

S131/S141/S151

The universal machines
for a broad range of internal cylindrical grinding applications.



Key data

The S131/S141/S151 cover a wide range of internal cylindrical grinding operations. With a choice of three lengths and three swing diameters, the right machine can be configured for every application. The maximum workpiece weight is 250 kg and the maximum length is 1 300 mm.

GLOBAL
TECHNOLOGY LEADER
PERFECTION
CUSTOMER FOCUS
EFFICIENCY
SAFETY
SOPHISTICATED PROCESSES
PRECISION

The Art of Grinding.

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GLOBAL
SOPHISTICATED PROCESSES
SAFETY

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 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. 22 000 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.

S131/S141/ S151

If you want to have state-of-the-art technology for your internal grinding applications too, then take a few minutes – for the S131/S141/S151. Whether flange parts or spindles up to 1300 mm (51.1") in length, they can master any challenge. The incomparable STUDER precision is based on the Granitan[®] machine bed and the StuderGuide[®] guideway system. During development the emphasis was placed on the machine ergonomics in relation to grinding, setup and maintenance.



General characteristics

Hardware

- StuderGuide® guide system with linear drive
- Grinding spindle turret with up to four grinding spindles
- Automatically swiveling workpiece table
- C-axis for workhead spindle for 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
- Short setup and resetting times e.g. with STUDER Quick-Set
- Standardized interfaces for loader and peripheral devices

S131

Specifications

The S131 is the most compact machine in this series. The swing diameter above the workpiece table is 250 mm, and the maximum workpiece length (including clamping device) is 300 mm. The S131 therefore shows its strength with flange parts and smaller workpieces of all types.

Dimension

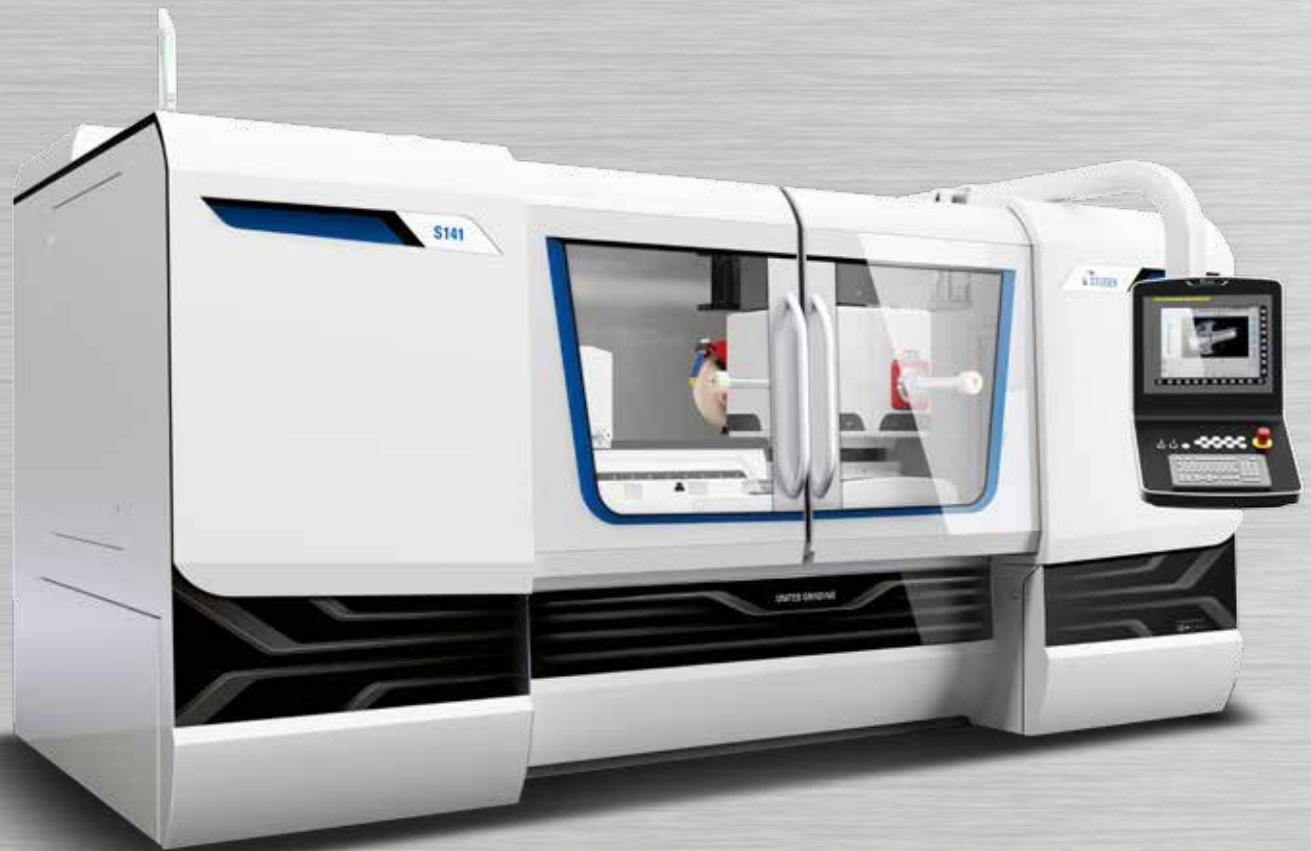
- Swing diameter above table 250 mm (9.8")
- Max. workpiece length (including clamping device) 300 mm (11.8")
- Internal grinding length 160 mm (6.3")
- Maximum workpiece weight 125 kg (275 lbs)

The S131/S141/S151 are CNC universal internal cylindrical grinding machines of the latest generation. They have a host of sophisticated technical features such as the revolutionary StuderGuide® guideway system, high-precision axis drives with linear motors, extremely fast direct drive of the grinding spindle turret, automatic swiveling of the workpiece table etc.

Precision is the result of perfect interaction between a large number of different factors. The basis is the machine bed comprising Granitan® S103 with its excellent cushioning and thermal behavior. The modules are ideally suited to each other and produced with the customary STUDER precis-

ion. The large distance between the guideways and the highly rigid slides provide the basis for the precision and productivity of these machines. All components involved in defining precision are temperature-stabilized.

StuderWIN creates a stable programming environment and contributes to efficient use of the machine. A PC is integrated into the CNC control system. The possibility of fully 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 drive elements are optimally adapted to the control.



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S141

Specifications

Three sizes are available for workpiece lengths (including clamping devices) of 300 mm, 700 mm and 1 300 mm. For all models the maximum grinding length is 250 mm for internal and 150 mm for external diameters. The S141 is the ideal machine for grinding spindle shafts, spindle casings, rotor shaft axes or flange parts. Many workpieces are in the areas of machine tools, drive elements, aerospace and die.

Dimension

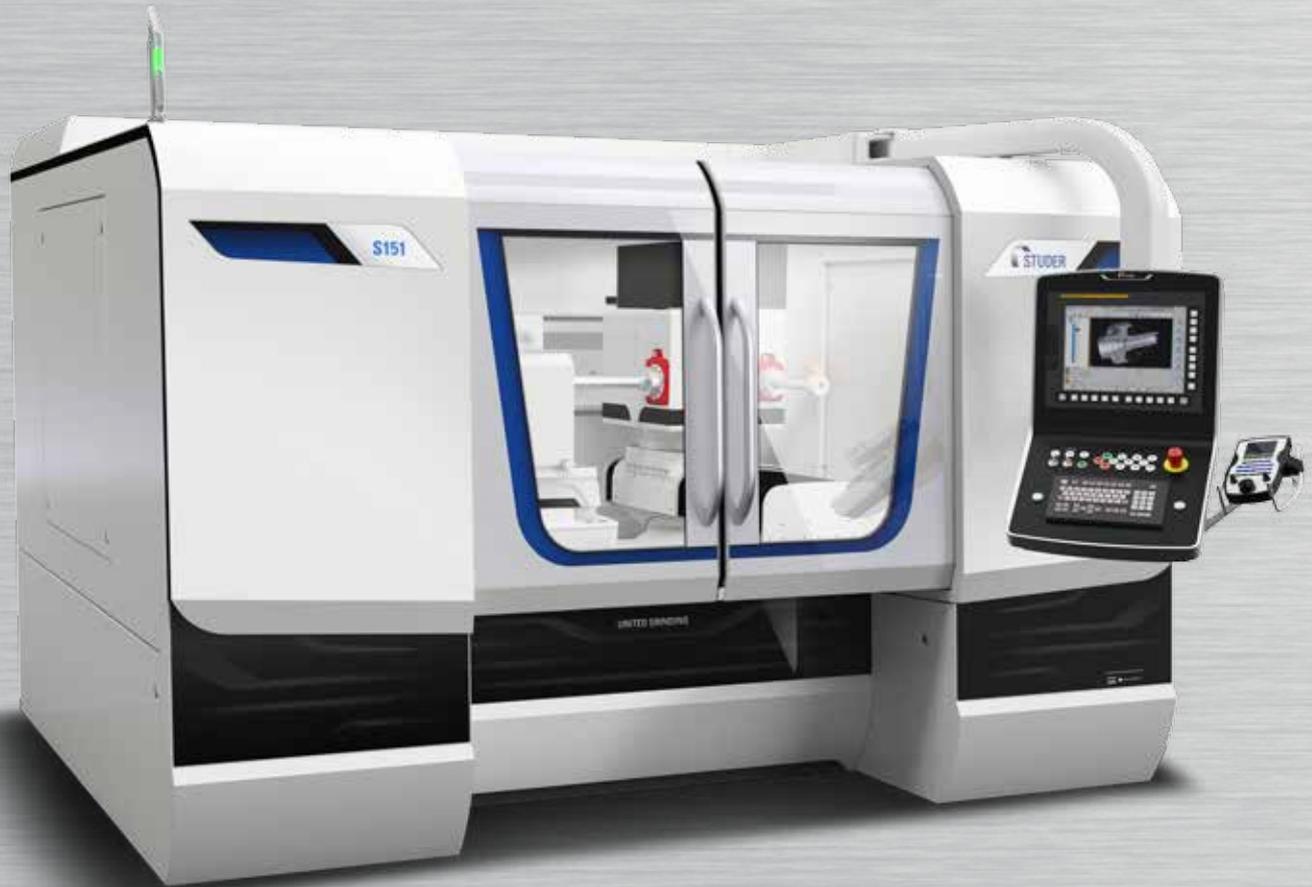
- Swing diameter above table 400 mm (15.7")
- Max. workpiece length (including clamping devices) 300/700/1 300 mm (11.8"/27.5"/51.1")
- Internal grinding length 250 mm (9.8")
- Maximum workpiece weight 250 kg (550 lbs)

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S151

Specifications

The S151 rounds off the upper end of the series. It is available in two sizes, for workpiece lengths (including clamping device) up to 700 mm or 1 300 mm. The swing diameter above the workpiece table is 550 mm. It is primarily used for machining large spindle shafts, spindle housings, rotor shafts or large flange parts.

Dimension

- Swing diameter above table 550 mm (21.6")
- Max. workpiece length (including clamping device) 700/1 300 mm (27.5"/51.1")
- Internal grinding length 390 mm (15.4")
- Maximum workpiece weight 250 kg (550 lbs)

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Machine overview

The S131, S141 and S151 form a complete series for every conceivable application in internal cylindrical grinding. Whether flange parts, spindle shafts, spindle housings, rotor shafts, bushes etc., wherever the highest precision and efficiency are required in internal cylindrical grinding, a machine from this series is the perfect solution. These machines set new standards in terms of technology, precision and cost effectiveness, enabling STUDER to strengthen its leading position in internal cylindrical grinding.

Each machine is based on the same state-of-the-art technology. The Granitan® machine bed offers excellent cushioning behavior, the StuderGuide® guide system with linear motors offers the highest possible geometrical traversing and guidance accuracy and the direct drive in the grinding spindle turret enables minimal positioning ranges. The series thoroughly impresses with its technical features and the proverbial STUDER precision. Whatever your internal grinding task, you will find the right machine here.



- 1 Max. workpiece diameter
- 2 Max. workpiece weight
- 3 Max. grinding depth (with swiveling turret)
- 4 Workpiece length (including clamping device)



- 1
- 2
- 3

1	dia. 250 mm (9.8")
2	125 kg (275 lbs)
3	160 mm (6.3")

L = 300 mm (11.8")	S131
L = 700 mm (27.5")	
L = 1300 mm (51.1")	

- 4



dia. 400 mm (15.7")	dia. 550 mm (21.6")
250 kg (550 lbs)	250 kg (550 lbs)
250 mm (9.8")	390 mm (15.4")
S141	
S141	S151
S141	S151

Granitan® S103

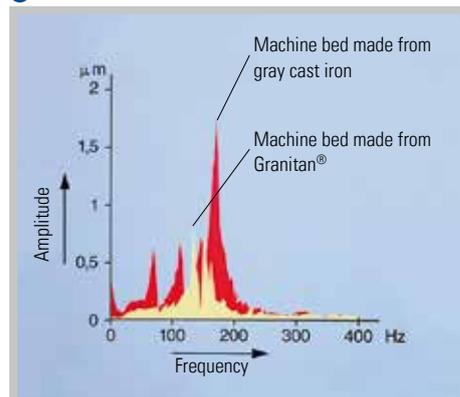
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- Vibration-damping
- Thermally stable
- Non-wearing

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 cushioning behavior of the machine bed 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 slide is formed directly in the machine bed and coated with Granitan® S200 wear-resistant guideway surfacing material. The guideways offer the highest 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 more or less completely retained.

2



1 Machine bed with longitudinal guides

2 Vibration behavior of gray cast iron and Granitan® S103

StuderGuide® in the longitudinal and transverse axis

1**2**

- High geometrical traversing accuracy
- Effective covering of the guideways

The StuderGuide® guide system for the X- and Z-axis is coated with Granitan® S200 wear-resistant guideway surfacing material and offers the highest possible accuracy through the entire speed range with high load capacity and cushioning levels. StuderGuide® extends the benefits of hydrostatic systems and guideways with a patented surface structure. A big advantage of StuderGuide® in comparison with hydrostatic guides is the cushioning component in the direction of

motion. The slides are powered by linear motors with direct measuring systems with a resolution of 10 nanometers. The maximum travel speed is 20 m/min for both axes. This provides the basis for high-precision and efficient grinding with the shortest possible auxiliary times. The combination of StuderGuide®, linear motors and direct measuring systems guarantee the highest possible interpolation accuracies.

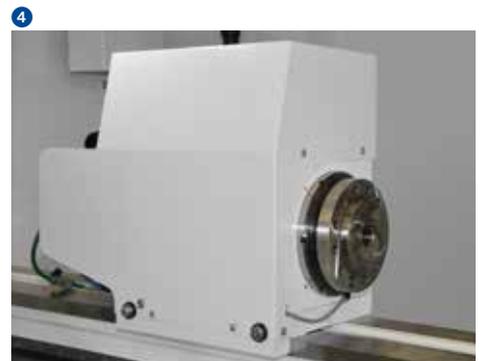
Grinding spindle turret



- Large selection of grinding spindles
- External grinding wheel changed in just a few movements

The spindle turret with integrated swivel axis enables the use of up to four grinding spindles (including a maximum of two external grinding spindles) and a universally usable measuring probe. The swivel axis has a direct drive which enables very quick and precise positioning. The high-resolution direct measuring system guarantees a positioning range of $<1''$. This allows complete machining of workpieces in the same clamping – with minimal auxiliary times and highest precision.

Workpiece table

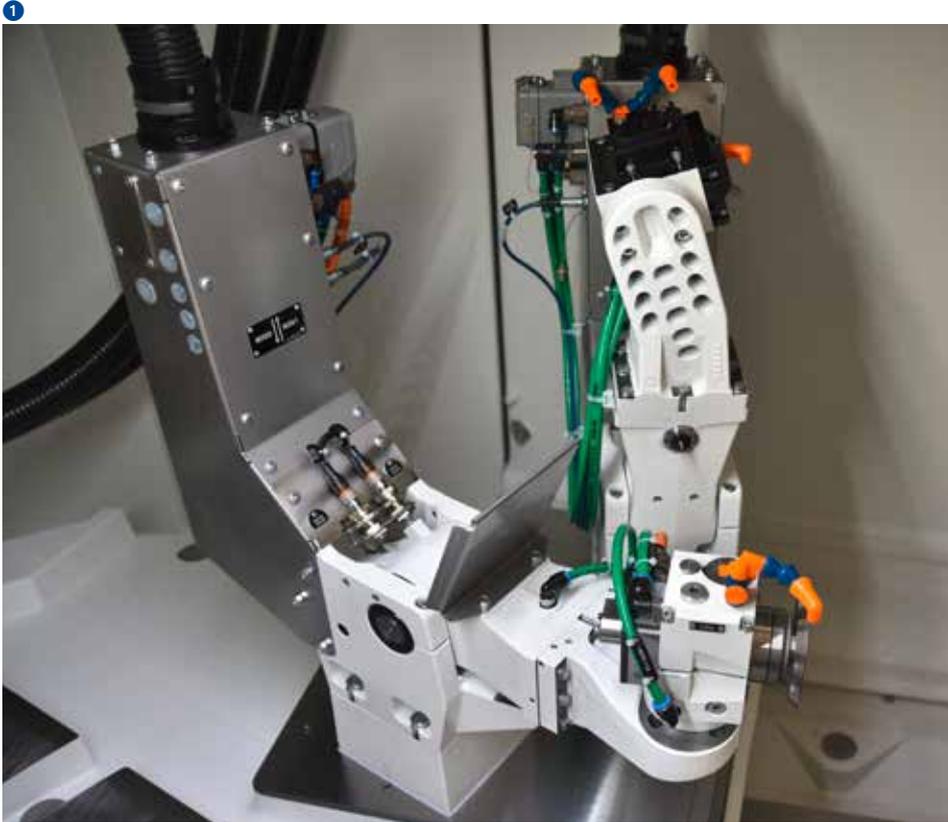


- Workhead adjustable for long workpieces
- Swiveling table for axis-parallel grinding of tapers
- Good ergonomics

The workhead is adjustably mounted on a swiveling table. The automatic swivel axis has a swiveling range of - 10 to +20 deg. The automatic swiveling action allows axis-parallel grinding of cylinders and various high-precision tapers in a single clamping. The machine concept allows optimum accessibility for the operator, whether for workpiece changeover, dressing or grinding wheel change. Different workheads are available, all equipped with an air lift for easy movement

during setup and resetting. The motorized workhead with a driving power of 10 kW (13.6 hp) has a high-precision C-axis and is ideally suited for form grinding. The chuck workhead with pre-tensioned precision ball bearings allows clamping of workpieces including clamping device up to a load of 400 Nm (298 ft lbs).

Dressing



- Configurable according to client's requirements
- Rotating or stationary dressing tools can be used

An easy-cutting grinding wheel is essential for cost-effective and high-quality grinding. Rotating and fixed dressing tools can be mounted on two pivoting dressing units. This makes it possible to coordinate the dressing process flexibly and optimally with the characteristics 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 facilitates the development of grinding programs. A software package is available to fine tune the dressing process and includes additional dressing functions.



Control system and operation

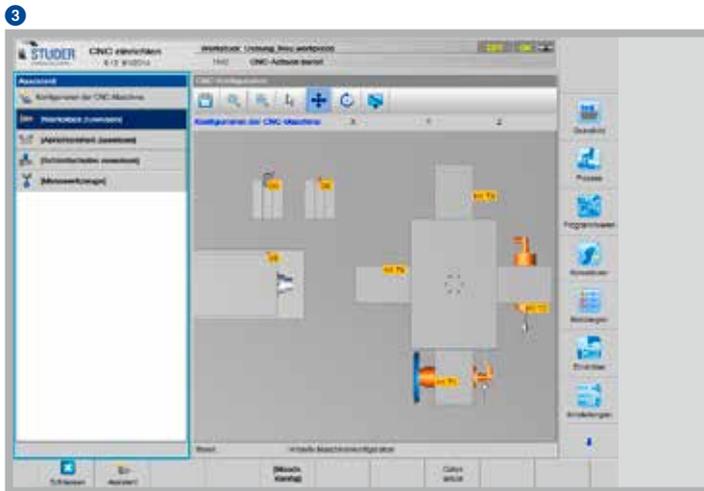
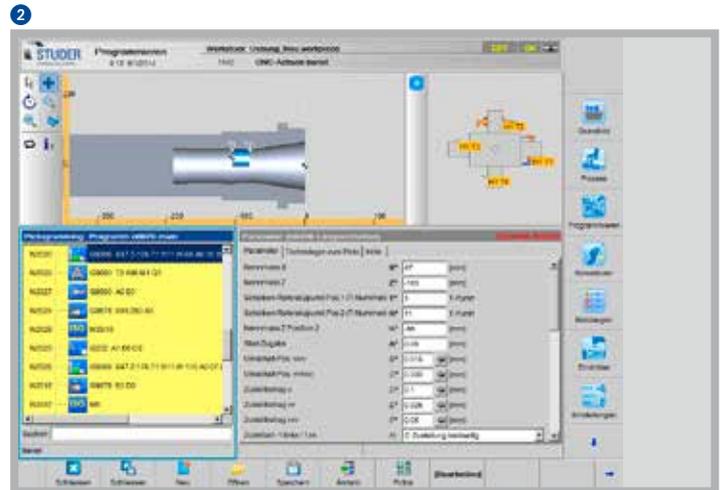
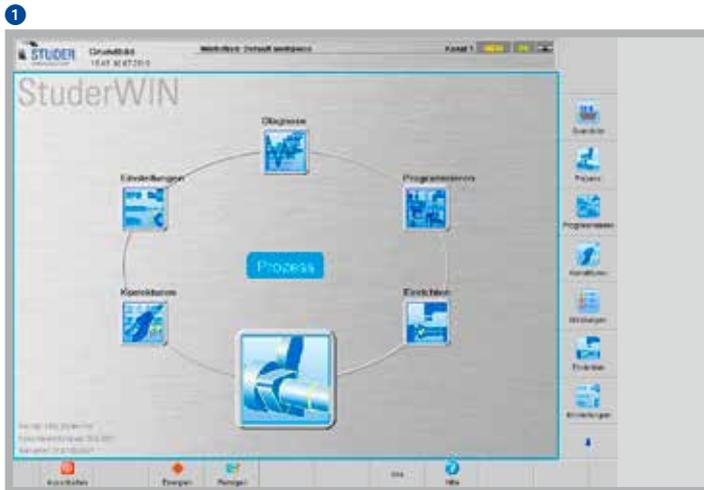


- PCU manual control unit
- EMC-tested control cabinet
- Ergonomically designed Operating elements

The Fanuc 31*i*-B series control system has an integrated PC. The 15" touch screen facilitates intuitive operation and programming of the machine. All operating elements 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.



StuderWIN



- Latest software technology
- StuderPictogramming

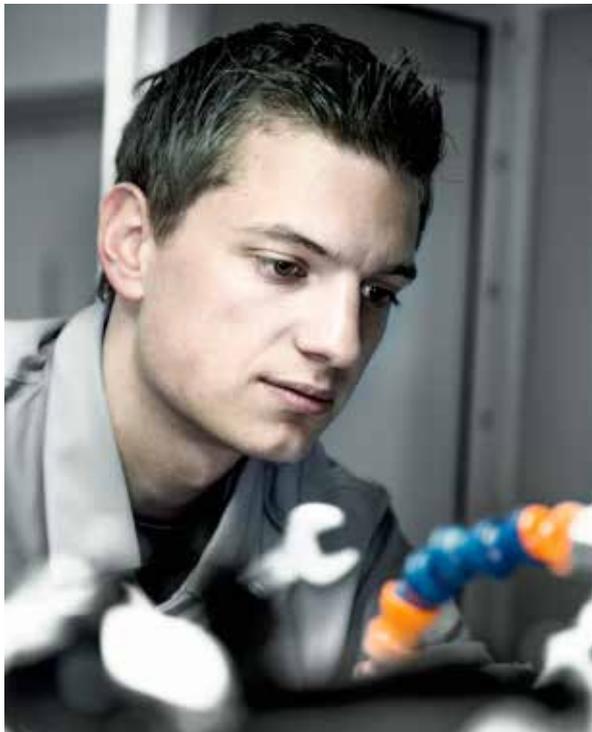
The StuderWIN operator interface creates a stable programming environment and contributes to efficient use of the machine. The possibility of fully integrating the in-process gauging and sensor technology for process monitoring as well as contact detection and automatic balancing systems in the operator interface enables standardized programming of the different systems. The drive elements are optimally adapted to the control. The sophisticated mechanical engineering concept is completed by a grinding software program developed in-house by STUDER and which is continuously further optimized in collaboration with users. This software offers:

- StuderPictogramming: The operator strings the individual grinding cycles together – the control unit generates the ISO code.
- STUDER Quick-Set: The setup support software 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 grinding technology calculation, optimized dressing as well as contour, thread and form grinding additionally increase the machine's functionality.

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



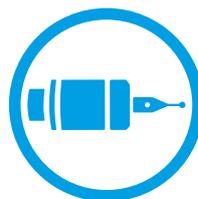
Prevention

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

	S131	S141	S151
Swing diameter over the table	250 mm (9.8")	400 mm (15.7")	550 mm (21.6")
Part length including clamping devices max.	300 mm (11.8")	300/700/1300 mm (11.8"/27.5"/51.1")	700/1300 mm (27.5"/51.1")
Internal grinding length max.	160 mm (6.3")	250 mm (9.8")	390 mm (15.4")
External grinding length max.	125 mm (4.9")	150 mm (5.9")	150 mm (5.9")

Transverse axis X

Max. travel	350 mm (13.8")	425 mm (16.7")	500 mm (19.7")
Speed	0.001–20000 mm/min (0.000,04–787 ipm)	0.001–20000 mm/min (0.000,04–787 ipm)	0.001–20000 mm/min (0.000,04–787 ipm)
Resolution	0.00001 mm (0.000,000,4")	0.00001 mm (0.000,000,4")	0.00001 mm (0.000,000,4")

Longitudinal axis Z

Max. travel	400 mm (15.7")	500/700 mm (19.7"/27.5")	500/700 mm (19.7"/27.5")
Speed	0.001–20000 mm/min (0.000,04–787 ipm)	0.001–20000 mm/min (0.000,04–787 ipm)	0.001–20000 mm/min (0.000,04–787 ipm)
Resolution	0.00001 mm (0.000,000,4")	0.00001 mm (0.000,000,4")	0.00001 mm (0.000,000,4")

Swiveling table

Swiveling range, continuously adjustable	-10 to +20 deg	-10 to +20 (+15) deg	-10 to +20 (+15) deg
Repetition accuracy	<1"	<1"	<1"
Swiveling time for 20 deg	<3s	<3s	<3s

Grinding spindle turret

Spindle set-up	Turret	Turret	Turret
Max. number of spindles	4	4	4
Swiveling range	-50 to +280 deg	-50 to +280 deg	-50 to +280 deg
Repetition accuracy	<1"	<1"	<1"
Swiveling time for 180 deg	<3 s	<4 s	<4 s
Resolution	0.00005 deg	0.00005 deg	0.00005 deg

Internal grinding

Locating bore	dia. 100/120 mm (3.9"/4.7")	dia. 120/140 mm (4.7"/5.5")	dia. 120/140 mm (4.7"/5.5")
Speeds	24000–120000 rpm	6000–120000 rpm	6000–120000 rpm
Grinding mandrel length (swiveling on the turret)	max. 175 mm (6.9")	max. 265 mm (10.4")	max. 405 mm (16")

External grinding

Peripheral speed	50 m/s (9840 sfpm)	50 m/s (9840 sfpm)	50 m/s (9840 sfpm)
Fitting taper	HSK-C50	1 : 10/40 mm (1.57")	1 : 10/40 mm (1.57")
Grinding wheel	dia. 250/50 x 25 mm (10"/2"x1")	dia. 300/127 x 32 mm (12"/5" x 1.26")	dia. 300/127 x 32 mm (12"/5" x 1.26")

Options

Measuring probe
Manual balancing

Chuck workhead

	S131	S141	S151
Rpm range	1 – 1500 rpm	1 – 500 rpm	1 – 500 rpm
Holding fixture	A4 according to DIN/ ISO 702-1/MK5	A8 according to DIN/ ISO 702-1	A8 according to DIN/ ISO 702-1
Bar capacity	35.5 mm (1.4")	40 mm (1.5")	40 mm (1.5")
Driving power	1.6 kW (2.2 hp)	3 kW (4 hp)	3 kW (4 hp)
Load for live spindle grinding	300 Nm (224 ft lbs)	400 Nm (298 ft lbs)	400 Nm (298 ft lbs)

C-axis for form grinding

- High-precision, direct measuring system	0.0001 deg	–	–
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Motorized workhead ISO50

Rpm range	–	1 – 1500 rpm	1 – 1500 rpm
Fitting taper / cylindrical external mounting	–	ISO50/dia. 110 mm	ISO50/dia. 110 mm
Bar capacity	–	dia. 50 mm (1.9")	dia. 50 mm (1.9")
Driving power	–	10 kW (13.6 hp)	10 kW (13.6 hp)
Load for live spindle grinding	–	500 Nm (372 ft lbs)	500 Nm (372 ft lbs)

C-axis for form grinding

- High-precision, direct measuring system	–	0.0001 deg	0.0001 deg
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Control system

Fanuc 31i-B with integrated PC
15" touch screen

Connected loads

Total connected load	32 kVA	32 kVA	32 kVA
Air pressure	5.5 bar (80 psi)	5.5 bar (80 psi)	5.5 bar (80 psi)
Extraction capacity for cooling lubricant mist	1 200 – 1 800 m ³ /h	1 200 – 1 800 m ³ /h	1 200 – 1 800 m ³ /h
Total weight	5 200 kg (11 440 lbs)	7 000/9 000/12 000 kg (15 400/19 800/26 400 lbs)	9 000/12 000 kg (19 800/26 400 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, colors, etc. of the machines supplied can differ. The diverse application possibilities of our machines depend on the technical equipment

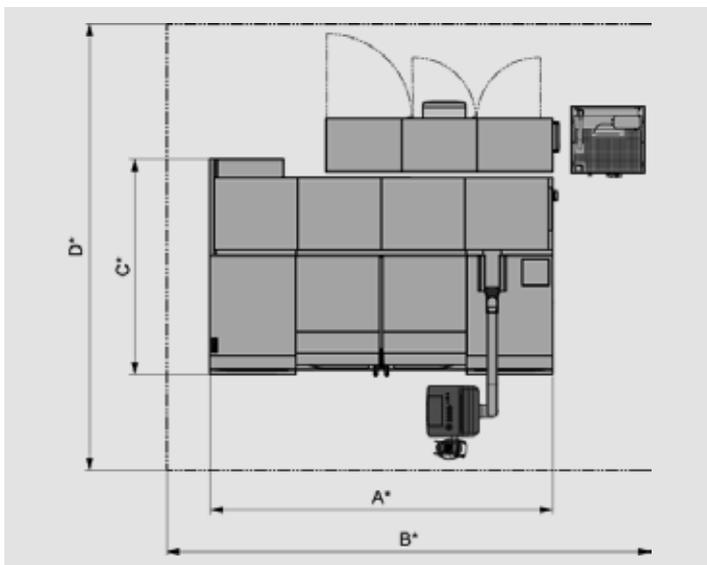
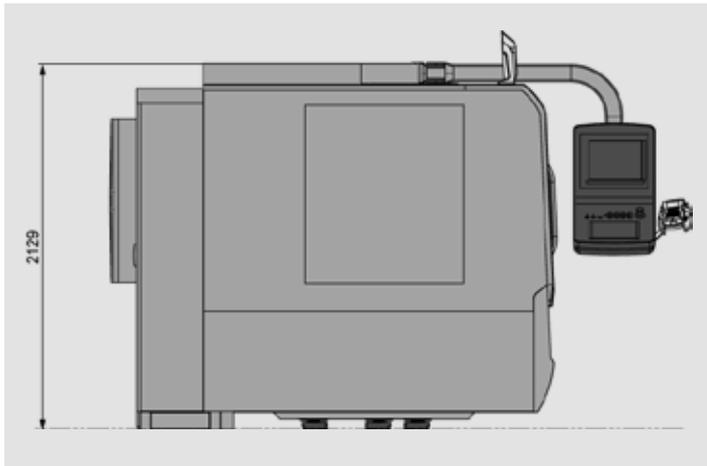
specifically requested by our customers. The equipment specifically agreed with the customer is therefore exclusively definitive for the equipping of the machines, and not any general data, information or illustrations.

Installation plans

S131 model	A*	B*	C*	D*
S131-300	2270	4050	2030	4030

S141 model	A*	B*	C*	D*
S141-300	2800	4580	2110	4280
S141-700	3200	4980	2025	4200
S141-1300	4160	5940	2025	4200

S151 model	A*	B*	C*	D*
S151-700	3255	5035	2140	4560
S151-1300	4160	5940	2140	4560





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VDA6.4
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