

Round grinding machines

Herbert Arnold GmbH & Co. KG Weilburg
Amtsgericht Limburg HRA-Nr. 2032 P.h.G.: H. u. W. Arnold GmbH Weilburg
Amtsgericht Limburg HRB-Nr. 3071 Geschäftsführer: Dipl.-Ing. Wolfram Arnold

Address

Herbert Arnold GmbH & Co. KG
Weilstrasse 6
D-35781 Weilburg

Telephone: +49 (0) 64 71 93 94 -0
Telefax: +49 (0) 64 71 20 65
E-Mail: info@h-arnold.de
Website: www.h-arnold.de

According to specification:
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Round Grinding Machine 72/856.600-156/210

Item number: VT4-00221

Category: Round grinding machines



This machine is suitable for chamfering and round grinding of squared mono-crystalline silicon workpieces in the format of 156 x 156 mm² and 210 x 210 mm², with three grinding aggregates (2 x pre-, 1 x fine grinding) and one additional grinding aggregate for OD grinding. Workpiece lengths of 180 up to 600 mm can be processed. The fully automatic grinding machine excels by the following advantages:

- grinding of flat (45°) and round chamfers
- unique, pneumatic clamping and centring of the workpieces, even in the case of a rectangular brick shape
- the squared ingots can be processed without preparation (for instance gluing of centring- or clamping-pieces)
- automatic edge detection and adjustment of grinding tools with ingot length detection, for an optimized cycle time, by using high-resolution measurement systems
- detection and evaluation of the work piece specific quality data after grinding, for instance chamfer size, chipping and un-grinded chamfer-area
- based on ingot defects incl. an evaluation of useable ingot lengths
- automatic wheel wear compensation
- equipped with two loading areas for manual and fully automatic loading, for instance with the help of an industrial robot
- high throughput, even when a high removal of silicon is achieved by using 4 grinding wheels with a separate pre- and fine grinding process, for instance: Ingot diameter as grown: \varnothing 203 mm Final ingot diameter: \varnothing 195 mm Ingot length: 500 mm Cycle time: 30 Min. Machine capacity: approx. 15.000 bricks/year (based 24/7-production) Quality data of workpiece:
 - DIN EN ISO 1101 evenness +/- 0,1 mm
 - DIN EN ISO 1101 roundness $\leq 0,1\text{ mm}$ up 200 mm
 - DIN EN ISO 1101 concentricity $\leq 0,2\text{ mm}$
 - surface roughness Ra $\leq 0,15\text{ }\mu\text{m}$

- grinding spindles (4 pieces) with air protected spindle bearings
- infinitely variable grinding spindle drive (4 pieces) via AC-servo motor
- linear axis (5 pieces) with ballscrew via AC-servo motor drive
- CPU Siemens S7/317
- high end industrial PC with dual core processor
- 15" tough panel with HMI, visualisation based on WinCC flexible
- integrated recipe management
- high-resolution laser measuring sensors (2 pieces)
- Option: ARPAT – “Arnold Remote Production Analysis Tool“ – machine internal MES

Workpiece length	180 - 600 mm
Workpiece format	156 x 156 mm ² , 210 x 210 mm ²

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Weight	approx. 8200 kg
Machine measurements (LxWxH)	approx. 6800 x 2290 x 2035 mm

Round Grinding Machine 72/856.1000-125/156

Item number: VT4-00222

Category: Round grinding machines



This machine is suitable for chamfering and round grinding of squared mono-crystalline silicon workpieces in the format of 125 x 125 mm² and 156 x 156 mm², with three grinding aggregates (2 x pre-, 1 x fine grinding) and one additional grinding aggregate for OD grinding.

Workpiece lengths of 450 up to 1000 mm can be processed.

The fully automatic grinding machine excels by the following advantages:

- grinding of flat (45°) and round chamfers
- unique, pneumatic clamping and centring of the workpieces, even in the case of a rectangular brick shape
- the squared ingots can be processed without preparation (for instance gluing of centring- or clamping-pieces)
- automatic edge detection and adjustment of grinding tools with ingot length detection, for an optimized cycle time, by using high-resolution measurement systems
- detection and evaluation of the work piece specific quality data after grinding, for instance chamfer size, chipping and ungrounded chamfer-area
- based on ingot defects incl. an evaluation of useable ingot lengths
- automatic wheel wear compensation
- equipped with two loading areas for manual and fully automatic loading, for instance with the help of an industrial robot
- high throughput, even when a high removal of silicon is achieved by using 4 grinding wheels with a separate pre- and fine grinding process, for instance:
 - Ingot diameter as grown: \varnothing 204 mm
 - Final ingot diameter: \varnothing 200 mm
 - Ingot length: 1000 mm
 - Cycle time: 48 Min.
 - Machine capacity: approx. 9.800 bricks/year (based 24/7- production)
- Quality data of workpiece:
 - DIN EN ISO 1101 evenness +/- 0,1 mm
 - DIN EN ISO 1101 roundness < 0,1 mm up 200 mm
 - DIN EN ISO 1101 concentricity $\pm 0,2\text{ mm}$
 - Average value Ra $\pm 0,15\ \mu\text{m}$

- grinding spindles (4 pieces) with air protected spindle bearings
- infinitely variable grinding spindle drive (4 pieces) via AC-servo motor
- linear axis (5 pieces) with ballscrew via AC-servo motor drive
- CPU Siemens S7/317
- high end industrial PC with dual core processor

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- 15" touch panel with HMI, visualisation based on WinCC flexible
- integrated recipe management
- high-resolution laser measuring sensors (2 pieces)
- Option: ARPAT – "Arnold Remote Production Analysis Tool" – machine internal MES (option)

Workpiece length	450 - 1000 mm
Workpiece format	125 x 125 mm ² ; 156 x 156 mm ²
Weight	approx. 8200 kg
Machine measurements (LxWxH)	approx. 6800 x 2290 x 2035 mm

Round Grinding Machine 72/856.1000-156/210

Item number: VT4-00223

Category: Round grinding machines



This machine is suitable for chamfering and round grinding of squared mono-crystalline silicon workpieces in the format of 156 x 156 mm² and 210 x 210 mm², with three grinding aggregates (2 x pre-, 1 x fine grinding) and one additional grinding aggregate for OD grinding. Workpiece lengths of 450 up to 1000 mm can be processed. The fully automatic grinding machine excels by the following advantages:

- grinding of flat (45°) and round chamfers
- unique, pneumatic clamping and centring of the workpieces, even in the case of a rectangular brick shape
- the squared ingots can be processed without preparation (for instance gluing of centring- or clamping-pieces)
- automatic edge detection and adjustment of grinding tools with ingot length detection, for an optimized cycle time, by using high-resolution measurement systems
- detection and evaluation of the work piece specific quality data after grinding, for instance chamfer size, chipping and un-grinded chamfer-area
- based on ingot defects incl. an evaluation of useable workpiece lengths
- automatic wheel wear compensation
- equipped with two loading areas for manual and fully automatic loading, for instance with the help of an industrial robot
- high throughput, even when a high removal of silicon is achieved by using 4 grinding wheels with a separate pre- and fine grinding process,
- for instance: Ingot diameter as grown: \varnothing 204 mm Final ingot diameter: \varnothing 200 mm Ingot length: 1000 mm
- Cycle time: 48 Min.
- Machine capacity: approx. 9.800 bricks/year (based 24/7-production)
- Quality data of workpiece:
 - DIN EN ISO 1101 evenness +/- 0,1 mm
 - DIN EN ISO 1101 roundness $\leq 0,1\text{ mm}$ up to 200 mm
 - DIN EN ISO 1101 concentricity $\leq 0,2\text{ mm}$
 - Average value Ra $\leq 0,15\text{ }\mu\text{m}$

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- grinding spindles (4 pieces) with air protected spindle bearings
- infinitely variable grinding spindle drive (4 pieces) via AC-servo motor
- linear axis (5 pieces) with ballscrew via AC-servo motor drive
- CPU Siemens S7/317
- high end industrial PC with dual core processor
- 15" touch panel with HMI, visualisation based on WinCC flexible
- integrated recipe management
- high-resolution laser measuring sensors (2 pieces)
- Optionen: ARPAT – "Arnold Remote Production Analysis Tool" – machine internal MES

Workpiece length	450 - 1000 mm
Workpiece format	156x156 mm ² ; 210x210 mm ²
Machine measurements without switch cabinet (LxWxH)	approx. 6800 x 2290 x 2035 mm
Machine weight	approx. 8200 kg

Round Grinding Machine 72/856.600-125/156

Item number: VT4-00220

Category: Round grinding machines



This machine is suitable for chamfering and round grinding of squared mono-crystalline silicon workpieces in the format of 125 x 125 mm² and 156 x 156 mm², with three grinding aggregates (2 x pre-, 1 x fine grinding) and one additional laterally working round grinding aggregate for OD grinding process. Workpiece lengths of 180 up to 600 mm can be processed. The fully automatic grinding machine excels by the following advantages:

- grinding of flat (45°) and round chamfers
- unique, pneumatic clamping and centring of the workpieces, even in the case of a rectangular brick shape
- the squared ingots can be processed without preparation (for instance gluing of centring- or clamping-pieces)
- automatic edge detection and adjustment of grinding tools with ingot length detection, for an optimized cycle time, by using high-resolution measurement systems
- detection and evaluation of the work piece specific quality data after grinding, for instance chamfer size, chipping and ungrounded chamfer-area
- based on ingot defects incl. an evaluation of useable ingot lengths
- automatic wheel wear compensation
- equipped with two loading areas for manual and fully automatic loading, for instance with the help of an industrial robot
- high throughput, even when a high removal of silicon is achieved by using 4 grinding wheels with a separate pre- and fine grinding process, for instance: Ingot diameter as grown: \varnothing 203 mm Final ingot diameter: \varnothing 195 mm Ingot length: 500 mm Cycle time: 30 Min. Machine capacity:

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sp; approx. 15.000 bricks/year (based 24/7-production) Quality data of workpiece: •
DIN EN ISO 1101 evenness +/- 0,1 mm • DIN EN ISO 1101 roundness < 0,1 mm up 200 mm •
DIN EN ISO 1101 concentricity ≤ 0,2 mm • Surface roughness Ra ≤ 0,15 µm

- grinding spindles (4 pieces) with air protected spindle bearings
- infinitely variable grinding spindle drive (4 pieces) via AC-servo motor
- linear axis (5 pieces) with ballscrew via AC-servo motor drive
- CPU Siemens S7/317
- high end industrial PC with dual core processor
- 15" tough panel with HMI, visualisation based on WinCC flexible
- integrated recipe management
- high-resolution laser measuring sensors (2 pieces)
- Option: ARPAT – "Arnold Remote Production Analysis Tool" – machine internal MES

Machine (LxWxH)	approx. 6800 x 2290 x 2035 mm
Weight	approx. 8200 kg
Workpiece format	125 x 125 mm ² ; 156 x 156 mm ²
Workpiece length	180 - 600 mm

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