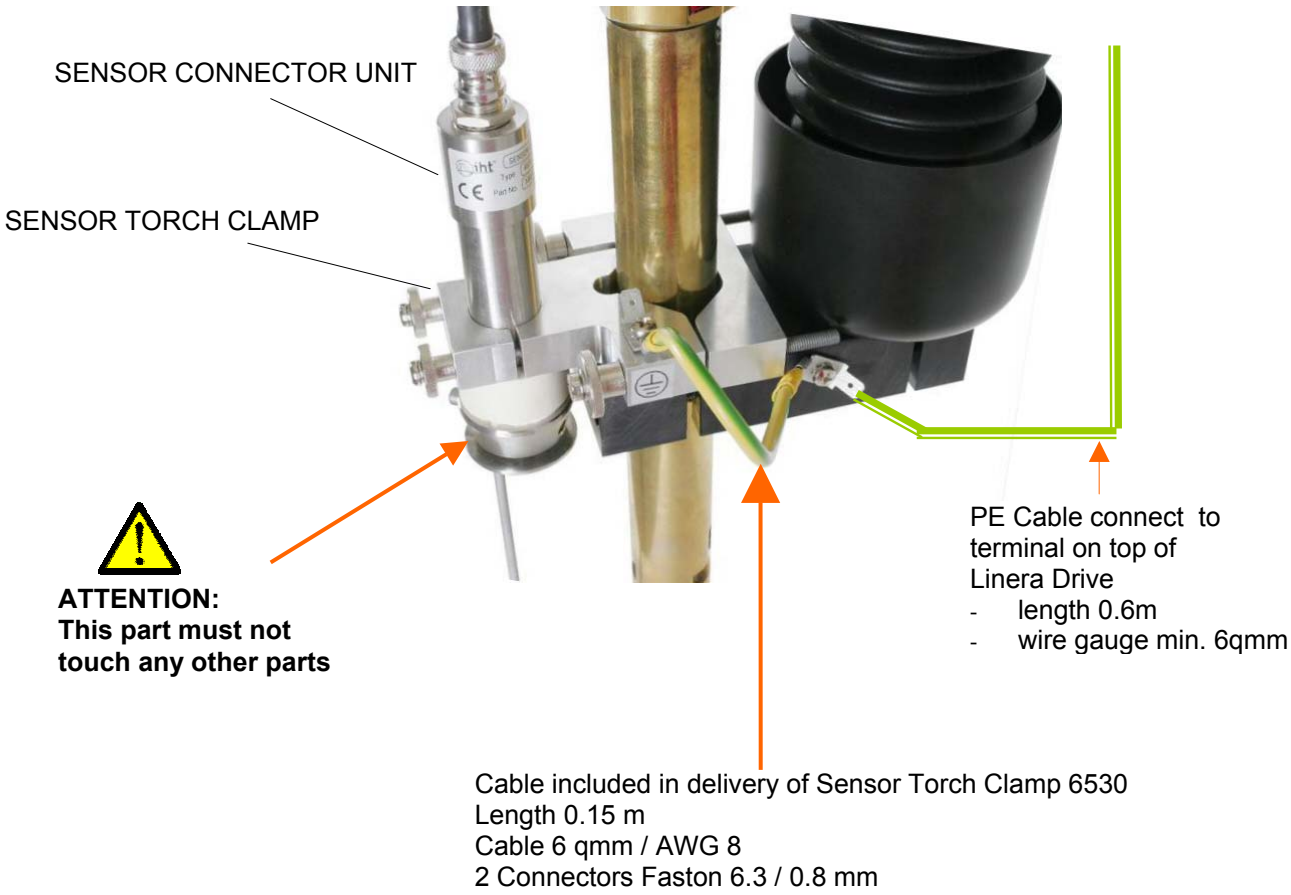
Note: This grounding cable is not included in delivery.

Cable length:	0.6 m
Cable:	6 qmm/AWG 8, yellow/green lengthwise striped
2 connectors:	Faston 6.3mm / 0.8 mm



ATTENTION!
The length of the cable may not be too short!
The movement of the lifter may not be hindered by the grounding cable up to the lower limit switch.

6.6 LINEAR DRIVE – Grounding for Capacitive Sensor Mode



ATTENTION!
The terminal on top of Linear Drive must be connected !

The SENSOR CONNECTOR UNIT must be connected with the machine ground via the SENSOR TORCH CLAMP.

Discharge of excess voltage will not be possible. This will cause damage.

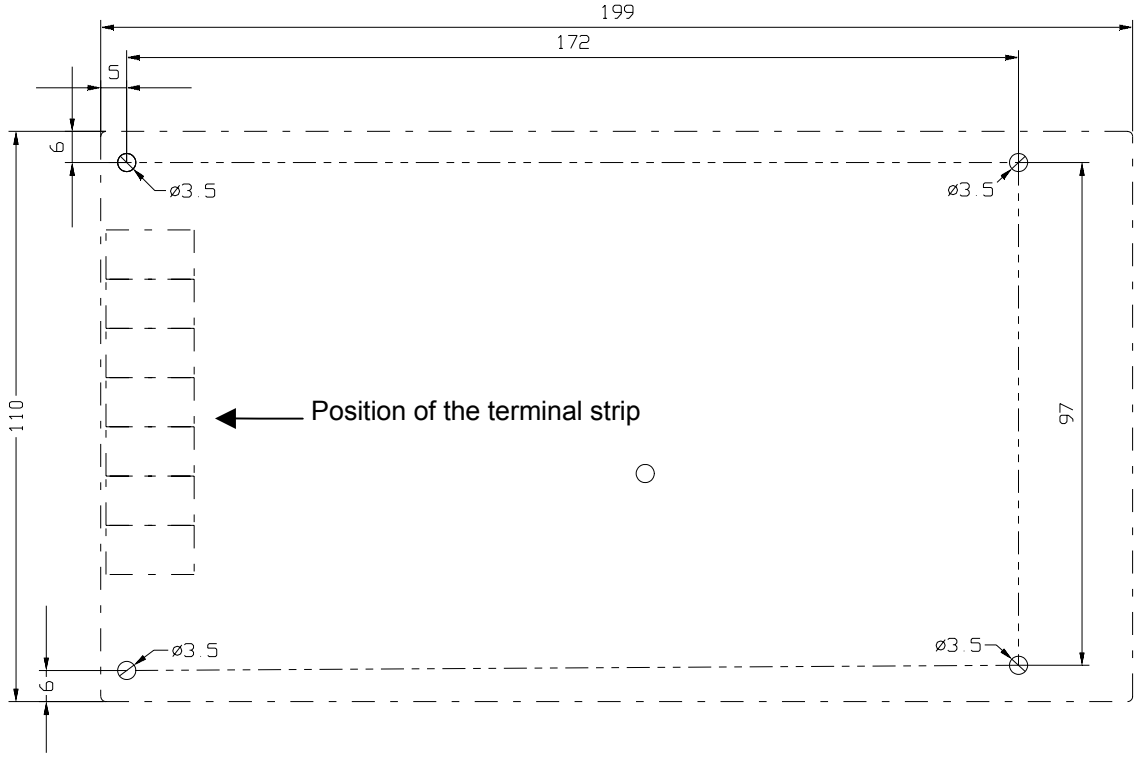
6.7 Installation of the POWER SUPPLY 7504

The Power Supply must be installed enclosed in the machine control cabinet.
Outer dimensions of the power supply: 199x110x50 mm (Length x Width x Height).
The power supply can be mounted on the base or the side face.

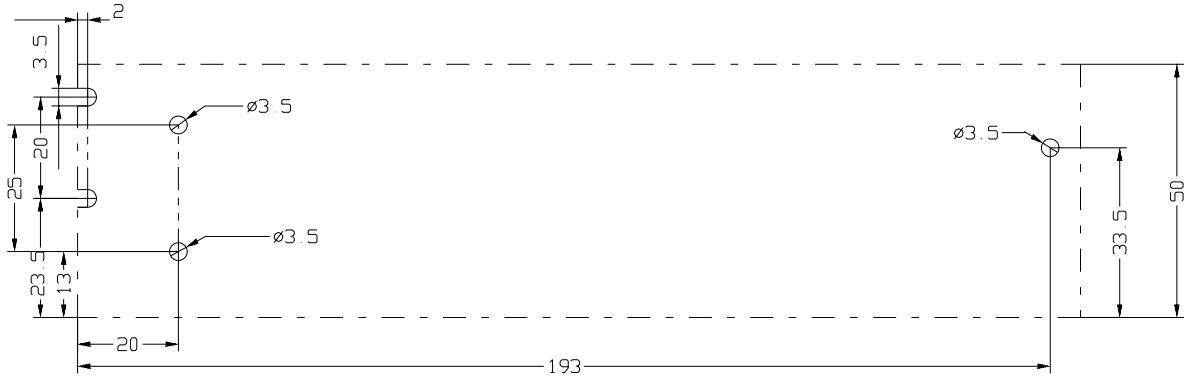
Attention!

Maximum length of engagement into the housing: 4 mm!

Hole pattern with outer dimensions for mounting the power supply at the base:
(terminal strip left). 4 mounting screws M3.



Hole pattern for mounting the power supply at the side face (terminal strip right)
Mounting holes for M3-screws



6.8 Electrical connection POWER SUPPLY 7504

Observe the safety regulations when connecting the power supply!

Check the supply voltage selector switch: factory setting: 230 VAC

At a supply voltage of 120 VAC switch the sliding switch.

The power supply must be mounted in an enclosure so that contact with other devices or humans is avoided.

Insert correct fuse in AC line Phase L.

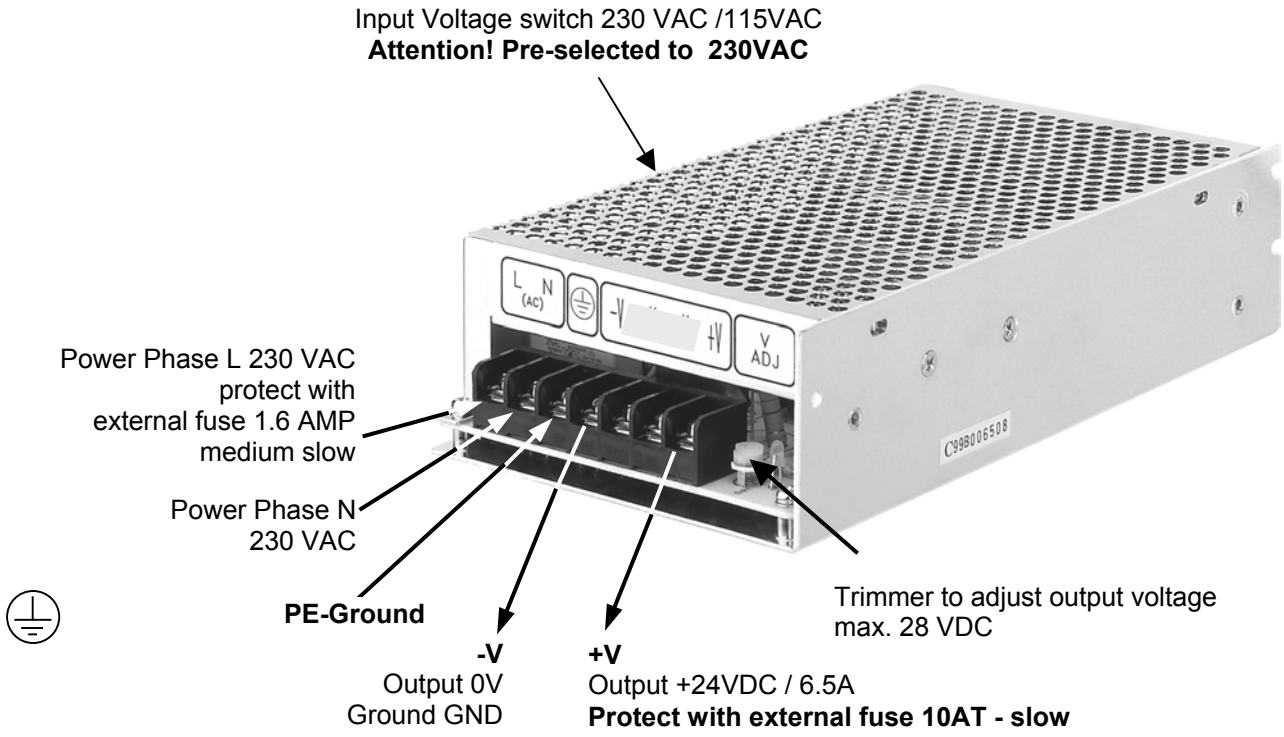
Fuse Phase L at 230 VAC with 1,6A medium slow.
Note instructions at the POWER SUPPLY 7504.

ATTENTION! Connect and check the protected earth connector (PE)!

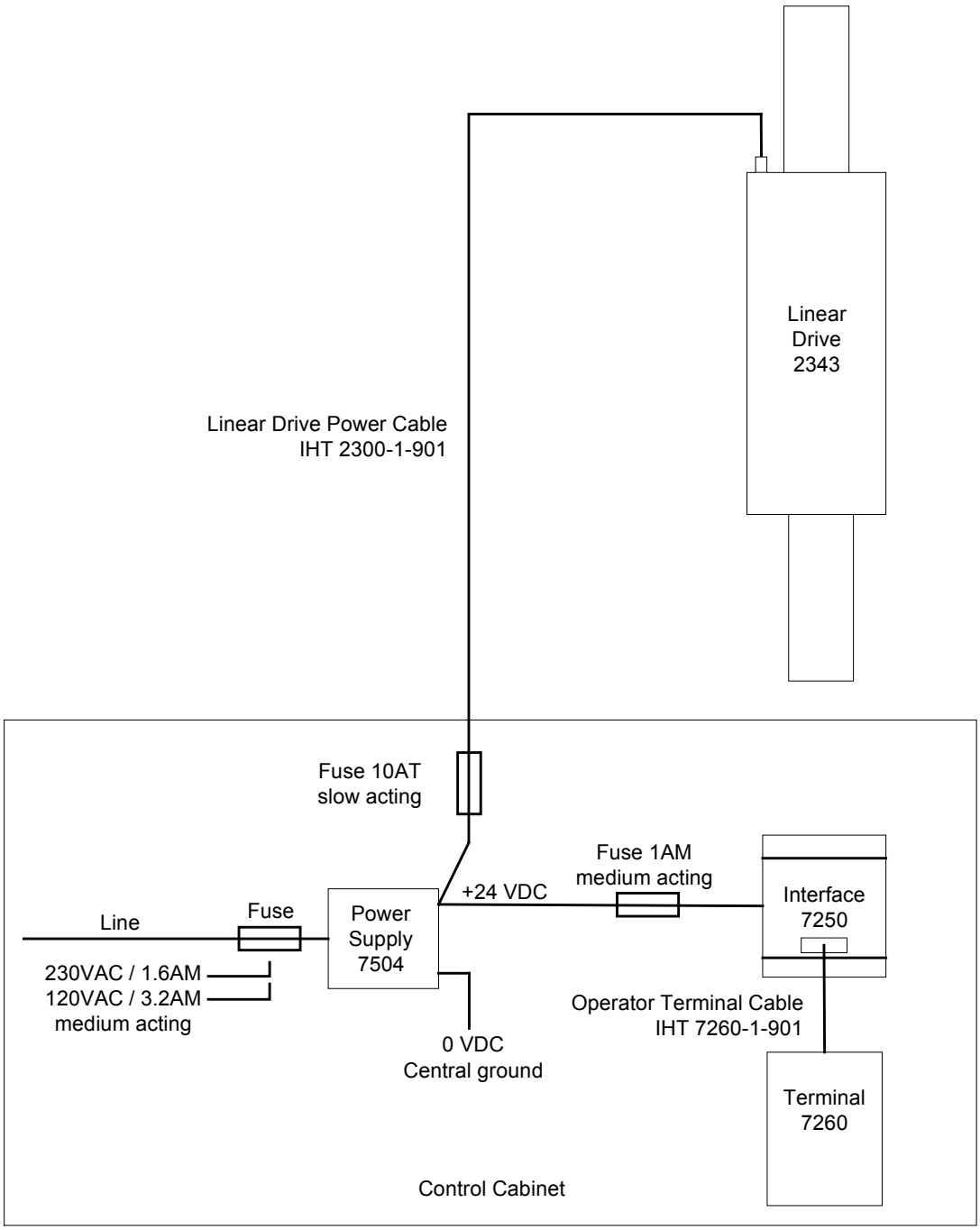
Protect the exit +24 VDC with a 10AT fuse.

Connect exit 0V (-V) of the POWER SUPPLY with electronic-GROUND at the power supply of the machine control. Width of cable 2.5 qmm/AWG3 or more.

ATTENTION!
Before switching on the power supply make sure that the wiring is completed correctly!



6.9 Power Wiring and Fusing

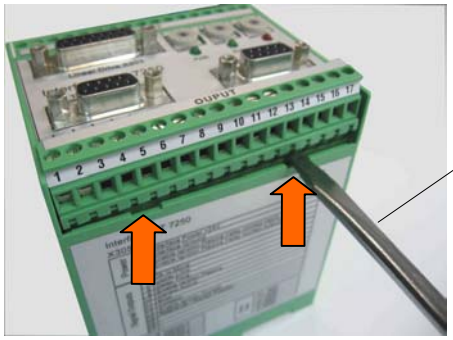


6.10 Installation of the INTERFACE IHT 7250

The Interface is build for mounting on a 35 mm DIN rail in the control cabinet or the operation panel.

6.11 Electrical Connection of the INTERFACE IHT 7250

Both 17-pole screwing terminals for input and exit are pluggable. Due to a certain code they cannot be mixed up.
To remove the screwing terminals put a screw driver in the slot of the housing and push it upwards.



6.12 Interface Input

Bold printed functions No. 2, 3, 6, 7, 9, 14 and 15 are the minimum configuration for plasma operation.

Note
If the plasma source is not equipped with a low voltage output of arc voltage, e.g. 0 to 10 VDC, than connect the high arc voltage (e.g. 0 to 300VDC) to terminal No. 1.
If a low arc voltage output is available, the use of this voltage is recommendable to achieve higher noise immunity. Use the terminal No. 2 as described below.

Input X301 No.	Function	Description	Input Voltage to Activate Function
1	High Arc Voltage 0 VDC	Arc voltage input 0 VDC	
2	**Low Arc Voltage 10 VDC**	**Low voltage input 0 to +10 VDC**	
3	**Arc Voltage Ground**	1) using high arc voltage minus 300 VDC **2) using low arc voltage 0 VDC (GND)**	
4	-	no function	
5	-	no function	
6	**Initial Position Start**	**Start finding initial position for plasma mode**	+24V
7	**Ready (Start XY)**	**XY movement starts, cutting operation**	+24V
8	Piercing Height Oxyfuel	Piercing Height when cutting with oxyfuel	+24V
9	**Corner**	**Corner, switch off of clearance control**	+24V
10	Retract 1	Retract position 20 mm above cutting height	+24V
11	Retract 2	Retract position 50 mm above cutting height	+24V
12	Scrap Cutting	Scrap Cutting without initial position finding	+24V
13	Start Clearance Control Oxyfuel	Clearance Control for oxyfuel cutting is active	+24V
14	**Manual Up**	**Moves torch up**	+24V
15	**Manual Down**	**Moves torch down**	+24V
16	-	no function	
17	-	no function	

The input voltage to activate the function of terminal No. 6 to 15 is +24 V referring to the INTERFACE GROUND at output terminal No. 2 as described on following page.

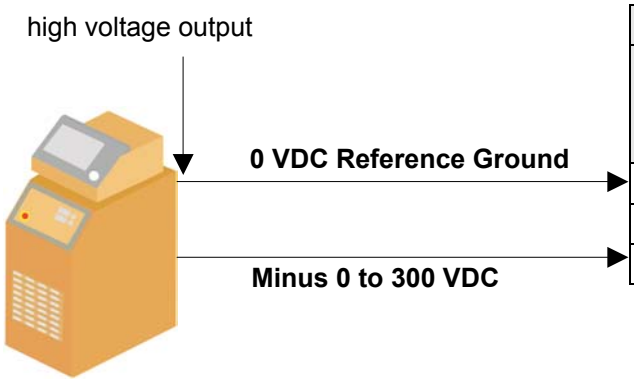
6.13 Connection of Arc Voltage at the Interface

The INTERFACE offers a high voltage input (0 to –300VDC) and a low voltage input (0 to +10VDC) for the arc voltage connection.

It is recommended to use a low voltage input 0 to +10V DC if the plasma source offers corresponding outputs for the arc voltage.

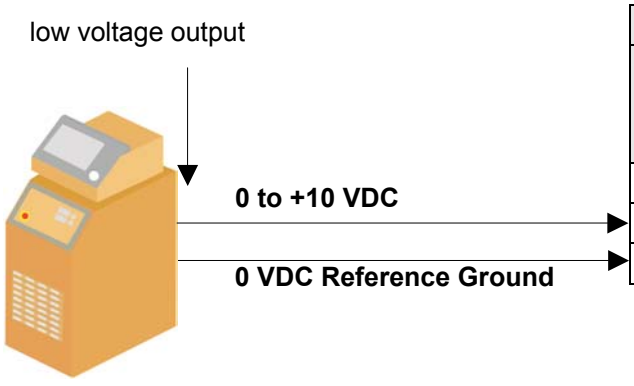
This reduces the interference between ignition voltage and arc voltage.

Example 1
Wiring of a plasma source with a high voltage output of 0 to -300 VDC



INTERFACE 7250	
Input X301 No.	**Function**
1	**High Arc Voltage 0 VDC**
2	Low Arc Voltage +10 VDC
3	**High voltage minus 300 VDC**

Example 2
Wiring of a plasma source with a low voltage output of 0 to +10 VDC

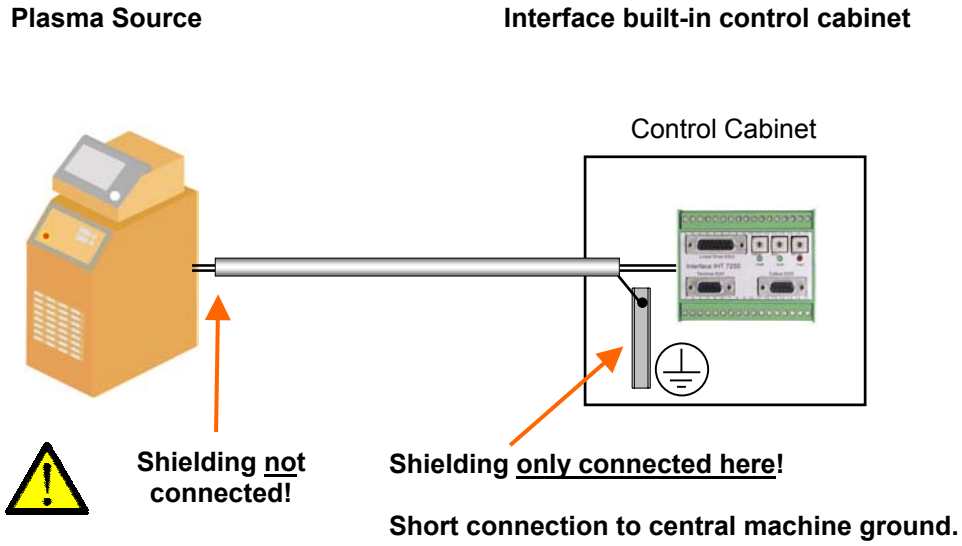


INTERFACE 7250	
Input X301 No.	**Function**
1	High Arc Voltage 0 VDC
2	**Low Arc Voltage +10 VDC**
3	**Arc Voltage Ground 0 VDC**

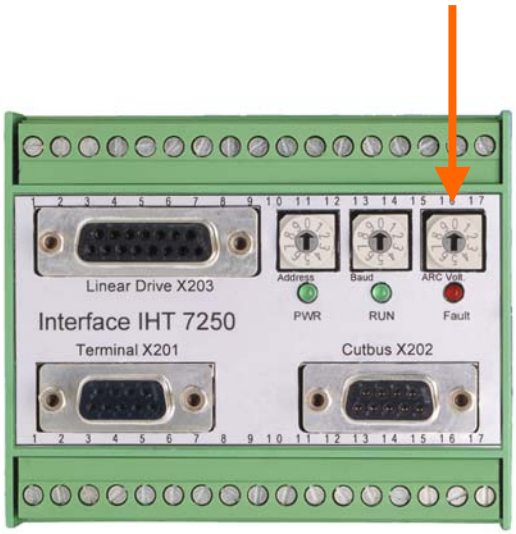
6.14 Arc Voltage Cable - Connection of Shielding

ATTENTION!

The shielding of the arc voltage cable to the plasma source must not be connected at the plasma source ground, but has to be connected in the control cabinet or the metal housing (PE Potential) with the machine ground in the shortest possible way.



6.15 Setting of Arc Voltage Range



Setting	Output Voltage of Plasma Source Arc Voltage Range	According an Arc Voltage
0	0-300 VDC	0-300 VDC
1	0-10 VDC	0-300 VDC
2	0-6 VDC	0-300 VDC
3	0-10 VDC	0-250 VDC

6.16 Interface Output

Bold printed functions No. 1, 2, 3, and 4 are the minimum configurations for plasma operation.

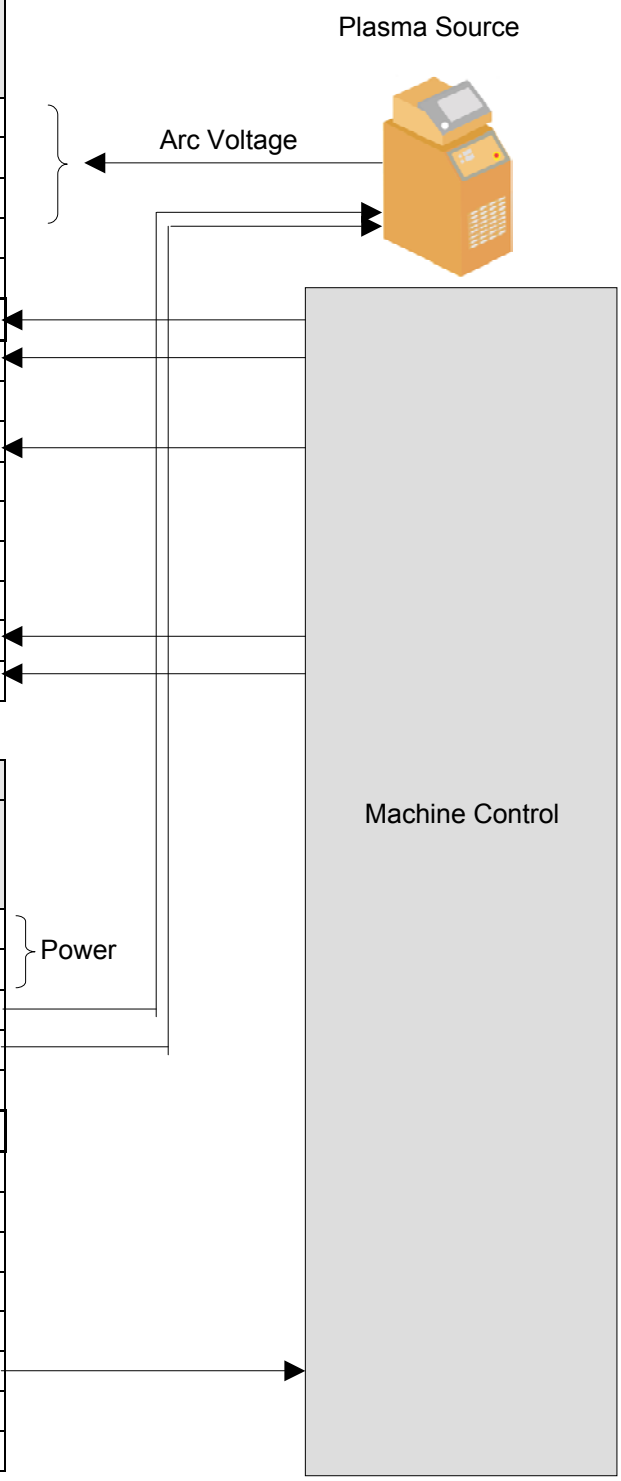
Output X305 No.	Function	Description	Output Voltage Function Active
1	**Interface Power +24V**	**Power for Interface and Operator Terminal +24 V**	
2	**Interface Ground**	**Power Ground (0 V), reference potential for input / output signals to CNC**	
3	**Plasma Start**	**Input to internal relay contact** This function is active at the same time as the terminal No. 9.	
4	**Plasma Start**	**Output from internal relay contact** This function is active at the same time as the terminal No. 9.	
5	-	no function	
6	Ok To Move	Release signal to start XY-movement by machine control (CNC), required when CNC is not generating this signal by itself.	+20V
7	Upper Threshold	The selected upper threshold value in % of ARC voltage is crossed by the measured ARC voltage, e.g. crossing kerfs, edges etc. Clearance control is blocked as long as upper threshold is exceeded.	+20V
8	Delay Time	Pierce delay time starts with Start XY and ends after the Pierce Delay Time. After end of the delay time, clearance control begins.	+20V
9	Plasma Start	Output signal to start ignition. Signal to plasma source. This function is active at the same time as the relay contact on terminal No. 3 and 4.	+20V
10	Control Active	Clearance control is active	+20V
11	Error	Error	+20V
12	Collision	Collision, in cutting process, the torch immediately moves up to the upper position. ATTENTION! Inverted output – active low!	0V
13	Enable ignition Oxyfuel	Enable ignition for oxyfuel torch	+20V
14	Reference / Retract Position	Output signal is active, when this position is reached.	+20V
15	Separate Ignition Plasma	Separate ignition for gas pre-flow.	+20V
16	-	no function	
17	-	no function	

Note
Reference ground potential of output signals No. 5 to 15 is terminal No. 2 INTERFACE GROUND.

6.17 Wiring Example of Control Signals for Plasma Mode – Minimal Configuration

INTERFACE 7250	
Input X301 No.	**Function**
1	High Arc Voltage 0V DC
2	**Low Arc Voltage 10 VDC**
3	**Arc Voltage Ground**
4	No function
5	No function
6	**Initial Position Start**
7	**Ready (Start XY)**
8	Piercing Height Oxyfuel
9	**Corner**
10	Retract 1
11	Retract 2
12	Scrap Cutting
13	Start Clearance Control Oxyfuel
14	**Manual Up**
15	**Manual Down**

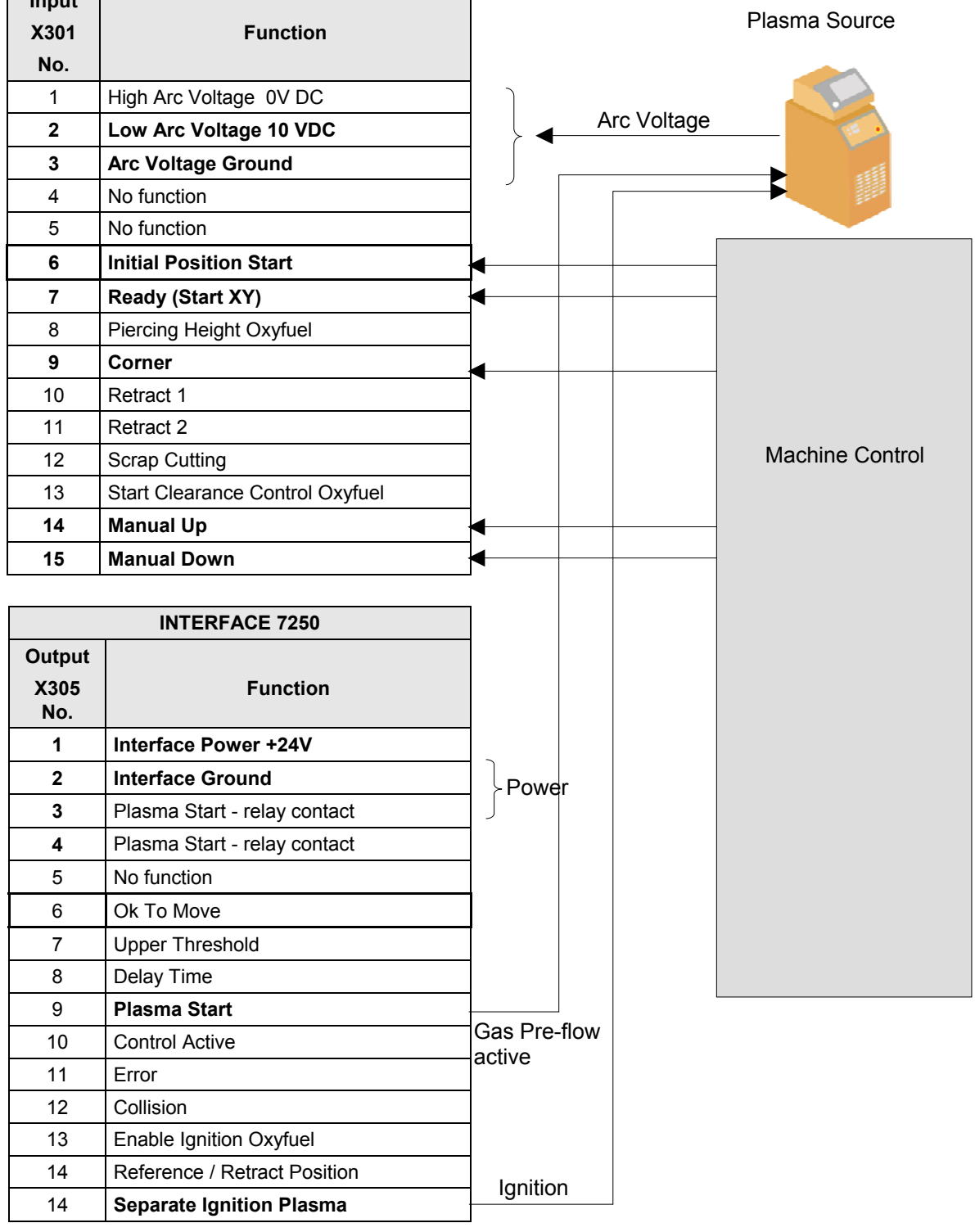
INTERFACE 7250	
Output X305 No.	**Function**
1	**Interface Power +24V**
2	**Interface Ground**
3	**Plasma Start - relay contact**
4	**Plasma Start - relay contact**
5	No function
6	Ok To Move
7	Upper Threshold
8	Delay Time
9	Plasma Start
10	Control Active
11	Error
12	**Collision**
13	Enable Ignition Oxyfuel
14	Reference / Retract Position



6.18 Wiring Example for Plasma Mode with Gas Pre-flow

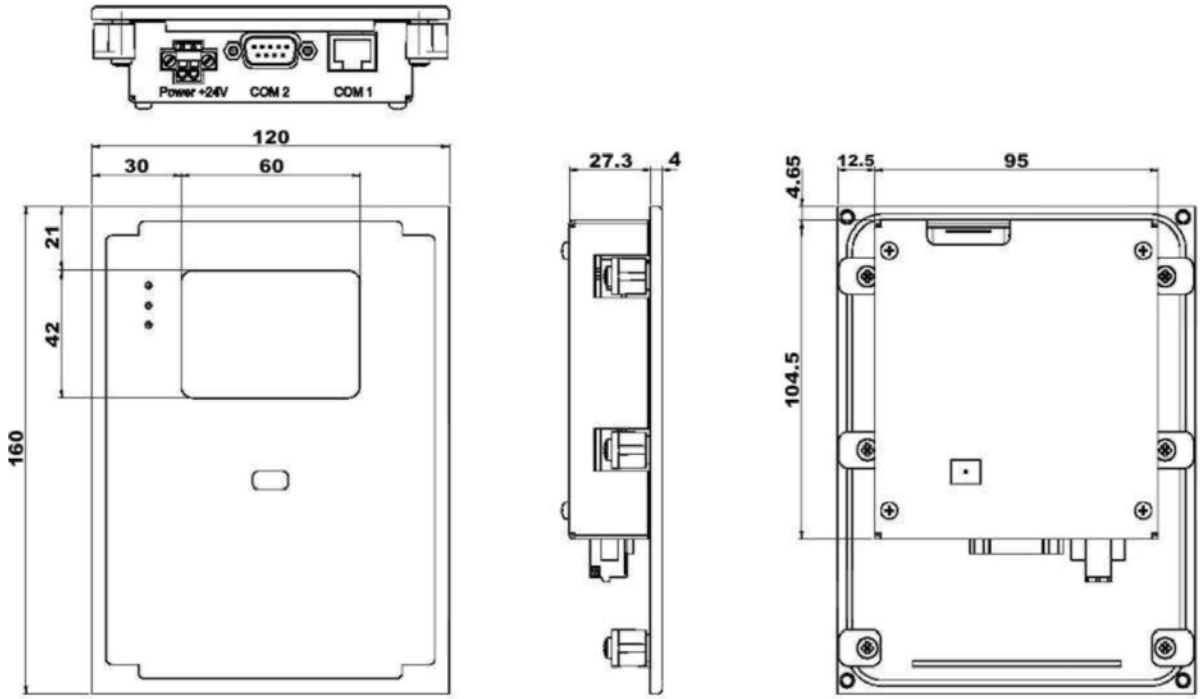
INTERFACE 7250	
Input X301 No.	**Function**
1	High Arc Voltage 0V DC
2	**Low Arc Voltage 10 VDC**
3	**Arc Voltage Ground**
4	No function
5	No function
6	**Initial Position Start**
7	**Ready (Start XY)**
8	Piercing Height Oxyfuel
9	**Corner**
10	Retract 1
11	Retract 2
12	Scrap Cutting
13	Start Clearance Control Oxyfuel
14	**Manual Up**
15	**Manual Down**

INTERFACE 7250	
Output X305 No.	**Function**
1	**Interface Power +24V**
2	**Interface Ground**
3	Plasma Start - relay contact
4	Plasma Start - relay contact
5	No function
6	Ok To Move
7	Upper Threshold
8	Delay Time
9	**Plasma Start**
10	Control Active
11	Error
12	Collision
13	Enable Ignition Oxyfuel
14	Reference / Retract Position
14	**Separate Ignition Plasma**



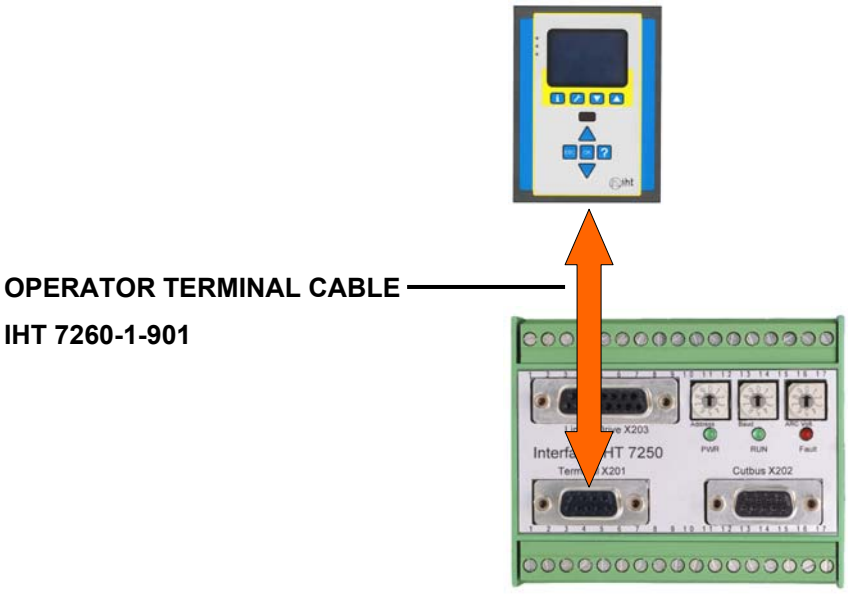
6.19 Mounting of the OPERATOR TERMINAL IHT 7260

6.20 Drawing for Installation



6.21 OPERATOR TERMINAL - Electrical Connection

The **Operator Terminal Cable IHT 7260-1-901** connects the Operator Terminal with the connector X201 at the Interface. The power supply is provided by this cable as well.



Attention when mounting the operator panel:

Connect PE-Terminal to PE-potential
of machine grounding.

Faston connector 6.3 mm
Wire gauge 0.75 qmm

6.22 Default Setting of DIP-Switch

Do not change this setting!

	1	2	3	4	5	6
ON	■	■	■	■		
OFF					■	■

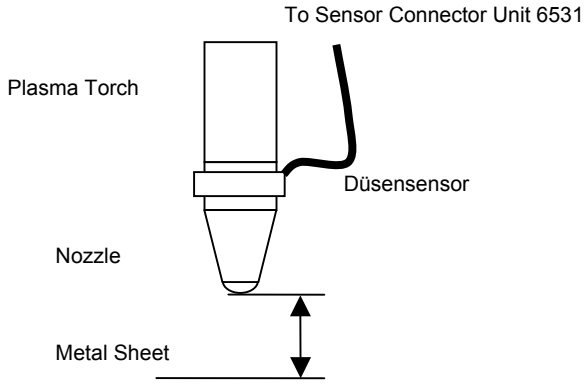
6.23 NOZZLE SENSOR

The IHT 3000 NOZZLE SENSOR detects the surface of the metal sheet precisely without touching. The NOZZLE SENSOR measures the clearance exactly at the tip of the nozzle where the piercing will be done. This enables the piercing and cutting directly at the edge of the metal sheet. This feature offers the maximum utilisation of the metal sheet.

The NOZZLE SENSOR reduces the time for finding the initial position significantly. Therefore fast cutting cycles can be achieved.

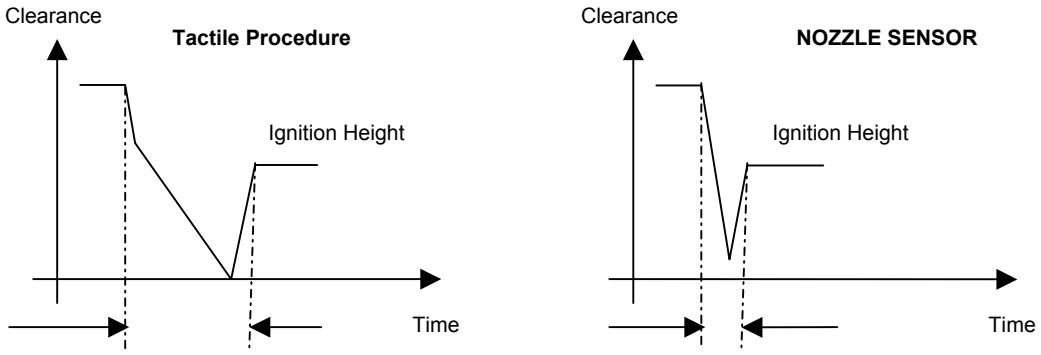
Needed devices

- IHT 3000 System
- NOZZLE SENSOR KIT

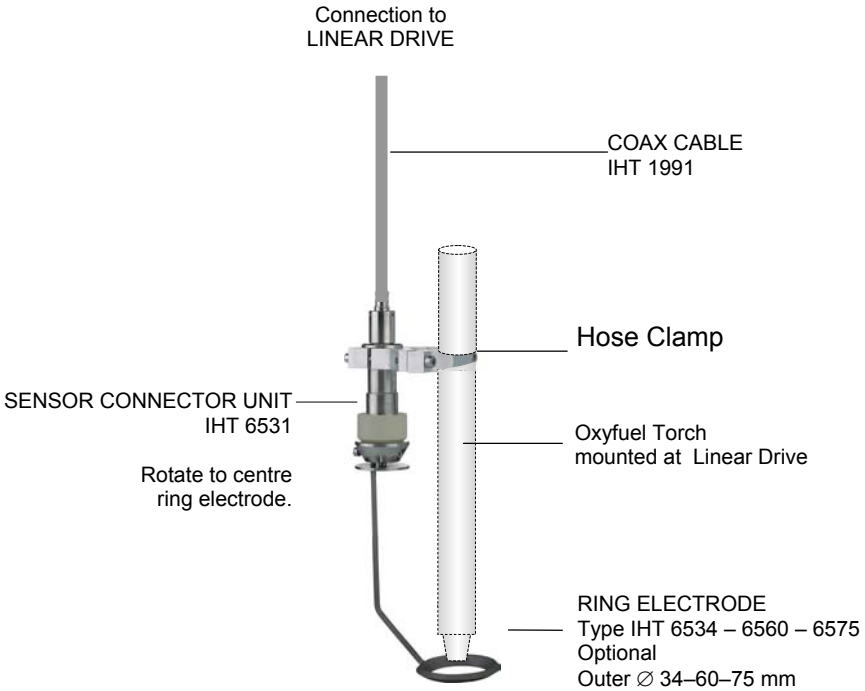


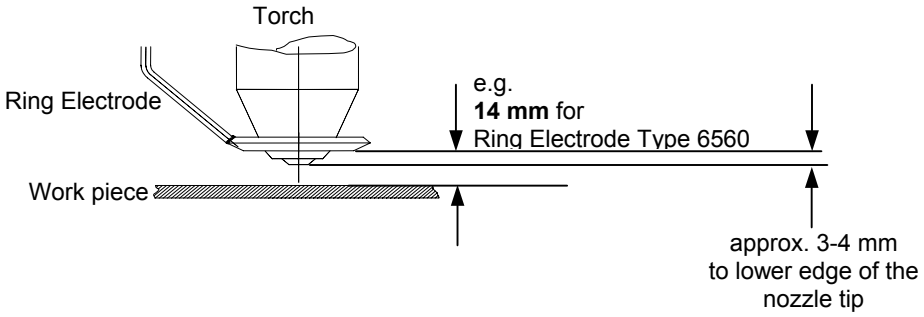
Function

A special capacitive measurement procedure using the NOZZLE SENSOR enables a fast movement to the surface of the metal sheet without touching it.
Additionally the measurement of the clearance between nozzle and metal sheet will be done with high precision.



6.24 Mounting of the Sensor Components for Capacitive Mode





Ring Electrode types and appropriate clearance:

Ring Electrode Type	Diameter / mm	Clearance / mm
6534	34	8
6560	60	14
6575	75	16-18

Note: Ring Electrode 6534 is primarily used for oxyfuel torches.

6.25 Interface Inputs for Capacitive Mode

Bold printed functions No. 8,13, 14 and 15 are for oxyfuel operation.

Input X301 No.	Function	Description	Input Voltage to Activate Function
1			
2			
3			
4			
5			
6			
7			
8	**Piercing Height Oxyfuel**	**Pierce height for oxyfuel cutting**	+24V
9			
10			
11			
12			
13	**Start Clearance Control Oxyfuel**	**Clearance control for oxyfuel cutting active (on)**	+24V
14	**Manual Up**	**Moves torch up**	+24V
15	**Manual Down**	**Moves torch down**	+24V
16	-	no function	
17	-	no function	

6.26 Interface Output for Capacitive Mode

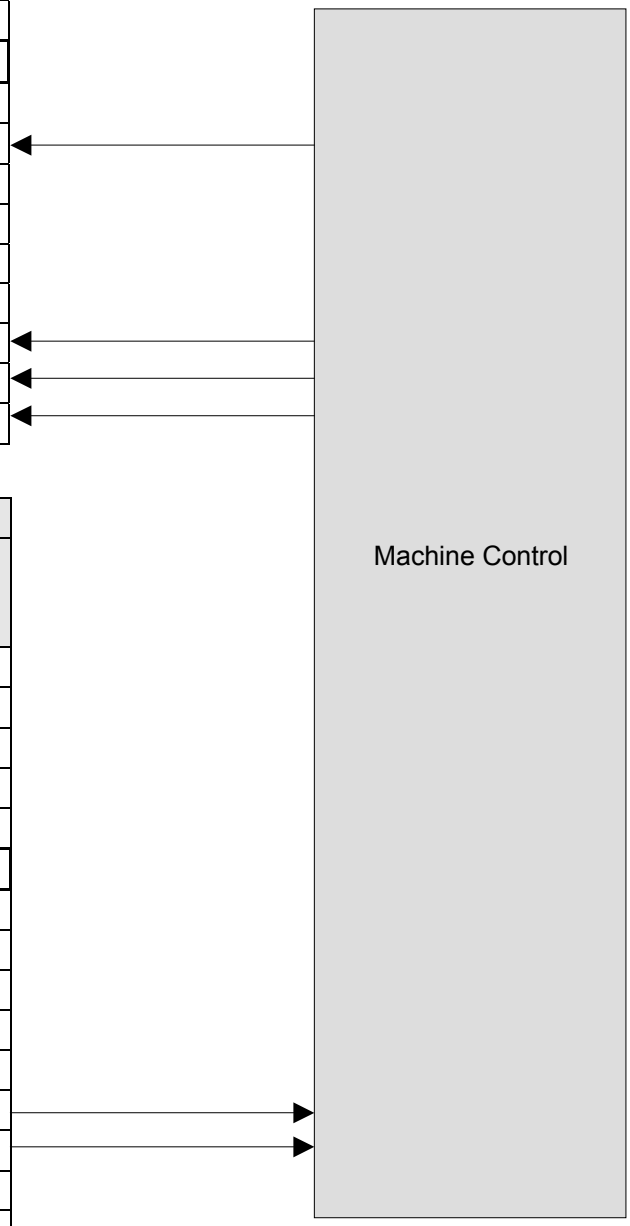
Bold printed functions No. 1, 2, 11, 12, and 13 are for oxyfuel operation.

Output Contact Nr.	Function	Description	Output Voltage to Activate Function
1	**Interface Power +24V**	**Operating voltage connection for +24 V**	
2	**Interface Ground**	**Power Ground (0 V), reference potential for input / output signals to CNC**	
3			
4			
5			
6			
7			
8			
9			
10			
11	**Error**	**Error**	+20V
12	**Collision**	**Collision** Attention! Negated output. No Collision: +20V	0V
13	**Enable Ignition Oxyfuel**	**Ignition enable for oxyfuel**	+20V
14	Reference / Retract Position	When this position is reached, the output signal is active	+20V
15			
16	-	no function	
17	-	no function	

6.27 Wiring of Control Signals for Oxyfuel Mode

INTERFACE 7250	
Input X301 No.	**Function**
1	High Arc Voltage 0V DC
2	Low Arc Voltage 10 VDC
3	Arc Voltage Ground
4	No function
5	No function
6	Initial Position Start
7	Ready (Start XY)
8	**Piercing Height Oxyfuel**
9	Corner
10	Retract 1
11	Retract 2
12	Scrap Cutting
13	Start Clearance Control Oxyfuel
14	**Manual Up**
15	**Manual Down**

INTERFACE 7250	
Output X305 No.	**Function**
1	**Interface Power +24V**
2	**Interface Ground**
3	Plasma Start - relay contact
4	Plasma Start - relay contact
5	No function
6	Ok To Move
7	Upper Threshold
8	Delay Time
9	**Plasma Start**
10	Control Active
11	Error
12	**Collision**
13	**Enable Ignition Oxyfuel**
14	Reference / Retract Position
14	Separate Ignition Plasma



7 Start-up

7.1 Safety Regulations

Please read the user's manual carefully!

- **Installation, getting started and maintenance work may only be performed by trained experts in compliance with the generally accepted rules of safety and technology.**

- **When wiring, follow the appropriate electrical safety regulations.**

- **In particular the accident prevention regulations, DIN VDE 0100 „Directions for the erection of power plants with nominal voltages up to 1000 volts“ and the European standard EN 60204-1 “Machine safety-electrical equipment of machines” regulations must be followed.**

WARNING!

Never put your hand under the ring electrode or the torch.

- **ATTENTION!**
  Parts mounted close to the ring electrode can influence the height control!

- **ATTENTION!**
  The capacitive mode with ring electrodes may not be used with water. Water influences the sensor system and causes malfunction. Protect the capacitive sensor system from water and dampness.

7.2 Requirements and Hints for first Start-up

Step	Instruction	OK √
1	Are all cables and wires connected and locked properly?	
2	Can the torch move in all directions? Is the linear drive in vertical direction and mounted correctly?	
3	Are the torch and the cable hose mounted correctly, weight compensation and collision protection set properly?	
4	Are all settings and signals from and to IHT 3000 correct?	
5	Are all grounding connections from the IHT 3000 system to the cutting machine and all cable shields connected to machine ground as described in the instructions?	
6	Is the power supply (+ 24V/6A) of the IHT 3000 System installed properly?	
7	Is the resistance between ground and earth of the plasma source less than 3 Ohm?	
8	All shields of cables going to the plasma source should not be connected at the plasma source. They must be connected in the control cabinet with the shortest possible connection to the machine ground.	

7.3 Checking of Grounding

These components

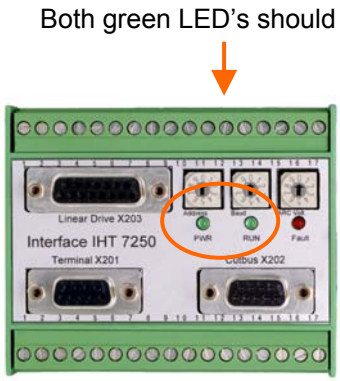
- POWER SUPPLY 7504
- LINEAR DRIVE 2343
- SENSOR TORCH CLAMP 6530

must be connected to machine ground (PE) as described in the installation instructions to obtain a safe and reliable operating system.

7.4 Power On

1. The LINEAR DRIVE moves the torch up to the upper reference position

2. Operation check at the Interface



3. Checking of operation at the Operator Terminal

After the power is switched on, an initialisation process runs for approx. 5 s.
The green LED at the Operator Terminal is on.

Start-up

After initialisation, .the main menu appears.

If the terminal displays '**Communication Error'** the serial communication has failed. At the same time the yellow LED will flash.

Correction:

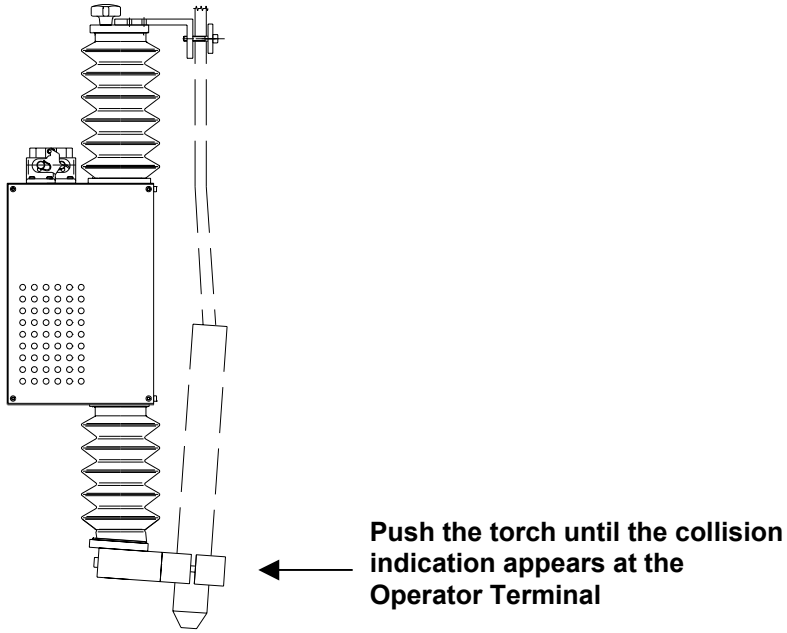
- Check the power to LINEAR DRIVE.
- Check the connection to OPERATOR TERMINAL CABLE.

7.5 Checking of LINEAR DRIVE functions

Move LINEAR DRIVE up / down with the keys MANUAL UP and MANUAL DOWN.

7.6 Check of Collision at LINEAR DRIVE

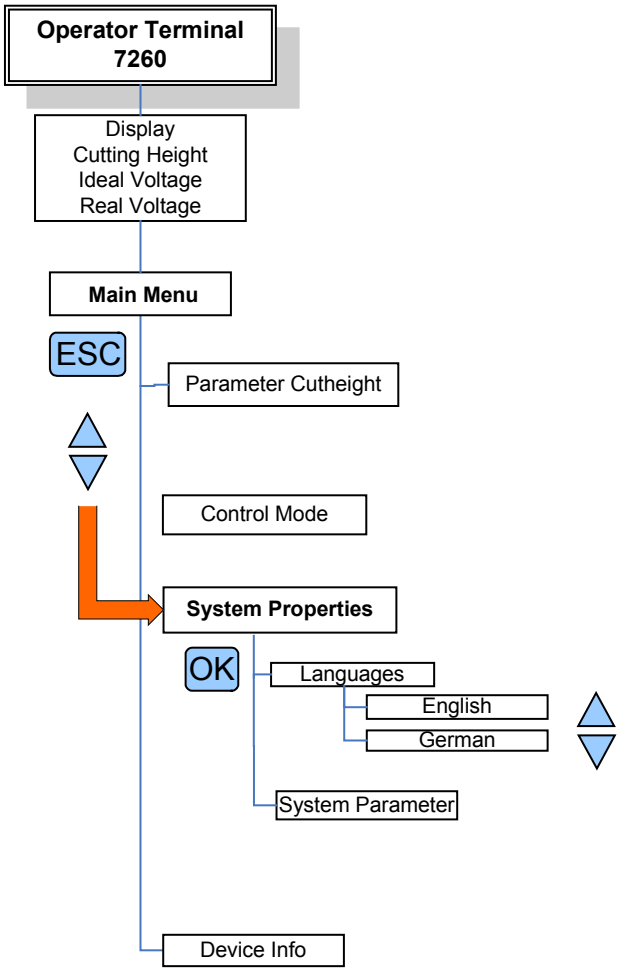
Manually drive the LINEAR DRIVE into 'middle position'.



8 Operation and Setup

8.1 Settings at the Operator Terminal

8.1.1 Setting of Language



8.1.2 Setting of Operation Modes

3 Operation Modes

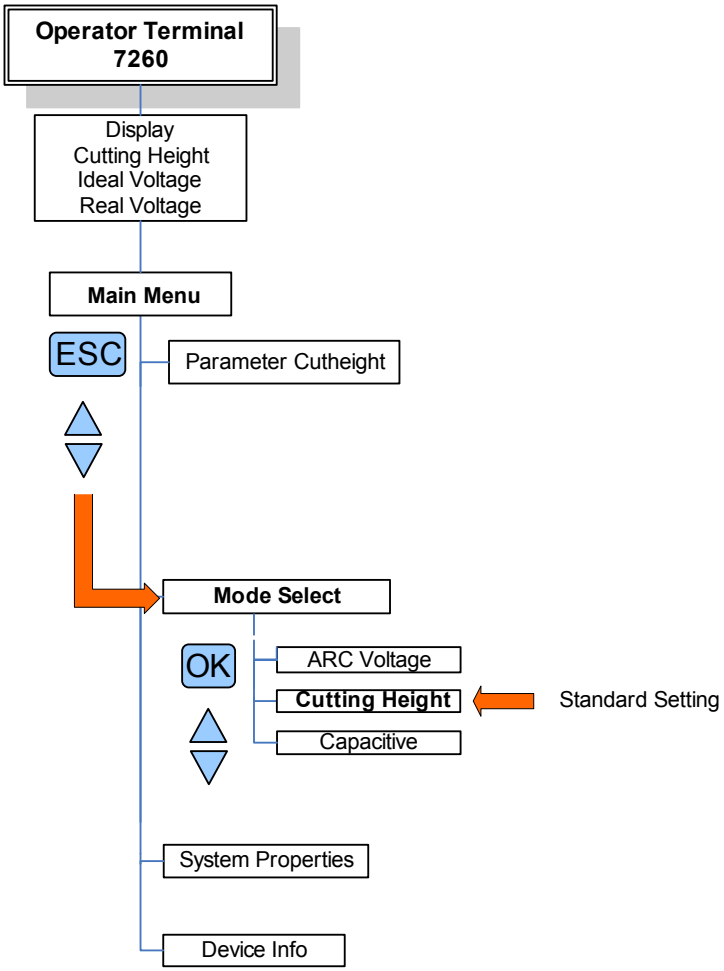
1. **ARC Voltage**
   Cutting height will be set via arc voltage setting.
   This mode can be used for test cuts.

   Example: 130.0 V

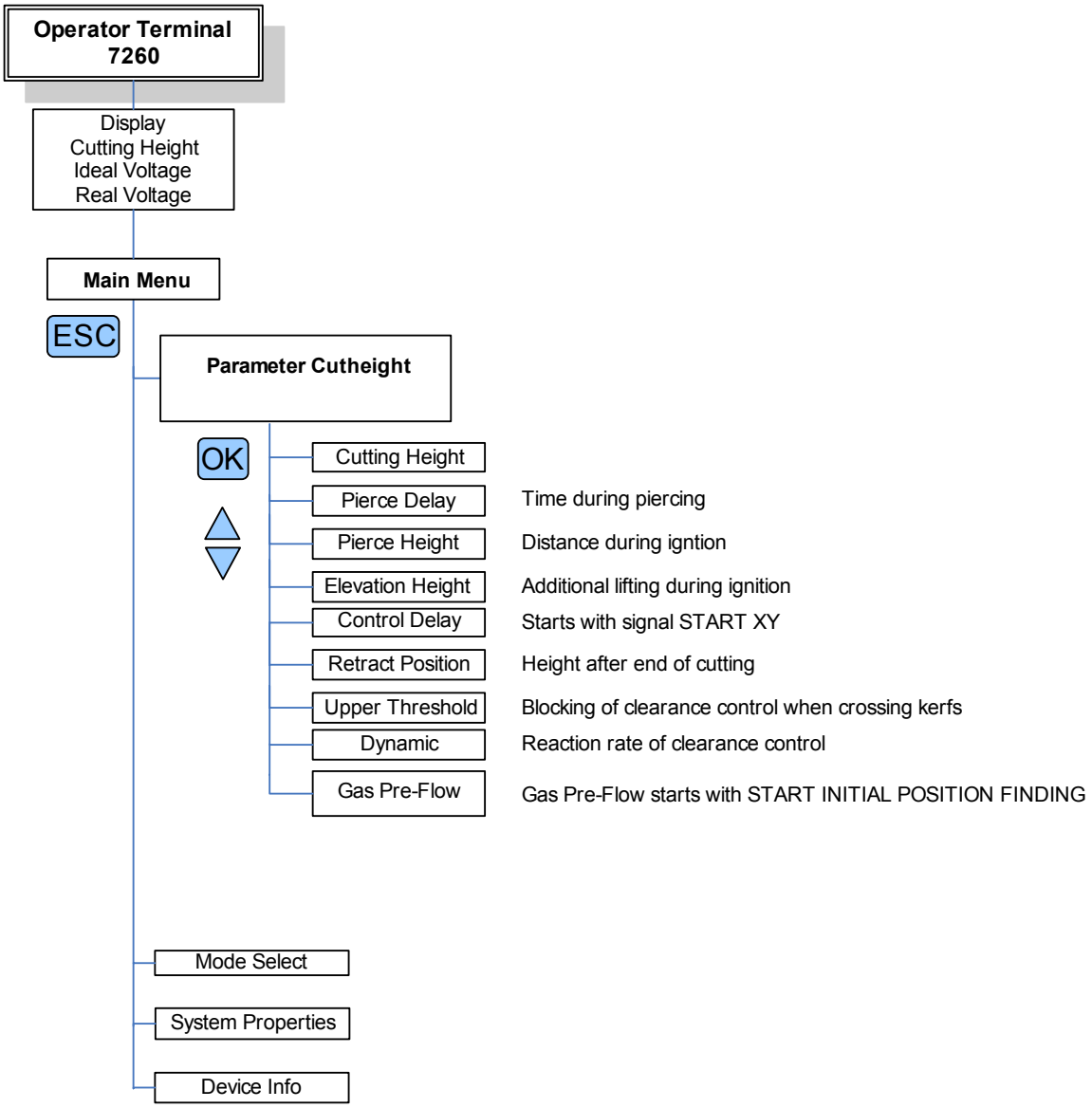
2. **Cutting Height**
   Cutting height will be directly set in mm.
   This is the standard operation mode.

   Example: 2.5 mm

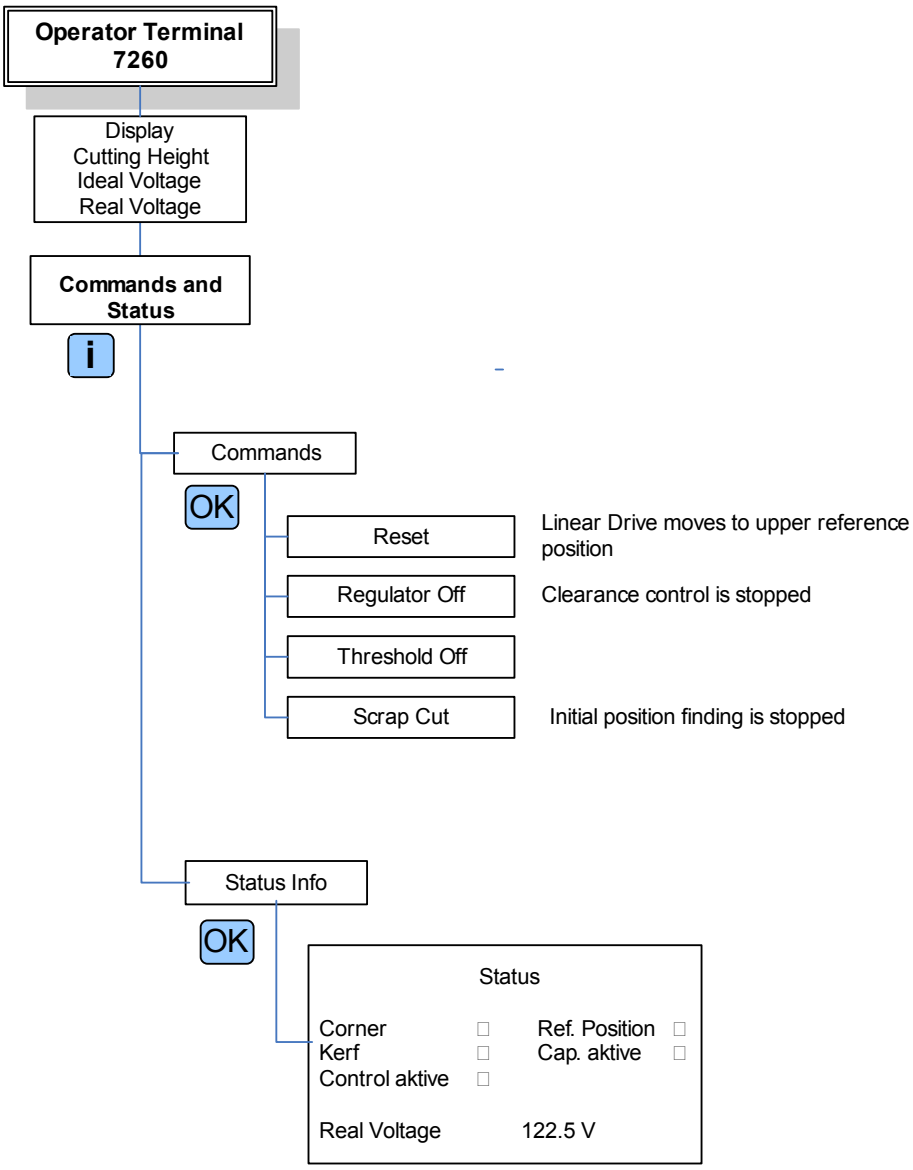
3. **Capacitive (Oxyfuel)**
   This mode will be used for oxyfuel (flame) cutting with ring electrodes.
   Example: 50 (relative value, no absolute height value)



8.1.3 Cutting Settings



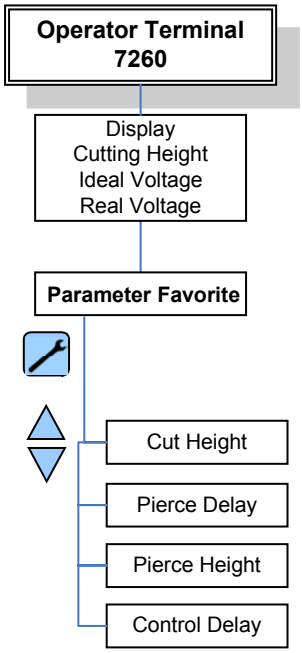
8.1.4 Commands and Status



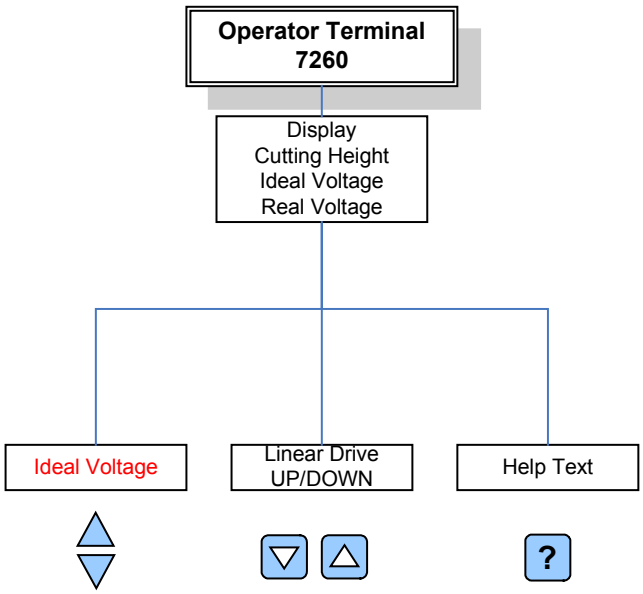
The Status shows the functions that are active during cutting.

8.1.5 Favourite Menu

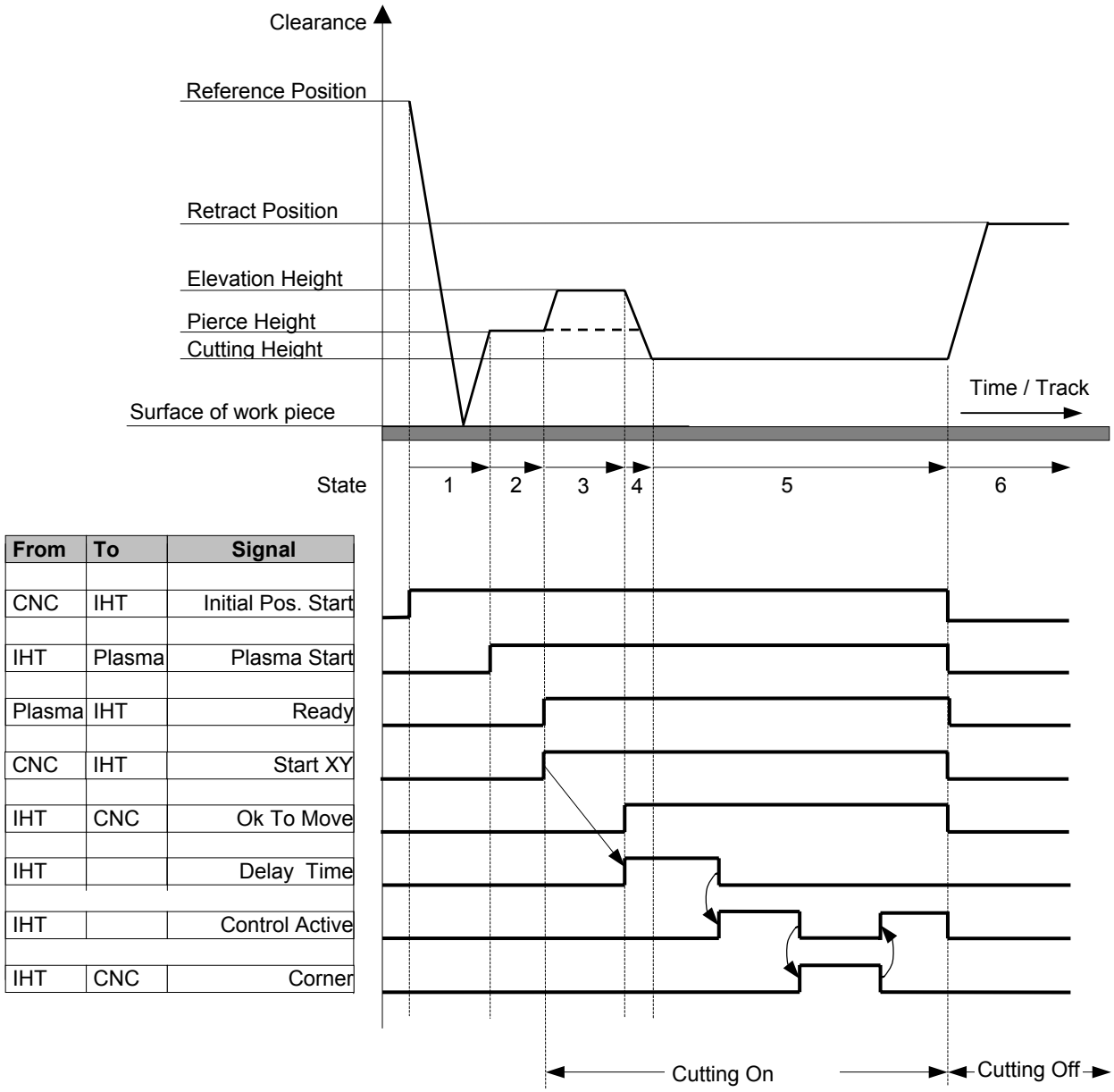
Using this menu, the main cutting parameters can be set quickly.



8.1.6 Additional Functions of Push Buttons



8.2 Signal Flow during Plasma Cutting



From	To	Signal
CNC	IHT	Initial Pos. Start
IHT	Plasma	Plasma Start
Plasma	IHT	Ready
CNC	IHT	Start XY
IHT	CNC	Ok To Move
IHT		Delay Time
IHT		Control Active
IHT	CNC	Corner

Procedure

1	Finding initial position and move to pierce height for ignition
2	Pierce height ready – Plasma Start – feedback signal '*Ready*' from plasma source – main arc active
3	Start XY-movement – descent to cutting height – *Delay Time* starts or at the same time movement to *Elevation Height*, if value greater than 0 and *Pierce Delay* greater than 0 seconds – after Pierce Delay the *Delay Time* starts
4	Descent to *Cutting Height* – after *Delay Time* is finished the clearance control will be active
5	Clearance control active – command corner interrupts clearance control
6	End of cutting – torch moves to *Retract Position*

8.3 End of Cutting – Retract Position

The Linear Drive moves to the retract position if following requirements are fulfilled:

- signal *Initial Position Start* off
- signal *Start XY* off
- arc voltage less than 30 V

8.4 Plasma Arc Breakdown

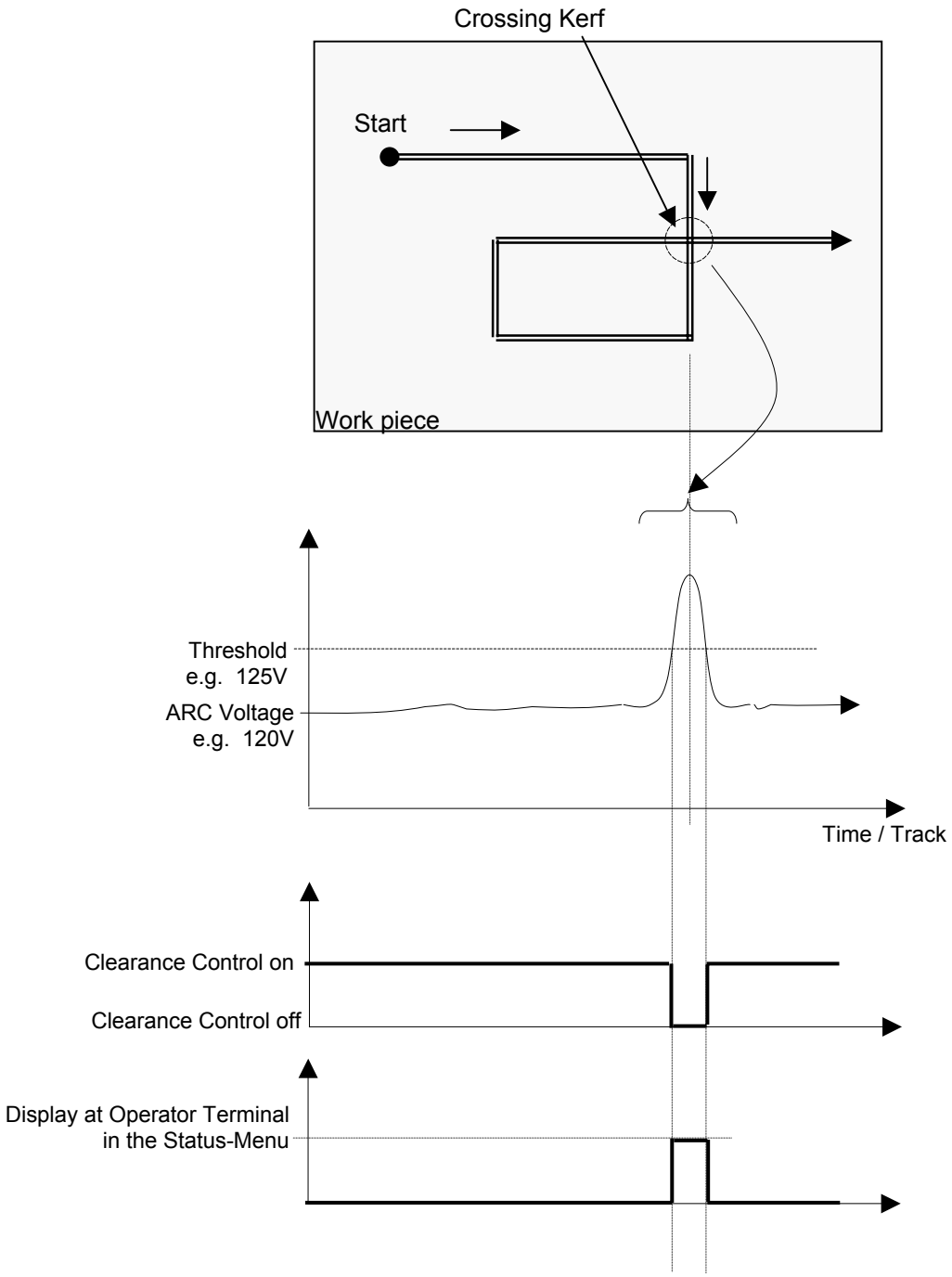
It is possible that the plasma arc breaks down during cutting process

The Linear Drive moves back up to the reference position as arc voltage is missing and the clearance control cannot operate anymore.

8.4.1 Detection of Kerfs and Edges during Cutting

This feature avoids that the plasma torch moves down into the kerf which has already been cut whilst moving across.

If the adjustable ***Upper Threshold*** exceeds the limit during cutting, the clearance control will be switched off when crossing kerfs.



8.4.2 Scrap Cutting

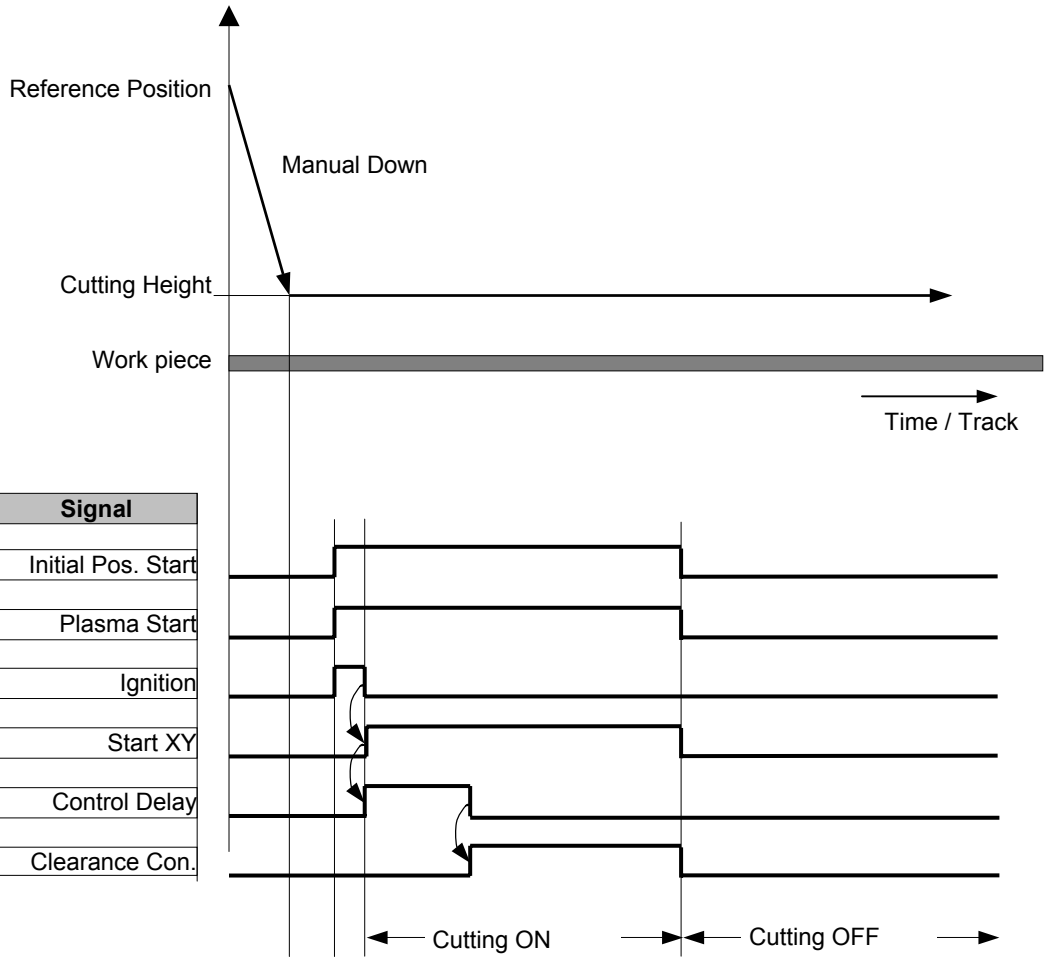
The automatic finding of initial position is disabled when scrap cutting is activated.

The IHT 3000 system sets the following parameter automatically

- Pierce Height 0 mm
- Retract Position 0 mm
- Pierce Elevation 0 mm
- Cutting Height 0 mm

Procedure

- Select SCRAP CUTTING at Operator Terminal in the command menu.
- Move the torch to the start position manually.
- Move the torch to suitable cutting height manually
- activate *Initial Position Start* and *Start XY*



From	To	Signal
CNC	IHT	Initial Pos. Start
IHT	Plasma	Plasma Start
CNC		Ignition
CNC	IHT	Start XY
IHT		Control Delay
IHT		Clearance Con.

8.4.3 Procedure with Gas Pre-flow

Advantage:
The time of gas-pre-flow after reaching the piercing position is eliminated and the cutting cycle is shortened significantly.

Requirement:
You need to be able to ignite the plasma source with a separate signal.

The gas-pre-flow already starts with the command *Initial Position Start*.
Therefore the torch can be ignited immediately after reaching the piercing position.

Settings

- Select the menu parameter **'Cut Height'** at the Operator Terminal by using the **ESC-key and select Gas-Pre-flow**.
- Set the time for gas-pre-flow. Max. 6 seconds.

  Note:
  If the set time is greater than 0 seconds, the gas-pre-flow function is active.

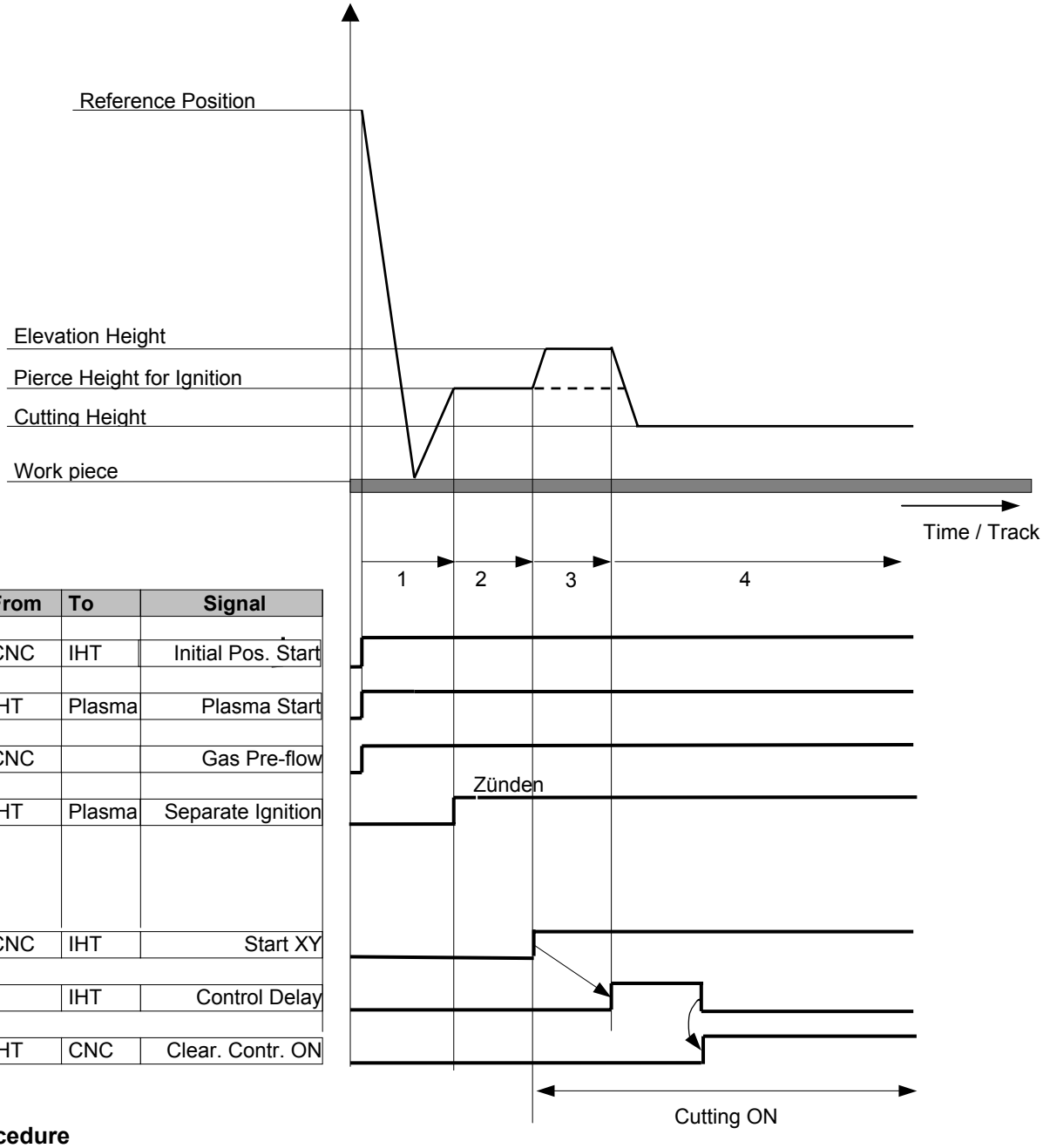
Procedure

- **Initial Position Start ON**

  ↓
- at the same time the **output No. 9** ***Plasma Start*** at the Interface will be active. This will trigger the plasma source to turn on the gas pre-flow.
- Torch moves down
- Torch moves to ignition height
- If the selected time of gas-pre-flow is completed **and** the torch has reached the ignition height, the **output No. 15** ***Separate Ignition Plasma*** will be active at the Interface. This is the signal for the plasma source to ignite.

The further process is the same as the standard procedure.

Procedure with Gas Pre-flow

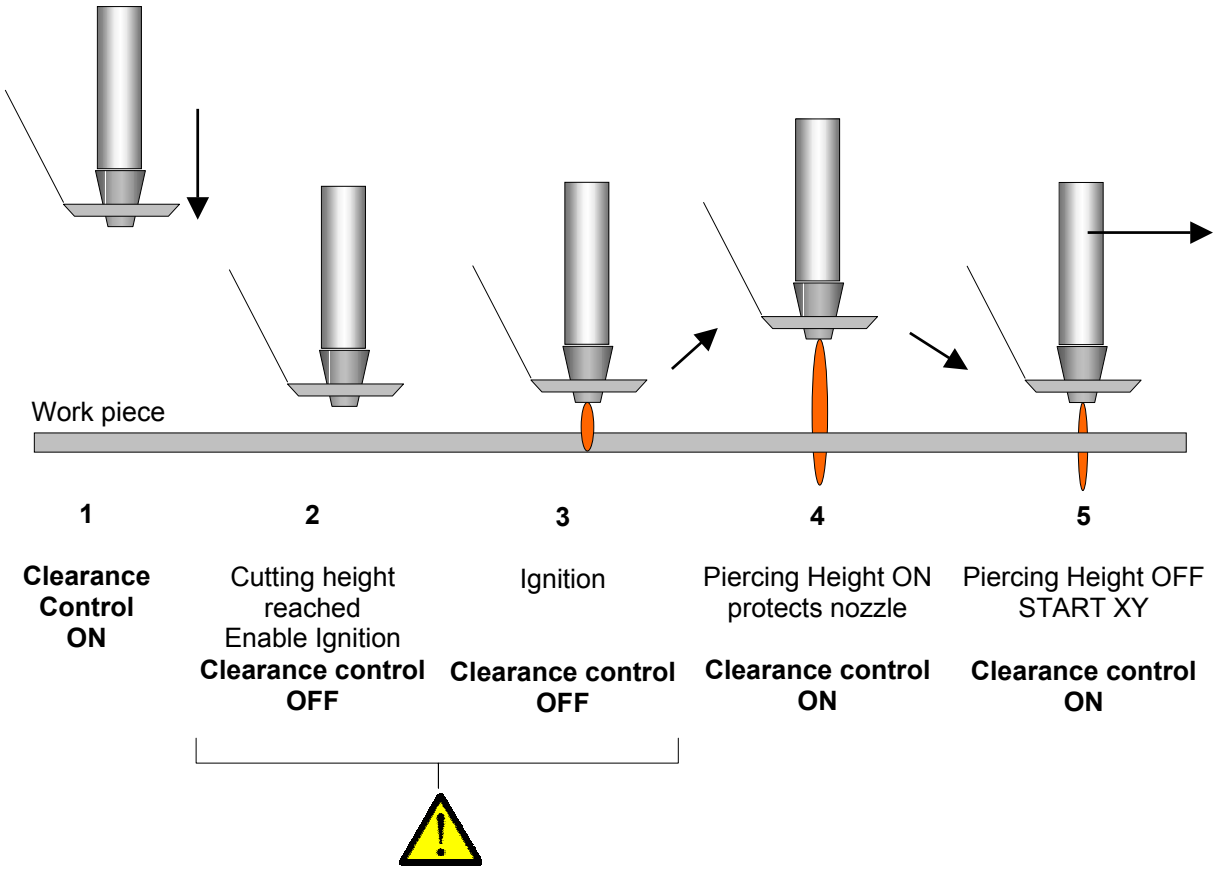


From	To	Signal
CNC	IHT	Initial Pos. Start
IHT	Plasma	Plasma Start
CNC		Gas Pre-flow
IHT	Plasma	Separate Ignition
CNC	IHT	Start XY
	IHT	Control Delay
IHT	CNC	Clear. Contr. ON

Procedure

1	Initial position finding and moving to ignition height – at the same time output No. 9 Gas Pre-flow is active until the set time is finished.
2	After the Gas Pre-flow is completed and the torch has reached the ignition height : Ignition signal for Plasma through output 15 at Interface – main arc ON - feedback signal of plasma source *Ready*
3	Start XY-movement – torch descents to cutting height – *Delay Time* starts or at the same time torch moves up to Elevation Height. If the value is greater 0 and *Pierce Delay* greater than 0 seconds – *Delay Time* starts after *Pierce Delay*
4	Lower to pierce height – after *Delay Time* the height control is activated.
6	End of cut – torch moves to *Retract Position*

8.5 Operational Workflow and Control during Oxyfuel Cutting



Start Clearance Control OFF at input No. 13 of INTERFACE
Piercing Height Oxyfuel = input 8 at INTERFACE.

ATTENTION!

1. **The Ring Electrode must not touch the torch or other parts!**

2. **During cutting the flame may not touch the Ring Electrode!**

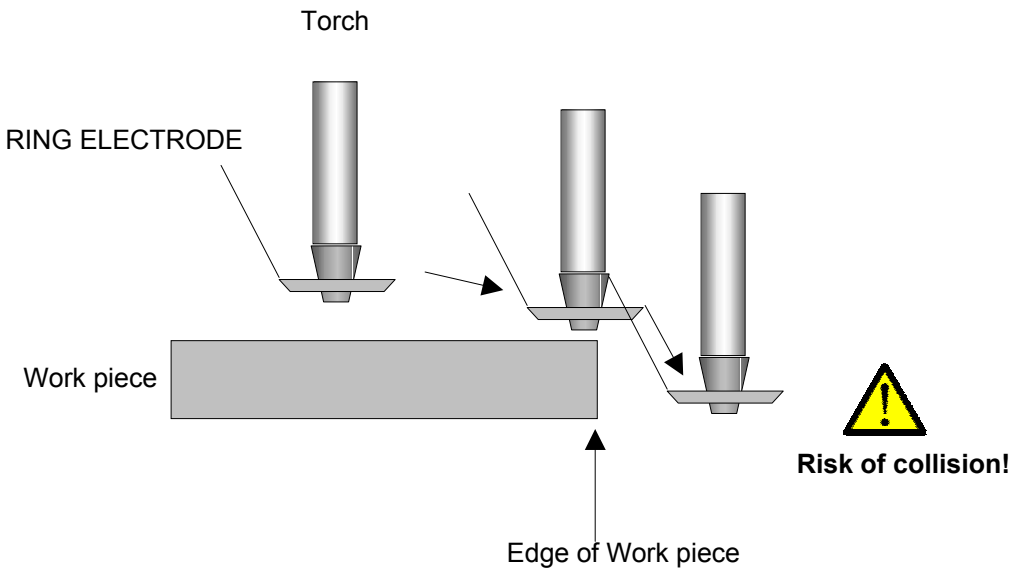
A direct influence of the flame modifies the electrical field around the ring electrode. This the height / distance.

Explanation:
During ignition and piercing the work piece reflects the flame which impacts on the RING ELECTRODE. No correct clearance control is possible and must be switched off during this time.

3. If the RING ELECTRODE approaches to an edge or corner of the work piece, the clearance control must be off until the whole RING ELECTRODE moves back to the work piece.

The distance will decrease relative to the adjusted distance, when only a part of the ring electrode diameter is above the work piece.

ATTENTION!
Risk of collision!



9 Maintenance

All components are free of maintenance except the SENSOR TORCH CLAMP and RING ELECTRODES.
The RING ELECTRODES may be influenced by hot and molten metallic splashes during the cutting process and should be exchanged if necessary.

ATTENTION!
The SENSOR CONNECTOR UNIT 6531 **torch clamp** should be kept clean.
Dust-deposition may influence its function.

Cleaning housings:

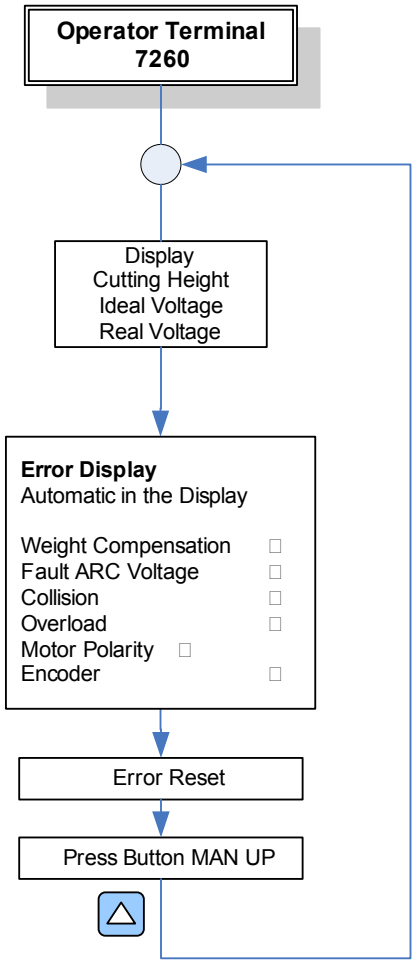
- Switch power off!
- Dirt and grease may be removed using a cloth dampened with a mild detergent and water solution.
- To prevent damage avoid using chemicals that contain benzine, toluene, xylene, acetone, or similar volatile solvents. Also avoid abrasive cleaners.
- Dry the surfaces carefully

10 Devices and Spare Parts

Description		Type No.	Part No.
1.	Linear Drive	IHT 2343-1-100	100354
2.	Interface	IHT 7250-1-100	100370
3.	Linear Drive Control Cable, Länge 10 m	IHT 7250-1-901/10	100359
4.	Linear Drive Control Cable, Länge 20 m	IHT 7250-1-901/20	100360
5.	Linear Drive Power Cable, Länge 10 m	IHT 2300-1-901/10	100361
6.	Linear Drive Power Cable, Länge 20 m	IHT 2300-1-901/20	100362
7.	Operator Terminal	IHT 7260-1-100	100372
8.	Operator Terminal Cable, Länge 5 m	IHT 7260-1-901/5	100364
9.	Operator Terminal Cable, Länge 10 m	IHT 7260-1-901/10	100365
10.	Sensor Connector Unit	IHT 6531-1-100	100374
11.	Operator Terminal in housing including cable 5 m	IHT 7261-1-100/5	100406
12.	Operator Terminal in housing including cable 10 m	IHT 7261-1-100/10	100407
13.	Sensor Torch Clamp	IHT 6530-1-100	100268
14.	Coax Cable	IHT 1991-1-100	100279
15.	Ring Electrode, ∅34 mm	IHT 6534-1-100	100269
16.	Ring Electrode, ∅60 mm	IHT 6560-1-100	100270
17.	Ring Electrode, ∅75 mm	IHT 6575-1-100	100271
18.	Nozzle Sensor	IHT 6590-1-100	100366
19.	Cutbus Cable, Länge 5 m	IHT 7250-1-904/5	100368
20.	Cutbus Cable, Länge 10 m	IHT 7250-1-904/10	100369
21.	Power Supply	IHT 7504-1-100	100229
22.	Converter RS232 / RS485	-	100395
23.	Converter USB / RS485	-	100400

11 Troubleshooting

11.1 Fault Indication and Reset at the OPERATOR TERMINAL



Fault Indication	Effect	Cause	Correction
Weight compensation	No initial position finding	1.The hose of the torch pulls upwards 2.Setting of weight compensation too strong 3. Switch of initial position finding	1. Loosen the attachment of the hose 2. Turn knob at Linear Drive counter clockwise. Check of the weight compensation described in chapter 4. Get in contact with IHT-Service
ARC Voltage	No finding of initial position	Arc voltage is missed at Interface	Check the connection between plasma source and Interface..

Fault Indication	Effect	Cause	Correction
Collision	Linear Drive moves to upper reference position	Collision protection was active Torch moved against a barrier.	Eliminate the barrier. Increase retract position if necessary.
Overload	No Movement	1. Load too much 2. Motor Amplifier faulty 3. Motor faulty	Check the load Get in contact with IHT Service
Motor cables interchanged	After power on the torch lifter moves downwards instead of upwards.	Motor cables interchanged	Interchange motor connectors at pcb-board
Encoder	Torch lifter moves to limit switch	Encoder or cable connection faulty	Check the cables and connectors

12 Revision History

13 Appendix

13.1 Grounding a Cutting Machine

This information and recommendations which are described here should help to understand the importance of correct machine grounding
Furthermore, all manufacturer installation instructions for cutting machines and plasma sources must be complied with.

The accurate grounding of plasma cutting machines is one of the most important parts to ensure proper functioning. This prevents electromagnetic interference (EMI) problems which can disturb electrical devices and causes a malfunction.

The aim is to achieve low electrical impedance from machine ground to earth ground.
This is described below.

13.2 Grounding a Cutting Machine

All components of the machine which need grounding are connected to a single star point.
Preferably this star point is affixed at the cutting table and is connected to a ground rod.

The distance to the star point should be less than 3 meters. The resistance to ground should be less than 3 Ohms.

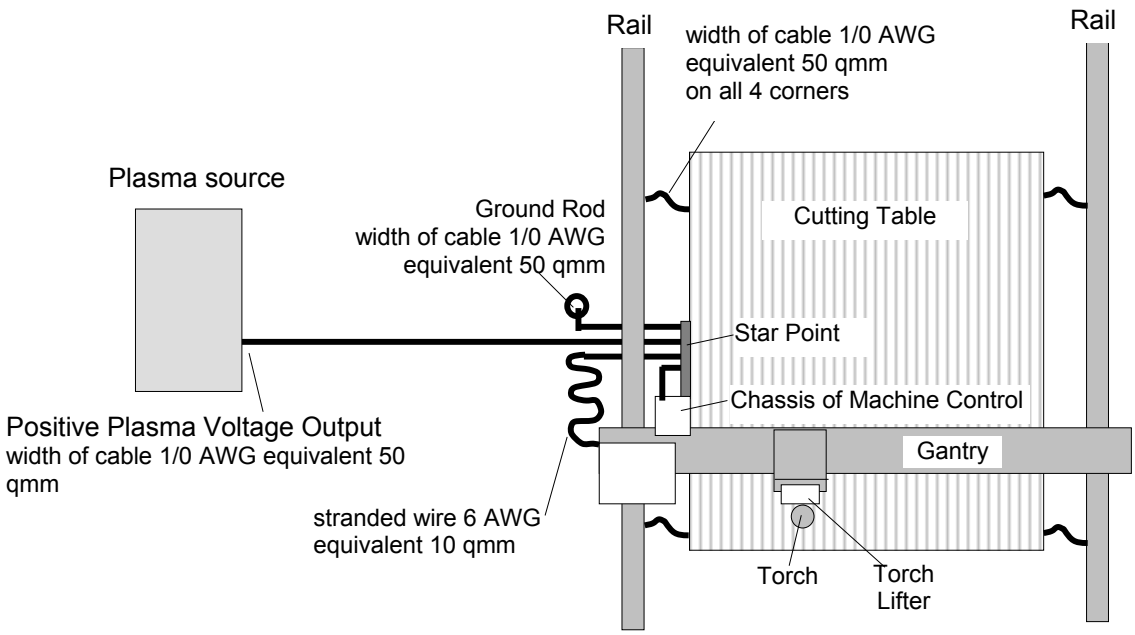
All metallic parts of the machine (servos, control console and height control components) are connected to the star point.

The four corners of the cutting table must be connected to the rail.

Grounding a Cutting Machine

Example of a Cutting machine with a cutting current up to 150 A.
The same cables used for welding can be used as grounding cables.

Figure1: View from above (top view)



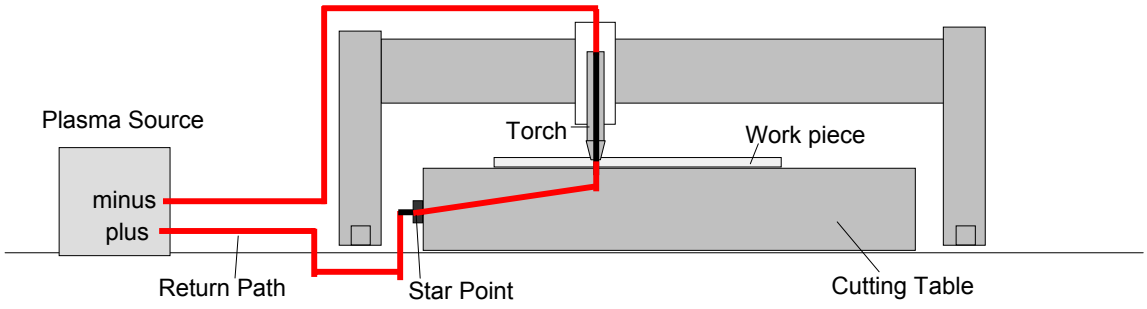
Note: For a higher cutting current (more than 150 A) the width of cables should be increased to 4/0 AWG, equivalent 95 qmm.

13.3 Notes to the Plasma Current Return Path

The plasma cutting current is generated by the plasma source. The current flows from the negative terminal to the torch, flows through the arc and the work piece to the cutting table.
From the star point the current flows back to the positive terminal of the plasma source.

To achieve a trouble-free operation, the impedance of the return path must be as small as possible. For this purpose the proper electrical connection to the star point and to the plasma source have a great influence. These electrical connections should be well maintained.

Figure 2



13.4 Notes about a Proper Electrical Contact

A proper electrical contact needs connections which are made with bare metal to metal contact. The connections have to be very tight and should be protected against rust and corrosion.

Grounding connexion has to be connected to the machine ground in the shortest possible way. Cable width should not be smaller than 2.5qmm.