

Ultrasonic 20 Linear 12 pages

# Specification

Oy Suomen EDM Ab

## ULTRASONIC 20 linear



### Highlights

- Highest dynamics due to **Linear drives in X/Y/Z** with a max. acceleration > **2 g**
- **Compact 5-axis-portal machine:** Gantry design with integrated NC-swivel/rotary table
- **Technology integration:** ULTRASONIC hard machining & HSC milling on one single machine
- Water-cooled USB 42 spindle for High Speed Cutting with HSK-E 32 with **max. 42.000 1/min.** as well as ULTRASONIC machining with HSK-S 32 with max. 10.000 1/min in the standard
- **Automatic feed adjustment** due to Adaptive Control (ADC) and Acoustic Control (ACC)
- Rigid, vibration-isolating **mineral fiber stand in mono BLOCK - design**

## SAUER ULTRASONIC 20 linear

### Price Specification

#### Basic Machine

- U-A3517\* Universal Machining Center:  
ULTRASONIC 20 linear  
Traverse range X/Y/Z 200/200/280 mm  
Linear drives in X, Y, Z - axis  
With rigid table with T-slots  
- USB 42 machining spindle  
  Ultrasonic-Transfer: via Induction  
  Tool holder types: HSK-E 32 / HSK-S 32  
  Max. rpm (HSK-E 32): 42.000 1/min  
  Max. rpm (HSK-S 32): 10.000 1/min  
  Ultrasonic frequency: 20 - 60 kHz  
- Automatic Pickup-Tool Changer with  
  24 magazine places for HSK-E 32 /  
  HSK-S 32 tool holder  
- Process monitoring: Adaptive Control  
  (ADC) for automatic feed adjustment  
  in real time during the process  
- Preparation for Ethernet - interface  
  (\*5-axis-version ULTRASONIC 20-5 lin.  
  only in combination with U-G4022)
- U-G1001\* Options package: Machining of  
glass, ceramics and tungsten carbide  
consisting of following single options:  
- U-B4033 Siemens 840D solution line  
- U-H3022 electronic hand wheel  
- U-H4003 Integration of  
  Acoustic Control (ACC)  
- U-C0142 Erowa Zero point clamping system  
- U-E3017 ICS through inner spindle  
- U-K3028 Coolant reprocessing plant  
  KMA-300  
- U-G0016 Oil and emulsion mist  
  precipator  
- U-N3060 Renishaw measuring probe  
  OMP 400  
- U-N3015 Renishaw Laser system NC4-III  
- U-L3005 Cooling unit for  
  electrical cabinet

#### Control

- U-B4033\* 3D-path control  
SINUMERIK 840D solution line

### **Working table**

- U-G4022      5-axis machine version  
                 with NC swivel/rotary table
- A-axis with direct torque motor  
                 Swivel range: -10\_ to 130°  
                 RPM: max. 50 1/min
  - C-Axis: NC-Rotary Table \_ 200 mm  
                 with direct torque motor integrated  
                 in swivel axis  
                 Range: 0 to 360°  
                 RPM: max. 150 1/m  
                 Incl. Siemens TRAORI cycle  
                 Incl. preparation for zero-point  
                 clamping system

### **Control options**

- U-H3024\*      MCIS DNC Machine for  
                 SINUMERIK 840D  
                 Basis product license and data carrier  
                 for the NC-Data transmission between  
                 PC and Machine via Ethernet-Interface  
                 Management on PCU50 is possible

### **Cooling media / chip removal**

- U-N3005      Flushing gun for machine room

### **Spindle options**

- U-E3053      Extra charge for spindle with  
                 increased torque  
                 Max. 6 Nm at S1 (100% ED)  
                 Max. 7,8 Nm at S4 (40% ED)
- Air blast through spindle and from nozzles

### **Automation / Measuring / Monitoring**

- U-G0002      Preparation for Automation system  
                 Linear magazine PH 10 | 100  
                 Electrical and mechanical preparation  
                 for the integration of the PH 10 | 100  
                 Automatic cover installed at the upside  
                 of the machine door

Transport zone: ohne Zone / no zone defined

U-G0001 Automation- linear magazine PH 10 | 100  
 basis package with X / Y / Z -portal  
 Work piece loading from top  
 with telescopic axis (handling arm)  
 in Z axis  
 Designed for:  
 Max. 99 mag. places (system size 50)  
 Max. 55 mag. places (system size 120)  
 Standard: 6 levels with 3, 5, 7 or 9  
 pallet places  
 (Specification necessary!)  
 Only in combination with  
 preparation (U-G0002)!

### General options

U-L4000 Special-shrink fit machine  
 for ULTRASONIC-actuating tool holders  
 - Heating power 10 kW  
 - for tools from 3 to 50 mm  
 - incl. Speed Cooler for tool cooling  
 after the shrinking process.

U-L3020 Transport gear for  
 HSC 20 linear / ULTRASONIC 20 linear  
 (Absolutely necessary for transport or  
 move of the machine, otherwise risk of  
 machine damages)

### Turn key

U-E2010 ULTRASONIC actuating tool holder  
 HSK-S 25 with shrink connection 7 pcs

### Open Mind

Open Mind Hyper Mill software  
 Open Mind postprocessor  
 For Ultrasonic 20 linear

### DMG Powertools

D-NET03\* DMG Net service VPN  
 Basic package consists of:  
 - DMG Net service box  
 (manual, software with CD)  
 - VPN client  
 - Licence for the 1st machine

## Attachment

### Technical Description

#### U-A3517 ULTRASONIC 20 linear

#### Universal Ultrasonic-Machining Center ULTRASONIC 20 linear

Traverse range:	X = 200 mm / 7.87 in. (long) Y = 200 mm / 7.87 in. (cross) Z = 280 mm / 11.02 in. (vertical)
Main drive:	Linear drives in X, Y, Z - Axes
RPM:	3.000 to 42.000 1/min. (USB 42)
Speed limitation ULTRASONIC:	Max. speed of the HSK-S 32 actuating tool 10.000 1/min
Ultrasonic:	max. 100 Watt HF-Power Frequency range 20 - 30,5 kHz Automatic Frequency und Amplitude - Control Ultrasonic-Parameters are integrated in the tool changing system on the Siemens-Control
Adaptive Control (ADC):	ADC causes an automatic, continuous feed regulation during the process in real time, to achieve a constant cutting speed. The bigger the spindle torque on the tool, the smaller the feed (vise versa). Influencing variable ADC: Spindle torque in Nm When reaching and holding the max. value for the time-t, a user specific cycle (USC) is automatically started. e.g.: relieving of the Z-axis Attention: Risk of collision when using the ADC in combination
Accoustic Control (ACC):	ACC causes an automatic, continuous feed regulation during the process in real time, to achieve a constant cutting speed. With increasing damping of the tool and thus higher US-forces, the feed speed is automatically reduced (vise versa). Influencing variable ACC: generator-power in W When reaching and holding the max. value for the time-t, a user specific cycle (USC) is automatically started. e.g.: relieving of the Z-axis Attention: Risk of collision when using the ACC in combination with cycle 800!
Tool holder:	HSK-S 32 Actuating-tool holder for Ultrasonic applications HSK-E 32 – holders for conventional machining
Max. Tool_:	_ 0,1 mm - 6 mm (Tool with defined cutting edge: max. _ dependent on material and machining task)
Max. Tool_:	_ 0,5 mm - 30 mm (Tool with undefined cutting edge: max. _ dependent on material and machining task)
Max. tool length:	Max. 200 mm incl. the Actuating tool holder

Transport zone: ohne Zone / no zone defined

Distance:	
HSK tool clamping -rotary table:	Min. 120 mm (ULTRASONIC 20-5 linear) Max. 400 mm (ULTRASONIC 20-5 linear)
Spindle:	liquid cooled (with active spindle chiller)
Positive air:	yes
Connection values:	All values depending on the machine specification!
	Electrical supply: (3N/PE) 50-60 Hz 400 V / 230V +/-10%
	max. power input: 50 – 70 kVA (see planning documents)
	recommended mains fuse: 100 - 125 A ((see planning documents)
	short-circuit power: 5,5 MVA
Air pressure :	Min. 6 bar air pressure connection
Coolant supply:	Standard: Coolant pump with max. 2,5 bar coolant pressure on 40l output. ULTRASONIC 20 linear with optional KMA-300-II (U-K3028), the coolant-pump is used as lifting pump.
<b>Note:</b>	<b>Only use (Ultrasonic - suitable) coolant according to the manufacturer's machine-specific recommendations!</b> <b>For an oil content &gt; 15% in the emulsion there is a risk of deflagration or explosion; additional safety package necessary (on request).</b> <b>The ignition point of the coolant must be greater than 140 _ Centigrade.</b>
Weight:	ca. 4.000 kg (ULTRASONIC 20-5 linear)
Machine dimensions basic machine:	
Footprint:	Length: 2.000 mm Width: 1.800 mm
Outside dimensions:	Length: 2.020 mm Width: 2.196 mm (incl. chiller for electrical cabinet) Height: 2.385 mm (incl. alarm light)
	Active spindle chiller: 480 mm x 425 mm
Machine dimensions with PH 10   100:	
Footprint:	Length: 2.020 mm Width: 3.096 mm
Outside dimensions:	Length: 2.020 mm Width: 3.343 mm (incl. chiller for electrical cabinet) Height: 3.400 mm
	Active spindle chiller: 480 mm x 425 mm
Automatic Tool Changer	24 tools (HSK 32 E / HSK 32 S)

Transport zone: ohne Zone / no zone defined

Chip-to-chip < 10 seconds  
(incl. autom. blow-off function for the HSK taper  
excl. cleaning of the working tool)

**Subjects to change without notice!**

**Attention:**

**The shrink fit machine is specially constructed for the actuating system with shrink fit connection.**

**U-G1001**

Options package: Machining of glass, ceramics and tungsten carbide consisting of following single options:

- U-B4033 (Siemens 840D solution line)
- U-H3022 (electronic hand wheel)
- U-H4003 (Integration of Acoustic Control)
- U-C0142 (Clamping system EROWA ITS 100)
- U-E3017 (ICS through inner spindle)
- U-K3028 (Coolant reprocessing plant KMA-300)
- U-G0016 (Oil and emulsion mist precipitator)
- U-N3060 (Renishaw measuring probe OMP 400)
- U-N3015 (Renishaw Laser system NC4-III)
- U-L3005 (Cooling unit for electrical cabinet)

**U-B4033**

**3D-path control SINUMERIK 840D solution line  
(ULTRASONIC 20 linear / HSC 20 linear)**

Hardware:	32-Bit-Multiprozessor system decentral bus concept (MPI, industrial Ethernet, Profibus, ASI-Bus) PCU 50: Pentium III Industrial PC 1.5 GHz / 256 MB NCU 720.3 Memory 512 MB DRAM; 1 MB SRAM PLC: AS 317-2DP with Profibus
Operator panel:	ERGO <i>line</i>
Screen:	19" TFT flat screen resolution 1,280 x 1.024 pixels
Keyboard:	CNC keyboard, Gildemeister control panel
DMG Softkeys:	freely programmable keys for frequently selected screen contents or operation sequences.
DMG SMARTkey	personalized operator authorization with corresponding access rights for control and machine.
Block processing time:	2.5 ms
Number of part programs/ workpieces in memory	500 / 250
Number of tools/cutters	600 / 1500
Look Ahead Function:	direction changes are checked by the control at least

Transport zone: ohne Zone / no zone defined

99 NC-blocks in advance. Feed speed is automatically adapted to the dynamics of the machine.

Number of axes:	5 out of 5 linear interpolating, digital (Export version: 4 out of 5) 2 circular interpolating, helical interpolation,
Data memory:	hard disk >8GByte central user memory 3 MB
Programming:	
Universal machining centre:	DIN/ISO 66025 with advanced language elements (no mixing process possible!)
Horizontal machining centre:	DIN/ISO 66025
Cycles:	peck drilling, geometry calculation, tapping with/without compensation chuck, reaming, boring, bore patterns, slot milling, rectangular and circular pockets, line by line milling of plane surfaces with manufacturer cycles (special machining cycles of the manufacturer) can be integrated, measuring cycles
Parameter programming:	mathematical functions: =,+,-,*,/,sin a, cos. a, logical connections: (=,<>, >, >=, <, <=) parenthesis functions, tana, arcs sin, arcs cos, tan, a <sup>n</sup> , e <sup>n</sup> , ln, log, absolute value of a figure, constant p, negration, cancel of numbers before and behind the semicolon, calculation parameter, global user parameter (GUDs), local user parameter (LUDs)
Program structure:	Sub programs, program part repetition, conditional jumps to labels, program grouping
Co-ordinate system	Cartesian, polar
Co-ordinate transformations:	movement, rotation, mirroring, measure factor TRAORI
Position details:	nominal/actual value, residual value for straight line and circles rectangular co-ordinates, absolute measures, display and input in mm or inch
Contour approach and departure:	via straight line: tangential or vertical via circle, via helix
Tool table:	tool table with 600 tools per table, number of tables is restricted by hard disk capacity
Constant speed:	related to tool centre contour related to cutting edge
Swiveling of machining plane:	Standard for machines with NC swivel rotary table or universal

Transport zone: ohne Zone / no zone defined

Re-positioning:	After emergency off or power fault easy tool removing with swivelled axis out of bore etc. (limit with tapping tools and programs without G7)
TRAORI:	Offset of the swivel axes is compensated so that the position of the tool tip to the contour is maintained.
Free contour programming:	contour programming (standard DIN/ISO)
Easy operate:	set-up and setting of reference point with menu technique (standard DIN/ISO)
Parallel operation:	Programming during machining of another program
Point table:	programming with points out of the point memory (max. number of points is restricted by capacity of random access memory)
Programming support:	graphical support: DIN/ISO, dialogue with graphical support, further information with help key
Service support:	Visualized memory function after 250 and 2000 operation hours. Optionally: DMG – Service Agent with the functions Notification, instruction and support for spare part ordering
Test graphics:	graphical simulation of the machining process: top view, presentation in 3 planes, 3D presentation, selective enlargement
Programming graphics:	during contour programming the NC blocks are drawn (2D line drawing).
Re-enter into the NC-Program:	Re-enter to any block in the program and approach of the calculated nominal position to continue machining program: interruption, contour departure and re-approach
Zero point tables:	zero point tables with 99 zero points inclusive text
Network connection:	Ethernet interface in electrical cabinet of machine: Fast Ethernet 10/100 BaseT (100 mBaud) Network protocol: TCP/IP USB interface in front plate USB 2.0 Data transfer: The PCU 50 communicates with external PCs like windows networks (integrated SMB server). by release of access structure.
Available Options:	
3D machining:	reduction of infeed speed, 3D tool compensation with vector to the surface, jerk compensation
CompCad:	Comp Cad ensures smooth velocity and acceleration. A number of straight blocks will be grouped and approached by means of

Transport zone: ohne Zone / no zone defined

different polynomials within an error tolerance (option).

Rotary table machining:	programming of contours on unwind of cylindrical work pieces (option)
MCIS-TDI	Tool management: Determination of tool usage. Direct data exchange with tool measurement; comfortable TIN/TOUT-support for complete exchange sequence; NC-program simulation (only with disc or chain magazine) (Option on request)
Automatic warm up of the machine:	By selecting of a warm up program and set of date and time the machine can be brought to the process temperature. (Option on request)
ShopMill Open:	Available on request: Shop Mill Open: graphic interactive programming
Additional Options:	on request

#### **U-H3024**

#### **MCIS Motion Control Information System**

With Motion Control Information System you can increase the productivity and reliability of your machine tools by perfectly incorporating these machines in your integrated system.

MCIS provides for consistent DNC networking from the programming system to NC program archives through to the CNC machines. This software makes available NC programs suitable for most diverse types of CNC controls as well as for CNC controls of different manufacturers and generations. In addition to this, the programs are archived conveniently and safely in a reliable database.

This offers you the following advantages in your manufacturing process:

- Time and cost savings for NC programmers and machine operators by means of an efficient NC program organization through convenient NC program management and transmission functions
- Cost reduction in the field of NC data organization
- Trouble-free coordination of planning, scheduling and implementation
- Reduced setup times and increased effectivity
- Reduced machine downtimes
- Simplified fault analyses

#### **U-K3028**

#### **KMA-300 II Coolant Reprocessing Plant**

**With centrifuge, 300 l capacity, 40 bar high pressure pump frequency controlled**

#### **Data of Centrifuge**

Separation of solid materials not only depends on the volumetric flow rate (duration of liquid in rotor) and on viscosity of the liquid, but also on other factors like specific gravity, shape and size of the solid particles, as well as separating factor of the centrifuge.

The following data on volume flow rates in relation to the viscosity only give standard values:

Transport zone: ohne Zone / no zone defined

Flow rate:	
Viscosity at 1 cSt (1 $\frac{mm^2}{s}$ )	80 l/min
Viscosity at 21 cSt (3 $\frac{mm^2}{s}$ )	60 l/min
Viscosity at 60 cSt (8 $\frac{mm^2}{s}$ )	40 l/min
Drive power	2;4 kW
Drum speed	4.048 rpm
Separating factor	1800 g
Drum capacity	7 dm <sup>3</sup>
Sludge capacity	max. 5 dm <sup>3</sup>
Inlet connection	DN 40
Outlet at a counter pressure of max.	1 bar
Dimensions	690 x 440 x 360 mm
Net weight	ca. 83 kg
Equivalent continuous sound pressure level at a distance of 1 m and a height of 1,6 m:	74 dB(A)

**Unit data:**

	<b>US 20</b>	<b>US 50</b>
Supply pump P1:		
Q	50 l/min	50 l/min
p	0,5 bar	0,5 bar
Admission pressure pump P3.1:		
Q	40 l/min	80 l/min
p	2,5 bar	8 bar
High pressure pump P3.2:		
Q	20 l/min	20 l/min
p	40 bar	40 bar
Tank capacity:	300 l	300 l
Weight of system:	approx. 450 kg	approx. 450 kg
Dimensions:	1,322 x 1,430 x 1,430 mm	1,322 x 1,430 x 1,430 mm
Power:	approx. 14 kW	approx. 17 kW
Total connected power:	26 A	32 A
Plug:	40 A	40 A

**U-N3015****Renishaw NC-4 III****Laser system for non-contact tool measurement**

The NC4 allows fast, non-contact tool setting and tool breakage detection on a variety of machining centres. It is mounted as a fixed system with 230 mm length (with 170 mm operating gap).

Depending on the gap between the transmitter and receiver unit, tools ex \_ 0,2 mm can be measured on every point along the laser. A breakage detection is possible ex \_ 0,1 mm.

NC4 incorporates the unique Micro Hole\_ protection system and the innovative failsafe Passive Seal\_, maintaining IPX8 environmental protection.

**U-L4000**

Special-shrink fit machine for ULTRASONIC-actuating tool holder

- Heating power 10 kW
- for tools from 3 to 50 mm
- incl. Speed Cooler for tool cooling after the shrinking process.

**Technical Data:**

Laser type:	Visible red light < 1 mW 670 nm Conforms to American (21 CFR 1040.10 und 1040.11 except for deviations pursuant to Laser Notice No. 50 vom 26.07.2001) and European (IEC 60825-1:1993 + A1:1997 + A2:2001) laser safety standards.
Electrical connection:	Hardwired cable on end of unit. Other configurations available on request.
Sealing:	IPX8 (air on or off).
Dimensions:	NC-4 III: 230 mm length x 40 mm wide (fixed)
Repeatability of trigger points:	_ 1.0 mm (2 $\sigma$ ) when 1 m distance
Minimum tool diameter for setting:	ex 0,2 mm (dependant on separation and mounting)
Minimum tool diameter for breakage detection:	ex 0,1 mm (dependant on separation and mounting)
Maximum tool diameter:	30 mm
Maximum tool length:	200 mm
Power supply required:	120 mA @ 12 V und 70 mA @ 24 V
Status Display:	Measuring-status-display via LED on the upper site of the transmitter and receiver unit
Air inhibition system:	air supply > 3 bar, consumption 8 l/min, machine requirement air quality by ISO 8573-1: air quality category 5.7
Temperature limit:	Operating +5 °C to +50 °C Storage -10 °C to +70 °C

**D-NT301**

The DMG Net service establishes a secure VPN connection to the DMG Service.

By the help of the online connection:

- an immediate and comprehensive problem analysis,
- direct troubleshooting on machine control or
- software adaption can be managed.

Shipment:

- DMG Net service Box (short manual, Software on CD-ROM)

Note:

With proprietary controls a separate PC is mandatory, which enables the start of DMG Net service from a PC. Placing into order (D-IB001) is obligatory.

For all technical and organisational information please have a look at DMG Net service-conditions.

To guarantee a smooth installation right from the beginning, a questionnaire with guideline scan should be requested by the customer.

There will be no online-costs incurred during the connecting between machine and DMG Service.

After warranty a monthly fee in the amount of 25€ per machine will be incurred.

Delivery outside Germany takes place in consideration of the German Federal Office of Economics and Export Control (BAFA) and has to be provided by a local reseller of Cisco Systems, Inc. (so called drop-off shipment).

**D-IB001**

Starting up of the DMG Net service per machine:

- Installation of DMG Net service software
- Configuration of the network and the ISDN router OR VPN client

Note: The customer has to provide an IT responsible for the support of this network.

For the ISDN Router the customer has to provide a two-channel ISDN-Line at the machine.

For the encrypted VPN-line the customer has to guarantee an ethernet-connection at the machine.

In preparation for the installation a questionnaire can be requested by the customer.