



S33

The reasonably priced
for individual requirements.

The Art of Grinding.



Advantages

S33 – Dimensions

- Distance between centres 650/1000 mm (25.6"/39.4")
- Centre height 175 mm (6.9")
- Max. workpiece weight 80/120 kg (176/264 lbs)

Hardware

- Optional wheelhead:
 - external wheelhead with grinding wheel on the right, can be swivelled on 0 deg and 30 deg end stops
 - turret-type wheelhead with manual swivel 2.5 deg Hirth with automatic swivel 1 deg Hirth
- External and internal grinding possible in one setup
- C axis for the workhead enabling form and thread grinding
- Granitan® mineral-casting S103 machine base

Software

- Extremely easy programming with Studer Pictogramming
- StuderGRIND programming software for producing grinding and dressing programs on a PC
- Reduced setup and resetting times with Studer Quick-Set
- Standardized interfaces for peripheral devices

S33



Changeover in two minutes

Changing over from grinding between centers to live spindle grinding is particularly easy on the S33. Only a few movements are needed to withdraw the tailstock to its «park position» and free up the space required for internal grinding. Reference points from grinding wheels to dressing tool and workpiece can be registered very quickly with the help of Quick-Set, the software-controlled set-up device from Studer. The new grinding cycle can then be started.



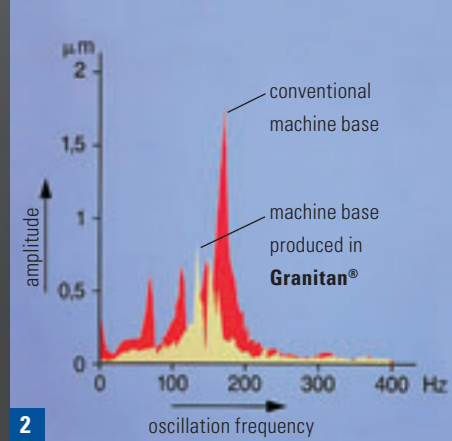
The reasonably priced for individual requirements.

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

The S33 CNC universal cylindrical grinding machine – designed for grinding medium-sized workpieces in individual and series production – is manufactured with distances between centers of 650 mm (25.6") and 1000 mm (39.4"). It can subsequently be easily adapted to other grinding tasks by means of various accessory kits such as in-process gauging, balancing system, contact detection and length positioning.

The solid Granitan® S103 machine base forms the basis for a cylindrical grinding machine that is equipped with high quality components, thus guaranteeing maximum precision, performance and reliability over many years. The choice of partial or complete enclosure provides an optimum insight into the grinding process.

The practical Studer grinding software with its proven pictogramming allows even less experienced users to quickly optimize the potential of this machine. The StuderGRIND software is also available; this enables efficient programming of special applications, such as form and thread grinding. 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.

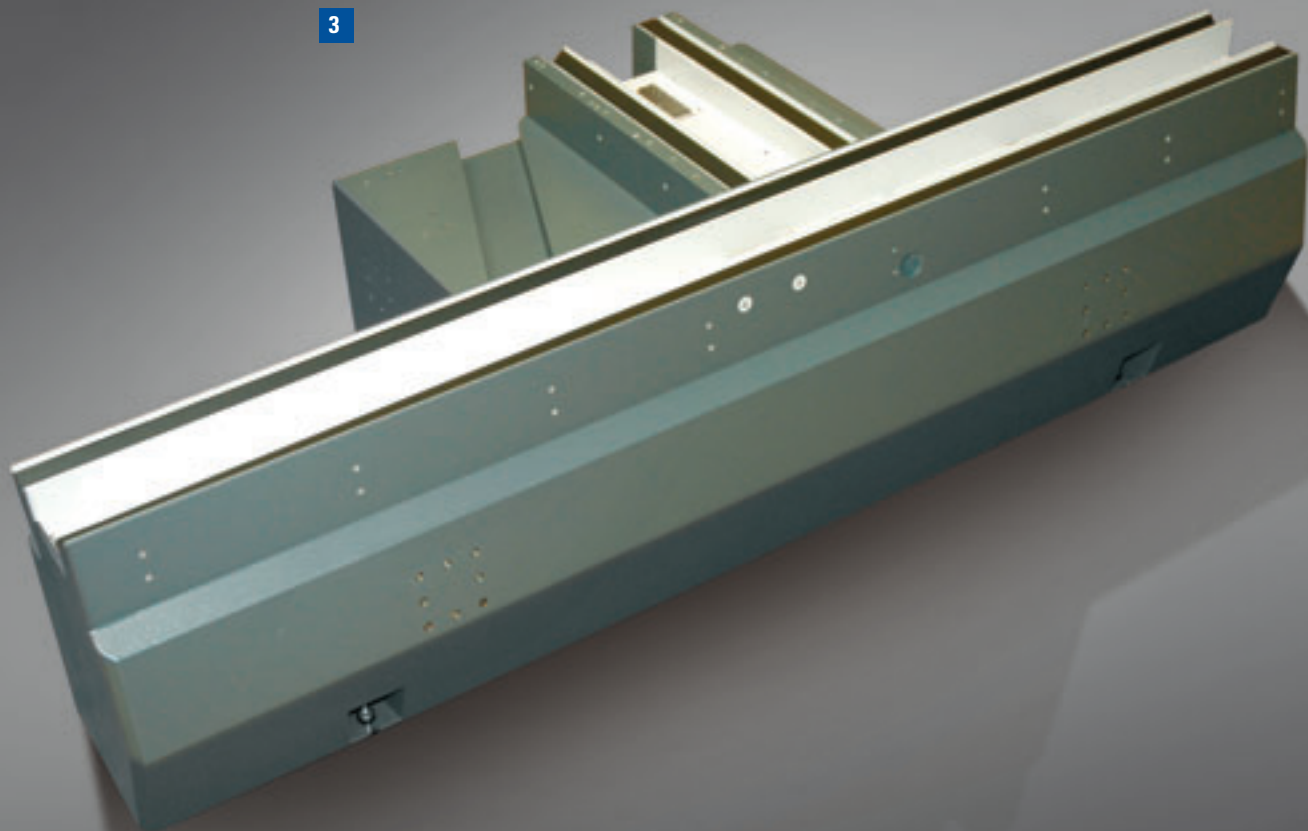


Vibration-damping

Thermal stability

Non-wearing

3



High-accuracy axis movements

Auxiliary scale for setup and resetting

Effective covering of the guideways

Granitan® mineral-casting S103 machine base

- 1 | Guideways with patented surface structure
- 2 | Vibration behavior of gray cast iron and Granitan® S103
- 3 | Machine bed with longitudinal and cross slides
- 4 | Swivelling table with setup scale
- 5 | Machine base with longitudinal and cross slides

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 proprieties 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 for by the favorable thermal behavior of Granitan®, resulting in high dimensional accuracy at all times.
- The V and flat guideways for the longitudinal and cross slides are moulded directly into the machine base and are provided with a non-abrasive Granitan® S200 slideway coating.

The patented knobbed structure of the guideways largely eliminates the slip-stick effect or

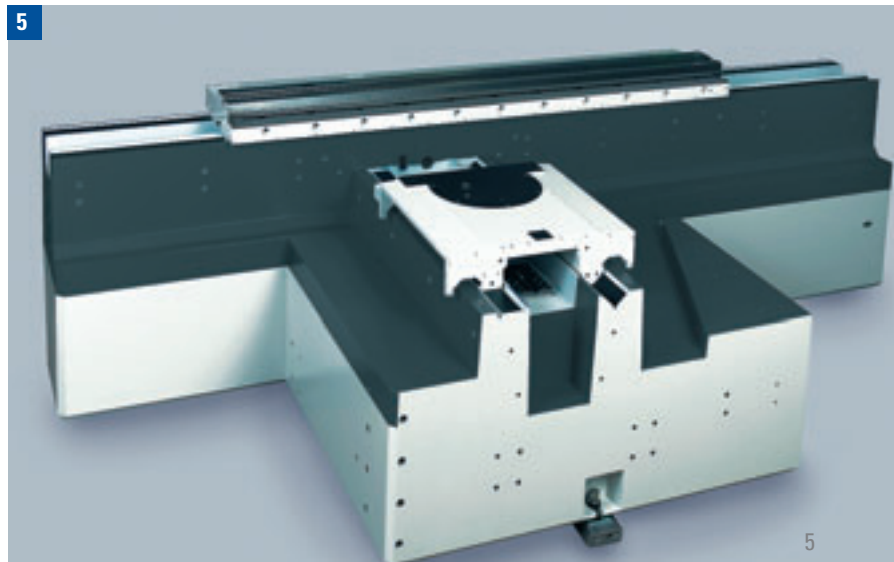
floating of the slides observed on conventional guideways. The guideways offer the highest possible accuracy through the entire speed range with high load capacity and dampening levels. Thanks to the robust and maintenance-free design, these excellent guideway characteristics are more or less completely retained.

Longitudinal and cross slides

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 inherent grinding straightness of 0.0025 mm (0.000,010") over 650 mm (25.6") measured length. The slides are advanced by 40 mm (1.57") diameter circulating ball screws connected to a three-phase servomotor via torsion-resistant, bellow-type cou-

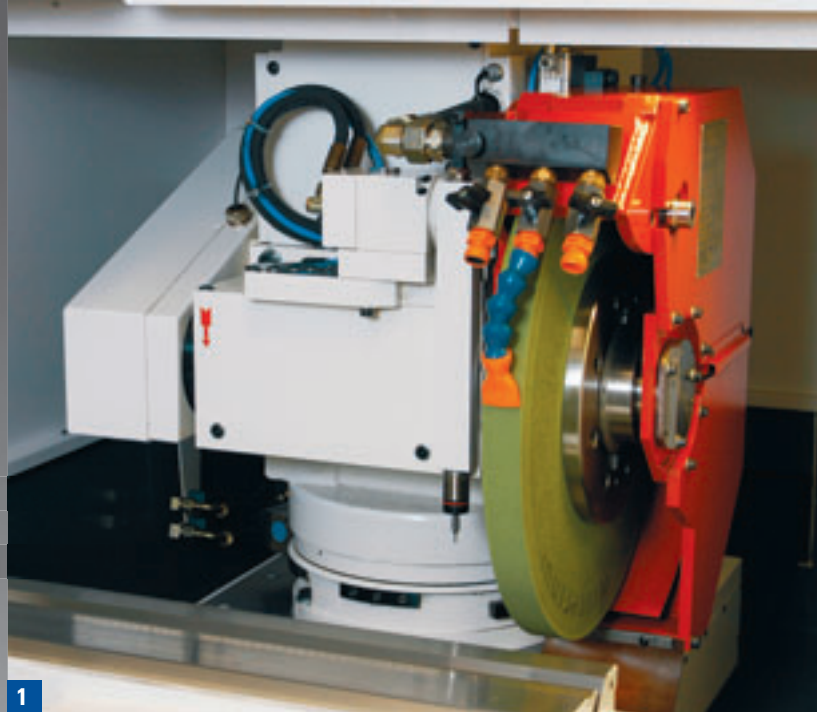
plings. These axes achieve high process speeds, on the one hand, while on the other hand the short auxiliary times also guarantee maximum precision with in-feed movements of 0.0001 mm (0.000,040"). These axes can be equipped with rotative or linear measuring systems, depending on requirements.

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. The scale, recessed in the table, makes it easy to set up and reset the machine.

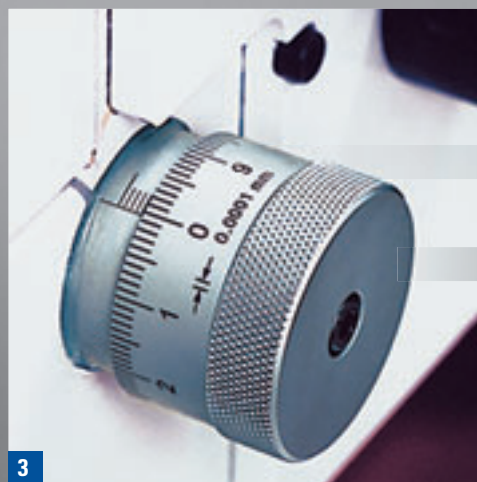
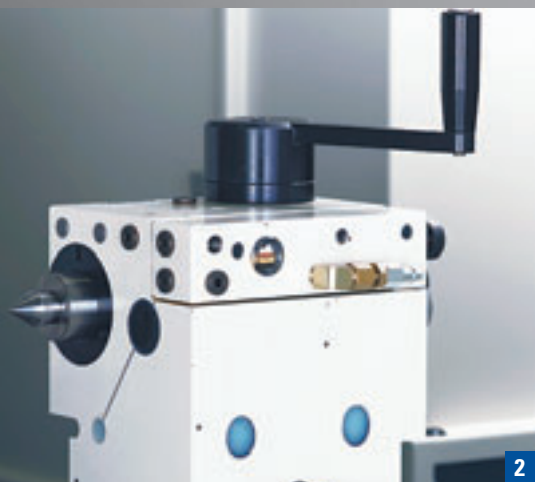


Complete machining

High output

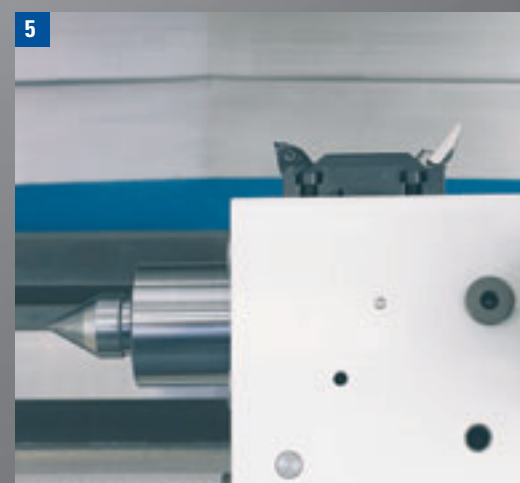
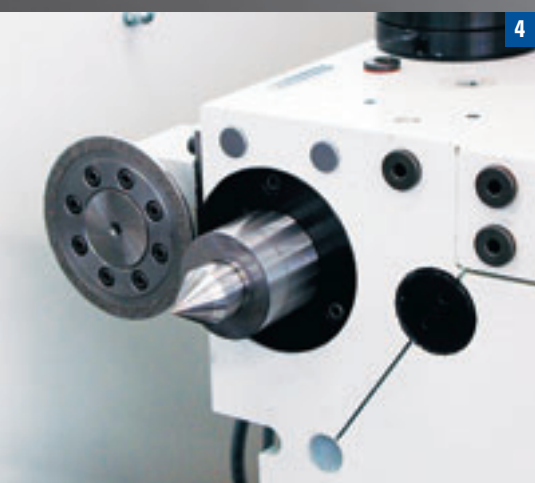


High cutting speed of 50 m/s (9842 sfpm)



Taper corrections

Barrel flooding



- 1 | Universal wheelhead
- 2 | Tailstock
- 3 | Fine adjustment for taper corrections
- 4 | Dressing spindle for rotative dressing

- 5 | Dressing tool holder
- 6 | External wheelhead
- 7 | Internal grinding spindle
- 8 | Tailstock in «Park» position for live spindle grinding

Wheelheads

Two variants are available:

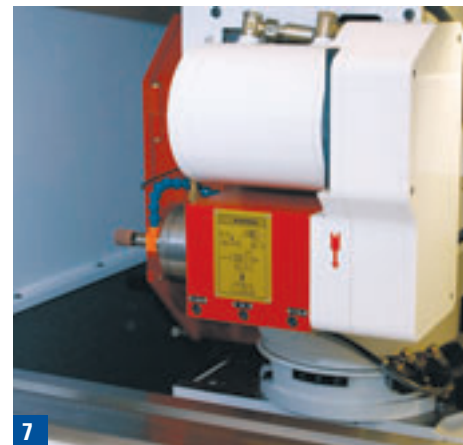
- The **external wheelhead** can be equipped with a grinding wheel on the right-hand side and swiveled by hand to the 0° and 30° stops. This results in a capability of using it as a 0° or 30° plunge grinder.
- The **turret wheelhead** can be used for both external and internal grinding; it can be equipped with an external grinding wheel (right) and an internal grinding spindle for this purpose. The user can index the turret wheelhead manually (2.5 deg) or automatically (1 deg) with high precision in a Hirth gear in a swiveling range of –15 deg/+195 deg.

Grinding wheels with a diameter of 500 mm (20") and a width of 63 (80 F5) mm [2.5" (3.15"F5)] x 203 mm (8") are suitable for both wheelhead variants; the drive capacity is 7.5 kW (10 hp) [Option 9 kW (12 hp)].

The optional frequency converter enables grinding at a constant cutting speed of maximum 50 m/s (9840 sfpm), optimally matched to the grinding process. The speed of the belt-driven internal grinding spindle is continuously adjustable. Spindles with nominal rpm of 20 000, 40 000 and 60 000 are available. As an option, high frequency internal grinding spindles are available.



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Tailstock

The generously dimensioned barrel, designed for the use of Morse 3 taper centers, glides in the tailstock housing. The center 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 taper corrections in the range below 1 µm when grinding between centers. A pneumatic lifting process facilitates movement during setup and resetting.

In order to guarantee optimum thermal stability, the tailstock is flooded with cooling lubricant, as are the barrel and the diamond holder. The machine is also equipped with an optional synchronous tailstock for direct driving of workpieces between centers.

Pneumatic lifting

Low-maintenance

High roundness accuracy

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Commissioning

Training

Production support

Warranty extension

HelpLine

Repair

Spare parts

Teleservice

Inspection

Maintenance

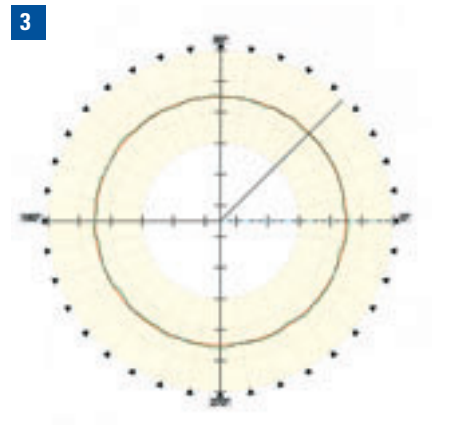
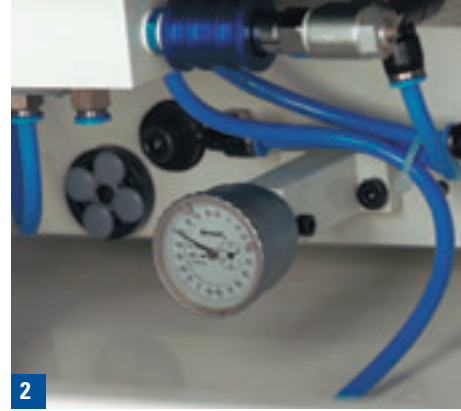
Overhaul

Workhead

The versatile universal workhead with Morse 5 fitting taper is capable of both live spindle grinding and grinding between centers. The workhead spindle is mounted on roller bearings, is low-maintenance and possesses an excellent roundness accuracy of below 0.0004 mm (0.000,016"). The fine adjustment allows for cylindricity corrections in the 1 µm range during live spindle operations. A pneumatic lifting process facilitates movement of the workhead during setup and resetting.

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.

- 1 | Universal workhead
- 2 | Fine adjustment for taper corrections
- 3 | Roundness during live spindle grinding operations
- 4 | External and internal thread grinding
- 5 | Deployment of engineers on the customer's premises
- 6 | Training on simulators



Accessories and services

There is an extensive range of accessory equipment available for all Studer cylindrical grinding machines, including centers, dressing tools, grinding wheels, clamping devices, internal grinding spindles, in-process gauging devices, etc.

The Studer Training Department organizes courses for hundreds of customers every year specializing in programming and machine use – a sound basis for optimum use of your Studer machines.

Maintenance courses are tailored to the respective requirements of the maintenance departments. On request, they can also take place on the customer's premises. Studer specialists collaborate in grinding problems, in order to achieve the optimal solution

The after sales service is able to speak the user's language and operates on a worldwide basis. This ensures that the service technicians do not have to travel far to make customer visits. The well thought-out service offer enables them to support the user to operate the machine in an optimal manner. And spare parts availability is guaranteed for a minimum of 10 years after installation.





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Manual control unit

EMC-tested control cabinet

Ergonomically arranged controls

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Latest software technology

Pictogramming

StuderGRIND programming software

Machine control and operation

The Fanuc 21i-TB 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.

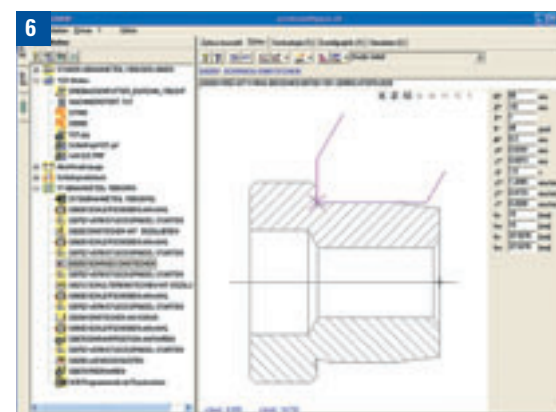
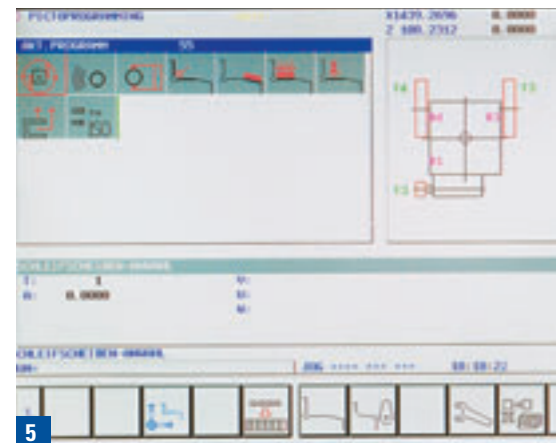
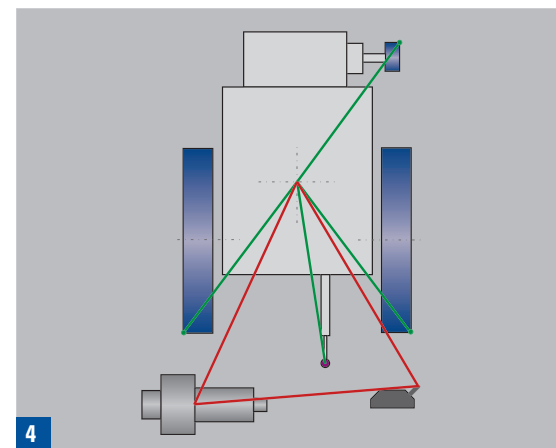
A special function – the Sensitron electronic contact detection device – reduces downtimes to a minimum.

- | | |
|--|--|
| 1 Machine control | 5 Pictogramming |
| 2 Manual control unit | 6 StuderGRIND modular programming software |
| 3 Internal view of the control cabinet | |
| 4 Quick-Set | |

Programming

The sophisticated mechanical engineering concept of the S33 is completed by a grinding software program developed in-house by Studer and continuously further optimized in collaboration with customers. This software offers:

- Pictogramming: The operator strings the individual grinding cycles together – the control unit generates the ISO code.
- Quick-Set: The software for grinding wheel alignment reduces resetting times by up to 90% (only available with the automatic turret wheelhead).
- Microfunctions: Free programming of grinding and dressing process sequences for optimization of the grinding process.
- StuderGRIND: Programming software for special applications such as form and thread grinding and profiling the grinding wheel for complex workpiece forms; the program is created on the PC and transferred directly to the machine control.





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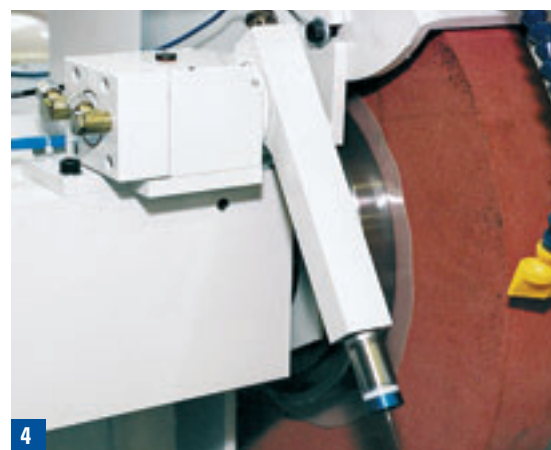


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- 1 | Electronic contact unit Sensitron
- 2 | Dynamic balancing system
- 3 | Measuring Amplifier
- 4 | Length positioning unit

Can be flexibly configured

Easy retrofitting possible



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Accessory kits

A strength of the S33 is that the customer can adapt it to varying requirements. He can extend the range of application of his machine with the help of accessory kits that are quickly available and easy to install. The following accessory kits are available:

Sensitron 2 electronic cut-in detection:

The Sensitron 2 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 MPM: 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 with manual adjustment of weights.

ES124 in-process gauging unit:

This accessory kit has two measuring circuits with which it controls the automatic sequence depending on workpiece dimension during external grinding. It thus helps to further increase process capability, productivity and quality.

Length positioning unit: This allows acquisition of the workpiece zero point in the Z-axis. When using Quick-Set, length positioning is necessary.

Measuring heads for the in-process gauging unit

The CR100 diameter measuring head is suitable for measuring uninterrupted surfaces. It has an electrical probe lift-off and uses one measuring circuit.

Diameter setting range: 4–100 mm (0.16"–3.9").

The CR257 diameter measuring head is suitable for measuring both uninterrupted and interrupted surfaces. It has an electrical probe lift-off and uses two measuring circuits.

Diameter setting range: 6–96 mm (0.2"–3.8").

The TMP91 length positioning measuring head is suitable for passive length positioning for uninterrupted and interrupted surfaces. It has an electrical probe lift-off and uses one measuring circuit.

Measuring range: ± 2.5 mm (0.1").

The CI213 match-measuring unit is suitable for manual measurement of inside diameters outside of the machine.



1 | Diameter measuring head CR100

2 | Diameter measuring head CR257

3 | Length measuring head TMP91

4 | Match grinding measuring unit CI213

Diameter measuring head CR100

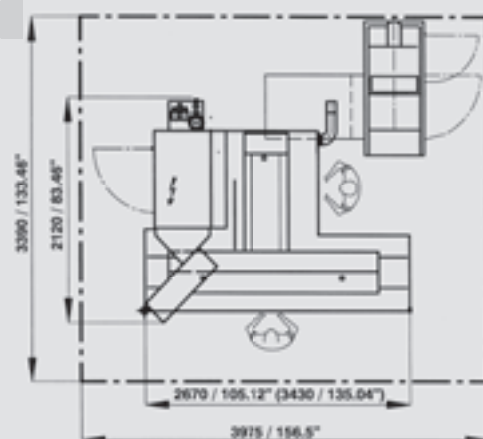
Diameter measuring head CR257

Length measuring head TMP91

Match grinding measuring unit CI213

Main dimensions		
Distance between centres	650/1000 mm (25.6"/39.4")	
Centre height	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	0,001–5000 mm/min (0.000,04–197 ipm)	
Resolution		
Rotational measuring system	0,0001 mm (0.000,004")	
[Option: linear measuring system	0,0001 mm (0.000,004")]	
Longitudinal slide: Z axis		
Max. travel	800/1150 mm (31.5"/45.3")	
Speed	0,001–10 000 mm/min (0.000,04–394 ipm)	
Resolution		
Rotational measuring system	0,0001 mm (0.000,004")	
[Option: linear measuring system	0,0001 mm (0.000,004")]	
Machine table swivelling range	8.5 deg	
Wheelhead		
	Type: external	Type: universal
Positive stop	0 deg/30 deg	
Swivel range	–15 deg to +195 deg	
Manual swivelling axis	2,5 deg Hirth	
Automatic swivelling axis	1 deg Hirth	
Fitting taper	dia. 63 mm (2.48")	dia. 63 mm (2.48")
Drive power	7.5 kW (10 hp) [9 kW (12 hp)]	7.5 kW (10 hp) [9 kW (12 hp)]
Grinding wheel right, dia. x width x bore	500 x 63 (80F5) x 203 mm 20" x 2.5" (3.15"F5) x 8"	500 x 63 (80F5) x 203 mm 20" x 2.5" (3.15"F5) x 8"
Circumferential speed	up to 50 m/s (9840 sfpm)	up to 50 m/s (9840 sfpm)
Internal grinding device for belt-driven spindles	dia. 100 mm (3.94")	
Speeds	20 000/40 000/60 000 rpm	
Internal grinding device for high frequency internal grinding spindles	dia. 120 mm (4.73")	
Speeds	24 000 – 120 000 rpm	

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.



Universal workhead	
Speed range	1–1500 rpm
Fitting taper	Morse 5
Spindle feedthrough	dia. 26 mm (1")
Drive power	1.6/3.0 kW (2.2/4 hp)
Load during live grinding	70 Nm (52 ft lbs)
Roundness accuracy during live grinding	0,0004 mm (0.000,016") (Option: 0,0002 mm/0.000,008")
Option:	
C axis standard, indirect measuring system	0,0001 deg
Tailstock	
Fitting taper	MK3
Travel of barrel	35 mm (1.37")
Diameter of barrel	50 mm (1.97")
Fine adjustment for cylindricity corrections	±40 µm (0.0016")
Control unit	
Fanuc 21/-TB	
Guaranteed working precision	
Straightness of the surface 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	20kVA
Air pressure	5.5 bar (80 psi)
Total weight	
Distance between centres 650 mm (25.6")	4000 kg (8800 lbs)
Distance between centres 1000 mm (39.4")	5000 kg (11 000 lbs)



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VDA6.4
certified

