

Digital flatbed cutter

PN Series

(S-800, M-800, M-1200, M-1600, L-800, L-1200, LR-1600, XL-800, XL-1200)

EN

Operating manual



Original operating instructions

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 Zünd Systemtechnik AG

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1 Introduction



Zünd Systemtechnik AG
Altstätten, Switzerland

1.1 Foreword

Dear customer,

By purchasing our product you are participating in the worldwide success of Zünd cutter systems.

The modular design of our systems ensures:

- A system solution that is suited to your individual requirements in terms of speed and quality
- The availability of the most up-to-date technology thanks to constant developments

Our approach

Constant and intensive cooperation with successful users is a prerequisite for innovative and practical solutions. We are therefore grateful for any comments or suggestions on how we can improve.

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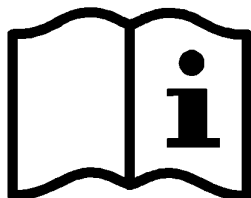


1.2 Using the documentation

The instruction handbook supplied is intended to help you to:

- Operate the machine safely
- Perform routine machine maintenance
- Use the machine optimally in all permitted areas

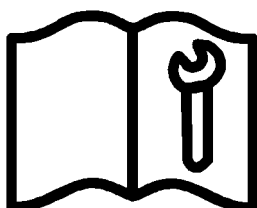
To do this, you need to be able to find what you want within the documentation.



The instruction handbook comprises:

Volume 1 - Operating manual

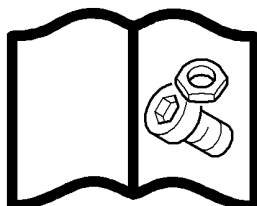
This volume contains information on the engineering, installation, operation and maintenance of the basic machine.



The technical documentation for the service personnel is contained in volumes 2 and 3:

Volume 2 - Service manual *

This volume contains information on the structure of the machine and on servicing by authorised service personnel



Volume 3 - Spare parts catalogue * (See Zünd homepage)

1.2.1 Structure of the operating manual

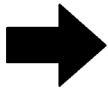
The operating manual consists of individual, consecutively numbered chapters. These sections are arranged according to the ring binder tabs.

The table of contents provides information on the structure of the individual chapters.

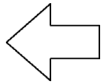
The numbers of pages and certain large graphics are prefixed with the number of the relevant chapter. Page number "2-10", for example, means the tenth page of chapter 2 "Product description".

1.2.2 Symbols

Illustration



Close, fix, tighten, in



Open, release, loosen, out



Higher



Lower

Text structuring



Task: Steps to perform



Result: Outcome of the tasks performed.



Prerequisites for performing a task



List of tools

Optional accessories



There are a number of optional accessories available for the machine. Any description relating to an optional accessory is identified in the operating manual by the * symbol.

1.3 Points to note when reading this operating manual

Text references

Chapter headings are numbered consecutively, with the first figure corresponding to the chapter number. Where reference is made to sections outside the current chapter, note the first figure and turn to the corresponding chapter, which contains the cited section. See chapter 2-4 "Overview of the machine", for example, leads to chapter 2 "Product description", which contains section 4 "Overview of the machine".

Sketches and schematic representations

These are provided for general information and do not necessarily correspond to the latest version of the machine.

Dimensional information

Dimensional information is listed in the SI/US unit system according to the place of installation.

1.4 Care of the documentation

Volume 1 "Instruction manual" must always be kept in close vicinity of the workstation.

Volume 2 "Service manual" must be made available to maintenance and service personnel when required.

1.5 Current status of documentation

Act accordingly to make sure that the documentation is complete and up-to-date at all times:

- Do not remove parts of the documentation
- Request copies of missing or illegible pages from the manufacturer, or download and print them from the Zünd homepage
- If any new documentation is delivered as a result of conversions taking place, file it away immediately
- If documentation is changed, file the new information and destroy the old
- If the documentation exists in more than one language, ensure that all languages are kept up-to-date

1.6 Standardisation, tests, marking

1.6.1 Standards

Scope of the documentation supplied

Volume 1: Operating manual

Volume 2: Service manual *

Volume 3: Spare parts catalogue *

Execution

This operating manual makes reference to the following standards:

- EN 62079
- EN 62023
- ANSI Z535-6
- EN ISO 12100-2



Important !

EU standards and guidelines which are applied are listed in the declaration of conformity.

In the interests of our customers, we reserve the right to make changes as a result of technical improvements. This document therefore corresponds to the technical status of the product supplied and not the manufacturer's current state of development.

1.6.2 CE marking



Within the EU, the cutter system is delivered with CE marking and an EC declaration of conformity according to Annex II A of the EC Machinery Directive 2006/42/EC (see chapter "Documents")



Important !

If the purchaser adds additional devices to the cutter system or if the system is integrated into a larger system, the device is supplied with a "Declaration for the installation of an incomplete machine" according to Appendix II A of the EU Machinery

Directive 2006/42/EC and/or without CE marking. As a result, the declaration of conformity must be issued again by the purchaser.

1.7 Legal notice

The information contained in this publication is intended for information purposes only and is subject to change without notice at any time. This does not constitute an obligation on the part of Zünd Systemtechnik AG.

No part of this document may be copied, distributed, used or disclosed to third parties without express permission. Offenders will be liable for damages.

1.8 Troubleshooting, hints and tips



Important !

You can find information about troubleshooting and useful hints and tips on the Zünd homepage. (www.zund.com)

1.9 Documented cutter models

This documentation applies for the following types of PN series cutters.

PN Series			
S-line	M line	L line	XL line
S-800	M-800	L-800	XL-800
	M-1200	L-1200	XL-1200
	M-1600	LR-1600	

1.10 Publishing details

Name

Operating manual for PN series cutters, side-support version.

Composition, illustration and publication

Zünd Systemtechnik AG - Technical Editorial Department

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Zünd Systemtechnik AG

2 Product description

2.1 General

This chapter contains information on the following:

- Representational conventions in the operating manual
- Possible uses of the machine
- Structure of the main components
- Important technical data
- General technical description of the device

Directional information

Directions such as "right, left" or "front, back" are specified according to the operator's view of the machine during operation.

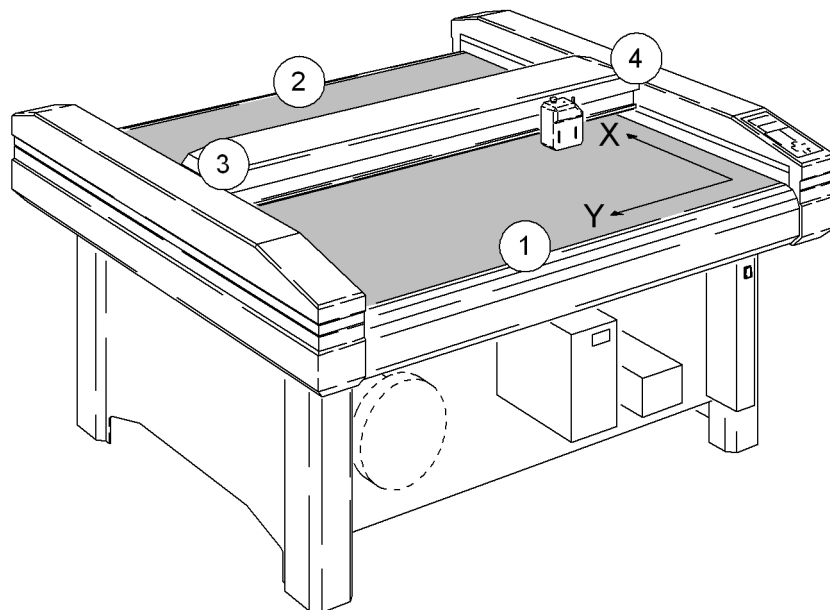


Fig. 2-1 Directional information

1 Front	3 Left
2 Back	4 Right
Y Y axis	X X axis

Important information



Important !

Refers to user tips and useful information which enhance the usability and prolong the service life of the machine and make the work significantly easier.

2.2 Product identification



Important !

The rating plate is used to uniquely identify your machine.

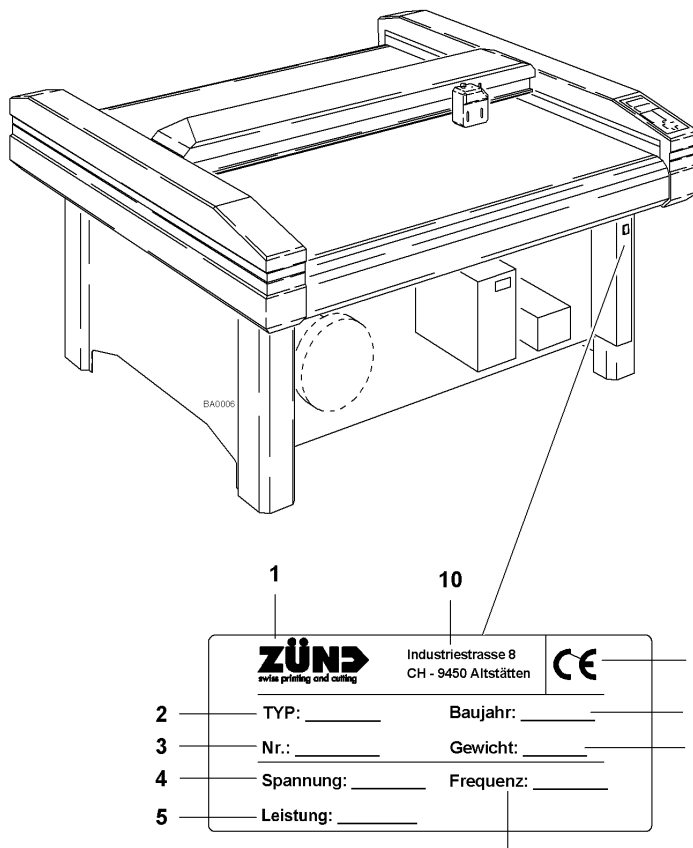


Fig. 2-2 Position of rating plate

- | | | | |
|---|---------------|----|-------------------------------|
| 1 | Manufacturer | 6 | Frequency |
| 2 | Machine type | 7 | Total weight |
| 3 | Serial number | 8 | Year of manufacture (YYYY/MM) |
| 4 | Voltage | 9 | CE symbol * |
| 5 | Power | 10 | Manufacturer's address |

2.3 Intended use

The cutter system can be used for the following purposes:

- As an output device for CAD/CAM data
- For processing and labelling materials arranged on the table

Aside from this, the intended use and the limits of the application are as follows:

- Depending on the tools and material feed system available,
- Described in the chapters "Tools", "Modules" and "Material transport".

2.4 Overview

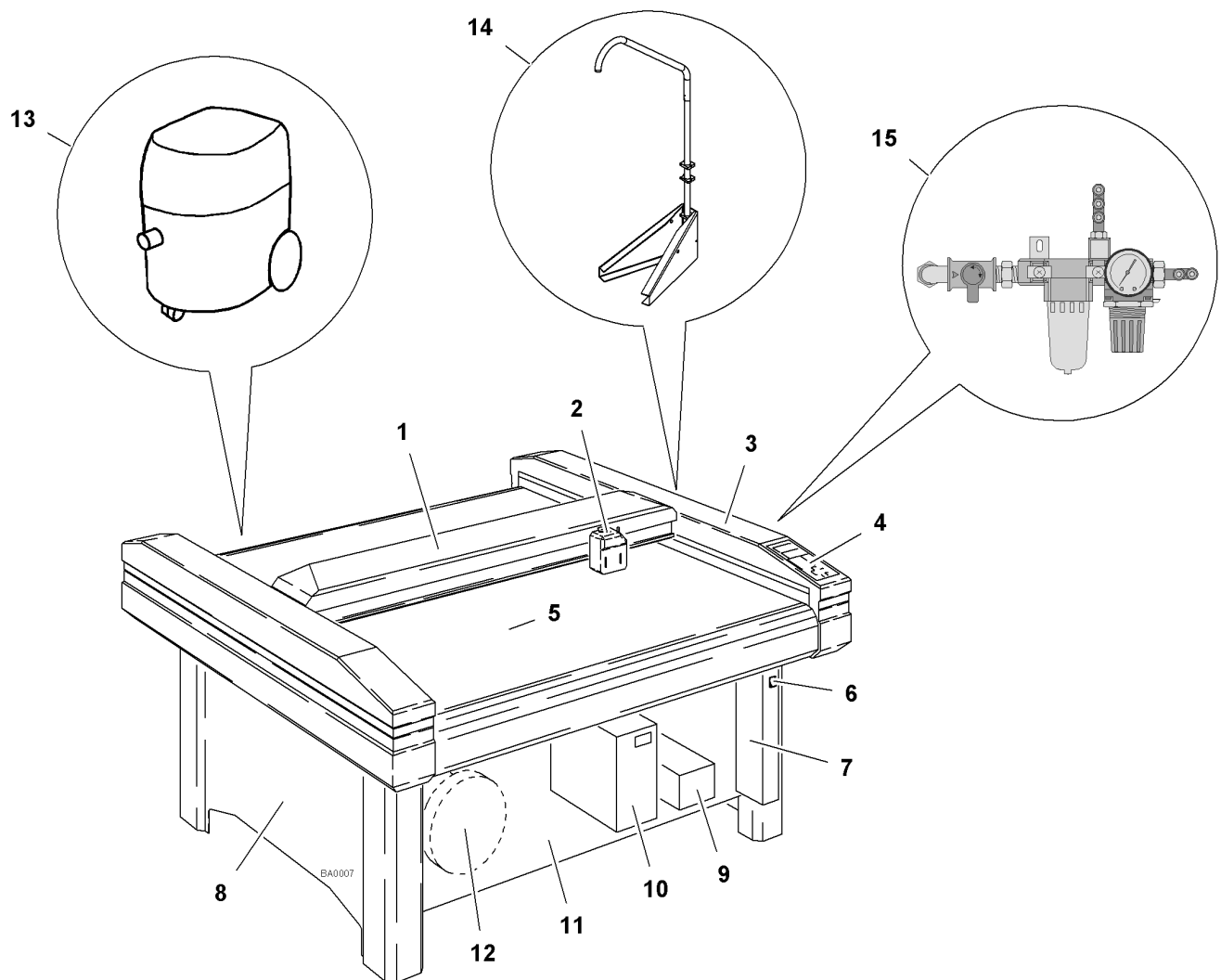


Fig. 2-3 Overview

- | | |
|--|---------------------|
| 1 Beam | 8 Side parts |
| 2 Head carriage with tool head, right side panelling | 9 Compressor |
| 3 Side panelling | 10 Electronics unit |
| 4 Operating unit | 11 Removable cover |
| 5 Table | 12 Vacuum pump(s) |
| 6 On/off switch | 13 Vacuum cleaner |
| 7 Distribution box | 14 Boom |
| | 15 Maintenance unit |

2.5 Layout and function

The cutter is constructed on a stable, welded frame construction.

Upper cutter part The upper cutter part comprises:

- Base frame with table
- Beam with carriage
- Beam drive
- Side covers with operating unit

The beam is driven by a DC-servo motor. The patented drive system:

- Has superb precision, reliability and durability (low maintenance)
- Consists of a slip-free steel band drive with torsion shaft and with hardened and ground linear guides.

The robust beam is designed to accept all tool systems available. Beam and tool head are monitored by a safety shut-down system consisting of light barriers and safety trip switches.

The carriage is part of the beam and is used for carrying the tool heads. A central locking screw enables quick and trouble-free head exchange.

The carriage drive is integrated into the beam and comprises:

- A servo-controlled DC motor
- A slip-free steel band drive

The standard tabletop is made from easy-care plastic. In practical use, it is a proven solution with low noise emission and it protects the tools. The material to be processed is put on the table and held down by vacuum.

Principle for fixing the material:

Small holes in the vacuum plate are connected to a vacuum pump via air ducts. The suction area of the table can be adjusted and controlled depending on the application and material feeding system.

The two side covers encase the beam drive.

The control panel:

- Is integrated into a side cover
- Consists of an LCD display and keypad
- Enables user-friendly input of settings and menu commands

- Lower cutter part** The lower cutter part comprises:
- Side parts
 - Covering panels
 - Electronic unit and distribution box
 - Vacuum pump(s)

The two side parts

- Are attached to the base frame
- Can be adapted to uneven floors using the levelling screws.

Between the side parts

- Braces are fastened for the assembly of the electronics box and the vacuum pump(s)
- Two removable covering panels are hung.

The electronic control box:

- Is fitted on pull-out rails for ease of servicing
- Contains the main processor, the servo processor for the 4-axis control system and the power supply unit
- Can be adapted to the available mains voltage using a voltage selector

The distribution box is operated using the On/Off switch and enables:

- All components of the plotter system to be switched on/off simultaneously
- Consumer loads to be switched on by the software
- Distribution of individual consumers to different mains phases

Compressor, extractor and vacuum pump(s) with accessories:

- Are adapted to the plotter version and to the material feed system,
- Are located under the plotter if there is enough space

Large vacuum pumps are installed in sound-proof boxes or in an adjoining room.

Extractors are used only for milling operations.

2.6 Intended use

The plotter system is to be used:

- As output device for CAD/CAM systems
- For processing materials arranged on the table

The intended use and the limits of the application:

- Depend on the tools and material feed system available
- Are specified in sections 3 and 4

2.7 Technical information

2.7.1 Dimensions and weights

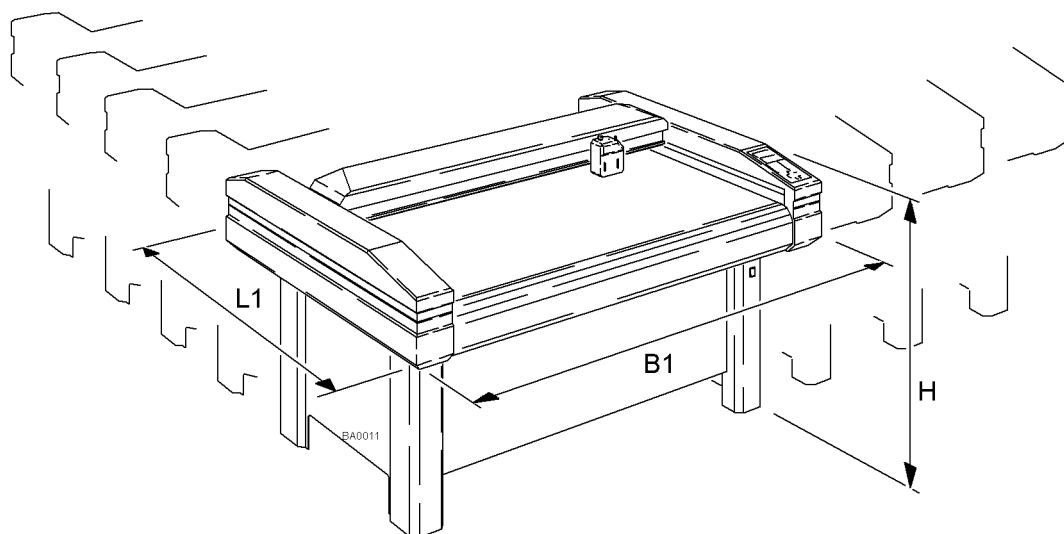


Fig. 2-4 Dimensions

Plotter line	Type	Working area * (W x L)	Overall dimensions	Weight approx.	Material Clearance Width*
S-line	S-800	800 x 800 mm	1355 x 1246 x 995 mm	250 kg	1,060 mm
M line	M-800	1300 x 800 mm	1841 x 1246 x 995 mm	310 kg	1,550 mm
	M-1200	1300 x 1,200 mm	1841 x 1646 x 995 mm	370 kg	1,550 mm
	M-1600	1300 x 1,620 mm	1841 x 2066 x 995 mm	460 kg	1,550 mm
L line	L-800	1800 x 800 mm	2361 x 1246 x 995 mm	490 kg	2,050 mm
	L-1200	1800 x 1,200 mm	2361 x 1646 x 995 mm	500 kg	2,050 mm
	LR-1600	1800 x 1,650 mm	2400 x 2280 x 1060 mm	570 kg	2,050 mm
XL line	XL-800	2200 x 800 mm	2760 x 1246 x 995 mm	430 kg	2,460 mm
	XL-1200	2200 x 1,200 mm	2760 x 1646 x 995 mm	720 kg	2,460 mm

* Working area and material clearance width are dependent on the tool heads used.

2.7.2 Mains connection**Cutter**

Adjustable voltage (for electronics unit only)	100 V, 115 V, 230 V tolerance $\pm 10\%$
Mains frequency	50/60 Hz
Power consumption, one-phase(without vacuum pump)	700 VA
Current consumption, one-phase(without vacuum pump)	2A

- Vacuum pump(s)** Refer to the rating plate or operating manual
The selection of vacuum pump(s) depends on
- Plotter type
 - Desired application
 - Local mains voltage and frequency

Compressor Refer to the rating plate or operating manual

2.7.3 Environmental conditions

Operating temperature	10 °C to 32 °C
Storage temperature	- 20 °C to + 52 °C
Relative humidity	40% - 80% non-condensing

Option with linear guidance

Operating temperature	+20 °C to +25 °C
-----------------------	------------------

2.7.4 Control unit

Execution 4-axis control system (X,Y,T,Z)
Variable, look-ahead vector control

Software

Command set	HPGL, extended
Data format	ASCII

Interface

RS-232C / V24	600 - 38200 Baud
---------------	------------------

1MB input buffer with replot function

2.7.5 Performance**Precision**

Resolution of measuring system	0.005 mm
Addressable resolution	0.01 mm
Mean static repeatability	± 0.04 mm

Cutting performance

Speed (axial)	1 - 1000 mm/s
Addressable resolution	10 m/s ²

2.7.6 Emissions**Noise**

Continuous sound pressure level for plotters	< 80 dB (A)
--	-------------

Depending on the tool system and materials to be processed

- The limit value of 80 dB(A) may be exceeded
- Noise protection measures may be necessary

Important !

Protective measures against noise and contamination (dust, solvents, material residues, etc.) for each tool head are specified in Part 3.

**Electromagnetic emissions**

The plotter meets the requirements of the following standards:

- EN 50081-2 EMC, emission standard for industrial environments
- EN 50082-2 EMC, interference resistance standard for industrial environments

Please ask the manufacturer if you wish to refer to the test reports.

3 Safety

3.1 General

Your safety – as the operator, service engineer or otherwise – is the primary concern. Certain situations, problems or faults that may occur on the equipment could put your safety at risk if you are not aware of the steps you should take to avoid the resulting dangers.

Contents

- Stipulation of the correct use of the machine
- Generally applicable safety instructions and safety regulations to be observed
- Explanation of the meaning of symbols and pictograms which are used in this manual and in signs on the machine
- Location of safety and monitoring devices on the machine
- Information on protective equipment required and of requirements for operators and maintenance personnel

Specific activity-related and situation-related safety instructions are given in the corresponding procedures in the following chapters of this manual and in other parts of the documentation.

Latest technology

The supplied machine meets the standards of the latest technology at the time of delivery.

However, the equipment may pose dangers unless the safety instructions in this guide are observed and implemented.

3.2 Proper use

The proper use of the machine is essential for its safe operation.

The equipment supplied:

- Is listed and labelled
- Determines the possible uses of the machine

The machine is intended for use as an output device for CAD/CAM data for the labelling and processing of materials arranged on the table.

The intended use and the limits of the application are dependent on:

- The module and tool system that is used
- The existing material transport system

Any other use or any use going beyond this scope constitutes improper use. The user bears sole liability for any damage arising as a result of improper use.

The operation of the machine is also seen as correct if:

- All nationally imposed safety regulations are complied with
- The safety instructions in this operating manual are observed
- The operating conditions are adhered to and the prescribed materials are used

3.3 Examples of improper use

Improper use of the machine can:

- Cause injury
- Result in serious damage to the machine
- Lead to loss of warranty

Improper use of the machine includes, among other things:

- Any structural modification to the machine carried out without written agreement from the manufacturer
- Use of unsuitable modules/tool inserts
- Servicing work performed by untrained or unauthorised personnel
- Installation of spare parts and use of accessories and resources not approved by the manufacturer
- Deliberate or careless interference with the machine during operation
- Commissioning of the machine
 - Without sufficient personal protection equipment
 - Without the designated protective and safety measures
 - If the operating manual is incomplete or not available in the local language
- Non-adherence to maintenance requirements
- Failure to react to signs of wear and damage

3.4 Hazard warnings, important instructions

3.4.1 Explanation of the hazard warning

Both in the operating manual and on the device itself, dangers, important instructions and user tips are designated by special symbols and signal words as follows.



Danger !

The safety instruction Danger

- Refers to an immediate threat
 - Refers to operational and service risks
 - Warns of serious effects on health and safety, including life-threatening injuries.
-



Warning !

The safety instruction Warning

- Refers to a dangerous situation
 - Refers to operational and service risks
 - Warns of serious effects on health and safety, including life-threatening injuries.
-



Attention !

The safety instruction Caution

- Refers to a dangerous situation
 - Refers to operational and service risks
 - Warns of minor injuries and other serious damage to the machine and secondary damage
-

Attention !

The safety instruction Caution without a hazard symbol

- Refers to a dangerous situation
 - Refers to operational and service risks
 - Warns of serious damage to the equipment, damage to other property and consequential damage
-



Important !

Refers to user tips and useful information which enhance the usability and prolong the service life of the machine and make the work significantly easier.

3.4.2 Structure of the hazard warnings

Example:



Warning !

Risk of poisoning from the emission of toxic dust

Processing certain materials can lead to the creation of toxic dust with significant risk to health.

- Obtain information about the toxicity of the material to be processed from the manufacturer
 - Use a suitable extraction unit or take other appropriate action accordingly
-

Hazard warnings consist of the following units:

- 1 The hazard symbol of the appropriate signal colour
- 2 The signal word corresponding to the danger resulting from the situation
- 3 The description of the danger
- 4 The description of the consequences which could result from this hazardous situation
- 5 Possible actions and codes of conduct to prevent the hazard occurring or to avert possible hazardous situations

3.5 Areas of responsibility

The manufacturer

- Is responsible for the safe condition of the machine on delivery, including instruction handbook and accessories, according to the sales documentation.

The owner or person authorised by him:

- Ensures that only adequately trained personnel, who have been properly instructed and have read and understood the content of the safety instructions in this chapter, will operate and maintain this machine
- Clearly determines the responsibility of the operators and service personnel as required in the instruction handbook
- Checks the personal protective equipment of operators and service personnel
- Is responsible for the safe condition of the machine
- Ensures that servicing and maintenance is carried out according to the maintenance schedule
- Notifies the manufacturer of any accident involving the machine that results in serious injury or substantial material damage
- Removes the machine from service immediately if defects arise that are detrimental to its operational safety

Operators and service personnel:

- Wear the necessary personal protective gear
- Halt operation immediately in the event of faults
- Report any changes which are detrimental to operational safety
- Keep the equipment clean
- Check the operation of the emergency stop switches before starting work

3.6 Personnel requirements

The operators and service personnel must meet the following requirements:

- Be physically and mentally suitable
- Be qualified by means of thorough training in the use of the machine
- Have read and understood the operating manual/service manual
- Be over the age of 16
- Have knowledge of first aid and the use of fire extinguishers

3.7 Rules and safety at work

- The operation of the machine is always subject to local regulations regarding safety at work and accident prevention.
- Before the machine is put into operation: Always check the safety equipment and protective covers.
- If a hazardous situation occurs, switch the machine from the ONLINE operating status to the STOPPED/OFFLINE operating status:
 - Switching can be carried out by pressing the ONLINE button on the operating unit
 - By pressing one or more direction keys (emergency stop function).
- You are not permitted to make unauthorised modifications and changes to the machine which might affect the system's safety. Accessories or spare parts produced by other manufacturers may only be used with the machine with the written approval of the manufacturer.
- Only service personnel authorised by the manufacturer are permitted to install, commission, maintain and repair the machine.
- Before carrying out any maintenance, repair and modification work:
 - Switch the machine off using the on/off switch and secure with a lock
 - Prevent the machine being switched on inadvertently by removing the mains supply cables to the distribution box (several mains connections).

3.8 Procedure in case of malfunctions

In principle, any troubleshooting work or inspection on the cutter is to be carried out only when it is switched off.

The following must never be by-passed or rendered ineffective:

- Light barriers and protective trip switches on the bar
- Monitoring sensors
- Safety and control switches in the machine

If malfunctions cannot be remedied by the operators using simple measures, then the responsible service station must be informed.

3.9 Danger areas

3.9.1 Danger areas

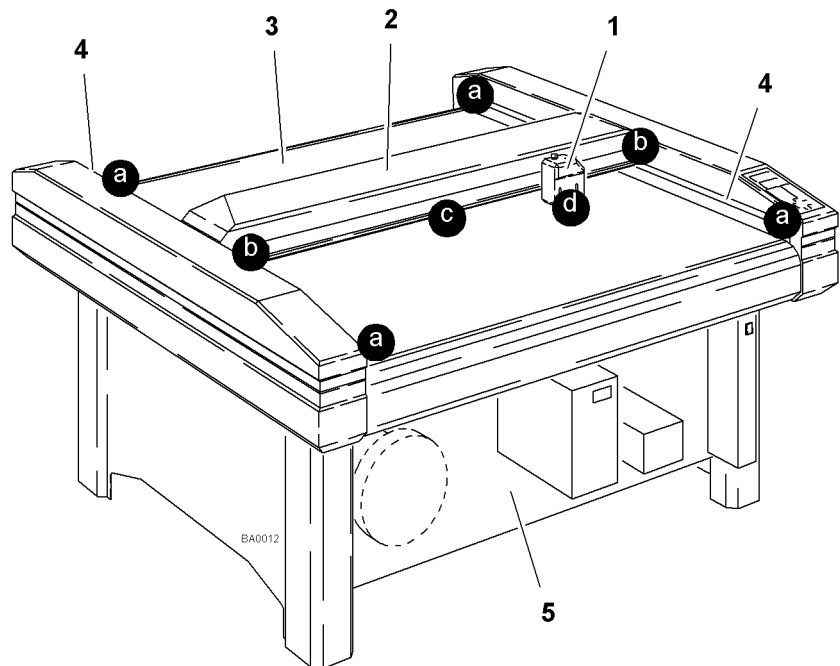


Fig. 3-1 Danger areas on the cutter

- | | |
|---|--|
| 1 Tool head | 4 Side covers near beam (openings) |
| 2 Beam | 5 Base plate (live parts) |
| 3 Working area on table | |
| a Openings at the end of the side covers in beam end position | c Clearance between beam and table |
| b Areas between side covers and tool head in end position | d Area between tool head and table and area around the tool used |

3.9.2 Danger area during processing

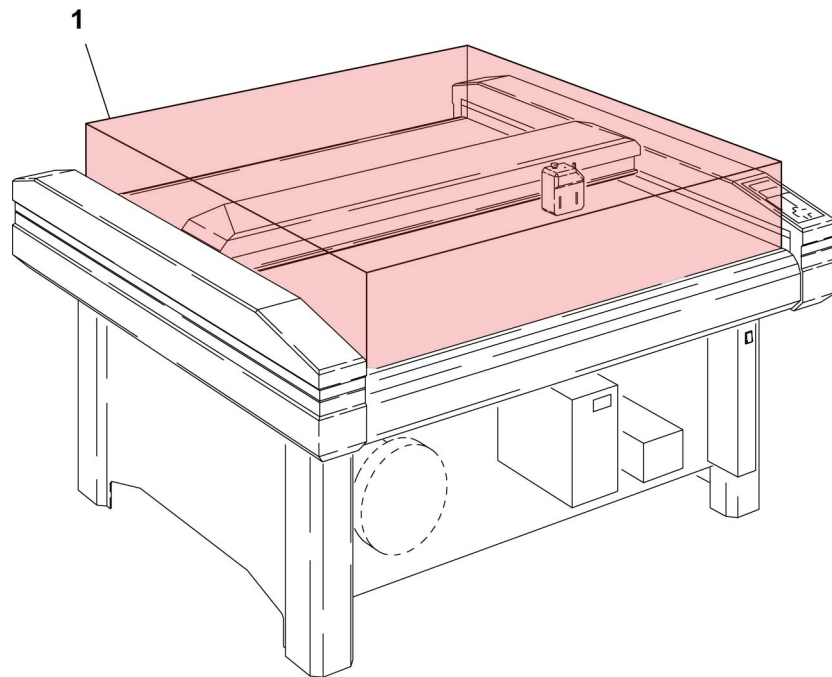


Fig. 3-2 Danger area during processing

1 Danger area

3.9.3 Danger area during initialisation



Attention !

Risk of injury during the manual initialisation of the tool.

The safety devices are not active during the manual initialisation

- Do not reach into the danger area during the manual initialisation
- Use the automatic initialisation function for the initialisation

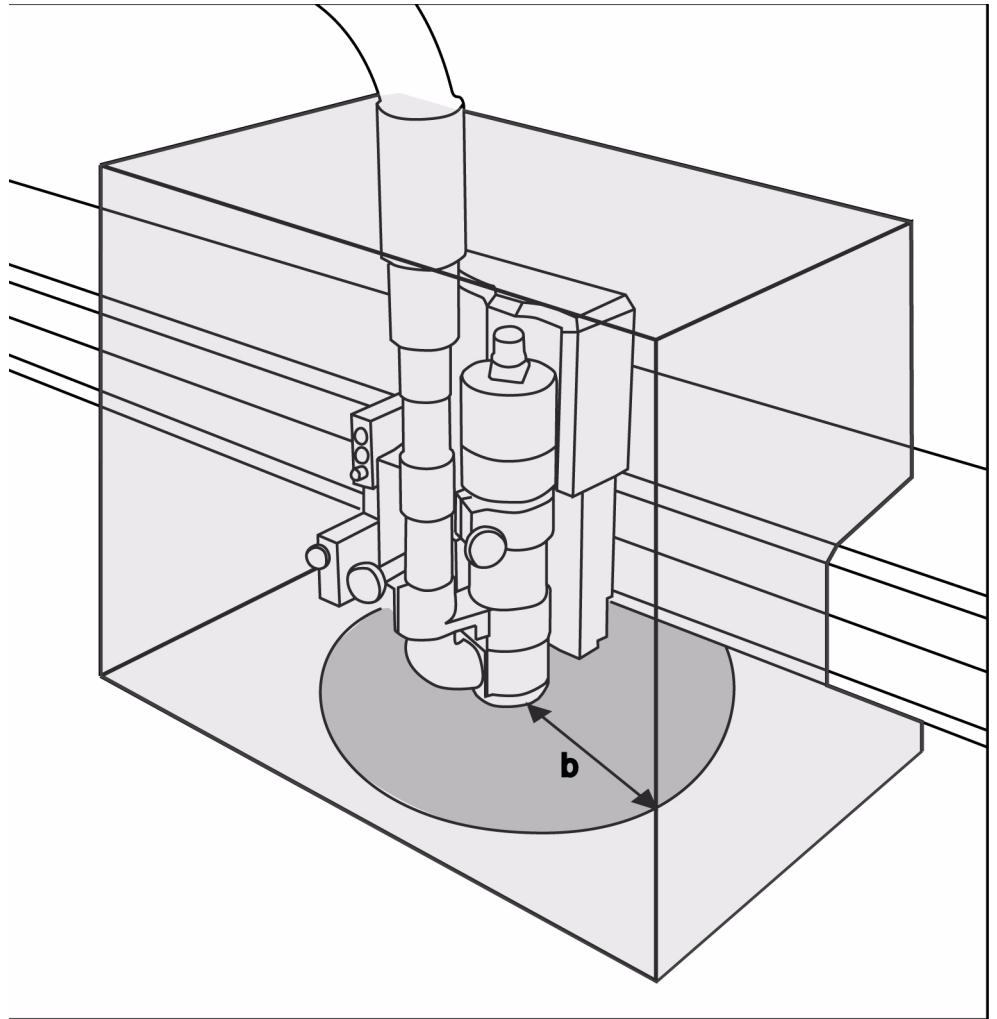


Fig. 3-3 Danger area during the installation (e.g. R45s)

b Safety distance

Safety distance during the manual initialisation

The safety distance (b) for operating personnel during manual initialisation is **25 cm**. Do not reach into the danger area during the initialisation phase.

3.10 Working and traffic area



Warning !

There is a danger of injury to others through inappropriate behaviour or carelessness.

Please advise others to maintain an appropriate safety distance from the designated work and traffic zone.

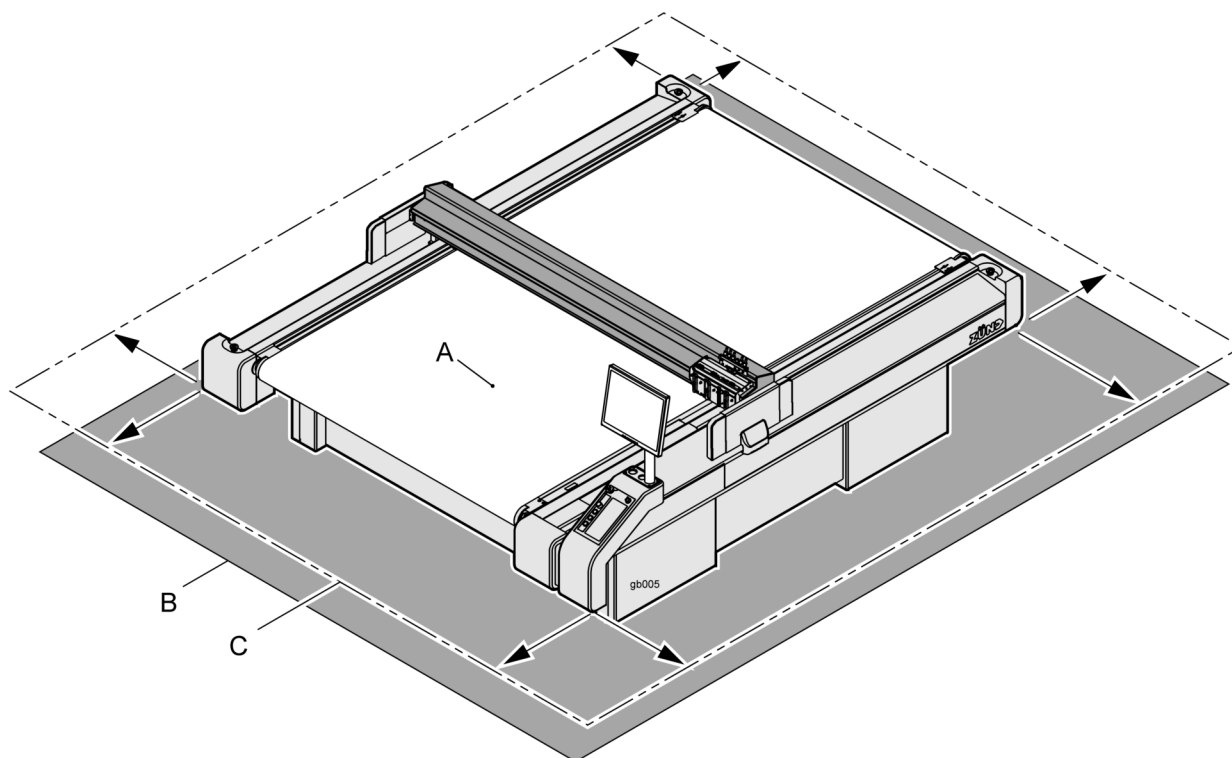


Fig. 3-4 Working area around the cutter

- A Working area - active area of the tool
- B Working and traffic area of the operator
- C Minimum safety distance for other personnel

Safety distance for other personnel

The safety distance for other personnel extends over the surface of the cutter plus a distance of at least one metre.

Working and traffic area

The working and traffic area extends over the surface of the cutter with fittings and options plus a distance of at least one metre.

Use with conveyor extension

When using a cutter extension, the loading and removal of material is permitted outside of the danger zone (working and active area).

3.11 Safety signs

3.11.1 Responsibility of the operator



Warning !

Risk of injury due to a lack of safety signs

Risks and sources of danger cannot be localised due to the lack of safety signs.

- Replace missing or illegible safety signs as per Fig. 3-5

The operator is responsible for replacing missing/illegible safety signs on the machine. The appropriate safety signs can be requested from your service partner.

3.11.2 Position of the safety signs

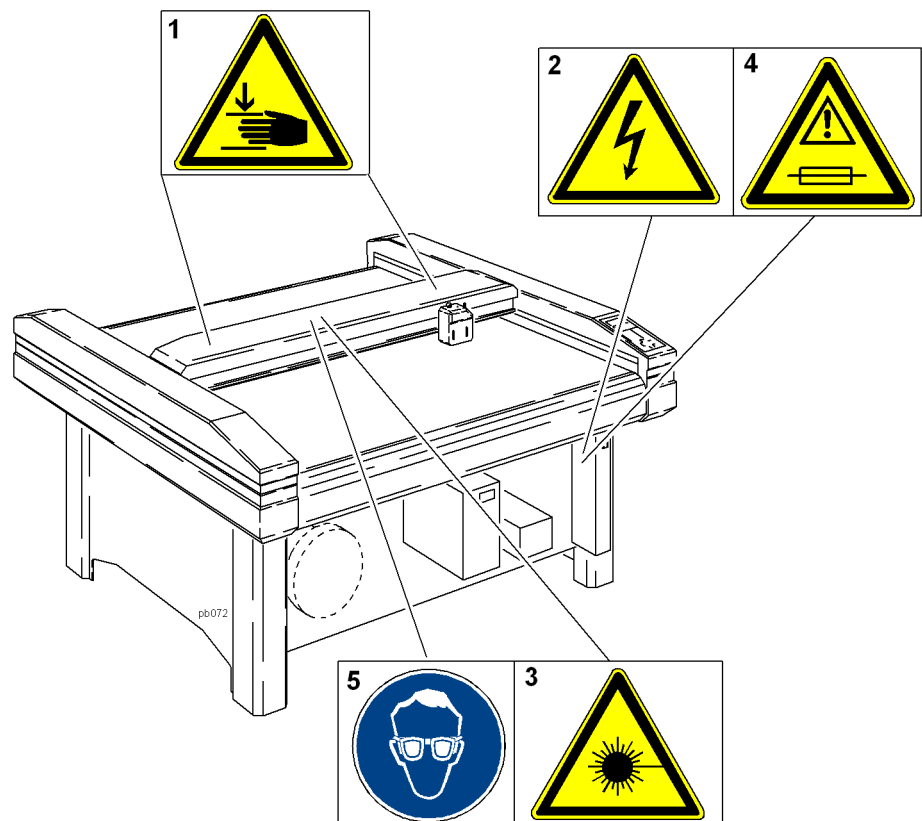


Fig. 3-5 Safety signs

- | | | | |
|---|------------------------------------|---|------------------------------|
| 1 | Danger of hand injuries | 4 | Caution: use specified fuses |
| 2 | Danger of electrical safety hazard | 5 | Wear eye protection |
| 3 | Laser safety hazard (optional) | | |

Important safety signs on the machine must be followed. Otherwise, this could result in serious injuries or death. Special module or tool specific signs can be found in the relevant operating manual.



Warning !**Safety risks due to missing or illegible safety signs**

Check all safety signs on a regular basis for legibility and completeness.

Replace missing or illegible safety signs promptly with new original signs.

Meaning of safety signs

The symbols on the safety signs

- Have specific meanings
- Are located wherever certain behaviour is prohibited due to it being potentially dangerous

Prohibition signs

- Are round and red-coloured
- Are located wherever certain behaviour is prohibited due to it being potentially dangerous

Order signs

- Are blue and circular
- Stipulate the wearing of personal protective equipment to protect against hazards



Wear eye protection



Wear protective gloves

Fire protection signs

- Are rectangular and red-coloured
- Are intended to draw attention to equipment and information for use in the event of a fire

Warning signs

- Are triangular and yellow-coloured
- Are intended to draw attention to objects and circumstances which represent a potential danger to life and limb.



Danger of hand injuries (crushing)



Danger of hand injuries (severing)



Danger of electrical safety hazard



Laser beam warning



Caution: use specified fuses

3.12 Safety and monitoring devices

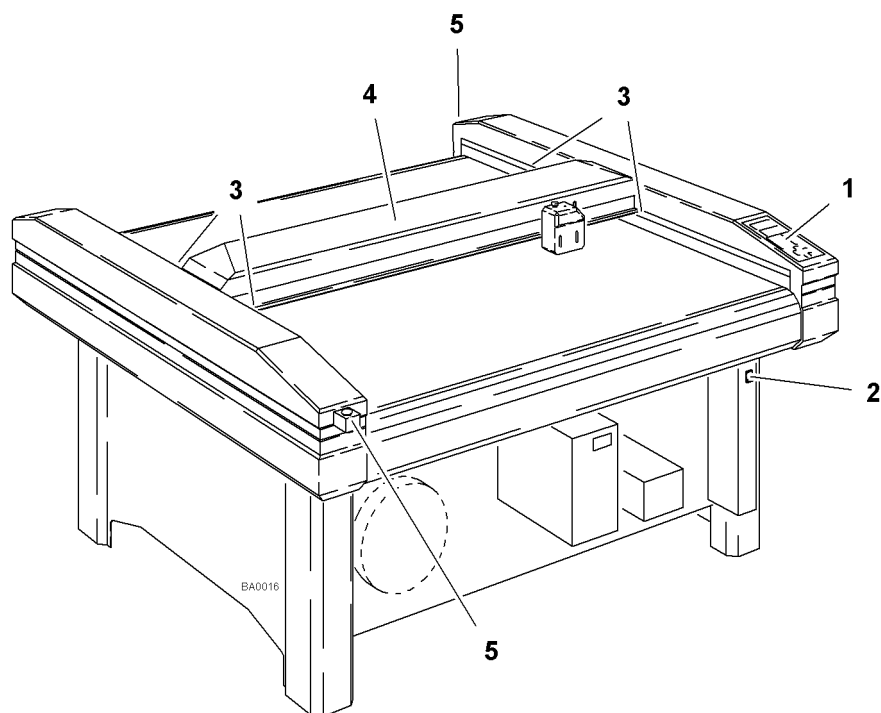


Fig. 3-6 Safety and monitoring devices

- | | |
|--|---------------------------|
| 1 Operating unit | 4 Beam |
| 2 On/off switch | 5 Emergency stop switches |
| 3 Light barriers on the ends of the beam | |

Protective trip switches Four protective trip switches mounted to the ends of the beam trigger the safety shut-down if they are touched by an obstruction (hand protection).

Light barriers The working area is monitored by light barriers on the front and rear side of the beam.



Important !

The light barriers are only active in ONLINE mode.

They do not work during initialisation or in OFFLINE mode.

Protective trip switches and light barriers are part of a self-monitoring safety shut-down system.

If an obstruction is detected by the protective trip switches or the light barriers

- An EMERGENCY STOP is activated
- The machine switches to OFFLINE mode
- An error message is displayed

Operating unit Malfunctions are indicated on the LCD display.
An acoustic signal sounds

- For emergency stops
- For acknowledging keypad entries

Emergency stop switches Emergency stop switches

- Are integral parts of a safety circuit
- Allow the machine to be switched off quickly in a dangerous situation

As an option, two emergency stop switches can be fitted on the edges of the machine

As soon as an emergency stop switch is pressed

- The power supply to the entire machine is shut off
- The operating unit remains switched on

Attention !

Pressing the emergency stop switch can damage the cutter.

Do not press the emergency stop switch to switch off the machine in routine operation.



Important !

To unlock an activated emergency stop switch after regaining operational safety, turn the switch anticlockwise.

Safety cut-off feature When an overload occurs or an axle drive (X,Y, T, Z) is blocked

- The emergency stop is activated
- The cutter changes to OFFLINE mode
- An error message and an alert buzzer indicate the safety shut-off.

Light barriers and safety shut-offs are no guarantee against injuries.

Due to the high kinetic energy of the machine's drives, the braking distance of the beam and tool head are considerable.

3.13 Personal protective equipment, clothing

The safety equipment required for operating the machine is dependent on the following factors:

- The module and tool system
- The material to be processed

When operating the machine or carrying out maintenance or servicing work, wear close-fitting clothing and the appropriate personal protective equipment.



Warning !

Risk of injury from being caught or trapped in moving machine parts.

- Do not wear loose clothing, scarves, open jackets or open shirt sleeves.
- Remove all jewellery before starting maintenance and servicing work.

Personal protective equipment comprises:

- Work clothes (service personnel),
- Protective goggles (operators, service personnel):
 - To provide protection from particles during cutting operations
 - To protect the eyes from dangerous radiation
 - To protect the eyes from chemicals
- Protective gloves where injury is possible due to:
 - Burns
 - Sharp or pointed objects
- Chemical-resistant protective gloves where injury is possible due to:
 - Chemicals (cleaning agents)
- Breathing protection when working with poisonous substances
- Ear protection if the continuous sound pressure level is over 80 dB.



Important !

You are personally responsible for:

- Using the required personal protective equipment
 - Cleaning and maintaining the equipment on a regular basis
 - Replacing damaged and unusable elements of protective equipment in a timely fashion
-

3.14 Mechanical hazards

3.14.1 Gathering, retraction

Hazards caused by the bar, modules or the tool system during gathering and retraction

Possible consequences:

- Cuts, bruising and crushing of fingers and hands
- Bruising of head and arms
- Tearing out of hair
- Damage to clothing
- Damage to the machine

Precautions during the initialisation and the operation in the ONLINE operating status:

- Do not touch tool head and bar
- Do not enter the working/active area
- Do not touch table surface and material to be processed
- Do not lay your hands on side covers
- Do not lean over the working surface
- Avoid leaving long hair loose and wearing loose clothes and ties

These precautions specifically apply if the cutter can be switched into ONLINE operating status by the CAD/CAM system.

3.14.2 Gathering, impacts of foreign objects

Foreign objects on the table are grasped and pushed away by the bar and the tool head.

Possible consequences:

- Facial injuries and other injuries due to objects being pushed away
- Damage to the machine

Precautions during the initialisation and the operation in the ONLINE/OFFLINE operating status:

- Do not place materials, tools or other objects on the table or side covers
- Before operation, check whether there are any objects on the table or the side covers

3.14.3 Cuts and stab wounds

Knives, routers and punching inserts have very sharp edges which are sometimes hidden by moving equipment (slipper spring).

Possible consequences:

- Cuts and stab wounds to the hands and arms

Precautions during the knife change, initialisation and the operation in the ONLINE operating status of the machine:

- Be extremely careful when changing the tool inserts
- Do not enter the working area during the initialisation and during operation in the ONLINE operating status

3.15 Risk of burns

Certain materials (metals) and tools (router) reach very high temperatures during processing.

Possible consequences:

- Burns on the limbs

Precautions:

- Allow workpieces to cool before removing them
- Wear suitable protective gloves when removing workpieces that have just been processed
- Allow tools (router, knife) to cool before removing them

3.16 Electrical hazard



Warning !

Risk of death or injury from electric shock.

The machine is operated with a mains voltage of 380 V, system frequency of 50/60 Hz.

Safety instructions

- Only trained service personnel are authorised to open switch boxes and electronics units.
- Ensure that mains cables are protected against mechanical loading and are laid so that they are free from strain.
- Replace damaged cables immediately.

3.17 Risks arising from the emission of toxic dust



Warning !

Risk of poisoning from the emission of toxic dust

Processing the most wide-ranging materials can lead to the creation of toxic dust with significant risk to health.

- Obtain information about the toxicity of the material to be processed from the manufacturer.
- Use a suitable extraction unit or take other appropriate action accordingly.

The company operating the system is responsible for making sure that all national regulations concerning the maximum permissible dust concentration at work are adhered to. When handling hazardous types of dust, all local safety regulations as well as the manufacturer's instructions must be observed. Use special vacuum cleaners with specially adjusted dust filters if you are routing/processing hazardous materials. Zünd offers suction systems which meet the following regulations as accessories:

- The extraction of hazardous dusts with a maximum concentration at work of up to 0.1 mg/m^3 and the extraction of wood dusts of dust class M
- The extraction of dusts conforming to dust class H

3.18 Risks arising from the processing of toxic/hazardous materials



Warning !

Risk of poisoning from emissions when processing toxic materials

Processing the most wide-ranging materials can lead to toxic emissions (gases, dust etc.) with significant risk to health.

- Never process toxic/hazardous materials!
- Obtain information from the **manufacturer of the material to be processed** about its toxicity.

Guidelines

- The company operating the system is responsible for establishing which processing materials are toxic/hazardous.
- It is prohibited to process toxic materials on Zünd cutters without appropriate additional safety measures!
- The company operating the system is responsible for installing appropriate additional safety measures!

3.19 Environmental hazard



Warning !

Processing residues, operating fluids etc. can cause damage and pollute the environment if they enter the soil, watercourses or the sewage system.

Explanation of the hazard label



Hazard label for substances that are harmful to the environment

Safety regulations and protective measures

- Dispose of waste materials in accordance with current national environmental protection regulations. In case of doubt, check the appropriate disposal methods with your local collection point or recycling centre.
- Collect different chemicals in separate containers.

3.20 Handling and storage of chemicals



Warning !

Cleaning agents, operating fluids etc., can cause skin irritation and can therefore be hazardous to health if handled carelessly.

Always wear personal protective equipment when working with chemicals.

Explanation of the hazard label



Hazard label for toxic substances



Hazard label for harmful substances



Hazard label for irritating substances



Important !

Chemicals classed as irritants are used to operate and clean this machine (cleaning agents, operating fluids). Safety datasheets of the substances in question can be downloaded from the Zünd homepage (www.Zund.com).

Safe handling of chemicals



Disposal !

Dispose of chemicals in accordance with national regulations.

- Store chemicals in tightly closed containers in a cool dry place (between 5 °C and 30 °C).
- Protect the containers from heat and direct sunlight.
- Provide good ventilation, including at floor level.
- Store chemicals in accordance with local regulations.
- Keep containers tightly closed.
- Use chemicals only for the intended purpose.

3.21 Risk of fire and explosion



Warning !

There is a risk of fire when routing and cutting inflammable materials

Terminate the routing/cutting and leave the tool to cool in the case of

- Formation of smoke
- Discolourations on the router/knife which point to increased heat development



Warning !

Risk of dust explosions

Flying sparks or electrostatic charges result in the risk that there will be dust explosions during the extraction of different materials.

- Obtain information about the risk of explosion when processing the type of material that you are using.
- If necessary, adjust the extraction to the required regulations.

Fire classes

Refer to the following table to find out which type of fire extinguisher is used for each fire class:



A Solid materials, mainly organic in nature; e.g. wood, paper, textiles, etc.



B Liquid and liquefiable substances; e.g. petrol, oils, greases, paints, etc.

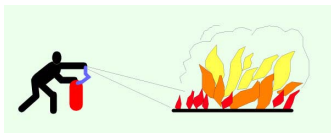


C Combustible gases: methane, propane, etc.

Danger caused by laser beam (laser pointer)

In the event of a fire:

- Switch off the machine (emergency stop switch)
- Assess the situation: If the situation is dangerous, leave the area immediately and call the fire brigade. Only try to extinguish the fire if your personal safety is not at risk.
- Remove a suitable fire extinguisher (A, B, C) from its bracket and prepare it for use.
- Locate the source of the fire. Attack the fire with repeated short bursts from the extinguisher. Always spray the extinguishing agent into the source of the fire. In other words, always aim at the burning material and not at the flames.
- After using the fire extinguisher, do not return it to its usual place but have it re-filled immediately.

**Observe the following safety rules and countermeasures**

- Find out the number of locations where fire extinguishers are kept and familiarise yourself with their use. The adjacent sign indicates the location of a fire extinguisher.
- Do not use inflammable cleaning agents to clean the machine.
- Store all processing materials in the proper manner in accordance with local guidelines.

3.22 Danger caused by laser beam (laser pointer)

Class 2 lasers are used as laser pointers. Momentary irradiation of the eyes, as can occur if you accidentally look directly at the laser, is not dangerous. In addition, depending on the construction, the laser beam is targeted directly at the material to be processed.

Safety instructions

- Avoid direct, prolonged eye contact

3.23 Safety instructions for operators

This instruction manual cannot cover all possible situations and potential hazards.

It is therefore particularly important that operators

- have been thoroughly trained and are aware of and able to correctly assess the hazards that can arise from the machine
- are familiar with all safety devices on the machine
- request information from the manufacturer without delay if an undocumented, hazardous situation arises in connection with the machine

In addition to these safety instructions, you must also observe the situation-related safety notes in the chapters "Controls and operation" and "Maintenance and cleaning".

3.24 Safety precautions for service personnel

The reliability, readiness and service life of the machine greatly depend on you carrying out your work in a conscientious manner.



Important !

Specialist knowledge and expertise are required to service and maintain the machine. The manufacturer provides this knowledge through training courses which are specially tailored for service personnel. Only personnel with Zünd certification are permitted to carry out service work on Zünd cutters.

3.25 Disposal



Disposal !

Information about proper disposal

- Identifies toxic substances that are harmful to the environment
 - Relates to the disposal of harmful substances
 - Warns against disposal with domestic waste or environmental pollution caused by hazardous substances and objects contaminated with such substances
-

Measures for disposal

Zünd cutters correspond with the requirements of the German Electrical and Electronic Device Act and generally do not contain any poisonous substances or consumables.

Contact Zünd customer services or your service partner before you dispose of your cutter.

Dispose of cutting waste in accordance with current national environmental protection regulations. In case of doubt, check the appropriate disposal methods with your local collection point or recycling centre.

4 Controls and operation

4.1 Controls

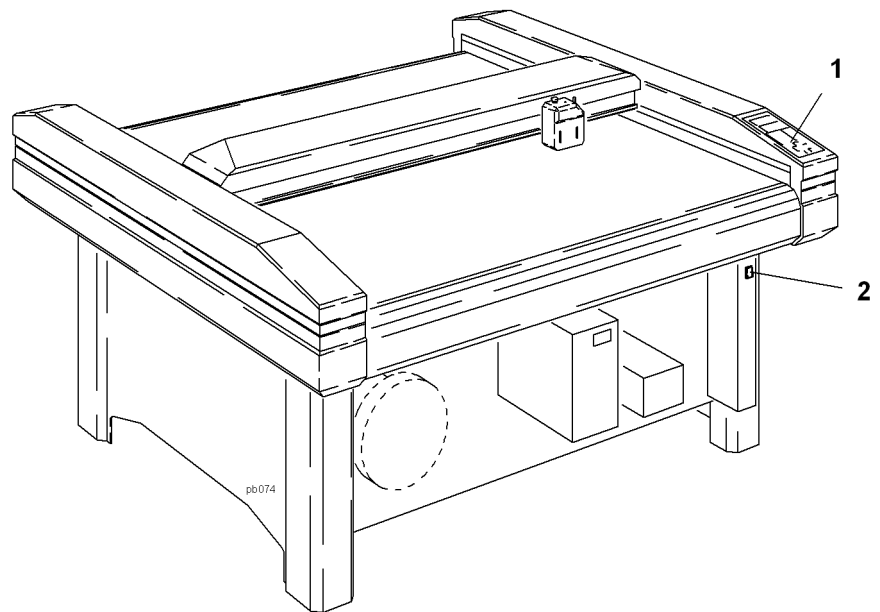


Fig. 4-1 Controls

The control panel (Fig. 4-1, item 1)

- Indicates the operating mode
- Enables commands to be input and parameters set for the machine
- Reports on errors and failures.

Use the On/Off switch to switch the entire cutter system on/off. (Fig. 4-1 item 2)

4.2 Operating modes

Initialisation

After switching on the cutter system

- Functions are checked using extensive self-tests
- The control system determines the available tool head and material feeding system for the machine.

Subsequently, the beam and tool head move at low speed to the zero point of the coordinates. This zero point is located near the operating panel on the vacuum plate.

The tool holder is positioned and aligned to the zero point of coordinates. When using tool heads with several tools the tool holder selected as standard is positioned.

OFFLINE mode

In this mode

- The cutter system does not process CAD/CAM data
- The data transferred is stored in the input buffer.

OFFLINE mode is used for:

- Settings
- Checks
- Adjustments and calibrations on the tool head
- Tool changes
- Material changes on the vacuum plate and on the material feeding system.

ONLINE mode

The operating panel

- Indicates the operating mode
- Is used for all key functions
- Can be used to switch between ON/OFFLINE mode using the ONLINE key.

The cutter system

- Processes the content of the input buffer and the data transferred from the CAD/CAM system.

The operating panel

- Indicates the mode and the HPGL commands
- Is used to initiate an emergency stop and change to OFFLINE mode by pressing one or more direction keys
- Is used to switch to OFFLINE mode using the ONLINE key.

All other key functions are locked.

4.3 Operating unit

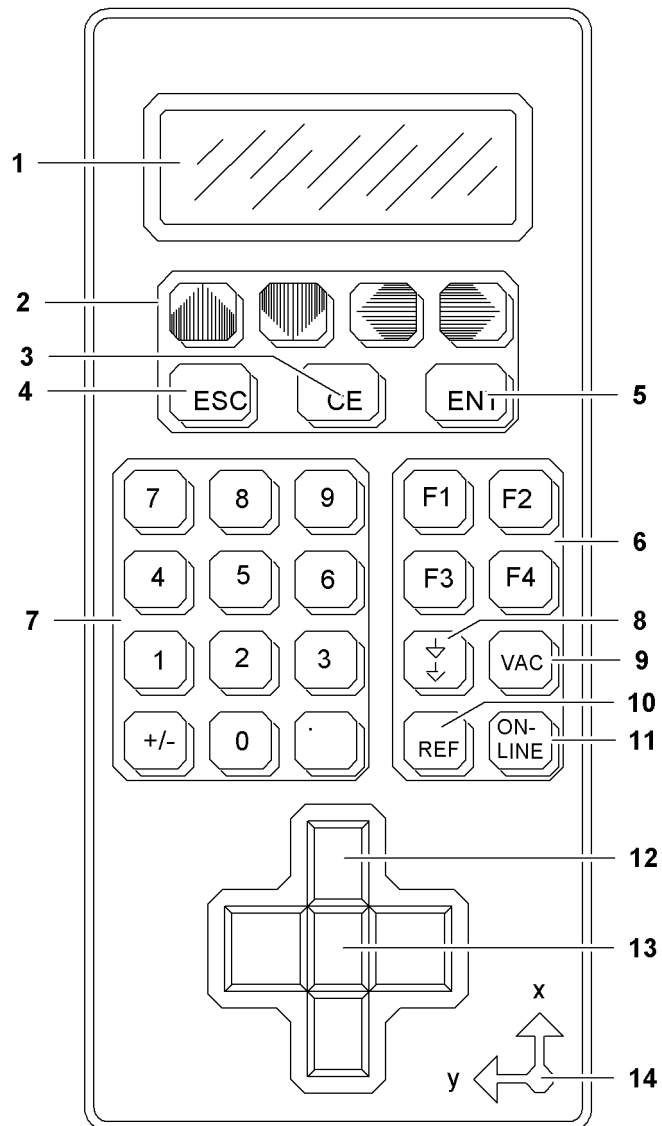


Fig. 4-2 Operating unit

- | | |
|------------------------|-------------------------|
| 1 LCD display | 8 PEN UP/DOWN key |
| 2 Arrow keys | 9 VACUUM key |
| 3 Clear key | 10 REF key (ZERO POINT) |
| 4 Escape key | 11 ONLINE key |
| 5 Enter key | 12 Direction keys (4x) |
| 6 Function block F1-F4 | 13 SHIFT key |
| 7 Numerical keys | 14 Coordinates symbol |

The operating panel consists of an LCD and keypad.

A coordinate symbol shows the direction of the coordinate axes as viewed from the reference point on the vacuum plate.

4.3.1 Description of keypad

The keypad on the operating panel is used to enter all commands, parameters and settings for cutter operation.

The keypad is divided into the following functional blocks:

- Menu operation with arrow keys, ESC, CE, ENT and numerical keys
- Direct functions for PEN, zero point, vacuum and F1 to F4.
- Direction keys for positioning the head.

An acoustic signal indicates that the key press has been accepted (with exception of direction keys).

Arrow keys (2)

Used for

- Navigating within the command menu
- Selecting commands and parameters.

CE key (3)

The CE key is used to

- Go back one step
- Go back to the higher menu level

ESC key (4)

Used for

- Terminating functions and inputs
- Calling up the highest menu level.

Function keys (5)

Function keys F1 to F4

- Are used for calling frequently used commands
- Are pre-configured by the manufacturer
- Can be reconfigured by the user.

Numerical keys (7)

Used for

- Entering command numbers
- Entering numerical values.

PEN UP/DOWN key (8)

For lowering/lifting the selected tool on the tool head. If this key is activated together with the SHIFT key, the selected tool moves into the park position when using tool heads type C2 and RzP.

VAC key (9)

This key calls up the VACUUM submenu with command number 392. This is used to switch on/off and set the vacuum for the table (depending on the material feeding system).

REF key (10)

This key calls up the ZERO POINT submenu with command number 391.

The zero point of coordinates on the vacuum plate can be used

- To preset, indicate or delete a user-defined reference point
- To enter X/Y coordinates.

Online key (11)

This key is used for switching between ONLINE and OFFLINE mode.

Direction keys (12)

Depending on the particular mode, these keys have the following functions:

In ONLINE mode, pressing one or more direction keys triggers an emergency stop. The machine switches to OFFLINE mode.

In OFFLINE mode, the beam and tool head can be positioned on the working surface. The assignment of keys corresponds to the direction of movement.

Simultaneously pressing a single direction key and the SHIFT key moves the beam and the tool head at a higher speed.

Simultaneously pressing a single direction key for each X and Y direction activates both drive axes and the tool head moves diagonally.

No movement occurs if two direction keys in opposite X/Y directions are pressed by mistake.

4.3.2 Description of the display

The four-lined LCD

- Indicates mode, errors and failures
- Shows the moving display, the standard menu and the command menu.

The moving display appears after

- Switching on and initialising the plotter
- Pressing a direction key.

```
***Mxxxx - Menu****
USR: 1   TOOL: 1 x  0-
Y=                0.00
X=                0.00
```

Display	Description
Mxxxx - Menu*	Display of table type
USR: 1	User no. 1 is selected
TOOL: 1x	Tool no. 1 is selected
x	Tool status (x)
X/Y	Display of X and Y position in the preset measurement unit of [m] or [inch]

Tool status (x)	
P	Tool in the upper park position (with C2, Tz-P and RzP tool heads only)
O	Tool is in the top position
U	Tool in in the bottom position

The standard menu (top menu or base level) appears after pressing the ESC key.

```
*Menu* TOOL: 1P
1>JOB SETUP
2  TOOL
3  FUNCTIONS
```

> Display of selected menu item.

The command menu appears after an input or when pressing the CE, ESC key.

```
FUNCTIONS
1>TESTCUT
2  PAGE/CUT
3  BUFFER
```

4.3.3 Command input

Dedicated keys are assigned for frequently used functions, such as for positioning the tool head, setting the zero point, etc. (see point 5.3.1).

Less commonly used functions are activated via the command menu (see point 5.4 "Command menu").

4.3.4 Setting the language

The cutter system

- Has a user interface in different languages
- Is set to the national language of the customer during commissioning.

This setting can be changed at a later point in time:

- Use the numerical keys to enter command number "531".
- Select desired language within the "LANGUAGE" submenu using the Up/Down arrow keys and confirm with ENT key.

4.3.5 Setting unit of length

During commissioning, the cutter system is set to a specific unit of length (meter, inch).

This setting is valid for all

- Length entries, such as feed length, Z depth and height
- Distances indicated on the display
- Internal calculations.

The unit of length can be changed later:

- Use the numerical keys to enter command number "521".
- Select the desired unit of length within the submenu by using the Up/Down arrow keys and confirm with ENT key.

4.3.6 User-defined function keys

Frequently used functions and commands are assigned to the function keys F1 - F4 by the manufacturer (see user parameters).

The programming for the function keys

- Is specifically adjusted to the tool and material feeding system
- Can be adapted as the customer requires (see command SET USER KEY (45), point 5.4.3).

4.3.7 User parameters

Nine different groups with user parameters can be called up in the USER submenu. Each group contains presettings for different applications. The corresponding group can be called up whenever a tool or material is changed; there is no more need for time-consuming settings on the operating panel.

The pre-programmed user parameters are listed in the following tables and can be adapted individually. Use the factory settings as a reference for your application.

Tabelle 1:

No	Parameters	Usr: 1	Usr: 2	Usr: 3	Usr: 4	Usr: 5	Usr: 6	Usr: 7	Usr: 8	Usr: 9
1	ZOOM X	1.000 0	1.000 0	1.000 0	1.000 0	1.000 0	1.000 0	1.000 0	1.000 0	1.000 0
2	ZOOM Y	1.000 0	1.000 0	1.000 0	1.000 0	1.000 0	1.000 0	1.000 0	1.000 0	1.000 0
3	BAUD (Interface Parameter)	9600	9600	9600	9600	9600	9600	9600	9600	9600
4	FORMAT (Interface Parameter)	8,NO NE,1 S	8,NO NE,1 S	8,NO NE,1 S	8,NO NE,1 S	8,NO NE,1 S	8,NO NE,1 S	8,NO NE,1 S	8,NO NE,1 S	8,NO NE,1 S
5	PROTOCOL (Interface Parameter)	HW	HW	HW	HW	HW	HW	HW	HW	HW
6	BEFORE UP (Pen delay)	20	20	20	20	20	20	50	50	50
7	AFTER UP (Pen delay)	20	20	20	20	20	20	50	50	50
8	BEFORE DOWN (Pen delay)	20	20	20	20	20	20	50	50	50
9	AFTER DOWN (Pen delay)	20	20	20	20	20	20	50	50	50
10	LINK TO TOOL (Router)	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
11	LINK TO TOOL (Oscillating tool)	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
12	LINK TO TOOL (PPT)	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

Tabelle 1:

1 3	LINK TO TOOL (Press. swit- ching)	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1 4	LINK TO TOOL (Trailing knife)	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1 5	LINK TO TOOL (Spec. Pen- pulse)	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1 6	FRE- QUENCY (Laser)	-								
1 7	RECESS POWER (Laser)	-								
1 8	MAX. POWER (Laser)	-								
1 9	EXTERNAL GAS (Laser)	-								
2 0	XY-UP (Accelera- tion)	4	4	4	4	4	4	4	4	4
2 1	XY-DOWN (Accelera- tion)	4	3	4	4	4	3	2	2	2
2 2	XY-UP (Speed)	1000	1000	1000	1000	1000	1000	1000	1000	1000
2 3	XY-DOWN (Speed)	1000	500	1000	1000	500	250	250	20	10
2 4	CORNER	40	40	40	40	40	40	40	40	40
2 5	PU-ANGLE	40	40	360	40	40	40	360	360	360

Tabelle 1:

26	USER STANDARD (Userstring)	Cut quickly	Cut slowly	Plot	T-MODULE fast	T-MODULE medium	T-MODULE slow	FAST routing	MEDIUM routing	SLOW routing
----	----------------------------	-------------	------------	------	---------------	-----------------	---------------	--------------	----------------	--------------

No.	Parameters	Usr: 1	Usr: 2	Usr: 3	Usr: 4	Usr: 5	Usr: 6	Usr: 7	Usr: 8	Usr: 9
27	F1 KEY	116	116	116	1183	1183	1183	1151	1151	1151
28	F2 KEY	351	351	1182	1182	1182	1153	1153	1153	
29	F3 KEY	332	332	1184	1184	1184	1155	1155	1155	
31	F4 KEY	331	331	332	332	332	332	332	332	
32	KNIFE PRESSURE	100	100	100	100	100	100	100	100	
33	CUT PRESSURE	500	500	500	500	500	500	500	500	
34	PAGE MODE	VAC	VAC	VAC	VAC	VAC	VAC	VAC	VAC	
35	TZ-POS UP (Pen1)	5	5	5	5	5	5	5	5	5
36	TZ-POS DOWN (Pen1)	0	0	0	0	0	0	0	0	0
37	TZ-POS UP (Pen 2)	5	5	5	5	5	5	5	5	5
38	TZ-POS DOWN (Pen 2)	0	0	0	0	0	0	0	0	0
35	TZ-POS UP (Pen 3)	5	5	5	5	5	5	5	5	5
35	TZ-POS DOWN (Pen 3)	0	0	0	0	0	0	0	0	0
35	TZ-POS UP (Pen 4)	5	5	5	5	5	5	5	5	5
35	TZ-POS DOWN (Pen 4)	0	0	0	0	0	0	0		
39	TZ LIFT TIME (Pen 1)	300	300	300	300	300	300	300	300	300
40	TZ DOWN TIME (Pen 1)	300	300	300	300	300	300	300	300	300
39	TZ LIFT TIME (Pen 2)	300	300	300	300	300	300	300	300	300
40	TZ DOWN TIME (Pen 2)	300	300	300	300	300	300	300	300	300
39	TZ LIFT TIME (Pen 3)	300	300	300	300	300	300	300	300	300
40	TZ DOWN TIME (Pen 3)	300	300	300	300	300	300	300	300	300
39	TZ LIFT TIME (Pen 4)	300	300	300	300	300	300	300	300	300
40	TZ DOWN TIME (Pen 4)	300	300	300	300	300	300	300	300	300
42	TZ PRESSURE X (Pen 1)	6	6	6	6	6	6	6	6	6
43	TZ PRESSURE Y (Pen 1)	6	6	6	6	6	6	6	6	6
42	TZ PRESSURE X (Pen 2)	6	6	6	6	6	6	6	6	6
43	TZ PRESSURE Y (Pen 2)	6	6	6	6	6	6	6	6	6
42	TZ PRESSURE X (Pen 3)	6	6	6	6	6	6	6	6	6
43	TZ PRESSURE Y (Pen 3)	6	6	6	6	6	6	6	6	6
42	TZ PRESSURE X (Pen 4)	6	6	6	6	6	6	6	6	6
43	TZ PRESSURE Y (Pen 4)	6	6	6	6	6	6	6	6	6

4.4 Command menu

4.4.1 General

All available commands are contained in a command menu.

The command menu has a user-friendly layout:

- Frequently used commands can be found at the start of the menu.
- Commands for specific functions and actions are grouped in submenus.
- Each command can be selected directly using the corresponding command number.
- An LCD display informs the user about
 - The current submenu
 - Additional entry and selection opportunities for the commands.

The command menu contains commands for

- The complete cutter line
- All versions of the material feeding system
- All tool heads.

An error message is displayed if the cutter system is not suited for execution of a particular command.

In the "Command index" section, you will find

- All available commands in alphabetical order
- The corresponding command numbers
- The page numbers for the detailed command descriptions.

4.4.2 Menu structure

The menu is structured in tree form. Related and similar functions are combined to form groups.

The basic level contains five groups:

Job setup

Settings for the JOB (configuration); e.g. speed, deceleration, initialisation.

Tool

Selection of tools

Functions

Functions such as cutting, clearing the buffer, replot mode.

Users

Functions such as cutting, clearing the buffer, replot mode.

Basic settings

Calling up and storing presets.

4.4.3 Operation

The basic level of the menu tree is called using the ESC key.

There are two possibilities for navigating within this menu tree:

The cursor within the display of the operating panel can be

- Moved line by line using the Up/Down arrow key
- Moved page by page using the Left/Right key.

The display shows the corresponding submenu.

Once the cursor has been placed on the entry, you can select it using the ENT key.

Instead of using the arrow keys, the number of a submenu or command can be entered directly using the number keys. Subsequently, the display shows the corresponding submenu.

Arrangement of submenus

On the lowest levels, the submenus show functions, numbers inputs or selection possibilities.

Commands

Commands are executed as soon as they are selected using the ENT key or using the corresponding command number.

The operation can be terminated using the ESC key.

Inputs of numbers

If a flashing cursor appears above a number an input is required: Enter the desired number using the numerical keys and confirm with ENT key.

Pressing the ESC key during input returns the display to the basic level without saving the input.

You can use the CE key to delete the input step by step.

Selection possibilities

If a flashing cursor appears on a text, a selection is required: Move the cursor using the left/right arrow key, select using the Up/Down arrow key and confirm with ENT key.

Pressing the ENT key deletes all characters to the right of the current cursor position.

Pressing the ESC key cancels the selection and returns the display to the basic level.

The CE key cancels the selection and the cursor remains in the submenu.

Example for operation

Selection of acceleration level "3" for moving with lifted tool.

Required command: XY-UP (1122)

When the following inputs are made, the associated submenu is indicated on the display:

ESC key	Start on basic level
1	JOB SETUP
1	AXES PARAM
2	ACCEL
2	Open the number input for acceleration with lifted tool (XY-UP); cursor flashes.
3	Enter acceleration level "3"
ENT key	Confirm input

Now the XY-UP acceleration is set and basic level is shown again on the display.

You can find command numbers

- Within the command menu diagram
- In the command description
- In the "Command index" section.

4.4.4 Service mode

The service mode is available within a submenu and is used for servicing purposes.

The service mode is protected against unauthorised access by a password and may only be used by authorised maintenance personnel.

Attention !

Entering incorrect parameters in service mode can cause damage to the cutter system.

4.5 Command description

The menu commands and parameters described below are not available for all plotter modes and some may not be released for use. Menu commands that are not available as standard and for which the associated submenus and parameters are *underlined* are therefore dependent on the plotter configuration.

General information on speed and acceleration:

Output performance depends on various parameters. Depending on the type of plotter, the software version, the configuration and the tool head, varying performance can be observed on different machines with the same parameter settings.

4.5.1 Job setup (1)

SPEED (111) Use this submenu to set the moving speed of the machine. There are "online" and "offline" parameters.

Online parameters are the values used when the plotter is in online mode, i.e. when processing internal commands such as performing test plots etc.

Offline parameters are the values used when the plotter is being operated using the arrow keys.

XY-DOWN (1111) Moving speed with lowered tool - in online mode.
Setting range: 1 - 1000 mm/s

XY-UP (1112) Moving speed with raised tool - in online mode.
Setting range: 1 - 1000 mm/s

MANUAL MOVE (1113)

SPEED UP (11131) Moving speed with raised tool - moving manually.
Setting range: 1 - 1000 mm/s

SPEED DOWN (11132) Moving speed with lowered tool - moving manually.
Setting range: 1 - 1000 mm/s

Save as a configuration parameter, if required (ESC 46).

ACCEL (112) This submenu is used to set the acceleration.

XY-DOWN (1121) Acceleration with lowered tool.

XY-UP (1122) Acceleration with raised tool.

Acceleration levels	Universal version	Speed version
1	$0.125 \times a_{\max}$	1.25 m/s^2
2	$0.25 \times a_{\max}$	2.5 m/s^2
3	$0.5 \times a_{\max}$	5 m/s^2
4	a_{\max}	10 m/s^2

Acceleration levels:

- Enter using the numeric keypad.
- Confirm with the ENT key.
- Save as a user parameter, if required.

With "Universal" version plotters, the maximum acceleration depends on the tool head used. The highest acceleration is reached with the C2/C2P, CP and Pen heads. Acceleration level 4 corresponds to the maximum acceleration (a_{\max}). With acceleration levels 3, 2, 1, this value is always reduced by 50%.

TANGENTIAL (113) The following settings are possible within this submenu:

TANG.ROT (1131) The rotation of the tangentially controlled tool can be switched on/off here. The TANG status cannot be stored and is always ON after switching on the plotter.

LIFTUP ANGLE (1132) You can set the angle for automatic corner lifting for the tool.

If a direction change of more than the set value is detected during the cutting process, the tool is raised automatically, turned into the cutting direction and lowered again.

The default value is an angle of 40 degrees.

Angle value:

- Enter using the numeric keypad.
- Confirm with the ENT key.
- Save as a user parameter, if required.

TOOL INIT (1133) The tool head identification is uploaded again and indicated in the display. Subsequently, the tangentially controlled tool is re-initialised.

TOOLDELAY (114) The following delays can be set within this submenu:

BEFORE DOWN (1141) Delay before lowering the tool.

AFTER DOWN (1142) Delay after lowering the tool.

BEFORE UP (1143) Delay before lifting the tool.

AFTER UP (1144) Delay after lifting the tool.

- CONNECT PU/PD (1145)** This function is to be used only in conjunction with a laser engraving system. Delays are entered in milliseconds (ms). The setting range is from 1 - 9999 ms. Delay time:
- Enter using the numeric keypad.
 - Confirm with the ENT key.
 - Save as a user parameter, if required.
- These delays are not relevant for heads with servo-controlled Z- or R-axis (e.g. Tz-P, RzP and C2).
- Z-AXIS (RZP) (115)** All functions and settings within this submenu are relevant only for milling head type RzP. The following commands are described in section 3 in the specifications for the milling head.
- INIT ABSOLUTE (1151)**
- INIT RELATIVE (1152)**
- POS DOWN (1153)**
- Z-LOWER (1154)**
- ROUTER ON/OFF (1155)**
- VAC CLEANER ON/OFF (1156)**
- POS UP (1157)**
- Z-LIFT (1158)**
- Z-OFFSET (1159)**
- KNIFE PRESSURE (116)** The following commands are valid only for the cutting and drawing head type C2.
- CUT (1161)** Here, the contact pressure of the knife can be adjusted to the material to be cut. Save the contact pressure as a user parameter (not as a configuration parameter). The default value is 100 gram.
- CUT OFF (1162)** Here, the contact pressure of the knife for the cut function is set. The default value is 500 gram.
- Contact pressure:
- Enter using the numeric keypad.
 - Confirm with the ENT key.
 - Save as a user parameter, if required.
- PROCESSING (117)** In this submenu, processing can be set to meet the desired quality and speed requirements. The largest speed advantage is achieved when the control software installed on the computer supports circular arc commands for curves. The improvement in speed is gained from increased speed while plotting curves. In medium and high settings, vector processing is identical; when HIGH, acceleration is reduced and the pen delay is optimised and locked.

QUALITY (1171) Possible settings: HIGH/MEDIUM/LOW/4/5/6/7/8/9
Default:MEDIUM

The "HIGH" quality level should always be selected for short texts with high quality requirements.

Make the setting either via:

- The arrow keys (left/right) or
- The numeric keypad:

1 = MEDIUM

2 = HIGH

3 = LOW

4 - 9 = The quality is reduced; the speed in plotting curves is increased.

Confirm input with the ENT key and save as configuration parameter.

CONTROL MODE (1172) This command controls the PD speed for specific tool heads and options:

Dispenser head

Milling head

Oscillating tool

A constant maximum speed is important with these tool heads. In the preset AUTO mode, the speed is automatically adjusted by the head recognition.

If a speed of 200 mm/s is set on the keyboard, the tool reaches a maximum speed of 283 mm/s in the MS (Master Slave) mode, moving on a 45° line.

In the CP (Continuous Path) mode, however, the maximum speed is limited to 200 mm/s.

Possible settings: AUTO / CP / MS

Make the setting either via:

- The arrow keys (left/right) or
- The numeric keypad: 0 = AUTO, 1 = CP, 2 = MS

Confirm input with the ENT key and save as configuration parameter for special applications or tests.

Tz-MODULE (118) All functions and settings within this submenu are relevant only for tool head type Tz. The following commands are described in section 3 in the specifications for the Tz head.

POS UP (1181)

POS DOWN (1182)

Z-OFFSET (1183)

Z-INIT (1184)

Z-INIT AUTO (1185)

Z-LOWER (1186)

Z-LIFT (1187)

MODE (1188)

PRESSURE (1189)

FEED (12) The following commands are used to control the material feeding system.

LENGTH (121) To define the feed length.

The feed length in millimetres:

- Enter using the numeric keypad.
- Confirm with the ENT key.

VAC TIME (122) Determines the period between the lowering of the feeder elements and the start of feeding.

This time is required to create the vacuum or a cushion of air.



Important !

If you are operating the XL-1200LC cutter in combination with a blower, set this value to 0.

FEEDER (123) A foil sensor is assigned to each feeder element on the table. If the plotter is configured for foil feeding, the feeder elements are monitored and controlled by the foil sensors.

When variable feeder elements are used, all elements are switched to and controlled by the command "FEEDER 1 (1231)".

All feeder elements outside of the foil should be fixed using the fixing button; see the section "Feed systems".

These commands can be used to do the following for each of the four feeder elements:

- Switch on (ON)
- Switch off (OFF)
- Set to automatic (AUTO)

Make the setting either via:

- The arrow keys (left/right) or
- The numeric keypad: 0 = AUTO, 1 = ON, 2 = OFF

Confirm the entry using the ENT key.

FEEDER 1 (1231)

FEEDER 2 (1232)

FEEDER 3 (1233)

FEEDER 4 (1234)

LIGHTBARRIER (124)

During feeding, the material often lifts from the table and breaks the light barriers. Using this command, the safety light barriers are deactivated during feeding of material.

Possible setting: ON/OFF

- Change using the arrow keys (left/right).
- Confirm with the ENT key.
- Save as a configuration parameter, if required.

QUICK CONFIG (125)

This function is needed only in the textile industry. Various methods of material fixing can be used here.

Typical applications:

- Drawing on paper (from roll to roll):
Material fixing using a clamping bar and tensioning motor; during feeding, a winding motor winds up the paper at the front.
- Cutting cardboard (from roll - with or without winding up of the rest):
Material fixing by means of vacuum; prior to feeding, the plotter stops for the removal of the cut parts; during material feed, a valve vents the vacuum and activates it again afterwards.

Once the settings have been saved, you can load the relevant setting by choosing configuration 1 or 2. During the loading of a configuration block, connections, e.g., the clamping bar, are undone so that material can be removed or new material added.

TOGGLE CONFIG (1251)

Changes between the current configuration block and the alternative.

TRANS. CONFIG. 1 (1252)

LOAD (12521)

Loads configuration 1.

SAVE (12522)

Saves the current values as configuration 1.

TRANS. CONFIG. 2 (1253)

LOAD (12531)

Loads configuration 2.

SAVE (12532)

Saves the current values as configuration 2.

The "Standard" settings for a "Marker" are as follows:

MODE	NO VACUUM	(128)
ROLL OFF	CORE	(1291)
FIXING	CLAMP B.	(1293)
ROLL-UP	CORE	(1294)

The "Standard" settings for a "Cutter" are as follows:

MODE	VAC / VAC + STOP	(128)
ROLL OFF	NONE OR CORE	(1291)
FIXING	VAC / VAC + CLAMP B.	(1293)
ROLL-UP	NONE OR CORE	(1294)

SET AND SAVE

Saving standard parameters:

It is advisable to save the standard configuration or the settings that are used most frequently as configuration block 1.

Example:

MODE	NO VAC	(128 U)	U = User parameter (save using <ESC> 42)
ROLL OFF	CORE	(1291 C)	*
FIXING	VAC / CLAMP B.	(1293 C)	*
CORE	ROLL-UP	(1294 C)	* C = Configuration parameter (save using <ESC> 46)

Save configuration block 1:

The basic configuration can be saved as configuration block 1 using <ESC> 12522. When the plotter is switched on, the standard parameters are loaded.

Save configuration block 2:

Set the parameters to suit the application.

Example:

MODE	VAC or VAC + STOP	(128 U)
ROLL OFF	NONE or CORE	(1291 C)
VAC	FIXING	(1293 C)
ROLL-UP	NONE or CORE	(1294 C)

Save configuration block 2 using <ESC> 12532.

Once all settings have been made correctly, it is possible to switch between block 1 and 2 using the "TOGGLE CONFIG" or "LOAD CONFIG x" function.

The configuration can also be changed using a software (HPGL) command.

- SHEET FEEDER (126)** The commands in this submenu are used to configure the sheet feeder (autom. sheet feeding). This can be operated in various ways.
- MODE (1261)** Here, it is possible to select between the various loading methods.
- Mode 1 LF a FF Load a new sheet immediately after feeding
 Mode 2 LD a DL Load with delay learnt automatically
- In the case of repetitions, once processing is complete, the plotter calculates the optimal time that it requires to position the next sheet.
- Mode 3 LD CMD Load on command
 Mode 4 LD FIX Load after fixed delay time
- DELAY (1262)** The delay time that is used for LD FIX can be set here.
- LB LOCK DIST (1263)** The material feed interrupts the safety light barriers at the rear of the plotter.
- Using this value, the light barrier (rear) can be set in such a way (deactivated in advance) that the material feed no longer interrupts it.
- All values and settings in this submenu are preset during installation and commissioning of the unit and do not need/should not be changed subsequently.
- The parameters can be saved as configuration parameters (46) if necessary.
- LOCK FEEDER (1264)** Lock sheet feeder.
- During the next feed, a new sheet will not be taken up from the feeder. The plotter transports only the material that is already on the plotter.
- Save the configuration.**
- The standard configuration for the plotter is a combination of configuration data and user data.
- This data is saved in different storage locations. When the plotter is switched on, the individual parameter blocks are loaded and then provide the basic configuration or the working configuration.
- The configuration blocks are stored in an independent storage location and are loaded into the memory when retrieved.
- ROLL OFF (127)** This command defines the feeding/take-up device installed for the material feeding system.
- Possible settings: AUTO / MANU
- The AUTO setting applies for the motor-driven foil take-up device.
- Confirm the setting with the ENT key and save as a configuration parameter, if required.

- MODE (128)** This command:
- Is valid only for plotter types "Marker" and "Marker/Cutter" used in the textile industry
 - Defines the feed cycle for the material feeding system

Possible settings: VACUUM, VAC + STOP, NO VAC

With VACUUM, the material is held down by vacuum. The plotter is equipped with a vacuum valve that reverses the air flow during feeding.

With VAC.+ST (Vacuum and Stop), the material feeding procedure is as follows:

- The beam moves to the rear.
- The feeder elements hold down the material.
- The vacuum valve reverses the air flow; an air cushion is generated between material and vacuum plate.
- The plotter goes into standby. The display shows:

Feed

Continue with ENT.

- Now the cut material can be removed from the vacuum plate.
- The material feed is carried out when the ENT key is pressed.

With NO VAC, the material is fixed by the clamping beam and take-up device - without vacuum. The vacuum is not activated during feeding.

Attention !

If the mode is NO VAC and the vacuum pump/blower is switched on at the keypad, the vacuum is not released during feeding - error "X-Override" appears.

- CONFIGURATION (129)** The following commands:
- Define the control of the material feeding system
 - Are factory-adapted to the installed material feeding system and stored as configuration parameters

- ROLL OFF (1291)** This command defines the take-up device.

Possible settings: MANU / DRIVEN / CORE / EXTERNAL

Setting	Take-up device
MANU	Not installed or manual device
DRIVEN	Motor-driven
CORE	Paper take-up with core, motor-driven for textile plotter Marker/Cutter
EXTERNAL	External device

SENSORS (1292) This command defines material monitoring with foil sensors.

Possible settings: 4x / 1x / NONE

Setting	Material monitoring
4x	4 foil sensors for automatic foil feeding with fixed feeder elements.
1x	End sensor for automatic foil feeding with shiftable feeder elements.
NONE	With conveyor installed.

FIXING (1293) This command defines material hold-down during feeding.

Possible settings: VAC / VAC+CLAMP B. / CLAMP B. / NONE

Setting	Material hold-down
VAC	With vacuum on the table.
VAC+CLAMP B.	With vacuum and clamping beam.
CLAMP B.	With clamping beam for the textile plotter Marker/Cutter.
NONE	Not installed.

ROLL-UP (1294) This command defines the take-up device.

Possible settings: WITHOUT / CORELESS / CORE / EXTERNAL

Setting	Take-up device
WITHOUT	Not installed
CORELESS	Coreless, with drive belts
CORE	Paper take-up with core, motor-driven for textile plotter Marker/Cutter
EXTERNAL	External device

ZOOM FACTORS (13) This submenu is a specific extension for the ZÜND plotter. The size of the output plot can be determined using the following commands.

ZOOM X,Y (131) The zoom factor for the X and Y axis is set here.

Example: With a zoom factor = 2, the complete output plot is enlarged by the factor 2.

ZOOM X (132) The zoom factor for the X axis is set here.

ZOOM FACTOR (133) The zoom factor for the Y axis is set here.

An output can be scaled easily by entering specific zoom factors for the X and Y axis. With negative zoom factors, the output is mirror-reversed.

Zoom factors:

- Enter using the numeric keypad.
- Confirm with the ENT key.

- Save as a user parameter, if required.

GEOMETRY (14) There is a geometric means of cutting a job (Cut-File) at a certain angle when using the plotter. As a precondition, the job may not include any feed and the size of the Cut-file may not exceed 1 MB.

Possible settings:

ROTATION (141)

ADJUST ANGLE (1411) Sets the cutting angle of the job. The plotter calculates the correct angle by moving to 2 points (P1 and P2) on the axis of rotation axis (e.g. ticks or the edge of the sheet). The 2 points should be as far apart as possible to enable exact calculation.

ANGLE (1412) The angle of rotation can be entered, if known.

ROTATION PT. (1413) Sets the position of the rotation point by manually moving to it.

ADJUST PT. (14131) The position of the rotation point can be entered directly using the keyboard.

ACTIVATION (1414) ON/OFF determines if defined values, such as angles, are calculated with the job. Determines the offset of the job coordinates to the work area of the plotter, preventing any part of the job from falling outside of the working area of the plotter.

A = Material

B = Rotation angle

P0 = Rotation point

4.5.2 Tool (2)

SELECT TOOL (21) A specific tool can be selected using the commands within this submenu.

NUMBER (211) A tool can be selected here.

Possible inputs: 1, 2, 3, 4

Enter the tool number using the numeric keypad and confirm with the ENT key.

The tool number cannot be stored permanently. When the machine is switched on, the tool with number 1 is always active.

LOCK TOOL (212) This function is used to lock a tool, so that it remains active, irrespective of software commands, until the locking is removed.

Possible settings: ON / OFF

TOOL SETUP 1 (22)

ROUTER (221) Within this submenu, the frequency converter for the milling spindle is adapted to the machine.

CONV.TYPE (2211) Use this command to specify the type of converter.

Possible settings: AUTO / MANU

Setting	Type of converter
AUTO	KAVO with digital display
MANU	KAVO without digital display or external device



Important !

With the AUTO setting, the converter transmits a confirmation to the machine after the switching-on signal or when a preset speed is reached. The data starts to be processed only once this confirmation has been made successfully.

ROUTER DELAY (2212) A delay can be specified here if a converter without confirmation is connected (MANU). This ensures that the milling spindle has reached the required rpm before the machine begins to process the data.

Desired delay:

- Enter using the numeric keypad.
- Confirm with the ENT key.
- Save as a configuration parameter, if required.

ROTATIONAL SPEED (2213) No function.

LINK TO TOOL (2214) If a router is inserted into a Tz-module/head, the tool no. must be defined here and, if required, stored as a configuration parameter.

OSCILLATING TOOL (222) The following settings are valid for electrical oscillating tools (EOT) and for pneumatic oscillating tools (POT).

DELAY (2221) Sets the delay parameter for the tool's downward movement.
Parameters are scaled in 1/10 seconds.
The default parameter is 3 (0.3 seconds).

LINK TO TOOL (2222) The tool module in which the oscillating tool is inserted must be defined in this menu.
Possible inputs: 0, 1, 2, 3, 4
Tool number:

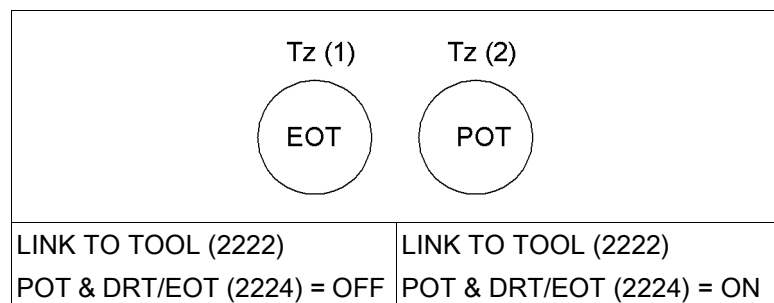
- Enter using the (left/right) arrow keys or the numeric keypad.
- Confirm with the ENT key.
- Save as a configuration parameter, if required.

FREQUENCY (2223) Valid only for EOT type tools.
Select high or low frequency for the EOT
(electric oscillating tool).
Possible settings: HIGH / LOW

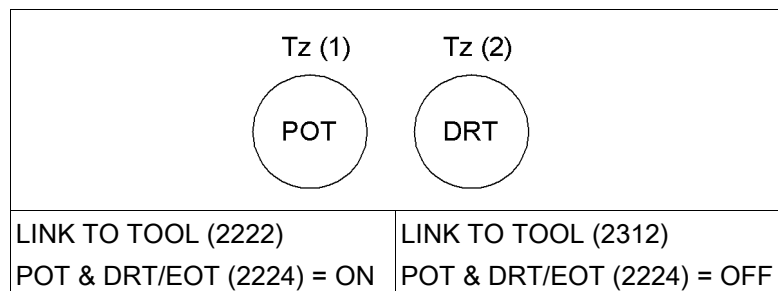
Setting	Stroke/min
HIGH	18000
LOW	12000

POT & DRT/EOT (2224) Operate POT in combination with an EOT/DRT tool. Assign the POT tool to the module used and set the function POT & DRT/EOT to ON.

E.g.: EOT - module 1, POT - module 2



E.g.: POT - module 1, DRT - module 2



LASER (223) The commands in this submenu are valid only in conjunction with a laser system. For a description of the commands, refer to the documentation for the laser system in section 3.

PASSEPARTOUT (224) This submenu contains commands for the PPT tool.

DELAY (2241) Set the delay for the PPT tool (in milliseconds).

The default value is 300ms.

Desired delay:

- Enter using the numeric keypad.
- Confirm with the ENT key.
- Save as a configuration parameter, if required.

LINK TO TOOL (2242) You can define the tool module into which the PPT tool is inserted here.

Possible inputs: 0, 1, 2, 3, 4

Tool number:

- Enter using the arrow keys (left/right) or the numeric keypad.
- Confirm with the ENT key.
- Save as a user parameter, if required.

CUTTING TOOL (225) The submenu for the cutting of foils.

WIDTH (2251) This command is valid only for cutting and drawing head type C2-P. Use this command to specify the width for automatic foil cutting.

Input range: 0mm to max. width of working surface

Desired width in millimetres:

- Enter using the numeric keypad.
- Confirm with the ENT key.
- Save as a configuration parameter, if required.

PRESSURE SWITCHING (226) This submenu contains commands for the creasing tool.

LINK TO TOOL (2261) For the creasing of cardboard, it is possible to switch the contact pressure automatically and dependent on direction.

- The creasing tool
- Switching the contact pressure

This command defines the tool module for

	Possible inputs: 0, 1, 2, 3, 4 Tool number:
	<ul style="list-style-type: none"> - Enter using the arrow keys (left/right) or the numeric keypad. - Confirm with the ENT key. - Save as a configuration parameter, if required.
JETPLOT (227)	No function.
LINK TO TOOL (2271)	No function.
SPEC. PENPULS (228)	This command increases the pen pulse if a type TP or TPT tool head with increased drawing pen stroke is installed.
LINK TO TOOL (2281)	The tool number for the increased pen pulse is specified here. Possible inputs: 0, 1, 2, 3, 4 Tool number:
	<ul style="list-style-type: none"> - Enter using the arrow keys (left/right) or the numeric keypad. - Confirm with the ENT key. - Save as a user parameter, if required.
DISTANCE COUNTER (229)	This command monitors and measures the distance covered by a lowered tool. For a long-life ballpoint, a drawing performance of 30km is entered, for example. After 30km drawing distance, the machine stops automatically and displays a corresponding message.
LINK TO TOOL (2291)	The tool number to be monitored is specified here. Possible inputs: 0, 1, 2, 3, 4 Tool number:
	<ul style="list-style-type: none"> - Enter using the arrow keys (left/right) or the numeric keypad. - Confirm with the ENT key. - Save as a configuration parameter, if required.
ACTUAL (2292)	If a used tool (ballpoint etc.) is inserted, the distance already covered can be entered here. The distance is saved directly after pressing the ENT key.
MAXIMUM (2293)	The maximum tool life expectancy can be entered here. The tool life is saved directly after pressing the ENT key.
DRT (231)	The following settings relate to the driven rotary tool - hereafter referred to as "DRT".
DELAY (2311)	Sets the delay parameter for the tool's downward movement.
LINK TO TOOL (2312)	Parameters are scaled in 1/10 seconds. The tool module into which the DRT is inserted is defined here. Possible inputs: 0,1,2,3,4 Tool number:
	<ul style="list-style-type: none"> - Enter using the (left/right) arrow keys or the numeric keypad. - Confirm with the ENT key. - Save as a configuration parameter, if required.

Command description

ROTATIONAL SPEED (2313) Select high or low frequency for the DRT.

Setting	RPM
HIGH	20000
LOW	12000

NOTCH TOOL (232) The notch tool consists of two rotating tools and can be used, depending on the tool application, as a punch tool (for drilling) or as a groove tool (to cut out V-shaped grooves). Dependent on this, you must define the tool here for punching.

PUNCH LEFT (2321) Defines if a punch tool is implemented here.

PUNCH RIGHT (2322) Defines if a punch tool is implemented here.

T75-MODULE (233) Refer to the description of the T-75 module.

GLUE MODULE (234) No function.

PART MARKER (235)	Settings for the "Part Marker" tool - an inkjet print head to label/mark parts or components.
LINK TO TOOL (2351)	The module of the tool into which the Part Marker is inserted has to be selected here. Possible inputs: OFF, 1, 2, 3, 4 Tool number: <ul style="list-style-type: none"> - Enter using the (left/right) arrow keys or the numeric keypad. - Confirm with the ENT key. - Save as configuration parameter, if required.
WIDTH CORR. (2352)	The width correction can be used to change (expand) the width of the fonts. The default is 1.0; an expansion of up to 2.0 is possible.
CAMERA ILLUM. (236)	The menu for the Zünd camera.
 MODE (2361)	Turn the camera illumination on/off. 0 ... Off 1 ... On
 INTENSITY (2362)	Set the intensity of illumination. Setting 1 ... 7
 RESERVED (2363)	-
 RESERVED (2364)	-
POWER ON INIT. (2365)	ON: The camera settings are adopted and can be saved using SAVE CONFIG (46). OFF: The basic settings are active: MODE - off, INTENSITY - 1
CUT PRECISION (24)	Depending on the tool heads and tools used, inaccuracies may occur as a result of the sum of several manufactured-in tolerances, especially during cutting.

Example: Tool head with knife:

Tool heads, insert sleeves, knife holders and even the knives themselves are subjected to manufactured-in tolerances. When a knife cuts, each cutting error is doubled with cutting in the reverse direction. If in this case a tolerance of only 1/100mm is assumed, then it is already 4/100mm. The "reversal error" doubles this tolerance. In our example, a tolerance of 8/100 mm could occur. The "Accuracy" function was implemented to eliminate the resulting inaccuracy.



Important !

Check the precision using online data or a test cut. Possible tolerances cannot be viewed when cutting in offline mode.

Procedure

To be able to correct occurring tolerances, the skew has to be determined. Use menu function ESC 2413 to perform a test cut. Determine tolerances with a scaled magnifying glass and set the corrective parameters accordingly.

In the **link to tool (ESC 241)**, assign this function/correction to the appropriate tool.

As a final check, carry out a test cut with the functions 2431 and 2432 resp. Corrections can be made for all tools separately (tools 1-4). When all tools are properly set up, save the configuration parameters (46).



Important !

This procedure must be repeated every time a tool is changed.

ADJUST XY (241)

X CORRECTION (2411) Enter the corrective parameter for the X-direction here.

Y CORRECTION (2412) Enter the corrective parameter for the Y-direction here

TEST-CUT (2413) Performs a test cut.

ADJUST TANG (242) The tangential angle can be readjusted by up to +/- 10° from the default setting (the knife is positioned at an angle to the cutting edge).



Important !

Changing the tangential angle may damage the tool!

TEST PATTERN (243)

POLYGON (2431) Cuts 2 octagons to check the corrective parameters.

If you place the two parts that have been cut on top of each other, the edges will show four errors in the Y axis.

An error in the X-axis results in corners not being cleanly cut.

RECTANGLE (2432) Cuts two rectangles to check the corrective parameters.

LINK TO TOOL (244)

TOOL 1 (2441)

TOOL 2 (2442)

TOOL 3 (2443)

TOOL 4 (2444) Assign the correction option to the tool here.

TOOL MANAGER (25)	The tool manager facilitates the initialisation and setup of frequently used tools by saving important settings and initialisation processes for each individual tool. Every tool for which a parameter set has been saved in the tool manager can be made ready for operation simply by accessing the relevant parameters. Refer to the "Tool Manager" operating manual.
SHOW ACTIVE TOOLS (251)	Shows which tool is currently being used in which module.
RECALL SETTINGS (252)	Recall a pre-saved initialisation process (tool, parameter set).
SAVE SETTINGS (253)	Save the parameter set for a specific tool in the module selected.
SPECIFY NEW TOOL (254)	Create a new tool parameter set.
MODE (255)	Select the tool manager mode (off/manual/auto*).
Z DOWN LIMIT(26)	<p>Set the "down position" limit (for the module/tool selected).</p> <p>The Z down limit option prevents too large a number from being entered for the POS DOWN. It can be entered separately for each module and is saved automatically.</p> <p>For example: If the Z DOWN LIMIT is set at 1mm, the DOWN POS (1182) will be reduced to 1mm if a value > 1mm is entered.</p> <ul style="list-style-type: none">• Enter the desired limit for the Z axis in the Z DOWN LIMIT (26) menu.

4.5.3 Functions (3)

TEST-CUT (3)

Attention !

This command may be used only with tangentially controlled tools (knives).

Using other tool heads could result in damage to the worksheet, tool and the surface of the table.

This function:

- Is used as the cutting test for dual head C2P and cutting/drawing head type C2 and T2
- Cuts/draws two squares, one within the other, with a 10mm/15mm length of side, using the selected tool

FEED/CUT OFF (32) The material feeding system is controlled using commands in this submenu. The necessary pre-settings must be made in the submenus FEED (12) and CUTTING TOOL (225).

FEED (321) A foil feed with a preset length is carried out.

CUT OFF (322) The foil is cut according to the preset parameters.

FEED&CUT OFF (323) This command:

- Can be used only in conjunction with a cutting device
- Carries out a foil feed from the current position and then cuts the foil

MANUAL FEED (324) The bar must be moved to the desired reference point using the arrow keys. After activating the function, the feeder elements are activated and the vacuum or hold down is released. The material can be feed using the arrow keys. To stop, press the ENT key.

By default, manual feed is set so that the material can be moved forward only. By readjusting the basic settings, "negative manual" feed is also possible.

EXT. MAN. FEED (325) This function is available only if an auxiliary conveyor belt drive is installed. It moves the conveyor belt back and forth without moving the X-beam.

BUFFER (33)

CLEAR BUFFER (331) Clears the internal data buffer and checks whether data arrives via the interface during deletion. If data is being received, the machine stays in clearing mode as long as data is still being received.

REPLOT (332) This function can re-issue the content of the data buffer. The machine changes into replot mode.

The internal memory of the plotter is 1 MB. All plot jobs below this limit can be completely repeated with this command.

Starting replot operation:

Enter the REPLOT command (332). The displays shows the following message:

* Replot Mode *
Start if Online

MOVEMENT POSSIBLE

Switch to ONLINE by pressing either the ENT, CE, ESC or ONLINE key.



Attention !

Danger from automatic starts

After switching to ONLINE, the machine moves to the reference point and immediately starts processing data. The operating unit display shows * Replot-Mode * instead of *** Online-Mode ***.



Important !

Start REPLOT only once the complete job has been transferred und stored in the data buffer.

Interrupting replot mode:

Press the ONLINE key. The machine switches into OFFLINE mode. Now a workpiece (material) or a tool change can be carried out. For a restart, enter the REPLOT command and press the ONLINE key.

Terminating replot-mode:

Enter the CLEAR BUFFER command (331).

WINDOW (34) The commands in this submenu enable users to limit the working area of the machine (window).

All data and vectors outside this window are ignored. Vectors which begin inside the window and end outside are clipped at the window boundary.

STATUS (341) Here the window can be activated/deactivated.

If the window is deactivated, the maximum working area of the machine is used.

If a window is activated, you cannot move over the specified limits either in ONLINE mode or in OFFLINE mode.

Possible inputs: Window ON, Window OFF

Make an entry

- Using the arrow keys (left/right) or
- The numeric keypad: 0 = OFF, 1 = ON
- And confirm with the ENT key.

This setting cannot be stored permanently.

DEFINE (342) The window range is determined here by entering two reference points on the working surface.

Procedure

- a Using the direction keys, move the tool head to the lower right corner of the desired window range and press the ENT key.
- b Using the direction keys, move the tool head to the upper left corner of the desired window range and press the ENT key.

SHOW (343) Used to show the window range. The plotter moves along the boundaries of the window you have defined.

Attention !

There is a risk of damage to the cutter through incorrect operation.

If a window range has not been specified, the machine moves along the boundaries of the complete working range. Depending on the default settings, this may be at maximum speed and acceleration.

C2 TOOL (35)

RELEASE TOOL (351) This command is available only for cutting/drawing head type C2. The tool holder is released after the command input and can be removed from the cutting/drawing head.

STATUS (36)

SHOW STATUS (361) Indicates the current basic settings on the display:

```
SNR:          300200      C2
HW:           9600, n, 8, 1
AS: 4.4 VS:   VS: 1000, 1000
MC: xxx           AC: xxx
```

SNR	Serial number
C2	Type of tool head
HW	Interface parameter
VS	Speed; tool down/tool up
AC	Axis controller; version no.
AS	Acceleration; tool down/tool up
MC	Master controller; version no.

When you press the downward arrow key, the following appears on the display:

X-Meter:	xxxxx	Total distance in X direction
Y-Meter:	xxxxx	Total distance in Y direction
Hours:	xxx	Number of operating hours

You can call the previous display using the upward arrow key.

To exit the display, press the ESC key: This returns it to the highest menu level.

PLOT STATUS (362) You use this command to plot different settings.

Before command input:

- Insert pen into tool head.

- Position a DIN A4 sheet on the table, at a right-angle to the X direction and fix it.
- Position the pen on the lower left corner of this sheet. Then press the REF key, set a reference point and confirm with the ENT key.

DIGITIZER (35) Only in connection with special software.

TESTS (38)

PLOTS (381) **For servicing purposes only!**

This submenu contains various test plots for the drawing/cutting of different patterns using the selected tool and according to preset parameters.

Attention !

It is possible to damage a lowered tool or to cause damage to the table. Therefore, remove the tool or make the appropriate settings before carrying out a test plot. Not all test plots can be stopped immediately!

Before each test plot, the following message appears on the operating unit display:

Check tool first!
Press ESC to abort.
Continue with ENT.

DIN (3811) Plots the DIN-TEST onto a DIN A3 sheet.

POLYGON (3812) Plots polygons over the complete working area of the table.

RANDOM LINE (3813) Travels continuously over random vectors with raised tool.

DIAGONAL (3814) Travels continuously over the diagonal of the active working area or over the diagonal of the window range if a window is set.

RANDOM CURVE (3815) Travels continuously over random curves with raised tool.

SQUARE (3816) Plots squares over the complete working area of the table.

CIRCLE (3817) Plots circles over the complete working area of the table.

SYSTEM (382)

TESTFUNCTIONS 382(1-...) These test functions are reserved for service and test purposes and may be used only by maintenance technicians or according to their instructions.

MORE (39)

REFERENCE (391, REF) This submenu contains commands for setting and displaying up to two reference points (starting points) on the working area. It can be beneficial to have a second reference point available for some specific applications.

The default reference point is by the operating unit and the machine moves to this point during initialisation.

Normally, one reference point (starting point) is used.

There are 3 different operating modes:

- Standard mode
- Tandem mode
- Double-sided mode

Standard mode

One reference point is used.

Tandem mode

In tandem mode, it is possible to set up or remove material from one side, while the plotter is operating on the other side. The appropriate reference point has to be toggled in order to perform the switch-over. The switch-over can also be done using the HPGL command.

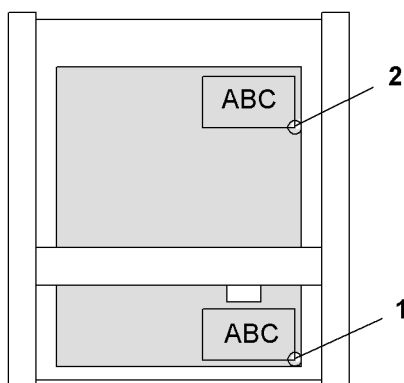


Fig. 4-3 Diagram of tandem mode

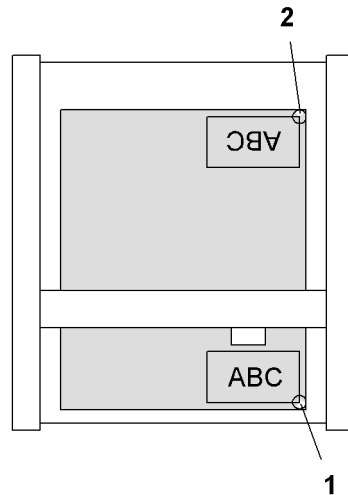
1 Ref. pt. 1

2 Ref. pt. 2

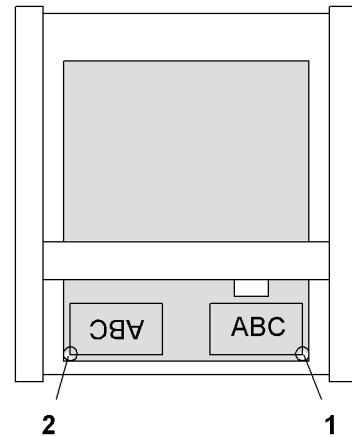
Double-sided mode

The selected axis (X or Y) is mirrored when you switch to double-sided mode.
For this application, it is necessary to mark or fix the position of the material.

Double reference point X



Double reference point Y



1 Ref. pt. 1

2 Ref. pt. 2

REFERENCE (391)**SET VAC (3911, REF + 1/2)**

This command sets a new reference point.

Procedure:

- Move the active tool or laser pointer to the new starting point using the arrow keys.
- Press the REF key on the operating unit and set the reference point (1 or 2) by pressing the appropriate key.

The reference point:

- May not be altered during a job
- Refers to the active tool or, if installed, the laser pointer

When you press the "REF" key, the following menu appears:

SET REFERENCE 1 (3911)

Reference point no. 1 is set.

GO REFERENCE 1 (3912)

The machine moves to reference point no. 1.

CLEAR & GO (3913)

Deletes the reference point(s) and moves to the original reference point.

GOTO XY (3914)**GOTO X (39141)**

A point can be set precisely by entering the X coordinate.

GOTO Y (39142)

A point can be set precisely by entering the Y coordinate.

MOVE Y2 (3915)

This command is valid only for the LC-16/52 and LC-27/32 cutters.

SET REFERENCE 2 (3916)

Reference point no. 2 is set.

Command description

GO REFERENCE 2 (3916) The machine moves to reference point no. 2.

MODE (3918) Switches from tandem to double-sided ref. mode.

DBL REF MOD (39181)

TANDEM	Tandem mode is activated (= default).
DBL X	DBL X is activated.
DBL Y	DBL Y is activated.

POINTER KIND (39182) If a laser pointer is installed in the tool head, define whether the active tool or the laser pointer is to be used as the reference point marker. The offset between the tool and laser pointer must already have been set while in service mode.

TOGGLE REF PT. (3919) Toggles between ref. point 1 and 2 if 2 reference points have been defined.

VACUUM (392, VAC) This submenu contains commands for the vacuum control system (material hold-down) and can be called up directly with the VAC key.

PUMP ON/OFF (3921, VAC+1) You use this command to switch the vacuum pump/blower on/off.

VALVE ON/OFF (3922, VAC+2) The vacuum valve switches between intake and exhaust. This valve is optional and is needed for material feeding.

WIDTH (3923, VAC+2) This command enables you to adjust the width of the vacuum using a motor-driven vacuum slide valve.

Procedure

- Press the VAC key on the operating unit.
- Enter the WIDTH command. The current vacuum width:
 - Is shown on the display
 - Is indicated by the tool head with Pen 1
- Move the tool head in the Y-direction using the direction keys until the desired vacuum width appears on the display.
- Press the ENT key to set the new vacuum width and move the tool head back to its original position.

Important !

When using the WIDTH command, the vacuum width is always indicated using the position of the the first pen/tool holder, irrespective of the actual tool head used.



OFF DELAY (3924, VAC+4)

This command starts a counter as soon as the command RELEASE VAC (3922) is issued and switches off the vacuum pump/blower automatically after a predefined time.

During material feed, large size materials can create a relatively large air cushion below them while moving forward. This may lead to folds forming in the materials. Switching off the vacuum pump/blower during material feeding can prevent this.

If, e.g., a value of 1 second is set, the feeder elements are lowered, the vacuum valve is toggled, the plotter pulls the material forward. 1 second after the toggle, the pump is turned off. This causes the air flow to slowly subside, and the air cushion is reduced slowly during material feed.

At the end of the feed movement, the valve and the vacuum pump/blower are toggled on again providing a slow, not sudden, build up of vacuum that prevents folds from forming in the material.

Input range	1 - 9999 sec
Default value	0 sec

The command is not active when using the default value of 0 seconds.

Example: OFF DELAY = 600

If the valve is ventilated with command RELEASE VAC (3922), the vacuum pump/blower and the valve are automatically deactivated after 600 seconds (10 minutes).

Delay time in seconds:

- Enter using the numeric keypad.
- Confirm with the ENT key.
- Save as a configuration parameter, if required.



Important !

If you are operating the XL-1200LC cutter in combination with a blower, set the off delay to 0.01.

SET VAC (3925, VAC + 5)

This command enables faster adjustment of the vacuum width.

Procedure

- Position the active tool to the desired vacuum width using the direction keys.
- Press the VAC key and key 5.

FOILCOVER (3926)

This command is valid only for the LC-16/52 and LC-27/32 plotters.

LC-16/52 ZONE (3927)

This command is valid only for the LC-16/52 plotters.

MOVE TO PARK (393)

When using the command MOVE TO PARK, the tool head moves to a specified position at the edge of the working area to enable undisturbed working (e.g. for changing material, for adjusting optional items etc.).

This command can also be called using the HPGL command 'PK' (without additional parameters).



Important !

While the tool head is in the park position, the keys on the operating unit are locked in order to avoid it being moved. Numerical keys 1, 2 and 3 are exempt from this lock-down and are assigned the following commands:

Numerical key	Command
1	Vac pump is on/off (3931)
2	Vacuum is on (3932)
3	Exit park mode (3933)

A command overview appears on the display:

****PARK MENU****

1	Vac pump is [on/off]	On/Off vacuum pump
2	Vacuum is on	Intake/exhaust by switching valve
3	Exit Park	Exit submenu and park position

The park position can be cancelled using numerical key '3' only. When this is done, the head moves to the last position from before the PARK command.

The park position:

- Is defined in service mode
- Is saved in the plotter Setup
- Can change depending on the tool head installed and the available options

PUMP ON/OFF (3931) You use this command to switch the vacuum pump/blower on/off.

In the park position, the command is executed by pressing numerical key 1 on the operating unit.

VALVE ON/OFF (3932) The vacuum valve switches between intake and exhaust. The valve must be exhausted for a material change during operation of the vacuum pump.

In the park position, the command is executed by pressing numerical key 2 on the operating unit.

END PARKING (3933) The tool head leaves the park position and continues with the plot job or moves to the reference point.

In the park position, the command is executed by pressing numerical key 3 on the operating unit.

SELECT TOOL (394) The commands in this submenu enable the active tool to be changed quickly.

Conditions:

The commands are assigned to a specific function key on the operating unit using the command SET USER KEY (45).

TOOL + (3941) This command increases the number of the active tool by 1 until the highest tool number is reached.

TOOL - (3942) This command decreases the number of the active tool by 1 until the first tool is active.

4.5.4 User (4)

This submenu is a ZÜND-specific extension that enables users to manage up to 9 different user parameters.

A user parameter group contains settings and defaults for the following commands:

CUT OFF	PEN DELAY
SET USERSTRING	POS UP
ACCEL	POS DOWN
FUNCTION KEY	KNIFE PRESSURE
SPEED XY-UP	TOOL POSITION
SPEED XY-DOWN	ZOOM
INTERFACE PARAMETER	

For "TZ" parameters, see also chapter "User Parameters".

LOAD (41) This command automatically loads a stored group and replaces the current user parameter.

- NUMBER (411)** Enter the number (1-9) of the desired user parameter group:
- Use either the arrow keys (left/right) or the numeric keypad.
 - Confirm with the ENT key.
- SAVE (42)** This command stores the current settings for the commands mentioned above as a user parameter group.
- NUMBER (421)** Enter a number (1-9) to save each group of user parameters.
- Use either the arrow keys (left/right) or the numeric keypad.
 - Confirm with the ENT key.
- SET START USER (43)** This number determines which user parameter group is loaded when the machine is switched on.
- NUMBER (431)** Enter the number (1-9) of the desired user parameter group:
- Use either the arrow keys (left/right) or the numeric keypad.
 - Confirm with the ENT key.
- SET USERSTRING (44)** In ONLINE mode, the display shows the default text "User 1" on the bottom line. You can use the SET USERSTRING command to edit and store this text for each group of user parameters.
- ENTER TEXT (441)** **Procedure**
- Enter the ENTER TEXT command.
- The display shows:
- ENTER TEXT:
User 1

Use cursor keys
- The arrowhead indicates the end of text.
- Press the ENT key.
The arrowhead is replaced by a flashing cursor.
 - For input of text:
Move the cursor using the Left/Right key.
Select a character using the Up/Down key.
 - Move the cursor to the end of text.
 - Confirm the text entered using the ENT key and save as User Parameter.
- SET FUNCTION KEY (45)** The function keys F1 to F4 on the operating unit can be assigned to frequently used commands. This assignment is stored in the user parameter groups. As a result, 4 x 9 variants are available.
- F1 KEY (451)** These commands enable a command number to be assigned to each function key.

Command description

F2 KEY (452)**F3 KEY (453)****F4 KEY (454)****REF KEY (455)**

VAC KEY (456) The new assignment of function keys must then be saved as a user parameter. The machine must be restarted in order to change the current function key assignment.

SAVE CONFIG (46) This command saves the following settings:

ROLL OFF	PARSER TYPE
DISPLAY MODE	PUMP OFF DELAY
ROLL-UP	QUALITY MODE
FIXING	LANGUAGE
SENSORS	START USER
OSCILLATION DELAY	VAC TIME
PASSEPARTOUT DELAY	

4.5.5 Basic setting (5)

SERIAL LINK (51) This submenu contains commands for setting up and monitoring data transmission.

BAUD (511) Used to set the Baud rate between 600 and 38,400 Baud.

FORMAT (512) The following combinations of data, parity and stop bits can be set:

- 7 data bits, 1 stop bit, odd parity
- 7 data bits, 1 stop bit, even parity
- 8 data bits, 1 stop bit, none parity
- 8 data bits, 1 stop bit, odd parity
- 7 data bits, 1 stop bit, even parity
- 9 data bits, 1 stop bit, none parity

PROTOCOL (513) For selecting the following transmission protocols:

- Hardware handshake HW
- Software handshake (XOn/XOff protocol) SW

TERMINAL CHECK (514) All data received via the interface is shown on the display, but is not processed by the machine.

SCI DIAGNOSTIC (515) If the data transmission is interrupted, the following settings can be used to call up test functions for data analysis:

ON	All interruptions to the serial interface are output.
1	Incorrect or incomplete HPGL commands and parity errors are shown on the display and are documented in an error message.
2	Incomplete HPGL commands are shown on the display.

The standard setting is "1".

UNITS (52) You use this submenu to define the length unit for:

- Length entries, such as feed length, Z depth and height
- Display indications
- Internal calculations

UNITS (521) Select length unit:

- METRIC (5211)**
- Using the arrow keys (left/right)
 - By entering the command number using the numeric keypad

INCHES (5212) Confirm with the ENT key and save as a configuration parameter.

MODE (53)

LANGUAGE (531) The commands in this submenu enable you to display the user interface in the following languages:

Select the desired language:

- Using the arrow keys (left/right)
- By entering the command number using the numeric keypad

Confirm with the ENT key and save as a configuration parameter.

PARSER (532) The following commands are available (after consulting the manufacturer) for special applications for the command interpreter (Parser):

ZUND (5321)

HPGL (5322) Default: Zünd-Parser (5321)

Select desired command:

- Using the arrow keys (left/right)
- By entering the command number using the numeric keypad

Confirm with the ENT key and save as a configuration parameter.

RIGHTS (533) This command is required only for service and test purposes.

LOCK SETTINGS (534) When using this command, the machine works only with the preset parameters (speed, acceleration etc.). All HPGL commands that modify these parameters are ignored.

L-BARRIER ON/OFF (54) The machine beam is protected by light barriers on the front and rear. This safety control is active only during ONLINE mode and can be switched off temporarily if malfunctions occur.



Important !

Always call your service contact if the light barriers do not work properly.

SERVICE MODE (55) The commands and functions within this submenu:

- Are locked for users
- Can be accessed only by authorised service personnel

4.6 Operating the cutter

4.6.1 Checks before switching on

- Are there any objects (tools, etc.) on the table and side covers?

Attention !

Light barriers and the safety shut-down are not active during initialisation.

Objects jammed between the beam, tool head and table can cause heavy damage.

- If several tool heads available: is the correct tool head installed?

Important !

Replace the tool head only when the cutter is switched off.



4.6.2 Switching on/off

The complete cutter system is activated/deactivated using the On/Off switch located beneath the operating panel.

After switching on:

- The machine initialises
- The tool plotter then switches into OFF-LINE mode

In OFF-LINE mode:

- The machine stores all data transferred by the CAD/CAM system
- All settings can be made to the tool and material feeding system
- Working material can be inserted or removed

If you press the ON-LINE key on the operator panel, the cutter switches into ON-LINE mode. Operation now starts with processing of:

- Data from contents of input memory
- Data transferred from CAD/CAM system

To switch the machine off:

- First switch the machine into OFF-LINE mode by pressing ON-LINE key.
- If the material feeding system is installed, prepare the processed material for removal (rewind, cut off to length etc.).
- Activate the On/Off switch.

4.6.3 Setting up



Attention !

Danger of injuries through uncontrolled movements of the beam and tool head in ON-LINE mode.

Carry out all setup work for the cutter system in OFF-LINE mode only!

You can find all necessary information about setting up the tool and the material feeding system in sections 3 and 4.

- Align the working material on the table and fix it with vacuum. To do this, press the VAC key and make the settings.
- If necessary, adapt reference point to material. For this purpose, press REF key and enter new reference point.

4.6.4 Checks before processing operation

- Does the SETUP side in the plot file match the current tool configuration?
- Are there any objects (tools, etc.) on the table and side covers?

Strong vibrations can occur in ONLINE operation which could cause objects to fall from the side covers.

5 Malfunctions

5.1 Troubleshooting for after-sales service

If cutter system failures occur and you need our after-sales service, make a note of:

- The machine's serial number
- The error number indicated on the operator panel including the **complete** error message (press ENT key several times for request).

You can find the serial number:

- On the type plate of the cutter
- In section 1 "General", chapter 5 "Conformity"

Once you have this information, please phone:

- Your service partner or Zünd representative in the first instance
- Zünd Systemtechnik AG

Telephone	+41 71 757 81 81
Fax	+41 71 757 81 91

5.2 Error messages

If the operating panel shows an error message:

- Remove the cause of error
- Confirm the error message with the ENT key

The cutter system will then proceed in the ON-LINE mode or give you more information on the display about how to rectify the error.

An error message:

- Can contain several display pages
- Can be displayed in its entirety by pressing the ENT key several times

The following table contains the most important error messages and is arranged according to error numbers.

0101	Serial interface	Parity
	Causes	Parity settings on PC and plotter are different, noise on the data cable.
	Action	Check RS232-settings on PC and plotter, check if there are noise sources near the data cable, connect PC and plotter to the same mains outlet.
	Hint	Test the data transfer using test function 8 (RS232 test) and observe the data that is received using test function 1 (terminal).
0102	Serial interface	Frame
	Causes	Different data formats (data, startbit, stopbit) on the PC and plotter, different baud rates, undefined data, PC switched off.
	Action	Check RS232-settings on PC and plotter.
	Comment	This message is disabled when SCI-diagnostic is set to level 1 or 2. Enter ESC 515, then use the > key to select 1 or 2 and complete using ENT. If "Frame" determines another error in the serial interface at the same time, "Frame" is displayed at level 1.
0103	Serial interface	Buffer overflow
	Causes	Plotter input buffer overflows, transmission stop was ignored. The data cable may not be suitable or is defective (if using hardware protocol) or the PC and plotter protocol settings are different.
	Action	Check protocol settings on PC and plotter, check data cable, use test function 8 (RS232-test).
0104	Serial interface	Noise detected
	Causes	Noise on the serial link
	Action	Check if there are noise sources near the data cable, connect PC and plotter to the same mains outlet.
	Comment	This message is disabled when SCI-diagnostic is set to level 1 or 2. Enter ESC 515, then use the > key to select 1 or 2 and complete using ENT. If "Noise detect" determines another error in the serial interface at the same time, "Noise detect" is displayed at level 1.
	Hint	Use Test function 8 (RS232-Test)
0106	Replot not available	Still receiving data
	Causes	Replot function selected while the plotter is still receiving data on the serial input.
	Action	Clear error message, only select replot after the first job has finished.

0301	AC fault	X-Override
	Causes	X-axis blocked or pushed out of its setting position
	Action	Try to reinitialise the plotter. If this is not possible, switch off the plotter and check the X-axis
	Hint	Check the position sensor using test function 52.
0302	AC fault	Y-Override
	Causes	Y-axis blocked or pushed out of its setting position
	Action	Try to reinitialise the plotter. If this is not possible, switch off the plotter and check the Y-axis
	Hint	Check the position sensor using test function 52
0303	AC fault T-Override	<ESC> for init.
	Causes	T-axis blocked or turned out of its setting position
	Action	Try to reinitialise the plotter. If this is not possible, switch off the plotter and check the T-axis
	Comment	Possible second error : 0001
	Hint	Check the position sensor using test function 52.
0304	AC Fault Z-Override	<ESC> for init.
	Causes	Z-axis (R-axis) blocked or pushed out of its setting position
	Action	Try to reinitialise the plotter. If this is not possible, switch off the plotter and check the Z-axis
	Comment	Possible secondary error : 0001
	Hint	Check the position sensor using test function 52.
0307	AC fault	Check AC
	Causes	Error in the AC part of the system detected or the MC software version is older than the one on the AC system.
	Action	Use <ENT> to check for more information or call Zünd service if there are no further messages
0308	AC fault	Emergency stop
	Causes	Emergency stop detected on laser interface.
	Action	Remove the reason for the emergency stop and switch the plotter off and on again. If you cannot see the reason for the error, check the emergency stop circuit on the laser interface.
0309	AC fault	Check power source
	Causes	Defective fuse or supply out of tolerance
	Action	Display further messages with <ENT> and check the relevant fuses.
	Hint	See chapter "Power supply" in the description of the electronics.
0312	AC fault	Check axis tool
	Causes	Failure while checking the axes after the plotter has been switched on.
	Action	Use <ENT> to check for more information or call Zünd service if there are no further messages
	Hint	See chapter "Check axes" in the description of the electronics.

0317	AC zero mark X	Permanent light
	Causes	X-axis zero mark sensor is defective (permanent light), defect on C-board or interruption between C-board and master board.
	Action	Troubleshooting: see chapter "Zeromarks" for more information.
0318	AC zero mark Y	Permanent light
	Causes	Y-axis zero mark sensor is defective (permanent light), defect on X-board or interruption between X-board and master board.
	Action	Troubleshooting: see chapter "Zeromarks" for more information.
0327	AC Init-Fault Z-Pen	Try to remove tool
	Causes	Z-axis (R-axis) blocked by the tool holder
	Action	Switch off plotter and remove tool holder. Reinsert tool holder after the initialization process
0357	2T tool change	Diff. too low
	Causes	Less than two revolutions for a tool change from one tool to the other.
	Action	Check the mechanics and set the number of revolutions for a tool change to two or more revolutions.
0358	2T tool change	Diff. too high
	Cause	More than 16 revolutions for a tool change from one tool to the other.
	Action	Check the mechanics and set the number of revolutions for a tool change to 16 or fewer revolutions.
0401	HPGL-Parser	Unknown syntax
	Cause	Invalid HPGL-character in the plotfile, noise on the data line
	Index	ASCII-Code of the cause
	Text	Current HPGL-command
	Action	Check plotfile and interface. It may be the case that sections of the plotfile were not transferred.
	Remarks	The current command is terminated. This message is disabled when SCI-diagnostic is set to level 2. Enter ESC 515, then use the > key to select 2 and complete using ENT.
0402	HPGL-Parser	Number of parameters
	Cause	Invalid number of parameters, caused e.g. by a letter in a number, noise
	Index	Required number of parameters
	Text	Current HPGL-command
	Action	Check plotfile and interface. It may be the case that sections of the plotfile were not transferred.
0801	Emergency stop	<ENT> to reinit
	Cause	Emergency stop initiated
	Index	0 : In normal cycle 1: In the test cycle
	Action	If initiated in a normal cycle, remove the reason for the emergency stop and switch plotter off and on. If the reason is not clear, possible causes could be a interrupted emergency loop, a defective master board, a short circuit to a voltage > 2.5 volts or noise.If initiated in a test cycle a hardware error or noise caused the message. Possible causes could be a short circuit against ground or case, or a defective master board.

0801	Emergency stop	<ENT> to reinit
	Hint	See chapter "Emergency stop" in the description of the electronics. It is usually possible to carry out a software reinitialisation if the external emergency stop print no. 5 000 458 is not installed.
0802	Light-barrier	Check working area
	Cause	Lightbarrier interrupted or error detected in the test cycle.
	Index	0 : Light barrier interrupted (normal cycle) 1 : Error in light barrier 1 test cycle 2 : Error in light barrier 2 test cycle 3 : Error in light barrier 3 test cycle
	Action	If the interruption occurs in the normal cycle, remove the object causing the interruption, clear the error message and return to online operation if necessary. If an error occurs, see the "Light barrier" chapter in the description of the electronics.
	Comment	All connected lightbarriers are active if at least one lightbarrier is activated in the menu. All connected lightbarriers must be activated in the menu to evaluate the corresponding test cycle.
0803	Emergency stop	Turn off plotter!
	Cause	Emergency stop initiated during plotter initialisation
	Index	0 : In normal cycle 1: In the test cycle
	Action	If initiated in a normal cycle, remove the reason for the emergency stop and switch plotter off and on. If the reason is not clear, possible causes could be a interrupted emergency loop, a defective master board, a short circuit to a voltage > 2.5 volts or noise. If initiated in a test cycle a hardware error or noise caused the message. Possible causes could be a short circuit against ground or case, or a defective master board.
	Hint	See chapter "Emergency stop" in the description of the electronics. Software reinitialisation is not possible.
0901	SPI-Communication	No Link to Slave
	Cause	Communication to a certain SPI slave-processor is no longer possible. Connection interrupted or disturbed, board defective or +5V too low.
	Index	Slave-number
	Text	Name of the board
	Action	Check the connection, verify +5V (see the "Power supply" chapter), replace the board or cabling.
	Comment	It is possible that the slave displayed is not faulty and that its communication is being interrupted by a different faulty slave.
	Hint	See chapter "SPI" in the description of the electronics.
0902	SPI-Communication	SPI-Slave not found
	Cause	This error corresponds to error 0901. The number is 0902 if the problem already exists when the system starts after power up. See error 0901 for more information
1001	Head Changed	Turn off plotter!
	Cause	Head changed while plotter is on or error in the head recognition connections.
	Index	False recognition code (decimal number, from MC >= V1.82)
	Hint	See chapter "Head recognition code" in the description of the electronics.
	Comment	Plotter must be switched off before head exchange

1002	Check axis tool	T or Z is faulty
	Cause	The head recognised requires an axis (T- or R-axis) for which an error was determined after power up (check axes).=> Axis problem or wrong head recognition.
	Action	Analyse the problem if the incorrect head is displayed when the plotter is switched on. See chapter "Head recognition code" in the description of the electronics. If head recognition functions correctly, use test function 100 (diagnostic display) to analyse the problem for the axes and check the relevant cables and components. See chapter "Check axes" in the description of the electronics.
1004	Head not permitted	Turn off plotter!
	Cause	The head recognised is not allowed on a S-type plotter (heavy heads).
	Text	Recognised head
	Action	Remove the head, check the connector for the head flat cable on the Y board. If the text displays an incorrect head type, use the "Head recognition code" chapter in the description of the electronics to analyse the problem.
1005	Function not allowed	Job is still active
	Cause	The "Select tool" option in the menu was used even though the job has not yet ended.
	Action	Allow the job to finish or delete the buffer.
1007	Tool-DST Counter	Change the tool
	Cause	Work distance counter reached the maximum value.
	Action	Exchange the tool and set a new maximum (ESC 2293). See the user manual for more information about this function.
1201	Keyboard Fault	A key is pressed
	Cause	Pressed key detected when plotter is switched on.
	Action	Press the associated key (to release it), use test function 7 (keyboard check) where necessary
1301	Vacuum width	Not initialised
	Cause	Uninitialised vacuum width
	Action	Initialise the vacuum and save the settings (see description)
1401	Error Uniboard	Axis override
	Cause	The axis that is controlled by the UNI-Board is blocked or has been pushed out of its setting position.
	Action	Switch off plotter and check the axis.
1406	Error Uniboard	Axis blocked?
	Cause	Axis on the UNI board did not move far enough during the axis test
	Action	If "Mincurrent" (Error 1405) is also reported, solve the "Mincurrent" problem first. If the axis was in motion prior to the axis check, switch the plotter off and on again.
1601	Vacuum pump	Error
	Cause	The temperature sensor on the vacuum pump switched the pump off.
	Action	Clear error and wait until the pump starts again. If necessary, determine the reason for the cut-out.

1602	Airpressure Check	Airpressure failed
	Cause	Compressed air monitoring was activated. Low air pressure detected for the vacuum zones (LC-16/... type cutters) or for the foil cover brakes (LC-27/32T).
	Action	Check whether compressed air is available and whether the pressure that has been set is correct. If this is correct, check the pressure switch and wiring (connection to the pressure sensor on S13 of the 3 axes board).
	Comment	The error can be cleared. If the pressure or a pressure-switch fails permanently, the error message is suppressed after two subsequent clears.
1610	Error DRT	Overtemp
	Cause	The DRT (Driven Rotary Tool) sensed excess temperature.
	Action	Check initialisation, offset and down position according to the DRT manual. To avoid overload, do not make the cut any deeper than necessary. Check the free movement of the axis to which the knife is attached (caution! The tool must be unplugged first!) If the error is also reported when the tool is not connected, check the wiring and Y board. Replace the DRT if the message is issued when the tool is not hot. If the cut material is too heavy, wait and allow the tool to cool down.
	Comment	See the next message (1611) for further information.
1611	Error DRT	Overcurrent
	Cause	The DRT (Driven Rotary Tool) current exceeded the preset limit for a while. Once the current reaches the limit, the tool is lifted, if it falls under the limit the tool is lowered again. This message is issued if the tool is lifted more than 1mm without any reduction of the current.
	Action	Check initialisation, offset and down position according to the DRT manual. Check if there is some material between knife and tool or if the friction is too high. (Caution! The tool must be unplugged first!) Replace the DRT if necessary.
	Comment	Heavy material can cause this message. See also message (1610).
1620	Warning Sheet Feeder	Material not in pos.
	Cause	If a sheet feeder unit is connected to the plotter, the 'material in position' signal of that unit is checked before the cutter starts feeding. If this signal is not received within 20s this message comes up.
	Action	If there is no material or it is not in the right position, fix that problem first, then clear the message. Check the hardware if the message continues to be displayed even when the sheet feeder is switched to manual.
	Comment	Ask for more information about the sheet feeder unit.
1621	Sheet Feeder	No response
	Cause	The SPI-slave 'Sheet Feeder' is activated but was not detected when the plotter was powered up.
	Action	Check the sheet feeder connection and the hardware. If necessary, deactivate the SPI-slave after clearing the message. (<ESC> 55155 in the service mode)
	Comment	More information is provided in the the sheet feeder unit documentation.

5.3 Failures in the distribution box

Error description

On/Off switch in pos. 'I'

- Plotter system does not function. LCD on operator panel dark.
- Machine is operating, but not the following units:
 - Vacuum pump(s)
 - Tool system router and extractor.

Troubleshooting

- 1 Turn off the cutter system
- 2 Check all connections to local mains:
 - Are supply cables undamaged and run unstressed?
 - Is the mains plug correctly inserted?
 - Are the upstream fuses in local installation working properly?
- 3 Open plotter base:
 - On the tool plotter, raise and detach the covering panel next to the on/off switch.

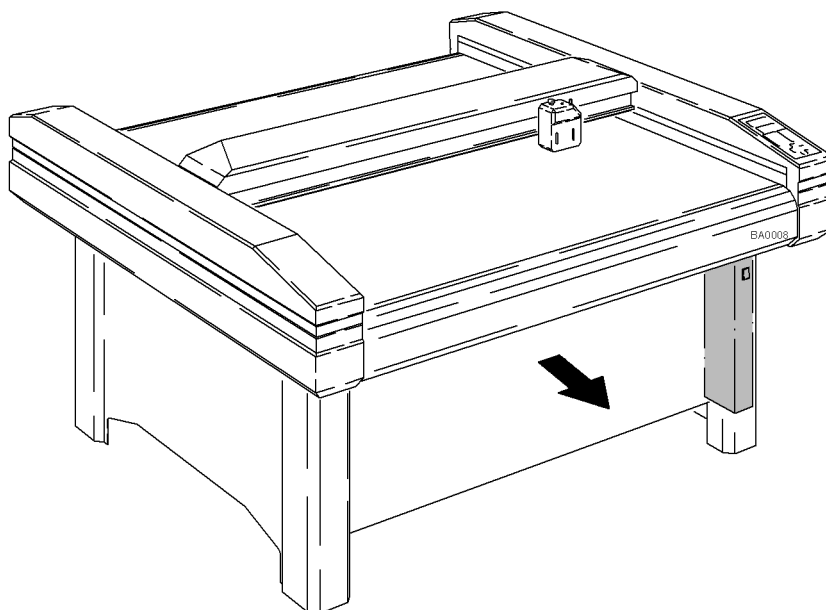


Fig. 5-1 Access to the distribution box

- 4 Check plug connections of distribution box.
 - Check all connections for correct seating.
- 5 Check fuses in the distribution box.



Warning !

Risk of injury from unauthorised maintenance.

Before maintenance, disconnect all power supplies to secure the machine against unauthorised start-up. (There is more than one power supply)

6 Check fuses in the distribution box.

One after the other, check mains inputs as follows:

- Remove the relevant mains cable.
- Unlock the fuse holder by pressing in the clips and pull it out.
- Replace faulty fuse(s); spare fuses are included with the accessories.

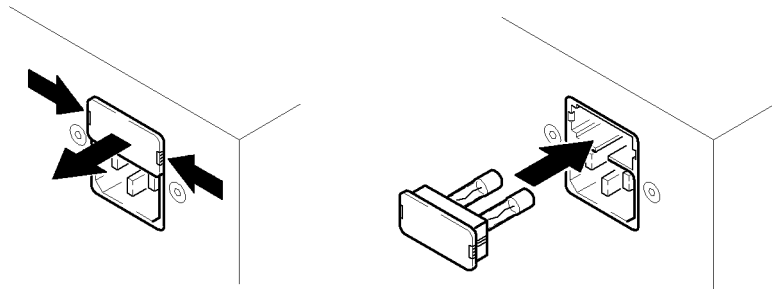


Fig. 5-2 Check the fuses

Rating must be:

- Identical for both fuses
- Adapted to the available mains voltage (see next page)

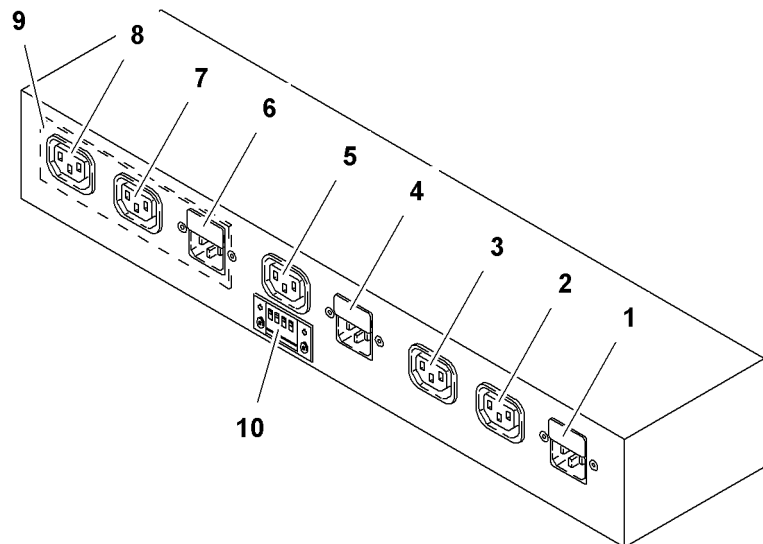


Fig. 5-3 Elements in the distribution box

1 AC input socket for:

- Electronic unit
- Optional compressor for material handling system

Fuse holder with 2 fuses

AC current	Fuse specifications
230 V, 50/60 Hz	10 A slow-blow, Ø 5 x 20 mm

Failures in the distribution box

110/115 V	12.5 A slow-blow, Ø 5 x 20 mm
-----------	-------------------------------

- 2 AC input electronic unit
- 3 AC input compressor
- 4 Mains input for vacuum pump

AC current	Fuse specifications
230 V, 50 Hz	16 A SPT, Ø 5 x 20 mm, high breaking capacity
110/115 V	8 A FST, Ø 5 x 20 mm
230 V 60 Hz	16 A SPT, Ø 5 x 20 mm

- 5 AC input vacuum pump
- 6 Mains input for machine options
 - Frequency transformer
 - Extractor
 - Auxiliary drive for second vacuum pump etc.

Fuse holder with 2 fuses

AC current	Fuse specifications
230 V	10 A slow-blow, Ø 5 x 20 mm
110/115 V	16 A slow-blow, Ø 5 x 20 mm

- 7 AC input frequency transformer (optional)
- 8 AC input extractor (optional)
- 9 Blank cover for standard version
- 10 Output 24 V to switch external devices on/off (optional)

5.4 Electronic box fuses



Attention !

Danger of injury by electric shock

Always remove all power cables from the mains before handling any live components of the cutter!

Inspect/replace fuses

Loosen the fuse holder carefully using a screwdriver and remove it from the housing (see illustration)

Remove the fuses from the fuse holder, inspect them and replace as necessary.

Only use the replacement fuse types listed below.

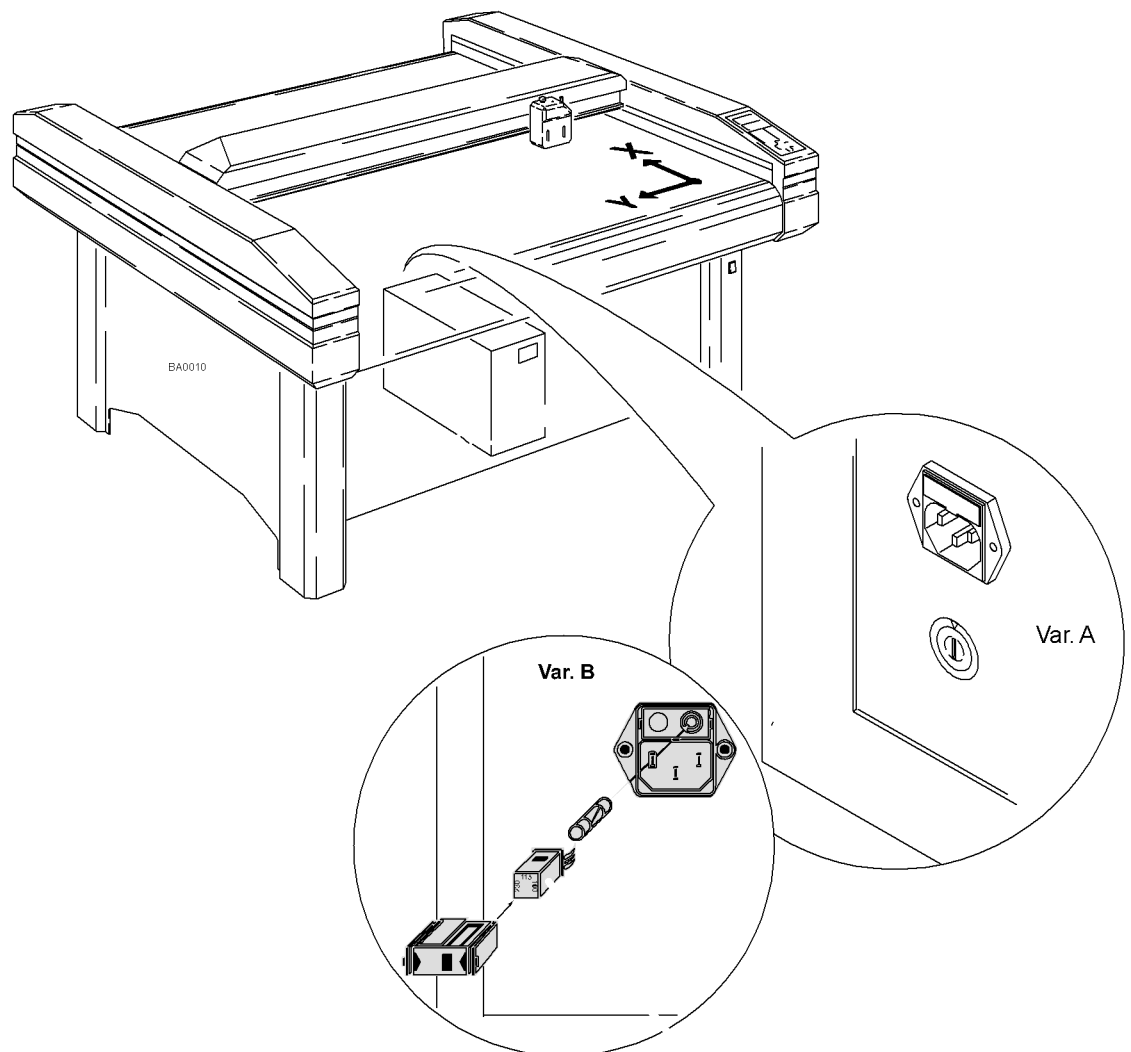


Fig. 5-4 Electronic box/fuse holder

1 Version A 2 Version B

Replacement fuses

Fuse holder with 2 fuses

AC current	Fuse specifications
230 V	4 A slow-blow, Ø 5 x 20 mm
100/115 V	8 A slow-blow, Ø 5 x 20 mm

6 Cleaning and maintenance

6.1 General

- This chapter describes (in tabular form) all the maintenance jobs which are required for the machine.
- The maintenance list only affects the basic unit. Maintenance activities for modules, tool inserts and options can be found in the respective operating manual.
- Maintenance jobs that operators can carry out themselves are specially indicated and are described in more detail in this chapter.



Important !

In general, no special tools are required for maintenance jobs that operators can carry out themselves.

- All other jobs must be undertaken only by personnel authorised by Zünd or by Zünd Systemtechnik Customer Services or by contractual partners authorised by Zünd Systemtechnik.
-



Important !

Do not exceed the specified maintenance and cleaning intervals. You can shorten these intervals if necessary at your own discretion.

Carry out the maintenance jobs conscientiously at the specified intervals. The intervals are given in calendar periods or operating hours.

Maintenance recommendation

The manufacturer recommends that a general inspection of the machine is carried **once per year**. This interval can be reduced in the case of greater utilisation and load to the system.

Regular maintenance extends the lifetime of the cutter. Provide the service technician with the accessories case and ensure that the maintenance work is confirmed.

Shutting down/extended downtimes

If the machine is to be shut down for a prolonged period or decommissioned, please contact your customer service representative to arrange proper conservation of the machine or to put the machine back into operation.

Work instructions

- When working on the machine you must observe the safety measures described in the "Safety" chapter.
- Absolute cleanliness must be maintained at all times.
- Replace damaged parts immediately with new original spare parts.

Tool heads, tools and options

Maintenance intervals/instructions on maintenance and cleaning for modules and options can be found in the corresponding operating manual.

6.2 Safe maintenance of the machine

General safety instructions

- Servicing and repair work must be carried out by trained specialist personnel.
- For periodic checks/inspections you must comply with the mandatory intervals or the intervals specified in the instruction manual. Equipment appropriate to the task must be available in order to carry out maintenance tasks.
- The maintenance schedule specifies precisely who is to carry out which jobs. The jobs listed as daily/weekly tasks may be carried out by operating personnel after appropriate training.
- You must ensure that spare parts meet the technical requirements laid down by the manufacturer. Original spare parts are always guaranteed to do so.
- The wearing of protective clothing (see "Personal protective equipment, clothing" in "Safety") is obligatory during maintenance and cleaning work.
- Keep unauthorised personnel well away from the machine during maintenance work.
- If possible, clearly attach a "DO NOT SWITCH ON" sign to the machine's main control panel during maintenance and cleaning work.
- Express approval must be obtained before carrying out welding or grinding work on the machine.
- Safety data sheets of the resources used can be found on the Zünd homepage.
- General safety instructions on handling chemicals can be found in the section "Safety", "Handling and storage of chemicals"

6.3 Operating resources

6.3.1 Handling operating materials

Following the instructions for handling operating materials carefully will increase the reliability and service life of the machine.

Follow the regulations for handling chemicals, particularly cleaning fluid and lubricants.

Environmental protection

- Always take care to protect the environment
- Observe the disposal regulations applicable in your country.
- Dispose of spent operating materials correctly



Disposal !

This concerns spent materials such as lubricants, adhesives, water/oil mixtures (maintenance unit) and all devices that were in contact with these materials.

- Observe the rules on environmental protection when disposing of spent materials.
 - Collect and store all spent materials separately in suitable containers and dispose of them in an environment-friendly manner and only at official sites.
 - Observe the regulations applicable in your country.
-

6.3.2 Cleaning fluids

Attention !

The use of incorrect cleaning fluids not approved by Zünd will damage the machine.

Only use cleaning fluids recommended by Zünd Systemtechnik.

Do not use abrasive cleaning fluids. Caustic substances and scouring agents can damage surfaces of the cutter (e.g. operating unit).

Cleaning fluids	Place of use
Plastic cleaning fluid	Covers, metal parts

6.3.3 Lubricants

XY axis guide rails, bearings

This machine uses a specially adapted synthetic lubricant which is also used in the food and pharmaceutical industry. This is characterised by good water resistance and corrosion protection and can be used at a temperature range from -25°C to +120°C.

Description	Specification
Klüberoil®	4UH1

Gears

To lubricate the gears, a Teflon special grease is used for precision gears in order to reduce friction.

Description	Specification
Fin Grease MP 2/3	-

6.3.4 Adhesives

Gluing the conveyor belt

Attention !

The instant adhesive used irritates the eyes, skin and respiratory system. Skin can be glued together in seconds.

- During use, wear protective gloves and protective goggles.
- If adhesive comes into contact with the skin, clean the affected area with soapy water.
- If adhesive comes into contact with the eyes, rinse with warm water and then contact a doctor.
- Contact a doctor if you experience prolonged breathing difficulties.

Important !

- Store the instant adhesive in a cool place.
- Note the expiry date.



Description	Specification
Advanced Performance Instant Adhesive	NI100

6.4 Steps for maintenance

Different types of symbols (circle, box, star – solid; circle, box, star – outline) divide the service and maintenance tasks into two groups.

Meaning of symbols:

Outline symbols: ○, □, ☆

- This service and maintenance work is carried out by **authorised service personnel of Zünd Systemtechnik**.

Solid symbols: ●, ■, ★

- Service and maintenance work is the **individual responsibility** of the company operating the machine or its operating personnel.



Important !

If necessary, carry out work before the stated intervals.

Change worn parts before the specified intervals as well. The intervals are given in operating hours (OH).

Maintenance/inspection in Operating hours				Work to be carried out		Chapter
daily	160–200 OH	annually (2000 OH)	at special intervals	by personnel	by authorised maintenance personnel	
				<ul style="list-style-type: none"> ● one-off activity ■ repetitive interval ★ when necessary 	<ul style="list-style-type: none"> ○ one-off activity □ repetitive interval ☆ when necessary 	
General						
■				Visually check the machine for damage		
■				Free the machine of dust and processing residue		
■				Check electrical equipment (options) to ensure they function		
■		□		Check correct functioning of the emergency stop switch		
■		□		Check all safety devices (correct functioning of light barriers, protective trip switch)		
Table complete						
		□		Check all screw connections and tighten according to requirements if necessary		
		□		Check levelling		
		□		Check feed system*		
		□		Check cabling/wiring and cable routing for signs of wear		
Vacuum plate						
		□	Conveyor replacement	Check levelling and adjust if required		
		□		Check the correct functioning of the vacuum zone control		
Beam						
		□		Check perpendicularity and align if required		
		□		Check length compensation and adjust if required		
Feeding options						
	■	□		Clean rubber cushions/needle cushions* of the feeder elements		
	■	□		Clean feed guide rail		
		□		Clean and oil feeder element piston rods		
X axis drive						
	■	□	☆	Clean and oil guide rails/guide carriage		
		□		Check tension of toothed/steel belt and readjust if necessary		
		□		Check alignment of toothed/steel belt and readjust if necessary		
		□		Check pivot bearing tension, adjust if necessary		
		□		Clean and lubricate the gears		
		□		Clean the drive belts		
		□		Clean the drive and guide rollers		
	■	□		Clean the chipping protection brush		
Y axis drive						
	■	□		Clean and oil the guide rails		

Maintenance/inspection in Operating hours				Work to be carried out		
daily	160-200 OH	annually (2000 OH)	at special intervals	by personnel ● one-off activity ■ repetitive interval ★ when necessary	by authorised maintenance personnel ○ one-off activity □ repetitive interval ☆ when necessary	Chapter
		<input type="checkbox"/>		Check alignment of toothed/steel belt and readjust if necessary		
		<input type="checkbox"/>		Check tension of toothed/steel belt and readjust if necessary		
		<input type="checkbox"/>		Check the belt tension		
			☆	Replace V-belt		
		<input type="checkbox"/>		Clean and lubricate the gears		
Head carriage						
		<input type="checkbox"/>	☆	Check clearance, replace bearing if necessary		
	■	<input type="checkbox"/>		Lubricate bearing		
		<input type="checkbox"/>		Replace wiper		
Vacuum pumps						
		<input type="checkbox"/>		Check correct functioning		
		<input type="checkbox"/>	Conveyor replacement	Check piping for damage and tightness		
Compressor *						
	■			Check the oil level, if necessary top up oil according to specifications		See operating instructions from the manufacturer
	■			Check water separator and drain water if necessary		
	■			Drain condensate from air cylinder		
	■			Check pressurised pipes for leaks – eliminate any faults		
	■			Check air intake filter, replace if clogged		
	■			Clean compressor		
	■			Check piping for damage and tightness		
		<input type="checkbox"/>		Check the function of the safety valve, adjust if necessary		
		<input type="checkbox"/>		Replace compressor oil		
Maintenance unit						
		<input type="checkbox"/>		Drain condensation water		

6.5 Maintenance jobs

6.5.1 Maintenance position



Warning !

Danger of injury

The cutter may be put into operation by third parties.

- Always place the cutter in the maintenance position before carrying out maintenance work!

Unless expressly required otherwise, move the machine to the maintenance position before starting maintenance work.

- Switch off the machine using the main switch.
- Protect the machine from unauthorised commissioning

6.5.2 Visually inspect machine for damage



Attention !

There is a risk of injury if the machine is damaged

Before daily commissioning ensure that there is no damage to the machine.

- Never start up a damaged machine.
- Have damage repaired immediately by authorised service personnel

Daily checks

- Walk around the cutter and check the machine for damage.
- Make sure that all the covers have been fitted. Fit any covers that are missing.

6.5.3 Clean the machine

Zünd cutters are production machines that are subject to enormous amounts of stress on a daily basis. Keeping the machine clean will help to keep operation as free from interruption as possible.



Important !

Do not use compressed air to clean the machine.

Loose cuttings and other dirt will end up in the bearings and drive belts and damage them.

Attention !

Danger of damage

Incorrect cleaning products and methods will damage the machine

- Only use gentle cleaning agents and plastic maintenance products for cleaning.
- Never clean the tool using ultrasound, a steam jet, compressed air etc.

Procedure

- Clean the table, operating unit, all covers and panels with a plastic maintenance product at regular intervals (weekly).

- Regularly (daily) remove all materials residues from the table, the tools and modules.
- Keep the environment clean (free from material residues, dust).

6.6 Instructions for disposal



Important !

Contact Zünd customer services or your service partner before you dispose of your cutter.

Zünd cutters are modern industrial devices which correspond with the current standards and guidelines on the disposal of old appliances.

- Steel and plate parts have been varnished with environmentally-friendly varnish or have been powder-coated. Aluminium components have been anodised. They can be disposed of as waste metal.
- PCBs have been soldered with lead-free solder and be disposed of as electric waste.

You must also observe the following:

- Country-specific legislation and regulations on waste disposal.
- No special measures are generally required when decommissioning the cutter system because no poisonous substances are used.
- Assign a disposal company to remove and recycle the machine correctly.

6.7 Starting up after periods at a standstill



Important !

Before extended periods of downtime/for commissioning of your cutter after periods at a standstill, contact the Zünd Customer Service department or your service partner.

In general, the machine can be started up immediately, even after prolonged periods at a standstill. Some options, however, require running-in routines, which must be respected in order to ensure further maintenance-free operation.

6.8 Transport and storage

6.8.1 General

For shipment, the tool plotter is either

- Completely pre-assembled, secured on a wooden pallet and packaged in a wooden crate
- Dismantled into the upper part of the plotter, side parts and accessory equipment (if it is difficult to get to the installation site).

The package material is part of delivery and is taken back, if desired.

The tool plotter

- Is a precision device that must be levelled at the installation site
- May be transported only by authorised personnel, in the event of moving or changing the installation site.

6.8.2 Transport damage

Shipment of the plotter system is carried out by qualified packaging and transport firms as arranged with the customer. However, damage or loss in transit might occur nonetheless.

The plotter system should therefore be inspected for completeness and signs of damage immediately upon delivery.

Inform the shipping company immediately if you notice external damage to the packaging. Describe the extent and cause of the damage. Refuse acceptance of the shipment if such details are not acknowledged.

If damage is discovered while the machine is being unpacked, the damaged part must be left as discovered in the packaging. The responsible transport company must be immediately notified of the damage.

Check the goods supplied for completeness according to the accompanying shipping papers.

Notify any loss or damage to the responsible transportation insurance and to your Zünd representative by means of a certificate of loss.

6.8.3 Storage

Prior to installation of the plotter system:

- Keep the tool plotter and accessories in their original package
- Store them in a dry location

6.9 Accessories, spare and wearing parts

6.9.1 Supplied accessories

The accessory equipment case contains:

- Teflon-based lubricant
- Oil
- 1 brush
- Back-up fuses for the distribution box (5 for each required rating)
- 1 Allen key, 4 mm; used to replace the tool head
- Special equipment for the tool and material feeding system.

6.9.2 Recommended spare and wearing parts

Pay attention to

- Special notes in sections 7 and 8 for the tool and material feeding system
- The plotter accessory list on the Zünd homepage (Zuend.com)

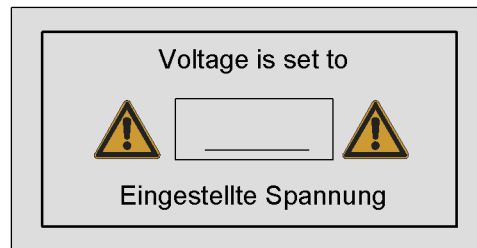
6.10 Information on installation and commissioning

The cutter system may only be installed and commissioned by

- Expert personnel from the manufacturer
- Personnel who have been trained and authorised by the manufacturer

Important note for commissioning

The cutter system is delivered with a preset mains voltage. Two labels display the voltage value that has been specified.



The label shown above is located within the cutter base on

- The mains input of the distribution box
- The voltage selector of the electronics unit.

Attention !

Danger of damaging the machine

The available local mains voltage must correspond with the voltage value specified on the rating label!

Inadmissible mains voltages could result in heavy damage to the cutter system.

Use only the original cables supplied with the machine. These cables have already been adapted for operation in your country.

When modifying the socket plug on single- or triple-phase cables, always observe the applicable regional standards.

For other mains voltage

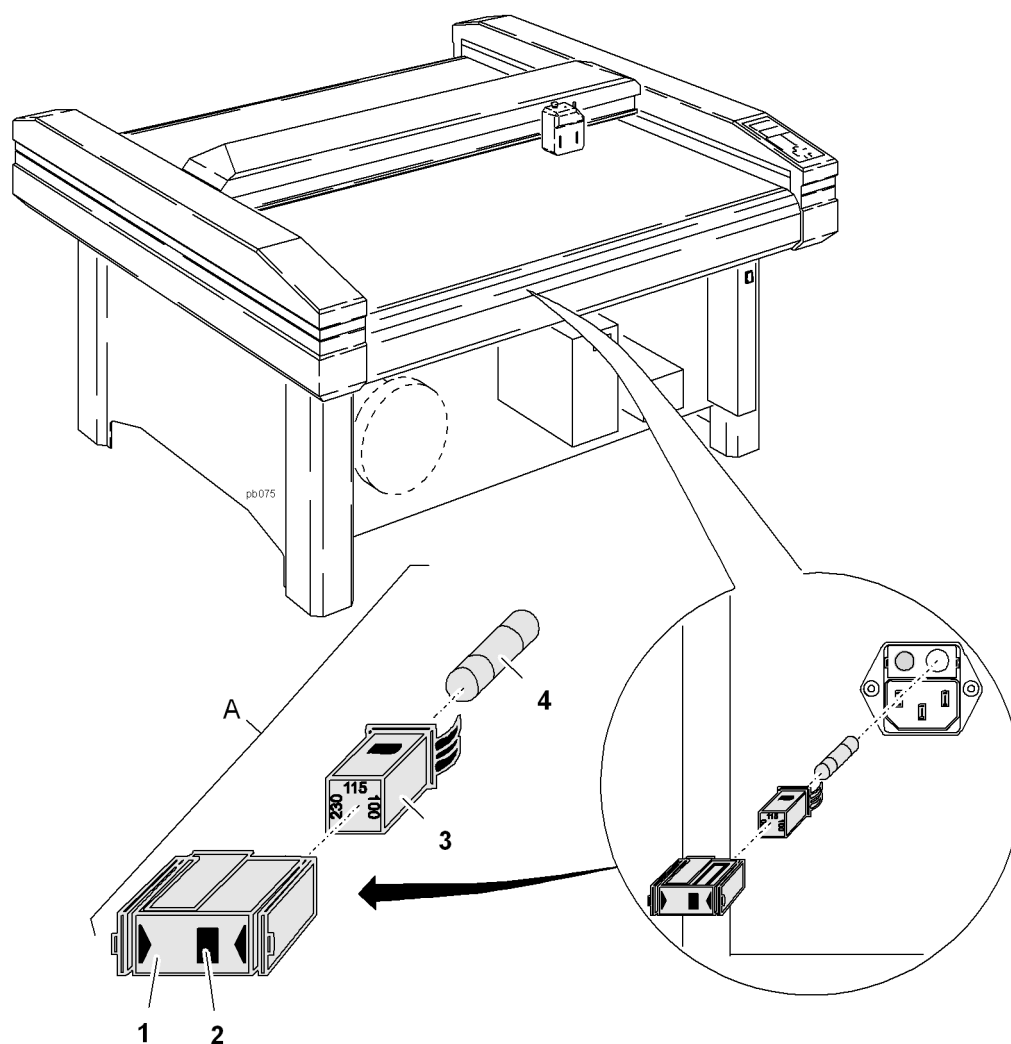


Fig. 6-1 Set the voltage

- | | |
|-------------------------------|---------------|
| 1 Holder | 3 Fuse holder |
| 2 Set voltage (230/115/100 V) | 4 Fuse |

- Set the voltage selector of the electronics unit to the available mains voltage. Change the fuses on the electronics unit or distribution box to correspond with the set voltage.
- Replace system components with a dedicated mains connection (vacuum pump(s), compressor, extractor, milling device, etc.) with appropriate substitutes.

7 Tools

8 Tool heads

9 Options

10 Material feed

11 Additional specifications

12 Documents

13 Annex

13.1 After-sales Service

Responsible service point:

--

Machine number:

--

Important default settings:

Modifications:

Interface parameters:

Date of initial commissioning:

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Responsible service engineer:

Signature

After-sales Service

Acceptance certificate from customer:

Date	Signature

