

DIADRIVE 2000

Workcenter with
3 Machine-
funktionen!

Multifunctional

Prototyping
Workcenter



Mutronic®

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Note:

Brochures and other information publications sometimes need updating, supplementing and correction after only a very short time, thanks to constant advances in the pace of new and further developments of products and machine options.

We have therefore decided to print most of our brochures ourselves. This enables us to provide speedy and constantly updated issues of requested information. We would, however, ask you to forgive the difference in printing quality when compared to high-gloss offset printing methods. You can also avail of information with high-resolution illustrations in the internet.

The machines illustrated in the pages of this brochure are mainly depicted with optional expansions. The price list contains further details relating to accessories and optional equipment. Please contact us if you feel you need further clarification. The illustrations of machines, options and accessories may deviate from the colour, shape and design, both technical and constructional, of the delivered goods.

You can find information on other *Mutronic* products (along with information on trade exhibitions) in the internet under: www.mutronic.de

PROTOTYPING + SERIAL PRODUCTION

Objective machining!

PCB drilling and insulation milling.



Drilling aluminium and plastic plates, milling and engraving



Milling and marking of norm test samples.



Processing mechanical workpieces
2D + 3D



Application and dispensing of pastes, adhesives and liquids
2D + 3D



Processing large volumed parts, e.g. cut-out sections in housings.
2D + 3D



DRILLING

MILLING

ENGRAVING

DISPENSING

Simultaneous linear and circular interpolation of all 3 main axes make the *DIADRIVE 2000* a multifunctional 3D CNC machining centre.

In addition to drilling and milling operations, machining can thus be carried out in the 3rd dimension.

Additional expansion possibilities of up to 8 axes, along with fittings for engraving, Dispensing, and needle engraving make the unit a useful long-term investment.

A new Windows control concept, specially developed for the *DIADRIVE 2000*, and practice-orientated software sophistication ensure high standards of operating comfort.

The future-orientated lateral construction (a base-free design in comparison with conventional systems) allows extremely large workpieces to be worked.

ADVANTAGES OF NEW DESIGN

We would like to give you some information here on the decisive advantages of the all-encompassing *DIADRIVE 2000* design to enable you to make a better choice of product:

A machine for many applications

Differing equipment, such as CNC prototyping milling and engraving machines and Dispensing stations etc. are required in the laboratory to carry out comprehensive mechanical work.

The *DIADRIVE 2000* provides you for the first time with a professional multi-functional 3D CNC center which, with suitable expansions, combines a variety of the applications arising in the area of prototyping in one machine.

Spindle drive in all 3 axes !

This characteristic distinguishes the *DIADRIVE 2000* from other machines which have two identical drive systems in the X and Y axes, but only simpler mechanisms for generating movement in the Z axis, such as toothed racks, pneumatic cylinders or stroke magnets etc.. Exact, three-dimensional positioning cannot be optimally achieved in this manner.

The *DIADRIVE 2000* thus has 3 identical positioning

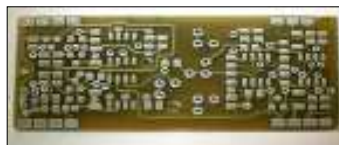
drives in all three axes which can be interpolated freely, making 3D machining possible (with optional programs).

Dynamic Z axis offset correction

This enables adjustments to be made during active milling and engraving procedures without the need to interrupt the program.

Room for large and small format workpieces

In addition to flat workpieces such as aluminium and PCB's,



large workpieces (such as housings) can be clamped and machined, even up to a workpiece height of 800 mm!



It is ideal for later machining of cavities etc., as the complete housing can be clamped without the need to dismantle it into its individual components again! Only the new *DIADRIVE 2000*'s base-free portal construction offers this advantage.

Working range up to 560 x 500 mm

The *DIADRIVE 2000* can be supplied with an extended working range.

This enables you to mount and machine a 19" front plate up to 10 HE completely without reclamping it.

Designed with expansion options

The large extra constructional room capacity allows for later expansion with optional fittings, new developments and customized equipment.



A saw head can be adapted for cut-off applications involving PCB's or ceramics (illustration), a Dispensing attachment for 3D application of pastes, adhesive etc. or a camera for testing purposes in place of the drilling and milling spindle. A huge variety of options exist.

Please make enquiries if you have special applications which you wish to realise with the *DIADRIVE 2000*. Individual components can also be delivered for customer solutions. ■

MACHINING OPTIONS

The DIADRIVE 2000 can be fitted with a variety of options. The following is an extract containing the most important expansions. The separate price list contains the complete range of suppliable options, along with further details.



Spindles:
Standard or special models, depending on the applications involved.



Spray mist atomizer with tank for smooth cutting edges on aluminium and plastic parts



Blow-clear nozzle for isolation milling of PCB`s . Prevents copper particles becoming embedded



Engraving table with index holder: PCB`s and sings can be positioned correctly.



Clamping runners hold securely and permit through milling of the workpiece.



Vacuum and adhesive table for non-aggressive clamping of delicate parts, such as ceramic, glass etc.



T-groove tables permit different workpieces to be clamped.



Clamping elements draw the workpiece securely towards the table.



Hand lever clamps for clamping with low vertical cutting force.



3D application of different media with the dispensing unit.



Safety cabin: safety and uninterrupted all-round vision, thanks to unbreakable windows made of special plastic.



Clamping fixture for secure fixing of plate material for specimen manufacture.



Extraction with micro-filter for health-endangering dust.

We also develop customized options to meet your requirements (e.g. special clamping fixtures, additional equipment etc.). Please contact us if this is required.

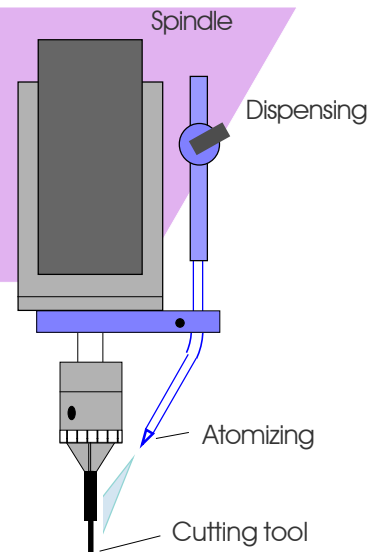
LUBRICATING + DISPENSING

Micro spray atomizer device

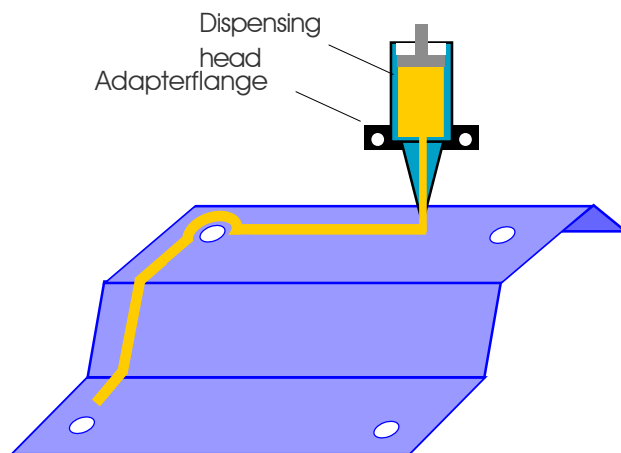
The micro spray atomizer device increases the useful life of cutting tools and improves the cutting result considerably for metals and plastics.

It is more effective and economical than any other moistening method (e.g. brush lubrication etc.), thanks to the atomizing process and the cooling effect associated with this.

Aluminium must be machined with atomized spray in order to avoid the "cold welding" associated with this material. The unit consists of a micro atomizer nozzle with air and liquid supplies, a tank with a shut-off valve and an electrical piston compressor to generate the atomizing pressure.



3D dispensing device



The dispensing device consists of a dispensing head with a cartridge, a separate pressure regulator unit with a magnetic valve, a manometer and a pressure controller.

Assembly on the *DIADRIVE 2000* Z-axis is achieved quickly and simply by means of an adapter flange. Control is effected directly from the software via the magnetic valve. Further installations are not necessary.

The *ET1* option is an additional soft-ware necessity. It enables the dispensing route to be input by "teach in" or in DIN 66025.

The *DIADRIVE 2000* can be used:

- a) with suitable optional equipment in multifunctional applications as a drilling, milling and engraving machine with selective dispensing option by adding to, or removing the Dispensing device, or
- b) as an independently operating CNC-dispensing-system (only dispensing) with the following basic equipment:

- 1 *DIADRIVE 2000/280* or *2000/500*
- 2 Dispensing unit art. no.: 10.08240
- 3 ET1 software art. no.: 10.07910

(see also under the heading "Ordering examples" in the separate *DIADRIVE 2000 price list*)



The cartridge is positioned in front of the milling cutter by a clamping adapter.

TEST SAMPLE PREPARATION

Nearly all shoulder bar geometries can be manufactured with the *DIADRIVE* machine!

It is suitable for small batches (up to 12 pieces/h) and a milling range between 0.5 mm and 0.6 mm.



Test pieces can be manufactured to DIN, ISO, ASTM, works' standards or special dimensions from plastic tubes, plastic sheets, reinforced plastic composite, Elastomer, thermoplastic and duroplastic plastic materials, etc.



DIADRIVE 2000 with U1-lower machine structure, protective casing, PC, LCD, and SF- spindle-generator

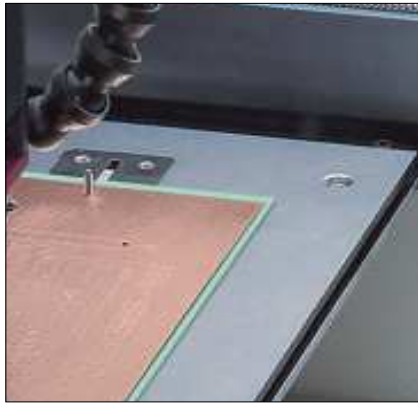


Clamping device for specimen with different shapes (incl. Software - ready for use).



Clamping device for manufacture of test pieces for fracture mechanics test.

MILLING + ENGRAVING



Automatic height compensation

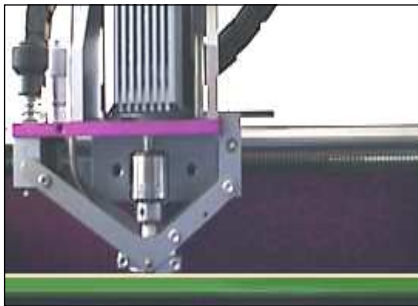
Differing thickness or unevenness of PCB's must be compensated for to ensure that consistent dividing channel milling widths are achieved.

DIADRIVE machines are fitted with special *engraving devices* (options), in contrast to previous solutions involving milling or engraving spindles with compensation bearings (extra play!) or surface milling of work surfaces prior to milling procedures (very time-consuming!).

These consist of an *engraving attachment* with a sliding ring and a spring-constructed *engraving table* with which the minimum height difference is automatically compensated. This is achieved with diametric pre-tensioned flat steel springs in the table interior which prevent any play in the XY directions, while maintaining the required movement in the Z direction.

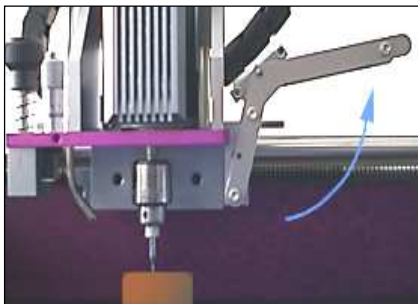


A light, removeable support plate (accessory) made of foam plastic is placed on the engraving table to protect it from damage caused during drilling or milling. The workpiece to be machined is laid on this and secured with indexing pins. It really couldn't be simpler or more rational.



Precision milling results

A sliding ring with articulated mounting on the *engraving attachment* adapts to the surface of the PCB, thus ensuring that engraving and milling results remain uniform when machining dividing channels. The immersion depth (engraving depth) of the cutting tool is adjusted precisely by means of the micrometer screw.



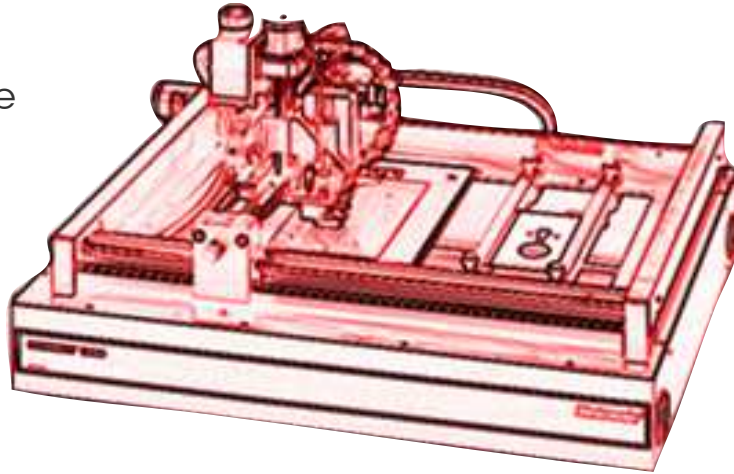
Abundant machining room

The *engraving attachment* with sliding ring can be pivoted to the rear, thus freeing the entire working field for normal drilling and milling work on mechanical workpieces. The DIADRIVE 2000 can thus be switched smoothly from the engraving operating mode to milling mode in a matter of seconds.

SOFTWARE OPTIONS

Diabase ET1, ER1, EX1

Expansion of basic machine software



■ ER1 Milling radius correctionstation

ER 1 expands the machine software *EdiTask* to „automatic milling radius correction“. Indispensable for milling of mechanical workpieces.

■ EX1 DXF Konverter

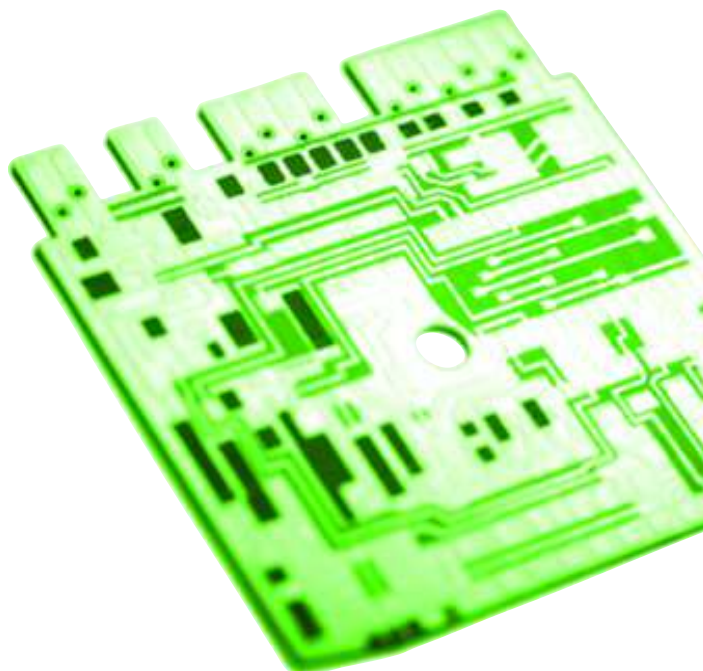
Conversion program for DXF data from CAD programs. (ET1 and ER1 are prerequisites).

■ ET1 Teach In+DIN 66025

ET 1 Enables programs to be written with „Teach In“ or in accordance with DIN 66025. This DIN contains standardized program commands for machine tools. Important for classroom training in schools, universities and training centers.

Diaboard LF1 + LE1

Simple prototyping programs for PCB's



■ LF1 drilling and insulation milling

Prototyping for simple PCB's on a (windows executable) MS-DOS basis.

This software calculates GERBER / EXCELLON data and contains all functions necessary for contour milling, including rubout.

■ LE1 only drilling

A drilling data conversion program for EXCELLON files. It is used if PCB's are produced by etching and only the drilling operation is performed with the *DIADRIVE*.

Further applications include automatic production of bores for contact pins in test adapters or carrying out serial drilling (e.g. ventilation bores, filter bores etc.).

SOFTWARE OPTIONS

Diaboard LZ1

Professional prototyping program for PCB`s in the digital-, NF- and HF-technic

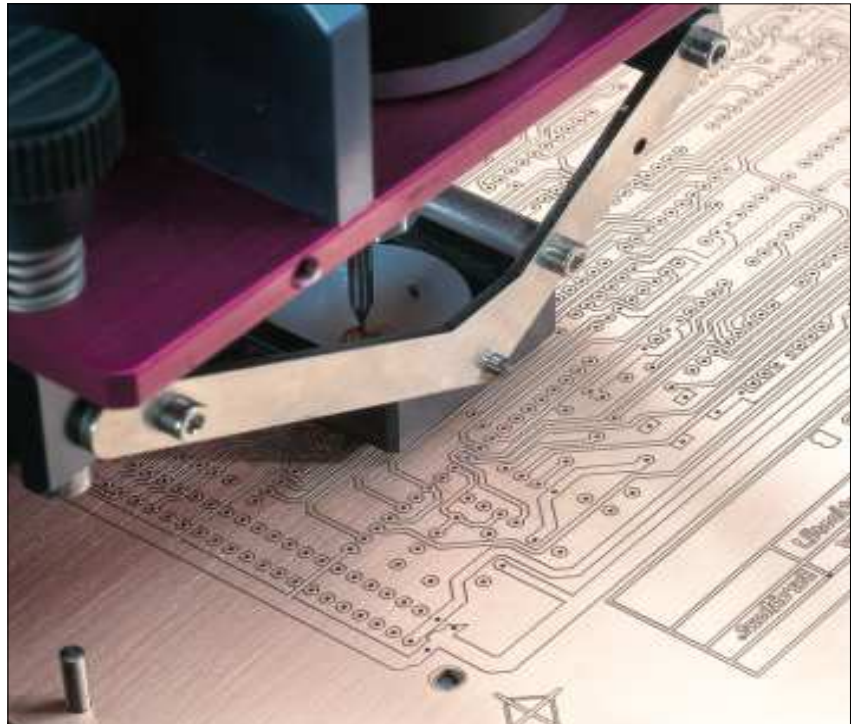
The new version (Win 98, 32 Bit+ NT) saves time, because all bores, milled cavities and dividing channels are machined with only ONE tool .

Key milling data: (DC spindle)

min. circuit board
conductor width 0.2 mm
min. insulation channel: 0.2 mm
min. bore Ø: 0.4 mm
min. solder pad Ø: 0.6 mm

Smaller widths/channels can be achieved using equipment with a high-speed frequency (SF) spindle.

(See page 11 "Technical data" for further details)



■ LZ1 Drilling- and milling for prototyping

Programm for rational prototyping of PCB`s. Without TOOL CHANGE.

This offers new advantage:

- **Minimum storage of tools**
- **No change cycles**
- **Operation without waiting periods**

The software calculates contour paths and bores for single and double sided PCB`s in formats such as EXCELLON, SIEB+MEYER, and GERBER Postscript-data.

First of all the smallest bores on the PCB are drilled with the new KOMBITool drilling/milling

tools with 0.6, 0.7 or 0.8 mm.

After that, the remaining larger bores are milled out in the form of a helical spiral (controlled automatically by the program). The final machining operation is the clearing of the contour paths which are machined WITHOUT TOOL CHANGE, with the same KOMBITool-drilling/milling tool.

The contour data resolution is not in linear form or pixels, but in real circles and arcs, as such, milled to a high quality.

Both the GERBER/Postscript data and the transformed contour are illustrated graphically.

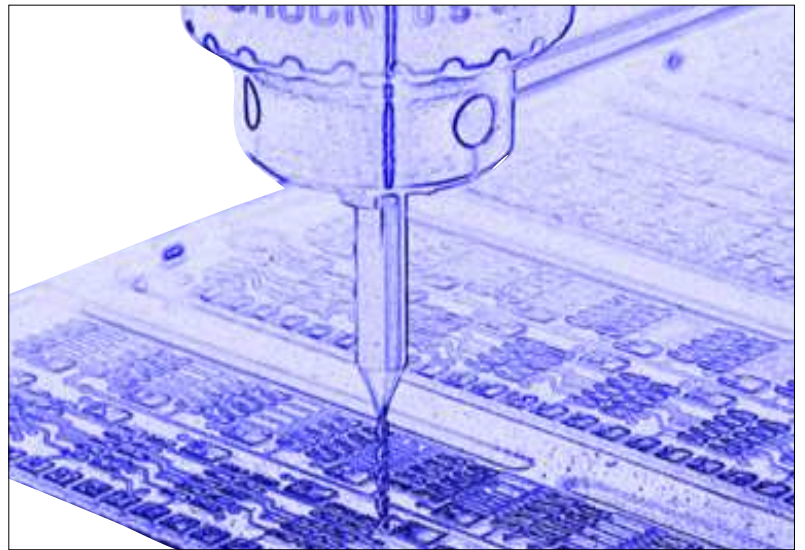
SOFTWARE OPTIONS

Diasign

Engraving and milling software for sign production

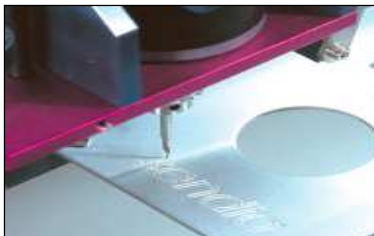
■ SP1 sign program

complete program with 20 engraving and 20 outline inscriptions, incl. construction, editing, scale production and drawing engraving from grey tone scans. Extensive import and export filters, such as EPS/ AI, DXF, HP-GL, Mastercam etc., output driver for ISO milling data etc.



■ SP2 sign program

as SP1 with addition of 2D milling correction, clearance milling and margin location of sw/ws BMP-, TIF- and PCX- pixel data.



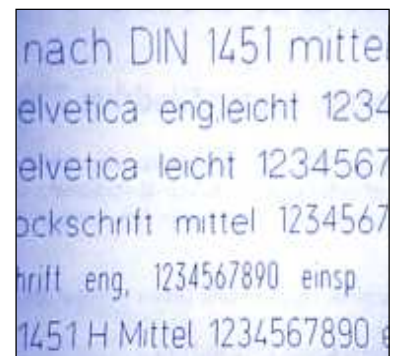
■ SP3 sign program

as SP2 with addition of 2D + 3D „sensitive milling radius correction“ Automatic punch calculation for a total of 10 tools.



■ SE1 character editor

Expansion for SP1- SP3 editor for regeneration, processing and transposition of vector character sets. Importing true type, ADOBE type 1-, LANG ZE1, LZ1 and Kuhlmann-BIN data records.



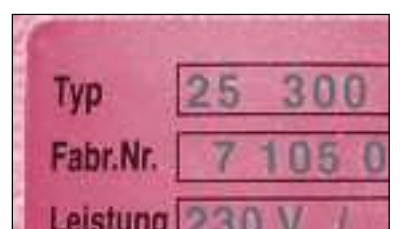
■ SZ1 character set

Expansion for SP1 - SP3 Contains 232 engraving and milling type faces, 40 of which are high-quality type faces. Standards, such as Times, Block-type, Helvetica, DIN 1451, etc., are contained in single or multiple-track sections.



■ ST1 rated plate

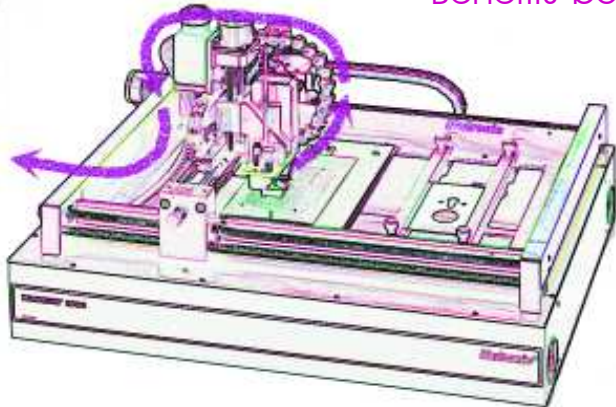
Expansion for SP1 - SP3 Generates a text list or text matrix with variable content and serial numbering.



Eurostile - Helvetica - Times New Roman - Script.....

DIAVAC-EXTRACTION

Benefits both your health and the environment



Materials which produce fine or health-endangering dust should always be machined in conjunction with the use of an extraction unit. This particularly applies to machining of fibre-strengthened materials (PCB's, fibre-strengthened plastics etc.)



Using *DIAVAC* extraction units prevents fine dust particles being blown out into the atmosphere.

Not every extraction unit is suited to this task. The *DIAVAC* extraction units are equipped with a special fine dust filter and thus guarantee optimum results.

A socket is provided for connecting the unit.

Shavings and dust particles are picked up by a flexible, adjustable exhaust arm and removed by the air flow of the exhaust facility.

Together with the air vortex of the optional "Blow-out facility" highly efficient dust removal is achieved.



TECHNICAL DATA

Mechanik - 2 Variantes

Machine-type:

DIADRIVE 2000/280

DIADRIVE 2000/500

Work area:

ca. 560 x 280 x 60 mm

ca. 560 x 500 x 60 mm

Rerun precision:

± 0,02 mm

± 0,03 mm

Symmetry precision:

± 0,05 mm

± 0,06 mm

Feed: ¹⁾

max. 18 mm/Sec.

max. 18 mm/Sec.

X-Y-Z-drive: ^{2) 3)}

2-phase stepping motors

2-phase stepping motors

Holding torque X/Y/Z- axis:

90 / 45 / 45 Ncm

90 / 45 / 45 Ncm

Step angle/resolut:

1,8° / 0,00375 mm

1,8° / 0,00375 mm

Weight:

ca. 40 kg

ca. 48 kg

Working temperature:

+15° C bis 25° C

+15° C bis 25° C

Area-humidity:

30% to 50%

30% to 50%

Axial drive:

direct drive, ball-bearing mounted, high tempered trapezoidal thread spindles

Guide systems:

Duplex linear guides, PTFE running elements, hardened precision steel shafts

Z-working stroke/Working height:

60 mm / 180 mm (optional 800 mm due to stand equipment)

Drilling/Milling performance:

Aluminium 1-2 mm, plastic 1-5 mm per milling operation (dependent on material)

Drilling/Milling spindle - 2 grades of power

Spindletype:

DC-spindle (Direct current-)

HF-spindel (high cycle frequency)

Area of application:

Reasonably priced design for uni-versal applications in Laboratory

among other things for use with extremely small tools (HF-technics)

Spindle-speed:

ca. 2.000 - 16.000 min⁻¹

ca. 6.000 - 60.000 min⁻¹

Tool fixture:

Chuck 0 - 4 mm (step-less)

Chuck 1 mm - 4 mm

Power ⁴⁾ / operating ⁵⁾:

P₁ = ca. 122 Watt, S6, 50 % ED

P₁/P₂ = 230/120 Watt, S6, 80% ED

Activation:

Via DC-Generator

Via HF-Generator

Spindle generator - 2 grades of power

Generatortype:

DC-Generator (Direct current-), inside of machine housing

HF-Generator (high cycle frequency-), external unit

Control:

I x R-integral action control autom. current compensation

Torque control, Electron. braking device

Power supply:

230 V AC, 200 Watt, 50 Hz

230 V AC, 600 Watt, 50 Hz

Activation:

Via machine control system

Via machine control system

Control

Type:

3-axial chopper control (inside of machine housing)

Successive steps:

adjustable: 1/1, 1/2, 1/4, 1/8 step

Power supply:

230 V AC, 250 Watt, 50 Hz

Machine-Software

Type:

Edi-Tasc 3D-contouring control software for 3 axes X,Y und Z. (effective with dongle with Windows 98/2000NT)

Expansion:

Extendable (with dongle) to other axes (please consult us before purchasing).

Data input:

HPGL, also with DIN 66025 option and teach-in programming.

DIADRIVE 2000

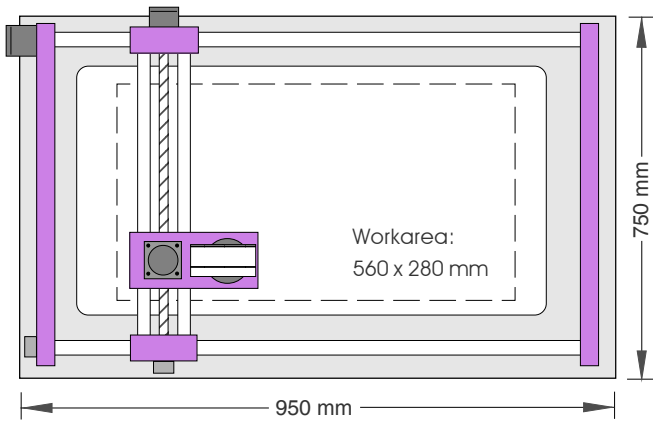
System prerequisites:

IBM® - compatible PC, suitable for the respective operating system, VGA®-screen adapter, VGA-monitor, mouse, 1 parallel port (LPT) 3 1/2" drive, harddisk Windows 2000/NT (dependent on selected software options)

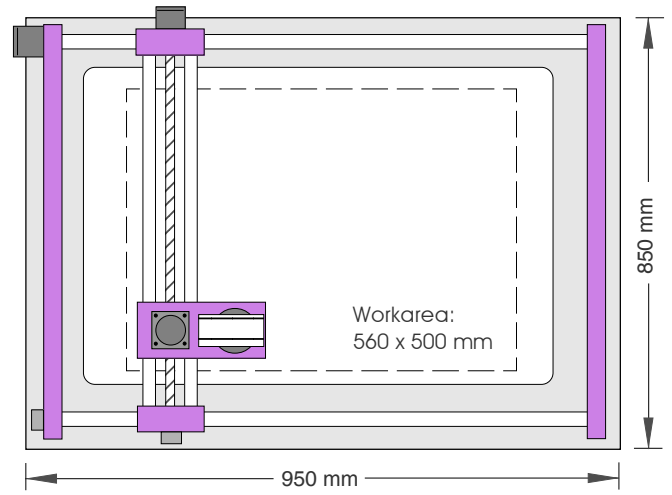
1) dependent on computer, 2) Servo motor drives on request, 3) further axes possible, 4) P1=power

5) S6=uninterrupted periodic operation with intermittent loading, percentage operating time (ED) in % in relation to 10 min. cycle duration.

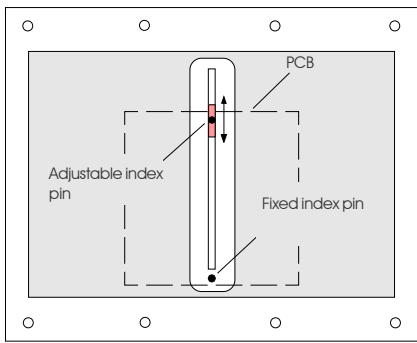
TECHNICAL DATA



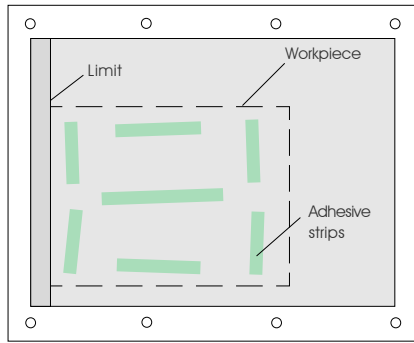
DIADRIVE 2000/280 (total height: 370 mm)



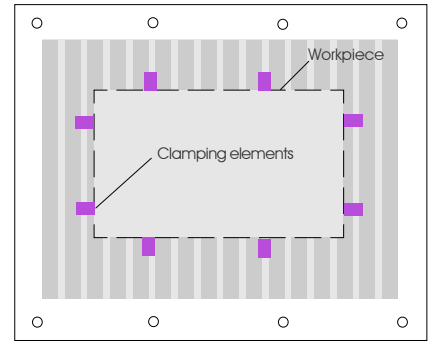
DIADRIVE 2000/500 (total height: 370 mm)



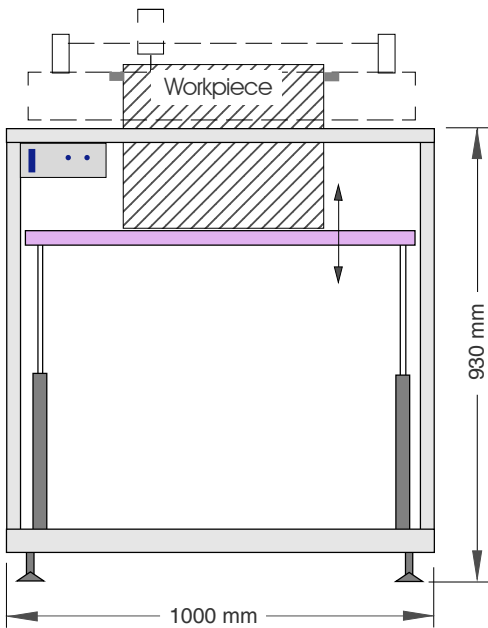
GT1/GT2 engraving table



GT3/GT4 engraving table



NT1- NT4 T-groove table



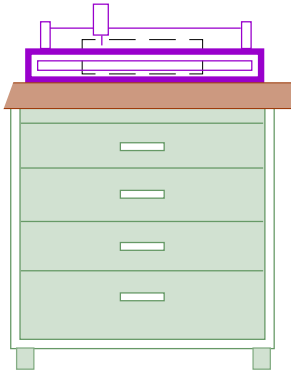
Lower machine structure (DIADRIVE 2000/280: 695 mm deep)
with lifting device (DIADRIVE 2000/500: 915 mm deep)

Remark: the drawings do not purport to represent the actual appearance of the machines or their components and accessories. We reserve the right to make amendments affecting dimensions, design, shape, colour and function. Please enquire immediately before purchase.

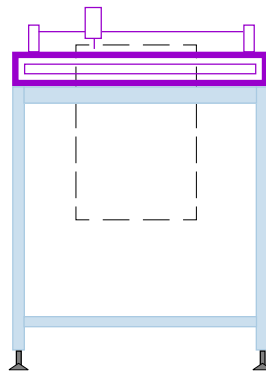
TECHNICAL DETAILS

Installation variants:

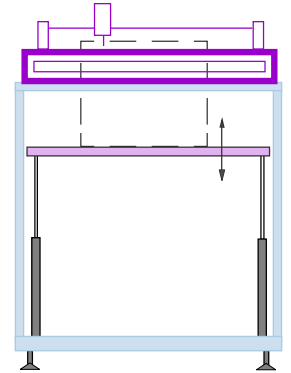
Workbench, laboratory table
Working height: Z=180 mm



DIADRIVE stand equipment
Working height: Z=max. 800 mm



DIADRIVE lifting device
Working height: Z=100-800 mm



Workbench or laboratory table:

Installation is carried out on an existing workbench or a stable laboratory table.
The surface should be even.

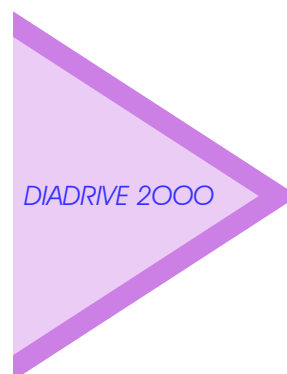
DIADRIVE stand equipment:

We recommend this option if you also wish to machine large workpieces with the DIADRIVE 2000. It consists of a stable lower construction with intermediate braces.
The open construction allows the workpiece to be inserted in the machine from below - simply and easily.

DIADRIVE lifting device:

Functions like the stand equipment, but it is additionally equipped with a hydraulic lifting mechanism. This enables this version to insert large workpieces of a heavier weight without any effort (recommended value from approx. 5 kg).

■ The working height is the maximum height the workpiece should have. The "stand equipment" and „lifting device" options increase the working height, as the workpiece (see broken line) has more room as a result, thanks to the open lower construction.
Please refer to the technical data for the true Z working stroke.



Text may contain errors. Right of amendment reserved.



TECHNICAL QUALITIES

Drive mechanism and safety

DIADISC precision machines are equipped with special high-speed balanced motors to maintain an universal and broad speed range as possible. An electronic speed regulator controls the motor spindle. The respective load is determined and additional output is readied automatically if necessary.

The speed can be steplessly adjusted throughout the entire range. It is characteristic of the speed that it does not remain entirely constant when the motor is under load, but rather adapts itself accordingly in critical situations.

The tendency of drills and milling hobs to block (along with the possibility of tool fracture as a result) is thus considerably reduced. ■

Material and quality



The construction and assembly elements used (milled and turned parts, ball bearings, etc.) are made exclusively of high-quality materials, such as non-corrosive stainless steel, special anodised aluminium or brass. Particularly important construction parts, such as chassis, bearing seats, pulleys and drive shafts are made of solid raw material turned, milled and ground on precision CNC machines.

Punched and bent parts are not used, due to their tolerance and stability characteristics. Parts from other suppliers, such as motors, control electronics and bearings, are produced exclusively in Germany, Austria and Switzerland in accordance with our production and quality stipulations. This ensures a long-term guarantee of both precision and the supply of spare parts. ■

Development and production



All *DIADISC* machines are developed in our production facilities and brought to their final technical maturity under the direction of engineers and experienced technicians. The machines are designed for lengthy periods of application, constructed with suitable stability and comply with currently valid standards.

Newly developed options are so designed as to be also suitable in most cases for retrofitting older serial models.

Machines and options are thus useful long-term investments.

The entire final production and quality control is carried out at our works in Rieden. ■

Further options and detailed information are contained in the separate price list. Please make enquiries in advance with regard to prices in the event of placing an order, as these can be subject to change.



Precision for laboratory and production

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