

INNOVATIVE  
TECHNOLOGIES



# EBOCAM

*modular*



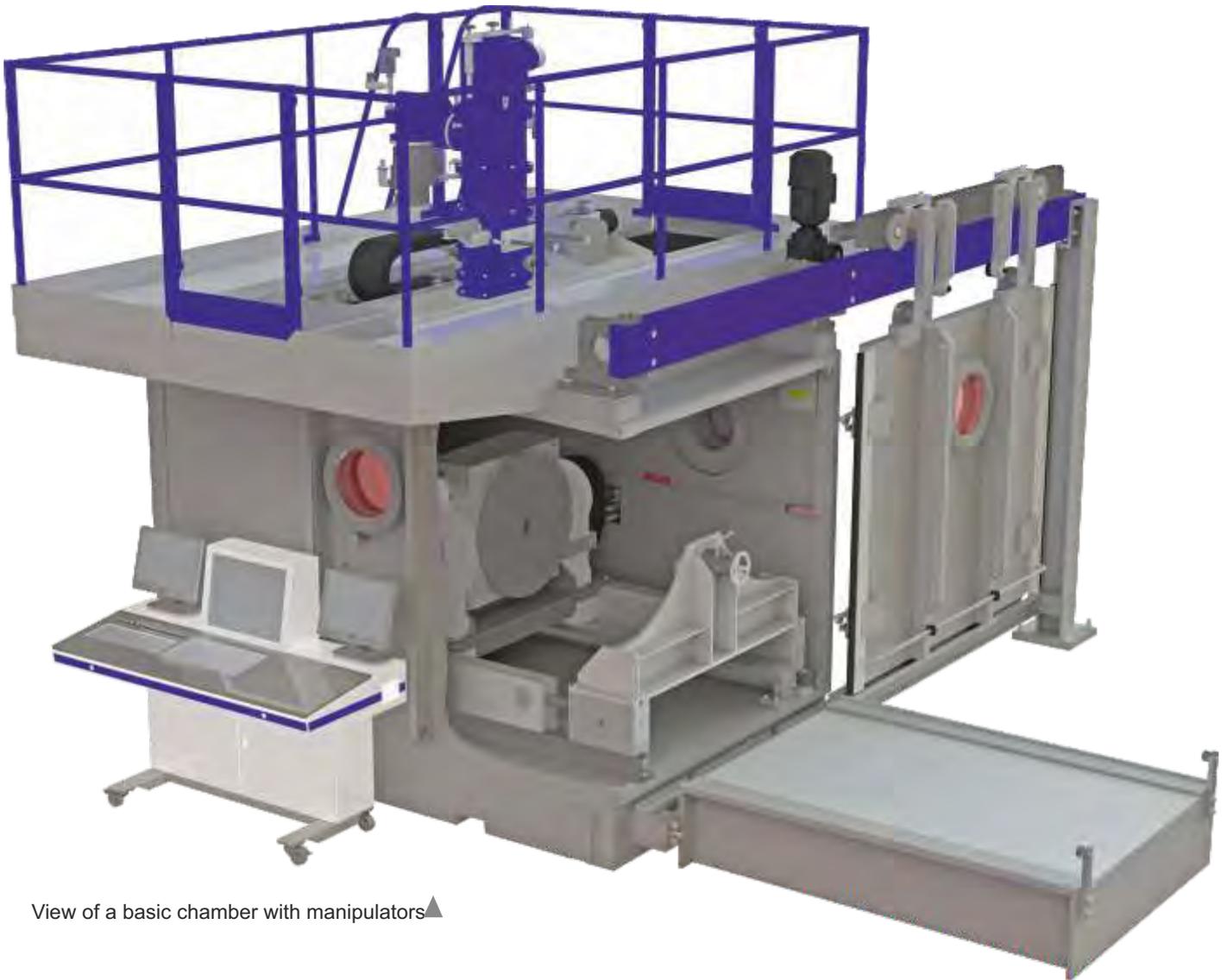
**Chamber machines with longitudinal slide  
and 150 kV EB generator on a generator slide**



Member of

Beam Technologies AG

# CHAMBER DESIGN



View of a basic chamber with manipulators▲

## The chamber concept

**EBOCAM modular** chamber systems are designed for optimum use of the chamber volume to guarantee the shortest evacuation times with the lowest pump capacities. They are loaded by a linear slide that is also used to move the work piece during the working process and they also move the generator installed approximately in the middle of the working chamber on a cross slide for processing.

The chambers and all the slides and manipulator systems are constructed so that their width and height are fully used during processing of the largest allowable components (during turning). They are offered in 7 standard cross sections for processing components with turning diameters of 500 to 2,500 mm and (practically) any length, where the chamber length is customized with varying extension modules.

The chamber construction and our production plants for precise manufacture and assembly of individual components fulfill the customer's specific wishes and allow changes in dimensions.

**The modular structure of the systems also supports the transportation of large chambers and enables conversion work to be done on later extensions and changes in production.**

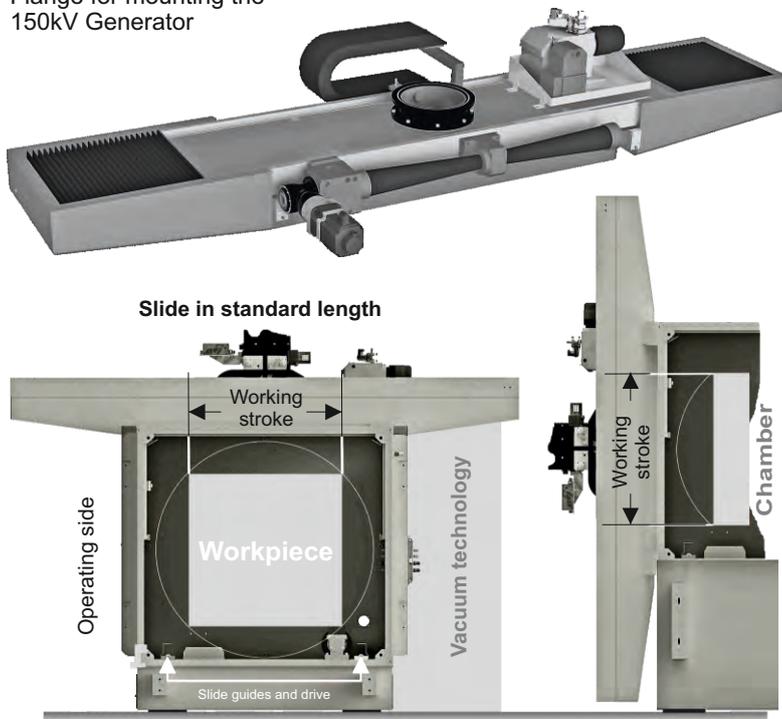
**All the inside walls of the modules are ground or polished and can be equipped with protective plates. The installation of cooling systems for further reduction of evacuation times is an option.**

**Further modules for automatic loading and unloading via locks and switch modules are available for using the plants for serial production (also differing components). This allows continuous, secure production without extra process times for evacuating the chamber.**



## Generator movement

Flange for mounting the 150kV Generator



The **generator chassis** is an ultra-precise, vacuum sealing linear slide system with a travelling distance in the standard model which allows the EB generator to move over the entire width of the components so that transverse movements of the work pieces are avoided. Evacuation time and energy costs are reduced considerably by this reduction in the width and volume of the chamber and **the productivity of the machine increases.**

The design (depth) of the manipulator can be included when the installation position is being determined in the chamber longitudinal axis so that components with a maximum length can be processed for all the equipment in the chamber.

The undercarriage can also be installed on the side wall of the chamber when welding has to be done **with a horizontal beam.** The chamber base is raised accordingly in this type of model. The installation of a foundation pit can be useful in certain cases.

## Chamber extension modules



◀ The chamber systems are created as modular structures. They are made as compact plants in 7 different sizes which can be developed for workpieces of (practically) unlimited length by using extension modules.

## Bypass and buffer modules



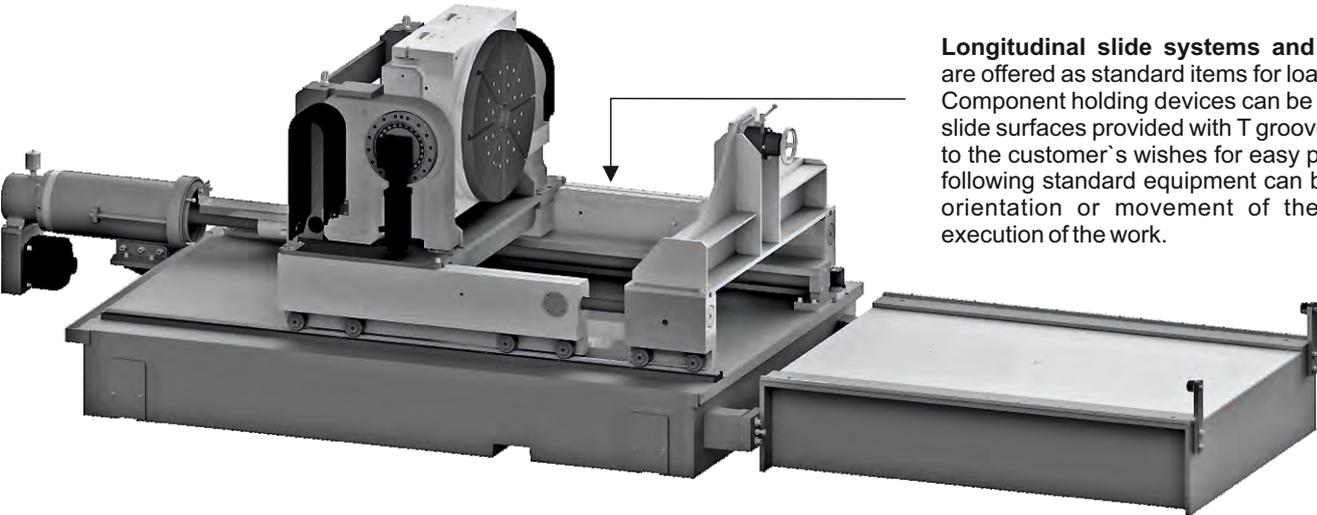
Order-related, vertical or horizontally aligned **switch and buffer modules** and also **lock chambers** with pallet transportation systems or for feeding alternately with two slides are produced for all chambers (according to the components and production conditions).

◀ **All chamber models can be developed into flexible production stations in this way or integrated into production lines.**

All the chamber modules are manufactured with great precision using state of the art production facilities. Exterior MIG welding and splash-free interior WIG seal welding is done by using a welding robot system. All the interior walls are ground and radiation protection is guaranteed by lining all the modules with lead.

# LONGITUDINAL SLIDES AND MANIPULATORS

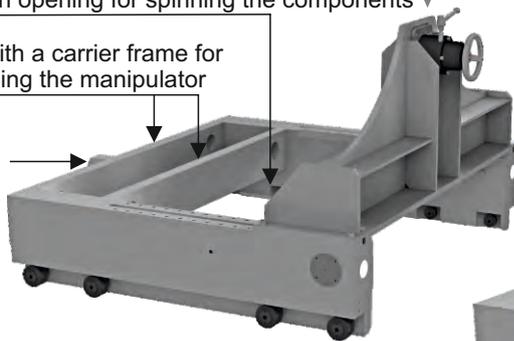
**Longitudinal slide systems and manipulators** are offered as standard items for loads from 1 to 5 t. Component holding devices can be installed on the slide surfaces provided with T grooves or according to the customer's wishes for easy processing. The following standard equipment can be delivered for orientation or movement of the parts during execution of the work.



**Compact slides with bridge and tailstock** with an opening for spinning the components

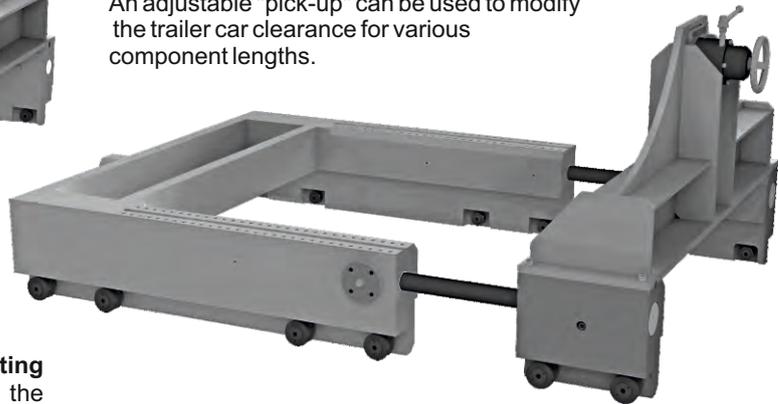
and with a carrier frame for attaching the manipulator

Ball screw

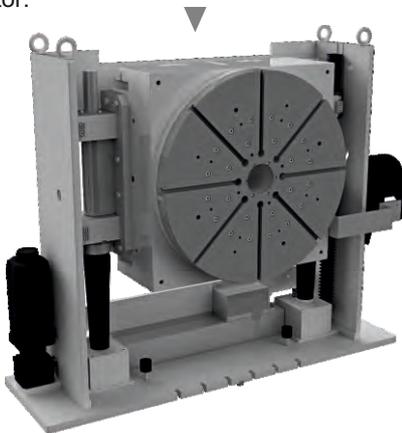


**or for longer components with a trailer car** for attaching the tailstock or a 2. Rotating device (idling or with synchronous drive). When the manipulator is being equipped with a vertical slide, the tailstock or the 2. rotating device at the trailer car can be attached to a synchronously moving slide.

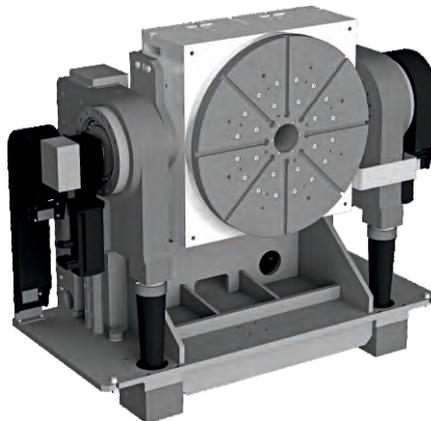
An adjustable "pick-up" can be used to modify the trailer car clearance for various component lengths.



**The modular Manipulation systems** consist of a **rotating device with T grooves-face plate** for installing the clamping device which is on bearings in a compact aluminium block and which is driven by a servo geared motor.



This rotating device can be mounted on a **hoisting slide** via ball screws with a precise drive on both sides as an option (as shown in the adjacent picture) - or with a **swivel unit with servo drive** for tilting the face plate by 90° (as shown) below.



This swivel unit is assembled onto a vertical slide **when the manipulator is fully extended** (as previously described) so that the rotating unit with the component is swivelled through 90° and can be moved vertically.

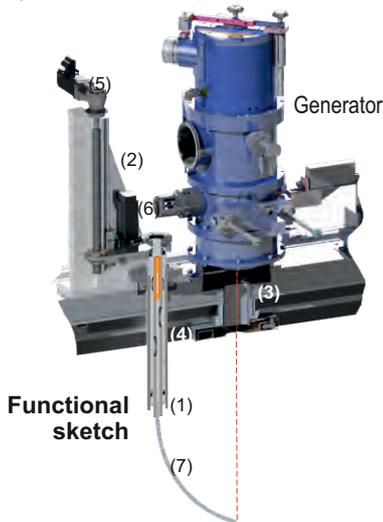
The construction of the slide and the device as well as the position of the cable guides and all the drive elements contribute towards the best possible use of the entire chamber volume.



# EB GENERATOR AND CONTROL

## EB generator

- Power range from 5 to 60 kW (with 150 kV), high voltage range from 70 to 150 kV.
- Stationary assembly together with the generator shifting unit on the chamber roof (vertical) or the chamber wall (horizontal).
- Ceramic insulators protected from vaporization, oil-free high voltage plugs.
- The greatest reproducibility and long term stability of the beam parameters for consistent processing results.
- Quick and precise cathode change with assembly device (as a general rule, no readjustment of the beam parameters).
- Dedicated high vacuum system ( $9 \times 10^{-5}$  mbar) for the compartment of the beam generating system.
- Column valve between the beam generating system and the working chamber. The generator remains evacuated when the chamber is being ventilated.
- The EB generators consist of modular units. The individual functional groups are assembled in cylindrical lead-lined housings which are flange connected with each other to be vacuum tight.
- Quick beam deflection EBO Jump Basic with electro-optical view EBO View, automatic beam adjustment EBO Set and joint searching system EBO Scan Offline.
- Optimum observation via a coaxial view system.



## Optional wire feed unit

The wire feed into the chamber is in a tube as a standard (1), which is mounted on the generator slide (3) on a vertical undercarriage (2) and which is guided from there through the slot in the chamber roof (4). The servo drive of this undercarriage (5) is integrated into the machine control unit and can supply the wire feed via sensors to the surface of the workpiece. Another drive (6), attached to the vertical slide turns the pipe (manually controlled) for adjustment of the horizontal position of the rotating unit.

A wire feed with a vacuum seal is located inside the tube (1). There is a turbo molecular pump connection on the outside with an interchangeable, bent wire feed tube (7) with an exchangeable, low wear tip. A flange for attaching the wire drive unit is located above the tube with a straight section and a wire coil holder. A large wire coil (with an intermediate wire drive) can be installed close to the floor as an option.

## The entire machine is controlled by a SINUMERIK 840D sl

The use of a special EB process control unit is necessary to optimize all the advantages of the EB process. Experience from 40 years of EB technology with a dedicated control system has been transferred to the modern hardware concept of the 840D sl.

Maximum CNC performance as well as unrivalled flexibility and openness are the basis for using the 840D SL in EB technology.

- Drive-based modular-CNC
- Multi technology-CNC
- Up to 93 axes / spindles and 30 processing channels (because of NCU LINK)
- Modular panel concept
- Up to 19" colour display
- SIMATIC S7-300 PLC

## Control advantages: Modular and scaleable.

The SINUMERIK 840D sl also offers high modularity of the operating components in addition to scaleable NCU performance. **Communicative on all levels**

PROFINET allows the SINUMERIK 840D sl to fit in perfectly into the modern production landscape. Totally Integrated Automation also stands for unparalleled consistency of the filed levels ranging from production through to the management level.



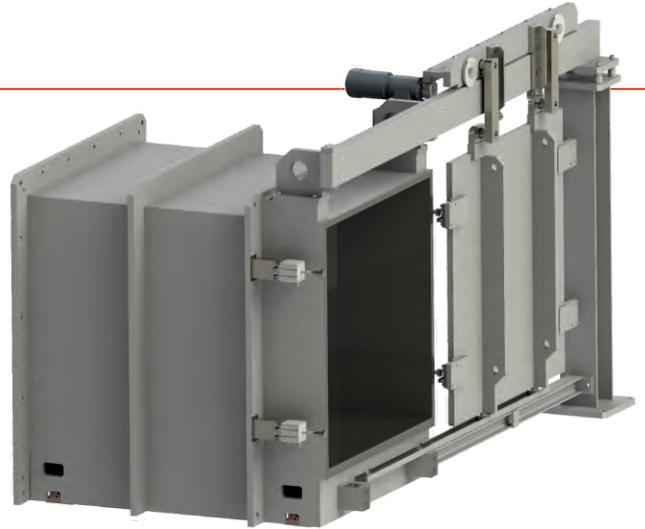
# SPECIAL DESIGNS

## Chamber modules

All dimensions of the chamber modules can be changed according to requirements, starting from 100mm or upwards.

A change in dimensions can be especially useful if only components with specific cross sections are processed which deviate strongly from round or square shapes or which can only be processed in the chamber with cross slides for special reasons.

Composite modules with a door and a back wall can also be useful for special applications. ▶



## Generator movement

The slide can be shortened as much as you like if the required processing only requires a short travel distance and no universal use of the machine is envisioned.

Corresponding extension of the slide movement is possible if processing has to take place over the entire width of the chamber (without turning option for the component). A low chamber base or one adjusted in height can also be delivered for shorter generator slides located vertically in the upper area of the chamber wall. A corresponding opening for the slide in the foundation can be useful instead of a high chamber base for larger systems.

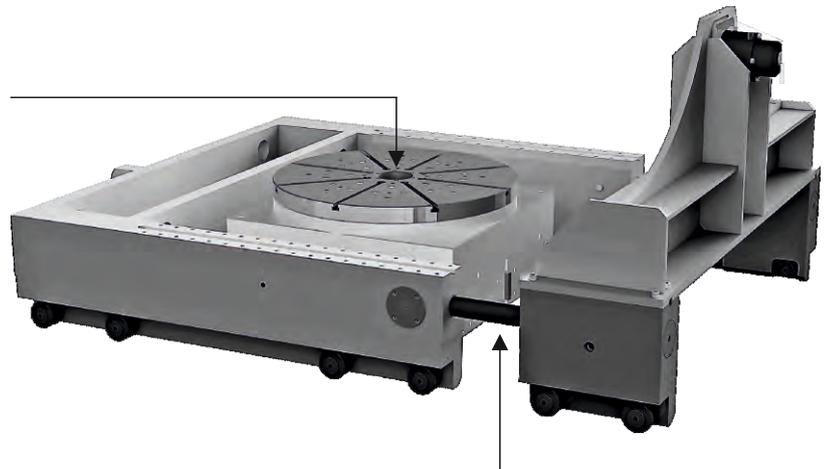
## Slides

The rotating device can also be installed close to the floor in the centre of the slide (with a horizontal face plate) for processing without swivelling or tilting the component.

The quill of the tailstock can be operated by hand with a crank or pneumatically. The components can also be clamped as an option with **pneumatic positioning** of the trailing car with the tailstock or by using the second faceplate for the longitudinal slide.

**This alternative slide guide is especially useful for chambers with fully automatic feed systems.**

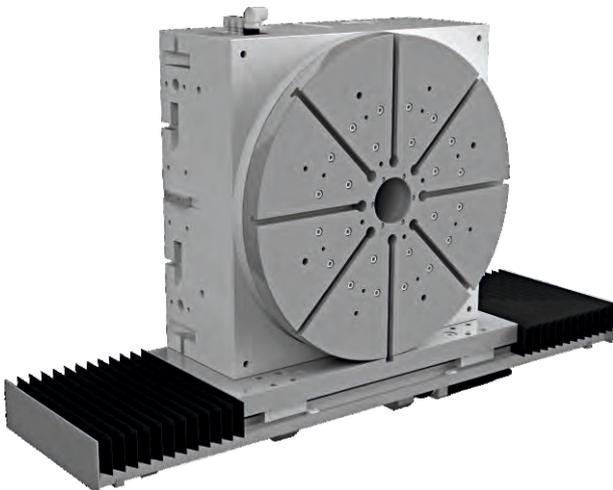
The "pick ups" are short and stable here: they do not allow any change in the slide length for differing components /pallet lengths).



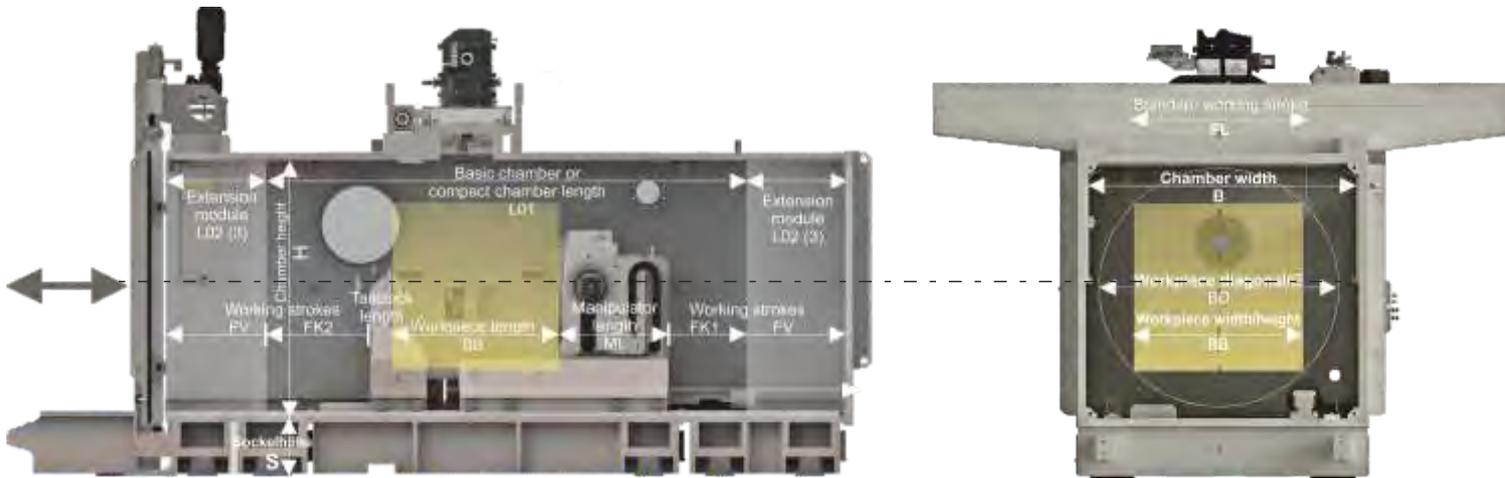
## Manipulators

For customers who prefer a cross movement of the workpiece instead of the generator a manipulator mounted on cross slides can be provided. Both the headstock and tailstock, if so equipped are supported on synchronized cross slides.

The advantage of reduced chamber height remains with this option. However, the chamber width and corresponding chamber volume are increased.



## Dimensions of standard types



### Selection chart

	Indicator	Standard sizes						
		EK-M 5	EK-M 11	EK-M 36	EK-M 49	EK-M 74	EK-M 110	EK-M 190
<b>Basic chamber</b> Length	L01	1.100 mm	1.340 mm	2.600 mm	2.700 mm	2.700 mm	3.100 mm	3.600 mm
Width	B	600 mm	900 mm	1.100 mm	1.300 mm	1.700 mm	2.000 mm	2.100 mm
Height	H	700 mm	950 mm	1.250 mm	1.400 mm	1.600 mm	1.800 mm	2.500 mm
Base height	S	650 mm	650 mm	380 mm				
Extension modules		For all sizes 500 mm and 1.000 mm						
<b>Generator-</b> Stroke	FL	According to workpiece width BB						
<b>movement</b> Optional max.		According to workpiece diagonal BD						
<b>Standard-</b> for workpiece Ø	BD	500 mm	750 mm	1.000 mm	1.200 mm	1.400 mm	1.600 mm	2.000 mm
<b>Manipulator</b> Workp. weight		350 kg	450 kg	500 kg	500 kg	2.000 kg	2.000 kg	2.000 kg

Manipulator specifications		On rotary device		On vertical slide		On tilt-z-device	
		450 kg	2.000 kg	450 kg	2.000 kg	450 kg	2.000 kg
Max. net load		300 Nm	10.000 Nm	300 Nm	10.000 Nm	750 Nm	6.500 Nm
Max. moment of tilt		200 mm	350 mm	420 mm	520 mm	300 mm	660 mm
Manipulator length	ML	120 mm MK1	300 mm MK3	120 mm MK1	300 mm MK3	120 mm MK1	300 mm MK3
Tailstock length	RL	120 mm MK1	300 mm MK3	120 mm MK1	300 mm MK3	120 mm MK1	300 mm MK3
<b>The undercarriage is calculated from the chamber length less the max. manipulator and tailstock length</b>							

A change in the dimensions of the chambers, the generator slides, the travel distance and also the load bearing capacity of the slides and the manipulators is possible in the special model.

## WE PLAN AND WORK FOR YOU

OUR PROJECT ENGINEERS HAVE STATE-OF-THE-ART TRAINING IN ALL OF THE LATEST CHAMBER SYSTEM APPLICATIONS AND WILL BE GLAD TO DEVELOP TOGETHER WITH YOU THE BEST CHAMBER DESIGN SOLUTION FOR YOUR PROJECTS.



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