TECHNICAL DATA
Centerless Grinding Machine

manufacturer	**SCHAUDT MIKROSA**
type	**KRONOS S 250**
built	**2010**

The KRONOS S 250 is designed for workpieces in the diameter range of 1.5 to 35 mm. It offers plunge cut and throughfeed grinding method with a plunge cut width up to 245 mm.
It is the perfect machine for mass production of small precision workpieces.

Grinding range			
Min./max. grinding diameter	1,5/35	mm	
Max. grinding length while plunge grinding	245	mm	
Grinding wheel diameter x width	450 x 250	mm	
Regulating wheel diameter x width	250 x 250	mm	
Profiling of grinding wheel by diamond roll			
Dynamic balancing unit			manufacturer DITTEL
Workpiece handling			

Machine bed made of mineral casting

- thermostable and vibration damping
- Foundation area 3,200 x 2,000 mm
- Coolant discharge height approx. 500 mm
- integrated bed flushing
- levelling elements
- Recesses for transport
- Elements for mounting the switch cabinet

Cross slide systems on the grinding wheel side X-slide

- for wear compensation of the grinding wheel and the infeed movement for grinding and for dressing (X1 axis) with recirculating roller guides
- Adjustment by means of digital three-phase servomotor via ball screw drive
- smallest infeed increment 0.1 µm
- Equipment with glass scale Z-slide
- arranged on the X-slide
- for transverse movement of the grinding wheel during dressing (Z2 axis) with recirculating roller guides
- Adjustment by means of digital three-phase servomotor via ball screw drive
- smallest infeed increment 0.1 µm

grinding wheel headstock

- with integrated protective cover in cast steel design
- attached to Z-slide
- Mounting of a grinding spindle with bearings on both sides
- 6° inclined

grinding spindle

- mounted on both sides in anti-friction bearings
- suitable for 250 mm wide grinding wheels
- long-life grease lubrication
- Bore diameter of the grinding wheel 203.2 mm
- Max. Speed 7.200 min-1

Drive grinding spindle

- Main drive for grinding wheel circumferential speed 40....150 m/sec

via three-phase main spindle motor 15 kW (water-cooled)
Remark:
Use of recooling system or use of an existing cooling circuit
Coolant conditions:

- Filter fineness 100 µm
- Cold water flow 8 l/min
- Cooling capacity 2750 W
- Coolant inlet temperature <25°C
- Cooling medium - water or low-viscosity oils

Cross slide systems on the regulating wheel side X-slide

- for wear compensation of the regulating wheel and the feed motion for dressing (X4 axis) with recirculating roller guides
- Adjustment by means of digital three-phase servomotor via ball screw drive
- smallest infeed increment 0.1 µm
- Equipment with glass scale

Z-slide
- arranged on the X-slide
- for transverse movement of the regulating wheel during dressing (Z3 axis) with recirculating roller guides
- Adjustment by means of digital three-phase servomotor via ball screw drive
- smallest infeed increment 0.1 µm

bearing housings
- with drive for control spindle
- arranged on the Z-slide

regulating wheel lowering
- manual clamping
- Adjustment via adjusting spindle
- Maximum lowering -20 to +40 mm
- Angle of inclination at maximum lowering +/- 5°

Control Spindle

- mounted on both sides in anti-friction bearings
- suitable for 250 mm wide regulating wheels
- long-life grease lubrication
- Bore diameter of the disc 127 mm
- Control spindle drive via three-phase servo motor 5 kW
- Dressing speed max. 1,000 min-1
- Working speed max. 500 min-1

Diamond roller device (without diamand roller)

- located in the centre of the machine on the working level

Complete with:
- Bearing for diamond roller mandrel
- direction of rotation in the same and opposite direction
- Spindle speed up to 9.000 min-1
- Speed and coolant flow monitoring
- diamond roll mandrel
- Drive via three-phase motor
- swiveling -3°<->0°<->+3° -3°->0°<->+3° -3°->0°->+3°-+3° -3°->+3°
- Clamping width up to 135 mm
- Diamond profile roller diameter 95 mm
- Diamond form roller diameter 125 mm
- Diamond roll mandrel diameter 52 mm

Dressing device for regulating wheel

- suitable for holding standing dressing tool (M 14 x 1)
- located in the centre of the machine on the working level

Full protection of working area

- for coolant mist shielding with electrical safety door monitoring
- Safety glass windows
- Connecting piece for external oil mist extraction system

Electrical system with switch cabinet and control unit

- Switch cabinet permanently attached to the machine
- Grid feed in from above
- Switch cabinet cooling via external service water cooling (not included in scope of delivery)
- Operating voltage 400 V, 50 Hz

CNC control:

- CNC control SIEMENS SINUMERIK 840 D and inverter system SIMODRIVE 611 D
- Control panel can be swivelled and attached to the control cabinet
- second identical control panel on the rear side of the machine
- Operating panel front OP010 with 10.4" TFT colour display
- 19" Push Button Panel (PP012) and user-specific extensions of the PP012
- 3 spindles and 4 position-controlled servo axes with digital setpoint interface
- Use of "Safety Integrated" with fail-safe modules (Profisafe)
- Parameter selection, fault diagnosis and operator guidance through clear menu structure
- Constant grinding and regulating wheel peripheral speed
- Integrated hardware and software for remote diagnosis and teleservice
- Connection via Ethernet

Additional monitoring of complete machine

Handset:

- incl. function extension
- Start/Stop Produce
- Input correction of the grinding gap with confirmation
- retreat
- emergency stop
- Move to home position
- acknowledgement button
- override switch
- incl. 10 m cable
- pluggable to main control unit

Grinding wheel incision detection:

- in conjunction with profile roller truing device

consisting of

- Electronics AE6000 incl. software for 4 sensors

Function:

- visual control with indication on the display
- Cut recognition of the grinding wheel during dressing

Dresser detection control wheel

- in conjunction with dresser detection Grinding wheel
consisting of
- additional sensor
Function:
- visual control with indication on the display
- Bleed detection of the regulating wheel during dressing
Incision detection workpiece:
- in conjunction with dresser detection Grinding wheel
- 1 sensor
Function:
- visual control with indication on the display
- Cut detection of the grinding wheel on the workpiece

Dynamic balancing device DITTEL

consisting of
- 1 built-in balancer with integrated conless receiver
- 1 control unit in control cabinet
- 1 electronic display integrated in the control panel
- 1 conless transmitter with speed sensor

Fire extinguishing system BATEC

- CO^2 fire extinguishing system completely installed (delivery without CO^2 bottle)
- Interface to the machine control system
- Detector for switching off machine function
- controlled fire damper at the suction nozzle

Preperation of external coolant system

consisting of
- electric main coolant valve mounted on the machine
- Coolant return interface
Coolant used so far: Oil
Maximum temperature: 25 °C
Temperature constancy: +/- 1 °C/h
Quantity: 150 l/min
Pressure: 3,5 bar
filtration degree: 20 µm
- Connection for a rinsing gun incl. holder for cleaning the interior of the machine
- prepared for high pressure rinsing of the grinding wheel, operating pressure approx. 10 bar, (high pressure)
pressure pump not included)

Automatic warm-up of the basic machine

The warm-up function shortens the starting phase of the grinding machine. Conditions for the machine is ready for warm-up:
- Machine is in basic position
- No emergency stop error message is pending
- No retraction Error message is pending
- Drives and control voltage are switched off
- Compressed air is available

The machine is started via software time switch with the following sequence:
- Switch on control voltage
- Switch on drives
- Referencing of all NC axes
- Switch on grinding wheel, regulating wheel and coolant.
- Disable screen darkening

Automation for loading and unloading rotor shafts

Designed for maximum workpiece diameter 60 mm, maximum workpiece length 160 mm
basic handling
- external with usable table width 750 mm
- NC axes for horizontal and vertical travel

loading portal
- base frame
- 2 NC axes for horizontal and vertical movement

Basic gripping device 1-fold mechanical
- for attachment to the basic handling system
- mechanical gripper basic device for radial gripping of the shafts
- 1 pair of gripper fingers each for radial gripping adapted to previous workpieces
- 1 delivery prism for 1 finished part, arranged below the horizontal axis

infeed belt - prism cycle belt
- Length approx. 800 mm
- with substructure and support at belt end
- Side and top guide for securing the workpiece position
- single-track prismatic clockband
- Belt with prismatic milling on the transport side for the exception of the workpieces
- Sensoric position control and sensoric recognition of workpiece presence
- Storage capacity for approx. 9 workpieces

Converter, Feeder
- with mechanical radial gripper
- Converter with a pneumatic horizontal and vertical axis and integrated, displaceable intermediate stop module
- 1 set of gripper fingers

The converter can move to three different positions (infeed cycle belt, measuring point, intermediate deposit prism under the loader axis).

Preparation for integration of a measuring point
- Measuring point integration for pre-process length measurement and DMC
- Integration of a measuring point to be mounted from the handling table

Clip-on prism for measured workpiece blank
- for depositing the measured raw part under the horizontal axis of the gantry loader in transfer position of the gripper

Pneumatically driven drawer

- is moved into the traverse path of the Horizotal axis if SPC is required
- is equipped with a bowl to hold the workpieces

NIO clockband
- Length approx. 1,200 mm
- with 2 workpiece tracks
- 3-track conveyor belt for separate depositing of workpieces with the NIO features "DMC not read" and "length tolerance not met."
- Each workpiece track is assigned a NIO marker.
- with substructure and support at belt end
- Side and top guide for securing the workpiece position
- single-track prismatic clockband
- Belt with prismatic milling on the transport side for holding the workpieces
- Sensory position control and sensory recognition of workpiece presence
- Storage capacity sufficient for approx. 16 workpieces
- the NIO band can be clocked manually via a button

Automatic central lubrication
- Automatic lubrication of all guide axes via a central pump lubrication unit

Other
- Protective device (CE-compliant), window areas equipped with Makrolon, 2 large double-action Doors with EUCHNER safety switches
- Pneumatic device with maintenance unit and soft start
- Electrics at the Profibus

Measurement control for rotor shafts

consisting of:
measuring device
- one base plate each prepared for integration into the loader
- Integration of 2 measuring systems in separate mechanical extensions
- Version complete with maintenance unit, cylinders, valves and proximity switches
- wired to Muhr CUbe67
- manual calibration of the measuring point by the operator

Measuring electronics P7me with housing IP 54
- for measured value acquisition
- with Profibus interface
- Transfer of the measurement data to the machine control system
- with software

Length measuring system

- required for actual measurement of the base "B" to the stop side
- for integration in charging automation

-2 Workpiece pre-feed prisms
- horizontal slide unit (pneumatically adjustable)
- Preparation for integration of a reader for DMC acquisition
- mechanical device for rotation of the parts for DMC detection

Measuring device "Rotor
consisting of
- Pre-process measuring device for length measurement before grinding operation
- with horizontal workpiece support
- with workpiece orientation
- with one probe against mechanical reference
- Connection to common measuring electronics with post-proc

Equipment/accessories

- Centerless external cylindrical grinding machine KRONOS S 250 for plunge-cut grinding (6°)
- Dynamic balancing device make DITTEL
- Grinding wheel holder with balancing weights
- Stand for control spindle with portal bearings
- Device for adjusting the height of the workpiece
- Coolant main valve (electric) for connection to central coolant supply
- machine light
- Equipping the feed axis Z2 with glass scale
- Equipping the feed axis Z3 with glass scale
- Interface for a central coolant system
- Interface for coolant return
- Automation for loading and unloading rotor shafts
- Extension of the control components integrated in the control cabinet
- Electrical and mechanical interface for loading and unloading system
- Interface for a DataMatrixCode reader
- Electrical interface for measurement control (32 I/O)
- Workpiece support holder for plunge grinding
- Workpiece support for plunge grinding
- Pneumatically actuated hold-down device
- Needle nozzles for plunge grinding (depending on workpiece)
- Adjustable stop for workpiece support holder
- Additional monitoring of complete machine
- second control panel at the rear of the machine
- operating handset
- Cut detection Grinding wheel
- Bleed detection Control wheel
- Cut Recognition Workpiece
- grinding wheel flushing
- Additional regulating wheel unit
- fire extinguishing system
- Extension of the switch cabinet cooling system

- Cooling of the control point
- Automatic warm-up

The machine was connected to a central coolant supply (grinding oil), and is
therefore supplied without its own coolant system.
The cooling of the grinding motor as well as the switch cabinet was carried out by decentralised service water cooling and must be ensured by a new cold water unit if necessary.