favoritCNC

The price hit
for a large range of applications.

Key data

The favoritCNC is a CNC universal cylindrical grinding machine for the individual and batch production of medium-sized workpieces.
It has distances between centres of 650/1000 mm and a centre height of 175 mm.
It can machine workpieces with a maximum weight of 80/120 kg.

STUDER

Fritz Studer AG

The name STUDER stands for more than 100 years of experience in the development and production of precision cylindrical grinding machines. «The Art of Grinding.» is our passion, highest precision is our aim and top Swiss quality is our benchmark.

Our product line includes both standard machines, as well as complex system solutions in high-precision cylindrical grinding for machining small and medium-sized workpieces. In addition we offer software, system integration and a wide range of services. As well as receiving a complete tailormade solution the customer also benefits from our 100 years of know-how in relation to the grinding process.

Our customers include companies from the machine tool industry, automotive engineering, tool and die makers, the aerospace industry, pneumatics/hydraulics, electronics/electrical engineering, medical technology, the watch industry and job order production. They value maximum precision, safety, productivity and longevity. 24000 manufactured and delivered systems make us the market leader and are clear evidence of our technological leadership in universal, external, internal and noncircular grinding. Around 800 employees, including 75 apprentices, make it their goal every day to ensure that «The Art of Grinding.» will continue to be closely linked to the name STUDER in the future.

favoritCNC

If you think a STUDER machine will exceed your budget, we recommend the favoritCNC. Top of the list with regard to price-performance ratio, this machine can be used universally and is quick and easy to program, thanks to StuderPictogramming. It's Granitan® S103 mineral casting machine bed largely equalizes temporary temperature fluctuations.

Characteristics

Dimensions

- Distance between centres 650 / 1 000 mm
- Height of centres 175 mm
- Max. workpiece weight 80 / 120 kg

Hardware

- Turret wheelhead with grinding wheel on the right and internal grinding unit (optional) with manual swivel 2.5° Hirth
- External and internal grinding possible in one setup
- Granitan® S103 mineral-casting machine base
- Complies with CE standards

Software

- Extremely easy programming with StuderPictogramming
- StuderGRIND programming software optionally available to create grinding and dressing programs on an external computer.

The CNC Universal cylindrical grinding machine for small budgets and high standards

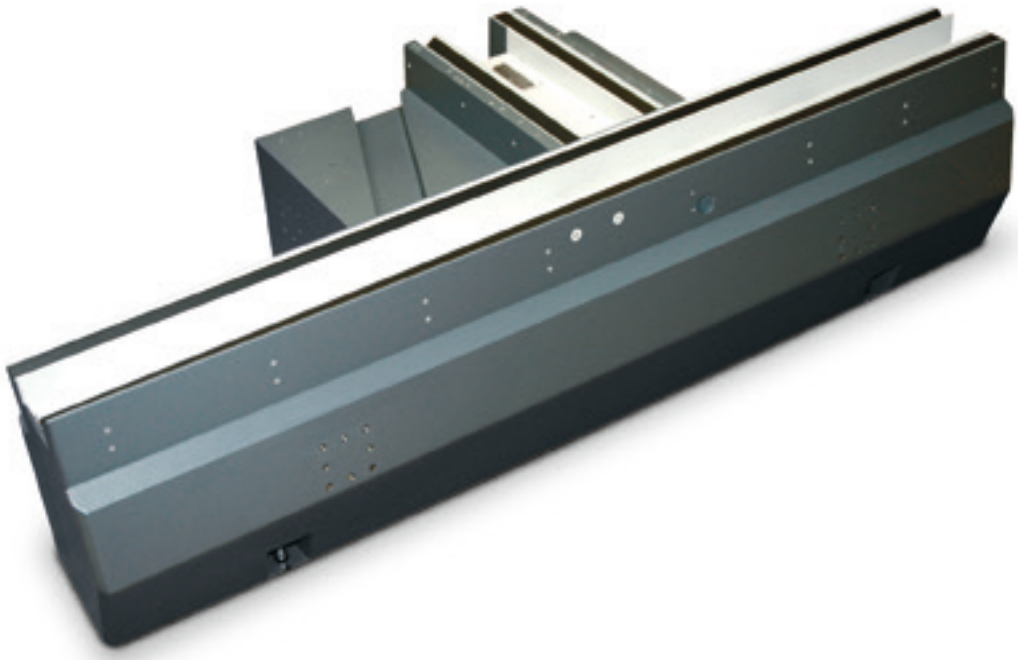
This CNC universal cylindrical grinding machine is designed for grinding medium-sized workpieces in individual and serial production. With the various options, such as in-process gauging, balancing system, contact detection and length positioning, the machine can be adapted for other grinding applications at a later date.

The machine bed made of solid Granitan® S103 forms the basis of the cylindrical grinding machine, which is equipped with high-quality components and can therefore guarantee exacting precision, performance and reliability for years. The full enclosure ensures an optimal view of the grinding process.

The practical STUDER grinding software with its proven StuderPictogramming means that even lesser-experienced users can quickly and practically program grinding and dressing cycles. The additional, optional StuderGRIND software is also available, with which special applications such as profiling grinding wheels for complex workpiece shapes can be programmed efficiently. Development, production, assembly and testing of Studer products all take place in a process-oriented manner and comply with the stringent directives stipulated in VDA 6.4 and ISO 9001.

Granitan® S103 mineral-casting machine base

1



- Vibration-damping
- Thermal stability
- Non-wearing

The material structure developed by STUDER and which has proved its superb efficiency over many years is produced in the company's own plant using the most modern industrial techniques.

- The excellent dampening behavior of the machine base ensures outstanding surface quality of the ground workpieces. The service life of the grinding wheel is also increased, leading to reduced downtimes.
- Temporary temperature fluctuations are extensively compensated by the favorable thermal behavior of Granitan®. This provides high stability throughout the day.
- The V and flat guideways for the cross slides are moulded directly into the machine base and are finished with a non-abrasive Granitan® S200 slideway coating. The patented surface structure prevents the slides from swimming and also eliminates the stick-slip effect, which is otherwise noted in conventional guideways. The guideways offer the best possible accuracy through the entire speed range with high load capacity and cushioning levels. Thanks to the robust and maintenance-free design, these excellent guideway characteristics are retained more or less without limit.

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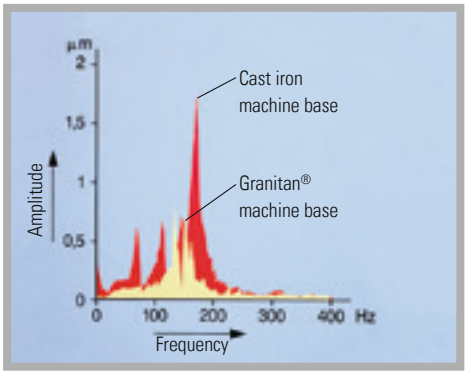
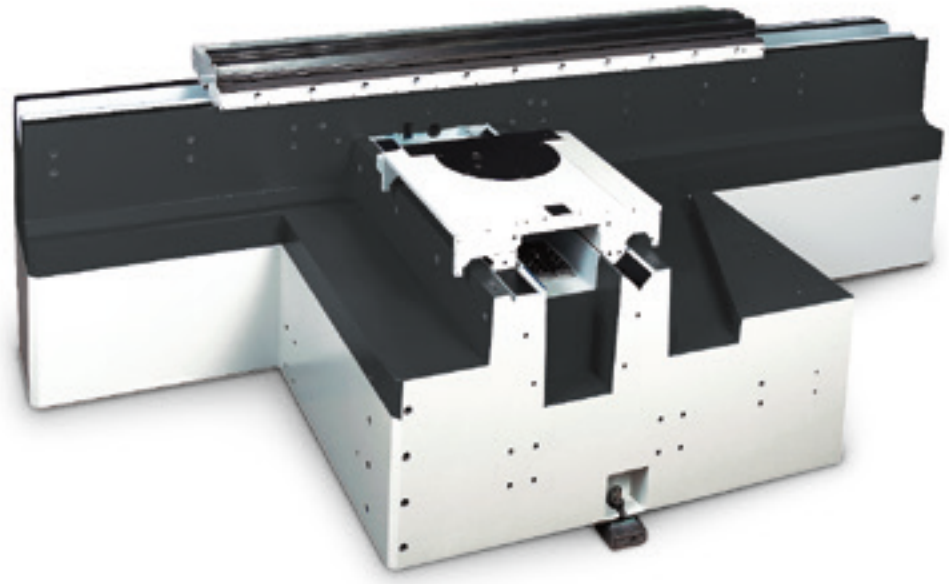


1 Machine bed with longitudinal and cross guideways
2 Guideways with patented surface structure
3 Vibration behavior of gray cast iron and Granitan® S103

Longitudinal and cross slides

1



- High-accuracy axis movements
- Effective covering of the guideways
- Auxiliary scale for setup and resetting
- Swiveling longitudinal table 8.5°

2

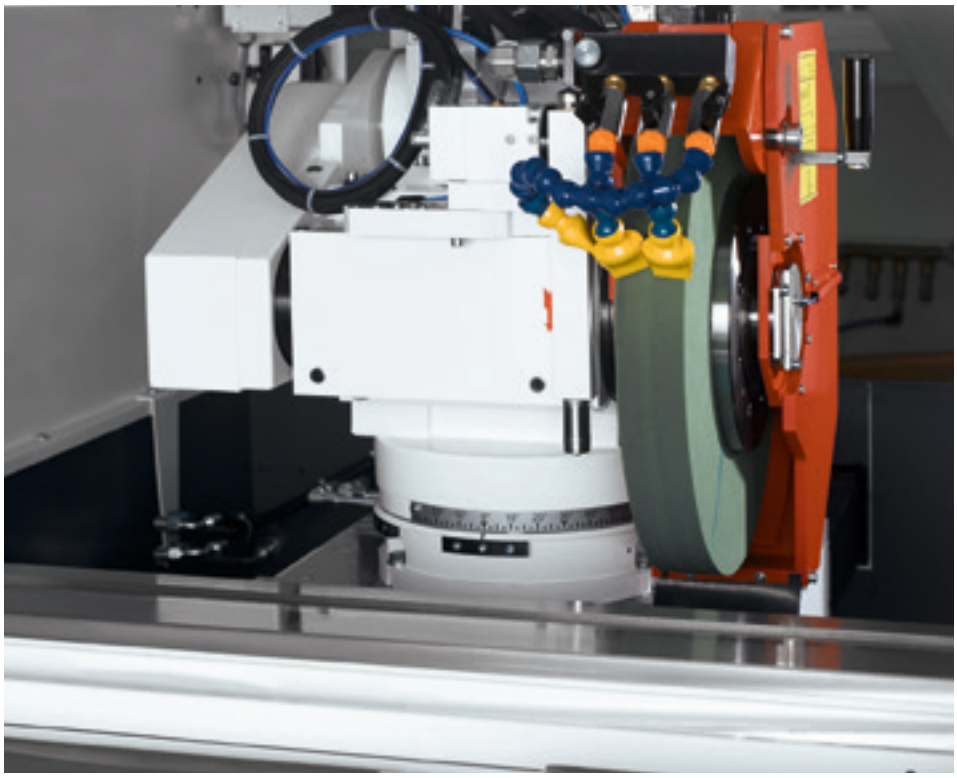
The longitudinal and cross slides are manufactured from high-quality gray cast iron and have highly precise, ground V and flat guideways, with the distance between the guideways optimally suited to the machine's overall rigidity. These distances are optimally coordinated to benefit the overall rigidity of the machine. The slides rest completely on the guideways of the machine bed through the entire speed range, which is the basis for the excellent straightness of 0,0025 mm over 650 mm measuring length. The slides are advanced by 40 mm diameter circulating ball screws connected to a three-phase servomotor via torsion-resistant, bellow-type couplings.

Use of the swiveling machine table on the longitudinal slide enables the whole length of the surface to be ground and acts as a support for the workhead, the tailstock, and also accessories and devices.

1 Machine bed with both longitudinal and cross slides
2 Workpiece table with swivel unit and set-up scale

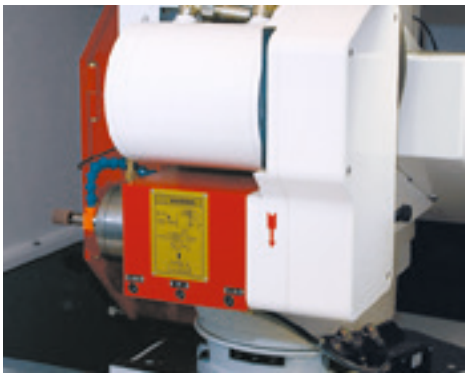
Wheelhead

1



- Turret wheelhead
- Complete machining
- High performance of 9 kW
- Cutting speed of up to 50 m / s
- Internal grinding spindle includes infinitely variable speed adjustment

2



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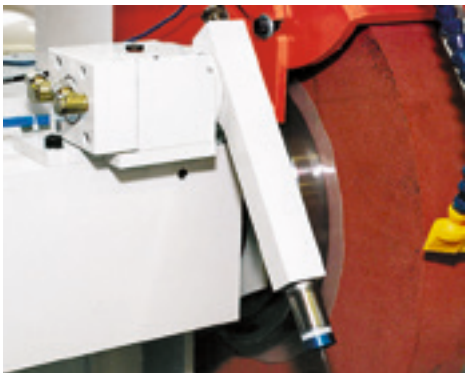


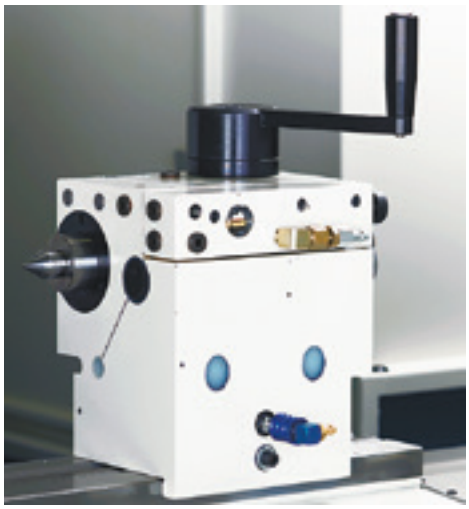
The turret wheelhead can be used for both external and internal grinding; it can be equipped with an external grinding wheel (right) and an internal grinding spindle for this purpose. With extreme precision, the user can manually (2.5°) index the turret wheelhead in a Hirth gear within a swiveling range of -15° / +195°.

Grinding wheel dimensions: Diameter 500 mm, width 63 (80 F5) mm, bore 203 mm. It has a drive power of 9 kW. The cutting speed of maximum 50 m / s enables efficient removal values during the grinding process.
The speed of the belt-driven internal grinding spindle can be infinitely variably regulated. Spindles are available with nominal speeds of 20 000, 40 000 and 60 000 min^{-1}.

1 Turret wheelhead
2 Internal grinding attachment
3 Length positioning facility

Tailstock

1



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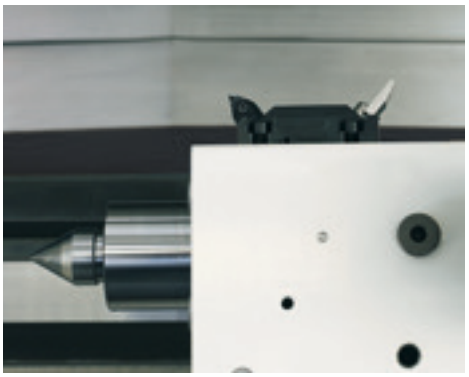


- Taper corrections
- Thermal stabilization via overflow capacity

The generously dimensioned barrel, designed for the deployment of Morse 4 taper centres, glides in the tailstock housing. The centre pressure can be adjusted with the delicate precision required for grinding high-precision workpieces. The fine adjustment enables taper corrections in the range below 1 µm when grinding between centres.

In order to guarantee optimum thermal stability, a cooling lubricant is passed through the tailstock, and totally covers the barrel and diamond holder.

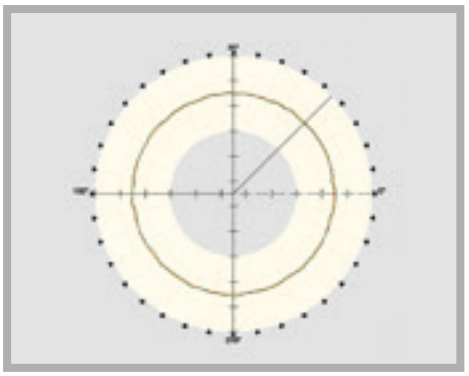
Workhead

4

- Pneumatic lifting
- High roundness accuracy < 0.0004 mm
- Large speed range 1 – 1500 rpm

The versatile universal workhead with MT5 fitting taper is capable of both live spindle grinding and grinding between centres. The workhead spindle is mounted on roller bearings, is low-maintenance and possesses an excellent roundness accuracy of below 0.0004 mm. The fine adjustment allows for cylindrical corrections in the 1 µm range during live spindle operations. A pneumatic lifting process facilitates movement of the workhead during setup and resetting.

5



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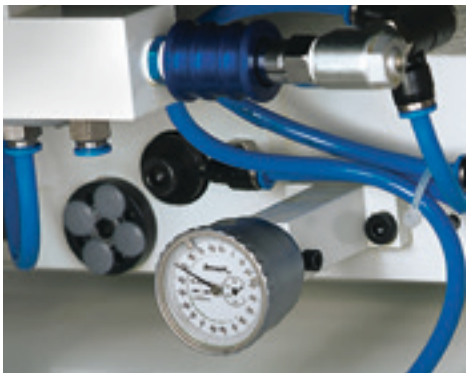
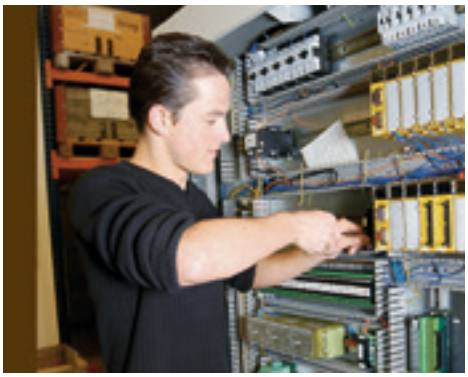


1 Tailstock
2 Fine adjustment for cylindrical corrections on the tailstock
3 Dressing tool holder behind tailstock
4 Universal workhead
5 Roundness during live spindle grinding operations
6 Fine adjustment for cylindrical corrections

Machine control and operation

1

2



3

The Fanuc 0*i* CNC control with active flat color monitor (10.4") is extremely reliable and optimally matched to the drive elements.

The control cabinet is bolted to the machine bed. The electrical equipment complies with established safety standards and is EMC-tested.

All controls are clearly and ergonomically arranged. An important role is played by the manual control unit, which facilitates setup close to the grinding process.

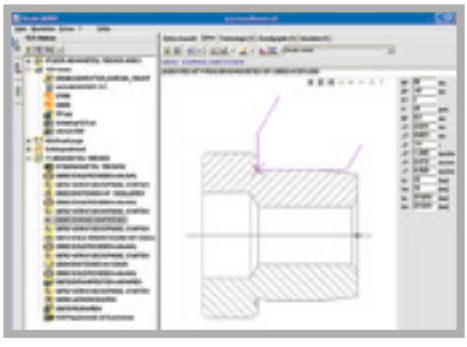
The special electronic contact detection sensitron (optional) function enables downtimes to be reduced to a minimum.

- PCU manual control unit
- EMC-tested control cabinet
- Ergonomically arranged controls
- Latest software technology
- StuderPictogramming
- Programming software StuderGRIND (Option)

Programming

4

5



The sophisticated mechanical engineering concept of the favoritCNC is completed by a grinding software program developed in-house by STUDER and which is continuously further optimized in collaboration with users of the software. This software offers:

- StuderPictogramming: The operator strings the individual grinding cycles together, and the control system generates the ISO code.
- Grinding and dressing process sequences can be programmed freely to optimize the grinding process.
- StuderGRIND (Option): Programming software for special applications such as profiling the grinding wheel for complex workpiece forms. The program is created on the PC and transferred directly to the machine control unit.

1 Machine control
2 Internal view of the control cabinet
3 Manual control unit
4 StuderPictogramming
5 StuderGRIND programming software

Additional options

1

2

One strength of the favoritCNC is that the machine can be adapted to suit different requirements. The range of application can be extented with additional options that are quickly available.
The following options are available:

Sensitron 6 electronic cut-in detection:
The Sensitron 6 contact control unit automatically switches from infeed to grinding feed. The air gap between the set allowance and the contact point is by-passed very quickly with a high infeed speed.

Dynamic balancing system:
An optimally balanced grinding wheel is a precondition for good grinding results. The dynamic balancing system displays the imbalance, and the grinding wheel can be balanced directly on the machine by manually adjusting weights.

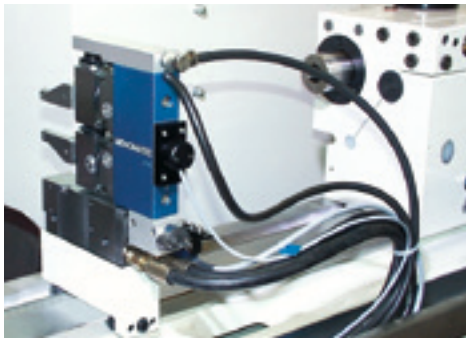
In-process gauging unit:
This accessory kit has two measuring circuits with which it controls the automatic feed sequence relative to the workpiece dimension during external grinding. It thus helps to further increase process reliability, productivity and quality. Products are available from Movomatic and Marposs.

Length positioning:
This allows the workpiece zero point to be captured in the Z-axis.

- Configuration is flexible
- Simple to retrofit
- Diameter measuring head
- Length positioning measuring head

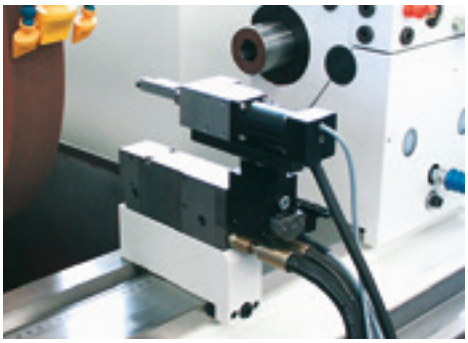
Measuring heads for the in-process gauging unit

3



Depending on the application, different diameter measuring heads are available. They have an electric or pneumatic probe lift-off and use one or two measuring circuits, depending on the application.

4



The length positioning measuring head is suitable for the passive length positioning of interupted or non-interupted surfaces. It has an electric or pneumatic probe lift-off and uses one measuring circuit.
Measuring range: ±2.5 mm.

1 Dynamic balancing system
2 In-process gauging unit
3 Diameter measuring head
4 Length positioning measuring head

Customer Care

STUDER cylindrical grinding machines should fulfil the customer's requirements for as long as possible, work cost-effectively, function reliably and be available at all times. From «start up» through to «retrofit» – our Customer Care is there for you throughout the working life of your machine. 30 professional helplines and more than 60 service technicians are available in your area, wherever you are in the world.

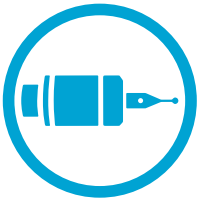
- We will provide you with fast, uncomplicated support.
- We will help to increase your productivity.
- We work professionally, reliably and transparently.
- We will provide a professional solution to your problems.

Start up
Commissioning
Warranty extension

Qualification
Training
Production support

Prevention
Maintenance
Inspection

Service
Customer service
Customer consultation
HelpLine
Remote service



Material
Spare parts
Replacement parts
Accessories

Rebuild
Machine overhaul
Assembly overhaul

Retrofit
Modifications
Retrofits

Technical specifications

Main dimensions

Distance between centres	650 / 1 000 mm (25.6" / 39.4")
Height of centres	175 mm (6.9")
Max. workpiece weight between centres	80 / 120 kg (176/264 lbs)

Cross slide: X-axis

Max. travel	285 mm (11.2")
Speed	0.001 – 10 000 mm / min (0.000.04 – 394 ipm)
Resolution	
Rotative encoder	0.0001 mm (0.000.004")

Longitudinal slide: Z-axis

Max. travel	800 / 1 150 mm (31.5" / 45.3")
Speed	0.001 – 20 000 mm / min (0.000.04–787 ipm)
Resolution	
Rotative encoder	0.0001 mm (0.000.004")
Machine table - swiveling range	8.5 deg

Wheelhead

Swiveling range	-15 to +195 deg
Swiveled manually	2.5 deg Hirth
Fitting taper	dia. 63 mm (2.48")
Driving power	9 kW (12 hp)
Right grinding wheel , Ø x width x bore	500 x 63 (80F5) x 203 mm (20" x 2.5" (3.15"F5) x 8")
Peripheral speed	Up to 50 m/s (9840 sfpm)
Internal grinding attachment for belt spindle	dia. 100 mm (3.94")
Speeds	20 000 / 40 000 / 60 000 rpm

Universal workhead

Rpm range	1 – 1 500 rpm
Fitting taper	MT5
Bar capacity	dia. 30 mm (1.18")
Driving power	1,8 kW (2.4 hp)
Load for live spindle grinding	70 Nm (52 ft lbs)
Roundness during live spindle grinding operations	0.0004 mm (0.000.016")

Tailstock

Fitting taper	MT4
Barrel stroke	35 mm (1.37")
Barrel diameter	50 mm (1.97")
Fine adjustment for cylindrical corrections	±40 µm (0.0016")

The information given is based on the technical levels of our machine at the time of this brochure going to print. We reserve the right to further develop our machines technically and make design modifications. This means that the dimensions, weights, colors, etc. of the machines supplied can differ. The diverse application possibilities of our machines depend on the technical equipment specifically requested by our customers. The equipment specifically agreed with the customer is therefore exclusively definitive for the equipping of the machines, and not any general data, information or illustrations.

Control system

Fanuc 0*i*

Guaranteed working precision

Straightness of the generating line	
Gauge length 650 mm (25.6")	0.0025 mm (0.000.10")
Gauge length 1000 mm (39.4")	0.0030 mm (0.000.12")

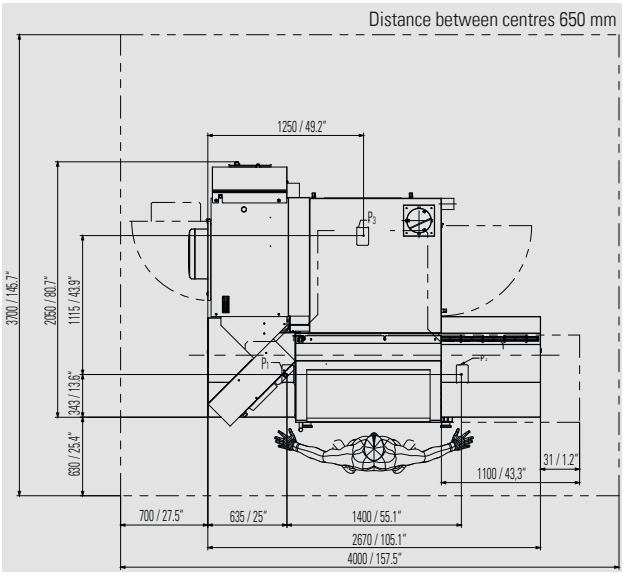
Connected loads

Total connected load	20 kVA
Air pressure	5.5 bar (80 psi)

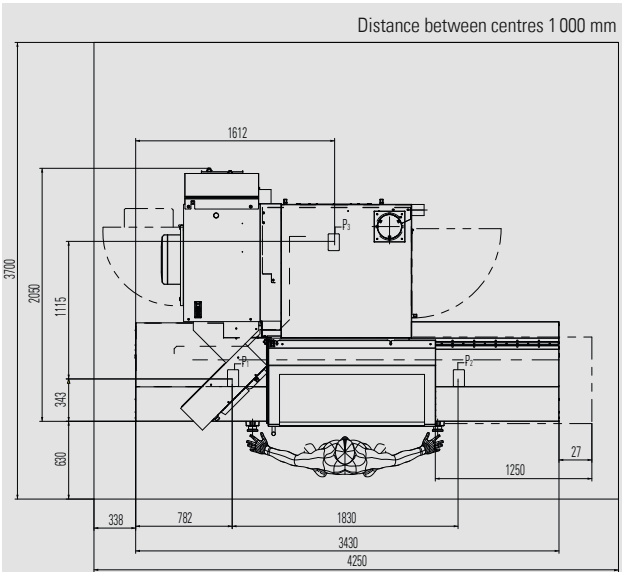
Total weight

Distance between centres 650 mm (25.6")	4 000 kg (8 800 lbs)
Distance between centres 1 000 mm (39.4")	5 000 kg (11 000 lbs)

Distance between centres 650 mm



Distance between centres 1 000 mm



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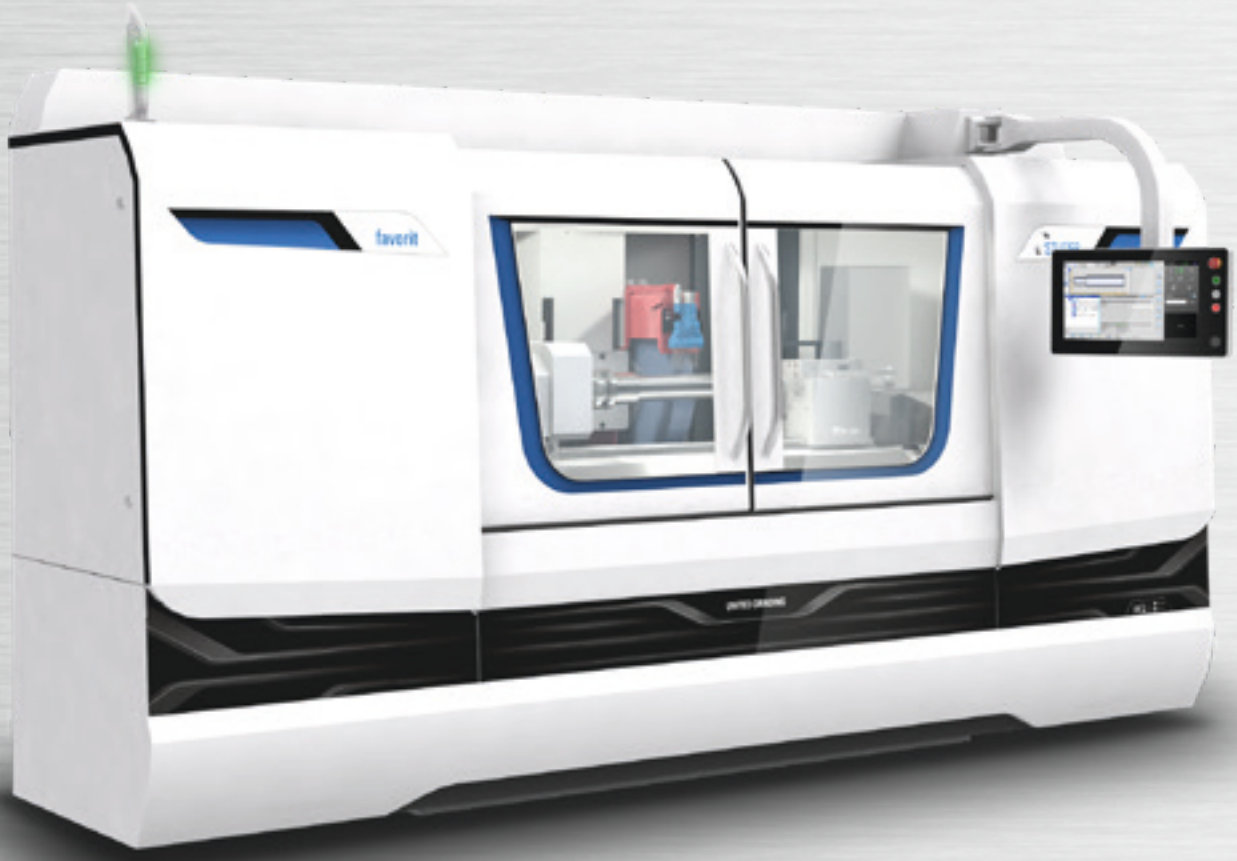
SWISS MADE

favorit

The price hit
for a large range of applications.



Key data

The favorit is a CNC universal cylindrical grinding machine for the individual and batch production of short to long-sized workpieces. It has distances between centres of 400 / 650 / 1000 / 1600 mm and a centre height of 175 mm. It can machine workpieces with a maximum weight of 150 kg.

STUDER

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Our product line includes both standard machines, as well as complex system solutions in high-precision cylindrical grinding for machining small and medium-sized workpieces. In addition we offer software, system integration and a wide range of services. As well as receiving a complete tailormade solution the customer also benefits from our 100 years of know-how in relation to the grinding process.

Our customers include companies from the machine tool industry, automotive engineering, tool and die makers, the aerospace industry, pneumatics/hydraulics, electronics/electrical engineering, medical technology, the watch industry and job order production. They value maximum precision, safety, productivity and longevity. 24000 manufactured and delivered systems make us the market leader and are clear evidence of our technological leadership in universal, external, internal and noncircular grinding. Around 800 employees, including 75 apprentices, make it their goal every day to ensure that "The Art of Grinding." will continue to be closely linked to the name STUDER in the future.

favorit

If you believe that the purchase of a STUDER machine exceeds your budget, then we recommend the favorit. The leader in terms of price and performance can be used in universal applications, and thanks to StuderPictogramming it is easy and quick to program. Your Granitan® S103 mineral-casting machine base largely offsets short-term temperature fluctuations.

Characteristics

Dimensions

- Distance between centres 400 / 650 / 1000 / 1600 mm (15.7"/25.6"/39.4"/63")
- Centre height 175 mm (6.9")
- Max. workpiece weight 150 kg (330 lbs)

Hardware

- Optional wheelhead:
  – Turret wheelhead with right or left grinding wheel and an internal grinding attachment. Automatic swiveling with 3° Hirth serration.
  – External wheelhead with grinding wheel on right, 0° / 15° / 30°
- External and internal grinding possible in one setup
- Granitan® S103 mineral-casting machine base
- CE-conform

Software

- Very simple programming thanks to StuderPictogramming
- StuderWINprogramming (optional) for creating grinding and dressing programs on an external PC

The CNC universal grinding machine for small budgets and high demands

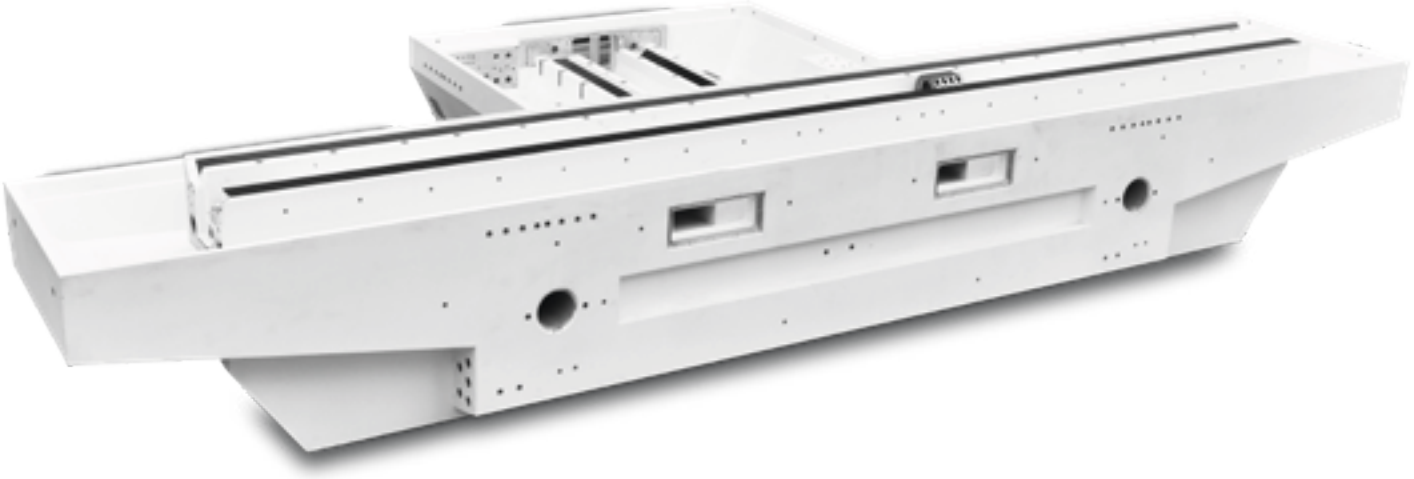
This CNC universal cylindrical grinding machine is designed for grinding short to long-sized workpieces in individual and series production. Thanks to various options such as in-process measuring system, balancing system, contact detection and longitudinal positioning, the machine can be adapted to other grinding tasks.

Made of Granitan® S103, the machine bed forms the basis for this cylindrical grinding machine which comes with top-quality components and can be relied on to work for years, while measuring up to the highest standards of precision, performance and safety. The full enclosure provides an optimum insight into the grinding process.

The practical Studer grinding software with its proven StuderPictogramming allows even less experienced users to quickly and practically program grinding and dressing cycles. The systematic development, production, assembly and testing of STUDER products are carried out in a process-oriented manner and in strict compliance with the VDA 6.4 and ISO 9001 directives.

Granitan® S103 mineral-casting machine base

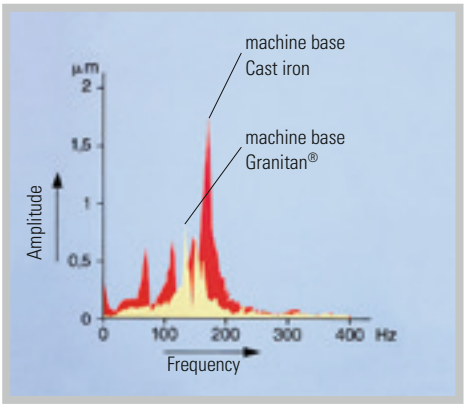
1



- Vibration-damping
- Thermally stable
- Non-wearing
- Coolant tank integrated into the machine base

The material structure developed by STUDER which has proved its superb efficiency over many years is produced in the company's own plant using the most modern industrial techniques. The excellent damping properties of the machine base ensure that an outstanding surface quality is achieved in the ground workpieces. The service life of the grinding wheel is also increased, leading to reduced downtimes. Temporary temperature fluctuations are extensively compensated by the favorable thermal behavior of Granitan®. This results in a high level of dimensional accuracy throughout the day. The V and flat guideways for the longitudinal and cross slides are molded directly into the machine base and finished with a wear-resistant Granitan® S200 surfacing material. The guideways offer the highest possible accuracy through the entire speed range with high load capacity and dampening levels. Thanks to the robust and maintenance-free design, these excellent guideway properties are hardly subject to deterioration.

2

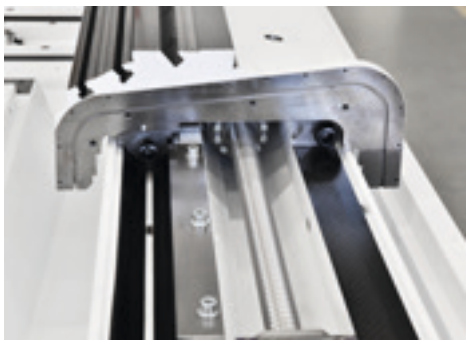


1 Machine base with X amd Z guideways
2 Vibration behavior of gray cast iron and Granitan® S103

Longitudinal and cross slides

1

2



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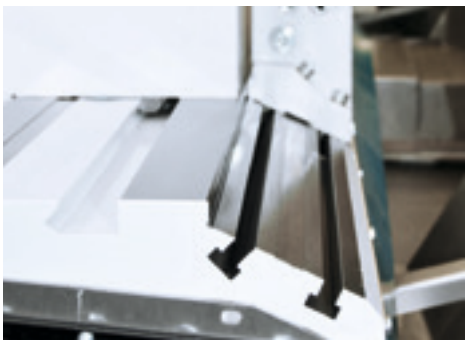


4

- High geometrical traverse precision
- Auxiliary scale for setup and resetting
- Effective covering of guideways

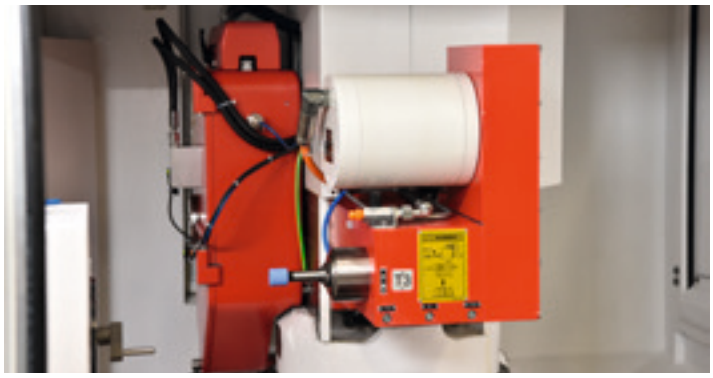
The longitudinal and cross slides are manufactured from high-quality gray cast iron and have highly precise, ground guideways. The slides rest completely on the guideways of the machine bed through the entire traversing range. This provides the cornerstone for the excellent straightness of 0.003 mm (0.000,12") over 1000 mm (39.4") measured length. The top of the longitudinal slide has a surface that is ground over its entire length and acts as a support for the workhead, the tailstock, as well as accessories and devices. A setup scale, recessed in the table, makes it easy to set up and reset the units on the table. An additional T-slot with a ground surface enables the optimal utilization of dressing devices. The slides are advanced by 40 mm (1.57") diameter circulating ball screws connected to a three-phase servomotor via torsion-resistant, bellow-type couplings.

1 Machine base with longitudinal and cross slides
2 Longitudinal axis with workpiece table
3 Double T-slot and clamping surface for mounting dressing tool holders etc.
4 Setup scale

Wheelhead

1

2



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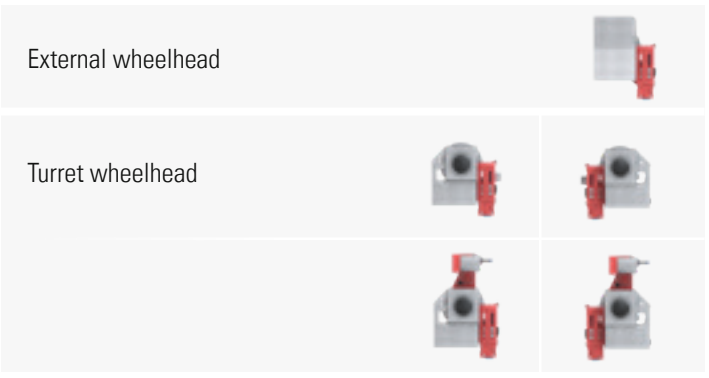


- Complete machining
- Cutting speed up to 50 m/s (9842 sfpm)
- Internal grinding spindle with infinitely variable speed adjustment

Two variants are available:

- Turret wheelhead with right or left grinding wheel and an internal grinding attachment. Automatic swiveling with 3 deg Hirth serration.
- External wheelhead with grinding wheel on right adjustable to 0/15/30 deg.

Grinding wheel size:
diameter 500 mm, width 63 (80 F5) mm, bore 203 mm (20×2.5" [3.15"F5]×8"). The driving power is 7.5 kW (10 hp). The cutting speed of a maximum 50 m/s (9840 sfpm) enables efficient surface removal rates in the grinding process.
The speed of the belt-driven internal grinding spindle is infinitely adjustable. Spindles with nominal rpms of 28 000, 42 000 and 60 000 are available.

1 Turret wheelhead
2 Internal grinding attachment
3 Wheelhead variants

Workhead

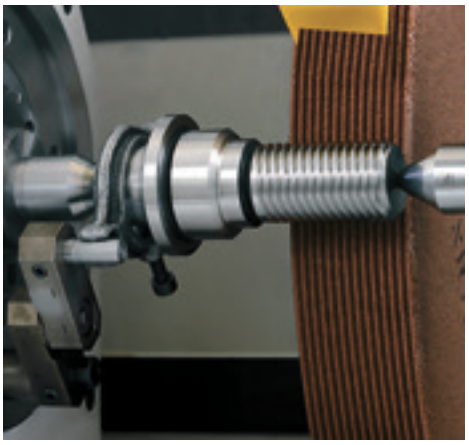
1

- Pneumatic lifting
- Low maintenance
- High roundness accuracy

The versatile universal workhead enables both live spindle grinding and grinding between centres.

The workhead is equipped with roller bearings, is low-maintenance and has an excellent roundness accuracy of under 0.0004 mm (0.000,016"), which can be optionally improved to under 0.0002 mm (0.000,008") during live spindle operations. The fine adjustment allows for taper corrections in the 1 µm range during live spindle operations. Like the tailstock, the workhead is also equipped with a pneumatic lifting device to facilitate movement during setup and resetting.

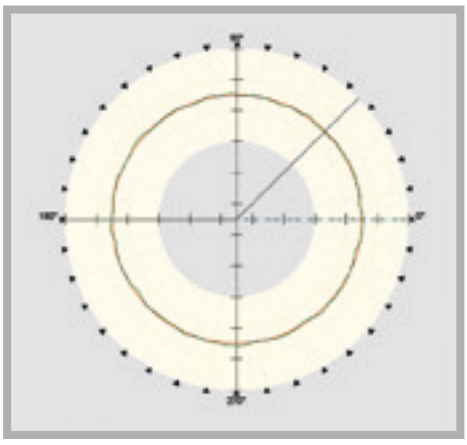
1



The optional C-axis enables thread and form grinding, increasing the machine's potential applications. A controlled power chucking cylinder which actuates power chuck and spring collets is available for automatic workpiece clamping.

3

4



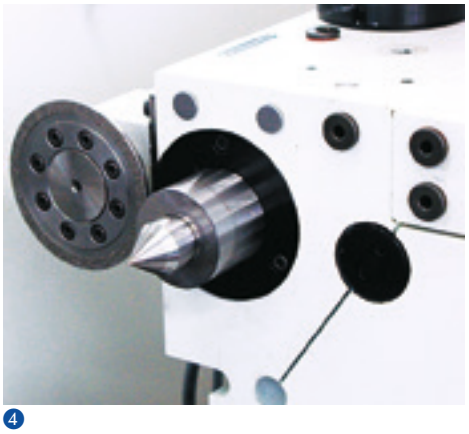
1 Universal workhead
2 External and internal thread grinding
3 Fine adjustment for taper corrections
4 Roundness during live spindle grinding operations

Tailstock

1

2

3



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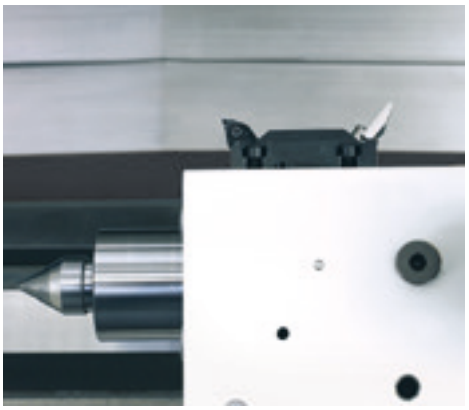


- Taper corrections
- Thermal stabilization by coolant floodingBarrel flooding

The generously dimensioned barrel, designed for the use of Morse 3 or 4 taper centres, glides in the tailstock housing.
The centre pressure can be adjusted with the delicate precision required for grinding high-precision workpieces. The tailstock can be equipped with a hydraulically actuated barrel retraction for workpiece change-over. The fine adjustment enables taper corrections in the range below 1 µm when grinding between centres.

In order to guarantee optimum thermal stability, the tailstock is flooded with cooling lubricant, as are the barrel and the diamond holder.

1 Tailstock
2 Fine adjustment for taper corrections
3 Dressing spindle for rotative dressing
4 Dressing tool holder behind tailstock

Control and programming

1

- Compact manual control unit
- EMC-tested control cabinet
- Ergonomically arranged controls

The favorit is equipped with a Fanuc 0*i*-TF. The clearly arranged and ergonomic layout of the control elements ensures efficient operation. The capacitive touchscreen (PCT) is resistant to scratches and dirt thanks to the glass plate that is fitted across the entire panel. It is even easy to operate if the user is wearing gloves. An important role is played by the manual control unit, which facilitates setup close to the grinding process. The control cabinet is located on the left rear of the machine. The layout of the elements complies with the relevant safety norms and is EMC-tested.

2

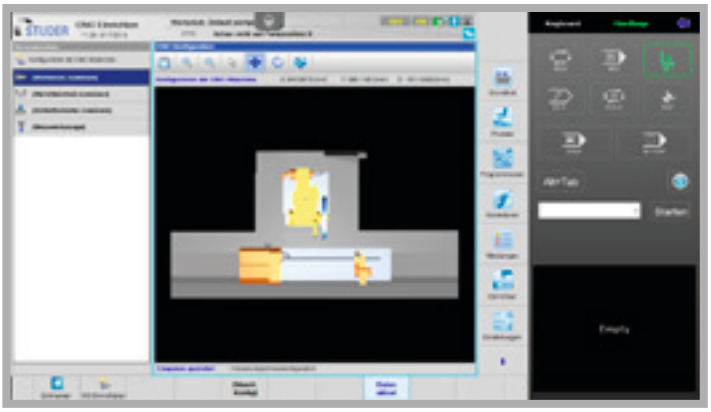
1 Machine control
2 Manual control unit

StuderWIN

1

2

3



- Latest software technology
- StuderPictogramming
- Integrated peripheral equipment

StuderWIN as the user interface and the integrated software modules create a stable programming environment and contribute to the efficiency of the machine. A PC is integrated into the CNC control. The possibility of fully integrating the in-process measuring system and sensor technology for process control as well as contact detection and automatic balancing systems in the Windows operator interface enables standardized programming of the different systems. The sophisticated mechanical engineering concept of the favorit is completed by a grinding software program developed in-house by Studer and which is continuously optimized in collaboration with users of the software.

This software offers:

- StuderPictogramming: The operator strings the individual grinding cycles together – the control unit generates the ISO code.
- STUDER Quick-Set: The software for grinding wheel alignment reduces changeover times by up to 90 %.

The diverse software options can extend the functional scope of the machine. Here are a few examples:

- Microfunctions: Free programming of grinding and dressing process sequences for optimization of the grinding process.
- The functionality of StuderWIN can be extended even more thanks to various enhancements in the form of integrated software modules.
- A valuable asset for the productivity of our customers' machines is StuderTechnology Integrated with the technology computer for automatic calculation of grinding parameters.

StuderWINprogramming, on the basis of StuderWIN, also continues to show its strengths in offline programming. The program is created on the PC and transferred directly to the machine control unit.

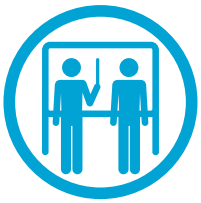
1 StuderWIN
2 Workpiece programming
3 Assisted Setup

Customer care

STUDER cylindrical grinding machines should fulfil the customer›s requirements for as long as possible, work costeffectively, function reliably and be available at all times. From «start up» through to «retrofit» – our Customer Care is there for you throughout the working life of your machine. 30 professional helplines and more than 60 service technicians are available in your area, wherever you are in the world.

- We will provide you with fast, uncomplicated support.
- We will help to increase your productivity.
- We work professionally, reliably and transparently.
- We will provide a professional solution to your problems.

Start up
Commissioning
Warranty extension

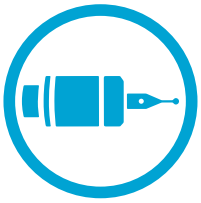


Qualification
Training
Product support

Prevention
Maintenance
Inspection

Service
Customer service
Customer consultation
HelpLine

Digital Solutions™
Remote service
Service monitor
Production monitor



Material
Spare parts
Replacement parts
Accessories

Rebuild
Machine overhaul
Assembly overhaul

Retrofit
Modifications
Retrofits

Technical Data

Main Dimensions

Distance between centres	400 / 650 / 1000 / 1600 mm (15.7"/25.6"/39.4"/63")
Centre height:	175 mm (6.9")
Max. workpiece weight between centres	150 kg (330 lbs)

Cross slide: X axis

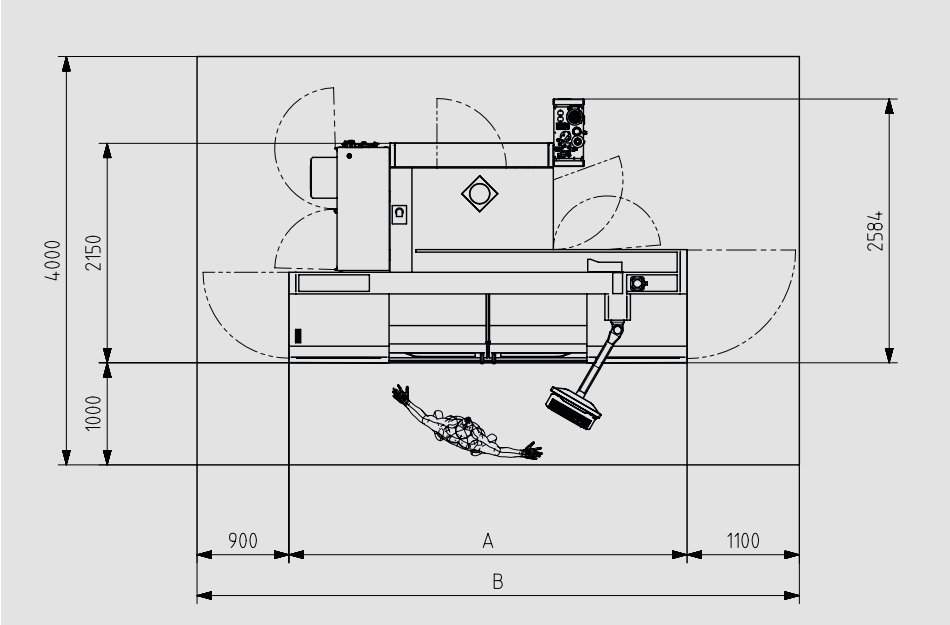
Max. travel	370 mm (14.6")
Speed	0,001 – 15 000 mm / min (0.000,04 – 394 ipm)
Resolution	0.00001 mm (0.000,000,4")

Longitudinal slide: Z axis

Max. travel	500 / 800 / 1150 / 1750 mm (19.7"/31.5"/45.3"/68.9")
Speed	0,001 – 20 000 mm / min (0.000,04 – 787 ipm)
Resolution	0.00001 mm (0.000,000,4")

Wheelhead

	Type: external	**Type: universal**
Positive stop	0/15/30 deg	
Swivel range		-30 to +210 deg
Automatic swivelling axis		3 deg Hirth
Fitting taper	dia. 73 mm (2.87")	dia. 73 mm (2.87")
Driving power:	7.5 kW (10 hp)	7.5 kW (10 hp)
Grinding wheel, Ø x width x bore	500 × 63 (80F5) × 203 mm (20" × 2.5" (3.15"F5) × 8")	500 × 63 (80 F5) × 203 mm (20" × 2.5" (3.15"F5) × 8")
Circumferential Speed	up to 50 m / s (9840 sfpm)	up to 50 m / s (9840 sfpm)
Internal grinding attachment for pulley spindles		dia. 80 mm (3.15")
Speeds		28, 000 / 42, 000 / 60, 000 rpm



	A	B
Distance between centres 400 mm (15.7")	2200 (86.6")	4500 (177")
Distance between centres 650 mm (25.6")	3200 (126")	5200 (205")
Distance between centres 1000 mm (39.4")	3900 (153.5")	5900 (232")
Distance between centres 1600 mm (63")	5100 (201")	7100 (280")

Universal workhead

Speed range	1 – 1000 rpm	1 – 1000 rpm	1 – 650 rpm	1 – 650 rpm
Fitting taper	MT4/Ø 70 mm (2.7")	MT5	MT5/Ø 110 mm (4.3")	ISO50/Ø 110 mm (4.3")
Spindle feedthrough	dia. 26 mm (1.02")	dia. 30 mm (1.18")	dia. 38 mm (1.5")	dia. 50 mm (1.97")
Driving power:	1.8 kW (2.4 hp)	2.5 kW (3.4 hp)	1,8 kW (2.4 hp)	2.5 kW (3.4 hp)
Load during live grinding	70 Nm (52 ft lbs)	70 Nm (52 ft lbs)	180 Nm (134 ft lbs)	180 Nm (134 ft lbs)
Roundness accuracy during live grinding	0.0004 mm (0.000,016") (Option: 0,0002mm / 0.000,008")	0.0004 mm (0.000,016") (Option: 0,0002mm / 0.000,008")	0,0004 mm (0.000,016") (Option: 0,0002 mm / 0.000,008")	0.0004 mm (0.000,016") (Option: 0,0002mm / 0.000,008")
Option				
C axis standard, indirect measuring system	0.0001 deg	0.0001 deg	0,0001deg	0.0001 deg

Tailstock

Fitting taper	MT3	MT4
Travel of barrel	35 mm (1.37")	60 mm (2.36")
Diameter of barrel	50 mm (1.97")	60 mm (2.36")
Fine adjustment for cylindricity corrections	±40 µm (0.0016")	±80 µm (0.0032")

Control unit

Fanuc 0*i*-TF

Guaranteed working precision

Straightness of the surface line	
Gauge length 400 mm (15.7")	0.0020 mm (0.000,08")
Gauge length 650 mm (25.6")	0.0025 mm (0.000,10")
Gauge length 1000 mm (39.4")	0.0030 mm (0.000,12")
Gauge length 1600 mm (63")	0.0040 mm (0.000,16")

Connected load

Total connected load	20 kVA
Air pressure	5.5-7 bar (80-102 psi)

Total weight

Distance between centres 400 mm (15.7")	8500 kg (18700 lbs)
Distance between centres 650 mm (25.6")	9500 kg (20900 lbs)
Distance between centres 1000 mm (39.4")	10500 kg (23100 lbs)
Distance between centres 1600mm (63")	12000 kg (26400 lbs)

The information given is based on the technical levels of our machine at the time of this brochure going to print. We reserve the right to further develop our machines technically and make design modifications. This means that the dimensions, weights, colours, etc. of the machines supplied can differ. The diverse application possibilities of our machines depend on the technical equipment specifically requested by our customers. The equipment specifically agreed with the customer is therefore exclusively definitive for the equipping of the machines, and not any general data, information or illustrations.

STUDER

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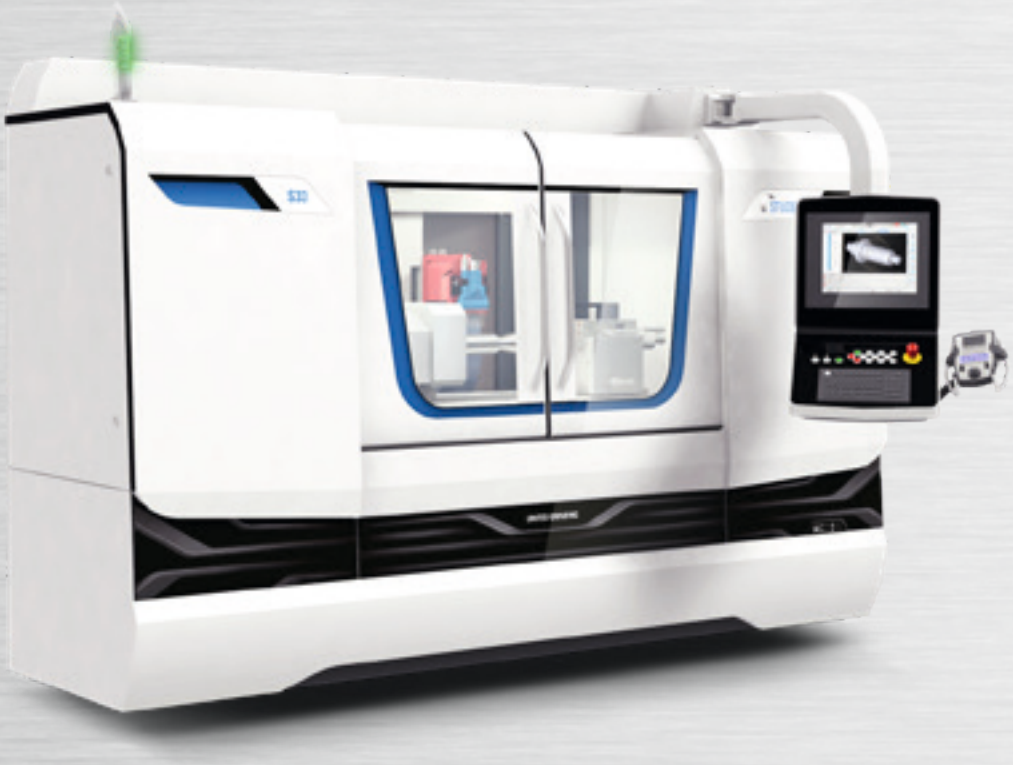
Partner of the Engineering Industry Sustainability Initiative

ISO 9001
VDA6.4
certified

SWISS MADE

S33

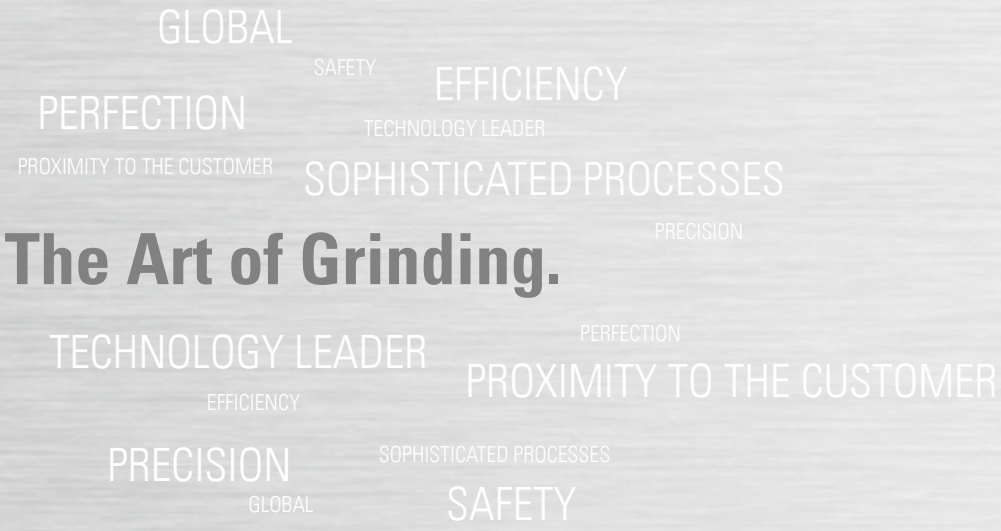
The reasonably priced
for individual requirements.



Key data

The S33 is a CNC universal cylindrical grinding machine for the individual, small-batch, and large-scale production of short to long-sized workpieces. It has distances between centers of 400 / 650 / 1000 / 1600 mm (15.7"/25.6"/39.4"/63") and a center height of 175 mm (6.9"). It can machine workpieces with a maximum weight of 150 kg (330 lbs).

STUDER



Fritz Studer AG

The name STUDER stands for more than 100 years of experience in the development and production of precision cylindrical grinding machines. "The Art of Grinding." is our passion, highest precision is our aim and top Swiss quality is our benchmark.

Our product line includes both standard machines, as well as complex system solutions in high-precision cylindrical grinding for machining small and medium-sized workpieces. In addition we offer software, system integration and a wide range of services. As well as receiving a complete tailormade solution the customer also benefits from our 100 years of know-how in relation to the grinding process.

Our customers include companies from the machine tool industry, automotive, tool and die makers, the aerospace industry, pneumatics/hydraulics, electronics/electrical engineering, medical technology, the watch industry and job shops. They value maximum precision, safety, productivity and longevity. 24 000 manufactured and delivered systems make us the market leader and are clear evidence of our technological leadership in universal, external, internal and noncircular grinding. Around 800 employees, including 75 apprentices, make it their goal every day to ensure that "The Art of Grinding." will continue to be closely linked to the name STUDER in the future.

S33

If you don’t know today what you’ll be grinding tomorrow, then the S33 will impress you with its universality and flexibility: it can be retooled from grinding between centers to live spindle grinding in record time. You can grind even complex workpieces in a single clamping; this is made possible by the new wheelhead with two motor spindles. You also benefit from a wide range of wheelhead variants.

Characteristics

Dimensions

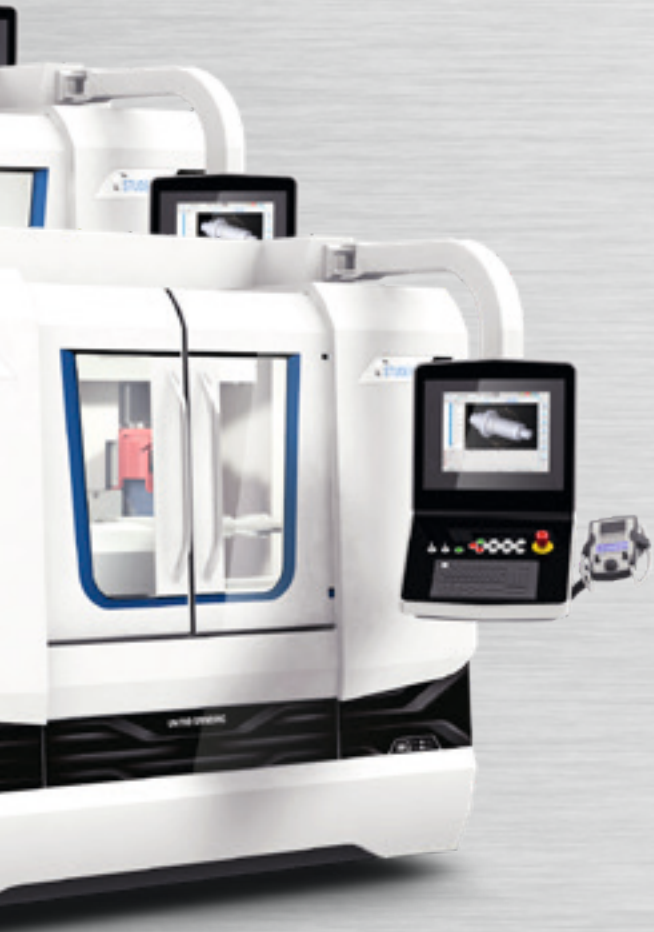
- Distance between centers 400 / 650 / 1000 / 1600 mm (15.7"/25.6"/39.4"/63")
- Centre height 175 mm (6.9")
- Max. workpiece weight 150 kg (330 lbs)

Hardware

- Optional wheelhead:
  - Turret wheelhead with up to 2 external grinding spindles and 1 internal grinding spindle. Automatic swiveling with 1 deg Hirth serration.
  - External wheelhead with grinding wheel right, 0 / 15 / 30 deg
- Turret wheelhead with frequency-controlled motor spindles for external and internal grinding
- C axis for the workhead, enabling form and thread grinding
- Tool table with integrated double T-slot for dressing devices
- Full enclosure with two sliding doors
- Granitan® S103 mineral-casting machine base

Software

- Very simple programming thanks to StuderPictogramming
- Reduced set-up and resetting times with STUDER Quick-Set
- Standardized interfaces for loader and peripheral devices
- Flexibly upgradeable with integrated software modules
- StuderWINprogramming software (optional) for creating grinding and dressing programs on an external PC



Customer value

- Turret wheelhead with frequency-controlled motor spindle
- Constant cutting speed is included in the standard package
- Two grinding wheels dia. 500 mm
- High-frequency internal grinding spindle

The CNC universal grinding machine for small budgets and high-demands.

From small to large workpieces. From single-part to series production. From distances between centers of 400 mm to 1600 mm (15.7" to 63"). The S33 is your flexible CNC universal cylindrical grinding machine.

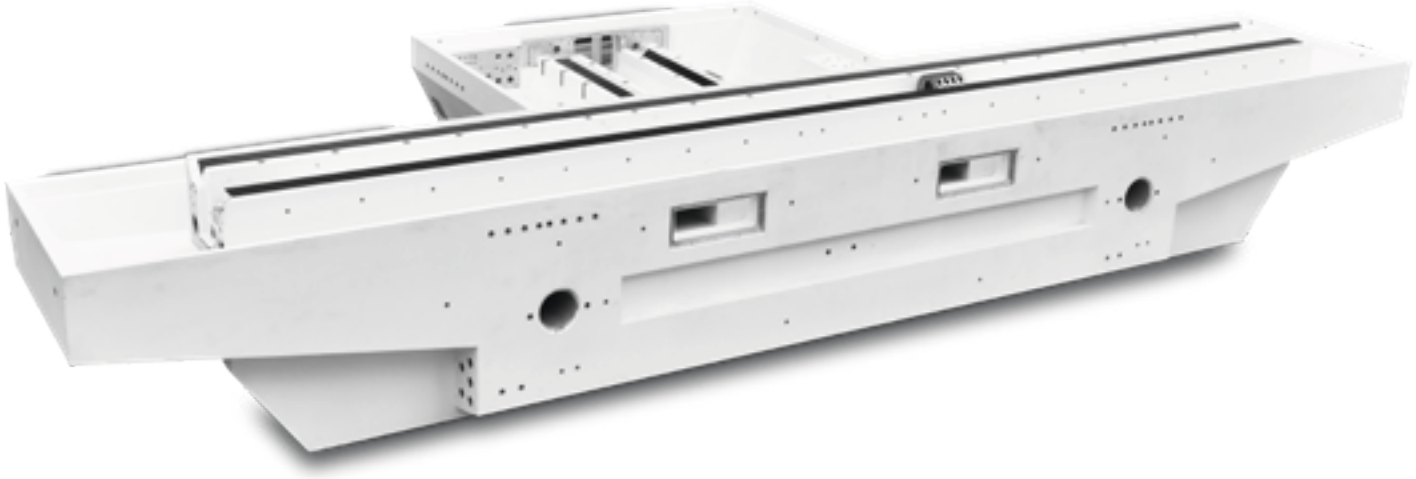
Its foundation is a machine base made of solid Granitan® S103. The high-quality STUDER sub-assemblies guarantee you the highest precision, performance, and safety over many years. The full enclosure with large sliding doors enables easy access to the machine.

The STUDER grinding software turns all users into pros. Practical Studer-Pictogramming quickly and ideally exploits the machine's full potential. Save time! With StuderWINprogramming, grinding and dressing programs can be created efficiently offline.

By the way: we are certified throughout the value chain. The systematic development, manufacture, assembly and testing of all STUDER products are process-oriented and comply with the strict guidelines of VDA 6.4 and ISO 9001.

Granitan® S103 mineral-casting machine base

1

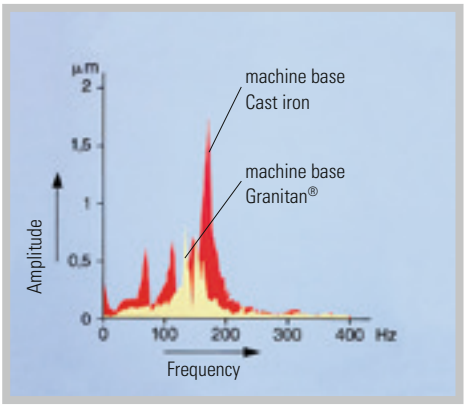


- Vibration-damping
- Wear-free
- Thermostable machine base thanks to an integrated cooling system
- Coolant tray integrated into the machine base

A good foundation is always the basis for success. That's why we use Granitan® S103 for our machine base. It's a mineral cast developed by STUDER that has proven itself over many years. What are the benefits of Granitan®? A high level of dimensional accuracy throughout the day. This is thanks to the excellent thermal properties of Granitan® and the flooding of the machine bed with coolant. Temporary temperature fluctuations are largely balanced out. The excellent damping properties of Granitan® ensure that an outstanding surface quality is achieved in the ground workpieces. Non-productive times also drop, as the grinding wheel's service life is increased.

The V and flat guideways for the longitudinal and cross slides are moulded directly into the machine base and are provided with a nonabrasive

2



Granitan® S200 slideway coating. The patented knobbed structure of the guideways largely eliminates the slip-stick effect or floating of the slides observed on conventional guideways. The guideways offer the highest possible accuracy through the entire speed range with high load capacity and dampening levels. Thanks to the robust and maintenance-free design, these excellent guideway characteristics are more or less completely retained.

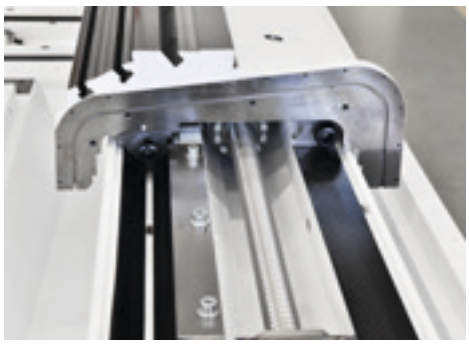
1 Machine base with X amd Z guideways

2 Vibration behavior comparison of gray cast iron and Granitan® S103

Longitudinal and cross slides

1

2



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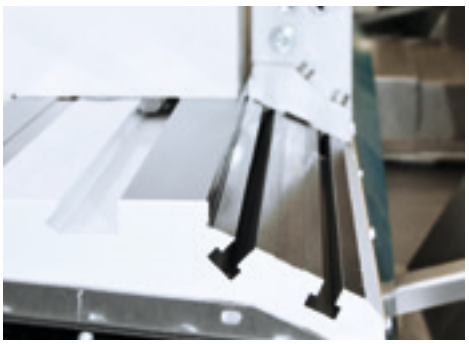


4

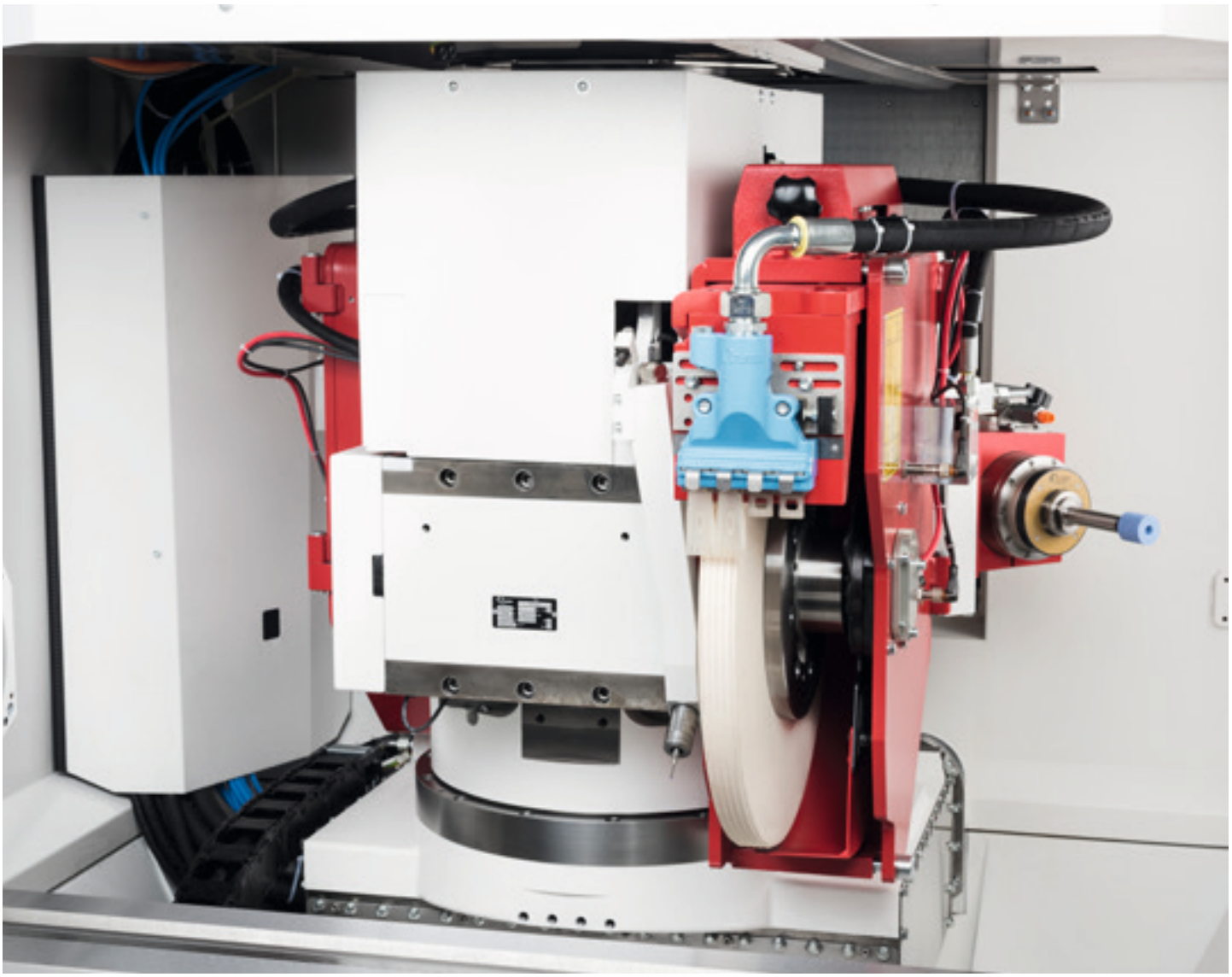
- High geometrical traverse precision
- Effective protection of guideways
- Auxiliary scale for setup and resetting

The longitudinal and cross slides are manufactured from high-quality gray cast iron and have highly precise, ground V and flat guideways. With the distance between the guideways optimally suited to the machine's overall rigidity. The slides rest completely on the guideways of the machine bed through the entire speed range. This provides the cornerstone for the excellent straightness of 0.003 mm (0.00012") over 1000 mm (40") measured length. The top of the longitudinal slide has a surface that is ground over its entire length and acts as a support for the workhead, the tailstock, as well as accessories and devices. A setup scale, recessed in the table, makes it easy to set up and reset the units on the table. An additional T-slot enables the optimal utilization of dressing units. The slides are advanced by circulating ball screws connected to a three-phase servomotor via torsion-resistant, bellow couplings.

1 Machine base with longitudinal and cross slides
2 Longitudinal axis with work table
3 Double T-slot and clamping surface for mounting dressing tool holders etc.
4 Setup scale

Wheelhead

1



- Complete machining
- High output
- Cutting speed up to 50 m/s (9842 sfpm)

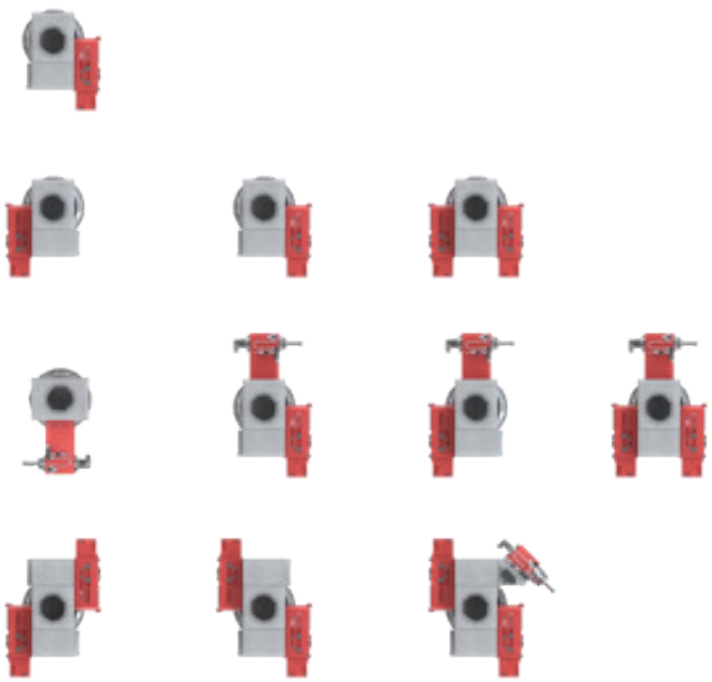
Two variants are available:

- Turret wheelhead with up to 2 external grinding spindles and 1 internal grinding spindle. Automatic swiveling with 1deg Hirth serration.
- External wheelhead with grinding wheel right, adjustable to 0 / 15 / 30 deg

Reduce set-up and resetting costs? You can do with this machine, especially in single-part or small-batch production. This is made possible by the turret wheelhead with several grinding wheels and Quick-Set for rapid set-up.
Boost efficiency with complete machining in a single clamping. The S33 handles internal, external, and face grinding with ease.

1 Turret wheelhead right/internal/right

2



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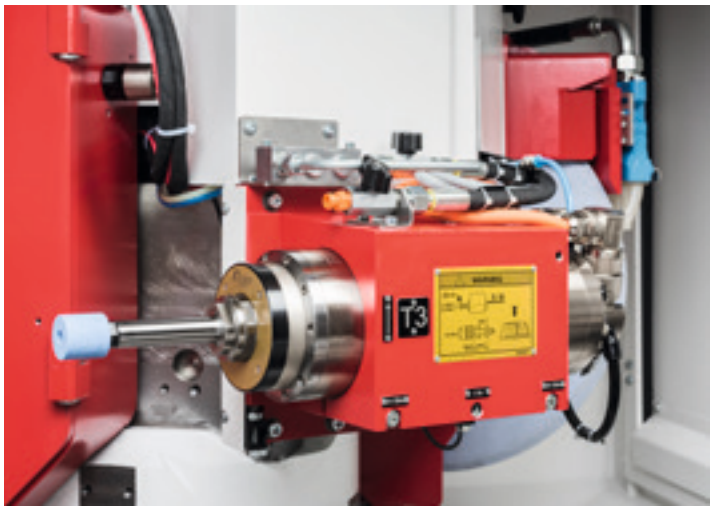


The swiveling wheelhead is equipped with water-cooled, roller-based, and maintenance-free motor spindles with stepless speed control and the latest generation of contact sensors. The shaft ends hold external wheelheads with a diameter of 500 mm (20") and a width of 63 (80 F5) mm (2.48" (3.15" F5)). For internal grinding, use powerful high-frequency spindles with 120 mm (4.72") external diameter. It's your choice: configure the wheelhead to match your specific needs.

2 Select wheelhead variants
3 Internal grinding attachment

Workhead

❶

- High roundness accuracy
- Low maintenance
- Air cushion

The versatile universal workhead enables both live spindle grinding and grinding between centres. The workhead is equipped with roller bearings, is low-maintenance and has an excellent roundness accuracy of under 0.0004 mm (0.000,016"), which can be optionally improved to under 0.0002 mm (0.000,008") during live spindle operations. The fine adjustment allows for taper corrections in the 1 µm (0.000,040") range during live spindle operations. Like the tailstock, the workhead is also equipped with a pneumatic lifting device to facilitate movement during setup and resetting.
The S33 can also be equipped with a chuck workhead specially designed for grinding chuck parts.

C axis for form and thread grinding
Grinding of shapes and threads is made possible by the position- and speed-controlled C axis. The C axis with an indirect measuring system on the drive motor is suitable for thread grinding and simple form grinding. For maximum form accuracy, a direct measuring system is mounted on the workhead spindle (high accuracy C-axis). With their high dynamic rigidity, the axis drives absorb the acceleration and grinding forces without any problem.

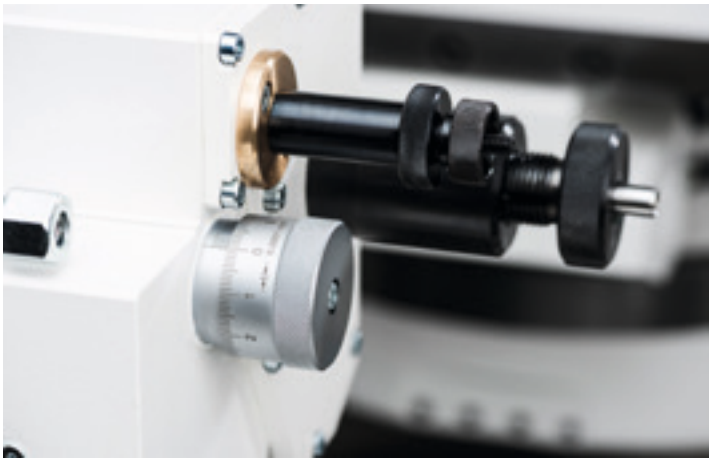
❶ Universal workhead

Tailstock

1

- Taper corrections
- Thermal stabilization by coolant flooding

2



The generously dimensioned barrel, designed for the use of Morse 3 or 4 taper centers, glides in the tailstock housing. The tailstock can be equipped with a hydraulically actuated barrel retraction for workpiece changeover. The center pressure can be easily fine-adjusted. The taper fine-adjustment allows corrections in the range below 1 µm (0.000,040") when grinding between centers. A high-precision result is guaranteed! An air cushion lift-off further facilitates simple movement during set-up and resetting.

In order to guarantee optimum thermal stability, the tailstock housing, barrel and the diamond holder are flooded with cooling lubricant. This guarantees ideal thermal stability. Clamping takes place with the help of a spring. This tailstock is suitable for workpiece weights up to 150 kg (330 lbs).

Synchronous tailstock
Use of the synchronous tailstock is particularly cost-effective when manufacturing part families, when grinding a workpiece over its entire length or if the use of a conventional driver is not possible.

Extra-fine grinding tailstock
Is the series production of hydraulic components your specialty? Then you will benefit from the extra-fine grinding tailstock with automatic cylindricity correction.

1 Tailstock
2 Fine adjustment for cylindricity corrections

Control and programming

1

- PCU manual control unit
- EMC-tested control cabinet
- Ergonomically arranged controls

The S33 is equipped with a Fanuc 0*i*-TF. The controls are clearly and ergonomically arranged, making operation easy and efficient.
The portable control unit (PCU) facilitates set-up close to the grinding process. A special function - the electronic contact detection - makes it possible to keep non-productive times to a minimum.

The control cabinet is thermally separated and located on the left rear of the machine. The layout of the elements complies with the relevant safety norms and is EMC-tested.

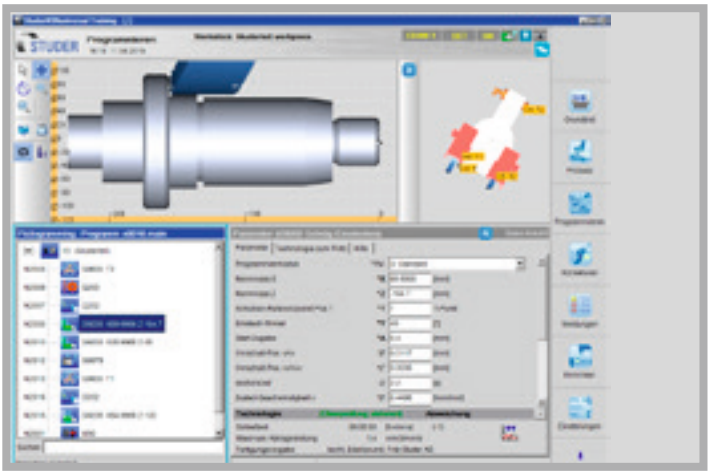
2

1 Machine control
2 Manual control unit

StuderWIN

1

2



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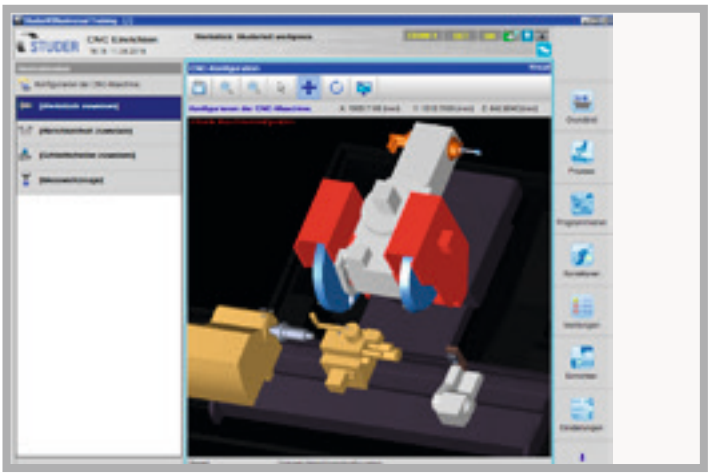


- Latest software technology
- StuderPictogramming
- Integrated peripheral equipment

Together with our users, STUDER has probably the greatest grinding expertise available anywhere in the world. We put all of our knowledge into our software solutions. Experience huge productivity gains with StuderTechnology. With just a few inputs, the technology computer automatically calculates the exact grinding parameters in just a few seconds. You will be amazed how precise you can grind with massively faster feed rates!

The StuderWIN user interface and the integrated software modules enable stable programming and efficient use of the machine. Standardized programming of the various systems enables the possibility of fully integrating the in-process measuring system and sensor technology for process monitoring.

More benefits with StuderWIN: import your workpiece drawing to visualize the grinding cycles. Or simply create your specific grinding wheel shapes on the basis of a workpiece imprint.

Expand the functionality of your machine with these optional integrated tools:

- StuderForm for form grinding and StuderThread for thread grinding, StuderContourBasic for contour grinding.
- Microfunctions: free programming of grinding and dressing process sequences for optimization of the grinding process.
- The functionality of StuderWIN can be extended even more thanks to various enhancements in the form of integrated software modules.

Do you prefer to program offline? Create your program on a PC using StuderWINprogramming, based on StuderWIN, and transfer it directly to the machine control unit.

1 StuderWIN
2 Workpiece programming
3 Assisted Setup

Process-optimized complete solutions guarantee greater efficiency and reliability throughout.

1

- Automatic production processes
- Integrated quality control
- Standard loader – interfaces

Several loading systems are available for the S33. You can choose between a standard or customized solution, which thanks to its modularity can be modified to match the exact usage of the machine and the machining processes. Seamlessly integrate your desired peripherals into the production process. The automation systems communicate with the machine via the standardized loader interface. This allows even complex handling tasks to be carried out. Comprehensive quality control is possible during the grinding process. This entails: in-process, post-process, recording, evaluation and correction. This type of quality assurance is crucial during grinding, and especially during match grinding.

2

3

1 STUDER *"easyLoad"*
2 Working space with workpiece handling
3 Post-process station

Customer care

STUDER cylindrical grinding machines should fulfil the customer›s requirements for as long as possible, work efficiently, function reliably and be available at all times. From «start up» through to «retrofit» – our Customer Care is there for you throughout the working life of your machine. 30 professional helplines and more than 60 service technicians are available in your area, wherever you are in the world.

- We will provide you with fast, uncomplicated support.
- We will help to increase your productivity.
- We work professionally, reliably and transparently.
- We will provide a professional solution to your problems.

Start up
Commissioning
Warranty extension

Qualification
Training
Product support

Prevention
Maintenance
Inspection

Service
Customer service
Customer consultation
HelpLine

Digital Solutions™
Remote service
Service monitor
Production monitor

Material
Spare parts
Replacement parts
Accessories

Rebuild
Machine overhaul
Assembly overhaul

Retrofit
Modifications
Retrofits

Technical specifications

Main Dimensions

Distance between centres	400 / 650 / 1000 / 1600 mm (15.7"/25.6"/39.4"/63")
Centre height:	175 mm (6.9")
Max. workpiece weight between centres	150 kg (330 lbs)

Cross slide: X axis

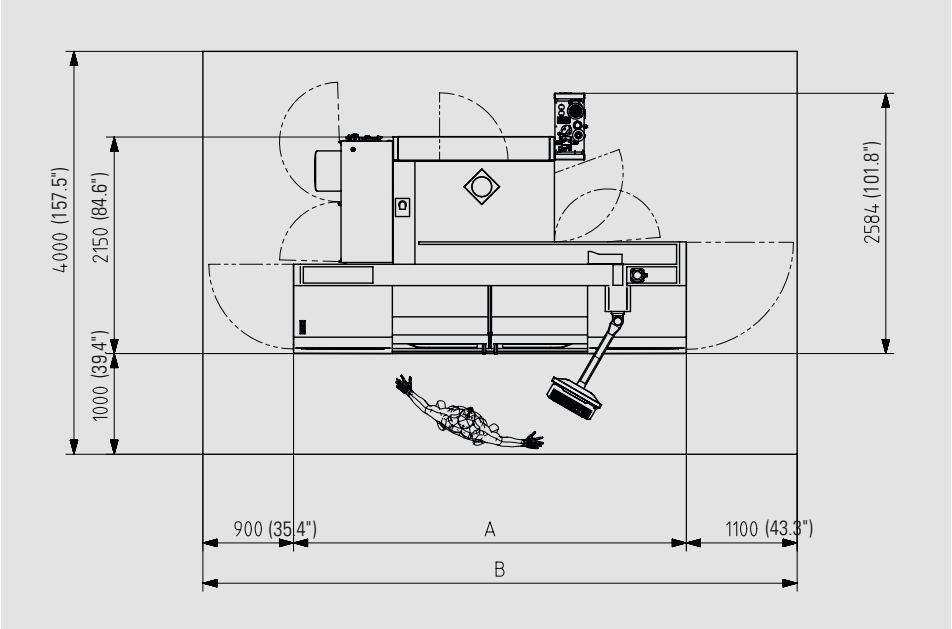
Max. travel	370 mm (14.6")
Speed	0,001 – 15 000 mm / min (0.000,04 – 590 ipm)
Resolution	0,00001 mm (0.000,000,4")

Longitudinal slide: Z axis

Max. travel	500 / 800 / 1150 / 1750 mm (19.7"/31.5"/45.3"/68.9")
Speed	0,001 – 20 000 mm / min (0.000,04 – 787 ipm)
Resolution	0,00001 mm (0.000,000,4")

Wheelhead

	Type: external	**Type: universal**
Swiveling range	0 / 15 / 30 deg	-30 to +210 deg
Resolution		1 deg Hirth
Fitting taper	dia. 73 mm (2.87")	dia. 73 mm (2.87")
Drive power	7,5 kW (10 hp)	7,5 kW (10 hp)
Grinding wheel, Ø×width×bore	500×63 (80F5)×203 mm (20"×2.5" (3.15"F5)×8")	500×63 (80F5)×203 mm (20"×2.5" (3.15"F5)×8")
Circumferential speed	up to 50 m / s (9840 sfpm)	up to 50 m / s (9840 sfpm)
Internal grinding attachment for high frequency spindles		
Spindle dia.		dia. 120 mm (4.73")
Speeds		24 000 – 120 000 rpm



	A	B
Distance between centers 400 (15.7")	2200 (86.6")	4500 (177")
Distance between centers 650 (25.6")	3200 (126")	5200 (205")
Distance between centers 1000 (39.4")	3900 (153.5")	5900 (232")
Distance between centers 1600 (63")	5100 (201")	7100 (280")

Universal workhead

Speed range	1 – 1500 rpm	1 – 1500 rpm	
Fitting taper	MT4 / dia. 70 mm (2.7")	MT5	
Spindle feedthrough	dia. 26 mm (1.02")	dia. 30 mm (1.18")	
Driving power:	3 kW (4 hp)	3 kW (4 hp)	
Load during live grinding	70 Nm (52 ft lbs)	70 Nm (52 ft lbs)	
Roundness accuracy during live grinding	0,0004 mm (0.000,016") (Option: 0,0002mm / 0.000,008")	0,0004 mm (0.000,016") (Option: 0,0002mm / 0.000,008")	

Speed range	1-1000 rpm	1-1000 rpm	
Fitting taper	MT5 / dia. 110 mm (4.3")	ISO50 / dia. 110 mm (4.3")	
Spindle feedthrough	dia. 38 mm (1.5")	dia. 50 mm (1.97")	
Driving power:	4 kW (5.4 hp)	4 kW (5.4 hp)	
Load during live grinding	180 Nm (134 ft lbs)	180 Nm (134 ft lbs)	
Roundness accuracy during live grinding	0,0004 mm (0.000,016") (Option: 0,0002mm / 0.000,008")	0,0004 mm (0.000,016") (Option: 0,0002mm / 0.000,008")	

Option

C axis standard, indirect measuring system	0,0001 deg	0,0001 deg	0,0001 deg

Chuck workhead

Speed range	1–1500 rpm	1–1000 rpm	1–1000 rpm
Fitting taper	MT4 / dia. 70 mm (2.7")	MT5 / dia. 110 mm (4.3")	ISO50 / dia. 110 mm (4.3")
Spindle feedthrough	dia. 26 mm (1.02")	dia. 38 mm (1.5")	dia. 50 mm (1.97")
Driving power:	3 kW (4 hp)	4 kW (5.4 hp)	4 kW (5.4 hp)
Load during live grinding	100 Nm (74 ft lbs)	250 Nm (186 ft lbs)	250 Nm (186 ft lbs)
Roundness during live spindle grinding	0,0004 mm (0.000,016") (Option: 0,0002mm / 0.000,008")	0,0004 mm (0.000,016") (Option: 0,0002mm / 0.000,008")	0,0004 mm (0.000,016") (Option: 0,0002mm / 0.000,008")

Option

C axis standard, indirect measuring system	0,0001 deg	0,0001 deg	0,0001 deg
C axis high-precision, direct measuring system	0,0001 deg	0,0001 deg	0,0001 deg

Tailstock

Fitting taper	MT3	MT4
Travel of barrel	35 mm (1.37")	60 mm (2.36")
Diameter of barrel	50 mm (1.97")	60 mm (2.36")
Fine adjustment for cylindricity corrections	±40 µm (0.0016")	±80 µm (0.0032")

Synchronous tailstock

Fitting taper	MT4
Travel of barrel	90 mm (3.54")
spindle nose	dia. 70 mm (2.75")
Workpiece weight between centres	50 kg (110 lbs)
Fine adjustment for cylindricity corrections	±80 µm (0.0032")

Extra-fine grinding tailstock

Fitting taper	MT3
Barrel stroke	35 mm (1.37")
Diameter of barrel	50 mm (1.97")
Automatic fine adjustment for cylindricity corrections	±40 µm (0.0016")

Control unit

Fanuc 0*i* –TF

Guaranteed working precision

Surface straightness	
Measuring length 400 mm	0,0020 mm (0.000,08")
Measuring length 650 mm (25.6")	0,0025 mm (0.000,10")
Measuring length 1 000 mm (39.4")	0,0030 mm (0.000,12")
Measuring length 1600 mm	0,0040 mm (0.000,16")

Connected load

Total connected load	20 kVA
Air pressure	5,5-7 bar (80-102 psi)

Total weight

Center distance 400mm	8500 kg (18 700 lbs)
Distance between centres 650 mm (25.6")	9500 kg (20 900 lbs)
Distance between centres 1 000 mm (39.4")	10 500 kg (23 150 lbs)
Center distance 1600mm	12 000 kg (26 500 lbs)

The information given is based on the technical levels of our machine at the time of this brochure going to print. We reserve the right to further develop our machines technically and make design modifications. This means that the dimensions, weights, colours, etc. of the machines supplied can differ. The diverse application possibilities of our machines depend on the technical equipment specifically requested by our customers. The equipment specifically agreed with the customer is therefore exclusively definitive for the equipping of the machines, and not any general data, information or illustrations.

STUDER

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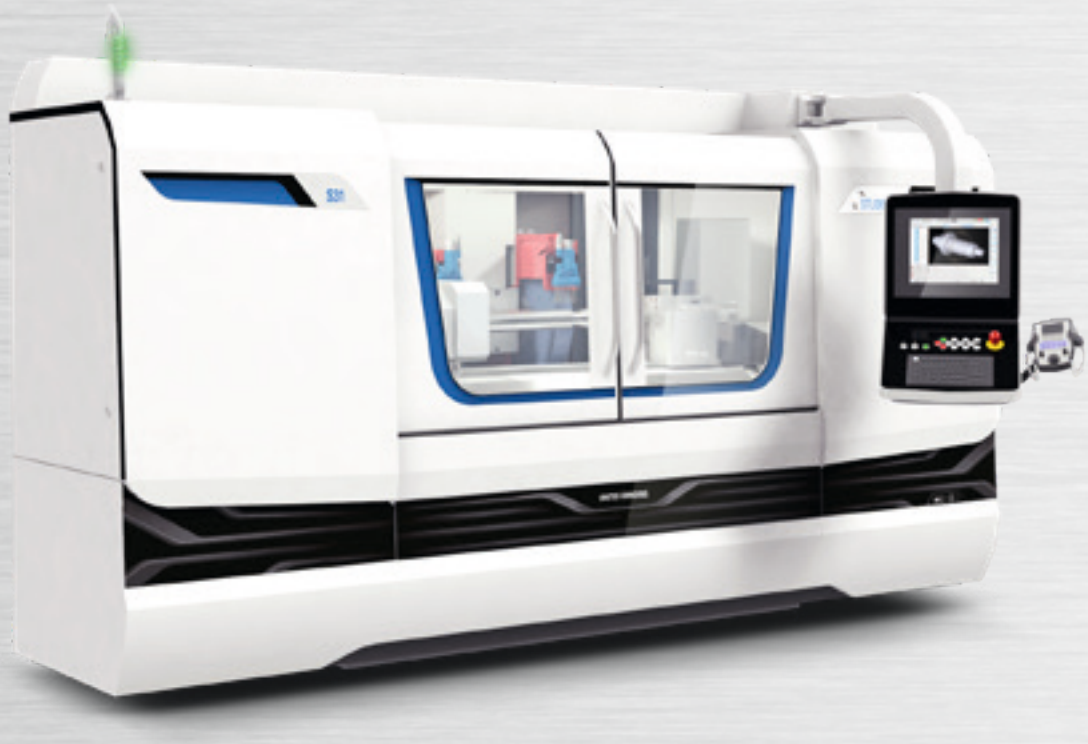
Partner of the Engineering Industry Sustainability Initiative

ISO 9001
VDA6.4
certified

SWISS MADE

S31

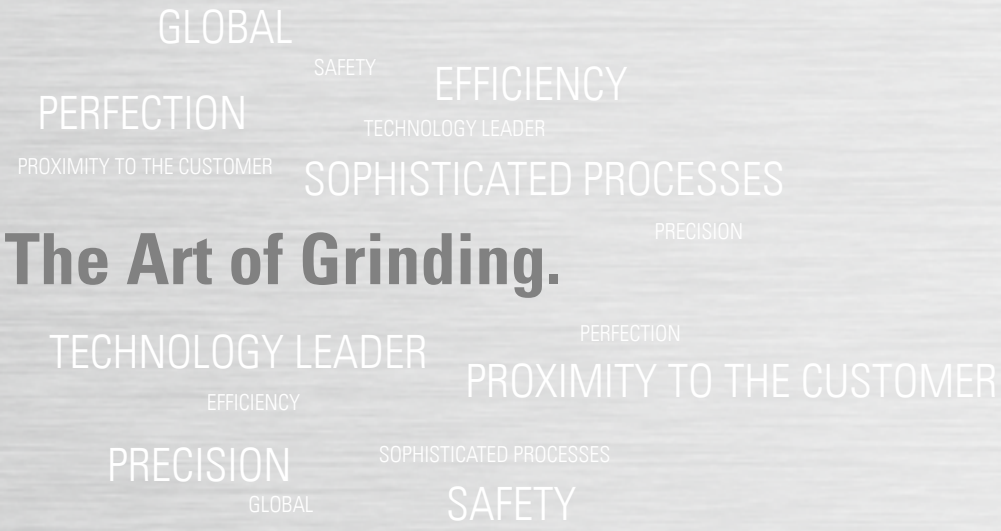
The versatile
for big tasks.



Key data

The S31 is a cylindrical grinding machine for the individual, small-batch, and large-scale production of short to long-sized workpieces. It has distances between centers of 400 / 650 / 1000 / 1600 mm (15.7"/25.6"/39.4"/63") and a center height of 175 mm (6.9"). It can machine workpieces with a maximum weight of 150 kg (330 lbs).

STUDER



Fritz Studer AG

The name STUDER stands for more than 100 years of experience in the development and production of precision cylindrical grinding machines. "The Art of Grinding." is our passion, highest precision is our aim and top Swiss quality is our benchmark.

Our product line includes both standard machines, as well as complex system solutions in high-precision cylindrical grinding for machining small and medium-sized workpieces. In addition we offer software, system integration and a wide range of services. As well as receiving a complete tailor-made solution the customer also benefits from our 100 years of know-how in relation to the grinding process.

Our customers include companies from the machine tool industry, automotive, tool and die makers, the aerospace industry, pneumatics/hydraulics, electronics/electrical engineering, medical technology, the watch industry and job shops. They value maximum precision, safety, productivity and longevity. 24 000 manufactured and delivered systems make us the market leader and are clear evidence of our technological leadership in universal, external, internal and noncircular grinding. Around 800 employees, including 75 apprentices, make it their goal every day to ensure that "The Art of Grinding." will continue to be closely linked to the name STUDER in the future.

S31

Is your grinding work complex and diverse? Then we recommend the S31. It can be used to produce small to large workpieces. With a high-resolution B axis of 0.00005°, the swiveling wheelhead makes external, internal, and face grinding of workpieces possible in a single clamping. Experience the revolutionary StuderGuide® guide system with its damping component in the direction of movement.

Characteristics

Dimensions

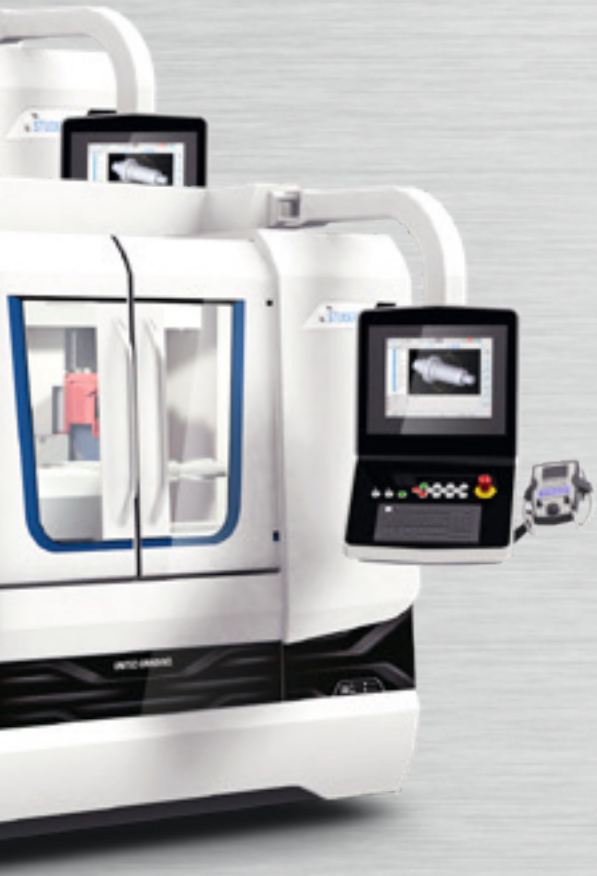
- Distance between centers 400 / 650 / 1000 / 1600 mm (15.7"/25.6"/39.4"/63")
- Centre height 175 mm (6.9")
- Grinding wheel diameter 500 mm (20")

Hardware

- Turret wheelhead with either:
  – Stepless B axis
  – B axis with 1deg Hirth serration
- Frequency-controlled motor spindle for external and internal grinding.
- C axis for the workhead, enabling form and thread grinding
- Tool table with integrated double T-slot for dressing devices
- Full enclosure with two sliding doors
- Granitan® S103 mineral-casting machine base

Software

- Very simple programming thanks to StuderPictogramming
- Reduced set-up and resetting times with STUDER Quick-Set
- High-Speed-Machining (HSM) for efficient and high-precision form grinding
- Standardized interfaces for loader and peripheral devices
- Flexibly upgradeable with integrated software modules
- StuderWINprogramming software (optional) for creating grinding and dressing programs on an external PC



Compact CNC universal cylindrical grinding machine for external and internal grinding of small to large workpieces in a single clamping.
From small to large workpieces. From single-part to volume production. The S31 is a universal cylindrical grinding machine that can easily handle complex jobs. How would you like your machine? Thanks to the upgradeable modular system, the S31 can be adapted to match all your requirements.

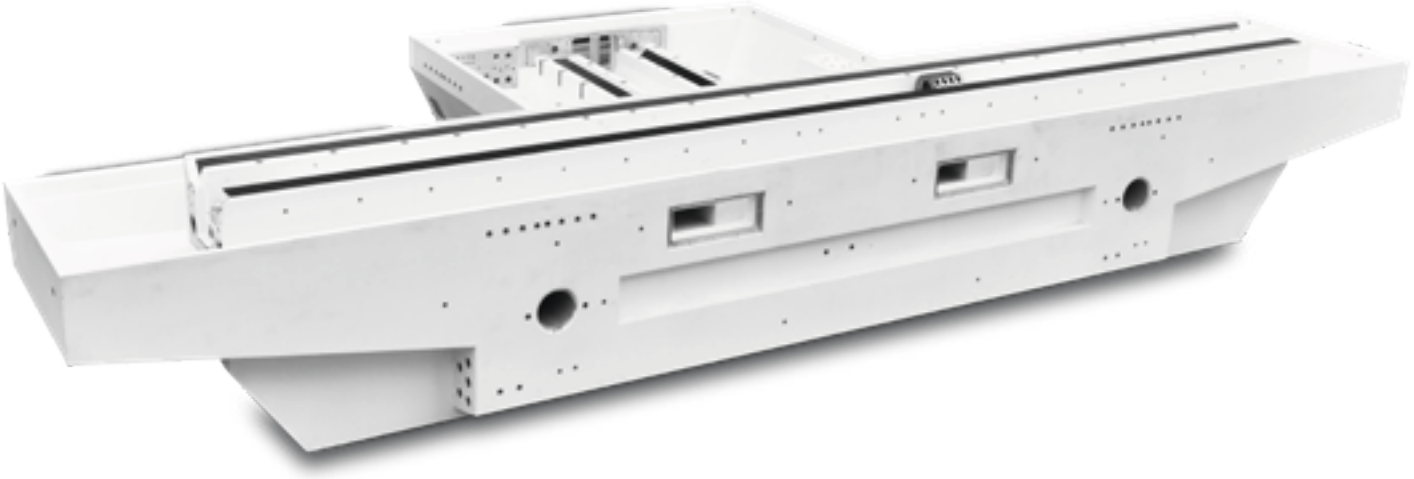
Its foundation is a machine base made of solid Granitan® S103. The full enclosure enables the use of emulsion or oil as a cooling lubricant. The two large sliding doors give an easy and ergonomical access to the inside of the machine. We assure you: wlth its high-quality STUDER subassemblies, the cylindrical grinding machine guarantees you maximum precision, performance and safety. Everything is configured for automated production around the clock – handling units can be easily connected via the defined loader interface.

The STUDER grinding software makes a pro out of any user. The practical StuderWIN quickly and ideally exploits the machine's full potential. StuderFormHSM enables efficient and fast form grinding. Save time! StuderWINprogramming can be used to efficiently create grinding and dressing programs offline.

By the way: we are certified throughout the value chain. The systematic development, manufacture, assembly and testing of all STUDER products are process-oriented and comply with the strict guidelines of VDA 6.4 and ISO 9001.

Granitan® S103 mineral-casting machine base

1

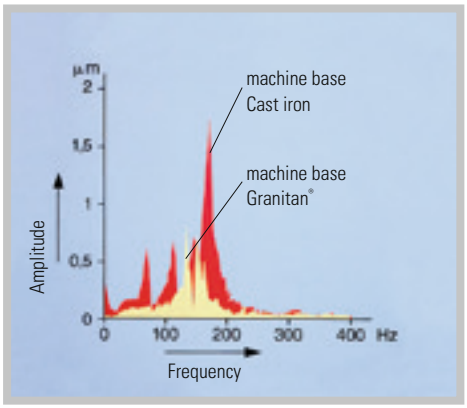


- Vibration-damping
- Thermostable machine base thanks to the use of an integrated cooling system
- Wear-free

A good foundation is always the basis for success. That's why we use Granitan® S103 for our machine base. It's a mineral cast developed by STUDER that has proven itself over many years. What are the benefits of Granitan®? A high level of dimensional accuracy throughout the day. This is thanks to the excellent thermal properties of Granitan® and the flooding of the machine bed with coolant. Temporary temperature fluctuations are largely balanced out. This also ensures you get outstanding surface quality in your ground workpieces – thanks to the excellent damping properties of the machine base. Non-productive times also drop, as the grinding wheel's service life is increased.

We have made the machine base even better, directly molding the StuderGuide® guide system for the longitudinal and cross slides into the machine base and finishing it with a wear-resistant Granitan® S200 surfacing material. The guideways offer the highest possible accuracy through the entire speed range with high load capacity and dampening levels. Thanks to the robust and maintenance-free design, these excellent guideway properties are hardly subject to deterioration.

2



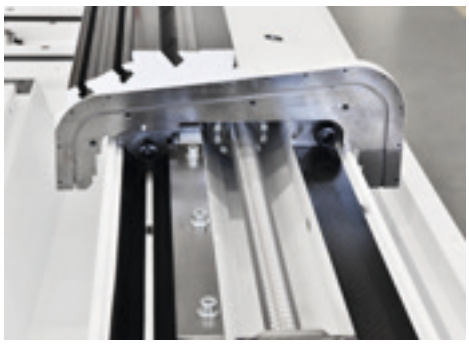
1 Machine base with longitudinal and cross guideways

2 Vibration behavior comparison of gray cast iron and Granitan® S103

StuderGuide® in longitudinal and cross slides

1

2



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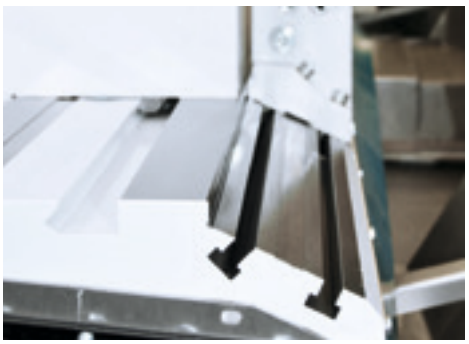


4

- High geometrical traverse precision
- Effective protection of guideways
- Auxiliary scale for set-up and resetting

The longitudinal and cross slides are manufactured from high-quality gray cast iron and have highly precise, ground V and flat guideways. With the distance between the guideways optimally suited to the machine's overall rigidity. The slides rest completely on the guideways of the machine bed through the entire speed range. This provides the cornerstone for the excellent straightness of 0.003 mm (0.000,12") over 1000 mm (40") measured length. The top of the longitudinal slide has a surface that is ground over its entire length and acts as a support for the workhead, the tailstock, as well as accessories and devices. A setup scale, recessed in the table, makes it easy to set up and reset the units on the table. An additional double T-slot enables the optimal utilization of dressing units.

The StuderGuide® guide system extends the advantages of hydrostatic systems and guideways with patented surface structure. A huge advantage of StuderGuide® over hydrostatic guideways is the damping component in the movement direction.

The slides are advanced by circulating ball screws connected to a three-phase servomotor via torsion-resistant, below couplings.

1 Machine base with longitudinal and cross slides
2 Longitudinal axis with work table
3 Double T-slot and clamping surface for mounting dressing tool holders etc.
4 Setup scale

Wheelhead

1

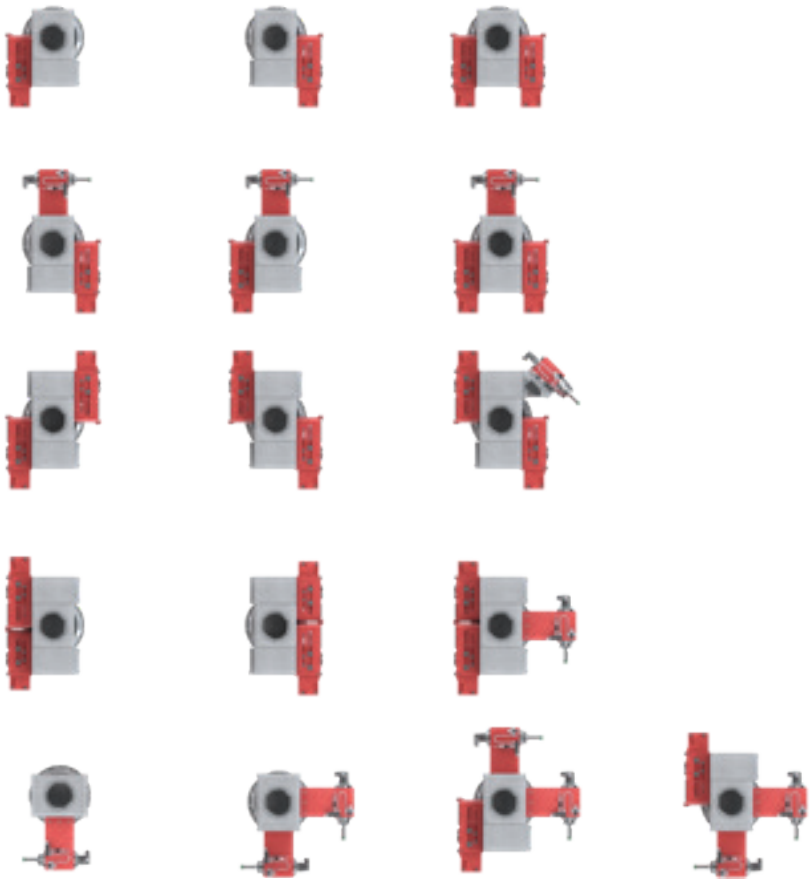
- Complete machining
- motor spindles
- High cutting speed of up to 50 m/s (9842 sfpm)
- 3 tools (2x external, 1x internal or 1x external, 2x internal)

Reduce set-up and resetting costs? This is possible with this machine, especially in single-part or small-batch production. This is made possible by the turret wheelhead with several grinding wheels and Quick-Set for rapid set-up.
Boost efficiency with complete machining in a single clamping. The S31 handles internal, external, and face grinding with ease.

The direct drive on the B axis with high-resolution direct measuring system offers you valuable support. It allows for the grinding of various diameters and any tapers using the same grinding wheel without intermediate dressing. It also guarantees a positioning range in the high-precision B axis of <1". Or, as an alternative, you can configure the wheelhead with a 1° Hirth serration and automatic swiveling.

1 Turret wheelhead left/right

2



3

The swiveling wheelhead is equipped with water-cooled, roller-based, and maintenance-free motor spindles with stepless speed control and the latest generation of contact sensors. The shaft ends hold external wheelheads with a diameter of 500 mm (20") and a width of 63 (80 F5) mm (2.48" (3.15" F5)). For internal grinding, use powerful high-frequency spindles with 120 mm (4.72") external diameter. It's your choice: configure the wheelhead to match your specific needs.

2 Select wheelhead variants
3 Internal grinding attachment

Workhead

1

- High roundness accuracy
- Low maintenance
- Air cushion
- High-accuracy C-axis for HSM

The versatile universal workhead enables both live spindle grinding and grinding between centres.
The workhead is equipped with roller bearings, is low-maintenance and has an excellent roundness accuracy of under 0.0004 mm (0.000,016"), which can be optionally improved to under 0.0002 mm (0.000,008") during live spindle operations.
The fine adjustment allows for taper corrections in the 1 µm (0.000,040") range during live spindle operations. Like the tailstock, the workhead is also equipped with a pneumatic lifting device to facilitate movement during setup and resetting.

The S31 can also be equipped with a chuck workhead specially designed for grinding chuck parts.

C axis for form and thread grinding
Grinding of shapes and threads is made possible by the position- and speed-controlled C axis. The C axis with an indirect measuring system on the drive motor is suitable for thread grinding and simple form grinding. For maximum form accuracy, a direct measuring system is mounted on the workhead spindle (high accuracy C-axis).

With their high dynamic rigidity, the axis drives absorb the acceleration and grinding forces without any problem.

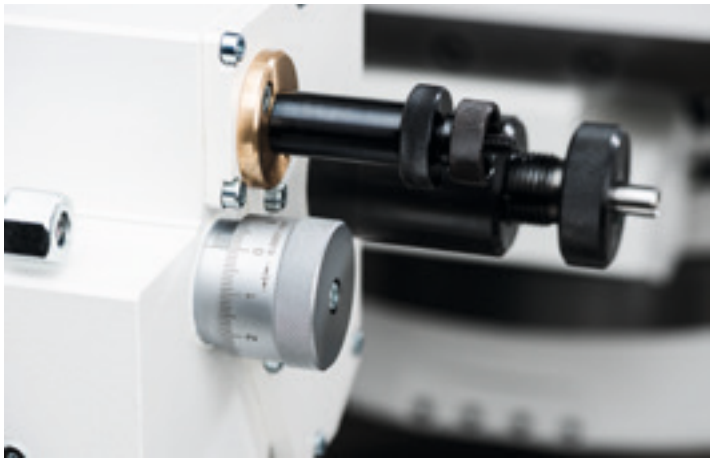
1 Chuck workhead

Tailstock

1

- Taper corrections
- Thermal stabilization by coolant flooding

2



The generously dimensioned barrel, designed for the use of Morse 3 or 4 taper centers, glides in the tailstock housing. The tailstock can be equipped with a hydraulically actuated barrel retraction for workpiece changeover. The center pressure can be easily fine-adjusted. The taper fine-adjustment allows taper corrections in the range below 1 µm (0.000,040") when grinding between centers. A high-precision result is guaranteed! An air cushion lift-off further facilitates simple movement during set-up and resetting.

In order to guarantee optimum thermal stability, the tailstock housing, barrel and the diamond holder are flooded with cooling lubricant. This guarantees ideal thermal stability. Clamping takes place with the help of a spring. This tailstock is suitable for workpiece weights up to 150 kg (330 lbs).

Synchronous tailstock
Use of the synchronous tailstock is particularly cost-effective when manufacturing part families, when grinding a workpiece over its entire length or if the use of a conventional driver is not possible.

Extra-fine grinding tailstock
Is the series production of hydraulic components, your specialty? Then you will benefit from the extra-fine grinding tailstock with automatic cylindricity correction.

1 Tailstock
2 Fine adjustment for cylindricity corrections

Control and programming

1

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- EMC-tested control cabinet
- Ergonomically arranged controls

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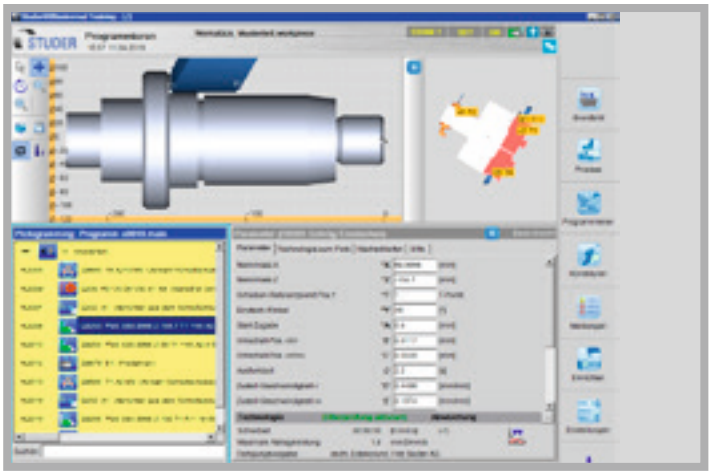
2

1 Machine control
2 Manual control unit

StuderWIN

1

2



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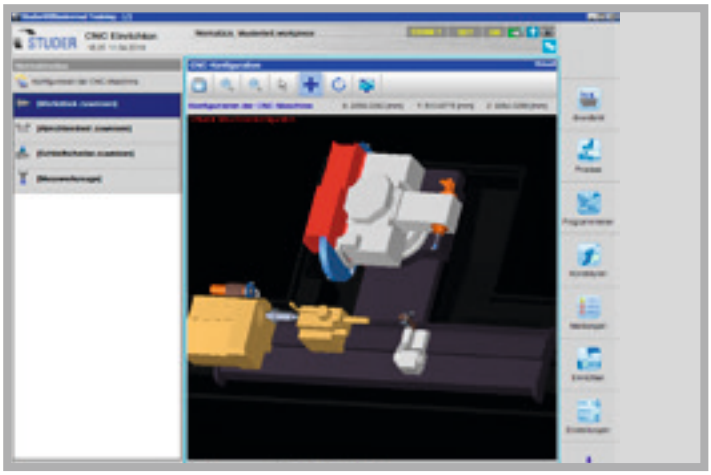

- Latest software technology
- StuderPictogramming
- Integrated peripheral equipment

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1 StuderWIN
2 Workpiece programming
3 Assisted set-up

Process-optimized complete solutions guarantee greater efficiency and reliability throughout.

1

- Automatic production processes
- Integrated quality control
- Standard loader – interfaces

Several loading systems are available for the S31. You can choose between a standard or customized solution, which thanks to its modularity can be modified to match the exact usage of the machine and the machining processes. Seamlessly integrate your desired peripherals into the production process. The automation systems communicate with the machine via the standardized loader interface. This allows even complex handling tasks to be carried out. Comprehensive quality control is possible during the grinding process. This entails: in-process, post-process, recording, evaluation and correction. In grinding, especially in match grinding, such quality assurance is crucial.

2

3

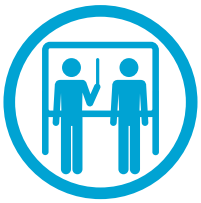
1 STUDER *"easyLoad"*
2 Working space with workpiece handling
3 Post-process station

Customer care

STUDER cylindrical grinding machines should fulfil the customer›s requirements for as long as possible, work efficiently, function reliably and be available at all times. From «start up» through to «retrofit» – our Customer Care is there for you throughout the working life of your machine. 30 professional helplines and more than 60 service technicians are available in your area, wherever you are in the world.

- We will provide you with fast, uncomplicated support.
- We will help to increase your productivity.
- We work professionally, reliably and transparently.
- We will provide a professional solution to your problems.

Start up
Commissioning
Warranty extension

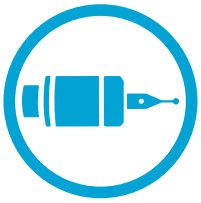


Qualification
Training
Product support

Prevention
Maintenance
Inspection

Service
Customer service
Customer consultation
HelpLine

Digital Solutions™
Remote service
Service monitor
Production monitor



Material
Spare parts
Replacement parts
Accessories

Rebuild
Machine overhaul
Assembly overhaul

Retrofit
Modifications
Retrofits

Technical Data

Main Dimensions

Distance between centres	400 / 650 / 1000 / 1600 mm (15.7"/25.6"/39.4"/63")
Centre height:	175 mm (6.9")
Max. workpiece weight between centres	80 / 150 kg (176 / 330 lbs)

Cross slide: X axis

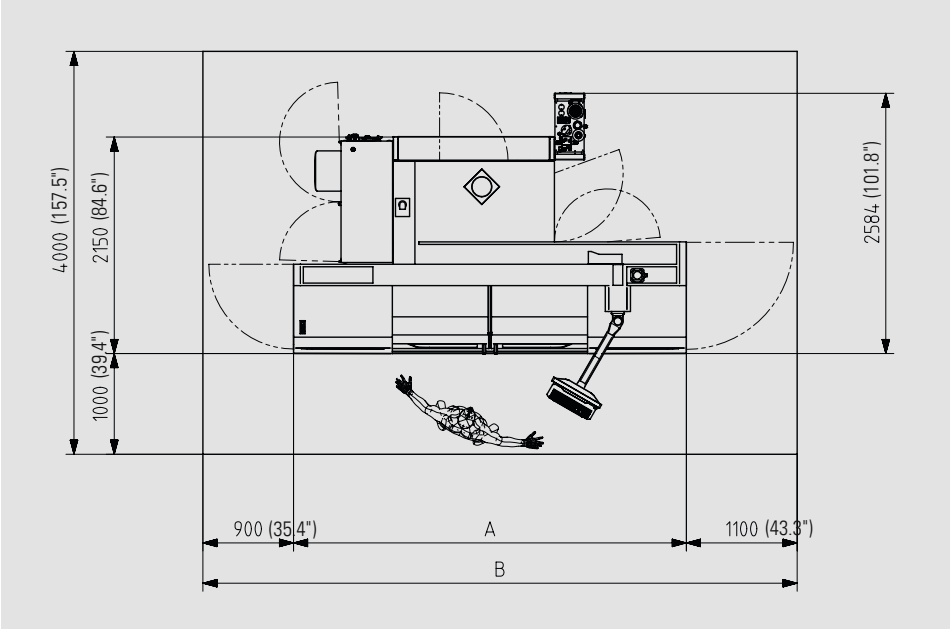
Max. travel	370 mm (14.6")
Speed	0,001 – 15 000 mm / min (0.000,04 – 590 ipm)
Resolution	0,00001 mm (0.000,000,4")

Longitudinal slide: Z axis

Max. travel	500 / 800 / 1150 / 1750 mm (19.7"/31.5"/45.3"/68.9")
Speed	0,001 – 20 000 mm / min (0.000,04 – 787 ipm)
Resolution	0,00001 mm (0.000,000,4")

Wheelhead

Swiveling range	-30 to +210 deg
Resolution	1 deg Hirth
Fitting taper	dia. 73 mm (2.87")
Driving power:	7,5 kW (10 hp)
Grinding wheel, Ø×width×bore	500×63 (80F5)×203 mm 20"×2.5" (3.15"F5)×8"
Circumferential Speed	up to 50 m / s (9840 sfpm)
Internal grinding device for high frequency internal grinding spindles	
Spindle dia.	dia. 120 mm (4.73")
Speeds	24 000 – 120 000 rpm
Option: Direct drive	
Resolution	0,00005 deg
Repetition Accuracy	< 1"



	A	B
Distance between centres 400 mm (15.7")	2200 (86.6")	4500 (177")
Distance between centres 650 mm (25.6")	3200 (126")	5200 (205")
Distance between centres 1000 mm (39.4")	3900 (153.5")	5900 (232")
Distance between centres 1600 mm (63")	5100 (201")	7100 (280")

Universal workhead

Speed range	1 – 1500 rpm	1 – 1500 rpm
Fitting taper	MT4 / dia. 70 mm (2.7")	MT5
Spindle feedthrough	dia. 26 mm (1.02")	dia. 30 mm (1.18")
Driving power:	3 kW (4 hp)	3 kW (4 hp)
Load during live grinding	70 Nm (52 ft lbs)	70 Nm (52 ft lbs)
Roundness accuracy during live grinding	0,0004 mm (0.000,016") (Option: 0,0002mm / 0.000,008")	0,0004 mm (0.000,016") (Option: 0,0002mm / 0.000,008")

Speed range	1 – 1000 rpm	1 – 1000 rpm
Fitting taper	MT5 / dia. 110 mm (4.3")	ISO50 / dia. 110 mm (4.3")
Spindle feedthrough	dia. 38 mm (1.5")	dia. 50 mm (1.97")
Driving power:	4 kW (5.4 hp)	4 kW (5.4 hp)
Load during live grinding	180 Nm (134 ft lbs)	180 Nm (134 ft lbs)
Roundness accuracy during live grinding	0,0004 mm (0.000,016") (Option: 0,0002mm / 0.000,008")	0,0004 mm (0.000,016") (Option: 0,0002mm / 0.000,008")

Option

C axis standard, indirect measuring system	0,0001 deg	0,0001 deg

Chuck workhead

Speed range	1 – 1500 rpm	1 – 1000 rpm	1 – 1000 rpm
Fitting taper	MT4 / dia. 70 mm (2.7")	MT5 / dia. 110 mm (4.3")	ISO50 / dia. 110 mm (4.3")
Spindle feedthrough	dia. 26 mm (1.02")	dia. 38 mm (1.5")	dia. 50 mm (1.97")
Driving power:	3 kW (4 hp)	4 kW (5.4 hp)	4 kW (5.4 hp)
Load during live grinding	100 Nm (74 ft lbs)	250 Nm (186 ft lbs)	250 Nm (186 ft lbs)
Roundness accuracy during live spindle grinding	0,0004 mm (0.000,016") (Option: 0,0002mm / 0.000,008")	0,0004 mm (0.000,016") (Option: 0,0002mm / 0.000,008")	0,0004 mm (0.000,016") (Option: 0,0002mm / 0.000,008")

Option

C axis standart, indirect measuring system	0,0001 deg	0,0001 deg	0,0001 deg
C axis high-precision, direct measuring system	0,0001 deg	0,0001 deg	0,0001 deg

Tailstock

Fitting taper	MT3	MT4
Travel of barrel	35 mm (1.37")	60 mm (2.36")
Diameter of barrel	50 mm (1.97")	60 mm (2.36")
Fine adjustment for cylindricity corrections	±40 µm (0.0016")	±80 µm (0.0032")

Synchronous tailstock

Fitting taper	MT4
Travel of barrel	90 mm (3.54")
Spindle nose	dia. 70 mm (2.75")
Workpiece weight between centres	50 kg (110 lbs)
Fine adjustment for cylindricity corrections	±80 µm (0.0032")

Extra-fine grinding tailstock

Fitting taper	MT3
Barrel stroke	35 mm (1.37")
Diameter of barrel	50 mm (1.97")
Automatic fine adjustment for cylindricity corrections	±40 µm (0.0016")

Control unit

Fanuc 0*i*-TF
Option for HSG: Fanuc 31*i*-B

Guaranteed working precision

Surface straightness	
Measuring length 400 mm (15.7")	0,0020 mm (0.000,08")
Measuring length 650 mm (25.6")	0,0025 mm (0.000,10")
Measuring length 1000 mm (39.4")	0,0030 mm (0.000,12")
Measuring length 1600 mm (63")	0,0040 mm (0.000,16")

Connected load

Total connected load	20 kVA
Air pressure	5,5-7 bar (80-102 psi)

Total weight

Distance between centres 400mm (15.7")	8500 kg (18 700 lbs)
Distance between centres 650 mm (25.6")	9500 kg (20 900 lbs)
Distance between centres 1000 mm (39.4")	10 500 kg (23 150 lbs)
Distance between centres 1600mm (63")	12 000 kg (26 500 lbs)

The information given is based on the technical levels of our machine at the time of this brochure going to print. We reserve the right to further develop our machines technically and make design modifications. This means that the dimensions, weights, colours, etc. of the machines supplied can differ. The diverse application possibilities of our machines depend on the technical equipment specifically requested by our customers. The equipment specifically agreed with the customer is therefore exclusively definitive for the equipping of the machines, and not any general data, information or illustrations.

STUDER

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SWISS MADE

S41

The Allrounder
for complex grinding jobs.

Key data

The S41 is a CNC universal cylindrical grinding machine for large workpieces.
It has distances between centres of 1000 / 1600 mm and centre heights of 225 / 275 mm.
It can machine workpieces with a maximum weight of 250 kg.

STUDER

Fritz Studer AG

The name STUDER stands for more than 100 years of experience in the development and production of precision cylindrical grinding machines. «The Art of Grinding.» is our passion, highest precision is our aim and top Swiss quality is our benchmark.

Our product line includes both standard machines, as well as complex system solutions in high-precision cylindrical grinding for machining small and medium-sized workpieces. In addition we offer software, system integration and a wide range of services. As well as receiving a complete tailormade solution the customer also benefits from our 100 years of know-how in relation to the grinding process.

Our customers include companies from the machine tool industry, automotive engineering, tool and die makers, the aerospace industry, pneumatics/hydraulics, electronics/electrical engineering, medical technology, the watch industry and job order production. They value maximum precision, safety, productivity and longevity. 24 000 manufactured and delivered systems make us the market leader and are clear evidence of our technological leadership in universal, external, internal and noncircular grinding. Around 800 employees, including 75 apprentices, make it their goal every day to ensure that «The Art of Grinding.» will continue to be closely linked to the name STUDER in the future.

S41

If you think that you already know everything about grinding machines, you don't know the S41 yet. New technical developments ensure flexibility, high precision and short auxiliary times. The patented Studer-Guide® guideway system with high-precision linear drive is just one of the advantages of the S41. It also boasts further technical features: you can choose from a large number of wheelhead variants. With up to four grinding wheels, the S41 fulfils virtually every requirement in complete machining.

Characteristics

Dimensions

- Distance between centres 1 000 / 1 600 mm
- Centre height 225 / 275 mm
- Maximum workpiece weight 250 kg

Hardware

- StuderGuide® guide system with linear drive
- Turret wheelhead with direct drive and 0.00005 deg resolution
- Complete machining with up to four grinding wheels
- C axis for the workhead enabling form and thread grinding
- Full enclosure with two sliding doors
- Granitan® S103 mineral-casting machine base

Software

- Very simple operation and programming thanks to StuderWIN
- StuderGRIND programming software for the creation of grinding and dressing programs directly on the machine control, or on an external PC
- Reduced setup and resetting times with STUDER Quick-Set
- Standardized interfaces for loader and peripheral devices

The S41 is a CNC universal cylindrical grinding machine of the latest generation. It boasts many technical features, such as the revolutionary StuderGuide® guideway system, high-precision axis drives with linear motors, extremely fast direct drive of the B-axis, an even larger selection of wheelhead variants etc.

The S41 meets every possible requirement.Thanks to the centre height of 225 or 275 mm and a distance between centres of 1 000 or 1 600 mm, the majority of daily grinding tasks can be efficiently performed on this machine. Naturally the S41 can also be configured as a single-purpose machine for large batch production. The S41 can make full use of its speed particularly in applications where short auxiliary times are important.

Precision is the result of perfect interaction between a large number of different factors. The base is the Granitan® S103 machine bed with its excellent damping characteristics and favorable thermal behavior. The modules are ideally suited to each other and produced with customary STUDER precision. The large distance between the guideways and the very rigidly constructed slides form the basis for the precision and productivity of this machine. All components involved in defining precision are temperature-stabilized.

StuderWIN as user interface and the software module by StuderGRIND create a stable programming environment and contribute to efficient use of the machine. A PC is integrated into the CNC control. The possibility of integrating the in-process gauging and sensor technology for process monitoring as well as contact detection and automatic balancing systems in the control enable standardized programming of the different systems. The software for an internal loading system is also integrated in the control. The driver elements are optimally adapted to the control.

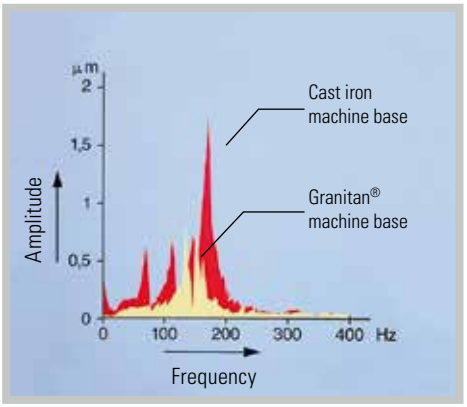
Granitan® S103 mineral casting machine bed

1

- Vibration-damping
- Thermally stable
- Non-wearing

The material structure developed by STUDER which has proved its superb efficiency over many years is produced in the company's own plant using the most modern industrial techniques.
The excellent dampening behavior of the machine base ensures outstanding surface quality of the ground workpieces. The service life of the grinding wheel is also increased, leading to reduced downtimes.
Temporary temperature fluctuations are extensively compensated by the favorable thermal behavior of Granitan®. This provides high stability throughout the day. The StuderGuide® guide system for the longitudinal and cross slides is moulded directly into the machine base and finished with a wear-resistant Granitan® S200 surfacing material. The guideways offer the highest possible accuracy through the entire speed range with high load capacity and dampening levels. Thanks to the robust and maintenance-free design, these excellent guideway characteristics are more or less completely retained.

2

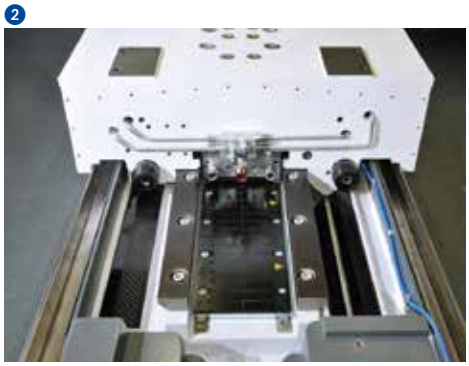


1 Machine base with X amd Z guideways
2 Vibration behavior of gray cast iron and Granitan® S103

StuderGuide® in longitudinal and cross slides

1

2



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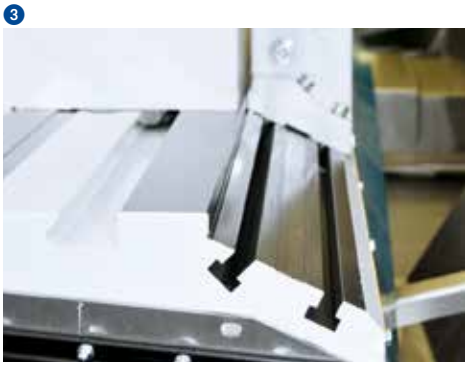


4

- High geometrical traverse precision
- Setup scale for setup and resetting
- Effective covering of guideways

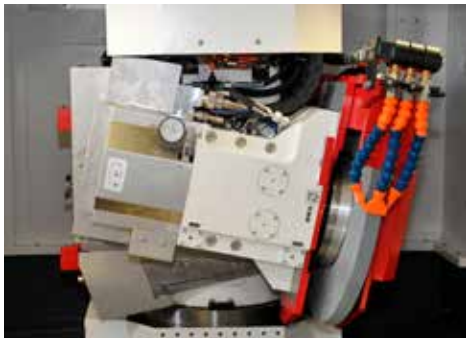
The longitudinal and cross slides are manufactured from high-quality gray cast iron and have highly precise, ground guideways. The slides rest completely on the guideways of the machine bed through the entire traversing range. This provides the cornerstone for the excellent straightness of 0.003 mm over 950 mm measured length. The top of the longitudinal slide has a surface that is ground over its entire length and acts as a support for the workhead, the tailstock, as well as accessories and devices. A setup scale, recessed in the table, makes it easy to set up and reset the units on the table. An additional T-slot with a ground surface enables the optimal utilization of dressing devices. The newly developed StuderGuide® guide system extends the advantages of hydrostatic systems and guideways with patented surface structure. A huge advantage of StuderGuide® over hydrostatic guideways is the damping component in the movement direction. The slides are powered by linear motors with direct measuring systems with a resolution of 10 nanometers. The maximum travel speed for both axes is 20 m/min. This lays the basis for high-precision and efficient grinding with the shortest possible auxiliary times. The combination of StuderGuide®, linear motors and direct measuring systems guarantees the highest interpolation accuracies.

1 Machine base with longitudinal and cross slides
2 X-axis with linear motor
3 Double T-slot and clamping surface for mounting dressing tool holders etc.
4 Setup scale

Turret wheelhead

1

2



3

4

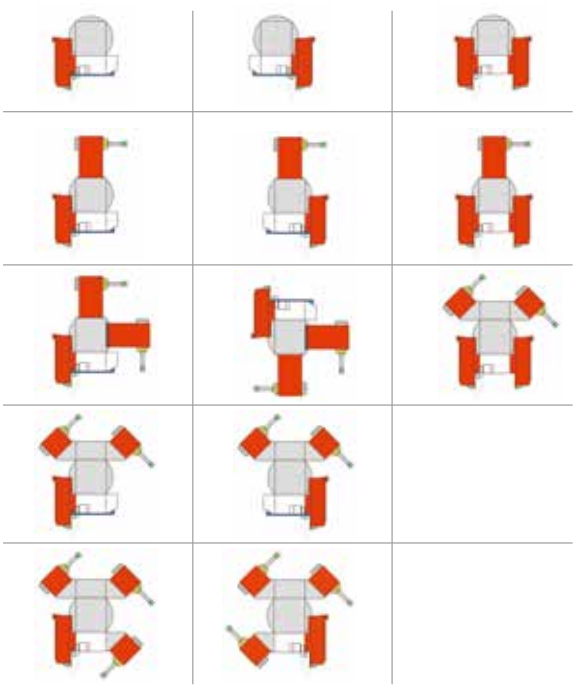
- Configurable in accordance with customer's requirements
- Complete machining
- Grinding of cylindrical and conical parts with the same grinding wheel

The most important component for complete machining is the wheelhead with integrated B-axis. It swivels automatically, and enables the use of up to four grinding wheels. This means that workpieces can be completely machined in the same clamping – with minimal auxiliary times combined with superior precision.
This B axis has a direct drive, which positions very quickly and precisely. The high-resolution direct measuring system guarantees a positioning range of the high-precision B-axis < 1".

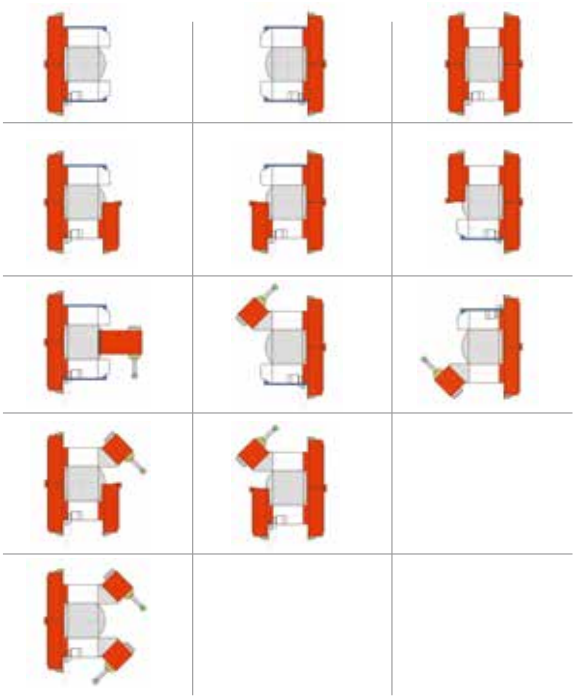
1 Turret wheelhead left / right / internal
2 Automatic A-axis
3 HSG spindle
4 Positioning probe horizontal to the work plane

Wheelhead variants

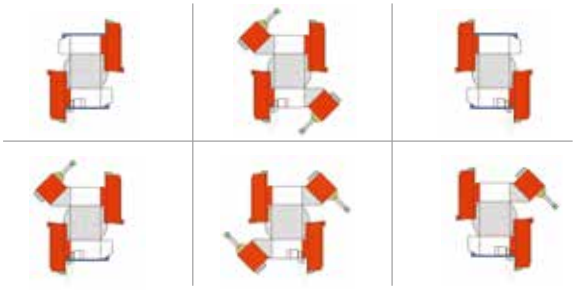
Universal



Tandem



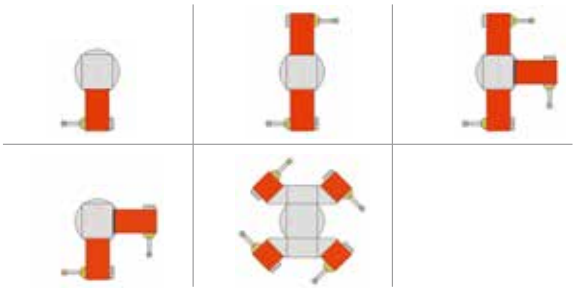
Diagonal



HSG possible

HSG not possible

Internal grinding



Combinations of up to four external or internal grinding spindles result in more than 30 basic variants. Internal grinding spindles with 6 000 rpm to 120 000 rpm can be used. Automatic balancing systems and frequency converters for the individual external grinding spindles enable even better coordination of the wheelhead variants with the grinding process. A vertical spindle for grinding splines or a longitudinal grinding axis for non-interpolating traverse grinding of internal tapers can also be mounted on the wheelhead as a special solution.

Automatic A-axis
STUDER offers an automatically swiveling A-axis on the S41 for efficient, high-precision thread grinding. The swivel angle is ±15 deg. Even greater pitch angles can be achieved with the aid of StuderThread, thanks to profile error compensation. There is one model for standard and one for HSG for external grinding and one model for internal grinding. Max. two A-axes are possible.

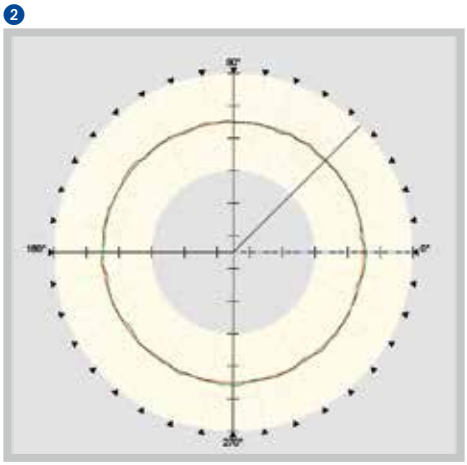
Workhead

1

- High roundness accuracy
- Low-maintenance
- Air cushion

The versatile universal workhead enables both live spindle grinding and grinding between centres. The machine can also be fitted with a specially designed chuck workhead for chuck applications. The workheads are mounted on roller bearings, are low-maintenance and possess an excellent roundness accuracy of below 0.0004 mm (optionally 0.0002 mm) during live spindle grinding operations. The fine adjustment allows for cylindricity corrections in the 1 µm range during live spindle operations. Like the tailstock, the workhead is also equipped with an air cushion lift-off to simplify movement during setup and resetting.

2



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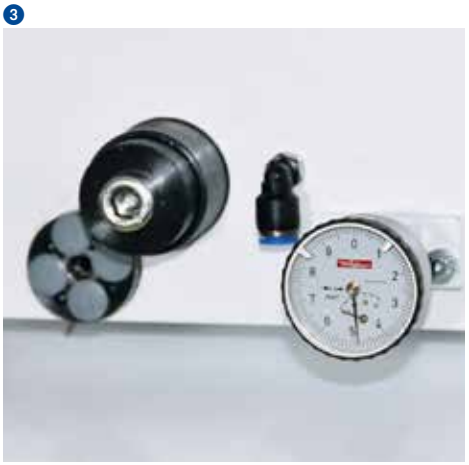


1 Universal workhead
2 Roundness accuracy (test certificate)
3 Fine adjustment for cylindricity corrections

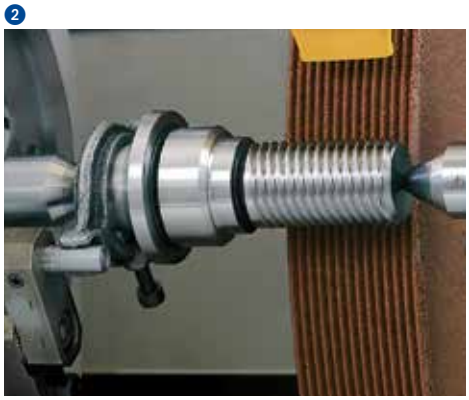
Direct-drive workhead

1

The direct-drive workhead is primarily used for live spindle grinding of heavy workpieces and for high-precision C-axis applications.
With form grinding, the spectrum of parts is expanded by the design configuration of the direct drive. The design also allows the installation of a high-precision measuring system directly on the spindle. This workhead does not have a fixed centre.

C-axis for form and thread grinding

2



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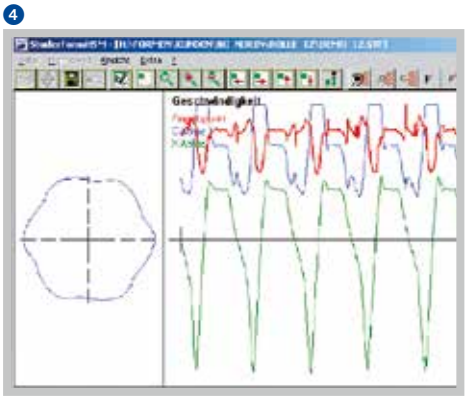


Complete machining also entails form and thread grinding operations to an ever increasing extent. These processes are made possible by the position and speed-controlled C-axis. The standard C-axis with measuring system on the drive motor is suitable for thread grinding. A direct measuring system is mounted on the workhead spindle (C-axis) to ensure the highest form accuracy). Acceleration and grinding forces are absorbed without difficulty through the high dynamic rigidity of the axis drives.

Form and thread grinding
The S41 enables axis-parallel grinding of conventional threads up to threads for high accuracy application. Polygons, excenters, control cams, cams etc. can be manufactured costeffectively and in the highest precision with High Speed Machining (HSM).

1 Direct-drive workhead
2 External and internal thread grinding
3 Form and die grinding
4 Contact ratios during form grinding

Tailstock

1

- Cylindricity corrections
- Thermal stabilization by coolant flooding

The generously dimensioned barrel, designed for the deployment of Morse 4 taper centres, glides in the tailstock housing. The centre pressure can be adjusted with the delicate precision required for grinding high-precision workpieces. The tailstock can be equipped with a hydraulically actuated barrel retraction for workpiece changeover. The fine adjustment enables cylindricity corrections in the range below 1 µm when grinding between centres. An air cushion lift-off facilitates simple movement during setup and resetting.

A cooling lubricant is passed through the tailstock and totally covers the barrel and diamond holder, in order to guarantee optimum thermal stability. Clamping is performed by a spring. This tailstock is suitable for workpiece weights up to 150 kg.

The centre pressure can be increased with the hydraulically operated tailstock, enabling a workpiece weight between centres of 250 kg.

Synchronous tailstock
Use of the synchronous tailstock is particularly cost-effective when manufacturing part families, when grinding a workpiece over its entire length or if the use of a conventional driver is not possible.

2

3

4

1 Tailstock
2 Hydraulic tailstock
3 Synchronous tailstock
4 Fine adjustment for cylindricity corrections

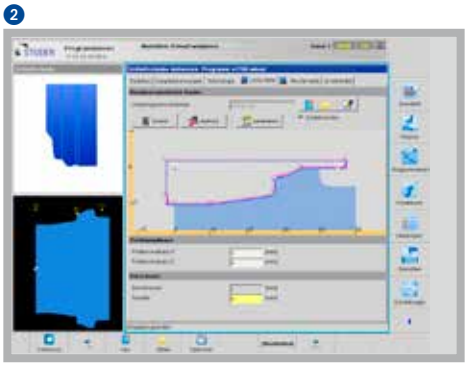
Dressing

1

An easy-cutting grinding wheel is essential for cost-effective and high-quality grinding. STUDER offers a large selection of dressing units, in order to coordinate the dressing process flexibly and optimally with the properties specific to the workpiece, tool or materials. The grinding wheel profile and dressing parameters are easily defined via macros. Another STUDER speciality is the grinding wheel reference points (T-numbers). This enables programming with normal dimensions, which considerably simplifies the programming of grinding programs.

A software package is available to fine tune the dressing process and includes additional dressing functions.

2



3

1 Swiveling dressing unit
2 Dressing parameters dialog screen
3 Diamond holder behind tailstock on table

Control system and operation

1

- PCU manual control unit
- EMC-tested control cabinet
- Ergonomically arranged controls

The S41 is equipped with a 31*i*-A series Fanuc control with integrated PC. The 15" touch screen facilitates intuitive operation and programming of the machine.
The electrical cabinet is positioned behind the machine. The power and control compartments are spatially separated. The layout of the elements complies with the relevant safety norms and is EMC-tested.

All controls are clearly and ergonomically arranged. An important role is played by the manual control unit, which facilitates setup close to the grinding process.
A special function – the Sensitron electronic contact detection device – reduces downtimes to a minimum.

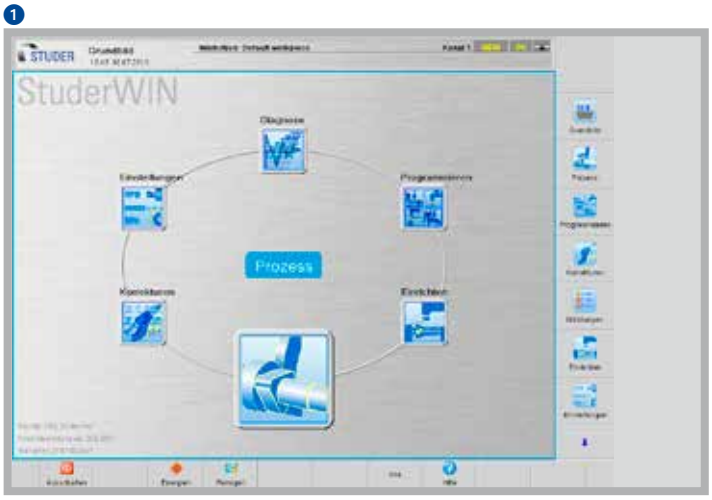
A free-standing height adjustable operating panel on casters is optionally available.

2

1 Machine control
2 Manual control unit

StuderWIN

1



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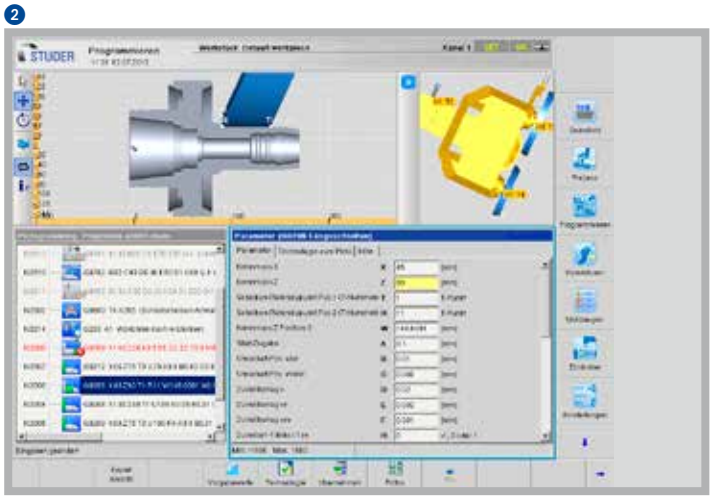

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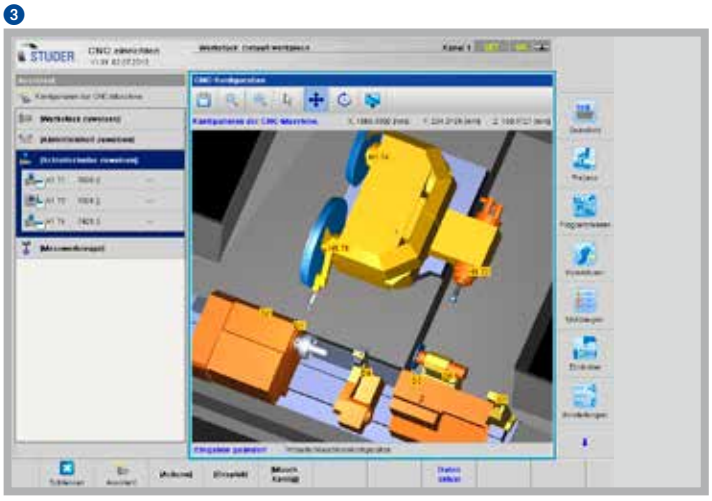


- Latest software technology
- StuderPictogramming

The user interface StuderWIN creates a stable programming environment and contributes to efficient use of the machine. The possibility of fully integrating the in-process gauging and sensor technology for process control as well as contact detection and automatic balancing systems in the operator interface enables standardized programming of the different systems. The software of an optional loading system is also integrated. The drive elements are optimally matched to the control system.

The sophisticated mechanical engineering concept of the S41 is completed by a grinding software program developed in-house by STUDER and which is continuously optimized in collaboration with users of the software. This software offers:

- StuderPictogramming: The operator strings the individual grinding cycles together – the control generates the ISO code.
- STUDER Quick-Set: The software for grinding wheel alignment reduces resetting times by up to 90 %.
- Microfunctions: Free programming of grinding and dressing process sequences for optimization of the grinding process.
- Integrated operating instructions assist safe machine operation.
- The software options for the grinding technology calculations, optimized dressing as well as the Contour-, Thread- and Formgrinding cycles increase the functionality of the machine.

1 StuderWIN
2 Workpiece programming
3 Assisted setup

Process-optimized complete solutions guarantee greater efficiency and reliability throughout.

1

- Automatic productionprocesses
- Integrated quality control
- Standard loader – interfaces

Several loading systems are available for the S41. From the cost-effective *easyLoad*, which is operated via the machine control, to the *easyLoad NC* with its own control unit, through to special solutions which can be precisely adapted to the machine application and machining processes, thanks to their modular design. The appropriate peripherals ensure seamless integration into the respective production process. The handling systems communicate with the machine via the standardized loader interface and enable even complex handling tasks to be solved. Comprehensive quality control is possible during the grinding process. This entails: in-process, post-process, recording, evaluation and correction. This type of quality assurance is crucial during grinding, but especially during match grinding.

2

3

1 STUDER *«easyLoad NC»*
2 Working space with workpiece handling
3 Post-process station

Customer Care

STUDER cylindrical grinding machines should fulfil the customer›s requirements for as long as possible, work cost-effectively, function reliably and be available at all times. From «start up» through to «retrofit» – our Customer Care is there for you throughout the working life of your machine. 30 professional helplines and more than 60 service technicians are available in your area, wherever you are in the world.

- We will provide you with fast, uncomplicated support.
- We will help to increase your productivity.
- We work professionally, reliably and transparently.
- We will provide a professional solution to your problems.

Start up
Commissioning
Warranty extension

Qualification
Training
Production support

Prevention
Maintenance
Inspection

Service
Customer service
Customer consultation
HelpLine
Remote service

Material
Spare parts
Replacement parts
Accessories

Rebuild
Machine overhaul
Assembly overhaul

Retrofit
Modifications
Retrofits

Technical Data

Main dimensions

Distance between centres	1 000 / 1 600 mm (39.4" / 63")
Centre height	225 / 275 mm (8.9" / 10.8")
Max. workpiece weight between centres	250 kg (550 lbs)

Cross slide: X-axis

Max. travel	350 mm (13.8")
Speed	0.001 – 20 000 mm / min (0.000,04 – 787 ipm)
Resolution	0.00001 mm (0.000,000,4")

Longitudinal slide: Z-axis

Max. travel	1 150 / 1 750 mm (45.3" / 68.9")
Speed	0.001 – 20 000 mm / min (0.000,04 – 787 ipm)
Resolution	0.00001 mm (0.000,000,4")

Wheelhead

Swiveling range	-45 to +225 deg
Repetition accuracy	<1"
Swiveling time for 180°	<3 s
Resolution	0.00005 deg

External grinding

Peripheral speed	50 / 80 m / s (9 840 / 15 745 sfpm)
Fitting taper	1 : 10 / 73 mm (2.87")
Driving power	15 kW (20 hp)
for 50 m / s	dia. 500 x 80 (100F5) x 203 mm (20" x 3.15" (3.9" F5) x 8")
for 80 m / s	dia. 500 x 50 x 203 mm (20" x 1.9" x 8")

HSG grinding

Peripheral speed	140 m / s (27 550 sfpm)
Wheel mount	dia. 127 mm (5")
Driving power	30 kW (41 hp)
Grinding wheel	dia. 400 x 40 mm (16" x 1.6")

Internal grinding

Spindle diameters	dia. 120 / 140 mm (4.72" / 5.51")
Speeds	6 000 – 120 000 rpm

Options

Length positioning active
Manual or fully automatic balancing
Contact detection

Universal workhead ISO50

For live spindle grinding or external grinding between centres

Speed range	1 – 1 000 rpm
Fitting taper / cylindrical external mounting	ISO50 / dia. 110 mm (4.33")
Bar capacity (spindle bore)	dia. 50 mm (1.96")
Driving power	4 kW (5.4 hp)
Load for live spindle grinding	180 Nm (134 ft lbs)
Max. workpiece weight between centres	150 kg (330 lbs)
Roundness during live spindle grinding operations	0.0004 mm (option: 0.0002 mm) (0.000,016" / 0.000,008")

C-axis for form grinding

– Standard, indirect measuring system	0.0001 deg

Chuck workhead ISO50

For live spindle grinding or external grinding with revolving centre

Speed range	1 – 1 000 rpm
Fitting taper / cylindrical external mounting	ISO50 / dia. 110 mm (4.33")
Bar capacity (spindle bore)	dia. 50 mm (1.96")
Driving power	4 kW (5.4 hp)
Load for live spindle grinding	250 Nm (186 ft lbs)
Max. workpiece weight between centres	200 kg (440 lbs)
Roundness during live spindle grinding operations	0.0004 mm (option: 0.0002 mm) (0.000,016" / 0.000,008")

C-axis for form grinding

– Standard, indirect measuring system	0.0001 deg
– High-precision, direct measuring system	0.0001 deg

Motor workhead

For live spindle grinding or external grinding with revolving centre

Speed range	1 – 1 500 rpm
Fitting taper / cylindrical external mounting	ISO50 / dia. 110 mm (4.33")
Bar capacity (spindle bore)	dia. 50 mm (1.96")
Driving power	10 kW (13.6 hp)
Load for live spindle grinding	500 Nm (372 ft lbs)
Max. workpiece weight between centres	250 kg (550 lbs)
Roundness during live spindle grinding operations	0.0004 mm (option: 0.0002 mm) (0.000,016" / 0.000,008")

C-axis for form grinding

– High-precision, direct measuring system	0.0001 deg

Tailstock

Fitting taper	MT 4
Barrel stroke	60 mm (2.36")
Barrel diameter	60 mm (2.36")
Workpiece weight between centres	150 kg (330 lbs)
Fine adjustment for cylindricity corrections	±80 µm (0.0032")

Tailstock, hydraulic

Fitting taper	MT 4
Barrel stroke	80 mm (3.15")
Barrel diameter	70 mm (2.75")
Workpiece weight between centres	250 kg (550 lbs)
Fine adjustment for cylindricity corrections	±80 µm (0.0032")

Synchronous tailstock

Fitting taper	MT 4
Stroke	90 mm (3.54")
Spindle nose	dia. 70 mm (2.76")
Workpiece weight between centres	50 kg (110 lbs)
Fine adjustment for cylindricity corrections	±80 µm (0.0032")

Control system

Fanuc 31*i*-A with integrated PC

Guaranteed working precision

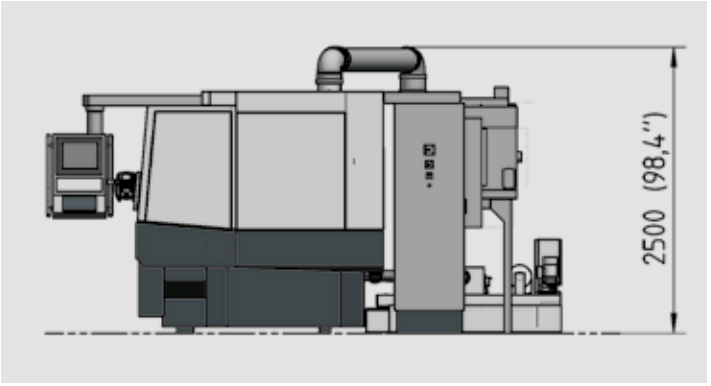
Straightness of the generating line	
Gauge length 950 mm (37.4")	<0.003 mm (0.000,12")
Gauge length 1 550 mm (61")	<0.004 mm (0.000,16")

Connected loads

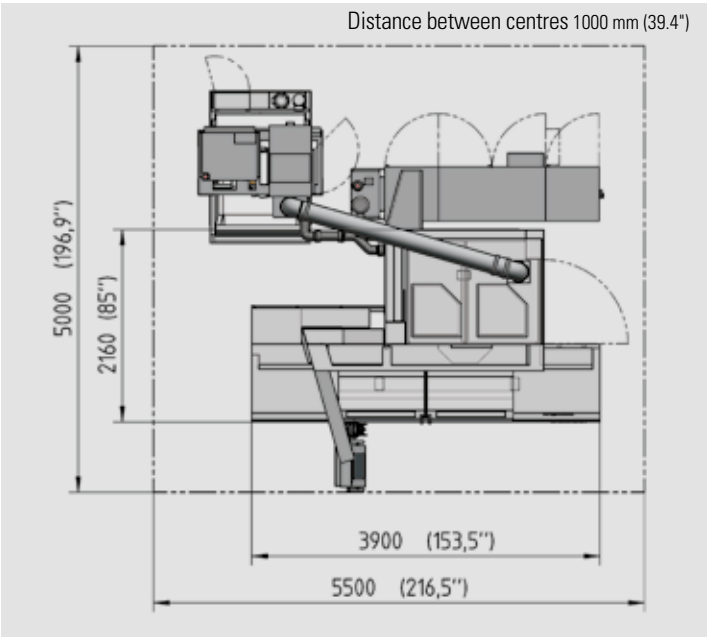
Total connected load	30 kVA (40 kVA for HSG)
Air pressure	5.5 bar (80 psi)
Extraction capacity for cooling lubricant mist	1 200–1 800 m^3/h

Total weight

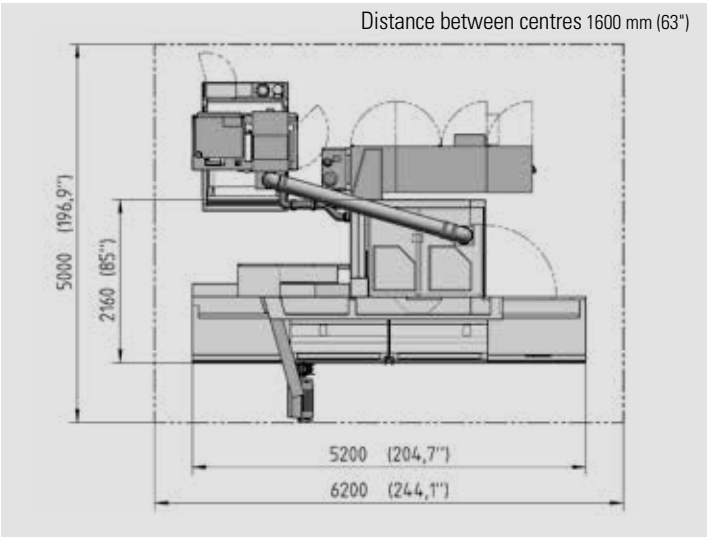
Distance between centres 1 000 mm (39.4")	9 000 kg (19 800 lbs)
Distance between centres 1 600 mm (63")	10 200 kg (22 440 lbs)



Distance between centres 1000 mm (39.4")



Distance between centres 1600 mm (63")



The information given is based on the technical levels of our machine at the time of this brochure going to print. We reserve the right to further develop our machines technically and make design modifications. This means that the dimensions, weights, colours, etc. of the machines supplied can differ. The diverse application possibilities of our machines depend on the technical equipment specifically requested by our customers. The equipment specifically agreed with the customer is therefore exclusively definitive for the equipping of the machines, and not any general data, information or illustrations.

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