
# Multifunctional vertical turning center

WEISSER
A HARDINGE COMPANY

## As flexible as your manufacturing tasks - 360° turning solutions from WEISSER

Just as chameleons can adapt to their environment, WEISSER's precision turning machines and multifunctional turning centers adapt to the customer's workpieces in the best possible way. In addition, WEISSER keeps an eye on the complete manufacturing process and offers the most economical solution for all requirements with its TURNKEY solutions.

# UNIVERTOR AC-1

## Version with one spindle

The machines of the AC-1 series are highly flexible and predestined for the complete machining of different batch sizes, with very high quality requirements. The design as a right-hand or left-hand machine concept realizes the ideal adaptation to the production sequence. Highly productive simultaneous machining in one machine with up to two powerful disk turrets (4 axes) or several grinding spindles enables intelligent technology processes with high savings potentials and creates high-precision machining results.


## Conceptional advantages UNIVERTOR AC-1

- Left and right machine variants available
- Machine columns with very good stiffness behavior and optimized damping properties due to remaining sand in the model
- Linear guides designed with high accuracy and preload classes in all machine axes
- All linear guides and feed drives arranged outside the working area for protection against chips
- Direct path measuring systems in all machining axes (glass scales)
- High dynamics of all machine axes
- Optimal chip fall downwards
- Self-built turning spindles with very good concentricity and axial run-out accuracy values
- Easy installation and removal of the turning spindle in the event of repairs
- Compact footprint due to integrated handling unit (2-axis version with swivel unit)
- Main spindle A6 according to DIN 55026
- Interface in tool turret VDI or Capto possible

## Options

- Integrated measuring probe
- Driven tools (for drilling operations)
- 4-axis machining (through additional turret on cross-slide unit)
- Additional internal grinding unit
- Additional external grinding unit
- Combination of turning and grinding in smallest space
- Additional drilling head
- Additional Y-A axis unit with milling spindle for gear milling
- Separation of both machine halfs (to a certain degree - halfs become independent from each other)

# UNIVERTOR AC-2

## Version with two spindles

With the two-spindle UNIVERTOR AC-2, simultaneous machining of two workpieces or machining of one workpiece in two clampings is possible. It has the same modularity and flexibility as the UNIVERTOR AC-1. The possibility of technology integrations of innovative processes such as rotation turning, hard turning, grinding, drilling or milling results in a significant reduction of in-house logistics processes and creates high-precision machining results.


## Conceptional advantages UNIVERTOR AC-2

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- All linear guides and feed drives arranged outside the working area for protection against chips
- Direct path measuring systems in all machining axes (glass scales)
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## Options

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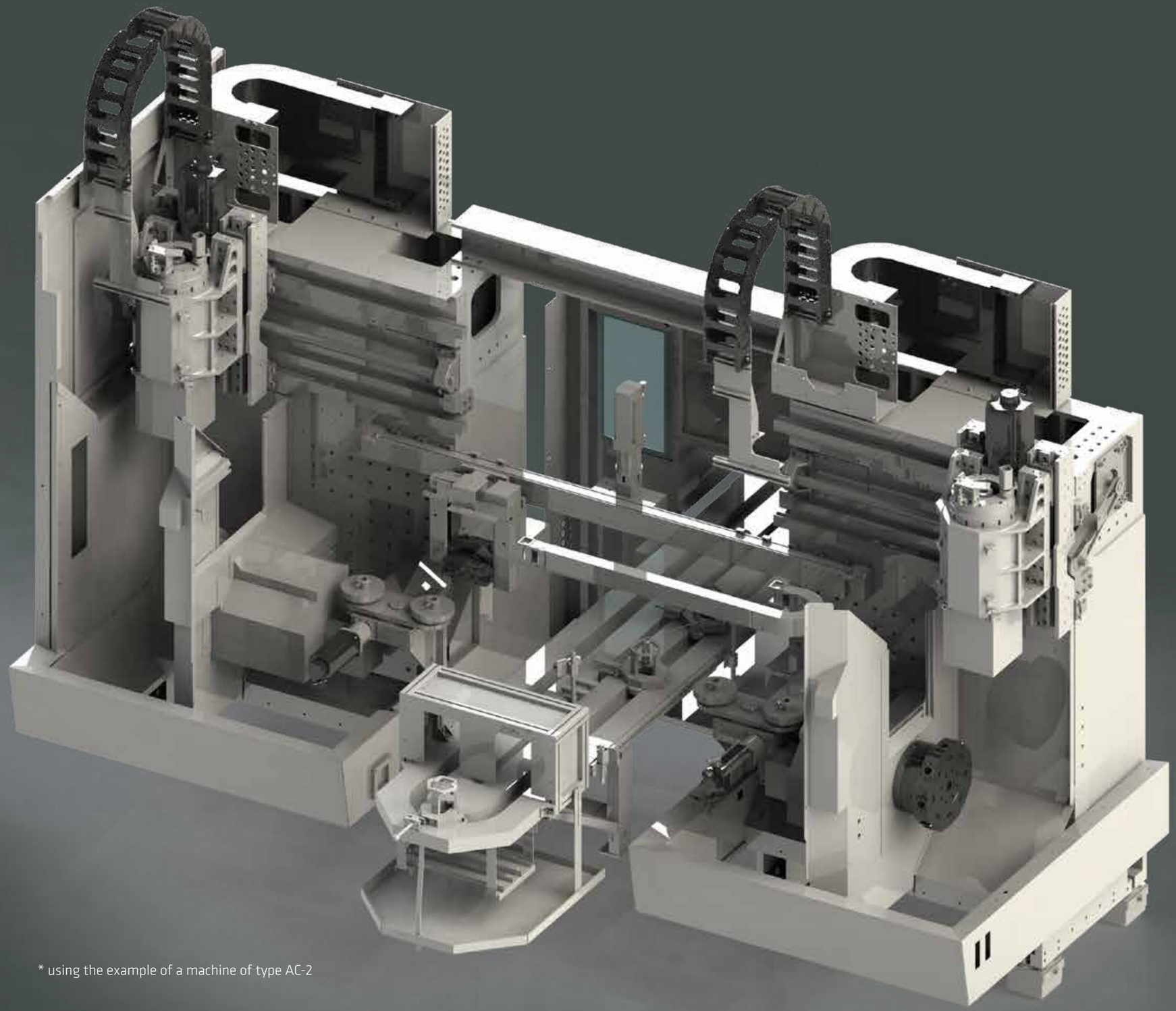
- Driven tools (for drilling operations)
- 4-axis machining (through additional turret on cross slide unit)
- Additional internal grinding unit
- Additional external grinding unit
- Combination of turning and grinding in smallest space
- Additional drilling head
- Additional Y-A axis unit with milling spindle for gear milling
- Spatial separation of both machine halves (to a certain extent independent of each other)
- Simultaneous or progressive machining(with possibility of turning the workpieces)
- Various automation variants

# Design AC*



## Base machine
Monobloc machine structure made of high quality cast iron. Heavily ribbed machine base.

## Main spindle
Maintenance-free spindle motor with digital drive technology.
- Spindle bearing Ø: 90 mm
- Spindle flange: A6 according DIN 55026

## Tool turret
- 12-position with electric drive
- Standard interface VDI
- Optional tool drive

## Integrated parts handling
- NC-controlled X- and Z-axis
- Pneumatically operated parallel gripper
- Reversible gripper 0°- 180

## Technical extensions
- Possibility of 4-axis machining
- Grinding spindle (internal and external)
- Multi-spindle drilling heads

* using the example of a machine of type AC-2

# Application examples

## Bringing the application advance to the road…

Differential housings, brake discs, pistons: components manufactured on WEISSER machines can be found in countless vehicles. Intelligent production processes require innovative technologies and reliable, highly accurate machining centers designed for high-performance use. Therefore, WEISSER's precision turning machines and multifunctional turning centers are built with the highest level of technical maturity and high accuracy. This gives customers the assurance that nothing stands in the way of their production of safety-relevant components.







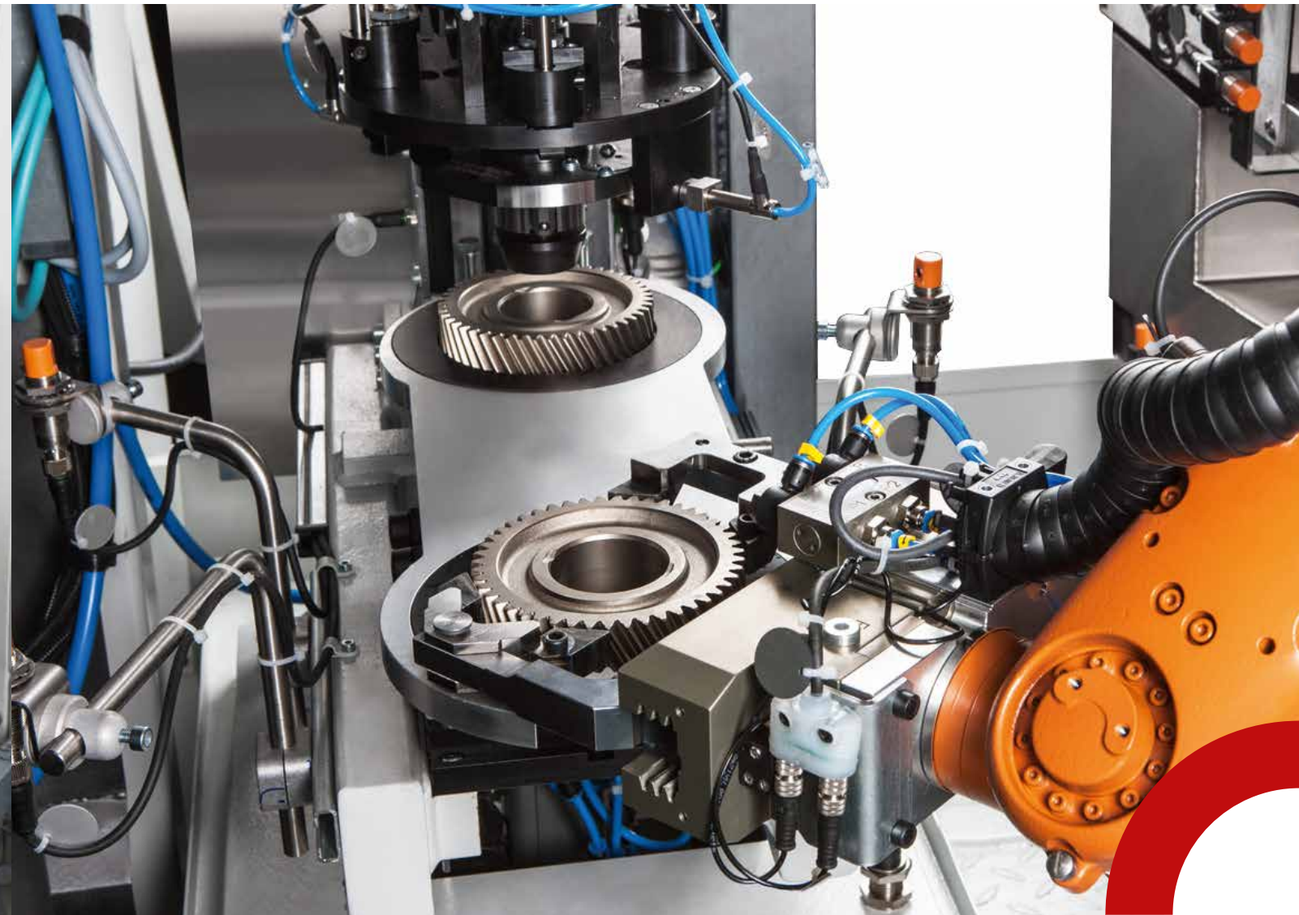
# Automation

## Transport systems

The automation options with different transport systems (e.g. pallet conveyor, drag frame, friction roller conveyor, etc.) offer highly variable application possibilities. Depending on the design, they can be adapted to the shape and weight of the workpieces to be transported. A variety of linking tasks, maximum flexibility and easy maintenance are part of the countless advantages offered by these customized automation solutions.

## Robot automation

Robot automation offers a highly flexible loading and unloading method for your machine. Machining solutions with robot automation are configured according to the customer's requirements, so that related processes (e.g. measuring, signing, aligning) can also be operated in a space-saving manner and offer maximum availability.



# Technical highlights

## Original WEISSER synchronous motor spindle with direct drive technology

More than 160 years of experience in development, design and own production of motor spindles carried out an unmatched competence potential, which is beneficial for WEISSER customers,

especially when it comes to:

- Process safety
- High technical availability
- Maximum productivity
- Excellent manufacturing quality

## Highest precision and accuracy

Measuring of all components and units relevant for the accuracy - despite high basic accuracies the individual components are „finely assembled“. As a result, mechanical deviations during assembly are minimized and wear is reduced. This ensures a high long-term stability of the complete machine system.

# Technologies

## 4-axes machining

Highly productive simultaneous machining in one machine with two powerful disk turrets (4 axes). Intelligent technology processes and the combination of different machining steps offer high savings potential. Working with two tools simultaneously shortens the machining times of the workpiece and reduces the cost per part.

## Rotational turning

With the rotation turning process developed and patented by WEISSER, precisely machined surfaces can be generated with twist-free finishing precision and thus replace the expensive grinding operations. The simultaneous rotation of workpiece and tool cutting edge reduces the machining time by up to 77 % compared with hard turning.

# Technologies

## Hard turning

Hard turning describes the turning of steel with a hardness of more than 45 HRC. It is an efficient alternative for grinding hardened workpieces. The advantages of this process are shorter cycle, set-up and tooling times as well as the relatively lower investment costs and the options of wet and dry machining.

## Out-of-round turning

3 times capacity with WEISSER HOT system for shorter piece times and lower piece costs. The technology enables the highly productive machining of a wide range of workpieces, such as pistons for combustion engines, camshafts, polygonal profiles or the production of polygon shapes (shaft-hub connections) with process-oriented perfection.

## Internal / external grinding

Machining with the technology of external and internal cylindrical grinding in one machine is exemplary for perfect hard fine machining of rotationally symmetrical workpieces. In order to achieve optimum cycle times, this machining technology can be combined with hard turning or rotational turning processes.

## Gear cutting (hobbing)

Integration of a hobbing module, being the only method to manufacture internal and external gearings with different helix angles and directions in a single machining center. This manufacturing process combines hobbing and slotting by continuous hobbing with maximum feed rate.

# Turnkey

## Intelligent technology processes and complete Turnkey systems

WEISSER machining centers with integrated technology concepts are the solution to demands for shorter process times, productivity and process safety. Shorter cycle times and the associated lower unit costs are decisive competitive factors, especially when manufacturing high quantities. WEISSER turnkey solutions not only score at high quantities but also at small quantities with high set-up flexibility. We pass this competitive advantage on to our customers. With the experience of more than 160 years of development, construction and realization of customized machines, our engineers develop today the most economical solution upon your requirements. The development of the complete production process provides you full cost transparency and helps you to solve complex tasks in an optimal way. With three steps to success. WEISSER Turnkey.

### OFFER PHASE AND PLANNING PHASE

- Process requirements
- Production boundary conditions
- Machine requirements & machine type
- Workpiece clamping / Tools
- MFU features
- Terms of acceptance
- Delivery instructions
- Processing strategy
- Inspection of critical MFU characteristics
- Number of fixings
- Number of spindles
- Design of the machine system
- Workpiece loading and automation
- Clamping device
- Tools

### IMPLEMENTATION PHASE

- Construction and integration of the workpiece-specific
  - Clamping fixtures
  - Tools
  - Automation
- Approval process of the tooling plan, layout plan, etc.
- The verification procedure of the process capability through
  - the preliminary acceptance at WEISSER
  - the final acceptance at the customer

### TARGET PHASE

- Assistance with production startup and support
- Training in operation, programming and maintenance
- Service e.g. with preventive maintenance, spare part support, qualified service personnel, etc.

# Workpieces

## Typical, machine-specific workpieces with cycle time and technical challenges

### Steel piston

**Machining of all functional surfaces in one clamping**

- Console chip removal equipment
- Highest accuracy
- Turning and grinding
- Cycle time: 50 seconds, depending on size and processing effort

### Ratchet wheel

**Machining of drillings and flat surfaces**

- Hard turning and grinding
- Clamping in the gearing or on the tip circle diameter
- Highest accuracy
- Grinding, drilling and taper in one machine
- Cycle time: 60 seconds depending on size and processing time

### Ratchet wheel (soft)

**Soft machining completely in two clamping positions**

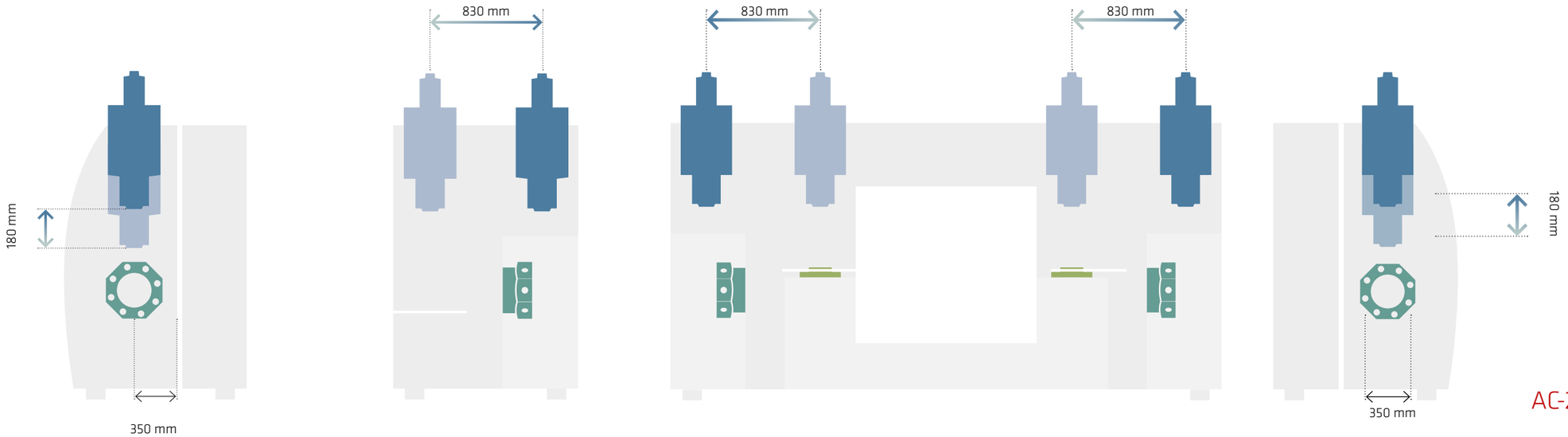
- OP10 Three-jaw power chuck
- OP20 Collet chuck or mandrel
- If required: spindle head with driven tools
- 4-axes machining
- Cycle time: 30-40 seconds depending on plate size

### Bearing inner ring

**Machining in several processing steps**

- Pre-turning and finish turning
- Turning the cooling channel
- Milling valve pockets
- Precision turning
- Turn grooves
- Bolt hole pre- and finish machining
- Line cycle 30 seconds

# Technical data AC




UNIVERTOR AC-1

AC-2

| | | | | | | |
|---|---|---|---|---|---|---|
| Max. Turning diameter | mm | 150 | Inner grinding spindle | | | |
| Max. Chuck diameter | mm | 215 | Drive power 100 % / 60% CDF | kW | 15 / 18 | |
| Max. Feed force X/Z (40 % CDF) | kN | 8 / 10 | Torque 100 % / 60% CDF | Nm | 4,7 / 5,7 | |
| Working stroke X/Z-axis | mm | 830 / 180 | Spindle bearing diameter | mm | 45 | |
| Max. Process speed X/Z | m/min | 60 / 30 | Max. Speed | rpm | 45.000 | |
| Ball screw diameter X1/Z1 | mm | 40 / 40 | Nominal speed | rpm | 30.000 | |
| Number of tools | | 12 | Tool holder | | D28 / 43 | |
| Tool holder | | VDI40 / Capto | External grinding | | | |
| Tool flight circle | mm | 670 | Drive power 100 % / 60% CDF | kW | 11,5 / 14 | |
| Main spindle | | | Torque 100 % / 60% CDF | Nm | 39,7 / 49 | |
| Spindle bearing diameter | mm | 90 | Spindle bearing diameter | mm | 80 | |
| Spindle flange | DIN55026 | A6 | Max. Speed | rpm | 6.000 | |
| Drive power 100 % CDF | kW | 16,8 (20,9) | Nominal speed | rpm | 2.700 | |
| Drive power 40 % CDF | kW | 21,5 (26,8) | Tool holder | | Pick-up cone Ø 73 | |
| Rated speed | rpm | 1.600 | Dimensions | | | |
| Max. Speed | rpm | 4.500 | Dimensions basic machine (LxWxH) | mm | AC-1: 2.450 x 2.400 x 3.000 | AC-2: 4.300 x 2.550 x 3.000 |
| Torque 100 % CDF | Nm | 100 (200) | Weight | kg | AC-1: 7.000 | AC-2: 15.000 |
| Torque 40 % CDF | Nm | 128 (255) | | | | |



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