

Computer Numerical Control

OPTIMUM[®]

MASCHINEN - GERMANY

CNC METAL WORKING MACHINERY
THE OPTIMUM IN TERMS OF QUALITY, PRICE-PERFORMANCE AND SERVICE



MAIN CATALOGUE 2021/22

OFFER FOR OUR CUSTOMERS, WHO ARE ENTREPRENEURS AND NOT CONSUMERS



The OPTIMUM in terms of quality, price-performance and service

Dear Customer,

To support any conceivable metalworking application, we have composed an assortment in our OPTIMUM CNC Catalogue that covers many areas with suitable machines. Each of our products impresses with its quality, precision, long service life and value stability.

Your requirements are our target

For more than 30 years, we have focused on the design, development and production of OPTIMUM machines, and for more than 15 years on CNC machines. We work unceasingly on continually optimising our machines. One important point here is also production, which is of great importance to us. This is why we made a careful choice of manufacturers to supplement our own production facilities. We set great store by the fact that these manufacturers meet our internal quality requirements. Besides our own manufacturing operations, OPTIMUM exclusively produces with manufacturers who meet our requirements. This means that we can offer you metalworking machines that impress on many scores.

OPTIMUM has built up a good reputation in the course of the years on what is a continually changing and developing tool and machine market. We are proud to say that we combine expertise, experience and a balanced price-performance ratio. Our utmost priority is you as a satisfied customer. With our motivated and expert personnel we strive to complete OPTIMUM's know-how and deliver it to you our customers.



Kilian Stürmer
Managing Director



DISCOVER OUR PRODUCT VIDEOS NOW!

All of our product videos are available for you to watch on our YouTube channel OPTIMUM Maschinen Germany GmbH. Subscribe to our YouTube channel to make sure you don't miss any of the new videos.





Sales and service Germany at Hallstadt / Bamberg

On-site for you: in Europe and worldwide

For many years, OPTIMUM Maschinen Germany has been synonymous with the development, design and production of metalworking machines and CNC machines characterised by high quality standards. In the course of the years, we have continually expanded our sales and service network.

In the meantime, the German company OPTIMUM Maschinen Germany GmbH works globally with expert partners from its headquarters in Hallstadt near Bamberg: OPTIMUM is represented all over Europe by retailers with great performance. Our international sales network extends well beyond Germany's borders to many countries all over the world. This helps us to ensure that our customers can rely on the fast, uncomplicated and service-oriented expertise and quality standards of OPTIMUM thanks to our extensive sales organisation. We have established a responsible market position that you can trust in the course of the years!



WE ARE ON-SITE FOR YOU



CUSTOMER ADVISORY SERVICE

When advising customers, our CNC experts and sales staff will work out individual machine and service solutions for you. In close collaboration with the customer, our staff analyse the fields of application to clearly identify the requirements. Our meaningful, detailed production information makes it easier for you to find your "dream machines".

INSTALLATION, COMMISSIONING AND INSTRUCTION

On request, our service technicians perform set-ups as well as professional commissioning and briefings so that the new machines and systems run reliably right away. Our trained staff help the user to get to grips with the new machine in the shortest possible time and to use it efficiently. This service saves our customers time and therefore reduces costs. In addition, these services help to avoid application errors and queries.

MAINTENANCE AND REPAIRS

Trained service personnel carry out one-off maintenance or - agreed by maintenance contract - regular maintenance. Our expertly performed maintenance ensures that machines run trouble-free for a long time! Repair costs are minimised and operational safety is maintained. In addition, our experts detect possible defects and wear at an early stage. In this way, we save our customers from unnecessary repair costs and avoidable downtime. Should a repair nevertheless be necessary, this will be carried out immediately in consultation with the customer.

SERVICE

Our service ensures you not only telephone support from specially trained staff, but also on-site support. Whether it's a planned service appointment or quick help after a sudden machine failure: In the event of service, our intensively trained OPTIMUM technicians are at your disposal with their sound knowledge and many years of experience. They quickly and reliably take care of repairing your CNC machines. With our carefully considered service solution we help to keep your OPTIMUM CNC machine working in a trouble-free way

COST TRANSPARENCY

Working time and travel shall be charged according to the agreed flat rate plus agreed material costs. The services of our service field service are charged fairly and favourably for the customer.

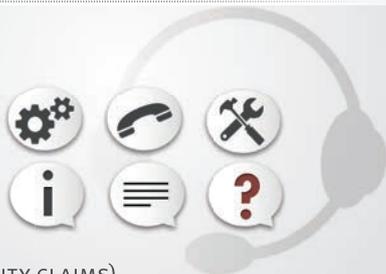
**MORE SERVICE - FAST EXECUTION - DIRECTLY ON SITE:
We ensure customer satisfaction!**



EVERY MACHINE NEEDS SERVICE ONCE. WE OFFER IT!

- › Maintenance work after a defined operating period
- › Service in the event of malfunctions
- › Competent advice and information
- › Spare parts supply
- › Complaint processing
- › Service in the CNC workshop or - if necessary - also at the customer's site

CUSTOMER NEEDS ARE SOLVED AS QUICKLY AS POSSIBLE AND TO THEIR SATISFACTION!



SERVICE HOTLINE
(REPAIRS, WARRANTY CLAIMS)

Quick acceptance & status enquiry: write us an e-mail:
CNC_service@stuermer-maschinen.de



i SALE DEMONSTRATION CENTER

+49 (0)951 96555-513

BERATUNG@OPTIMUM-MASCHINEN.DE



i SERVICE HOTLINE (REPAIRS, WARRANTY CLAIMS)

+49 (0)951 96555-129

CNC_SERVICE@STUERMER-MASCHINEN.DE



i SPARE PARTS/ SERVICE

+49 (0)951 96555-138

CNC@STUERMER-MASCHINEN.DE

We are available as follows:

Monday through Thursday: 7:00 - 16:30

Friday: 7:00 - 13:30

CNC SIMULATION WITH THE DIGITAL TWIN IN TRAINING AND PRODUCTION, PROTECTS YOUR MACHINE FROM EXPENSIVE DAMAGE

Cost-effective and low-risk work preparation and qualification on the virtual machine.

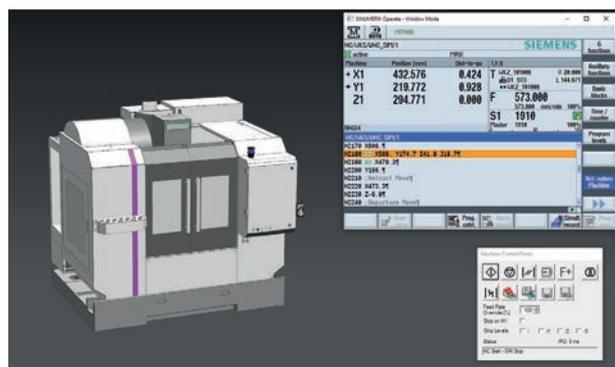
For CAM systems, it is common to run a simulation of the toolpaths before using the postprocessor. Often this is not accurate enough and does not safeguard all toolpaths and movements subsequently generated by the postprocessor. To get an exact statement about the movement on the machine, it is advisable to use a digital twin of the machine.

Realistic digital image of the real machine tool

The digital twin is the realistic digital image of the real machine tool used in the workshop. Including all geometries of the machine, fixtures and tools, as well as the control system used in the real machine, including version and all parameter settings.

For this purpose, all machine data and parameters of a SIEMENS 828D / 840Dsl control can be extracted from the Optimum CNC machine and transferred to the PC version of the control.

This option is only available for Sinumerik controllers. The VNCK (Virtual NC Core) is then coupled with the outputs of the CAD-CAM software and thus all movements of the machine with tools, clamping devices and components can be represented kinematically using the virtual machine.



Digital twin for training on CNC machines

With its product Run MyVirtual Machine, Siemens AG has developed an ideal platform for creating and operating a digital twin. Especially for the area of vocational training, training on virtual machines has proven to be advantageous.

The student can safely test and optimise his NC programs without causing damage to a real machine. In traditional training, it is almost impossible for the teacher to have every one of his students programming on the machine. Most educational institutions do not have the resources to run more than one CNC machine. Often you still have to choose between turning and milling.

Almost any type of machine and any kinematics can be simulated with the digital twin.

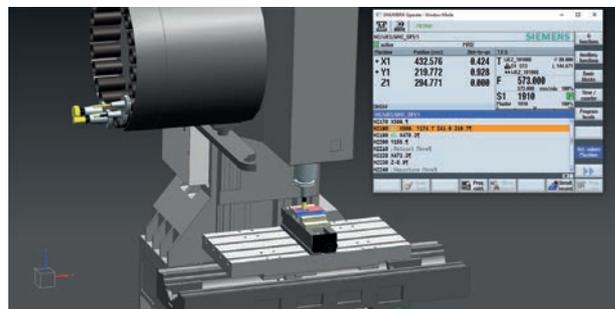


Fig.: OPTImill F150 HSC without protective housing

Use the digital twin of our CNC machines

The digital twin is already available for the OPTIMUM CNC milling machines OPTImill F150 HSC and OPTImill FU5 as well as the CNC lathe OPTItturn L44. Other Optimum machines can be created and adapted to customer requirements.

The digital twin contains a virtual image of the machine from the original machine data with animated tool change and the VNCK (Virtual NC Core). Tools and set-ups can be managed by the machine user himself.

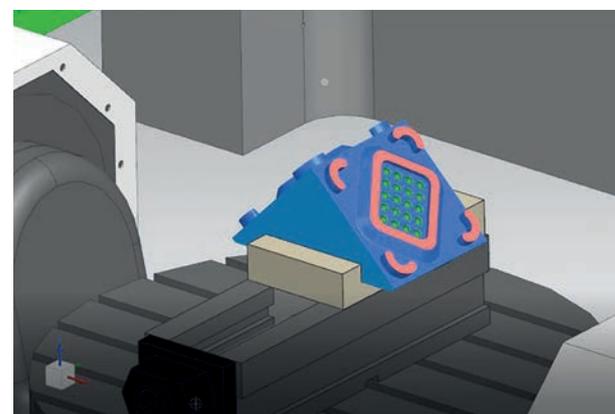


Fig.: OPTImill FU 5:
The clamping and manufacturing of the workpiece can be verified in the simulation. The part can be viewed from all directions. The critical collision areas of the machine can also be viewed.



You can get more information at
www.christiani.de
 Björn Wagner
 Bjoern.wagner@christiani.de
 +497531 5801-165

www.christiani.de/cms/fachraumkonzepte/fachraume/metall/



EQUIPMENT FOR SPECIAL-PURPOSE FACILITIES

WE KNOW WHAT IS IMPORTANT

In collaboration with Dr.-Ing. Paul Christiani GmbH & Co. KG - Technisches Institut für Aus- und Weiterbildung (Technical Institute for Education and Training) - which has played an active role in education for more than 90 years, we plan and implement your entire special-purpose facility.

Whether you are looking to extend an existing special-purpose facility, or set up a new one, OPTIMUM Maschinen and Christiani are your partners for planning and implementing workrooms and laboratories for technical education and training. And naturally also for your production operations.

With our expertise, we will find a solution for your requirements.

Our services in cooperation with Christiani:

- Advice and needs analysis
- Planning and conception
- Completion and commissioning
- Train-the-trainer training and support



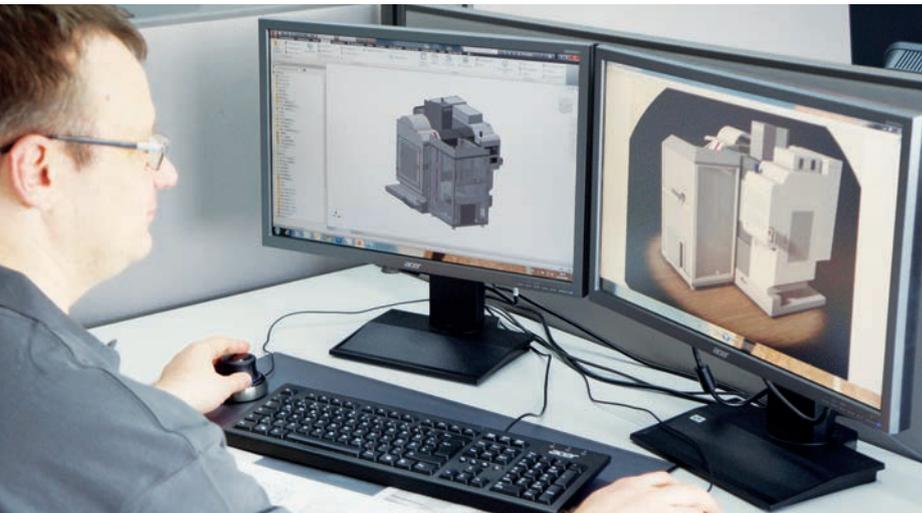
A STRONG TEAM



PLANNING

As early as the planning phase our engineering department manages the development of new products, which are manufactured both our facility and facilities operated by our partners. Major advantage: This means that all market influences and customer requirements are immediately incorporated where the course is set for successful product design.

Our Engineering department has a well-coordinated team of specialists with excellent engineering qualifications. Their established expertise allows flexible and creative implementation of all requirements posed for our products and services.



DEVELOPMENT

Development relies exclusively on state-of-the-art 3D CAD software, which we use to create a virtual model of the machine. Besides ensuring optimum functionality of the machines, our development process also targets re-usability of the data generated during the development phase. These data are not only used for devising production documents and manuals, but are also used for computations, for computer-aided manufacturing, and for visualisation and animations.



PRACTICAL TESTING

Our engineers combine theory and practice. To avoid leaving anything to chance in terms of product satisfaction, all of our machines and tools go through application selected engineering tests, and we also consistently involve selected customers in this process. This means that each new product is expected to prove itself in the daily grind before it comes a fixed part of our product range. Engineering analysis helps us to discover and eliminate any remaining weak points.

SUPPLIER MANAGEMENT

Regular work meetings between our engineers and suppliers help to transfer our new developments and enhancements into series production at the manufacturing location in a targeted way. This direct support at our production facilities has been indispensable in manufacturing the quality products that our customers have trusted for more than 25 years.

We set great store by the fact our employees have a clear-cut engineering orientation. In addition to the premium quality of our products, and our expert service, this contributes to constantly high levels of customer satisfaction. And our focus on technically affine employees ensures our market success – today and looking forward!



COPYRIGHT

To secure the rewards of our technical development work for both ourselves and our customers, patent and utility model protection is essential for our in-house developments. This helps us permanently keep the technical lead that OPTIMUM products have. The entire catalogue is protected by copyright. Additionally, to protect our products, we register our rights to our brands, patents and designs where possible in each individual case. We take strong action against any violation of our intellectual property.



DOCUMENTATION AND RISK ANALYSES

Our technical authors again achieve a high standardised level that meets or even exceeds all requirements. These huge efforts exclusively serve the purpose of facilitating the process of familiarisation with the machine for our customers, and ensuring permanent and safe operations. Risk mitigation measures are developed to compensate for any safety risks identified in the scope of analysis. Following this, after implementing the measures, the residual risk is evaluated.



A STRONG TEAM



QUALITY MANAGEMENT GOODS ISSUE INSPECTION

Our quality managers from Germany are the first contacts for quality compliance on site. They are responsible for dimensional precision of the components, for validating this precision, and the quality of the production process. They collaborate closely with our Engineering department at head office in Germany, with which they form an optimal symbiosis.

QUALITY MANAGEMENT, PRODUCTION AND GOODS ISSUE INSPECTION

Besides adhering to delivery deadlines and service, the quality of our products is extremely important to us. Continuous checks by our quality managers on-site ensure our quality. Our comprehensive incoming goods inspection is performed in line with generally accepted technical guidelines.



PRODUCTION

A team of employees and a German mechanical engineer directly influence the production process on site through regular training and checks. It is only through this intensive support and training at the production site that we are in a position to achieve the proverbial OPTIMUM.



DIN EN ISO 9001

■ Excellent quality

OPTIMUM Yangzhou is DIN EN ISO 9001 certified. This means that all company departments and services are subject to strict quality requirements. And this means consistently high quality for you. The objective of high quality is thrilled customers. And achieving this demanding certification is ultimately driven by this approach. The key to the long-term success of our enterprise is also a relationship of trust with customers and suppliers. This explains why it is just as important to us as the sustainable quality of our products.



COOPERATION PARTNER FOR CNC TRAINING IN BAVARIA



A STRONG TEAM

SIEMENS has for many years been the system supplier of the control and drive technology for CNC-controlled lathes and milling machines by OPTIMUM Maschinen Germany GmbH. Due to our long-standing and successful collaboration, a cooperation partnership for CNC training in Bavaria was agreed in June 2012.

Target-group specific courses familiarise the participants of the training program with the various Sinumerik controls.

Optimum uses CNC machines with the Sinumerik controls 808 D Advanced, 828 D Basic, 828 D or 840 D sl for this. And the training offerings also include the "Sinumerik Operate" software with work step programming "ShopMill" and "ShopTurn". The machine operators learn rapid NC programming, work preparation and intuitive software handling. OPTIMUM Maschinen Germany GmbH trainers, who ARE SIEMENS-certified, train your employees either directly at their workplaces or at OPTIMUM headquarters in Hallstadt near Bamberg.



DISCOVER OUR PRODUCT VIDEOS NOW!

All our product videos are available on our YouTube channel.
Subscribe to our YouTube channel to not miss any of the new videos.

DEMONSTRATION CENTRE

You can experience many of our highlights live on a floor space of some 2 000 m² in our demonstration centre at our main facility in Hallstadt, near Bamberg, Germany. Four customer advisors are available to help you with their expert knowledge.

What you can look forward to:

- approx. 2 000 m² of training and exhibition floor space
- 150 machines from all fields of application are permanently available as demonstrators
- an excerpt of the most important machines from each sector of our product portfolio

OPTIMUM also provides product training for its retail partners at our company headquarters in Hallstadt. At our specially equipped training and presentation rooms, retailers learn the key facts about OPTIMUM products, and the unique selling points compared with third-party products.

Many machines are presented, demonstrated and explained in our exhibition space. Hands-on training is guaranteed.



Aircraft compressors and accessories

MAKE AN APPOINTMENT DEMONSTRATION CENTRE

For faster and less complicated registration
Send us an e-mail with complete data
to: cnc@optimum-maschinen.de



Cleancraft cleaning technology and accessories



DISCOVER THE VIDEO ABOUT OUR
DEMONSTRATION CENTRE
On our YouTube channel



TRAINING

OPTIMUM offers **dealer training and product training such as Sinumerik Operate training, 3-D printing basic training, 3-D printing advanced seminar** at the company location in Hallstadt and Pettstadt for its trade partners. Please note the training courses offered from page 328

Our aim is to give you a practical and technical understanding of our products so that you can advise and sell more expertly to your customers on site.

In the specially equipped training and demonstration rooms, the specialist dealers are given important specialist knowledge about the OPTIMUM products as well as the differences to competitor products.

You and your employees will benefit from being able to experience our machines live.



Practice-oriented training



The company's own bistro for a cosy end to meetings, discussions and training sessions.

DISTRIBUTION SYSTEM



TWO-STAGE DISTRIBUTION SYSTEM

PRODUCTION OF CNC MACHINES FOR CRAFTSMAN

Our customers are our focus

To implement these goals in the best possible way, we liaise directly with the customer. This proximity puts in a position to identify strategic topics in good time and find the right response. Thanks to decades of experience, high quality and reliability in manufacture and delivery, we can guarantee mature engineering to our customers.

Our engineers in Germany plan and develop new and innovative CNC machines driven by the experience of our customers. Always with the premise of optimising machines and existing solutions down to the final detail. Our products are manufactured at the OPTIMUM factory in Yangzhou China. To monitor the quality process end-to-end, are machines are first accepted by our expert CNC team after their arrival in Germany. An OPTIMUM CNC machine is not delivered to the customer until strict checks have been completed.

We also manufacture on our own CNC machines

The OPTIMUM machine factory in China is the first to put our new developments through their paces. Due to the wide variety of tasks in manufacturing drilling and milling machines, and lathes of all types, the required performance spectrum is unrivalled. We do not release the newly developed CNC machines for sale on the market until they have been successfully deployed in our OPTIMUM factory. Because we constantly use our own machines, we are continually discovering new approaches and potentials for improvement.

The CNC machines on the market right now have a level of maturity that reflects the current state of the art.



Only original with the pink stripe



TWO-STAGE DISTRIBUTION SYSTEM

PREMIUM

PRODUCTION OF CNC INDUSTRIAL MACHINES

Strictest requirements

We impose the strictest requirements for the production of OPTIMUM Premium CNC machines, which are required to thrive in the harsh environment of three-shift operations. Our partner company has more than 35 years' experience in the CNC field and thus offers the best conditions for fulfilling the tasks set by the market in collaboration with us.

Our end customers' experiences are analysed by our CNC specialists. This information is adopted into the production process. While doing so, we also influence the most important components of each machine. Of course, only brand-name components by manufacturers of international repute are used for our machines. In the sensitive area of industrial bearings, linear guides, rotating spindles and main spindles in particular, we set great store by meeting the continually increasing requirements of the market. This is what characterises our machines and sets us apart from our competitors.

OPTIMUM customers are guaranteed requirements-driven stock levels, delivery capability and short-term availability of all required replacement and wear parts. Thanks to an on-going training process, the CNC team both guarantees orderly processing of repairs or maintenance, while at the same time training your staff for future tasks. We spell Service with a capital S.

Only original with the blue Premium stripe



CIVIL/MILITARY OCCUPATIONAL TRAINING CENTRE IN TUNISIA GERMANY'S FEDERAL GOVERNMENT DEPLOYS OPTIMUM CNC MACHINES IN DEVELOPMENT PROJECT IN TUNISIA

The Federal Ministry of Defence requested a total of five OPTIMUM machines from Hallstadt-based Stürmer Maschinen for a development project in Tunisia. Now the machines have been successfully commissioned at the Military Vocational Training Centre in Northern Tunisia under the meticulous supervision of Stürmer technicians.

The scope of delivery included both CNC-controlled and conventional Optimum milling and turning machines as well as an OPTidrill drilling machine and a METALLKRAFT metal band saw. The order also included a large volume of accessories. Stürmer has already implemented many projects on a similar scale. However, due to the SIEMENS NX CAD system integrated on this occasion, and the fact that virtual twins were created, this technology project is extraordinary in every respect and will be trend-setting for the future. This is because the advanced technology supplied by Stürmer will in future prevent tool collisions and thus damage of up to €10,000 that can occur on running in the programs. This is made possible by software that imitates the machines with all their controllers and drive units 1:1 and visualises them on a PC.

The installation of the machines at the civil-military occupational training centre has now been completed and the machines can be used in future for training purposes for Tunisian armed forces. In January 2020, training courses were held by Stürmer and SIEMENS to instruct local personnel in the use of the machines. The official inauguration and commissioning ceremony also took place within this framework.



OPTIMUM PREMIUM CNC-Slant bed lathe S 620 with counter spindle



5 axis simultaneous processing centre OPTIMUM PREMIUM FU 5



Three-axis OPTIMUM PREMIUM F150 HSC milling machine



OPTIMUM CNC technician

*TRAINING WORKSHOP AT THE TYRE MANUFACTURER MICHELIN
 RAPID TECHNOLOGICAL PROGRESS POSES GREAT CHALLENGES FOR TRAINERS AND MANY COMPANIES
 AND VOCATIONAL SCHOOLS ARE STILL TEACHING ON OUTDATED MACHINE TOOLS.*



From left to right. Alois Penzkofer (SIEMENS AG), Witali Reiswich (Michelin Reifenwerke AG & Co. KGaA), Martin Trepesch (Optimum Maschinen Germany GmbH)

Modern car tyres are high-tech products. Manufactured in complex production processes, they ensure traction and short braking distances in all weather conditions, are extremely resilient and help to save fuel.

More than 22 000 tyres in sizes ranging from 16 to 18 inches leave the Michelin plant in Hallstadt near Bamberg, Franconia, every day, employing over 900 people. In order to meet the demand for skilled personnel, 45 young women and men are currently undergoing their three-and-a-half year training as industrial mechanics and electronics technicians in the training workshop. "We train for our own needs and, if possible, take on all trainees.

CNC technology has been of little importance here so far. It was only part of the vocational school education, but not relevant to the examinations in careers where we offer apprenticeships. However, we wanted to strengthen this part in order to better prepare our trainees for the future and to keep Michelin competitive as a training company in the long term," explains trainer Witali Reiswich. But, there is one obstacle on the way to this goal: money.

Special leasing solution for training workshops

The central workshop in Hallstadt, manufactures precision knives on a toolmaking machine equipped with a Sinumerik 840D sl; the tool are used in tyre production. The programs - both for series production and for the many prototypes - are developed in a tool chain with SolidWorks and Sinumerik. On this machine, the trainees occasionally created smaller programs and workpieces such as cups. However, the machine's increasing degree of utilisation no longer permitted this.

"We then examined the investment in a 3-axis milling machine for the training workshop. For economic reasons, however, this was not possible at first.

Our biggest fear was that the technology would rapidly become obsolete. Because training on an outdated machine is counterproductive," says Witali Reiswich summing up. "Fortunately for us, we then held talks with machine tool manufacturer Optimum. We were thus able to benefit from its solution for schools and training workshops."

Optimum Maschinen offers machine commissioning, initial training and multiple-day training courses for instructors and users. Optimum Maschinen Germany GmbH has agreed a cooperation partnership with SIEMENS for CNC training and can therefore also issue SIEMENS certificates to trained customers.



TABLE OF CONTENTS

01 STANDARD MACHINES

MILLING

CNC milling machine F 80	22
CNC milling machine F 105	28
CNC milling machine F 150E	34

TURNING

CNC lathe L 34HS.....	42
CNC lathe L 50E.....	48
CNC lathe S 400E.....	54

02 PRODUCTION MACHINES

MILLING

CNC milling machine F 120X	62
CNC milling machine F 150HSC.....	70
CNC milling machine F 210P.....	78
CNC milling machine F 210HSC.....	86
CNC milling machine F 310HSC.....	94
CNC milling machine F 410HSC.....	102
CNC milling machine F 610HSC.....	110

TURNING

CNC lathe L 44	120
CNC lathe L 50P	128
CNC lathe S 600.....	136
CNC lathe L 440 / L 460.....	144
CNC lathe S 620 / S 620L	152
CNC lathe S 500 / S 500L	160
CNC lathe S 750K / S 750	160
Production machines user report.....	168

03 5-AXIS MACHINES

MILLING

CNC milling machine FU 3 / 3+2	172
CNC milling machine FU 5 / 3+2	180
CNC milling machine FU 5	188
5-axis milling machines user report	196

04 PORTAL MILLING MACHINES

MILLING

CNC Portal milling machine FP 1700/ FP 2200	200
CNC Portal milling machine FP 3200/ FP 4200	208
Portal milling machines user report	218

05 HORIZONTAL DRILLING AND MILLING CENTER

Horizontal drilling and milling center HF 400.....	222
Horizontal drilling and milling center HF 500.....	232
Horizontal drilling and milling center HF 600.....	232

06 TRAINING MACHINES

MILLING

CNC milling machine F 3Pro	244
CNC milling machine MZ 4CNC.....	248

TURNING

CNC lathe L 28HS.....	256
-----------------------	-----

07 ROBOTS

Automatisation	263
----------------------	-----

08 3D-PRINTING

Applications	266
3X/5X printing head	267
Accessories	268
3D Printing application report.....	274

09 ACCESSORIES

MILLING

Starter set BT 30	282
Starter set BT 40	283
Starter set SK 40.....	284
Starter set HSK A-63	285
Starter set SK 50.....	286
3 D probe	287
Fourth axis rotary indexing table.....	276
5-axis rotary/swivelling table.....	280

WORKPIECE/TOOL MEASURING

Renishaw Primo Set.....	289
Renishaw OMP 40-2 /OMP 400	288
Renishaw OTS.....	288
BLUM TC 52IR / TC 62RC	290
BLUM ZX-Speed	291
BLUM LC50-DIGILOG	292

TURNING

Starter set VDI 30	294
Starter set VDI 40	295
Short bar loader	296
GRIPPEX bar gripper	299
Measuring arm	300

GENERAL ACCESSORIES

Tools.....	302
Vices	306
Sucker	310
Machine lamps	311
Coolant accessories	308
Rotoclear	312

10 SOFTWARE

NCTouch	314
SINUTRAIN	315
SYMPPLUS.....	316
Manual machine MM+	318

11 SERVICE & SUPPORT

Service packages.....	320
Maintenance contracts	321

12 TRAINING

SINUMERIK Operate training	329
3D Printing Basic Training / Advanced Training	326
Retailer training	328



STANDARD



02
PRODUCTION MACHINES



03
5-AXIS MACHINES



04
PORTAL MILLING MACHINES



05
DRILLING AND MILLING CENTER



06
TRAINING MACHINES



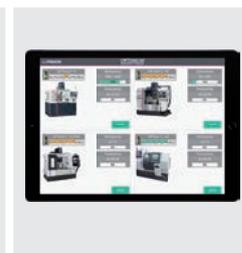
07
ROBOTER



08
3-D PRINTING



09
ACCESSORIES



10
SOFTWARE



11
SERVICE



12
TRAINING





CNC milling machine F 80
CNC milling machine F 105
CNC milling machine F 150E

01 *MILLING*
STANDARD MACHINES

F 80

Ideal for part production, prototype and jig building

SIEMENS SINUMERIK 808D ADVANCED

- Machine with cast stand design for good stiffness values
- Carousel tool changer with ten tool slots
- All linear guides with stainless steel covers
- Automatic centralised lubrication
- **SIEMENS** main spindle motor
- **SIEMENS** servo drives on all axes (closed loop)
- Max. spindle speed up to 10 000 rpm
- Portable, electronic handwheel with confirm button and emergency stop button substantially facilitates running in of programs
- Coolant unit with 70 litre coolant tank
- Tool change occurs automatically or at the push of a button (electropneumatic tool clamping device)
- Solid, precision milling table, generously dimensioned with precision surface finish
- Access doors very generously designed to reduce cleaning and maintenance times to a minimum
- LED machine lamp for complete illumination of the workspace
- Including two years **SIEMENS** warranty (warranty extension on page 25. Information on the warranty at www.optimum-machines.com)
- Information on „Maintenance contracts“ on page 321



Follow this for the video presentation of our Optimum milling machine F 80

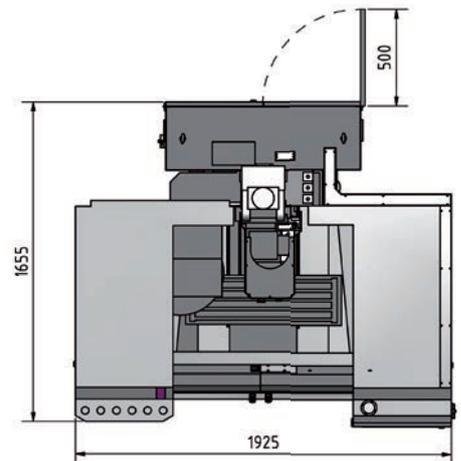
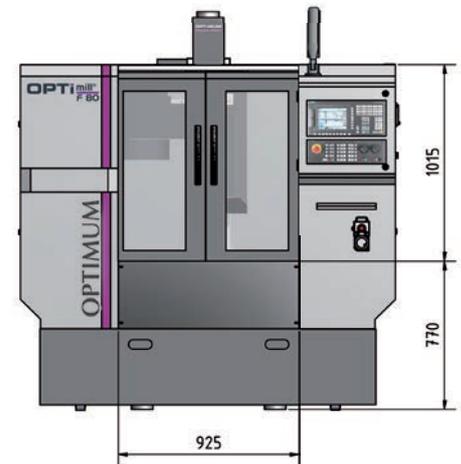
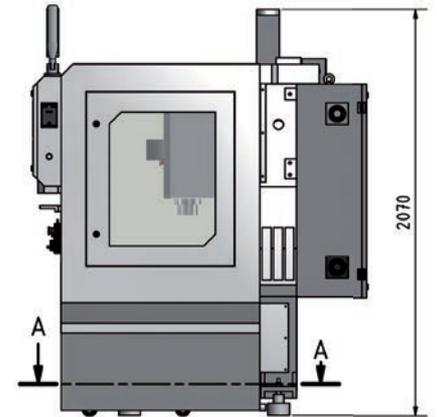
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Fig.: with optional accessories

TECHNICAL DATA

Model	F 80
Article no.	3501085
Machine data	
Electrical connection	400 V / 3 Ph ~50 Hz
Total connected load	14 kVA
Milling spindle	
Drive motor S1 operation	3.7 kW
Torque drive motor S1 operation	24 Nm
Drive motor S6 30 % operation	5.5 kW
Torque drive motor S6 30 % operation	35 Nm
Spindle seat	BT 30
Cooling lubricant system	
Coolant pump motor	650 W
Tank capacity	70 litres
Milling cutter size	
Cutter head size max.	Ø 70 mm
End mill size max.	Ø 25 mm
Milling precision	
Repeat accuracy	± 0.008 mm
Positioning accuracy	± 0.008 mm
Tool changer	
Type	Carousel
Number of tool slots	10 tools
Max. tool diameter	60 mm
Tool length	200 mm
Max. tool weight	6 kg
Tool change time	7 seconds
Traverse paths	
X axis	400 mm
Y axis	225 mm
Z axis	375 mm
Axis feed drive	
Rapid traverse X/Y/Z axis	10 m/min.
Motor torque	
X axis	3.5 Nm
Y axis	6 Nm
Z axis	6 Nm
Speed range	
Speeds*	50 - 10 000 rpm
Pneumatics	
Compressed air	7 bar
Milling table	
Clearance spindle to table	75 - 475 mm
Table length x width	800 x 260 mm
T-slot size / amount / distance	16 mm / 5 / 50 mm
Max. load of working table	150 kg
Dimensions	
Length x width x height	1 925 x 1 655 x 2 070 mm
Overall weight	1 900 kg



SINUMERIK 808 ADVANCED

CNC technology from the technology leader, paired with a revolutionary operating concept

Boost productivity in production

- The SINUMERIK 808D ADVANCED control is a panel-based CNC control. The compact and user-friendly entry-level solution is deployed in simple milling applications. Features such as easy operation, commissioning and maintenance are the perfect basis for equipping CNC machines.
- With its technology-specific variants, the SINUMERIK 808D ADVANCED control is perfectly preconfigured for milling. And with its hardware and software enhancements, the SINUMERIK 808D ADVANCED also offers sufficient performance for simple milling functionalities in mould and tool making.

COMPACT AND ROBUST

- Thanks to a panel-based CNC design with very few interfaces and an IP65 protected control panel, the SINUMERIK 808D ADVANCED is perfectly prepared for deployment in tough environments. The small dimensions allow use on compact machines.

SINUMERIK 808D ON PC

- Control-identical software package that further simplifies handling of the machine tool. *Free to download at www.cnc4you.com*



Control

- 8.4" LCD colour display with a resolution of 800x600

Warranty extension

The warranty extension lets you protect your new machine against warranty damage for a further 12 or 36 months after the two-year **SIEMENS** warranty expires. (can only be ordered within the two-year **SIEMENS** warranty)

12 months; Article no. 3589010
36 months; Article no. 3589012

OVERALL PACKAGE

- RJ45 Ethernet port
- Prepared for remote maintenance
- AST function; allows easy optimization for higher dynamic and accuracy requirements
- Absolute encoder / no homing necessary
- Higher accuracy



STORAGE COMPARTMENT



- Keep tools within reach on the machine

HANDWHEEL



- Portable
- Electronic
- Substantially facilitates running in of programs
- Emergency stop button
- Confirm button

SIGNAL LIGHT



- Visually displays the machine status
- Very bright and with a long service life

TOOL CHANGER



- Carousel tool changer
- 10 tool slots
- Tool change time: 7 seconds

CONTROL CABINET



- Clearly-arranged
- Standards-compliant setup
- Drives by **SIEMENS**

LINEAR GUIDE



- Maximum static and dynamic stiffness
- High positioning accuracy
- Smooth, backlash-free movement
- Consistent precision for a long time lifespan

CENTRAL LUBRICATION SYSTEM



- Automatic
- Prevents wear, repair costs and unnecessary downtime to a major extent

SINUMERIK 808D ON PC



- With SINUMERIK 808D on PC, **SIEMENS** offers a software package that is identical to the control and thus further simplifies machine tool handling. Use as a hands-on training software program to program and simulate workpieces offline.

Free to download at www.cnc4you.com

Training and learning

- SINUMERIK Operate BASIC operations can be explored on a PC without additional hardware
- Simple and convenient learning experience with a user interface identical to that of the control

Offline CNC programming:

- Boos productivity by programming directly on a PC
- Test sub-routines on the PC with the integrated simulator

Professional CNC presentations:

- Present the SINUMERIK Operate BASIC user interface on the PC – at any time and anywhere without additional hardware
- Covers the comprehensive SINUMERIK Operate BASIC feature set incl. programGUIDE BASIC

TOOL MEASURING SYSTEM

Article no.			
350108580*	RENISHAW Primo set		<ul style="list-style-type: none"> • Tool measuring probe Radio Part Setter • Tool probe • Radio 3D Tool • Primo Interface • GoProbe Software • Collet BT 30 • License for six months
<p>➤ Information on the Primo set also available ex warehouse Germany see page 289</p>			

NEW

3-D PRINTING PREPARATION

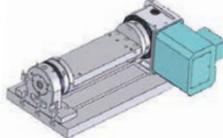
Article no.			
350108590*	Motor upgrade 3-D PRINTING		<ul style="list-style-type: none"> • Main spindle motor with high-resolution encoder • 20 bit absolute value encoder instead of incremental encoder
350108591*	3-D printing interface		<ul style="list-style-type: none"> • Plug connector on milling head for OPTImill 3X printing head • Power supply is installed in control cabinet • Prepared for connecting open circuit monitoring • Filament holder
<p>➤ Information on 3-D printing from page 266</p>			

STARTER SET

Article no.			
3536107	Starter set BT 30		<ul style="list-style-type: none"> • 1 pc. milling head holder • 1 pc. chuck • 2 each Weldon 6 mm and 20 mm • 1 each Weldon 8 / 10 / 12 / 16 mm • 1 pc. Adapter BT 30 • 4 pcs. Collet chuck holder ER 32 • 1 pc. Collet spanner ER 32 • 18-part collet chuck set ER 32 • 1 pc. Height-adjuster • 1 pc. Assembly and tool adjustment gauge • 14 pcs. pull stud • 1 pc. taper squeegee
<p>➤ Information on the starter set „BT 30“ on page 282</p>			

NEW

FOURTH AXIS

Article no.			
350108502*	Preparation for fourth axis		
350108503*	Fourth axis Complete set		<ul style="list-style-type: none"> • Rotary indexing table Ø 80 mm • Three-jaw lathe chuck Ø 75 mm • Mounting included
350108504*	Swivel bridge		<ul style="list-style-type: none"> • Size 160 x 85 mm • With counterholder
<p>➤ For details on the fourth axis for the rotary indexing table see page 276</p>			

*Delivery ex works. The option must be ordered with the basic machine. Cannot be retrofitted.

F 105

The compact solution for small batch production in medium-sized companies

SIEMENS SINUMERIK 808D ADVANCED

- Rugged design
- Carousel tool changer with 12 tool slots
- All linear guides with stainless steel covers
- Automatic centralised lubrication
- **SIEMENS** main spindle motor
- **SIEMENS** servo drives on all axes (closed loop)
- Max. spindle speed 10 000 rpm
- Portable, electronic handwheel with confirm button and emergency stop button substantially facilitates running in of programs
- Coolant unit with 120 litre coolant tank
- Tool change occurs automatically or at the push of a button (electropneumatic tool clamping device)
- Solid, precision milling table, generously dimensioned with precision surface finish
- Access doors very generously designed to reduce cleaning and maintenance times to a minimum
- LED machine lamp for complete illumination of the workspace
- Including two years **SIEMENS** warranty (**WARRANTY** extension on page 31)
- Information on the warranty at www.optimum-machines.com
- Information on „Maintenance contracts“ on page 321



Follow this for the video presentation of our Optimum milling machine F 105

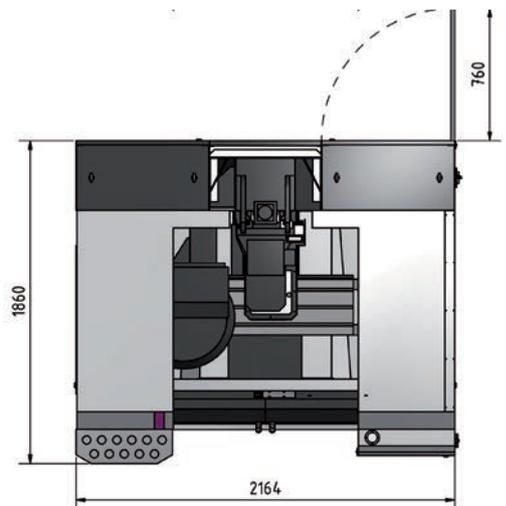
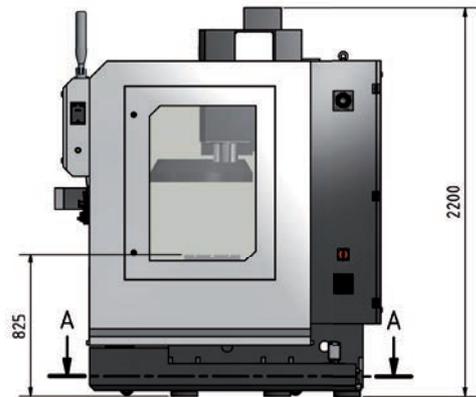
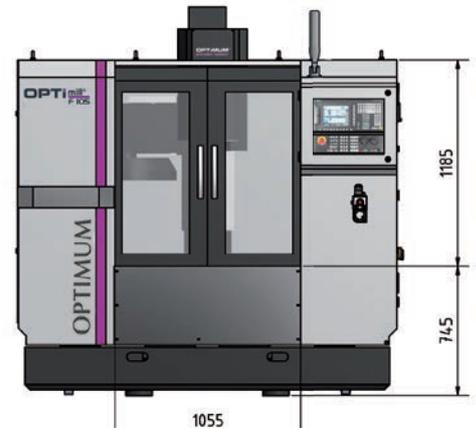
Subscribe to our YouTube channel, to avoid missing any of the new videos:
www.youtube.com/user/OptimumMaschinen



Fig. with optional accessories

TECHNICAL DATA

Model	F 105
Article no.	3501100
Machine data	
Electrical connection	400 V / 3 Ph ~50 Hz
Total connected load	15 kVA
Milling spindle	
Drive motor S1 operation	7.5 kW
Torque drive motor S1 operation	48 Nm
Drive motor S6 30 % operation	11 kW
Torque drive motor S6 30 % operation	70 Nm
Spindle seat	BT 40
Cooling lubricant system	
Coolant pump motor	650 W
Tank capacity	120 litres
End mill size	
Cutter head size max.	Ø 63 mm
End mill size max.	Ø 35 mm
Milling precision	
Repeat accuracy	± 0.008 mm
Positioning accuracy	± 0.008 mm
Tool changer	
Type	Carousel
Number of tool slots	12 tools
Max. tool diameter	63 mm
Max. tool length	300 mm
Max. tool weight	6 kg
Tool change time	7 seconds
Traverse paths	
X axis	550 mm
Y axis	305 mm
Z axis	460 mm
Axis feed drive	
Rapid traverse X/Y/Z axis	15 m/min.
Motor torque	
X axis	8 Nm
Y axis	8 Nm
Z axis	11 Nm
Speed range	
Speeds*	10 - 10 000 rpm
Pneumatics	
Compressed air	7 bar
Milling table	
Clearance spindle to table	100 - 600 mm
Table length x width	800 x 320 mm
T-slot size / amount / distance	14 mm / 3 / 100 mm
Max. load of working table	300 kg
Dimensions	
Length x width x height	2 164 x 1 860 x 2 200 mm
Overall weight	2 800 kg



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COMPACT AND ROBUST

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SINUMERIK 808D ON PC

- Control-identical software package that further simplifies handling of the machine tool. *Free to download at www.cnc4you.com*



Control

- 8.4" LCD colour display with a resolution of 800x600

Warranty extension

The warranty extension lets you protect your new machine against warranty damage for a further 12 or 36 months after the two-year **SIEMENS** warranty expires. (can only be ordered within the two-year **SIEMENS** warranty)

12 months; Article no. 3589010
36 months; Article no. 3589012

OVERALL PACKAGE

- RJ45 Ethernet port
- Ready for remote maintenance
- AST function gives users an easy optimisation option in case of stricter dynamic and precision requirements
- Absolute encoder / no referencing move required
- Greater precision



STORAGE COMPARTMENT



- Keep tools within reach on the machine

HANDWHEEL



- Portable
- Electronic
- Substantially facilitates running in of programs
- Emergency stop button
- Confirm button

MAIN SPINDLE



- Spindle speed from 10 to 10 000 rpm

TOOL CHANGER



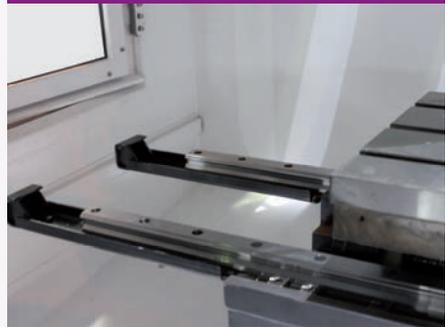
- Carousel
- 12 tool slots
- Tool change time: 7 seconds

CONTROL CABINET



- Clearly-arranged
- With SIEMENS servo drive
- Standards-compliant setup

LINEAR GUIDE



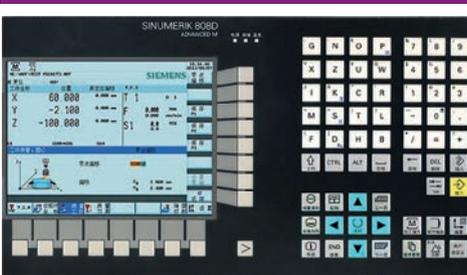
- High permissible load and high stiffness
- Low coefficient of friction

CENTRAL LUBRICATION SYSTEM



- Automatic
- Prevents wear, repair costs and unnecessary downtime to a major extent

SINUMERIK 808D ON PC



- With SINUMERIK 808D on PC, SIEMENS offers a software package that is identical to the control and thus further simplifies machine tool handling. Use as a hands-on training software program to program and simulate workpieces offline.

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TOOL MEASURING SYSTEM

Article no.			
350110080*	RENISHAW Primo set		<ul style="list-style-type: none"> • Tool measuring probe Radio Part Setter • Tool probe • Radio 3D Tool • Primo Interface • GoProbe Software • Collet BT 30 • License for six months

➔ Information on the Primo set also available ex warehouse Germany see page 289

NEW

3-D PRINTING PREPARATION

Article no.			
350110090*	Motor upgrade 3-D PRINTING		<ul style="list-style-type: none"> • Main spindle motor with high-resolution encoder • 20 bit absolute value encoder instead of incremental encoder
350110091*	3-D printing interface		<ul style="list-style-type: none"> • Plug connector on milling head for OPTImill 3X printing head • Power supply is installed in control cabinet • Prepared for connecting open circuit monitoring • Filament holder

➔ Information on 3-D printing from page 266

STARTER SET

Article no.			
3536108	Starter set BT 40		<ul style="list-style-type: none"> • 1 pc. milling head holder • 1 pc. quick clamping drill chuck 1 - 13 mm • 2 each Weldon 6 mm and 20 mm • 1 each Weldon 8 / 10 / 12 / 16 mm • 1 pc. Adapter BT 40 to MT 3 • 4 pcs. Collet chuck holder ER 32 • 1 pc. Collet chuck spanner ER 32 • 18-part collet chuck set ER 32 • 1 pc. Height-adjuster • 1 pc. Assembly and tool adjustment gauge • 15 pcs. Pull stud • 1pc. Taper squeegee

➔ For Information on the starter set see „BT 40“ on page 283

NEW

FOURTH AXIS

Article no.			
350110002*	Preparation for fourth axis		
350110003*	Fourth axis Complete set		<ul style="list-style-type: none"> • Rotary indexing table Ø 125 mm • Three-jaw lathe chuck 100 mm • Tailstock with MT 2 quill • Mounting included
350110004*	Swivel bridge		<ul style="list-style-type: none"> • Size 260 x 130 mm • with counterholder

Similar to fig. and with optional fourth axis

➔ For details on the fourth axis for the rotary indexing table see page 276

A white circular badge with a purple shadow, containing the word "NEW" in purple capital letters.

F 150E

The compact solution for small batch production in medium-sized companies

SIEMENS SINUMERIK 808D ADVANCED

- Carousel tool changer with 16 tool slots
- All linear guides with stainless steel covers
- Automatic centralised lubrication
- SIEMENS main spindle motor
- SIEMENS servo drives on all axes (closed loop)
- Chip conveyor, belt type ensures efficient chip discharge
- Chip carriage
- Max. spindle speed 10 000 rpm
- Portable, electronic handwheel with confirm button and emergency stop button Substantially facilitates running in of programs
- Coolant unit with 190 litre coolant tank
- Tool change occurs automatically or at the push of a button (electropneumatic tool clamping device)
- Solid, precision milling table, generously dimensioned with precision surface finish
- Access doors very generously designed to reduce cleaning and maintenance times to a minimum
- Six levelling feet
- LED machine lamp for complete illumination of the workspace
- Including two years SIEMENS warranty. (warranty extension on page 37). Information on the warranty at www.optimum-machines.com
- Information on „Maintenance contracts“ on page 321



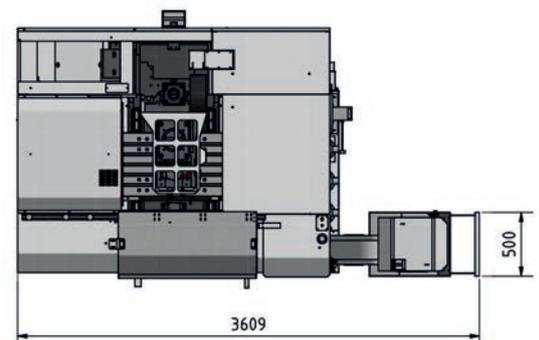
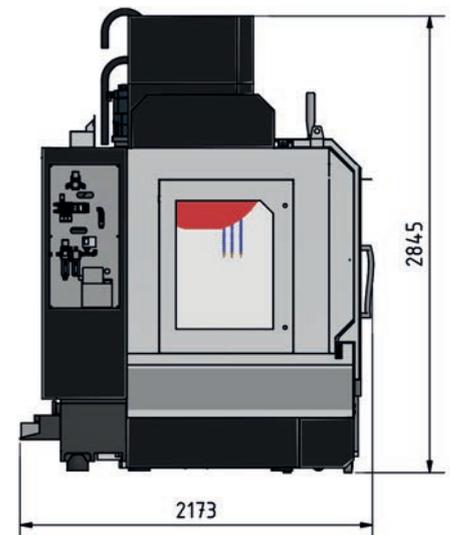
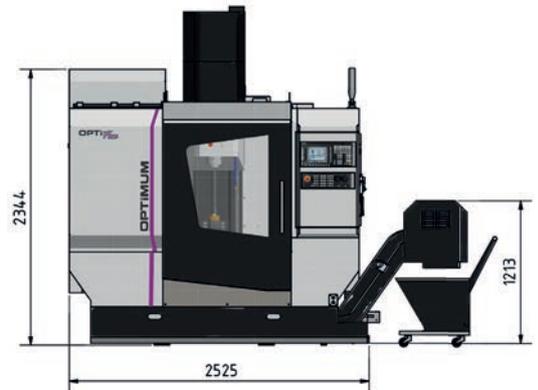
Fig.: with optional accessories



Fig.: with optional accessories

TECHNICAL DATA

Model	F 150E
Article no.	3501150
Spindle	Belt drive
Machine data	
Electrical connection	400 V / 3 Ph ~50 Hz
Total connected load	15 kW
Milling spindle	
Drive motor S1 operation	7.5 kW
Drive motor torque S1	48 Nm
Drive motor S6 30 % operation	11.25 kW
Torque drive motor S6 30 % operation	72 Nm
Spindle seat	BT 40
Cooling lubricant system	
Coolant pump motor	370 W
Tank capacity	190 litres
End mill size	
Cutter head size max.	Ø 80 mm
Max. shaft milling cutter size	Ø 38 mm
Milling precision	
Repeat accuracy	± 0.008 mm
Positioning accuracy	± 0.008 mm
Tool changer	
Type	Carousel
Number of tool slots	16 tools
Max. tool diameter	90 mm
Max. tool diameter (tools slots beside not occupied)	180 mm
Max. tool length	250 mm
Max. tool weight	8 kg
Tool change time T-T	6 seconds
Traverse paths	
X axis	750 mm
Y axis	500 mm
Z axis	500 mm
Axis feed drive	
Rapid traverse X/Y/Z axis	20 m/min.
Motor torque	
X/Y/Z axis	9.55 Nm / 9.55 Nm / 16.7 Nm
Speed range	
Speeds*	10 - 10 000 rpm
Pneumatics	
Compressed air	0.6 mpa
Milling table	
Clearance spindle to table	100 - 600 mm
Table length x width	900 x 500 mm
T-slot size / amount / distance	5 / 18 / 80 mm
Max. load of working table	350 kg
Dimensions	
Length x width x height	3 420 x 2 050 x 2 400 mm
Overall weight	4 500 kg



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COMPACT AND ROBUST

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Control

- 8.4" LCD colour display with a resolution of 800x600

Warranty extension

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12 months; Article no. 3589010
36 months; Article no. 3589012

OVERALL PACKAGE

- RJ45 Ethernet port
- Ready for remote maintenance
- AST function gives users an easy optimisation option in case of stricter dynamic and precision requirements
- Absolute encoder / no referencing move required
- Greater precision



CONTROL CABINET



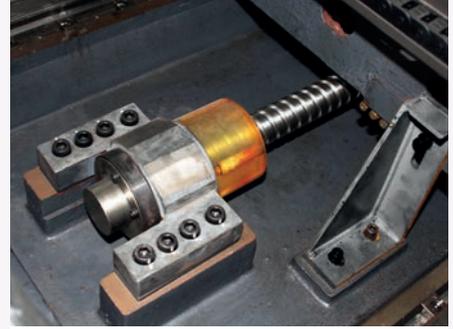
- Closed, uncluttered switch cabinet with integrated heat exchanger; ensures optimal temperature
- With SIEMENS servo drive
- Standards-compliant setup

HANDWHEEL



- Portable
- Electronic
- Substantially facilitates running in of programs
- Emergency stop button
- Confirm button

BALL SCREW



- Ball screw for fast rapid motion speeds on all axes

TOOL CHANGER



- Carousel
- 16 tool slots
- Tool change time: 6 seconds

CENTRAL LUBRICATION



- Prevents wear, repair costs and unnecessary downtime to a major extent

LINEAR GUIDE



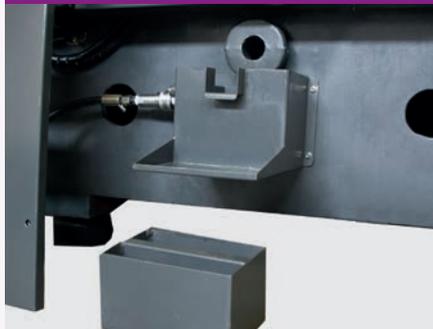
- High permissible load and high stiffness
- Low coefficient of friction

CHIP CONVEYOR



- Conveyor version
- For efficient chip discharge

OIL SEPARATOR / OIL SKIMMER



- Oil skimmer reliably removes floating tramp oils and finest chip debris from cooling lubricants

MILLING TABLE



- Solid, precision milling table with five T-grooves, generously dimensioned with precision surface finish

TOOL MEASURING SYSTEM		
Article no.		
350110080*	RENISHAW Primo set	 <ul style="list-style-type: none"> • Tool measuring probe Radio Part Setter • Tool probe • Radio 3D Tool • Primo Interface • GoProbe Software • Collet BT 30 • License for six months
 Information on the Primo set also available ex warehouse Germany see page 289		

3-D PRINTING PREPARATION		
Article no.		
350115090*	Motor upgrade 3-D PRINTING	 <ul style="list-style-type: none"> • Main spindle motor with high-resolution encoder • 20 bit absolute value encoder instead of incremental encoder
350115091*	3-D printing interface	 <ul style="list-style-type: none"> • Plug connector on milling head for OPTImill 3X printing head • Power supply is installed in control cabinet • Prepared for connecting open circuit monitoring • Filament holder
 Information on 3-D printing from page 266		

MISCELLANEOUS		
Article no.		
350115010*	Spindle oil cooler	 <ul style="list-style-type: none"> • Continuous precision • Optimum heat transfer and dimensional stability • Higher productivity

STARTER SET		
Article no.		
3536108	Starter set BT 40	 <ul style="list-style-type: none"> • 1 pc. milling head holder • 1 pc. quick clamping drill chuck 1 - 13 mm • 2 each Weldon 6 mm and 20 mm • 1 each Weldon 8 / 10 / 12 / 16 mm • 1 pc. Adapter BT 40 to MT 3 • 4 pcs. Collet chuck holder ER 32 • 1 pc. Collet chuck spanner ER 32 • 18-part collet chuck set ER 32 • 1 pc. Height-adjuster • 1 pc. Assembly and tool adjustment gauge • 15 pcs. Pull stud • 1 pc. Taper squeegee
 For Information on the starter set see „BT 40“ on page 283		

FOURTH AXIS		
Article no.		
350115001*	Preparation for fourth axis	
350110003*	Fourth axis Complete set	 <ul style="list-style-type: none"> • Rotary indexing table Ø 125 mm • Three-jaw lathe chuck Ø 100 mm • Tailstock with MT 2 quill • mounting included
350110004*	Swivel bridge	 <p style="text-align: center;">Similar to fig. and with optional fourth axis</p> <ul style="list-style-type: none"> • Size 260 x 130 mm • with counterholder
 For details on the fourth axis for the rotary indexing table see page 276		





CNC lathe L 34HS
CNC lathe L 50E
CNC lathe S 400E

01 **TURNING**
STANDARD MACHINES

L 34HS

CNC-controlled lathe with linear guide

SIEMENS SINUMERIK 808D ADVANCED

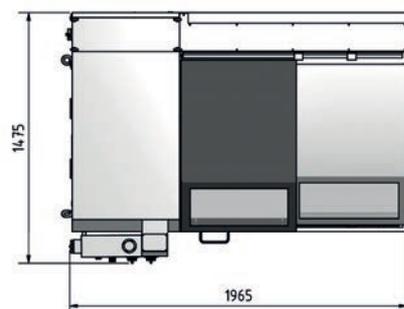
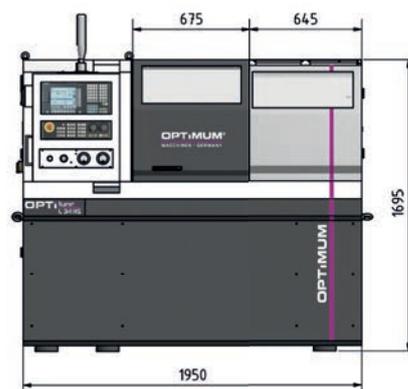
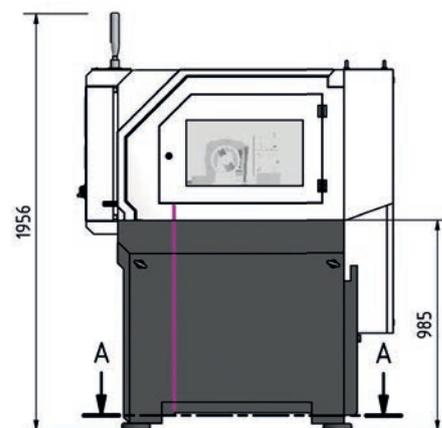
- Precise workmanship
- Spindle and servo motors by [Siemens](#)
- Braced machine bed made from grey cast-iron
- Maintenance-friendly protective housing
- Grinded ball screw spindles
- Complex spindle bearing
- Linear guides on both axes
- Emergency stop button
- Central lubrication
- Access flap on rear for maintenance
- Safety switch on front sliding door
- Turret located behind the lathe centre (left turning tool)
- Including two-year [SIEMENS](#) warranty. (warranty extension on page 45). Information on the warranty at www.optimum-machines.com
- Information on „Maintenance contracts“ on page 321



OPTITURN L 34HS

TECHNICAL DATA

Model	L 34HS
Article no.	3504232
Machine data	
Electrical connection	400 V / 3 Ph ~50 Hz
Total connected load	6.5 kVA
Spindle	
Drive motor S1 operation	3.7 kW
Torque drive motor S1 operation	23.6 Nm
Torque at the spindle	40 Nm
Spindle seat	ISO 702-1 No. 4 - Form A2
Spindle bore	Ø 46 mm
Chuck passage	Ø 42 mm
Lathe chuck	Ø 160 mm
Cooling lubricant system	
Coolant pump output	95 W
Tank capacity	75 litres
Machine data	
Centre height	165 mm
Centre width	600 mm
Swing Ø above cross slide	146 mm
Swing Ø above machine bed	350 mm
Bed width	208 mm
Speed range	
Speeds*	30 - 3 500 rpm
Tool turret	
Type	electrical
Number of tool slots	6 tools
Max. height, width square	16 x 16 mm
Max. diameter drilling rod	16 mm
Tool change time T-T	1.5 seconds
Precision	
Repeat accuracy	± 0.01 mm
Positioning accuracy	± 0.01 mm
Travel	
X axis	185 mm
Z axis	750 mm
Feed speed	
X axis	6 m/min.
Z axis	8 m/min.
Motor torque	
X axis	4 Nm
Z axis	6 Nm
Tailstock	
Tailstock seat	MT 3
Tailstock quill diameter	45 mm
Tailstock - quill stroke	120 mm
Dimensions	
Length x width x height	1 950 x 1 475 x 1 956 mm
Overall weight	1 200 kg



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COMPACT AND ROBUST

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SINUMERIK 808D ON PC

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Control

- 8.4" LCD colour display with a resolution of 800x600

Warranty extension

The warranty extension lets you protect your new machine against warranty damage for a further 12 or 36 months after the two-year **SIEMENS** warranty expires. (can only be ordered within the two-year **SIEMENS** warranty)

12 months; Article no. 3589010
36 months; Article no. 3589012

OVERALL PACKAGE

- RJ45 Ethernet port
- Ready for remote maintenance
- AST function gives users an easy optimisation option in case of stricter dynamic and precision requirements
- Absolute encoder / no referencing move required
- Greater precision

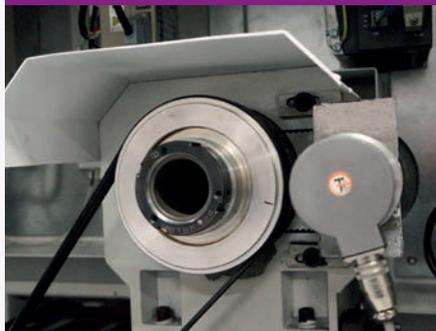


TOOL TURRET



- For 6 tool slots

SPINDLE



- Incremental encoder for spindle positioning (thread tapping)
- Large spindle bore

LINEAR GUIDE



- High permissible load and high stiffness
- Low coefficient of friction
- Greater precision of the machine

COOLANT SYSTEM



- Pulls out
- Easy chip disposal

MACHINE LAMP



- Full illumination of the workspace

CENTRAL LUBRICATION SYSTEM



- Guarantees regular and automatic lubrication
- Lubricating points that are connected to the central lubricating system have a longer service life

SINUMERIK 808D ON PC



- Software package identical to control
- Facilitates the handling of the machine tool
- The workpieces can be programmed and simulated offline.

Training and learning

- SINUMERIK Operate BASIC operations can be explored on a PC without additional hardware.
- Easy and convenient learning experience with a user interface identical to that of the control

Offline CNC programming:

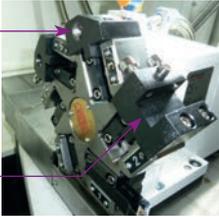
- Boosts productivity by programming directly on a PC
- Testing of part programmes on the PC with the integrated simulation

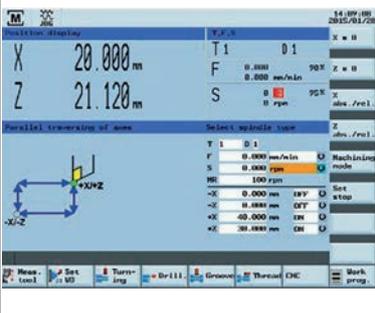
Professional CNC presentations:

- Present the SINUMERIK Operate BASIC user interface on the PC – at any time and anywhere without additional hardware

Free to download at www.cnc4you.com

LATHE CHUCK			
Article no.			
3450232	Bison three-jaw lathe chuck		<ul style="list-style-type: none"> • Cast, Ø 160 mm DIN 6350 • Hard jaws, single-part, with outside-inside clamping • Chuck key • Runout accuracy: 0.03 mm
3450412	Bison monoblock jaw set, soft		<ul style="list-style-type: none"> • for three-jaw lathe chuck Ø 160 mm
3450236	Bison four-jaw lathe chuck		<ul style="list-style-type: none"> • Cast, Ø 160 mm DIN 6350 • Hard jaws, single-part, with outside-inside clamping • Chuck key • Runout accuracy: 0.03 mm
3450422	Bison monoblock jaw set, soft		<ul style="list-style-type: none"> • for four-jaw lathe chuck Ø 160 mm
3450246	Bison chuck flange		<ul style="list-style-type: none"> • for lathe chuck Ø 160 mm • for collet chuck 16C (Article no. 3450245)
3450245	Collet chuck 16C		<ul style="list-style-type: none"> • Ø 160 mm • Chuck flange needed (Article no. 3450246) • Manually operated chuck for distortion-free clamping of workpieces • Steel chuck body
		Fig. with collet - not included in the scope of delivery	

MISCELLANEOUS			
3441215	Lathe tool set HM 16 mm		<ul style="list-style-type: none"> • 4-part
3535170	Cylindrical holder Ø16 mm		<ul style="list-style-type: none"> • for drill chuck B16
350422010	Boring bar holder round, up to 20 mm		<ul style="list-style-type: none"> • for tool changer • Info: The hole is to be drilled by the user himself
350422011	Turning tool holder transverse up to 16 mm		<ul style="list-style-type: none"> • for tool changer

SOFTWARE			
3584150*	SIEMENS Manual Machine Plus (MM+) Simple cycle control		<p>The software enables the transition from conventional machines to CNC programming. The machine can be operated by means of hand wheels like a conventional machine, but with the advantages of CNC-supported technology cycles.</p> <p>Functions:</p> <ul style="list-style-type: none"> • Axis-parallel traverse, taper turning, radius turning, centre drilling, tapping, groove cycle, tapping, pre-turning of contours
		➡ For more information see on page 318	

*Delivery ex works. The option must be ordered with the basic machine. Cannot be retrofitted.

A circular badge with a white background and a purple border, containing the word "NEW" in purple capital letters.

L 50E

OPTIMUM PREMIUM Universal CNC Lathe
Complete solution - Diverse possibilities

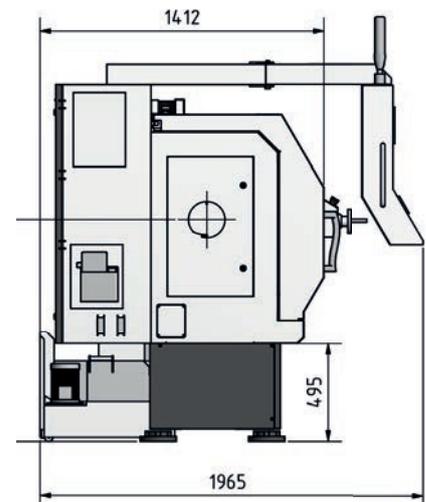
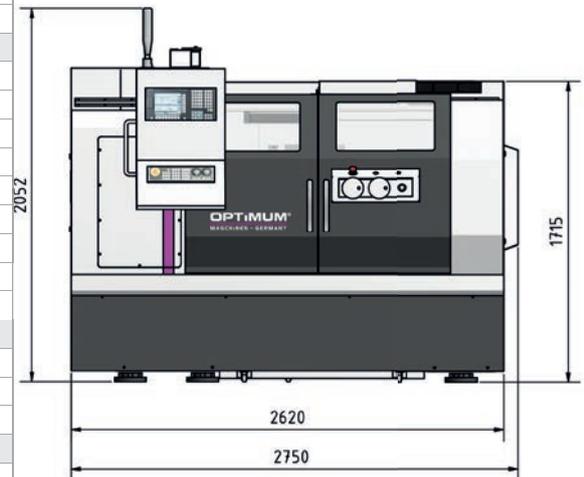
SIEMENS SINUMERIK 808D ADVANCED

- Precision workmanship
- Spindle and servo motors by **SIEMENS**
- Machine housing with safety switches
- With max. spindle speed up to 3 000 rpm as standard
- Hydraulic lathe chuck
- Ball screws
- Linear guides on all axes
- Automatic centralised lubrication
- Servo hydraulic VDI 30 tool changer with 8 tools
- Swivelling operating unit
- Electronic handwheels for the X and Z axis
- Coolant unit with 110 litre coolant tank
- RJ45 plug-in connection, USB connection and power connection 230 V
- EMC Electromagnetic compatibility
- Six levelling feet
- Operating tool
- Including two-year **SIEMENS** warranty (**WARRANTY** extension on page 51
- Information on the warranty at www.optimum-machines.com
- Information on „Maintenance contracts“ on page 321



TECHNICAL DATA

Model	L 50E
Article no.	3504240
Machine data	
Electrical connection	400 V / 3 Ph ~50 Hz
Total connected load	11 kW
Spindle	
Drive motor S1 operation	7.5 kW
Torque drive motor S1 operation	48 Nm
Drive motor S6 30 % operation	11.25 kW
Torque drive motor S6 30 % operation	72 Nm
Spindle seat	ISO 702-1 No. 6 form A2
Hydraulic lathe chuck	Ø 210 mm
Chuck passage	Ø 52 mm
Spindle bore*	Ø 66 mm
Torque at the spindle	86 Nm
Cooling lubricant system	
Cleaning pump output	1 kW
Coolant pump output	450 W
Tank capacity	110 litres
Hydraulic system	
Hydraulic pump power	2.2 kW
Tank capacity	50 litres
Machine data	
Turning length	618 mm
Turning diameter	245 mm
Swing Ø above cross slide	280 mm
Swing Ø above machine bed	490 mm
Bed width	400 mm
Speed range	
Spindle speeds	3 000 rpm
Tool turret	
Tool changer seat	VDI 30
Type	Servo hydraulic
Number of tool slots	8 tools
Max. height, width square	20 mm
Max. diameter drilling rod	32 mm
Precision	
Repeat accuracy	± 0.005 mm
Positioning accuracy	± 0.008 mm
Traverse paths	
X axis	300 mm
Z axis	800 mm
Feed speed	
X axis fast motion	12 m/min.
Z axis fast motion	15 m/min.
Motor torque	
X axis	6 Nm
Z axis	11 Nm
Tailstock	
Tailstock seat	MT 5
Tailstock quill diameter	75 mm
Tailstock - quill stroke	150 mm
Dimensions	
Length x width x height	2 750 x 1 965 x 2 052 mm
Overall weight	4 200 kg



SINUMERIK 808 ADVANCED

CNC technology from the technology leader, paired with a revolutionary operating concept

Boost productivity in production

- The SINUMERIK 808D ADVANCED control is a panel-based CNC control. The compact and user-friendly entry-level solution is used for simple turning applications. Features such as easy operation, commissioning and maintenance are the perfect basis for equipping CNC machines.
- With its technology-specific variants, the SINUMERIK 808D ADVANCED control is perfectly preconfigured for turning. And with its hardware and software enhancements, the SINUMERIK 808D ADVANCED also offers sufficient performance for simple turning functionalities in mould and tool making.

COMPACT AND ROBUST

- Thanks to a panel-based CNC design with very few interfaces and an IP65 protected control panel, the SINUMERIK 808D ADVANCED is perfectly prepared for deployment in tough environments. The small dimensions allow use on compact machines.

SINUMERIK 808D ON PC

Control-identical software package that further simplifies handling of the machine tool. *Free to download at www.cnc4you.com*



Control

- 8.4" LCD colour display with a resolution of 800x600

Warranty extension

The warranty extension lets you protect your new machine against warranty damage for a further 12 or 36 months after the two-year **SIEMENS** warranty expires. (can only be ordered within the two-year **SIEMENS** warranty)

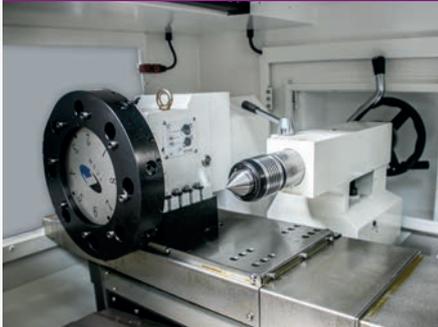
12 months; Article no. 3589010
36 months; Article no. 3589012

OVERALL PACKAGE

- RJ45 Ethernet port
- Ready for remote maintenance
- AST function gives users an easy optimisation option in case of stricter dynamic and precision requirements
- Absolute encoder / no referencing move required
- Greater precision

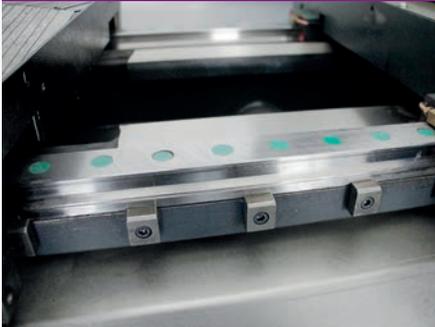


TOOL TURRET



- For eight tool stations
- Servo Hydraulic VDI30 tool turret
- Max. height 20 mm
- Max. diameter 32 mm

LINEAR GUIDE



- Maximum feed speed
- Durable
- Stainless steel cover

SIGNAL LIGHT



- Visually displays the machine status

HANDWHEELS



- Handwheel for moving the X axis and Z axis manually
- Emergency stop button

CONTROL CABINET



- Clear-cut layout of the control cabinet
- Standard-compliant
- Drives by **SIEMENS**

CENTRAL LUBRICATION SYSTEM



- Guarantees regular and automatic lubrication
- Lubricating points that are connected to the central lubricating system have a longer service life

SINUMERIK 808D ON PC



- Software package identical to control
- Facilitates the handling of the machine tool
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Training and learning

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Offline CNC programming:

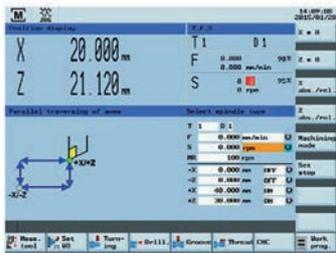
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- Testing of part programmes on the PC with the integrated simulation

Professional CNC presentations:

- Present the SINUMERIK Operate BASIC user interface on the PC – at any time and anywhere without additional hardware

Free to download at www.cnc4you.com

ACCESSORIES			
Article no.			
350434014*	Four-jaw lathe chuck Ø 210 mm		<ul style="list-style-type: none"> instead of standard equipment › three-jaw lathe chuck Ø 210 mm
3519712	Soft top jaw (1 pc.)		<ul style="list-style-type: none"> for lathe chuck Ø 210 mm
3519732	Hard top jaw set (3 pcs.)		<ul style="list-style-type: none"> for three-jaw chuck Ø 210 mm - included in the standard equipment
3519733	Hard top jaw set (4 pcs.)		<ul style="list-style-type: none"> for the optional four-jaw lathe chuck Ø 210 mm
3536115	Starter set VDI 30		<ul style="list-style-type: none"> 3 pcs. square transverse holder 1 pc. square transverse overhead holder 1 pc. square longitudinal holder 5 pieces boring bar holder Ø 10 / 12 / 16 / 20 / 25 mm 3 pcs. cap 1 pc. collet chuck holder ER 25 1 pc. collet spanner ER 25 15-part collet set ER 25 1 pc. tool holder 1 pc. chuck
350424004	Chip conveyor with chip trolley		<ul style="list-style-type: none"> Conveyor version
350424003	Oil separator / oil skimmer		<ul style="list-style-type: none"> Separation of non emulsified foreign oils by skimming Separation of solids by settling in the collection tank
350424002	High performance coolant pump 1 kW		<ul style="list-style-type: none"> instead of the - in the standard equipment › coolant pump 450 W
350424001	Lifting device		<ul style="list-style-type: none"> a lifting device is required to unload the machine.

SOFTWARE			
Article no.			
3584150*	<p>SIEMENS Manual Machine Plus (MM+) Simple cycle control</p>		<p>The software enables the transition from conventional machines to CNC programming.</p> <p>Functions:</p> <ul style="list-style-type: none"> Axis parallel motion Turning tapers Turning radii Centre drilling Thread tapping Slotting cycle Thread tapping Preliminary contour turning
<p>➡ For more information see on page 318</p>			

*Delivery ex works. The option must be ordered with the basic machine. Cannot be retrofitted.

S 400E

CNC-Slant bed lathe by OPTIMUM

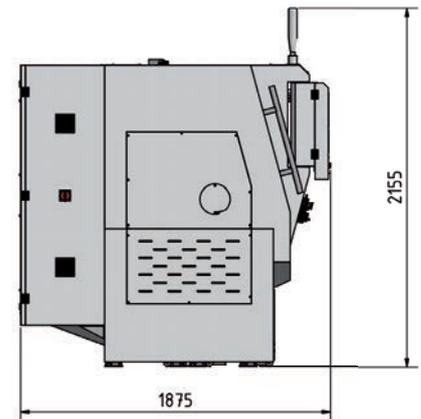
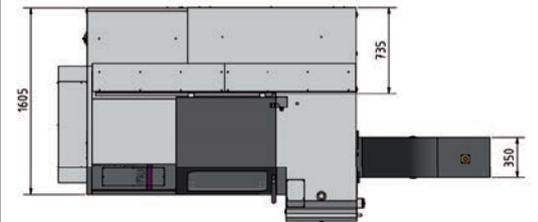
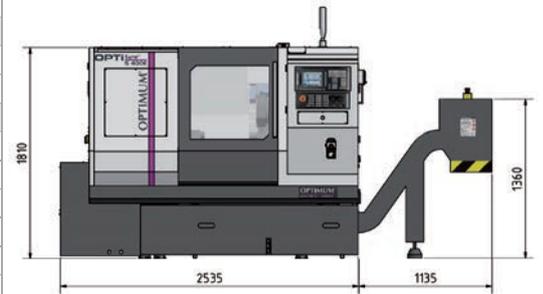
SIEMENS SINUMERIK 808D ADVANCED

- Compact design
- Spindle and servo motors by SIEMENS
- Slant bed design 45° for particularly large machining diameter
- Easy chip removal into the chip tray
- Hydraulic 3-jaw lathe chuck Ø 200 mm
- Hardened and grinded ball screw spindles
- Dimensionally stable linear guides ensure a long service thanks to maximum static and dynamic stiffness
- Tailstock with hydraulic quill
- Portable electronic hand wheel substantially facilitates running in of programs
- Chip conveyor
- Chip carriage
- Work lamp
- Including two-year SIEMENS warranty (warranty extension see page 57). Information on the warranty at www.optimum-machines.com
- Information on „Maintenance contracts“ on page 321



TECHNICAL DATA

Model	S 400E
Article no.	3504325
Machine data	
Electrical connection	400 V / 3 Ph ~50 Hz
Total connected load	15 kVA
Spindle	
Drive motor S1 operation	7.5 kW
Torque drive motor S1 operation	48 Nm
Drive motor S6 30 % operation	11 kW
Torque drive motor S6 30 % operation	70 Nm
Spindle seat	ISO 702-1 No. 6 form A2
Spindle bore*	Ø 61 mm*
Chuck passage	Ø 52 mm
Hydraulic lathe chuck	Ø 200 mm
Cooling lubricant system	
Coolant pump output	650 W
Tank capacity	140 litres
Hydraulic system	
Hydraulic pump power	1.5 kW
Tank capacity	60 litres
Machine data	
Turning diameter	225 mm
Turning length	450 mm
Swing Ø above cross slide	220 mm
Swing Ø above machine bed	450 mm
Slant bed	45°
Speed range	
Spindle speeds	40 - 4 500 rpm
Tool turret	
Type	hydraulic
Number of tool slots	8 tools
Max. height, width square	25 mm
Max. diameter drilling rod	16 mm
Precision	
Repeat accuracy	± 0.01 mm
Positioning accuracy	± 0.008 mm
Traverse paths	
X axis	230 mm
Z axis	450 mm
Feed speed	
X axis fast motion	6 m/min.
Z axis fast motion	8 m/min.
Motor torque	
X axis	10 Nm
Z axis	10 Nm
Tailstock	
Tailstock seat	MT 4
Tailstock quill diameter	72 mm
Tailstock - quill stroke	100 mm
Dimensions	
L with/without chip conveyor x W x H	3 650 (1 410) x 1 900 x 1 800 mm
Overall weight	3 500 kg



SINUMERIK 808 ADVANCED

CNC technology from the technology leader, paired with a revolutionary operating concept

Boost productivity in production

- The SINUMERIK 808D ADVANCED control is a panel-based CNC control. The compact and user-friendly entry-level solution is used for simple turning applications. Features such as easy operation, commissioning and maintenance are the perfect basis for equipping CNC machines.
- With its technology-specific variants, the SINUMERIK 808D ADVANCED control is perfectly preconfigured for turning. And with its hardware and software enhancements, the SINUMERIK 808D ADVANCED also offers sufficient performance for simple turning functionalities in mould and tool making.

COMPACT AND ROBUST

- Thanks to a panel-based CNC design with very few interfaces and an IP65 protected control panel, the SINUMERIK 808D ADVANCED is perfectly prepared for deployment in tough environments. The small dimensions allow use on compact machines.

SINUMERIK 808D ON PC

- Control-identical software package that further simplifies handling of the machine tool. *Free to download at www.cnc4you.com*



Control

- 8.4" LCD colour display with a resolution of 800x600

Warranty extension

The warranty extension lets you protect your new machine against warranty damage for a further 12 or 36 months after the two-year **SIEMENS** warranty expires. (can only be ordered within the two-year **SIEMENS** warranty)

12 months; Article no. 3589010
36 months; Article no. 3589012

OVERALL PACKAGE

- RJ45 Ethernet port
- Ready for remote maintenance
- AST function gives users an easy optimisation option in case of stricter dynamic and precision requirements
- Absolute encoder / no referencing move required
- Greater precision

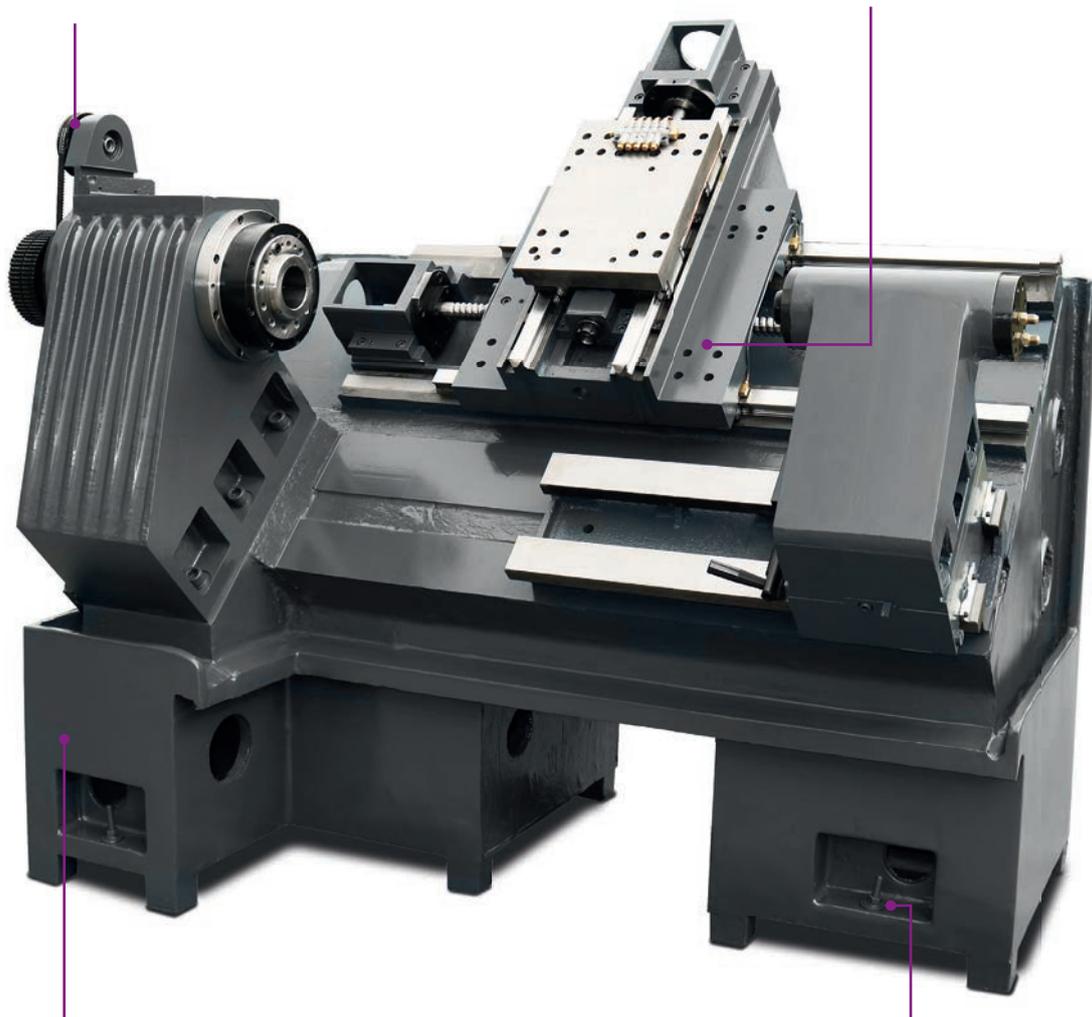


Main spindle

- 7.5 kW main spindle motor has high torque over the entire speed range
- Speed range 40 - 4 500 rpm
- High dynamics
- Ø 61 mm spindle bore

Machine bed

- Pronounced ribbing
- Stable 45° slant bed construction
- Excellent stiffness and durability
- Good chip removal



Machine stand

- Components and castings ensure stiffness
- Compact design

Machine feet

- Optimal machine levelling

CHIP CONVEYOR - TROLLEY



- Chip conveyor automates chip removal and increases machining productivity by the cuttings are safely removed from the removed from the processes

HANDWHEEL



- Portable
- Electronic
- Substantially facilitates running in of programs
- Emergency stop button
- Confirm button

CENTRAL OIL LUBRICATION SYSTEM



- Guarantees regular and automatic lubrication
- Lubricating points that are connected to the central lubricating system have a longer service life

TOOL CHANGER



- 8 tool slots
- hydraulic
- Only requires 0.25 seconds for a 45° swivel
- Bracket for tool changer

TAILSTOCK



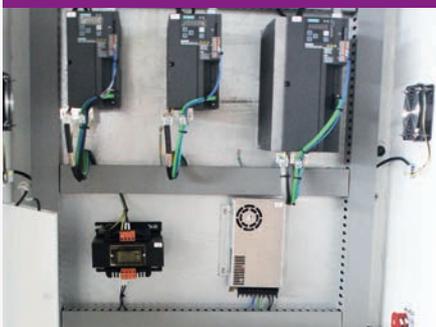
- The tailstock quill is moved hydraulically with the foot switch.
- The quill has a stroke of 100 mm and has a MK4 morse taper

SLANT BED 45°



- Larger swing diameter over machine bed
- Better unobstructed chip flow with flowing chips
- Reduced machine depth compared to standard bed with the same travel in the the X-axis

CONTROL CABINET



- Clear-cut layout of the control cabinet

HYDRAULIC LATHE CHUCK



- Hydraulically operated three-jaw chuck Ø 200 mm
- Uniformly high clamping forces at all clamping points increases the machining accuracy

SINUMERIK 808D ON PC



- Software package identical to control
- Facilitates the handling of the machine tool
- The workpieces can be programmed and simulated offline.

Free to download at www.cnc4you.com





CNC milling machine F 120X
CNC milling machine F 150HSC
CNC milling machine F 210P
CNC milling machine F 210HSC
CNC milling machine F 310HSC
CNC milling machine F 410HSC
CNC milling machine F 610HSC
Production machines user report on page 168

F 120X

Drilling and thread tapping machine with full milling capability

SIEMENS SINUMERIK 828D with PPU 290

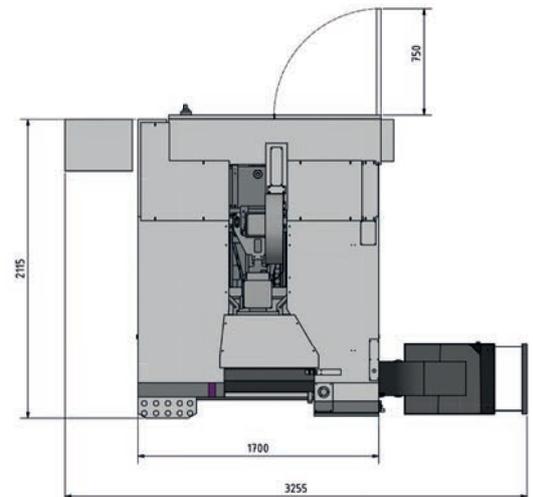
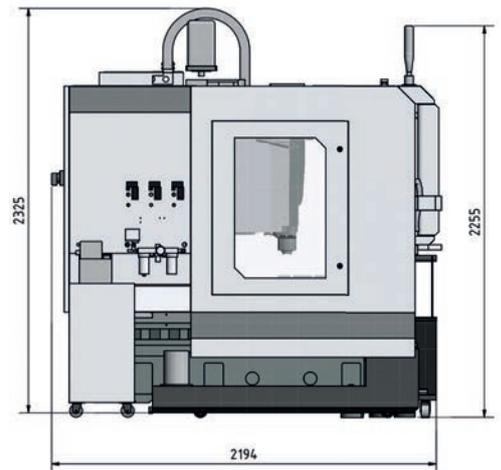
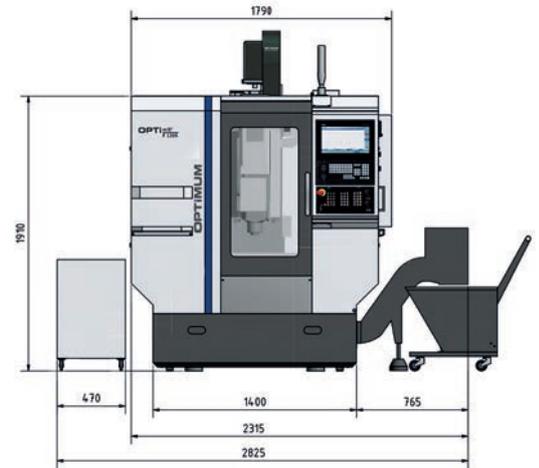
- Rugged design
- Servo tool changer with 21 tool slots
- All linear guides with stainless steel covers
- Automatic centralised lubrication
- **SIEMENS** main spindle motor
- **SIEMENS** servo drives on all axes (closed loop)
- Max. spindle speed - inline spindle 16 000 rpm. The direct connection between spindle and motor increases surface quality and thermal stability
- Hardened and precision-ground ball screws for high rapid traverse speeds in all axes
- Portable, electronic handwheel with confirm button and emergency stop button substantially facilitates running in of programs
- Coolant unit with 120 litre coolant tank
- Fully automatic tool change
- Solid, precision milling table with precision surface finish
- Access doors very generously designed to reduce cleaning and maintenance times to a minimum
- Chip conveyor, belt type ensures efficient chip discharge
- Chip carriage
- Oil cooler, compensates for temperature fluctuations at the main spindle
- LED machine lamp for complete illumination of the workspace
- Including two years **SIEMENS** warranty. (warranty extension on page 65). Information on the warranty at www.optimum-machines.com
- Information on „Maintenance contracts“ on page 321



Fig. F 120X with optional accessories

TECHNICAL DATA

Model	F 120X
Article no.	3515120
Spindle	Inline spindle
Machine data	
Electrical connection	400 V / 3 Ph ~50 Hz
Total connected load	45 kVA
Milling spindle	
Drive motor S1 operation	12 kW
Drive motor torque S1	38 Nm
Drive motor S6 30 % operation	22.8 kW
Torque drive motor S6 30 % operation	116 Nm
Spindle seat	BT 30
Cooling lubricant system	
Coolant pump motor	370 W
Tank capacity	120 litres
End mill size	
Cutter head size max.	Ø 63 mm
Max. shaft milling cutter size	Ø 25 mm
Milling precision	
Repeat accuracy	± 0.006 mm
Positioning accuracy	± 0.005 mm
Tool changer	
Type	Servo
Number of tool slots	21
Max. tool diameter	80 mm
Max. tool length	80 mm
Max. tool weight	3 kg
Tool change time T-T	0.5 seconds
Traverse paths	
X axis	500 mm
Y axis	400 mm
Z axis	300 mm
Feed drive axes (X/Y/Z axis)	
Rapid traverse	40 m/min.
Acceleration	2 m/s ²
Motor torque (X/Y/Z axis)	
Drive motor S1 operation	2.32 / 2.32 / 3.3 kW
Drive motor torque S1	7.4 / 7.4 / 10.5 Nm
Drive motor S6 30 % operation	4.1 / 4.1 / 6.5 kW
Torque drive motor S6 30 % operation	14 / 14 / 21 Nm
Speed range	
Speeds*	16 000 rpm
Pneumatics	
Compressed air	6 bar
Milling table	
Spindle centre to Z axis cover	400 mm
Clearance spindle to table	150 - 450 mm
Table length x width	650 x 400 mm
T-slot size / amount / distance	14 mm / 3 / 125 mm
Max. load of working table	250 kg
Dimensions	
Length x width x height (with chip conveyor)	2 315 x 2 194 x 2 325 mm
Overall weight	3 800 kg
Sinumerik 828D system software	
CNC memory	8 MB
Cycle change time	1 ms
Look Ahead	150
Number of tools	512



SINUMERIK 828D

The power package in the compact class of CNC controls

Boosting productivity and precision in manufacturing

Robust hardware architecture and intelligent control algorithms as well as top-class drive and motor technology ensure the highest dynamics and precision during machining.

Advanced software-controlled compensation functions ensure additional quality in surface machining and high availability of the machine tool.

With SINUMERIK Operate, all machining technologies, from standard to complex, can be operated intuitively and with a uniform "look & feel".

ADVANCED SURFACE

- Thanks to the new Advanced Surface movement guide, it can also be used for tool and mould making.



Perfect surface quality through reproducible results in adjacent milling paths (right picture)

Multitouch operation with PPU 290

The 15.6" panel is robust even in harsh environments. The SINUMERIK Operate user interface is optimised for touch-sensitive operation.

User-friendly

- Capacitive 15.6" color display, 16:9 format
- Configurable side screen
- Intuitive Multitouch operation
- Full QWERTY keyboard
- Soft key selection via touch function
- Easy data transfer thanks to IP65 protected front interfaces (USB 2.0, RJ45 Ethernet)
- Proximity/distance sensor for smart display control

Rugged and maintenance-free

- Front panel made of die-cast magnesium with scratchproof glass front
- Can be operated while wearing gloves
- NV RAM memory technology without buffer battery
- Fanless and hard diskless design

Warranty extension

The warranty extension lets you protect your new machine against warranty damage for a further 12, 24 or 36 months after the two-year **SIEMENS** warranty expires. (can only be ordered within the two-year **SIEMENS** warranty)

12 months; Article no. 3589020
24 months; Article no. 3589021
36 months; Article no. 3589022

TOP SURFACE

- Siemens shows a further development in terms of surface quality in mould making with Top Surface (optional article no. 3584012).
- The function optimises the CAD/CAM-CNC data, which reduces the dependence of the manufacturing quality on the CAD/CAM calculation tolerance and improves the surface quality and shape accuracy.

DXF READER

- Faster from the drawing to the workpiece. Easy transfer of CAD data into programming by DXF reader (optional article no. 3584014).



SIEMENS SAFETY INTEGRATED

SET UP WORK WITH OPEN DOORS

Functional safety also provides protection against high costs!

Machine and plant safety is not only important because strict regulations must be observed. When everything runs safely, you benefit from time savings in engineering, higher system availability and more investment security.

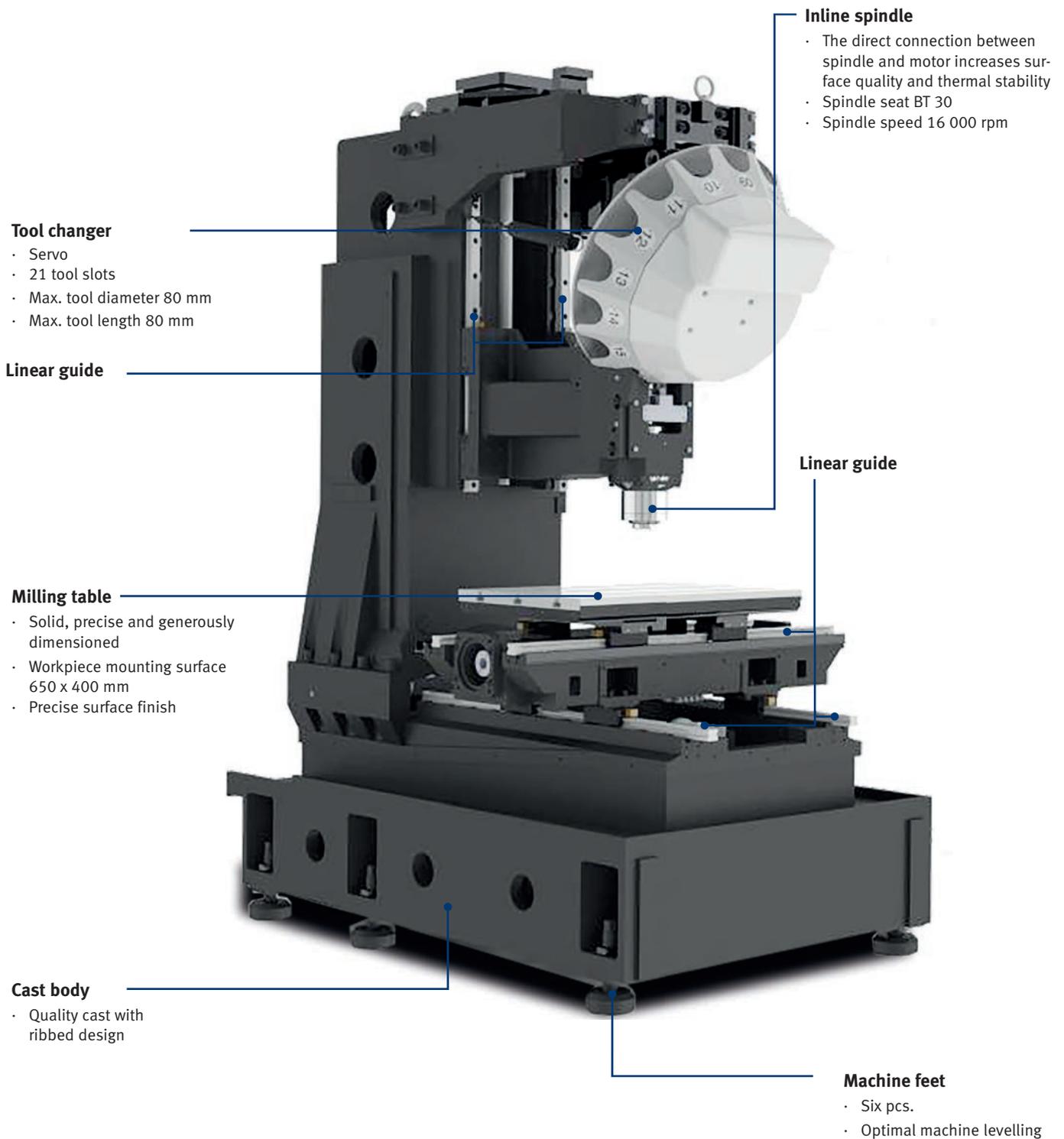
OVERALL PACKAGE

- Safety Integrated
- Residual material detection and machining
- ShopMill work step programming
- Managing network drives
- 3-D simulation
- Simultaneous recording
- System software SW 28x



RUGGED DESIGN

Dynamics, precision and ergonomics



Tool changer

- Servo
- 21 tool slots
- Max. tool diameter 80 mm
- Max. tool length 80 mm

Linear guide

Milling table

- Solid, precise and generously dimensioned
- Workpiece mounting surface 650 x 400 mm
- Precise surface finish

Cast body

- Quality cast with ribbed design

In-line spindle

- The direct connection between spindle and motor increases surface quality and thermal stability
- Spindle seat BT 30
- Spindle speed 16 000 rpm

Linear guide

Machine feet

- Six pcs.
- Optimal machine levelling

COOLANT PUMP



- Powerful 370 W coolant pump
- Tank capacity 120 litres
- max. delivery volume 4 m³/h (66 litres per minute)

HANDWHEEL



- Portable; electronic
- Substantially facilitates running in of programs
- Emergency stop button
- Confirm button

SPINDLE OIL COOLER



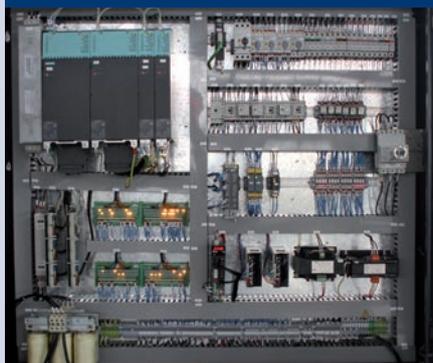
- Prevents deviation of the spindle centre line or thermal deformation of the machine
- Prevents oil vibration
- Extends the machine's service life

TOOL CHANGER SYSTEM



- Servo
- 21 tool slots
- Tool change time T-T: 0.5 seconds

CONTROL CABINET



- Clearly-arranged
- With SIEMENS servo drive
- Standards-compliant setup

LINEAR GUIDE



- Maximum static and dynamic stiffness
- High positioning accuracy
- Smooth, backlash-free movement
- Consistent precision with long service life

COMPARTMENTS



- Storage compartment
- Tool compartment for clean and clear-cut storage of tools
- Within reach on the machine

INLINE SPINDLE



- Spindle speed up to 16 000 rpm
- The direct connection between spindle and motor increases surface quality and thermal stability

CENTRAL LUBRICATION SYSTEM



- Prevents wear, repair costs and unnecessary downtime to a major extent

TOOL MEASURING / WORKPIECE MEASURING

➔ For information on tool/workpiece measurement ex warehouse Germany see page 290.

MISCELLANEOUS

3536107	1	Starter set BT 30	➔ Information on page 282	
351512010*	3	Coolant through spindle (CTS)	<ul style="list-style-type: none"> • Pump pressure 30 bars • Integrated unit 	we recommend a suction
351512011*			<ul style="list-style-type: none"> • Pump pressure 70 bars • External power unit • Tank capacity 168 l 	
NEW 351512016*	2	Double contact spindle system BIG-PLUS® BT 30	<ul style="list-style-type: none"> • BIG-PLUS® is an extremely stable connection between the machine spindle and the tool holder, which is achieved by simultaneous taper and face contact of the tool holder in the machine spindle. 	

FOURTH AXIS

351512002*	4	Fourth axis rotary indexing table	<ul style="list-style-type: none"> • Preparation
351512003*			<ul style="list-style-type: none"> • Rotary indexing table Ø 120 mm • Three-jaw lathe chuck 100 mm • Tailstock • Installation
350110004*	5	Swivel bridge	<ul style="list-style-type: none"> • 260 x 130 mm • with counterholder

➔ For details on the fourth axis for the rotary indexing table see page 276

SOFTWARE

3584014	6	DXF Reader for SIEMENS SINUMERIK controls	<ul style="list-style-type: none"> • from version 4.7 • For importing DXF files • Hiding graphics layers • Automatic contour tracking • Arbitrary workpiece zero point per contour/drilling point
3584012	7	Top surface for SIEMENS SINUMERIK control	<ul style="list-style-type: none"> • The NC data from the CAM system are optimised online during processing • The result is excellent surface quality while milling complex free-form surfaces. This is particularly beneficial for geometrically complex mould parts in automobile or aerospace applications or in power generation

MISCELLANEOUS

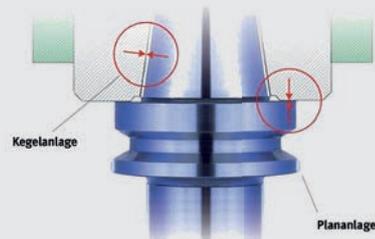
on request	8	Punch Tap READY	<p>Punch Tap cycle installed Punch Tap revolutionises thread tapping. For more information see: https://punchtap.com</p>
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1 STARTER SET BT 30



- Milling head holder 1
- Drill chuck 1 - 13 mm 2
- 2 each Weldon 6 mm and 20 mm
- 1 each Weldon 8/10/12/16 mm 3
- Adapter BT 30 4
- 4 pcs. collet chuck holder ER 32 5
- Collet spanner ER 32 6
- 18-part collet set ER 32 7
- Height adjuster 8
- Assembly and tool adjustment gauge 9
- 14 pcs. Pull stud 10
- Taper squeegee 11

2 DOUBLE CONTACT SPINDLE SYSTEM BIG-PLUS[®]



The advantages

- Improve surface quality and dimensional accuracy
- Longer service life of the tools
- Prevents fretting corrosion during heavy machining
- Maximum change accuracy with the tool changer
- No axial offset at high speeds
- Improved concentricity in drilling work
- Improved flat surface contact (BT 30: BIG-PLUS Ø 46 mm - conventional Ø 31.75 mm)

3 COOLANT THROUGH SPINDLE



- Guarantees optimal service life
- Optionally with internal or external unit
- Pump pressure 30 bars or 70 bars

4 PREPARATION



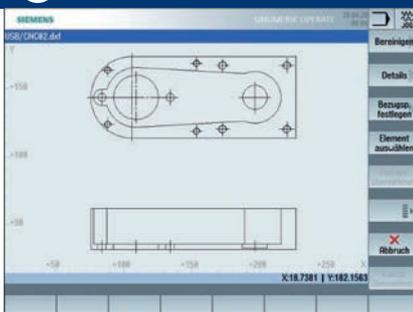
- Preparation for fourth axis

5 FOURTH AXIS



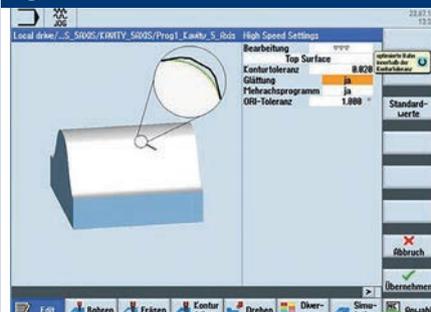
- Rigid design thanks to single-part front plate and spindle design
- A combination of high-precision worm wheel and bronze/nickel housing. The screw made of hardened steel

6 DXF READER



- DXF data can be converted to NC programs for drilling patterns and contours.

7 TOP SURFACE



- Excellent surface quality and form precision
- Fast and precise machining thanks to new technology
- Complete machining fully integrated with Sinumerik Operate

8 PUNCH TAP READY



- EMUGE Punch Tap technology, also known as helical thread forming, is a fourth manufacturing technology for the production of internal threads in addition to thread forming, thread cutting and thread milling

F 150HSC

Excellent precision, solid design, effectiveness and efficiency

SIEMENS SINUMERIK 828D mit PPU 290 with 15.6 inch touchscreen

- Heavy duty version
- High productivity
- High reliability
- Torsion free machine base thanks to strong ribbing
- Profile rail with ball screw for fast rapid motion speeds on all axes
- High-torque servo drives on all three axes
- Telescopic guide rail covers on all three axes
- Solid, precision milling table with four T-grooves, generously dimensioned with precision surface finish
- Portable, electronic handwheel with confirm button and emergency stop button substantially facilitates running in of programs
- Coolant unit with 210 litre coolant tank, including chip flushing system and cleaning gun
- Chip conveyor in screw conveyor design ensures efficient chip removal
- RJ45 plug-in connection, USB connection and 230 V power connection
- Spindle oil cooler
- Closed switch cabinet with integrated heat exchanger; ensures optimal temperature even in case of high ambient temperatures; prevents dirt particle penetration
- Machine lamp in the workspace
- Including two years **SIEMENS** warranty. (warranty extension on page 73). Information on the warranty at www.optimum-machines.com
- Information on „Maintenance contracts“ on page 321



Follow this for the video presentation of our Optimum milling machine F 150

Subscribe to our YouTube channel, to avoid missing any of the new videos:
www.youtube.com/user/OptimumMaschinen



Fig. F 150HSC with optional accessories

TECHNICAL DATA

Model	F 150HSC
Article no.	3511213
Spindle	Inline spindle
Machine data	
Electrical connection	400 V / 3 Ph ~50 Hz
Total connected load	31 kVA
Milling spindle	
Drive motor S1 operation	9 kW
Drive motor torque S1	57 Nm
Drive motor S6 30 % operation	21.2 kW
Torque drive motor S6 30 % operation	135 Nm
Spindle seat	SK 40 / DIN 69871
Cooling lubricant system	
Motor - coolant pumps, 3 pcs.	1.27 kW each
Pump capacity	66 - 100 l/min
Tank capacity	210 litres
End mill size	
Cutter head size max.	Ø 63 mm
Max. shaft milling cutter size	Ø 32 mm
Milling precision	
Repeat accuracy	± 0.005 mm
Positioning accuracy	± 0.005 mm
Tool changer	
Type	Double arm grab
Number of tool slots	24 tools
Max. tool diameter	80 mm
Max. tool diameter (tools slots beside not occupied)	125 mm
Tool length	200 mm
Max. tool weight	8 kg
Tool change time T-T	2 seconds
Traverse paths	
X axis	760 mm
Y axis	440 mm
Z axis	460 mm
Axis feed drive	
Rapid traverse X/Y/Z axis	36 m/min.
Motor torque	
X/Y/Z axis	7.3 Nm / 10.5 Nm / 15 Nm
Feed forces	
X/Y/Z axis	3 kN / 5.5 kN / 5.5 kN
Speed range	
Speeds*	12 000 rpm
Pneumatics	
Compressed air	5 - 7 bar
Milling table	
Clearance spindle to table	102 - 562 mm
Throat	480 mm
Table length x width	900 x 410 mm
T-slot size / amount / distance	16 mm / 4 / 102 mm
Max. load of working table	350 kg
Dimensions	
Length x width x height	3 000 x 1 950 x 2 5310 mm
Overall weight	4 350 kg

Sinumerik 828D system software	SW 28x
CNC memory	8 MB
Cycle change time	1 ms
Look Ahead	150
Number of tools	512

SINUMERIK 828D

The power package in the compact class of CNC controls

Boosting productivity and precision in manufacturing

Robust hardware architecture and intelligent control algorithms as well as top-class drive and motor technology ensure the highest dynamics and precision during machining.

Advanced software-controlled compensation functions ensure additional quality in surface machining and high availability of the machine tool.

With SINUMERIK Operate, all machining technologies, from standard to complex, can be operated intuitively and with a uniform "look & feel".

ADVANCED SURFACE

- Thanks to the new Advanced Surface movement guide, it can also be used for tool and mould making.



Perfect surface quality through reproducible results in adjacent milling paths (right picture)

Multitouch operation with PPU 290

The 15.6" panel is robust even in harsh environments. The SINUMERIK Operate user interface is optimised for touch-sensitive operation.

User-friendly

- Capacitive 15.6" color display, 16:9 format
- Configurable side screen
- Intuitive Multitouch operation
- Full QWERTY keyboard
- Soft key selection via touch function
- Easy data transfer thanks to IP65 protected front interfaces (USB 2.0, RJ45 Ethernet)
- Proximity/distance sensor for smart display control

Rugged and maintenance-free

- Front panel made of die-cast magnesium with scratchproof glass front
- Can be operated while wearing gloves
- NV RAM memory technology without buffer battery
- Fanless and hard diskless design

Warranty extension

The warranty extension lets you protect your new machine against warranty damage for a further 12, 24 or 36 months after the two-year **SIEMENS** warranty expires. (can only be ordered within the two-year **SIEMENS** warranty)

12 months; Article no. 3589020
24 months; Article no. 3589021
36 months; Article no. 3589022

TOP SURFACE

- Siemens shows a further development in terms of surface quality in mould making with Top Surface (optional article no. 3584012).
- The function optimises the CAD/CAM-CNC data, which reduces the dependence of the manufacturing quality on the CAD/CAM calculation tolerance and improves the surface quality and shape accuracy.

DXF READER

- Faster from the drawing to the workpiece. Easy transfer of CAD data into programming by DXF reader (optional article no. 3584014).



SIEMENS SAFETY INTEGRATED

SET UP WORK WITH OPEN DOORS

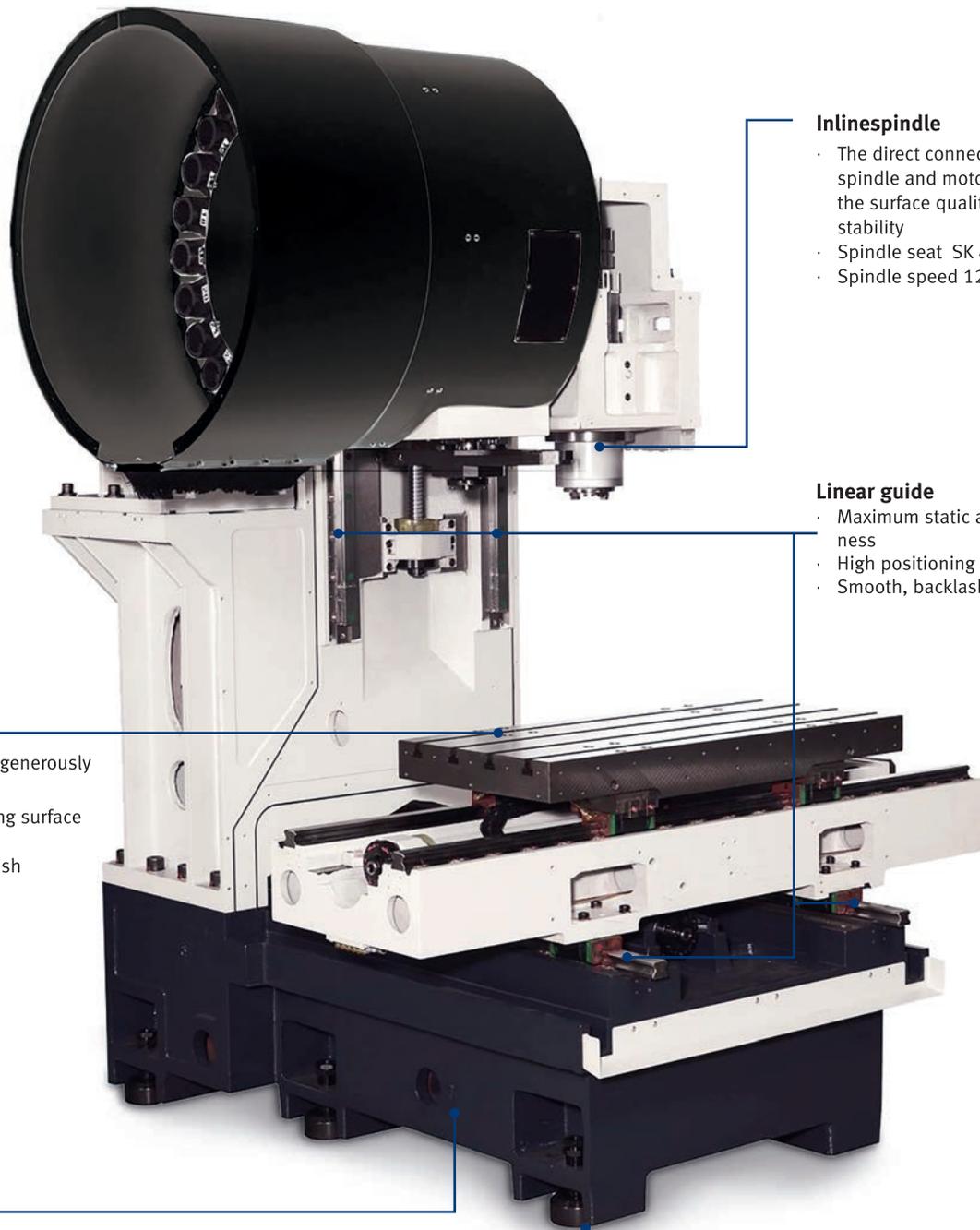
Functional safety also provides protection against high costs!

Machine and plant safety is not only important because strict regulations must be observed. When everything runs safely, you benefit from time savings in engineering, higher system availability and more investment security.

OVERALL PACKAGE

- Safety Integrated
- Residual material detection and machining
- ShopMill work step programming
- Managing network drives
- 3-D simulation
- Simultaneous recording
- System software SW 28x





Inlinespindle

- The direct connection between spindle and motor increases the surface quality and thermal stability
- Spindle seat SK 40 / DIN 69871
- Spindle speed 12 000 rpm

Linear guide

- Maximum static and dynamic stiffness
- High positioning accuracy
- Smooth, backlash-free movement

Milling table

- Solid, precise and generously dimensioned
- Workpiece mounting surface 900 x 410 mm
- Precise surface finish

Cast body

- Quality cast with ribbed design

Machine feet

- Six pcs.
- Optimal machine levelling

CLEANING GUN



- Easy cleaning of the workspace

HANDWHEEL



- Portable; electronic
- Substantially facilitates running in of programs
- Emergency stop button
- Confirm button

HEAT EXCHANGER



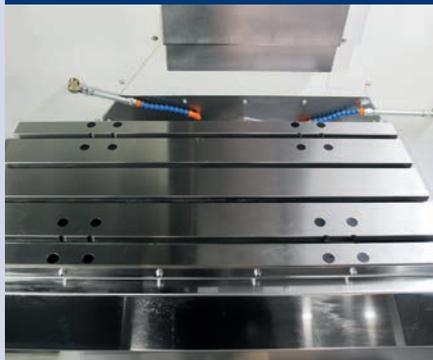
- Closed switch cabinet with smart cooling management
- Optimal temperature even in case of high ambient temperatures

TOOL CHANGER SYSTEM



- Double arm grab with 24 tool slots
- Max. tool length 300 mm
- Tool-to-tool change in 2 seconds

CHIP FLUSHING SYSTEM



- Powerful chip flushing system for cleaning the workspace and workpiece

CONTROL CABINET



- Closed, uncluttered switch cabinet with integrated heat exchanger; ensures optimal temperature
- With SIEMENS servo drive
- Standards-compliant setup

CHIP CONVEYOR



- Screw auger design
- For efficient chip discharge

COOLING LUBRICANT SYSTEM



- Three coolant pumps with 1.27 Watt each
- Tank capacity 210 litres

CENTRAL LUBRICATION SYSTEM



- Prevents wear, repair costs and unnecessary downtime to a major extent

TOOL MEASURING / WORKPIECE MEASURING			
3511290604*		BLUM TC52IR Universal measuring probe	<ul style="list-style-type: none"> Switching point repetition accuracy from 0, 3µm 2 at 2 m/ min. measuring speed Wear-free and durably stable Very compact probe with 40 mm diameter
3511290605*		BLUM ZX-Speed 3-D probe	<ul style="list-style-type: none"> Universal 3-D probe for toolmaking and tool break monitoring
➔ For information on Blum workpiece/tool measuring, also ex warehouse Germany see page 275			
3511290620*		Renishaw NC 4 Laser system for tool measurement	<ul style="list-style-type: none"> NC4 zero-contact tool control system is a high-precision, extremely fast solution for tool measurement and breakage checking
3511290621*		Renishaw OMP 60 Probe with optical signal transmission	<ul style="list-style-type: none"> For checking and setting up workpieces on processing centres Compact, touch-actuated 3D probe. Reliably modulated, optical signal transmission.
3511290622*		Renishaw TS 27R Probe for tactile tool measurement	<ul style="list-style-type: none"> Tool breakage check Compact, tactile 3-D tool probe with wired signal transmission

NEW

3-D PRINTING			
3562411		3-D printing interface	<ul style="list-style-type: none"> Plug connector on milling head for OPTImill 3X printing head Power supply is installed in control cabinet Prepared for open circuit monitoring and filament holder
➔ For information on 3-D printing and accessories see 266			

MISCELLANEOUS			
3536109	1	Starter set SK 40 / DIN 69871	➔ For Information on the starter set see on page 284
3511290100*	2	Coolant through spindle (CTS)	<ul style="list-style-type: none"> Integrated unit, 20 bar pump pressure
3511290102*			we recommend a suction
3511290104*		<ul style="list-style-type: none"> External unit, pump pressure 20 bars, tank capacity 165 litres, delivery rate 30 l/min 	
3511290104*		<ul style="list-style-type: none"> External unit, pump pressure 70 bars, tank capacity 165 litres, delivery rate 29 l/min 	
3511290401*	3	Air conditioner	<ul style="list-style-type: none"> Instead of the standard heat exchanger
3511290299		Automatic side door	<ul style="list-style-type: none"> for robot loading, including assembly
3511290501*	4	Power transformer	<ul style="list-style-type: none"> for special voltages
3511290303*	5	Chip conveyor, belt-type	<ul style="list-style-type: none"> Instead of standard equipment > chip conveyor, screw auger type
3511290301*		Chip trolley	<ul style="list-style-type: none"> L x W x H: 994 x 510 x 838 mm, Capacity: 65 litres

NEW

FOURTH AND FIFTH AXIS			
3511290201*	6	Fourth axis rotary indexing table	<ul style="list-style-type: none"> Preparation
3511290210*			<ul style="list-style-type: none"> Table diameter 120 mm, three-jaw lathe chuck Ø 100 mm Tailstock, Siemens Motor, assembly
3511290202*	7	5-axis rotary/swivelling table	<ul style="list-style-type: none"> Preparation
3511290250*			<ul style="list-style-type: none"> Possible machining diameter 120 mm, Three-jaw lathe chuck Ø 100 mm Tailstock, Siemens Motor, assembly
➔ For details on the fourth axis for the rotary indexing table and 5-axis rotary/swivelling table see page 276			

SOFTWARE			
3584014		DXF Reader for SIEMENS SINUMERIK controls	<ul style="list-style-type: none"> from version 4.7 For importing DXF files Hiding graphics layers
3584012	8	Top surface for SIEMENS SINUMERIK control	<ul style="list-style-type: none"> The NC data from the CAM system are optimised online during processing The result is excellent surface quality while milling complex free-form surfaces. This is particularly beneficial for geometrically complex mould parts

1 STARTER SET SK 40 / DIN 69871



- Milling head holder with 27 mm seat 1
- Quick-action drill chuck 1- 13 mm 2
- 2 each Weldon 6 mm and 20 mm 3
- 1 each Weldon 8/10/12/16 mm 3
- Adapter SK 40 to MT 3 4
- 4 pcs. Collet chuck holder ER 32 5
- Collet spanner ER 32 6
- 18-part collet set ER 32 7
- Assembly and tool adjustment gauge 8
- Height-adjuster 9
- Taper squeegee 10
- Pull stud 11

2 COOLANT THROUGH SPINDLE



- Guarantees optimal service life
- Optionally with internal or external unit
- Pump pressure 20 bars or 70 bars



Fig. Filter unit internal 20 bar

3 AIR CONDITIONER



- Instead of heat exchanger
- The air conditioner permanently and constantly cools the control cabinet to the set temperature.

4 POWER TRANSFORMER



- For custom voltage
- Weight 147 kg

5 CHIP TROLLEY CONVEYOR



- Conveyor version
- For efficient chip discharge

6 FOURTH AXIS



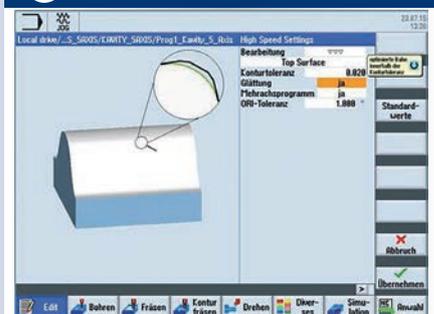
- Table diameter 120 mm
- Vertical table centre height 115 mm
- Total vertical height without motor cover 193 mm
- Horizontal table height 170 mm
- Workpiece weight horizontal / vertical max. 75 / 35 kg

7 FIFTH AXIS



- Compact design
- Possible machining \varnothing 120 mm
- Vertical table centre height 150 mm
- Vertical table overall height 235 mm
- Through hole diameter 30^{H7}mm
- Slot nut width 14^{H7}mm

8 TOP SURFACE



- Excellent surface quality and form precision
- Fast and precise machining thanks to new technology
- Complete machining fully integrated with Sinumerik Operate

A circular badge with a white background and a blue border, containing the word "NEW" in blue capital letters.

F 210P

Excellent precision, solid design, effectiveness and efficiency

SIEMENS SINUMERIK 828D mit PPU 290 with 15.6 inch touchscreen

- Heavy duty version
- High productivity
- High reliability
- Torsion free machine base thanks to strong ribbing
- Profile rail with ball screw for fast rapid motion speeds on all axes
- High-torque servo drives on all three axes
- Telescopic guide rail covers on all three axes
- Solid, precision milling table with five T-grooves, generously dimensioned with precision surface finish
- Portable, electronic handwheel with confirm button and emergency stop button substantially facilitates running in of programs
- Coolant unit with 210 litre coolant tank, including chip flushing system and cleaning gun
- Chip conveyor in belt type ensures efficient chip removal
- Chip carriage
- RJ45 plug-in connection, USB connection and 230 V power connection
- Closed switch cabinet with integrated heat exchanger; ensures optimal temperature even in case of high ambient temperatures; prevents dirt particle penetration
- Machine lamp in the workspace for optimal illumination
- Including two years **SIEMENS** warranty (warranty extension on page 81). Information on the warranty at www.optimum-machines.com
- Information on „Maintenance contracts“ on page 321



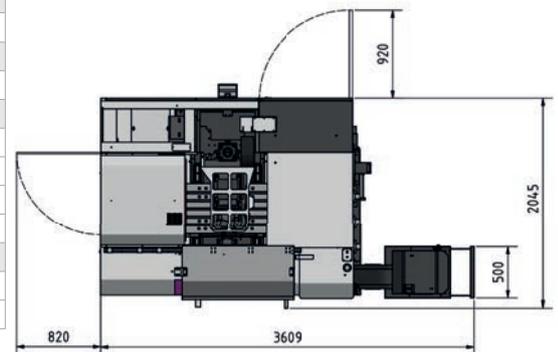
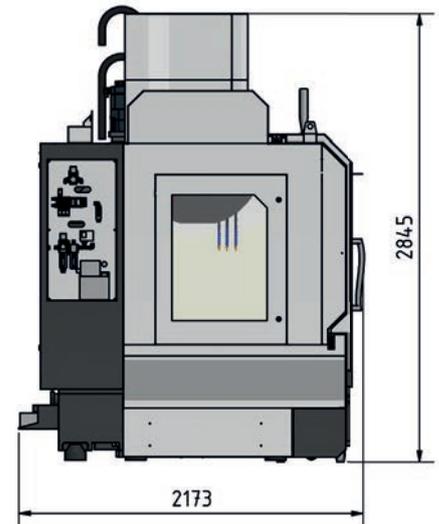
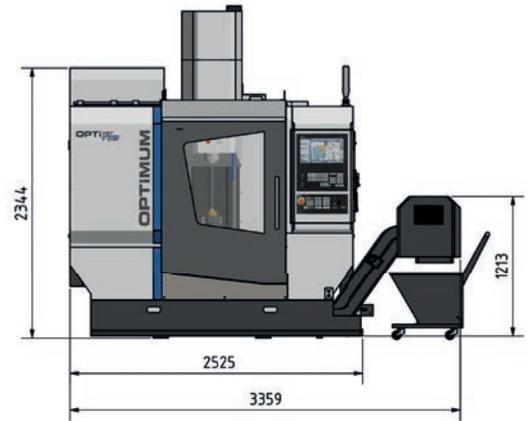
PREMIUM

Fig. with optional accessories



TECHNICAL DATA

Model	F 210P
Article no.	3511215
Spindle	Inline spindle
Machine data	
Electrical connection	400 V / 3 Ph ~50 Hz
Total connected load	20 KVA
Milling spindle	
Drive motor S1 operation	9 kW
Drive motor torque S1	57 Nm
Drive motor S6 30 % operation	15.8 kW
Torque drive motor S6 30 % operation	95 Nm
Spindle seat	BT 40
Cooling lubricant system	
Coolant pump motor	450 W
Tank capacity	200 litres
End mill size	
Cutter head size max.	Ø 80 mm
Max. shaft milling cutter size	Ø 38 mm
Milling precision	
Repeat accuracy	± 0,005 mm
Positioning accuracy	± 0,005 mm
Tool changer	
Type	Double arm grab
Number of tool slots	30 tools
Max. tool diameter	75 mm
Max. tool diameter (tools slots beside not occupied)	150 mm
Max. tool length	300 mm
Max. tool weight	8 kg
Tool change time T-T	2.5 seconds
Traverse paths	
X axis	800 mm
Y axis	500 mm
Z axis	500 mm
Axis feed drive	
Rapid traverse X/Y/Z axis	30 m/min.
Motor torque	
X/Y/Z axis	7.3 Nm / 10.5 Nm / 15 Nm
Speed range	
Speeds*	10 - 12 000 rpm
Pneumatics	
Compressed air	0.6 Mpa
Milling table	
Clearance spindle to table	100 - 600 mm
Table length x width	1 000 x 500 mm
T-slot size / amount / distance	5 / 18 / 80 mm
Max. load of working table	350 kg
Dimensions	
Length x width x height	3 609 x 2 173 x 2 845 mm
Overall weight	4 800 kg



Sinumerik 828D system software	SW 28x
CNC memory	8 MB
Cycle change time	1 ms
Look Ahead	150
Number of tools	512

SINUMERIK 828D

The power package in the compact class of CNC controls

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Robust hardware architecture and intelligent control algorithms as well as top-class drive and motor technology ensure the highest dynamics and precision during machining.

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ADVANCED SURFACE

- Thanks to the new Advanced Surface movement guide, it can also be used for tool and mould making.



Perfect surface quality through reproducible results in adjacent milling paths (right picture)

Multitouch operation with PPU 290

The 15.6" panel is robust even in harsh environments. The SINUMERIK Operate user interface is optimised for touch-sensitive operation.

User-friendly

- Capacitive 15.6" color display, 16:9 format
- Configurable side screen
- Intuitive Multitouch operation
- Full QWERTY keyboard
- Soft key selection via touch function
- Easy data transfer thanks to IP65 protected front interfaces (USB 2.0, RJ45 Ethernet)
- Proximity/distance sensor for smart display control

Rugged and maintenance-free

- Front panel made of die-cast magnesium with scratchproof glass front
- Can be operated while wearing gloves
- NV RAM memory technology without buffer battery
- Fanless and hard diskless design

Warranty extension

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12 months; Article no. 3589020
24 months; Article no. 3589021
36 months; Article no. 3589022

TOP SURFACE

- Siemens shows a further development in terms of surface quality in mould making with Top Surface (*optional article no. 3584012*).
- The function optimises the CAD/CAM-CNC data, which reduces the dependence of the manufacturing quality on the CAD/CAM calculation tolerance and improves the surface quality and shape accuracy.

DXF READER

- Faster from the drawing to the workpiece. Easy transfer of CAD data into programming by DXF reader (*optional article no. 3584014*).



SIEMENS SAFETY INTEGRATED

SET UP WORK WITH OPEN DOORS

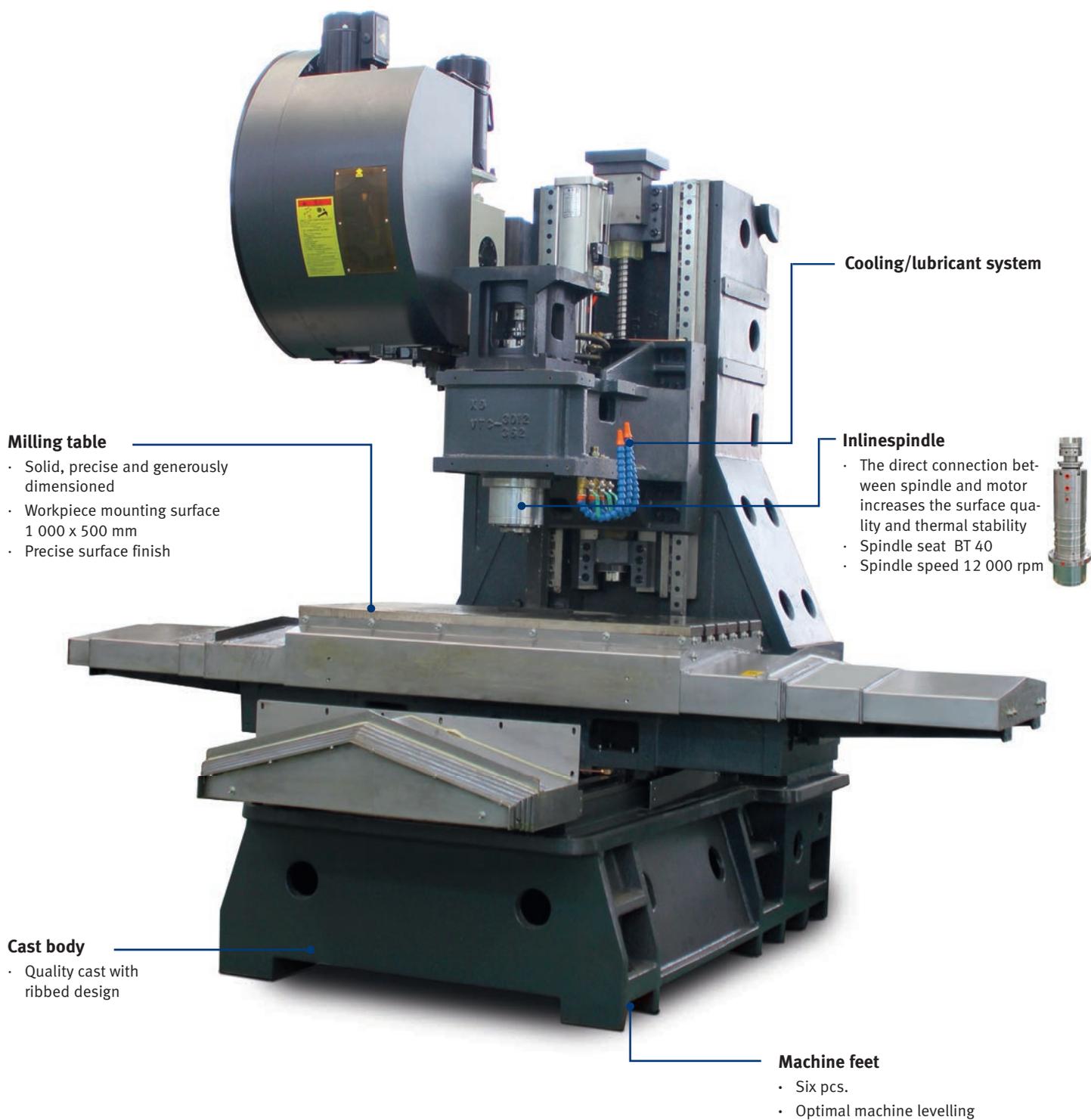
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Machine and plant safety is not only important because strict regulations must be observed. When everything runs safely, you benefit from time savings in engineering, higher system availability and more investment security.

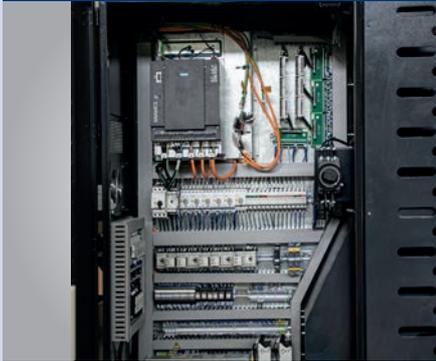
OVERALL PACKAGE

- Safety Integrated
- Residual material detection and machining
- ShopMill work step programming
- Managing network drives
- 3-D simulation
- Simultaneous recording
- System software SW 28x





CONTROL CABINET



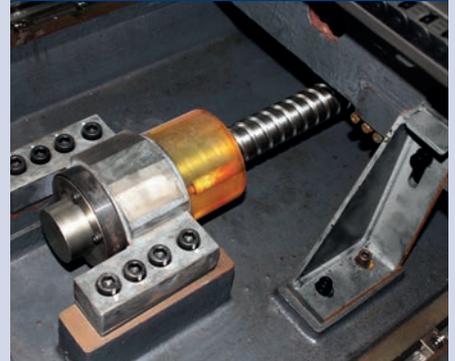
- Closed, uncluttered switch cabinet with integrated heat exchanger; ensures optimal temperature
- With SIEMENS servo drive
- Standards-compliant setup

HANDWHEEL



- Portable
- Electronic
- Substantially facilitates running in of programs
- Emergency stop button
- Confirm button

BALL SCREW



- Ball screw for fast rapid motion speeds on all axes
- High positioning and repeat accuracy
- Reduced wear

TOOL CHANGER



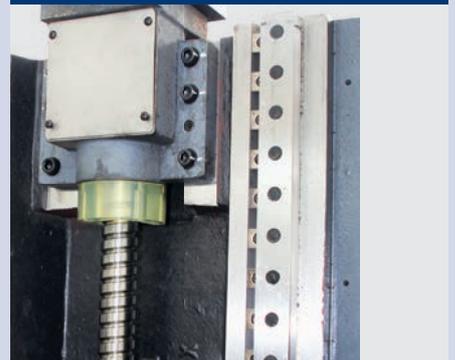
- Double arm grab
- 30 tool slots
- Tool change time: 2.5 seconds

GREASE LUBRICATION



- Reduces wear
- High load-bearing capacity
- Excellent lubricant film
- Low maintenance
- Good adhesion properties

LINEAR GUIDE



- High permissible load and high stiffness
- High positioning accuracy
- Smooth, backlash-free movement
- Consistent precision with long service life

CHIP CONVEYOR



- Conveyor version
- For efficient chip discharge

OIL SEPARATOR / OIL SKIMMER



- Oil skimmer separate floating tramp oils and finest chip debris from cooling lubricants
- Collection container easily removable

MILLING TABLE



- Solid, precision milling table with five T-grooves, generously dimensioned with precision surface finish

TOOL MEASURING / WORKPIECE MEASURING

➔ For information on tool/workpiece measurement ex warehouse Germany see page 290

MISCELLANEOUS

3536108	1	Starter set BT 40	➔ Information on the starter set on page 283
351121520*	2	Coolant through spindle (CTS)	• Integrated unit, 30 bar pump pressure
351121521*			• External unit, pump pressure 70 bars, tank capacity 165 litres, delivery rate 29 l/ min. We recommend an extraction unit

3-D PRINTING

351121591*	3	3-D printing interface	• Interface, power supply, preparation for open circuit monitoring, filament holder
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➔ For information on 3-D printing and accessories see 266

FOURTH AND FIFTH AXIS

351121501*	4	Fourth axis rotary indexing table complete set	• Preparation
351121509*			• Rotary indexing table Ø 120 mm • Three-jaw lathe chuck Ø 100 mm • Tailstock • Installation
350110004*			• 260 x 130 mm • with counterholder for fourth axis • Enables multi-sided machining with multiple clamping • With a quadruple clamping system, the tool change time per workpiece is only a quarter of that of a single clamping
351121502*	5	5-axis rotary/swivelling table	• Preparation
351121510*			• Possible machining diameter 120 mm • Three-jaw lathe chuck 100 mm • Tailstock • Siemens motor • Installation

➔ For details on the fourth axis for the rotary indexing table and 5-axis rotary/swivelling table see page 276

SOFTWARE

3584014		DXF Reader for SIEMENS SINUMERIK controls	<ul style="list-style-type: none"> • from version 4.7 • For importing DXF files • Hiding graphics layers • Automatic contour tracking • Arbitrary workpiece zero point per contour/drilling point
3584012		Top surface for SIEMENS SINUMERIK control	<ul style="list-style-type: none"> • The NC data from the CAM system are optimised online during processing • The result is excellent surface quality while milling complex free-form surfaces. This is particularly beneficial for geometrically complex mould parts in automobile or aerospace applications or in power generation

1 STARTER SET BT 40



- Milling head holder with 27 mm collet 1
- Chuck 1 - 13 mm 2
- Pull stud 3
- 2 each Weldon 6 mm and 20 mm 4
- 2 each Weldon 8 mm, 10 mm, 12 mm and 16 mm 4
- Adapter BT 40 to MT 3 5
- Collet holder ER 32 6
- Collet spanner ER 32 7
- Collet set ER 32 8
- Assembly and tool adjustment gauge 9
- Height-adjuster 10
- Taper squeegee 11

2 COOLANT THROUGH SPINDLE



- Guarantees optimal service life
- Optionally with internal or external unit
- Pump pressure 30 bars or 70 bars



Fig.: CTS extern 70 bar

3 3-D PRINTING INTERFACE



- Plug connector on milling head for OPTImill 3X and 5X printing heads
- Power supply is installed in control cabinet
- Prepared for connecting open circuit monitoring
- Filament holder

4 FOURTH AXIS



Swivel bridge similar to fig. and with optional fourth axis

- Rigid design thanks to single-part front plate and spindle design
- A combination of high-precision worm wheel and bronze/nickel housing. Worm screw made of hardened steel
- Design with low transmission ratio (90:1), for a fast feed speed

5 FIFTH AXIS



- Compact design
- 120mm possible machining diameter
- Three-jaw lathe chuck 100 mm
- Tailstock
- Vertical centre height 150 mm
- Vertical overall height 235 mm
- Slot nut width 14^{H7}
- Servo motor SIEMENS 1FK7042

F 210HSC

Excellent precision, solid design, effectiveness and efficiency

SIEMENS SINUMERIK 828D mit PPU 290 and 15.6 inch touchscreen

- Heavy duty version
- High productivity
- High reliability
- Torsion free machine base thanks to strong ribbing
- Profile rail with roller recirculation for high rapid traverse speeds in all axes
- High-torque servo drives on all three axes
- Telescopic guide rail covers on all three axes
- Automatic lubrication
- Solid, precision milling table with four T-grooves, generously dimensioned with precision surface finish
- Portable, electronic handwheel with confirm button and emergency stop button. Substantially facilitates running in of programs
- Coolant unit with 370 litre coolant tank, chip flushing system and cleaning gun
- Chip conveyor, belt type ensures efficient chip discharge
- Chip carriage
- RJ45 plug-in connection, USB connection and power connection 230 V
- Closed switch cabinet with integrated heat exchanger; ensures optimal temperature even in case of high ambient temperatures; prevents dirt particle penetration
- Machine lamp in the workspace
- Including two years **SIEMENS** warranty (warranty extension on page 89). Information on the warranty at www.optimum-machines.com
- Information on „Maintenance contracts“ on page 321



TECHNICAL DATA

Model	F 210HSC	
Article no.	3511222	
Milling spindle	Belt drive	Inline spindle
	Standard	Optional Item No: 3511290002**
Machine data		
Electrical connection	400 V / 3 Ph ~50 Hz	
Total connected load	31 kVA	
Milling spindle		
Drive motor S1 operation	9 kW	
Drive motor torque S1	57 Nm	
Drive motor S6 30 % operation	21.2 kW	
Torque drive motor S6 30 % operation	135 Nm	
Spindle seat	SK 40 / DIN 69871	
Cooling lubricant system		
Motor - coolant pumps, 3 pcs.	1.27 kW	
Pump capacity	155 l/min	
Tank capacity	370 litres	
End mill size		
Cutter head size max.	Ø 63 mm	
Max. shaft milling cutter size	Ø 32 mm	
Milling precision		
Repeat accuracy	± 0.005 mm	
Positioning accuracy	± 0.005 mm	
Tool changer		
Type	Double arm grab	
Number of tool slots	30 tools	
Max. tool diameter	75 mm	
Max. tool diameter (tools slots beside not occupied)	125 mm	
Tool length	300 mm	
Max. tool weight	8 kg	
Tool change time T-T	2 seconds	
Traverse paths		
X axis	800 mm	
Y axis	500 mm	
Z axis	500 mm	
Axis feed drive		
Rapid traverse X/Y/Z axis	30 m/min.	
Motor torque		
X/Y/Z axis	11 Nm / 11 Nm / 16 Nm	
Feed forces		
X/Y/Z axis	4,1 kN / 4,1 kN / 5,9 kN	
Speed range		
Speeds*	10 000 rpm	12 000 rpm
Pneumatics		
Compressed air	5 - 7 bar	
Milling table		
Clearance spindle to table	100 - 600 mm	
Table length x width	900 x 520 mm	
T-slot size / amount / distance	16 mm / 5 / 80 mm	
Max. load of working table	450 kg	
Dimensions		
Length x width x height	3 838 x 2 280 x 2260 mm	
Overall weight	6 250 kg	

Sinumerik 828D system software	SW 28x
CNC memory	8 MB
Cycle change time	1 ms
Look Ahead	150
Number of tools	512

* Please note that the maximum spindle speed must be reduced by approx. 20 % in continuous operation

** The option must be ordered with the basic machine. Cannot be retrofitted.

SINUMERIK 828D

The power package in the compact class of CNC controls

Boosting productivity and precision in manufacturing

Robust hardware architecture and intelligent control algorithms as well as top-class drive and motor technology ensure the highest dynamics and precision during machining.

Advanced software-controlled compensation functions ensure additional quality in surface machining and high availability of the machine tool.

With SINUMERIK Operate, all machining technologies, from standard to complex, can be operated intuitively and with a uniform "look & feel".

ADVANCED SURFACE

- Thanks to the new Advanced Surface movement guide, it can also be used for tool and mould making.



Perfect surface quality through reproducible results in adjacent milling paths (right picture)

Multitouch operation with PPU 290

The 15.6" panel is robust even in harsh environments. The SINUMERIK Operate user interface is optimised for touch-sensitive operation.

User-friendly

- Capacitive 15.6" color display, 16:9 format
- Configurable side screen
- Intuitive Multitouch operation
- Full QWERTY keyboard
- Soft key selection via touch function
- Easy data transfer thanks to IP65 protected front interfaces (USB 2.0, RJ45 Ethernet)
- Proximity/distance sensor for smart display control

Rugged and maintenance-free

- Front panel made of die-cast magnesium with scratchproof glass front
- Can be operated while wearing gloves
- NV RAM memory technology without buffer battery
- Fanless and hard diskless design

Warranty extension

The warranty extension lets you protect your new machine against warranty damage for a further 12, 24 or 36 months after the two-year SIEMENS warranty expires. (can only be ordered within the two-year SIEMENS warranty)

12 months; Article no. 3589020
24 months; Article no. 3589021
36 months; Article no. 3589022

TOP SURFACE

- Siemens shows a further development in terms of surface quality in mould making with Top Surface (*optional article no. 3584012*).
- The function optimises the CAD/CAM-CNC data, which reduces the dependence of the manufacturing quality on the CAD/CAM calculation tolerance and improves the surface quality and shape accuracy.

DXF READER

- Faster from the drawing to the workpiece. Easy transfer of CAD data into programming by DXF reader (*optional article no. 3584014*).



SIEMENS SAFETY INTEGRATED

SET UP WORK WITH OPEN DOORS

Functional safety also provides protection against high costs!

Machine and plant safety is not only important because strict regulations must be observed. When everything runs safely, you benefit from time savings in engineering, higher system availability and more investment security.

OVERALL PACKAGE

- Safety Integrated
- Residual material detection and machining
- ShopMill work step programming
- Managing network drives
- 3-D simulation
- Simultaneous recording
- System software SW 28x



Belt drive

- Offers a good combination of torque and speed suitable for a wide range of machining operations
 - Spindle seat SK 40 / DIN 69871
 - Spindle speed 10 000 rpm
- or

Inlinespindle

- The direct connection between spindle and motor increases surface quality and thermal stability
- Spindle seat SK 40 / DIN 69871
- Spindle speed 12 000 rpm

Linear guide

- Maximum static and dynamic stiffness
- High positioning accuracy
- Smooth, backlash-free movement

Milling table

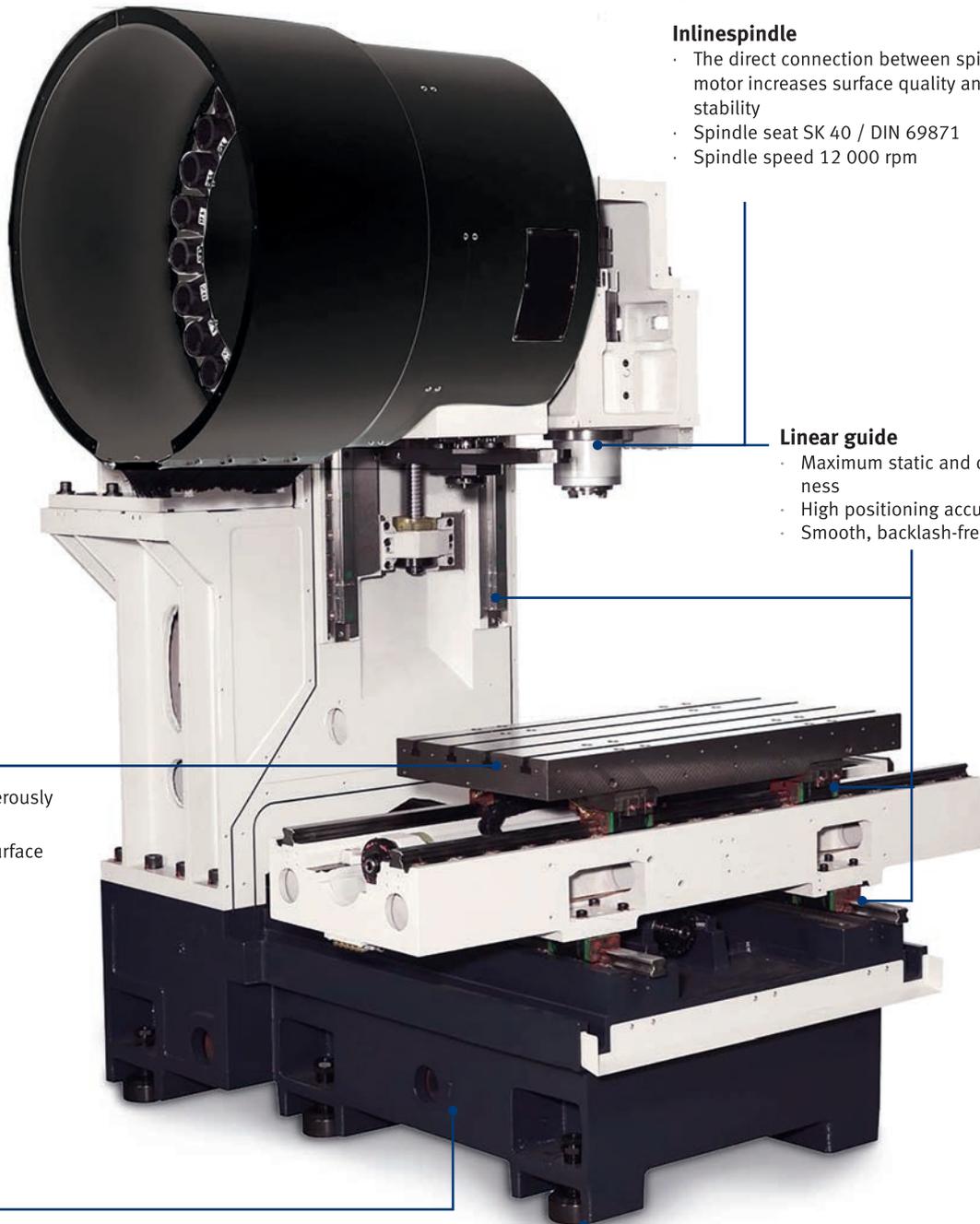
- Solid, precise and generously dimensioned
- Workpiece mounting surface 900 x 520 mm
- Precise surface finish

Cast body

- Quality cast with ribbed design

Machine feet

- Six pcs.
- Optimal machine levelling

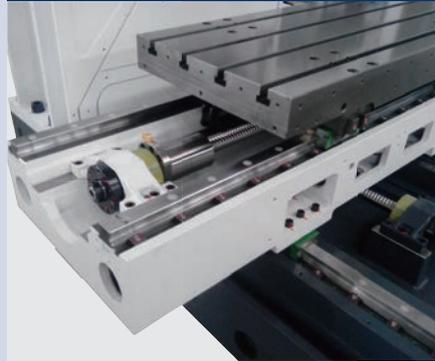


CLEANING GUN



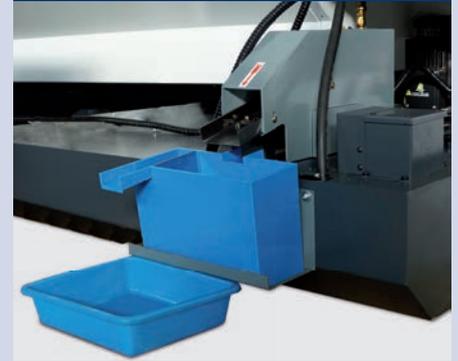
- Easy cleaning of the workspace

BALL SCREWS



- Accuracy class C3
- For high precision and repetition accuracy
- Low wear
- Coupled servo drive on the ballscrew

OIL SEPARATOR / OIL SKIMMER



- Oil skimmer reliably removes floating tramp oils and finest chip debris from cooling lubricants

TOOL CHANGER SYSTEM



- Double arm grab with 30 tool slots
- Max. tool length 300 mm
- Tool-to-tool change in 2 seconds

CHIP FLUSHING SYSTEM



- Powerful chip flushing system for cleaning the workspace and workpiece

CONTROL CABINET



- Closed, clearly arranged control cabinet
- With **SIEMENS** servo drive
- Construction according to standards

CHIP CONVEYOR



- Conveyor version
- For efficient chip discharge

COOLING LUBRICANT SYSTEM



- Three coolant pumps with 1.27 Watt each
- Tank capacity 370 litres

CENTRAL LUBRICATION SYSTEM



- Prevents wear, repair costs and unnecessary downtime to a major extent

TOOL MEASURING / WORKPIECE MEASURING		
3511290604*		BLUM TC52IR Universal measuring probe <ul style="list-style-type: none"> Switching point repetition accuracy from 0, 3µm 2 at 2 m/ min. measuring speed Wear-free and durably stable Very compact probe with 40 mm diameter
3511290605*		BLUM ZX-Speed 3-D probe <ul style="list-style-type: none"> Universal 3-D probe for toolmaking and tool break monitoring
 For information on Blum workpiece/tool measuring, also ex warehouse Germany see page 275		
3511290620*		Renishaw NC 4 Laser system for tool measurement <ul style="list-style-type: none"> NC4 zero-contact tool control system is a high-precision, extremely fast solution for tool measurement and breakage checking
3511290621*		Renishaw OMP 60 Probe with optical signal transmission <ul style="list-style-type: none"> For checking and setting up workpieces on processing centres Compact, touch-actuated 3D probe. Reliably modulated, optical signal transmission. Excellent measuring performance for less scrap and more profit
3511290622*		Renishaw TS 27R Probe for tactile tool measurement <ul style="list-style-type: none"> Tool breakage check Compact, tactile 3-D tool probe with wired signal transmission



3-D PRINTING

3562411		3-D printing interface <ul style="list-style-type: none"> Plug connector on milling head for OPTImill 3X/5X printing head Power supply is installed in control cabinet Prepared for open circuit monitoring and filament holder
 For information on 3-D printing and accessories see 266		

MISCELLANEOUS

3536109	1	Starter set SK 40 / DIN 69871	 For Information on the starter set see on page 284	
3511290100*	2	Coolant through spindle (CTS)	<ul style="list-style-type: none"> Integrated unit, 20 bar pump pressure 	An extraction unit is required
3511290102*			<ul style="list-style-type: none"> External unit, pump pressure 20 bars, tank capacity 165 litres, delivery rate 30 l/min 	
3511290104*			<ul style="list-style-type: none"> External unit, pump pressure 70 bars, tank capacity 165 litres, delivery rate 29 l/min 	
3511290402*	3	Air conditioner	<ul style="list-style-type: none"> Instead of the standard equipment › heat exchanger 	
3511290502*	4	Power transformer	<ul style="list-style-type: none"> for custom voltage 	

FOURTH AXIS AND 5-AXIS ROTARY/SWIVEL TABLE

3511290201*	5	Fourth axis rotary indexing table complete set	<ul style="list-style-type: none"> Preparation
3511290210*			<ul style="list-style-type: none"> Three-jaw lathe chuck Ø 100 mm, Table diameter 120 mm Tailstock Motor from SIEMENS, assembly
3511290202*			<ul style="list-style-type: none"> Preparation
3511290250*	6	5-axis rotary/swivelling table	<ul style="list-style-type: none"> Three-jaw lathe chuck Ø 100 mm, Possible machining Ø 120 mm Tailstock Motor from SIEMENS, assembly

 For details on the fourth axis for the rotary indexing table and 5-axis rotary/swivelling table see page 276

SOFTWARE

3584014	7	DXF Reader for SIEMENS SINUMERIK controls	<ul style="list-style-type: none"> From version 4.7 For importing DXF files Hiding graphics layers Automatic contour tracking
3584012	8	Top surface for SIEMENS SINUMERIK control	<ul style="list-style-type: none"> The NC data from the CAM system is optimised online during processing. The result is a high surface quality when milling complex free-form surfaces.

1 STARTER SET SK 40 / DIN 69871



- Milling head holder with 27 mm collet 1
- Quick-action drill chuck 1- 13 mm 2
- 2 each Weldon 6 mm and 20 mm 3
- 1 each Weldon 8/10/12/16 mm 3
- Adapter SK 40 to MT 3 4
- 4 pcs. Collet chuck holder ER 32 5
- Collet spanner ER 32 6
- 18-part collet set ER 32 7
- Assembly and tool adjustment gauge 8
- Height-adjuster 9
- Taper squeegee 10
- Pull stud 11

2 COOLANT THROUGH SPINDLE



- Guarantees optimal service life
- Optionally with internal or external unit
- Pump pressure 20 bars or 70 bars

3 AIR CONDITIONER



- Instead of heat exchanger
- The air conditioner permanently and constantly cools the control cabinet to the set temperature.

4 POWER TRANSFORMER



- For custom voltage
- Weight 147 kg

5 FOURTH AXIS



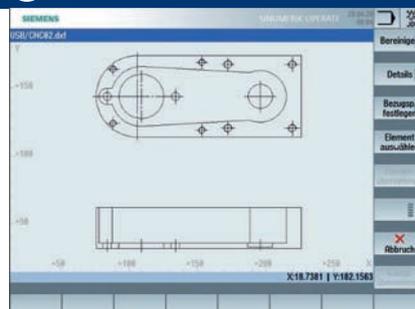
- Table diameter 120 mm
- Vertical table centre height 115 mm
- Total vertical height without motor cover 193 mm
- Horizontal table height 170 mm

6 FIFTH AXIS



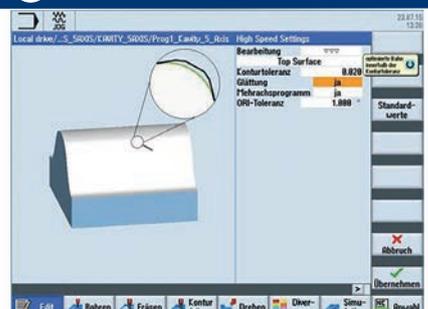
- Compact design
- Possible machining \varnothing 120 mm
- Vertical table centre height 150 mm
- Vertical table overall height 235 mm
- Through hole diameter 30^{H7}mm
- Slot nut width 14^{H7}mm

7 DXF READER



- DXF data can be converted to NC programs for drilling patterns and contours.

8 TOP SURFACE



- Excellent surface quality and form precision
- Fast and precise machining thanks to new technology
- Complete machining fully integrated with Sinumerik Operate

F 310HSC

Power, speed, precision and a long service life

SIEMENS SINUMERIK 828D mit PPU 290 and 15.6 inch touchscreen

- Heavy duty version
- High productivity
- High reliability
- Torsion free machine base thanks to strong ribbing
- Profile rail with recirculating rollers on all axes for high load bearing capacity
- High-torque servo drives mounted directly on the ball screws on all three axes
- Telescopic guide rail covers on all three axes
- Main spindle SK40 up to 10 000 rpm with belt drive and up to 12 000 rpm with inline spindle
- Solid, precision milling table with four T-grooves, generously dimensioned with precision surface finish
- Portable, electronic handwheel with confirm button and emergency stop button substantially facilitates running in of programs
- Tool changer, double arm grab with 30 tool slots
- Precision ground, prestressed, high-performance ball screws (Ø 40 mm x P16 x C3) on all axes
- Coolant unit with 520 litre coolant tank, including chip flushing system and cleaning gun
- Chip conveyor, belt type ensures efficient chip discharge
- Chip carriage
- RJ45 plug-in connection, USB connection and 230 V power connection
- Closed switch cabinet with integrated heat exchanger; ensures optimal temperature even in case of high ambient temperatures; prevents dirt particle penetration
- Oil Separator
- Machine lamp in the workspace
- Including two years **SIEMENS** warranty (warranty extension on page 97). Information on the warranty at www.optimum-machines.com
- Information on „Maintenance contracts“ on page 321



TECHNICAL DATA

Model	F 310HSC	
Article no.	3511232	
Spindle	Belt drive	Inline spindle
	Standard	Optional Item No. 3511290005**
Machine data		
Electrical connection	400 V / 3 Ph ~50 Hz	
Total connected load	40 kVA	56 kVA
Milling spindle		
Drive motor S1 operation	11 kW	20 kW
Drive motor torque S1	70 Nm	96 Nm
Drive motor S6 30 % operation	31.4 kW	50.3 kW
Torque drive motor S6 30 % operation	200 Nm	240 Nm
Spindle seat	SK 40 DIN 69871	
Cooling lubricant system		
Motor - coolant pumps, 3 pcs.	2 pumps 930 W and 1 pump 850 W	
Delivery rate max.	155 l/min.	
Tank capacity	520 litres	
End mill size		
Cutter head size max.	Ø 63 mm	
Max. shaft milling cutter size	Ø 32 mm	
Milling precision		
Repeat accuracy	± 0.005 mm	
Positioning accuracy	± 0.005 mm	
Tool changer		
Type	Double arm grab	
Number of tool slots	30 tools	
Max. tool diameter	80 mm	
Max. tool diameter (tools slots beside not occupied)	125 mm	
Tool length	300 mm	
Max. tool weight	8 kg	
Tool change time T-T	2 seconds	
Traverse paths		
X axis	1 050 mm	
Y axis	600 mm	
Z axis	600 mm	
Axis feed drive		
Rapid traverse X/Y/Z axis	30 m/min.	
Motor torque		
X/Y/Z axis	18 Nm / 18 Nm / 27 Nm	
Feed forces		
X/Y/Z axis	6.7 kN / 6.7 kN / 10 kN	
Speed range		
Speeds*	10 000 rpm	12 000 rpm
Pneumatics		
Compressed air	6 bar	
Milling table		
Clearance spindle to table	100 - 750 mm	
Table length x width	1 200 x 600 mm	
T-slot size / amount / distance	16 mm / 6 / 100 mm	
Max. load of working table	800 kg	
Dimensions		
Length (with chip conveyor) x width x height	3 060 (4 319) x 2 286 x 2 928 mm	
Overall weight	7 000 kg	

Sinumerik 828D system software	SW 28x
CNC memory	8 MB
Cycle change time	1 ms
Look Ahead	150
Number of tools	512

* Please note that the maximum spindle speed must be reduced by approx. 20 % in continuous operation

** The option must be ordered with the basic machine. Cannot be retrofitted.

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User-friendly

- Capacitive 15.6" color display, 16:9 format
- Configurable side screen
- Intuitive Multitouch operation
- Full QWERTY keyboard
- Soft key selection via touch function
- Easy data transfer thanks to IP65 protected front interfaces (USB 2.0, RJ45 Ethernet)
- Proximity/distance sensor for smart display control

Rugged and maintenance-free

- Front panel made of die-cast magnesium with scratchproof glass front
- Can be operated while wearing gloves
- NV RAM memory technology without buffer battery
- Fanless and hard diskless design

Warranty extension

The warranty extension lets you protect your new machine against warranty damage for a further 12, 24 or 36 months after the two-year SIEMENS warranty expires. (can only be ordered within the two-year SIEMENS warranty)

12 months; Article no. 3589020

24 months; Article no. 3589021

36 months; Article no. 3589022

TOP SURFACE

- Siemens shows a further development in terms of surface quality in mould making with Top Surface (optional article no. 3584012).
- The function optimises the CAD/CAM-CNC data, which reduces the dependence of the manufacturing quality on the CAD/CAM calculation tolerance and improves the surface quality and shape accuracy.

DXF READER

- Faster from the drawing to the workpiece. Easy transfer of CAD data into programming by DXF reader (optional article no. 3584014)



SIEMENS SAFETY INTEGRATED

SET UP WORK WITH OPEN DOORS

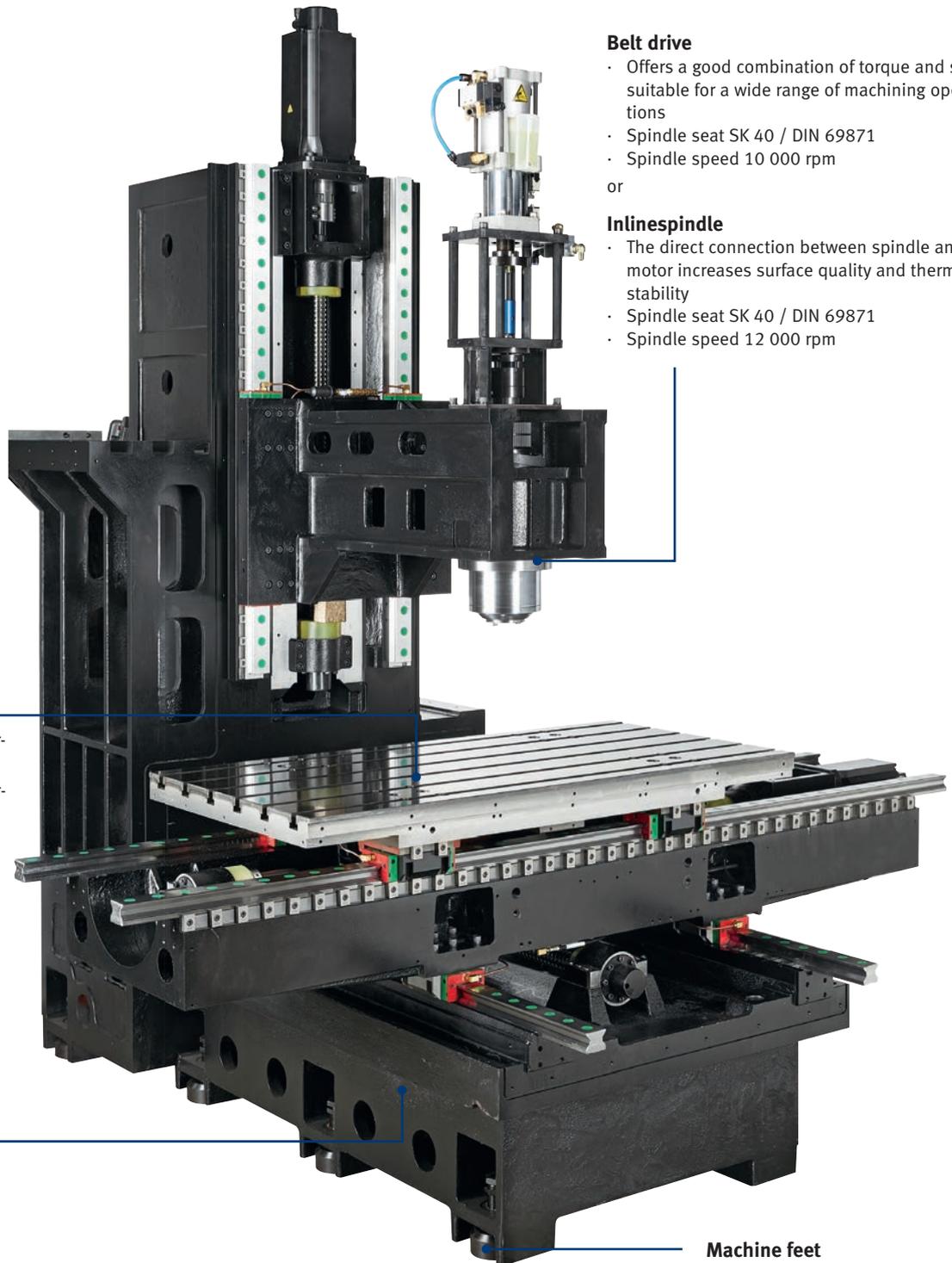
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OVERALL PACKAGE

- Safety Integrated
- Residual material detection and machining
- ShopMill work step programming
- Managing network drives
- 3-D simulation
- Simultaneous recording
- System software SW 28x





Belt drive

- Offers a good combination of torque and speed suitable for a wide range of machining operations
 - Spindle seat SK 40 / DIN 69871
 - Spindle speed 10 000 rpm
- or

Inlinespindle

- The direct connection between spindle and motor increases surface quality and thermal stability
- Spindle seat SK 40 / DIN 69871
- Spindle speed 12 000 rpm

Milling table

- Solid, precise and generously dimensioned
- Workpiece mounting surface 1 200 x 600 mm
- Precise surface finish

Cast body

- Quality cast with ribbed design

Machine feet

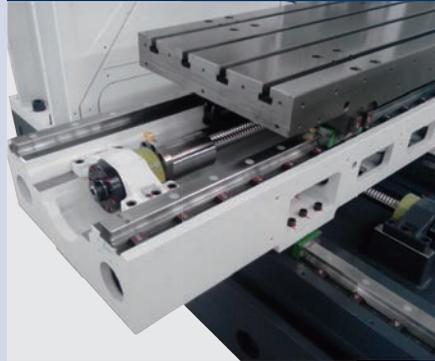
- Eight pcs.
- Optimal machine levelling

HEAT EXCHANGER



- Closed switch cabinet with smart cooling management
- Optimal temperature even in case of high ambient temperatures

BALL SCREWS



- Accuracy class C3
- For high precision and repetition accuracy
- Low wear
- Coupled servo drive on the ballscrew

OIL SEPARATOR / OIL SKIMMER



- Oil skimmer reliably removes floating tramp oils and finest chip debris from cooling lubricants

TOOL CHANGER SYSTEM



- Double arm grab with 30 tool slots
- Max. tool length 300 mm
- Tool-to-tool change in 2 seconds

CHIP FLUSHING SYSTEM



- Powerful chip flushing system for cleaning the workspace and workpiece

LINEAR GUIDE



- Maximum static and dynamic stiffness
- High positioning accuracy
- Smooth, backlash-free movement
- Consistent precision with long service life

CHIP CONVEYOR



- Conveyor version
- For efficient chip discharge

COOLING LUBRICANT SYSTEM



- Two coolant pumps with 930 watts and one coolant pump with 850 watts
- Tank capacity 860 litres

CENTRAL LUBRICATION SYSTEM



- Prevents wear, repair costs and unnecessary downtime to a major extent

TOOL MEASURING / WORKPIECE MEASURING			
3511290604*		BLUM TC52IR Universal measuring probe	<ul style="list-style-type: none"> Switching point repetition accuracy from 0, 3µm 2 at 2 m/ min. measuring speed Wear-free and durably stable Very compact probe with 40 mm diameter
3511290605*		BLUM ZX-Speed 3-D probe	<ul style="list-style-type: none"> Universal 3-D probe for toolmaking and tool break monitoring
<p>➔ For information on Blum workpiece/tool measuring, also ex warehouse Germany see page 275</p>			
3511290620*		Renishaw NC 4 Laser system for tool measurement	<ul style="list-style-type: none"> NC4 zero-contact tool control system is a high-precision, extremely fast solution for tool measurement and breakage checking
3511290621*		Renishaw OMP 60 Probe with optical signal transmission	<ul style="list-style-type: none"> For checking and setting up workpieces on processing centres Compact, touch-actuated 3D probe. Reliably modulated, optical signal transmission. Excellent measuring performance for less scrap and more profit.
3511290622*		Renishaw TS 27R Probe for tactile tool measurement	<ul style="list-style-type: none"> Tool breakage check Compact, tactile 3-D tool probe with wired signal transmission
<p>NEW</p>			
3-D PRINTING			
3562411	1	3-D printing interface	<ul style="list-style-type: none"> Preparation
<p>➔ For information on 3-D printing and accessories see 266</p>			
MISCELLANEOUS			
3536109	2	Starter set SK 40 / DIN 69871	<p>➔ For Information on the starter set see on page 284</p>
3511290100*	3	Coolant through spindle (CTS)	<ul style="list-style-type: none"> Integrated unit, 20 bar pump pressure
3511290102*			<ul style="list-style-type: none"> External unit, pump pressure 20 bars, tank capacity 165 litres, delivery rate 30 l/min
3511290104*			<ul style="list-style-type: none"> External unit, pump pressure 70 bars, tank capacity 165 litres, delivery rate 29 l/min
3511290110			<ul style="list-style-type: none"> External unit with paper filter, Pump pressure 20 bars, tank capacity 320 litres, recommended for aluminium or cast iron
3511290112			<ul style="list-style-type: none"> External unit with paper filter, programmable, pump pressure 70 bars, tank capacity 320 litres, recommended for aluminium or cast iron
3512904101		Automatic side door	<ul style="list-style-type: none"> for robot loading, including assembly
3511290402*	4	Air conditioner	<ul style="list-style-type: none"> Instead of the standard equipment › heat exchanger
3511290502*	5	Power transformer	<ul style="list-style-type: none"> for special voltages
<p>NEW</p>			
FOURTH AXIS AND 5-AXIS ROTARY/SWIVEL TABLE			
3511290201*	6	Fourth axis rotary indexing table	<ul style="list-style-type: none"> Preparation
3511290210*			<ul style="list-style-type: none"> Three-jaw lathe chuck Ø 100 mm, Table diameter 120 mm Tailstock, SIEMENS Motor, assembly
3511290202*	7	5-axis rotary/swivelling table	<ul style="list-style-type: none"> Preparation
3511290250*			<ul style="list-style-type: none"> Three-jaw lathe chuck Ø 100 mm, Tailstock, SIEMENS motor, assembly Possible machining diameter 120 mm
3511290251*			<ul style="list-style-type: none"> Three-jaw lathe chuck Ø 200 mm, Tailstock, SIEMENS motor, assembly Possible machining diameter 200 mm
<p>➔ For details on the fourth axis for the rotary indexing table and 5-axis rotary/swivelling table see from page 278</p>			
SOFTWARE			
3584014		DXF Reader for SIEMENS SINUMERIK controls	<ul style="list-style-type: none"> From version 4.7 Import of DXF files, hiding of graphic layers
3584012	8	Top surface for SIEMENS SINUMERIK control	<ul style="list-style-type: none"> The NC data from the CAM system are optimised online during processing

1 3-D PRINTING INTERFACE



- Plug connector on milling head for OPTImill 3X/5X printing head
- Power supply is installed in control cabinet
- Prepared for open circuit monitoring and filament holder

2 STARTER SET SK 40 / DIN 69871



- Milling head holder with 27 mm seat 1
- Quick-action drill chuck 1- 13 mm 2
- 2 each Weldon 6 mm and 20 mm 3
- 1 each Weldon 8/10/12/16 mm 3
- Adapter SK 40 to MT 3 4
- 4 pcs. Collet chuck holder ER 32 5
- Collet spanner ER 32 6
- 18-part collet set ER 32 7
- Assembly and tool adjustment gauge 8
- Height-adjuster 9
- Taper squeegee 10
- Pull stud 11

3 EXTERNAL CTS



Fig. External unit with paper filter

- Optionally with 20 bar or 70 bar pressure
- Also with paper filter, oil skimmer
- 25µm paper filter
- Coolant cooler
- Tank capacity 165 litres or 320 litres

4 AIR CONDITIONER



- Instead of heat exchanger
- The air conditioner permanently and constantly cools the control cabinet to the set temperature

5 POWER TRANSFORMER



- For custom voltage
- Weight 147 kg

6 FOURTH AXIS



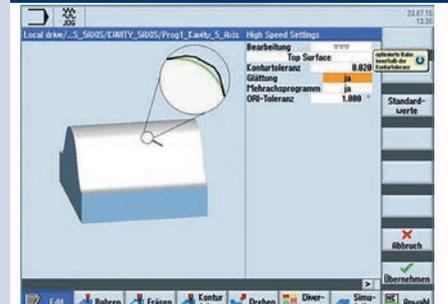
- Table diameter 120 mm
- Vertical table centre height 115 mm
- Total vertical height without motor cover 193 mm
- Horizontal table height 170 mm
- Workpiece weight horizontal / vertical max. 75 / 35 kg

7 FIFTH AXIS



- Possible machining-Ø optionally 120 mm or 200 mm
- Vertical table centre height 150 resp. 355 mm
- Vertical overall height 235 resp. 360 mm
- Through hole diameter 30^{H7}mm resp. 35^{H7}mm
- Slot nut width 14^{H7}mm

8 TOP SURFACE



- Excellent surface quality and form precision
- Fast and precise machining thanks to new technology
- Complete machining fully integrated with Sinumerik Operate

F 410HSC

Top quality and an excellent price-performance ratio; an investment that keeps its value

SIEMENS SINUMERIK 828D mit PPU 290 and 15.6 inch touchscreen

- Heavy duty version
- High productivity
- High reliability
- Torsion free machine base thanks to strong ribbing
- Profile rail with recirculating rollers on all axes for high load bearing capacity
- High-torque servo drives mounted directly on the ball screws on all three axes
- Precision ground, prestressed, high-performance ball screws (Ø 40 mm x P16 x C3) on all axes for high rapid traverse speeds in all axes
- Telescopic guide rail covers on all three axes
- Main spindle SK40 up to 10 000 rpm with belt drive and up to 12 000 rpm with inline spindle
- Solid, precision milling table with four T-grooves, generously dimensioned with precision surface finish
- Portable, electronic handwheel with confirm button and emergency stop button substantially facilitates running in of programs
- Tool changer, double arm grab with 30 tool slots
- Coolant unit with 80 litre coolant tank, including chip flushing system and cleaning gun
- Chip conveyor, belt type ensures efficient chip discharge
- Chip carriage
- RJ45 plug-in connection, USB connection and 230 V power connection
- Closed switch cabinet with integrated heat exchanger; ensures optimal temperature even in case of high ambient temperatures; prevents dirt particle penetration
- Oil Separator
- Machine lamp in the workspace
- Including two years **SIEMENS** warranty (warranty extension on page 97). Information on the warranty at www.optimum-machines.com
- Information on „Maintenance contracts“ on page 321



TECHNICAL DATA

Model	F 410HSC	
Article no.	3511242	
Spindles	Belt drive	Inline spindle
	-	Optional item No. 3511290005**
Machine data		
Electrical connection	400 V / 3 Ph ~50 Hz	
Total connected load	40 kVA	56 kVA
Milling spindle		
Drive motor S1 operation	11 kW	20 kW
Drive motor torque S1	70 Nm	96 Nm
Drive motor S6 30 % operation	31.4 kW	50.3 kW
Torque drive motor S6 30 % operation	200 Nm	240 Nm
Spindle seat	SK 40 DIN 69871	
Cooling lubricant system		
Motor - coolant pumps, 3 pcs.	each 850 Watts	
Tank capacity	860 litres	
End mill size		
Cutter head size max.	Ø 63 mm	
Max. shaft milling cutter size	Ø 32 mm	
Milling precision		
Repeat accuracy	± 0.005 mm	
Positioning accuracy	± 0.005 mm	
Tool changer		
Type	Double arm grab	
Number of tool slots	30 tools	
Max. tool diameter	80 mm	
Max. tool diameter (tools slots beside not occupied)	125 mm	
Tool length	300 mm	
Max. tool weight	8 kg	
Tool change time T-T	2 seconds	
Traverse paths		
X axis	1 200 mm	
Y axis	730 mm	
Z axis	650 mm	
Axis feed drive		
Rapid traverse X/Y/Z axis	30 m/min.	
Motor torque		
X/Y/Z axis	18 Nm / 27 Nm / 36 Nm	
Feed forces		
X/Y/Z axis	6.7 kN / 10.1 kN / 13.5 kN	
Speed range		
Speeds*	10 000 rpm	12 000 rpm
Pneumatics		
Compressed air	6 bar	
Milling table		
Clearance spindle to table	100 - 750 mm	
Table length x width	1 400 x 710 mm	
T-slot size / amount / distance	18 mm / 7 / 100 mm	
Max. load of working table	1 000 kg	
Dimensions		
Length (with chip conveyor) x width x height	3 600 (4 731 mm) x 2 322 x 3 024 mm	
Overall weight	8 800 kg	

Sinumerik 828D system software	SW 28x
CNC memory	8 MB
Cycle change time	1 ms
Look Ahead	150
Number of tools	512

SINUMERIK 828D

The power package in the compact class of CNC controls

Boosting productivity and precision in manufacturing

Robust hardware architecture and intelligent control algorithms as well as top-class drive and motor technology ensure the highest dynamics and precision during machining.

Advanced software-controlled compensation functions ensure additional quality in surface machining and high availability of the machine tool.

With SINUMERIK Operate, all machining technologies, from standard to complex, can be operated intuitively and with a uniform "look & feel".

ADVANCED SURFACE

- Thanks to the new Advanced Surface movement guide, it can also be used for tool and mould making.



Perfect surface quality through reproducible results in adjacent milling paths (right picture)

Multitouch operation with PPU 290

The 15.6" panel is robust even in harsh environments. The SINUMERIK Operate user interface is optimised for touch-sensitive operation.

User-friendly

- Capacitive 15.6" color display, 16:9 format
- Configurable side screen
- Intuitive Multitouch operation
- Full QWERTY keyboard
- Soft key selection via touch function
- Easy data transfer thanks to IP65 protected front interfaces (USB 2.0, RJ45 Ethernet)
- Proximity/distance sensor for smart display control

Rugged and maintenance-free

- Front panel made of die-cast magnesium with scratchproof glass front
- Can be operated while wearing gloves
- NV RAM memory technology without buffer battery
- Fanless and hard diskless design

Warranty extension

The warranty extension lets you protect your new machine against warranty damage for a further 12, 24 or 36 months after the two-year **SIEMENS** warranty expires. (can only be ordered within the two-year **SIEMENS** warranty)

12 months; Article no. 3589020
24 months; Article no. 3589021
36 months; Article no. 3589022

TOP SURFACE

- Siemens shows a further development in terms of surface quality in mould making with Top Surface (optional article no. 3584012).
- The function optimises the CAD/CAM-CNC data, which reduces the dependence of the manufacturing quality on the CAD/CAM calculation tolerance and improves the surface quality and shape accuracy.

DXF READER

- Faster from the drawing to the workpiece. Easy transfer of CAD data into programming by DXF reader (optional article no. 3584014).



SIEMENS SAFETY INTEGRATED

SET UP WORK WITH OPEN DOORS

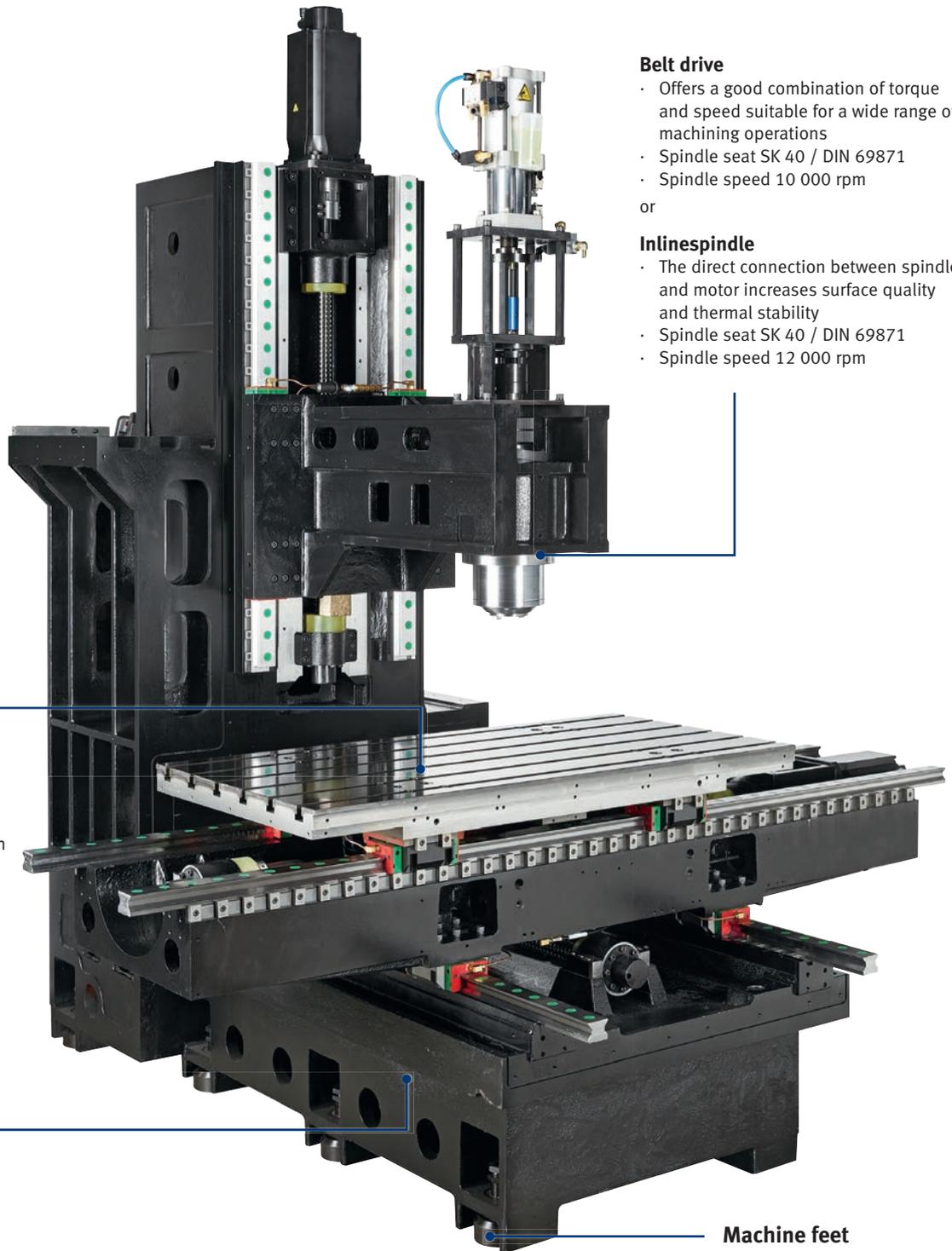
Functional safety also provides protection against high costs!

Machine and plant safety is not only important because strict regulations must be observed. When everything runs safely, you benefit from time savings in engineering, higher system availability and more investment security.

OVERALL PACKAGE

- Safety Integrated
- Residual material detection and machining
- ShopMill work step programming
- Managing network drives
- 3-D simulation
- Simultaneous recording
- System software SW 28x





Belt drive

- Offers a good combination of torque and speed suitable for a wide range of machining operations
 - Spindle seat SK 40 / DIN 69871
 - Spindle speed 10 000 rpm
- or

Inlinespindle

- The direct connection between spindle and motor increases surface quality and thermal stability
- Spindle seat SK 40 / DIN 69871
- Spindle speed 12 000 rpm

Milling table

- Solid, precise and generously dimensioned
- Clamping area 1 400 x 710 mm
- Precise surface finish

Cast body

- Quality cast with ribbed design

Machine feet

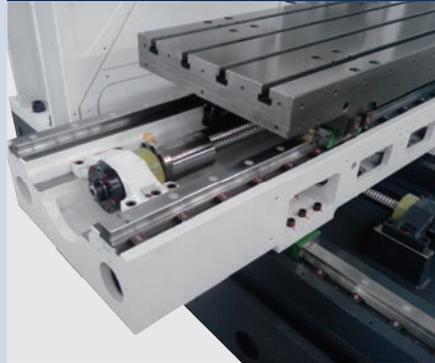
- Eight pcs.
- Optimum alignment of the machine

HEAT EXCHANGER



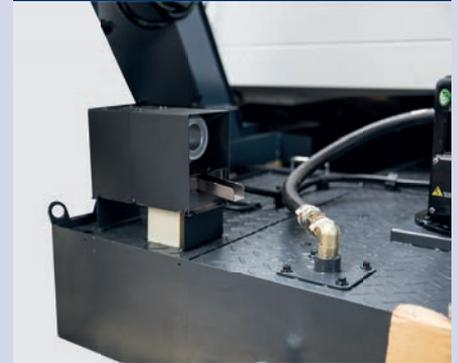
- Closed switch cabinet with smart cooling management
- Optimal temperature even in case of high ambient temperatures

BALL SCREWS



- Accuracy class C3
- For high precision and repetition accuracy
- Low wear
- Coupled servo drive on the ballscrew

OIL SEPARATOR / OIL SKIMMER



- Oil skimmer reliably removes floating tramp oils and finest chip debris from cooling lubricants

TOOL CHANGER SYSTEM



- Double arm grab with 30 tool slots
- Max. tool length 300 mm
- Tool-to-tool change in 2 seconds

CHIP FLUSHING SYSTEM



- Powerful chip flushing system for cleaning the workspace and workpiece

LINEAR GUIDE



- High permissible load and high stiffness
- High positioning accuracy
- Smooth, backlash-free movement
- Consistent precision with long service life

CHIP CONVEYOR



- Conveyor version
- For efficient chip discharge

COOLING LUBRICANT SYSTEM



- Three coolant pumps with 850 Watt each
- Tank capacity 860 litres

CENTRAL LUBRICATION SYSTEM



- Prevents wear, repair costs and unnecessary downtime to a major extent



TOOL MEASURING / WORKPIECE MEASURING			
3511290604*		BLUM TC52IR Universal measuring probe	<ul style="list-style-type: none"> Switching point repetition accuracy from 0, 3µm 2 at 2 m/ min. measuring speed Wear-free and durably stable Very compact probe with 40 mm diameter
3511290605*		BLUM ZX-Speed 3-D probe	<ul style="list-style-type: none"> Universal 3-D probe for toolmaking and tool break monitoring
<p>➔ For information on Blum workpiece/tool measuring, also ex warehouse Germany see page 275</p>			
3511290620*		Renishaw NC 4 Laser system for tool measurement	<ul style="list-style-type: none"> NC4 zero-contact tool control system is a high-precision, extremely fast solution for tool measurement and breakage checking
3511290621*		Renishaw OMP 60 Probe with optical signal transmission	<ul style="list-style-type: none"> For checking and setting up workpieces on processing centres Compact, touch-actuated 3D probe. Reliably modulated, optical signal transmission.
3511290622*		Renishaw TS 27R Probe for tactile tool measurement	<ul style="list-style-type: none"> Tool breakage check Compact, tactile 3-D tool probe with wired signal transmission
3-D PRINTING			
3562411	1	3-D printing interface	<ul style="list-style-type: none"> Plug connector on milling head for OPTImill 3X/5X printing head Power supply is installed in control cabinet Prepared for open circuit monitoring and filament holder
<p>➔ For information on 3-D printing and accessories see 266</p>			
MISCELLANEOUS			
3536109	2	Starter set SK 40 / DIN 69871	<p>➔ For Information on the starter set see on page 284</p>
3511290100*	3	Coolant through spindle (CTS)	<ul style="list-style-type: none"> Integrated unit, 20 bar pump pressure
3511290102*			<ul style="list-style-type: none"> External unit, pump pressure 20 bars, delivery rate 30 l/min
3511290104*			<ul style="list-style-type: none"> External unit, pump pressure 70 bars, tank capacity 165 litres, delivery rate 29 l/min
3511290110			<ul style="list-style-type: none"> External unit with paper filter, Pump pressure 20 bars, tank capacity 320 litres, recommended for aluminium or cast iron
3511290112			<ul style="list-style-type: none"> External unit with paper filter, programmable, pump pressure 70 bars, tank capacity 320 litres, recommended for aluminium or cast iron
3511290402*	4	Air conditioner	<ul style="list-style-type: none"> Instead of the standard equipment > heat exchanger
3511290502*	5	Power transformer	<ul style="list-style-type: none"> for custom voltage
<p>An extraction unit is required</p>			
FOURTH AXIS AND 5-AXIS ROTARY/SWIVEL TABLE			
3511290201*	6	Fourth axis rotary indexing table complete set	<ul style="list-style-type: none"> Preparation
3511290210*			<ul style="list-style-type: none"> Three-jaw lathe chuck Ø 100 mm, Tailstock, SIEMENS motor, assembly Table diameter 120 mm
3511290211*			<ul style="list-style-type: none"> Three-jaw lathe chuck Ø 250 mm, Tailstock, SIEMENS motor, assembly Table diameter 250 mm
3511290202*	7	5-axis rotary/swivelling table	<ul style="list-style-type: none"> Preparation
3511290250*			<ul style="list-style-type: none"> Three-jaw lathe chuck Ø 100 mm, Tailstock, SIEMENS motor, assembly Possible machining diameter 120 mm
3511290251*			<ul style="list-style-type: none"> Three-jaw lathe chuck Ø 200 mm, Tailstock, SIEMENS motor, assembly Possible machining diameter 200 mm
<p>➔ For details on the fourth axis for the rotary indexing table and 5-axis rotary/swivelling table see from page 278</p>			
SOFTWARE			
3584014		DXF Reader for SIEMENS SINUMERIK controls	<ul style="list-style-type: none"> From version 4.7, For importing DXF files Hiding of graphic layers, automatic contour tracing, arbitrary workpiece zero point per contour/drilling point
3584012	8	Top surface for SIEMENS SINUMERIK control	<ul style="list-style-type: none"> From version 4.7, Optimal workpiece surfaces at highest machining speeds thanks to smart motion guidance

1 3-D PRINTING INTERFACE



- Plug connector on milling head for OPTImill 3X/5X printing head
- Power supply is installed in control cabinet
- Prepared for open circuit monitoring and filament holder

2 STARTER SET SK 40 / DIN 69871



- Milling head holder with 27 mm collet (1)
- Quick-action drill chuck 1- 13 mm (2)
- 2 each Weldon 6 mm and 20 mm (3)
- 1 each Weldon 8/10/12/16 mm (4)
- Adapter SK 40 to MT 3 (5)
- 4 pcs. Collet chuck holder ER 32 (6)
- Collet spanner ER 32 (7)
- 18-part collet set ER 32 (8)
- Assembly and tool adjustment gauge (9)
- Height-adjuster (10)
- Taper squeegee (11)
- Pull stud (11)

3 EXTERNAL CTS



Fig. External unit with paper filter

- Optionally with 20 bars or 70 bars pump pressure
- Cartridge filter, oil skimmer
- 25µm paper filter
- Coolant cooler
- Tank capacity 320 litres

4 AIR CONDITIONER



- Instead of heat exchanger
- The air conditioner permanently and constantly cools the control cabinet to the set temperature

5 POWER TRANSFORMER



- For custom voltage
- Weight 147 kg

6 FOURTH AXIS



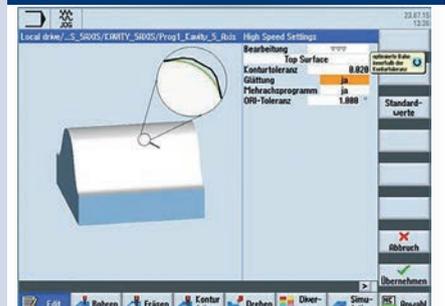
- Table diameter 120 mm
- Vertical table centre height 115 mm
- Total vertical height without motor cover 193 mm
- Horizontal table height 170 mm
- Workpiece weight horizontal / vertical max. 75 / 35 kg

7 FIFTH AXIS



- Possible machining-Ø optionally 120 mm or 200 mm
- Vertical table centre height 150 resp. 355 mm
- Vertical overall height 235 resp. 360 mm
- Through hole diameter 30^{H7}mm resp. 35^{H7}mm
- Slot nut width 14^{H7}mm

8 TOP SURFACE



- Excellent surface quality and form precision
- Fast and precise machining thanks to new technology
- Complete machining fully integrated with Sinumerik Operate

A circular badge with a white background and a blue border, containing the word "NEW" in blue capital letters.

F 610HSC

Top quality and an excellent price-performance ratio; an investment that keeps its value

SIEMENS SINUMERIK 828D mit PPU 290 and 15.6 inch touchscreen

- Heavy duty version
- High productivity
- High reliability
- All components and the entire machine frame were analysed with ANSYS Mechanical (= Finite Element Analysis (FEA) tool) to solve difficult mechanical problems in the complex product architecture
- Profile rail with recirculating rollers on all axes for high load bearing capacity
- High-torque servo drives mounted directly on the ball screws on all three axes
- Telescopic guide rail covers on all three axes
- Solid, precision milling table with five T-grooves, generously dimensioned with precision surface finish
- Portable, electronic handwheel with confirm button and emergency stop button substantially facilitates running in of programs
- Tool changer, double arm grab with 30 tool slots
- Precision ground, pre-stressed, high-performance ball screws on all axes
- The machine hood is opened to load the machine with a crane
- Chip conveyor, belt type ensures efficient chip discharge
- RJ45 plug-in connection, USB connection and power connection 230 V
- Coolant unit with 980 litre coolant tank, including chip flushing system and 4 bars cleaning gun
- Closed switch cabinet with integrated heat exchanger; ensures optimal temperature even in case of high ambient temperatures; prevents dirt particle penetration
- Oil Separator
- Machine lamp in the workspace
- Including two years **SIEMENS** warranty (warranty extension on page 113). Information on the warranty at www.optimum-machines.com
- Information on „Maintenance contracts“ on page 321



TECHNICAL DATA

Model	F 610HSC
Article no.	3511260
Spindle	Inline spindle
Machine data	
Electrical connection	400 V / 3 Ph ~50 Hz
Total connected load	50 kVA
Milling spindle	
Drive motor S1 operation	20 kW
Drive motor torque S1	133.7 Nm
Drive motor S6 30 % operation	30 kW
Torque drive motor S6 30 % operation	200.6 Nm
Spindle seat	ISO 40/DIN 69871
Distance spindle to Z axis	825 mm
Cooling lubricant system	
Coolant pump motor	1.5 kW
Tank capacity	980 litres
End mill size	
Cutter head size max.	Ø 63 mm
Max. shaft milling cutter size	Ø 32 mm
Milling precision	
Repeat accuracy	± 0.005 mm
Positioning accuracy	± 0.005 mm
Tool changer	
Type	Double arm grab
Number of tool slots	30 tools
Max. tool diameter	75 mm
Max. tool diameter (tools slots beside not occupied)	125 mm
Tool length	300 mm
Max. tool weight	8 kg
Tool change time T-T	1.94 seconds
Traverse paths	
X axis	1,700 mm
Y axis	800 mm
Z axis	800 mm
Axis feed drive	
Rapid traverse X/Y/Z axis	30 m/min.
Motor torque	
X/Y/Z axis	18 Nm / 27 Nm / 36 Nm
Feed forces	
X/Y/Z axis	6,7 kN / 10 kN / 13,4 kN
Speed range	
Speeds*	12 000 rpm
Pneumatics	
Compressed air	6 bar
Milling table	
Clearance spindle to table	100 - 900 mm
Table length x width	1 700 x 700 mm
T-slot size / amount / distance	18 mm / 5 / 125 mm
Max. load of working table	1 500 kg
Dimensions	
Length (with chip conveyor) x width x height	4 400 (5 735) x 4 400 x 3 248 mm
Overall weight	10 500 kg
Sinumerik 828D system software	
CNC memory	8 MB
Cycle change time	1 ms
Look Ahead	150
Number of tools	512

SINUMERIK 828D

The power package in the compact class of CNC controls

Boosting productivity and precision in manufacturing

Robust hardware architecture and intelligent control algorithms as well as top-class drive and motor technology ensure the highest dynamics and precision during machining.

Advanced software-controlled compensation functions ensure additional quality in surface machining and high availability of the machine tool.

With SINUMERIK Operate, all machining technologies, from standard to complex, can be operated intuitively and with a uniform "look & feel".

ADVANCED SURFACE

- Thanks to the new Advanced Surface movement guide, it can also be used for tool and mould making.



Perfect surface quality through reproducible results in adjacent milling paths (right picture)

Multitouch operation with PPU 290

The 15.6" panel is robust even in harsh environments. The SINUMERIK Operate user interface is optimised for touch-sensitive operation.

User-friendly

- Capacitive 15.6" color display, 16:9 format
- Configurable side screen
- Intuitive Multitouch operation
- Full QWERTY keyboard
- Soft key selection via touch function
- Easy data transfer thanks to IP65 protected front interfaces (USB 2.0, RJ45 Ethernet)
- Proximity/distance sensor for smart display control

Rugged and maintenance-free

- Front panel made of die-cast magnesium with scratchproof glass front
- Can be operated while wearing gloves
- NV RAM memory technology without buffer battery
- Fanless and hard diskless design

Warranty extension

The warranty extension lets you protect your new machine against warranty damage for a further 12, 24 or 36 months after the two-year **SIEMENS** warranty expires. (can only be ordered within the two-year **SIEMENS** warranty)

12 months; Article no. 3589020
24 months; Article no. 3589021
36 months; Article no. 3589022

TOP SURFACE

- Siemens shows a further development in terms of surface quality in mould making with Top Surface (optional article no. 3584012).
- The function optimises the CAD/CAM-CNC data, which reduces the dependence of the manufacturing quality on the CAD/CAM calculation tolerance and improves the surface quality and shape accuracy.

DXF READER

- Faster from the drawing to the workpiece. Easy transfer of CAD data into programming by DXF reader (optional article no. 3584014).



SIEMENS SAFETY INTEGRATED

SET UP WORK WITH OPEN DOORS

Functional safety also provides protection against high costs!

Machine and plant safety is not only important because strict regulations must be observed. When everything runs safely, you benefit from time savings in engineering, higher system availability and more investment security.

OVERALL PACKAGE

- Safety Integrated
- Residual material detection and machining
- ShopMill work step programming
- Managing network drives
- 3-D simulation
- Simultaneous recording
- System software SW 28x



Spindle

- Directly coupled
- High positioning accuracy

Inlinespindle

- The direct connection between spindle and motor increases the surface quality and thermal stability
- Spindle seat ISO 40 / DIN 69871
- Spindle speed 12 000 rpm

Linear guide

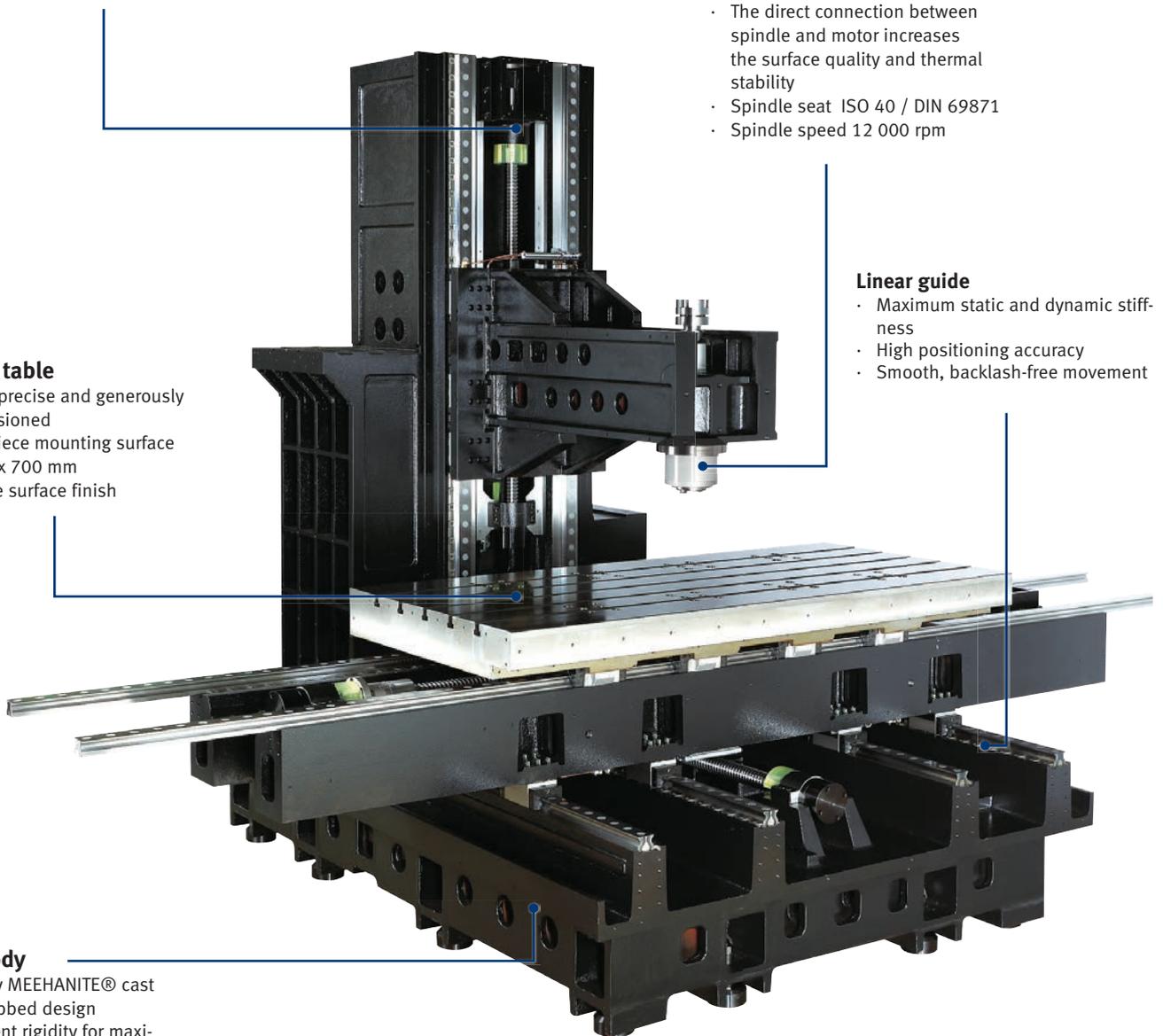
- Maximum static and dynamic stiffness
- High positioning accuracy
- Smooth, backlash-free movement

Milling table

- Solid, precise and generously dimensioned
- Workpiece mounting surface 1 700 x 700 mm
- Precise surface finish

Cast body

- Quality MEEHANITE® cast with ribbed design
- Excellent rigidity for maximum load



HEAT EXCHANGER



- Closed switch cabinet with smart cooling management
- Optimal temperature even in case of high ambient temperatures

BALL SCREWS



- Accuracy class C3
- For high precision and repetition accuracy
- Low wear
- Coupled servo drive on the ballscrew

CHIP FLUSHING SYSTEM



- Oil skimmer reliably removes floating tramp oils and finest chip debris from cooling lubricants

TOOL CHANGER SYSTEM



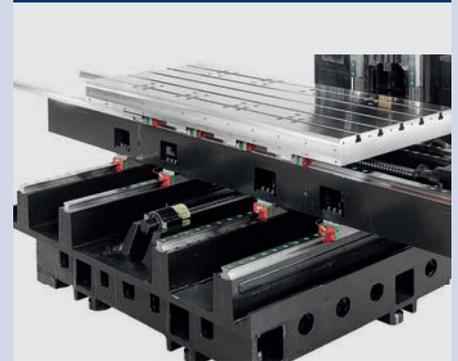
- Double arm grab with 30 tool slots
- Max. tool length 300 mm
- Tool-to-tool change in 1.94 seconds

CHIP FLUSHING SYSTEM



- Powerful chip flushing system for cleaning the workspace and workpiece

LINEAR GUIDE



- 4 linear guides on the Y axis to ensure maximum rigidity
- Profile rails with recirculating roller

CHIP CONVEYOR



- Conveyor version
- For efficient chip discharge

COOLING LUBRICANT SYSTEM



- Powerful coolant pumps with 1.5 kW

CENTRAL LUBRICATION SYSTEM



- Prevents wear, repair costs and unnecessary downtime to a major extent.

TOOL MEASURING / WORKPIECE MEASURING

3511290604*		BLUM TC52IR Universal measuring probe	<ul style="list-style-type: none"> Switching point repetition accuracy from 0, 3µm 2 at 2 m/ min. measuring speed Wear-free and durably stable Very compact probe with 40 mm diameter
3511290605*		BLUM ZX-Speed 3-D probe	<ul style="list-style-type: none"> Universal 3-D probe for toolmaking and tool break monitoring
<p>➡ For information on Blum workpiece/tool measuring, also ex warehouse Germany see page 275</p>			
3511290620*		Renishaw NC 4 Laser system for tool measurement	<ul style="list-style-type: none"> NC4 non-contact tool inspection system is a high-precision, extremely fast solution for tool measurement and breakage control
3511290621*		Renishaw OMP 60 Probe with optical signal transmission	<ul style="list-style-type: none"> For checking and setting up workpieces on processing centres Compact, touch-actuated 3D probe. Reliably modulated, optical signal transmission.
3511290622*		Renishaw TS 27R Probe for tactile tool measurement	<ul style="list-style-type: none"> Tool breakage check Compact, tactile 3-D tool probe with wired signal transmission for tool breakage checking

NEW

3-D PRINTING

3562411	1	3-D printing interface	<ul style="list-style-type: none"> Preparation
<p>➡ For information on 3-D printing and accessories see 266</p>			

MISCELLANEOUS

3536109	2	Starter set SK 40 / DIN 69871	➡ For Information on the starter set see on page 284	
3511290120*	3	Coolant through spindle (CTS)	<ul style="list-style-type: none"> Integrated unit, 20 bar pump pressure 	an extraction unit is required
3511290122			<ul style="list-style-type: none"> External unit, pump pressure 20 bars, tank capacity 165 litres, delivery rate 30 l/min 	
3511290124			<ul style="list-style-type: none"> External unit, pump pressure 70 bars, tank capacity 165 litres, delivery rate 29 l/min 	
3511290126			<ul style="list-style-type: none"> External unit with paper filter, Pump pressure 20 bars, tank capacity 320 litres, recommended for aluminium or cast iron 	
3511290113			<ul style="list-style-type: none"> External unit with paper filter, programmable, pump pressure 70 bars, tank capacity 320 litres, recommended for aluminium or cast iron 	
3511290655*	4	Heidenhain Linear Measuring scales	<ul style="list-style-type: none"> on the X/Y/Z axis 	
3511290403*	5	Air conditioner	<ul style="list-style-type: none"> Instead of the standard equipment > heat exchanger 	
3511290502*		Power transformer	<ul style="list-style-type: none"> for custom voltage 	

FOURTH AXIS AND 5-AXIS ROTARY/SWIVEL TABLE

3511290203*	6	Fourth axis rotary indexing table	<ul style="list-style-type: none"> Preparation
3511290212*			<ul style="list-style-type: none"> Three-jaw lathe chuck Ø 320 mm, Tailstock, SIEMENS motor, assembly Table diameter 320 mm
3511290202*			<ul style="list-style-type: none"> Preparation
3511290213*	7	5-axis rotary/swivelling table	<ul style="list-style-type: none"> Possible machining diameter Ø 250 mm, Tailstock, SIEMENS motor, assembly
<p>➡ For details on the fourth axis for the rotary indexing table and 5-axis rotary/swivelling table see page 278</p>			

SOFTWARE

3584014		DXF Reader for SIEMENS SINUMERIK controls	<ul style="list-style-type: none"> from version 4.7 For importing DXF files Hiding of graphic layers, automatic contour tracing, arbitrary workpiece zero point per contour/drilling point
3584012	8	Top surface for SIEMENS SINUMERIK control	<ul style="list-style-type: none"> from version 4.7 optimal workpiece surfaces at highest machining speeds thanks to smart motion guidance

1 3-D PRINTING INTERFACE



- Plug connector on milling head for OPTimill 3X/5X printing head
- Power supply is installed in control cabinet
- Prepared for open circuit monitoring and filament holder

2 STARTER SET SK 40 / DIN 69871



- Milling head holder with 27 mm collet 1
- Quick-action drill chuck 1- 13 mm 2
- 2 each Weldon 6 mm and 20 mm 3
- 1 each Weldon 8/10/12/16 mm 3
- Adapter SK 40 to MT 3 4
- 4 pcs. Collet chuck holder ER 32 5
- Collet spanner ER 32 6
- 18-part collet set ER 32 7
- Assembly and tool adjustment gauge 8
- Height-adjuster 9
- Taper squeegee 10
- Pull stud 11

3 EXTERNAL CTS



Fig. External unit with paper filter

- Optionally with 20 bar or 70 bar pressure
- Cartridge filter, oil skimmer
- 25µm paper filter
- Coolant cooler
- Tank capacity 320 litres

4 LINEAR MEASURING SCALES



- Encapsulated length measuring device
- Aluminium housing protects the scale, scanning carriage and its guide from chips, dust and splash water
- Elastic sealing lips close the housing at the bottom.
- The scanning carriage is guided on the scale with low friction

5 AIR CONDITIONER



- Instead of heat exchanger
- The air conditioner permanently and constantly cools the control cabinet to the set temperature

6 FOURTH AXIS



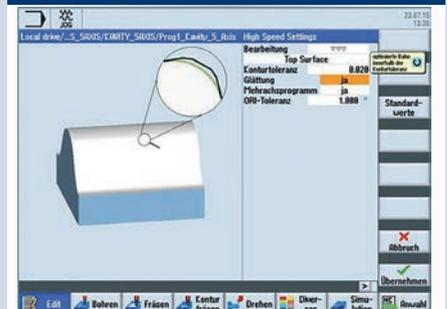
- Table diameter 320 mm
- Vertical table centre height 210 mm
- Total vertical height without motor cover 315 mm
- Horizontal table height 200 mm
- Workpiece weight horizontal / vertical max. 300 / 150 kg

7 FIFTH AXIS



- Possible machining Ø 250 mm
- Vertical table centre height 255 mm
- Vertical table overall height 355 mm
- Through hole diameter 70^{H7}mm
- Slot nut width 18^{H7}mm

8 TOP SURFACE



- Excellent surface quality and form precision
- Fast and precise machining thanks to new technology
- Complete machining fully integrated with Sinumerik Operate





CNC lathe L 44
CNC lathe L 50P
CNC lathe S 600
CNC lathe L 440 / L 460
CNC lathe S 620 / S 620L
CNC lathe S 500 / S 500L
CNC lathe S 750K / S 750
Production machines user report on page 168

L 44

OPTIMUM PREMIUM CNC lathe with cycle control that sets standards in terms of speed, performance, precision and service life

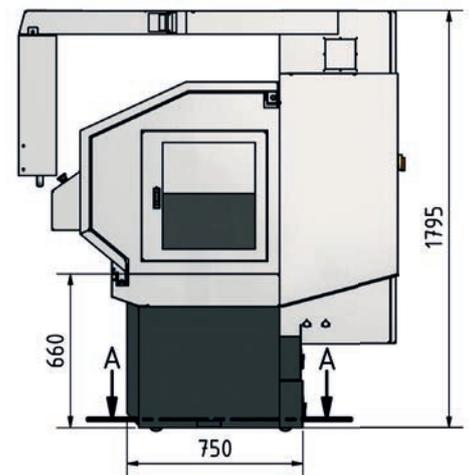
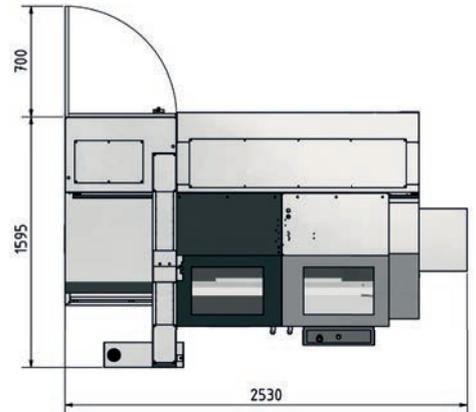
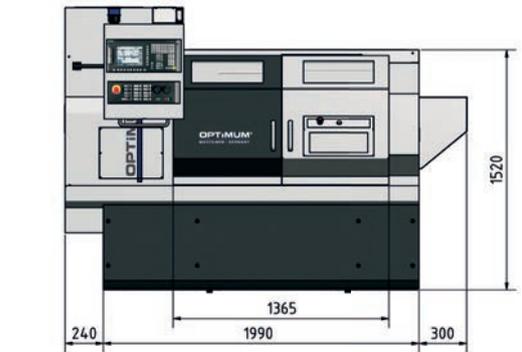
SIEMENS SINUMERIK 828D BASIC

- Spindle and servo motors by **SIEMENS**
- Machine housing with safety switches
- With max. spindle speed up to 3 000 rpm as standard
- Automatic centralised lubrication
- Swivelling operating unit
- Tailstock cover
- Electronic handwheels for the X and Z axis
- Coolant unit with 90 litre coolant tank
- RJ45 plug-in connection, USB connection and power connection 230 V
- EMC Electromagnetic compatibility
- Six levelling feet
- Operating tool
- Including two-year **SIEMENS** warranty (warranty extension on page 123. Information on the warranty at www.optimum-machines.com)
- Information on „Maintenance contracts“ on page 321



TECHNICAL DATA

Model	L 44
Article no.	3514330
Machine data	
Electrical connection	400 V / 3 Ph ~50 Hz
Total connected load	23 kVA
Spindle	
Drive motor S1 operation	7 kW
Torque drive motor S1 operation	33 Nm
Drive motor S6 30 % operation	16 kW
Torque drive motor S6 30 % operation	80 Nm
Spindle seat	DIN ISO 702-1 No. 5
Torque at spindle	87 Nm
Spindle bore *	Ø 52 mm
Chuck passage	Ø 40 mm
Hydraulic lathe chuck	Ø 150 mm
Cooling lubricant system	
Coolant pump output	270 W
Tank capacity	90 litres
Hydraulic system	
Hydraulic pump power	750 W
Tank capacity	50 litres
Machine data	
Centre height	223 mm
Centre width	850 mm
Swing Ø above cross slide	240 mm
Swing Ø above machine bed	446 mm
Swing Ø in the bed bridge	520 mm
Bed width	300 mm
Speed range	
Rotational speeds	10 - 3 000 rpm
Tool turret	
Tool changer seat	VDI 30
Type	Hydraulic
Number of tool slots	8 tools
Max. height square	20 mm
Max. diameter drilling rod	25 mm
Precision	
Repeat accuracy	± 0.005 mm
Positioning accuracy	± 0.005 mm
Travel	
X axis	250 mm
Z axis	760 mm
Feed speed	
X axis/Y axis	15 m/min.
Motor torque	
X/Z axis	6 Nm / 8.5 Nm
Feed forces	
X/Z axis	7.5 kN / 5.3 kN
Tailstock	
Tailstock seat	MT 4
Tailstock quill diameter	52 mm
Tailstock - quill stroke hydraulic	165 mm
Dimensions	
Length x width x height	2 530 x 1 595 x 1 795 mm
Overall weight	2 600 kg



Sinumerik 828D system software	PPU 271 SW 24	PPU 290/SW 26x (optional article no. 351433030)
CNC memory	3 MB	5 MB
Cycle change time	3 ms	2 ms
Look Ahead	50	100
Number of tools	128	256

SINUMERIK 828D Basic

High-tech for the compact class

Boosting productivity and precision in manufacturing

The use of two autonomously operating tools makes 4-axis turning - balance cutting - possible. The new functions include multi-channel capability with ShopTurn, which, among other things, allows programmes to be synchronised with programSYNC. The new Software offers the possibility to run two channels simultaneously in turning and grinding machines. SINUMERIK CNC control Sinumerik 828D Basic sets standards in all aspects of machining performance. Whether accuracy and speed, whether reduction of cycle times or energy efficiency and safety - the SINUMERIK sets the pace.

SHOPTURN

- shortest programming time for creating one-off parts and small batches

DXF READER

- Faster from the drawing to the workpiece. Easy transfer of CAD data into programming by DXF reader (optional article no. 3584014).



Control

- 10.4" colour display
- 4:3 format
- User-friendly SINUMERIK Operate software
- Front interfaces: Front USB 2.0, RJ45 Ethernet, Compact Flash (CF) Card
- The 8 horizontal and 8 vertical soft keys take the user to all control windows with just a few key presses
- Rugged and robust

Warranty extension

The warranty extension lets you protect your new machine against warranty damage for a further 12, 24 or 36 months after the two-year SIEMENS warranty expires. (can only be ordered within the two-year SIEMENS warranty)

12 months; Article no. 3589020

24 months; Article no. 3589021

36 months; Article no. 3589022

SIEMENS SAFETY INTEGRATED

SET UP WORK WITH OPEN DOORS

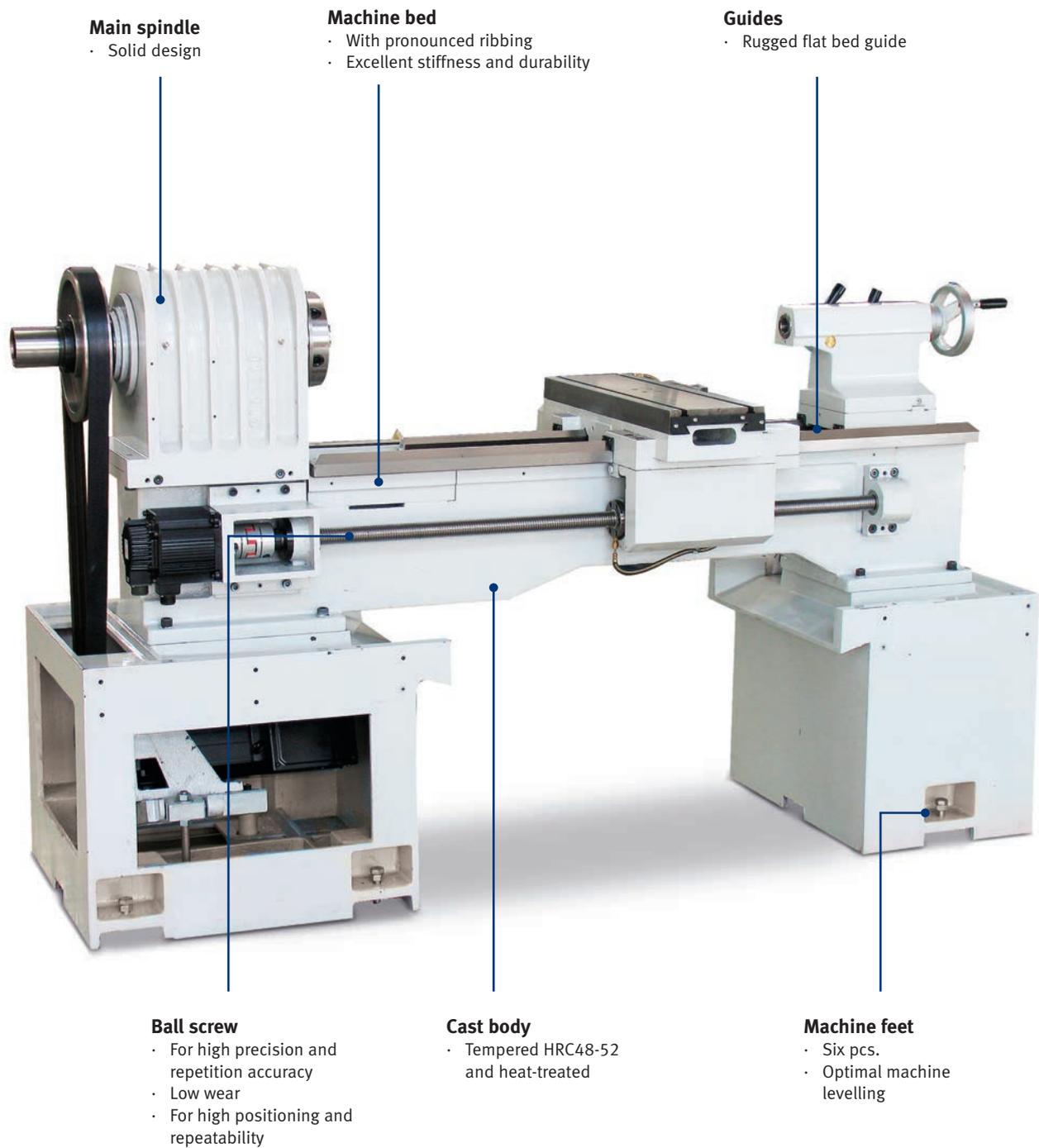
Functional safety also provides protection against high costs!

Machine and plant safety is not only important because strict regulations must be observed. When everything runs safely, you benefit from time savings in engineering, higher system availability and more investment security.

OVERALL PACKAGE

- Safety Integrated
- Residual material detection and machining
- Shopturn work step programming
- Managing network drives
- 3-D simulation
- Simultaneous recording





HEAT EXCHANGER



- Closed switch cabinet with smart cooling management
- Optimal temperature even in case of high ambient temperatures

TOOL CHANGER SYSTEM



- Eight tool slots
- Hydraulic VDI30 tool turret
- Max. height 20 mm

TAILSTOCK



- Generously dimensioned
- Slide with ball screw and pre-stressed nut

HYDRAULIC POWER UNIT



- Motor output 750 W
- Tank capacity 50 litres
- Clamping pressure/operating pressure 2 500 - 2 942 kPa

THREE-JAW CHUCK



- Hydraulic three-jaw lathe chuck \varnothing 150 mm
- Hydraulic release and clamping via footswitch
- Easy workpiece clamping
- Hard and soft block jaws

CENTRAL LUBRICATION SYSTEM



- Automatic interval supply
- Reduces the wear on bearings, rails and ball screw drives
- With float switch. If the oil level is too low, an audible signal is output

HAND WHEELS



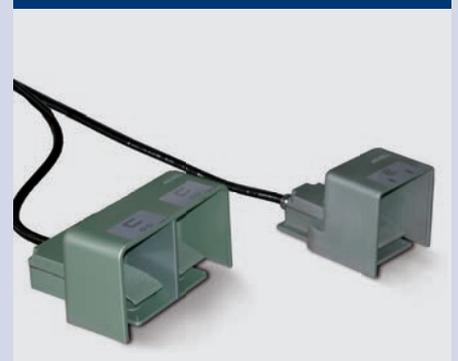
- Joystick for moving the X, Z axis
- Handwheel for moving the X axis and Z axis manually
- Emergency stop button
- Confirm button

COOLANT TANK



- Pull-out chip tray
- Pull-out cooling lubricant tank
- Level indicator
- Tank capacity 90 litres

FOOT PEDAL



- For releasing and clamping the lathe chuck
- Optional tailstock sleeve extends/retracts hydraulically

STEADY RESTS			
351433002*	1	Fixed steady rest	
351433003*		Follow steady rest	
BAR FEEDER			
351433026*	2	Bar feeder interface	
351433012*		Bar feeder Pro V 65E 1.2 metres	· Includes bar feeder interface (Item No.: 351433026)
351433019*		Bar feeder Pro Conqueror 3 metres	· Includes bar feeder interface (Item No.: 351433026)
↪ For information on bar feeders, and more bar feeders ex warehouse Germany see page 296			
MISCELLANEOUS			
3536115	3	Starter set VDI 30	
351433001*		Hydraulic tailstock quill	· for fast machining · Quill can be extended and retracted hydraulically
351433011*	4	Fast change tool holder Multifix 4	· Instead of standard equipment › hydraulic tool turret VDI30
351433009*		Portable electronic handwheel	· Instead of the standard equipment › Joystick
351433013*	5	Power transformer	· for custom voltage · Weight 147 kg
NEW 3511294601*	6	HPRA Renishaw High Precision Measuring Arm	· for Ø 150 mm lathe chuck · for tool measuring and tool break monitoring
↪ Information on the measuring arm ex warehouse Germany can be found at page 300			
LATHE CHUCK			
351433015*		Three-jaw lathe chuck manual Ø 200 mm	· Instead of standard equipment › three-jaw lathe chuck hydraulic Ø 150 mm
351433016*		Four-jaw lathe chuck manual Ø 250 mm	· Instead of standard equipment › three-jaw lathe chuck hydraulic Ø 150 mm
351433018*		Three-jaw lathe chuck hydraulic Ø 200 mm	· Instead of standard equipment › three-jaw lathe chuck hydraulic Ø 150 mm
351433020*		Hydraulic four-jaw lathe chuck Ø 200 mm	· Instead of standard equipment › hydraulic three-jaw lathe chuck Ø 150 mm
3519706		soft top jaw	· for the › hydraulic three-jaw lathe chuck Ø 150 mm - included in the standard equipment
3519726		Hard insert jaws	· for the › hydraulic three-jaw lathe chuck Ø 150 mm - included in the standard equipment
3519707		soft top jaw	· for the three-jaw lathe chuck hydraulic Ø 200 mm (Item No. 351433018) · for the four-jaw lathe chuck hydraulic Ø 200 mm (Item No. 351433020)
3519727		Hard insert jaws	· for the three-jaw lathe chuck hydraulic Ø 200 mm (Item No. 351433018) · for the four-jaw lathe chuck hydraulic Ø 200 mm (Item No. 351433020)
351433024*		Collet chuck	· for the › hydraulic three-jaw lathe chuck Ø 150 mm - included in the standard equipment
SOFTWARE			
3584014	7	Software DXF Viewer/Reader	· from version 4.7 · For importing DXF files · Hiding of graphic layers, automatic contour tracking
HARDWARE			
351433030*	8	SIEMENS control PPU 290	· 15.6" colour display- 16:9 format, System software SW 26x

1 STEADY RESTS



Fixed steady rest

- Passage Ø 10 mm to Ø 130 mm

Follow steady rest

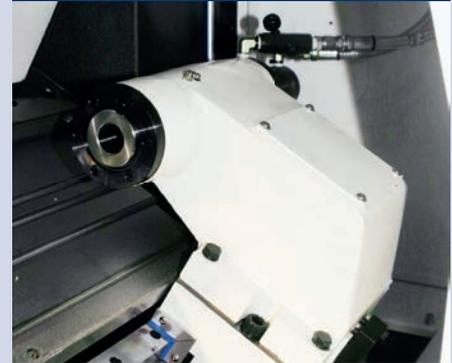
- Passage Ø 10 mm to Ø 100 mm

2 BAR FEEDER



- The bar feeders are the ideal solutions for automatic loading of CNC lathes with short bars. They combine maximum productivity with a small footprint

3 TAILSTOCK SPINDLE SLEEVE



- Retract and extend hydraulically via foot pedal

4 HANDWHEEL



- Portable, electronic
- Substantially facilitates running in of programs
- Emergency stop button
- Confirm button

5 POWER TRANSFORMER



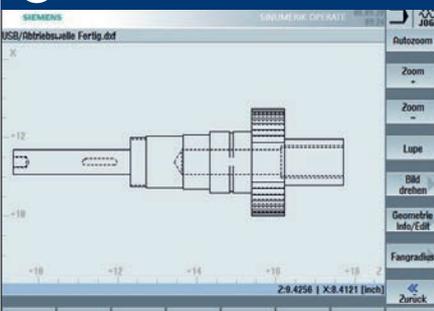
- For custom voltage
- Weight 147 kg

6 MEASURING ARM



- Up to 90 % faster tool measuring
- Typical position accuracy of 5 µm 2
- LED displays the probe status and the operational readiness of the arm
- IPX8 protected (static)
- TS12 Interface

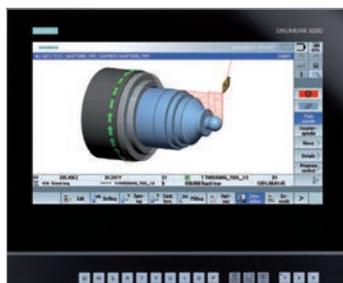
7 SOFTWARE DXF VIEWER/READER



■ from version 4.7

Imports eDrawings, 3-D objects as well as SolidWorks and AutoCad files in the formats DWG and DXF, EASM and PDM. The tool offers various functions for displaying, simulating and printing drawings and 3-D projects.

8 CONTROL PPU 290



The PPU 290 enables Multitouch operation. The 15.6" panel is robust even in harsh environments. The SINUMERIK Operate user interface is optimised for touch-sensitive operation.

User-friendly

- Capacitive 15.6" color display, 16:9 format
- Configurable side screen
- Intuitive Multitouch operation
- Full QWERTY keyboard
- Soft key selection via touch function
- Easy data transfer thanks to IP65 protected front interfaces (USB 2.0, RJ45 Ethernet)
- Proximity/distance sensor for smart display control

Robust and maintenance-free

- Front panel made of die-cast magnesium with scratchproof glass front
- Can be operated while wearing gloves
- NV RAM memory technology without buffer battery

A circular badge with a white background and a dark blue border, containing the word "NEW" in dark blue capital letters.

L 50P

OPTIMUM PREMIUM Universal CNC lathe with cycle control.

Complete solution - Diverse possibilities

SIEMENS SINUMERIK 828D with PPU 290

- Precision workmanship
- Spindle and servo motors by **SIEMENS**
- Machine housing with safety switches
- With max. spindle speed up to 3 500 rpm as standard
- Hydraulic lathe chuck
- Ball screws for high rapid traverse speeds in all axes
- Linear guides on all axes
- Automatic centralised lubrication
- Servo hydraulic VDI 30 tool changer with 8 tools
- Swivelling operating unit
- Electronic handwheels for the X and Z axis
- Coolant unit with 110 litre coolant tank
- RJ45 plug-in connection, USB connection and power connection 230 V
- EMC Electromagnetic compatibility
- Six levelling feet
- Operating tool
- Including two-year **SIEMENS** warranty (warranty extension on page 51). Information on the warranty at www.optimum-machines.com
- Information on „Maintenance contracts“ on page 321

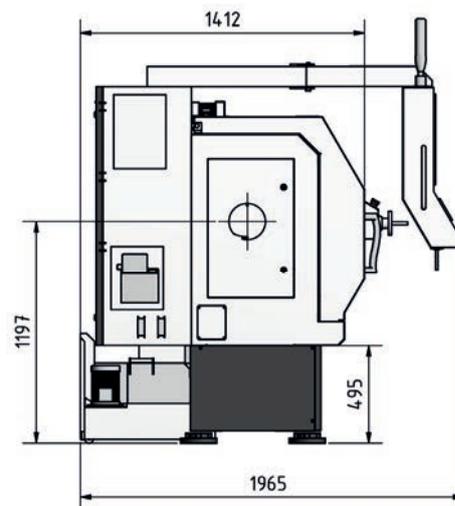
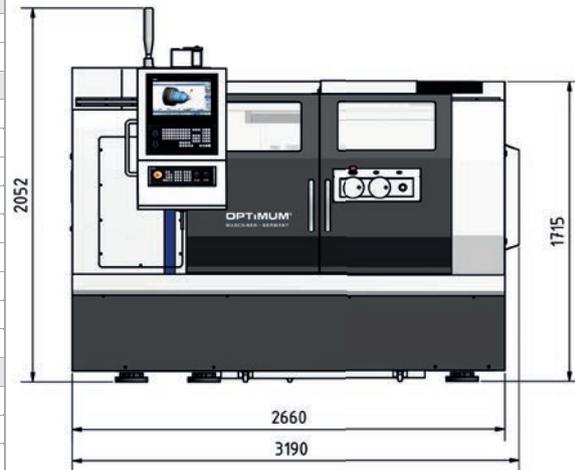


PREMIUM



TECHNICAL DATA

Model	L 50P
Article no.	3514340
Machine data	
Electrical connection	400 V / 3 Ph ~50 Hz
Total connected load	18 kVA
Spindle	
Drive motor S1 operation	9 kW
Torque drive motor S1 operation	57 Nm
Drive motor S6 30 % operation	15.8 kW
Torque drive motor S6 30 % operation	95 Nm
Spindle seat	ISO 702-1 No. 6 form A2
Hydraulic lathe chuck	Ø 210 mm
Chuck passage	Ø 52 mm
Spindle bore*	Ø 66 mm
Torque at the spindle	95 Nm
Cooling lubricant system	
Cleaning pump output	1 kW
Coolant pump output	450 W
Tank capacity	110 litres
Hydraulic system	
Hydraulic pump power	2.2 kW
Tank capacity	50 litres
Machine data	
Turning length	618 mm
Turning diameter	245 mm
Swing Ø above cross slide	280 mm
Swing Ø above machine bed	490 mm
Bed width	400 mm
Speed range	
Spindle speeds	3 500 rpm
Tool turret	
Tool changer seat	VDI 30
Type	Servo hydraulic
Number of tool slots	8
Max. height, width square	20 mm
Max. diameter drilling rod	Ø 32 mm
Precision	
Repeat accuracy	± 0.005 mm
Positioning accuracy	± 0.005 mm
Traverse paths	
X axis	300 mm
Z axis	800 mm
Feed speed	
X axis fast motion	15 m/min.
Z axis fast motion	20 m/min.
Motor torque	
X axis	6 Nm
Z axis	11 Nm
Tailstock	
Tailstock seat	MT 5
Tailstock quill diameter	Ø 75 mm
Tailstock - quill stroke	150 mm
Dimensions	
Length x width x height	3 190 x 1 965 x 2 052 mm
Overall weight	4 500 kg



Sinumerik 828D system software	SW 26x
CNC memory	5 MB
Cycle change time	2 ms
Look Ahead	100
Number of tools	256

SINUMERIK 828D

The power package in the compact class of CNC controls

Boosting productivity and precision in manufacturing

Robust hardware architecture and intelligent control algorithms as well as top-class drive and motor technology ensure the highest dynamics and precision during machining.

Advanced software-controlled compensation functions ensure additional quality in surface machining and high availability of the machine tool.

With SINUMERIK Operate, all machining technologies, from standard to complex, can be operated intuitively and with a uniform "look & feel".

SINUTRAIN

- NC programming on the PC as on the CNC - same operation and programming
- Work preparation already while the machine is still cutting: Test, run-in and simulate NC programs on the PC - less time stress at the machine

Multitouch operation with PPU 290

The 15.6" panel is robust even in harsh environments. The SINUMERIK Operate user interface is optimised for touch-sensitive operation.

User-friendly

- Capacitive 15.6" color display, 16:9 format
- Configurable side screen
- Intuitive Multitouch operation
- Full QWERTY keyboard
- Soft key selection via touch function
- Easy data transfer thanks to IP65 protected front interfaces (USB 2.0, RJ45 Ethernet)
- Proximity/distance sensor for smart display control

Rugged and maintenance-free

- Front panel made of die-cast magnesium with scratchproof glass front
- Can be operated while wearing gloves
- NV RAM memory technology without buffer battery
- Fanless and hard diskless design

Warranty extension

The warranty extension lets you protect your new machine against warranty damage for a further 12, 24 or 36 months after the two-year SIEMENS warranty expires. (can only be ordered within the two-year SIEMENS warranty)

12 months; Article no. 3589020
24 months; Article no. 3589021
36 months; Article no. 3589022

- CNC education and training with exactly the same programming and operating interface as in the workshop - without waiting for it to "finally get to it", without the risk of breaking something - and with the possibility of doing preparatory and follow-up work at home or on the road.

DXF READER

- Faster from the drawing to the workpiece. Easy transfer of CAD data into programming by DXF reader (optional article no. 3584014).



SIEMENS SAFETY INTEGRATED

SET UP WORK WITH OPEN DOORS

Functional safety also provides protection against high costs!

Machine and plant safety is not only important because strict regulations must be observed. When everything runs safely, you benefit from time savings in engineering, higher system availability and more investment security.

OVERALL PACKAGE

- Safety Integrated
- Residual material detection and machining
- Shopturn work step programming
- Managing network drives
- 3-D simulation
- Simultaneous recording
- System software SW 26x



Main spindle

- Solid design

Ball screw

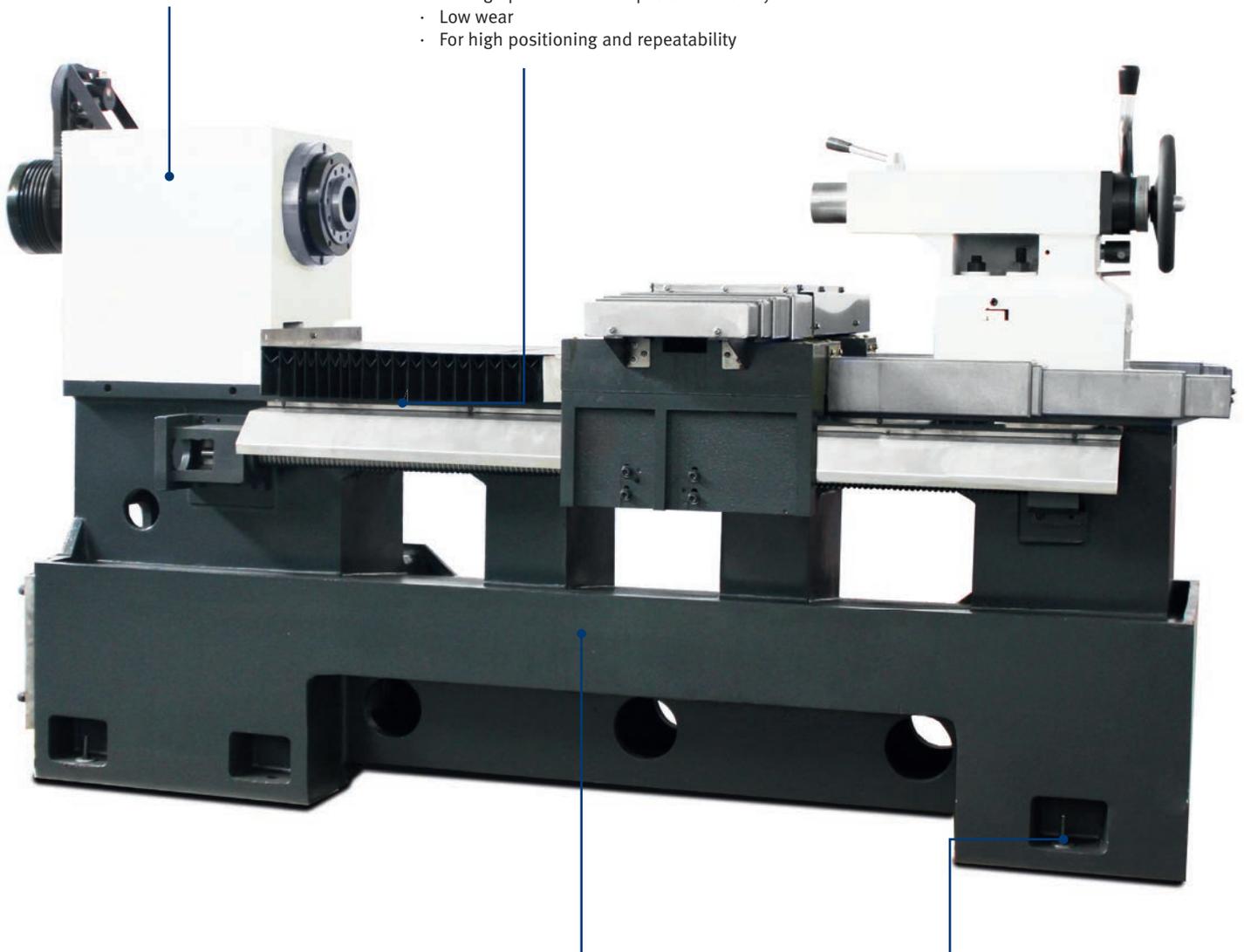
- Grinded
- For high precision and repetition accuracy
- Low wear
- For high positioning and repeatability

Machine bed

- With pronounced ribbing
- Excellent stiffness and durability

Machine feet

- Six pcs.
- Optimal machine levelling

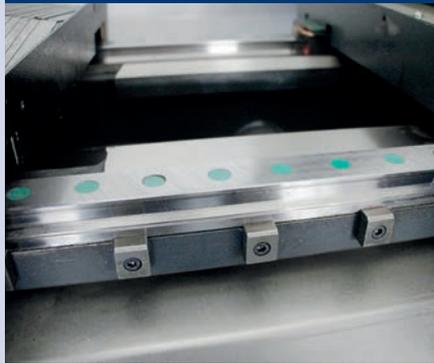


TOOL TURRET



- For eight tool stations
- Servo hydraulic VDI 30 tool changer
- Mounting height square max. 20 mm
- Reception \varnothing boring bar 32 mm

LINEAR GUIDE



- High permissible load and high stiffness
- High positioning accuracy
- Smooth, backlash-free movement
- Consistent precision with long service life
- Stainless steel cover

SIGNAL LIGHT



- Visually displays the machine status
- Long service life

HANDWHEELS



- Handwheel for moving the X axis and Z axis manually
- Emergency stop button

HEAT EXCHANGER



- Closed switch cabinet with smart cooling management
- Optimal temperature even in case of high ambient temperatures

CENTRAL LUBRICATION SYSTEM



- Guarantees regular and automatic lubrication
- Lubricating points that are connected to the central lubricating system have a longer service life

TAILSTOCK



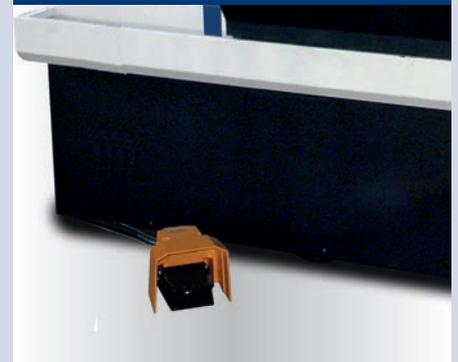
- Fast, easy adjustment without tools thanks to clamping lever

THREE-JAW CHUCK



- Hydraulic three-jaw lathe chuck \varnothing 200 mm
- Passageway \varnothing 52 mm
- Easy workpiece clamping

FOOT PEDAL



- Enables easy and quick opening and closing of the lathe chuck

BAR FEEDER

➔ For information on bar feeders see from page 296

RENISHAW MEASURING ARM

351434020*	1	Renishaw measuring arm with probe for Ø 200 mm lathe chuck	<ul style="list-style-type: none"> · Including assembly · TSI2 Interface
➔ Information on the measuring arm ex warehouse Germany can be found at page 300			

MISCELLANEOUS

351434001*	2	Lifting device	
3536115	3	Starter set VDI 30	➔ For Information on the starter set see page 294
351434004*	4	Chip conveyor with chip trolley	
351434003*	5	Oil separator / oil skimmer	
351434002*		High performance coolant pump 1 kW	· instead of standard equipment › coolant pump 450 W
351434010*		Hydraulic tailstock quill	<ul style="list-style-type: none"> · For fast machining · Quill can be extended and retracted hydraulically

LATHE CHUCK

351434014*		Four-jaw lathe chuck Ø 210 mm	· instead of standard equipment › three-jaw lathe chuck Ø 210 mm
3519712		Soft top jaw (1 pc.)	· for lathe chuck Ø 210 mm
3519732		Hard top jaw set (3 pcs.)	· for three-jaw chuck Ø 210 mm - included in the standard equipment
3519733		Hard top jaw set (4 pcs.)	· for the optional four-jaw lathe chuck Ø 210 mm

SOFTWARE

3584014	6	Software DXF Viewer/Reader	<ul style="list-style-type: none"> · from version 4.7 · For importing DXF files · Hiding graphics layers · Automatic contour tracking
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1 HPPA RENISHAW MEASURING ARM



- High-precision, manually swivelling arm HPPA with probe for tool measurement, which has a 3-axis RP3 probe.
- TSI2 interface included
- ➔ Information on the measuring arm see page 300

2 LIFTING DEVICE



- A lifting device is required to unload the machine

3 STARTER SET VDI 30



- | | |
|--|--|
| <ul style="list-style-type: none"> ■ 3 pcs. square transverse holder 1 ■ 1 pc. square transverse overhead holder 2 ■ 1 pc. square longitudinal holder 3 ■ 5 pcs. drill rod holder \varnothing 10 / 12 / 16 / 20 / 25 mm 4 ■ 3 pcs. cap 5 | <ul style="list-style-type: none"> ■ 1 pc. collet chuck holder ER 25 6 ■ 1 pc. collet spanner ER 25 7 ■ 15-part collet set ER 25 8 ■ 1 pc. tool holder 9 ■ 1 pc. chuck 10 |
|--|--|

4 CHIP TROLLEY CONVEYOR



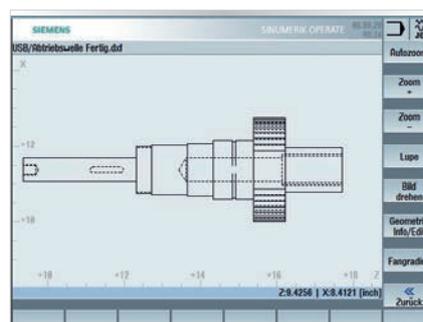
- Conveyor version
- For efficient chip discharge

5 OIL SEPARATOR / OIL SKIMMER



- Oil skimmer reliably removes floating tramp oils and finest chip debris from cooling lubricants

6 SOFTWARE DXF VIEWER/READER



■ from version 4.7

Imports eDrawings, 3-D objects as well as SolidWorks and AutoCad files in the formats DWG and DXF, EASM and PDM. The tool offers various functions for displaying, simulating and printing drawings and 3-D projects.

S 600

PREMIUM CNC-Slant bed lathe characterised by high speed, performance, precision and a long service life

SIEMENS SINUMERIK 828D BASIC

- Heavy duty version
- Compact design
- **SIEMENS** servo motors on all axes
- All servomotors with integrated encoder for maximum precision
- Slant bed design 30° for particularly large machining diameter
- Easy chip removal into the chip tray
- Hydraulic three-jaw lathe chuck Ø 200 mm
- Hard and soft block jaws
- VDI30 tool changer with 8 tools as standard
- Hardened and grinded ball screw spindles for high rapid traverse speeds in all axes
- Dimensionally stable linear guides ensure a long service thanks to maximum static and dynamic stiffness
- Device for manual tool measuring
- Tailstock with hydraulic quill
- Heat exchanger
- Portable electronic hand wheel with enabling switch and emergency stop pushbutton substantially facilitates running in of programs
- Chip conveyor in belt design ensures efficient chip removal
- Chip carriage
- Halogen work lamp for complete illumination of the working area
- Coolant system
- EMC Electromagnetic compatibility
- Including two-year **SIEMENS** warranty (warranty extension on page 139). Information on the warranty at www.optimum-machines.com
- Information on „Maintenance contracts“ on page 321

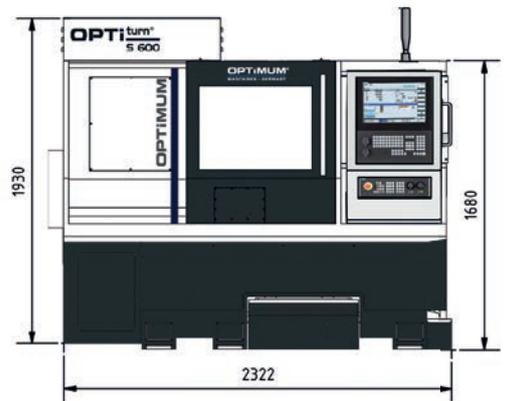
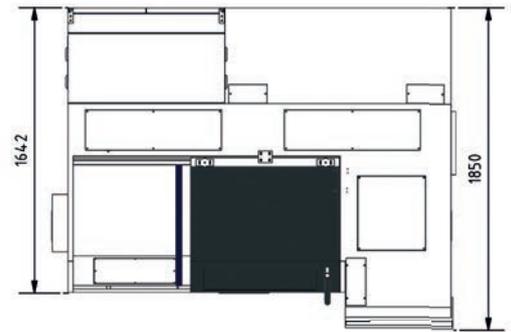


Fig. with optional SIEMENS PPU 290 control and parts catcher

OPTITURN S 600

TECHNICAL DATA

Model	S 600
Article no.	3515060
Machine data	
Electrical connection	400 V / 3 Ph ~50 Hz
Total connected load	31 kVA
Spindle	
Drive motor S1 operation	12 kW
Torque drive motor S1 operation	115 Nm
Drive motor S6 30 % operation	30 kW
Torque drive motor S6 30 % operation	250 Nm
Spindle seat	DIN ISO 702-1 No. 6
Spindle bore**	Ø 75 mm
Chuck passage	Ø 65 mm
Hydraulic lathe chuck	Ø 200 mm
Cooling lubricant system	
Coolant pump output	750 W
Cleaning pump output	750 W
Tank capacity	140 litres
Hydraulic system	
Motor - hydraulic pump	1.5 kW
Tank capacity	60 litres
Machine data	
Turning diameter	250 mm
Turning length	460 mm
Swing Ø above cross slide	220 mm
Swing Ø above machine bed	500 mm
Slant bed	30°
Speed range	
Spindle speeds*	40 - 4 500 rpm
Tool turret	
Type	VDI 30
Number of tool slots	8 tools
Option: Sauter tool turret with driven tools DIN5480 (article no. 351506001)	
Type	VDI 30
Number of tool slots	12 tools
Max. permissible speed at tool coupling	max. 4,500 rpm
Tool output	4.82 KW
Max. tool torque	20 Nm
Precision	
Repeat accuracy	± 0.005 mm
Positioning accuracy	± 0.005 mm
Traverse paths	
X axis	215 mm
Z axis	520 mm
Feed speed	
X axis/Y axis	30 m/min.
Motor torque	
X axis/Y axis	11 Nm
Feed forces	
X axis/Y axis	6.9 kN
Tailstock	
Tailstock seat	MT 4
Travel	425 mm
Tailstock quill diameter	65 mm
Tailstock - quill stroke hydraulic	60 mm
Dimensions	
Length x width x height	2 322 x 1 948 x 1 930 mm
Overall weight	3 200 kg



Sinumerik 828D system software	PPU 271 SW 24	PPU 290/SW 26x (optional 351506030)
CNC memory	3 MB	5 MB
Cycle change time	3 ms	2 ms
Look Ahead	50	100
Number of tools	128	256

SINUMERIK 828D Basic

High-tech for the compact class

Boosting productivity and precision in manufacturing

The use of two autonomously operating tools makes 4-axis turning - balance cutting - possible. The new functions include multi-channel capability with ShopTurn, which, among other things, allows programmes to be synchronised with programSYNC. The new Software offers the possibility to run two channels simultaneously in turning and grinding machines. SINUMERIK CNC control Sinumerik 828D Basic sets standards in all aspects of machining performance. Whether accuracy and speed, whether reduction of cycle times or energy efficiency and safety - the SINUMERIK sets the pace.

SHOPTURN

- shortest programming time for creating one-off parts and small batches

DXF READER

- Faster from the drawing to the workpiece. Easy transfer of CAD data into programming by DXF reader (optional article no. 3584014).



Control

- 10.4" colour display
- 4:3 format
- User-friendly SINUMERIK Operate software
- Front interfaces: Front USB 2.0, RJ45 Ethernet, Compact Flash (CF) Card
- The 8 horizontal and 8 vertical soft keys take the user to all control windows with just a few key presses
- Rugged and robust

Warranty extension

The warranty extension lets you protect your new machine against warranty damage for a further 12, 24 or 36 months after the two-year SIEMENS warranty expires. (can only be ordered within the two-year SIEMENS warranty)

12 months; Article no. 3589020

24 months; Article no. 3589021

36 months; Article no. 3589022

SIEMENS SAFETY INTEGRATED

SET UP WORK WITH OPEN DOORS

Functional safety also provides protection against high costs!

Machine and plant safety is not only important because strict regulations must be observed. When everything runs safely, you benefit from time savings in engineering, higher system availability and more investment security.

OVERALL PACKAGE

- Safety Integrated
- Residual material detection and machining
- Shopturn work step programming
- Managing network drives
- 3-D simulation
- Simultaneous recording



Components and cast parts

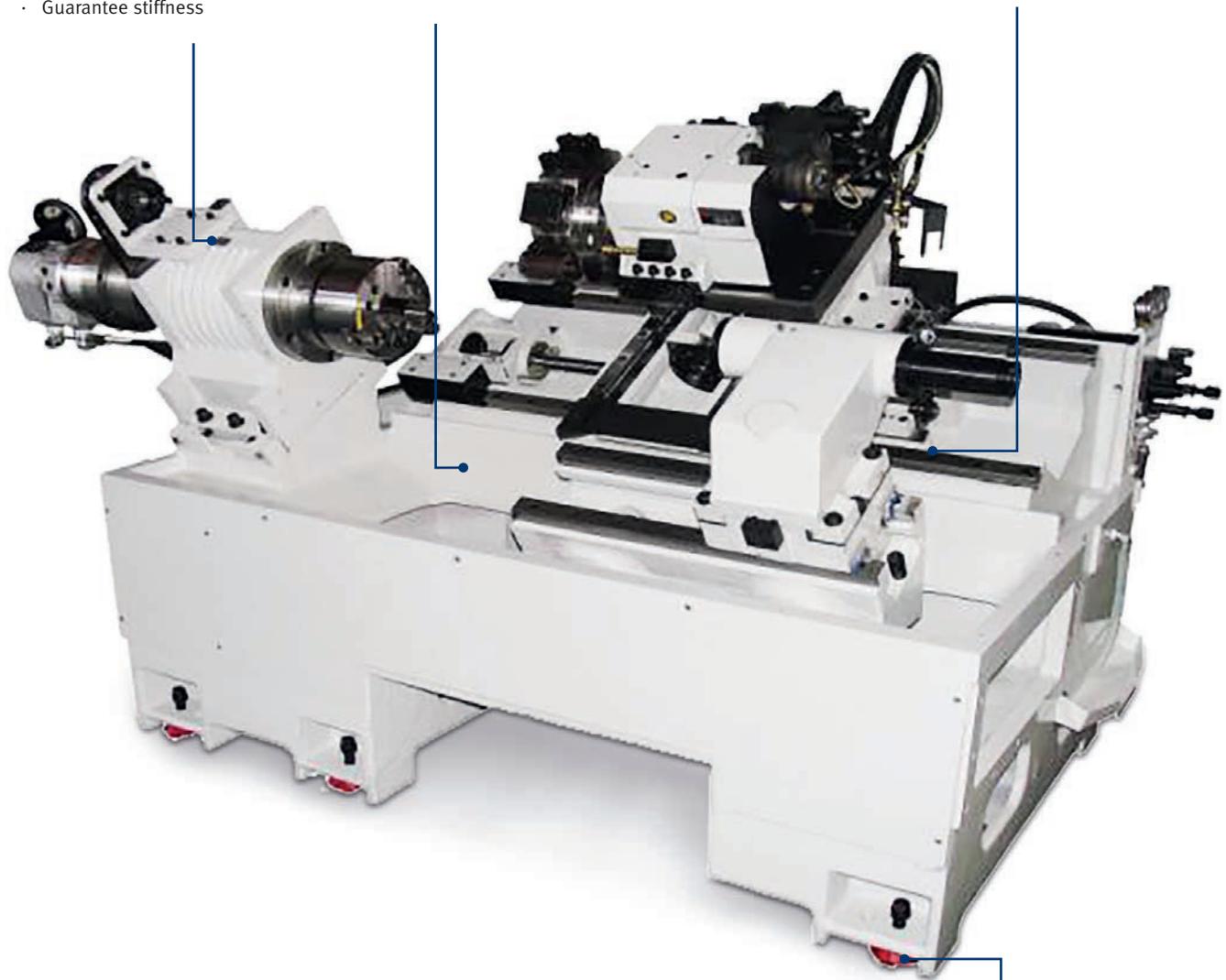
- Guarantee stiffness

Machine bed

- Pronounced ribbing
- 30-degree slant
- Excellent stiffness and durability

Linear guide

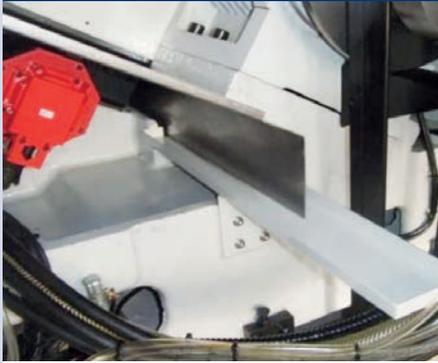
- Maximum static and dynamic stiffness
- High positioning accuracy
- Smooth, backlash-free movement



Machine feet

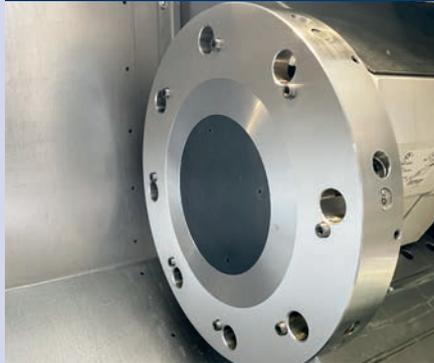
- Six pcs.
- Optimal machine levelling

SEPARATOR



- Separates lubricant from coolant

TOOL TURRET



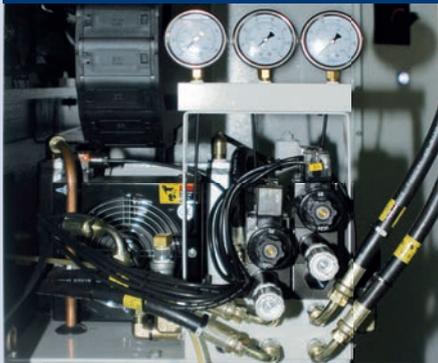
- 8 tool slots
- VDI 30

TAILSTOCK QUILL



- The tailstock quill is moved hydraulically with the foot switches.
- Hydraulic quill stroke 60 mm
- Faster machining

HYDRAULIC POWER UNIT



- Safety non-return valve
- Motor output 1.5 kW
- Tank capacity 60 litres

TOOL PROBE



- By Renishaw
- Allows tools to be measured inside the machine

AUTOM. LUBRICATION SYSTEM



- Folds out
- With float switch. If the oil level is too low, an audible signal is output

THREE-JAW CHUCK



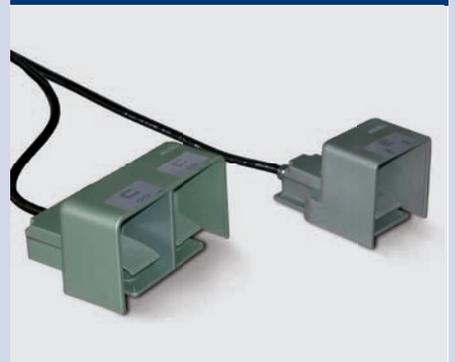
- Hydraulic three-jaw lathe chuck \varnothing 200 mm
- Passageway \varnothing 65 mm
- Easy workpiece clamping

COOLANT TANK



- Pull-out chip tray
- Pull-out cooling lubricant tank
- Level indicator
- Tank capacity 140 litres

FOOT PEDAL



- For releasing and clamping the lathe chuck
- Optional tailstock sleeve extends/retracts hydraulically

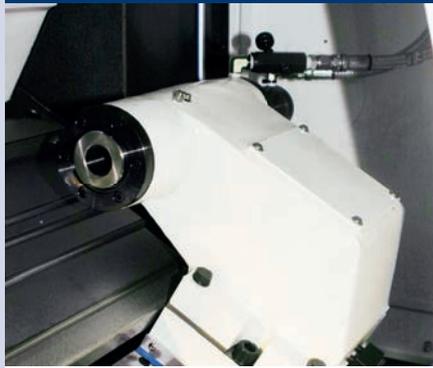
TOOL TURRET (Please note: traverse paths can change)		
351506001*	1	Sauter tool turret VDI 30 driven tools DIN 5480 · Twelve driven tools DIN 5480, C-axis brake system · Instead of Standard equipment › VDI 30 tool turret without power tools
TOOL HOLDER		
351506034		Axially driven tool holder · VDI30 DIN 5480
351506035		Radially driven tool holder · VDI30 DIN 5480
351506036		Radially driven tool holder on rear side · VDI30 DIN 5480
STARTER SET		
3536115		Starter set VDI 30 · Information VDI 30 on page 294
TAILSTOCK		
351506004*	2	Automatic tailstock motion · via M Code
351506005*		Machine preparation · Only for automatic tailstock motion (351506004)
BAR FEEDER		
351506011*		Bar feeder interface
351506012*	3	Bar feeder Pro V 65E 1.2 metres · Including bar feeder interface (351506011)
351506013*		Bar feeder Pro V 65LE 1.5 metres · Including bar feeder interface (351506011)
351506023*		Bar feeder Pro Conque ror 3 metres · Including bar feeder interface (351506011)
↔ For information on bar feeders, and more bar feeders ex warehouse Germany see page 296		
COLLETS FOR COLLET CHUCKS		
351506017*	4	Individual collets for collet chucks · from Ø 10 mm to Ø 14.9 mm
351506018*		Individual collets for collet chucks · from Ø 15 mm to Ø 60 mm
351506002*		Collet chuck · for collets from Ø 15 mm to Ø 60 mm
LATHE CHUCK		
351506024		Hydraulic four-jaw lathe chuck Ø 200 mm · Instead of standard equipment › hydraulic three-jaw lathe chuck Ø 200 mm
351506008		Hydraulic three-jaw lathe chuck Ø 250 mm · Instead of standard equipment › hydraulic three-jaw lathe chuck Ø 200 mm
351506025		Hydraulic four-jaw lathe chuck Ø 250 mm · Instead of standard equipment › hydraulic three-jaw lathe chuck Ø 200 mm
3519707		soft top jaw · for the › hydraulic three-jaw lathe chuck Ø 200 mm - included in the standard equipment · for the hydraulic four-jaw lathe chuck Ø 200 mm (351506024)
3519727		Hard insert jaws · for the › hydraulic three-jaw lathe chuck Ø 200 mm - included in the standard equipment · for the hydraulic four-jaw lathe chuck Ø 200 mm (351506024)
3519708		soft top jaw · for the hydraulic three-jaw lathe chuck Ø 250 mm (351506008) · for the hydraulic four-jaw lathe chuck Ø 250 mm (351506025)
3519728		Hard insert jaws · for the hydraulic three-jaw lathe chuck Ø 250 mm (351506008) · for the hydraulic four-jaw lathe chuck Ø 250 mm (351506025)
MISCELLANEOUS		
351506019*		Internal tool cooling · External unit, 20 bar
351506020*	5	Oil separator · with rotary disc, removes oil from the coolant · Capacity: 1 litre per hour
351506022*		High performance coolant pump · 5 bar
351506021*	6	Air conditioner · Instead of the standard equipment › heat exchanger
351506006*		Automatic tool measuring · Instead of standard equipment › Manual tool measuring
351506007*		Automatic part gripper
351506016*		Automatic door opening
SOFTWARE		
3584014	7	Software DXF Viewer/Reader · from version 4.7
HARDWARE		
351506030*	8	SIEMENS control PPU 290 · 15.6" colour display- 16:9 format, System software SW 26x

1 TOOL TURRET



- VDI 30 with driven tools by Sauter incl. C axis brake system

2 TAILSTOCK



- Fully automatic tailstock, for faster configuration
- Faster, more easily repeatable and more precise tailstock motion

3 BAR FEEDER



- The bar feeders are the ideal solutions for automatic loading of CNC lathes with short bars. They combine maximum productivity with a small footprint

4 COLLETS AND COLLET CHUCKS



- Available from 10 mm to 60 mm

5 OIL SEPARATOR / OIL SKIMMER



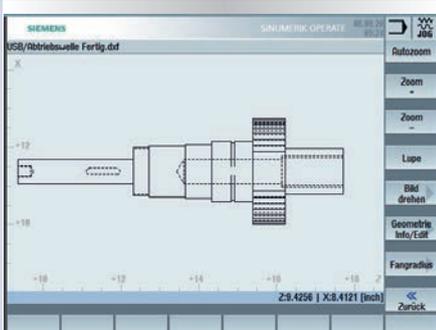
- Oil skimmer reliably removes floating tramp oils and finest chip debris from cooling lubricants

6 AIR CONDITIONER



- Instead of heat exchanger
- The air conditioner permanently and constantly cools the control cabinet to the set temperature.

7 DXF READER



- DXF data can be converted to NC programs for drilling patterns and contours

8 CONTROL PPU 290



- The PPU 290 enables Multitouch operation of the SINUMERIK 828. The 15.6" panel is robust even in harsh environments. The SINUMERIK Operate user interface is optimised for touch-sensitive operation.
- Capacitive 15.6" color display, 16:9 format
- Configurable side screen
- Intuitive Multitouch operation
- Full QWERTY keyboard
- Soft key selection via touch function
- Easy data transfer thanks to IP65 protected front interfaces (USB 2.0, RJ45 Ethernet)
- Proximity/distance sensor for smart display control
- Rugged and maintenance-free
- Can be operated while wearing gloves
- System software SW 26x

L 440 / L 460

The OPTIMUM PREMiUM high-performance CNC lathe with cycle control

SIEMENS SINUMERIK 828D BASIC

- High-precision machine with the latest **SIEMENS** control and **SIEMENS** servo drives
- Compact spindle stock design
- Spindle stock design guarantees minimal noise development
- High-speed spindle 4 500 rpm with high-precision and generously dimensioned taper roller bearings
- Shifting between the two gears occurs pneumatically via a compressed air cylinder
- Wide machine bed with double rectangular guideways
- Bed rails tempered and grinded
- Generously dimensioned tailstock and easily positionable with quick clamping mechanism
- Two separately movable sliding doors with integrated view windows at front
- Microswitch prevents starting the machine if the door is not fully closed
- Mobile control panel
- Two electronic hand wheels for manual control of the X and Z axis
- Automatic spindle stock lubrication
- Automatic lubrication of longitudinal and transverse slides
- Tailstock end cover
- Halogen work lamp
- Closed switch cabinet with integrated heat exchanger ensures an optimal temperature even in case of high ambient temperatures, and prevents dirt particle penetration
- Hard and soft block jaws in standard scope of delivery
- RJ45 plug-in connection, USB connection and 230 V power connection
- Six machine feet in the standard scope of delivery
- EMC Electromagnetic compatibility
- Including two-year **SIEMENS** warranty (warranty extension on page 147). Information on the warranty at www.optimum-machines.com
- Information on „Maintenance contracts“ on page 321



OPTITURN L 440 / L 460

TECHNICAL DATA

Model	L 440	L 460
Article no.	3514410	3514420
Machine data		
Electrical connection	400 V / 3 Ph ~50 Hz	
Total connected load	25 kVA	
Spindle		
Drive motor S1 operation	11 kW	
Torque drive motor S1 operation	70 Nm	
Drive motor S6 30 % operation	23 kW	
Torque drive motor S6 30 % operation	148 Nm	
Spindle seat	DIN ISO 702-1 No. 6	
Spindle bore*	Ø 65 mm	
Chuck passage	Ø 52 mm	
Hydraulic lathe chuck	Ø 200 mm	
Cooling lubricant system		
Coolant pump motor	375 W	
Tank capacity	170 litres	
Hydraulic system		
Motor - hydraulic pump	750 W	
Tank capacity	50 litres	
Machine data		
Centre height	235 mm	
Centre width	1 000 mm	1 500 mm
Swing Ø above cross slide	240 mm	
Swing Ø above machine bed	475 mm	
Swing Ø in the bed bridge	710 mm	
Bed width	355 mm	
Speed range		
Speeds stage 1 / stage 2	100 - 950 rpm / 900 - 4 500 rpm	
Torque at stage 1/stage 2	525 Nm / 382 Nm	
Tool turret		
Hydraulic type	LS 160 VDI 40	
Number of tool slots	8 tools	
Max. height, width square	25 x 25 mm	
Max. diameter drilling rod	32 mm	
Option: Baruffaldi tool turret	(Article no. 351441012)	(Article no. 351442012)
Number of tool slots	8 tools	
Type (hydraulic)	Baruffaldi VDI40 - TBMA- 160 with tool drive	
Max. permissible speed at tool coupling	max. 4 500 rpm	
Tool output	5 kW (S3 - 40 % duty cycle 10 min.)	
Max. tool torque	20 Nm	
Precision		
Repeat accuracy	± 0.005 mm	
Positioning accuracy	± 0.005 mm	
Travel		
X axis	260 mm	
Z axis	1 150 mm	1 680 mm
Feed speed		
X axis/Y axis	15 m/min.	
Motor torque		
X axis/Y axis	6 Nm / 16 Nm	
Feed forces		
X axis/Y axis	7.5 kN / 10 kN	
Tailstock		
Tailstock seat	MT 4	
Tailstock quill diameter	65 mm	
Tailstock - quill stroke	150 mm	
Dimensions		
Length x width x height	3 030 x 1 952 x 2 025 mm	3 530 x 1 952 x 2 025 mm
Overall weight	3 000 kg	3 450 kg
Sinumerik 828D system software	PPU 271/SW 24x	PPU 290/SW 26x (optional 351442080)
CNC memory	3 MB	5 MB
Cycle change time	3 ms	2 ms
Look Ahead	50	100
Number of tools	128	256

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High-tech for the compact class

Boosting productivity and precision in manufacturing

The use of two autonomously operating tools makes 4-axis turning - balance cutting - possible. The new functions include multi-channel capability with ShopTurn, which, among other things, allows programmes to be synchronised with programSYNC. The new Software offers the possibility to run two channels simultaneously in turning and grinding machines. SINUMERIK CNC control Sinumerik 828D Basic sets standards in all aspects of machining performance. Whether accuracy and speed, whether reduction of cycle times or energy efficiency and safety - the SINUMERIK sets the pace.

SHOPTURN

- shortest programming time for creating one-off parts and small batches

DXF READER

- Faster from the drawing to the workpiece. Easy transfer of CAD data into programming by DXF reader (optional article no. 3584014).



Control

- 10.4" colour display
- 4:3 format
- User-friendly SINUMERIK Operate software
- Front interfaces: Front USB 2.0, RJ45 Ethernet, Compact Flash (CF) Card
- The 8 horizontal and 8 vertical soft keys take the user to all control windows with just a few key presses
- Rugged and robust

Warranty extension

The warranty extension lets you protect your new machine against warranty damage for a further 12, 24 or 36 months after the two-year SIEMENS warranty expires. (can only be ordered within the two-year SIEMENS warranty)

- 12 months; Article no. 3589020
- 24 months; Article no. 3589021
- 36 months; Article no. 3589022

SIEMENS SAFETY INTEGRATED

SET UP WORK WITH OPEN DOORS

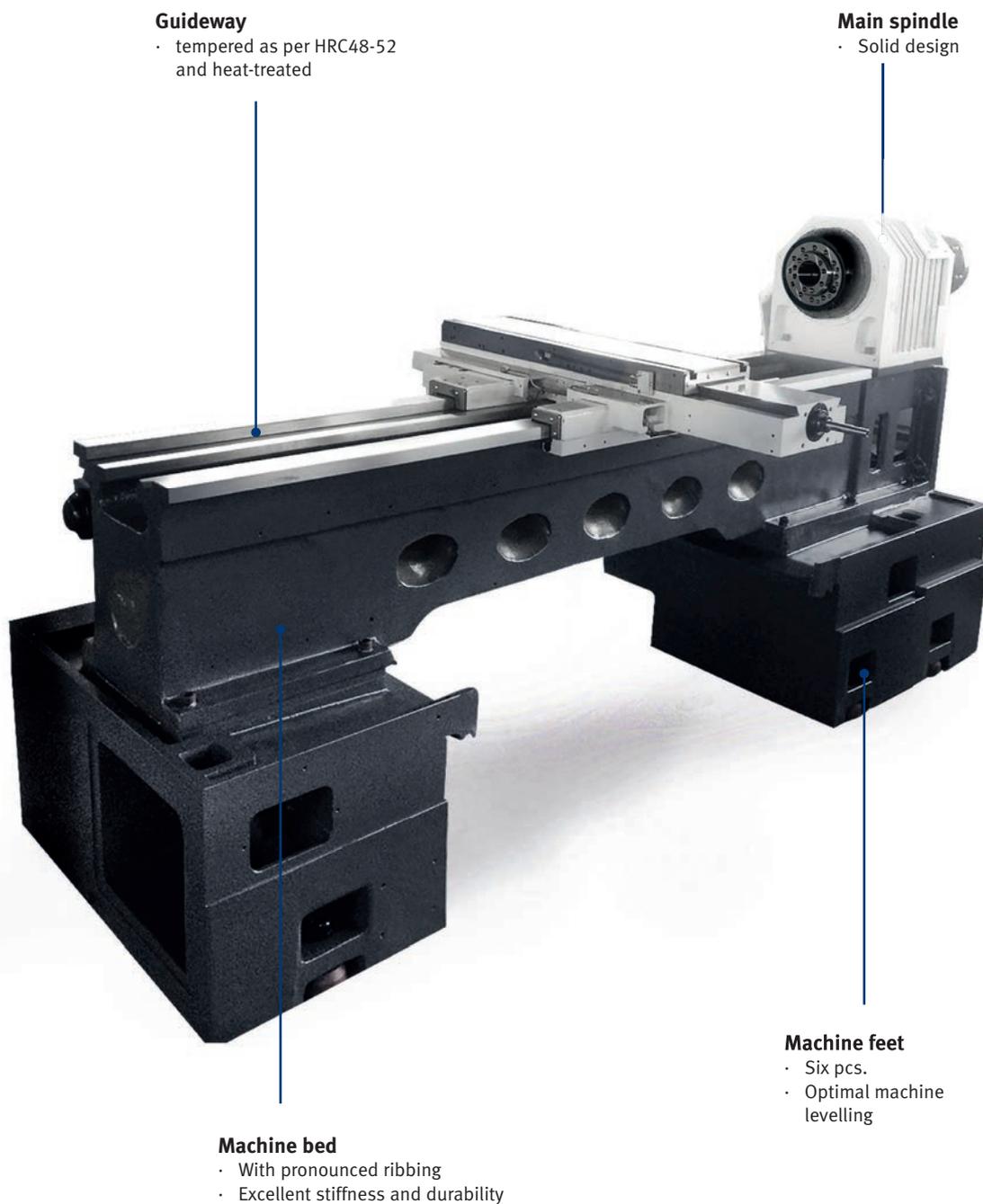
Functional safety also provides protection against high costs!

Machine and plant safety is not only important because strict regulations must be observed. When everything runs safely, you benefit from time savings in engineering, higher system availability and more investment security.

OVERALL PACKAGE

- Safety Integrated
- Residual material detection and machining
- Shopturn work step programming
- Managing network drives
- 3-D simulation
- Simultaneous recording
- System software SW 24x



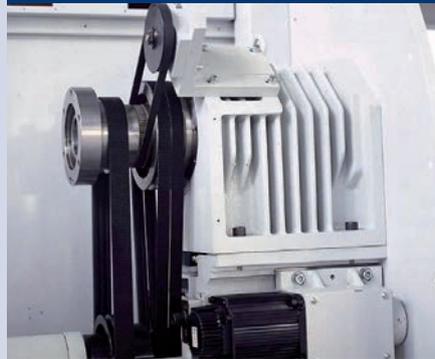


HORIZONTAL / VERTICAL



- Particularly wide design
- Ball screw drive for excellent repetition accuracy

SPINDLE STOCK



- Precision borne
- Rugged design
- Smooth action even at high spindle speeds

HEAT EXCHANGER



- Closed switch cabinet with smart cooling management ensures an optimal temperature even in case of high ambient temperatures

SWITCH GEARBOX



- Pneumatic
- Automatic
- The shaft runs in sintered bronze thus guaranteeing excellent precision

AUTOM. LUBRICATION SYSTEM



- Automatic lubrication of the headstock and the longitudinal and cross slide

TOOL TURRET



- Eight tool slots
- Hydraulic VDI40 tool turret
- Mounting height square max. 25 mm
- Boring bar diameter 32 mm

TAILSTOCK



- Generously dimensioned
- Slide with ball screw and pre-stressed nut

HYDRAULIC POWER UNIT



- For clamping jaws, lathe chuck and tool turret
- Motor output 750 W
- Tank capacity 50 litres
- Clamping/operating pressure 2 500 - 2 942 kPa

THREE-JAW CHUCK



- Hydraulic three-jaw lathe chuck Ø 200 mm
- Passageway Ø 52 mm
- Easy workpiece clamping

L440		L460	
TOOL TURRET AND C-AXIS (Please note: traverse paths can change)			
351441042 *	351442042*	1	Baruffaldi tool turret TBMA160 VDI40 with tool drive · Instead of standard equipment › tool turret LS160
TAILSTOCK			
351441019*	351442019*	2	Tailstock spindle · Machine preparation for the hydraulic tailstock spindle
351441021*	351442021*		· Hydraulic tailstock spindle
351441023*	351442023*		Pneumatic lifting device for the tailstock · Pneumatic air cushion, reduces friction thus facilitating tailstock movement
351441022*	351442022*		Device for travelling tailstock · Tailstock and support are linked for motion
BAR FEEDER			
351441037*	351442037*	3	Bar feeder interface · Preparation
351441033*	351442033*		Bar feeder Pro V 65E 1.2 metres · Including bar feeder interface (351441037/351442037)
351441034*	351442034*		Bar feeder Pro V 65LE 1.5 metres · Including bar feeder interface (351441037/351442037)
351441038*	351442038*		Bar feeder Pro Conqueror 3 metres · Including bar feeder interface (351441037/351442037)
↻ For information on bar feeders, and more bar feeders ex warehouse Germany see page 296			
LIFTING DEVICE			
3514301			Lifting device · a lifting device is required to unload the machine.
LATHE CHUCK			
351441008*	351442008*		Three-jaw lathe chuck · manual Ø 200 mm
351441011*	351442011*		Four-jaw lathe chuck · manual Ø 250 mm
351441028*	351442028*		Hydraulic three-jaw lathe chuck Ø 250 mm · Instead of standard equipment › hydraulic three-jaw lathe chuck Ø 200 mm
351441031*	351442031*		Hydraulic four-jaw lathe chuck Ø 250 mm · Instead of standard equipment › hydraulic three-jaw lathe chuck Ø 200 mm
3519707			soft top jaw · for the hydraulic three-jaw lathe chuck Ø 200 mm included in the standard equipment
3519727			Hard insert jaws · for the hydraulic three-jaw lathe chuck Ø 200 mm included in the standard equipment
3519708			soft top jaw · for the hydraulic three-jaw lathe chuck Ø 250 mm (351441028) · for the hydraulic four-jaw lathe chuck Ø 250 mm (351441031)
3519728			Hard insert jaws · for the hydraulic three-jaw lathe chuck Ø 250 mm (351441028) · for the hydraulic four-jaw lathe chuck Ø 250 mm (351441031)
MISCELLANEOUS			
351441001*	351442001*		Internal tool cooling · External unit (an extraction unit is required)
351441007*	351442007*	4	Oil separator · with rotary disc, removes oil from the coolant
351441013*	351442013*		High performance coolant pump · 5 bar
351441014*	351442014*	5	Air conditioner · Instead of the standard equipment › heat exchanger
351441016*	351442016*		Tool holder set · For the › tool turret LS160 - included in the standard equipment
351441020*	351442020*		Portable electronic handwheel · Instead of standard equipment › electronic handwheel (cannot be combined with joystick 351441002 / 351442002)
351441002*	351442002*		Joystick · Cannot be combined with electronic handwheel 351441(2)0 20
351441003*	351442003*	6	Fixed steady rest
351441004*	351442004*		Follow steady rest
351441043		7	HPRA Renishaw High Precision Measuring Arm · for Ø 200 mm lathe chuck · for Ø 250 mm lathe chuck
351441044			
351441005*	351442005*		Chip conveyor · L 440: 1.0 metre - L 460: 1.5 metres
351441006*			Chip carriage · Rollable, folding, L x W x H: 994 x 510 x 838 mm
SOFTWARE			
3584014		8	Software DXF Viewer/Reader · From version 4.7
HARDWARE			
351442080*		9	SIEMENS control PPU 290 · 15.6" colour display- 16:9 format, Software SW 26x

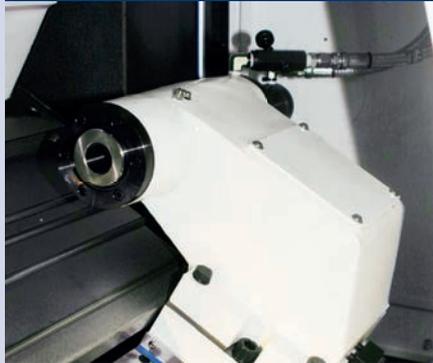
NEW

1 TOOL TURRET



- Max. permissible speed 6 000 rpm at tool coupling
- Max. 5 kW tool output (S3 40 % duty cycle 10 min.)
- Max. 20 Nm tool torque
- Hydraulic drive

2 TAILSTOCK



- Fully automatic tailstock, for faster configuration
- Faster, more easily repeatable and more precise tailstock motion

3 BAR FEEDER



- The bar feeders are the ideal solutions for automatic loading of CNC lathes with short bars
- They combine maximum productivity with a small footprint

4 OIL SEPARATOR / OIL SKIMMER



- Oil skimmer reliably removes floating tramp oils and finest chip debris from cooling lubricants

5 AIR CONDITIONER



- Instead of heat exchanger
- The air conditioner permanently and constantly cools the control cabinet to the set temperature.

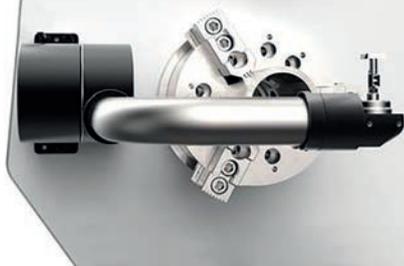
6 STEADY RESTS



- Fixed steady rest
 - Passage from \varnothing 20 mm to \varnothing 200 mm
- Follow steady rest
 - Passage from \varnothing 20 mm to \varnothing 100 mm

7 MEASURING ARM

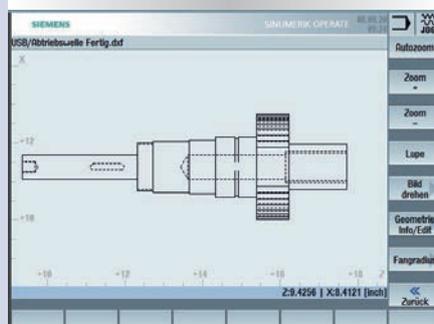
NEW



- Up to 90 % faster tool measuring
- Typical position accuracy of $5 \mu\text{m} \pm 2$
- TS12 Interface

Information on the measuring arm see page 300

8 DXF READER



- DXF data can be converted to NC programs for drilling patterns and contours

9 CONTROL PPU 290



- Capacitive display with Multitouch controller
- Intuitive Multitouch operation
- Soft key selection via touch function
- Software SW 26

S 620 / S 620L

OPTIMUM PREMIUM CNC-Slant bed lathes with counter spindle

SIEMENS SINUMERIK 828D with PPU 290

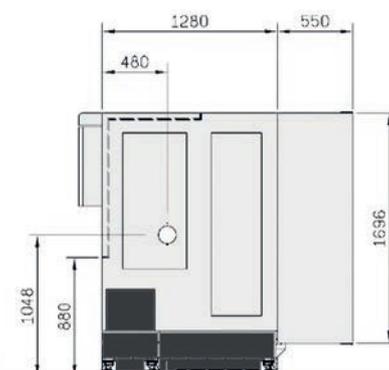
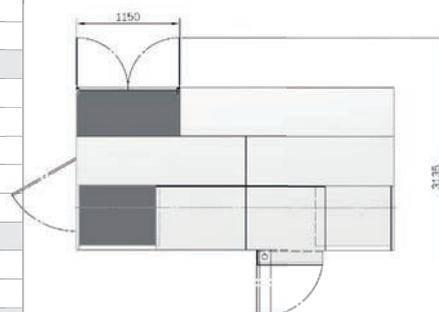
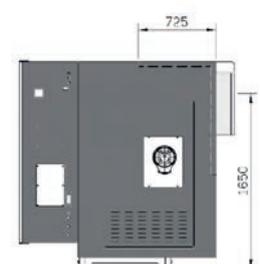
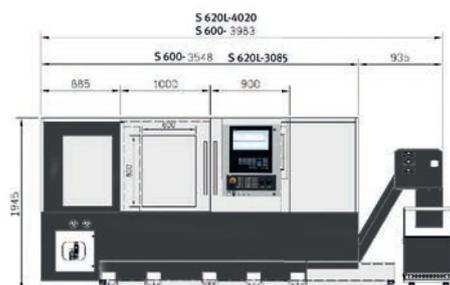
- Heavy duty version
- Compact design
- **SIEMENS** servo motors on all axes
- Slant bed design 30° for particularly large machining diameter
- Easy chip removal into the chip tray
- Dimensionally stable linear guides ensure a long service thanks to maximum static and dynamic stiffness
- Hardened and grinded ball screw spindles
- All servomotors with integrated encoder for maximum precision
- Portable electronic hand wheel with enabling switch and emergency stop pushbutton substantially facilitates running in of programs
- Chip conveyor in belt design ensures efficient chip removal
- Halogen work lamp for complete illumination of the working area
- C axis with brake system APEX PT16-16-RB-330 and 12 tools VDI 30
- Hydraulic three-jaw lathe chuck Ø 200 mm and Ø 150 mm for the counter spindle
- Coolant system
- Foot switch
- Automatic lubrication system
- Hydraulic unit
- Heat exchanger for switch cabinet
- Bar feeder interface
- EMC Electromagnetic compatibility
- Including two-year **SIEMENS** warranty (warranty extension on page 155). Information on the warranty at www.optimum-machines.com
- Information on „Maintenance contracts“ on page 321



OPTITURN S 620 / S 620L

TECHNICAL DATA

Model	S 620	S 620L
Article no.	3515065	3515070
Machine data		
Electrical connection	400 V / 3 Ph ~50 Hz	
Total connected load	20 kVA	
Main spindle Z spindle		
Drive motor S1 operation	11 kW	
Torque drive motor S1 operation	98.7 Nm	
Drive motor S6 30 % operation	15 kW	
Torque drive motor S6 30 % operation	199.2 Nm	
Spindle seat	DIN ISO 702-1 No. 6	
Spindle bore*	Ø 75 mm	
Chuck passage	Ø 65 mm	
Hydraulic lathe chuck	Ø 200 mm	
Counter spindle Z2 spindle		
Drive motor S1 operation	7.5 kW	
Torque drive motor S1 operation	50 Nm	
Drive motor S6 30 % operation	11 kW	
Torque drive motor S6 30 % operation	112 Nm	
Spindle seat	DIN ISO 702-1 No. 5	
Spindle bore*	Ø 52 mm	
Chuck passage	Ø 45 mm	
Hydraulic lathe chuck	Ø 150 mm	
Pumps		
Coolant pump output	530 W	
Output of hydraulic pump	2.2 kW	
Central lubrication system output	30 W	
Machine data		
Turning diameter	325 mm	
Turning length	520 mm	1 020 mm
Swing Ø above machine bed	650 mm	
Swing Ø above cross slide	380 mm	
Slant bed	30°	
Speed range		
Speeds main spindle Z spindle	4 000 rpm	
Speeds counter spindle Z2 spindle	5 000 rpm	
Tool turret		
Hydraulic type	VDI 30 DIN 5480	
Motor output, power tools DIN 5480	3.75 kW	
Speed, power tools DIN 5480	6 000 rpm	
Number of tool slots	12 tools	
Max. height, width square	25 x 25 mm	
Max. diameter drilling rod	40 mm	
Precision		
Repeat accuracy	± 0.005 mm	
Positioning accuracy	± 0.005 mm	
Travel		
X axis	215 mm	
Y axis (option)	100 mm (± 50 mm)	
Z axis/Z2 axis	520 mm	1 020 mm
Feed speed/rapid motion		
X axis	24 m/min	
Y axis (option)	6 m/min.	
Z axis/Z2 axis	24 m/min	
Motor torque		
X axis/Y axis	11 Nm / 16 Nm	
Y axis (option)	6 Nm	
Feed forces		
X axis/Y axis	6.9 kN / 10 kN	
Y axis (option)	6.2 kN	
Dimensions		
Length without / with chip conveyor	3 500 mm/3 985 mm	4 020 mm/4 485 mm
Width x height	3 135 x 1 950 mm	
Overall weight	5 000 kg	6 000 kg



Sinumerik 828D system software	SW 28
CNC memory	8 MB
Cycle change time	1 ms
Look Ahead	150
Number of tools	512

SINUMERIK 828D

The power package in the compact class of CNC controls

Boosting productivity and precision in manufacturing

Robust hardware architecture and intelligent control algorithms as well as top-class drive and motor technology ensure the highest dynamics and precision during machining.

Advanced software-controlled compensation functions ensure additional quality in surface machining and high availability of the machine tool.

With SINUMERIK Operate, all machining technologies, from standard to complex, can be operated intuitively and with a uniform "look & feel".

Multitouch operation with PPU 290

The 15.6" panel is robust even in harsh environments. The SINUMERIK Operate user interface is optimised for touch-sensitive operation.

User-friendly

- Capacitive 15.6" color display, 16:9 format
- Configurable side screen
- Intuitive Multitouch operation
- Full QWERTY keyboard
- Soft key selection via touch function
- Easy data transfer thanks to IP65 protected front interfaces (USB 2.0, RJ45 Ethernet)
- Proximity/distance sensor for smart display control

Rugged and maintenance-free

- Front panel made of die-cast magnesium with scratchproof glass front
- Can be operated while wearing gloves
- NV RAM memory technology without buffer battery
- Fanless and hard diskless design

Warranty extension

The warranty extension lets you protect your new machine against warranty damage for a further 12, 24 or 36 months after the two-year SIEMENS warranty expires. (can only be ordered within the two-year SIEMENS warranty)

- 12 months; Article no. 3589020
- 24 months; Article no. 3589021
- 36 months; Article no. 3589022

SINUTRAIN

- NC programming on the PC as on the CNC - same operation and programming
- Work preparation already while the machine is still cutting: Test, run-in and simulate NC programs on the PC - less time stress at the machine
- CNC education and training with exactly the same programming and operating interface as in the workshop - without waiting for it to "finally get to it", without the risk of breaking something - and with the possibility of doing preparatory and follow-up work at home or on the road.



SIEMENS
SAFETY

INTEGRATED

SET UP WORK WITH OPEN DOORS

Functional safety also provides protection against high costs!

Machine and plant safety is not only important because strict regulations must be observed. When everything runs safely, you benefit from time savings in engineering, higher system availability and more investment security.

OVERALL PACKAGE

- Safety Integrated
- Residual material detection and machining
- Shopturn work step programming
- Managing network drives
- 3-D simulation
- Simultaneous recording
- System software SW 28x



Guides

- High-performance linear guides contribute towards machine stability and ensure high precision and low vibrations during machining

Slant bed

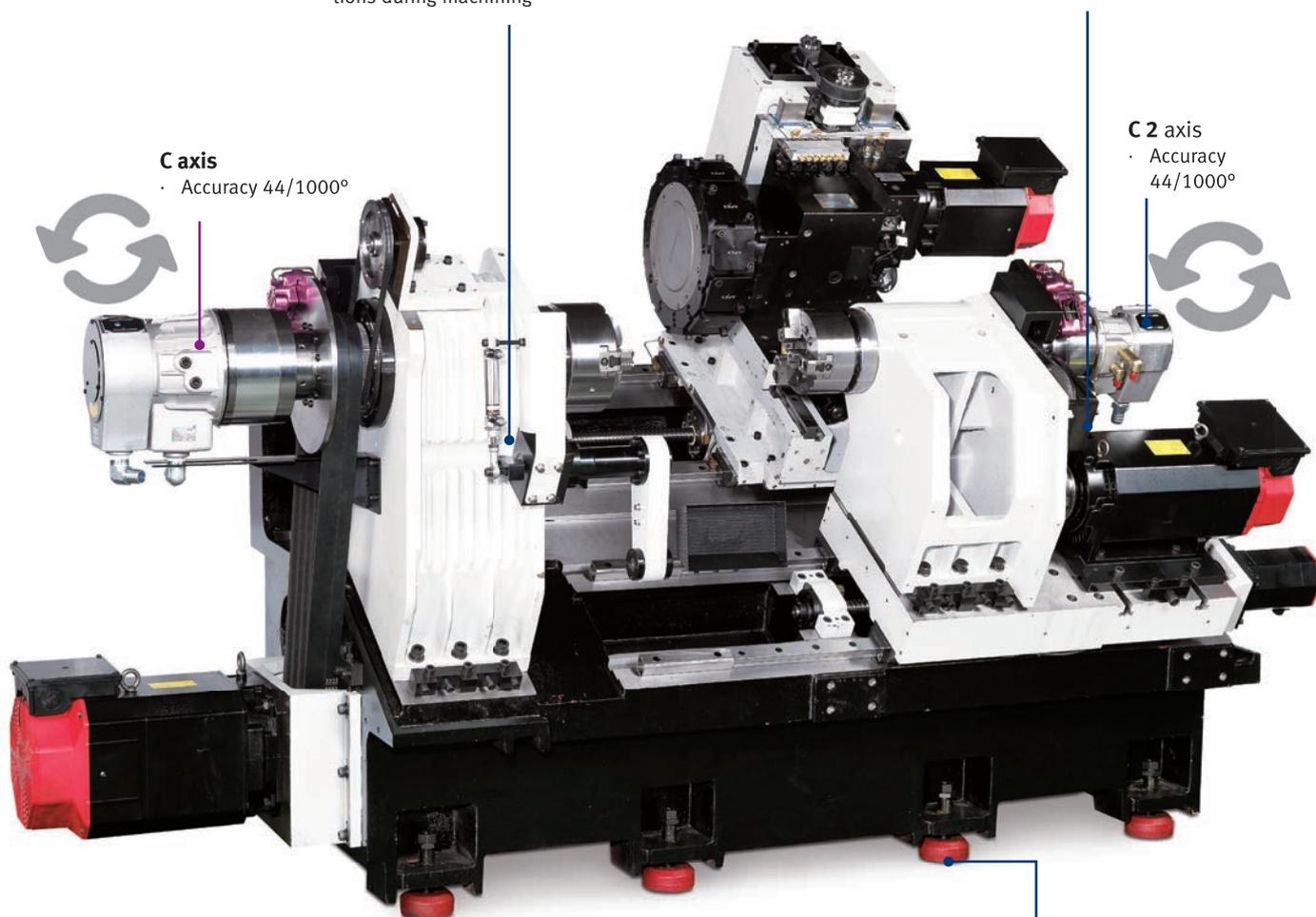
- single-piece
- Slant bed
- For excellent stability

C axis

- Accuracy 44/1000°

C 2 axis

- Accuracy 44/1000°



Machine feet

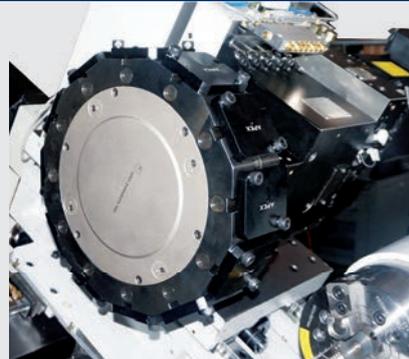
- Eight pcs.
- Optimised alignment of the machine

HEAT EXCHANGER



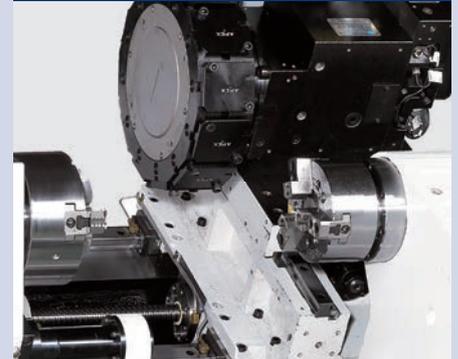
- Closed switch cabinet with smart cooling management
- Optimal temperature even in case of high ambient temperatures

TOOL TURRET



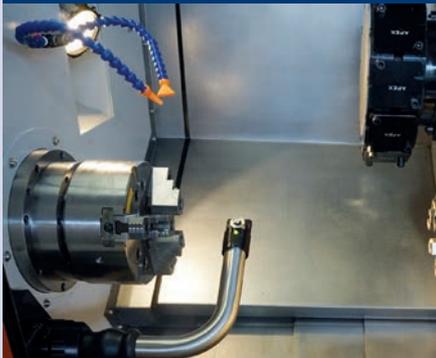
- Reliable and fast changer Apex PT-16-RB-330-12
- Driven tools DIN 5480 with servo motor, 12 tool slots

COUNTER SPINDLE



- Both spindles with C axis control
- Hydraulic
- Braking system with spindle angle indexing

TOOL PROBE



- By Renishaw
- Enables measuring of the tools within the machine at the main spindle

LATHE CHUCK



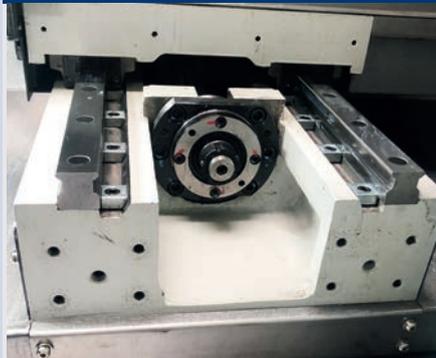
- Hydraulic lathe chuck Ø 200 mm

AUTOM. LUBRICATION SYSTEM



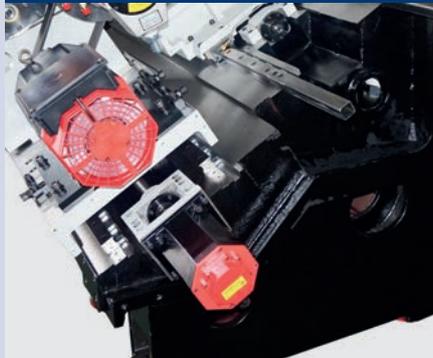
- Folds out
- With float switch. If the oil level is too low, an audible signal is output

LINEAR GUIDE



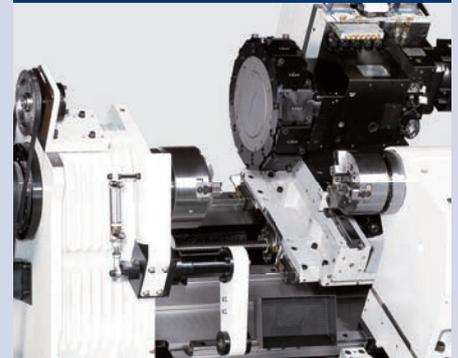
- Maximum static and dynamic stiffness
- High positioning accuracy
- Smooth, backlash-free movement
- Consistent precision with long service life

SLANT BED



- Reduced machine depth compared to standard bed with the same travel in the X-axis
- Better unhindered chip flow with flow chips

C-ACHSE



- Main spindle rotary axis, for precise positioning of the workpiece
- Provides accurate spindle indexing and a consistently stable low speed

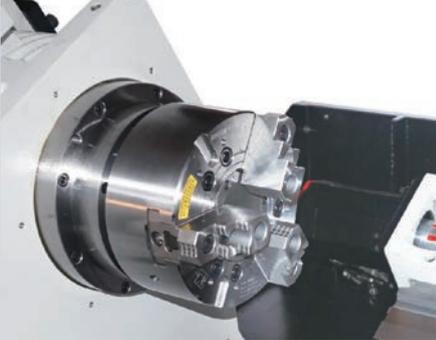
LATHE CHUCK			
351506501	1	Hydraulic three-jaw lathe chuck Ø 250 mm	· Instead of standard equipment › hydraulic three-jaw lathe chuck Ø 200 mm
351506502		Hydraulic four-jaw chuck Ø 200 mm	· Instead of standard equipment › hydraulic three-jaw lathe chuck Ø 200 mm
351506503		Hydraulic four-jaw chuck Ø 250 mm	· Instead of standard equipment › hydraulic three-jaw lathe chuck Ø 200 mm
351506510		Hydraulic four-jaw chuck Ø 150 mm	· Instead of standard equipment › hydraulic three-jaw lathe chuck Ø 150 mm · for counter spindle / B spindle

BAR FEEDER			
351506535*	2	Bar feeder Pro V 65E	· Rod length 1 200 mm; material rods Ø 5 mm - Ø 65 mm
351506536*		Bar feeder Pro V 65LE	· Rod length 1 500 mm; material rods Ø 5 mm - Ø 65 mm
351506538*		Bar feeder Pro Conqueror	· Rod length 3 000 mm; material rods Ø 5 - 51 mm
➔ For information on bar feeders, and more bar feeders ex warehouse Germany see page 296			

COLLET CHUCK			
351506504*	3	Collet chuck	· for the main spindle - instead of standard equipment › hydraulic three-jaw lathe chuck Ø 200 mm
351506511*		Collet chuck	· for the B spindle - instead of standard equipment › hydraulic three-jaw lathe chuck Ø 150 mm

MISCELLANEOUS			
351506515*	4	Y axis	· for more flexible milling applications
351506520*	5	Internal tool cooling	· 20 bar
351506527*		Air conditioner	· Instead of the standard equipment › heat exchanger
351506528*	6	Automatic door opener	
351506525*	7	Automatic tool set-up	
351506526*	8	Automatic parts catcher	

1 LATHE CHUCK



- Hydraulic three-jaw lathe chuck available in size Ø 250 mm
- Hydraulic four-jaw lathe chuck in sizes Ø 200 mm and Ø 250 mm
- For the counter spindle, hydraulic four-jaw lathe chuck Ø 150 mm

2 BAR FEEDER



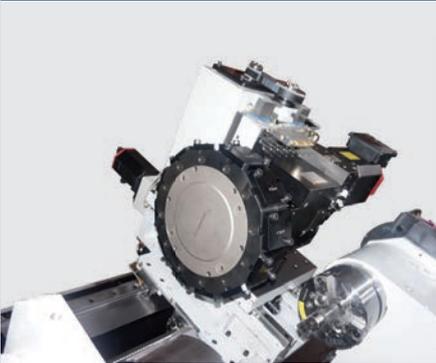
- The bar feeders are the ideal solutions for automatic loading of CNC lathes with short bars
- They combine maximum productivity with a small footprint

3 COLLET CHUCK



- For the main spindle and counter spindle

4 Y AXIS



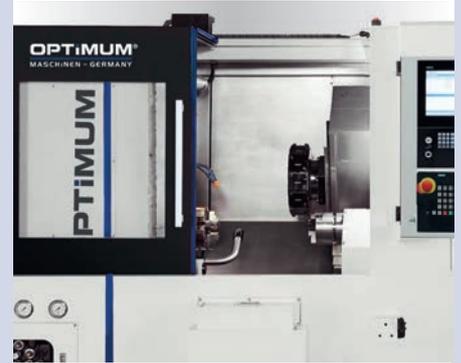
- More flexible machining

5 AIR CONDITIONER



- Instead of heat exchanger
- The air conditioner permanently and constantly cools the control cabinet to the set temperature.

6 DOOR OPENERS



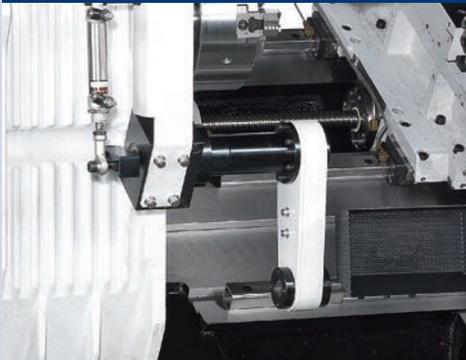
- Particularly user-friendly
- High level of automation

7 TOOL SETUP

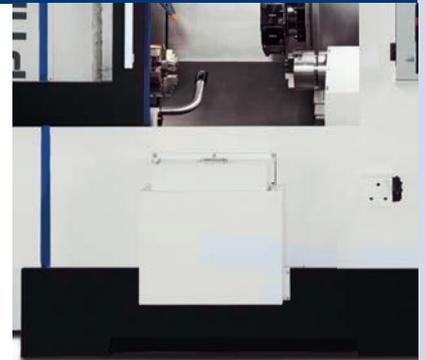


- Automatic
- High level of automation

8 PART GRIPPERS



- An automatic part catcher reduces non-productive times, as the finished workpieces can be removed outside the machine
- Automatically computes the correct position



S 500 / S 500L S 750K / S 750

OPTIMUM PREMIUM CNC lathes impress with high speeds, precision and efficiency and with additional equipment such as chip conveyors and a C axis

SIEMENS SINUMERIK 828D

- All axes with **SIEMENS** servo motors
- Rugged and heavy "Cartridge" spindle system with one two-row cylinder roller bearing each at the front and back, and a double-side taper bearing in the centre
- Long service life of all bearings thanks to permanent lubrication
- All axes directly driven to eliminate torsion backlash or for greater precision in thread tapping and contour machining
- Doubly pre-stressed ball screw spindles with low helix slope to increase feed force
- Fast turret head switching - releasing and rotation occur practically at the same time
- Turret head switching occurs non-stop bi-directionally
- Programmable tailstock where the spindle sleeve is activated with the pedal or in the program
- Tailstock body can be positioned with a drive rod
- Portable electronic handwheel
- Hydraulic tool turret by Sauter with driven tools
- Automatic door opening with monitoring
- 20 bars Coolant Through Spindle
- Coolant system
- Heat exchanger
- Bar feeder interface
- Chip conveyor in belt design ensures efficient chip removal
- Chip trolley
- Automatic Renishaw tool measuring arm for tool measuring
- Programmable part catcher is activated via M code
- Including two-year **SIEMENS** warranty (warranty extension on page 163). Information on the warranty at www.optimum-machines.com
- Information on „Maintenance contracts“ on page 321



OPTITURN S 500 / S 750

TECHNICAL DATA

Model	S 500	S 500L	S 750K	S 750
Article no.	3515150	3515152	3515172	3515170
Machine data				
Electrical connection	400 V / 3 Ph ~50 Hz			
Total connected load	50 kVA		62.5 kVA	
Spindle				
Drive motor S1 operation	17 kW		30 kW	
Torque drive motor S1 operation	162 Nm		186 Nm	
Drive motor S6 30 % operation	25.5 kW		45 kW	
Torque drive motor S6 30 % operation	463 Nm		1 064 Nm	
Spindle seat	DIN ISO 702-1 No. 6		DIN ISO 702-1 No. 8	
Spindle bore*	Ø 66 mm		Ø 88 mm	
Chuck passage	Ø 52 mm		Ø 77 mm	
Hydraulic lathe chuck	Ø 200 mm		Ø 250 mm	
Cooling lubricant system				
Coolant pump output	750 W			
Tank capacity	185 litres			
Hydraulic system				
Hydraulic pump power	1.5 kW			
Tank capacity	70 litres			
Machine data				
Centre height	300 mm			
Turning length* with tool turret	750 mm	1 250 mm	750 mm	1 250 mm
Swing Ø above cross slide	450 mm			
Swing Ø above machine bed	600 mm			
Slant bed	45°			
Speed range				
Spindle speeds	10 - 4 500 rpm		10 - 3 000 rpm	
Tool turret				
Hydraulic type	Sauter VDI40 with tool drive			
Number of tool slots	12 tools			
Permissible speed at tool coupling	max. 4 500 rpm			
Power of the tools	4.82 KW			
Max. tool torque	20 Nm			
Max. height, width square	25 x 25 mm			
Max. diameter drilling rod	32 mm			
Precision				
Repeat accuracy	± 0.005 mm			
Positioning accuracy	± 0.005 mm			
Travel				
X axis	305 mm			
Z axis	750 mm	1 250 mm	750 mm	1 250 mm
Y axis (optional)	+/- 50 mm			
Feed speed				
X axis/Y axis	24 m/min.			
Motor torque				
X axis/Y axis	11 Nm / 27 Nm			
Feed forces				
X axis/Y axis	6.9 kN / 16.9 kN			
Tailstock				
Tailstock seat	MT 5			
Travel	650 mm	1 150 mm	650 mm	1 150 mm
Tailstock quill diameter	90 mm			
Tailstock - quill stroke hydraulic	120 mm			
Dimensions				
Length	3 015 mm	4 114 mm	3 515 mm	4 614 mm
Width x height	1 856 x 2 016 mm		1 856 x 2 016 mm	
Overall weight	5 600 kg	6 400 kg	5 700 kg	6 500 kg

Sinumerik 828D system software	PPU 271/SW 26x		
CNC memory	5 MB	Look Ahead	100
Cycle change time	2 ms	Number of tools	256

SINUMERIK 828D

The power package in the compact class of CNC controls

Boosting productivity and precision in manufacturing

Robust hardware architecture and intelligent control algorithms as well as top-class drive and motor technology ensure the highest dynamics and precision during machining.

Advanced software-controlled compensation functions ensure additional quality in surface machining and high availability of the machine tool.

With SINUMERIK Operate, all machining technologies, from standard to complex, can be operated intuitively and with a uniform "look & feel".

SINUTRAIN

- NC programming on the PC as on the CNC - same operation and programming
- Work preparation already while the machine is still cutting: Test, run-in and simulate NC programs on the PC - less time stress at the machine
- CNC education and training with exactly the same programming and operating interface as in the workshop - without waiting for it to "finally get to it", without the risk of breaking something - and with the possibility of doing preparatory and follow-up work at home or on the road.



Control

- 10.4" colour display
- 4:3 format
- User-friendly SINUMERIK Operate software
- Front interfaces: Front USB 2.0, RJ45 Ethernet, Compact Flash (CF) Card
- The 8 horizontal and 8 vertical soft keys take the user to all control windows with just a few key presses
- Rugged and robust

Warranty extension

The warranty extension lets you protect your new machine against warranty damage for a further 12, 24 or 36 months after the two-year SIEMENS warranty expires. (can only be ordered within the two-year SIEMENS warranty)

12 months; Article no. 3589020
24 months; Article no. 3589021
36 months; Article no. 3589022

SIEMENS SAFETY INTEGRATED

SET UP WORK WITH OPEN DOORS

Functional safety also provides protection against high costs!

Machine and plant safety is not only important because strict regulations must be observed. When everything runs safely, you benefit from time savings in engineering, higher system availability and more investment security.

OVERALL PACKAGE

- Safety Integrated
- Residual material detection and machining
- Shopturn work step programming
- Managing network drives
- 3-D simulation
- Simultaneous recording

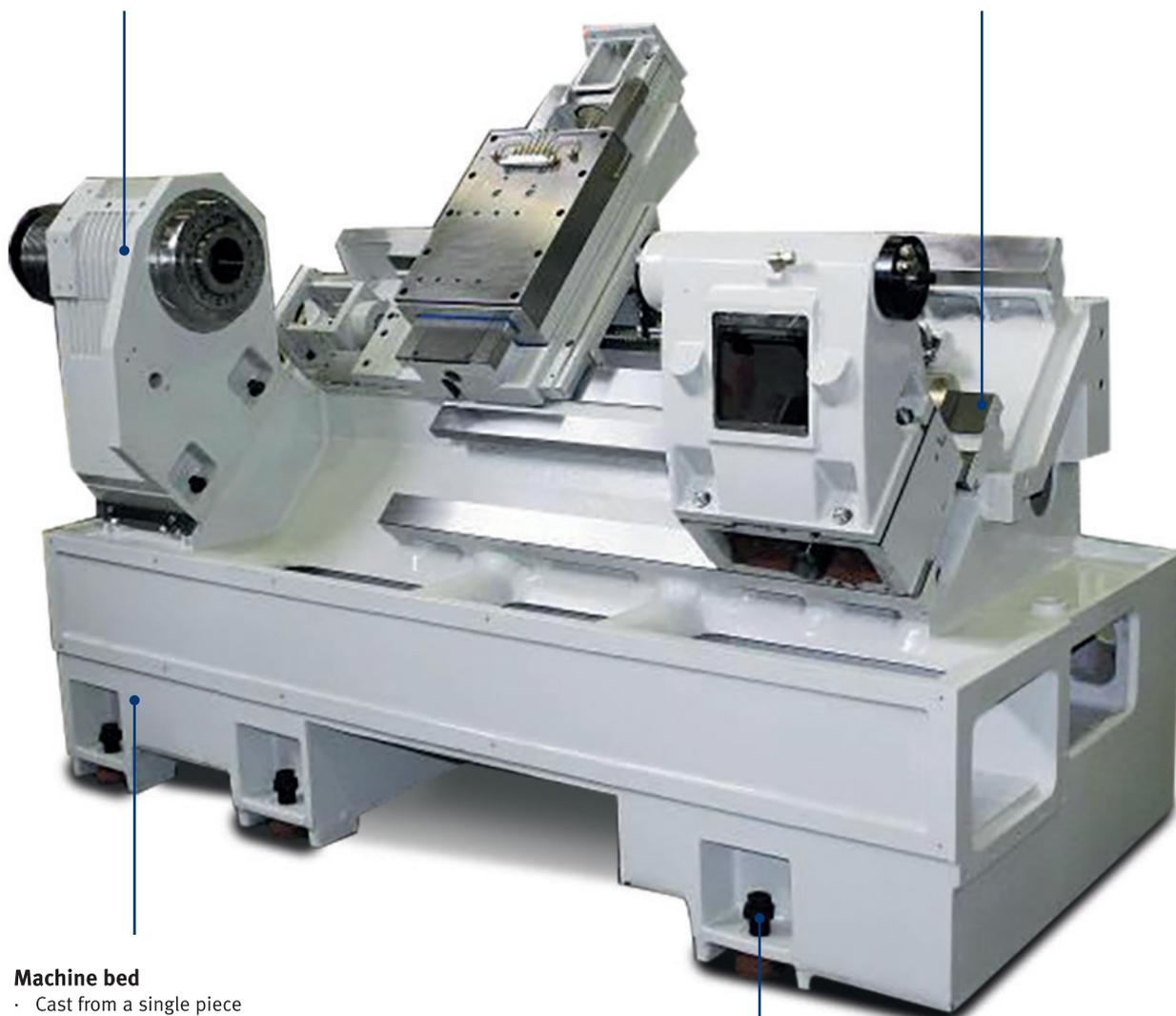


Headstock

- MEEHANITE® cast iron
- Cooling ribs on outside dissipate heat more effectively

Guide

- Excellent stiffness and stability



Machine bed

- Cast from a single piece
- Pronounced ribbing
- 45-degree slant
- Excellent stiffness and durability
- MEEHANITE® cast iron with a hardness of HB 170 ~ 180

Machine feet

- Six pcs.
- Optimal machine levelling

LASER MEASURING



- Guaranteed repetition and positioning accuracy

C AXIS



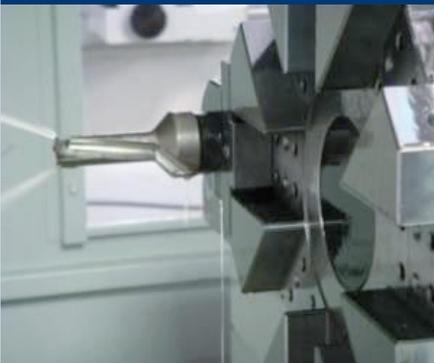
- C-axis is the rotary axis that controls the rotation of the spindle for precise positioning of the workpiece
- It provides accurate spindle indexing and a consistently stable low speed

TAILSTOCK



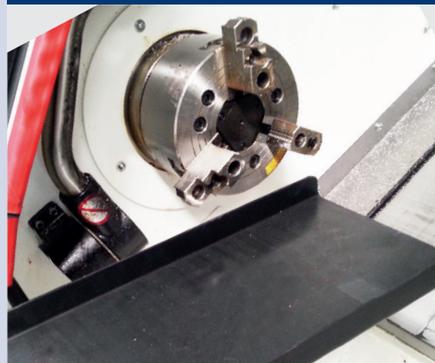
- Programmable
- Heavy duty version
- Excellent stiffness
- Can be optionally operated via a program or the foot pedal

TOOL WITH INTERNAL COOLING



- Pressure: 20 bars
- 25µm filter accuracy

PART GRIPPER DEVICE



- Automatic
- Finished parts are transported from the main spindle to the finished parts container with the aid of the parts catcher
- This enables the gentle removal of the finished parts

INTERFACE



- Preparation
 - Connection for bar feeder
- ➔ For information on bar feeders see page 296

AUTOM. RENISHAW MEASURING ARM



- Far less time spent on setting up tools and workpieces
- Less scrap due to setup errors
- Break detection

CHIP CONVEYOR - TROLLEY



- Conveyor version

FOOT PEDAL



- For releasing and clamping the lathe chuck
- Optional tailstock sleeve extends/retracts hydraulically

S 500		S 750			
TOOL TURRET AND Y-AXIS (Please note: traverse paths can change)					
351515018*	351517018*	1	Y axis Including Sauter tool turret with drive	<ul style="list-style-type: none"> Travel path +/- 50 mm Instead of standard equipment > hydraulic tool turret 	
BAR FEEDER					
351515003*	351517003*	2	Bar feeder Pro V 65E	Rod length 1 500 mm; material rods Ø 5 mm - Ø 65 mm	
351515012*	351517012*		Bar feeder Pro Conqueror	Rod length 3 000 mm; material rods Ø 5 - 51 mm	
➡ For information on bar feeders, and more bar feeders ex warehouse Germany see from page 296					
TOOL HOLDER					
351515006*	351517006*	3	Axially driven tool holder	Collet chuck ER 32	
351515007*	351517007*	4	Radially driven tool holder	Collet chuck ER 32	
351515008*	351517008*	5	Radially driven tool holder on rear side	Collet chuck ER 32	
STEADY RESTS					
351515010	351517010	6	Fixed steady rest		
MISCELLANEOUS					
351515009*	351517009*	7	Air conditioner	<ul style="list-style-type: none"> Instead of the standard equipment > heat exchanger 	
351515001*	351517001*		Oil separator	<ul style="list-style-type: none"> with rotary disc, removes oil from the coolant Capacity: 1 litre per hour 	
SOFTWARE					
3584014		8	Software DXF Viewer/Reader	<ul style="list-style-type: none"> from version 4.7 For importing DXF files Hiding graphics layers Automatic contour tracking Arbitrary workpiece zero point per contour/drilling point 	
HARDWARE					
351515030*		9	SIEMENS control PPU 290	15.6" colour display- 16:9 format, Software SW 26	
LATHE CHUCK					
-	351517013		Hydraulic four-jaw lathe chuck Ø 200 mm	<ul style="list-style-type: none"> Instead of standard equipment - hydraulic three-jaw lathe chuck Ø 250 mm 	
-	351517015		Four-jaw lathe chuck hydraulic Ø 300 mm	<ul style="list-style-type: none"> Instead of standard equipment > three-jaw lathe chuck hydraulic Ø 250 mm 	
351515013	-		Hydraulic four-jaw lathe chuck Ø 200 mm	<ul style="list-style-type: none"> Instead of standard equipment > hydraulic three-jaw lathe chuck Ø 200 mm 	
351515016	-		Hydraulic three-jaw lathe chuck Ø 250 mm	<ul style="list-style-type: none"> Instead of standard equipment > hydraulic three-jaw lathe chuck Ø 200 mm 	
351515017	-		Four-jaw lathe chuck hydraulic Ø 250 mm	<ul style="list-style-type: none"> Instead of standard equipment > hydraulic three-jaw lathe chuck Ø 200 mm 	
3519707			soft top jaw	<ul style="list-style-type: none"> for the hydraulic four-jaw lathe chuck Ø 200 mm (351517013) 	
3519727			Hard insert jaws	<ul style="list-style-type: none"> for the hydraulic four-jaw lathe chuck Ø 200 mm (351517013) 	
3519708			soft top jaw	<ul style="list-style-type: none"> for the hydraulic three-jaw lathe chuck Ø 250 mm included in the standard equipment for the hydraulic four-jaw lathe chuck Ø 250 mm (351517015) 	
3519728			Hard insert jaws	<ul style="list-style-type: none"> for the hydraulic three-jaw lathe chuck Ø 250 mm included in the standard equipment for the hydraulic four-jaw lathe chuck Ø 250 mm (351517015) 	

1 Y AXIS



- Including Sauter tool turret
- With drive

2 BAR FEEDER



- The bar feeders are the ideal solutions for automatic loading of CNC lathes with short bars
- They combine maximum productivity with a small footprint

3 TOOL HOLDER



- Axial drive
- High-precision bevel gears with excellent running characteristics
- Precision anti-friction bearings
- Excellent basic precision

4 TOOL HOLDER



- Radially offset drilling and milling head
- External coolant supply
- Excellent basic precision

5 TOOL HOLDER



- Rear side radially offset drilling and milling head
- External coolant supply
- Excellent basic precision

6 STEADY



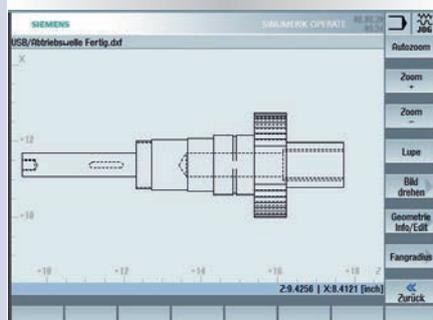
- Fixed steady with a passageway of $\varnothing 20 - 200$ mm

7 AIR CONDITIONER



- Instead of heat exchanger
- The air conditioner permanently and constantly cools the control cabinet to the set temperature.

8 DXF READER



- DXF data can be converted to NC programs for drilling patterns and contours

9 CONTROL PPU 290



- Capacitive display with Multitouch controller
- Intuitive Multitouch operation
- Soft key selection via touch function
- Software SW 26

BALTEC IN KAUNAS

TRAINING AND PRODUCTION CENTRE IN LITHUANIA USES CURRENTLY 30 OPTIMUM CNC MACHINES



Baltec CNC Technologies company headquarters in Kaunas

For eight years now, Baltec CNC Technologies, a manufacturer of mechanical precision components in Lithuania, has been relying on OPTIMUM lathes and milling machines. Now the cooperation is being taken to a new level: Since March 2020, the company's own training centre has also been equipped with OPTIMUM machines.

The milled parts specialist, which was founded in 1995 in central Lithuania, currently has around 45 CNC machines in operation, all of which run in 2-shift and, if required, 3-shift operation. Half of them are OPTIMUM brand machines. Under the meticulous eye of highly qualified specialists, these machines produce around 36 000 milled parts a year, the majority of which are exported to Western and Northern Europe, e.g. to Germany, Sweden, Norway and Switzerland. The company also specialises in welding, CNC bending, flame cutting, powder coating and the assembly of subassemblies. Production is optimised for machining individual workpieces made of steel, aluminium, titanium and plastic.



OPTIMUM machinery at the Baltec CNC Technologies production facility



Turned and milled parts manufactured on OPTIMUM machines



OPTIMUM service technicians on site performing maintenance in Production

Thus far, Baltec CNC Technologies has used OPTIMUM machines exclusively for the production processes. A total of **30 CNC-controlled OPTIMUM machines** are used to manufacture components for the automotive industry, universal mechanical engineering, printing machine technology and the energy sector. To achieve the best possible results, Baltec CNC Technologies is already working with the new 3D printing head 3X technology, which supports the production of medical components by means of 3D printing processes. Since March 2020, the company has not only been using OPTIMUM machines in its production facilities, but has also equipped its in-house training centre with OPTIMUM machines. The company uses this facility, which has an accredited training program, to serve professional development needs of its employees, who can take courses in CNC production techniques there.



Seven F150 CNC milling machines and two F310 HSC CNC milling machines in one of Baltec's production shops



Automatic production with robots

In order to further expand its leading position in the production of milled parts in Lithuania, Baltec has even developed its own automation cell featuring a robot for the OPTIMUM CNC machines in recent years. Parts are automatically provided to the robot on three levels; they are delivered from the workpiece table to the OPTIMUM CNC machine workpiece table. A Blum measuring system checks the part which is returned to the material workstation after completion. In the future, the company will not only be using these products for its own production but will also offer them to other companies using OPTIMUM CNC machines. The Lithuanian manufacturer of milled parts, which is also a reseller of CNC-controlled machines in the Baltic States, is thus extending its product range to include further innovative solutions.

OPTIMUM lathes and milling machines at Baltec CNC Technologies in Lithuania



Maintenance system for monitoring machine utilisation



OPTIMUM CNC machines coupled to robots



OPTIMUM
MASCHINEN - GERMANY

OPTIMUM
OPTiMILL
PU 5





CNC milling machine FU 3 -3+2
CNC milling machine FU 5 -3+2
CNC milling machine FU 5
5-axis milling machines user report see page 196

03

5-AXIS MACHINES

A circular badge with a white background and a blue border, containing the word "NEW" in blue capital letters.

FU 3 / 3+2

5-axis milling machine with 3+2 machining for powerful complete processing

SIEMENS SINUMERIK CONTROL 828D mit PPU 290 and 15.6 inch touchscreen

- Heavy duty version
- High productivity
- The CAM software and milling strategies are equivalent to normal 3-axis programming
- Laterally mounted tool changer, double arm grab with 24 tool slots
- Inline spindle with max. spindle speed of 15 000 rpm. The direct connection between spindle and motor spindle and motor increases surface quality and thermal stability
- Portable, electronic handwheel with confirm button and emergency stop button substantially facilitates running in of programs
- Coolant unit with 250 litre coolant tank, including chip flushing system and cleaning gun
- Automatic centralised lubrication
- Chip conveyor, belt type ensures efficient chip discharge
- Chip carriage
- High-performance oil cooler for spindle cooling and ball screw spindle
- 20 bar internal spindle cooling (an extraction unit is required)
- EMC Electromagnetic compatibility and safety module by SIEMENS
- Closed switch cabinet with integrated heat exchanger; ensures optimal temperature even in case of high ambient temperatures; prevents dirt particle penetration
- Machine lamp in the workspace
- RJ45 plug-in connection, USB connection and power connection 230 V
- Ethernet
- Including two years SIEMENS warranty (warranty extension on page 175). Information on the warranty at www.optimum-machines.com
- Information on „Maintenance contracts“ on page 321



Fig. FU 3 with optional accessories

TECHNICAL DATA

Model	FU 3/3+2
Article no.	3511370
Spindle	Inline spindle
Machine data	
Electrical connection	400 V / 3 Ph ~50 Hz
Total connected load	31 kVA
Milling spindle	
Drive motor S1 operation	15 kW
Torque drive motor S1 operation	20 Nm
Drive motor S6 30 % operation	22.5 kW
Torque drive motor S6 30 % operation	62 Nm
Spindle seat	SK 40 DIN 69871
Spindle centre to Z axis cover	595 mm
Clearance spindle to table	100 - 500 mm
Cooling lubricant system	
Tank capacity cooling lubricant tank	250 litres
Milling precision	
Repeat accuracy	± 0.005 mm / 300 mm
Positioning accuracy	± 0.005 mm
Tool changer	
Type	Double arm grab
Number of tool slots	24 slots
Max. tool diameter	80 mm
Max. tool diameter (tools slots beside not occupied)	130 mm
Tool length	245 mm
Max. tool weight	8 kg
Tool change time T-T	2 seconds
Traverse paths	
X axis	400 mm
Y axis	560 mm
Z axis	400 mm
Axis feed drive	
Speed swivel axis A	max. 25 rpm
Speed rotation axis C	max. 25 rpm
Acceleration X/Y/Z axis	6 m/s ²
Rapid traverse X/Y/Z axis	48 m/min.
Speed range	
Speeds*	15 000 rpm
Pneumatics	
Compressed air	6 bar
Inclining and rotating table	
Table diameter	Ø 320 mm
Table height	1 160 mm
Indexing A axis	60 seconds
Indexing C axis	20 seconds
Swivel range A axis	± 120° / -30°
Rotation range C axis	360°
T-slot size	12 mm
Max. load of working table	100 kg
Dimensions	
Length x width x height	2 254 x 2 990 x 2 960 mm
Length x width x height with chip conveyor	3 110 x 2 990 x 2 960 mm
Overall weight	5 000 kg

Sinumerik 828D system software	SW 28x
CNC memory	8 MB
Cycle change time	1 ms
Look Ahead	150
Number of tools	512

SINUMERIK 828D

The power package in the compact class of CNC controls

Boosting productivity and precision in manufacturing

Robust hardware architecture and intelligent control algorithms as well as top-class drive and motor technology ensure the highest dynamics and precision during machining.

Advanced software-controlled compensation functions ensure additional quality in surface machining and high availability of the machine tool.

With SINUMERIK Operate, all machining technologies, from standard to complex, can be operated intuitively and with a uniform "look & feel".

ADVANCED SURFACE

- Thanks to the new Advanced Surface movement guide, it can also be used for tool and mould making.



Perfect surface quality through reproducible results in adjacent milling paths (right picture)

Multitouch operation with PPU 290

The 15.6" panel is robust even in harsh environments. The SINUMERIK Operate user interface is optimised for touch-sensitive operation.

User-friendly

- Capacitive 15.6" color display, 16:9 format
- Configurable side screen
- Intuitive Multitouch operation
- Full QWERTY keyboard
- Soft key selection via touch function
- Easy data transfer thanks to IP65 protected front interfaces (USB 2.0, RJ45 Ethernet)
- Proximity/distance sensor for smart display control

Rugged and maintenance-free

- Front panel made of die-cast magnesium with scratchproof glass front
- Can be operated while wearing gloves
- NV RAM memory technology without buffer battery
- Fanless and hard diskless design

Warranty extension

The warranty extension lets you protect your new machine against warranty damage for a further 12, 24 or 36 months after the two-year SIEMENS warranty expires. (can only be ordered within the two-year SIEMENS warranty)

12 months; Article no. 3589020
24 months; Article no. 3589021
36 months; Article no. 3589022

TOP SURFACE

- Siemens shows a further development in terms of surface quality in mould making with Top Surface (*optional article no. 3584012*).
- The function optimises the CAD/CAM-CNC data, which reduces the dependence of the manufacturing quality on the CAD/CAM calculation tolerance and improves the surface quality and shape accuracy.

DXF READER

- Faster from the drawing to the workpiece. Easy transfer of CAD data into programming by DXF reader (*optional article no. 3584014*).



SIEMENS SAFETY INTEGRATED

SET UP WORK WITH OPEN DOORS

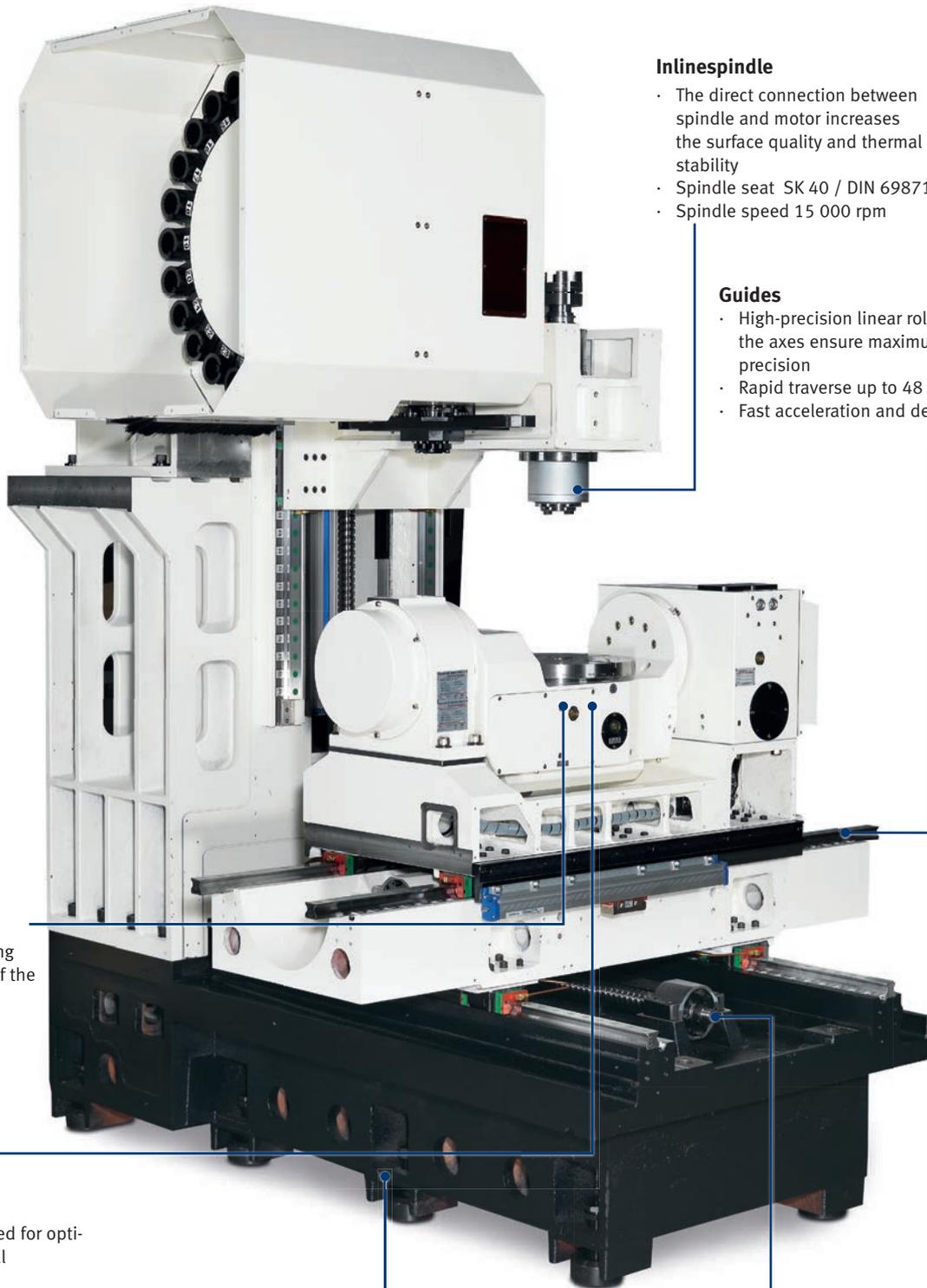
Functional safety also provides protection against high costs!

Machine and plant safety is not only important because strict regulations must be observed. When everything runs safely, you benefit from time savings in engineering, higher system availability and more investment security.

OVERALL PACKAGE

- Safety Integrated
- Residual material detection and machining
- ShopMill work step programming
- Managing network drives
- 3-D simulation
- Simultaneous recording
- System software SW 28x





Inlinespindle

- The direct connection between spindle and motor increases the surface quality and thermal stability
- Spindle seat SK 40 / DIN 69871
- Spindle speed 15 000 rpm

Guides

- High-precision linear roller guides on the axes ensure maximum stiffness and precision
- Rapid traverse up to 48 m/min. possible
- Fast acceleration and deceleration speed

Large work area

- Facilitates loading and unloading of the machine

Chip removal

- Machine designed for optimal chip removal

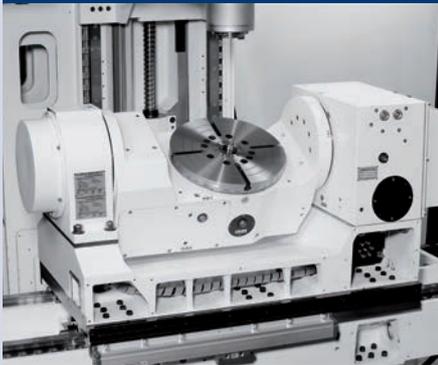
Base body

- Torsion free machine base thanks to strong ribbing, made of quality cast iron

Precision ball screw drives

- With pre-stressed double nut that allows for high tolerance and low play
- Cooled recirculating spindle

LARGE WORK AREA



- For amazing versatility of machine applications
- Clearance spindle to table 100 - 500 mm

CONTROL



- Swivel and rotatable
- with signal lamp

TOOL CHANGER



- Double arm grab
- Drum magazine
- 24 tool slots
- Tool change time T-T: 2 seconds

HANDWHEEL



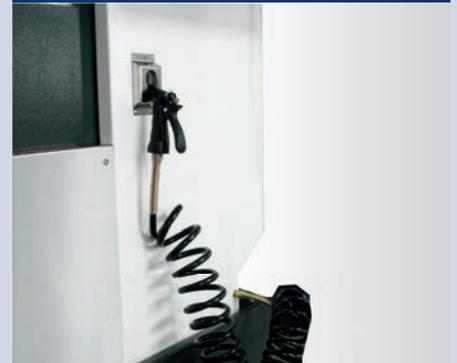
- Portable; electronic
- Substantially facilitates running in of programs
- Emergency stop button
- Confirm button

OIL SEPARATOR / OIL SKIMMER



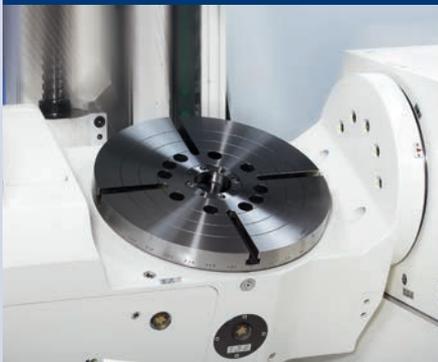
- Oil skimmer reliably removes floating tramp oils and finest chip debris from cooling lubricants

CLEANING GUN



- Easy cleaning of the workspace

INCLINING AND ROTATING TABLE



- Load-bearing capacity of up to 100 kg
- Diameter 320 mm

CHIP CONVEYOR



- Conveyor version
- For efficient chip discharge

CENTRAL LUBRICATION



- Prevents wear, repair costs and unnecessary downtime to a major extent

TOOL MEASURING / WORKPIECE MEASURING			
3511290604*		BLUM TC52IR Universal measuring probe	<ul style="list-style-type: none"> Switching point repetition accuracy from 0.3µm 2 at 2 m/ min. measuring speed Wear-free and durably stable Very compact probe with 40 mm diameter
3511290605*		BLUM ZX-Speed 3-D probe	<ul style="list-style-type: none"> Universal 3-D probe for toolmaking and tool break monitoring
 For information on Blum workpiece/tool measuring, also ex warehouse Germany see page 275			

MISCELLANEOUS			
3536109	1	Starter set SK 40 / DIN 69871	 For Information on the starter set see on page 284
351137001*	2	Coolant through spindle (CTS)	<ul style="list-style-type: none"> External power unit Pump pressure 20 bars
351137002*			<ul style="list-style-type: none"> External power unit Pump pressure 70 bars
351137012*	3	Air conditioner	<ul style="list-style-type: none"> Instead of the standard equipment › heat exchanger
351137015*	4	Heidenhain glass scales on X/Y/Z axis	<ul style="list-style-type: none"> Greater precision

SOFTWARE			
3584014	5	DXF Reader for SIEMENS SINUMERIK controls	<ul style="list-style-type: none"> from version 4.7 For importing DXF files Hiding graphics layers Automatic contour tracking Arbitrary workpiece zero point per contour/drilling point Multiple contours/drilling points can be selected at the same time Generate and convert contours or drilling points for ShopMill Displays the created contours/drilling points in the geometry processor/cycle support
3584012	6	Top surface for SIEMENS SINUMERIK control	<ul style="list-style-type: none"> The NC data from the CAM system are optimised online during processing The result is excellent surface quality while milling complex free-form surfaces. This is particularly beneficial for geometrically complex mould parts in automobile or aerospace applications or in power generation

1 STARTER SET SK 40 / DIN 69871



- Milling head holder with 27 mm collet 1
- Chuck 1 - 13 mm 2
- Pull stud 3
- 2 each Weldon 6 mm and 20 mm 4
- 2 each Weldon 8 mm, 10 mm, 12 mm and 16 mm
- Reduction sleeve SK 40 to MT 3 5
- Collet chuck ER 32 6
- Collet spanner ER 32 7
- Collet set ER 32 8
- Assembly and tool adjustment gauge 9
- Height-adjuster 10
- Taper squeegee 11

2 COOLANT THROUGH SPINDLE



- Guarantees optimal service life
- External unit
- Pump pressure 20 bars or 70 bars

3 AIR CONDITIONER



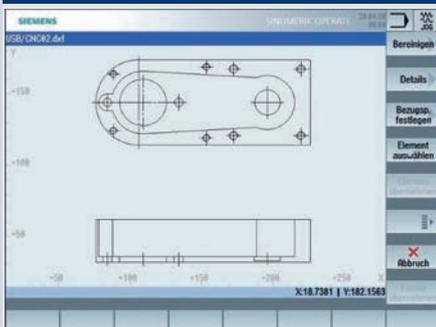
- Instead of heat exchanger
- The air conditioner permanently and constantly cools the control cabinet to the set temperature.

4 GLASS SCALES



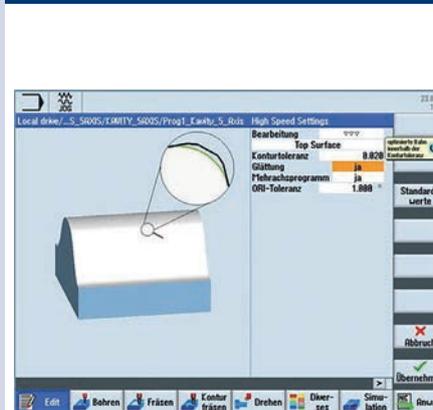
- X, Y and Z axis
- Greater precision

5 DXF READER



- DXF data can be converted to NC programs for drilling patterns and contours.

6 TOP SURFACE



- Top Surface gets the most out of your machine
- Top Surface is synonymous with milling at the physical limits of the machine – at the highest speeds, with utmost accuracy and the best surface quality – not only in mould making
- Excellent surface quality and form precision
- Fast and precise machining thanks to new technology
- Complete machining fully integrated with Sinumerik Operate

FU 5/3+2

NEW

5-axis milling machine for 3+2 machining

SIEMENS SINUMERIK CONTROL 828D with PPU 290

- Heavy duty version
- High productivity
- Telescopic guideway cover
- Precision ground, pre-stressed, high-performance ball screws for high rapid traverse speeds
- Spindle borne on P5 precision bearings and permanently lubricated
- High-torque servo drives on all five axes
- Precision linear guides
- Glass scales
- Fast rapid motion speed of up to 36 m/min.
- C-axis with torque motor. For maximum rotational speed and precision over service life
- A axis with screw drive for high torque during tilting actions
- Portable, electronic handwheel with enabling switch and emergency stop button that significantly facilitates the running-in of programmes
- Double arm grab tool changer with 32 tool slots included in standard scope of delivery (optionally available with 48 or 60 tool slots)
- Coolant unit with 380 litre coolant tank, including chip flushing system and cleaning gun
- Automatic centralised lubrication
- RJ45 plug-in connection, USB connection and 230 V power connection
- Additional USB interface on control panel
- Water circuit cooling unit for the main spindle and main spindle motor
- Chip conveyor, belt type ensures efficient chip discharge
- Chip carriage
- Heat exchanger
- EMC Electromagnetic compatibility
- Including two years **SIEMENS** warranty (warranty extension on page 183). Information on „Maintenance contracts“ on page 321



Fig. FU 5 with optional
SCHUNK vice

OPTIMILL FU 5/3+2

TECHNICAL DATA

Model	FU 5/3+2
Article no.	3511375
Spindle	Inline Spindle
Machine data	
Electrical connection	400 V / 3 Ph ~50 Hz
Total connected load	70 kVA
Milling spindle	
Drive motor S1 operation	25 kW
Drive motor torque S1	105 Nm
Drive motor S6 30 % operation	40 kW
Torque drive motor S6 30 % operation	261 Nm
Spindle seat	SK 40 DIN 69871
Milling precision	
Repeat accuracy	± 0.004 mm
Positioning accuracy	± 0.008 mm
Tool changer	
Type	Double arm grab
Number of tool slots	32 slots
Max. tool diameter	78 mm
Max. tool diameter (tools slots beside not occupied)	120 mm
Tool length	300 mm
Max. tool weight	7 kg
Tool change time T-T	1.51 seconds
Traverse paths	
X axis	600 mm
Y axis	600 mm (+400 mm and -200 mm)
Z axis	500 mm
Axis feed drive	
Acceleration X/Y/Z axis	7 m/s ²
Rapid traverse X/Y/Z axis	36 m/min.
Motor torque	
X/Y/Z axis	20 Nm
Feed forces	
X/Y/Z axis	10 kN
Speed range	
Speeds*	15 000 rpm
Pneumatics	
Compressed air	6 bar
Cooling lubricant system	
Tank capacity cooling lubricant tank	380 litres
Tank capacity of external CTS unit	165 litres
Pump motor chip flushing/delivery rate	0.85 kW / 150 l/min
Pump motor front/left chip flushing/delivery rate	1.08 kW / 150 l/min
Pump motor cleaning gun/delivery rate	0.53 kW / 58 l/min
Inclining and rotating table	
Table length x width	500 x 420 mm
T-slot size / amount / distance	14 mm / 7 / 75 mm
Max. load of working table	600 kg
Axis C	
Rotating axis	360°
Hydraulic clamping torque	1 200 Nm (at 50 bar hydraulic operating pressure)
Maximum rotational speed (worm gear)	max. 90 rpm
A axis	
Tilting axis	± 120°
Hydraulic clamping torque of tilting axis	2 900 Nm (at 50 bar hydraulic operating pressure)
Max. permissible torque (S1)	393 Nm
Max. permissible torque (S6)	707 Nm
Maximum tilting speed (torque motor)	max. 16.6 rpm
Dimensions	
Length x width x height	3 015 x 4 440 x 3 000 mm
Overall weight	9 150 kg

Sinumerik 828D system software	SW 28x
CNC memory	8 MB
Cycle change time	1 ms
Look Ahead	150
Number of tools	512

* Please note that the maximum spindle speed must be reduced by approx. 20 % in continuous operation

SINUMERIK 828D

The power package in the compact class of CNC controls

Boosting productivity and precision in manufacturing

Robust hardware architecture and intelligent control algorithms as well as top-class drive and motor technology ensure the highest dynamics and precision during machining.

Advanced software-controlled compensation functions ensure additional quality in surface machining and high availability of the machine tool.

With SINUMERIK Operate, all machining technologies, from standard to complex, can be operated intuitively and with a uniform "look & feel".

ADVANCED SURFACE

- Thanks to the new Advanced Surface movement guide, it can also be used for tool and mould making.



Perfect surface quality through reproducible results in adjacent milling paths (right picture)

Multitouch operation with PPU 290

The 15.6" panel is robust even in harsh environments. The SINUMERIK Operate user interface is optimised for touch-sensitive operation.

User-friendly

- Capacitive 15.6" color display, 16:9 format
- Configurable side screen
- Intuitive Multitouch operation
- Full QWERTY keyboard
- Soft key selection via touch function
- Easy data transfer thanks to IP65 protected front interfaces (USB 2.0, RJ45 Ethernet)
- Proximity/distance sensor for smart display control

Rugged and maintenance-free

- Front panel made of die-cast magnesium with scratchproof glass front
- Can be operated while wearing gloves
- NV RAM memory technology without buffer battery
- Fanless and hard diskless design

Warranty extension

The warranty extension lets you protect your new machine against warranty damage for a further 12, 24 or 36 months after the two-year SIEMENS warranty expires. (can only be ordered within the two-year SIEMENS warranty)

12 months; Article no. 3589020
24 months; Article no. 3589021
36 months; Article no. 3589022

TOP SURFACE

- Siemens shows a further development in terms of surface quality in mould making with Top Surface (*optional article no. 3584012*).
- The function optimises the CAD/CAM-CNC data, which reduces the dependence of the manufacturing quality on the CAD/CAM calculation tolerance and improves the surface quality and shape accuracy.

DXF READER

- Faster from the drawing to the workpiece. Easy transfer of CAD data into programming by DXF reader (*optional article no. 3584014*).



SIEMENS SAFETY INTEGRATED

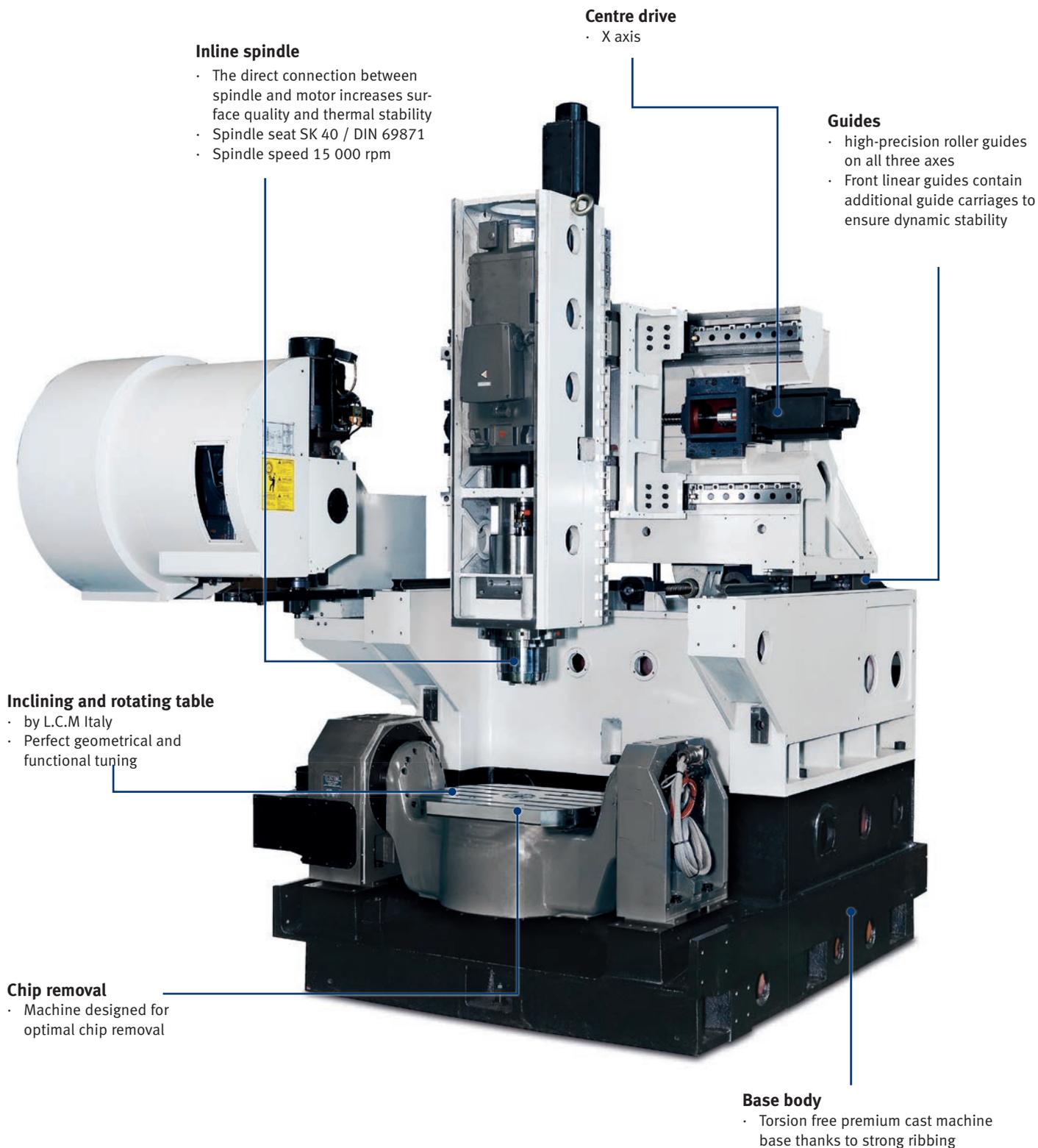
SET UP WORK WITH OPEN DOORS

Functional safety also provides protection against high costs!

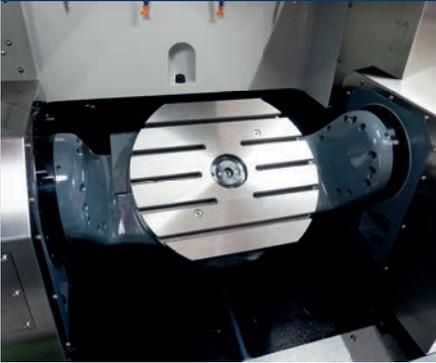
OVERALL PACKAGE

- Safety Integrated
- Residual material detection and machining
- ShopMill work step programming
- Managing network drives
- 3-D simulation
- Simultaneous recording
- System software SW 28x



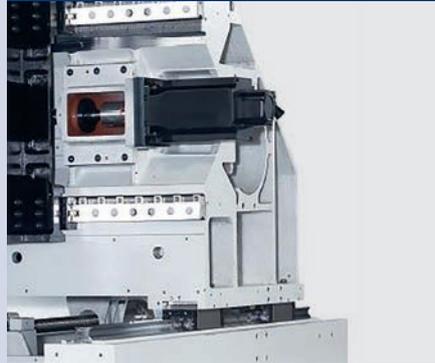


INCLINING AND ROTATING TABLE



- Max. rotational speed 90 rpm
- Max. tilt speed 16.6 rpm
- 3x hydraulic and 1x pneumatic connections (without valves)
- High-precision A axis & C axis
- Maximum table load 600 kg

FEED AXES



- Direct driven
- Rapid traverse X/Y/Z axis 36 m/min.

TOOL CHANGER



- Double arm gripper
- Drum magazine
- 32 tool slots
- optionally with 48 or 60 tool slots

GREASE LUBRICATION



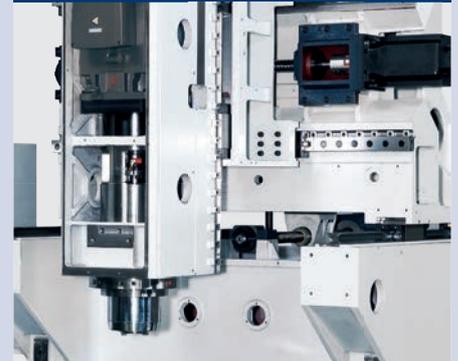
- Reduces wear
- High load-bearing capacity
- Excellent lubricant film
- Low maintenance
- Good adhesion properties

OIL SEPARATOR / OIL SKIMMER



- Oil skimmer reliably removes floating tramp oils and finest chip debris from cooling lubricants

GUIDES



- High-precision roller guides on all three axes
- Front linear guides contain additional guide carriages to ensure dynamic stability

CONTROL



- Next generation control panel with new machine control options
- Modern Multitouch screen interface

CHIP CONVEYOR



- Conveyor version
- for efficient chip discharge

COOLING UNIT



- Main spindle and main spindle motor cooling

TOOL MEASURING / WORKPIECE MEASURING			
351138018*		BLUM TC52IR Universal measuring probe	<ul style="list-style-type: none"> Switching point repetition accuracy from 0.3µm 2 at 2 m/ min. measuring speed Wear-free and durably stable Very compact probe with 40 mm diameter
351137506*		BLUM NT 2A Laser measuring system	<ul style="list-style-type: none"> Proven, high-precision laser measuring system Carrier systems offer best possible precision Laser diodes and lenses of the highest quality
➔ For information on Blum workpiece/tool measuring, also ex warehouse Germany see page 275			
3511290620*		Renishaw NC 4 Laser system for tool measurement	<ul style="list-style-type: none"> NC4 zero-contact tool control system is a high-precision, extremely fast solution for tool measurement and breakage checking
351138019*		Renishaw OMP 60 Probe with optical signal transmission	<ul style="list-style-type: none"> For checking and setting up workpieces on processing centres Compact, touch-actuated 3D probe. Reliably modulated, optical signal transmission.
3511290622*		Renishaw TS 27R Probe for tactile tool measurement	<ul style="list-style-type: none"> Tool breakage check Compact, tactile 3-D tool probe with wired signal transmission for tool breakage checking and fast measurement of the tool length and diameter

MISCELLANEOUS				
3536109	1	Starter set SK 40 / DIN 69871	➔ For Information on the starter set see on page 284	
351137503*	2	Coolant through spindle (CTS)	<ul style="list-style-type: none"> External unit, pump pressure 70 bars, tank capacity 165 litres, flow rate 29 l/min (a suction unit is required) 	
351137504*			<ul style="list-style-type: none"> External unit Grundfos high pressure 20 bars 	<ul style="list-style-type: none"> with oil separator paper filter cooling unit
351137505*			<ul style="list-style-type: none"> External unit Grundfos high pressure 70 bars 	
351137516*	3	Hood for machine work space		
354590050		Grease cartridge LHL - X100-7	<ul style="list-style-type: none"> for grease lubrication - 700 ml / 680 g grease Greases create an ideal and constant lubricating film on the mechanical parts of the machine Significantly extends the machine's service life 	

TOOL CHANGER			
351137509*	4	Double arm grab tool changer 48 tool slots	<ul style="list-style-type: none"> Instead of standard equipment › double arm grab tool changer with 32 tool slots
351137510*		Double arm grab tool changer 60 tool slots	<ul style="list-style-type: none"> Instead of standard equipment › double arm grab tool changer with 32 tool slots
<ul style="list-style-type: none"> If the tool changer option with 48 or 60 tool magazines is selected, the tools can be easily changed from the left-hand side during automatic operation to avoid idle time between power-up times 			

SOFTWARE			
3584014	5	DXF Reader for SIEMENS SINUMERIK controls	<ul style="list-style-type: none"> From version 4.7 For importing DXF files Hiding graphics layers
3584012	6	Top surface for SIEMENS SINUMERIK control	<ul style="list-style-type: none"> The NC data from the CAM system are optimised online during processing
351137520*	7	Collision Avoidance ECO	<ul style="list-style-type: none"> Enables simple, reliable machine protection and prevents inherent collisions of the machine bodies in the work area

1 STARTER SET SK 40 / DIN 69871



- Milling head holder with 27 mm collet 1
- Chuck 1 - 13 mm 2
- Pull stud 3
- 2 each Weldon 6 mm and 20 mm 4
- 2 each Weldon 8 mm, 10 mm, 12 mm and 16 mm
- Reduction sleeve SK 40 to MT 3 5
- Collet chuck ER 32 6
- Collet spanner ER 32 7
- Collet set ER 32 8
- Assembly and tool adjustment gauge 9
- Height-adjuster 10
- Taper squeegee 11

2 COOLANT THROUGH SPINDLE



- Guarantees optimal service life
- Optionally with internal or external unit
- Also available with Grundfoss high-performance pump
- Pump pressure 20 bars or 70 bars

3 TOOL CHANGER



- Double arm grab
- Drum magazine
- 48 or 60 tool slots

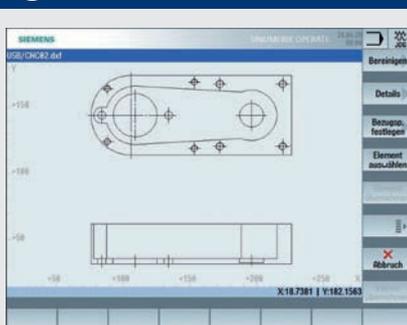
4 HOOD



- Easy loading and unloading of heavy and bulky workplaces with a crane
- Top machine space cover
- For oil mist extraction

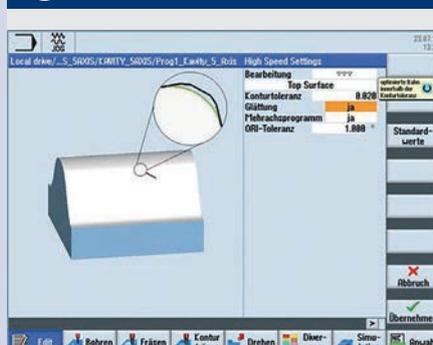


5 DXF READER



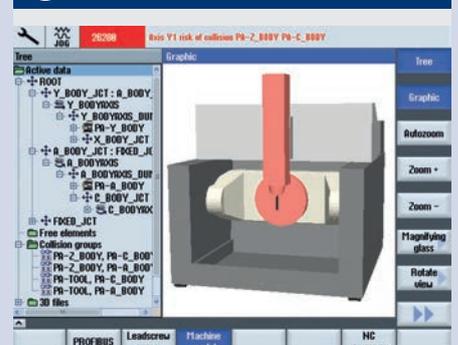
- DXF data can be converted to NC programs for drilling patterns and contours.

6 TOP SURFACE



- Excellent surface quality and form precision
- Fast and precise machining thanks to new technology
- Complete machining fully integrated with Sinumerik Operate

7 COLLISION AVOIDANCE ECO



- The Collision Avoidance Eco collision avoidance system relies on user-configurable safety areas and clearances

FU 5

5-axis simultaneous machining centre

SIEMENS SINUMERIK 840D SL with OP 019 BLACK

- Heavy duty version
- High productivity
- Telescopic guideway cover
- Precision ground, pre-stressed, high-performance ball screws for high rapid traverse speeds
- Spindle borne on P5 precision bearings and permanently lubricated
- High-torque servo drives on all five axes
- Precision linear guides
- Heidenhain glass scales – additional measuring system ensures greater precision
- Fast rapid motion speed of up to 36 m/min.
- C-axis with torque motor. For maximum rotational speed and precision over service life
- A axis with screw drive for high torque during tilting actions
- Portable, electronic handwheel with confirm button and emergency stop button substantially facilitates running in of programs
- Double arm grab tool changer with 32 tool slots included in standard scope of delivery (optionally available with 48 or 60 tool slots)
- Coolant unit with 380 litre coolant tank, including chip flushing system and cleaning gun
- Automatic centralised lubrication
- RJ45 plug-in connection, USB connection and 230 V power connection
- Additional USB interface on control panel
- Water circuit cooling unit for the main spindle and main spindle motor
- Chip conveyor, belt type ensures efficient chip discharge
- Chip carriage
- 20-bar internal spindle cooling with internal tank(an extraction unit is required)
- Heat exchanger
- EMC Electromagnetic compatibility
- Two years **SIEMENS** repair service contract included. Extension of the **SIEMENS** repair service contracts (RSV) see page 191
- Information on „Maintenance contracts“ on page 321



Follow this for the video presentation of our Optimum FU 5 milling machine

Subscribe to our YouTube channel, to avoid missing any of the new videos: www.youtube.com/user/OptimumMaschinen



Fig. FU 5 with optional
SCHUNK vice

TECHNICAL DATA

Models	FU 5-600 HSC 15	FU 5-600 HSC 24
Article no.	3511382	3511386
Spindle	Inline spindle	High frequency spindle (Built-in spindle) from Kessler
Machine data		
Electrical connection	400 V / 3 Ph ~50 Hz	
Total connected load	70 kVA	77 kVA
Milling spindle		
Drive motor S1 operation	25 kW	25 kW
Drive motor torque S1	105 Nm	32 Nm
Drive motor S6 30 % operation	40 kW	35 kW
Torque drive motor S6 30 % operation	261 Nm	39 Nm
Spindle seat	SK 40 DIN 69871	HSK A-63 DIN 69893
Milling precision		
Repeat accuracy	± 0.004 mm	
Positioning accuracy	± 0.008 mm	
Tool changer		
Type	Double arm grab	
Number of tool slots	32 slots	
Max. tool diameter	78 mm	
Max. tool diameter (tools slots beside not occupied)	120 mm	
Tool length	300 mm	
Max. tool weight	7 kg	
Tool change time T-T	1.51 seconds	
Traverse paths		
X axis	600 mm	
Y axis	600 mm (+500 mm und -100 mm)	
Z axis	500 mm	
Axis feed drive		
Acceleration X/Y/Z axis	7 m/s ²	
Rapid traverse X/Y/Z axis	36 m/min.	
Motor torque		
X/Y/Z axis	20 Nm	
Feed forces		
X/Y/Z axis	10 kN	
Speed range		
Speeds*	15 000 rpm	24 000 rpm
Pneumatics		
Compressed air	6 bar	
Cooling lubricant system		
Tank capacity cooling lubricant tank	380 litres	
Tank capacity of external CTS unit	165 litres	
Pump motor chip flushing/delivery rate	0.85 kW / 150 l/min	
Pump motor front/left chip flushing/delivery rate	1.08 kW / 150 l/min	
Pump motor cleaning gun/delivery rate	0.53 kW / 58 l/min	
Inclining and rotating table		
Table diameter	600 mm	
T-slot size / amount / distance	14 mm / 7 / 75 mm	
Max. load of working table	600 kg	
Axis C		
Rotating axis	360°	
Hydraulic clamping torque	1 200 Nm (at 50 bar hydraulic operating pressure)	
Maximum rotational speed (worm gear)	max. 90 rpm	
Axis A		
Tilting axis	± 120°	
Hydraulic clamping torque of tilting axis	2 900 Nm (at 50 bar hydraulic operating pressure)	
Max. permissible torque (S1)	393 Nm	
Max. permissible torque (S6)	707 Nm	
Maximum tilting speed (torque motor)	max. 16.6 rpm	
Dimensions		
Length x width x height	3 015 x 4 440 x 3 000 mm	
Overall weight	9 150 kg	

* Please note that the maximum spindle speed must be reduced by approx. 20 % in continuous operation

SINUMERIK 840D sl with OP 019 black Multitouch operating panel

The right solution for any engineering challenge

- The SINUMERIK 840D sl is rightly considered the benchmark in the CNC premium class. Maximum CNC performance and unrivalled flexibility and openness are the basis for almost any machine concept.

Multitouch operation OP 019 black

- 18.5" diagonal industrial display
- Maximum operating comfort: Capacitive multi-touch technology (up to 5 contact points simultaneously)
- High resolution of 1 366 x 768 pixels in widescreen format
- Rugged: No wear of mechanical components thanks to Multitouch technology
- Scratch-proof glass front
- Modern, intelligent design
- Can be operated while wearing gloves

SIEMENS
SAFETY INTEGRATED
SET UP WORK WITH OPEN DOORS

Functional safety also provides protection against high costs!

- Machine and plant safety is not only important because strict regulations must be observed. When everything runs safely, you benefit from time savings in engineering, higher system availability and more investment security.

OVERALL PACKAGE

- Safety functions SINUMERIK Safety Integrated
- Residual material detection and machining
- ShopMill work step programming
- MDynamics 5-axis
- Managing network drives
- 3-D simulation
- Advanced surface
- Spline interpolation
- TRANSMIT/cylinder surface transformation
- Measuring cycles
- Simultaneous recording
- HMI user memory on CF card
- 3D tool radius correction
- Kinematics measuring cycle CYCLE996



Extension of the **SIEMENS** repair service contracts (RSV)

The **SIEMENS** Repair Service Contract (RSV) helps you to protect your machine for another 12, 24 or 36 months (can only be ordered within the two-year Siemens warranty period).

12 months; Article no. 3589035 / 24 months; Article no. 3589036
36 months; Article no. 3589037

MODULAR AND SCALABLE

- In addition to scalable NCU performance, the SINUMERIK 840D sl also offers a high degree of modularity of the operating components. With a flexible operating concept - e.g. the combination of any control panel with the NCU - the SINUMERIK 840D sl ideally adapts to the operating philosophy of modern premium machine concepts.

BENCHMARK IN OPEN ARCHITECTURE

- The system openness of the SINUMERIK 840D sl is unparalleled. In this way, the CNC can be optimally adapted to the technology of the machine and has a high degree of freedom in production automation.

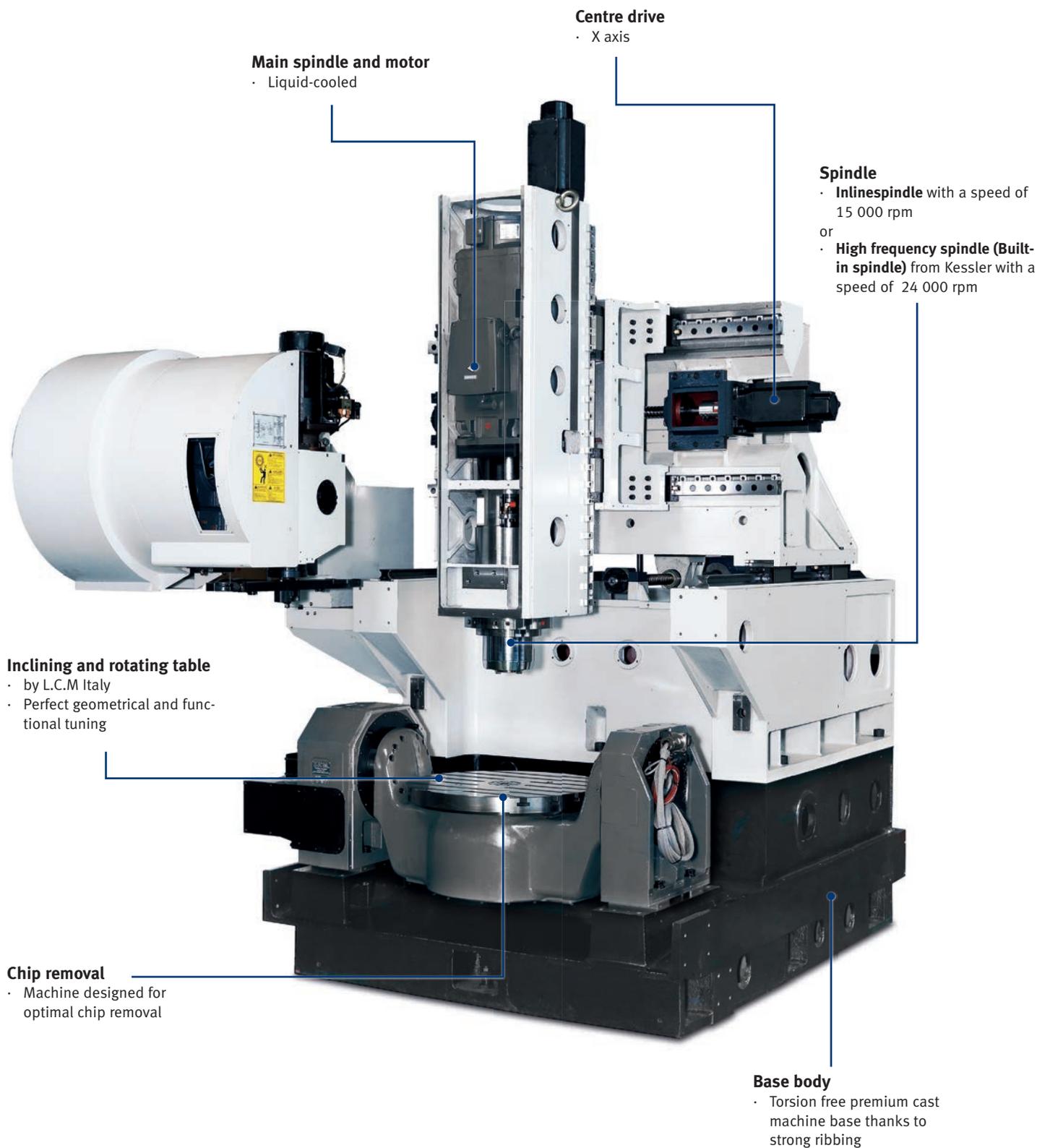


SIEMENS NCU 730.3

- up to 31 axes
- Cycle time 0.3 ms
- up to 1 500 tools
- Optional collision avoidance

NEW





Main spindle and motor
· Liquid-cooled

Centre drive
· X axis

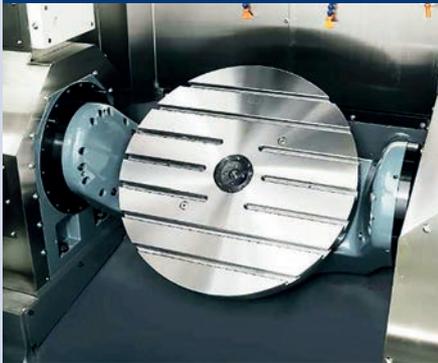
Spindle
· Inlinespindle with a speed of 15 000 rpm
or
· High frequency spindle (**Built-in spindle**) from Kessler with a speed of 24 000 rpm

Inclining and rotating table
· by L.C.M Italy
· Perfect geometrical and functional tuning

Chip removal
· Machine designed for optimal chip removal

Base body
· Torsion free premium cast machine base thanks to strong ribbing

INCLINING AND ROTATING TABLE



- Max. rotational speed 90 rpm
- Max. tilt speed 16.6 rpm
- 3x hydraulic and 1x pneumatic connections (without valves)
- High-precision A axis & C axis
- Maximum table load 600 kg

FEED AXES



- Direct driven
- Rapid traverse X/Y/Z axis 36 m/min.

TOOL CHANGER



- Double arm grab
- Drum magazine
- 32 tool slots
- Optionally with 48 or 60 tool slots

GREASE LUBRICATION



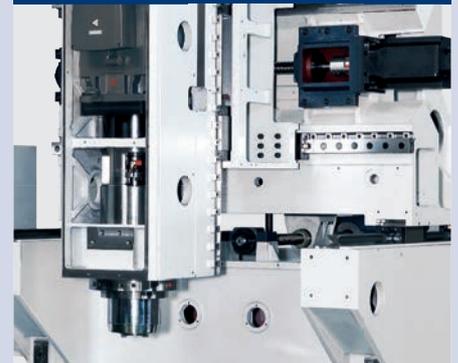
- Reduces wear
- High load-bearing capacity
- Excellent lubricant film
- Low maintenance
- Good adhesion properties

OIL SEPARATOR / OIL SKIMMER



- Oil skimmer reliably removes floating tramp oils and finest chip debris from cooling lubricants

GUIDES



- High-precision roller guides on all three axes
- Front linear guides contain additional guide carriages to ensure dynamic stability.

CONTROL



- Next generation control panel with new machine control options
- Modern Multitouch screen interface

CHIP CONVEYOR



- Conveyor version
- for efficient chip discharge

WATER CIRCULATION UNIT



- Main spindle and main spindle motor cooling

TOOL MEASURING / WORKPIECE MEASURING			
351138018*		BLUM TC52IR Universal measuring probe	<ul style="list-style-type: none"> Switching point repetition accuracy from 0.3µm 2 at 2 m/ min. measuring speed Wear-free and durably stable Very compact probe with 40 mm diameter
351138006*		BLUM NT 2A Laser measuring system	<ul style="list-style-type: none"> Proven, high-precision laser measuring system Carrier systems offer best possible precision Laser diodes and lenses of the highest quality
 For information on Blum workpiece/tool measuring see page 275			

MISCELLANEOUS								
3536109	1	Starter set SK 40 / DIN 69871	 For Information on the starter set see on page 284					
3536110	2	Starter set HSK A-63	 For Information on the starter set see on page 285					
351138003*	3	Coolant through spindle (CTS)	<table border="1"> <tr> <td> <ul style="list-style-type: none"> External unit pump pressure 20 bars </td> <td> <ul style="list-style-type: none"> tank capacity 165 litres delivery rate 30 l/min </td> <td rowspan="2">An extraction unit is required</td> </tr> <tr> <td> <ul style="list-style-type: none"> External unit pump pressure 70 bars </td> <td></td> </tr> </table>	<ul style="list-style-type: none"> External unit pump pressure 20 bars 	<ul style="list-style-type: none"> tank capacity 165 litres delivery rate 30 l/min 	An extraction unit is required	<ul style="list-style-type: none"> External unit pump pressure 70 bars 	
<ul style="list-style-type: none"> External unit pump pressure 20 bars 			<ul style="list-style-type: none"> tank capacity 165 litres delivery rate 30 l/min 	An extraction unit is required				
<ul style="list-style-type: none"> External unit pump pressure 70 bars 								
351138004*			<ul style="list-style-type: none"> External unit, Grundfos high pressure 70 bars, with oil separator, paper filter and cooling unit 					
351138005*								
351138002*		Air conditioner	<ul style="list-style-type: none"> Instead of the standard equipment › heat exchanger 					
351138016*	4	Hood for machine work space						
351138017*		Solenoid valve set for router table	<ul style="list-style-type: none"> For controlling three hydraulic connections and one pneumatic connection for workpiece clamping 					
354590050		Grease cartridge LHL - X100-7	<ul style="list-style-type: none"> for grease lubrication - 700 ml / 680 g grease Greases create an ideal and constant lubricating film on the mechanical parts of the machine Significantly extends the machine's service life 					

TOOL CHANGER			
<ul style="list-style-type: none"> If the tool changer option with 48 or 60 tool magazines is selected, the tools can be easily changed from the left-hand side during automatic operation to avoid idle time between power-up times 			
351138009*		Double arm grab tool changer 48 tool slots	<ul style="list-style-type: none"> Instead of standard equipment › double arm grab tool changer with 32 tool slots
351138010*		Double arm grab tool changer 60 tool slots	<ul style="list-style-type: none"> Instead of standard equipment › double arm grab tool changer with 32 tool slots

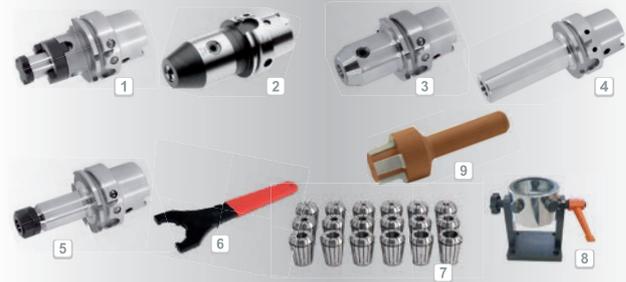
SOFTWARE			
3584014		DXF Reader for SIEMENS SINUMERIK controls	<ul style="list-style-type: none"> From version 4.7 For importing DXF files Hiding graphics layers Automatic contour tracking
3584012	5	Top surface for SIEMENS SINUMERIK control	<ul style="list-style-type: none"> The NC data from the CAM system are optimised online during processing
351138014*	6	Collision Avoidance, Collision avoidance software	<ul style="list-style-type: none"> Enables simple, reliable machine protection and prevents inherent collisions of the machine bodies in the work area

1 STARTER SET SK 40 / DIN 69871



- Milling head holder 27 mm seat 1
- Chuck 1 - 13 mm 2
- Pull stud 3
- 2 each Weldon 6 mm and 20 mm 4
- 2 each Weldon 8 / 10 / 12 / 16 mm 4
- Reduction sleeve SK 40 to MT 3 5
- Collet chuck ER 32 6
- Collet spanner ER 32 7
- Collet set ER 32 8
- Assembly and tool adjustment gauge 9
- Height-adjuster 10
- Taper squeegee 11

2 STARTER SET HSK A-63



- Milling head holder with 27 mm collet 1
- Chuck 1 - 13 mm 2
- Weldon 6 / 8 / 10 / 12 / 16 / 20 mm 3
- Adapter HSK63 to MT 3 4
- Collet chuck holder 5
- Collet spanner 6
- Collet chuck set 7
- Swivelling mounting block 8
- Taper squeegee 9

3 COOLANT THROUGH SPINDLE



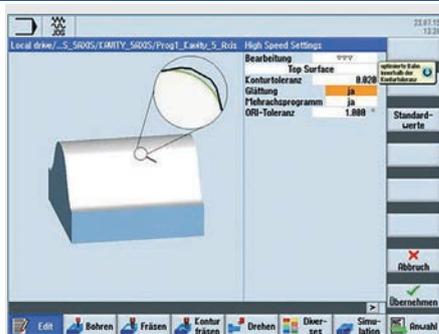
- Guarantees optimal service life
- External unit
- Also with Grundfos high pressure pump
- Pump pressure 20 bars or 70 bars

4 HOOD



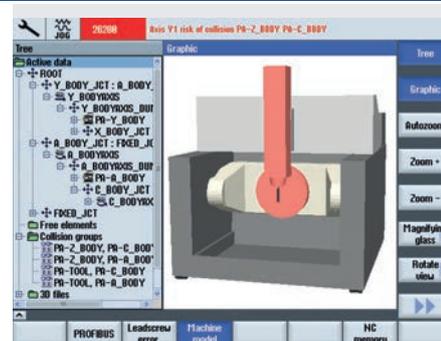
- Easy loading and unloading of heavy and bulky workpieces with a crane
- Top machine space cover
- For oil mist extraction

5 TOP SURFACE



- The NC data from the CAM system are optimised online during processing
- Excellent surface quality and form precision
- Fast and precise machining thanks to new technology
- Complete machining fully integrated with Sinumerik Operate

6 COLLISION AVOIDANCE



- Complex machining of components with both static and moving parts without risk of collision

ENVIRONMENTAL CAMPUS BIRKENFELD

OPTIMUM PROVIDES NEW CNC MACHINE FOR RESEARCH AND DEVELOPMENT



Just in time for the start of the winter semester 2019, the Hallstadt-based company Stürmer Maschinen GmbH provided the students at the Environmental Campus Birkenfeld with a new, state-of-the-art type OPTIMUM FU 5 CNC machine. The Environmental Campus specialises in environmental planning, technology and economics and is among the top ten in the world ranking list in the current GreenMetricRanking. The new OPTIMUM FU 5 milling machine is used for development work in the field of Industry 4.0 in order to achieve an optimised learning effect for the students, who can now demonstrate their developments with this machine.

The modern 5-axis machine with a weight of 10 tons and a value of approx. 240 000 euros was initially made available to the Environmental Campus free of charge for nine months. It will help employees and students at the Institute of Operations and Technology Management (ITB) to develop new methods of 3-D printing and thus provide new impetus in the fields of Industry 4.0 and the Digital Factory. The OPTIMUM FU5 milling machine is the ideal companion for this, as it enables filament printing on a 3-axis machine tool in combination with a modern software solution that can control the CNC machine via a Sinumerik control.

This project sees Stürmer continue its close cooperation with the Environmental Campus enabling employees and students to advance their research work in the field of 3-D printing with state-of-the-art technology. "Constant modernisation of the equipment in our laboratories in this area cannot be financed with internal resources. The loan shows that we have our finger on the pulse with our education and research programs, and we hope that we can expand this form of cooperation further," says Prof. Dr.-Ing. Peter Gutheil, Dean of the Department of Environmental Planning and Environmental Technology. Project manager Dipl.-Ing. (FH) Stefan Hirsch also sees the advantages: "The learning effect for the students involved is enormous and can have an extremely positive impact when starting a career."



OPTIMILL FU5 CNC MILLING MACHINE IMPRESSES IN TEST

A new milestone in progressive digitalisation of industrial production can be set thanks to support from Stürmer.

In January 2020, the Optimum FU 5 CNC milling machine, which had been made available to the Environmental Campus Birkenfeld a few months ago for 3-D printing trials, was tested in the scope of a workshop. The 5-axis machining centre impressed across the board. Even under the camera microscope used in the workshop, it was virtually impossible to detect defects on the test workpieces milled by the Optimum machine.

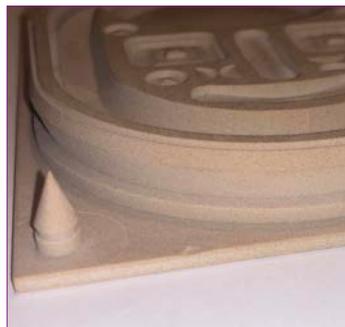
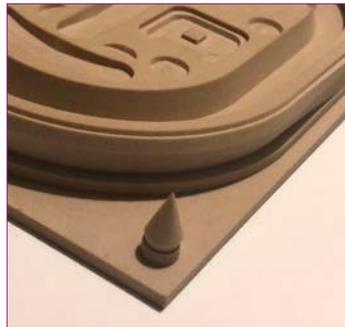
The CNC milling machine was tested using a test workpiece that the NC Gesellschaft e.V. had developed in 2005 to investigate the dynamic synchronisation of the machine axes and milling operations. The program data for this test part are now in the care of the Environmental Campus Birkenfeld, and were used to test the machine's machining precision. During a workshop with Hans Vogler, one of the developers of the test piece and an expert in the field of NC control, the OPTImill FU5 was put through its paces at the Environmental Campus Birkenfeld in the presence of representatives of Optimum and SIEMENS AG. The many years of experience that Mr. Vogler has built up from his development and consulting activities from the beginnings of NC control to the present day proved to be massively beneficial for the participants.

In a first step, SIEMENS application engineer Wolfgang Reichert explained the special cycles for 5-axis programming on the SIEMENS 840 D controller used here. Subsequently, various adaptations of machine data and control parameters were tested directly on the machine and optimised to tune the test workpiece. Using these adapted parameters, Hans Vogler's team produced several test parts on the milling machine in a second step; the parts were then examined with regard to running time and potential geometric deviations.

Defects of the test pieces produced by the OPTImill FU5 were virtually undetectable, even using a camera microscope. To underline the precise operation of the OPTIMUM CNC machine, archive pictures with negative examples were finally used; this once again illustrated the outstanding results achieved by the OPTIMUM 5-axis machining centre.

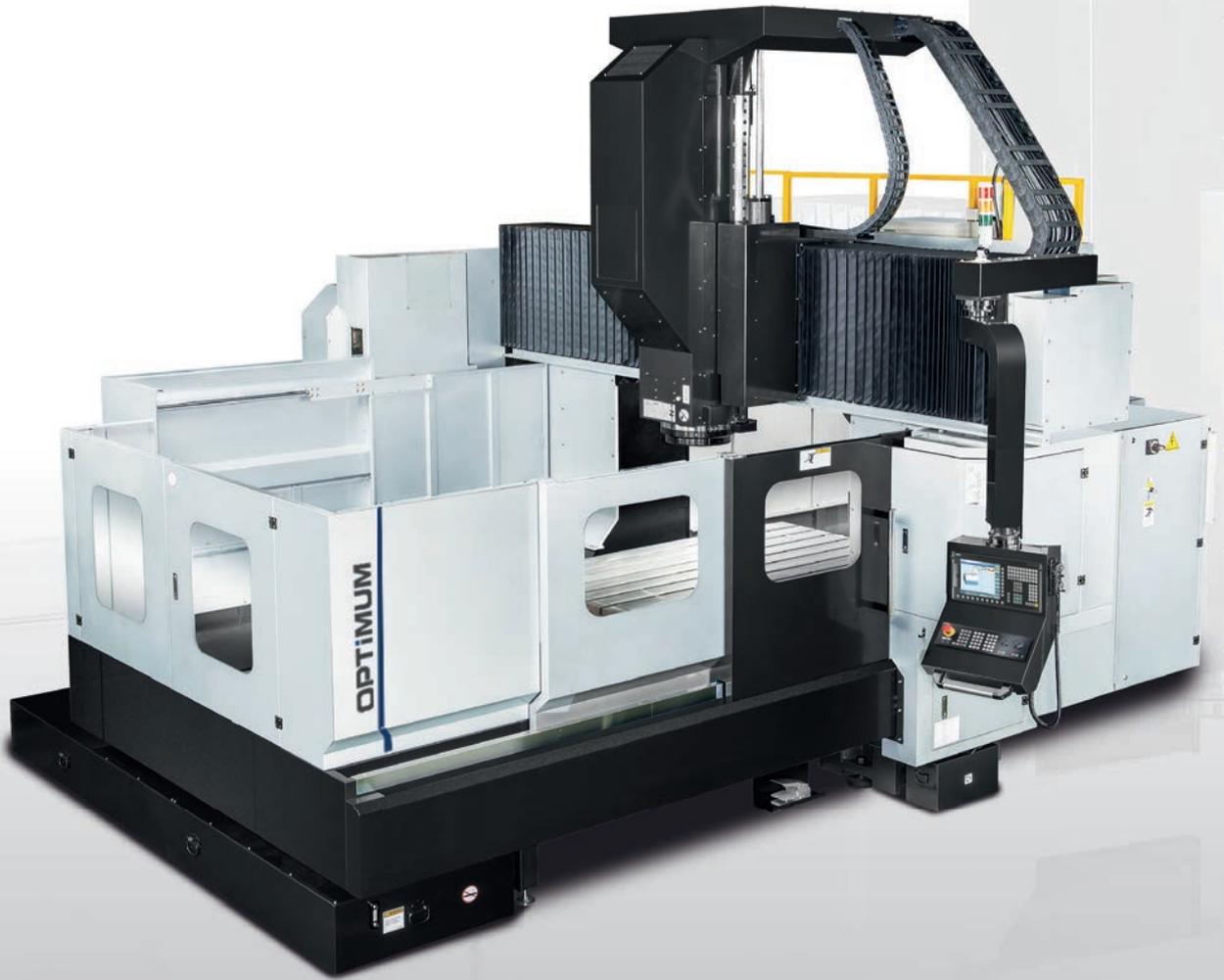
Conclusions:

With this perfectly manufactured test workpiece, the OPTImill FU5 stands up to any comparison with market competitors in terms of quality, precision and price-performance ratio.



Follow this for the video presentation

Subscribe to our YouTube channel, to avoid missing any of the new videos:
www.youtube.com/user/OptimumMaschinen





CNC Portal milling machine FP 1700
CNC Portal milling machine FP 2200
CNC Portal milling machine FP 3200
CNC Portal milling machine FP 4200
Portal milling machines user report see page 218

04

PORTAL MILLING MACHINES

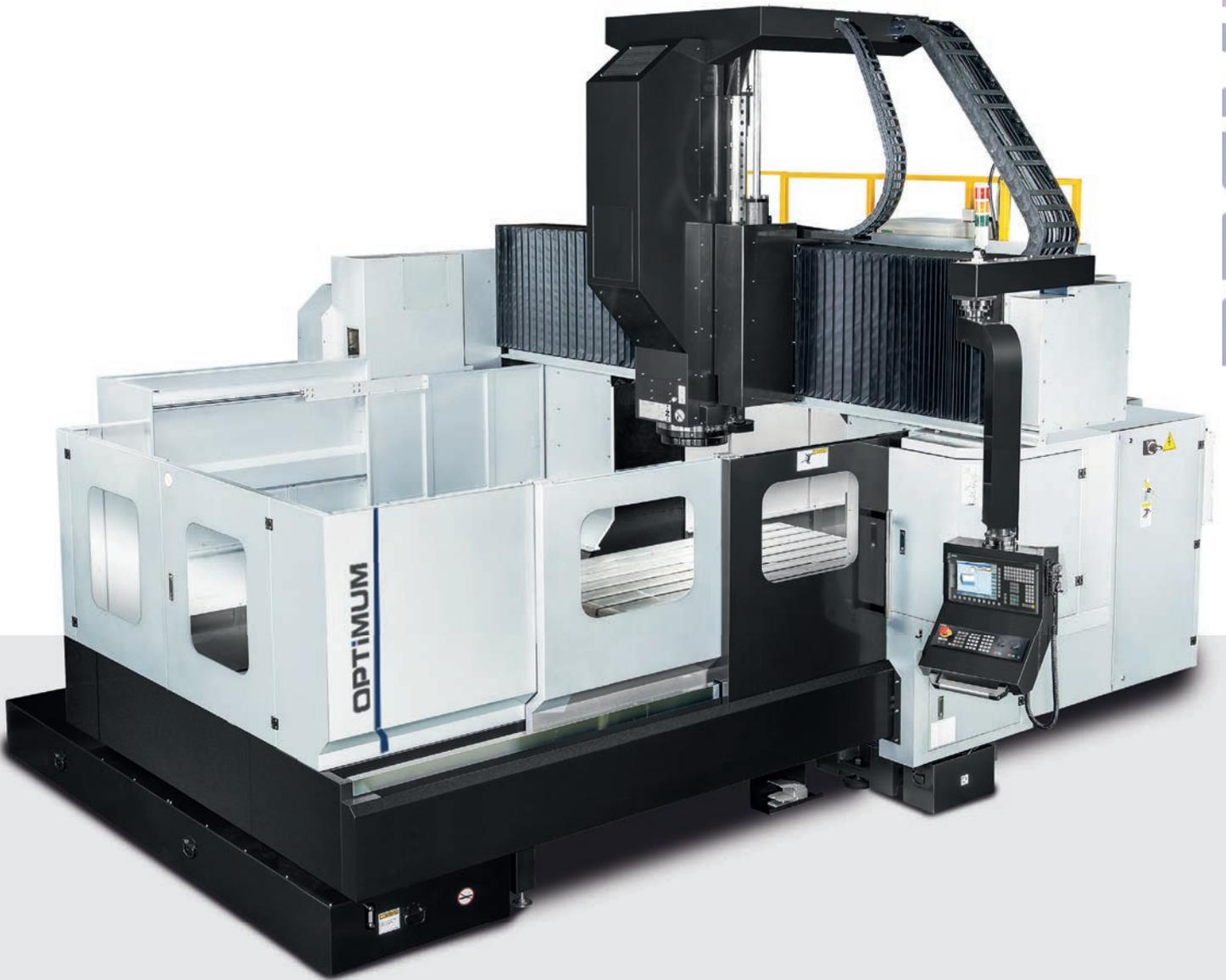
A circular badge with a white background and a blue border, containing the word "NEW" in bold blue capital letters.

FP 1700 / FP 2200

OPTIMUM PREMIUM CNC Portal milling machines.

SIEMENS SINUMERIK CONTROL 828D

- Perfect structures and a rugged design guarantee best possible rigidity and stability
- All main components - bed, worktable, column, crossbeam, saddle and headstock are made of high quality MEEHANITE® cast iron
- Generously dimensioned guides on the X, Y and Z axes
- All guide rails tempered and ground (HRC50 -HRC55)
- The X and Y axes are equipped with linear roller guides. This allows the axes to travel with maximum precision even at high speed
- Highest machining accuracy and high damping due to wide adjustable box ways of the Z-axis for high drilling and milling performance with high spindle output torque
- Hardened and precision-ground ball screws mounted in high-precision bearings in all three axes allow for absolutely unbalance-free rotation of the spindle
- Cooling of the main spindle gear (gear wheels, bearings, spindle), by oil circulation system to reduce thermal expansion
- Operating status display (work end lamp)
- Axis covers
- Working lamp
- Air gun/water gun
- Heat exchanger
- SK50 spindle seat with a maximum spindle speed of 8 000 rpm with 2-stage gear for high precision
- Pneumatic counterbalance of the Z-axis ensures very high reliability and stability while several axes are working simultaneously. The SCBS system does not need an additional power supply or drive. This balance system helps to achieve high speeds and excellent machining
- Complete machine enclosure with wide opening doors for ergonomic workpiece handling
- Automatic lubrication system with pressure control system
- Torsion free machine base thanks to strong ribbing
- Separating system for lubricating oil and coolant
- Set-up elements
- Including two years **SIEMENS** warranty (warranty extension on page 203). Information on the warranty at www.optimum-machines.com
- Information on „Maintenance contracts“ on page 321



OPTIMILL FP 1700/FP 2200

TECHNICAL DATA

Model	FP 1700	FP 2200
Article no.	3511610	3511620
Machine data		
Electrical connection	400 V / 3 Ph ~50 Hz	
Total connected load	50 KVA	
Milling spindle		
Drive motor S1	15 kW	
Drive motor torque S1	126 Nm	
Drive motor S6 30 % operation	22.5 kW	
Torque drive motor S6 30 % operation	380 Nm	
Spindle seat	SK 50 DIN 69871	
Cooling lubricant system		
Tank capacity	900 litres	
Tool changer		
Type	Double arm grab	
Number of tool slots	32 tools	
Max. tool diameter	160 mm	
Max. tool diameter (tools slots beside not occupied)	250 mm	
Tool length	350 mm	
Max. tool weight	15 kg	
Milling precision		
Repeat accuracy	± 0.008 mm	
Positioning accuracy	± 0.008 mm	
Traverse paths		
X axis (linear guide)	1 700 mm	2 200 mm
Y axis (linear guide)	1 400 mm	
Z axis (box way)	850 mm (option 1050 mm)	
Axis feed drive		
X axis fast motion	20 m/min.	16 m/min.
Y axis / Z axis rapid traverse	20 m/min.	
Motor torque		
X/Y/Z axis	48 Nm	
Feed forces		
X/Y/Z axis	13 kN / 15.6 kN / 15.6 kN	
Speed range		
Speeds*	8 000 rpm	
Pneumatics		
Compressed air	0.6 MPa (6 bar)	
Milling table		
Table length x width	1 700 x 1 200 mm	2 200 x 1 200 mm
T-slot size / amount / distance	22 / 7 / 150 mm	
Max. load of working table	5 000 kg	5 000 kg
Spindle to table distance	50 - 900 mm	
Stand to spindle distance	404 mm	
Distance between the stands	1 400 mm	
	„Work area“ on page 212	
Dimensions		
Footprint	6 000 x 4 500 mm	8 130 x 4 150 mm
	„Machinery layout plan“ on page 212	
Overall weight	17 000 kg	19 500 kg

Sinumerik 828D system software	SW 26x
CNC memory	5 MB
Cycle change time	2 ms
Look Ahead	100
Number of tools	256

SINUMERIK 828D

The power package in the compact class of CNC controls

Boosting productivity and precision in manufacturing

- With the SINUMERIK 828D CNC control from SIEMENS, users benefit from the fast and well-engineered hardware. The control offers maximum ease of use and ensures good connections to a wide range of storage media and networks. In its basic structure, the CNC control corresponds to the standards of common NC technology.
- As a top specialist for sophisticated milling machines, the Siemens SINUMERIK 828D masters every conceivable drilling and milling operation. Of course, this also applies in any tilted workpiece plane and on cylindrical workpieces. Even for mould making applications you do not need a special CNC control. The unique performance of the SINUMERIK 828D guarantees mirror-smooth surfaces with a minimum of machining time.
- For ergonomic operation and programming, the SINUMERIK 828D is equipped with a large 10.4-inch graphic colour screen. Robust function keys and a full QWERTY keyboard on the terminal allow the user to program, set up and operate even in harsh workshop environments. The mechanical buttons are protected against dust and liquids according to IP 65 by a stable and durable foil.
- Since the SINUMERIK 828D operates without components that are subject to wear, such as the fan and hard disk, it is maintenance-free and reliable in the long term. Powerful computers and memory enable modern NC strategies to be processed quickly and extensive colour graphics to be displayed in real time, even in animated form. On the one hand, this increases machining accuracy, and on the other, it simplifies operation, programming and diagnostics. The computing and storage capacity is so generous that moving graphics can be generated and shown to help with all functions and detailed simulations can be generated and shown for programmed operations.

Control

- 10.4" colour display
- 4:3 format
- User-friendly SINUMERIK Operate software
- Front interfaces: Front USB 2.0, RJ45 Ethernet, Compact Flash (CF) Card
- The 8 horizontal and 8 vertical soft keys take the user to all control windows with just a few key presses
- Rugged and robust



SIEMENS SAFETY INTEGRATED

SET UP WORK WITH OPEN DOORS

Functional safety also provides protection against high costs!

Machine and plant safety is not only important because strict regulations must be observed. When everything runs safely, you benefit from time savings in engineering, higher system availability and more investment security.

Warranty extension

The warranty extension lets you protect your new machine against warranty damage for a further 12, 24 or 36 months after the two-year SIEMENS warranty expires. (can only be ordered within the two-year SIEMENS warranty)

- 12 months; Article no. 3589020
- 24 months; Article no. 3589021
- 36 months; Article no. 3589022

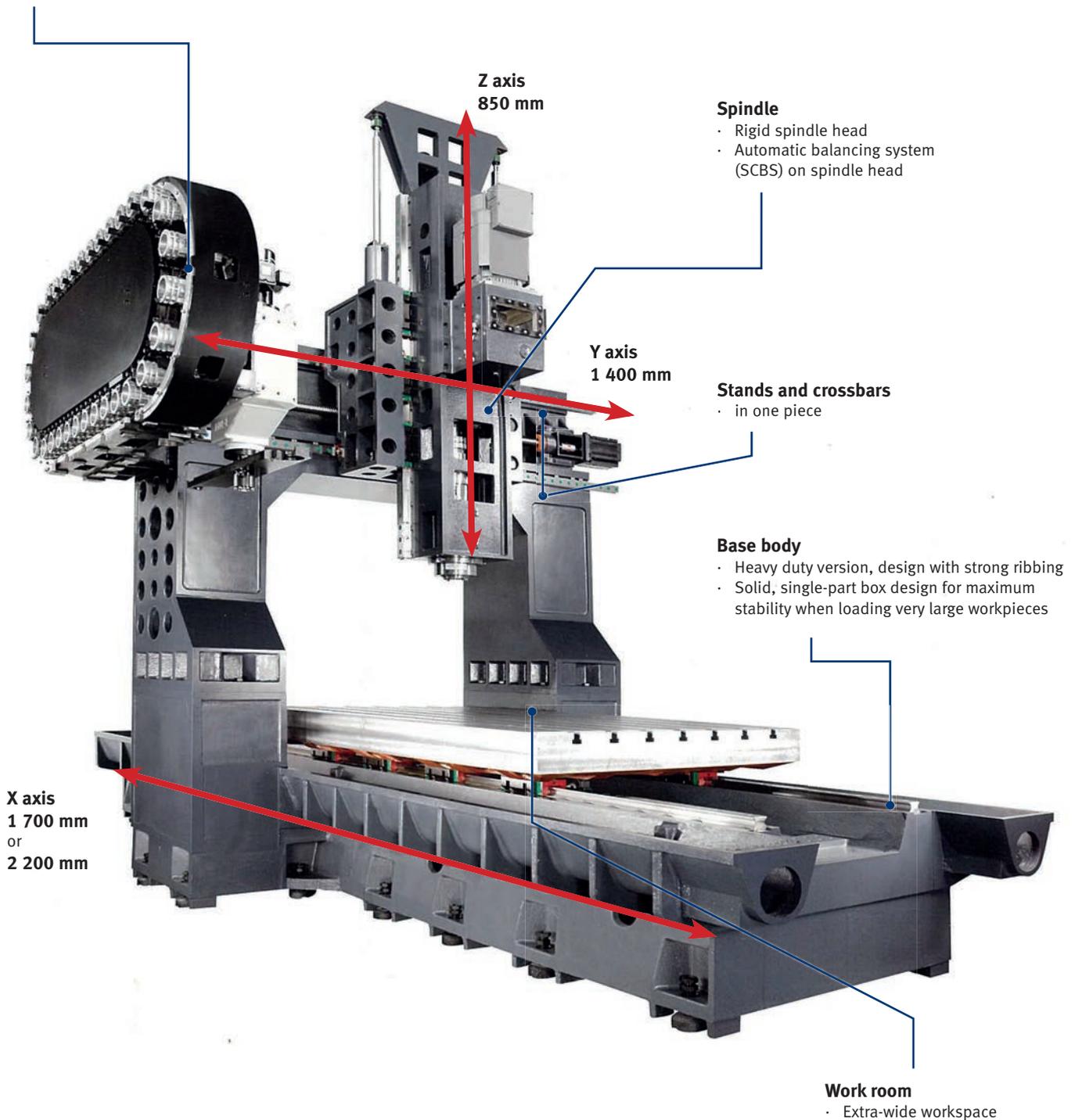
OVERALL PACKAGE

- Safety Integrated
- Residual material detection and machining
- ShopMill work step programming
- Managing network drives
- 3-D simulation
- Simultaneous recording
- System software SW 26x



Tool changer

- Driven by precision cam for fast and accurate tool positioning
- The tools are transferred directly from the tool magazine to the spindle during the tool change by means of a double gripper
- Tool selection occurs bidirectionally via the shortest route.
- The tool magazine is located outside of the work area
- The cover on the tool magazine protects the tools against chips or coolant



Z axis
850 mm

Spindle

- Rigid spindle head
- Automatic balancing system (SCBS) on spindle head

Y axis
1 400 mm

Stands and crossbars

- in one piece

Base body

- Heavy duty version, design with strong ribbing
- Solid, single-part box design for maximum stability when loading very large workpieces

X axis
1 700 mm
or
2 200 mm

Work room

- Extra-wide workspace

CHIP DISPOSAL



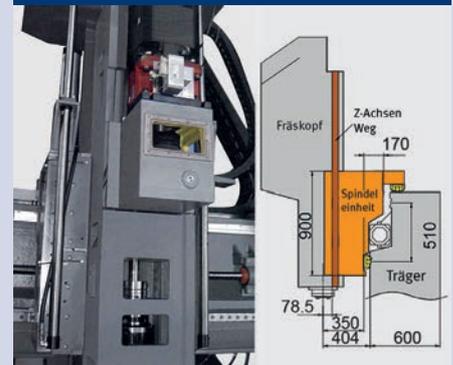
- Feeder spirals on both sides of the machine base transport high flow rates to the chip auger

SPINDLE HEAD



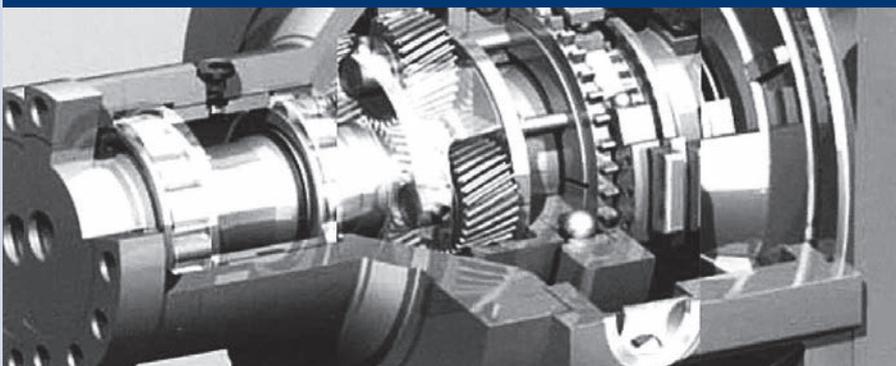
- ZF gearbox for high speeds
- oil bath lubricated
- Efficient cooling of the workpiece by internal spindle cooling
- Longer service life and high accuracy

Z AXIS



- Excellent stiffness and stability
- Box design
- Stability even with heavy machining

SPINDLE



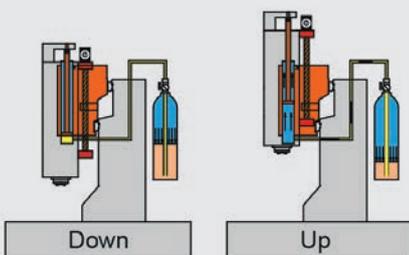
- High torque spindle ideal for high performance cutting applications
- Wide speed range up to 8 000 rpm for heavy machining and precision machining
- Automatic oil lubrication of spindles with cooling
- Inline spindle SK 50
- Cam gear

GEARBOX



- Gearbox with high transmission ratio

Z AXIS



- Pneumatic weight compensation in the Z-axis for high dynamics

PRECISION



- Each machine goes through dynamic and static precision tests. The machine precision complies with
- ISO 10791
- VDI 3441t
- ISO 230
- JIS B6388
- and ASME B5 standards.

Standard	ISO 10791-4	FP 1700/2200
	Axes traverse path	
Tolerance	>1 250 mm >2 000 mm	
Bi-directional positioning accuracy	A	0.042 mm
Bi-directional Repeat accuracy	R	0.020 mm
		0.008 mm

JIS B6336-4 shows the same value as the ISO standard:
The P value of VDI / DGQ3441 is equivalent to A in ISO10791-4 and PS is equivalent to R.
All values shown above were measured in environments with good air conditioning.

TOOL MEASURING / WORKPIECE MEASURING			
351161023*	1	BLUM TC62 Universal measuring probe	<ul style="list-style-type: none"> Switching point repetition accuracy from 0.3µm² at 2 m/ min. measuring speed Wear-free and durably stable Very compact probe with 40 mm diameter
351161024*		BLUM ZX-Speed 3-D probe	<ul style="list-style-type: none"> Universal 3-D probe for toolmaking and tool break monitoring
<p>➔ For information on Blum workpiece/tool measuring, also ex warehouse Germany see page 275</p>			
351161021*	2	Renishaw OMP 60 Probe with optical signal transmission	<ul style="list-style-type: none"> For checking and setting up workpieces on processing centres Compact, touch-actuated 3D probe. Reliably modulated, optical signal transmission.
351161020*		Renishaw NC 4 Laser system for tool measurement	<ul style="list-style-type: none"> NC4 non-contact tool inspection system is a high-precision, extremely fast solution for tool measurement and breakage control
351161022*	3	Renishaw TS 27R Probe for tactile tool measurement	<ul style="list-style-type: none"> Tool breakage check Compact, tactile 3-D tool probe with wired signal transmission for tool breakage checking
<p>➔ For information on the Renishaw laser system and probe, also ex warehouse Germany see page 288</p>			

3-D PRINTING			
3562411		3-D printing interface	<ul style="list-style-type: none"> Plug connector on milling head for OPTImill 3X/5X printing head Power supply is installed in control cabinet Prepared for open circuit monitoring and filament holder
<p>➔ For information on 3-D printing and accessories see 266</p>			

MISCELLANEOUS				
3536111		Starter set SK 50 / DIN 69871	<ul style="list-style-type: none"> Cutter head holder with 27 mm receptacle, 2 each Weldon 6 mm/20 mm, 1 each Weldon 8 mm / 10 mm / 12 mm / 16 mm, adapter SK 50 to MK 3, 4 collet holders ER 32, collet spanner ER 32, 18-piece collet set ER 32, height adjuster, cone squeegee, 15 tightening bolts 	
351161001*	4	Coolant through spindle (CTS)	<ul style="list-style-type: none"> Integrated unit, 20 bar 	we recommend an suction
351161002*			<ul style="list-style-type: none"> External unit; tank capacity 165 litres, 20 bars pump pressure 	
351161003*			<ul style="list-style-type: none"> External unit; tank capacity 165 litres, 70 bars pump pressure 	
351161014*	6	Air conditioner	<ul style="list-style-type: none"> Instead of the standard equipment › heat exchanger 	
351161005*		Linear guide	<ul style="list-style-type: none"> for Z axis 	
351161010*		Tool changer with 40 tool slots	<ul style="list-style-type: none"> Instead of the standard equipment › Tool changer with 32 tool slots 	
351161011*		Tool changer with 60 tool slots	<ul style="list-style-type: none"> Instead of the standard equipment › Tool changer with 32 tool slots 	
351161025*	5	Hood for machine work space		
351161030*		Z-axis extension	<ul style="list-style-type: none"> Z = 1 050 mm 	
351161035*	7	90° angle milling head	<ul style="list-style-type: none"> Speed up to 2 500 rpm Gearbox transmission ratio 1:1 38 kW maximum power transfer of the spindle drive 	
351161036*	8	Automatically indexing milling head B and C axis	<ul style="list-style-type: none"> Speed up to 3 500 rpm 5° pitch 	
On request		Fourth axis	<ul style="list-style-type: none"> 250 mm 	
On request		Fifth axis		

1 BLUM TC62 / ZX-SPEED



- Precise, directionally independent approach behaviour
- Constant deflection forces
- Spindle orientation not required
- No detrimental 3-leg principle with lobing effect

2 RENISHAW OMP 60



- Compact, high-accuracy probe that offers all the advantages of an automatic workpiece setup while enabling the measurement of complex 3D part geometries on CNC machining centres.

3 RENISHAW TS 27R



- Proven kinematic design.
- Interference-free, wired communication
- Least expensive tool measurement for all types of machining centres.
- Repetition accuracy of 1.00 µm (2)

4 COOLANT THROUGH SPINDLE



- Guarantees optimal service life
- Optionally with internal or external unit
- Pump pressure 20 bars or 70 bars

5 HOOD



- Easy loading and unloading of heavy and bulky workpieces with a crane
- Top machine space cover
- For oil mist extraction

6 AIR CONDITIONER



- Instead of heat exchanger
- The air conditioner permanently and constantly cools the control cabinet to the set temperature.

7 90° ANGLE MILLING HEAD



- Increases the technological nature of the machining equipment, work productivity and reduces set-up and auxiliary times and the need for special fixtures.

8 AUTOMATIC MILLING HEAD



- Increase in machining accuracy because it is not necessary to change the position of the clamped workpiece.
- Speed up to 3 500 rpm
- 5° pitch

NEW

FP 3200 / FP 4200

OPTIMUM PREMIUM CNC Portal milling machine

SIEMENS SINUMERIK CONTROL 828D

- Perfect structures and a rugged design guarantee best possible rigidity and stability
- All main components - bed, worktable, column, crossbeam, saddle and headstock are made of high quality MEEHANITE® cast iron
- Generously dimensioned guides on the X, Y and Z axes
- All guide rails tempered and ground (HRC50 -HRC55)
- The X and Y axes are equipped with linear roller guides. This allows the axes to travel with maximum precision even at high speed
- Highest machining accuracy and high damping due to wide adjustable box way guides of the Z-axis for high drilling and milling performance with high spindle output torque.
- Hardened and precision-ground ball screws mounted in high-precision bearings in all three axes allow for absolutely unbalance-free rotation of the spindle
- Cooling of the main spindle gear (gear wheels, bearings, spindle), by oil circulation system to reduce thermal expansion
- Operating status display (work end lamp)
- Axis covers
- Working lamp
- Air gun/water gun
- Heat exchanger
- SK50 spindle seat with a maximum spindle speed of 8 000 rpm with 2-stage gear for high precision
- Pneumatic counterbalance of the Z-axis ensures very high reliability and stability while several axes are working simultaneously. The SCBS system does not need an additional power supply or drive. This balance system helps to achieve high speeds and excellent machining precision
- Complete machine enclosure with wide opening doors for ergonomic workpiece handling
- Automatic lubrication system with pressure control system
- Torsion free machine base thanks to strong ribbing
- Separating system for lubricating oil and coolant
- Including two years **SIEMENS** warranty (warranty extension on page 203). Information on the warranty at www.optimum-machines.com
- Information on „Maintenance contracts“ on page 321

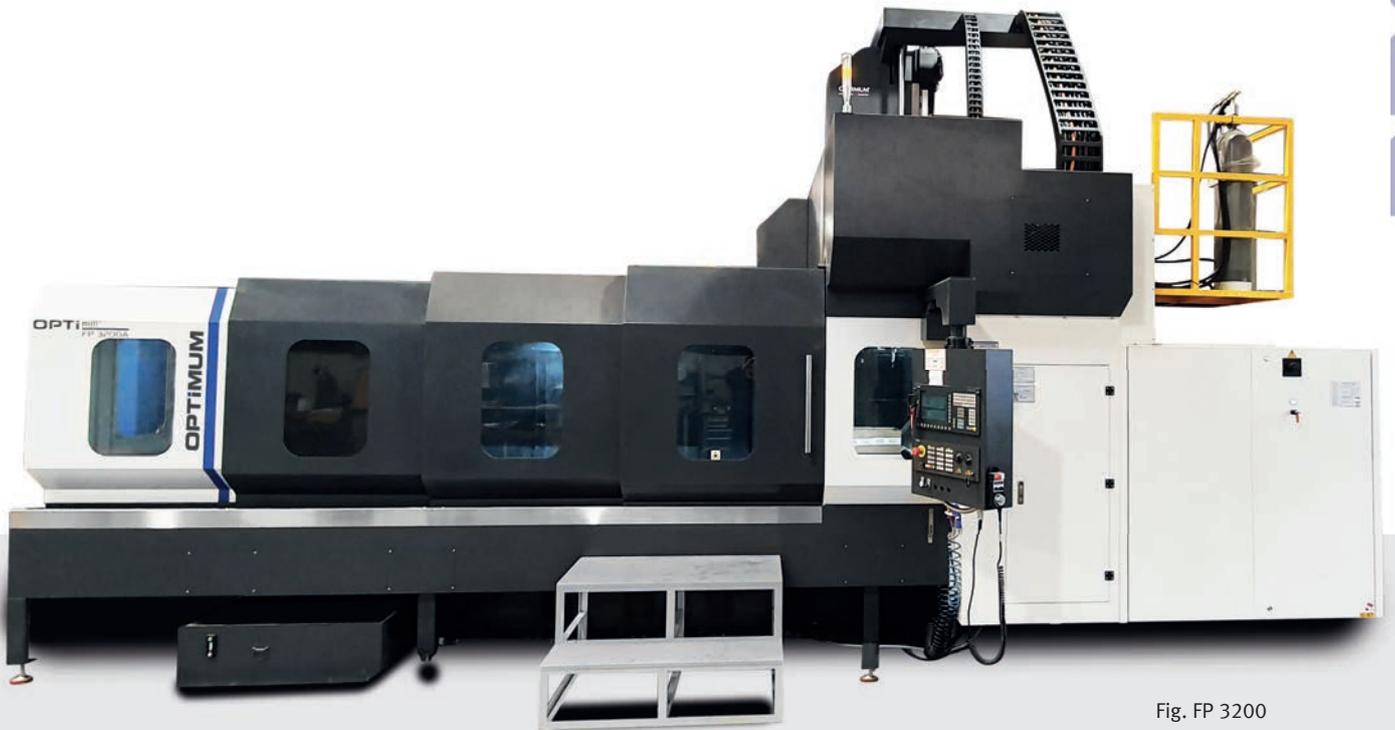


Fig. FP 3200

OPTIMILL FP 3200 / FP 4200

TECHNICAL DATA

Model	FP 3200	FP 4200
Article no.	3511630	3511640
Machine data		
Electrical connection	400 V / 3 Ph ~50 Hz	
Total connected load	50 KVA	
Milling spindle		
Drive motor S1	15 kW	
Drive motor torque S1	126 Nm	
Drive motor S6 30 % operation	22.5 kW	
Torque drive motor S6 30 % operation	380 Nm	
Spindle seat	SK 50 DIN 69871	
	„Spindle power and torque diagram“ on page 213	
Cooling lubricant system		
Tank capacity	900 litres	
Tool changer		
Type	Double arm grab	
Number of tool slots	32 tools	
Max. tool diameter	160 mm	
Max. tool diameter (tools slots beside not occupied)	250 mm	
Tool length	350 mm	
Max. tool weight	15 kg	
Milling precision		
Repeat accuracy	± 0.008 mm	
Positioning accuracy	± 0.008 mm	
Traverse paths		
X axis (linear guide)	3 200 mm	4 200 mm
Y axis (linear guide)	1 400 mm	
Z axis (box way)	850 mm (option 1050 mm)	
Axis feed drive		
X axis fast motion	16 m/min.	12 m/min.
Y axis fast motion	20 m/min.	
Z axis rapid traverse	20 m/min.	
Motor torque		
X/Y/Z axis	48 Nm	
Feed forces		
X/Y/Z axis	14.4 kN / 28.9 kN / 28.9 kN	
Speed range		
Speeds*	8 000 rpm	
Pneumatics		
Compressed air	0.6 MPa (6 bar)	
Milling table		
Table length x width	3 200 x 1 200 mm	4 200 x 1 200 mm
T-slot size / amount / distance	22 / 7 / 150 mm	
Max. load of working table	8 000 kg	
Clearance spindle to table	50 - 900 mm	
Distance spindle to crossbar	404 mm	
Distance between the stands	1 400 mm	
	„Work area“ on page 212	
Dimensions		
Footprint	8 130 x 4 500 mm	10 000 x 4 500 mm
	„Machinery layout plan“ on page 212	
Overall weight	21 000 kg	22 000 kg

Sinumerik 828D system software	SW 26x
CNC memory	5 MB
Cycle change time	2 ms
Look Ahead	100
Number of tools	256

SINUMERIK 828D

The power package in the compact class of CNC controls

Boosting productivity and precision in manufacturing

- With the SINUMERIK 828D CNC control from SIEMENS, users benefit from the fast and well-engineered hardware. The control offers maximum ease of use and ensures good connections to a wide range of storage media and networks. In its basic structure, the CNC control corresponds to the standards of common NC technology.
- As a top specialist for sophisticated milling machines, the Siemens SINUMERIK 828D masters every conceivable drilling and milling operation. Of course, this also applies in any tilted workpiece plane and on cylindrical workpieces. Even for mould making applications you do not need a special CNC control. The unique performance of the SINUMERIK 828D guarantees mirror-smooth surfaces with a minimum of machining time.
- For ergonomic operation and programming, the SINUMERIK 828D is equipped with a large 10.4-inch graphic colour screen. Robust function keys and a full QWERTY keyboard on the terminal allow the user to

program, set up and operate even in harsh workshop environments. The mechanical buttons are protected against dust and liquids according to IP 65 by a stable and durable foil.

- Since the SINUMERIK 828D operates without components that are subject to wear, such as the fan and hard disk, it is maintenance-free and reliable in the long term. Powerful computers and memory enable modern NC strategies to be processed quickly and extensive colour graphics to be displayed in real time, even in animated form. On the one hand, this increases machining accuracy, and on the other, it simplifies operation, programming and diagnostics. The computing and storage capacity is so generous that moving graphics can be generated and shown to help with all functions and detailed simulations can be generated and shown for programmed operations.

Control

- 10.4" colour display
- 4:3 format
- User-friendly SINUMERIK Operate software
- Front interfaces: Front USB 2.0, RJ45 Ethernet, Compact Flash (CF) Card
- The 8 horizontal and 8 vertical soft keys take the user to all control windows with just a few key presses
- Rugged and robust



SIEMENS SAFETY INTEGRATED

SET UP WORK WITH OPEN DOORS

Functional safety also provides protection against high costs!

Machine and plant safety is not only important because strict regulations must be observed. When everything runs safely, you benefit from time savings in engineering, higher system availability and more investment security.

Warranty extension

The warranty extension lets you protect your new machine against warranty damage for a further 12, 24 or 36 months after the two-year SIEMENS warranty expires. (can only be ordered within the two-year SIEMENS warranty)

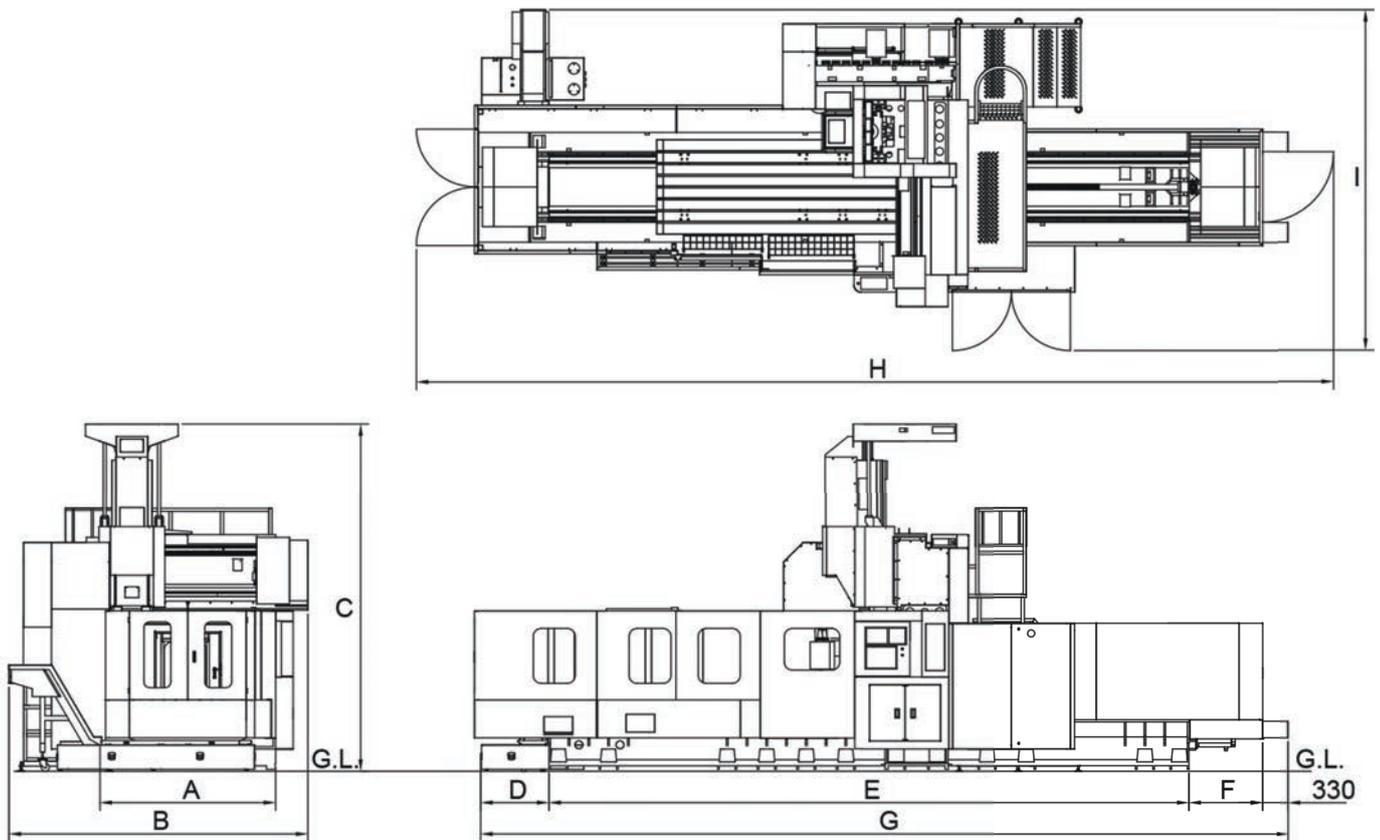
- 12 months; Article no. 3589020
- 24 months; Article no. 3589021
- 36 months; Article no. 3589022

OVERALL PACKAGE

- Safety Integrated
- Residual material detection and machining
- ShopMill work step programming
- Managing network drives
- 3-D simulation
- Simultaneous recording
- System software SW 26x

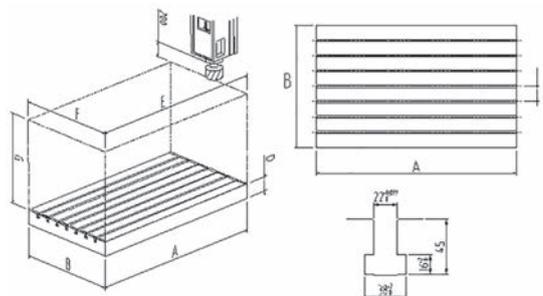


MACHINERY LAYOUT PLAN



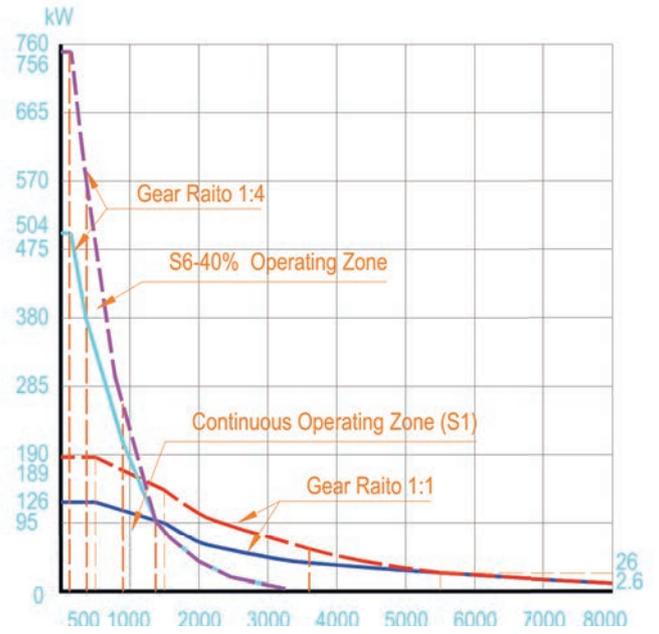
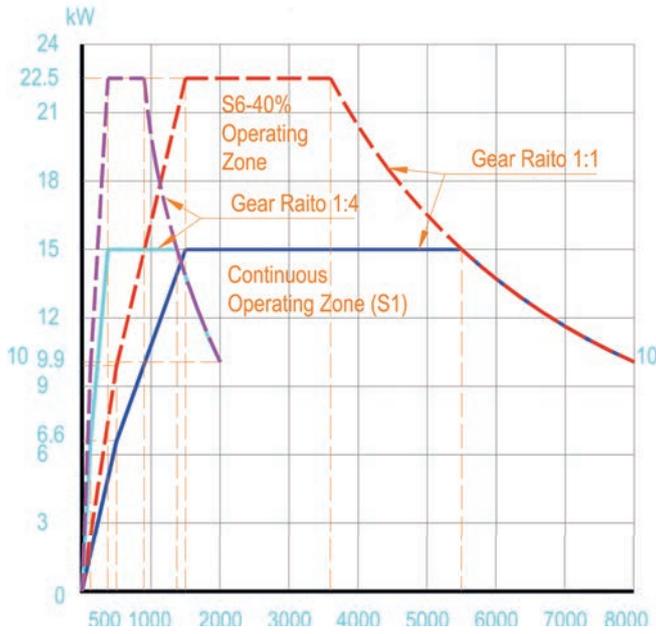
	mm			
	FP 1700	FP 2200	FP 3200	FP 4200
A	2 200	2 200	2 200	2 200
B	3 850	3 850	3 850	3 850
C	4 420	4 420	4 420	4 420
D	860	860	860	860
E	4 100	4 100	6 100	8 100
F	735	735	840	932
G	6 025	6 025	8 130	10 312
H	8 600	8 600	10 600	13 300
I	4 335	4 335	4 335	4 335

WORK AREA



	mm			
	FP 1700	FP 2200	FP 3200	FP 4200
A	1 700	2 200	3 200	4 200
B	1 200	1 200	1 200	1 200
C	150	150	150	150
D	150	150	150	150
E	1 700	2 200	3 200	4 200
F	1 200	1 200	1 200	1 200
G	725	725	725	725

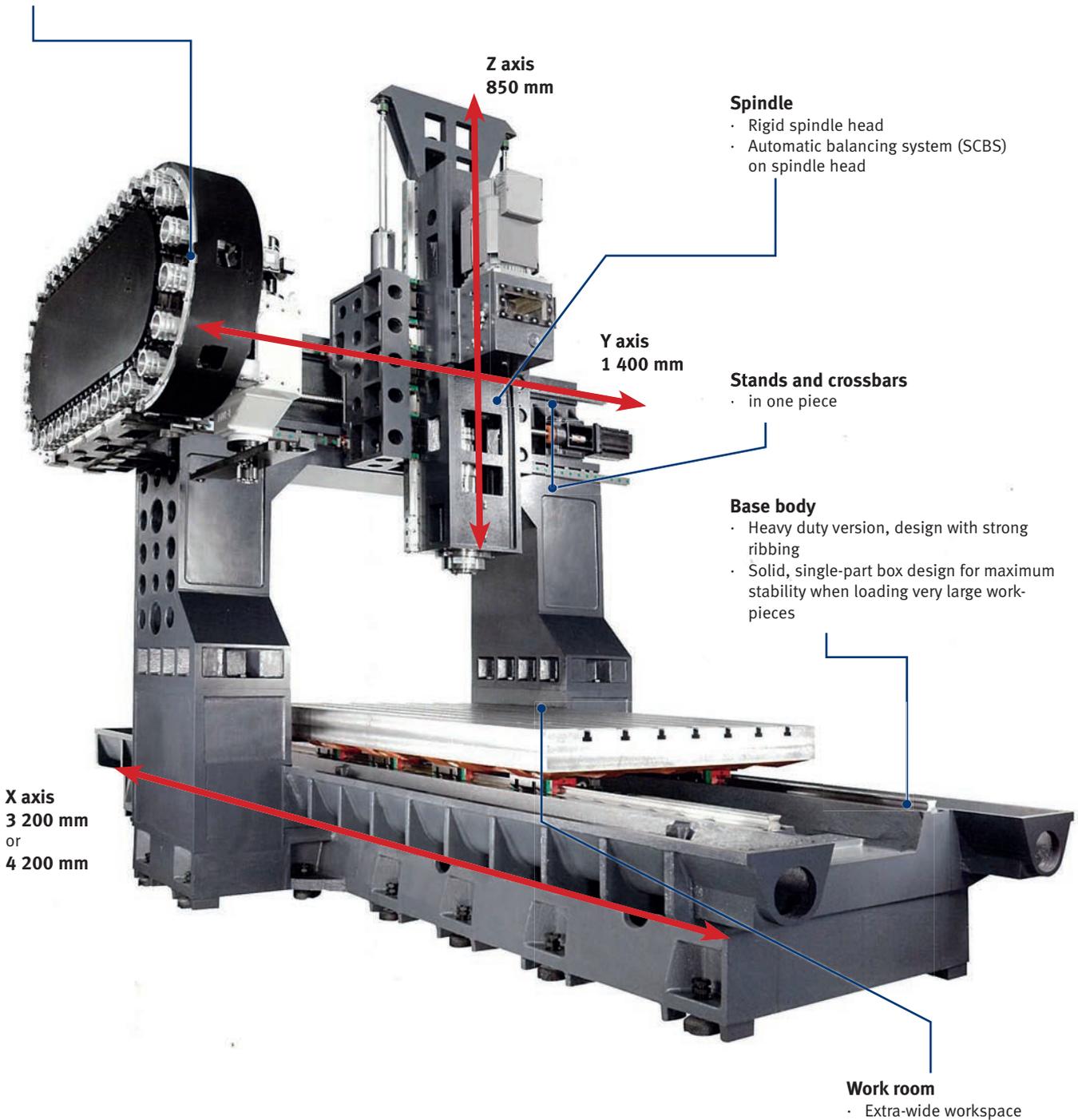
SPINDLE POWER AND TORQUE DIAGRAM



Torque/KW diagram data	
Spindle seat	SK 50 DIN 69871
Rotational speeds	8 000 rpm
Drive motor	Siemens 1PH8133-1DF02-1DA1 15 / 22.5 kW
Pulley ratio	1:1 1:4

Tool changer

- Driven by precision cam for fast and accurate tool positioning
- The tools are transferred directly from the tool magazine to the spindle during the tool change by means of a double gripper
- Tool selection occurs bidirectionally via the shortest route.
- The tool magazine is located outside of the work area
- The cover on the tool magazine protects the tools against chips or coolant



CHIP DISPOSAL



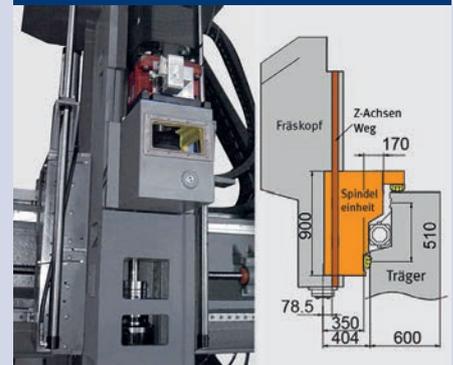
- Feeder spirals on both sides of the machine base transport high flow rates to the chip auger

SPINDLE HEAD



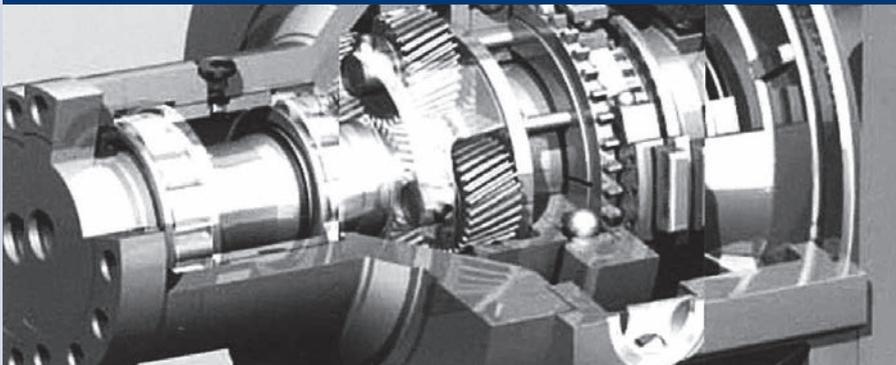
- All gear wheels and bearings in the gearbox are oil bath lubricated
- Efficient cooling of the workpiece by internal spindle cooling
- Longer service life and excellent part accuracy

Z AXIS



- Excellent stiffness and stability
- Box design
- Stability even with heavy machining

SPINDLE



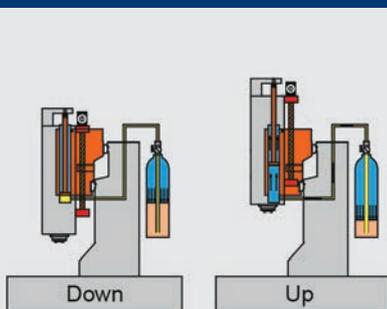
- High torque spindle ideal for high performance cutting applications
- Wide speed range up to 8 000 rpm for heavy machining and precision machining
- Automatic oil lubrication of spindles with cooling
- Inline spindle SK 50
- Cam gear

GEARBOX



- Gearbox with high transmission ratio

Z AXIS



- Pneumatic weight compensation in the Z-axis for high dynamics

PRECISION



Each machine goes through dynamic and static precision tests. The machine precision complies with:

- ISO 10791
- VDI 3441t
- ISO 230
- JIS B6388
- and ASME B5 standards.

Standard	ISO 10791-4	FP 3200 FP 4200	
	Tolerance	Axes traverse path	
	>1 250 mm >2 000 mm		
Bi-directional positioning accuracy	A	0.042 mm	0.008 mm
Bi-directional Repeat accuracy	R	0.020 mm	0.008 mm

JIS B6336-4 shows the same value as the ISO standard: The P value of VDI / DGQ3441 is equivalent to A in ISO10791-4 and PS is equivalent to R. All values shown above were measured in environments with good air conditioning.

TOOL MEASURING / WORKPIECE MEASURING			
351161023*	1	BLUM TC62 Universal measuring probe	<ul style="list-style-type: none"> Switching point repetition accuracy from 0.3µm 2 at 2 m/ min. measuring speed Wear-free and durably stable Very compact probe with 40 mm diameter
351161024*		BLUM ZX-Speed 3-D probe	<ul style="list-style-type: none"> Universal 3-D probe for toolmaking and tool break monitoring
➔ For information on Blum workpiece/tool measuring, also ex warehouse Germany see page 275			
351161020*	2	Renishaw NC 4 Laser system for tool measurement	<ul style="list-style-type: none"> NC4 non-contact tool inspection system is a high-precision, extremely fast solution for tool measurement and breakage control
351161021*		Renishaw OMP 60 Probe with optical signal transmission	<ul style="list-style-type: none"> For checking and setting up workpieces on processing centres Compact, touch-actuated 3D probe. Reliably modulated, optical signal transmission.
351161022*		Renishaw TS 27R Probe for tactile tool measurement	<ul style="list-style-type: none"> Tool breakage check Compact, tactile 3-D tool probe with wired signal transmission for tool breakage checking
➔ For information on the Renishaw laser system and probe, also ex warehouse Germany see page 288			

3-D PRINTING			
3562411		3-D printing interface	<ul style="list-style-type: none"> Plug connector on milling head for OPTImill 3X/5X printing head Power supply is installed in control cabinet Prepared for open circuit monitoring and filament holder
➔ For information on 3-D printing and accessories see 266			

MISCELLANEOUS			
3536111		Starter set SK 50 / DIN 69871	<ul style="list-style-type: none"> Cutter head holder with 27 mm receptacle, 2 each Weldon 6 mm/20 mm, 1 each Weldon 8 mm / 10 mm / 12 mm / 16 mm, adapter SK 50 to MK 3, 4 collet holders ER 32, collet spanner ER 32, 18-piece collet set ER 32, height adjuster, cone squeegee, 15 tightening bolts
351161001*	4	Coolant through spindle (CTS)	<ul style="list-style-type: none"> Integrated unit, 20 bars pump pressure
351161002*			<ul style="list-style-type: none"> External unit; tank capacity 165 litres, 20 bars pump pressure
351161003*			<ul style="list-style-type: none"> External unit; tank capacity 165 litres, 70 bars pump pressure
351161014*	6	Air conditioner	<ul style="list-style-type: none"> Instead of the standard equipment › heat exchanger
351161005*		Linear guide	<ul style="list-style-type: none"> for the Z axis
351161010*		Tool changer with 40 tool slots	<ul style="list-style-type: none"> Instead of the standard equipment › Tool changer with 32 tool slots
351161011*		Tool changer with 60 tool slots	<ul style="list-style-type: none"> Instead of the standard equipment › Tool changer with 32 tool slots
351163026*	5	Hood for machine work space	<ul style="list-style-type: none"> FP 3200
351164027*			<ul style="list-style-type: none"> FP 4200
351161030*		Z axis extension	<ul style="list-style-type: none"> Z = 1 050 mm
351161035*	7	90° angle milling head	<ul style="list-style-type: none"> Speed up to 2 500 rpm Gearbox transmission ratio 1:1 38 kW maximum power transfer of the spindle drive
351161036*	8	Automatically indexing milling head B and C axis	<ul style="list-style-type: none"> Speed up to 3 500 rpm 5° pitch
On request		Fourth axis	<ul style="list-style-type: none"> 250 mm
On request		Fifth axis	

1 BLUM TC62 / ZX-SPEED



- Precise, directionally independent approach behaviour
- Constant deflection forces
- Spindle orientation not required
- No detrimental 3-leg principle with lobing effect
- BRC wireless technology

2 RENISHAW OMP 60



- Compact, high-accuracy probe that offers all the advantages of an automatic workpiece setup while enabling the measurement of complex 3D part geometries on CNC machining centres.

3 RENISHAW TS 27R



- Proven kinematic design
- Interference-free, wired communication
- Least expensive tool measurement for all types of machining centres
- Repetition accuracy of 1.00 µm (2)

4 COOLANT THROUGH SPINDLE



- Guarantees optimal service life
- Optionally with internal or external unit
- Pump pressure 20 bars or 70 bars

5 HOOD



- Easy loading and unloading of heavy and bulky workpieces with a crane
- Top machine space cover
- For oil mist extraction

6 AIR CONDITIONER



- Instead of heat exchanger
- The air conditioner permanently and constantly cools the control cabinet to the set temperature.

7 MANUAL MILLING HEAD



- Increases the technological nature of the machining equipment, work productivity and reduces set-up and auxiliary times and the need for special fixtures.

8 AUTOMATIC MILLING HEAD



- Increase in machining accuracy because it is not necessary to change the position of the clamped workpiece.
- Speed up to 3 500 rpm
- 5° pitch

EYRING STAHL- UND METALLBAU UG

THURINGIAN METALWORKING COMPANY EXTENDS MACHINE LINE-UP TO INCLUDE OPTIMUM CNC PORTAL MILLING MACHINE

Eyring Stahl- und Metallbau, based in Römhild, Thuringia, has been a major player in the production of steel and metal structures made of aluminium, stainless steel and brass since 1981. Now the family-run company has expanded its machinery to include the OPTIMUM CNC Portal milling machine FP 3200A, thus raising its production process to a new technological level.

Optimill FP 3200 Portal milling machine

On a production area of approx. 1.500 m² the company combines a wide variety of metalworking machines in order to be able to react quickly to individual needs and to offer tailor-made, innovative solutions at any time. They include bending machines, hydraulic presses, welding equipment, painting cabins, grinding machines, circular saws and gate shears. They are used to manufacture external and internal stairways, railings, canopies, fences and gates, balcony railings and special constructions. Now that the new OPTIMUM FP 3200A CNC Portal milling machine has been integrated

into its machine line-up, the company can rely on state-of-the-art technology to automate its manufacturing processes in a sustainable manner and meet the increased precision requirements in an even better way in the future.

SIEMENS Sinumerik 828D control

The OPTIMUM CNC portal milling machine, which was presented to the market only a few months ago, is equipped with a SIEMENS Sinumerik control 828D, which enables intelligent motion control. This makes the machine especially suitable for the production of workpieces with a high dimensional accuracy and surface quality. 3-D simulation allows the manufacturing processes to be optimally controlled and adjusted where neces-



sary. Due to its rigid, rugged design, made of high-quality MEEHANITE[®] quality cast iron, and the milling head mounted on a cross beam, the Portal milling machine guarantees maximum stability and is ideally suited for machining large surfaces such as panels. Roller linear guides on the X and Y axis as well as a balance system in the Z axis ensure highest precision and reliability even at high speeds. The ball screws are mounted in high-precision bearings and allow for absolutely unbalance-free rotation of the spindle. In order to set the highest standards in safety, the portal milling machine is also equipped with the **SIEMENS** Safety Integrated function, which prevents injuries to persons, resulting in higher machine availability and thus increased productivity.

High quality and reliable service

In addition to high quality and reliable service, the large dimensioned clamping area was an important factor for the metal construction company Eyring when choosing the OPTIMUM CNC Portal milling machine. This is why the traditional Thuringian company will be using the machine especially for the production of large components such as welding frames in the future.







Horizontal drilling and milling centre HF 400
Horizontal drilling and milling centre HF 500
Horizontal drilling and milling centre HF 600

05

HORIZONTAL DRILLING AND MILLING CENTRE

A circular badge with a white background and a dark blue border, containing the word "NEW" in bold, dark blue capital letters.

HF 400

OPTIMUM PREMIUM CNC horizontal milling and drilling centre.

SIEMENS CONTROL 840D SL with OP 019 BLACK

- Perfect structures and robust construction in Meehanite cast iron guarantee maximum rigidity and excellent mechanical stability
- Dimensionally stable extra-wide roller linear guides of the X and Z axes for maximum static and dynamic rigidity even at high speed
- Y-axis equipped with flat guide increases tool life and running smoothness, resulting in better surface quality on the workpiece and higher cutting performance
- Turcite B headstock support surface
- Hardened spindle and quill (surface hardness HRC52-55) ensure high stiffness and accuracy
- The X / Y and Z axis is equipped with a 1 µm linear scale as standard, the B-axis with angular scale
- Large, fully ground swivel table with 11 T-slots
- Swivel table with 0.001° high graduation accuracy
- High table loading with 8 t or optionally with 10 t
- Extremely large working capacity with fixed ram head
- Spindle Vibration Supervision (SVS) function - spindle vibration monitoring software and real-time control technology
- AC servo motor offers extremely high torque, as well as very high power and axis force
- Precision-ground, preloaded high-performance ball screws for high rapid traverse speeds
- SK 50 tool changer with 60 tool slots
- Headstock stability through hydraulic counterweight
- Chip conveyor, belt type ensures efficient chip discharge
- Chip carriage
- Spindle oil cooler
- Automatic central lubrication system
- Coolant gun
- Coolant system with check valve
- Control system for low voltage switching
- Lifting device for unloading the machine
- Levelling feet
- Including two years **SIEMENS** warranty
- Extension of the **SIEMENS** repair service contracts (RSV), see page 225
- Information on „Maintenance contracts“ on page 321



Fig. machines without standard protective housing

TECHNICAL DATA

Model	HF 400
Article no.:	3512040
Machine data	
Electrical connection	400 V / 3 Ph ~50 Hz
Total connected load	47 KVA
Milling spindle	
Drive motor S1	37 kW
Drive motor torque S1	1 941 Nm
Drive motor S6 30 % operation	56 kW
Torque drive motor S6 30 % operation	2 912 Nm
Quill diameter (W-axis)	130 mm
Spindle bearing inner diameter	170 mm
Spindle seat	SK50 DIN 69871
Tool changer	
Number of tool slots	60 tools
Max. tool diameter	125 mm
Max. tool diameter (tools slots beside not occupied)	245 mm
Tool length	500 mm
Max. tool weight	25 kg
Tool change time T-T	16 sec.
Max. total tool weight in magazine	900 kg
Milling precision	
Repeat accuracy	± 0.015 mm
Positioning accuracy	± 0.004 mm
Traverse paths	
X axis (linear guide)	2 000 mm
Y axis (box way)	2 000 mm
Z axis (linear guide)	1 400 mm
W1 axis	700 mm
Axis feed drive	
X axis fast motion	10 m/min.
Y axis fast motion	10 m/min.
Z axis fast motion	10 m/min.
W axis rapid traverse	8 m/min.
Speed range	
Speeds*	35 - 788 rpm / 789 - 3 000 rpm
stages	2 stages
Work table	
Table length x width	1 400 x 1 600 mm
Table height	1 280 mm
T-slot size / amount / distance	24 mm / 9 / 160 mm
Maximum payload	8 t
Positioning accuracy of the rotary table	15"
Rotary table repeatability	4"
Spindle to table distance	70 - 2 170 mm
Spindle to stand distance	65 - 2 090 mm
Encoder accuracy	± 0.005°
 Table dimensions on page 226	
Dimensions	
Installation area	7 853 x 7 050 x 3 706 mm
Overall weight	40 000 kg
 More dimensions on page 227	

* Please note that the maximum spindle speed must be reduced by approx. 20 % in continuous operation

SINUMERIK 840D sl with OP 019 black Multitouch operating panel

The right solution for any engineering challenge

- The SINUMERIK 840D sl is rightly considered the benchmark in the CNC premium class. Maximum CNC performance and unrivalled flexibility and openness are the basis for almost any machine concept.

Multitouch operation OP 019 black

- 18.5" diagonal industrial display
- Maximum operating comfort: Capacitive multi-touch technology (up to 5 contact points simultaneously)
- High resolution of 1 366 x 768 pixels in widescreen format
- Rugged: No wear of mechanical components thanks to Multitouch technology
- Scratch-proof glass front
- Modern, intelligent design
- Can be operated while wearing gloves

SIEMENS SAFETY INTEGRATED
SET UP WORK WITH OPEN DOORS

Functional safety also provides protection against high costs!
Machine and plant safety is not only important because strict regulations must be observed. When everything runs safely, you benefit from time savings in engineering, higher system availability and more investment security.

OVERALL PACKAGE

INCLUDING:

- Safety functions SINUMERIK Safety Integrated
- Residual material detection
- Shopmill
- Simultaneous recording
- 3D simulation



Extension of the **SIEMENS** repair service contracts (RSV)

The **SIEMENS** Repair Service Contract (RSV) helps you to protect your machine for another 12, 24 or 36 months (can only be ordered within the two-year Siemens warranty period).

12 months; Article no. 3589035
24 months; Article no. 3589036
36 months; Article no. 3589037

MODULAR AND SCALABLE

- In addition to scalable NCU performance, the SINUMERIK 840D sl also offers a high degree of modularity of the operating components. With a flexible operating concept - e.g. the combination of any control panel with the NCU - the SINUMERIK 840D sl ideally adapts to the operating philosophy of modern premium machine concepts.

BENCHMARK IN OPEN ARCHITECTURE

- The system openness of the SINUMERIK 840D sl is unparalleled. In this way, the CNC can be optimally adapted to the technology of the machine and has a high degree of freedom in production automation.

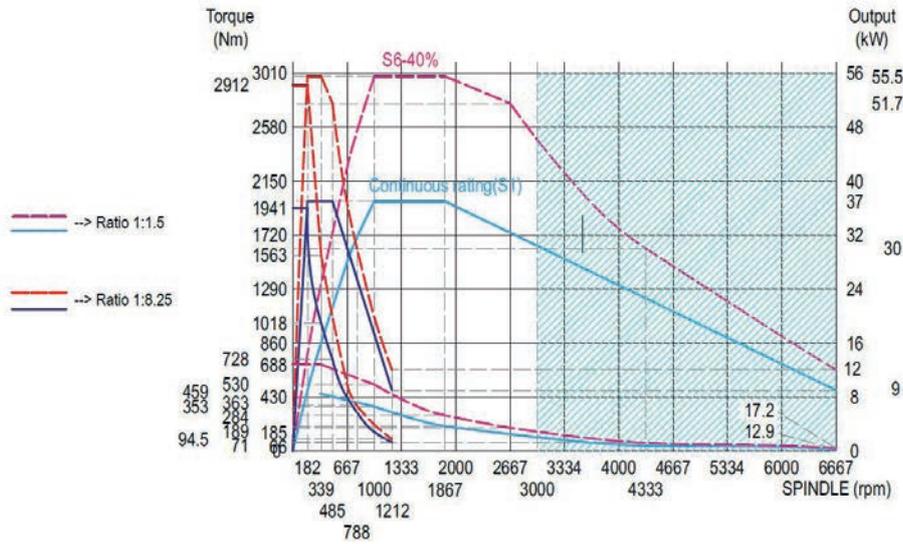


SIEMENS NCU 710.3B

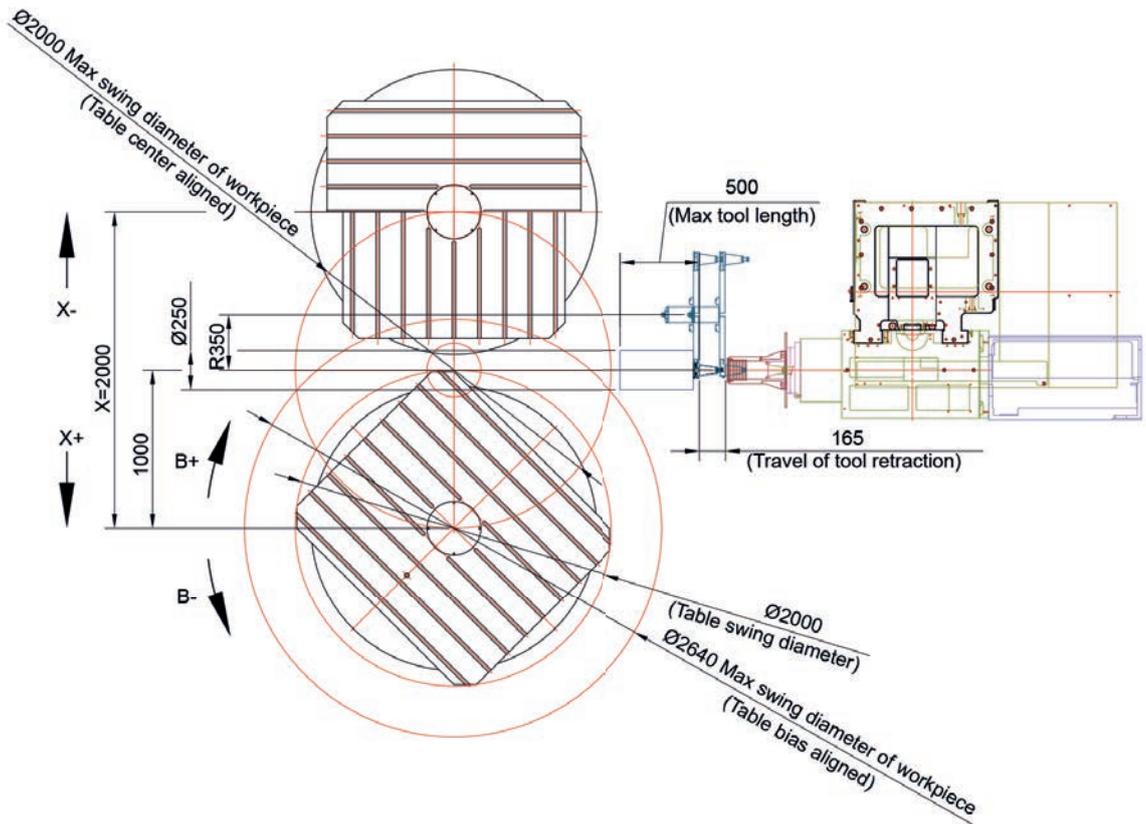
- up to 8 axes
- Cycle time 1.2 ms
- up to 600 tools



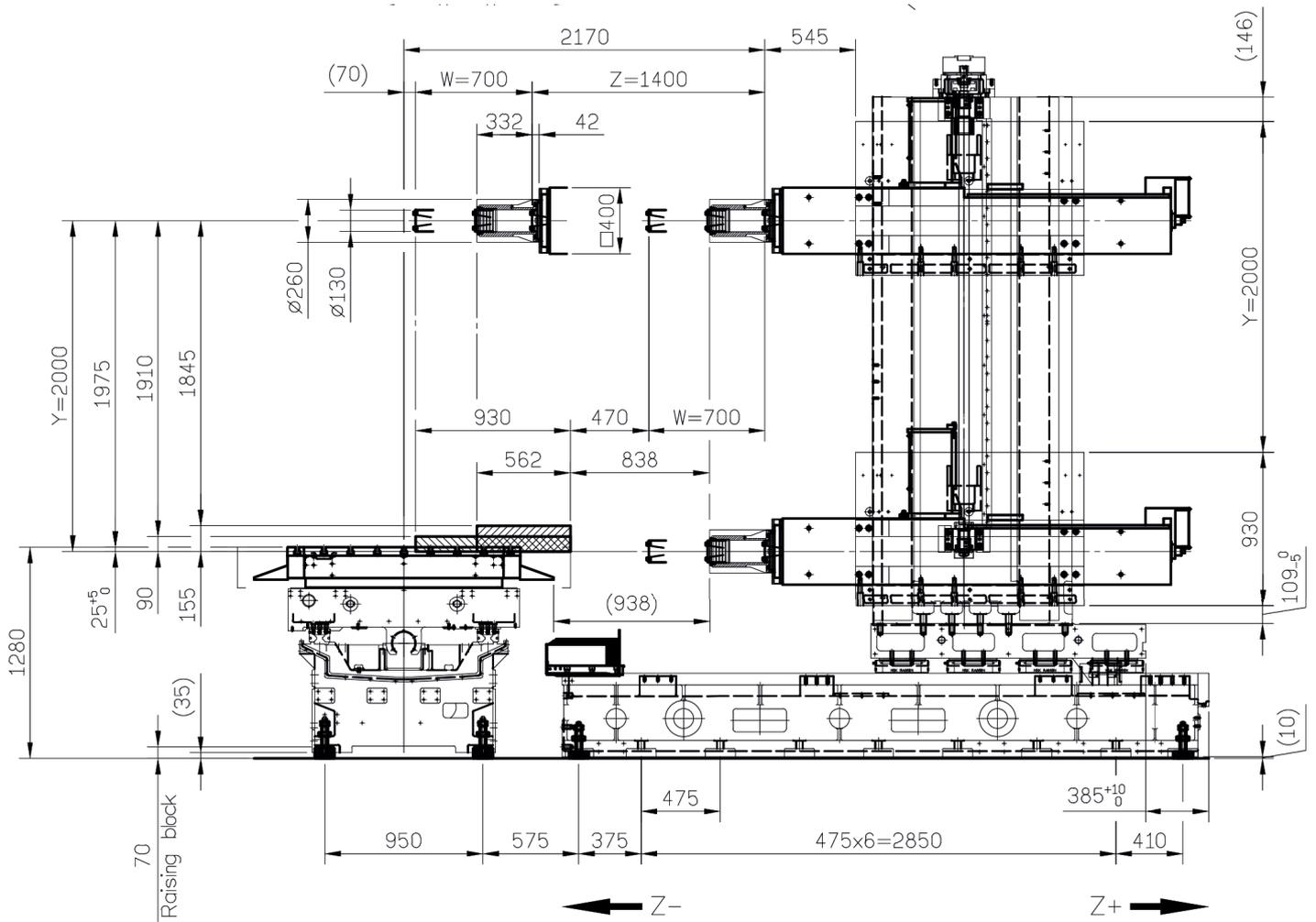
POWER AND TORQUE DIAGRAM



SWIVEL TABLE WORKING AREA



DIMENSIONS



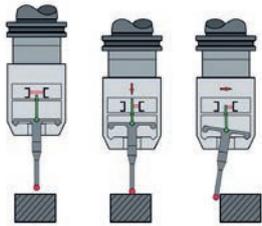
TC 62RC - WORKPIECE TOUCH PROBE

COMPACT HIGH SPEED MEASURING PROBE FOR WORKPIECE MEASUREMENT

Unrivalled precision and fast workpiece measuring thanks to modern, multidirectional measuring system with optical/electronic switching signal generation.

Wear-free, optical-electronic signal generation:

- Switching signal generated by interrupting a miniature light barrier
- Switching point repeatability of $0.3\mu\text{m}$ at 2 m/min. Measuring speed
- Wear-free and durably stable
- Very compact probe with \varnothing 40 mm



High-precision, rotationally symmetrical measuring system

- Precise, directionally independent approach behaviour
- Constant deflection forces
- Spindle orientation not required
- No detrimental 3-leg principle with lobing effect



ZX SPEED

TOOL MEASURING PROBE

UNIVERSAL 3-D PROBE HEADS FOR TOOL ADJUSTMENT AND TOOL BREAK MONITORING

Economical solutions for tool length and radius adjustment and tool break monitoring Precise and process-assured measurements due to state-of-the-art metrology equipment with optoelectronic switching signal generation

Wear-free, optical/electronic signal generation

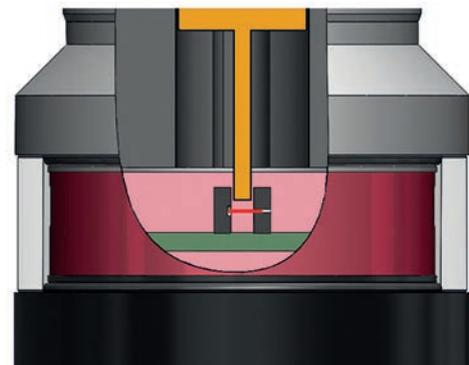
- Switching signal is generated by interrupting a miniature light barrier
- Allows for faster measuring speeds and measuring precision than comparable probes
- Reliable tool adjustment under the toughest conditions

High-precision state-of-the-art measuring equipment

- Precise, directionally independent switching behaviour
- Constant deflection forces
- Premium BLUM measuring equipment, latest generation
- No detrimental 3-leg principle
- No highly-sensitive switching elements

Latest transmission technologies

- ZX speed: Cable-connected
- ZX speed IR: Infrared transmission

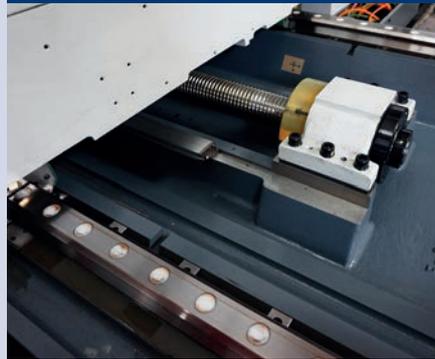


BALL SCREWS



- Class C3 ball screws with double nuts for high rapid traverse speeds in all axes

LINEAR GUIDE



- Maximum static and dynamic stiffness
- High positioning accuracy
- Smooth, backlash-free movement
- Consistent precision with long service life

CHIP DISPOSAL



- Conveyor belt transports high chip quantities to the chip conveyor

AUTOMATIC LUBRICATION SYSTEM



- Pressureless circulation lubrication: the oil volume is controlled according to the measured distribution values and takes place according to the lubricating oil requirement of the sliding surface and the recirculating ball screw
- With oil level detector unit. The alarm is displayed on the screen when there is a lack of oil.



MEASURING SYSTEM



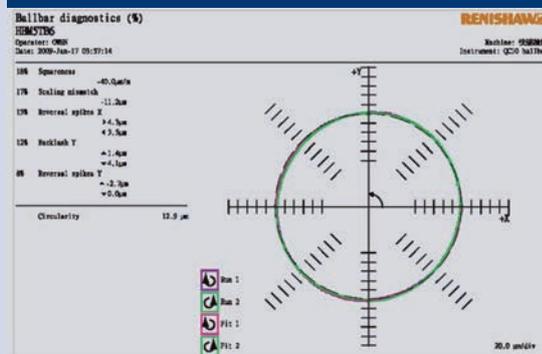
- All three axes are equipped with an absolute linear scale with an accuracy of $\pm 5 \mu\text{m}$
- Rotary table with rotary encoder with an accuracy of 0.001

HIGH-PERFORMANCE SPINDLE



- Developed for deep drilling
- The spindle with cylindrical roller bearing (double roller) is suitable for high-performance machining.
- Ground spindle and sleeve for high accuracy

GEOMETRIC TEST FOR HIGH ACCURACY



- Geometric accuracy is tested according to the ISO 3070-2 standard and repeatability and positioning accuracy according to the ISO 230-1 standard. And it is approved by laser devices

- All geometric tests are completed after 24 hours of full function run, then a test is performed on the machine and the complete test programmes are stored.

MISCELLANEOUS				
3512065010*		Coolant Through Spindle External unit; tank capacity 165 litres, 70 bars pump pressure	<ul style="list-style-type: none"> • Instead of the series equipment › Internal spindle cooling 20 bar 	<ul style="list-style-type: none"> • We recommend an extraction unit
3512065028	1	Oil separator / oil skimmer	<ul style="list-style-type: none"> • Longer service life of the cooling lubricants 	
3512065020	2	Right-angled stop	<ul style="list-style-type: none"> • L x W x H: 800 x 525 x 800 mm 	
3512065021			<ul style="list-style-type: none"> • L x W x H: 1 000 x 550 x 1 000 mm 	
3512065022			<ul style="list-style-type: none"> • L x W x H: 1 300 x 700 x 1 300 mm 	
3512065047*	3	Tool changer with 120 tool slots	<ul style="list-style-type: none"> • Instead of series equipment › tool changer with 60 tool slots 	
3512065046*	5	Air conditioner	<ul style="list-style-type: none"> • Instead of series equipment › heat exchanger 	

TRAVEL AND WORKING RANGE				
3512065047*		X axis travel to 3 000 mm	<ul style="list-style-type: none"> • Instead of series equipment › X axis travel 2 000 mm 	
3512065030*	4	Work area Table size 1 600 x 1 800 mm Load capacity max. 10 tons	<ul style="list-style-type: none"> • Instead of the series equipment › Table size 1 400 x 1 600 mm • Instead of the series equipment › Load capacity max. 8 tons 	

MILLING HEADS AND ACCESSORIES				
3512065060	6	Angle head 90° N75	<ul style="list-style-type: none"> • for extended machining options (milling, drilling, reaming, thread cutting) 	
3512065062	7	Spindle extension sleeve	<ul style="list-style-type: none"> • absolutely necessary for the 3512065061 Universal milling head 	
3512065061	8	Universal milling head	<ul style="list-style-type: none"> • Milling head with two axes of rotation, thus pivots and rotates to any spatial angle 	

* Must be ordered with the basic machine. Cannot be retrofitted

1 OIL SEPARATOR / OIL SKIMMER



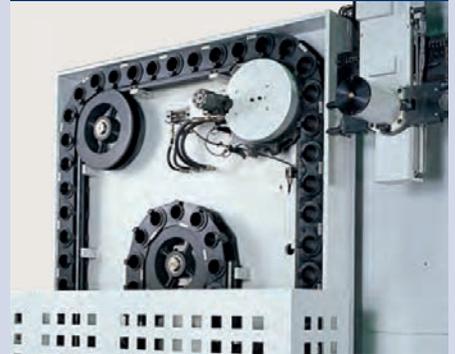
- Oil skimmer reliably removes floating tramp oils and finest chip debris from cooling lubricants

2 RIGHT-ANGLED STOP



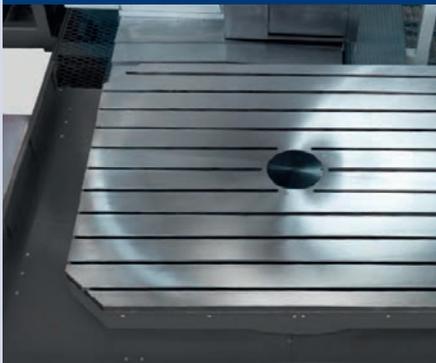
- Extra thick and heavy ribbed construction

3 TOOL CHANGER



- Changer for up to 120 tools

4 SWIVEL TABLE



- High table load with 10t
- Rotary table with 0.001° high pitch accuracy
- Large, fully ground work table with 11 T-slots

5 AIR CONDITIONER



- Instead of heat exchanger
- The air conditioner permanently and constantly cools the control cabinet to the set temperature.

6 ANGLE HEAD N75 90°



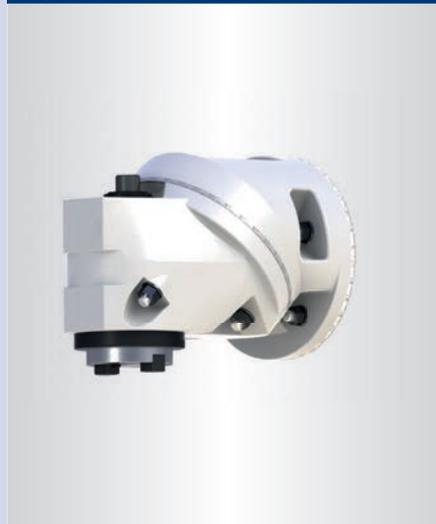
- Complete machining
- Reduction of machine downtimes
- Machining of otherwise inaccessible workpiece areas (internal machining)

7 SPINDLE EXTENSION SLEEVE



- for the universal milling head

8 UNIVERSAL MILLING HEAD



- Rotation axes arranged at an angle of 45° to each other
- Maximum speed 1 800 rpm
- Spindles and gears made of hardened chrome-nickel steel
- High precision angular contact ball bearings

A circular badge with a white background and a dark blue border, containing the word "NEW" in dark blue capital letters.

HF 500 / HF 600

OPTIMUM PREMIUM CNC horizontal milling and drilling centre.

Convincing technology for dynamics and precision

SIEMENS CONTROL 840D SL with OP 019 BLACK

- Perfect structures and robust construction in Meehanite cast iron guarantee maximum rigidity and excellent mechanical stability
- Dimensionally stable extra-wide roller linear guides of the X and Z axes for maximum static and dynamic rigidity even at high speed
- Y-axis equipped with flat guide increases tool life and running smoothness, resulting in better surface quality on the workpiece and higher cutting performance
- Turcite B headstock support surface
- Hardened spindle and quill (surface hardness HRC52-55) ensure high stiffness and accuracy
- The X / Y and Z axis is equipped with a 1 µm linear scale as standard, the B-axis with angular scale
- Large, fully ground swivel table with 11 T-slots
- Swivel table with 0.001° high graduation accuracy
- High table load with 15t
- Extremely large working capacity with fixed ram head
- Spindle Vibration Supervision (SVS) function - spindle vibration monitoring software and real-time control technology
- AC servo motor offers extremely high torque, as well as very high power and axis force
- Precision-ground, preloaded high-performance ball screws for high rapid traverse speeds
- SK 50 tool changer with 60 tool slots
- Headstock stability through hydraulic counterweight
- Chip conveyor, belt type ensures efficient chip discharge
- Chip carriage
- Spindle oil cooler
- Automatic central lubrication system
- Coolant gun
- Coolant system with check valve
- Control system for low voltage switching
- Lifting device for unloading the machine
- Levelling feet
- Including two years **SIEMENS** warranty
- Extension of the **SIEMENS** repair service contracts (RSV), see page 235
- Information on „Maintenance contracts“ on page 321



Fig. HF 600 without standard protective housing



Fig. HF 600

OPTIMILL HF 500 / HF 600

TECHNICAL DATA

Model	HF 500	HF 600
Article no.:	3512050	3512060
Machine data		
Electrical connection	400 V / 3 Ph ~50 Hz	400 V / 3 Ph ~50 Hz
Total connected load	95 KVA	95 KVA
Milling spindle		
Drive motor S1	37 kW	37 kW
Drive motor torque S1	1 941 Nm	1 941 Nm
Drive motor S6 30 % operation	56 kW	56 kW
Torque drive motor S6 30 % operation	2 912 Nm	2 912 Nm
Quill diameter (W-axis)	Ø 130 mm	Ø 150 mm
Spindle bearing inner diameter	Ø 170 mm	Ø 190 mm
Spindle seat	SK50 DIN 69871	SK50 DIN 69871
Tool changer		
Number of tool slots	60 tools	60 tools
Max. tool diameter	Ø 125 mm	Ø 125 mm
Max. tool diameter (adjacent slots not occupied)	Ø 245 mm	Ø 245 mm
Tool length	500 mm	500 mm
Max. tool weight	25 kg	25 kg
Max. total tool weight in magazine	900 kg	900 kg
Milling precision		
Repeat accuracy	± 0.015 mm	± 0.015 mm
Positioning accuracy	± 0.004 mm	± 0.004 mm
Traverse paths		
X axis (linear guide)	4 500 mm	5 500 mm
Y axis (box way)	2 600 mm	3 200 mm
Z axis (linear guide)	2 000 mm	2 000 mm
W1 axis	700 mm	900 mm
Axis feed drive		
X axis fast motion	10 m/min.	10 m/min.
Y axis fast motion	10 m/min.	10 m/min.
Z axis fast motion	10 m/min.	10 m/min.
W axis rapid traverse	8 m/min.	8 m/min.
Speed range		
Speeds*	35 - 788 rpm / 789 - 3 000 rpm	35 - 788 rpm / 789 - 2 000 rpm
stages	2 stages	2 stages
Work table		
Table length x width	1 800 x 2 200 mm	1 800 x 2 200 mm
Table height	1 390 mm	1 390 mm
T-slot size / amount / distance	24 mm / 11 / 160 mm	24 mm / 11 / 160 mm
Maximum payload	15 t	15 t
Positioning accuracy	15"	15"
Rotary table repeatability	4"	4"
Spindle to table distance	30 - 2 070 mm	230 - 2 070 mm
Spindle to stand distance	100 - 2 000 mm	100 - 2 000 mm
Encoder accuracy	± 0.005°	± 0.005°
↻ Table dimensions on page 236		
Dimensions		
Installation area	8 450 x 8 500 x 5 400 mm	10 100 x 5 580 x 9 000 mm
Overall weight	51 500 kg	56 500 kg
↻ More dimensions on page 237		

* Please note that the maximum spindle speed must be reduced by approx. 20 % in continuous operation

SINUMERIK 840D sl with OP 019 black Multitouch operating panel

The right solution for any engineering challenge

- The SINUMERIK 840D sl is rightly considered the benchmark in the CNC premium class. Maximum CNC performance and unrivalled flexibility and openness are the basis for almost any machine concept.

Multitouch operation OP 019 black

- 18.5" diagonal industrial display
- Maximum operating comfort: Capacitive multi-touch technology (up to 5 contact points simultaneously)
- High resolution of 1 366 x 768 pixels in widescreen format
- Rugged: No wear of mechanical components thanks to Multitouch technology
- Scratch-proof glass front
- Modern, intelligent design
- Can be operated while wearing gloves

SIEMENS SAFETY INTEGRATED
SET UP WORK WITH OPEN DOORS

Functional safety also provides protection against high costs!
Machine and plant safety is not only important because strict regulations must be observed. When everything runs safely, you benefit from time savings in engineering, higher system availability and more investment security.

OVERALL PACKAGE

INCLUDING:

- Safety functions SINUMERIK Safety Integrated
- Residual material detection
- Shopmill
- Simultaneous recording
- 3D simulation



Extension of the SIEMENS repair service contracts (RSV)

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24 months; Article no. 3589036
36 months; Article no. 3589037

MODULAR AND SCALABLE

- In addition to scalable NCU performance, the SINUMERIK 840D sl also offers a high degree of modularity of the operating components. With a flexible operating concept - e.g. the combination of any control panel with the NCU - the SINUMERIK 840D sl ideally adapts to the operating philosophy of modern premium machine concepts.

BENCHMARK IN OPEN ARCHITECTURE

- The system openness of the SINUMERIK 840D sl is unparalleled. In this way, the CNC can be optimally adapted to the technology of the machine and has a high degree of freedom in production automation.

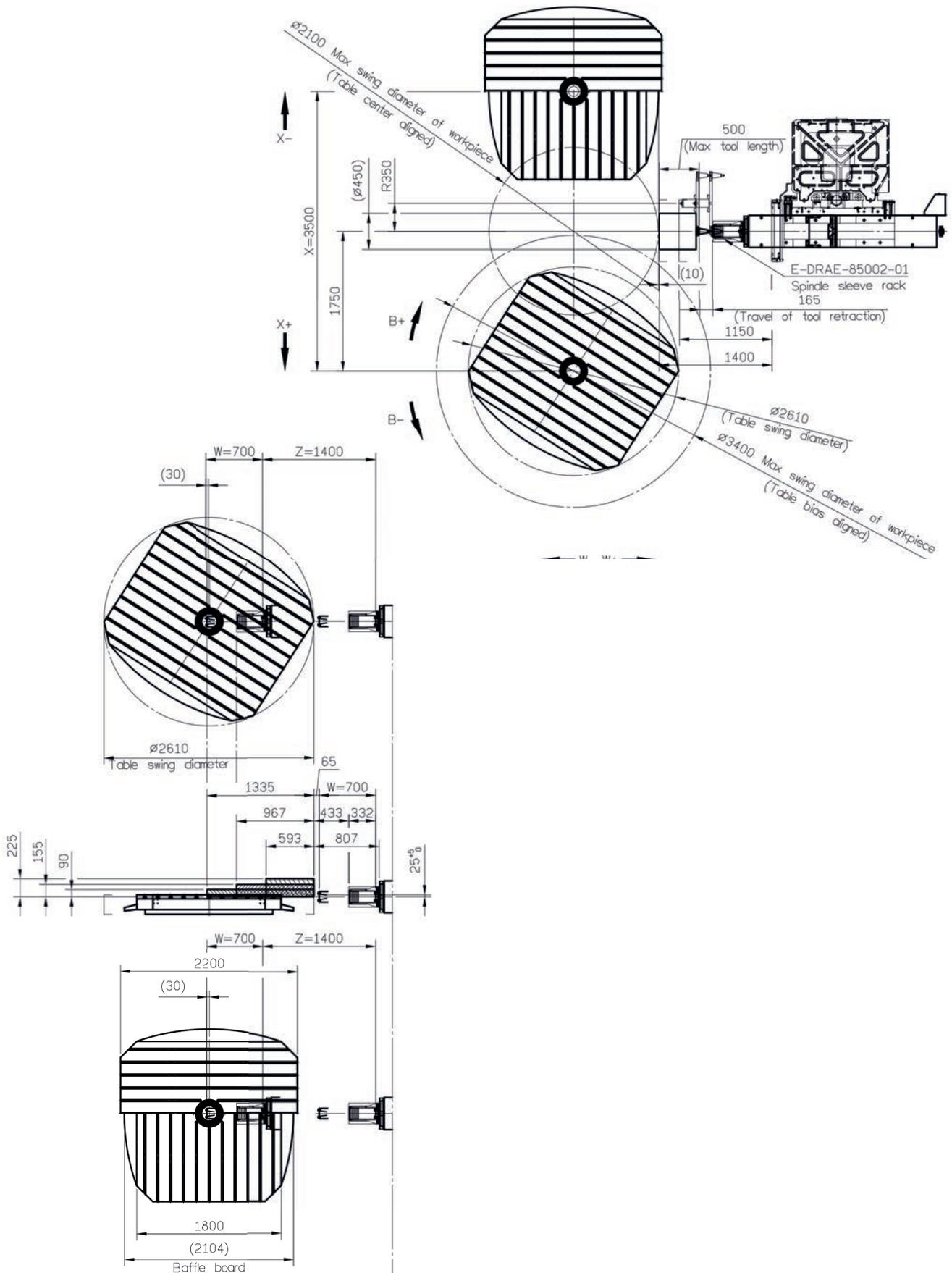


SIEMENS NCU 710.3B

- up to 8 axes
- Cycle time 1.2 ms
- up to 600 tools



SWIVEL TABLE WORKING AREA



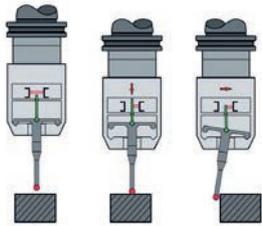
TC 62RC - WORKPIECE TOUCH PROBE

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Wear-free, optical-electronic signal generation:

- Switching signal generated by interrupting a miniature light barrier
- Switching point repeatability of $0.3\mu\text{m}$ at 2 m/min. Measuring speed
- Wear-free and durably stable
- Very compact probe with \varnothing 40 mm



High-precision, rotationally symmetrical measuring system

- Precise, directionally independent approach behaviour
- Constant deflection forces
- Spindle orientation not required
- No detrimental 3-leg principle with lobing effect



ZX SPEED TOOL MEASURING PROBE

UNIVERSAL 3-D PROBE HEADS FOR TOOL ADJUSTMENT AND TOOL BREAK MONITORING

Economical solutions for tool length and radius adjustment and tool break monitoring. Precise and process-assured measurements due to state-of-the-art metrology equipment with optoelectronic switching signal generation.

Wear-free, optical/electronic signal generation

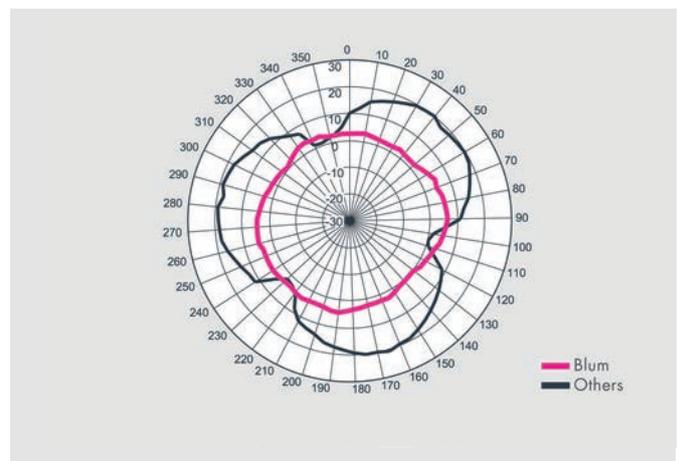
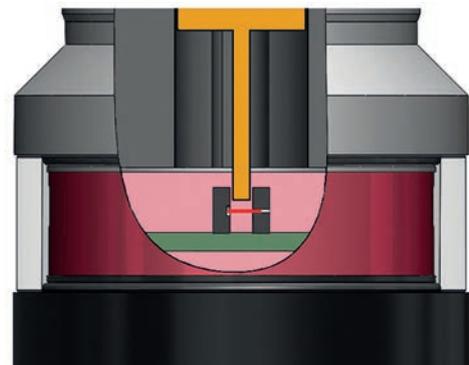
- Switching signal is generated by interrupting a miniature light barrier
- Allows for faster measuring speeds and measuring precision than comparable probes
- Reliable tool adjustment under the toughest conditions

High-precision state-of-the-art measuring equipment

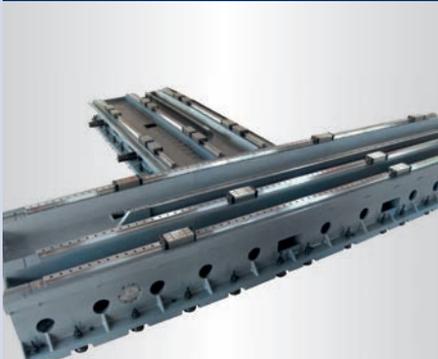
- Precise, directionally independent switching behaviour
- Constant deflection forces
- Premium BLUM measuring equipment, latest generation
- No detrimental 3-leg principle
- No highly-sensitive switching elements

Latest transmission technologies

- ZX speed: Cable-connected
- ZX speed IR: Infrared transmission

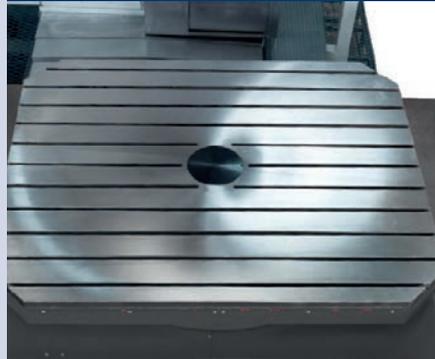


LINEAR GUIDES



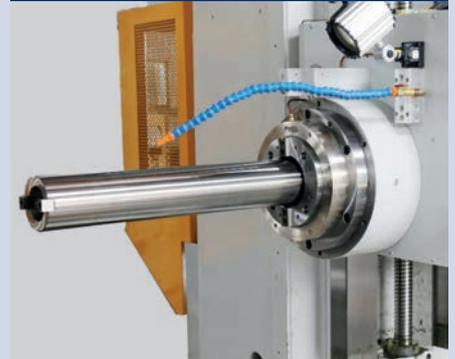
- High rigidity and load-bearing capacity
- High positioning accuracy
- Smooth, backlash-free movement
- X axis: Two roller linear guide with 6 glide shoes Z - axis with 8 glide shoes

DRILLING AND MILLING TABLE



- Rotary table with high indexing accuracy of 0.001 degrees.

HIGH-PERFORMANCE SPINDLE



- Developed for deep drilling
- The spindle with cylindrical roller bearing (double roller) is suitable for high-performance machining.
- Ground spindle and sleeve for high accuracy.

AUTOMATIC LUBRICATION SYSTEM



- Pressureless recirculating lubrication: the oil volume is controlled according to the measured distribution values; the oil is supplied according to the lubricating oil requirement of the sliding surface and the recirculating ball screw
- With oil level detector unit. The alarm is displayed on the screen when there is a lack of oil. Sealed spindle bearings are lubricated with grease

BALL SCREW



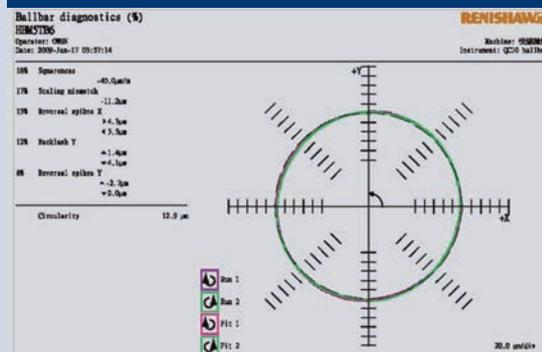
- Class C3 ball screw with double nuts for high axis accuracy and low deformation under high axial force

CHIP CONVEYOR



- Belt design ensures efficient chip removal

GEOMETRIC TEST FOR HIGH ACCURACY



- Geometric accuracy is tested according to the ISO 3070-2 standard and repeatability and positioning accuracy according to the ISO 230-1 standard. And it is approved by laser devices

- All geometric tests are completed after 24 hours of full function run, then a test is performed on the machine and the complete test programmes are stored.

MISCELLANEOUS				
3512065012*		Coolant Through Spindle External unit; tank capacity 165 litres, 70 bars pump pressure	<ul style="list-style-type: none"> • Instead of the series equipment › Internal spindle cooling 20 bar 	<ul style="list-style-type: none"> • We recommend an extraction unit
3512065028	1	Oil separator / oil skimmer	<ul style="list-style-type: none"> • Longer service life of the cooling lubricants 	
3512065020	2	Right-angled stop	<ul style="list-style-type: none"> • L x W x H: 800 x 525 x 800 mm 	
3512065021			<ul style="list-style-type: none"> • L x W x H: 1 000 x 550 x 1 000 mm 	
3512065022			<ul style="list-style-type: none"> • L x W x H: 1 300 x 700 x 1 300 mm 	
3512065047*	3	Tool changer with 120 tool slots	<ul style="list-style-type: none"> • Instead of series equipment › tool changer with 60 tool slots 	
3512065046*	5	Air conditioner	<ul style="list-style-type: none"> • Instead of series equipment › heat exchanger 	

TRAVEL AND WORKING RANGE				
HBM 5T: 3512065041*	4	X axis travel path to 5 500 mm	<ul style="list-style-type: none"> • Instead of series equipment › X axis travel 4 500 mm 	
HBM 5T 3512065043*		Y axis travel path to 3 200 mm	<ul style="list-style-type: none"> • Instead of series equipment › Y axis travel 2 600 mm 	
3512065031*		Table size 1 800 x 2 200 mm Load capacity max. 20 tons	<ul style="list-style-type: none"> • Instead of the series equipment › table size 1 800 x 2 200 mm • Instead of the series equipmen › Load capacity max. 15 tons 	
3512065032*		Table size 2 500 x 2 500 mm Load capacity max. 20 tons		
3512065 043*		Lifting device for the table 2 500 x 2 500 mm	<ul style="list-style-type: none"> • absolutely necessary 	

MILLING HEADS AND ACCESSORIES				
3512065060	6	Angle head 90° N75	<ul style="list-style-type: none"> • for extended machining options (milling, drilling, reaming, thread cutting) 	
3512065062	7	Spindle extension sleeve	<ul style="list-style-type: none"> • absolutely necessary for the 3512065061 Universal milling head 	
3512065061	8	Universal milling head	<ul style="list-style-type: none"> • Milling head with two axes of rotation, thus pivots and rotates to any spatial angle 	
3512065064	9	Angle milling head ALBERTI T90-8	<ul style="list-style-type: none"> • with 675 mm extension sleeve 	
3512065063		Driven face milling head,	<ul style="list-style-type: none"> • driven by the W-axis 	

1 OIL SEPARATOR / OIL SKIMMER



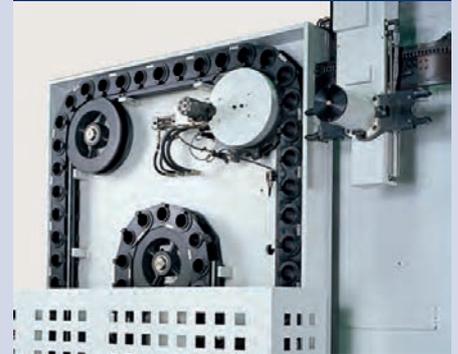
- Oil skimmer reliably removes floating tramp oils and finest chip debris from cooling lubricants

2 RIGHT-ANGLED STOP



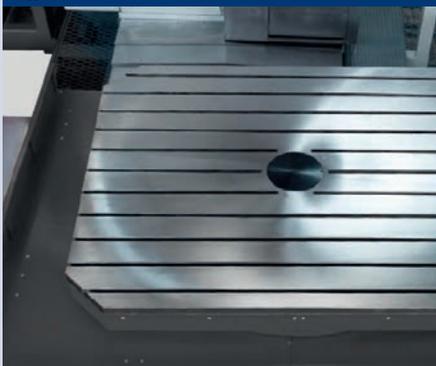
- Extra thick and heavy ribbed construction

3 TOOL CHANGER



- for up to 120 tools

4 TABLE WORKSPACE



- High table load with up to 20T
- Rotary table with 0.001° high pitch accuracy
- Large, fully ground work table with 11 T-slots

5 AIR CONDITIONER



- Instead of heat exchanger
- The air conditioner permanently and constantly cools the control cabinet to the set temperature.

6 ANGLE HEAD N75 90°



- Complete machining
- Reduction of machine downtimes
- Machining of otherwise inaccessible workpiece areas (internal machining)

7 SPINDLE EXTENSION SLEEVE



- for the universal milling head

8 UNIVERSAL MILLING HEAD



- Rotation axes arranged at an angle of 45° to each other
- Maximum speed 1 800 rpm
- Spindles and gears made of hardened chrome-nickel steel.
- High precision angular contact ball bearings

9 ALBERTI ANGLE MILLING HEAD



- The orientation ring and the locking arm, which carries the locking pin, can be rotated 360°





CNC milling machine F 3Pro
CNC milling machine MZ 4CNC
Media package see page 263

06 **MILLING**
TRAINING MACHINES

F 3Pro

Universal milling machines with servo drives

SIEMENS SINUMERIK 808D ADVANCED

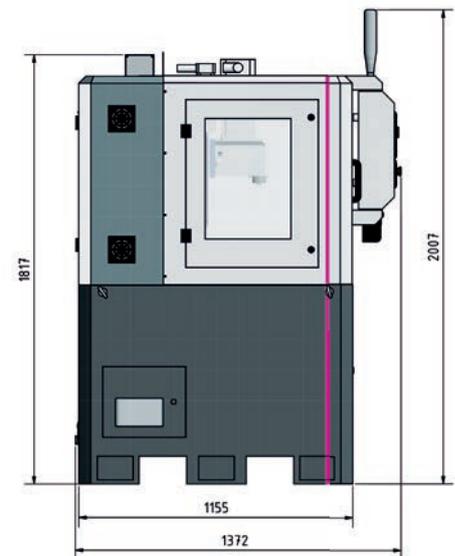
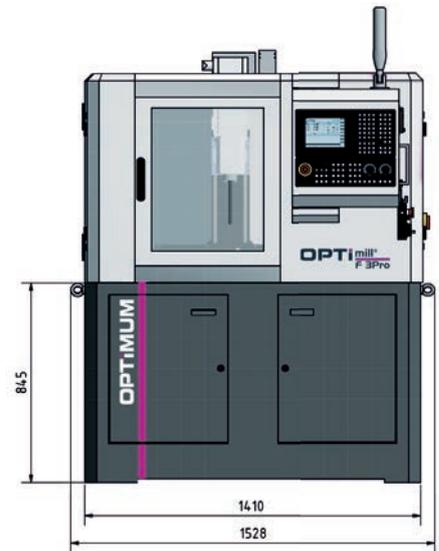
- Linear guides on all axes
- All axes with ball screws
- Servo drive on all axes (X, Y and Z axis)
- Tool change at the push of a button (electropneumatic tool clamping device)
- Coolant system
- Central lubrication
- Signal light
- Solid, precision milling table, generously dimensioned with precision surface finish
- Swivelling control panel
- Portable, electronic handwheel with confirm button and emergency stop button substantially facilitates running in of programs
- Including two years **SIEMENS** warranty (warranty extension on page 246). Information on the warranty at www.optimum-machines.com
- Information on „Maintenance contracts“ on page 321



OPTIMILL F 3PRO

TECHNICAL DATA

Model	F 3Pro
Article no.	3500415
Machine data	
Electrical connection	400 V / 3 Ph ~50 Hz
Total connected load	5 kVA
Milling spindle	
Drive motor S1 operation	1.5 kW
Torque drive motor S1 operation	9.5 Nm
Drive motor S6 30 % operation	2.2 kW
Torque drive motor S6 30 % operation	14 Nm
Spindle seat	BT 30
Cooling lubricant system	
Coolant pump motor	95 W
Tank capacity	30 litres
End mill size	
Cutter head size max.	Ø 50 mm
Max. shaft milling cutter size	Ø 25 mm
Milling precision	
Repeat accuracy	± 0.02 mm
Positioning accuracy	± 0.01 mm
Travel	
X axis	355 mm
Y axis	190 mm
Z axis	245 mm
Feed speed	
X axis	10 m/min.
Y axis	10 m/min.
Z axis	10 m/min.
Speed range	
Speeds*	max. 4 000 rpm
Motor torque	
X axis	1.9 Nm
Y axis	3.5 Nm
Z axis	3.5 Nm
Milling table	
Throat	220 mm
Clearance spindle to table	50 - 295 mm
Table length x width	620 x 180 mm
T-slot size / amount / distance	12 mm / 3 / 50 mm
Max. load of working table	30 kg
Dimensions	
Length x width x height	1 410 x 1 372 x 2 007 mm
Overall weight	1 000 kg



SINUMERIK 808D ADVANCED

- RJ45 Ethernet port
- 8.4" LCD colour display with a resolution of 800x600
- Network function
- Ready for remote maintenance
- AST function gives users an easy optimisation option in case of stricter dynamic and precision requirements
- Closed-loop control circuit
- Greater precision
- Incremental encoder/referencing move required

Warranty extension

The warranty extension lets you protect your new machine against warranty damage for a further 24 or 36 months after the two-year SIEMENS warranty expires. (can only be ordered within the two-year SIEMENS warranty)
12 months; Art. no. 3589010; 36 months; Art. no. 3589012



WORK AREA



- Clearly visible from three sides
- Clear, resilient Makrolon panes

HANDWHEEL



- Portable
- Electronic
- Substantially facilitates running in of programs
- Emergency stop button
- Confirm button

SIGNAL LIGHT



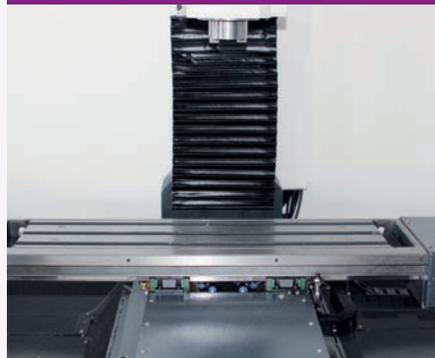
- Visually displays the machine status
- Very bright and with a long service life

CONNECTIONS



- For easy access
- Easy to connect to the machine
- Data interfaces:
 - > Power connection
 - > RJ45 plug-in connection
 - > Ethernet connection
 - > USB connection

LINEAR GUIDE



- High permissible load and high stiffness
- Low coefficient of friction
- High positioning accuracy
- Smooth, backlash-free movement
- Excellent error compensation due to X layout

TOOL CHANGE



- Pneumatic with pushbutton (electropneumatic tool clamping device)
- BT 30 Spindle holder

OPTIONS

STARTER SET BT 30

Article no. 3536107

Comprises:

- 1 pc. milling head holder 1
- 1 pc. drill chuck 2
- 2 pcs. each Weldon 6 mm / 20 mm 3
- 1 pc. each Weldon 8 mm / 10 mm / 12 mm / 16 mm 3
- 1 pc. adapter BT 30 to MT 2 4
- 4 units collet chuck ER 32 5
- 1 pc. collet spanner ER 32 6
- 18-part collet set ER 32 7
- 1 pc. height adjuster 8
- 1 pc. assembly and tool adjustment gauge 9
- 14 pcs. pull studs 10
- 1 pc. taper squeegee 11



➤ For more information see page 282

A circular badge with a white background and a purple border, containing the word "NEW" in purple capital letters.

MZ 4CNC

Rugged universal tool milling machine with maximum operator convenience.

SIEMENS SINUMERIK 828D with PPU 290

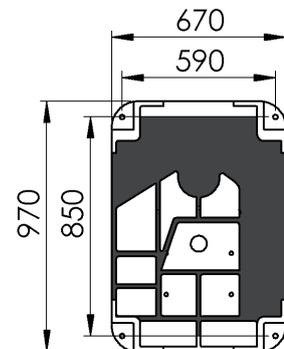
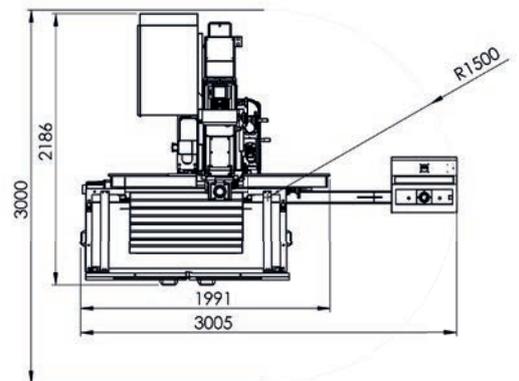
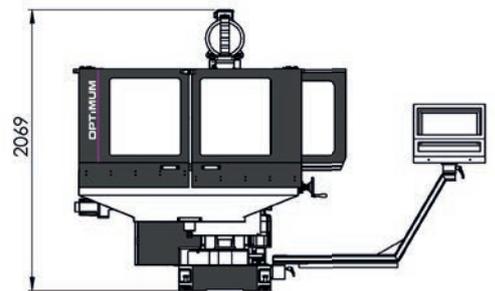
- Versatile range of applications
- All important components such as machine structure, column, slide, angle table, cross table and milling head body are made of stress-free MEEHANITE[®] quality cast iron (FC30), some of them with multiple ribbing
- Excellent damping characteristics and stability of machine mobile chassis
- Servo drive on X/Y/Z axis
- X and Y axis with rugged dovetail guide
- Portable, electronic handwheel with confirm button and emergency stop button substantially facilitates running in of programs
- All guides are hardened, ground and additionally coated with Turcite[®]-B to ensure optimum and constant movement
- All guides adjustable using wedge bars
- All axes with ball screws
- Central and clearly arranged control panel with control
- Solid XY table, generously dimensioned with precision surface finish, hardened and precision ground
- Milling head pivots through $\pm 45^\circ$
- Coolant system
- Machine lamp
- Smooth action
- Foldable table protection with lockable safety switch
- Heat exchanger for switchbox
- Telescopic covers on all 3 axes
- Automatic centralised lubrication with lubricating oil and oil volume control
- Hydraulic tool clamping
- Including two years **SIEMENS** warranty (warranty extension on page 251). Information on the warranty at www.optimum-machines.com
- Information on „Maintenance contracts“ on page 321



OPTIMILL MZ 4CNC

TECHNICAL DATA

Model	MZ 4CNC
Article no.	3511050
Machine data	
Electrical connection	400 V / 3 Ph ~50 Hz
Milling spindle	
Drive motor S1 operation	5.5 kW
Torque drive motor S1 operation	94 Nm
Drive motor S6 30 % operation	9.5 kW
Torque drive motor S6 30 % operation	120 Nm
Coolant pump motor	90 W
Spindle	
Vertical	
Spindle seat	SK 40 DIN 69871
Spindle sleeve diameter	100 mm
Spindle sleeve stroke	120 mm
Throat	110 - 560 mm
Clearance spindle to table	58 - 460 mm
Horizontal	
Spindle seat	SK 40 DIN 2080
Clearance spindle to table	152 - 580 mm
End mill size	
Cutter head size max.	Ø 85 mm
Max. shaft milling cutter size	Ø 20 mm
Milling precision	
Repeat accuracy	± 0.02 mm
Positioning accuracy	± 0.02 mm
Travel	
X axis	600 mm
Y axis	460 mm
Z axis	395 mm
Feed speed	
Feed	10 - 2 m/min.
Rapid traverse	5 m/min.
Speed range	
Speeds*	48 - 3 800 rpm
Speeds	6
Milling table	
Table length x width horizontal	500 x 900 mm
T-slot size / spacing / count horizontal	14 / 7 / 63 mm
Table length x width vertical	300 x 960 mm
T-slot size / spacing / count vertical	14 / 4 / 63 mm
Max. load of working table	320 kg
Dimensions	
Length x width x height	2 186 x 3 005 x 2 069 mm
Overall weight	1 950 kg



Sinumerik 828D system software	SW 26x
CNC memory	5 MB
Cycle change time	2 ms
Look Ahead	100
Number of tools	256

SINUMERIK 828D

The power package in the compact class of CNC controls

Boosting productivity and precision in manufacturing

Robust hardware architecture and intelligent control algorithms as well as top-class drive and motor technology ensure the highest dynamics and precision during machining.

Advanced software-controlled compensation functions ensure additional quality in surface machining and high availability of the machine tool. With SINUMERIK Operate, all machining technologies, from standard to complex, can be operated intuitively and with a uniform "look & feel".

Multitouch operation with PPU 290

The 15.6" panel is robust even in harsh environments. The SINUMERIK Operate user interface is optimised for touch-sensitive operation.

User-friendly

- Capacitive 15.6" color display, 16:9 format
- Configurable side screen
- Intuitive Multitouch operation
- Full QWERTY keyboard
- Soft key selection via touch function
- Easy data transfer thanks to IP65 protected front interfaces (USB 2.0, RJ45 Ethernet)
- Proximity/distance sensor for smart display control

Rugged and maintenance-free

- Front panel made of die-cast magnesium with scratchproof glass front
- Can be operated while wearing gloves
- NV RAM memory technology without buffer battery
- Fanless and hard diskless design

Warranty extension

The warranty extension lets you protect your new machine against warranty damage for a further 12, 24 or 36 months after the two-year SIEMENS warranty expires. (can only be ordered within the two-year SIEMENS warranty)

- 12 months; Article no. 3589020
- 24 months; Article no. 3589021
- 36 months; Article no. 3589022



SIEMENS SAFETY INTEGRATED
SET UP WORK WITH OPEN DOORS

Functional safety also provides protection against high costs!

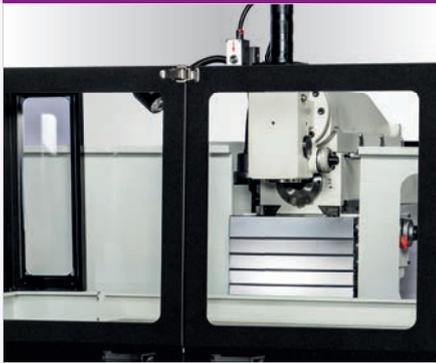
Machine and plant safety is not only important because strict regulations must be observed. When everything runs safely, you benefit from time savings in engineering, higher system availability and more investment security.

OVERALL PACKAGE

- Safety Integrated
- Residual material detection and machining
- Simultaneous recording
- System software SW 26X



WORK AREA



- Clearly visible from three sides
- Clear, resilient Makrolon panes

HANDWHEEL



- Electronic
- Substantially facilitates running in of programs
- Emergency stop button
- Confirm button

SIGNAL LIGHT



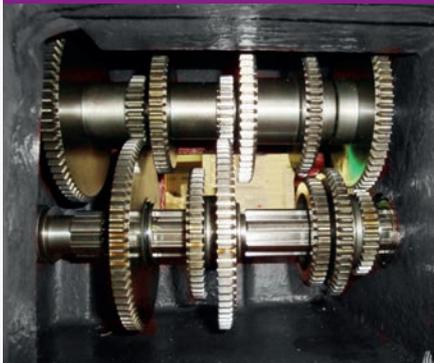
- Visually displays the machine status
- Very bright and with a long service life

BALL SCREW



- Ball screw for high rapid traverse speeds in all axes
- High positioning and repeat accuracy
- Reduced wear

GEARBOX



- High quality

MILLING TABLE



- Solid, precision milling table with five T-grooves, generously dimensioned with precision surface finish

OPERATING PANEL



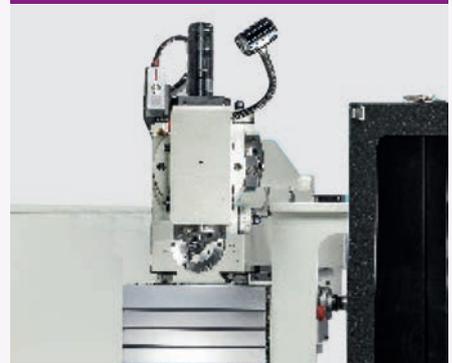
- Pivotal, central and clear

CENTRAL LUBRICATION



- Prevents wear, repair costs and unnecessary downtime to a major extent

MILLING HEAD



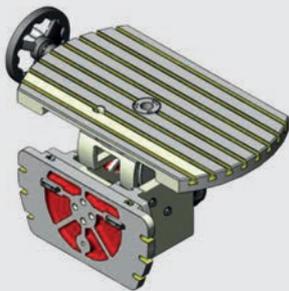
- ±45° pivotable

STANDARD

Counter-bearing for horizontal spindle
Hydraulic clamping set (DIN 40-DIN 69871) 95 mm for vertical spindle
3 reduction sleeves (MT 1, MT 2, MT 3)
3x pull studs
Collet chuck with 7 collets (Ø 6, 8, 10, 12, 16, 20, 25 mm)
External arbour and long cutter arbour (27 mm) for horizontal spindle
LED work lamp
Operating tool

OPTIONS

ANGLED TABLE



Angled table
 Article no. 3346221

- Table length x width 375 x 660 mm
- Max. load of working table 150 kg
- T-slot size / amount / distance: 12 mm / 8 / 45 mm
- Dimensions 895 x 433 x 354 mm
- Weight 140 kg

SPINDLE WITH SERVO DRIVE

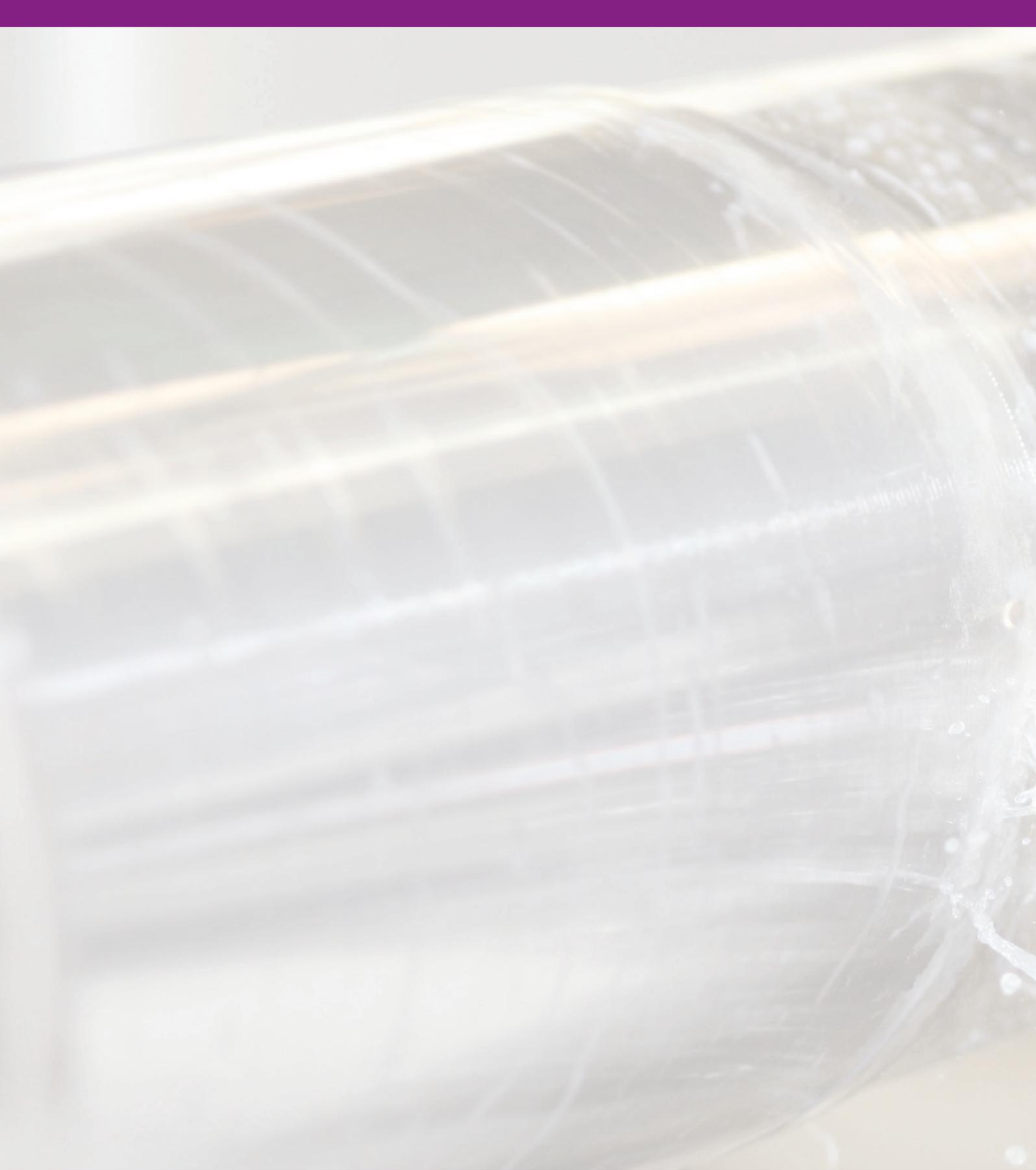
Upgrade spindle with servo drive (instead of inverter)
 Article no. 351105001*

VIBRATION DAMPER, FOOT



SE 55
 (4 items required)
 Article no. 3352981

- Excellent vibration and structure-borne noise insulation
- Noise reduction
- Eliminates floor unevenness up to 5°
- Precision levelling by means of a regular threaded screw





Media package
CNC Lathe L 28HS see page 263

06 **TURNING**
TRAINING MACHINES

L 28HS

CNC-controlled flat bed lathe with linear guide

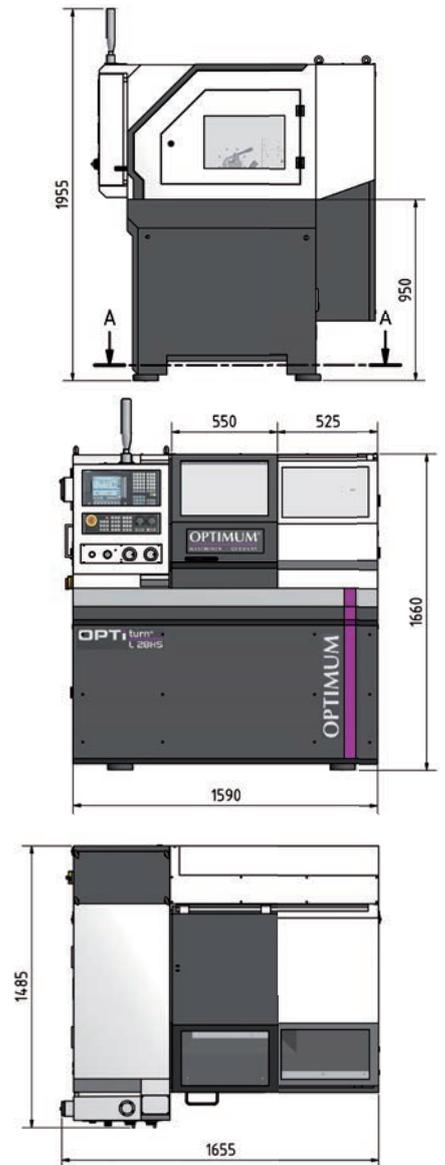
SIEMENS SINUMERIK 808D ADVANCED

- Braced machine bed made from grey cast-iron
- Complex spindle bearing
- Emergency stop button
- Central lubrication
- Reference switch
- Maintenance-friendly protective housing
- Access flap on rear for maintenance
- Safety switch on front sliding door
- Turret located behind the lathe centre (left turning tool)
- Linear guide
- Including two-year **SIEMENS** warranty (warranty extension on page 259). Information on the warranty at www.optimum-machines.com
- Information on „Maintenance contracts“ on page 321



TECHNICAL DATA

Model	L 28HS
Article no.	3504220
Machine data	
Electrical connection	400 V / 3 Ph ~50 Hz
Total connected load	3.75 kVA
Spindle	
Drive motor S1 operation	2.2 kW
Torque drive motor S1 operation	14 Nm
Torque at the spindle	28 Nm
Spindle seat	DIN 6350 A2-3
Spindle taper	5C
Spindle bore	Ø 30 mm
Cooling lubricant system	
Coolant pump output	95 W
Tank capacity	25 litres
Machine data	
Centre height	169 mm
Centre width	430 mm
Swing Ø above cross slide	200 mm
Swing Ø above machine bed	300 mm
Speed range	
Spindle speeds	40 - 4 000 rpm
Tool turret	
Type	electrical
Number of tool slots	6 tools
Max. height, width square	16 mm
Max. diameter drilling rod	16 mm
Precision	
Repeat accuracy	± 0.01 mm
Positioning accuracy	± 0.01 mm
Travel	
X axis	145 mm
Z axis	465 mm
Feed speed	
X axis	10 m/min.
Z axis	12 m/min.
Motor torque	
X axis	1.3 Nm
Z axis	2.4 Nm
Tailstock	
Tailstock seat	MT 2
Tailstock quill diameter	30 mm
Tailstock - quill stroke	120 mm
Dimensions	
Length x width x height	1 655 x 1 590 x 1 955 mm
Overall weight	832 kg



SINUMERIK 808 ADVANCED CNC technology from the technology leader, combined with a revolutionary operating strategy

Surprisingly much dynamics and precision

- The SINUMERIK 808D ADVANCED control is a panel-based CNC control. The compact and user-friendly entry-level solution is used for simple turning applications. Features such as simple operation, commissioning and maintenance, but also an optimal cost position are the perfect basis for equipping entry-level CNC machines. With its technology-specific variants, the SINUMERIK 808D ADVANCED control is perfectly preconfigured for turning.

Intelligent machine optimisation

- With the proven Auto Servo Tuning (AST) function, users can easily optimise the machine. By selecting the tuning strategy, the CNC and drive parameters are automatically optimised according to the machine condition. This allows the simple optimisation of standard machines for applications that require high dynamics.



Control

- 8.4" colour display with 800x600 resolution
- SIMATIC S7-200 PLC-based
- Front USB port (IP65)
- Rear RJ45 Ethernet port
- Technology-specific keyboard layout
- Mechanical keys with protective film
- No battery– permanent intermediate data storage thanks to NV-RAM technology
- Protection class IP65 at the front
- LED tool number display
- MCP with rotary switch for feed and spindle override

Warranty extension

The warranty extension lets you protect your new machine against warranty damage for a further 24 or 36 months after the two-year **SIEMENS** warranty expires. (can only be ordered within the two-year **SIEMENS** warranty)

12 months; Article no. 3589010
36 months; Article no. 3589012

OVERALL PACKAGE

- RJ45 Ethernet port
- Ready for remote maintenance
- AST function gives users an easy optimisation option in case of stricter dynamic and precision requirements
- Greater precision
- Incremental encoder/referencing move required

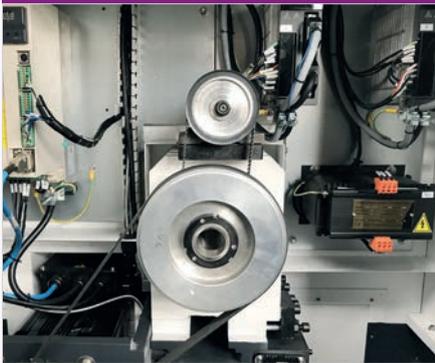


TOOL TURRET



- For 6 tool slots

SPINDLE



- Incremental encoder for spindle positioning (thread tapping)
- Large spindle bore

LINEAR GUIDE



- High permissible load and high stiffness
- High repetition accuracy
- Low coefficient of friction

COOLANT SYSTEM



- Pulls out
- Easy chip disposal

MACHINE LAMP



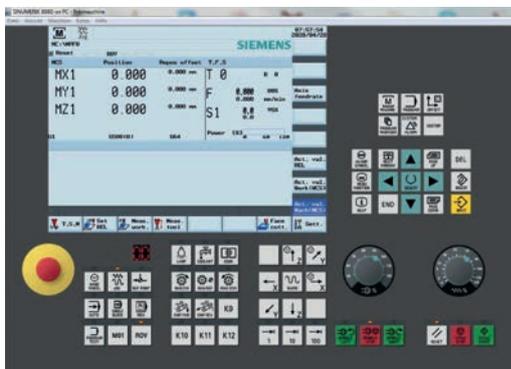
- Full illumination of the workspace

CENTRAL LUBRICATION SYSTEM



- Guarantees regular and automatic lubrication
- Lubricating points that are connected to the central lubricating system have a longer service life

SINUMERIK 808D ON PC



- Software package identical to control
- Facilitates the handling of the machine tool
- The workpieces can be programmed and simulated offline.

Training and learning

SINUMERIK Operate BASIC operations can be explored on a PC without additional hardware. Easy and convenient learning experience with a user interface identical to that of the control

Offline CNC programming:

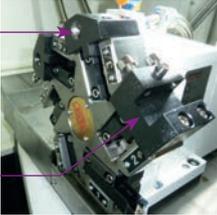
Boos productivity by programming directly on a PC. Test sub-routines on the PC with the integrated simulator

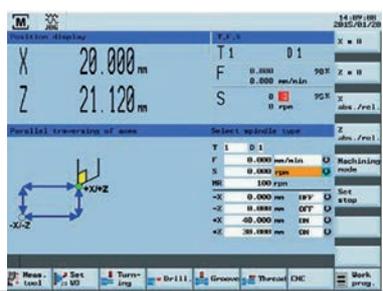
Professional CNC presentations:

Present the SINUMERIK Operate BASIC user interface on the PC – at any time and anywhere without additional hardware

Free to download at www.cnc4you.com

LATHE CHUCK			
Article no.			
3450230	Bison three-jaw lathe chuck		<ul style="list-style-type: none"> • Cast, Ø 125 mm DIN 6350 • Hard jaws, single-part, with outside-inside clamping • Chuck key • Runout accuracy: 0.03 mm
3450410	Bison monoblock jaw set, soft		<ul style="list-style-type: none"> • for three-jaw lathe chuck Ø 125 mm
3450234	Bison four-jaw lathe chuck		<ul style="list-style-type: none"> • Cast, Ø 125 mm DIN 6350 • Hard jaws, single-part, with outside-inside clamping • Chuck key • Runout accuracy: 0.03 mm
3450420	Bison monoblock jaw set, soft		<ul style="list-style-type: none"> • For four-jaw lathe chuck Ø 125 mm
3450240	Bison Chuck flange		<ul style="list-style-type: none"> • For lathe chuck Ø 125 mm • For collet chuck 5C (Article no. 3450238)
3450238	Collet chuck 5C		<ul style="list-style-type: none"> • Size Ø 25 mm • Chuck flange needed (Article no. 3450240)
Fig. with collet chuck - not included in scope of delivery			

MISCELLANEOUS			
3441215	Lathe tool set HM 16 mm		<ul style="list-style-type: none"> • 4-part
3535170	Cylindrical holder Ø16 mm		<ul style="list-style-type: none"> • for B16 chuck
350422010	Boring bar holder round, up to 20 mm		<ul style="list-style-type: none"> • for tool changer • Info: The hole is to be drilled by the user himself
350422011	Turning tool holder transverse up to 16 mm		<ul style="list-style-type: none"> • for tool changer

SOFTWARE			
3584150*	SIEMENS Manual Machine Plus (MM+) Simple cycle control		<p>Enables the transition from conventional machines to CNC programming. The machine can be operated by means of hand wheels like a conventional machine, but with the advantages of CNC-supported technology cycles.</p> <p>Functions:</p> <ul style="list-style-type: none"> • Axis-parallel traverse, taper turning, radius turning, centre drilling, tapping, groove cycle, tapping, pre-turning of contours
➔ For more information see on page 318			

*Delivery ex works. The option must be ordered with the basic machine. Cannot be retrofitted.



MEDIA PACKAGE
SIDE DOOR

07 ROBOTS

OPTIMILL F 150 CNC MILLING MACHINE

THE COMPLETE PACKAGE CENTRED ON THE PREMIUM CNC MILLING MACHINE OPTIMILL F 150 WITH SIEMENS SINUMERIK 828D CONTROL SYSTEM INCLUDING SCHUNK CLAMPING TECHNOLOGY, MEDIABLOC CFC AND THE ROBUST KCR SAFETY CAGE.



Product video
OPTImill F 150 CNC milling machine with robot



More packages on request!

Similar to fig.

Media package

3519013

- Monitor LCD TV 127 cm (50 inch) with HDMI connection
The monitor shows either the working area of the machine or the control system. Optionally also with split screen for displaying the working area and the control.
- Desktop computer
- Splash water-protected camera
- Multimedia table
- Housing including holder
- Installed SIEMENS Toolbox CD
- Keyboard and mouse



Automatic side door

Article no.

- for automatic tooling of the machine
- Door dimension – depending on the machine
- Net weight 46 kg
- including installation

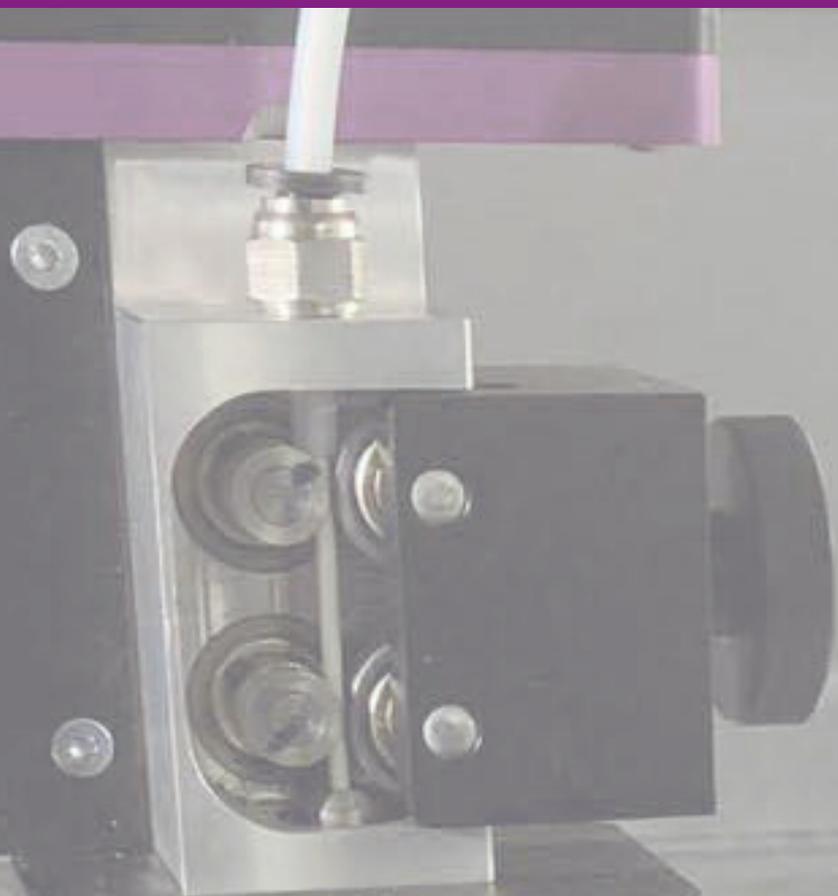
F 150 HSC	3511290299
F 310 HSC	3511290410

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OPTimill 3X
OPTIMUM[®]
MASCHINEN - GERMANY





3-D printing head
Filaments
Accessories
3D Printing application report see page 274

OPTIMILL PRINT HEAD 3X /5X

THE OPTIMILL 3X AND OPTIMILL 5X PRINT HEADS ENABLE THE PRODUCTION OF TANGIBLE OBJECTS FROM DIGITAL 3-D FILES CREATED BY A CAD SYSTEM

Printing instead of milling

Turn your CNC milling machine into a fully functional 3-D printer in just minutes.

The OPTIMUM OPTImill 3X and OPTImill 5X print heads turn your machine into a top class 3-D printer.

The supplied software can convert and load 3-D models and convert them into machine-compatible G-code. I.e. the components are programmed using the Cura Slice program and output to our machines using add-on software.

A very big advantage of our concept is that the wire feed is controlled by the spindle speed. So we can brake in corners and accelerate out, which leads to very good results. Thanks to the use of web preview and feed control, it is possible to print much faster than all other commercially available competitors while maintaining the same quality. More than three times the printing speed with the same or better print quality.

Setup times of maximum 20 minutes* - easy integration on the machine thanks to 3-D interface.

Think big – print big!

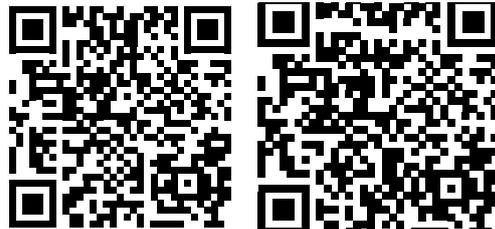
The installation space of your CNC machine allows you to print workpieces that commercial printers cannot produce. The advantage of our concept is that it is possible to machine on the CNC machine during the day, and convert your machine's normal downtime into cash by fully utilising the machine, for example, overnight.

Thanks to the two heating elements on the print head of the Optimill 3x and the ring heater of the Optimill 5X, we achieve temperatures of up to 300 °C, which means that a wide variety of filaments can be printed. Materials such as PA, PLA, ABS, nylon, and carbon are no problem for the printer.

The OPTIMUM print heads OPTImill 3X and OPTImill 5X offer unlimited possibilities

Whether you need large or small 3D prototypes or highly complex components, the flexibility and speed, together with the accuracy of your CNC machine, allows you to produce more cost-effectively and flexibly than ever before. We used the Cura 3-D software for our programming.

With the standard scope of supply filament with a thickness of 1.75 mm can be printed. A conversion kit for the print head is required for 2.85 mm filament. You will also benefit economically from our exchangeable printing nozzles. It is not necessary to replace the entire module, as is often the case with other manufacturers.



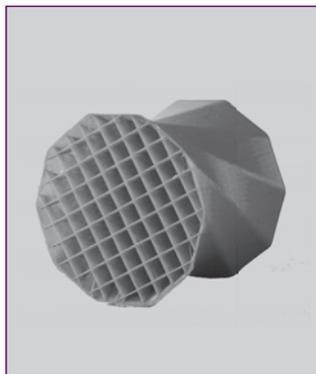
Product video showing the Optimum 3 X - 3-D Printer

AREAS OF APPLICATION



Models

Models are particularly useful for making designs tangible.



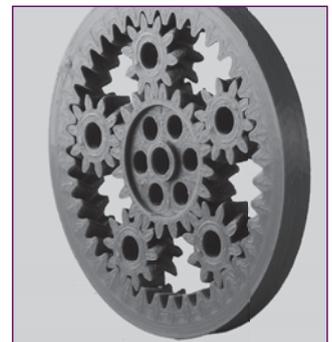
Prototypes

Prototyping gives companies the ability to decisively reduce the development time of new products. In this way, errors can be corrected and improvements introduced at an early stage.



Batch size one production

It is often only possible to produce components and models with complex geometries at very high cost or not at all using conventional, chip-removing manufacturing processes. Especially for small quantities, switching to additive production makes a lot of sense.



Spare parts

Printing spare parts is a popular and inexpensive solution with fast availability. Possible improvements can also be integrated to extend the durability or offer additional benefits.



OPTIMILL PRINT HEAD

AS AN ADD-ON FOR ANY OPTIMUM CNC MILLING MACHINE WITH A SIEMENSSINUMERIK 808D/828D/840D SL CONTROL

NEW

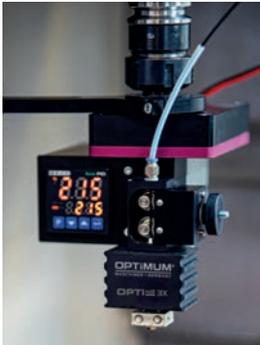


Fig. 3X print head



Fig. 5X print head

OPTImill print head	3X	5X
Item No.	3560010	3560012
	milling machines with 3 axis	milling machines with 3 axis and 5 axis
Extruder drive mounting	Ø 16mm	
Heating	100 Watt at 24V	
Heating element	2 heating nozzles	Ring heater
controllable temperature range	150° - 300 °C	
temperature control	PID (Proportional, Integral und Differential)	
extrusion speed	depending on the drive concept of the CNC milling machine ± 75 mm/s	
Ambient temperature	20°C to 30°C	
Relative humidity	no condensation	

Scope of delivery:

- 2 feed rollers for filament 1.75 mm
- Filament holder
- Printing nozzle size 0.4 mm
- Print head with PID temperature control
- Power supply unit 230 V/24 V DC 15A
- Instruction manual

HEATER PLATES

PREVENT FAST COOLING OF THE OBJECTS, THUS IMPROVING ADHESION.
IMPROVE ADHESION, ESPECIALLY FOR LARGE COMPONENTS.

Heater plate	
Size 1	3560050
suitable for OPTIMUM CNC machines	F 80 / F 105 / F 120X / F 150E / F 150HSC / F 210P / F 210HSC
Work surface	600 x 245 mm
Power	500 W / 230 V ~50 Hz
Heating temperature controllable	0°C to 120°C

Size 2	3560051
suitable for OPTIMUM CNC machines	F 310HSC / F 410HSC
Work surface	980 x 500 mm
Power	2200 W / 230 V ~50 Hz
Heating temperature controllable	0°C to 120°C

Size 3	3560052
suitable for OPTIMUM CNC machines	FU 5 / FU 5 3+2 / FP 1700 / FP 2200 / FP 3200 / FP 4200
Work surface	370 x 410 mm
Power	500 W / 230 V ~50 Hz
Heating temperature controllable	0°C to 120°C



Including separate temperature control with magnetic holder



Custom sizes on request

Feed roller transfer shaft

- 2 pcs.
- High-quality design
- Milled carrier grooves

Feed rollers for 1.75 mm filament	3562202
Feed rollers for 2.85 mm filament	3562204
· Without coating	
Feed rollers for 1.75 mm filament	3562212
Feed rollers for 2.85 mm filament	3562214
· with diamond coating	



Conversion kit for 2.85 mm filament

- Premium design

NEW

for OPTImill 3X	3562220
for OPTImill 5X	3562222

Including

- Holder with press-on rollers
- Radiator body
- Screw connection for insertion
- Two feed rollers with milled driving grooves for 2.85 mm filament
- Hotend feed through 2.85 mm
- Teflon hose
- Screwdriver



Extruder nozzle sets, 3 pcs.

- Rugged and durable

Stainless steel nozzle set for 1.75 mm filament	3562302
· For nozzle size 0.4 mm / 0.6 mm / 0.8 mm	
· Suitable for PLA plastics or similar	
Stainless steel nozzle set for 2.85 mm filament	3562308
· For nozzle size 0.8 mm / 1.0 mm / 1.2 mm	
· Suitable for PLA plastics or similar	
Titanium nozzle set for 1.75 mm filament	3562312
· For nozzle size 0.4 mm / 0.6 mm / 0.8 mm	
· Suitable for carbon material	
Titanium nozzle set for 2.85 mm filament	3562318
· For nozzle size 0.8 mm / 1.0 mm / 1.2 mm	
· Suitable for carbon material	
Brass nozzle set for 1.75 mm filament	3562322
· For nozzle size 0.4 mm / 0.6 mm / 0.8 mm	
· Suitable for PLA material	
Brass nozzle set for 2.85 mm filament	3562328
· For nozzle size 0.8 mm / 1.0 mm / 1.2 mm	
· Suitable for PLA material	



Fig. Stainless steel nozzle set

Fig. Brass nozzle set

Hotend feed-through, 3 pcs.

1.75 mm filament	3562401
2.85 mm filament	3562402



Nozzle cleaning set

- Nozzle drill
- Cleaning drill

Nozzle cleaning set, small

3562342

- for nozzle size 0.4 mm / 0.6 mm / 0.8 mm

Nozzle cleaning set, large

3562344

- for nozzle size 0.8 mm / 1.0 mm / 1.2 mm



Fig. Nozzle cleaning set, small

Fig. Nozzle cleaning set, large

Wire break monitoring

3562410

- Machine stops in case of wire break or at end of wire
- Error message is displayed on the control



Infrared radiant heater

3562420

- Size: 600 x 600 x 17 mm
- Utilisation of complete construction area
- Optimisation of construction area temperature
- Heating output 300 Watt, protection type IP 44
- without fastener



GRP permanent printing plate set

- 2x permanent printing plate set
- Fastening material
- Glass fibre black
- The printed part is removed from the printer with the plate.
- Bends easily to make removal of printed parts easier in cold state.
- Very strong adhesion to printed part in heated state
- Printed parts have a very smooth bottom surface
- Plate can be easily and thoroughly cleaned and is very durable

Size: 600 x 245 mm

3562260

Size: 980 x 500 mm

3562262

Size: 370 x 410 mm

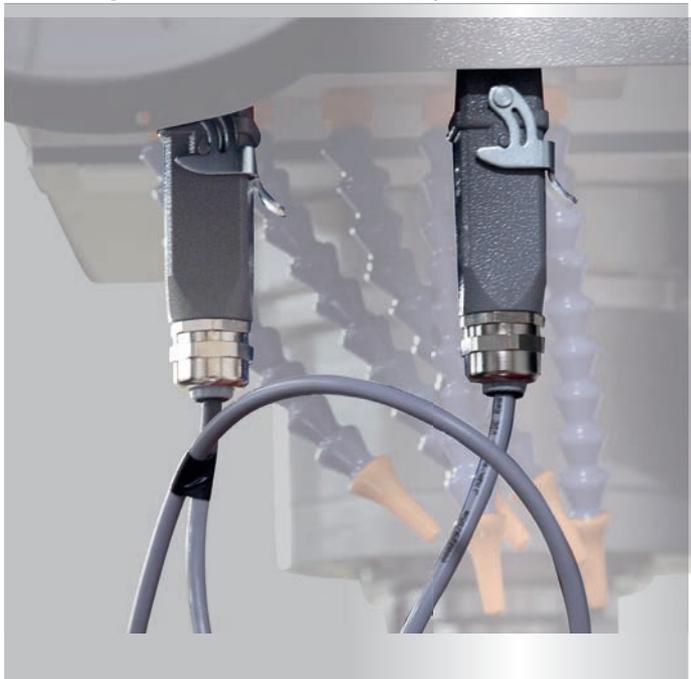
3562264



3-D printing interface

3562411

- Plug connector on milling head for OPTImill 3X printing head and 5X printing head
- The power supply is installed in control cabinet
- Prepared for connecting wire break monitoring
- Filament holder installed
- including installation ex warehouse Germany



NEW

Tool holder set 3-D print head

BT 30	3562188
<ul style="list-style-type: none"> • Collet chuck holder ER32 / BT 30 • Collet chuck spanner ER32 • Collet chuck ER32/16 mm • Pull stud BT 30 	

NEW

BT 40	3562189
<ul style="list-style-type: none"> • Collet chuck holder ER32 / BT 40 • Collet chuck spanner ER32 • Collet chuck ER32/16 mm • Pull stud BT 40 	

SK40 DIN69871	3562190
<ul style="list-style-type: none"> • Collet chuck holder ER32/SK40 DIN69871 • Collet chuck spanner ER32 • Collet chuck ER32/16 mm 	



Cleaning scraper

3562430
<ul style="list-style-type: none"> • Material: Stainless steel • Colour: silver • Protection due to complete retraction of the blade • 40 mm blades • 5 blades included



Spare blades

3562431
<ul style="list-style-type: none"> • 10 blades

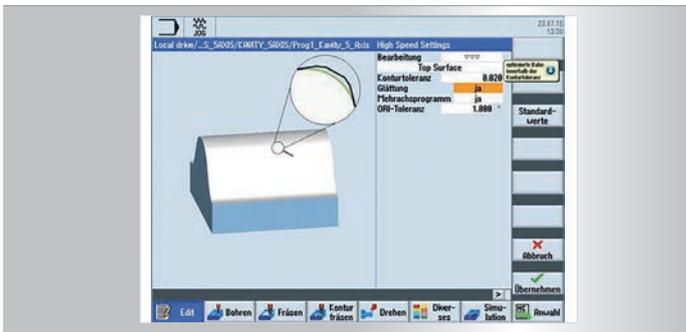
Software Cura 4.5

- <https://ultimaker.com/en/products/ultimaker-cura-software>
- Includes plugin via USB



Top surface for SIEMENS control

- | |
|---|
| 3584012 |
| <ul style="list-style-type: none"> • The NC data from the CAM system are optimised online during processing. • The result is excellent surface quality while milling complex free-form surfaces. • All new functions are system integrated and available with Sinumerik Operate. |



Torque supports

- for fastening on the main spindle
 - Custom sizes on request
- | | |
|----------|---------|
| Ø 100 mm | 3562522 |
| Ø 120 mm | 3562511 |
| Ø 125 mm | 3562512 |
| Ø 130 mm | 3562513 |
| Ø 140 mm | 3562514 |
| Ø 150 mm | 3562521 |
| Ø 155 mm | 3562515 |
| Ø 160 mm | 3562516 |
| Ø 200 mm | 3562520 |



Filament roll holder

3562590

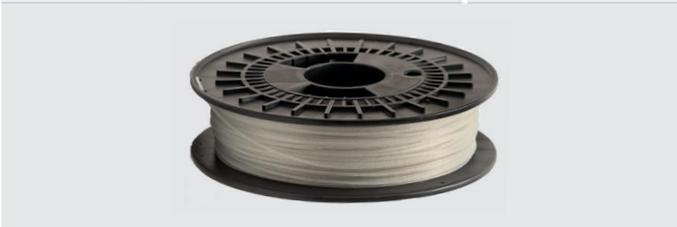
- Dimension L x W: 250 x 85 mm
- For machines with wide heads
- Holder must be bolted on (by customer)



Glass fibre filament

- Basic material PA 6
- 15 % extra long fibres
- Extremely good hardness/rigidity

1.75 mm (1 kg)	3568071
2.85 mm (2 kg)	3568072



Carbon filament

- Basic material PA 6
- Carbon fibre/carbon filament
- Carbon look
- 15 % extra long carbon fibres
- Extremely high hardness/rigidity
- 1 kg reel

1.75 mm	3568061
---------	---------



PA 6 (polyamide) filament

- High strength and load capacity
- Very durable and very high resistance against chemicals
- Perfectly suited for mechanically loaded components, e.g., gearwheels or screws

1.75 mm (1 kg)	3568081
2.85 mm (2 kg)	3568082



PLA (Polylactide) filament

- Material processing 1A
- Saturated and clear colours
- PLA filament with good performance
- Excellent filament for daily use
- Characterised by high strength
- 1 kg reel

Black 1.75 mm	3568014
Black 2.85 mm	3568015
White 1.75 mm	3568011
White 2.85 mm	3568012
Red 1.75 mm	3568017
Red 2.85 mm	3568018



XT-CF20 filament

- Basic material PLA
- Carbon fibre composite material on co-polyester basis with a carbon fibre content of at least 20 %
- Very good adhesion properties of the printed layers
- Odourless and free from styrenes
- High glass temperature (T_g = 80 °C)
- Very high melt strength
- Very high melt viscosity
- Matt black surface

1.75 mm	3568051
2.85 mm	3568052



ABS filament

- Synthetic (petrochemical based)
- High rigidity, toughness and strength achievable
- Very good impact and scratch resistance
- Excellent weathering resistance
- Specially suited for components exposed to high stress
- black

1.75 mm (1 kg)	3568040
2.85 mm (2 kg)	3568041



3D PRINTING ON 5 AXES

OPTIMILL 5X AS AN EXTENSION TO THE CNC MILLING MACHINE FU5

In cooperation with the University of Trier and a German engineering company, OPTIMUM Maschinen Germany GmbH has developed a new 3D print head that enables 5-axis 3D printing on the CNC milling machine OPTIMUM FU5 or another 5-axis milling machine with Siemens 840DSL control using Siemens NX software.

The new print head 5X is a further development of the well-known 3-axis print head Optimill 3X, which has already been successfully in use as a machine component for OPTIMUM's CNC milling machines since 2018. Compared to the 3-axis printing process, however, Optimill 5X offers a clear advantage: Printing on five axes not only saves time, but also achieves greater stability of the printed components. By adjusting the fourth and fifth axes, the Optimill 5X printhead eliminates the need for additional structures and allows the part to be printed in one piece without any additional supports. This improves the surfaces and avoids staircase effects.

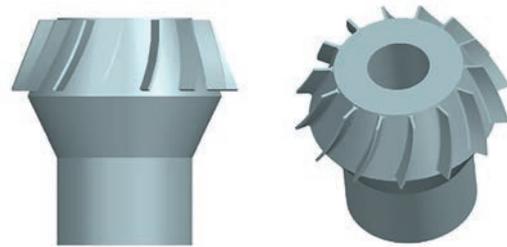
Other components that have been optimised as part of this new development are the projection length of the hot end, which reduces interfering edges, and the heating, which in the toroidal core heating design now enables uniform and faster melting of the filament as well as large flow rates. This is necessary to speed up the printing process and/or to work with large nozzle diameters.

In order to exploit all the functionalities of the Optimill 5X printhead, it is recommended to use the Siemens NX software. In principle, however, other CAD/CAM systems are also capable of programming the complex 5-axis motion control.

Of course, you always have the option of performing ordinary 3-axis printing with the Optimill 5X printhead. To do this, you can use the Cura programming software.

5-axis printing using Siemens NX

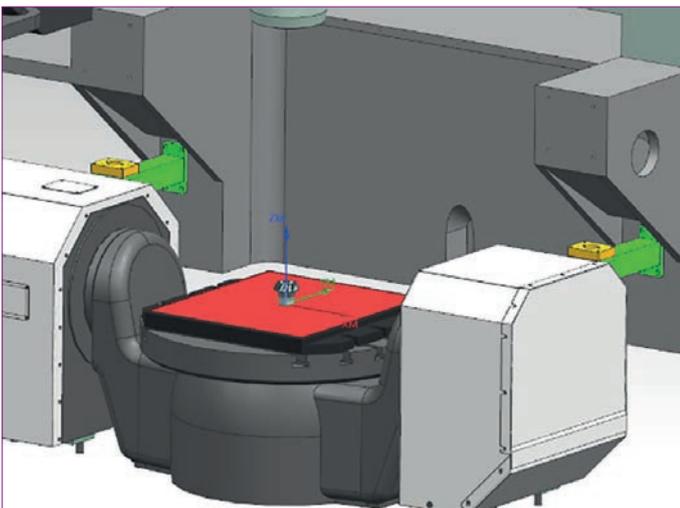
In order to be able to carry out a complete simulation of the machine tool in Siemens NX, a 3D model of the machine tool must first be available, which has previously been kinematised and has a deposited postprocessor. In addition, the print head required for production must be stored as a model and the component to be printed must be created as a model. This can either be designed directly in NX or you can use alternative systems and file formats and then import the models into NX.



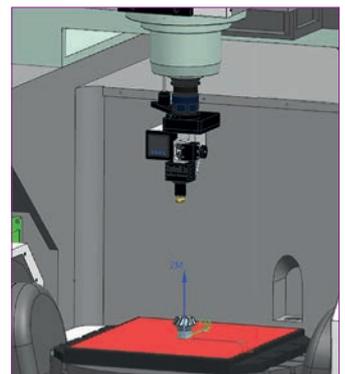
Example: Printing of a cylindrical body.

In the following example, we show you the individual work steps for producing a cylindrical body with the aid of the Optimill 5X 5-axis print head.

First, add both the print bed and the component to the machine in the production environment. Then add the Optimill 5X 3D print head as a machine component.

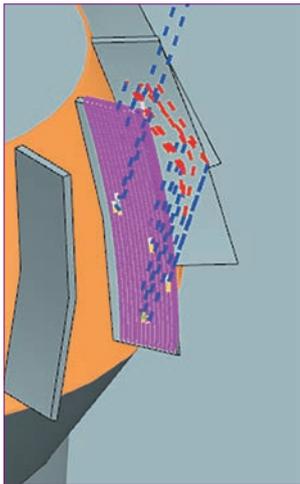


Now load the nozzle with the appropriate diameter from the tool library into this machine component.



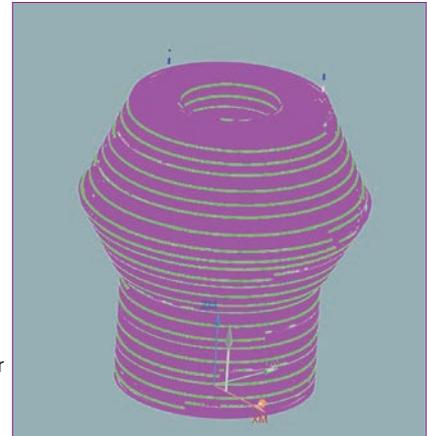
When printing a cylindrical body, working with two operation types is recommended. The operation "Planar Additive Spiral inwards and outwards" can be used for the basic body. This operation creates round toolpaths and is therefore ideal for cylindrical bodies. The picture opposite shows the toolpaths of the first operation.

For the sides of the part, a second operation is used, "freeform additive build", as the orientation of the machine tool table should be adjusted for this. The aim is that the tool always remains in its initial orientation.

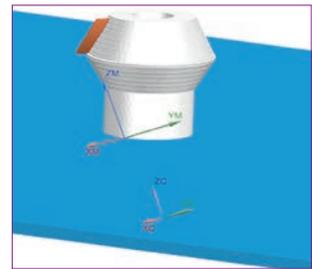
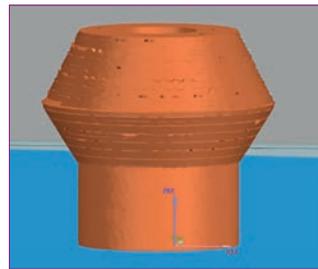


In addition, many other types of operations are available. These include operations for zig-zag build-up, build-up movements and movements on free-form surfaces as well as special operations for the production of tubes.

The normal of the component surface can be selected for the output axis. After creation, the toolpaths are then displayed directly. In this operation, all other side surfaces can also be made after the check.

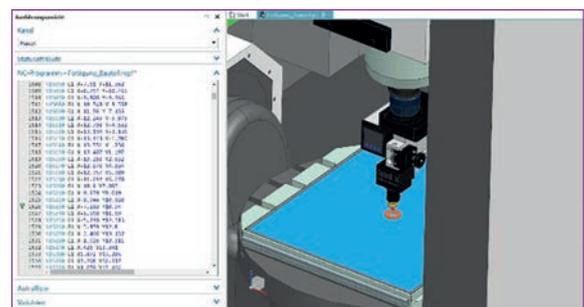


The simulation can now be carried out either as a whole or - as shown below - in individual steps.



Once the simulation process has run smoothly, the programme is output via the postprocessor. If the machine has been correctly integrated beforehand, the simulation process is immediately specified to match the machine. In this case, this results in a programme for the Sinumerik 828D or 840DSL.

The following illustration shows the simulation of the post-processor output. This eliminates any collisions that may occur later.



Afterwards, the created programme can be transferred to the machine without any problems.

The programme sequence is designed in such a way that the table is adjusted to a certain angle and also rotated. As the heating plate is connected to a cable, it is possible that a message will prompt you to briefly disconnect the heating plate from the power supply so that the axis can swing over.



FRANCONIAN INNOVATION HELPS FIGHT COVID-19

HALLSTADT-BASED COMPANY LAUNCHES PRODUCTION OF FACE SHIELDS FOR HOSPITALS USING INNOVATIVE 3-D PRINTING TECHNOLOGY

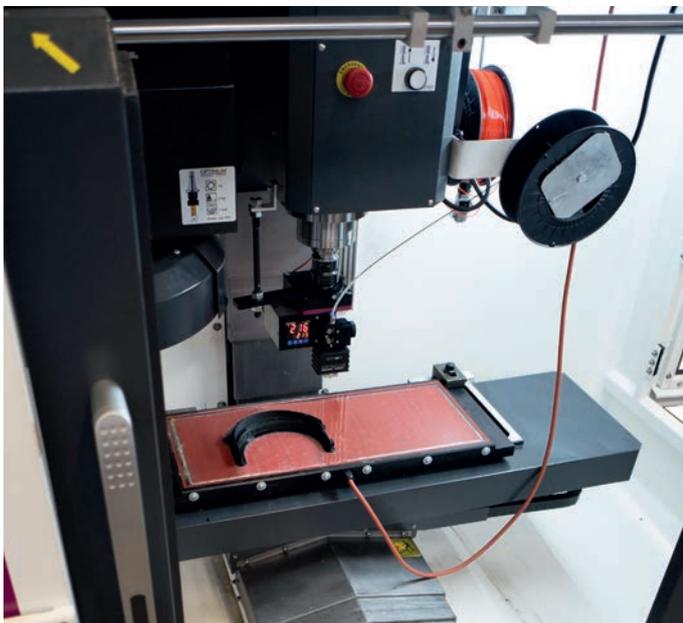
Optimum Maschinen Germany GmbH, in collaboration with a German engineering office and the University of Trier, has set up a 3-D print head that is ready for series production for industrial use in the production of urgently needed face shields. Since the end of last week, these visors, needed by doctors, hospital and nursing staff, can be produced using OPTIMUM brand CNC milling machines in a 3-D printing process. Starting next week, these visors will be made available free of charge to hospitals in the Bamberg area and northern Bavaria.

The great advantage of the technology used here is that such plastic parts can be additionally produced using the OPTIMUM OPTImill 3X 3-D print head in unmanned secondary shifts on standard CNC milling machines, which are used for other applications in the main shifts at the production plants. When the day shift starts, these parts, produced as a "positive side effect" can then be finished with very little manual effort and immediately distributed to the hospitals.

Although the quantities are not comparable to those achieved with conventional industrial plastics processing machines, for example, in injection moulding, the number of parts produced is still very high. However, there is no capital outlay for expensive moulds, and the additional costs for setup and machine operation are also extremely low. In addition, many different variants can be produced without any problems in line with individual requirements, even in the smallest batch sizes. All that is required is changes in the machine control programs, but no expensive plastics moulds, which would first have to be manufactured with a long lead time.



Follow this for the video presentation



In the production of the plastic components, Optimum uses PLA filament, which is particularly suitable for the production of the required components due to its light weight and good flexibility. In addition, this material is obtained from renewable and natural raw materials and is therefore easily biodegradable.

Stürmer printed initial prototypes of these face shields on its OPTImill F 80 3-axis milling centre at its logistics centre in Pettstadt near Bamberg. The products are now being supplied to hospitals. The software required for this comes from Prusa Research a.s. in the Czech Republic, a company specialising in 3-D printing processes, which has made it available specifically for combating the corona pandemic. Kilian Stürmer, owner of the group, did not hesitate for a moment and was immediately enthusiastic about the idea of joining forces across national borders to tackle the pandemic and provide several milling machines for the production of these visors: "We are very happy to combine this great concept of our Czech neighbours with our know-how and decades of experience in the field of CNC milling and thus support those people who are currently working unconditionally for the health of all of us".



Starter sets
Vices
Fourth axis rotary indexing table
5-axis rotary/swivelling table
Workpiece/tool measuring

09 MILLING ACCESSORIES

FOURTH AXIS ROTARY INDEXING TABLE

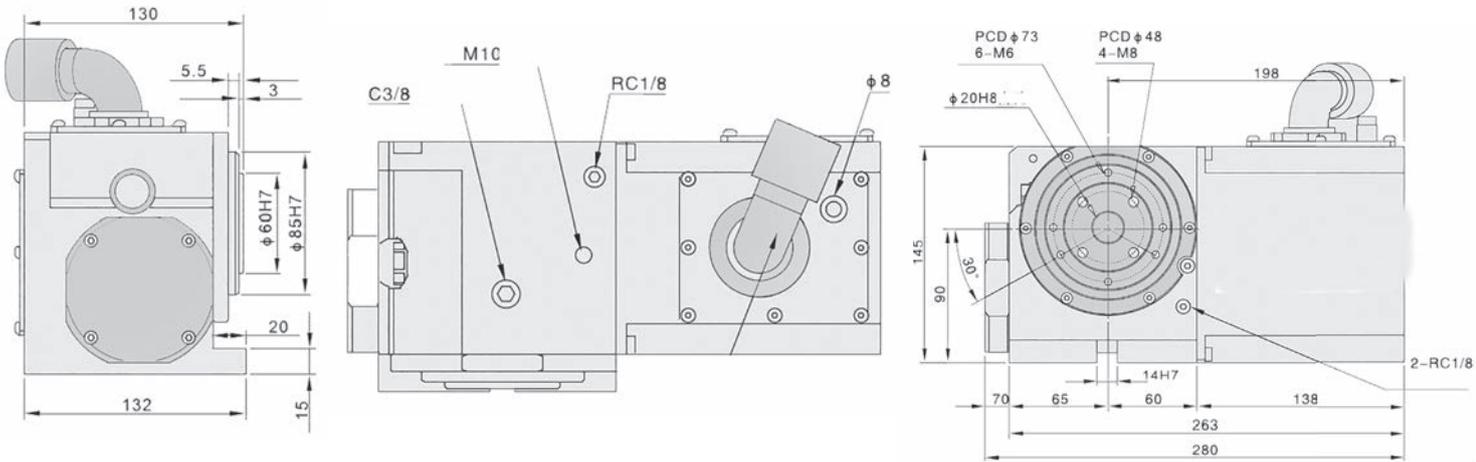


NEW

Model		F 80	F 105 / F 150E	F 120X	F 210P	F 150 / 210 / 310 / 410
Article no.		350108503*	350110003*	351512003*	351121509*	3511290210*
Technical data						
Table diameter		80 mm		120 mm		120 mm
Vertical table centre height		90 mm		110 mm		115 mm
Horizontal table height		130 mm		150 mm		170 mm
Total vertical height without motor cover		200 mm		190 mm		193 mm
Through bore		Ø 20 mm		Ø 30 mm		Ø 30 mm
T-slot width		14 H7		12 H7		10 H7
Slot nut width		14 H7		14 H7		14 H7
Servo motor type		SIEMENS		SIEMENS		SIEMENS
Transmission ratio		1:60		1:60		1:60
Minimum step width		0.001°		0.001°		0.001°
max. speed		100 rpm		44.4 with motor 4 000 rpm		33.3 rpm
when connected to compressed air: pneumatic clamping force at 5 bar operating pressure		78 Nm		118 Nm		120 Nm
when connected to hydraulics: hydraulic clamping force at 20 bar operating pressure						240 Nm
Indexing accuracy		30"		60"		30"
Unidirectional repeatability		4"		+/- 2		4"
Bidirectional repeatability		490 Nm		118 Nm		12"
Net weight		25 kg		38		28 kg
max. vertical tool weight		W = 20 kg		W = 50 kg		W = 35 kg
max. horizontal tool weight		W = 50 kg		W = 100 kg		W = 75 kg
Max. radial load		F = 50 kg		F = 5.8 KN		F = 5.8 KN
		F x L = 8 kg x m		F x L = 147 Nm		F x L = 78.5 Nm
		F x L = 20 kg x m		F x L = 196 Nm		F x L = 176.5 Nm

F 80

Article no. 350108503*



F 105 / F 150E

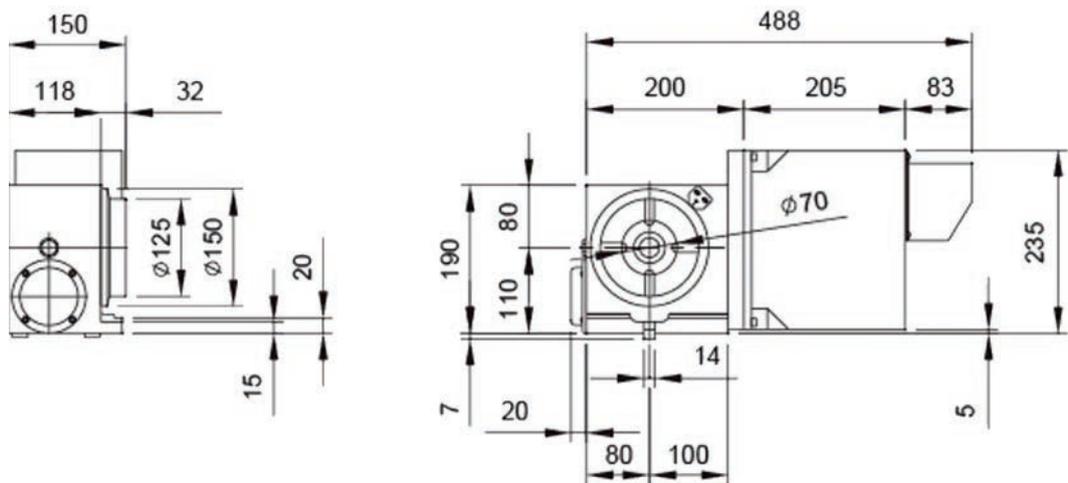
Article no. 350110003

F 120X

Article no. 351512003

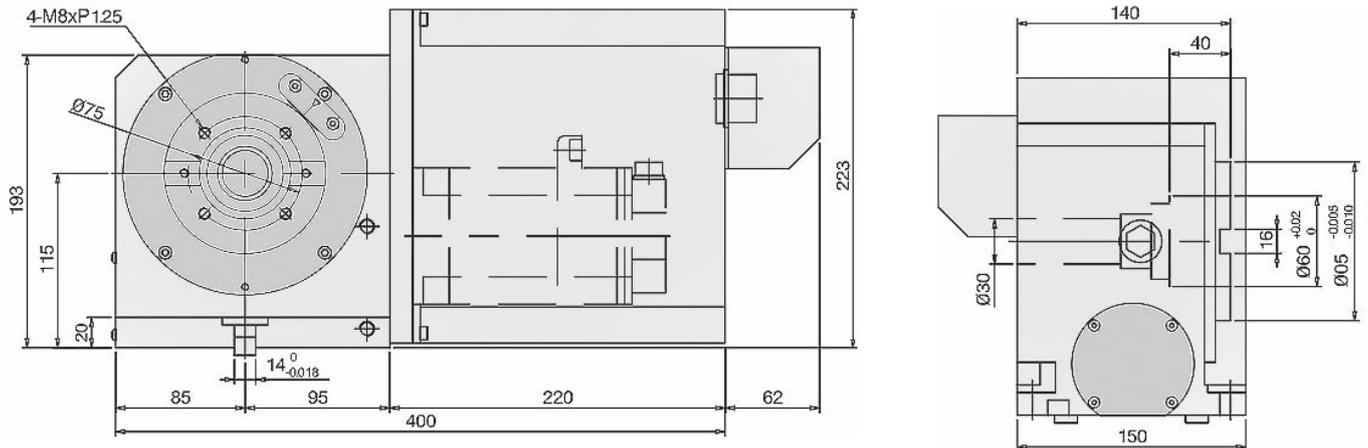
F 210P

Article no. 351121509



F 150HSC / F 210HSC / F 310HSC / F 410HSC

Article no. 351121509



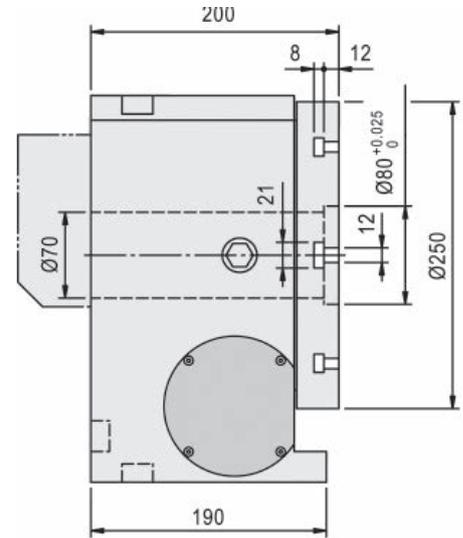
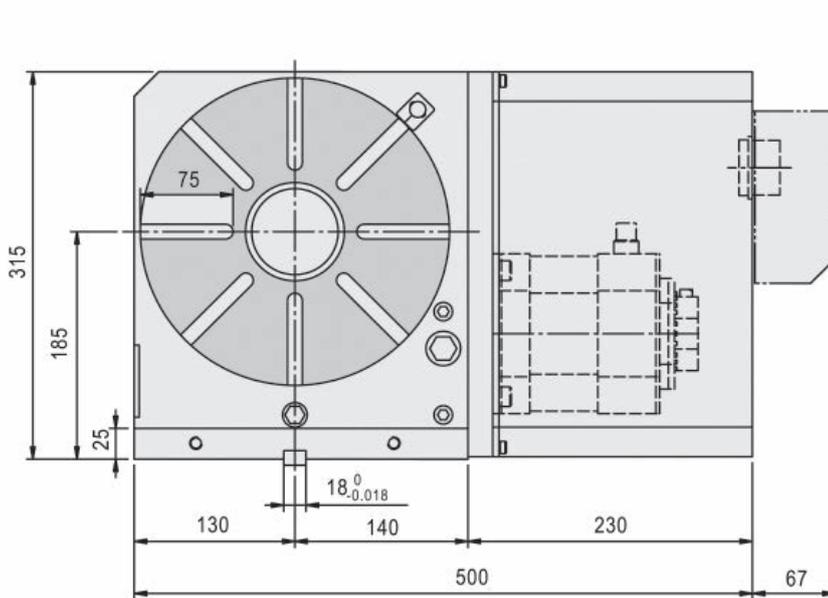
4-AXIS ROTARY INDEXING TABLE



Model		F 410 HSC	F 610 HSC
Article no.		3511290211*	3511290212*
Technical data			
Table diameter		250 mm	320 mm
Vertical table centre height		185 mm	210 mm
Horizontal table height		200 mm	240 mm
Total vertical height without motor cover		315 mm	380 mm
Through bore		Ø 70 ^{H7} mm	Ø 110 ^{H7} mm
T-slot width		12 ^{H7} mm	14 ^{H7} mm
Slot nut width		18 ^{H7} mm	18 ^{H7} mm
Servo motor type		SIEMENS 1FK7060	SIEMENS 1FK7083
Transmission ratio		1:180	1:180
Minimum step width		0.001°	0.001°
max. speed		11.1/22.2 rpm	11.1/22.2 rpm
when connected to compressed air: pneumatic clamping force at 5 bar operating pressure		250 Nm	
when connected to hydraulics: hydraulic clamping force at 20 bar operating pressure		500 Nm	
Indexing accuracy		15"	15"
Unidirectional repeatability		4"	4"
Bidirectional repeatability		50"	50"
Net weight		124 kg	210 kg
max. vertical tool weight		W = 150 kg	W = 175 kg
max. horizontal tool weight		W = 300 kg	W = 350 kg
Max. radial load		F=1 450 kg	F =2 500 kg
		F x L = 922 Nm	FxL=142 kg x m
		F x L =1770 Nm	FxL=200 kg x m

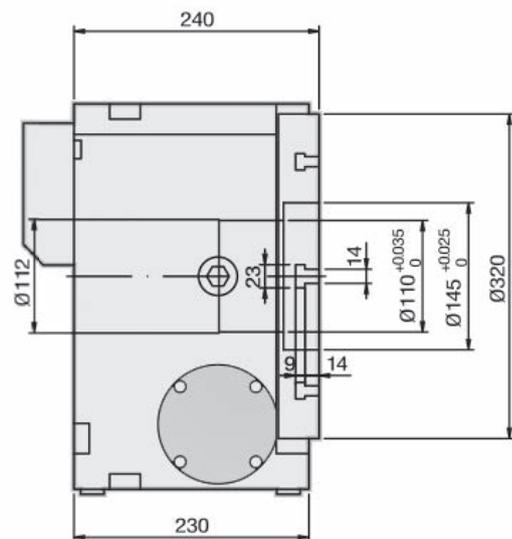
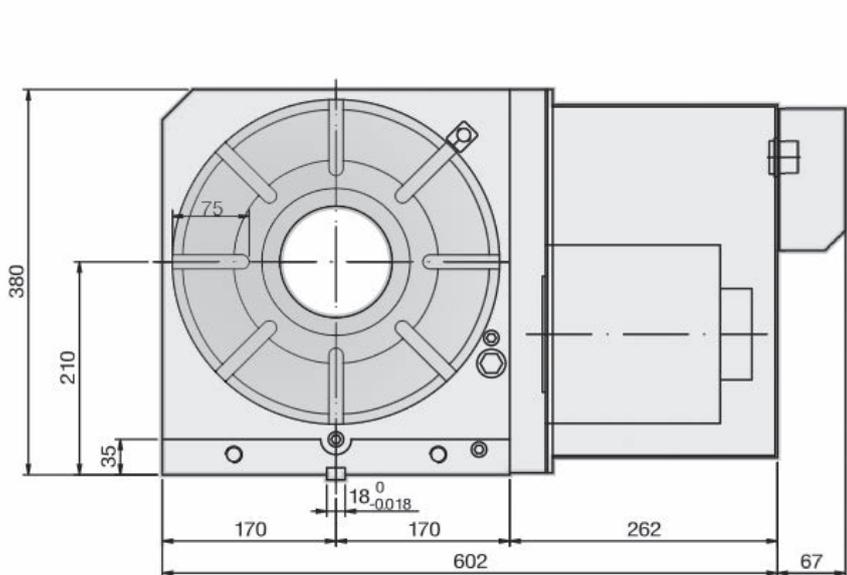
F 410 HSC

Article no. 3511290211



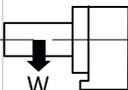
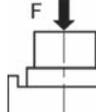
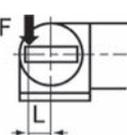
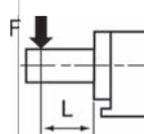
F 610 HSC

Article no. 3511290212



5-AXIS ROTARY/SWIVELLING TABLE



Model	F 150 HSC	F 310 HSC F 410 HSC	F210P	F 310 HSC F 410 HSC F 610HSC	F 610 HSC
Article no.	3511290210*	3511290202*	351121510*	3511290251*	35111290252*
Technical data					
Possible machining diameter		120 mm		200 mm	250 mm
Height of the tilting centre		150 mm		195 mm	225 mm
Vertical overall height		235 mm		360 mm	355 mm
Passageway		Ø 30 ^{H7} mm		Ø 35 ^{H7} mm	Ø 70 ^{H7} mm
T-groove size		10 ^{H7} mm		12 ^{H7} mm	12 ^{H7} mm
Slot nut width		14 ^{H7} mm		18 ^{H7} mm	18 ^{H7} mm
Rotate servo motor types		SIEMENS 1FK7042		SIEMENS 1FK7060	SIEMENS 1FK7060
Tilting servo motor types		SIEMENS 1FK7042		SIEMENS 1FK7063	SIEMENS 1FK7063
Rotate transmission ratio		1:72		1:90	1:90
Tilting transmission ratio		1:120		1:180	1:180
Minimum step width		0,001°		0,001°	0,001°
Rotate / Tilting speed		max. 27.8 rpm / 16.7 rpm		max. 22.1 rpm / 11.1 rpm	max. 22.1 rpm / 11.1 rpm
Tilt angle		-20° ~ 120°		-110° ~ 110°	-110° ~ 110°
Rotate indexing accuracy		30"		20"	15"
Tilting indexing accuracy		60"		50"	30"
Net weight		105 kg		240 kg	280
max. vertical tool weight		W = 20 kg		W = 50 kg	W=60 kg
max. horizontal tool weight		W = 35 kg		W = 100 kg	W=100 kg
Max. radial load		F = 3.9 KN		F = 4.9 KN	F=1200 kg
		F x L = 235 Nm		F x L = 161 Nm	F x L = 100 kg x m
		F x L = 294 Nm		F x L = 147 Nm	F x L = 120 kg x m

STARTER SET

BT 30

Starter set BT 30	3536107
Comprises:	
· 1 pc. milling head holder	
· 1 pc. quick-release drill chuck 1 - 13 mm	
· 2 pcs. each Weldon 6 mm/ 20 mm	
· 1 pc. each Weldon 8 mm / 10 mm / 12 mm / 16 mm	
· 1 pc. adapter BT 30 to MT 2	
· 4 pc. collet chuck holder ER 32	
· 1 pc. collet spanner ER 32	
· 18-part collet set ER 32	
· 1 pc. height adjuster	
· 1 pc. assembly and tool setting aid	
· 14 pcs. pull studs	
· 1 pc. taper squeegee	

Milling head holder	3536306
· 22 mm seat	



Chuck	3536303
· Clamping range 1 - 13 mm	
· Concentricity 0.03 mm	
· Max. speed 12 000 rpm	



Weldon holder	
Ø 6 mm	3536310
Ø 8 mm	3536311
Ø 10 mm	3536312
Ø 12 mm	3536313
Ø 16 mm	3536314
Ø 20 mm	3536315



Adapter	
BT 30 to MT 2	3536305
BT 30 to MT 3*	3536316

* not in starter set



Holder BT 30 - B16*	3353308
* not in starter set	



Collet chuck holder ER 32	3536304
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Collet chuck spanner ER 32	3536307
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Collet set ER 32	3441122
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· 18-part collet chuck set size Ø 1 - 16 mm



Height-adjuster	3536290
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· Analogue version
 · For fast and easy determination of the reference point on the Z axis and/or for adjusting tools "to zero" (e.g., for milling or drilling) without damaging the workpiece



Assembly and tool adjustment gauge	3536193
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· For easy and precise adjustment of tools
 · Vertical and horizontal collet for tools with a steep-angle taper



Taper squeegee	3536301
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Pull stud JIS B 6339	3536302
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· 30°



BT 40

09 ACCESSORIES

Starter set BT 40	3536108
Comprises:	
· 1 pc. milling head holder with 27 mm collet	
· 1 pc. quick-release drill chuck 1 - 13 mm	
· 2 pcs. each Weldon 6 mm/ 20 mm	
· 1 pc. each Weldon 8 mm / 10 mm / 12 mm / 16 mm	
· 1 pc. adapter BT 40 to MT 3	
· 4 pc. collet chuck holder ER 32	
· 1 pc. collet spanner ER 32	
· 18-part collet set ER 32	
· 1 pc. height adjuster	
· 1 pc. assembly and tool setting aid	
· 15 pcs. pull studs	
· 1 pc. taper squeegee	

Milling head holder	3536336
· Collet 27 mm	



Chuck	3536333
· Clamping range 1.5 - 16 mm	



Weldon holder	
Ø 6 mm	3536340
Ø 8 mm	3536341
Ø 10 mm	3536342
Ø 12 mm	3536343
Ø 16 mm	3536344
Ø 20 mm	3536345



Adapter	3536335
· BT 40 to MT 3	



Holder BT 40 - B16*	3353338
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Collet chuck holder ER 32	3536334
----------------------------------	---------



Collet chuck spanner ER 32	3536307
-----------------------------------	---------



Collet set ER 32	3441122
-------------------------	---------

- 18 collet chucks; sizes Ø 1 - 16 mm



Height-adjuster	3536290
------------------------	---------

- Analogue version
- For fast and easy determination of the reference point on the Z axis and/or for adjusting tools "to zero" (e.g., for milling or drilling) without damaging the workpiece
- Housing height 50 mm



Assembly and tool adjustment gauge	3536204
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- For easy and precise adjustment of tools
- Vertical and horizontal collet for tools with a steep-angle taper



Taper squeegee	3536331
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Pull stud JIS B 6339	3536332
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- 30°



STARTER SET

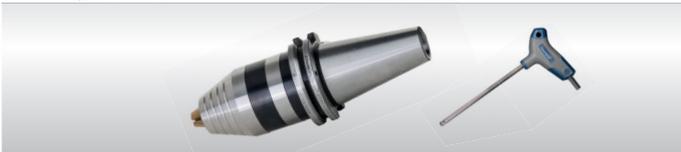
SK 40 / DIN 69871

Starter set SK 40 / DIN 69871	3536109
Comprises:	
· 1 pc. milling head holder with 27 mm collet	
· 1 pc. quick-release drill chuck 1 - 13 mm	
· 2 pcs. Weldon 6 mm	
· 1 pc. Weldon 8 mm	
· 1 pc. Weldon 10 mm	
· 1 pc. Weldon 12 mm	
· 1 pc. Weldon 16 mm	
· 2 pcs. Weldon 20 mm	
· 1 pc. adapter SK 40 to MT 3	
· 4 pcs. collet chuck holder ER 32	
· 1 pc. collet spanner ER 32	
· 18-part collet set ER 32	
· 1 pc. height adjuster	
· 1 pc. assembly and tool setting aid	
· 1 pc. taper squeegee	
· 15 pcs. pull studs	

Milling head holder	3536366
· Collet 27 mm	



Chuck	3536363
· Clamping range 1 - 13 mm	



Weldon holder	
Ø 6 mm	3536370
Ø 8 mm	3536371
Ø 10 mm	3536372
Ø 12 mm	3536373
Ø 16 mm	3536374
Ø 20 mm	3536375

Reduction sleeve	3536365
· SK 40 to MT 3	



Collet chuck holder ER 32	3536364
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Collet chuck spanner ER 32	3536307
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Collet set ER 32	3441122
· 18 collet chucks; sizes Ø 1 - 16 mm	

Height-adjuster	3536290
· Analogue version	

- For fast and easy determination of the reference point on the Z axis and/or for adjusting tools "to zero" (e.g., for milling or drilling) without damaging the workpiece
- Housing height 50 mm

Assembly and tool adjustment gauge	3536195
· For easy and precise adjustment of tools	
· Vertical and horizontal collet for tools with a steep-angle taper	

Taper squeegee	3536331
-----------------------	---------

Pull stud DIN 69872	3536362
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HSK A-63

09 ACCESSORIES

Starter set HSK A-63	3536110
Comprises:	
· 1 pc. milling head holder with 27 mm collet	
· 1 pc. chuck 1 - 13 mm	
· 1 pc. Weldon 6 mm	
· 1 pc. Weldon 8 mm	
· 1 pc. Weldon 10 mm	
· 1 pc. Weldon 12 mm	
· 1 pc. Weldon 16 mm	
· 1 pc. Weldon 20 mm	
· 1 pc. adapter HSK63 to MT 3	
· 1 pc. collet chuck holder ER 32	
· 18-part collet set ER 32	
· 1 pc. collet spanner ER 32	
· 1 pc. swivelling assembly block	
· 1 pc. taper squeegee	

Milling head holder	3536414
· Collet 27 mm	



Chuck	3536411
· Clamping range 1 - 13 mm	
· Excellent precision and concentricity	
· Secure clamping of the workpiece thanks to mechanical clamping force booster	
· Avoids autonomous release of clamp while machining clockwise or anti-clockwise and in case of spindle stop	



Weldon holder	
· For clamping tools with a lateral carrier	
· Extremely smooth action	

Ø 6 mm	3536450
Ø 8 mm	3536451
Ø 10 mm	3536452
Ø 12 mm	3536453
Ø 16 mm	3536454
Ø 20 mm	3536455



Collet chuck holder ER 32	3536412
· For clamping tools with a cylindrical shank in ER collet chucks	
· Clamping range 0.5 - 10 mm	



Collet chuck spanner ER 32	3536307
	

Reduction sleeve	3536413
· HSK63 to MT 3	
· Ground to precisely match helix gradient on inside and outside	



Collet set ER 32	3441122
· 18 collet chucks; sizes Ø 1 - 16 mm	



Assembly block	3536415
· For easy and precise adjustment of tools	
· Swivelling	



Taper squeegee	3536410
· For cleaning the machine taper to remove dust, chips and soiling	
· Non-woven border	



STARTER SET

SK 50 DIN 69871

Starter set SK 50 / DIN 69871	3536111
Comprises:	
· 1 pc. milling head holder with 27 mm collet	
· 2 pcs. Weldon 6 mm	
· 1 pc. Weldon 8 mm	
· 1 pc. Weldon 10 mm	
· 1 pc. Weldon 12 mm	
· 1 pc. Weldon 16 mm	
· 2 pcs. Weldon 20 mm	
· 1 pc. adapter SK 50 to MT 3	
· 4 pcs. collet chuck holder ER 32	
· 1 pc. collet spanner ER 32	
· 18-part collet set ER 32	
· 1 pc. height adjuster	
· 1 pc. taper squeegee	
· 15 pcs. pull studs	

Milling head holder	3536506
----------------------------	---------

- Collet 27 mm



Weldon holder	
Ø 6 mm	3536510
Ø 8 mm	3536511
Ø 10 mm	3536512
Ø 12 mm	3536513
Ø 16 mm	3536514
Ø 20 mm	3536515



Reduction sleeve	3536505
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- SK 50 to MT 3



Collet chuck holder ER 32	3536504
----------------------------------	---------



Collet chuck spanner ER 32	3536307
-----------------------------------	---------



Collet set ER 32	3441122
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- 18 collet chucks; sizes Ø 1 - 16 mm



Height-adjuster	3536290
------------------------	---------

- Analogue version
- For fast and easy determination of the reference point on the Z axis and/or for adjusting tools "to zero" (e.g., for milling or drilling) without damaging the workpiece
- Housing height 50 mm



Taper squeegee	3536501
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Pull stud DIN 69872	3536502
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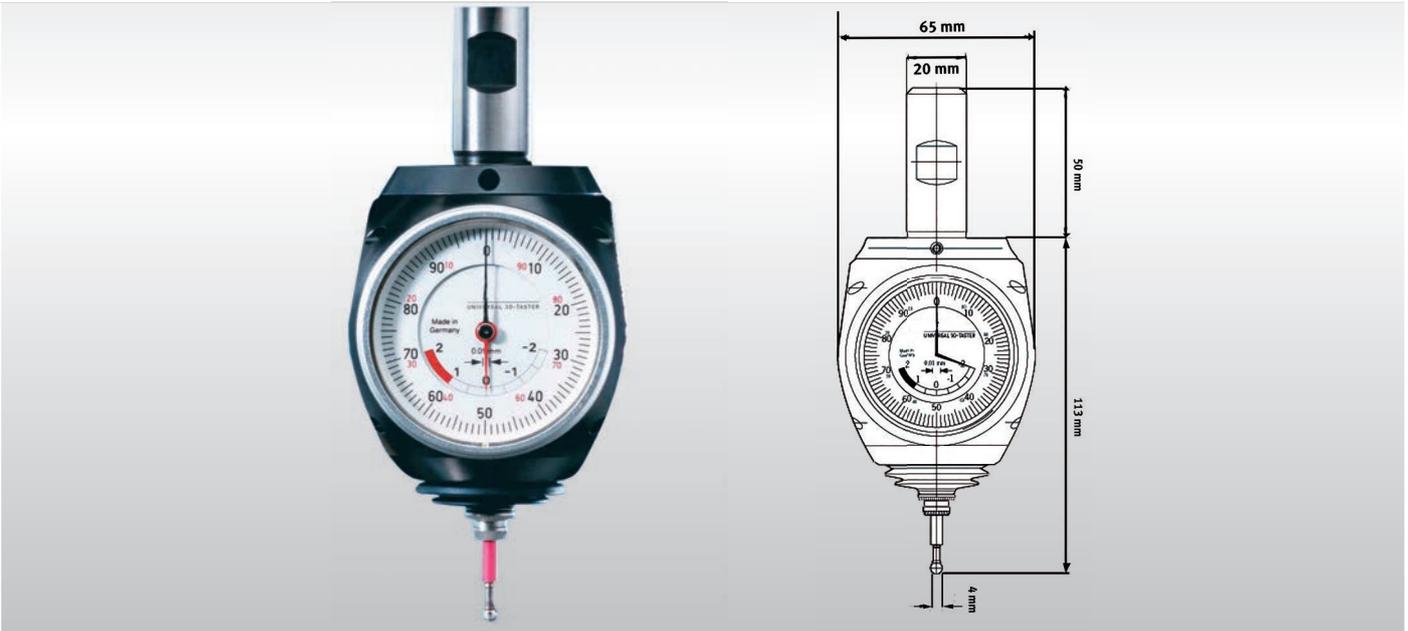
3D PROBE

09 ACCESSORIES

Universal 3D probe

Article no. 354700201

- Including short probe insert Ø 4 mm
- High-precision, versatile measuring device for milling and erosion machines
- This is clamped in the cutter spindle or the drilling head and supports precise positioning of the spindle axis on the workpiece or jig edges
- For fast and easy setting of workpiece zero points and for length measurement
- Arbitrary touch direction (X/Y/Z axis)
- Dial gauge shows the clearance between the spindle axis and the workpiece
- Reduces overheads, improves productivity and reduces staff workload
- Probe inserts of different lengths available, interchangeable without tools
- To maximise measuring accuracy and precision, all Universal 3D probes are individually measured and calibrated in installation
- Meets all currently applicable safety regulations
- Splash proof as per IP 67



Replacement tip for 3-D Haimer probe	Article no.
short Ø 4 mm	354700201S1
long Ø 8 mm	354700201S2

- › Both short (ball Ø 4 mm) and long (ball Ø 8 mm) tips are available for the probe, and can be changed without tools
- › No re-calibration is needed after replacing the probe
- › The tips are, of course, compatible with all HAIMER 3-D probes

RENISHAW

OMP 40-2 /OMP 400 MEASURING PROBE

ULTRA-COMPACT WITH OPTICAL SIGNAL TRANSMISSION FOR WORKPIECE SET-UP AND TESTING

OMP 40-2 measuring probe

- The OMP40-2 transmits signals over 360° at an angle of 90° to the spindle axis and with a range of up to 5 m
- Modulated optical signal transmission is also resilient to malfunctions caused by light interference
- The repetition accuracy in one direction is 1.0 µm (determined with an approach speed of 480 mm/min and 50 mm probe insert)
- The probe can be switched off by an M command or via a configurable switch-off time

OMP 400 measuring probe

- Unrivalled 3D precision and repetition accuracy
- Reliably modulated, optical signal transmission
- Proven and patented Rengage technology
- Excellent resistance to light interference with modulated signal transmission
- 360° transmission range
- Ultra-compact design
- 3D measuring performance ideal for 5-axis machines
- Excellent 3D precision, specially for measuring 3D freeform surfaces
- High repetition accuracy independently of the probing direction
- Due to the very low probing force and probing uncertainty even longer

OTS - tactile 3-D tool measuring probe for tool measuring and tool break monitoring

Contact switching 3-D measurements

- Compact, tactile 3-D tool probe with optical signal transmission for tool breakage checking and fast measurement of the tool length and diameter on a variety of different tools
- Compatible with Renishaw receivers with optical signal transmission

Benefits and features

- Proven kinematic design
- Excellent resistance to light interference with modulated signal transmission
- Directionally adjustable optical infrared module
- Cable-free for unrestricted machine movement and easy installation
- Repetition accuracy of 1.00 µm (2)

- Protection class IPX8, developed for tough deployment in machining centres.
- Visible LED display diagnostics

Renishaw OMP 40-2	Article no.
Ex warehouse Germany	3582010
• Including installation	

Workpiece and tool measuring probe	Article no.
OMP 40-2 and OTS	3582012
• Includes assembly	

- probe inserts can be used
- Up to 10 times longer service life than with conventional switching probes
- Elimination of reset errors
- Switching on and off is possible in any spindle position

Renishaw OMP 400	Article no.
Ex warehouse Germany	3582020
• Including installation	



Touch probe	Article no.
OTS	3582011
• Including installation	

Workpiece and tool measuring probe	Article no.
OMP 40-2 and OTS	3582012
• Includes assembly	

RENISHAW

RENISHAW PRIMO SET* - Includes everything you need.

START WITH AUTOMATIC WORKPIECE AND TOOL MEASUREMENT IN YOUR PRODUCTION ENVIRONMENT NOW AND ENJOY THE BENEFITS

Renishaw Primo Set	Article no.
with collet BT 30	3582030
with collet BT 40	3582031
<ul style="list-style-type: none"> · Radio Part Setter · Radio 3D Tool Setter · Primo Interface · GoProbe Software · Primo CREDIT-6 - Six month credit token including Primo Total Protect 	

Primo Credit Token	Article no.
Primo CREDIT-6- six months	3582040
· Includes Primo Total Protect (PTP)	
Primo CREDIT-U - unlimited use	3582041

Primo™ Radio Part Setter (Tool measuring probe)

This probe automatically determines the workpiece reference point before machining and performs in-process measurements of the roughing or finishing workpiece dimensions.



Primo™ Radio 3D Tool Setter (Tool measuring probe)

This measuring probe is used for automatic length and diameter measurement of a tool. It also enables tool breakage control during machining process.



Primo™ Interface (Interface)

The interface communicates with the workpiece and tool measuring probe and the machine tool control via Renishaw's highly reliable Frequency Hopping Spread Spectrum (FHSS) radio transmission.



Primo Credit Token (Credit token)

Each Primo Kit contains the first 6-month credit token. The 6-month credit token supports operation of the Primo System for six months. It offers flexibility in terms of credit payment, because you can postpone the purchase of a Primo credit token during quieter periods, until you need your Primo system back. The upgrade credit token - Primo CREDIT-U - offers unlimited use of the Primo system for a one-off payment.



GoProbe Software

supports cycles for workpiece and tool measurement and calibration. All cycles use a single line of code, making the software quick to learn and easy to use in daily operations. Including: Manual, programming disk, app, e-training, training workpiece, programming manual



Primo Total Protect (PTP)* (Primo total protection)

Primo Complete Protection is an extended guarantee to protect your investment when you have activated a credit token. If your Primo probe is accidentally damaged during this period, your Renishaw representative will supply you with a free replacement. *Renishaw's terms and conditions apply



BLUM

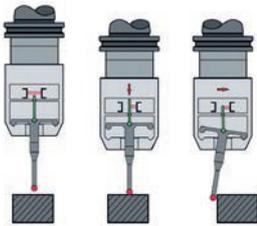
TC 52IR / TC 62RC WORKPIECE MEASURING PROBE

COMPACT HIGH SPEED MEASURING PROBE FOR WORKPIECE MEASUREMENT

Unrivalled precision and fast workpiece measuring thanks to modern, multidirectional measuring system with optical/electronic switching signal generation.

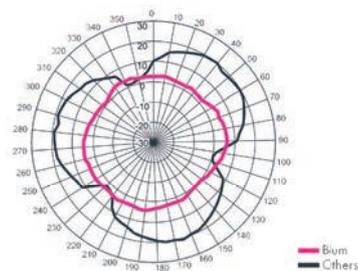
Wear-free, optical-electronic signal generation:

- Switching signal generated by interrupting a miniature light barrier
- Switching point repeatability of $0.3\mu\text{m}$ at 2 m/min. Measuring speed
- Wear-free and durably stable
- Very compact probe with $\varnothing 40\text{ mm}$



High-precision, rotationally symmetrical measuring system

- Precise, directionally independent approach behaviour
- Constant deflection forces
- Spindle orientation not required
- No detrimental 3-leg principle with lobing effect



Only for machines with an 828D control

Tool measuring probe TC	Article no. Ex warehouse Germany	Article no. ex work
TC 52IR- Infrared transmission	3582102	3511290604
TC 62RC- BRC wireless technology (without tool fitting)	3582103	-

- SIEMENS licence
- Including installation



Reliable and proven transmission technology

- Sequential actuation of up to 2 measuring systems with one infrared receiver
- Switching on and off with M command



Rubin measuring insert	Article no.
Length 30 mm, $\varnothing 3\text{ mm}$ carbide	3582140
Length 30 mm, $\varnothing 5\text{ mm}$ carbide	3582141
Length 50 mm, $\varnothing 3\text{ mm}$ carbide	3582142
Length 50 mm, $\varnothing 5\text{ mm}$ carbide	3582143

Accessories for TC 52IR / TC 62RC	Article no.
SK 40 Holder*	3582125
HSK-A63 holder*	3582126
BT 30 holder*	3582124
BT 40 holder*	3582127

*To be ordered according to the spindle holder

BLUM

ZX SPEED TOOL MEASURING PROBE

UNIVERSAL 3-D PROBE HEADS FOR TOOL ADJUSTMENT AND TOOL BREAK MONITORING

Economical solutions for tool length and radius adjustment and tool break monitoring Precise and process-assured measurements due to state-of-the-art metrology equipment with optoelectronic switching signal generation

Wear-free, optical/electronic signal generation

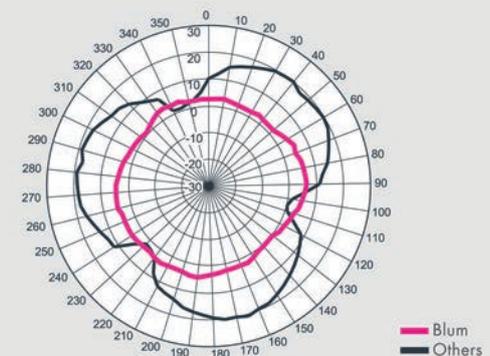
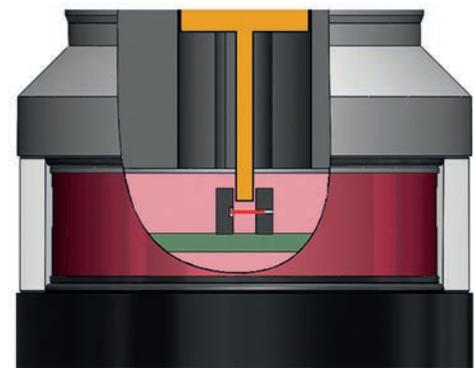
- Switching signal is generated by interrupting a miniature light barrier
- Allows for faster measuring speeds and measuring precision than comparable probes
- Reliable tool adjustment under the toughest conditions

High-precision state-of-the-art measuring equipment

- Precise, directionally independent switching behaviour
- Constant deflection forces
- Premium BLUM measuring equipment, latest generation
- No detrimental 3-leg principle
- No highly-sensitive switching elements

Latest transmission technologies

- ZX speed: Cable-connected
- ZX speed IR: Infrared transmission



Tool measuring probe ZX-Speed	Article no.
IR - Infrared transmission	3582104
RC - BRC wireless technology	3582105
<ul style="list-style-type: none"> • SIEMENS licence • Including installation 	

Workpiece and tool measuring probe	Article no.
TC 52IR and ZX-speed IR infrared transmission	3582108
TC 62IRC and ZX-Speed RC BRC wireless technology (without tool fitting)	3582109
<ul style="list-style-type: none"> • SIEMENS licence • Including installation 	

Reference tool	Article no.
<ul style="list-style-type: none"> • made by EMUGE • without pull stud 	
BT 30	3582502
BT 40	3582504
SK 40	3582506



BLUM



BLUM NOVOTEST FOR LC50-DIGILOG

PREMIUM LASER MEASURING SYSTEM FOR TOOL MEASUREMENT AND TOOL MONITORING



The most advanced laser measuring system worldwide

- Highly dynamic measurements of all tool characteristics
- Touchless measuring of all tool types, shapes and cutting materials
- Detection of geometry changes, such as cutting edge wear
- Continuously good part precision thanks to process-integrated temperature compensation
- Reliable compensation for spindle growth and orbital errors
- Automatic concentricity check detects poor tool holders and soiling
- Automated operation at low staffing levels



LC50-DIGILOG	3582116
• Blum LC50 Digilog length 200 mm	
• Smart Dock 1	
• Connecting cable 10 m	
• Spiral hose 3 m	
• Interface	
• Software Laser NT SIE	
• Max. tool diameter max. 80 mm	
• Including installation	
<i>Attention: Don't forget the reference tool</i>	

Laser control and measuring system	Article no.
TC 52IR and LC50-DIGILOG - Infrared transmission	3582117
TC 62RC and LC50-DIGILOG - BRC wireless technology	3582118
• for tools up to 80 mm diameter	
• SIEMENS licence	
• Including installation	

Reference tool	Article no.
SK 40 holder*	3582121
HSK-A63 holder*	3582122



Starter sets
Bar feeder
Bar gripper

09 TURNING ACCESSORIES

STARTER SET

VDI 30

Starter set VDI 30	3536115
Comprises:	
3 pcs. square transverse holder	
1 pc. square transverse overhead holder	
1 pc. square longitudinal holder	
5 pcs. boring bar holder Ø 10 / 12 / 16 / 20 / 25 mm	
3 pcs. cap	
1 pc. collet chuck holder ER 25	
1 pc. collet spanner ER 25	
15-part collet set ER 25	
1 pc. tool holder	
1 pc. chuck	

Square transverse holder	3536231
<ul style="list-style-type: none"> · Right-hand type, short · DIN 69880 · Large adjustable conical tipped nozzle 	



Square transverse holder	3536232
<ul style="list-style-type: none"> · For overhead work · Right-hand type, short · DIN 69880 · Large adjustable conical tipped nozzle 	



Square longitudinal holder	3536233
<ul style="list-style-type: none"> · Right-hand type · Large adjustable conical tipped nozzle 	



Sealing cover	3536236
<ul style="list-style-type: none"> · Protects the tool changer against soiling 	



Collet chuck holder ER 25	3536237

Collet spanner ER 25	3536240

Collet set ER 25	3441109
<ul style="list-style-type: none"> · 15 pcs.; sizes Ø 1 - 16 mm 	



Tool holder	3536238
<ul style="list-style-type: none"> · Pre-worked · Round blank 	



Chuck	3536239
<ul style="list-style-type: none"> · Clamping range 1 - 13 mm 	



Drill rod holder	
Ø 10 mm	3536241
Ø 12 mm	3536242
Ø 16 mm	3536243
Ø 20 mm	3536244
Ø 25 mm	3536245



VDI 40

09 ACCESSORIES

Starter set VDI 40 3536116

- Comprises:**
- 3 pcs. square transverse holder
 - 1 pc. square transverse overhead holder
 - 1 pc. square longitudinal holder
 - 5 pcs. boring bar holder Ø 10 / 12 / 16 / 20 / 25 mm
 - 3 pcs. cap
 - 1 pc. collet chuck holder ER 25
 - 1 pc. collet spanner ER 25
 - 15-part collet chuck set ER 25
 - 1 pc. tool holder
 - 1 pc. chuck

Square transverse holder 3536251

- Right-hand type, short
- DIN 69880
- Large adjustable conical tipped nozzle



Square transverse holder 3536252

- For overhead work
- Right-hand type, short
- DIN 69880
- Large adjustable conical tipped nozzle



Square longitudinal holder 3536253

- Right-hand type
- Large adjustable conical tipped nozzle



Sealing cover 3536256

- Protects the tool changer against soiling



Collet chuck holder ER 25 3536257



Collet spanner ER 25 3536260



Collet set ER 25 3441109

- 15 pcs.; sizes Ø 1 - 16 mm



Tool holder 3536258

- Pre-worked
- Round blank



Chuck 3536259

- Clamping range 1 - 13 mm



Drill rod holder

Ø 10 mm	3536261
Ø 12 mm	3536262
Ø 16 mm	3536263
Ø 20 mm	3536264
Ø 25 mm	3536265





SHORT BAR LOADER AM 90N/AM 90L

THE IDEAL SOLUTION FOR AUTOMATIC LOADING

Automatic short bar loading magazine for machining bars with $\varnothing 4 \text{ mm} - \varnothing 80 \text{ mm} / \varnothing 120 \text{ mm}$
 Maximum bar lengths 1 270 mm for AM 90N or 1 620 mm for AM 90L

Easy operation with control panel

- Low energy consumption: The average energy consumption is less than 50 Watt
- Low maintenance
- Programmable logic controller: Several programme variants are available for special applications.
- Feed speed: All movement sequences can be optimised via throttles.
- Control panel: Easy handling due to user-friendly designed removable control panel

- Each type also available as "CCW" version. Loading frame can be loaded from the front side for locations where there is little space at the rear next to the CNC lathe.
- Noise and vibration free. During machining, there is no connection via the material bar to the loading magazine, this ensures problem-free machining of round, square and hexagonal material



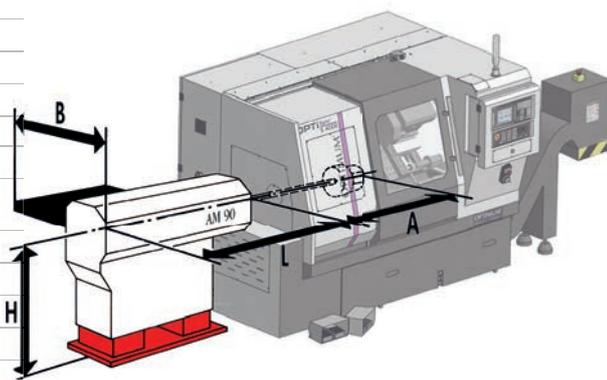
Fig.: AM 90N (S)



Fig.: AM 90L (S)

On request

Technical data		AM90N (S)	AM90L (S)
Bar diameter		$\varnothing 4 \text{ mm}$ to $\varnothing 80 \text{ mm}$ ($\varnothing 6 \text{ mm}$ to $\varnothing 120 \text{ mm}$)	
Bar length		100 to 1 270 mm	100 to 1 620 mm
Rod weight max.		35 kg (65 kg)	
Spindle height adjustable	H	850 mm to 1 250 mm	
Total length	L	1 600 mm	1 950 mm
Distance	A	max. 1 250 mm	max. 1 600 mm
Overall height	H +200 mm	1 050 mm to 1 450 mm	
Width with loading frame	B	1 150 mm	
Weight		approx. 250 kg	approx. 270 kg
E - energy supply		110/220 V; 0.4 A; 50/60 Hz; max. 50 W;	
Compressed air requirement		approx. 0.6 Mpa (6 bar); max. 20 l/min	
Control		logic programmable	



SHORT BAR LOADER PRO CONQUEROR HYDRODYNAMIC MODEL

The Pro Conqueror bar loaders are the ideal solution for automatically loading CNC lathes with short bars. They combine maximum productivity with a small footprint, and is equipped with one magazine (in the E version) for up to 3 200 mm bar length

Easy to use control unit

- Hydraulic
- High rotation load and quiet turning
- Various parameter settings, alarm detection and function display
- Mitsubishi AC servo motor
- Excellent stability and easy operation
- High-density steel construction for rigidity and durability
- The machine synchronised unit fits on the CNC lathe with sliding headstock and ensures fast and stable feeding
- Fast change channel for easy and convenient changes



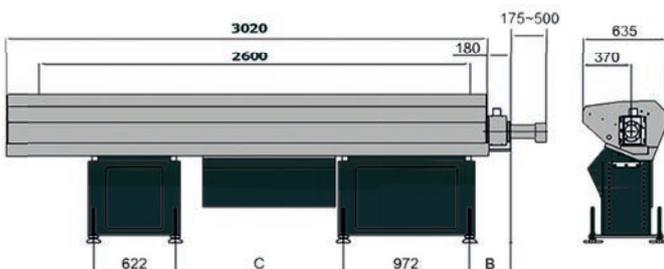
Material stop

- › Easy adjustment of the material stop without tools.
- › Saves time and effort



Clamping cutter in feed unit

- › Automatic positioning in the infeed centre to save time for material change.
- › Robust clamping cutter



Multilingual control panel

- › Settings and functions are displayed
- › Alarm list display, easy troubleshooting

	Pro Conqueror
Material bars	Ø 5- 51 mm
Bar length ¹⁾	3 200 mm
Operating voltage	3 x 200 - 240
Compressed air	5 - 7 kg/cm ²
Dimensions L x W	3 020 x 635 mm
Weight	850 kg

Pro Conqueror	Article no.
L 44	351433019
L 440	351441038
L 460	351442038
S 600	351506023
S 620 / S 620L	351506538
S 500 / S 500L	351515012
S 750 / S 750k	351517012

SHORT BAR FEEDER PRO V65E / PRO V 65LE

THE IDEAL SOLUTION FOR AUTOMATIC LOADING

The Pro V 65E / Pro V 65LE bar loaders are the ideal solution for automatically loading CNC lathes with short bars. It combines maximum productivity with a small footprint, and is equipped with one magazine (in the E version) for up to 1 200 mm bar length – up to 1 500 mm with the LE variant.

Intuitive control unit and remote control

A user-friendly control unit and remote control ensure the interplay between the loading magazine and the lathe.

This allows the owner to run the production process safely and efficiently.

- Mitsubishi PLC controller
- Touchscreen digital interface with LCD display
- Various function and parameter settings are clearly visible on the display; they ensure easy and clear-cut control.
- Alarm display for troubleshooting
- Basic functions can be accessed via the remote control

- Bar diameter \varnothing 5.0 mm ~ F 65 mm
- Fast loading speed, specially developed design
- No special requirements or restrictions in terms of material straightness.
- The material rotates within the machining area and spindle length of the lathe.
- The lathe spindle speed can be maximised.
- The material can be round, hexagonal and moulded.
- The material lengths can be uniform or different.
- Easy to operate and maintain.



Remote control for checks and adjustments



Quick and accurate adjustment of the height by means of an adjustment lever with scale



	Bar feeder interface	Pro V 65 E	Pro V 65 LE
	Article no.	Article no.	Article no.
L 440	351441037	351441033	351441034
L 460	351442037	351442033	351442034
S 600	351506011	351506012	351506013
S 620 / S 620L	-	351506535	351506536
S 500 / S 500L	-	351515003	-
S 750 / S 750k	-	351517003	-
		Pro V 65 E	Pro V 65 LE
Diameter		\varnothing 5 mm - \varnothing 65 mm	
Bar length		1 200 mm	1 500 mm
Spindle height		920 mm / 1 300 mm	
Loading weight		210 kg	240 kg



AUTOMATIC BAR GRAB GRIPPEX LIGHTWEIGHT AND COMPACT

The Grippex bar grab boosts production and automation on your CNC lathe!

Only a small minority of all CNC lathes installed today is equipped with a bar feeder magazine. There are various reasons for this, such as the relatively high procurement costs or lack of space in the workshop. For small-batch production, however, a bar feeder that makes use of the existing conditions on the machine, such as hollow spindles and hollow clamping cylinders, is often sufficient. These devices only need to be supplemented with a guide tube and the GRIPPEX bar gripper. The Grippex bar gripper can be added to almost any lathe turret.

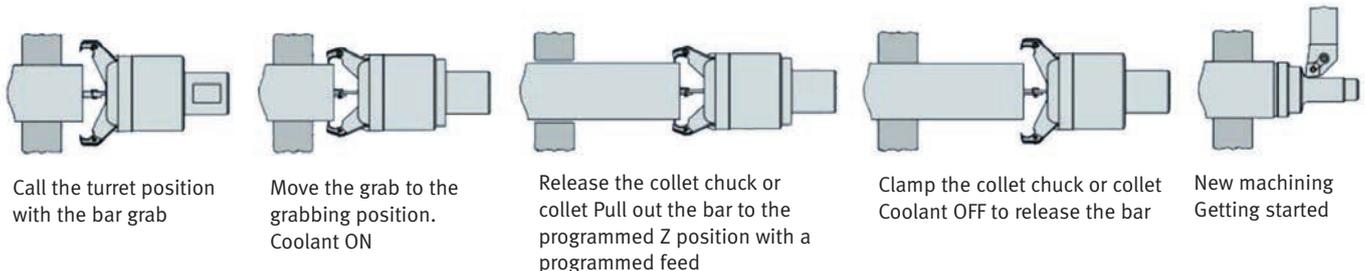
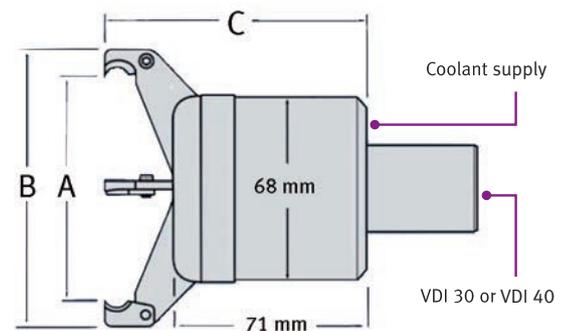
Benefits and main features of the GRIPPEX bar grab

- Fast and easy installation - the grab's work range can be fully utilised without conversion
- Lightweight and compact - thus allowing the turret to be fully occupied
- Resists high coolant pressure (20 bar). No need for a pressure reduction valve
- Works reliably as of 0.5 bar coolant pressure
- Clamps directly at the chuck - resulting in stable cutting of the turned parts.
- Clamps with 3 legs - thus ensuring trouble-free processing of hexagonal bars at any angle to the spindle.
- Equipped with robot clamping jaws, the device can also be used as a workpiece grab.



Grippex II	VDI 30	VDI 40
	Article no.	Article no.
Grab range 2-60 mm	354500100	354500103
Grab range 3-80 mm	354500101	354500104
Grab range 7-105 mm	354500102	354500105

Gripping ranges	A	B	C
2-60 mm	64 mm	83 mm	89 mm
3-80 mm	83 mm	102 mm	94 mm
7-105 mm	110 mm	129 mm	108 mm



HIGH-PRECISION MANUALLY PIVOTING HPPA ARM WITH PROBE FOR TOOL MEASUREMENT, FEATURING A 3-AXIS RP3 PROBE

Why measure on the machine?

Your lathe represents a considerable investment. Fast machining of complicated workpieces is just one of the many benefits. However, this investment can only be profitable if your machines produce as many workpieces as possible.

But why do some machines stand still for hours? Quite simple: Tools are often set manually and workpieces are checked for dimensional accuracy outside the machine. In both cases an expensive piece of equipment is idle, and this inevitably leads to long, unprofitable and avoidable standstill periods.

Reduce downtimes, avoid scrap

Manual tool measurement, position detection of workpieces and dimensional checks take a lot of time. In addition, these work steps offer no repetition accuracy and susceptible to operating errors. The use of measuring probes eliminates the need for set-up workplaces and expensive clamping fixtures. The measuring software automatically determines the diameter and length of the tools, detects the position of the workpiece and identifies allowances and dimensions of workpiece blanks. The use of measuring probe systems avoids unprofitable standstill periods and scrap.



Renishaw measuring arm with probe	Article no.
L 44 for Ø 150 mm lathe chuck	3582080
L 440 / L 460 / L 50P for Ø 200 mm lathe chuck	3582081
L 440 / L 460 / L 50P for Ø 250 mm lathe chuck	3582082
· Including installation	
· TSI2 Interface	
· User Manual	

Arm/housing unit with probe

- The compact arm/housing unit is fully sealed.

Probe protection housing

- A separate probe protection housing protects the probe when not in use.

TSI2 Interface

- The interface processes signals between the probe and the machine control and thus supports easy integration. The unit is mounted on a DIN rail and has an "Easy Fit" installation mechanism. Two plugs are provided for easy wiring with the HPPA (3-pin) and machine control (25-pin SUB-D).

Benefits

- Up to 90 % faster tool measuring.
- Recommended OEM arm configurations for all standard chuck sizes.
- Robust Renishaw design guarantees trouble-free operation even under the toughest ambient conditions in a tool machine.
- IPX8 protected (static)
- LED displays the probe status and the operational readiness of the arm
- Use of a probe with a predetermined breaking section protects the probe if the max. probe overrun is exceeded.

System specification		
Application	Tool measurement on CNC lathes	
Touch directions	Measuring probe	±X, ±Y, +Z
	Machine	±X, ±Z, +Y
Typical position accuracy (measuring speed 36 mm/min)	5 µm 2σ X/Z	
Protection against environmental influences	IPX8 (static)	
Temperature range for operation	5° C to 60° C	
Arm pivoting angle	91°/90° (if the probe protection housing by Renishaw is not use, the max. arm pivoting angle is 91°)	



Tools
Vices
Cleaning agents
Machine lamps
Coolant accessories
Rotating windows

09

GENERAL ACCESSORIES

Carbide end mill set

3352118

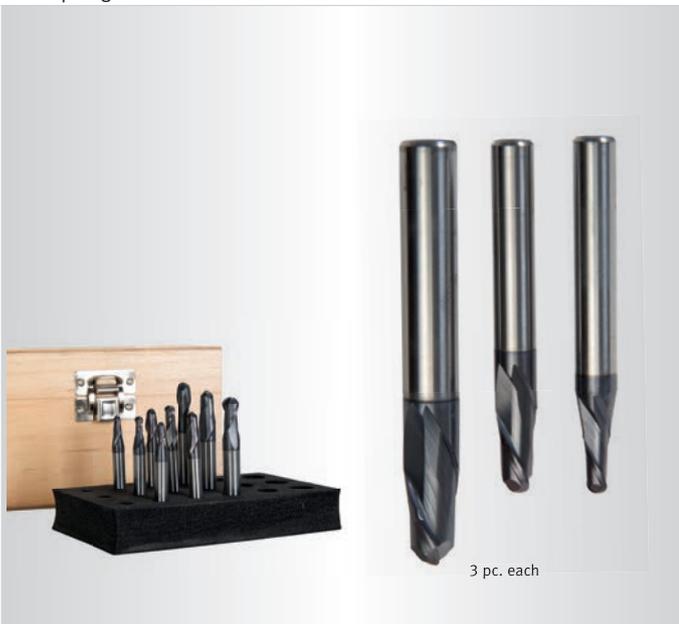
- › 18-part; 3 each in the sizes 3/4/6/8/10 and 12 mm
- › 4-cutting edge version
- › Coated solid carbide end mill (TiAlN)
- › Centre cut for plunging
- › Chip angle 35°



Radius end mill set

3352116

- › 9-part; 3 each in the sizes 4 mm / 6 mm / 8 mm
- › 2-cutting edge version
- › Coated solid carbide end mill (TiAlN)
- › Face cutting geometry for plunging
- › Chip angle 30°



Conical counterbore set

3201050

- › As per standard DIN 335C
- › 6-part: 6/8/10/11.5/15/19 mm
- › Premium conical counterbores Burrs are nicely chamfered and removed without causing scratches
- › Compatible with popular battery-powered screwdrivers and drills, including upright drilling machines
- › Practical OPTIMUM plastic case



Drilling and thread tapping set

3202015

- › Through bore
- › 15-part
- › 7 pcs. thread taps: M3 / M4 / M5 / M6 / M8 / M10 / M12
- › 7 pcs. twist drills DIN 338: Ø2.5 mm / Ø3.3 mm / Ø4.2 mm / Ø5.0 mm / Ø6.8 mm / Ø8.5 mm / Ø10.2 mm
- › Tap wrench DIN 1814 size 1½
- › Practical OPTIMUM plastic case



Twist drill HSS with morse taper	Article no.
<ul style="list-style-type: none"> › 9-part; 14.5/16/18/20/22/24/26/28/30 mm › Long service life. › Good chip removal › Right handed 	
MT 2	3051002
MT 3	3051003



Twist drill set	Article no.
<ul style="list-style-type: none"> › As per DIN 338 HSS-CO 5 % › Tetrahedral 135° split point allows for excellent self-centring › High speed/feed properties › Strong core design optimises the structural strength of the bit and minimises the risk of bit breakage › Practical OPTIMUM plastic case 	
25-part	3201010
› 1- 13 mm	
51-part	3201020
› 1 - 6 mm (in 0.1 mm increments)	
41-part	3201021
› 6 - 10 mm (in 0.1 mm increments)	



OPTIMUM Precision quick-action drill chuck	Article no.
Concentricity better than 0.06 mm	
1 - 8 mm; B16	3050608
1 - 10 mm; B16	3050610



Travelling centre tip	Article no.
max. radial run-out 0.005 mm	
MT 2	3451002
<ul style="list-style-type: none"> › Max. speed 7 000 rpm; radial load max. 2 000 N › NSK ball roller bearings and INA needle bearings 	
MT 3	3451003
<ul style="list-style-type: none"> › Max. speed 5 000 rpm; radial load max. 4 000 N › NSK ball roller bearings and INA needle bearings 	
MT 4	3451004
<ul style="list-style-type: none"> › Max. speed 3 800 rpm; radial load max. 8 000 N › NSK ball roller bearings and INA needle bearings 	
MT 5	3451005
<ul style="list-style-type: none"> › Max. speed 3 000 rpm; radial load max. 20 000 N › 2-row SKF angular contact bearings 	



Quick release chuck	Article no.
DKC13 / 0-13 mm 4 800 rpm	3050632
DKC16 / 0-16 mm 4 000 rpm	3050633



Clamping tool assortment SPW	Article no.
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- › Metric thread
- › 58-part: 24 pcs. tightening bolts, 6 pcs. T-nuts, 6 pcs. nuts, 4 pcs. extension nuts, 6 pcs. clamping punches, 12 pcs. clamping blocks

Size 8	3352015
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- › T-slot nuts 10 mm; locking thread M 8

Size 10	3352016
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- › T-slot nuts 12 mm; locking thread M10

Size 12	3352017
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- › T-slot nuts 14 mm; locking thread M12

Size 14	3352018
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- › T-slot nuts 16 mm; locking thread M 14

Size 16	3352019
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- › T-slot nuts 18 mm; locking thread M16



Clamping block set 16-05	3440653
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- › 1 pc. clamping block SLTBN 16-05
- › 1 pc. parting off tool SLIH 26-2
- › 1 pc. parting off tool SLIH 26-3
- › 5 pcs. cutting plates GTN2 (cutting width 2.2 mm)
- › 5 pcs. cutting plates GTN3 (cutting width 3.1 mm)
- › Aluminium box

Clamping block set 20-05	3440654
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- › 1 pc. clamping block SLTBN 20-05
- › 1 pc. parting off tool SLIH 26-3
- › 1 pc. parting off tool SLIH 26-4
- › 5 pcs. cutting plates GTN3 (cutting width 3.1 mm)
- › 5 pcs. cutting plates GTN4 (cutting width 4.1 mm)
- › Aluminium box

Clamping block set 25-05	3440655
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- › 1 pc. clamping block SLTBN 25-05
- › 1 pc. parting off tool SLIH 26-3
- › 1 pc. parting off tool SLIH 26-4
- › 5 pcs. cutting plates GTN3 (cutting width 3.1 mm)
- › 5 pcs. cutting plates GTN4 (cutting width 4.1 mm)
- › Aluminium box

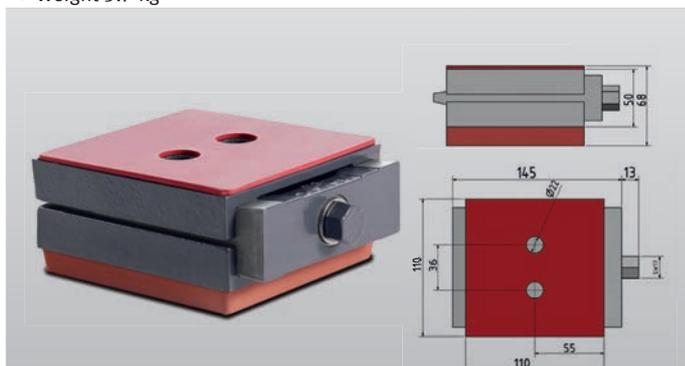


Replacement cutting insert set (10 pcs.)	Article no.
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- | | |
|----------------------------------|---------|
| for cutting inserts GTN 2 | 3440663 |
| for cutting inserts GTN 3 | 3440664 |
| for cutting inserts GTN 4 | 3440665 |

Precision machine shoe SEU1	3352985
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- › Patented double spindle bearing
- › With slip-protection plate at top
- › Maximum load 60 kN
- › Suitable for M16 threaded rod
- › Vibration-insulation plate for particularly loads. Good structure-borne noise insulation
- › Adjustment range +5 / -4 mm
- › High-precision, jerk-free levelling even of heavy machines
- › Installation time savings of up to 50 % thanks to precision levelling and freedom of installation.
- › Improves the dynamic behaviour of machines while reducing noise
- › Weight 3.7 kg



Vibration damping machine base	Article no.
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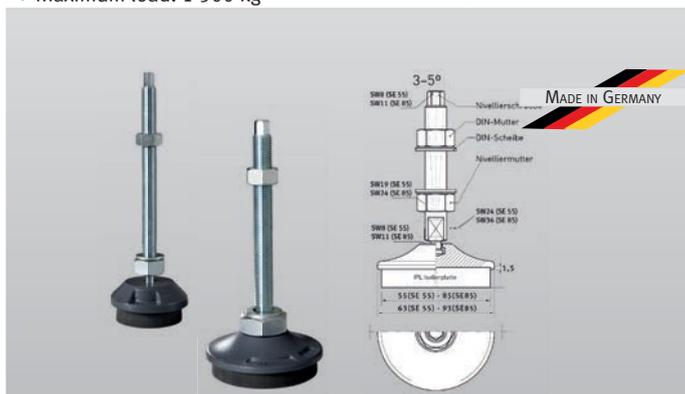
- › Excellent vibration and structure-borne noise insulation
- › Noise reduction
- › Eliminates floor unevenness up to 5°
- › Precision levelling by means of a regular threaded screw
- › Better distribution of impact-like axial forces due to the geometrically larger contact surface with the screw
- › No notching effect - like for example with conical screw tips
- › The levelling screw and the levelling disc are captively connected by a very simple system.
- › Problem-free changeover of the machine possible, as the complete levelling disc remains on the machine foot when the machine is lifted

SE 55	3352981
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- › Jackscrew M12 x 1 x 150
- › Maximum load: 600 kg

SE 85	3352982
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- › Levelling screw M16 x 150
- › Maximum load: 1 500 kg



Thread repair assortment	3202010
› 5 pcs. twist drill bit (5.2 mm/6.3 mm/8.3 mm/10.4 mm/12.4 mm)	
› 5 pcs. thread tap (M5 / M6 / M8 / M10 / M12)	
› 5 pcs. inserter for threaded inserts	
› 5 pcs. tang breaker	
› 100 pcs. threaded inserts: 25 pcs. each M5x0.8 mm / M6x1.0 mm/ M8x1.25 mm/ M10x1.5 mm	
› 10 pcs. threaded insert: M12x1.75 mm	
› For repairing defective threads	
› For reinforcing the thread on materials with a low shear strength	
› Practical OPTIMUM metal case	



Flat countersink set	3201051
› As per standard 373	
› 6-part: for M3 / M4 / M5 / M6 / M8 / M10 mm screws	
› HSS	
› Piloted counterbore size 6.5 x 3.2 mm / 8 x 4.3 mm / 10 x 5.3 mm / 11 x 6.4 mm / 15 x 8.54 mm / 18 x 10.5 mm	
› Fine grade for countersinking screws and nuts as per DIN 74	
› Practical OPTIMUM plastic case	



Shank	3535170
• cylindrical seat Ø 16 mm for B16 drill chuck	



Face-milling cutter without indexable inserts	Article no.
Ø 63 mm bore, 27 mm	3536390
Ø 50 mm bore, 22 mm	3536391



Indexable inserts	3536392
• For face-milling cutter 3536390/3536391	
• Ten pcs.	

Workpiece support	Article no.
Material S 45C	
WPS-1 height 40 mm	3354261
WPS-2 height 70 mm	3354262
WPS-3 height 150 mm	3354263
WPS-4 height 250 mm	3354264



Modular machine vices	Article no.
MVSP 150x200	3530104
MVSP 150x300	3530108
MVSP 150x400	3530110
MVSP 175x300	3530114
MVMP 150x300	3530138

- Modular machine vice with high precision and repetition accuracy for series production and single-part machining on CNC milling machines and machining centres
- Modular machine vice made completely of NiCrMo steel with hardness HRC60, tolerance 0.0015 mm
- Mobile jaws with extra long guides to prevent lift-off and slingshot risk
- Guide surfaces tempered and polished
- Large clamping range due to lock bolts with various hole spacings
- Long service life thanks to high quality
- Includes spanner
- Model MVSP with fixed jaws, Model MVMP with pull-down jaws

Clamping jaw set	Article no.
150 mm - smooth for MVSP	3530216
175 mm - smooth for MVSP	3530217
150 mm - smooth for MVMP	3530256



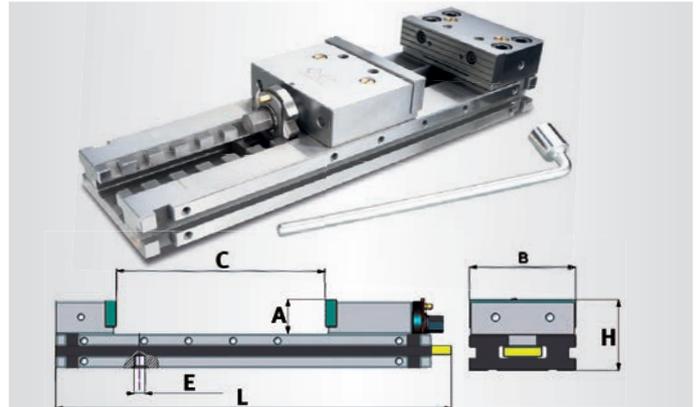
Clamping jaw set	Article no.
150 mm - knurled for MVSP	3530231
175 mm - knurled for MVSP	3530232
175 mm - knurled for MVMP	3530271



Side clamping blocks	Article no.
150 mm - soft (2 pcs.)	3530406
175 mm - soft (2 pcs.)	3530407

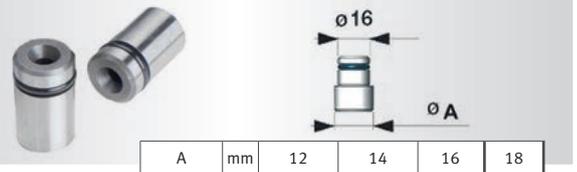


Cylindrical T-slot nuts	Article no.
Ø 12 mm (2 pcs.)	3530390
Ø 14 mm (2 pcs.)	3530391
Ø 16 mm (2 pcs.)	3530392
Ø 18 mm (2 pcs.)	3530393



Tech. data	A	C	E	L	B	H	kg
MVSP 150x200 mm	50	205	16	480	149	100	34
MVSP 150x300 mm	50	305	16	580	149	100	38.6
MVSP 150x400 mm	50	405	16	680	149	100	45
MVSP 175x300 mm	50	505	16	780	149	100	51.5
MVMP 150x200 mm	60	305	16	636	174	118	58.5

T-slot nuts	Article no.
Ø 12 mm (2 pcs.)	3530380
Ø 14 mm (2 pcs.)	3530381
Ø 16 mm (2 pcs.)	3530382
Ø 18 mm (2 pcs.)	3530383



A	mm	12	14	16	18
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Intermediate jaw	Article no.
150 mm - mobile	3530351
175 mm - mobile	3530352

For parallel workpieces



Jaw	A	B	C
150 mm	149	30	50
175 mm	174	30	60

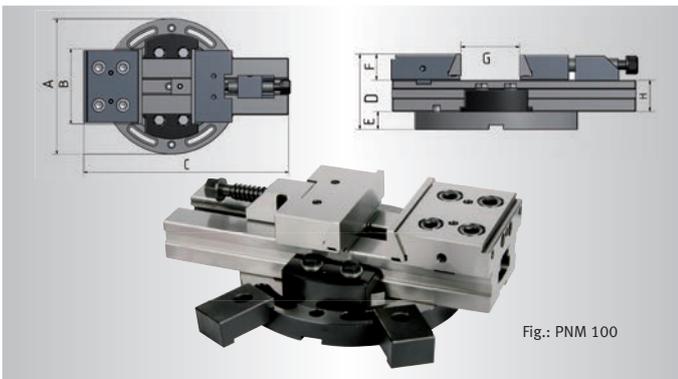
Clamping jaw set	Article no.
150 mm for extending the clamping area	3530361
175 mm for extending the clamping area	3530362



Precision modular vices PNM	Article no.
PNM 100	3355551
PNM 125	3355553

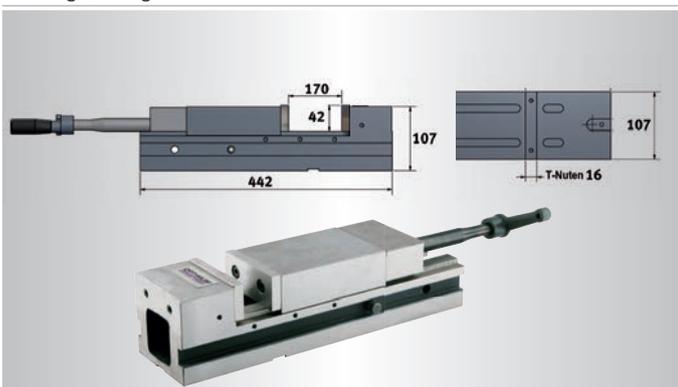
- Modular vice for series production and single-part machining on CNC milling machines and machining centres
- Turntable
- Fast alignment via longitudinal and transverse grooves
- High precision
- High clamping force
- For horizontal and vertical use
- Low extension height
- Easy to use

Technical data	A	B	C	D	E	F	G	H	kg
PNM 100 mm	180	100	270	85	20	30	95	35	10.3
PNM 125 mm	226	125	345	103	23	40	150	40	18.2



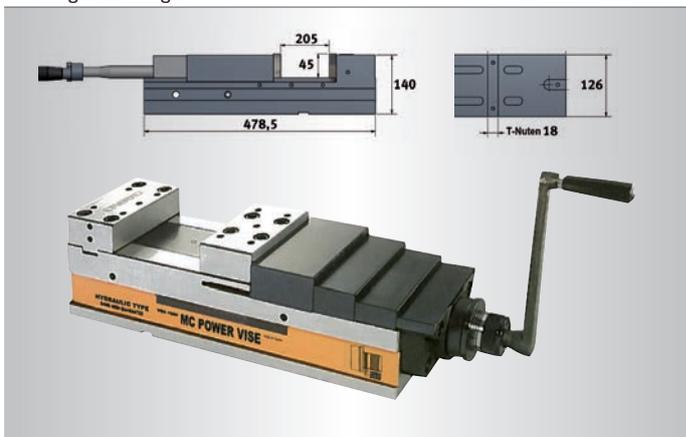
Hydraulic machine vice HCV 105	Article no.
HCV 105	3536210

- Modular machine vice with high precision and repetition accuracy for series production and single-part machining on CNC milling machines and machining centres
- Robust design for milling
- Guide surfaces tempered and polished
- Booster system, requires little force, high pressure build-up during clamping
- Large clamping range due to lock bolts with various hole spacings
- Made of premium grade stainless steel
- Long service life thanks to high quality
- High clamping force
- Clamping pressure 24.5 Nm
- Clamping force 2 500 kg
- Weight 22 kg



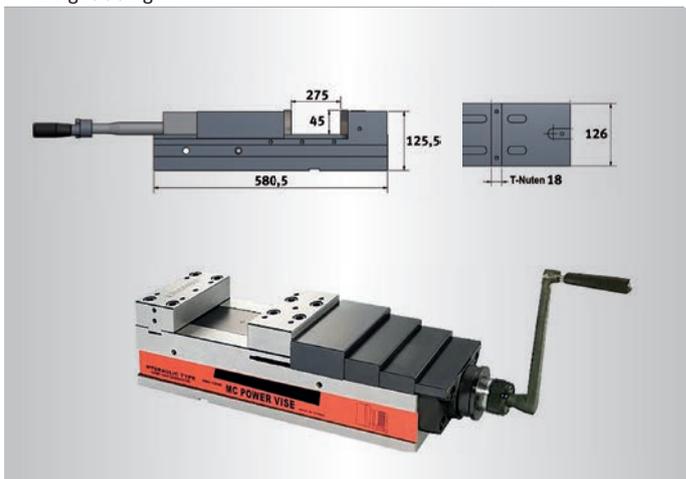
Hydraulic machine vice HCV 125	Article no.
HCV 125	3536214
Soft jaws 2 pcs.	3536221
L jaws 2 pcs.	3536222

- Modular machine vice with high precision and repetition accuracy for series production and single-part machining on CNC milling machines and machining centres
- Robust design for milling
- Guide surfaces tempered and polished
- Booster system, requires little force, high pressure build-up during clamping
- Clamping pressure 40 Nm
- Clamping force 4 000 kg
- Weight 35.4 kg



Hydraulic machine vice HCV 160	Article no.
HCV 160	3536215
Soft jaws 2 pcs.	3536225
L jaws 2 pcs.	3536226

- Hydraulic CNC precision machine vice for series and one-off machining of workpieces on CNC milling centres and machining centres
- Patented anti-lift mechanism
- Spindle is protected against soiling and chips
- Parallelism: 0.01/100 mm/ tolerance between bed and jaws: 0.02/100 mm
- Clamping pressure 60 Nm
- Clamping force 6 000 kg
- Weight 66 kg



COOLANT ACCESSORIES

AQUACUT C1	3530030
<ul style="list-style-type: none"> > 10 litre cannister > For mixing emulsions > Drilling and cooling emulsion > High-pressure resistant and containing mineral oil, for long tool life and clean surfaces > Emulsifiable with water, microbe-resistant and kind to the skin 	



NEW

Motorex coolant for spindle cooling	354590005
<ul style="list-style-type: none"> > 5 litre cannister 	

NEW

Distilled water	354590020
<ul style="list-style-type: none"> > 25 litre cannister 	

NEW

Motorex CS Cleaner	354590010
<ul style="list-style-type: none"> > 1 litres > System cleaner for CNC machines 	

	Designation	Size	Article no.
	<p>Coolant hoses basic equipment 1/4" - no. 1</p> <ul style="list-style-type: none"> > 8 pcs. articulated hose 150 mm > 2 pcs. each round nozzle 1/16" / 1/8" / 1/4" > 2 pcs. NPT connection 1/4" and 1/8" > 1 pc. flat nozzle > 1 pc. Y-distributor > 2 pcs. shut-off valve inside and outside > 2 pcs. shut-off valve inside - 1/4" > 2 pc. NPT extension > 1 pc. magnetic base > 1 pc. flexible sealing tape 	1/4"	3356704
	<p>Coolant hoses basic equipment 1/4" - no. 2</p> <ul style="list-style-type: none"> > 6 pcs. articulated hose 150 mm > 2 pcs. each round nozzle 1/16" / 1/8" / 1/4" > 2 pcs. each NPT connection 1/4" and 1/8" > 5 pcs. flat nozzle > 4 pcs. 90° nozzle > 1 pc. Y-distributor > 1 pc. shut-off valve, inside and outside > 1 pc. shut-off valve, inside - 1/4" > 1 pc. clamping tong 	1/4"	3356705
	<p>Coolant hoses basic equipment 1/2" - no. 1</p> <ul style="list-style-type: none"> > 6 pcs. articulated hose 150 mm > 2 pcs. each round nozzle 1/2" / 3/8" / 1/4" > 2 pcs. each NPT connection 1/4" and 1/2" > 1 pc. flat nozzle > 3 pcs. 90° round nozzle 1/2" / 3/8" / 1/4" > 1 pc. Y-distributor > 1 pc. shut-off valve, inside and outside > 1 pc. shut-off valve, inside - 1/2" > 1 pc. clamping tong 	1/2"	3356800

	Designation	Size	Article no.
	Coolant hose set 2 pcs. articulated hose; 300 mm 2 pcs. round nozzles, 1 pc. shut-off valve 1 pc. magnetic base	1/4"	3356700
		1/2"	3356801
	Coolant hoses 4 pcs. articulated hose; 150 mm	1/4"	3356701
	Coolant hose set 2 pcs. articulated hose; 150 mm 2 pcs. NPT connection 1/4" and 1/8" 3 pcs. round nozzle 1/16" / 1/8" / 1/4" 1 pc. flat nozzle	1/4"	3356702
	Coolant hose set 2 pcs. articulated hose; 150 mm 2 pcs. NPT connection 1/4" and 1/8" 3 pcs. round nozzle 1/16" / 1/8" / 1/4"	1/2"	3356802
	Coolant hose set 2 pcs. articulated hose; 150 mm 2 pcs. NPT connection 1/4" and 1/8" 2 pcs. round nozzle 1/8" / 1/4", 2 pcs. shut-off valve	1/4"	3356703
	Grips	1/4"	3356710
		1/2"	3356810
	Articulated hose Hose roll 15 metres	1/4"	3356711
		1/2"	3356811
	Circular nozzles	1/4"	3356712
		1/2"	3356812
	Flat nozzles 5-hole 5 pcs.	1/4"	3356713
		1/2"	3356820
	Flat nozzles 5 pcs.	1/4"	3356714
		1/2"	3356813
	Flat nozzle 75 mm wide 2 pcs.	1/4"	3356715
		1/2"	3356814
	Connector Threaded connection RP3/8" 5 pcs.	1/4"	3356716
		1/2"	3356815
	Connector Threaded connection RP1/2" 5 pcs.	1/2"	3356816
	Y connector 5 pcs. 1/4" 2 pcs. 1/2"	1/4"	3356717
		1/2"	3356817
	Cap 5 pcs.	1/4"	3356718
		1/2"	3356818
	Shut-off valve for Articulated hose 2 pcs.	Threaded connection RP 1/4"	3356719
		Threaded connection RP1/2"	3356819

SPECIAL VACUUM CLEANERS



FLEXCAT 378 EOT-PRO

SPECIAL VACUUM CLEANER FOR INDUSTRIAL APPLICATIONS WITH SPECIAL INSERT FOR EXTRACTING COOLING LUBRICANTS, LIQUIDS WITH A HIGH OIL CONTENT, AND HIGH VOLUMES OF COARSE METAL SWARF

- › Designed for vacuuming liquids, swarf and other solid particles, e.g., for extracting cooling lubricants, liquids with a high oil content, and coarse metal swarf
- › Removable strainer insert for separate disposal of the metal swarf
- › Ball valve for draining fluids
- › Motors equipped with copper windings and motor protection
- › For exacting machine cleaning in professional metalworking
- › The special seal between the head and the tank is resistant against oil and chemical residues without compromising on flexibility
- › Oil-resistant suction hose resilient to heavy loads and any kind of twisting
- › Stainless steel container is insensitive to sharp-edged metal chips.
- › Side hose connection for improved suction power
- › Metal hose connection on tank with locking mechanism prevents the hose coming loose during cleaning
- › Suction motors with noise damping to ensure quiet operation
- › Three motors with separate on/off switches. The operator can choose how many motors to work with. This allows for substantial energy savings

Model	flexCAT 378 EOT-PRO
Article no.	7003380
Vacuum cleaner type	Wet & dry
Rating	3,3 kW 230 V ~50 Hz
Tank volume	78 l
Tank material	Edelstahl
Dimensions (L x W x H)	635 x 58 x 1 030 mm
Weight	34 kg

- › For particularly demanding machine cleaning in professional metal working and processing
- › Stainless steel container is insensitive to sharp-edged metal chips
- › Hose connection on the side for improved suction performance



FLEXCAT 3100 EOT-PRO

SPECIAL VACUUM FOR LIQUIDS WITH OIL CONTENT AND METAL CHIPS



- › Ball valve for draining fluids
- › Powder-coated steel frame as additional impact protection
- › Integrated sieve bucket system
- › Stainless steel container is insensitive to sharp-edged metal chips
- › Large chip basket for collecting dry metal chips
- › Float for safe stop when container is full of liquid
- › Metal hose connection on the container with locking device
- › With fill level indicator and visual fill level monitoring through clear hose on the side
- › Trolley with non-marking fixed castors at the rear and swivel castors with parking brake at the front
- › With filter monitoring, device socket and automatic switch-on
- › Special seal between the head and the container is resistant to oil and chemical residues, without losing flexibility
- › Oil-resistant suction hose resists high loads and any kind of twisting
- › Suction motors with noise filters to ensure low-noise operation
- › Three motors can be switched on separately
- › Motors equipped with copper windings
- › Unit supplied with 230V CEE plug

Model	flexCAT 3100 EOT-PRO
Article no.	7003382
Vacuum cleaner type	Wet & dry
Rating	3,3 kW 230 V ~50 Hz
Luftmenge	10.500 l/min
Tank volume	100 l
Hose diameter/length	50 mm / 3 m
Sound pressure level	76 dB(A)
Tank material	Edelstahl
Dimensions (L x W x H)	850 x 650 x 1 350 mm
Weight	65 kg



- 3m oil resistant suction hose**
Article no. 7013435
- Floor nozzle**
Article no. 7013436
- Rubber lip insert for floor nozzle**
Article no. 7013437
- Rubber surface nozzle**
Article no. 7013438
- Adapter cable 230V Schuko - CEE-coupling 16A, 1,5m**
Article no. 7013800
- Adapter cable 400V CEE-plug- CEE-coupling 16A, 1,5m**
Article no. 7013805



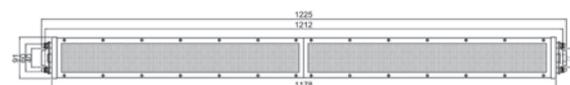
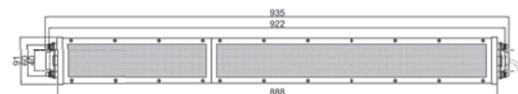
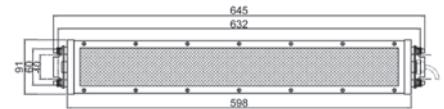
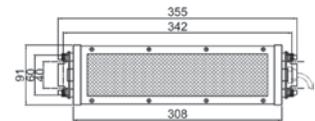
ROBUST MACHINE LAMPS FOR INDIVIDUAL USE

LED machine and workshop lighting

- > Electrical connection DC 24V
- > Colour temperature neutral white 5 000 K
- > Safety glass
- > Robust, high-luminosity machine lamp
- > Aluminium housing with black side parts
- > Reflection angle 120° (reflector)
- > LED service life > 60 000 h
- > Vibration-proof at 10 to 55 Hz (amplitude 0.35 mm), shockproof up to 50 g
- > Degree of protection IP65, protection class I (operation with PE connection)
- > Operational mode: Continuous operation
- > Maximum permissible ambient temperature T_{max}. 50° C°
- > Bracket-mounted, swivel angle ± 45°

Model	MWL 1	MWL 2	MWL 3	MWL 4
Article no.	3351040*	3351041*	3351042*	3351043*
Output	28 Watts	56 Watts	84 Watts	112 Watts
Lamp length	340 mm	630 mm	920 mm	1 210 mm
Luminosity (Lumen)	3 456 Lm	6 800 Lm	10 300 Lm	13 600 Lm

* Required safety transformer as per EN 61558-2-6 not included in scope of delivery



ROTOCLEAR® S3

CLEAR VIEW AS ADHESION BONDING OR SCREW-TYPE VERSION

Clear view of all your production processes, proven at all times and under the toughest conditions wherever soiled panels prevent permanent monitoring of the work sequence. Suitable for all types of CNC milling machines and lathes, as well as machining centres and test beds.

Installation

The system is either integrated into the viewing glass by means of a screw-type flange or simply adhesion bonded without perforation. Untrained staff can do this without error thanks to a specially developed, process-assured adhesion bonding procedure assisted by a transparent step-by-step short guide. Installation can occur either during initial OEM installation or retroactively without any worries. We recommend the use of the screw-type version on milling machines (polycarbonate panels) and the adhesion bonded version on lathes (laminated safety glass panels).

The principle

A rotating panel spins off any water-miscible and non-water-miscible cooling lubricants and chips towards the outside. This gives the machine operator a permanently clear view of the machining workspace – operator safety is thus always ensured in line with currently applicable safety regulations..

The product

- The lowest installation depth worldwide - just 34 mm
- Maximises the clear view thanks to a larger view panel with a revolutionary drive concept
- Unobtrusive design
- Wear panel can be replaced with just one screw in less than 1 min without removing the entire device
- Easy assembly of the system thanks to screw-type or adhesion bonded version
- Improves functional safety thanks to integrate barrier air supply
- Low power consumption
- High torque for deployment under the toughest conditions



Rotoclear S3S	354700101
<ul style="list-style-type: none"> • Screw-type version 	
<ul style="list-style-type: none"> • 1 x Rotoclear® S3 - Basic 460 • Screw-type flange (6 - 17 mm pane) • Perforated positioning template • Hose 1.6 m • Compressed air hose 8.5 m • Cable 2 x 0.75 mm² shielded 10 m • Adapter electro-pneumatic for hose • Threaded fitting for hose • 2 x Threaded fitting for protective tube • Screw-in bracket 90° • Without installation 	
Assembly Rotoclear S3S / S3K	354700129
<ul style="list-style-type: none"> • Assembly kit including installation 	

Rotoclear S3K	354700121
<ul style="list-style-type: none"> • Adhesion bonded version 	
<ul style="list-style-type: none"> • Rotoclear® S3 - Basic 460 • Adhesive flange with cover plate • 2-component adhesive for adhesive flange 50 ml • Dosing gun for 2-component adhesive • Perforated positioning template • Hose 1.6 m • Compressed air hose 8.5 m • Cable 2 x 0.75 mm² shielded 10 m • Adapter electro-pneumatic for hose • Threaded fitting for hose • 2 x Threaded fitting for protective tube • Screw-in bracket 90° • Primer for PC pane 25 ml • Swab for primer • Adhesion bonding guide • Without installation 	

NCTOUCH

APPLICATION FOR THE STAND-ALONE MACHINE THROUGH TO THE NETWORKED SOLUTION.
TOUCH MY NC

Are you ready for a piece of Industry 4.0!

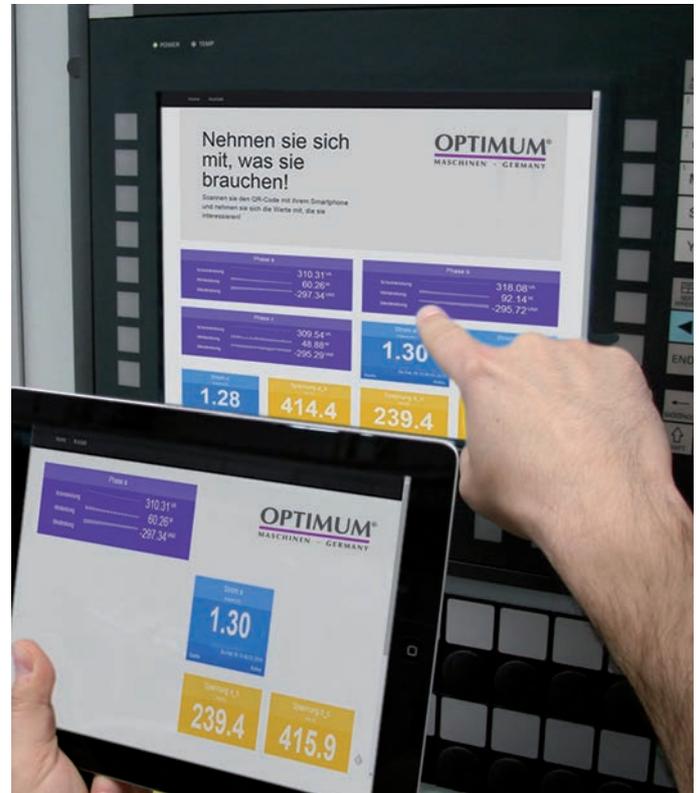
Easy-to-use, integrated middleware for connecting any smart device to the SINUMERIK 828 and SINUMERIK 840D sl CNC controls.

Benefits

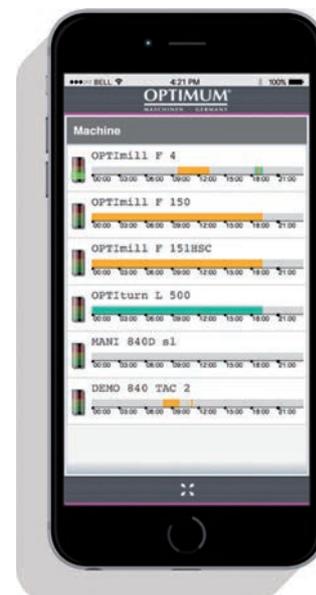
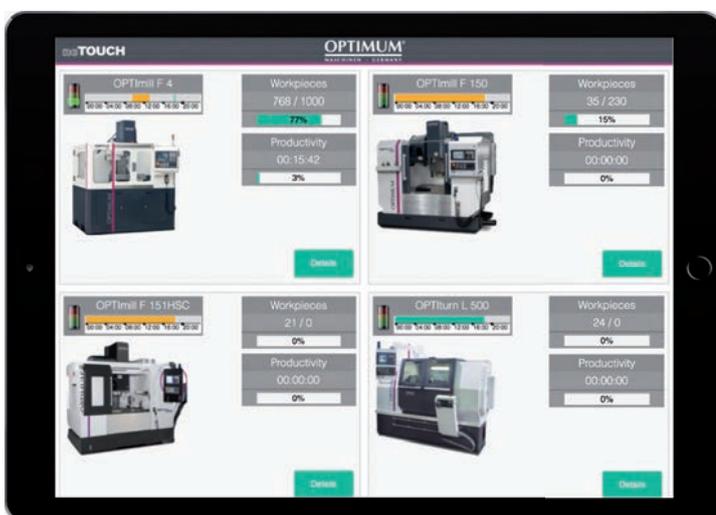
- Runs on any smart device
- Simple scripting language for rapid development
- Customer-specific adaptation of screens
- Integrated solution for the SINUMERIK CNC controls; no additional hardware required
- Allows access to information on the SINUMERIK 840D sl / 828D
- Important information, such as the operating state, pending alarms, load, tool information and much more is displayed at a glance, allowing for rapid intervention in case of interference in production.

Function

- Visualisation and interaction with the SINUMERIK CNC controls on your smart device
- Design your own screens in your corporate design
- Create apps with individual content, e.g., monitoring, alert processing or custom views
- Only scripting skills are needed for programming
- Flexible design functions for maximum portability to any smart device



➔ For more details, go to www.Mill-IT.de



SINUTRAIN FOR SINUMERIK OPERATE

THE NC PROGRAMMING WORKSTATION THAT IS IDENTICAL TO A CONTROL

SinuTrain, the NC programming workstation that is identical to a control, brings SINUMERIK Operate including a realistic animated machine control panel to the PC. This allows for convenient work preparation in your standard work environment. NC programs can be directly created and verified here thanks to the original SINUMERIK CNC kernel before they are uploaded to the physical machine. Users benefit from improved machine availability and safety. On top of this, SinuTrain is ideal for training users in SINUMERIK operations and programming, as well as for presentations and testing new SINUMERIK functions.



Features - Technology overview

- Identical NC programming language scope of the SINUMERIK: Standard ISO / DIN & SINUMERIK CNC code, ShopMill / ShopTurn, programSYNC for multi-channel
- Full graphical CNC simulation and plotting
- Tutorials and programming guides
- Software-based machine control panel – easy to control with mouse and keyboard
- Integrated DXF reader for importing DXF files
- Printing function for DIN/ISO and ShopMill/ShopTurn work step programming
- Program transfer via network and USB
- Preconfigured machine examples
- Option: Customisation to match your physical machine

To make it easier for newcomers and trainees to learn the machine's functions, the computer-based training includes programming tasks that have to be worked through in various modules.

This means that trainees can familiarise themselves with details such as control, workspace and tool change in the best possible way.



For effective training

SinuTrain Software makes training more effective while substantially improving cost efficiency.

In particular due to its excellent functionality and operational assurance, SinuTrain is appreciated by many training institutes as a top ranking solution for basic and on-going training. More than 25 000 licences are currently in use

The advantages at a glance

■ Safe:

Virtually 100 percent offline verification/evaluation of NC programs thanks to the original CNC kernel

■ Tailor-made:

Use as an optimal programming workplace thanks to adaptation to match the physical machine (e.g., by the machine manufacturer)

■ Flexible:

Perfectly tailored packages for training and work preparation

■ Hands-on:

Operations and programming exactly like the genuine SINUMERIK

NEW

SinuTrain for SINUMERIK Operate* SIEMENS SinuTrain Operate	V 4.7 Article no.	V 4.8 Article no.
** Please quote the control software version with your order		
SinuTrain Single	3584106	3584107
· Single station license		
· commercial use		
SinuTrain Trainer Package XL	3584112	3584113
· commercial use		
· 18 x single station license		
SinuTrain Trainer Package XL	3584130	3584131
· Only for schools (not for commercial use)		
· 18x single station licenses for students		
SINUMERIK 808D <i>free to download at www.cnc4you.com</i>		

SYMPLUS FRÄSEN PLUSCARE™

IS THE IDEAL SOFTWARE ADD-IN FOR ALL SIEMENS CONTROLLED OPTIMUM MILLING MACHINES. FOR LOW-COST, FAST AND ECONOMIC WORK.

As a training software package, SYMplus plusCARE™ supports a rapid introduction to DIN programming as per PAL and SIEMENS.

But above all, plusCARE™ is a genuinely easy to learn CAD/CAM system that helps you save programming time, avoid crashes, reduce production time and create NC programs for various OPTIMUM machines or SIEMENS controls (802S,808D, 828D, 840D, ...) in a uniform interface.

System requirements for the plus systems:

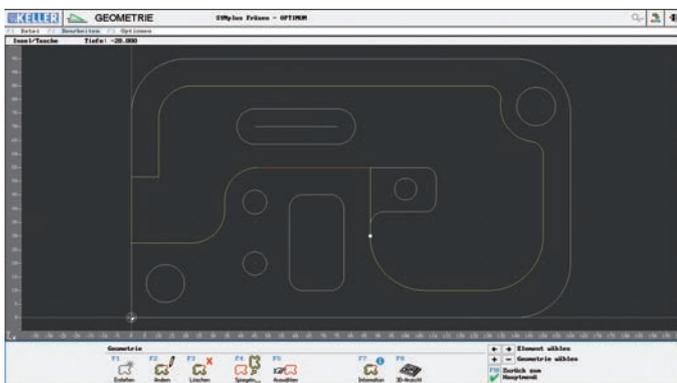
- Supported operating systems: Microsoft Windows® 7/8/10 (32/64 Bit)
- Screen resolution min. 1024 x 768
- OpenGL-compatible 3D graphics card, e.g. GeForce GT 210 (1024 MB)
- RAM: min. 2 GB
- Approx. 2 GB free disc space per technology for system data

Selection of licencing models:

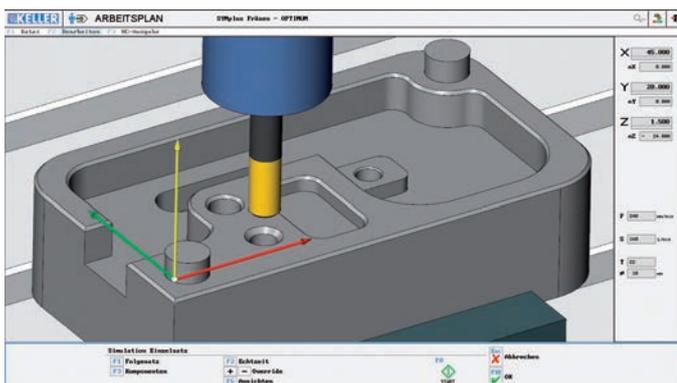
- CodeMeter (licence is stored on USB dongle)
- CodeMeterWAN (licensing via internet connection, login with ID and password)

■ CAD - Geometry Creation

SYMplus plusCARE™ lets you program workpieces in an unbeatably quick and simple way using a graphical interface, even if the drawing is not dimensioned in an NC compliant way.



2D simulation shows many details, such as allowances and the cutting path of every single milling run. You can also "capture" control dimensions (not shown). 3D simulation gives you the best possible overview of machining.



CNC software SYMplus milling plusCARE™	Article no.
Milling	3581010
<ul style="list-style-type: none"> • commercial use • Also available as a package for 2, 5, 10 or 20 users • Includes post-processors for SINUMERIK 802C, 802D, 808D, 810D/840D, 840D sl/828D 	

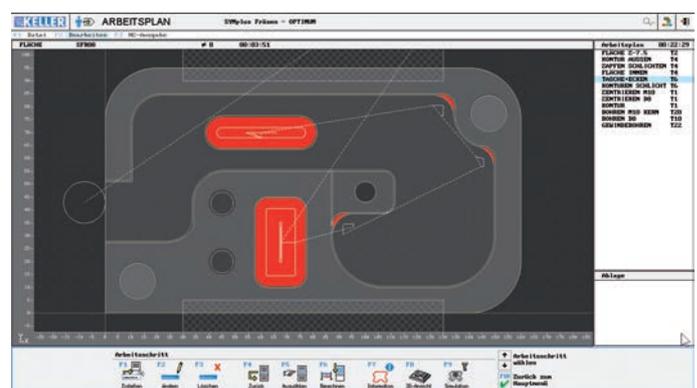
plusCARE™

- annual charge includes regular updates, telephone and email support, and remote maintenance by the manufacturer

■ CAM - work schedule generation

Machining is also defined graphically using pictograms. You can conveniently compare production strategies and thus optimise machining. Timing computation helps you with costing.

The residual material detection refers to the entire process, the unmachined part is continuously tracked.



Alternatively, you can use CAD contours from DXF.

You create the NC program itself with just a few clicks and transfer it to the control, for example using a USB stick.

SYMplus plusCARE™ Milling runs under Windows 7, 8 and 10. Further information and additional modules on request.

SYMPLUS TURNING PLUSCARE™

IS THE IDEAL SOFTWARE COMPLEMENT TO OPTIMUM CNC LATHES. WORKSHOP CAPABLE CAD/CAM SYSTEM WITH 802S TRAINING.

We also offer SYMplus plusCARE™ with an identical interface for turning technology (cf. left side).

Because you can work independently of a specific control, you only need to master one system to be able to flexibly spread the load across multiple machines. Integrated didactical components help you train new staff and prepare apprentices for their exams.

System requirements for the plus systems:

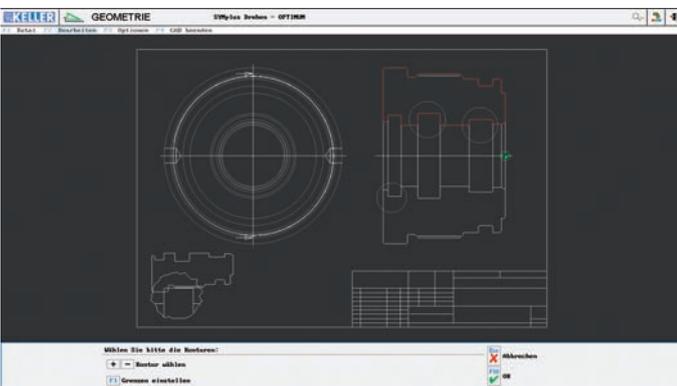
- Supported operating systems: Microsoft Windows® 7/8/10 (32/64 Bit)
- Screen resolution min. 1024 x 768
- OpenGL-compatible 3D graphics card, e.g. GeForce GT 210 (1024 MB)
- RAM: min. 2 GB
- Approx. 2 GB free disc space per technology for system data

Selection of licencing models:

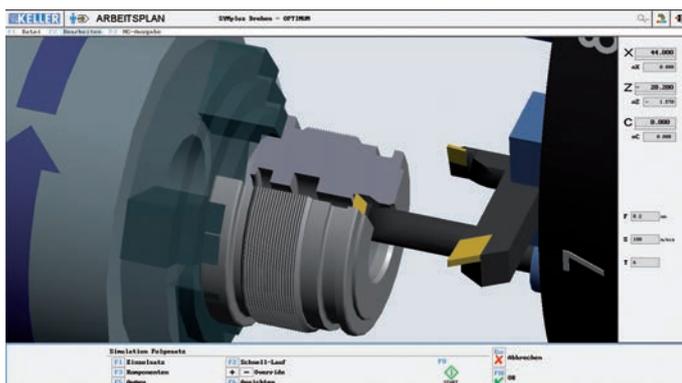
- CodeMeter (licence is stored on USB dongle)
- CodeMeterWAN (licensing via internet connection, login with ID and password)

■ CAD - Geometry Creation

If you have a drawing in an electronic format, you can transfer the turning contour with just a few clicks or key presses.



You can precisely monitor the dimensional accuracy of the programming with the measuring function from within the 2D simulation (not shown). Collision monitoring of the cutting edge and holders is performed. In the 3D simulation you can also monitor adjacent tools.



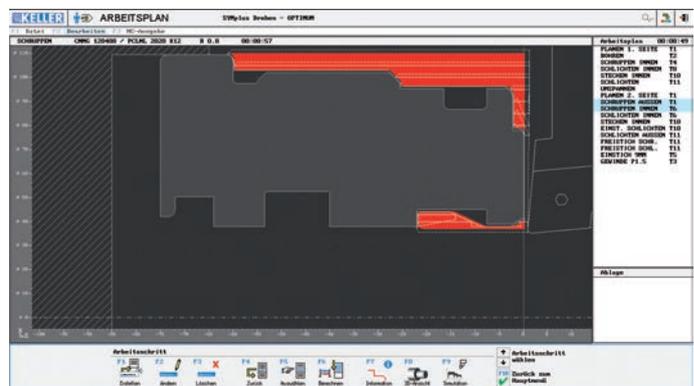
CNC software SYMplus turning plusCARE™	Article no.
Turning	3581012
<ul style="list-style-type: none"> • commercial use • Also available as a package for 2, 5, 10 or 20 users • Includes post-processors for SINUMERIK 802C, 802D, 808D, 810D/840D, 840D sl/828D 	

plusCARE™

- annual charge includes regular updates, telephone and email support, and remote maintenance by the manufacturer

■ CAM - work schedule generation

Like in milling, you define the work steps in a graphical interface and benefit from residual material detection throughout the entire production process (incl. re-clamping).



Finally, you select the post-processor for the machine on which you will be producing, and transfer the program.

Of course, there is also a dialogue-based contour computer for transferring hard copy drawings.

SYMplus plusCARE™ Milling runs under Windows 7, 8 and 10. Further information and additional modules on request.

MANUAL MACHINE PLUS (MM+)

SIEMENS MANUAL MACHINE PLUS (MM+)

ENABLES THE TRANSITION FROM CONVENTIONAL MACHINES TO CNC PROGRAMMING.
SIMPLE CYCLE CONTROL.

With the Manual Machine + (MM+) package, the SINUMERIK 808D offers you simple operation of the machine tool, in that all operating actions are supported by graphic help images and operation is as easy as with a conventional machine tool.

The functions provided give you a fast, practical machine setup for machining. This specifically includes determining the workpiece position in the machine and maintaining and measuring the tools used.

A comfortable DIN/ISO editor with complete GCode according to DIN66025 and ISO dialect is available for programming. Graphical input for technological machining cycles and contours supports you during programming.

With the SINUMERIK 808D, you have a powerful complete system at your disposal that covers all required applications without subsequent commissioning and training overhead:

- Intuitive user interface for all machine functions
- Flexible completion of individual machining actions without programming
- DIN/ISO programming on the machine
- DIN/ISO programming offline via CAD/CAM system
- Automatic measuring of the tool in setup mode

In Manual Machine operating mode, you can machine workpieces without having to create a part program. You have access to the following functions:

- Axis-parallel travel
- Taper turning
- Radius turning
- Centre drilling
- Thread tapping
- Grooving/Cutting off
- Thread tapping
- Machining of contours

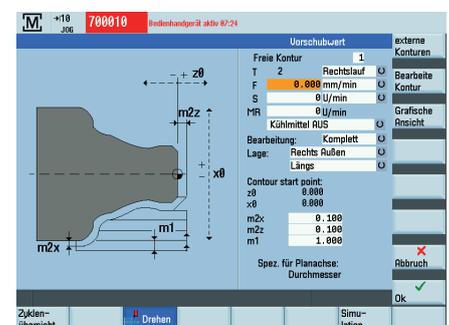
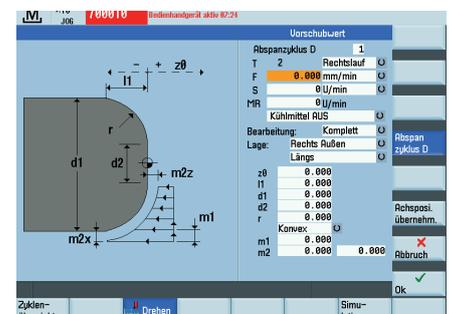
For the definition/parameterization of the function you are supported by comfortable input windows with images as an aid.

The cross slide is controlled via handwheels or axis direction switches/enabling switches or via the axis direction buttons. The spindle is controlled via spindle direction switches or via individual buttons for forward, stop and return.

Note: The machine manufacturer can define in which mode the start-up of the control should take place (MM+ or standard).

The advantages at a glance

- Save time with simple machining operations, e.g., repairs or reworking of individual pieces, because no parts program is necessary
- Flexible design of work steps
- No programming skills needed



Manual Machine Plus (MM+)

3584150

- User Manual
- for CNC lathes L 28HS / L 34HS / L 50E



support

Maintenance contracts
Service packages
Service data backup
Service geometry check



SERVICE & SUPPORT

SERVICE PACKAGES

FOR PREVENTION AND AN ASSURED SUPPLY OF SPARE PARTS

Whether it's a planned service appointment or quick help after a sudden machine failure: In the event of service, our intensively trained OPTIMUM technicians are at your disposal with their sound knowledge and many years of experience. They quickly and reliably take care of repairing your CNC machines. With our carefully considered service solution we help to keep your OPTIMUM CNC machine working in a trouble-free way.

Know-how for satisfied customers: Our Engineering department has a well-coordinated team of specialists with excellent engineering qualifications. We view the clear, technical orientation of our staff as the basis for a high level of customer satisfaction. This is what you can expect of us:

- Fast and comprehensive advice
- Expert on site service
- Reliable help with maintenance, servicing and incidents

Our preventive maintenance options, check-ups and service packages ensure trouble-free and economic use of your CNC machines. Our staff handle all of this in an expert way. Big plus: Regular maintenance and servicing by our service department increases the functional reliability and thus extends the service life of the machines!



FAST & RELIABLE

WITH DECADES OF EXPERIENCE

Capable CNC machines with a comprehensive feature set and OPTIMUM price and performance – this is what OPTIMUM Maschinen Germany stands for. Each one of our products impresses with its quality, precision, long service life and value stability. In addition to our own manufacturing facilities, we have now produced throughout the more than 23 years of our existence at manufacturers capable of meeting our high quality requirements.

Before purchasing a CNC machine, it is especially important to also consider the indirect costs in addition to the cost of purchasing. This means, for example, maintenance, repairs, or taking CNC machine downtime into consideration. To ensure the profitability of your OPTIMUM CNC machine, we offer you maintenance options to help prevent time-consuming repairs, check-ups and comprehensive service packages.

In the case of a repair, you benefit from our reliable spare parts supply: one of the basic premises of our customer oriented service solution is fast availability of spare parts. We match planning, coordination and provision of parts in a targeted way. This improves economy, after all, machines repaired quickly can be quickly re-deployed on your lines.



MAINTENANCE CONTRACTS

COMFORT, MEDIUM OR BASIC

The objective of our service is to make maintaining and repairing make your OPTIMUM CNC machine a simple as possible. This is why OPTIMUM offers you a variety of maintenance contracts that you can tune to perfectly match your requirements and wishes.

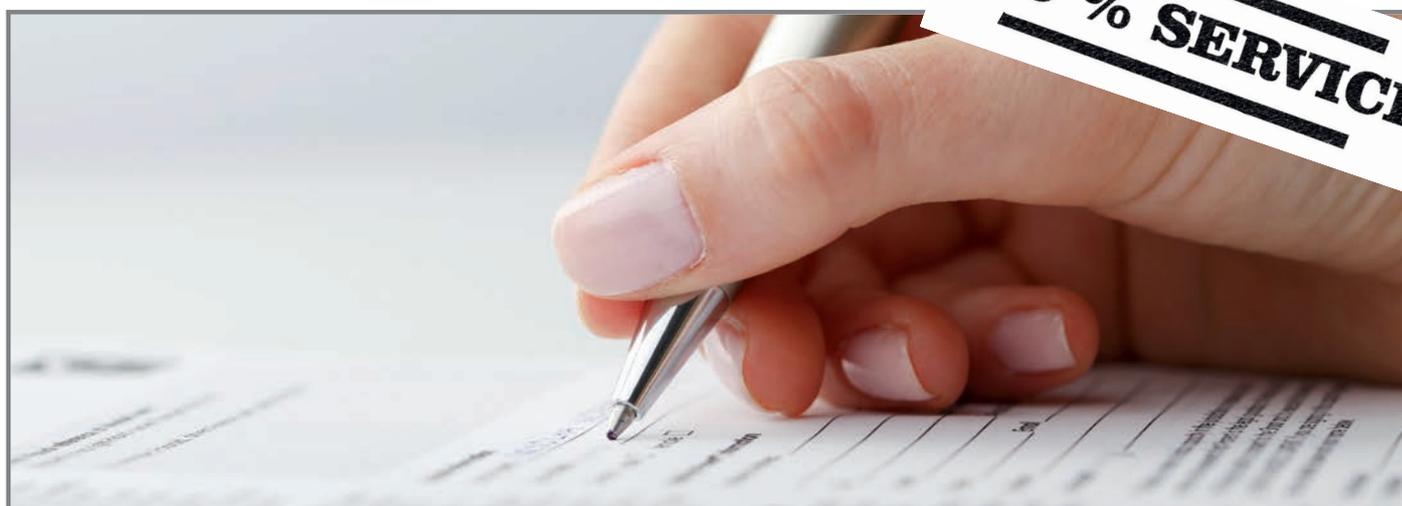
You can choose between our Comfort, Medium and Basic maintenance contract options. You can be sure: Our technicians are there to help with any problem - whether on the phone, through remote maintenance via Teamviewer or in person.
 The following options are available:



Options *	Comfort:	Medium	basic
	Article no.	Article no.	Article no.
with less than 5 axes	3589106	3589107	3589108
5 axes or more	3589120	3589121	3589122

Response to a problem	within 1 working day	Within max. 2 working days	Within max. 3 working days
Technical troubleshooting by phone	✓	✓	✓
Preventive maintenance options	Every 6 months	Annually	Annually
Remote maintenance via Teamviewer**	✓	✓	
Spare parts supply for non-wearing parts via express	✓		

- incl. 400 km total (200 km one way)
- each additional kilometre is invoiced at EUR 0.69
- plus travel expenses at EUR 66.00 per hour or part thereof
- Accommodation costs and expenses at cost



** the prerequisites must be in place customer-side

MAINTENANCE WORK

PREVENTIVE MAINTENANCE FOR BETTER ECONOMY

Just like your car's annual service, preventive maintenance of CNC machines in the form of a service ensures that the individual parts are kept in good shape. Our preventive maintenance options include planning and handling of maintenance for your OPTIMUM CNC machine. At the same time, they include preventive repairs and preventive part replacement. We want your CNC machine to work perfectly and to ensure its long service life. In work package or around eight hours, our engineers, for example, inspect the coolant, lubrication and compressed air systems and check the electrical and mechanical systems. The biggest advantage is that any weak points can be immediately eliminated – before extensive repairs are needed. The cost of preventive maintenance is quickly amortised as your CNC machine's efficiency increases. Take a look at the many measures that our inspections include:

Coolant system:

- Remove/check coolant pump and motor
- Clean coolant pump filter
- Check lines and screw connections for leak tightness

Lubrication system:

- Check and/or replace filter units
- Check lines and screw connections for leak tightness
- Performing an function test of the central lubrication system

Compressed air system:

- Perform pressure test
- Performing of maintenance unit check
- Check and/or replace filters

For CNC lathes

- Replace oil filter on hydraulic unit
- Check hoses and screw connections for leak tightness

Electrical system:

- Clean switch cabinet
- Check terminals and connections
- Replace air filter
- Check limit switches and safety equipment

DETAILS:

- Work package approx. 8 working hours
- incl. 400 km total (200 km one way)
- each additional kilometre is invoiced at EUR 0.69 plus travel expenses at EUR 66.00 per hour or part thereof
- Accommodation costs and expenses at cost

Mechanical system:

For CNC milling machines

- Geometric measurement of the machine with Renishaw QC20 test report
- Check and adjust levelling of machine
- Check reverse clearance of the X, Y, and Z axes and adjust electronically
- Check spindle positioning
- Check covers and scrapers
- Check concentricity of the spindle taper
- Check spindle taper for damage
- Check counterweight system or compressed air cylinders
- Check axis running noise
- Check spindle running noise
- Completely check/lubricate tool changer system
- Check drive belt on main spindle drive
- Visual check of lines and screw connections

For CNC lathes

- Check and adjust levelling of machine with Renishaw QC20 test report
- Check reverse clearance of the X, Y, and Z axes and adjust electronically, or adjust wedge rails
- Check covers and scrapers
- Measure concentricity of main spindle
- Check axis running noise
- Check main spindle running noise
- Completely check/lubricate tool changer system
- Check of main spindle belt drive and replace if needed
- Visual check of lines and screw connections
- Check and adjust turret alignment
- Check and adjust spindle alignment based on a sample part

Preventive maintenance options

3589112

Lathes/Milling machines



LIQUID COOLING MAINTENANCE

Maintenance of liquid cooling system

3589180

Including:

- Motorex coolant concentrate 5 litres
- Motorex CS Cleaner 1 litre
- Distilled water 25 litres

Material for maintenance of liquid cooling system

3589200

if customer does not have material in stock

SERVICE DATA BACKUP

WE OFFER VARIOUS SERVICE PACKAGES FOR MAINTAINING AND REPAIRING YOUR OPTIMUM CNC MACHINE. YOU CAN CHOOSE FROM VARIOUS OFFERS TO SUIT YOUR INDIVIDUAL REQUIREMENTS.

MACHINE TYPE:

Lathes/Milling machines

Our state-of-the-art data backup fully backs up your machine data. This includes axis compensation values, parameters, NC and PLC data, zero points and CNC programs. This saves a huge amount of time, and thus money, for re-entering the data in case of data loss. Thanks to a data backup, your information can be simply and quickly restored. While restoring the data, our technician also checks the memory buffer battery* and replaces it if needed.

FEATURES:

- Backup of all relevant data
- Backup to a storage medium
- Buffer battery* check and replacement if needed
- CNC program backup option

Service data backup

3589110

Lathes / Milling machines

YOUR BENEFITS:

- Prevents data loss as you have a backup of your machine data in case of a malfunction
- Avoids downtime

DETAILS:

- Duration individual
- incl. 400 km total (200 km one way)
- each additional kilometre is invoiced at EUR 0.69
- plus travel expenses at EUR 66.00 per hour or part thereof
- Accommodation costs and expenses at cost



SERVICE GEOMETRY CHECK

COMPLETELY CAREFREE!

MACHINE TYPE:

Lathes/Milling machines

During the Service Geometry Check, our engineers precisely and comprehensively verify your machine's geometry. The measuring results are documented, thus allowing conclusions on any anomalies to be drawn. In case of problems, our staff give you expert advice, showing you where the problems lie and providing an inexpensive solution. The Service Geometry Check is especially useful in the scope of preventive maintenance to discover and compensate for wear at an early stage. This avoids malfunctions and machine failures

FEATURES:

Geometry check

- Circular shape test with Renishaw QC20 (milling machines)
- Detailed test report of all measuring results
- Analysis and evaluation of the measuring results
- Quotation for eliminating any identified defects

Geometry check

3589111

Lathes / Milling machines

YOUR BENEFITS:

- Discovers wear at an early stage
- Machine maintenance can be scheduled in good time
- Boost production quality
- Plan your service costs
- Production assurance

DETAILS:

- incl. 400 km total (200 km one way)
- each additional kilometre is invoiced at EUR 0.69
- plus travel expenses at EUR 66.00 per hour or part thereof
- Accommodation costs and expenses according to expenditure



* if installed



YOUR **TRAINING** MANAGER



MARTIN TREPESCH
TECHNICAL MANAGER

 +49 (0)951 96555-850

 M.TREPESCH@OPTIMUM-MASCHINEN.DE



THOMAS LASCHIMKE
HEAD OF CNC

 +49 (0)951 96555-129

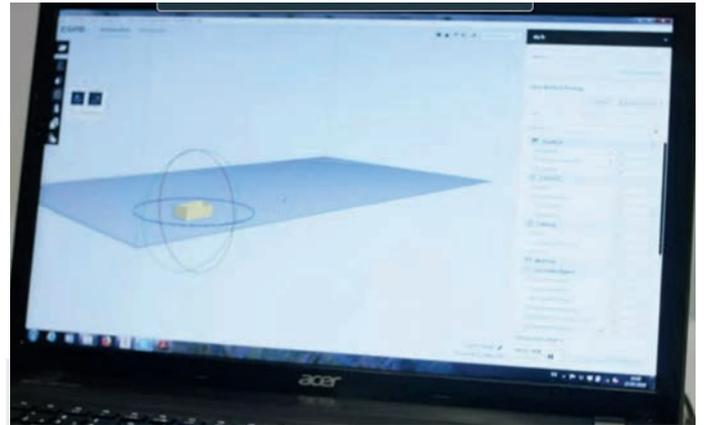
 T.LASCHIMKE@STUERMER-MASCHINEN.DE

12
TRAINING

3-D PRINTING BASIC TRAINING

3-DAY SEMINAR

Many companies have already recognised the great potential of 3-D printing and are benefitting from it. As materials and processing methods continue to evolve, industrial 3-D printing continues to qualify for an increasing number of applications.



CONTENT

OVERVIEW

In this course you will discover the entire process chain of 3-D printing using concrete examples. From component preparation and machine operation to the production of your 3-D objects with final finishing, you will learn how to put your knowledge of industrial 3-D printing into practice.

CONTENT

- Part preparation
- Getting to know relevant 3-D printing technologies and systems
- Getting to know our 3-D printing system
- Component creation
- 3-D printer operation
- Optimising parts and troubleshooting with the help of CAD tools
- Part reworking

REQUIREMENT

- Basic knowledge of automation technology

OBJECTIVES

- Our 3-D printing workshop prepares you optimally for your own practical application by taking you through the process chain of additive manufacturing and creating industry-relevant components.
- After a short theoretical introduction to the equipment used, you will learn how to select the appropriate print head (3x and 5x print head) based on given component data and material properties.
- In the second step, you will create your part and become familiar with the operation of the selected 3-D printing device. At the end of the workshop, the group will analyse the parts for errors and make optimisations using CAD tools to identify design difficulties.

TARGET GROUP

- Parties interested in a purchase
- Engineers
- Technicians
- Industrial designers
- Professional 3-D printing users

Date	Course number
Subject to agreement	3D GS1
Trainers: Martin Trepesch, Thomas Laschimke	

3-D PRINTING ADVANCED SEMINAR

2-DAY SEMINAR

Here you will acquire the basic knowledge of our CNC programme including 3D printing. In this way, they are later able to provide their clients with basic advice.

We then advise your potential client fully for you after their basic consultation.



CONTENT OVERVIEW

Our 3-D printing workshop prepares you optimally for your own practical application by taking you through the process chain of additive manufacturing and creating industry-relevant components.

CONTENT

- Extended settings in CURA
- 5-axis printing. How the system works
- Avoiding printing errors
- Handling of various materials and accessories
- Time optimisation of components

Date	Course number
Subject to agreement	3D GS2

Trainers:

Martin Trepesch, Thomas Laschimke

OBJECTIVES

- In this course you will learn about common sources of error in 3D printing and we will give you practical tips on how to avoid errors.
- After a short theoretical introduction to the equipment used, you will learn how to select a suitable print head (3x and 5x print head) based on given component data and material properties.
- In the second step, you will create your part and become familiar with the operation of the selected 3-D printing device.
- At the end of the workshop, the group will analyse the parts for errors and make optimisations using CAD tools to identify design difficulties.

TARGET GROUP

- Engineers
- Technicians
- Industrial designers
- Professional 3-D printing users

REQUIREMENT

- 3-D printing basic training

GENERAL NOTES ON OPERATING OUR MACHINES

- Our machines must be supervised at all times during operation. Leaving the machine during operations constitutes gross negligence. The details on machine precision are found in the technical data of the catalogue pages. If you do not find any values here, please contact info@optimum-maschinen.de for more detailed information. The stated precisions are achieved under standardised conditions (correct installation of the machine and ambient temperature of 20 °C). The machines are not designed for continuous operation. ⁽¹⁾ Please note that operators are required to make conversions in the event of installing third-party chucks or flanged chucks to reach the stated, technically possible rotating diameter. For products with a stated guarantee: Information on scope, duration, content and guarantor at www.optimum-machines.com or to be requested at Optimum Maschinen Germany GmbH

RETAILER TRAINING

2-DAY SEMINAR

In the dealer training, you will acquire sound specialist knowledge in order to be able to advise your customers competently and professionally on OPTIMUM CNC machines. In this way, you create the basis for a firm integration of CNC-controlled machine concepts into your trade and, with the knowledge you have acquired, you can optimise existing structures so that your customers use the technology optimally and successfully.



CONTENT

OVERVIEW

In this course, you will learn about the entire process chain of computer-controlled turning and milling using concrete examples and put your knowledge of industrial CNC processes into practice. Starting with preparation and machine operation through to the production of your components with final finishing, you will receive many practical tips on modern CNC technologies.

CONTENT

- Recognising the versatile application possibilities of CNC machine tools
- Tools for understanding further production methods
- Knowledge of current developments, design and manufacturing processes with CNC technologies
- Selection, application and sale of the appropriate CNC machine
- Initial experience in the planning, design and manufacture of components using CNC milling and turning machines

REQUIREMENT

- Basic knowledge of automation technology

OBJECTIVES

- Getting to know new developments in the field of CNC technology
- Optimal preparation for the customer visit
- Acquire practical and technical product knowledge to be able to advise your customers even more expertly on site.
- Conduct sales talks with the existing sales documents
- Optimal needs assessment for the customer
- Getting to know the potential of CNC machines in production and logistics and selecting the appropriate technology.
- Consulting and concept development in a wide range of production areas.
- Understand differences to competitor products

Extended in-depth training available on customer request

TARGET GROUP

- Resellers

Date	Course number
Subject to agreement	3D GS3

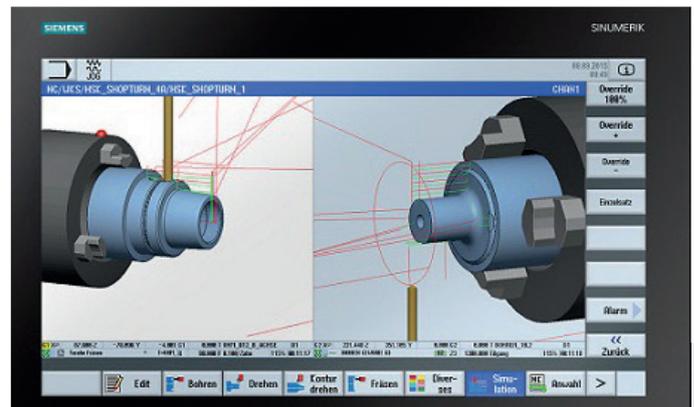
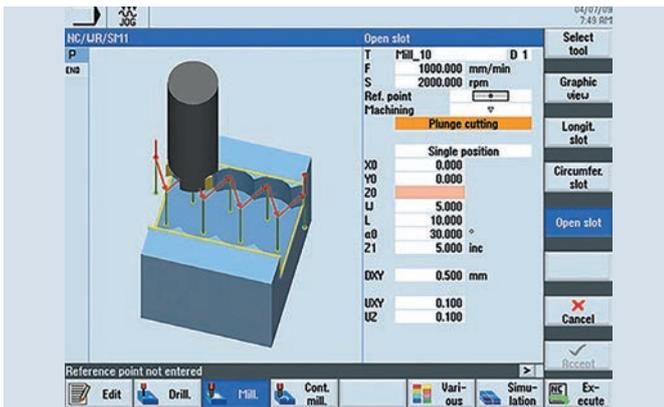
Trainers:

Martin Trepesch, Thomas Laschimke

SINUMERIK OPERATE TRAINING

UP TO MAX 5 DAYS (TURNING OR MILLING)

SINUMERIK CNC controls offer the right solution for every machine concept - from simple CNC standard machines to standardized machine concepts and modular premium machine concepts



CONTENT

OVERVIEW

This course familiarises you with the operation of SINUMERIK Operate, the machine guidance and the basics of programming part programs.

CONTENT

- SINUMERIK system overview
- Machine operating and control panel
- Operating modes, operating areas, control elements
- File system, editor
- Cycle description with application examples
- Basics of programming
- Tool correction data and tool management
- Conversion and parametrisation of standard cycles
- Backing up program data
- Practical operating exercises based on existing NC programs on training equipment

REQUIREMENT

- Basic knowledge of automation technology

OBJECTIVES

- This course familiarises you with the operation of SINUMERIK Operate, the machine guidance and the basics of programming part programs.
- Practical operating exercises on our training devices using predefined part programs are an important part of the training.
- To make the exercises even more practice-oriented, we use the graphic simulation and the simultaneous recording function of SINUMERIK Operate. This allows knowledge to be conveyed even more clearly and learning success can be improved.
- After completing the course, you will be able to operate the SINUMERIK Operate with the standard user interface and make changes to sub-programs. This helps you gain confidence in handling machine tools while minimising the risk of operator error.

TARGET GROUP

- Machine operators
- Operators
- CNC programmers

Date

Subject to agreement

Course number

CNC GS1

Trainers:

Martin Trepesch, Thomas Laschimke

CLEANING TECHNOLOGY

High pressure cleaner
Hot and cold water



Fresh and waste water pumps,
submersible pumps, garden pumps
and domestic waterworks



Single disc machines
Scrubbing machines
Double roller machines



Ride-on scrubber-dryers



Sweepers
Ride-on sweeper



Wet/dry vacuum cleaner



Dry vacuum cleaner



Special vacuum cleaner



Accessories
Nozzles, brushes, hoses,
filter bags, cartridge filters



COMPRESSORS / COMPRESSED AIR TECHNOLOGY

Mobile professional compressors for the craftsman with maximum equipment



The assembly professionals



The solid compressors for craftsmen



Screw compressors and stationary screw Compressors



The Stationary - High Performance in the smallest space



Silent compressors - for installation in the direct working environment



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- The publication of this catalogue renders all previous price lists invalid. We accept no liability for printing errors, mistakes or incorrect representation. Subject to technical modifications and visual changes. Illustrations show optimal accessories in some cases. Delivery is effected solely on the basis of our terms of delivery and payment. The machines are delivered partly knocked down for transportation reasons. All items are sold through specialist retailers. The goods shall remain our property until payment has been received in full. Our retention of title shall remain valid in case of sale to a third-party. Legal warranty conditions apply for businesses. Copying and reproduction in full or in part is subject to written approval by us. Please note that transport packaging surcharges apply for some machines in this catalogue to cover transport units, packaging and packaging overheads. These machines are appropriately marked in the catalogue.
- For products with a stated guarantee: Information on scope, duration, content and guarantor at www.optimum-machines.com or to be requested at Optimum Maschinen Germany GmbH

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YOU WILL FIND MORE PRODUCTS IN OUR MAIN CATALOGUES



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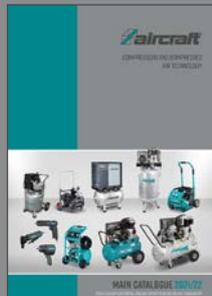
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Sales Germany:

OPTIMUM Maschinen Germany GmbH
Dr. Robert-Pfleger-Str. 26
96103 Hallstadt/Germany

Phone: +49 (0) 9 51 - 96 555 - 0

Fax: +49 (0) 9 51 - 96 555 - 888

e-mail: info@optimum-maschinen.de



www.optimum-machines.com

Sales Austria:

AIRCRAFT Kompressorenbau GmbH
Gewerbestraße Ost 6
4921 Hohenzell / Austria

Phone: +43 (0) 77 52 - 70 929 - 0

Fax: +43 (0) 77 52 - 70 929 - 99

e-Mail: info@aircraft.at

Web: www.aircraft.at