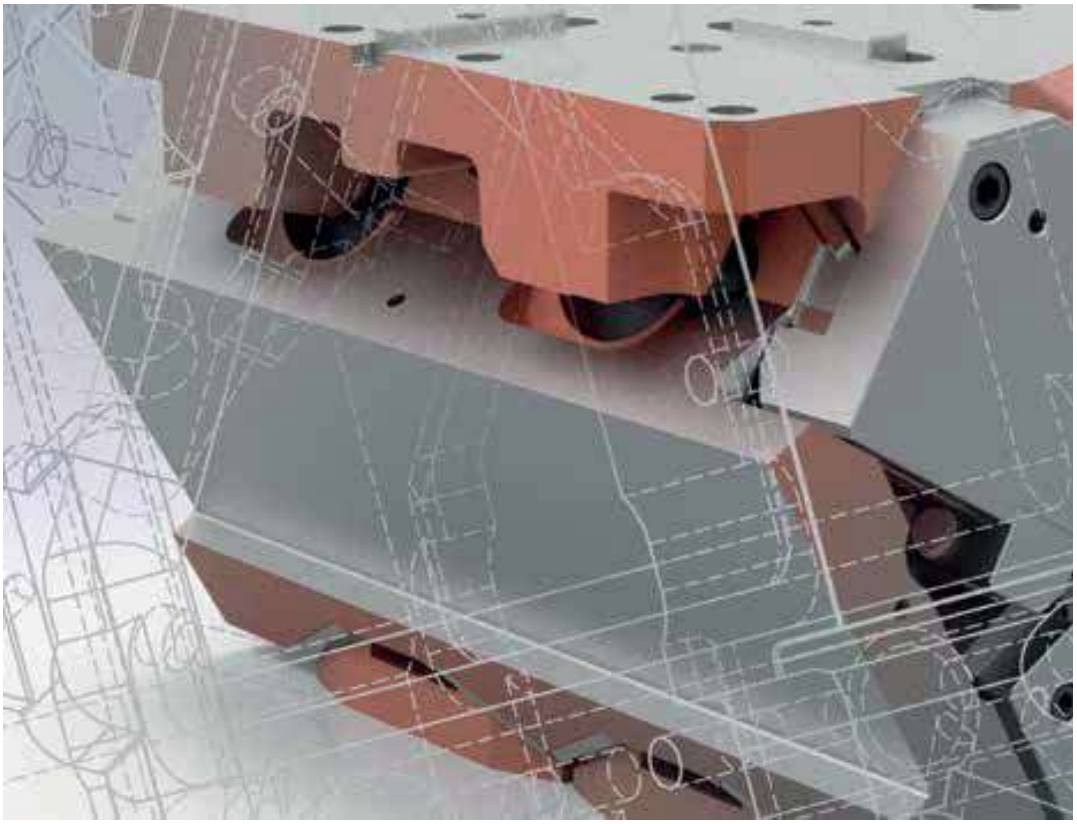
CESEHSA soluciones

FIBRO

CAM UNITS



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2016.25. AERIAL CAM FCC BAK — DAIMLER, VOLVO, VOLKSWAGEN GROUP

2016.207. AERIAL CAM ECO LINE

2016.208. AERIAL CAM ECO LINE

CUSTOMER-SPECIFIC SERVICES

APPENDIX

EMERGENCY SITUATION / CONTACTS

FIBRO – PARTNER FOR YOUR PRODUCTION

FIBRO – an internationally successful company.
As a market leader in Standard Parts and Rotary Indexing Tables, FIBRO provides products and solutions to ensure your production keeps moving.
So what is the secret of the FIBRO success?
Products developed in-house, tailor-made for the market with uncompromising quality.

But good products are not enough on their own.
FIBRO combines excellent products, the know-how and service competence of an internationally focused company, matched to the actual needs of customers - wherever they are.

Hassmersheim plant

Standard Parts

Today the Standard Parts Divison operates from the Hassmersheim and Weinsberg plant, which manufacture a comprehensive range of standard parts and maintain stock, ready for immediate dispatch world wide. The product ranges of the machine tool, mechanical and systems engineering, have been developed to meet the needs of the customers.
They include die sets, precision ground plates and flat bars, lifting and clamping devices, guide elements and precision components, such as punches and matrixes, special steel compression springs, gas springs, forming materials, metal bonding agents, moulding resins, peripheral equipment for pressing and tool making, electronic thread molding units, tool slides with cam or roller slides and hydraulic cam systems.
FIBRO has become renowned world-wide for its comprehensive range of products in stock and its readiness to deliver.

FIBRO is customer-focused – world-wide. A well-developed network of sales and service points and strategic partners ensure that help is always at hand. This ensures technical advance, world-wide experience in applications and rapid availability of products.

Facts and figures on FIBRO:
- founded 1958
- approximately 770 staff
- more than 70 representatives and service stations world-wide
- branches in France, USA, India, Switzerland, Singapore, Korea and China
- ISO 9001:2000 Quality Assurance and ISO 14001 environmental certification

Precision parts manufacturing

Rotary tables

FIBRO - The worldwide pioneer in the field of rotary tables offers a comprehensive range of types:
FIBROPLAN®– NC rotary table with worm drive
FIBRODYN® – NC rotary table with direct torque drive
FIBROMAX® – Heavy-duty NC rotary table with Twin Drive
FIBROTAKT® – Rotary indexing table with Hirth face gear
FIBROTOR® – Electromechanical rotary indexing table for applications that do not involve high machining forces

Rotary tables for all applications – from flexible workpiece positioning for rotary and multiple-axis machining to assembly automation

Used in all branches of industry – from the automobile industry through solar energy to machine tools

A wide range of sizes – from micro-machining to processing of very large parts

Customer-oriented design – from the standard modular table to customized special solutions

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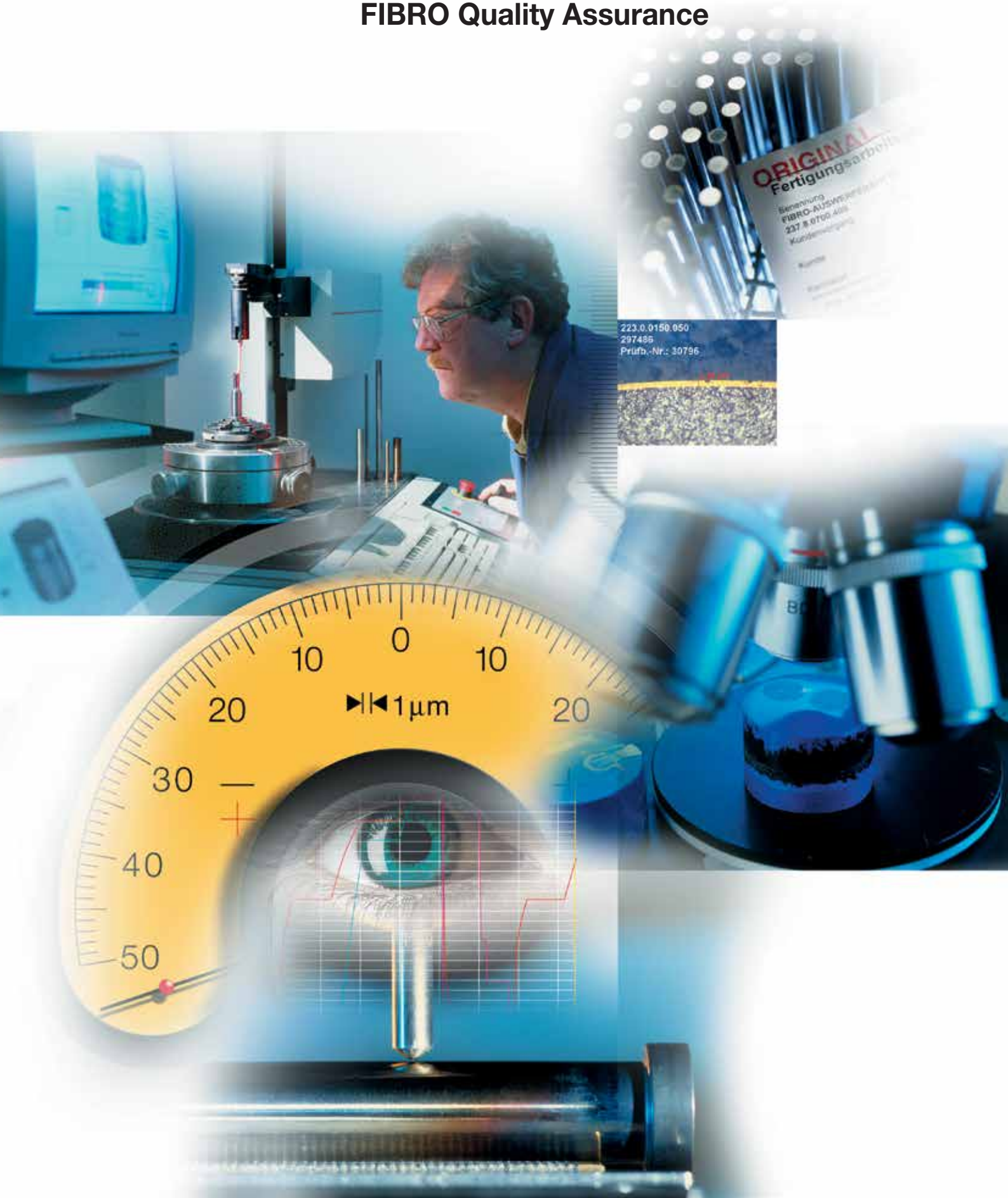
FIBRO

Experience and expertise you can rely on FIBRO Quality Assurance



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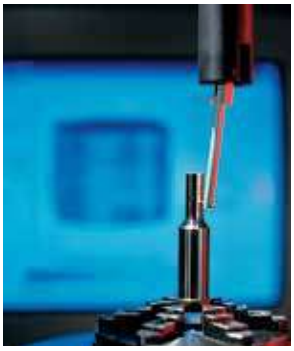
FIBRO is renowned for its quality world-wide. This high quality is achieved through our dedication and commitment to Quality Assurance.

FIBRO testing starts on the raw material and continues right through production to the completed product. The test facilities themselves are also subject to stringent continuous testing. Only by setting itself such stringent standards can a company support its customers long term in safety, cost-effectiveness and quality.

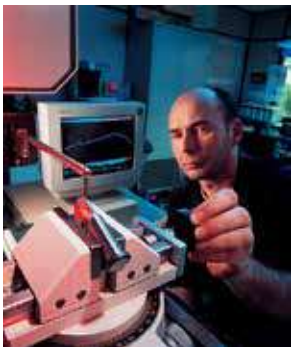


Tests during production

Precision shape and contour testing equipment is used directly in production. This ensures early confirmation of the quality of the product.

The shape testing equipment tests for qualities such as roundness, concentricity, straightness and rectangularity.

FIBRO state of the art technology provides 3D visualisation of concentricity, coaxiality and cylindricity.



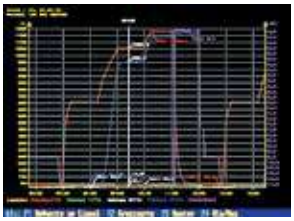
Materials testing - raw materials to specification

The FIBRO laboratories carry out microscopic investigation of the raw materials, including enlargement to 2,500 times natural size.

Spectral analysis determines whether the material is correct in terms of chemical composition.

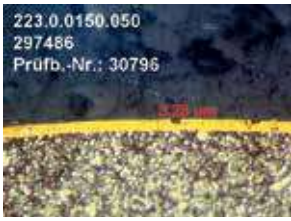
Hardening – hardness testing

All the process parameters in the hardening process in our own hardening shop are recorded and documented.
Hardness testing is used to monitor the results of the hardening process on every batch.



Final tests

For precision at micro level if certain basic requirements have to be met. It goes without saying that the temperature of the measuring room at FIBRO is kept at 20°C. Here the fine precision FIBRO products are measured after production before being released to the customer.



FIBRO – CAM UNIT CONFIGURATOR

FIBRO offers a comprehensive cam unit portfolio for various requirements. The FIBRO - Cam unit configurator on our Internet site will assist you with the selection of the matching cam unit for your application.

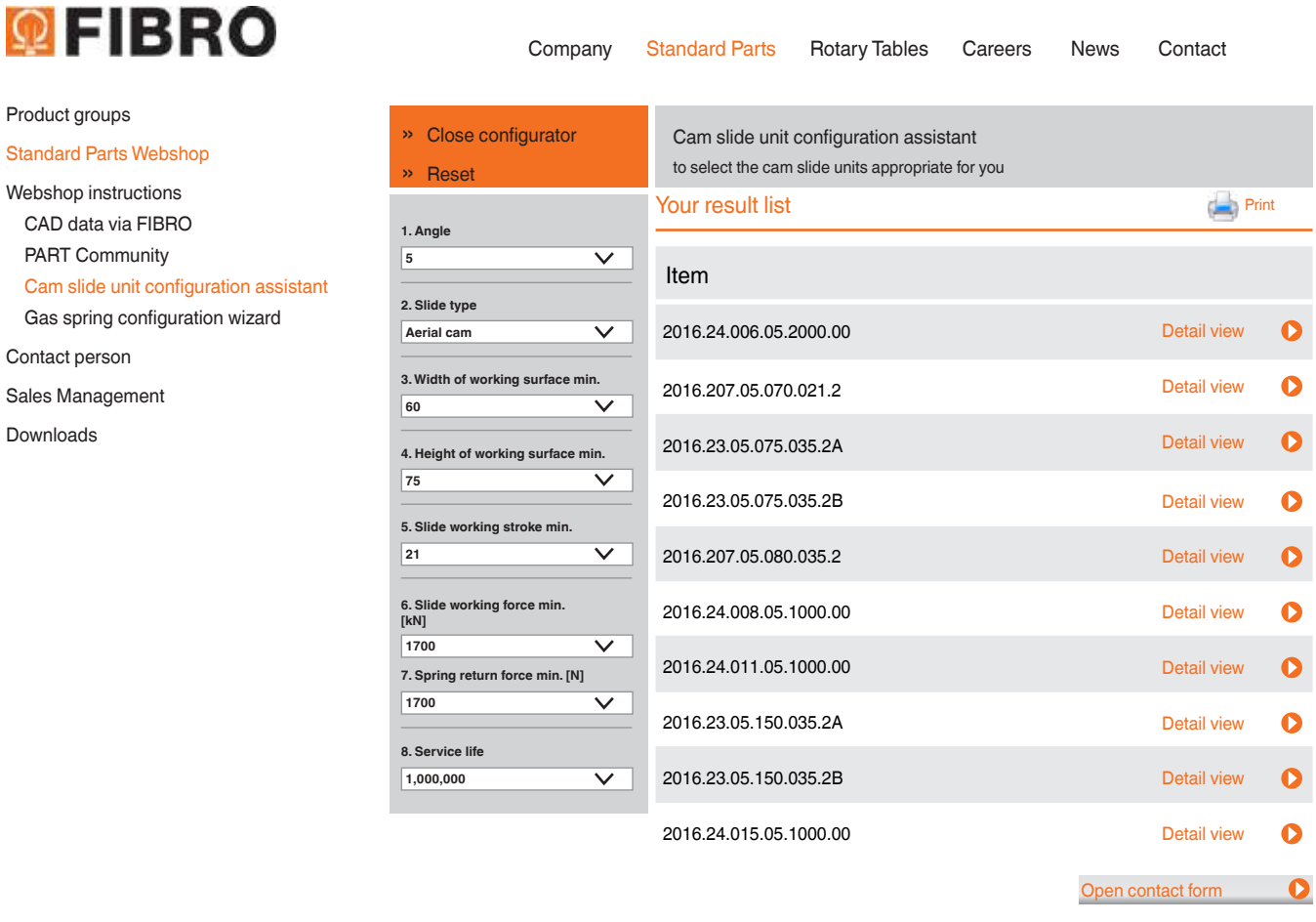
The configuration of your cam unit is done in four steps:

1. Angle
2. Cam unit type
3. Width of working surface (min.)
4. Height of working surface (min.)

After this, an initial hitlist with max. 10 matches will be displayed.
Further restrictions can be used to narrow down the selection list:

5. Cam unit working stroke (min.)
6. Cam unit working force (min.)
7. Retraction force (min.)
8. Life time

Link to the cam unit configurator:
http://keilnormschieber.fibro.de/



CONTENT NUMERICALLY LISTED BY ORDER NUMBER

Order number	Width [mm]	Aerial/ die mounted cam	Page
2016.11.	52 – 400	DMC	Request catalogue 2.2911.
2016.12.	65 – 150	DMC	Request catalogue 2.2911.
2016.14.	52 – 400	DMC	Request catalogue 2.2911.
2016.207.	70 – 400	AEC	219
2016.208.	500 – 1000	AEC	259
2016.21.	65 – 200	AEC	Request catalogue 2.2911.
2016.22.	65 – 200	AEC	Request catalogue 2.2911.
2016.23.	50 – 300	AEC	Request catalogue 2.2911.
2016.24.	60 – 600	AEC	53
2016.25.	700 – 1050	AEC	175

CONTENT BY OEM APPROVAL

OEM	Order number	Width [mm]	Aerial/ die mounted cam	Page
BMW	---			---
Daimler				
	2016.12	65 - 150	DMC	Request catalogue 2.2911.
	2016.23.	50 - 300	AEC	Request catalogue 2.2911.
	2016.24.	60 - 600	AEC	53
	2016.25.	700 - 1050	AEC	175
Ford	---			---
Opel	---			---
PSA				
	2016.23.	50 - 300	AEC	Request catalogue 2.2911.
Renault				
	2016.12.	65 - 150	DMC	Request catalogue 2.2911.
	2016.14.	52 - 400	DMC	Request catalogue 2.2911.
	2016.22.	65 - 200	AEC	Request catalogue 2.2911.
	2016.23.	50 - 300	AEC	Request catalogue 2.2911.
Volvo				
	2016.11.	52 - 400	DMC	Request catalogue 2.2911.
	2016.12.	65 - 150	DMC	Request catalogue 2.2911.
	2016.14.	52 - 400	DMC	Request catalogue 2.2911.
	2016.21.	65 - 200	AEC	Request catalogue 2.2911.
	2016.22.	65 - 200	AEC	Request catalogue 2.2911.
	2016.23.	50 - 300	AEC	Request catalogue 2.2911.
	2016.24.	60 - 600	AEC	53
	2016.25.	700 - 1050	AEC	175
Volkswagen Group with corporate brands				
	2016.12.	65 - 150	DMC	Request catalogue 2.2911.
	2016.24.	60 - 600	AEC	53
	2016.25.	700 - 1050	AEC	175

Processing status: 17.08.2016

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http://www.fibro.de/de/normalien/produktgruppen/k-schieber.html.

CONTENT BY TYPE

	Order number	Width [mm]	Page
Aerial cam unit	2016.207.	70 - 400	219
	2016.208.	500 - 1000	259
	2016.21.	65 - 200	Request catalogue 2.2911.
	2016.22.	65 - 200	Request catalogue 2.2911.
	2016.23.	50 - 300	Request catalogue 2.2911.
	2016.24.	60 - 600	53
	2016.25.	700 - 1050	175
Die mounted cam unit	2016.11.	52 - 400	Request catalogue 2.2911.
	2016.12.	65 - 150	Request catalogue 2.2911.
	2016.14.	52 - 400	Request catalogue 2.2911.

OVERVIEW SPECIFICATIONS

	Sliding pair	Features	Guaranteed number of strokes / lifetime	Working angle	Angle Increments (step size)	Width [mm]
2016.11. DIE MOUNT CAM STANDARD				**Request catalogue 2.2911.!**		
	Sliding planes: Cast / Cast with solid lubricant	unpopulated with compression spring	300,000	0°	--	52 – 400
2016.12. HORIZONTAL BAK STANDARD				**Request catalogue 2.2911.!**		
	Sliding planes: Hardened steel / bronze with solid lubricant	Fully equipped, shouldered guide bars, gas springs correspond to the NAAMS standard	1,000,000	0°	--	65 – 150
2016.14. HORIZONTAL				**Request catalogue 2.2911.!**		
	Sliding planes: Hardened steel / bronze with solid lubricant	Partly populated with compression spring	600,000	0°	--	52 – 400
2016.207. AERIAL CAM ECO LINE						
	Sliding planes: Hardened steel / bronze with solid lubricant	Fully equipped Guide bars Gas spring	1,000,000	0° – 60°	5°	70 – 400
2016.208. AERIAL CAM ECO LINE						
	Sliding planes: Hardened steel / bronze with solid lubricant	Fully equipped, Guide bars, gas spring	1,000,000	0° – 60°	10°	500 – 1000
2016.21. AERIAL CAM STANDARD				**Request catalogue 2.2911.!**		
	Sliding planes: Cast / Cast with solid lubricant	unpopulated with screw compression spring	300,000	0° – 70°	10°	65 – 200

OVERVIEW SPECIFICATIONS

	Sliding pair	Features	Guaranteed number of strokes / lifetime	Working angle	Angle Increments (step size)	Width [mm]
2016.22. AERIAL CAM				**Request catalogue 2.2911.!**		
	Sliding planes: Hardened steel / bronze with solid lubricant	Fully equipped, shouldered Guide bars, prismatic guide, Gas spring	1,000,000	0° – 70°	10°	65 – 200
2016.23. AERIAL CAM KBV1				**Request catalogue 2.2911.!**		
	Sliding planes: Hardened steel / bronze with solid lubricant	Fully equipped, shouldered Guide bars, gas springs correspond to the NAAMS standard	1,000,000	0° – 60°	5°	50 – 300
2016.24. AERIAL CAM FCC						
	Sliding planes: Hardened steel / bronze with solid lubricant	Fully equipped, shouldered Guide bars; sliding guide as double prismatic guide; gas spring, fulfils the BAK contract specification	1,000,000	0° – 75°	5°	60 – 600
2016.25. AERIAL CAM FCC						
	Sliding planes: Hardened steel / bronze with solid lubricant	Fully equipped, shouldered Guide bars, gas spring, fulfils the BAK contract specification	1,000,000	0° – 75°	5°	700 – 1050
2016.34. SLOPED				**Request catalogue 2.2911.!**		
	Sliding planes: Hardened steel / bronze with solid lubricant	Partly populated with compression spring	600,000	10° – 20°	10°	65 – 150

INTRODUCTION
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2016.24. AERIAL CAM FCC BAK — DAIMLER, VOLVO, VOLKSWAGEN GROUP

2016.25. AERIAL CAM FCC BAK — DAIMLER, VOLVO, VOLKSWAGEN GROUP

2016.207. AERIAL CAM ECO LINE

2016.208. AERIAL CAM ECO LINE

CUSTOMER-SPECIFIC
SERVICES

APPENDIX

EMERGENCY SITUATION /
CONTACTS

DESIGN, CONSTRUCTION

ENGINEERING

The FIBRO cam unit program offers matching system solutions for the widest range of applications. From the use in progressive punching tools with the smallest dimensions up to the demanding use in large tools. From the use in tools with small piece numbers up to premium applications in the manufacture of bodywork parts with the highest requirements in terms of precision, lifetime and process force transmission, our cam unit program offers the matching solution to your application. The fault-free operation is guaranteed by FIBRO over the guaranteed, nominal lifetime. The design of the cam units, in the course of the tool construction, is indispensable in this regard. Operating conditions of the tool, as well as the expected environmental influences, must be taken into account to the best extent possible. Using a precise and conscientious design, it is possible to achieve a lifetime which extends far beyond the guaranteed stroke rate.

The desired lifetime can only be achieved by using the cam units as intended. An overloading of the cam units will reduce the number of strokes of the cam unit and can, in the extreme case, lead to the immediate failure of the cam unit during the initial strokes.
The operational reliability of FIBRO cam units is demonstrated by the guaranteed number of strokes. The size of the working force, the position of the center of the force on the working surface and the sequence of the introduction of the force, all have an effect on the system. All performance specifications were calculated using factors known to us at the time of printing. Changed operation conditions can influence the lifetime of the cam unit and must be taken into account separately in consultation with the operator.

FIBRO supports you competently throughout the entire process chain: Starting with the selection of a suitable cam unit for your application, to the correct design, up to the delivery of the cam unit to the assembly, FIBRO is by your side when you have questions. After the completion of the engineering and assembly phase, FIBRO's after-sales support also provides you with professional support for your needs. Take advantage of our experience as a standard system supplier for toolmaking and customise your tools with our products to your specific applications in the most optimal way.

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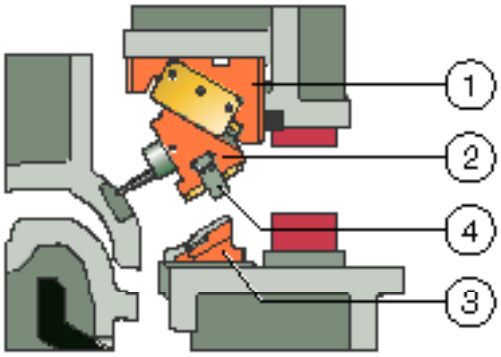
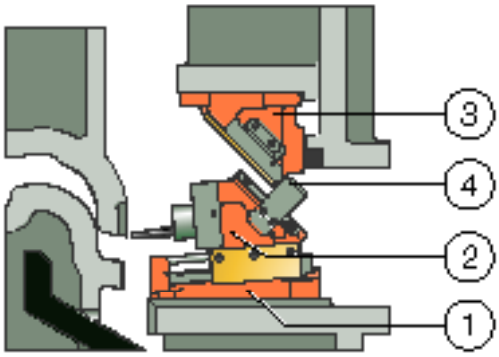
Installed state,
Depicted 100 mm in front of bottom dead center

Aerial cam unit (I)

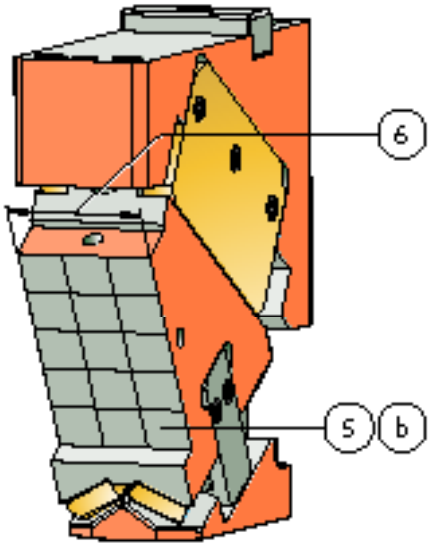


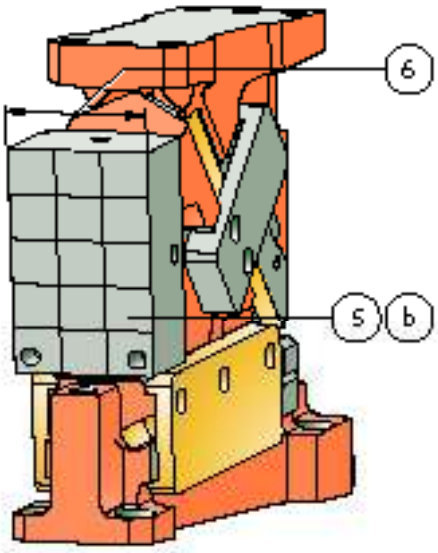
Cam unit mounted in the upper die:
Lifts with upper die during the course of the press cycle.

Die mounted cam unit (II)

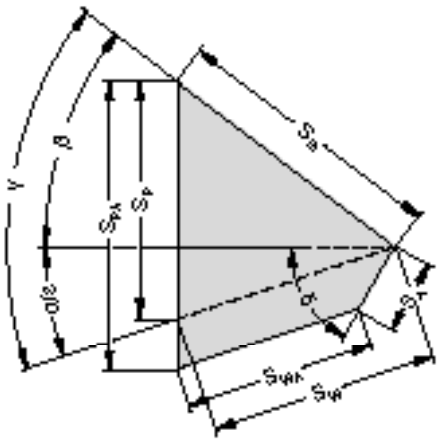


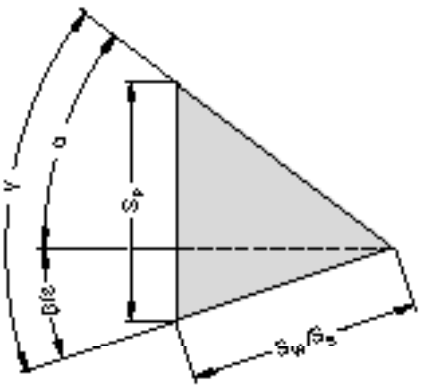
Cam unit mounted in the lower die:
Remains seating on the lower die during the course of the press cycle.





Cam diagram (A)





ENGINEERING
DEFINITION OF TERMS

(I)	**Aerial cam unit**	Assembly cam base / cam slider is mounted in the upper die, the driver in the lower die. Aerial cams are preferably utilised to increase press cycle times.
(II)	**Die mounted cam unit**	Assembly cam base / cam slider is mounted in the lower die, the driver in the upper die. Die mounted cam units improve the tool dynamics, since the moved mass is reduced in the upper die.

(1)	**Cam base**	Assembly for receiving the traveling slide body.
(2)	**Cam slider**	Assembly with the working surface for accommodating the tool-specific components. The cam slider assembly is mounted in the cam base so that it travels linearly.
(3)	**Cam driver**	Component or assembly which drives the slider body in the course of the press movement.
(4)	**Positive return**	Constructional device on the cam unit, which retracts the slide body mechanically during the upwards stroke of the press into the initial position.
no figure	**Pre-acceleration**	Constructional device on the cam unit, which influences the acceleration and braking behaviour of the cam slider in the press stroke. Version as plate or roll pre-acceleration possible.
(5)	**Working surface**	Surface on the cam slider for accommodating the tool-specific components.
(6)	**Working width**	Width of working surface

no figure	**Maximum permissible working force**	Maximum permissible force acting perpendicular to the working surface, with which the cam unit achieves the nominally guaranteed lifetime.
(b)	**Force diagram**	Specifies the maximum permissible working force when the centre of the force is located in different sectors on the working surface.
no figure	**Stripper force**	The force required by the parameters of the working process, which is necessary to return the tools to the initial position (tool / process-condition) after reaching the presses bottom dead center.
no figure	**Retraction force**	Constructionally related force of the cam unit, which returns it to the starting position after reaching the presses bottom dead center.
no figure	**Return force**	Force which is necessary in order to return the cam slider in the cam base back to the initial position without the action of a process-related stripper force.
no figure	**Spring force**	Constructionally related nominal force of the spring component used in the cam unit

(A)	**Cam diagram**	Represents the angle and distance ratios of the cam unit.
(ε)	**Cam angle**	Operating direction of the cam unit - angle of the cam unit working direction measured to the horizontal.
(α)	**Driver angle**	Angle of the driver gliding surface measured to the horizontal.
(β)	**Base angle**	Angle of the cam base gliding surface measured to the horizontal.
(γ)	**Included angle**	Angle of the sliding surfaces on the cam slider between driver and base.
(δ)	**Pre-acceleration angle**	Angle of the pre-acceleration gliding surface measured to the horizontal.
(S_W)	**Cam stroke**	Usable stroke in the working direction of the cam unit (representation aerial cam unit with and without pre-acceleration).
(S_S)	**Spring stroke**	Stroke of the spring in the cam unit.
(S_P)	**Press stroke**	Distance in the press direction required to close the cam unit completely.
(S_A)	**Pre-acceleration stroke**	Stroke which the cam unit travels when a pre-acceleration mechanism is used in the direction of the latter.

W_T	Cutting work	[Nm]
B	Width	[mm]
C_A	Centre of the force of the stripper	
C_B	Centre of working force	
C_F	Centre of force	
C_n	Centre of mass n	
D	Diagonal dimension	[mm]
F	Force	[kN]
F_A	Stripper force	[kN]
F_B	Operating force	[kN]
F_{hn}	Horizontal force n	[kN]
F_P	Force for punching	[kN]
F_{pp}	Return force	[kN]
F_R	Retraction force	[kN]
F_S	Spring force	[kN]
F_T	Cutting force	[kN]
F_{vn}	Vertical force n	[kN]
F_W	Working force	[kN]
H	Installation height	[mm]
H_1	Distance reference point / support top	[mm]
Hn	Height shoulder n	[mm]
H_W	Height of the working surface	[mm]
K	Cutting contour	
l	Cutting length	[mm]
l_n	Length contour element n	[mm]
L	Length	[mm]
L_1	Distance reference point / stop top	[mm]
L_2	Clamping surface top	[mm]
L_3	Distance reference point / stop bottom	[mm]
L_4	Clamping surface bottom	[mm]
L_5	Distance reference point to the top edge Working surface	[mm]
n	Counter	
P_n	Punch counter n	
R_m	Tensile strength	[N/mm²]
s	Sheet metal thickness	[mm]
S	Stroke	[mm]
S_A	Pre-acceleration stroke	[mm]
S_P	Press stroke	[mm]
S_{PA}	Press stroke with pre-acceleration	[mm]
S_S	Spring stroke	[mm]
S_W	Cam unit stroke	[mm]
S_{WA}	Cam unit stroke with pre-acceleration	[mm]
t	Time	[s]
u	Protrusion	[mm]
u_s	Protrusion to side	[mm]
u_f	Protrusion to front	[mm]
B_W	Working width	[mm]
x_n	Distance n x-direction	[mm]
y_n	Distance n y-direction	[mm]
α	Driver angle	[°]
β	Cam base angle	[°]
γ	Included angle	[°]
δ	Pre-acceleration angle	[°]
ε	Cam unit angle	[°]
τ_T	Shear strength	[N/mm²]
x_{CA}	Centre of mass of the stripper in x-direction	[mm]
y_{CA}	Centre of mass of the stripper in y-direction	[mm]
x_{Ctotal}	Centre of mass in x-direction, total	[mm]
y_{Ctotal}	Centre of mass in y-direction, total	[mm]

The size of the maximum force transferable by the cam unit is significantly influenced by the type of installation chosen. A technically correct selection of the installation type must be considered analogue to the cam unit design.

The working force can be transmitted via the shoulder of the cam base on FIBRO cam units, alternatively via concealed fitting wedges on the cam base support. The shouldered installation allows maximum load values to be transferred, while a compact mounting space can be realized by installing via the concealed seating wedges. The reduced load values must be observed when installing via the feather keys.

The manufacture of the cam unit interface in the tool can be optimised by means of simple constructional solutions and cost-effectively, without loss of performance.

Force transmission via shoulder

The maximum power values of the cam unit are achieved by the shouldering of the cam base in the nominal shoulder height (see catalogue specifications). It is not necessary to shoulder the die over the entire height of the cam base.

In the following, three possible versions of the shouldering of the cam base in the die are shown, the designs 2 + 3 thereof are preferred since production is optimised.

1. Shouldering over entire cam base height

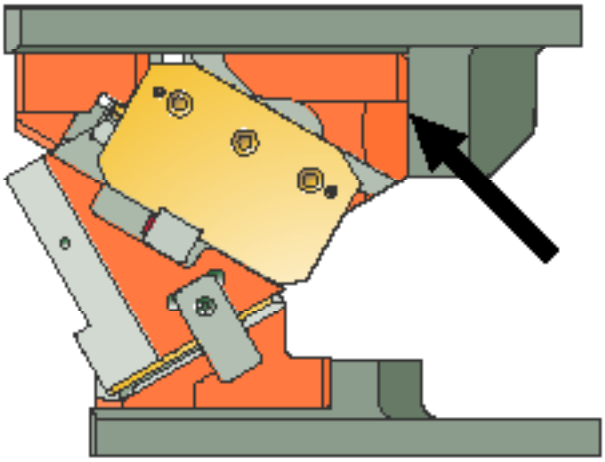


Figure 1: Cam base completely shouldered

2. Shouldering via cast shoulder in the upper area of the cam base, lower area exposed

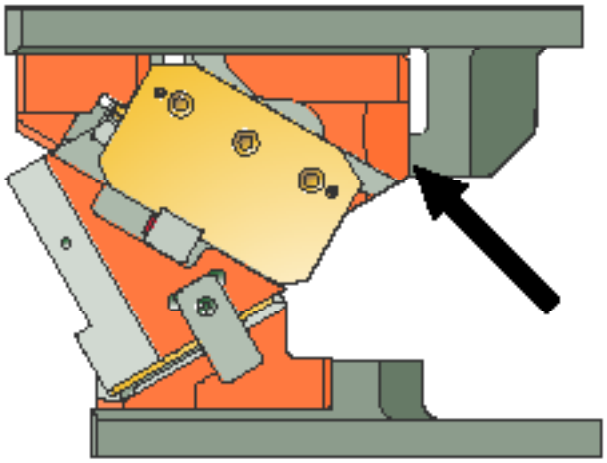


Figure 2: Cam base shouldered at top

3. Shouldering via inserted feather key between cam base and die casting in the upper area of the cam base, lower area exposed

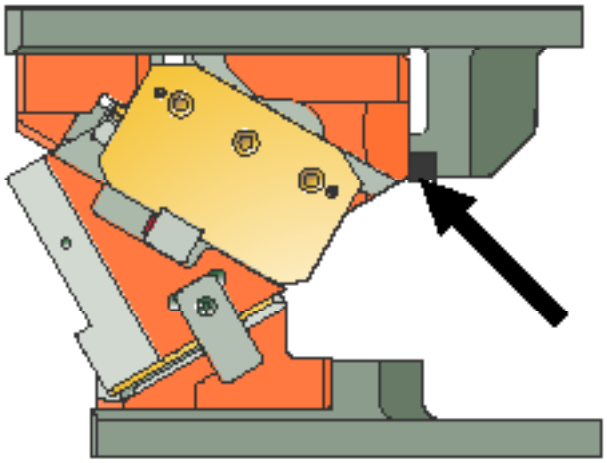


Figure 3: Cam base shouldered at top with key

Force transmission via feather key

In the case of lower requirements on the transmission of force, the cam unit can be installed in the tool by means of bracing via the key so that it is optimised to the installation space. For the mechanical machining of the feather key groove, in this case a distance from the groove geometry to the possible interference geometries in the die cast of at least 140 mm must be observed in order to avoid a collision of the milling spindle.

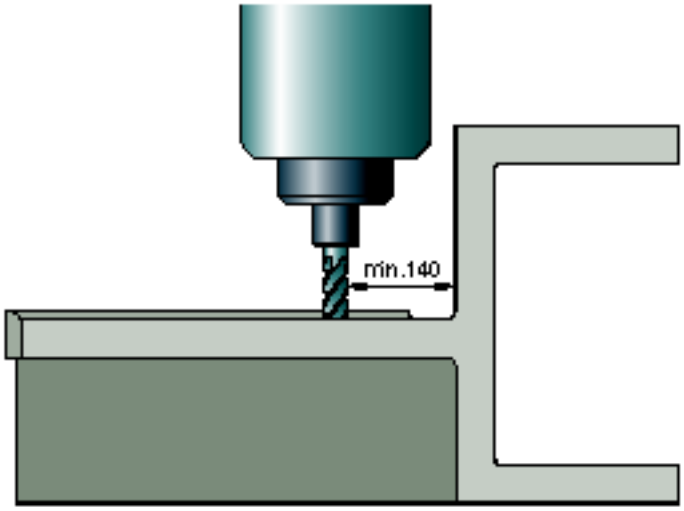


Figure 4: Milling spindle clearance

FIBRO cam units must be fitted with head cap screws having strength class 8.8 or higher.

The operating reliability is demonstrated independently of the operating mode as follows:

1. Evaluation of the calculated operating force
2. Evaluation of the arithmetical centre of force and formation of the substitute force
3. Comparison of the substitute force with permissible force

The operating force is generated by the tools mounted on the cam during the engagement in the sheet metal. When determining the operating forces, the following operating modes are distinguished:

a) Cutting
b) Punching
c) Forming
d) Operations with additional stripper

a) Cutting

During cutting, the operating force is created by overcoming the shear strength of the machined sheet metal part.

The force is calculated using the formula:

$$F_S = l \times s \times \tau_T \quad [1]$$

Cutting length [l] and sheet thickness [s] are taken from the method plan, the shear strength [τ] from material tables. If there are no values for the shear strength, this can be approximately determined from the tensile strength. For ductile materials, this amounts to between 60 and 90% of the tensile strength.

In general, the maximum value of the possible characteristic range of the sheet material must be used as a basis for the calculation because the steel grades are produced and delivered within the specified range. Thus, the characteristic values of the processed sheets can assume the highest permissible characteristic values and thus also the highest possible loads on the tool components can be applied.

For evaluating the cam unit stability, the centre of force applied by the cutting is determined and compared with the force diagram of the desired cam unit. The centre of force of the cutting is determined by means of the centre of mass of the cutting line. For this purpose, complex, free-shaped sections can be dissected into a sufficiently precisely segmented substitute contour with known segment focal points (see Fig. 5)

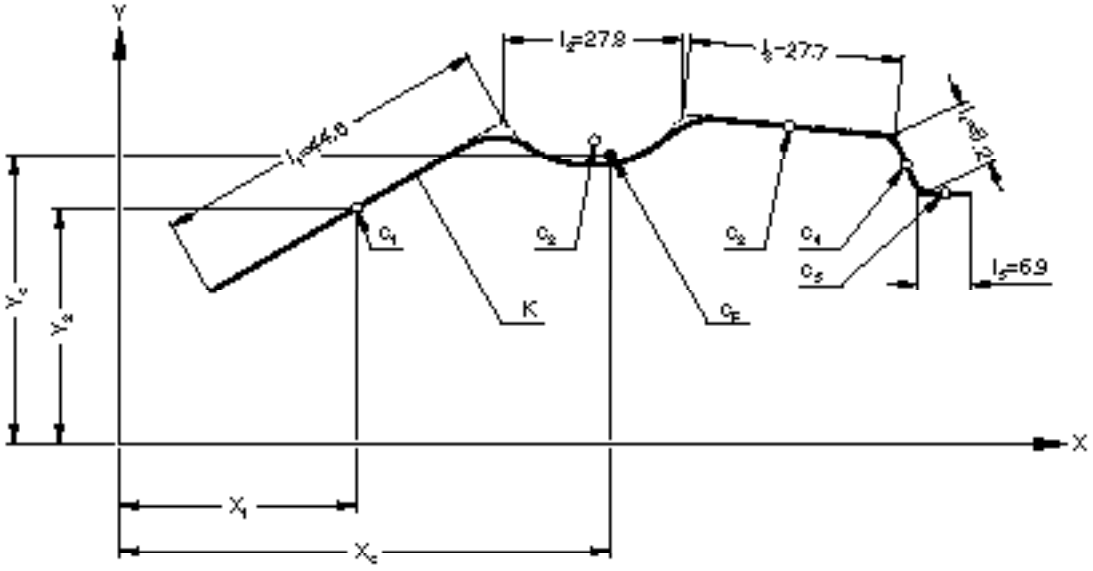


Figure 5: Cutting contour original and approximated

The total centre of force is determined from the individual segments of the line:

x value:

$$x_C = (x_1 \times l_1 + x_2 \times l_2 + x_n \times l_n) / (l_1 + l_2 + l_3) \quad [2]$$

y value:

$$y_C = (y_1 \times l_1 + y_2 \times l_2 + y_n \times l_n) / (l_1 + l_2 + l_3) \quad [3]$$

The following boundary conditions apply to the calculation model:

In this determination of the centre of force, a uniform trim steel engagement is assumed. A non-uniform trim steel engagement determines both the change in the cutting force F_T as well as the centre of the force C_F over the cutting line t_T.

Force-reducing measures such as, for example, the targeted manipulation of the cutting line are not taken into account in this consideration. The modification of the strength values by a cold work hardening of the material in preliminary forming operations is likewise not taken into account in this consideration. It applies in particular to modern, high-strength materials for vehicle structural components (e.g. in dual phase steels) and depends on the material as well as on the degree of metal forming. Cold work hardening effects must be taken into account in the individual case in the design of the cam unit. If a stripper is used on the cam unit, the loading by the stripper must be taken into account accordingly (see section d).

b) Punching

Punching is a special form of cutting. The determination of the operating force thus follows a similar scheme, although some important particulars have to be considered.

The determination of the force is performed analogous to the calculation of the force during cutting. In the case of punching operations, several punches are often arranged on a cam unit. In this case, the force introduced by each punch must be determined as well as the sum of all individual forces.

$$F_{Pn} = l_n \times s \times T_T \quad [4]$$

$$F_{Ptotal} = F_{P1} + F_{P2} + F_{Pn} \quad [5]$$

As a second step, the determination of the centre of the force is carried out analogously to the design during cutting. In contrast to simple cutting, the position of each individual punch and the position of centre of mass of the sum of the individual cells must be examined during punching and compared with the force diagram. This is necessary, since during punching onto a mould surface, each punch engages with a very high probability at a different point in time, and the load in the cam unit is also introduced in a steplike manner.

The centres of the force are calculated as follows:

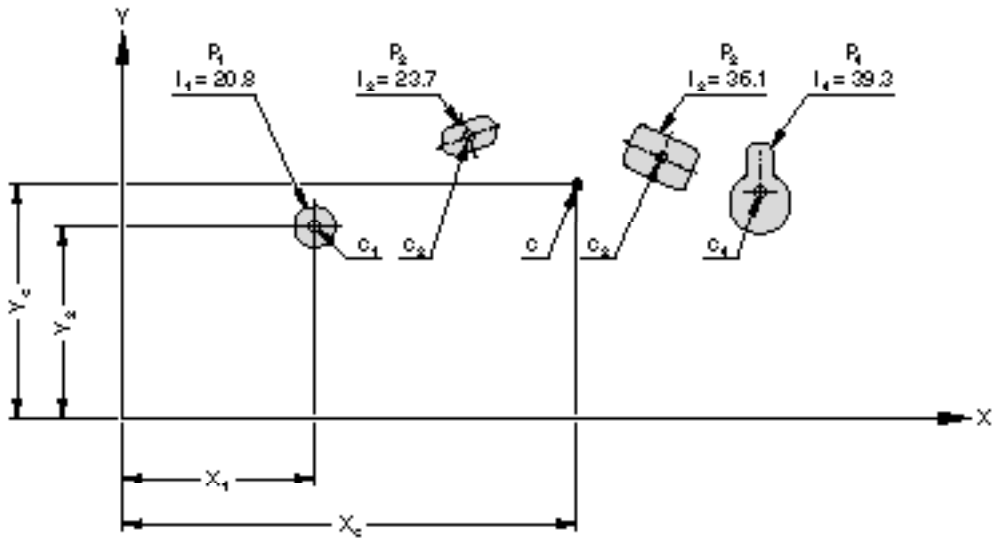


Figure 6: Hole sample

P_1 (round hole) > centre of force in the centre
P_2 (slot) > centre of force in the centre
P_3 (square hole) > centre of force in the centre
P_4 (shaped hole) > determination of the centre by calculating the line centre

In the determination of the total centre of the force of a punching field, the individual cutting lengths of each punch are replaced by the punching forces. The total centre point of the punch field can thus be determined from the individual centre positions:

x value:

$$x_C = (x_1 \times F_{P1} + x_2 \times F_{P2} + x_n \times F_{Pn}) / (F_{P1} + F_{P2} + F_{Pn}) \quad [6]$$

y value:

$$y_C = (y_1 \times F_{P1} + y_2 \times F_{P2} + y_n \times F_{Pn}) / (F_{P1} + F_{P2} + F_{Pn}) \quad [7]$$

Boundary conditions of this calculation model:

In the consideration, a uniform punch engagement of each individual punch is assumed, which is the exception due to the component shape. Tilt and bending of the mould surfaces cause a delayed plunging of the punches. The cutting force reduction by these geometric effects is not taken into account in this calculation model.

The load is changed by the use of a stripper. This must be taken into account in the cam design (see section d)

c) Forming

The term "forming" includes all operations that cause a ductile, permanent form change of the component. The following work operations belong to the forming operating mode:

- Chamfering
- Adjustment
- Postforming
- Drawing

The force required for moulding depends on the shape and the material characteristics. Forming operations on vehicle components are usually complex due to the free form of the components and produce a multi-axial state of stress. The determination of the forces required for this purpose is only possible with difficulty or only with a disproportionate effort. The moulding forces occurring can usually be determined by a drawing simulation. Hard die spotting ("drive to final pressure" / "run against block") with the cam unit is to be avoided if possible. By insufficient coordination of this operation, forces can be introduced into the cam, which exceed the permissible maximum of the allowed operating load by a multiple. Thereby, an immediate failure of the cam unit is possible.

d) Operations with additional stripper

An additional force is introduced into the cam by the use of a stripper resp. cam pad. It is to be taken into account accordingly.

Strippers are used as a stripper plate or as an elastomer / pop-on stripper. The calculation of the centre of force of both variants differs.

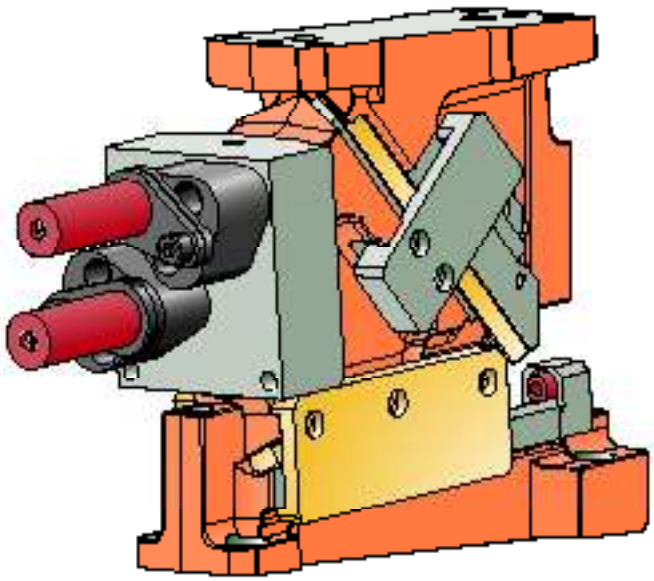


Figure 7: Cam unit with elastomer stripper

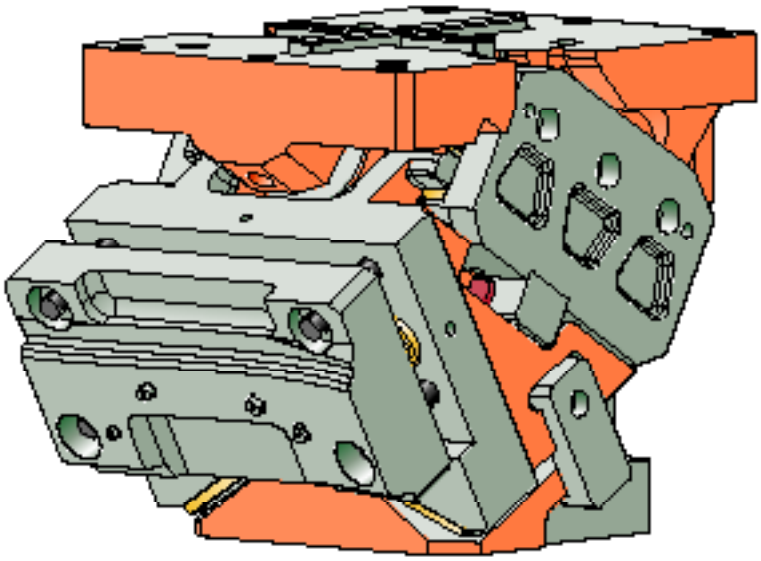


Figure 8: Cam unit with stripper plate

d.1) Elastomer-/Pop-on stripper

Elastomer / Pop-on strippers are extremely compact stripper units, which are directly attached to the supporting plate of a punch. By this arrangement, the centre of mass of an elastomer / pop-on stripper element is centred on the centre axis of the punch.

The total operating force corresponds to the sum of the cutting and stripping force. The centre of mass is then calculated analogous to punching.

d.2) Stripper plate

The centre of the force produced by the stripper plates, in contrast to elastomer / pop-on strippers, is not coincident with the centre of mass force of the working operation. If working with a stripping plate, both the total centre of force of the working operation + stripper plate as well as the centre of force of the stripping plate alone must be compared with the permissible operating force of the cam. This is due to the fact that the load of the stripper plate continues to be present after the fall of the operating force, for example, after punching through the sheet, until the stripper springs are released while opening the die.

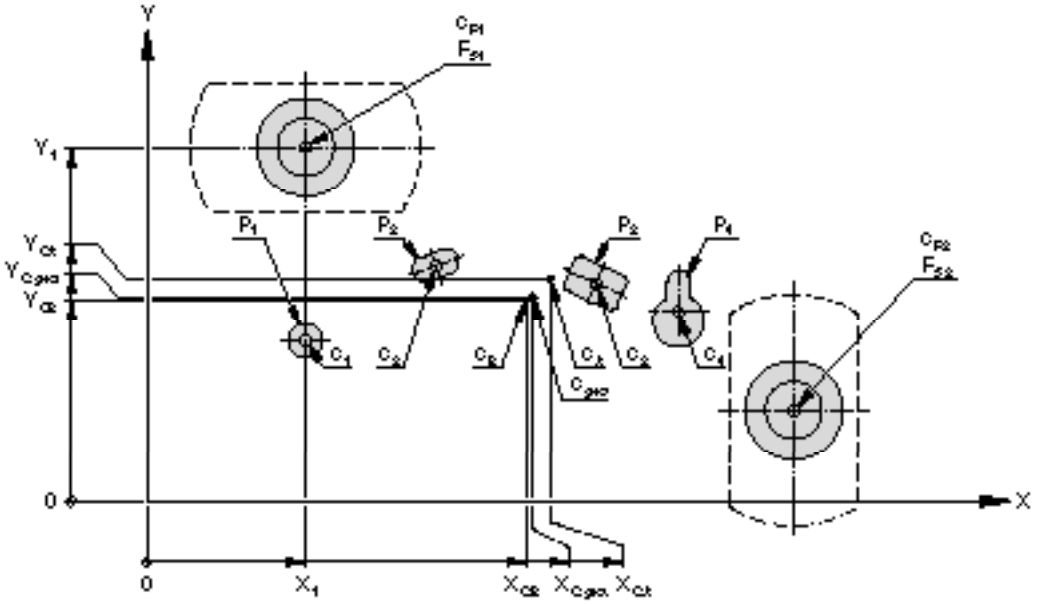


Figure 9: Hole pattern with gas spring

Centre of force of the elastomer / pop-on stripper:

x value:

$$x_{CA} = (x_1 \times F_{S1} + x_2 \times F_{S2} + x_n \times F_{Sn}) / (F_{S1} + F_{S2} + F_{Sn}) \quad [8]$$

y value:

$$y_{CA} = (y1 \times F_{S1} + y_2 \times F_{S2} + y_n \times F_{Sn}) / (F_{S1} + F_{S2} + F_{Sn}) \quad [9]$$

Total centre of operating force and stripper force:

x value:

$$x_{Ctotal} = (x_{CA} \times \text{Sum } F_S + x_{CB} \times F_B) / (\text{Sum } F_S + F_B) \quad [10]$$

y value:

$$y_{Ctotal} = (y_{CA} \times \text{Sum } F_S + y_{CB} \times F_B) / (\text{Sum } F_S + F_B) \quad [11]$$

ENGINEERING
PROOF OF LIFETIME

The lifetime test is carried out by comparing the existing operating force with the maximum operating force permitted for the guaranteed lifetime. This results in the statement whether or not the cam unit with the introduced force reaches the guaranteed lifetime.

Cutting

The calculated operating force in the determined centre of the force is compared with the permissible operating force from the force diagram of the desired cam unit. The cam unit maintains the guaranteed lifetime if

$$F_B \leqq F_{zul} \quad [12]$$

Punching

When punching, each individual punch Pn must be compared with its centre of mass Cn, as well as the sum of all punches with the total centre of the force point, with the force diagram of the desired cam unit. The cam unit maintains the guaranteed lifetime if

$$F_{Bn} \leqq F_{zul} \quad [13]$$

and

$$F_{Btotal} \leqq F_{zul} \quad [14]$$

Forming

The operating force determined from the drawing simulation and applied at the centre of the force point is compared with the permissible operating force from the corresponding force diagram. The cam unit maintains the guaranteed lifetime if

$$F_B \leqq F_{zul} \quad [15]$$

Stripper with cam stripper plate

When a cam stripper plate is used, the sum of the operating force + stripping force, with its associated centre of the force point, as well as the stripping load alone, must be compared with its centre of the force point with the force diagram. The cam unit maintains the guaranteed lifetime if

$$F_A + F_B \leqq F_{zul} \quad [16]$$

and

$$F_A \leqq F_{zul} \quad [17]$$

General instructions

- The force specifications of the individual force diagram sectors must never be added.
- The substitute force with the corresponding centre of the force point must always be formed in accordance with the preceding descriptions and these must be compared with the force diagram.
- The specifications in the force diagram correspond to the punctually introduced substitute loads and are not surface pressure specifications!

General notes on permissible operating force

As a matter of principle, the transverse loads acting on the cam unit are to be absorbed by design measures in the tool. Uncompensated transverse loads can have a massively negative effect on the cam unit lifetime.

Determined by the tension conditions and resulting elastic deformations in the machined sheet metal, cutting and forming components stick after the machining process when the bottom dead centre is reached. Accordingly, a stripping force is required to pull the tools out of the sheet into the initial position. For the design of tools, an approximate calculation of the stripping forces, based on experience values, is sufficiently accurate. The stripping force is calculated as a percentage of the working force.
For cutting operations, this amounts to:

$$F_A = 0.07 \times F_T \quad \text{[valid for open cutting contours]} \qquad [18]$$

$$F_A = 0.10 \times F_T \quad \text{[valid for closed cutting contours]} \qquad [19]$$

In the case of forming operations, the stripping forces vary to a greater degree. When determining the stripping forces during forming operations, the instructions of the tool manufacturers or operators must be observed.

Cam units have a system-related retraction capability. This can be used to overcome the necessary stripping force. If the retraction capacity of the cam unit is higher than the necessary stripping force, no tool-specific actions need to be taken to return the die components to the initial position. In this case, the cam unit can work directly through the main pad of the die.

$$F_R > F_A \qquad [20]$$

If the retraction capacity of the cam unit is less than the tool- or process-specific stripping force, then constructional measures need to be provided, such as the use of a cam stripper.

$$F_R < F_A \qquad [21]$$

The retraction force specifications of all FIBRO cam units refer to the working direction of the cam unit, thus, a conversion is not necessary.

If an aerial cam unit remains in its bottom dead centre after the working operation, considerable damage to the cam unit and die is to be expected due to collision of die components while opening it.
In contrast, if a die mounted cam remains in its bottom dead centre after the working operation, then no profound damage is to be expected in the event that the cam does not operate through the main pad. As a rule, the die mechanism in this case is not able to remove the blank out of the die, which stops the movement of the machine by means of the mechanisation sensor system.
If the die components of a die mounted cam also operate through the main pad, similar damage to the cam and die as in the case of an aerial cam unit is to be expected.
Please note that for this reason, the mechanical retraction clamps must not be removed without consulting with FIBRO.

The design for die construction is illustrated by the following three examples.

1. Cutting

a) by main pad

Process parameters:

Cam unit angle 40°
greatest width of the cutting line on cam 278 mm
Cutting contour see figure
Length l = 305.9 mm
Sheet metal thickness s = 0.7 mm
Material DX51D+Z; max. tensile strength R_m = 270...500 N/mm²
open cutting line: Stripping force 7% of cutting force

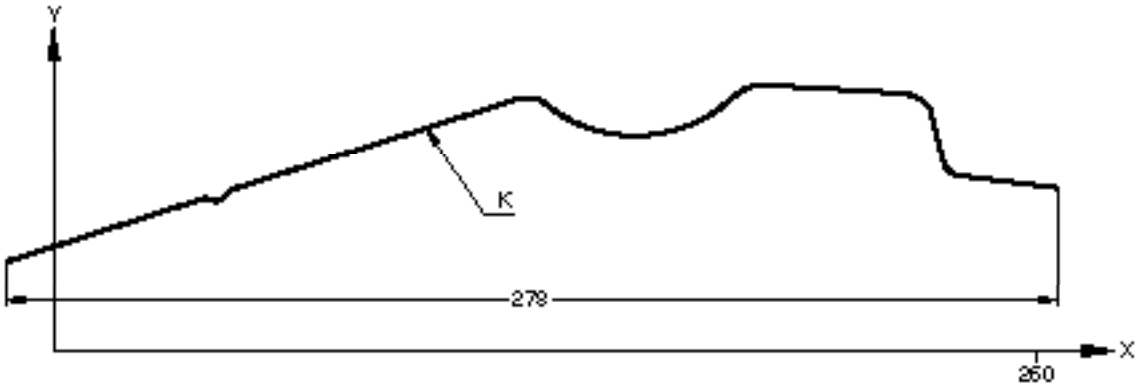


Figure 10: Cutting contour

Determination cutting force F_T (= Operating load F_B)

$$\mathbf{F_T = l \times s \times \delta_T = l \times s \times R_m \times 0.8}$$

F_T = 305,9 mm × 0.7 mm × 500 N/mm² × 0.8

$$\mathbf{F_T = 85.7\ kN}$$

Determination stripping force F_A

$$\mathbf{F_A = F_T \times 0.07}$$

F_A = 85.7 kN × 0.07

$$\mathbf{F_A = 6\ kN}$$

Determination of centre of the force C_F

The cutting contour is segmented into the replacement cutting contour, compare figure. The mass centres of the individual segments of the replacement cutting contour are known.
For the calculation of the total centre of the force, the zero point of the coordinate system is assumed to be x + 12.5 / y - 23.5 measured from the left outermost corner of the cutting contour. The lengths, as well as single centre of mass values of the individual contours are as follows (graphically determined values):

No.	Type	Length contour element (mm)	x_C (mm)	y_C (mm)
1	Line	146.7	57.4	45.7
2	Arc	62.8	155.6	61.1
3	Line	48	207.1	69.1
4	Line	21.8	233.7	57
5	Line	29.4	250.9	44.7

The position of the total centre of the force is calculated from the values of the individual segments:

$$\mathbf{x_C = (x_1 \times l_1 + x_2 \times l_2 + x_3 \times l_3 + x_4 \times l_4 + x_5 \times l_5) / (l_1 + l_2 + l_3 + l_4 + l_5)}$$

x_C = (57.4 mm × 146.7 mm + 155.6 mm × 62.8 mm + 207.1 mm × 48 mm + 233.7 mm × 21.8 mm + 250.9 mm × 29.4 mm) / (146.7 mm + 62.8 mm + 48 mm + 21.8 mm + 29.4 mm)

$$\mathbf{x_C = 131.5\ mm}$$

$$\mathbf{y_C = (y_1 \times l_1 + y_2 \times l_2 + y_3 \times l_3 + y_4 \times l_4 + y_5 \times l_5) / (l_1 + l_2 + l_3 + l_4 + l_5)}$$

y_C = (45.7 mm × 146.7 mm + 61.1 mm × 62.8 mm + 69.1 mm × 48 mm + 57 mm × 21.8 mm + 44.7 mm × 29.4 mm) / (146.7 mm + 62.8 mm + 48 mm + 21.8 mm + 29.4 mm)

$$\mathbf{y_C = 53.2\ mm}$$

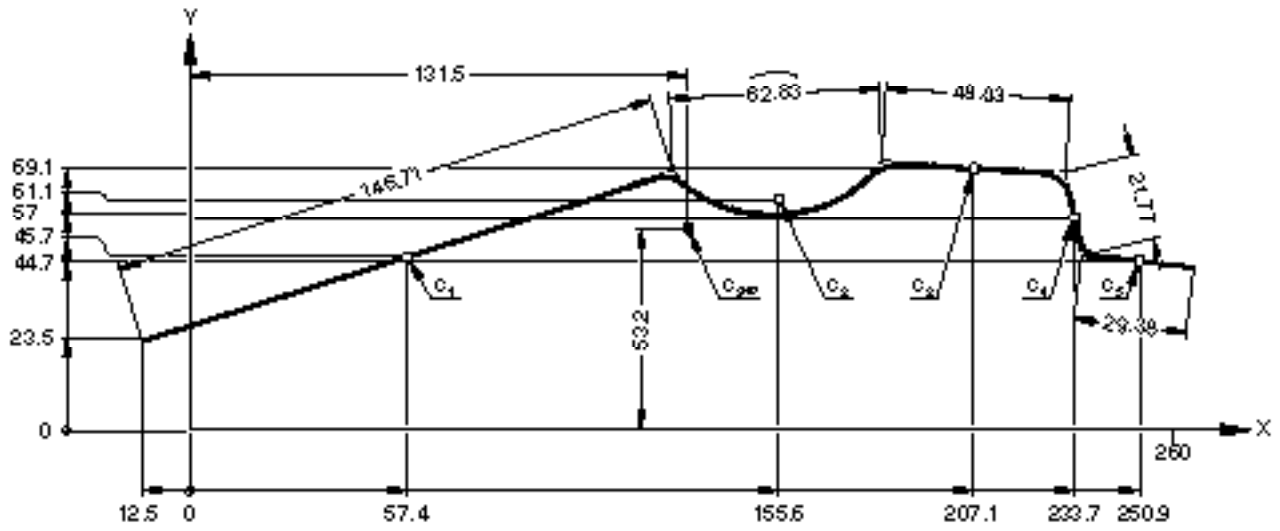


Figure 11: Cutting contour approximated

The determined force values are compared with the performance data of the selected cam unit. For this work operation, an aerial cam unit of the 2016.24. series with a working width of 260 mm is to be used. The cam unit has the following performance data:

max. working force (shouldered installation): 737 kN
max. working force (installation with feather key): 359 kN
Retraction force: 36.4 kN

The total centre of force of the cam cut is on the quadrant of the force diagram with 737 kN permissible load (shouldered) or 320 kN permissible load (installed with feather key). The cam unit can therefore be installed with the given cutting contour and the applied process parameters both with the force relief via a shoulder on the rear side of the cam base as well as via the feather key inserted into the cam base supporting surface in the die:

$$F_T < F_{permissible\ feather\ key} < F_{permissible\ shoulder}$$

85.7 kN < 320 kN < 737 kN

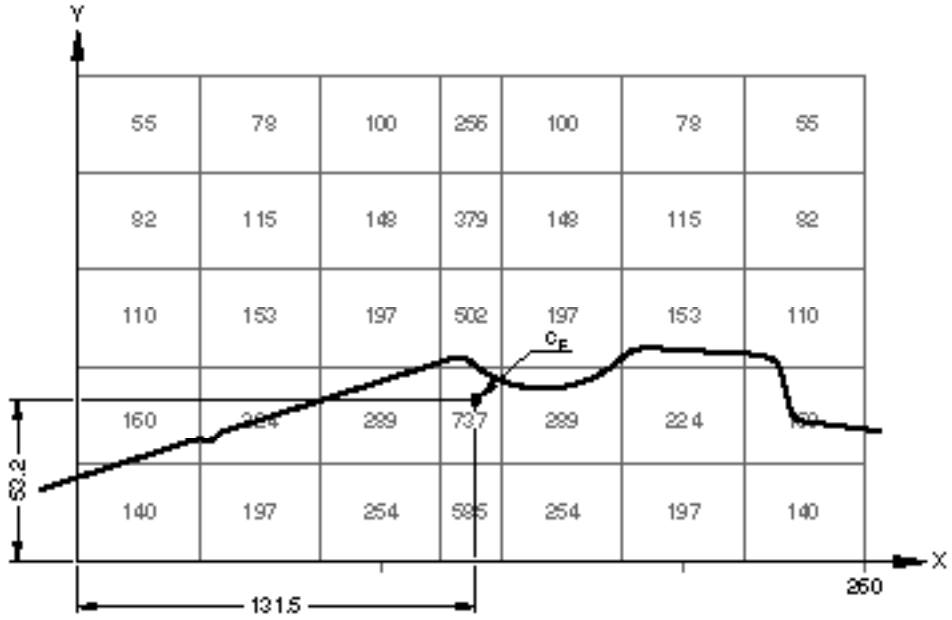


Figure 12: Cutting contour with force diagram

No further actions have to be taken to move the cam unit back in the initial position when the press is opened – the retraction force of the cam unit is higher than the process-induced stripping force:

$$F_R > F_A$$

33.6 kN > 6 kN

2. Punching

a) by main pad

Process parameters: Cam unit angle 15°
largest distance between punch centres is 72.6 mm
Punch contours, see figure
Contour lengths and individual centres of the force, see table
Sheet metal thickness s = 1.5 mm
Material D750MS /+Z; max. tensile strength R_m = 1,000...1,200 N/mm²
closed cutting line: Stripping force 10% of cutting force

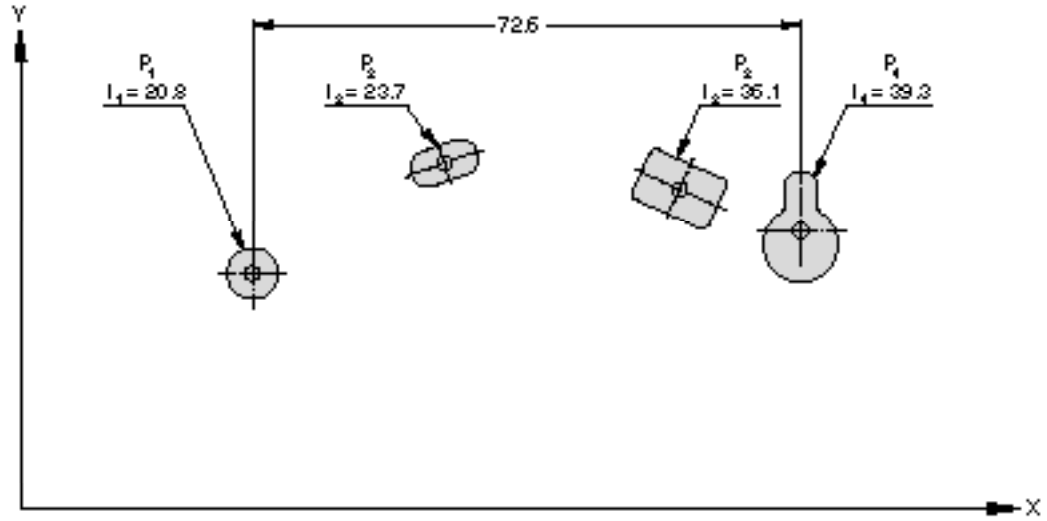


Figure 13: Hole pattern with size estimation

Determination cutting force during punching F_{Pn} (= Operating force F_B)

$$F_P = l \times s \times \delta T = l \times s \times R_m \times 0.8$$

Punch P_1:
F_{P1} = 20.9 mm × 1.5 mm × 1,200 N/mm² × 0.8
F_{P1} = 30.1 kN

Punch P_2:
F_{P2} = 23.8 mm × 1.5 mm × 1,200 N/mm² × 0.8
F_{P2} = 34.3 kN

Punch P_3:
F_{P3} = 36.1 mm × 1.5 mm × 1,200 N/mm² × 0.8
F_{P3} = 52 kN

Punch P_4:
F_{P4} = 39.3 mm × 1.5 mm × 1,200 N/mm² × 0.8
F_{P4} = 56.6 kN

Total cutting force F_{Ptotal} during punching:

$$\mathbf{F_{Ptotal} = F_{P1} + F_{P2} + F_{P3} + F_{P4}}$$
$$F_{Ptotal} = 30.1\ kN + 34.3\ kN + 52\ kN + 56.6\ kN$$
$$\mathbf{F_{Ptotal} = 173\ kN}$$

Determination stripping force F_A

$$\mathbf{F_A = F_{Ptotal} \times 0.1}$$
$$F_A = 173\ N \times 0.1$$
$$\mathbf{F_A = 17.3\ kN}$$

Determination of the total centre of the force

The centres of the force of the individual punches are known. For the calculation of the total centre of the force, the zero point of the coordinate system is assumed to be x + -26.6 / y - 31.2 measured from the centrepoint of the punch P_1. The positions of the individual centre of the force values result from the method plan as follows (graphically determined values):

No.	Type	Length (mm)	x_C (mm)	y_C (mm)
P_1	Round hole	20.8	26.6	31.2
P_2	Slot	23.7	51.8	45.9
P_3	Square hole	36.1	83.2	42.5
P_4	Keyhole	39.3	99.3	36.1

The position of the total centre of the force is calculated from the values of the individual punches:

$$\mathbf{x_C = (x_1 \times F_{P1} + x_2 \times F_{P2} + x_3 \times F_{P3} + x_4 \times F_{P4}) / (F_{P1} + F_{P2} + F_{P3} + F_{P4})}$$
$$x_C = (26.6\ mm \times 30.1\ kN + 51.8\ mm \times 34.3\ kN + 83.2\ mm \times 52\ kN + 99.3\ mm \times 56.6\ kN) / (30.1\ kN + 34.3\ kN + 52\ kN + 56.6\ kN)$$
$$\mathbf{x_C = 72.4\ mm}$$

$$\mathbf{y_C = (y_1 \times F_{P1} + y_2 \times F_{P2} + y_3 \times F_{P3} + y_4 \times F_{P4}) / (F_{P1} + F_{P2} + F_{P3} + F_{P4})}$$
$$y_C = (31.2\ mm \times 30.1\ kN + 45.9\ mm \times 34.3\ kN + 42.5\ mm \times 52\ kN + 36.1\ mm \times 56.6\ kN) / (30.1\ kN + 34.3\ kN + 52\ kN + 56.6\ kN)$$
$$\mathbf{y_C = 39.1\ mm}$$

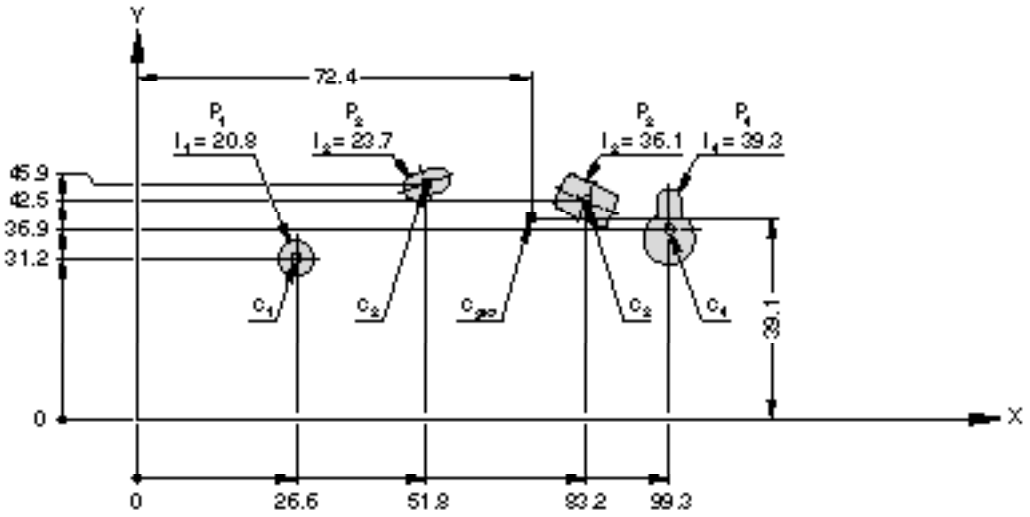


Figure 14: Hole pattern with individual centre of mass

The determined force values are compared with the performance data of the selected cam unit. For this work operation, preferably, a compact aerial cam unit of the 2016.24. series is to be used.
Due to the maximum distance of about 72.6 mm of the centre of mass of the holes, an attempt is made to use a cam unit with a width of 110 mm and a multi-punch retainer plate.

The selected cam unit has the following performance data:
max. working force (shouldered installation): 372 kN
max. working force (installation with feather key): 93 kN
Retraction force: 5.8 kN

The total centre of the force of the hole pattern is on the quadrant of the force diagram with 372 kN permissible load (shouldered) or 80 kN permissible load (installed with feather key). Therefore, the process forces on the cam should absolutely be absorbed by a shoulder on the back of the cam base for the given hole pattern and its process parameters:

$$F_{\text{permissible feather key}} < F_P < F_{\text{permissible shoulder}}$$
80 kN < 173 kN < 372 kN

The individual centres of the force of each punch lie on quadrants of the force diagram in each case with a higher permissible load than the present operating force. A stepped punching caused by the partial shape thus does not cause any unacceptable overloads on the cam unit. In the following, only the forces with the force diagrams installation type "shouldered" are compared:

Punch P_1:
30.1 kN < 91 kN

Punch P_2:
34.3 kN < 164 kN

Punch P_3:
52 kN < 164 kN

Punch P_4:
56.6kN < 164kN

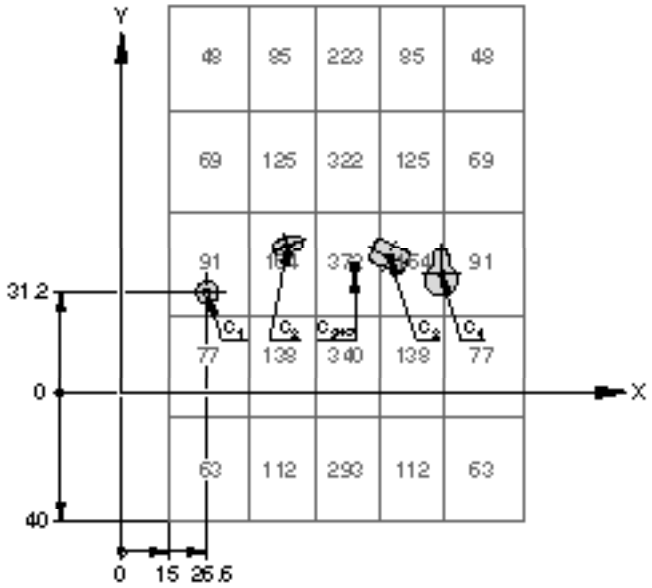


Figure 15: Hole pattern with force diagram

The constructional retraction force of the cam is not sufficient to move the slider back into the initial position while the press opens; the return force of the cam is less than the process-induced stripping force:

$F_R < F_A$
5 kN < 17.3 kN

Die specific actions must be taken in order to ensure that the slider can be returned.
In this case, a cam stripper is used.

b) with gas-spring-operated cam stripper

The cam from point a) is equipped with a gas-spring-operated cam stripper to increase the retraction force. It has to be operated by two or three compact gas springs of the POWERLINE series. According to the design, approx. 12 kN retraction force is missing for a smooth process. Springs of the POWERLINE series with a cylinder diameter of 38 mm have an initial force of 5 kN. For the present case, three springs are thus required for the actuation of the cam pad. The springs are mounted using a square mounting flange. The additional installation space required for this is to be taken into account when selecting the cam unit. As a result of the flange dimensions, the width of the slider working surface must be at least 147 mm. Accordingly, the next largest cam unit width is selected with 150 mm. With approx. 8 kN, this cam unit has a greater retraction capacity than the originally selected cam unit with a width of 110 mm. With this cam unit and the selected gas springs, two pieces are sufficient to actuate the cam stripper. In order to be able to accommodate the guide, retaining and safety elements on the cam unit work surface, to obtain a good distribution of the force introduction, and to realise a compact overall space, the springs are arranged diagonally on the working surface (compare illustration).

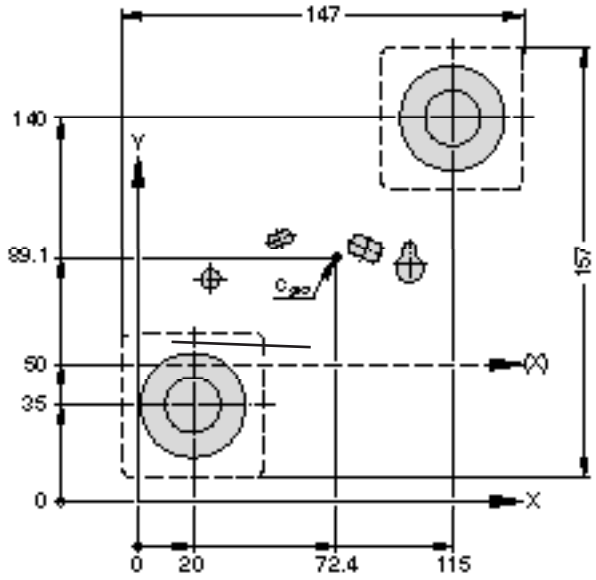


Figure 16: Hole pattern with stripper plate

Determination of the centre of the force of the stripper plate.

Shifted by 50 mm in the y-direction for the calculation, the original reference system:

$$\mathbf{x_{CA} = (x_1 \times F_{S1} + x_2 \times F_{S2}) / (F_{S1} + F_{S2})}$$
$$x_{CA} = (20\ mm \times 5\ kN + 115\ mm \times 5\ kN) / (5\ kN + 5\ kN)$$
$$\mathbf{x_{CA} = 67.5\ mm}$$

$$\mathbf{y_{CA} = (y_1 \times F_{S1} + y_2 \times F_{S2}) / (F_{S1} + F_{S2})}$$
$$y_{CA} = (35\ mm \times 5\ kN + 140mm \times 5\ kN) / (5\ kN + 5\ kN)$$
$$\mathbf{y_{CA} = 87.5\ mm}$$

Determination of the total centre of the force hole pattern + stripper plate

$$\mathbf{x_{Ctotal} = (x_{CA} \times \Sigma\ F_S + x_{CB} \times F_B) / (\Sigma\ F_S + F_B)}$$
$$x_{Ctotal} = (67.5\ mm \times 10\ kN + 72.4mm \times 173\ kN) / (10\ kN + 173\ kN)$$
$$\mathbf{x_{Ctotal} = 72.1\ mm}$$

$$\mathbf{y_{Ctotal} = (y_{CA} \times \Sigma\ F_S + y_{CB} \times F_B) / (\Sigma\ F_S + F_B)}$$
$$y_{Ctotal} = (87.5\ mm \times 10\ kN + 89.1mm \times 173\ kN) /(10\ kN + 173\ kN)$$
$$\mathbf{y_{Ctotal} = 89.0\ mm}$$

The additional cam stripper does not cause any unacceptable operating states. Both the force of each punch, the total force of all punches with their centre of the force, the force of the cam stripper with its centre of the force as well as the total force of all the forces acting with the total centre of the force lie within the permissible forces of the respective quadrant of the cam diagram. The cam must be installed shouldered in the die.

$\Sigma F_S < F_{permissible\ feather\ key} < F_{permissible\ shoulder}$
10 kN < 110 kN < 439 kN

$F_{permissible\ feather\ key} < F_{total} < F_{permissible\ shoulder}$
110 kN < 183 kN < 439 kN

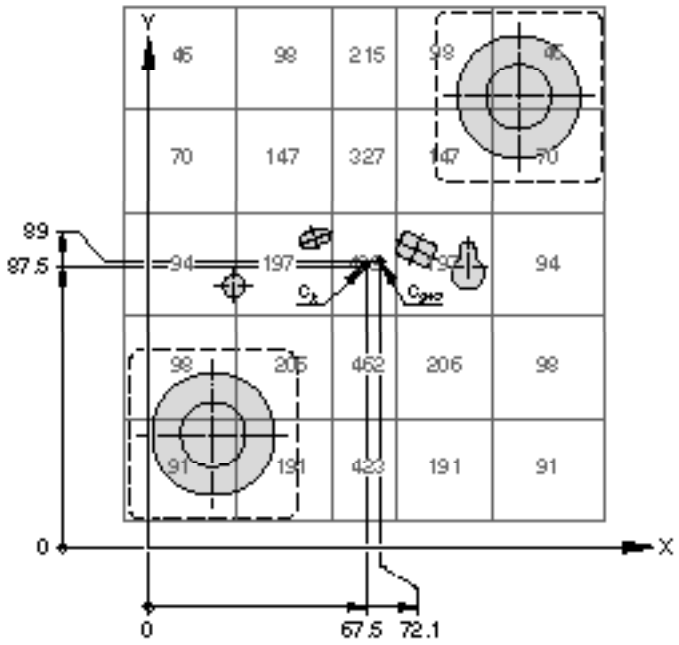


Figure 17: Hole pattern with stripper plate and force diagram

The sum of the retraction force of the cam and stripper is sufficient to move the cam back into the initial position while the press opens:

$F_R > F_A$
18 kN > 17.3 kN

Constructive actions can reduce or compensate operating and secondary loads (e.g. transverse forces). These actions may have effects on the quality of the press part or the manufacturing process. Therefore they have to be coordinated with the operator of the die.

a) Modified trim steel geometry

In the case of a simultaneous trim steel engagement over the entire cutting length, the cutting work is performed over the path of the sheet thickness. The cutting work is calculated from:

$$W_T = F_T \times t$$

If the trim steel geometry is designed in the form of a shear, a roof or a wave, the working path is extended analogous to the selected trim steel shape. The performed cutting work W_T remains unchanged in its size, therefore the necessary cutting force F_T becomes lower.

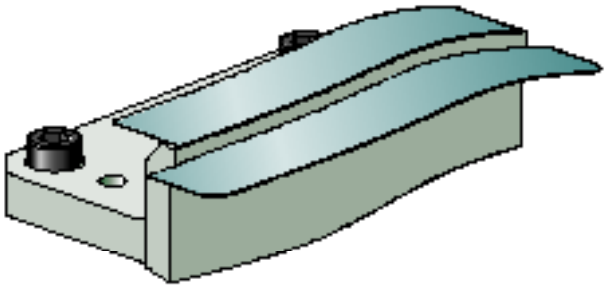


Figure 18: Trim steel with parallel grinding

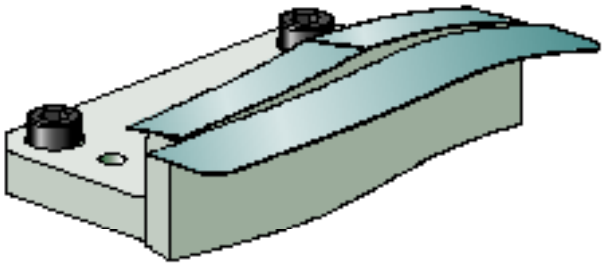


Figure 19: Trim steel with top grinding

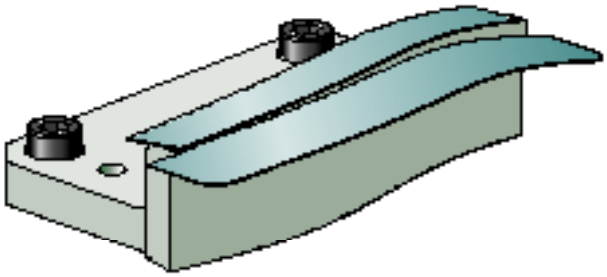


Figure 20: Trim steel with scissors grinding

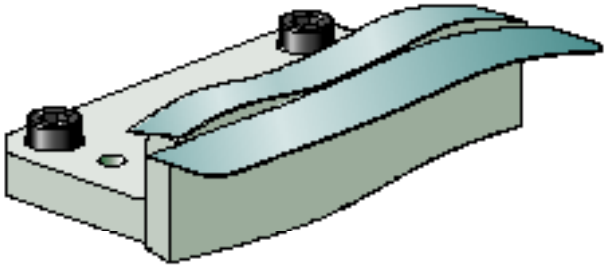


Figure 21: Trim steel with wave grinding

The cutting force can be reduced up to 50% by means of a cutting force reducing design. Due to the geometrically altered design of the trim steels the centre of the force may also vary during the cutting process. A quantitative statement about the centre of the force progression is difficult to determine with trim steels shaped in this way. Due to cam load it's recommened to design the force-optimised trim steels symmetric.

For aluminium press parts, these cutting force reducing actions are not recommended. They can cause uncontrollable, inadmissible process fluctuations here.

b) Absorption of transverse forces

Transverse forces cause additional loads on the cam unit components. They add up vectorially to the operating force in the cam direction and thus have a significant influence on the cam unit lifetime. Therefore transverse forces must be compensated by constructive measures in the die in order to prevent system overload. The absorption of the transverse force is preferably performed parallel to the working engagement at the same height.

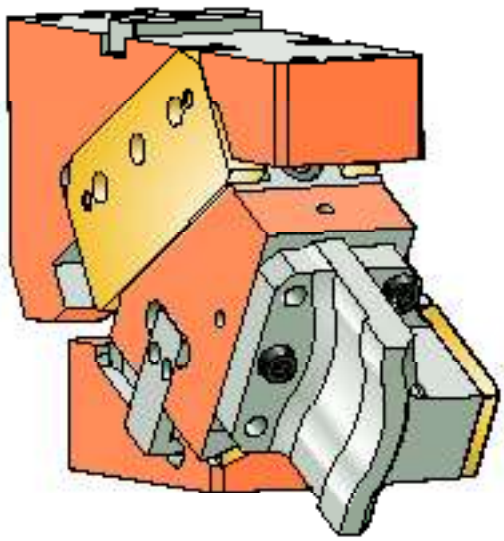


Figure 22: Absorption of transverse force

A simple description of the relationship between the transverse force and the lifetime is not possible since the permissible transverse force depends on the direction of action and the magnitude of the operating force.

C) Dimensioning of the protrusion

Large tool protrusions over the work surface have an influence on the working result, the system load and the lifetime of the cam unit due to geometric and static effects:

- high weight load on cam unit system due to large tool fittings on the work surface
- Multiplication of the effect by transverse forces due to lever mechanisms
- noticeably faster influence on the work result by lever effect through possible changes in the clearance
- changed damping behaviour

In general, you should therefore endeavour to achiev the smallest possible protrusion in the working area. Standard punching lengths (including retainer plate) + approx. 50 mm can be assumed as a guide.
Overhangs in front of the working surface, which go beyond this guideline, are also possible, but must be checked and evaluated in the course of the die design. FIBRO is pleased to advise and support you.

d) Application of compensatory forces

In the case of eccentric operating forces, the total force distribution can be positively influenced by introducing compensating forces. Appropriately dimensioned springs are arranged on the work surface for this purpose, which act against the lower die or against the mounted main pad. Through the use of compensating forces, the total force as well as the total centre of the force change. Accordingly, compensating elements must be taken into account during the course of the cam unit design.

Compensation elements behave analogously to slider strippers. Their force continues to be applied after the end of the working process, for example, after cutting through the sheet metal. The centre of the force of the compensating forces must therefore also be compared with the permissible cam forces in order to make a sound statement about the applied cam force possible (solution path, see chapter "Cam stripper").

Example:

The following values are known for one application case:

Process parameters	cam unit:	2016.24.150.015.1000.0
	Working width:	150 mm
	Angle:	15°
	Cutting length l_1:	42.7 mm
	Cutting length l_2:	54.5 mm
	Punch contours + possible arrangement, see figure	
	Sheet metal thickness:	1,2 mm
	Tensile strength:	1,000 N/mm²

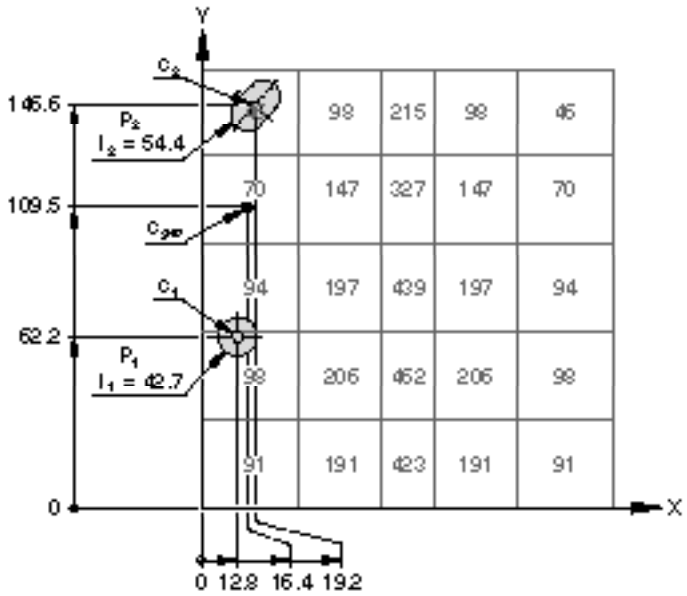


Figure 23: Eccentric hole pattern

The forces and centres of the force are as follows:

F_{P1} = 41.0 kN / x_{C1} = 12.8 mm / y_{C1} = 62.2 mm
F_{P2} = 52.2 kN / x_{C2} = 19.2 mm / y_{C2} = 146.6 mm
F_{Ptotal} = 93.2 kN / x_{Ctotal} = 16.4 mm / y_{Ctotal} = 109.5 mm

The forces of the cam unit are absorbed by means of a solid cast shoulder on the back of the cam base. Accordingly, the proof of lifetime results after comparison of the forces with the cam load diagram:

$F_{P1} < F_{zul}$
41 kN < 98 kN -> Loading by punch P_1 permissible

$F_{P2} > F_{zul}$
52.2 kN > 46 kN -> Loading by punch P_2 not permissible

$F_{Ptotal} > F_{zul}$
93.2 kN > 70 kN -> Loading by load sum not permissible

Corresponding to the calculation results, constructive countermeasures must be provided in order to avoid overloading and thus a reduced lifetime of the cam unit. The centre of the force of the punch P2 as well as the total centre of the force must be moved further towards the middle of the cam unit. For this purpose, a compensating spring is to be provided on the working surface of the cam which acts against the main pad of the die:

Selected spring: FIBRO 2487.12.02400.016 (POWERLINE)
Spring nominal force: 24 kN
Mounting position x/y: 105 mm / 62.2 mm

By means of this additional spring, the total centre of the force point of the punch P2 and of the spring is shifted to the following coordinates:

$F_{Compensation}$ = 72,6 kN / $x_{Ccompensation}$ = 46,2 mm / $y_{Ccompensation}$ = 120 mm

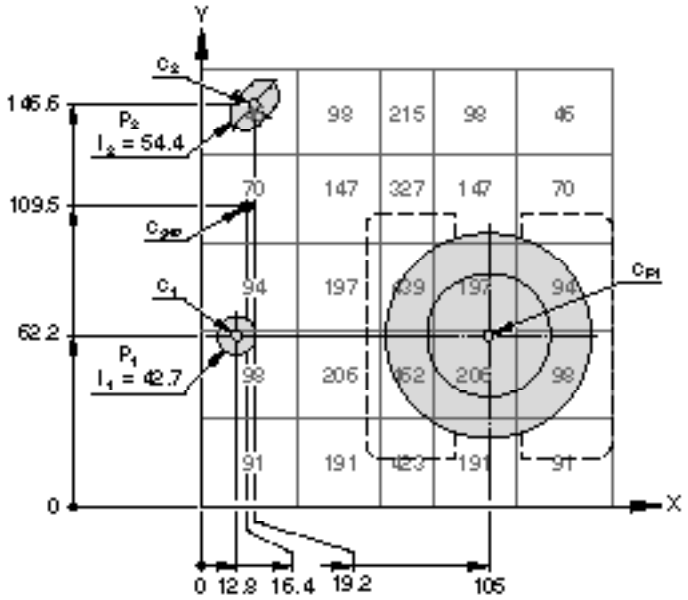


Figure 24: Eccentric hole pattern with compensation spring

With this arrangement, the proof of lifetime no longer produces inadmissible operating conditions:

$F_{Compensation} < F_{permissible}$
76.2 kN < 147 kN -> Loading by punch P_2 permissible

$F_{S1} < F_{permissible}$
24 kN < 206 kN -> The loading of the compensation spring after the end of the cutting process is permissible.

The solution must be coordinated with the die operator.

ENGINEERING
PROTRUSION BOX

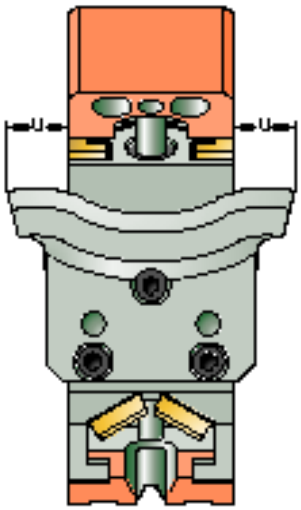
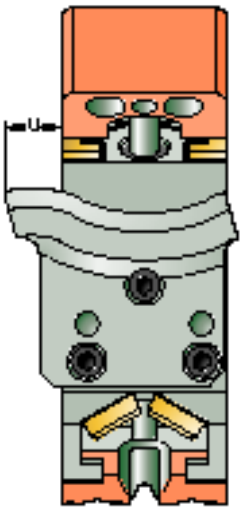
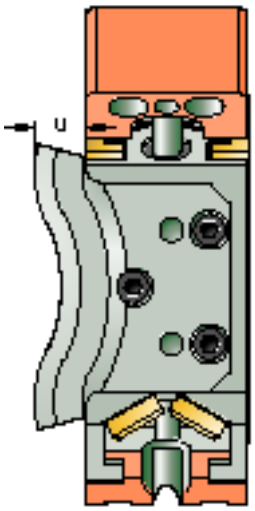
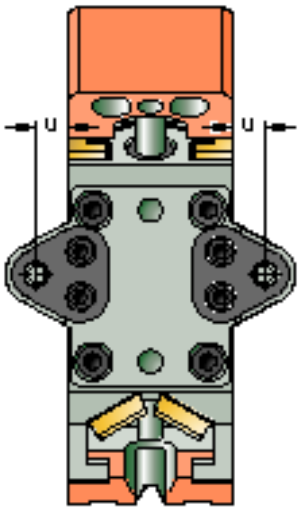
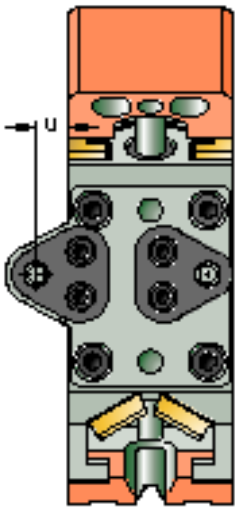
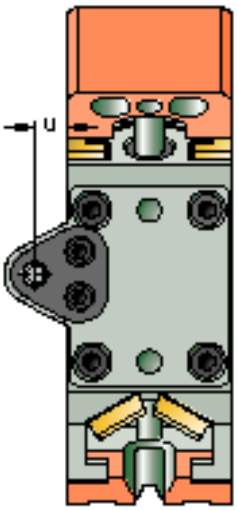
Lateral protrusions beyond the cam unit work surface should generally be avoided - a wider cam unit is the better choice in these application cases. If a lateral protrusion can not be avoided for certain reasons, the following aspects must be ensured to guarantee the desired lifetime:

1. The total working force must not exceed the maximum permissible working force of the cam unit.

2. Asymmetrically arranged elements on the cam unit cause a shift of the centre of the force. The position of the centre of the force must be taken into account and adjusted with the permissible values according to the force diagram.

3. In the case of multiple hole operations on free-form surfaces, it is generally assumed that the hole punches enter the sheet at different times. Punches arranged eccentrically or in the protrusion of the cam work surface require a particularly precise design.

The tool length on cam units also has a significant influence on the system load and the working result of the cam unit. Long protrusions should be avoided whenever possible due to a weaker bending stiffness of the tools and a large lever effect.

	unrestricted or partially permissible		not permitted
Cutting + forming	 Figure 25: Trim steel, Protrusion centric	 Figure 26. Trim steel, Protrusion one-sided horizontal	 Figure 27: Trim steel, Protrusion one-sided vertical
Punching*	 Figure 28. Hole pattern, Protrusion centric	 Figure 29. Hole pattern, Protrusion one-sided	 Figure 30. Punch, Protrusion one-sided

* Observe engagement point in time of the punches

Subject to alterations

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ENGINEERING

2016.24. AERIAL FCC BAK — DAIMLER, VOLVO, VOLKSWAGEN GROUP

2016.25. AERIAL FCC BAK — DAIMLER, VOLVO, VOLKSWAGEN GROUP

2016.207. AERIAL ECO LINE

2016.208. AERIAL ECO LINE

CUSTOMER-SPECIFIC SERVICES

APPENDIX

EMERGENCY SITUATION / CONTACTS

AERIAL FCC
2016.24.

AERIAL FCC
2016.24.

The FIBRO cam unit FCC 2016.24. features compact dimensions, high forces in the working and return strokes as well as excellent precision, even after a high number of cycles.
All sliding elements are shouldered. The gas spring can be replaced, without having to remove the cam. Due to its design, the FIBRO cam unit series FCC meets the minimum maintenance requirements. The FIBRO cam unit FCC can be designed ex works with customer-specific tool-specific machining, which meets even the highest requirements of modern diemaking processes.
The FIBRO cam units FCC 2016.24. meet the requirements of the BAK product specification as well as the NAAMS.

Design features:
- Double prism guide
- Sliding surfaces hardened steel / bronze with solid lubricant
- Gas spring
- Positive locking connections

FIBRO cam units FCC 2016.24. are available in the widths from 60 to 600 mm and in the angular variants 0° to 75° (gradation 5°).

Order number	Width [mm]	Performance class [kN]*	Page
2016.24.006.□□.2000.00	60	125	57
2016.24.008.□□.1000.00	85	225	67
2016.24.011.□□.1000.00	110	350	77
2016.24.015.□□.1000.00	150	425	87
2016.24.018.□□.1000.00	180	500	97
2016.24.022.□□.1000.00	220	600	107
2016.24.026.□□.1000.00	260	650	117
2016.24.033.□□.2000.00	330	1000	127
2016.24.040.□□.2000.00	400	1050	137
2016.24.050.□□.2000.00	500	1150	147
2016.24.060.□□.2000.00	600	1200	157

* For exact power values, please refer to the force diagrams of the corresponding cam units

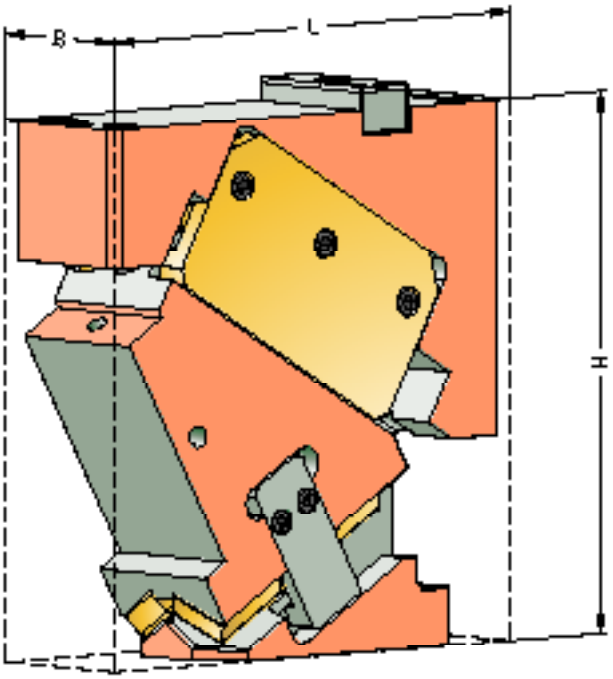
Ordering example:

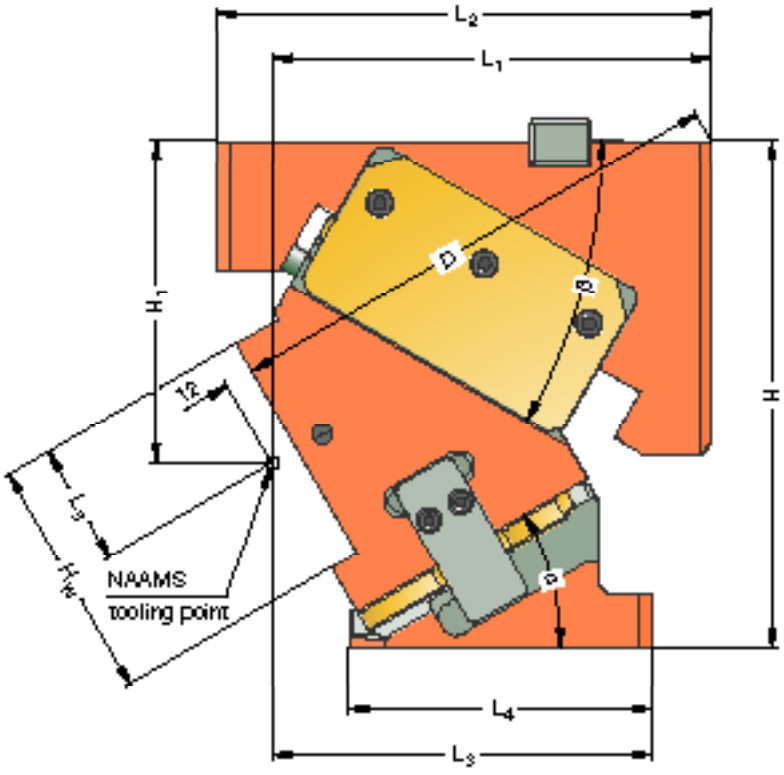
FIBRO cam unit FCC, aerial, width 85 mm	=	2016.24.008. □□.1000.00
Cam unit angle α = 50°	=	50.
Order number	=	2016.24.008. 50. 1000.00

AERIAL FCC 2016.24.006.

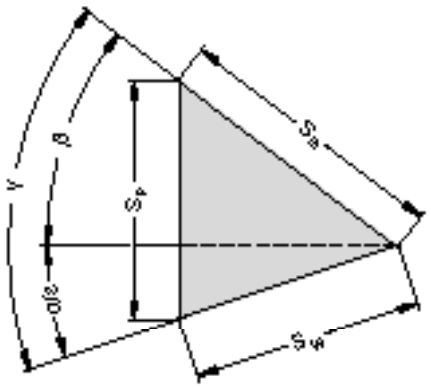
Working width:	60 mm
Performance class:	125 kN

AERIAL FCC
2016.24.006.
SIZE TABLE





AERIAL FCC
2016.24.006.
SIZE TABLE



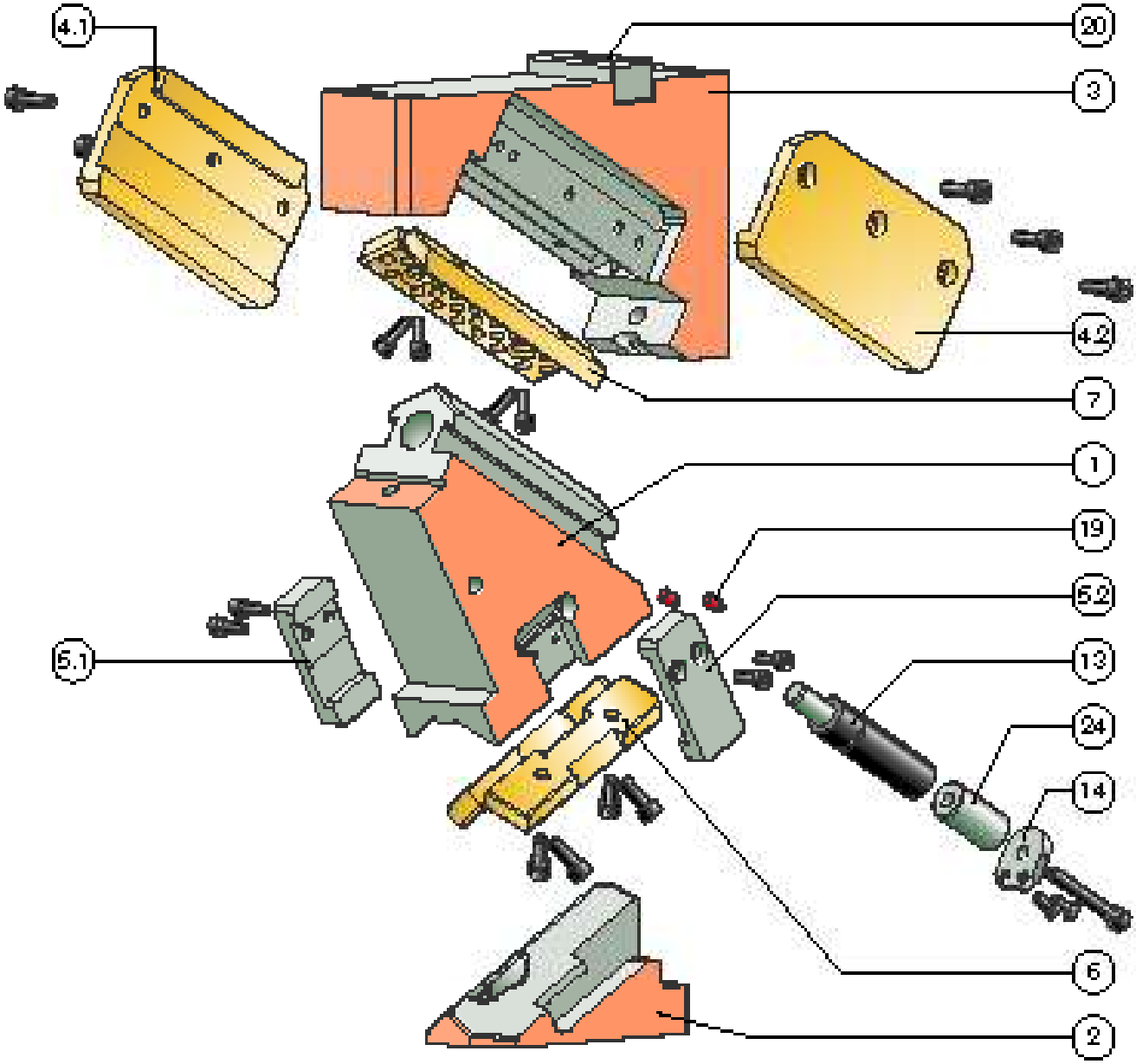
Order number	L [mm]	B [mm]	H [mm]	H_1 [mm]	H_W [mm]	L_1 [mm]	L_2 [mm]	L_3 [mm]	L_4 [mm]	L_5 [mm]	D [mm]	α [°]	β [°]	S_W* [mm]	S_S [mm]	S_P* [mm]
2016.24.006.00.2000.00	205	60	210	105.00	100	187.00	205	162.00	155	50	175.00	0	50	19.3	30	23.0
2016.24.006.05.2000.00	205	60	210	108.23	100	186.86	205	161.86	150	50	183.58	5	45	21.3	30	23.1
2016.24.006.10.2000.00	205	60	210	111.43	100	186.44	205	161.44	145	50	190.95	10	45	21.5	30	25.0
2016.24.006.15.2000.00	205	60	210	124.58	100	185.74	205	160.74	140	60	199.65	15	40	23.8	30	25.4
2016.24.006.20.2000.00	205	60	210	127.66	100	184.77	205	159.77	140	50	205.29	20	40	24.5	30	27.6
2016.24.006.25.2000.00	205	60	210	130.64	100	183.53	205	158.53	125	50	209.55	25	35	27.1	30	28.7
2016.24.006.30.2000.00	205	60	210	133.50	100	182.04	205	157.04	125	50	212.40	30	30	30.0	30	30.0
2016.24.006.35.2000.00	205	60	210	136.22	100	180.31	205	155.31	115	50	213.83	35	30	31.7	30	33.2
2016.24.006.40.2000.00	220	60	210	138.78	100	178.34	220	168.34	110	45	213.83	40	25	35.5	30	35.5
2016.24.006.45.2000.00	235	60	210	141.16	100	206.16	235	166.16	105	40	233.60	45	25	38.5	30	39.9
2016.24.006.50.2000.00	220	60	210	148.34	100	188.78	220	178.78	105	40	222.99	50	20	43.9	30	43.9
2016.24.006.55.2000.00	220	60	210	150.31	100	186.22	220	176.22	105	40	217.94	55	20	49.1	30	50.5
2016.24.006.60.2000.00	220	60	210	152.04	100	183.50	220	173.50	92	30	211.42	60	15	58.0	30	58.0
2016.24.006.65.2000.00	220	60	210	153.53	100	180.64	220	170.64	85	30	203.49	65	15	68.6	30	69.9
2016.24.006.70.2000.00	220	60	210	174.77	100	162.66	220	152.66	85	50	207.86	70	15	70.6	25	72.8
2016.24.006.75.2000.00	235	60	210	175.74	100	159.58	235	149.58	80	50	199.05	75	10	76.1	20	77.0

* Values rounded

Mounting cam base:
Hexagon socket head cap screws DIN EN ISO 4762 — 4x M12 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735 — 2x Ø10

Mounting cam driver :
Hexagon socket head cap screws DIN EN ISO 4762 — 3x M10 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735 — 2x Ø10

AERIAL FCC
2016.24.006.
EXPLODED VIEW



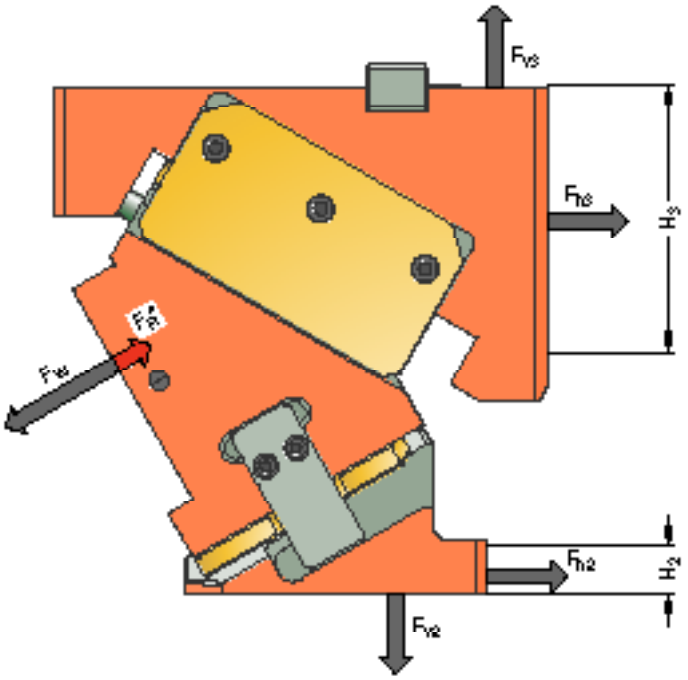
AERIAL FCC
2016.24.006.
PARTS LIST

Position	Piece	Designation	Material	spare part
1	1	Slider	1.7225	--
2	1	Cam driver	1.7225	--
2.1				
2.2				
3	1	Cam base	1.7225	--
4.1	1	Clamp, left	Bronze with solid lubricant	x
4.2	1	Clamp, right	Bronze with solid lubricant	x
5.1	1	Positive return, left	1.7225	x
5.2	1	Positive return, right	1.7225	x
6	2	Sliding plate	Bronze with solid lubricant	x
7	2	Sliding plate	Bronze with solid lubricant	x
8				
9				
10				
11				
12				
13	1	Gas spring	2487.12.00170.□□□	x
14	1	Stop plate	1.7225	x
15				
16.1				
16.2				
17				
18 (not shown)	1	Lockout system		x
19	2	Damping element	Elastomer	x
20	1	Feather key (T-nut)		x
21				
22				
23				
24	1	Spacer	1.1191	x

For inquiries or when ordering spare parts (x), we require the following data:

- ▶ Cam unit order no.
- ▶ Cam unit serial no.
- ▶ Item number / Designation / Spare part

AERIAL FCC
2016.24.006.
SYSTEM AND SURROUNDING FORCES



Order number	α [°]	F_W [kN]	F_R* [kN]	F_{h2} [kN]	F_{v2} [kN]	F_{h3} [kN]	F_{v3} [kN]	H_2 [mm]	H_3 [mm]
2016.24.006.00.2000.00	0	136	2.6	0	114	136	114	22	150
2016.24.006.05.2000.00	5	137	2.7	10	115	126	126	22	140
2016.24.006.10.2000.00	10	138	2.9	17	95	119	119	22	140
2016.24.006.15.2000.00	15	139	3.0	25	94	109	130	22	130
2016.24.006.20.2000.00	20	140	3.3	28	76	104	124	22	120
2016.24.006.25.2000.00	25	141	3.4	34	74	93	133	22	120
2016.24.006.30.2000.00	30	142	3.4	41	71	82	142	22	110
2016.24.006.35.2000.00	35	143	3.9	38	55	79	137	22	110
2016.24.006.40.2000.00	40	143	4.0	43	51	67	143	40	100
2016.24.006.45.2000.00	45	143	4.7	37	37	64	138	22	100
2016.24.006.50.2000.00	50	142	4.8	40	33	52	142	22	90
2016.24.006.55.2000.00	55	142	6.0	31	22	50	138	22	90
2016.24.006.60.2000.00	60	142	6.0	33	19	38	142	22	80
2016.24.006.65.2000.00	65	142	8.2	23	11	37	139	22	80
2016.24.006.70.2000.00	70	141	12.0	12	4	37	137	70	70
2016.24.006.75.2000.00	75	141	11.4	12	3	25	139	70	70

* Retraction force values correspond to the spring-generated retraction force at the working point

The forces F_{h2}, F_{V2} as well as F_{h3}, F_{V3} act on the tool environment at maximum working force F_W.

AERIAL FCC
2016.24.006.
FORCE DIAGRAM

shouldered

0°

Height 100 mm	Width 60 mm: 20	20	20
20	21	82	21
20	28	109	28
20	34	136	34
20	27	109	27
20	21	76	21

5°

Height 100 mm	Width 60 mm: 20	20	20
20	23	84	23
20	30	111	30
20	37	137	37
20	30	110	30
20	23	83	23

10°

Height 100 mm	Width 60 mm: 20	20	20
20	25	85	25
20	32	112	32
20	40	138	40
20	32	111	32
20	25	84	25

15°

Height 100 mm	Width 60 mm: 20	20	20
20	27	87	27
20	35	113	35
20	43	139	43
20	35	113	35
20	27	85	27

20°

Height 100 mm	Width 60 mm: 20	20	20
20	29	88	29
20	37	114	37
20	46	140	46
20	37	114	37
20	29	87	29

25°

Height 100 mm	Width 60 mm: 20	20	20
20	31	90	31
20	40	116	40
20	49	141	49
20	40	115	40
20	31	88	31

Support with feather key

0°

Height 100 mm	Width 60 mm: 20	20	20
20	15	34	15
20	20	35	20
20	25	35	25
20	20	35	20
20	15	34	15

5°

Height 100 mm	Width 60 mm: 20	20	20
20	18	37	18
20	22	40	22
20	27	40	27
20	22	40	22
20	18	34	18

10°

Height 100 mm	Width 60 mm: 20	20	20
20	20	39	20
20	22	41	22
20	27	41	27
20	22	41	22
20	20	39	20

15°

Height 100 mm	Width 60 mm: 20	20	20
20	18	43	18
20	24	45	24
20	28	45	28
20	24	45	24
20	20	43	20

20°

Height 100 mm	Width 60 mm: 20	20	20
20	20	43	20
20	25	50	25
20	32	50	32
20	26	50	26
20	21	50	21

25°

Height 100 mm	Width 60 mm: 20	20	20
20	15	25	15
20	23	55	23
20	23	55	23
20	23	55	23
20	18	53	18

AERIAL FCC
2016.24.006.
FORCE DIAGRAM

shouldered

30°

Height 100 mm	Width 60 mm: 20	20	20
20	33	91	33
20	42	117	42
20	52	142	52
20	42	116	42
20	33	89	33

35°

Height 100 mm	Width 60 mm: 20	20	20
20	35	93	35
20	45	118	45
20	54	143	54
20	45	117	45
20	35	91	35

40°

Height 100 mm	Width 60 mm: 20	20	20
20	34	89	34
20	45	116	45
20	56	143	56
20	46	117	46
20	35	91	35

45°

Height 100 mm	Width 60 mm: 20	20	20
20	33	84	33
20	45	113	45
20	57	143	57
20	47	117	47
20	36	90	36

50°

Height 100 mm	Width 60 mm: 20	20	20
20	32	80	32
20	45	111	45
20	58	142	58
20	48	116	48
20	37	90	37

55°

Height 100 mm	Width 60 mm: 20	20	20
20	31	75	31
20	45	109	45
20	60	142	60
20	49	116	49
20	37	90	37

Support with feather key

30°

Height 100 mm	Width 60 mm: 20	20	20
20	20	60	20
20	27	60	27
20	30	62	30
20	28	62	28
20	24	60	24

35°

Height 100 mm	Width 60 mm: 20	20	20
20	16	60	16
20	18	63	18
20	20	64	20
20	19	64	19
20	17	61	17

40°

Height 100 mm	Width 60 mm: 20	20	20
20	15	54	15
20	19	77	19
20	19	77	19
20	19	77	19
20	17	69	17

45°

Height 100 mm	Width 60 mm: 20	20	20
20	10	27	10
20	12	76	12
20	13	80	13
20	13	81	13
20	12	67	12

50°

Height 100 mm	Width 60 mm: 20	20	20
20	14	32	14
20	16	82	16
20	16	95	16
20	17	86	17
20	15	66	15

55°

Height 100 mm	Width 60 mm: 20	20	20
20	10	13	10
20	12	56	12
20	13	105	13
20	14	99	14
20	13	76	13

Subject to alterations

AERIAL FCC
2016.24.006.
FORCE DIAGRAM

shouldered

60°

Height 100 mm	Width 60 mm: 20	20	20
20	30	71	30
20	45	106	45
20	61	142	61
20	50	115	50
20	38	89	38

65°

Height 100 mm	Width 60 mm: 20	20	20
20	29	67	29
20	45	104	45
20	62	142	62
20	51	115	51
20	39	89	39

70°

Height 100 mm	Width 60 mm: 20	20	20
20	28	62	28
20	46	102	46
20	64	141	64
20	52	115	52
20	40	88	40

75°

Height 100 mm	Width 60 mm: 20	20	20
20	27	58	27
20	46	100	46
20	65	141	65
20	53	114	53
20	40	88	40

Support with feather key

60°

Height 100 mm	Width 60 mm: 20	20	20
20	10	60	10
20	12	91	12
20	13	121	13
20	14	98	14
20	13	76	13

65°

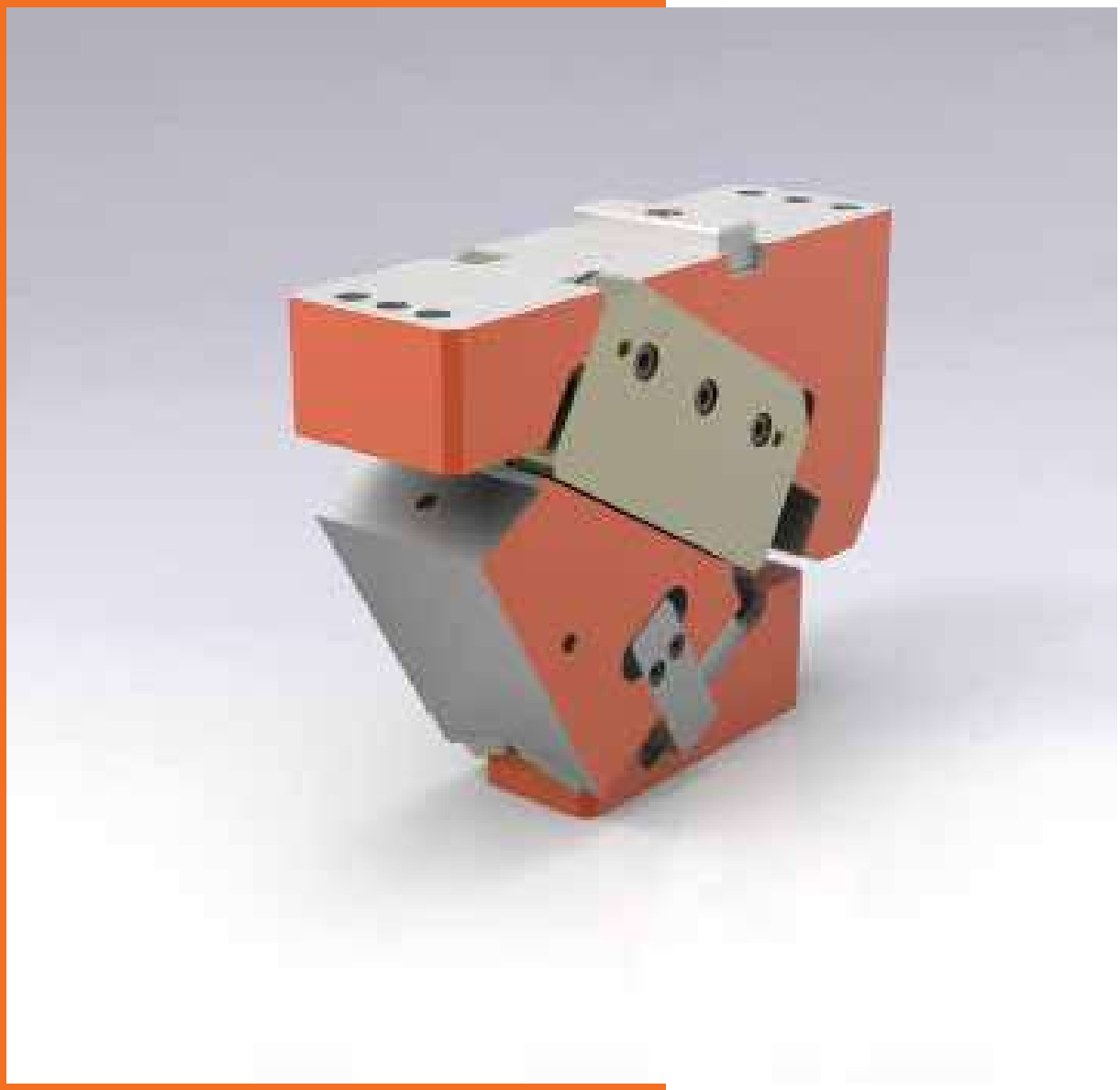
Height 100 mm	Width 60 mm: 20	20	20
20	10	16	10
20	12	50	12
20	12	115	12
20	12	110	12
20	12	80	12

70°

Height 100 mm	Width 60 mm: 20	20	20
20	10	16	10
20	12	45	12
20	12	120	12
20	12	115	12
20	12	88	12

75°

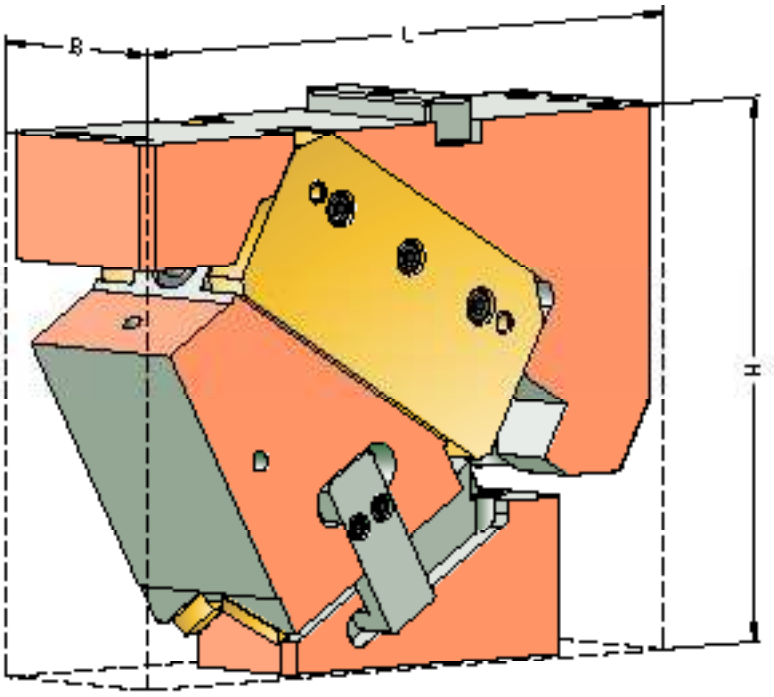
Height 100 mm	Width 60 mm: 20	20	20
20	10	16	10
20	12	38	12
20	12	128	12
20	12	114	12
20	12	88	12

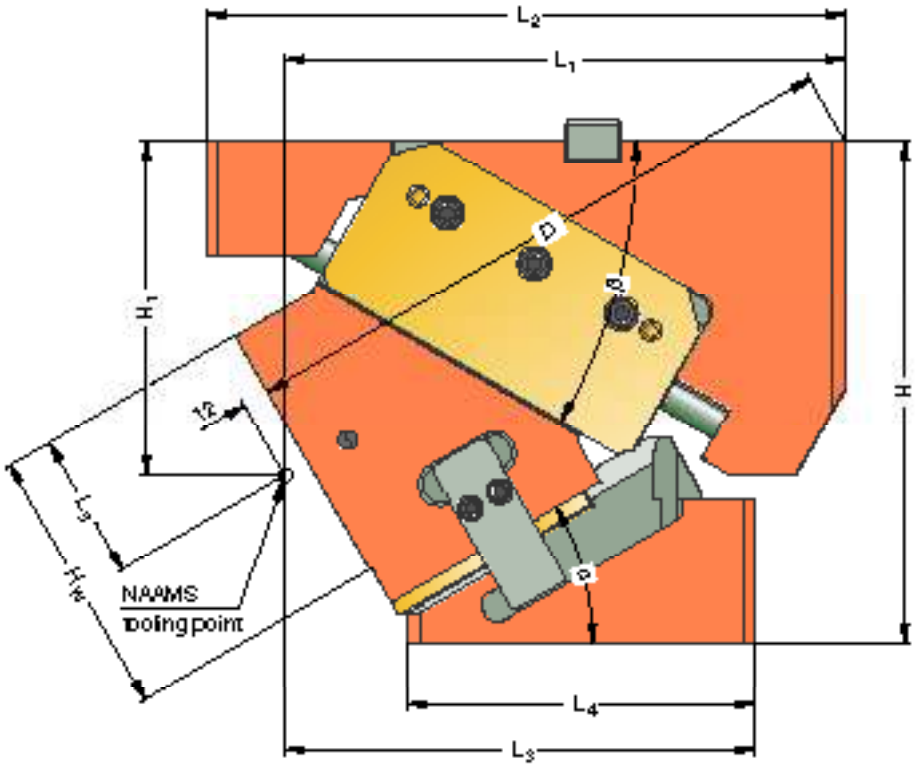


AERIAL FCC 2016.24.008.

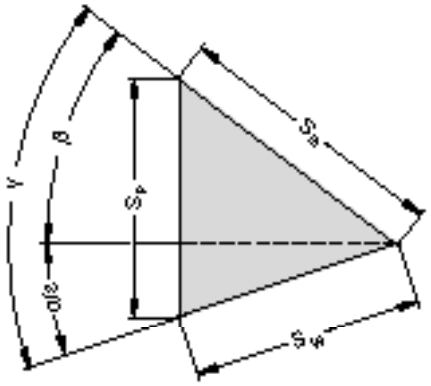
Working width:	85 mm
Performance class:	225 kN

AERIAL FCC
2016.24.008.
SIZE TABLE





AERIAL FCC
2016.24.008.
SIZE TABLE



Order number	L [mm]	B [mm]	H [mm]	H_1 [mm]	H_W [mm]	L_1 [mm]	L_2 [mm]	L_3 [mm]	L_4 [mm]	L_5 [mm]	D [mm]	α [°]	β [°]	S_W* [mm]	S_S [mm]	S_P* [mm]
2016.24.008.00.1000.00	255	85	225	120	120	250	255	195	175	60	238.00	0	50	30.9	48	36.8
2016.24.008.05.1000.00	255	85	225	125	120	250	255	195	170	60	247.94	5	45	34.1	48	36.9
2016.24.008.10.1000.00	255	85	225	130	120	250	255	195	160	55	256.78	10	45	34.5	48	39.9
2016.24.008.15.1000.00	255	85	225	135	120	250	255	195	155	55	264.42	15	40	38.1	48	40.7
2016.24.008.20.1000.00	259	85	225	140	120	250	255	195	155	60	270.81	20	35	41.8	48	41.8
2016.24.008.25.1000.00	285	85	225	145	120	250	285	210	155	55	275.86	25	35	43.4	48	45.9
2016.24.008.30.1000.00	285	85	225	150	120	250	285	210	155	65	279.51	30	30	48.0	48	48.0
2016.24.008.35.1000.00	285	85	225	155	120	250	285	210	155	65	281.69	35	30	50.7	48	53.1
2016.24.008.40.1000.00	285	85	225	160	120	250	285	210	155	65	282.36	40	25	56.8	48	56.8
2016.24.008.45.1000.00	265	85	225	165	120	215	265	215	150	55	256.70	45	25	42.3	33	43.9
2016.24.008.50.1000.00	265	85	225	170	120	215	265	215	135	52	256.43	50	20	48.2	33	48.2
2016.24.008.55.1000.00	265	85	225	175	120	215	265	215	135	67	254.67	55	20	54.1	33	55.6
2016.24.008.60.1000.00	267	85	225	180	120	215	265	215	135	67	251.39	60	15	63.8	33	63.8
2016.24.008.65.1000.00	265	85	225	180	120	215	265	215	126	52	242.00	65	15	75.4	33	76.9
2016.24.008.70.1000.00	275	85	225	195	120	190	275	185	109	67	236.22	70	10	95.0	33	95.0
2016.24.008.75.1000.00	275	85	225	210	120	190	275	185	109	67	240.02	75	10	95.1	25	96.2

* Values rounded

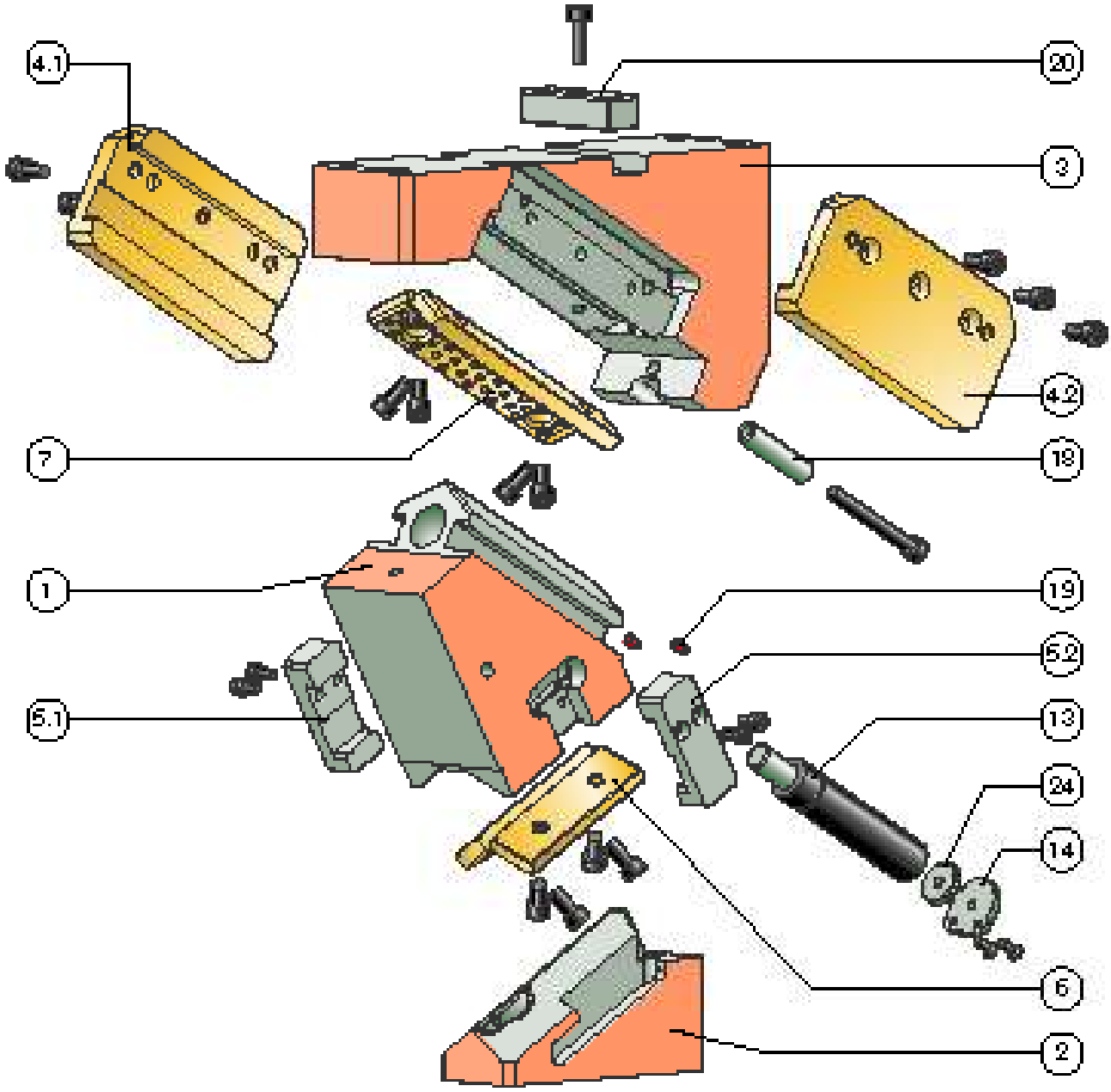
Fastening cam base:

Hexagon socket head cap screws DIN EN ISO 4762	4x M12 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x Ø12

Fastening cam driver :

Hexagon socket head cap screws DIN EN ISO 4762	3x M12 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x Ø12

AERIAL FCC
2016.24.008.
EXPLODED VIEW



Subject to alterations

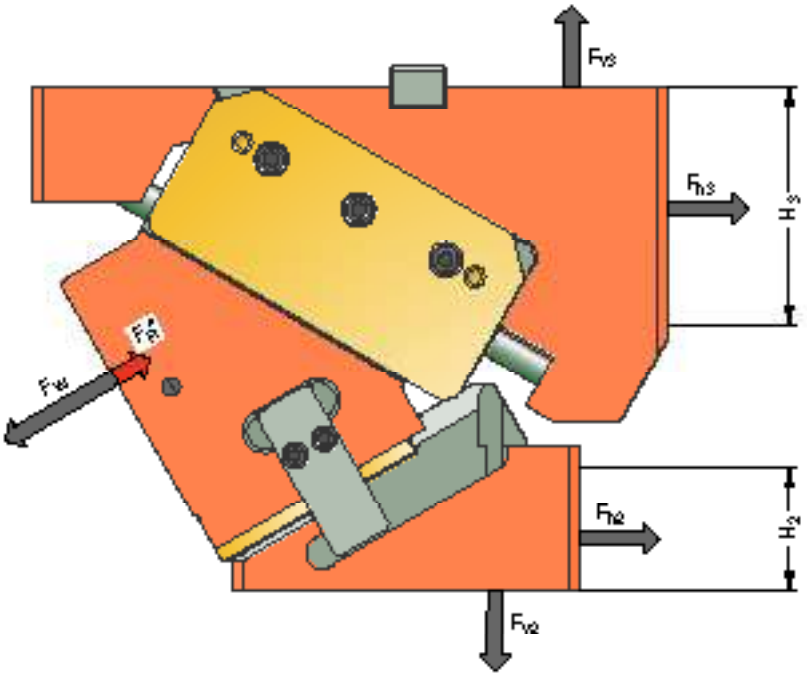
AERIAL FCC
2016.24.008.
PARTS LIST

Position	Piece	Designation	Material	spare part
1	1	Slider	1.7225	--
2	1	Cam driver	1.7225	--
2.1				
2.2				
3	1	Cam base	1.7225	--
4.1	1	Clamp, left	Bronze with solid lubricant	x
4.2	1	Clamp, right	Bronze with solid lubricant	x
5.1	1	Positive return, left	1.7225	x
5.2	1	Positive return, right	1.7225	x
6	2	Sliding plate	Bronze with solid lubricant	x
7	2	Sliding plate	Bronze with solid lubricant	x
8				
9				
10				
11				
12				
13	1	Gas spring	2487.12.00320.□□□	x
14	1	Stop plate	1.7225	x
15				
16.1				
16.2				
17				
18	1	Lockout system		x
19	2	Damping element	Elastomer	x
20	1	Feather key (T-nut)		x
21				
22				
23				
24	1	Spacer	1.1191	x

For inquiries or when ordering spare parts (x), we require the following data:

- ▶ Cam unit order no.
- ▶ Cam unit serial no.
- ▶ Item number / Designation / Spare part

AERIAL FCC
2016.24.008.
SYSTEM AND SURROUNDING FORCES



Order number	α [°]	F_W [kN]	F_R* [kN]	F_{h2} [kN]	F_{v2} [kN]	F_{h3} [kN]	F_{v3} [kN]	H_2 [mm]	H_3 [mm]
2016.24.008.00.1000.00	0	230	5.1	0	230	193	193	25	150
2016.24.008.05.1000.00	5	230	5.2	17	212	192	212	25	140
2016.24.008.10.1000.00	10	230	5.7	28	199	159	199	25	140
2016.24.008.15.1000.00	15	230	5.7	42	180	156	215	25	120
2016.24.008.20.1000.00	20	230	5.7	55	161	151	230	25	120
2016.24.008.25.1000.00	25	229	6.4	56	152	120	217	25	120
2016.24.008.30.1000.00	30	229	6.4	66	132	115	229	40	110
2016.24.008.35.1000.00	35	229	7.4	61	126	87	219	40	110
2016.24.008.40.1000.00	40	237	7.8	71	111	85	237	50	85
2016.24.008.45.1000.00	45	245	8.3	63	110	63	236	50	95
2016.24.008.50.1000.00	50	253	8.4	71	92	59	253	50	70
2016.24.008.55.1000.00	55	261	10.5	57	92	40	254	50	70
2016.24.008.60.1000.00	60	269	10.5	62	72	36	269	50	55
2016.24.008.65.1000.00	65	277	14.2	44	73	21	272	70	55
2016.24.008.70.1000.00	70	285	14.3	47	50	17	285	85	70
2016.24.008.75.1000.00	75	293	20.9	25	51	7	290	100	70

* Retraction force values correspond to the spring-generated retraction force at the working point

The forces F_{h2}, F_{V2} as well as F_{h3}, F_{V3} act on the tool environment at maximum working force F_W.

AERIAL FCC
2016.24.008.
FORCE DIAGRAM

shouldered

0°

Height 120 mm	Width 85 mm 32.5	20	32.5
24	49	129	49
24	69	180	69
24	88	230	88
24	63	165	63
24	38	99	38

5°

Height 120 mm	Width 85 mm 32.5	20	32.5
24	49	128	49
24	68	179	68
24	88	230	88
24	63	166	63
24	39	101	39

10°

Height 120 mm	Width 85 mm 32.5	20	32.5
24	48	127	48
24	68	178	68
24	87	230	87
24	63	167	63
24	40	104	40

15°

Height 120 mm	Width 85 mm 32.5	20	32.5
24	47	126	47
24	67	178	67
24	87	230	87
24	64	168	64
24	40	106	40

20°

Height 120 mm	Width 85 mm 32.5	20	32.5
24	47	125	47
24	67	177	67
24	86	230	86
24	64	170	64
24	41	108	41

25°

Height 120 mm	Width 85 mm 32.5	20	32.5
24	46	123	46
24	66	176	66
24	86	229	86
24	64	171	64
24	42	111	42

Support with feather key

0°

Height 120 mm	Width 85 mm 32.5	20	32.5
24	39	50	39
24	45	56	45
24	45	56	45
24	45	56	45
24	36	56	36

5°

Height 120 mm	Width 85 mm 32.5	20	32.5
24	39	57	39
24	43	62	43
24	45	62	45
24	45	62	45
24	32	62	32

10°

Height 120 mm	Width 85 mm 32.5	20	32.5
24	39	60	39
24	39	62	39
24	45	62	45
24	45	62	45
24	35	62	35

15°

Height 120 mm	Width 85 mm 32.5	20	32.5
24	35	72	35
24	48	74	48
24	53	74	53
24	54	74	54
24	36	74	36

20°

Height 120 mm	Width 85 mm 32.5	20	32.5
24	32	76	32
24	48	78	48
24	54	78	54
24	54	78	54
24	37	76	37

25°

Height 120 mm	Width 85 mm 32.5	20	32.5
24	28	80	28
24	40	85	40
24	56	85	56
24	49	85	49
24	38	85	38

AERIAL FCC
2016.24.008.
FORCE DIAGRAM

shouldered

30°

Height 120 mm	Width 85 mm 32.5	20	32.5
24	46	122	46
24	66	176	66
24	85	229	85
24	64	172	64
24	43	113	43

35°

Height 120 mm	Width 85 mm 32.5	20	32.5
24	45	121	45
24	65	175	65
24	85	229	85
24	64	173	64
24	44	118	44

40°

Height 120 mm	Width 85 mm 32.5	20	32.5
24	43	119	43
24	63	178	63
24	84	237	84
24	63	178	63
24	42	119	42

45°

Height 120 mm	Width 85 mm 32.5	20	32.5
24	40	116	40
24	61	181	61
24	82	245	82
24	62	183	62
24	41	121	41

50°

Height 120 mm	Width 85 mm 32.5	20	32.5
24	38	114	38
24	60	183	60
24	81	253	81
24	61	188	61
24	40	123	40

55°

Height 120 mm	Width 85 mm 32.5	20	32.5
24	38	114	38
24	60	183	60
24	81	253	81
24	61	188	61
24	40	123	40

Support with feather key

30°

Height 120 mm	Width 85 mm 32.5	20	32.5
24	27	72	27
24	39	84	39
24	51	90	51
24	42	90	42
24	38	86	38

35°

Height 120 mm	Width 85 mm 32.5	20	32.5
24	27	74	27
24	39	95	39
24	51	95	51
24	39	95	39
24	39	88	39

40°

Height 120 mm	Width 85 mm 32.5	20	32.5
24	27	78	27
24	43	113	43
24	72	108	72
24	56	108	56
24	38	105	38

45°

Height 120 mm	Width 85 mm 32.5	20	32.5
24	25	78	25
24	43	118	43
24	74	123	74
24	55	108	55
24	40	105	40

50°

Height 120 mm	Width 85 mm 32.5	20	32.5
24	24	84	24
24	53	135	53
24	73	145	73
24	55	139	55
24	39	115	39

55°

Height 120 mm	Width 85 mm 32.5	20	32.5
24	22	94	22
24	42	141	42
24	73	174	73
24	54	172	54
24	38	125	38

Subject to alterations

AERIAL FCC
2016.24.008.
FORCE DIAGRAM

shouldered

60°		Width 85 mm		
		32.5	20	32.5
Height 120 mm	24	33	108	33
	24	56	189	56
	24	79	269	79
	24	58	198	58
	24	37	126	37

Support with feather key

60°		Width 85 mm		
		32.5	20	32.5
Height 120 mm	24	21	92	21
	24	35	143	35
	24	50	197	50
	24	42	175	42
	24	31	126	31

65°		Width 85 mm		
		32.5	20	32.5
Height 120 mm	24	31	106	31
	24	54	192	54
	24	77	277	77
	24	57	203	57
	24	36	128	36

65°		Width 85 mm		
		32.5	20	32.5
Height 120 mm	24	20	98	20
	24	36	178	36
	24	52	203	52
	24	43	189	43
	24	32	119	32

70°		Width 85 mm		
		32.5	20	32.5
Height 120 mm	24	28	103	28
	24	52	194	52
	24	76	285	76
	24	56	208	56
	24	35	130	35

70°		Width 85 mm		
		32.5	20	32.5
Height 120 mm	24	19	103	19
	24	35	194	35
	24	51	205	51
	24	37	192	37
	24	23	130	23

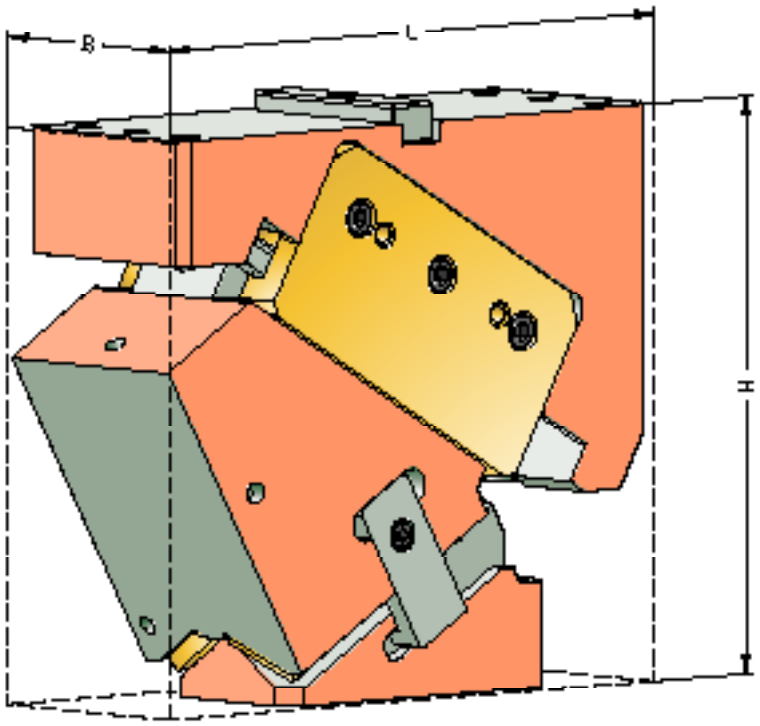
75°		Width 85 mm		
		32.5	20	32.5
Height 120 mm	24	26	101	26
	24	50	197	50
	24	75	293	75
	24	54	212	54
	24	34	132	34

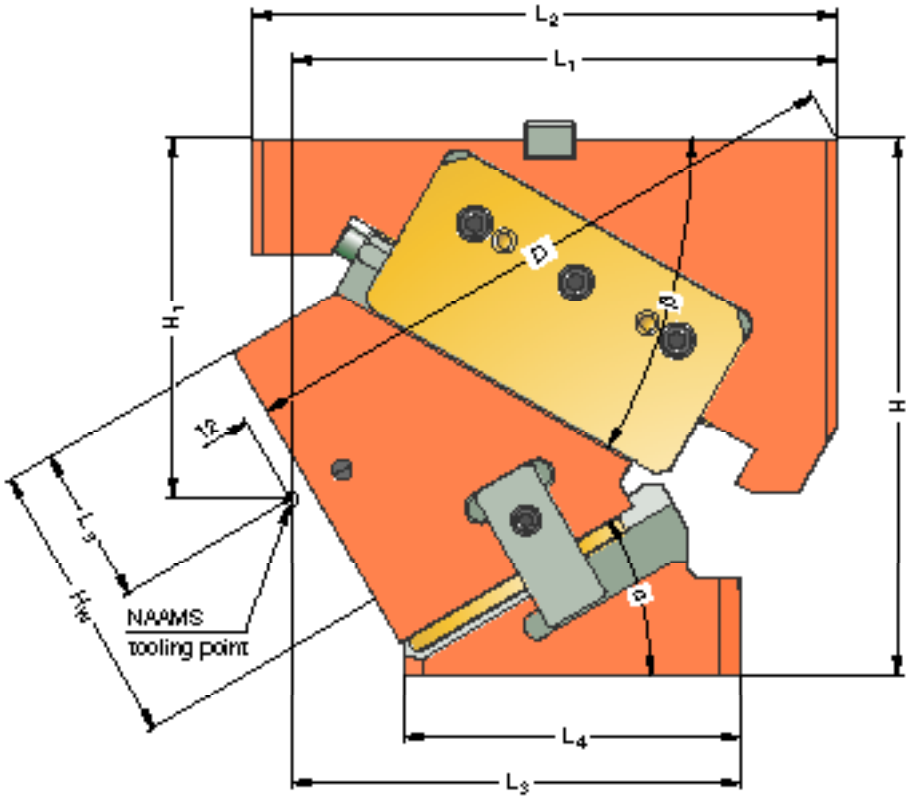
75°		Width 85 mm		
		32.5	20	32.5
Height 120 mm	24	17	101	17
	24	34	197	34
	24	50	225	50
	24	36	225	36
	24	22	132	22

AERIAL FCC 2016.24.011.

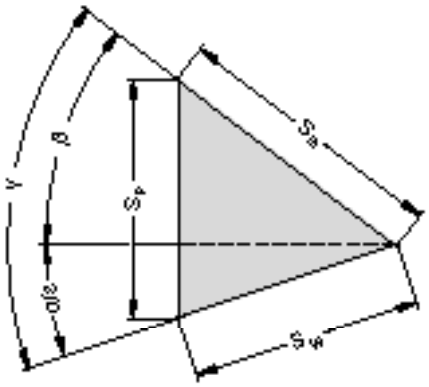
Working width:	110 mm
Performance class:	350 kN

AERIAL FCC
2016.24.011.
SIZE TABLE





AERIAL FCC
2016.24.011.
SIZE TABLE



Order number	L [mm]	B [mm]	H [mm]	H_1 [mm]	H_W [mm]	L_1 [mm]	L_2 [mm]	L_3 [mm]	L_4 [mm]	L_5 [mm]	D [mm]	α [°]	β [°]	S_W* [mm]	S_S [mm]	S_P* [mm]
2016.24.011.00.1000.00	290	110	275	155	160	290	290	230	210	85	278.0	0	50	30.9	48	36.8
2016.24.011.05.1000.00	290	110	275	160	160	290	290	230	205	85	290.8	5	45	34.1	48	36.9
2016.24.011.10.1000.00	293	110	275	165	160	290	290	230	195	85	302.2	10	45	34.5	48	39.9
2016.24.011.15.1000.00	300	110	275	170	160	290	290	230	190	85	312.1	15	40	38.1	48	40.7
2016.24.011.20.1000.00	308	110	275	175	160	290	290	230	185	85	320.4	20	35	41.8	48	41.8
2016.24.011.25.1000.00	303	110	275	180	160	280	300	230	178	80	317.8	25	35	43.4	48	45.9
2016.24.011.30.1000.00	310	110	275	185	160	280	300	230	172	80	323.0	30	30	48.0	48	48.0
2016.24.011.35.1000.00	316	110	275	190	160	280	300	230	167	80	326.3	35	30	50.7	48	53.1
2016.24.011.40.1000.00	322	110	275	195	160	280	300	230	163	80	327.8	40	25	56.8	48	56.8
2016.24.011.45.1000.00	312	110	275	200	160	260	295	250	183	85	313.3	45	25	61.5	48	63.8
2016.24.011.50.1000.00	310	110	275	205	160	260	295	250	172	75	312.2	50	20	48.2	33	48.2
2016.24.011.55.1000.00	302	110	275	210	160	260	295	250	157	60	309.2	55	20	54.1	33	55.6
2016.24.011.60.1000.00	306	110	275	215	160	260	295	250	155	60	304.2	60	15	63.8	33	63.8
2016.24.011.65.1000.00	295	110	275	225	160	250	295	250	137	45	297.6	65	15	75.4	33	76.9
2016.24.011.70.1000.00	295	110	275	235	160	250	295	250	135	45	294.3	70	10	95.0	33	95.0
2016.24.011.75.1000.00	310	110	275	235	160	250	310	250	134	45	279.7	75	10	95.1	25	96.2

* Values rounded

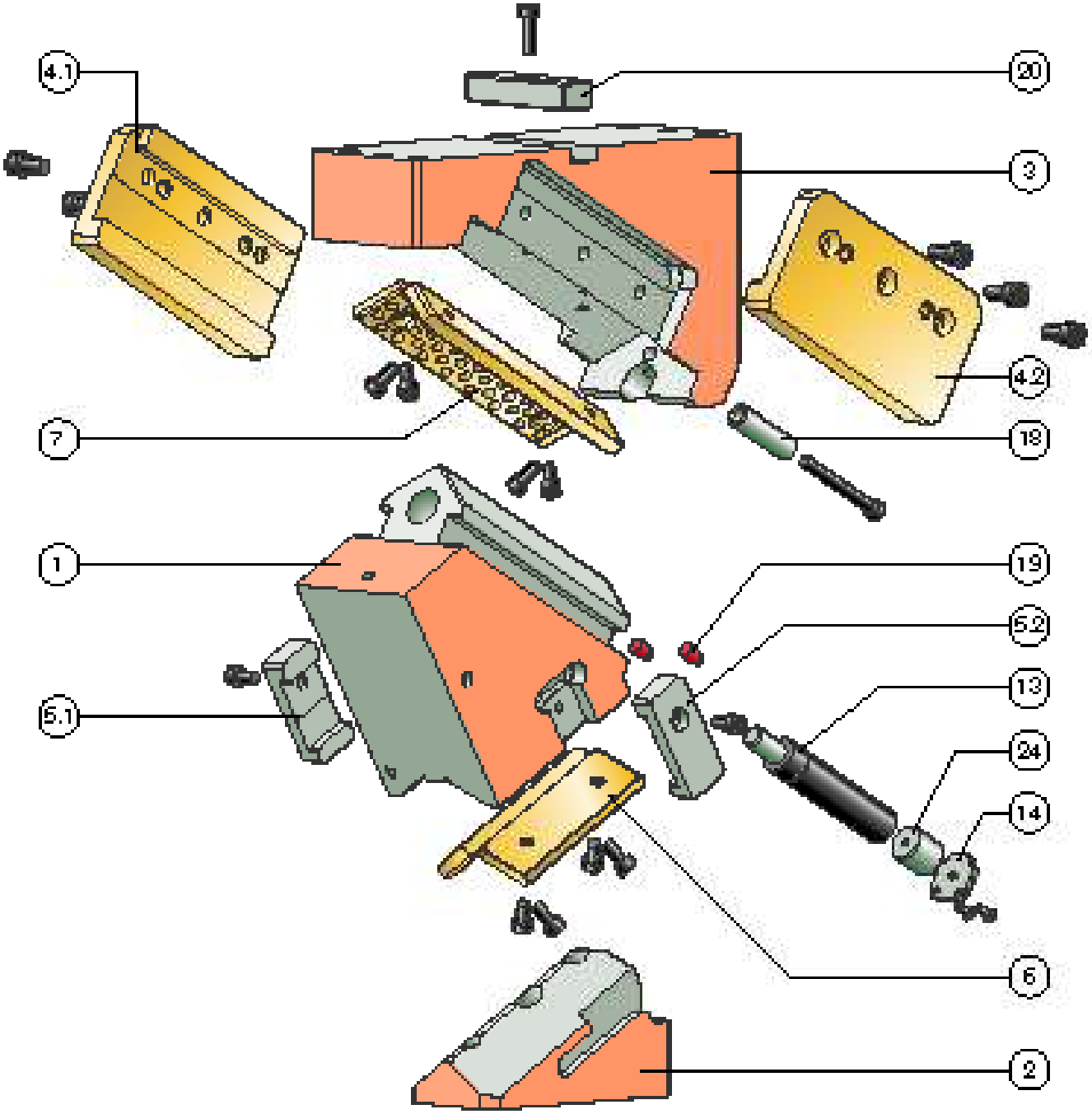
Fastening cam base:

Hexagon socket head cap screws DIN EN ISO 4762	4x M12 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x Ø12

Fastening cam driver :

Hexagon socket head cap screws DIN EN ISO 4762	4x M12 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x Ø12

AERIAL FCC
2016.24.011.
EXPLODED VIEW



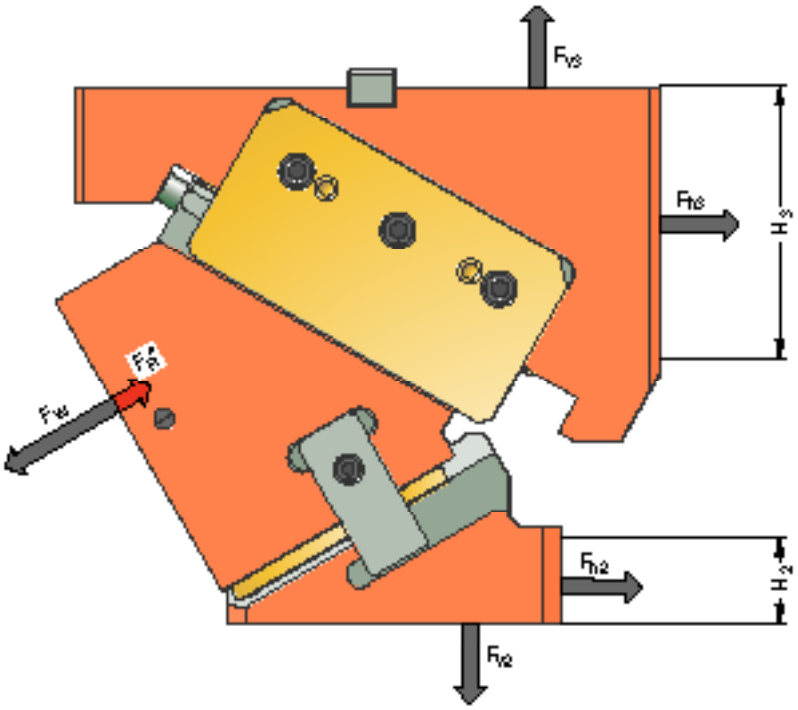
AERIAL FCC
2016.24.011.
PARTS LIST

Position	Piece	Designation	Material	spare part
1	1	Slider	1.7225	--
2	1	Cam driver	1.7225	--
2.1				
2.2				
3	1	Cam base	1.7225	--
4.1	1	Clamp, left	Bronze with solid lubricant	x
4.2	1	Clamp, right	Bronze with solid lubricant	x
5.1	1	Positive return, left	1.7225	x
5.2	1	Positive return, right	1.7225	x
6	2	Sliding plate	Bronze with solid lubricant	x
7	2	Sliding plate	Bronze with solid lubricant	x
8				
9				
10				
11				
12				
13	1	Gas spring	2487.12.00320.□□□	x
14	1	Stop plate	1.7225	x
15				
16.1				
16.2				
17				
18	1	Lockout system		x
19	2	Damping element	Elastomer	x
20	1	Feather key (T-nut)		x
21				
22				
23				
24	1	Spacer	1.1191	x

For inquiries or when ordering spare parts (x), we require the following data:

- ▶ Cam unit order no.
- ▶ Cam unit serial no.
- ▶ Item number / Designation / Spare part

AERIAL FCC
2016.24.011.
SYSTEM AND SURROUNDING FORCES



Order number	α [°]	F_W [kN]	F_R* [kN]	F_{h2} [kN]	F_{v2} [kN]	F_{h3} [kN]	F_{v3} [kN]	H_2 [mm]	H_3 [mm]
2016.24.011.00.1000.00	0	375	5.2	0	315	375	315	25	160
2016.24.011.05.1000.00	5	355	5.3	26	297	328	328	25	150
2016.24.011.10.1000.00	10	359	5.8	44	248	310	310	25	150
2016.24.011.15.1000.00	15	372	5.8	67	252	292	348	30	140
2016.24.011.20.1000.00	20	375	5.8	90	247	263	375	30	130
2016.24.011.25.1000.00	25	378	6.5	92	198	250	358	30	130
2016.24.011.30.1000.00	30	381	6.5	110	191	220	381	40	120
2016.24.011.35.1000.00	35	384	7.5	103	147	212	367	40	120
2016.24.011.40.1000.00	40	387	7.5	116	138	180	387	40	100
2016.24.011.45.1000.00	45	390	9.0	100	100	175	376	50	100
2016.24.011.50.1000.00	50	393	8.2	110	92	143	393	50	100
2016.24.011.55.1000.00	55	396	10.2	87	61	140	385	65	100
2016.24.011.60.1000.00	60	399	10.2	93	53	107	399	75	100
2016.24.011.65.1000.00	65	402	13.8	64	30	106	394	80	90
2016.24.011.70.1000.00	70	405	13.8	67	24	71	405	85	82
2016.24.011.75.1000.00	75	407	21.0	34	9	71	402	90	56

* Retraction force values correspond to the spring-generated retraction force at the working point

The forces F_{h2}, F_{V2} as well as F_{h3}, F_{V3} act on the tool environment at maximum working force F_W.

AERIAL FCC
2016.24.011.
FORCE DIAGRAM

shouldered

0°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	59	95	226	95	59
32	76	123	292	123	76
32	93	150	357	150	93
32	85	137	326	137	85
32	76	124	294	124	76

5°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	55	92	225	92	55
32	74	123	305	123	74
32	92	155	366	155	92
32	82	137	334	137	82
32	72	120	294	120	72

10°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	52	88	224	88	52
32	72	124	316	124	72
32	91	159	369	159	91
32	79	138	337	138	79
32	68	116	294	116	68

15°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	48	85	223	85	48
32	69	125	322	125	69
32	91	164	372	164	91
32	77	138	340	138	77
32	63	112	293	112	63

20°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	45	82	222	82	45
32	67	125	328	125	67
32	90	168	375	168	90
32	74	138	343	138	74
32	59	108	293	108	59

25°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	41	78	221	78	41
32	65	126	334	126	65
32	89	173	378	173	89
32	72	138	345	138	72
32	55	104	293	104	55

Support with feather key

0°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	35	57	70	57	35
32	45	57	73	57	45
32	56	57	73	57	56
32	51	57	73	57	51
32	46	57	73	57	46

5°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	33	55	79	55	33
32	44	58	82	58	44
32	55	60	82	60	55
32	49	60	82	60	49
32	43	58	82	58	43

10°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	31	53	82	53	31
32	43	74	85	74	43
32	55	83	86	83	55
32	48	83	86	83	48
32	41	69	84	69	41

15°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	29	51	92	51	29
32	42	75	92	75	42
32	54	83	93	83	54
32	46	83	93	83	46
32	38	67	92	67	38

20°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	27	49	97	49	27
32	40	75	103	75	40
32	54	83	103	83	54
32	45	83	103	83	45
32	35	65	103	65	35

25°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	25	47	98	47	25
32	39	75	110	75	39
32	53	83	115	83	53
32	43	83	115	83	43
32	33	62	112	62	33

AERIAL FCC
2016.24.011.
FORCE DIAGRAM

shouldered

30°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	38	75	220	75	38
32	63	126	340	126	63
32	88	177	381	177	88
32	69	139	348	139	69
32	50	100	293	100	50

35°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	35	72	219	72	35
32	61	127	346	127	61
32	87	182	384	182	87
32	67	139	351	139	67
32	46	96	293	96	46

40°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	34	72	226	72	34
32	60	126	344	126	60
32	86	181	387	181	86
32	65	136	352	136	65
32	44	91	283	91	44

45°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	34	72	232	72	34
32	59	126	342	126	59
32	85	180	390	180	85
32	63	133	353	133	63
32	41	87	274	87	41

50°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	34	72	239	72	34
32	59	126	340	126	59
32	84	179	393	179	84
32	61	130	354	130	61
32	39	82	264	82	39

55°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	34	73	245	73	34
32	58	125	338	125	58
32	82	178	396	178	82
32	59	128	356	128	59
32	36	77	255	77	36

Support with feather key

30°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	23	45	100	45	23
32	38	76	120	76	38
32	53	83	125	83	53
32	42	83	125	83	42
32	30	60	125	60	30

35°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	21	43	105	43	21
32	37	76	126	76	37
32	52	93	127	93	52
32	40	83	127	83	40
32	28	58	126	58	28

40°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	22	56	135	56	22
32	38	80	142	80	38
32	54	114	156	114	54
32	41	86	154	86	41
32	28	58	150	58	28

45°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	22	46	148	46	22
32	38	80	151	80	38
32	54	114	165	114	54
32	40	84	165	84	40
32	26	55	140	55	26

50°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	21	46	149	46	21
32	37	79	167	79	37
32	53	113	190	113	53
32	39	82	189	82	39
32	24	52	150	52	24

55°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	21	46	153	46	21
32	37	79	170	79	37
32	52	112	193	112	52
32	37	81	193	81	37
32	23	49	159	49	23

Subject to alterations

AERIAL FCC
2016.24.011.
FORCE DIAGRAM

shouldered

60°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	33	73	252	73	33
32	57	125	336	125	57
32	81	177	399	177	81
32	57	125	357	125	57
32	34	73	246	73	34

65°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	33	73	259	73	33
32	56	124	335	124	56
32	80	176	402	176	80
32	55	122	358	122	55
32	31	68	236	68	31

70°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	33	73	261	73	33
32	56	124	333	124	56
32	78	174	405	174	78
32	54	119	359	119	54
32	29	64	227	64	29

75°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	55	123	331	123	55
32	77	173	407	173	77
32	52	116	360	116	52
32	26	59	218	59	26
32	41	87	274	87	41

Support with feather key

60°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	21	46	161	46	21
32	36	79	172	79	36
32	51	112	253	112	51
32	36	79	253	79	36
32	21	46	168	46	21

65°

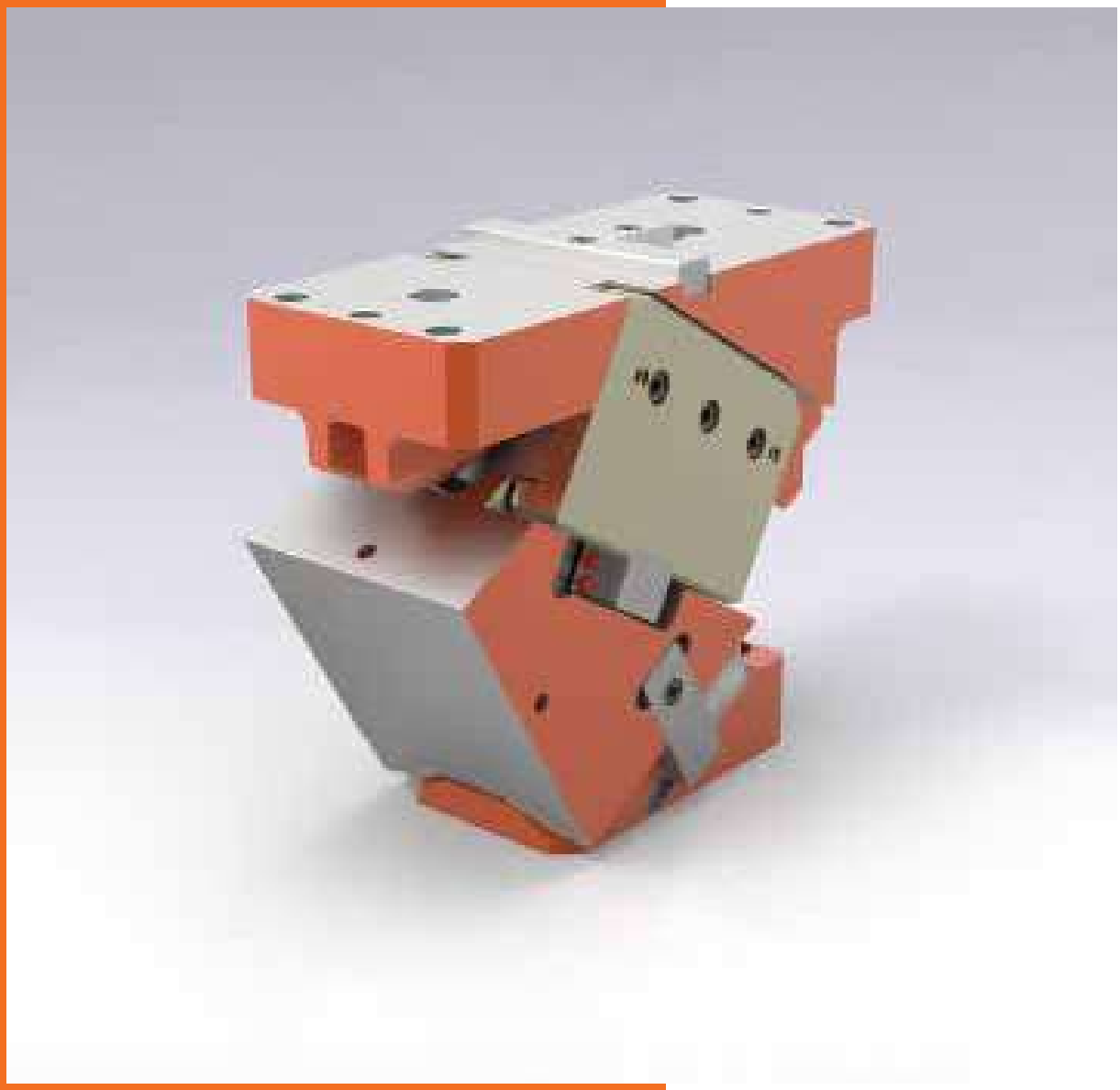
Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	22	49	169	49	22
32	38	83	175	83	38
32	53	117	270	117	53
32	37	81	270	81	37
32	21	45	170	45	21

70°

Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	22	49	170	49	22
32	37	83	176	83	37
32	52	90	273	90	52
32	36	79	263	79	36
32	19	42	173	42	19

75°

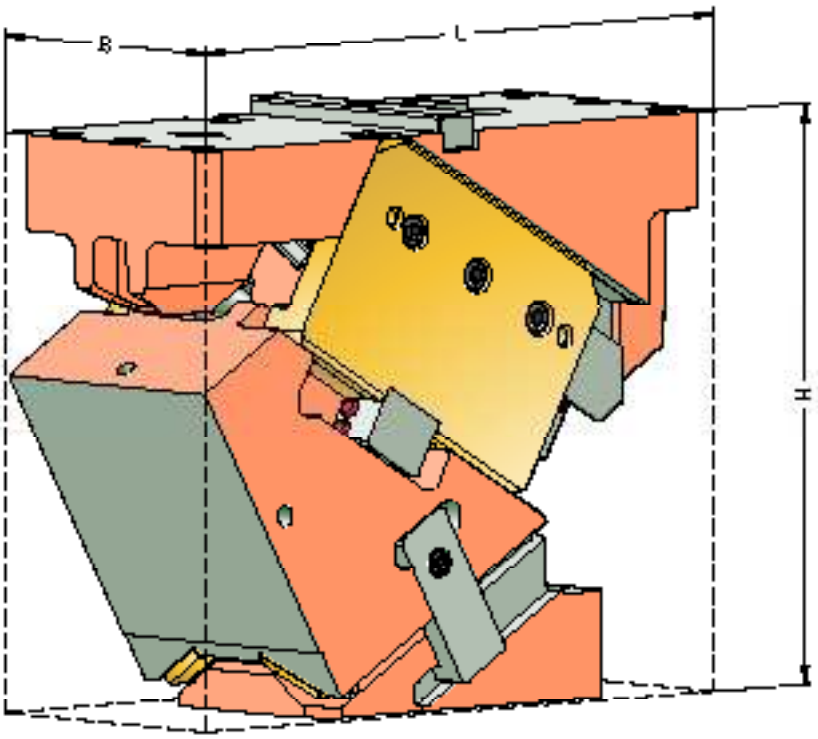
Height 160 mm	Width 110 mm				
	25	20	20	20	25
32	22	49	255	49	22
32	37	82	331	82	37
32	51	90	370	90	51
32	34	77	360	77	34
32	17	39	218	39	17

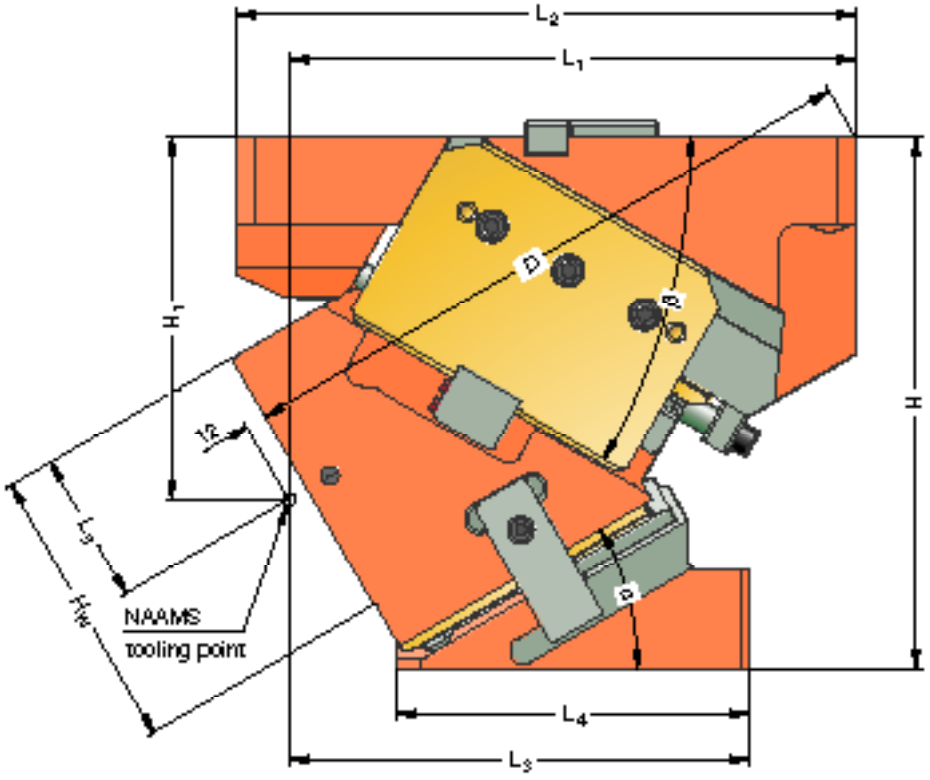


AERIAL FCC 2016.24.015.

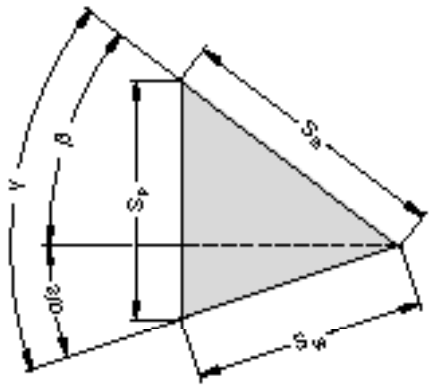
Working width:	150 mm
Performance class:	425 kN

AERIAL FCC
2016.24.015.
SIZE TABLE





AERIAL FCC
2016.24.015.
SIZE TABLE



Order number	L [mm]	B [mm]	H [mm]	H_1 [mm]	H_W [mm]	L_1 [mm]	L_2 [mm]	L_3 [mm]	L_4 [mm]	L_5 [mm]	D [mm]	α [°]	β [°]	S_W* [mm]	S_S [mm]	S_P* [mm]
2016.24.015.00.1000.00	310	150	300	170	160	310	310	240	220	105	298.0	0	50	32.1	50	38.3
2016.24.015.05.1000.00	310	150	300	175	160	310	310	240	210	105	312.1	5	45	35.5	50	38.4
2016.24.015.10.1000.00	314	150	300	180	160	310	310	240	200	90	324.5	10	45	35.9	50	41.6
2016.24.015.15.1000.00	322	150	300	185	160	310	310	240	195	90	335.3	15	40	39.7	50	42.4
2016.24.015.20.1000.00	330	150	300	190	160	310	310	240	194	90	344.3	20	35	43.6	50	43.6
2016.24.015.25.1000.00	350	150	300	195	160	320	350	260	202	80	360.4	25	35	45.2	50	47.8
2016.24.015.30.1000.00	352	150	300	205	160	320	350	260	199	85	367.6	30	30	50.0	50	50.0
2016.24.015.35.1000.00	365	150	300	215	160	320	350	260	201	95	373.4	35	30	52.9	50	55.3
2016.24.015.40.1000.00	372	150	300	225	160	320	350	260	197	95	377.8	40	25	59.2	50	59.2
2016.24.015.45.1000.00	340	150	300	235	160	260	340	240	182	105	338.0	45	25	64.1	50	66.4
2016.24.015.50.1000.00	340	150	300	245	160	260	340	240	179	105	342.8	50	20	73.1	50	73.1
2016.24.015.55.1000.00	347	150	300	255	160	260	340	240	186	115	346.0	55	20	81.9	50	84.2
2016.24.015.60.1000.00	354	150	300	265	160	260	340	240	183	115	347.5	60	15	96.6	50	96.6
2016.24.015.65.1000.00	359	150	300	265	160	260	340	240	183	115	338.1	65	15	91.4	40	93.2
2016.24.015.70.1000.00	340	150	300	275	160	235	340	235	168	110	326.8	70	15	84.7	30	87.4
2016.24.015.75.1000.00	340	150	300	275	160	235	340	235	167	110	314.5	75	10	76.1	20	77.0

* Values rounded

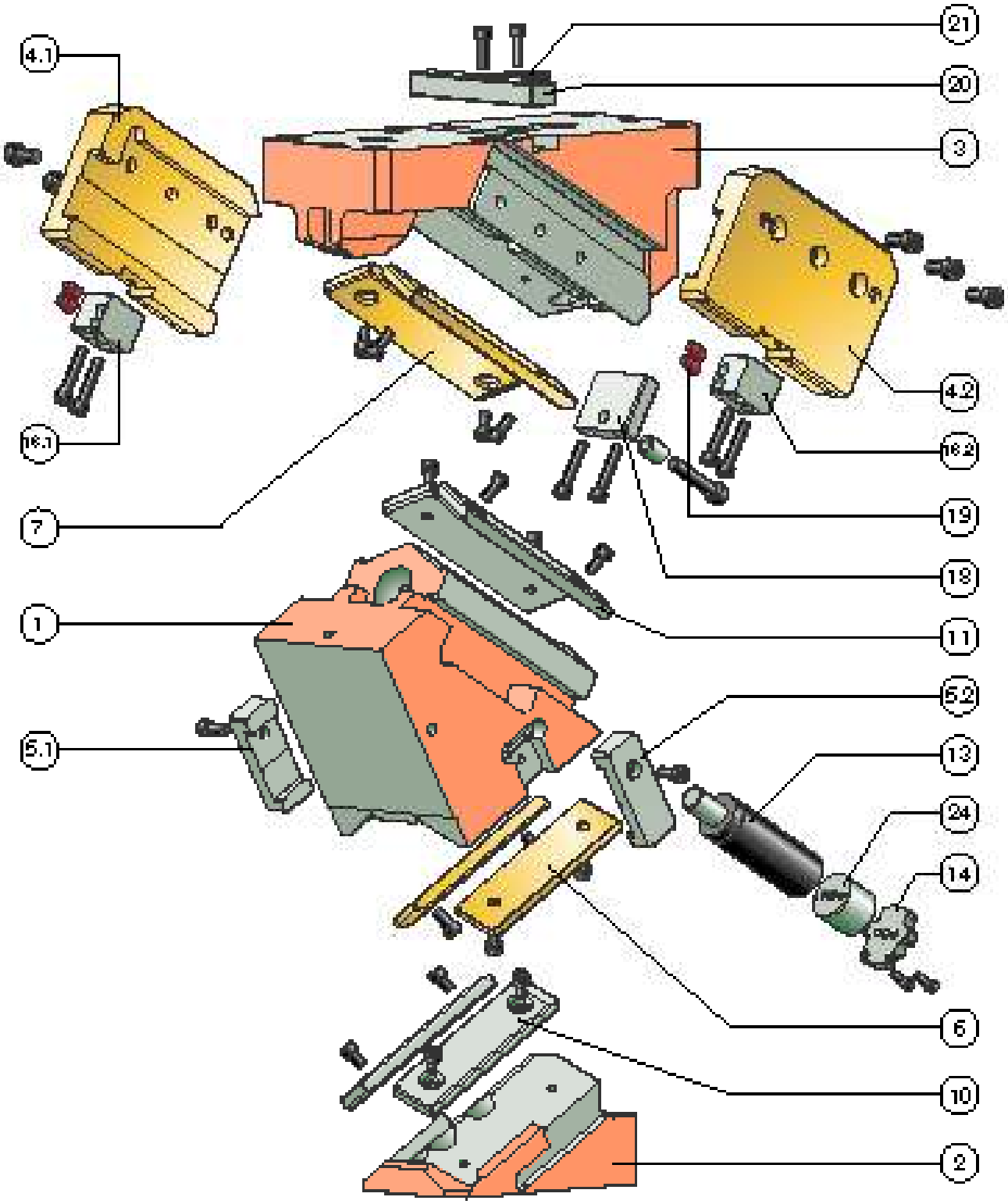
Fastening cam base:

Hexagon socket head cap screws DIN EN ISO 4762	4x M16 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x Ø16

Fastening cam driver :

Hexagon socket head cap screws DIN EN ISO 4762	4x M16 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x Ø16

AERIAL FCC
2016.24.015.
EXPLODED VIEW



Subject to alterations

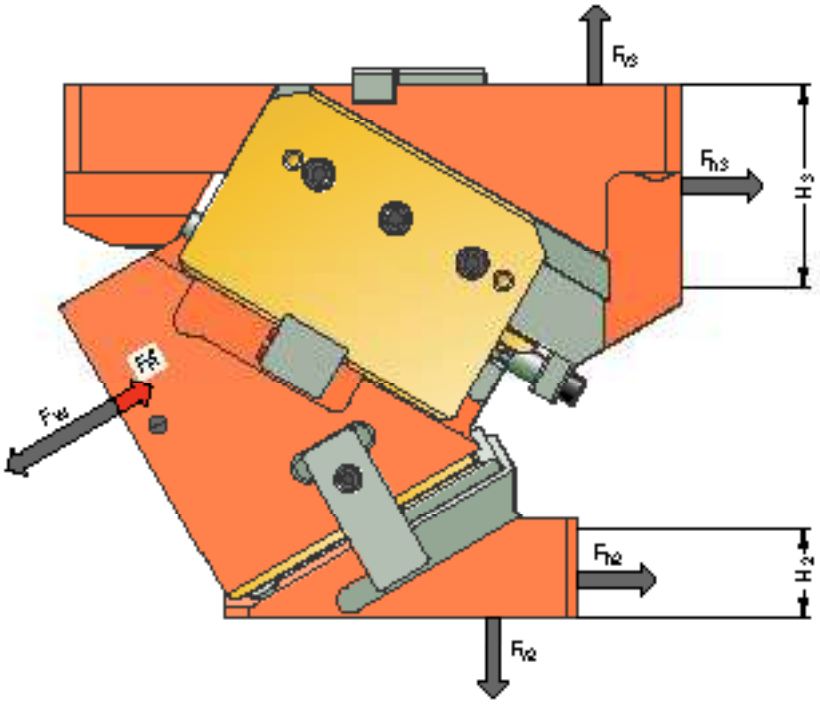
AERIAL FCC
2016.24.015.
PARTS LIST

Position	Piece	Designation	Material	spare part
1	1	Slider	GGG60	--
2	1	Cam driver	GGG60	--
2.1				
2.2				
3	1	Cam base	GGG60	--
4.1	1	Clamp, left	Bronze with solid lubricant	x
4.2	1	Clamp, right	Bronze with solid lubricant	x
5.1	1	Positive return, left	1.7225	x
5.2	1	Positive return, right	1.7225	x
6	2	Sliding plate	Bronze with solid lubricant	x
7	2	Sliding plate	Bronze with solid lubricant	x
8				
9				
10	2	Sliding plate	1.7131	x
11	2	Sliding plate	1.7131	x
12				
13	1	Gas spring	2487.12.00500.□□□	x
14	1	Stop plate	1.7225	x
15				
16.1	1	Cam slide stop, left	1.1191	x
16.2	1	Cam slide stop, right	1.1191	x
17				
18	1	Lockout system		x
19	4	Damping element	Elastomer	x
20	1	Feather key (T-nut)		x
21	1	Feather key (T-nut)		x
22				
23				
24	1	Spacer	1.1191	x

For inquiries or when ordering spare parts (x), we require the following data:

- ▶ Cam unit order no.
- ▶ Cam unit serial no.
- ▶ Item number / Designation / Spare part

AERIAL FCC
2016.24.015.
SYSTEM AND SURROUNDING FORCES



Order number	α [°]	F_W [kN]	F_R* [kN]	F_{h2} [kN]	F_{v2} [kN]	F_{h3} [kN]	F_{v3} [kN]	H_2 [mm]	H_3 [mm]
2016.24.015.00.1000.00	0	421	7.6	0	353	421	353	27	160
2016.24.015.05.1000.00	5	435	7.7	32	364	402	402	40	150
2016.24.015.10.1000.00	10	448	8.4	54	309	387	387	35	150
2016.24.015.15.1000.00	15	462	8.4	84	312	363	432	40	140
2016.24.015.20.1000.00	20	476	8.4	114	313	333	476	40	130
2016.24.015.25.1000.00	25	489	9.5	119	256	324	463	40	130
2016.24.015.30.1000.00	30	503	9.5	145	252	290	503	40	120
2016.24.015.35.1000.00	35	517	10.9	138	197	285	494	40	120
2016.24.015.40.1000.00	40	528	10.9	158	189	246	528	40	100
2016.24.015.45.1000.00	45	540	13.0	139	139	243	521	50	100
2016.24.015.50.1000.00	50	551	13.0	154	129	201	551	50	97
2016.24.015.55.1000.00	55	558	16.2	122	86	198	543	60	82
2016.24.015.60.1000.00	60	565	16.2	131	76	151	565	60	85
2016.24.015.65.1000.00	65	571	23.4	91	43	150	560	70	85
2016.24.015.70.1000.00	70	578	33.9	48	17	150	560	80	84
2016.24.015.75.1000.00	75	584	31.6	49	13	102	577	80	90

* Retraction force values correspond to the spring-generated retraction force at the working point

The forces F_{h2}, F_{V2} as well as F_{h3}, F_{V3} act on the tool environment at maximum working force F_W.

AERIAL FCC
2016.24.015.
FORCE DIAGRAM

shouldered

0°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	53	112	226	112	53
32	77	162	327	162	77
32	101	212	428	212	101
32	99	209	421	209	99
32	97	205	414	205	97

5°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	51	107	223	107	51
32	75	157	327	157	75
32	98	207	432	207	98
32	99	208	435	208	99
32	95	200	417	200	95

10°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	49	102	219	102	49
32	72	152	327	152	72
32	96	202	436	202	96
32	98	207	448	207	98
32	93	196	420	196	93

15°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	46	98	215	98	46
32	70	147	327	147	70
32	94	197	439	197	94
32	98	206	462	206	98
32	91	191	423	191	91

20°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	44	93	212	93	44
32	68	143	328	143	68
32	92	192	443	192	92
32	97	205	476	205	97
32	88	186	427	186	88

25°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	42	88	208	88	42
32	66	138	328	138	66
32	89	187	447	187	89
32	97	204	489	204	97
32	86	181	430	181	86

Support with feather key

0°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	32	67	103	67	32
32	46	88	103	88	46
32	60	89	103	89	60
32	59	90	103	90	59
32	58	90	103	90	58

5°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	31	64	105	64	31
32	45	87	108	87	45
32	59	87	108	87	59
32	59	87	108	87	59
32	57	87	108	87	57

10°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	29	61	105	61	29
32	43	91	113	91	43
32	58	91	115	91	58
32	59	91	115	91	59
32	56	91	115	91	56

15°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	46	82	120	82	46
32	60	85	120	85	60
32	64	88	120	88	64
32	64	88	120	88	64
32	57	83	120	83	57

20°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	27	56	128	56	27
32	41	86	133	86	41
32	55	115	135	115	55
32	58	115	135	115	58
32	53	111	135	111	53

25°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	25	53	146	53	25
32	39	83	152	83	39
32	54	112	152	112	54
32	58	112	152	112	58
32	52	109	152	109	52

AERIAL FCC
2016.24.015.
FORCE DIAGRAM

shouldered

30°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	40	83	205	83	40
32	63	133	328	133	63
32	87	182	451	182	87
32	97	203	503	203	97
32	84	176	433	176	84

35°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	38	79	201	79	38
32	61	128	328	128	61
32	85	177	455	177	85
32	96	202	517	202	96
32	82	171	439	171	82

40°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	38	81	198	81	38
32	64	135	330	135	64
32	89	190	461	190	89
32	102	218	528	218	102
32	85	181	441	181	85

45°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	38	83	195	83	38
32	66	142	332	142	66
32	94	202	468	202	94
32	108	233	540	233	108
32	88	191	444	191	88

50°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	39	85	191	85	39
32	68	149	333	149	68
32	98	214	475	214	98
32	114	249	551	249	114
32	92	200	447	200	92

55°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	39	87	188	87	39
32	71	157	335	157	71
32	102	227	482	227	102
32	120	265	558	265	120
32	95	210	449	210	95

Support with feather key

30°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	24	50	75	50	24
32	38	80	163	80	38
32	52	109	176	109	52
32	58	122	176	122	58
32	50	106	173	106	50

35°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	23	47	65	47	23
32	37	77	171	77	37
32	51	106	180	106	51
32	58	121	180	121	58
32	49	103	180	103	49

40°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	24	51	67	51	24
32	40	85	177	85	40
32	56	120	212	120	56
32	56	137	214	137	56
32	54	114	210	114	54

45°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	24	52	69	52	24
32	42	90	185	90	42
32	59	128	213	128	59
32	59	147	215	147	59
32	56	120	210	120	56

50°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	25	53	69	53	25
32	43	94	187	94	43
32	58	135	265	135	58
32	58	157	263	157	58
32	58	126	200	126	58

55°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	25	55	77	55	25
32	45	99	198	99	45
32	65	143	275	143	65
32	65	167	260	167	65
32	60	132	205	132	60

Subject to alterations

AERIAL FCC
2016.24.015.
FORCE DIAGRAM

shouldered

60°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	40	89	185	89	40
32	73	164	337	164	73
32	107	239	489	239	107
32	125	281	565	281	125
32	98	219	452	219	98

65°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	40	91	182	91	40
32	76	171	339	171	76
32	111	251	496	251	111
32	131	297	571	297	131
32	101	229	448	229	101

70°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	41	93	178	93	41
32	78	178	341	178	78
32	115	263	499	263	115
32	137	313	578	313	137
32	105	239	438	239	105

75°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	41	95	175	95	41
32	80	185	343	185	80
32	120	276	501	276	120
32	143	329	584	329	143
32	108	248	427	248	108

Support with feather key

60°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	25	56	78	56	25
32	46	103	123	103	46
32	67	151	369	151	67
32	67	178	372	178	67
32	62	139	269	139	62

65°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	27	60	79	60	27
32	50	95	103	95	50
32	74	167	358	167	74
32	74	198	362	198	74
32	68	153	286	153	68

70°

Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	27	62	77	62	27
32	52	97	103	97	52
32	77	176	375	176	77
32	77	209	375	209	77
32	70	159	290	159	70

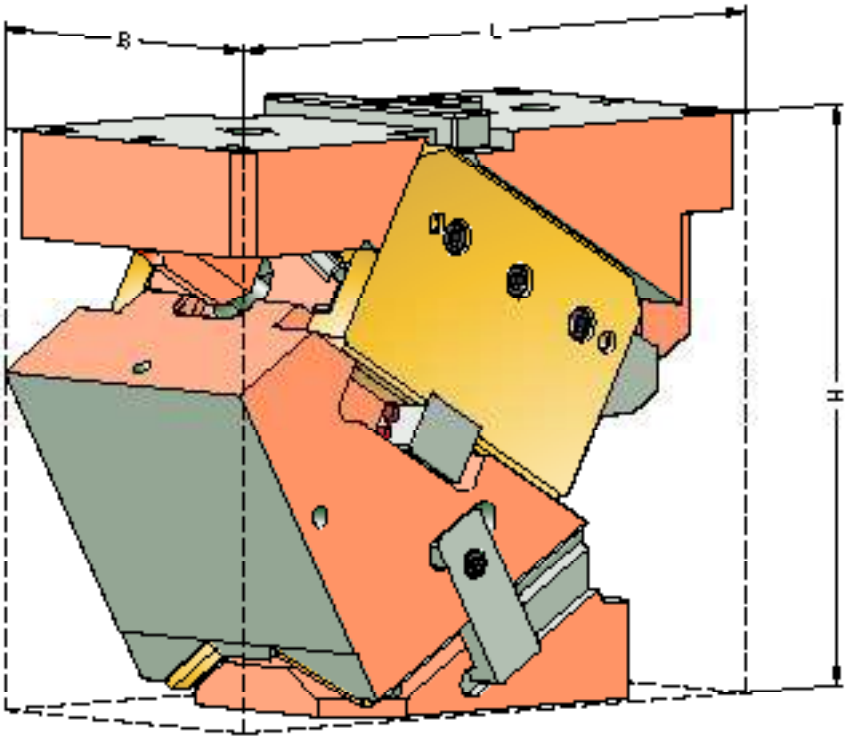
75°

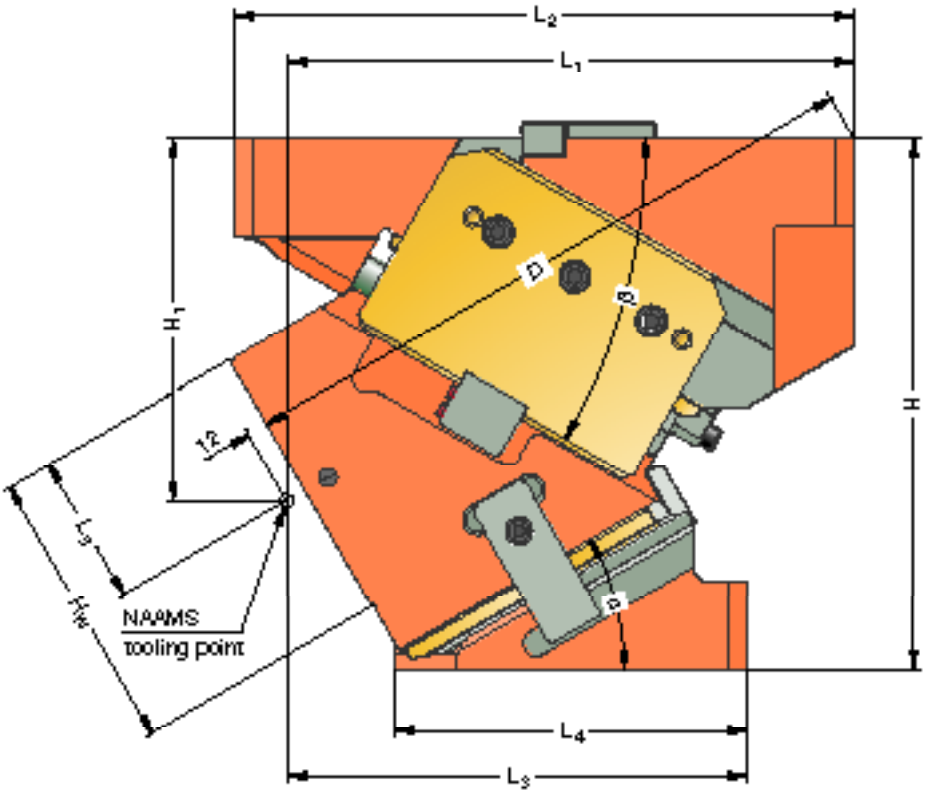
Height 160 mm	Width 150 mm				
	35	30	20	30	35
32	27	63	75	63	27
32	54	75	83	75	54
32	80	184	367	184	80
32	80	219	523	219	80
32	72	166	325	166	72

AERIAL FCC 2016.24.018.

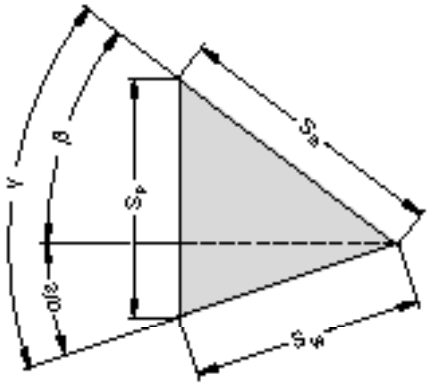
Working width:	180 mm
Performance class:	500 kN

AERIAL FCC
2016.24.018.
SIZE TABLE





AERIAL FCC
2016.24.018.
SIZE TABLE



Order number	L [mm]	B [mm]	H [mm]	H_1 [mm]	H_W [mm]	L_1 [mm]	L_2 [mm]	L_3 [mm]	L_4 [mm]	L_5 [mm]	D [mm]	α [°]	β [°]	S_W* [mm]	S_S [mm]	S_P* [mm]
2016.24.018.00.1000.00	310	180	300	170	160	310	310	240	220	105	298.0	0	50	32.1	50	38.3
2016.24.018.05.1000.00	310	180	300	175	160	310	310	240	210	105	312.0	5	45	35.5	50	38.4
2016.24.018.10.1000.00	314	180	300	180	160	310	310	240	200	90	324.5	10	45	35.9	50	41.6
2016.24.018.15.1000.00	322	180	300	185	160	310	310	240	195	90	335.3	15	40	39.7	50	42.4
2016.24.018.20.1000.00	330	180	300	190	160	310	310	240	191	90	344.3	20	35	43.6	50	43.6
2016.24.018.25.1000.00	350	180	300	195	160	320	350	260	199	80	360.4	25	35	45.2	50	47.8
2016.24.018.30.1000.00	352	180	300	205	160	320	350	260	199	85	367.6	30	30	50.0	50	50.0
2016.24.018.35.1000.00	365	180	300	215	160	320	350	260	201	95	373.5	35	30	52.9	50	55.3
2016.24.018.40.1000.00	372	180	300	225	160	320	350	260	197	95	377.8	40	25	59.2	50	59.2
2016.24.018.45.1000.00	340	180	300	235	160	260	340	240	182	105	338.0	45	25	64.1	50	66.4
2016.24.018.50.1000.00	340	180	300	245	160	260	340	240	179	105	342.8	50	20	73.1	50	73.1
2016.24.018.55.1000.00	347	180	300	255	160	260	340	240	186	115	346.0	55	20	81.9	50	84.2
2016.24.018.60.1000.00	354	180	300	265	160	260	340	240	182	115	347.5	60	15	96.6	50	96.6
2016.24.018.65.1000.00	359	180	300	265	160	260	340	240	181	115	338.1	65	15	91.4	40	93.2
2016.24.018.70.1000.00	340	180	300	275	160	235	340	235	168	110	326.8	70	15	84.7	30	87.4
2016.24.018.75.1000.00	340	180	300	275	160	235	340	235	172	110	314.5	75	10	76.1	20	77.0

* Values rounded

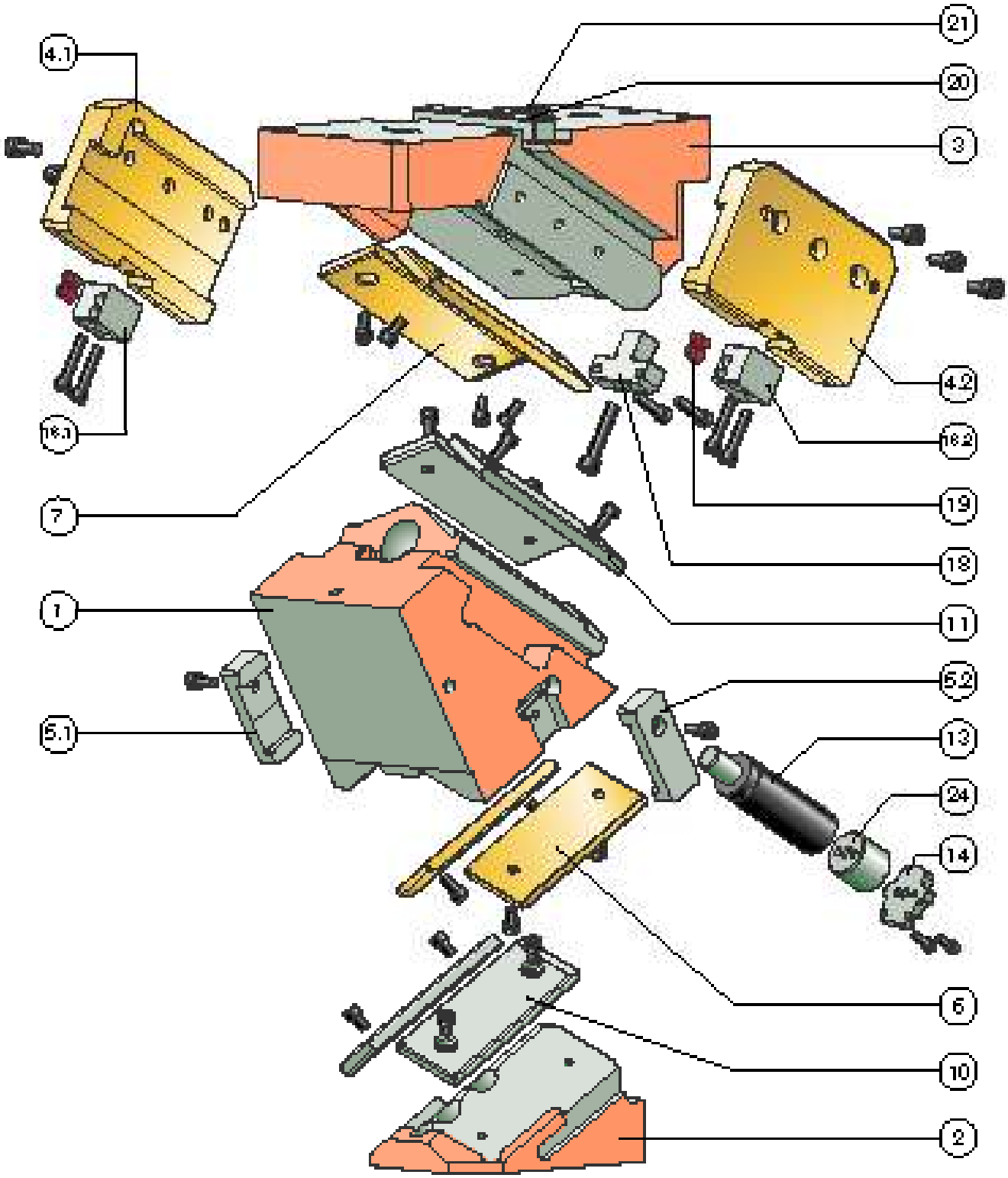
Fastening cam base:

Hexagon socket head cap screws DIN EN ISO 4762	4x M16 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x Ø16

Fastening cam driver :

Hexagon socket head cap screws DIN EN ISO 4762	4x M16 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x Ø16

AERIAL FCC
2016.24.018.
EXPLODED VIEW



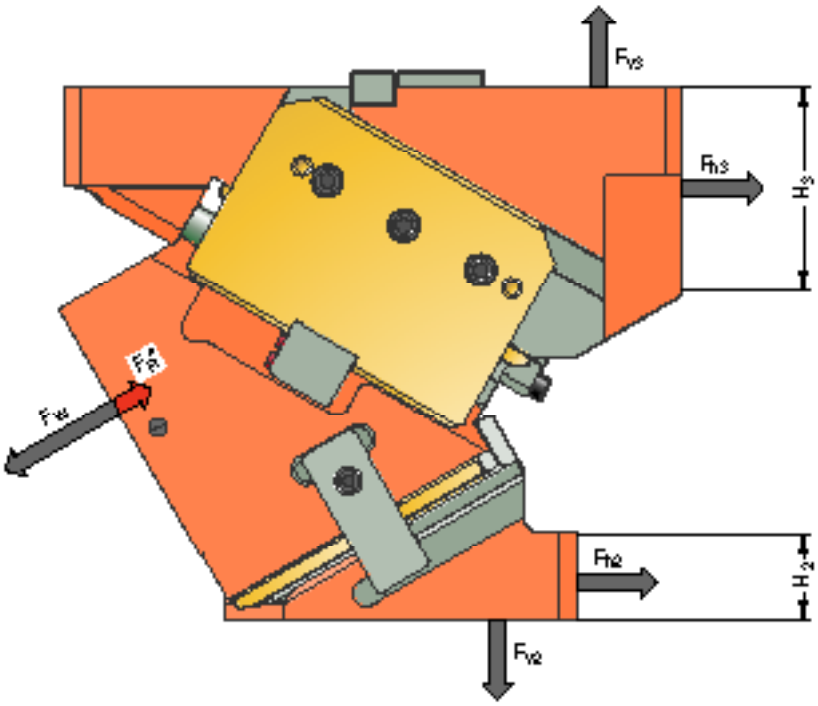
AERIAL FCC
2016.24.018.
PARTS LIST

Position	Piece	Designation	Material	spare part
1	1	Slider	GGG60	--
2	1	Cam driver	GGG60	--
2.1				
2.2				
3	1	Cam base	GGG60	--
4.1	1	Clamp, left	Bronze with solid lubricant	x
4.2	1	Clamp, right	Bronze with solid lubricant	x
5.1	1	Positive return, left	1.7225	x
5.2	1	Positive return, right	1.7225	x
6	2	Sliding plate	Bronze with solid lubricant	x
7	2	Sliding plate	Bronze with solid lubricant	x
8				
9				
10	2	Sliding plate	1.7131	x
11	2	Sliding plate	1.7131	x
12				
13	1	Gas spring	2487.12.00500.□□□	x
14	1	Stop plate	1.7225	x
15				
16.1	1	Cam slide stop, left	1.1191	
16.2	1	Cam slide stop, right	1.1191	
17				
18	1	Lockout system		x
19	4	Damping element	Elastomer	x
20	1	Feather key (T-nut)		x
21	1	Feather key (T-nut)		x
22				
23				
24	1	Spacer	1.1191	x

For inquiries or when ordering spare parts (x), we require the following data:

- ▶ Cam unit order no.
- ▶ Cam unit serial no.
- ▶ Item number / Designation / Spare part

AERIAL FCC
2016.24.018.
SYSTEM AND SURROUNDING FORCES



Order number	α [°]	F_W [kN]	F_R^* [kN]	F_{h2} [kN]	F_{v2} [kN]	F_{h3} [kN]	F_{v3} [kN]	H_2 [mm]	H_3 [mm]
2016.24.018.00.1000.00	0	474	7.7	0	398	474	398	27	160
2016.24.018.05.1000.00	5	488	7.7	36	408	450	450	40	150
2016.24.018.10.1000.00	10	503	8.5	61	347	434	434	27	150
2016.24.018.15.1000.00	15	518	8.5	94	350	406	484	27	140
2016.24.018.20.1000.00	20	533	8.5	128	351	373	533	27	130
2016.24.018.25.1000.00	25	542	9.5	132	284	359	513	40	130
2016.24.018.30.1000.00	30	543	9.5	157	272	314	543	40	117
2016.24.018.35.1000.00	35	543	11.0	145	207	300	519	40	117
2016.24.018.40.1000.00	40	550	11.0	165	196	256	550	40	100
2016.24.018.45.1000.00	45	557	13.0	143	143	251	537	50	100
2016.24.018.50.1000.00	50	564	13.0	157	132	205	564	50	81
2016.24.018.55.1000.00	55	571	16.3	125	88	202	555	60	66
2016.24.018.60.1000.00	60	578	16.3	134	77	155	578	60	70
2016.24.018.65.1000.00	65	584	21.9	93	44	153	573	60	74
2016.24.018.70.1000.00	70	591	34.0	49	18	154	573	80	84
2016.24.018.75.1000.00	75	598	31.6	51	14	104	591	90	63

* Retraction force values correspond to the spring-generated retraction force at the working point

The forces F_{h2}, F_{V2} as well as F_{h3}, F_{V3} act on the tool environment at maximum working force F_W.

AERIAL FCC
2016.24.018.
FORCE DIAGRAM

shouldered

0°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	83	172	244	172	83
32	109	226	321	226	109
32	135	280	397	280	135
32	184	333	474	333	184
32	99	117	167	117	99

5°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	81	158	233	158	81
32	106	207	305	207	106
32	132	276	378	276	132
32	191	356	488	356	191
32	120	153	199	153	120

10°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	79	143	221	143	79
32	104	187	290	187	104
32	129	272	359	272	129
32	198	338	503	338	198
32	133	188	232	188	133

15°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	77	128	209	128	77
32	101	168	274	168	101
32	125	267	340	267	125
32	205	317	518	317	205
32	146	212	264	212	146

20°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	75	113	197	113	75
32	99	149	259	149	99
32	122	263	321	263	122
32	211	296	533	296	211
32	159	209	297	209	159

25°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	73	98	185	98	73
32	96	129	243	129	96
32	119	259	302	259	119
32	218	275	542	279	218
32	172	205	330	205	172

Support with feather key

0°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	50	84	117	84	50
32	65	84	117	84	65
32	65	85	117	85	65
32	65	86	117	86	65
32	59	82	117	82	59

5°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	49	93	115	93	49
32	64	99	118	99	64
32	72	99	122	99	72
32	72	99	123	99	72
32	72	96	122	96	72

10°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	47	100	130	100	47
32	62	108	132	108	62
32	77	112	135	112	77
32	78	112	135	112	78
32	76	110	134	110	76

15°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	46	90	125	90	46
32	61	113	140	113	61
32	75	118	145	118	75
32	75	118	146	118	75
32	75	116	143	116	75

20°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	45	79	118	79	45
32	59	104	155	104	59
32	73	125	164	125	73
32	73	125	166	125	73
32	73	125	163	125	73

25°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	44	69	111	69	44
32	58	91	146	91	58
32	71	188	175	188	71
32	71	142	178	142	71
32	70	143	176	143	70

AERIAL FCC
2016.24.018.
FORCE DIAGRAM

shouldered

30°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	71	84	173	84	71
32	93	110	228	110	93
32	116	255	283	255	116
32	225	253	543	253	225
32	185	201	362	201	185

35°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	69	69	161	69	69
32	91	91	212	91	91
32	113	251	264	251	113
32	232	232	543	232	232
32	198	198	427	198	198

40°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	64	70	164	70	64
32	86	96	227	96	86
32	108	244	289	244	108
32	215	234	550	234	215
32	181	194	433	194	181

45°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	59	71	167	71	59
32	81	102	241	102	81
32	103	236	315	236	103
32	198	235	557	235	198
32	165	190	438	190	165

50°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	54	71	170	71	54
32	76	107	255	107	76
32	99	229	341	229	99
32	181	237	564	237	181
32	148	187	443	187	148

55°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	49	72	173	72	49
32	72	112	270	112	72
32	94	222	367	222	94
32	164	239	571	239	164
32	132	183	436	183	132

Support with feather key

30°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	43	83	104	83	43
32	57	110	169	110	57
32	69	137	178	137	69
32	75	149	193	149	75
32	67	141	181	141	67

35°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	41	48	98	48	41
32	54	64	127	64	54
32	68	150	158	150	68
32	68	152	216	152	68
32	68	139	214	139	68

40°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	40	51	64	51	40
32	54	71	141	71	54
32	68	172	238	172	68
32	68	172	241	172	68
32	57	143	237	143	57

45°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	37	52	72	52	37
32	51	75	152	75	51
32	65	174	256	174	65
32	65	173	260	173	65
32	60	140	210	140	60

50°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	34	53	72	53	34
32	48	79	153	79	48
32	62	169	310	169	62
32	62	175	313	175	62
32	48	138	211	138	48

55°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	31	61	74	61	31
32	49	96	160	96	49
32	59	189	314	189	59
32	59	203	315	203	59
32	53	156	210	156	53

Subject to alterations

AERIAL FCC
2016.24.018.
FORCE DIAGRAM

shouldered

60°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	44	73	176	73	44
32	67	118	284	118	67
32	89	215	393	215	89
32	147	240	578	240	147
32	115	179	430	179	115

65°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	39	74	179	74	39
32	62	123	299	123	62
32	84	207	418	207	84
32	130	242	584	242	130
32	99	176	423	176	99

70°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	34	75	182	75	34
32	57	129	313	129	57
32	80	200	444	200	80
32	113	244	591	244	113
32	82	172	417	172	82

75°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	29	76	184	76	29
32	52	134	327	134	52
32	75	193	470	193	75
32	96	245	598	245	96
32	65	168	410	168	65

Support with feather key

60°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	28	62	111	62	28
32	42	100	179	100	42
32	56	182	248	182	56
32	56	204	365	204	56
32	56	152	271	152	56

65°

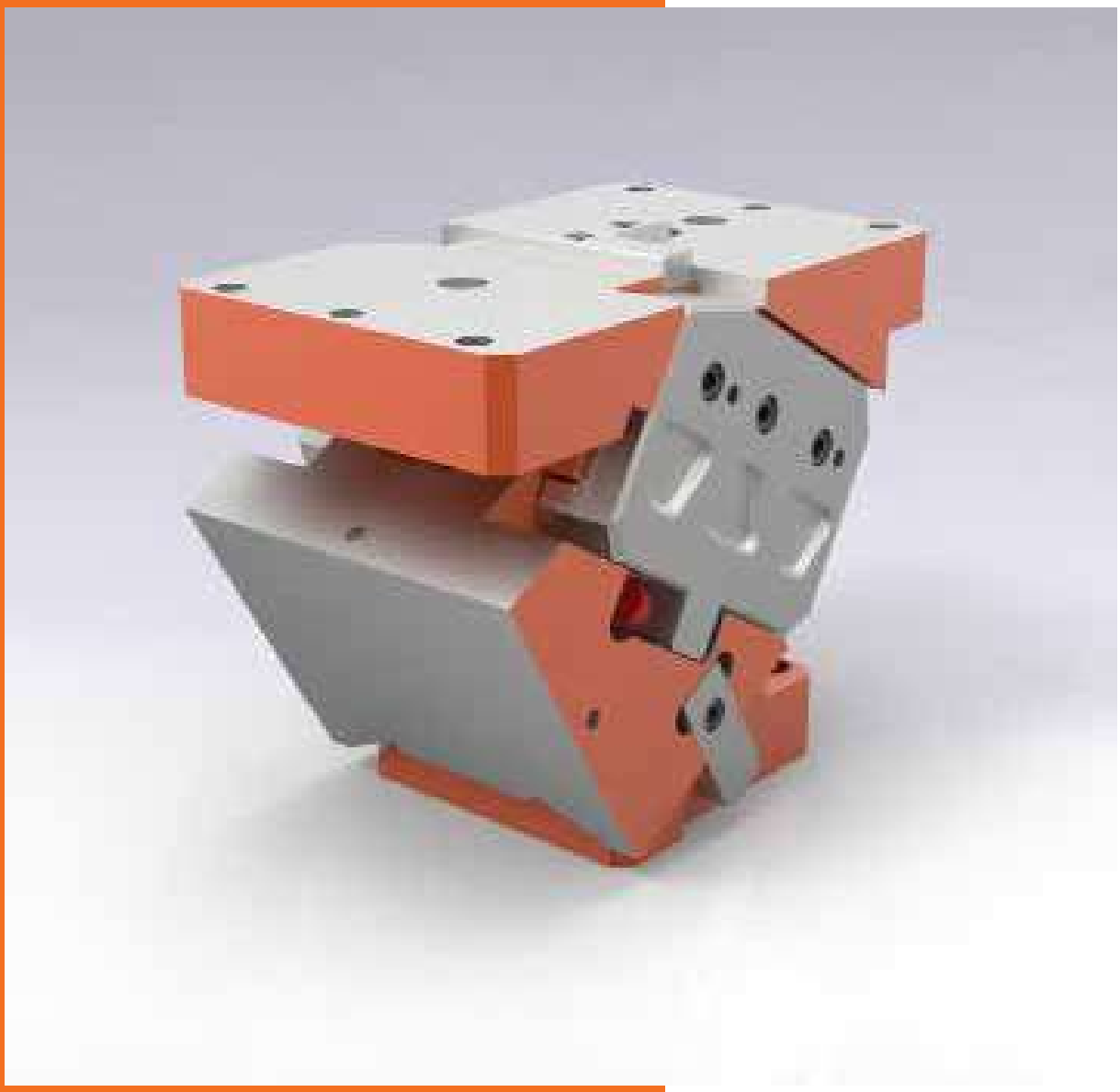
Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	26	69	119	69	26
32	41	115	199	115	41
32	56	193	279	193	56
32	56	225	390	225	56
32	56	163	282	163	56

70°

Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	23	75	76	75	23
32	38	129	209	129	38
32	53	200	296	200	53
32	55	244	394	244	55
32	55	172	278	172	55

75°

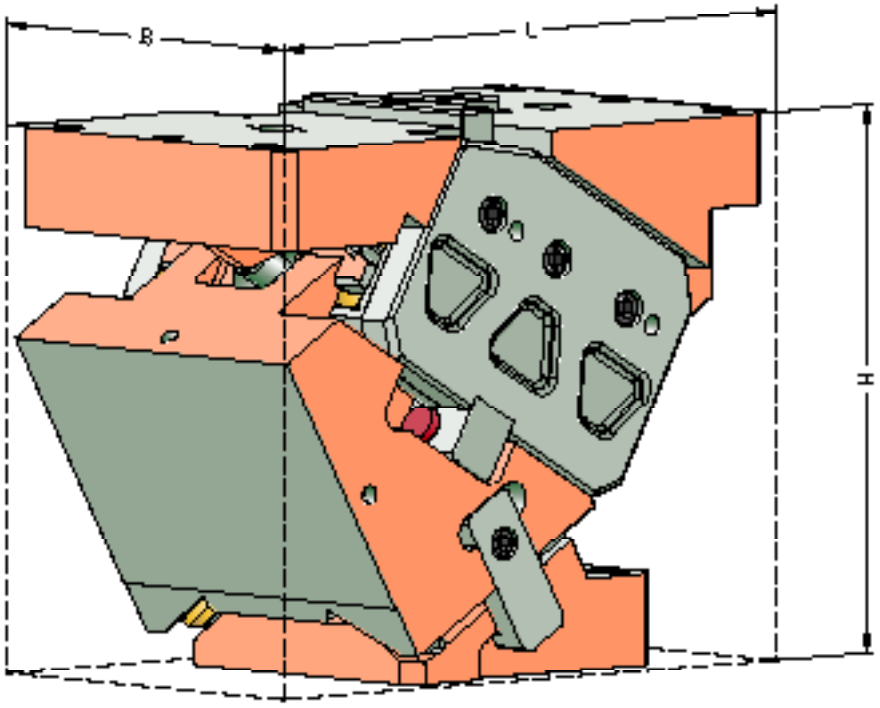
Height 160 mm	Width 180 mm				
	40	40	20	40	40
32	20	76	76	76	20
32	35	134	218	134	35
32	50	193	313	193	50
32	50	245	399	245	50
32	44	168	273	168	44

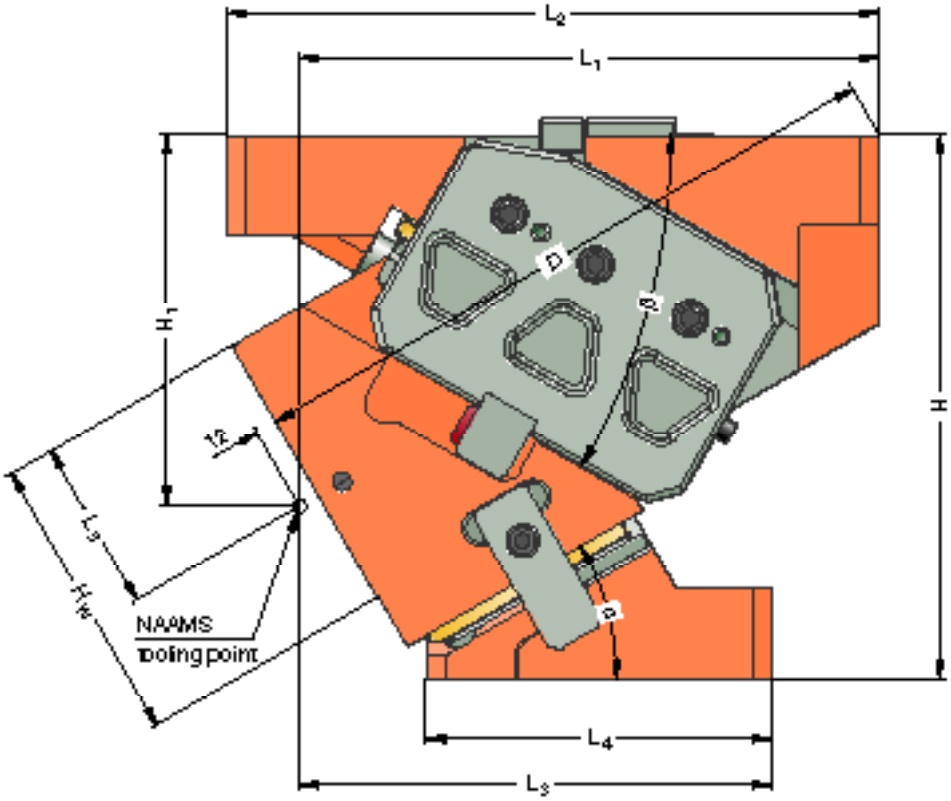


AERIAL FCC 2016.24.022.

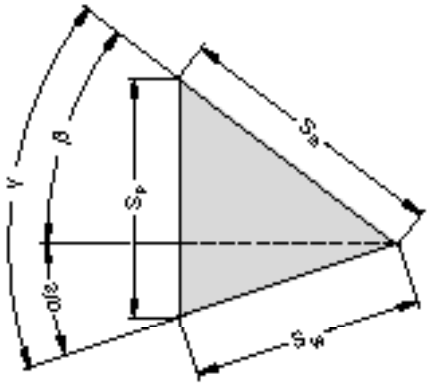
Working width:	220 mm
Performance class:	600 kN

AERIAL FCC
2016.24.022.
SIZE TABLE





AERIAL FCC
2016.24.022.
SIZE TABLE



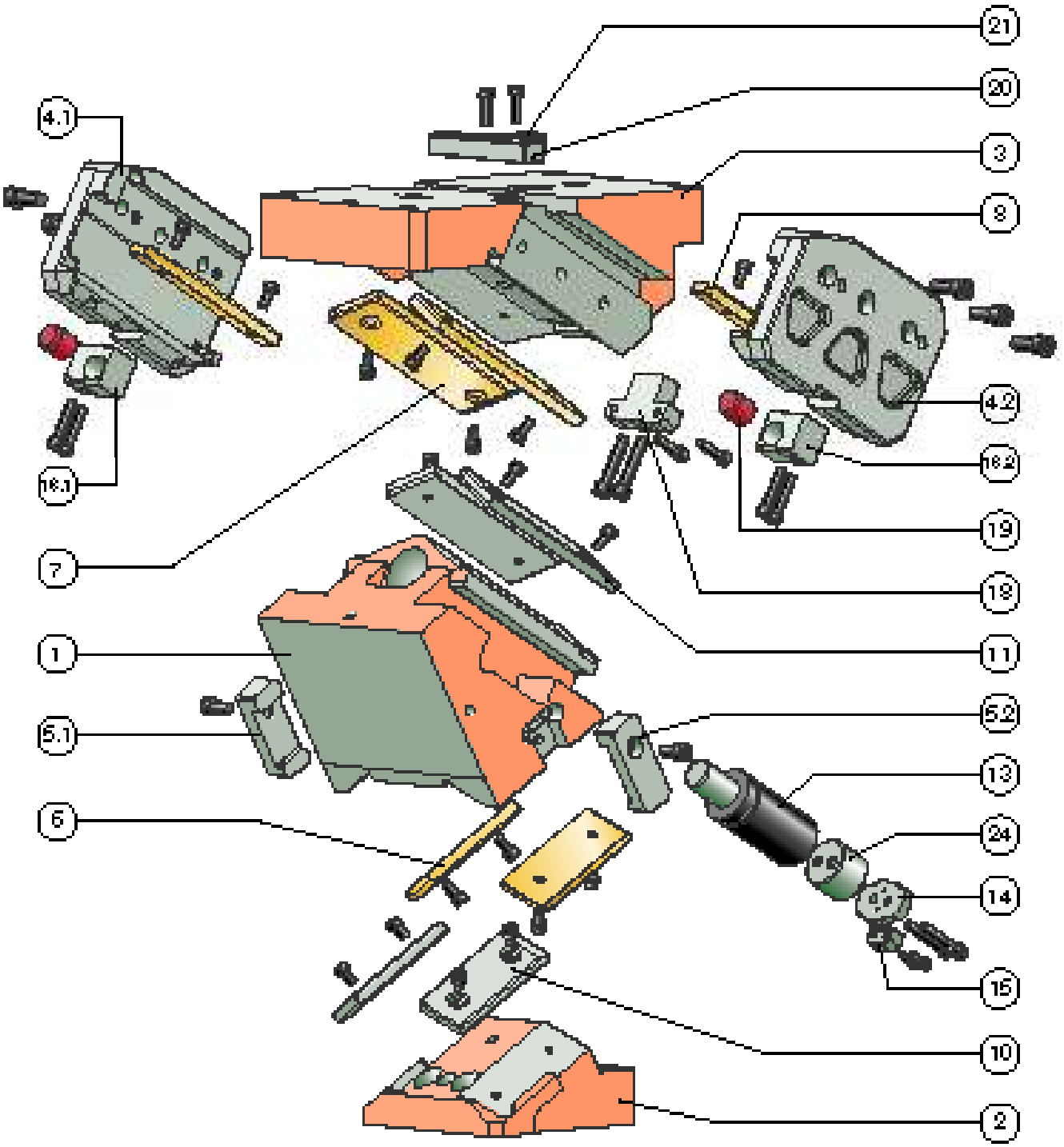
Order number	L [mm]	B [mm]	H [mm]	H_1 [mm]	H_W [mm]	L_1 [mm]	L_2 [mm]	L_3 [mm]	L_4 [mm]	L_5 [mm]	D [mm]	α [°]	β [°]	S_W* [mm]	S_S [mm]	S_P* [mm]
2016.24.022.00.1000.00	320	220	300	170	160	320	320	240	215	110	308.0	0	50	32.1	50	38.3
2016.24.022.05.1000.00	320	220	300	175	160	320	320	240	210	110	322.0	5	45	35.5	50	38.4
2016.24.022.10.1000.00	324	220	300	180	160	320	320	240	200	90	334.4	10	45	35.9	50	41.6
2016.24.022.15.1000.00	332	220	300	185	160	320	320	240	190	90	345.0	15	40	39.7	50	42.4
2016.24.022.20.1000.00	338	220	300	190	160	320	320	240	185	85	353.7	20	35	43.6	50	43.6
2016.24.022.25.1000.00	360	220	300	195	160	320	360	260	195	85	360.4	25	35	45.2	50	47.8
2016.24.022.30.1000.00	360	220	300	205	160	320	360	260	190	95	375.7	30	30	50.0	50	50.0
2016.24.022.35.1000.00	363	220	300	215	160	320	360	260	185	92	373.4	35	30	52.9	50	55.3
2016.24.022.40.1000.00	373	220	300	225	160	320	360	260	180	97	377.8	40	25	59.2	50	59.2
2016.24.022.45.1000.00	365	220	300	235	160	285	365	240	160	102	355.7	45	25	64.1	50	66.4
2016.24.022.50.1000.00	365	220	300	245	160	285	365	240	160	102	358.9	50	20	73.1	50	73.1
2016.24.022.55.1000.00	365	220	300	255	160	285	365	240	161	102	360.4	55	20	81.9	50	84.2
2016.24.022.60.1000.00	372	220	300	265	160	285	365	240	159	107	360.0	60	15	96.6	50	96.6
2016.24.022.65.1000.00	368	220	300	265	160	285	365	240	161	97	348.6	65	15	91.4	40	93.2
2016.24.022.70.1000.00	372	220	300	265	160	285	365	240	163	97	334.5	70	10	100.8	35	100.8
2016.24.022.75.1000.00	365	220	300	280	160	275	365	240	145	83	329.6	75	10	95.1	25	96.2

* Values rounded

Fastening cam base:
Hexagon socket head cap screws DIN EN ISO 4762 — 4x M16 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735 — 2x Ø16

Fastening cam driver :
Hexagon socket head cap screws DIN EN ISO 4762 — 4x M16 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735 — 2x Ø16

AERIAL FCC
2016.24.022.
EXPLODED VIEW



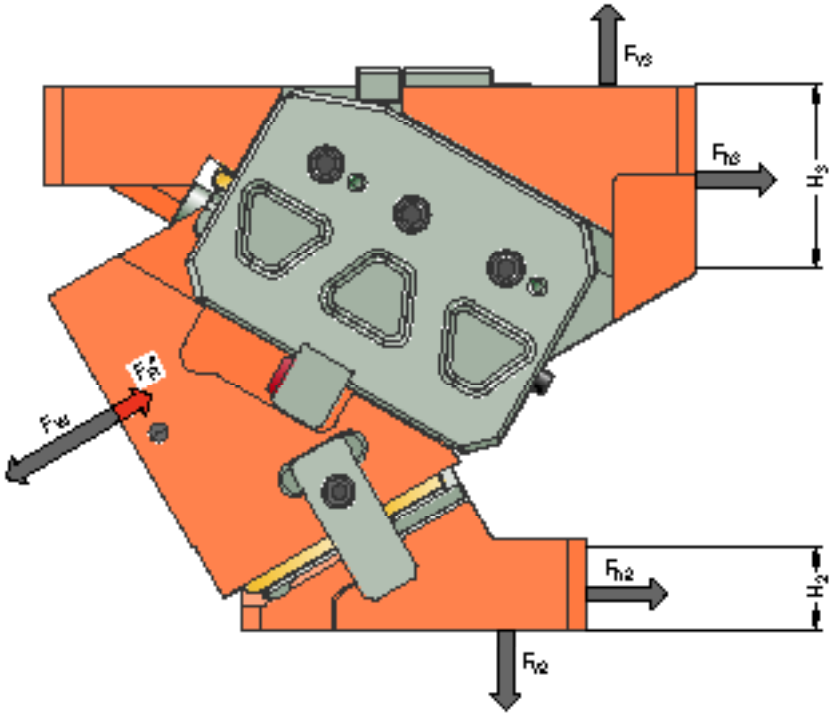
AERIAL FCC
2016.24.022.
PARTS LIST

Position	Piece	Designation	Material	spare part
1	1	Slider	GGG60	--
2	1	Cam driver	GGG60	--
2.1				
2.2				
3	1	Cam base	GGG60	--
4.1	1	Clamp, left	1.7225	x
4.2	1	Clamp, right	1.7225	x
5.1	1	Positive return, left	1.7225	x
5.2	1	Positive return, right	1.7225	x
6	2	Sliding plate	Bronze with solid lubricant	x
7	2	Sliding plate	Bronze with solid lubricant	x
8	2	Sliding plate	Bronze with solid lubricant	x
9				
10	2	Sliding plate	1.7131	x
11	2	Sliding plate	1.7131	x
12				
13	1	Gas spring	2487.12.00750.□□□	x
14	1	Stop plate	1.7225	x
15	1	Safety plate	1.1191	x
16.1	1	Cam slide stop, left	1.1191	x
16.2	1	Cam slide stop, right	1.1191	x
17				
18	1	Lockout system		x
19	2	Damping element	Elastomer	x
20	1	Feather key (T-nut)		x
21	1	Feather key (T-nut)		x
22				
23				
24	1	Spacer	1.1191	x

For inquiries or when ordering spare parts (x), we require the following data:

- ▶ Cam unit order no.
- ▶ Cam unit serial no.
- ▶ Item number / Designation / Spare part

AERIAL FCC
2016.24.022.
SYSTEM AND SURROUNDING FORCES



Order number	α [°]	F_W [kN]	F_R* [kN]	F_{h2} [kN]	F_{v2} [kN]	F_{h3} [kN]	F_{v3} [kN]	H_2 [mm]	H_3 [mm]
2016.24.022.00.1000.00	0	635	12.4	0	533	635	533	40	160
2016.24.022.05.1000.00	5	648	12.5	47	542	598	598	40	150
2016.24.022.10.1000.00	10	661	13.7	80	456	571	571	40	150
2016.24.022.15.1000.00	15	674	13.7	122	456	529	630	40	140
2016.24.022.20.1000.00	20	687	13.8	165	452	481	687	20	130
2016.24.022.25.1000.00	25	700	15.5	171	366	464	662	40	130
2016.24.022.30.1000.00	30	714	15.5	206	357	412	714	40	104
2016.24.022.35.1000.00	35	727	17.8	194	278	401	695	40	107
2016.24.022.40.1000.00	40	727	17.9	218	260	339	727	40	93
2016.24.022.45.1000.00	45	728	21.3	187	187	327	702	50	100
2016.24.022.50.1000.00	50	729	21.3	203	171	265	729	40	61
2016.24.022.55.1000.00	55	729	26.7	160	112	258	709	60	53
2016.24.022.60.1000.00	60	730	26.7	169	98	196	730	60	67
2016.24.022.65.1000.00	65	730	34.1	117	54	192	716	60	72
2016.24.022.70.1000.00	70	731	33.1	121	44	129	731	80	58
2016.24.022.75.1000.00	75	732	50.2	62	17	128	724	90	56

* Retraction force values correspond to the spring-generated retraction force at the working point

The forces F_{h2}, F_{V2} as well as F_{h3}, F_{V3} act on the tool environment at maximum working force F_W.

AERIAL FCC
2016.24.022.
FORCE DIAGRAM

shouldered

0°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	69	154	307	154	69
32	86	192	384	192	86
32	103	231	460	231	103
32	143	318	635	318	143
32	89	198	396	198	89

5°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	75	159	306	159	75
32	95	201	390	201	95
32	153	328	475	328	153
32	107	218	648	218	107
32	105	219	415	219	105

10°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	79	162	305	162	79
32	102	207	397	207	102
32	117	228	489	228	117
32	123	239	661	239	123
32	121	240	435	240	121

15°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	82	162	304	162	82
32	109	212	404	212	109
32	134	250	504	250	134
32	139	260	674	260	139
32	138	261	454	261	138

20°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	85	162	302	162	85
32	116	217	410	217	116
32	151	271	518	271	151
32	156	281	687	281	156
32	154	282	473	282	154

25°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	89	162	301	162	89
32	123	222	417	222	123
32	168	293	532	293	168
32	172	301	700	301	172
32	170	303	493	303	170

Support with feather key

0°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	41	85	140	85	41
32	52	106	140	106	52
32	62	113	140	113	62
32	67	113	140	113	67
32	53	109	140	109	53

5°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	45	87	153	87	45
32	57	111	155	111	57
32	69	119	155	119	69
32	64	119	155	119	64
32	63	119	155	119	63

10°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	47	89	152	89	47
32	61	114	156	114	61
32	70	125	156	125	70
32	74	131	156	131	74
32	73	132	156	132	73

15°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	49	89	152	89	49
32	65	116	174	116	65
32	72	137	174	137	72
32	72	137	174	137	72
32	72	137	174	137	72

20°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	51	89	151	89	51
32	69	119	196	119	69
32	74	149	196	149	74
32	74	154	196	154	74
32	74	155	196	155	74

25°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	53	89	151	89	53
32	74	122	208	122	74
32	86	152	208	152	86
32	86	152	208	152	86
32	86	152	208	152	86

AERIAL FCC
2016.24.022.
FORCE DIAGRAM

shouldered

0°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	69	154	307	154	69
32	86	192	384	192	86
32	103	231	460	231	103
32	143	318	635	318	143
32	89	198	396	198	89

5°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	75	159	306	159	75
32	95	201	390	201	95
32	153	328	475	328	153
32	107	218	648	218	107
32	105	219	415	219	105

10°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	79	162	305	162	79
32	102	207	397	207	102
32	117	228	489	228	117
32	123	239	661	239	123
32	121	240	435	240	121

15°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	82	162	304	162	82
32	109	212	404	212	109
32	134	250	504	250	134
32	139	260	674	260	139
32	138	261	454	261	138

20°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	85	162	302	162	85
32	116	217	410	217	116
32	151	271	518	271	151
32	156	281	687	281	156
32	154	282	473	282	154

25°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	89	162	301	162	89
32	123	222	417	222	123
32	168	293	532	293	168
32	172	301	700	301	172
32	170	303	493	303	170

Support with feather key

0°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	41	85	140	85	41
32	52	106	140	106	52
32	62	113	140	113	62
32	67	113	140	113	67
32	53	109	140	109	53

5°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	45	87	153	87	45
32	57	111	155	111	57
32	69	119	155	119	69
32	64	119	155	119	64
32	63	119	155	119	63

10°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	47	89	152	89	47
32	61	114	156	114	61
32	70	125	156	125	70
32	74	131	156	131	74
32	73	132	156	132	73

15°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	49	89	152	89	49
32	65	116	174	116	65
32	72	137	174	137	72
32	72	137	174	137	72
32	72	137	174	137	72

20°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	51	89	151	89	51
32	69	119	196	119	69
32	74	149	196	149	74
32	74	154	196	154	74
32	74	155	196	155	74

25°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	53	89	151	89	53
32	74	122	208	122	74
32	86	152	208	152	86
32	86	152	208	152	86
32	86	152	208	152	86

Subject to alterations

AERIAL FCC
2016.24.022.
FORCE DIAGRAM

shouldered

30°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	92	161	300	161	92
32	130	227	423	227	130
32	184	315	547	315	184
32	188	322	714	322	188
32	187	324	512	324	187

35°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	95	161	299	161	95
32	137	232	430	232	137
32	178	303	561	303	178
32	268	454	727	454	268
32	203	345	551	345	203

40°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	96	164	297	164	96
32	138	236	427	236	138
32	266	453	557	453	266
32	204	347	727	347	204
32	199	339	540	339	199

45°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	97	166	294	166	97
32	140	239	424	239	140
32	202	346	553	346	202
32	200	341	728	341	200
32	195	333	528	333	195

50°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	99	169	292	169	99
32	142	243	420	243	142
32	198	340	548	340	198
32	195	335	729	335	195
32	191	327	516	327	191

55°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	100	171	290	171	100
32	144	247	417	247	144
32	194	334	544	334	194
32	191	329	729	329	191
32	187	321	504	321	187

Support with feather key

30°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	55	89	150	89	55
32	78	125	212	125	78
32	95	173	238	173	95
32	95	177	238	177	95
32	95	178	238	178	95

35°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	57	105	180	105	57
32	82	151	258	151	82
32	98	205	258	205	98
32	98	205	258	205	98
32	98	205	258	205	98

40°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	61	107	178	107	61
32	87	153	256	153	87
32	102	205	302	205	102
32	102	205	302	205	102
32	102	205	302	205	102

45°

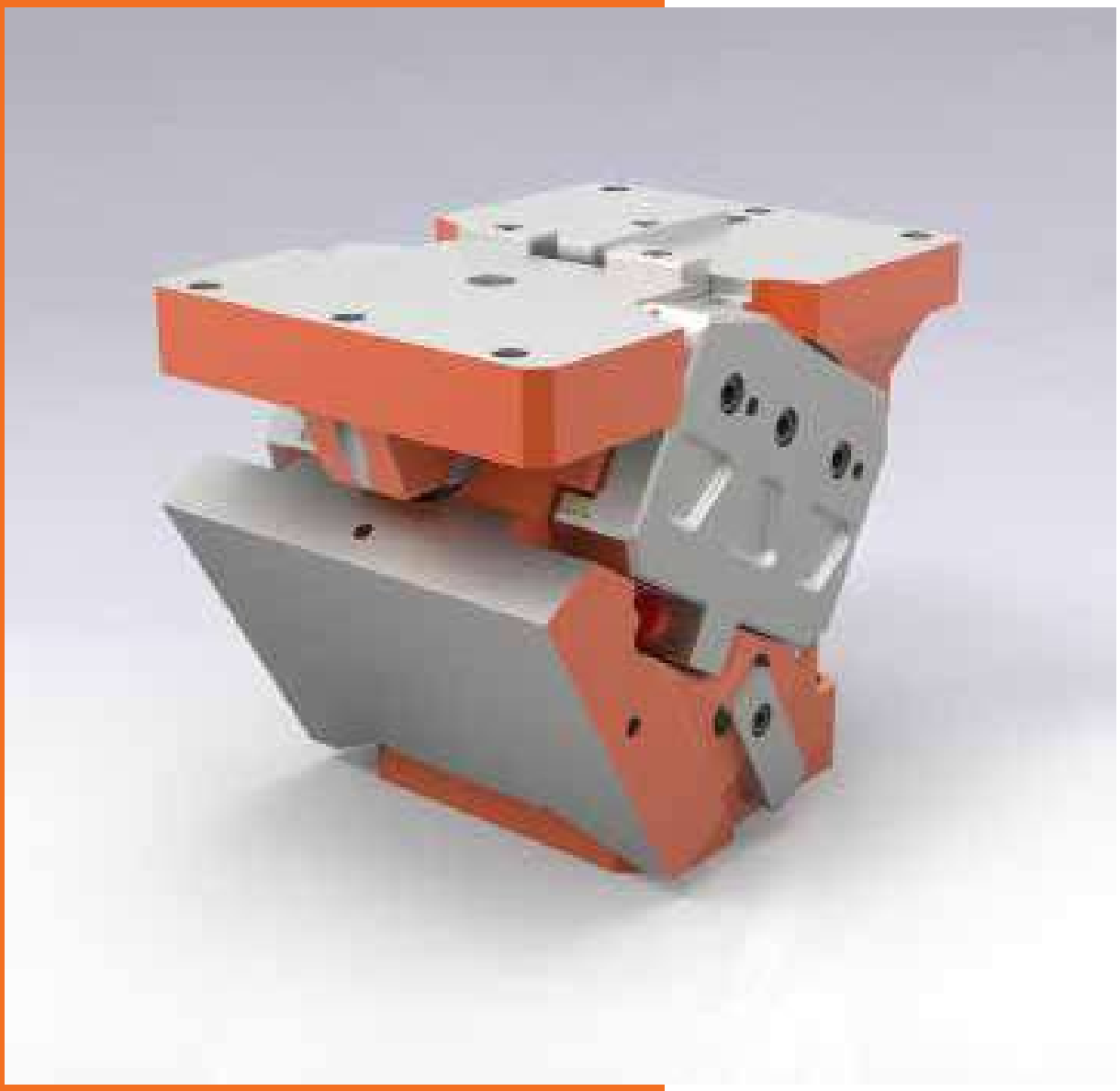
Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	61	100	191	100	61
32	88	144	275	144	88
32	112	208	303	208	112
32	115	205	308	205	115
32	115	200	308	200	115

50°

Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	62	101	190	101	62
32	90	146	273	146	90
32	125	204	356	204	125
32	123	201	360	201	123
32	121	196	335	196	121

55°

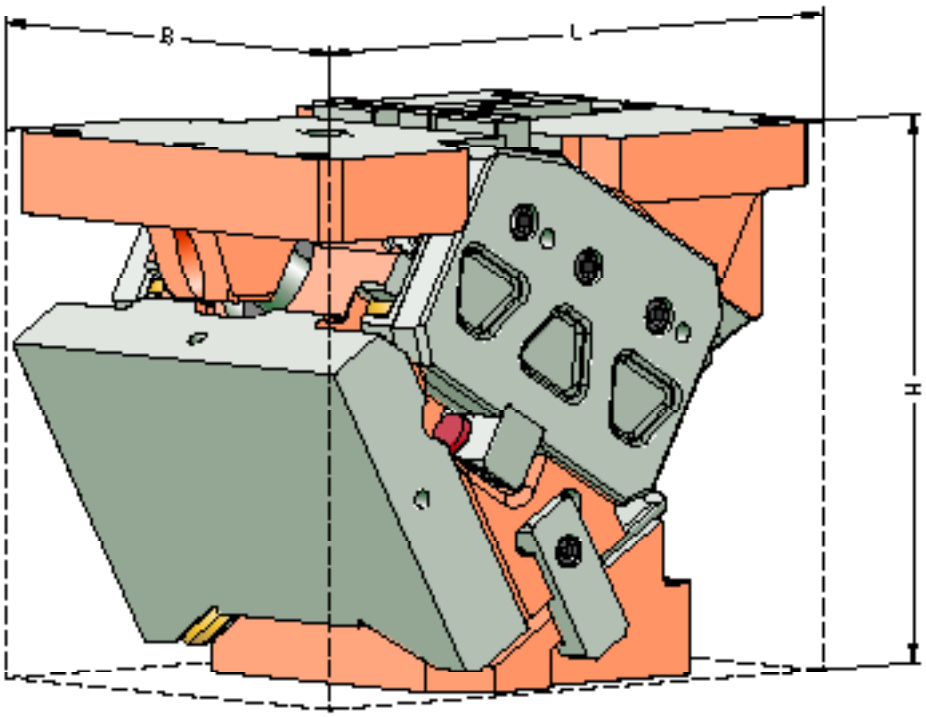
Height 160 mm	Width 220 mm				
	50	50	20	50	50
32	63	103	180	103	63
32	91	148	334	148	91
32	123	200	390	200	123
32	121	197	390	197	121
32	118	192	390	192	118

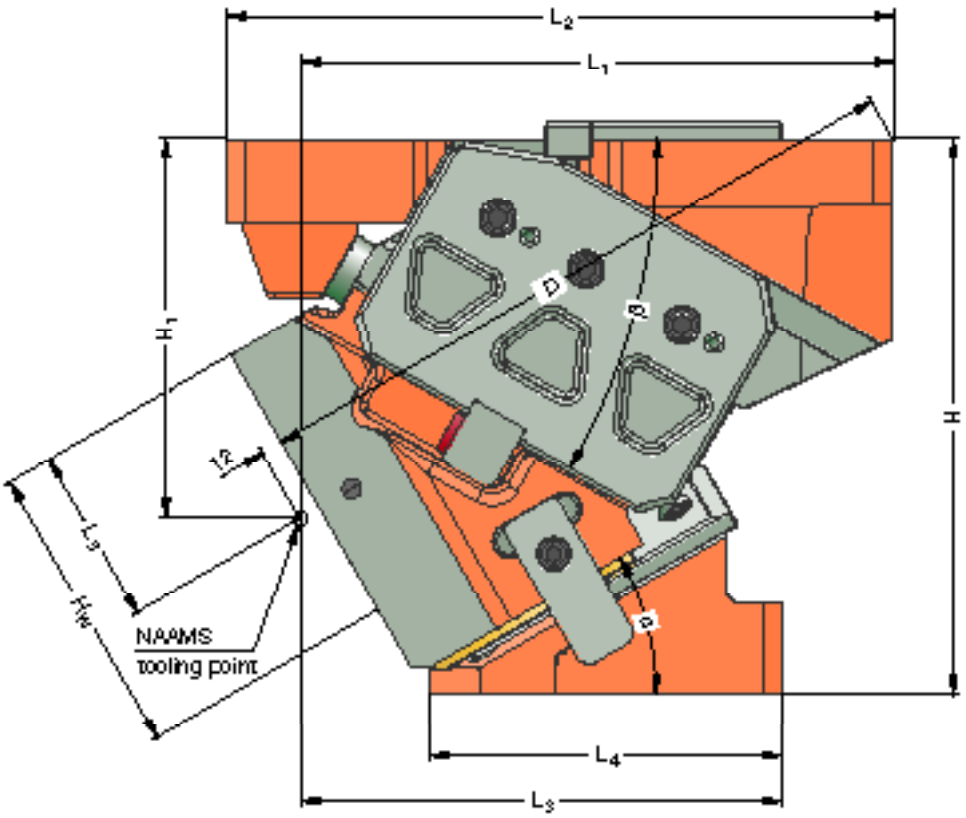


AERIAL FCC 2016.24.026.

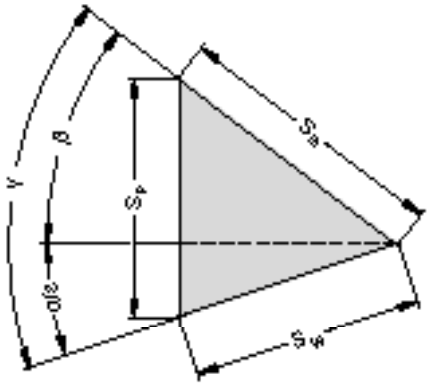
Working width:	260 mm
Performance class:	650 kN

AERIAL FCC
2016.24.026.
SIZE TABLE





AERIAL FCC
2016.24.026.
SIZE TABLE



Order number	L [mm]	B [mm]	H [mm]	H_1 [mm]	H_W [mm]	L_1 [mm]	L_2 [mm]	L_3 [mm]	L_4 [mm]	L_5 [mm]	D [mm]	α [°]	β [°]	S_W* [mm]	S_S [mm]	S_P* [mm]
2016.24.026.00.1000.00	320	260	300	170	160	320	320	240	215	110	308.0	0	50	32.1	50	38.3
2016.24.026.05.1000.00	320	260	300	175	160	320	320	240	210	110	324.1	5	45	35.5	50	38.4
2016.24.026.10.1000.00	324	260	300	180	160	320	320	240	200	90	334.4	10	45	35.9	50	41.6
2016.24.026.15.1000.00	332	260	300	185	160	320	320	240	190	90	345.0	15	40	39.7	50	42.4
2016.24.026.20.1000.00	338	260	300	190	160	320	320	240	185	85	353.7	20	35	43.6	50	43.6
2016.24.026.25.1000.00	360	260	300	195	160	320	360	260	195	85	360.4	25	35	45.2	50	47.8
2016.24.026.30.1000.00	360	260	300	205	160	320	360	260	190	95	367.6	30	30	50.0	50	50.0
2016.24.026.35.1000.00	363	260	300	215	160	320	360	260	185	92	373.4	35	30	52.9	50	55.3
2016.24.026.40.1000.00	373	260	300	225	160	320	360	260	180	97	377.8	40	25	59.2	50	59.2
2016.24.026.45.1000.00	365	260	300	235	160	285	365	240	160	102	355.7	45	25	64.1	50	66.4
2016.24.026.50.1000.00	365	260	300	245	160	285	365	240	160	102	358.9	50	20	73.1	50	73.1
2016.24.026.55.1000.00	365	260	300	255	160	285	365	240	170	102	360.4	55	20	81.9	50	84.2
2016.24.026.60.1000.00	372	260	300	265	160	285	365	240	160	107	360.0	60	15	96.6	50	96.6
2016.24.026.65.1000.00	368	260	300	265	160	285	365	240	166	97	348.6	65	15	91.4	40	93.2
2016.24.026.70.1000.00	372	260	300	265	160	285	365	240	165	97	334.5	70	10	100.8	35	100.8
2016.24.026.75.1000.00	365	260	300	280	160	275	365	240	150	83	329.6	75	10	95.1	25	96.2

* Values rounded

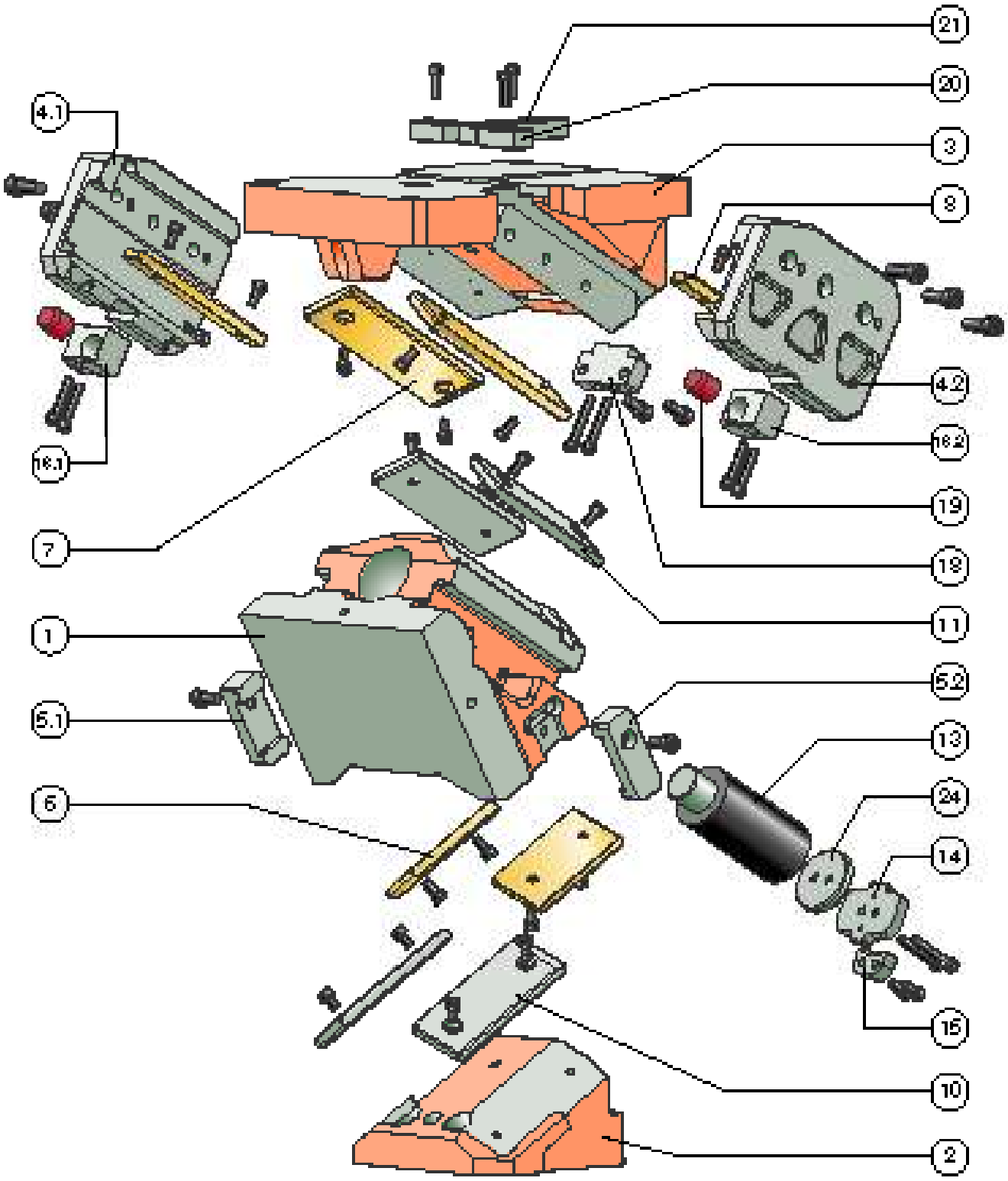
Fastening cam base:

Hexagon socket head cap screws DIN EN ISO 4762	4x M16 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x Ø16

Fastening cam driver :

Hexagon socket head cap screws DIN EN ISO 4762	4x M16 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x Ø16

AERIAL FCC
2016.24.026.
EXPLODED VIEW



Subject to alterations

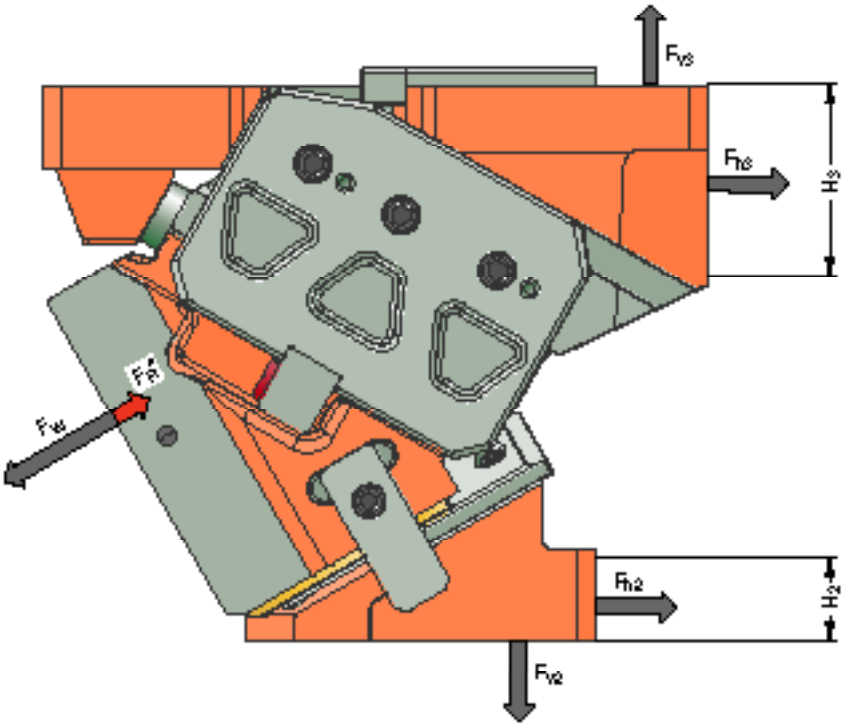
AERIAL FCC
2016.24.026.
PARTS LIST

Position	Piece	Designation	Material	spare part
1	1	Slider	GGG60	--
2	1	Cam driver	GGG60	--
2.1				
2.2				
3	1	Cam base	GGG60	--
4.1	1	Clamp, left	1.7225	x
4.2	1	Clamp, right	1.7225	x
5.1	1	Positive return, left	1.7225	x
5.2	1	Positive return, right	1.7225	x
6	2	Sliding plate	Bronze with solid lubricant	x
7	2	Sliding plate	Bronze with solid lubricant	x
8	2	Sliding plate	Bronze with solid lubricant	x
9				
10	2	Sliding plate	1.7131	x
11	2	Sliding plate	1.7131	x
12				
13	1	Gas spring	2487.12.01500.□□□	x
14	1	Stop plate	1.7225	x
15	1	Safety plate	1.1191	x
16.1	1	Cam slide stop, left	1.1191	x
16.2	1	Cam slide stop, right	1.1191	x
17				
18	1	Lockout system		x
19	2	Damping element	Elastomer	x
20	2	Feather key (T-nut)		x
21	1	Feather key (T-nut)		x
22				
23				
24	1	Spacer	1.1191	x

For inquiries or when ordering spare parts (x), we require the following data:

- ▶ Cam unit order no.
- ▶ Cam unit serial no.
- ▶ Item number / Designation / Spare part

AERIAL FCC
2016.24.026.
SYSTEM AND SURROUNDING FORCES



Order number	α [°]	F_W [kN]	F_R* [kN]	F_{h2} [kN]	F_{v2} [kN]	F_{h3} [kN]	F_{v3} [kN]	H_2 [mm]	H_3 [mm]
2016.24.026.00.1000.00	0	536	24.9	0	450	536	450	25	160
2016.24.026.05.1000.00	5	564	25.1	41	471	521	521	32	138
2016.24.026.10.1000.00	10	593	27.6	72	409	512	512	35	138
2016.24.026.15.1000.00	15	621	27.8	113	420	487	581	40	112
2016.24.026.20.1000.00	20	650	27.9	156	428	455	650	40	89
2016.24.026.25.1000.00	25	673	31.3	164	352	446	637	40	123
2016.24.026.30.1000.00	30	690	31.4	199	345	398	690	40	108
2016.24.026.35.1000.00	35	708	36.2	189	270	391	677	38	114
2016.24.026.40.1000.00	40	737	36.4	221	263	344	737	40	92
2016.24.026.45.1000.00	45	744	43.4	191	191	335	718	50	82
2016.24.026.50.1000.00	50	747	43.5	208	175	272	747	50	65
2016.24.026.55.1000.00	55	751	54.5	165	115	266	731	60	65
2016.24.026.60.1000.00	60	755	54.6	175	101	202	755	60	61
2016.24.026.65.1000.00	65	759	60.0	121	57	199	744	70	57
2016.24.026.70.1000.00	70	763	60.0	126	46	135	763	70	46
2016.24.026.75.1000.00	75	767	60.0	65	17	134	758	70	46

* Retraction force values correspond to the spring-generated retraction force at the working point

The forces F_{h2}, F_{V2} as well as F_{h3}, F_{V3} act on the tool environment at maximum working force F_W.

AERIAL FCC
2016.24.026.
FORCE DIAGRAM

shouldered

0°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	47	86	120	223	120	86	47
32	61	111	159	295	159	111	61
32	75	136	197	367	197	136	75
32	104	188	272	536	272	188	104
32	91	165	207	385	207	165	91

5°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	48	84	120	234	120	84	48
32	64	111	158	311	158	111	64
32	79	137	195	388	195	137	79
32	111	192	273	564	273	192	111
32	98	170	241	410	241	170	98

10°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	49	83	117	246	117	83	49
32	66	110	155	328	155	110	66
32	82	138	193	410	193	138	82
32	117	195	273	593	273	195	117
32	105	174	244	435	244	174	105

15°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	50	82	113	257	113	82	50
32	68	110	152	344	152	110	68
32	86	139	191	432	191	139	86
32	124	199	274	621	274	199	124
32	112	179	246	460	246	179	112

20°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	51	80	110	260	110	80	51
32	70	110	150	355	150	110	70
32	90	139	189	451	189	139	90
32	130	202	274	650	274	202	130
32	119	183	248	485	248	183	119

25°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	52	79	106	258	106	79	52
32	73	110	147	358	147	110	73
32	93	140	187	458	187	140	93
32	137	206	274	673	274	206	137
32	125	188	250	510	250	188	125

Support with feather key

0°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	45	69	108	156	108	69	45
32	58	89	132	163	132	89	58
32	72	109	132	163	132	109	72
32	72	109	132	163	132	109	72
32	72	109	132	163	132	109	72

5°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	46	68	108	164	108	68	46
32	60	89	142	178	142	89	60
32	75	110	145	178	145	110	75
32	75	110	145	178	145	110	75
32	75	110	145	178	145	110	75

10°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	47	66	105	172	105	66	47
32	63	88	140	189	140	88	63
32	78	110	148	189	148	110	78
32	78	110	148	189	148	110	78
32	78	110	148	189	148	110	78

15°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	48	65	102	180	102	65	48
32	65	88	137	221	137	88	65
32	82	111	172	221	172	111	82
32	82	111	172	221	172	111	82
32	82	111	172	221	172	111	82

20°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	50	66	101	185	101	66	50
32	68	90	137	254	137	90	68
32	87	114	174	254	174	114	87
32	87	121	174	254	174	121	87
32	87	121	174	254	174	121	87

25°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	51	65	98	184	98	65	51
32	70	90	135	256	135	90	70
32	90	114	172	256	172	114	90
32	90	123	172	256	172	123	90
32	90	123	172	256	172	123	90

AERIAL FCC
2016.24.026.
FORCE DIAGRAM

shouldered

30°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	53	78	103	256	103	78	53
32	75	109	144	361	144	109	75
32	97	141	186	465	186	141	97
32	144	209	275	690	275	209	144
32	132	192	253	535	253	192	132

35°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	54	77	99	255	99	77	54
32	77	109	141	364	141	109	77
32	100	142	184	472	184	142	100
32	150	213	275	708	275	213	150
32	139	197	255	585	255	197	139

40°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	55	78	100	256	100	78	55
32	82	115	148	379	148	115	82
32	110	153	197	502	197	153	110
32	160	224	289	737	289	224	160
32	140	197	254	585	254	197	140

45°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	57	79	101	257	101	79	57
32	88	122	155	394	155	122	88
32	119	164	210	532	210	164	119
32	170	236	302	744	302	236	170
32	142	197	253	586	253	197	142

50°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	93	128	162	410	162	128	93
32	128	176	223	561	223	176	128
32	181	248	315	747	315	248	181
32	143	198	252	587	252	198	143
32	119	183	248	485	248	183	119

55°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	59	81	102	258	102	81	59
32	98	134	169	425	169	134	98
32	138	187	236	575	236	187	138
32	191	260	328	751	328	260	191
32	145	198	251	587	251	198	145

Support with feather key

30°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	51	64	94	183	94	64	51
32	73	89	132	258	132	89	73
32	94	115	170	275	170	115	94
32	94	132	189	275	189	132	94
32	94	132	189	275	189	132	94

35°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	52	63	91	182	91	63	52
32	75	89	130	260	130	89	75
32	97	116	169	262	169	116	97
32	97	161	210	262	210	161	97
32	97	161	210	262	210	161	97

40°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	54	63	92	183	92	63	54
32	80	94	136	271	136	94	80
32	106	125	181	359	181	125	106
32	106	161	233	359	233	161	106
32	106	161	233	359	233	161	106

45°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	57	66	95	205	95	66	57
32	88	102	147	316	147	102	88
32	119	138	199	363	199	138	119
32	119	199	286	365	286	199	119
32	119	166	240	365	240	166	119

50°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	58	67	96	206	96	67	58
32	93	108	154	328	154	108	93
32	128	148	211	449	211	148	128
32	128	209	298	449	298	209	128
32	128	166	239	449	239	166	128

55°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	59	68	97	219	97	68	59
32	98	113	160	362	160	113	98
32	138	157	224	454	224	157	138
32	145	219	311	460	311	219	145
32	145	167	238	460	238	167	145

Subject to alterations

AERIAL FCC
2016.24.026.
FORCE DIAGRAM

shouldered

60°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	60	82	103	259	103	82	60
32	104	140	176	441	176	140	104
32	147	198	249	589	249	198	147
32	201	271	342	755	342	271	201
32	146	198	250	588	250	198	146

65°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	62	83	104	260	104	83	62
32	109	146	183	453	183	146	109
32	156	209	262	603	262	209	156
32	211	283	355	759	355	283	211
32	147	198	249	588	249	198	147

70°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	63	84	105	261	105	84	63
32	114	152	190	460	190	152	114
32	166	221	275	617	275	221	166
32	221	295	368	763	368	295	221
32	149	198	248	589	248	198	149

75°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	64	85	106	261	106	85	64
32	120	158	197	467	197	158	120
32	175	232	288	632	288	232	175
32	232	306	381	767	381	306	232
32	150	199	247	590	247	199	150

Support with feather key

60°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	60	69	98	220	98	69	60
32	104	118	167	375	167	118	104
32	147	167	236	501	236	167	147
32	147	205	293	600	293	205	147
32	146	167	237	500	237	167	146

65°

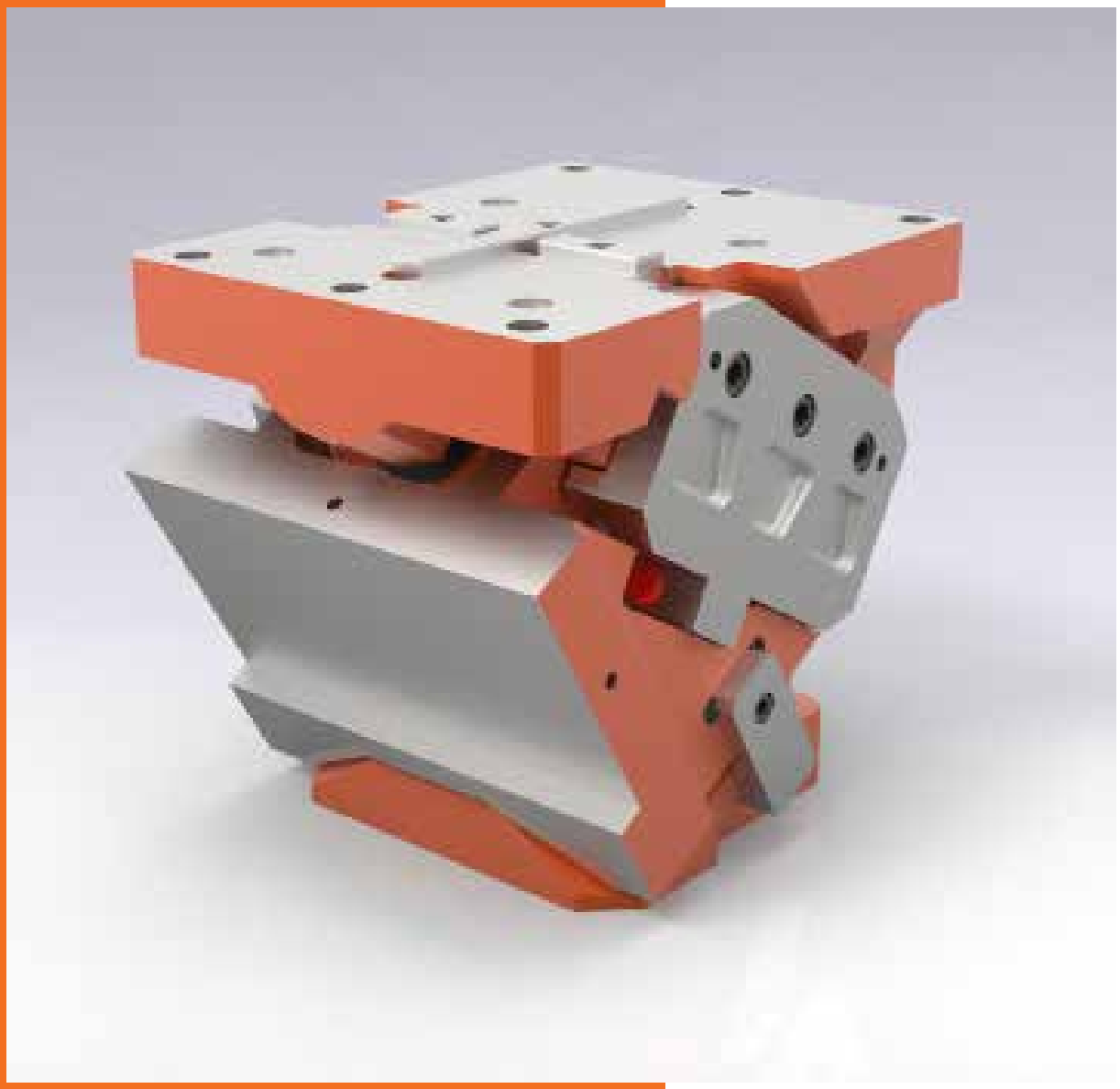
Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	62	70	99	247	99	70	62
32	109	123	174	430	174	123	109
32	156	176	248	573	248	176	156
32	156	238	336	580	336	238	156
32	147	167	236	559	236	167	147

70°

Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	63	71	99	248	99	71	63
32	114	128	180	437	180	128	114
32	166	186	261	587	261	186	166
32	150	248	349	725	349	248	150
32	149	167	235	560	235	167	149

75°

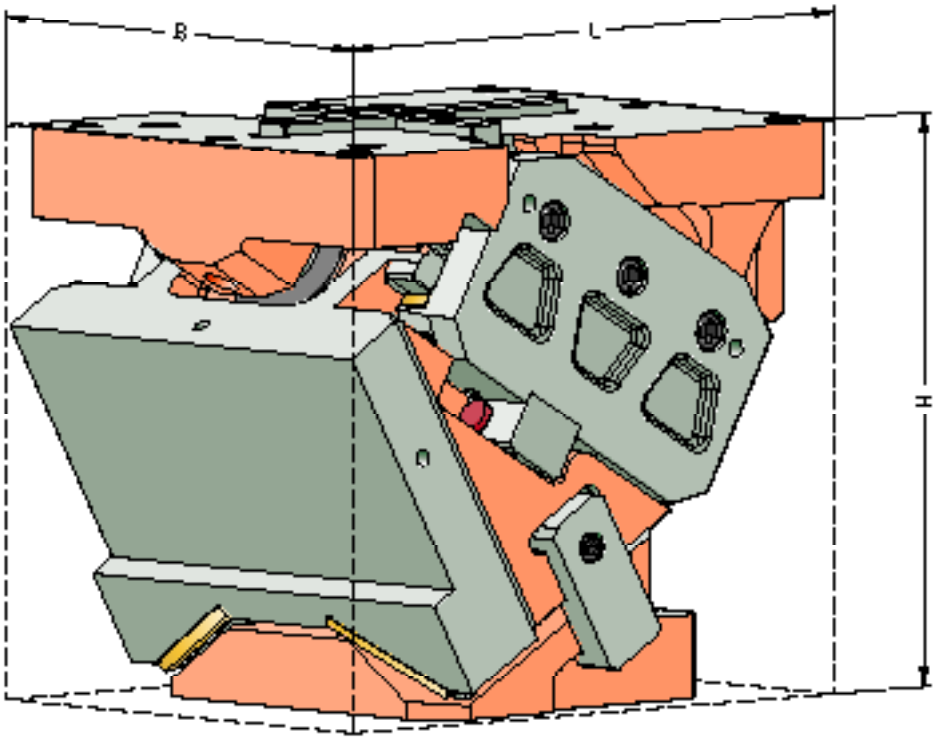
Height 160 mm	Width 260 mm						
	40	40	40	20	40	40	40
32	64	72	100	261	100	72	64
32	120	133	187	467	187	133	120
32	175	195	273	632	273	195	175
32	175	258	361	767	361	258	175
32	150	167	234	590	234	167	150

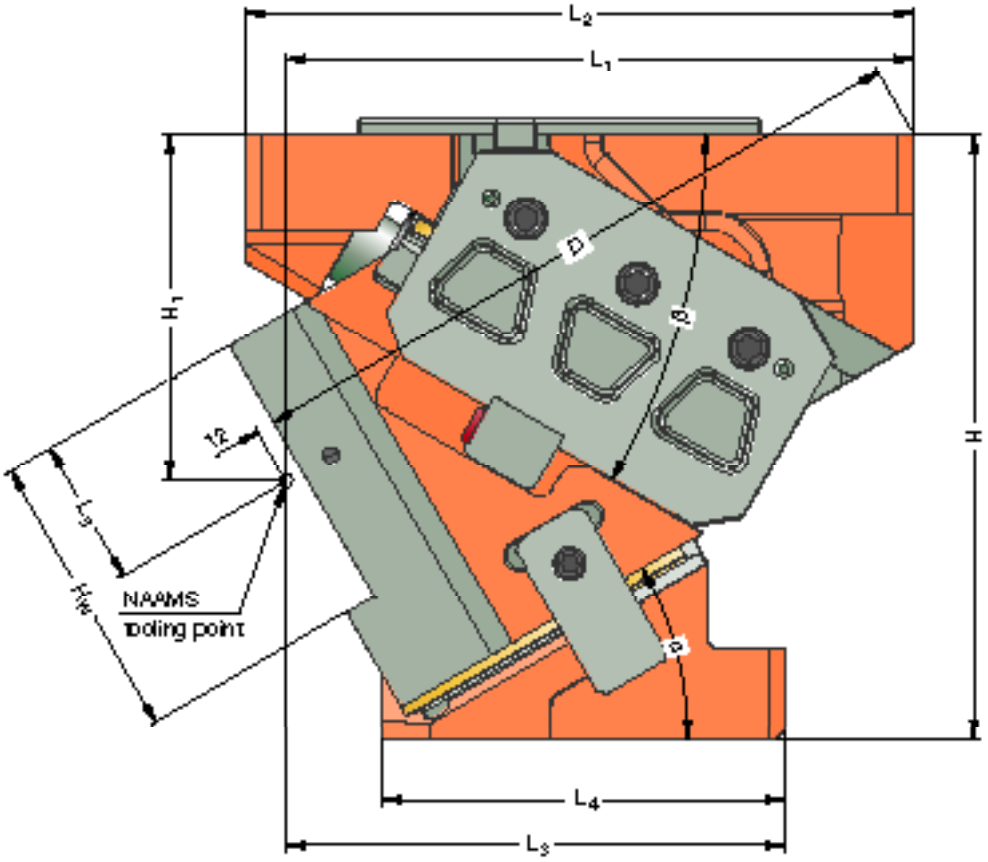


AERIAL FCC 2016.24.033.

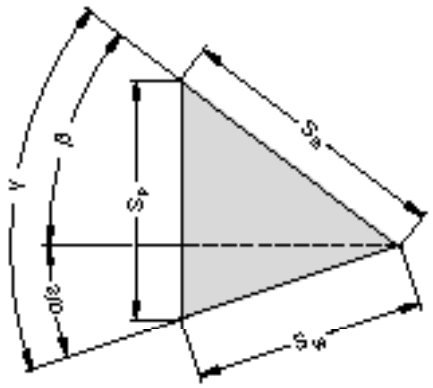
Working width:	330 mm
Performance class:	1000 kN

AERIAL FCC
2016.24.033.
SIZE TABLE





AERIAL FCC
2016.24.033.
SIZE TABLE



Order number	L [mm]	B [mm]	H [mm]	H_1 [mm]	H_W [mm]	L_1 [mm]	L_2 [mm]	L_3 [mm]	L_4 [mm]	L_5 [mm]	D [mm]	α [°]	β [°]	S_W* [mm]	S_S [mm]	S_P* [mm]
2016.24.033.00.2000.00	415	330	375	415	180	403	415	285	280	105	403.0	0	50	37.3	58	44.4
2016.24.033.05.2000.00	415	330	375	185	180	415	415	285	268	90	417.5	5	45	41.2	58	44.6
2016.24.033.10.2000.00	419	330	375	190	180	415	415	285	254	90	429.7	10	45	41.6	58	48.2
2016.24.033.15.2000.00	427	330	375	195	180	415	415	285	255	90	439.3	15	40	46.0	58	49.2
2016.24.033.20.2000.01	434.5	330	375	200	180	415	415	285	245	90	446.4	20	35	50.6	58	50.6
2016.24.033.25.2000.00	417	330	375	205	180	390	415	310	259	90	428.1	25	35	52.4	58	55.4
2016.24.033.30.2000.00	425	330	375	215	180	390	415	310	250	90	433.3	30	30	58.0	58	58.0
2016.24.033.35.2000.00	428	330	375	225	180	390	415	310	237	83	436.5	35	30	61.3	58	64.2
2016.24.033.40.2000.00	439	330	375	235	180	390	415	310	232	90	437.8	40	25	68.6	58	68.6
2016.24.033.45.2000.00	450	330	375	245	180	340	450	310	225	90	401.7	45	25	74.3	58	77.1
2016.24.033.50.2000.00	450	330	375	265	180	340	450	310	222	105	409.6	50	20	84.8	58	84.8
2016.24.033.55.2000.00	450	330	375	285	180	340	450	310	226	110	416.5	55	20	95.0	58	97.7
2016.24.033.60.2000.00	450	330	375	300	180	340	450	310	228	115	418.0	60	15	112.0	58	112.0
2016.24.033.65.2000.00	450	330	375	300	180	340	450	340	242	110	403.6	65	15	102.9	45	104.9
2016.24.033.70.2000.00	450	330	375	300	180	340	450	340	232	100	386.2	70	15	127.1	45	131.1
2016.24.033.75.2000.00	450	330	375	300	180	325	450	325	221	100	361.9	75	10	114.2	30	115.5

* Values rounded

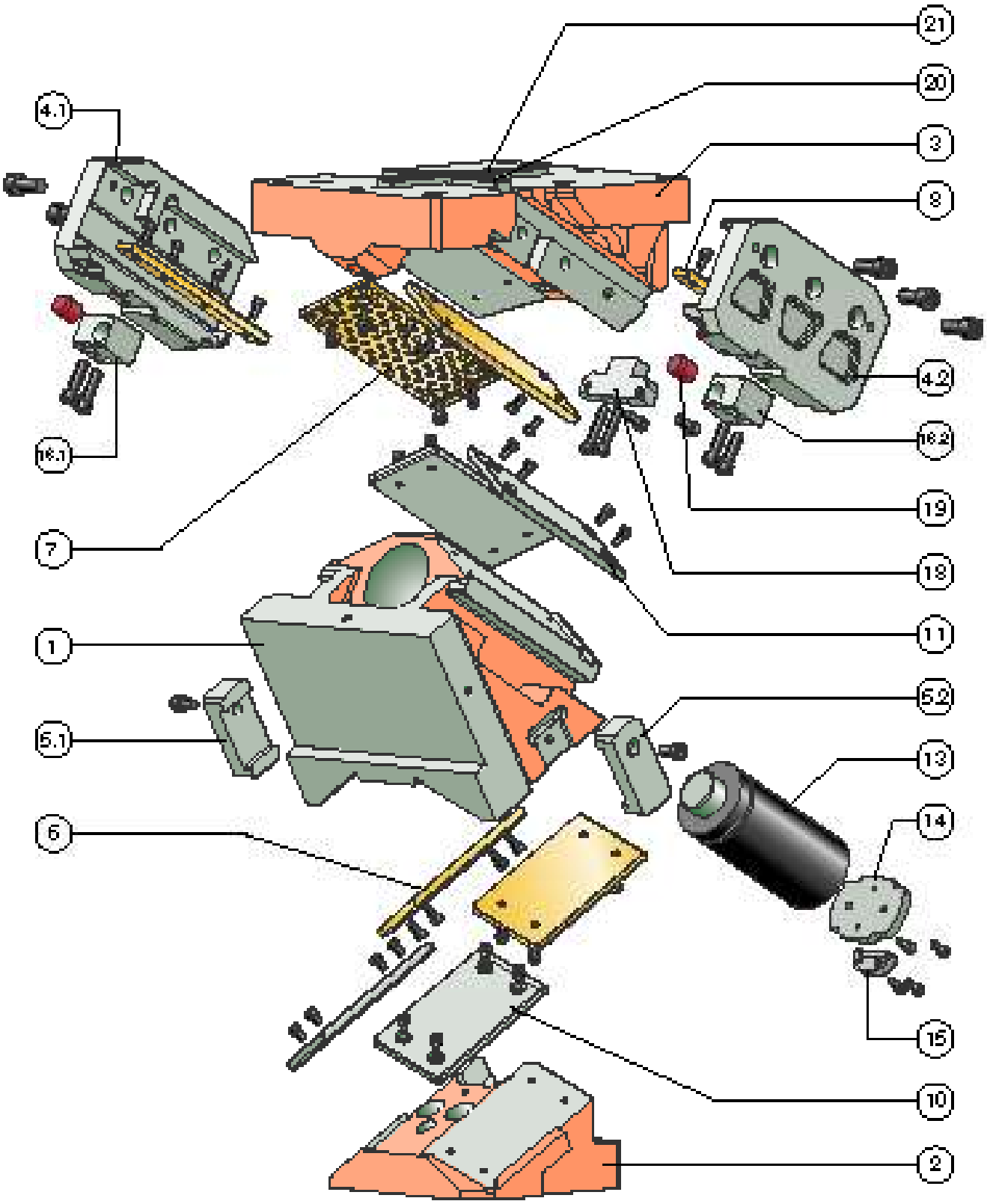
Fastening cam base:

Hexagon socket head cap screws DIN EN ISO 4762	4x M20 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x Ø20

Fastening cam driver :

Hexagon socket head cap screws DIN EN ISO 4762	4x M20 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x Ø20

AERIAL FCC
2016.24.033.
EXPLODED VIEW



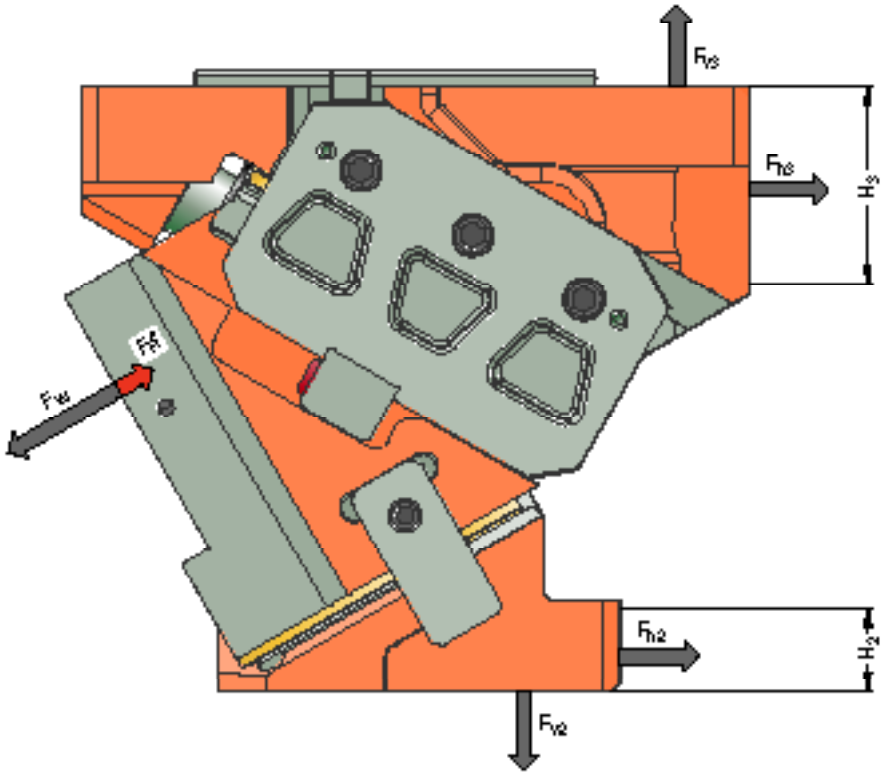
AERIAL FCC
2016.24.033.
PARTS LIST

Position	Piece	Designation	Material	spare part
1	1	Slider	GGG60	--
2	1	Cam driver	GGG60	--
2.1				
2.2				
3	1	Cam base	GGG60	--
4.1	1	Clamp, left	1.7225	x
4.2	1	Clamp, right	1.7225	x
5.1	1	Positive return, left	1.7225	x
5.2	1	Positive return, right	1.7225	x
6	2	Sliding plate	Bronze with solid lubricant	x
7	2	Sliding plate	Bronze with solid lubricant	x
8	2	Sliding plate	Bronze with solid lubricant	x
9				
10	2	Sliding plate	1.7131	x
11	2	Sliding plate	1.7131	x
12				
13	1	Gas spring	2487.12.03000.□□□	x
14	1	Stop plate	1.7225	x
15	1	Safety plate	1.1191	x
16.1	1	Cam slide stop, left	1.1191	x
16.2	1	Cam slide stop, right	1.1191	x
17				x
18	1	Lockout system		x
19	2	Damping element	Elastomer	x
20	2	Feather key (T-nut)		x
21	1	Feather key (T-nut)		x
22				
23				
24				

For inquiries or when ordering spare parts (x), we require the following data:

- ▶ Cam unit order no.
- ▶ Cam unit serial no.
- ▶ Item number / Designation / Spare part

AERIAL FCC
2016.24.033.
SYSTEM AND SURROUNDING FORCES



Order number	α [°]	F_W [kN]	F_R* [kN]	F_{h2} [kN]	F_{v2} [kN]	F_{h3} [kN]	F_{v3} [kN]	H_2 [mm]	H_3 [mm]
2016.24.033.00.2000.00	0	1006	53.3	0	844	1006	844	40	162
2016.24.033.05.2000.00	5	1005	53.6	73	840	928	928	40	164
2016.24.033.10.2000.00	10	1005	59.0	122	693	868	868	40	163
2016.24.033.15.2000.00	15	1005	59.3	182	680	789	940	40	139
2016.24.033.20.2000.01	20	1007	63.3	241	663	705	1007	40	125
2016.24.033.25.2000.00	25	1009	67.0	246	528	668	954	40	145
2016.24.033.30.2000.00	30	1010	67.2	292	505	583	1010	40	126
2016.24.033.35.2000.00	35	1012	77.5	271	387	558	967	40	127
2016.24.033.40.2000.00	40	1013	77.8	304	362	472	1013	40	117
2016.24.033.45.2000.00	45	1014	92.8	261	261	456	978	50	140
2016.24.033.50.2000.00	50	1015	93.1	283	237	369	1015	50	120
2016.24.033.55.2000.00	55	1016	95.0	223	156	360	988	60	120
2016.24.033.60.2000.00	60	1017	100.0	236	136	273	1017	70	114
2016.24.033.65.2000.00	65	1018	100.0	163	76	268	998	32	100
2016.24.033.70.2000.00	70	1019	100.0	84	30	265	988	32	99
2016.24.033.75.2000.00	75	1020	100.0	86	23	178	1008	32	73

* Retraction force values correspond to the spring-generated retraction force at the working point

The forces F_{h2}, F_{V2} as well as F_{h3}, F_{V3} act on the tool environment at maximum working force F_W.

AERIAL FCC
2016.24.033.
FORCE DIAGRAM

shouldered

0°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	87	174	261	499	261	174	87
36	118	237	355	679	355	237	118
36	150	300	449	858	449	300	150
36	177	354	531	1001	531	354	177
36	176	351	527	1006	527	351	176

5°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	86	172	259	492	259	172	86
36	120	240	360	684	360	240	120
36	153	307	461	876	461	307	153
36	179	358	537	1002	537	358	179
36	178	357	535	1005	535	357	178

10°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	85	171	256	486	256	171	85
36	121	243	364	690	364	243	121
36	157	315	472	894	472	315	157
36	181	362	543	1004	543	362	181
36	181	362	543	1005	543	362	181

15°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	84	169	254	479	254	169	84
36	123	246	368	696	368	246	123
36	161	322	483	912	483	322	161
36	183	366	549	1005	549	366	183
36	183	367	551	1005	551	367	183

20°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	84	167	251	473	251	167	84
36	124	248	373	702	373	248	124
36	164	330	495	930	495	330	164
36	185	370	555	1007	555	370	185
36	186	372	558	1005	558	372	186

25°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	83	166	249	466	249	166	83
36	125	251	377	707	377	251	125
36	168	337	506	948	506	337	168
36	186	374	561	1009	561	374	186
36	188	377	566	1004	566	377	188

Support with feather key

0°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	67	96	115	129	115	96	67
36	67	96	115	129	115	96	67
36	67	96	115	129	115	96	67
36	67	96	115	129	115	96	67
36	67	96	115	129	115	96	67

5°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	82	95	116	143	116	95	82
36	82	97	116	143	116	97	82
36	82	97	116	143	116	97	82
36	82	97	116	143	116	97	82
36	82	97	116	143	116	97	82

10°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	79	85	115	156	115	85	79
36	79	99	120	156	120	99	79
36	79	99	120	156	120	99	79
36	79	100	120	156	120	100	79
36	79	100	120	156	120	100	79

15°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	80	85	114	168	114	85	80
36	80	100	122	168	122	100	80
36	80	100	122	168	122	100	80
36	80	100	122	168	122	100	80
36	80	100	122	168	122	100	80

20°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	81	84	113	166	113	84	81
36	81	116	148	187	148	116	81
36	81	116	148	187	148	116	81
36	81	116	148	187	148	116	81
36	81	116	148	187	148	116	81

25°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	80	83	112	163	112	83	80
36	80	126	154	208	154	126	80
36	80	126	154	208	154	126	80
36	80	126	154	208	154	126	80
36	80	126	154	208	154	126	80

AERIAL FCC
2016.24.033.
FORCE DIAGRAM

shouldered

30°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	82	164	246	460	246	164	82
36	127	254	382	713	382	254	127
36	172	344	517	966	517	344	172
36	188	378	567	1010	567	378	188
36	191	382	574	1004	574	382	191

35°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	81	162	244	453	244	162	81
36	128	257	386	719	386	257	128
36	175	352	528	984	528	352	175
36	190	382	573	1012	573	382	190
36	193	387	582	1004	582	387	193

40°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	81	161	241	443	241	161	81
36	131	259	387	711	387	259	131
36	180	357	534	979	534	357	180
36	200	396	592	1013	592	396	200
36	200	396	592	1003	592	396	200

45°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	81	160	239	433	239	160	81
36	133	261	389	704	389	261	133
36	185	362	539	975	539	362	185
36	210	411	612	1014	612	411	210
36	207	405	603	1003	603	405	207

50°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	82	159	236	423	236	159	82
36	135	263	390	697	390	263	135
36	189	367	544	970	544	367	189
36	220	426	631	1015	631	426	220
36	213	413	613	1003	613	413	213

55°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	82	158	234	413	234	158	82
36	138	265	392	689	392	265	138
36	194	372	550	966	550	372	194
36	230	440	650	1016	650	440	230
36	220	422	623	1002	623	422	220

Support with feather key

30°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	82	111	161	111	82	79	67
36	127	172	225	172	127	85	67
36	133	172	225	172	133	85	67
36	133	172	225	172	133	85	67
36	133	172	225	172	133	85	67

35°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	78	114	151	197	151	114	78
36	78	127	167	227	167	127	78
36	81	128	169	227	169	128	81
36	83	135	175	236	175	135	83
36	82	131	171	234	171	131	82

40°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	79	89	121	177	121	89	79
36	99	142	194	285	194	142	99
36	99	157	194	285	194	157	99
36	99	157	194	285	194	157	99
36	99	157	194	285	194	157	99

45°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	81	96	131	195	131	96	81
36	112	157	214	293	214	157	112
36	112	168	245	293	245	168	112
36	112	168	245	293	245	168	112
36	112	168	245	293	245	168	112

50°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	82	95	130	190	130	95	82
36	128	158	215	314	215	158	128
36	128	175	250	362	250	175	128
36	128	175	250	362	250	175	128
36	128	175	250	362	250	175	128

55°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	82	100	129	207	129	100	82
36	138	167	216	345	216	167	138
36	138	208	265	383	265	208	138
36	138	208	265	383	265	208	138
36	138	208	265	383	265	208	138

Subject to alterations

AERIAL FCC
2016.24.033.
FORCE DIAGRAM

shouldered

60°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	82	157	232	403	232	157	82
36	140	267	393	682	393	267	140
36	198	377	555	961	555	377	198
36	240	455	669	1017	669	455	240
36	227	430	634	1002	634	430	227

65°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	83	156	229	393	229	156	83
36	143	269	395	675	395	269	143
36	203	382	560	957	560	382	203
36	250	469	689	1018	689	469	250
36	233	439	644	1001	644	439	233

70°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	83	155	227	383	227	155	83
36	145	271	396	668	396	271	145
36	207	387	566	952	566	387	207
36	260	484	708	1019	708	484	260
36	240	447	654	1001	654	447	240

75°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	83	154	225	373	225	154	83
36	148	273	398	660	398	273	148
36	212	391	571	948	571	391	212
36	270	499	727	1020	727	499	270
36	247	456	665	1001	665	456	247

Support with feather key

60°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	82	99	127	202	127	99	82
36	140	168	216	341	216	168	140
36	158	237	305	481	305	237	158
36	158	237	348	481	348	237	158
36	158	237	348	481	348	237	158

65°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	83	98	138	216	138	98	83
36	143	169	237	371	237	169	143
36	173	240	336	482	336	240	173
36	173	265	350	495	350	265	173
36	173	265	350	495	350	265	173

70°

Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	83	119	163	268	163	119	83
36	145	209	285	467	285	209	145
36	200	272	372	497	372	272	200
36	200	272	382	505	382	272	200
36	200	272	382	508	382	272	200

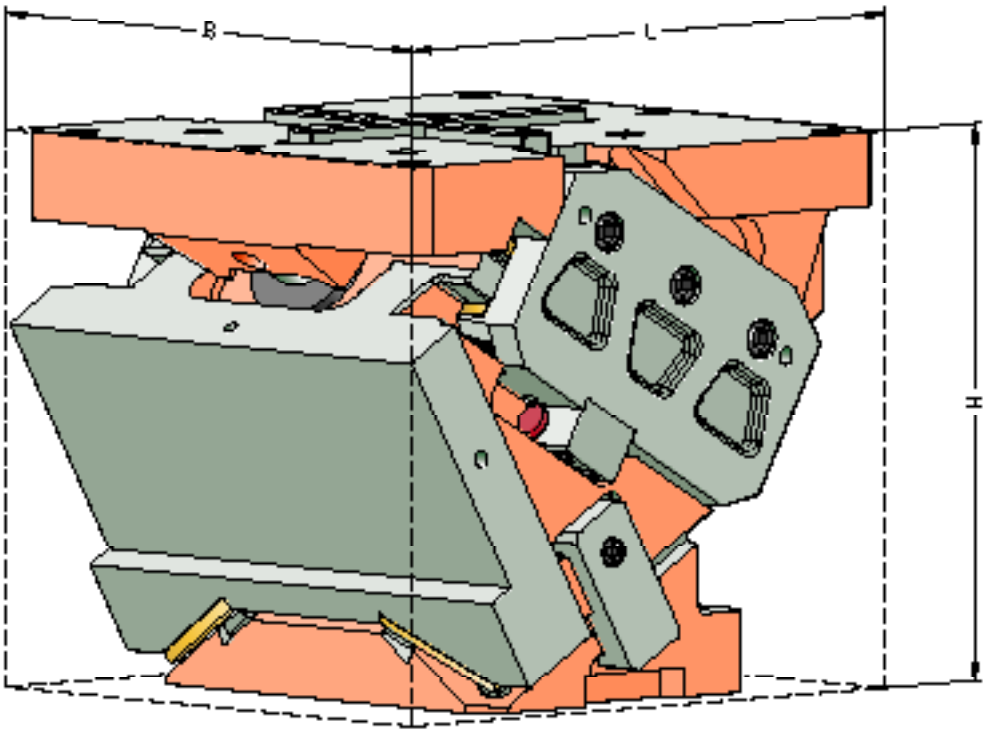
75°

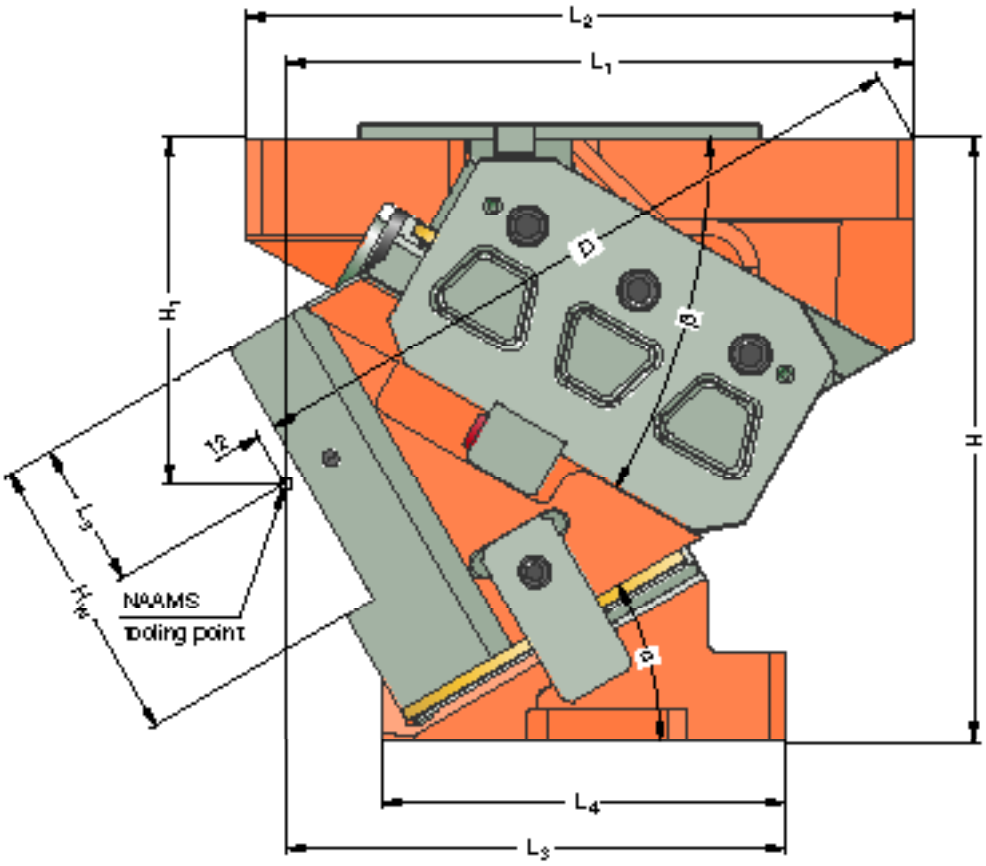
Height 180 mm	Width 330 mm						
	50	50	50	30	50	50	50
36	83	119	162	261	162	119	83
36	148	210	286	462	286	210	148
36	212	301	411	663	411	301	212
36	270	384	524	714	524	384	270
36	247	351	479	700	479	351	247

AERIAL FCC 2016.24.040.

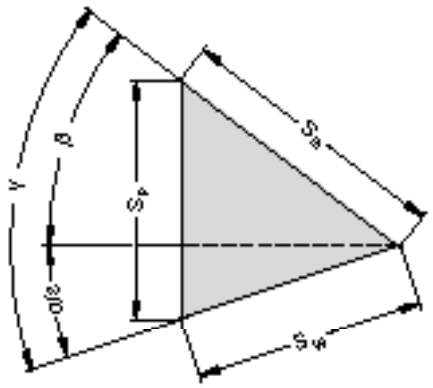
Working width:	400 mm
Performance class:	1050 kN

AERIAL FCC
2016.24.040.
SIZE TABLE





AERIAL FCC
2016.24.040.
SIZE TABLE



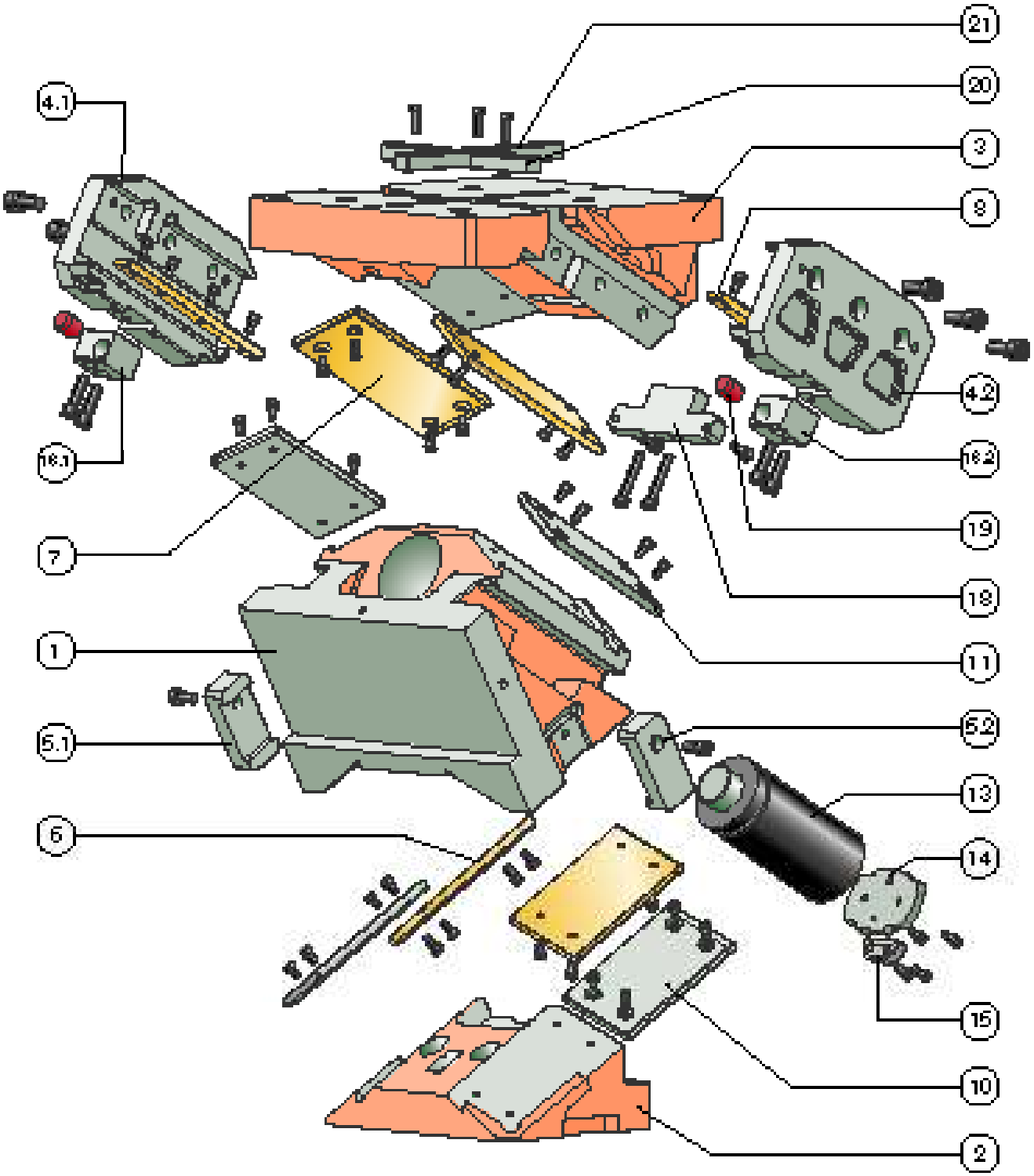
Order number	L [mm]	B [mm]	H [mm]	H_1 [mm]	H_W [mm]	L_1 [mm]	L_2 [mm]	L_3 [mm]	L_4 [mm]	L_5 [mm]	D [mm]	α [°]	β [°]	S_W* [mm]	S_S [mm]	S_P* [mm]
2016.24.040.00.2000.00	415	400	375	185	180	415	415	285	280	105	403.0	0	50	37.3	58	44.4
2016.24.040.05.2000.00	415	400	375	185	180	415	415	285	280	90	417.5	5	45	41.2	58	44.6
2016.24.040.10.2000.00	419	400	375	190	180	415	415	285	255	90	429.7	10	45	41.6	58	48.2
2016.24.040.15.2000.00	427	400	375	195	180	415	415	285	255	90	439.3	15	40	46.0	58	49.2
2016.24.040.20.2000.01	434.5	400	375	200	180	415	415	285	245	90	446.4	20	35	50.6	58	50.6
2016.24.040.25.2000.00	417	400	375	205	180	390	415	310	260	90	428.1	25	35	52.4	58	55.4
2016.24.040.30.2000.00	425	400	375	215	180	390	415	310	250	90	433.3	30	30	58.0	58	58.0
2016.24.040.35.2000.00	428	400	375	225	180	390	415	310	237	83	436.5	35	30	61.3	58	64.2
2016.24.040.40.2000.00	439	400	375	235	180	390	415	310	230	90	437.8	40	25	68.6	58	68.6
2016.24.040.45.2000.00	450	400	375	245	180	340	450	310	225	90	401.7	45	25	74.3	58	77.1
2016.24.040.50.2000.00	450	400	375	265	180	340	450	310	215	105	409.6	50	20	84.8	58	84.8
2016.24.040.55.2000.00	450	400	375	285	180	340	450	310	226	110	416.5	55	20	95.0	58	97.7
2016.24.040.60.2000.00	450	400	375	300	180	340	450	310	230	115	417.8	60	15	112.0	58	112.0
2016.24.040.65.2000.00	450	400	375	300	180	340	450	340	242	110	403.6	65	15	102.9	45	104.9
2016.24.040.70.2000.00	450	400	375	300	180	340	450	340	226	100	386.2	70	15	127.1	45	131.1
2016.24.040.75.2000.00	450	400	375	300	180	325	450	325	214	100	361.9	75	10	114.2	30	115.5

* Values rounded

Fastening cam base:
Hexagon socket head cap screws DIN EN ISO 4762 — 4x M20 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735 — 2x Ø20

Fastening cam driver :
Hexagon socket head cap screws DIN EN ISO 4762 — 4x M20 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735 — 2x Ø20

AERIAL FCC
2016.24.040.
EXPLODED VIEW



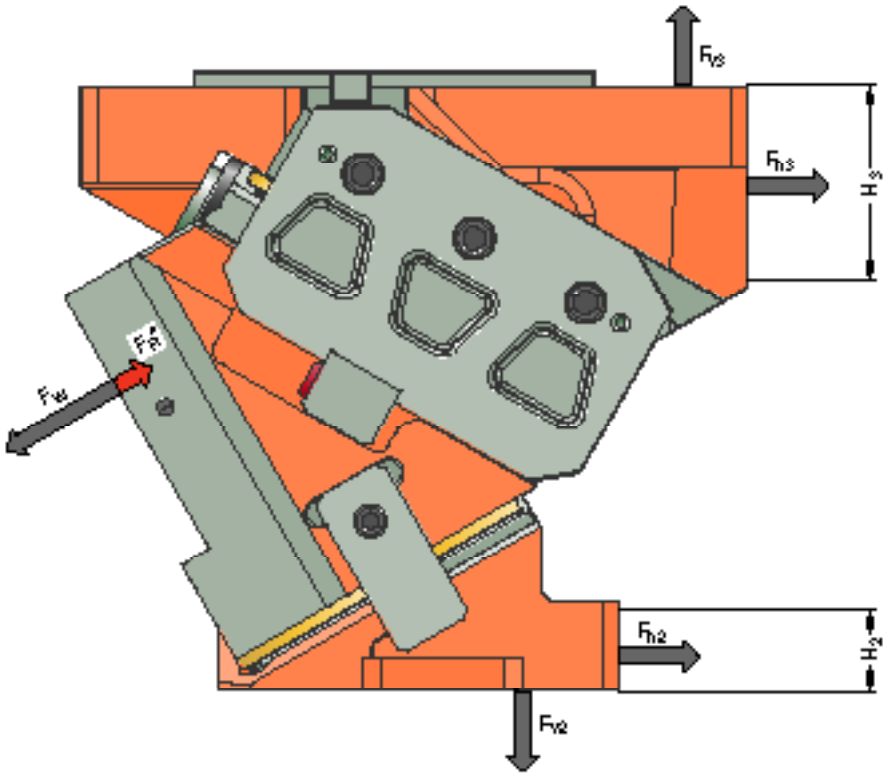
AERIAL FCC
2016.24.040.
PARTS LIST

Position	Piece	Designation	Material	spare part
1	1	Slider	GGG60	--
2	1	Cam driver	GGG60	--
2.1				
2.2				
3	1	Cam base	GGG60	--
4.1	1	Clamp, left	1.7225	x
4.2	1	Clamp, right	1.7225	x
5.1	1	Positive return, left	1.7225	x
5.2	1	Positive return, right	1.7225	x
6	2	Sliding plate	Bronze with solid lubricant	x
7	2	Sliding plate	Bronze with solid lubricant	x
8	2	Sliding plate	Bronze with solid lubricant	x
9				
10	2	Sliding plate	1.7131	x
11	2	Sliding plate	1.7131	x
12				
13	1	Gas spring	2487.12.03000.□□□	x
14	1	Stop plate	1.7225	x
15	1	Safety plate	1.1191	x
16.1	1	Cam slide stop, left	1.1191	x
16.2	1	Cam slide stop, right	1.1191	x
17				
18	1	Lockout system		x
19	2	Damping element	Elastomer	x
20	2	Feather key (T-nut)		x
21	1	Feather key (T-nut)		x
22				
23				
24				

For inquiries or when ordering spare parts (x), we require the following data:

- ▶ Cam unit order no.
- ▶ Cam unit serial no.
- ▶ Item number / Designation / Spare part

AERIAL FCC
2016.24.040.
SYSTEM AND SURROUNDING FORCES



Order number	α [°]	F_W [kN]	F_R^* [kN]	F_{h2} [kN]	F_{v2} [kN]	F_{h3} [kN]	F_{v3} [kN]	H_2 [mm]	H_3 [mm]
2016.24.040.00.2000.00	0	1055	53.6	0	885	1055	885	30	176
2016.24.040.05.2000.00	5	1055	53.9	77	882	974	974	40	176
2016.24.040.10.2000.00	10	1054	59.3	128	727	910	910	40	176
2016.24.040.15.2000.00	15	1054	59.6	191	713	827	986	40	135
2016.24.040.20.2000.01	20	1054	59.8	252	694	738	1054	40	126
2016.24.040.25.2000.00	25	1054	67.2	257	552	698	997	40	134
2016.24.040.30.2000.00	30	1054	67.4	304	527	609	1054	40	125
2016.24.040.35.2000.00	35	1054	77.8	282	403	581	1007	40	125
2016.24.040.40.2000.00	40	1054	83.2	316	377	491	1054	50	110
2016.24.040.45.2000.00	45	1054	93.1	271	271	474	1017	50	140
2016.24.040.50.2000.00	50	1053	93.3	294	246	383	1053	60	120
2016.24.040.55.2000.00	55	1053	100.0	231	162	373	1024	70	120
2016.24.040.60.2000.00	60	1053	100.0	244	141	282	1053	80	112
2016.24.040.65.2000.00	65	1053	100.0	168	78	277	1033	32	100
2016.24.040.70.2000.00	70	1053	100.0	87	32	274	1021	32	100
2016.24.040.75.2000.00	75	1052	100.0	89	24	183	1040	32	49

* Retraction force values correspond to the spring-generated retraction force at the working point

The forces F_{h2}, F_{V2} as well as F_{h3}, F_{V3} act on the tool environment at maximum working force F_W.

AERIAL FCC
2016.24.040.
FORCE DIAGRAM

shouldered

0°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	87	218	349	489	349	218	87
36	120	301	446	676	446	301	120
36	153	335	492	863	492	335	153
36	185	355	520	1045	520	355	185
36	186	349	512	1055	512	349	186

5°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	84	206	327	475	327	206	84
36	119	289	439	672	439	289	119
36	154	341	500	868	500	341	154
36	186	361	529	1046	529	361	186
36	189	354	519	1055	519	354	189

10°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	82	194	306	461	306	194	82
36	119	278	432	667	432	278	119
36	156	347	509	873	509	347	156
36	187	367	537	1047	537	367	187
36	192	359	525	1054	525	359	192

15°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	80	182	284	448	284	182	80
36	118	267	415	663	415	267	118
36	157	351	517	878	517	351	157
36	187	373	546	1049	546	373	187
36	195	364	532	1054	532	364	195

20°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	78	170	262	434	262	170	78
36	118	255	392	658	392	255	118
36	158	340	522	883	522	340	158
36	188	379	555	1050	555	379	188
36	198	368	539	1054	539	368	198

25°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	75	158	241	420	241	158	75
36	117	244	370	654	370	244	117
36	159	329	499	888	499	329	159
36	189	385	563	1051	563	385	189
36	201	373	546	1054	546	373	201

Support with feather key

0°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	72	109	141	171	141	109	72
36	72	109	141	191	141	109	72
36	72	109	141	191	141	109	72
36	72	109	141	191	141	109	72
36	72	109	141	191	141	109	72

5°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	72	113	136	166	136	113	72
36	72	113	136	182	136	113	72
36	72	113	136	182	136	113	72
36	72	113	136	182	136	113	72
36	72	113	136	182	136	113	72

10°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	72	97	138	162	138	97	72
36	72	112	138	194	138	112	72
36	72	112	138	194	138	112	72
36	72	112	138	194	138	112	72
36	72	112	138	194	138	112	72

15°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	76	91	128	157	128	91	76
36	76	117	153	219	153	117	76
36	76	117	153	219	153	117	76
36	76	117	153	219	153	117	76
36	76	117	153	219	153	117	76

20°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	75	85	118	152	118	85	75
36	75	128	166	230	166	128	75
36	75	128	166	240	166	128	75
36	75	128	166	240	166	128	75
36	75	128	166	240	166	128	75

25°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	73	79	108	147	108	79	73
36	73	122	167	229	167	122	73
36	73	130	175	259	175	130	73
36	73	130	175	259	175	130	73
36	73	130	175	259	175	130	73

AERIAL FCC
2016.24.040.
FORCE DIAGRAM

shouldered

30°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	73	146	219	406	219	146	73
36	117	232	348	650	348	232	117
36	161	318	476	893	476	318	161
36	189	376	562	1053	562	376	189
36	203	378	553	1054	553	378	203

35°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	71	134	198	392	198	134	71
36	116	221	325	645	325	221	116
36	162	307	453	898	453	307	162
36	190	361	531	1054	531	361	190
36	206	383	559	1054	559	383	206

40°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	77	143	209	393	209	143	77
36	125	233	340	641	340	233	125
36	173	322	472	889	472	322	173
36	206	384	561	1054	561	384	206
36	219	391	563	1054	563	391	219

45°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	83	152	221	394	221	152	83
36	134	245	356	637	356	245	134
36	184	337	490	880	490	337	184
36	222	406	582	1054	582	406	222
36	232	399	567	1053	567	399	232

50°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	90	161	233	395	233	161	90
36	142	257	371	633	371	257	142
36	195	352	509	871	509	352	195
36	239	416	584	1053	584	416	239
36	245	408	571	1053	571	408	245

55°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	96	170	244	396	244	170	96
36	151	269	386	629	386	269	151
36	206	367	528	862	528	367	206
36	255	423	585	1053	585	423	255
36	257	416	575	1053	575	416	257

Support with feather key

30°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	71	73	99	142	99	73	71
36	80	116	159	227	159	116	80
36	80	132	187	297	187	132	80
36	80	132	187	297	187	132	80
36	80	132	187	297	187	132	80

35°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	69	74	99	157	99	74	69
36	81	121	163	258	163	121	81
36	81	134	189	310	189	134	81
36	81	134	189	310	189	134	81
36	81	134	189	310	189	134	81

40°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	75	79	105	157	105	79	75
36	92	128	170	256	170	128	92
36	92	162	205	356	205	162	92
36	92	162	205	358	205	162	92
36	92	162	205	358	205	162	92

45°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	83	91	122	177	122	91	83
36	108	147	196	287	196	147	108
36	108	202	227	382	227	202	108
36	108	202	227	382	227	202	108
36	108	202	227	382	227	202	108

50°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	90	97	128	178	128	97	90
36	108	154	204	285	204	154	108
36	108	189	274	392	274	189	108
36	108	189	274	474	274	189	108
36	108	189	274	474	274	189	108

55°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	96	107	134	198	134	107	96
36	123	169	212	314	212	169	123
36	123	202	290	431	290	202	123
36	123	204	290	495	290	204	123
36	123	202	290	495	290	202	123

Subject to alterations

AERIAL FCC
2016.24.040.
FORCE DIAGRAM

shouldered

60°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	102	179	256	396	256	179	102
36	160	281	401	625	401	281	160
36	218	382	547	853	547	382	218
36	271	429	586	1053	586	429	271
36	270	424	578	1053	578	424	270

65°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	108	188	268	397	268	188	108
36	169	293	417	621	417	293	169
36	229	397	566	845	566	397	229
36	285	436	587	1053	587	436	285
36	283	433	582	1053	582	433	283

70°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	115	197	279	398	279	197	115
36	177	305	432	617	432	305	177
36	240	412	585	836	585	412	240
36	296	442	588	1052	588	442	296
36	296	441	586	1053	586	441	296

75°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	121	206	291	399	291	206	121
36	186	317	447	613	447	317	186
36	251	427	603	827	603	427	251
36	308	449	589	1051	589	449	308
36	309	449	590	1052	590	449	309

Support with feather key

60°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	102	113	141	198	141	113	102
36	147	177	221	312	221	177	147
36	147	241	301	427	301	241	147
36	147	270	322	526	322	270	147
36	147	267	318	526	318	267	147

65°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	108	118	161	218	161	118	108
36	196	184	250	341	250	184	196
36	196	250	339	465	339	250	196
36	196	275	352	579	352	275	196
36	196	273	349	579	349	273	196

70°

Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	115	152	265	280	265	152	115
36	177	235	410	487	410	235	177
36	190	317	410	666	410	317	190
36	190	317	410	666	410	317	190
36	190	317	450	664	450	317	190

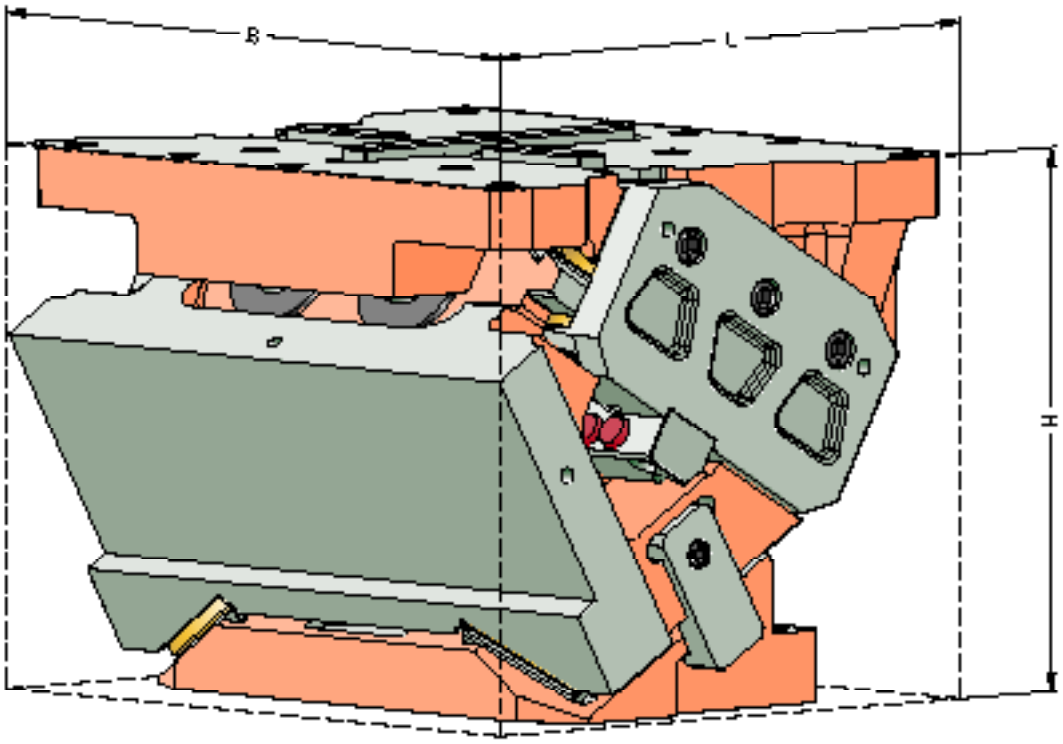
75°

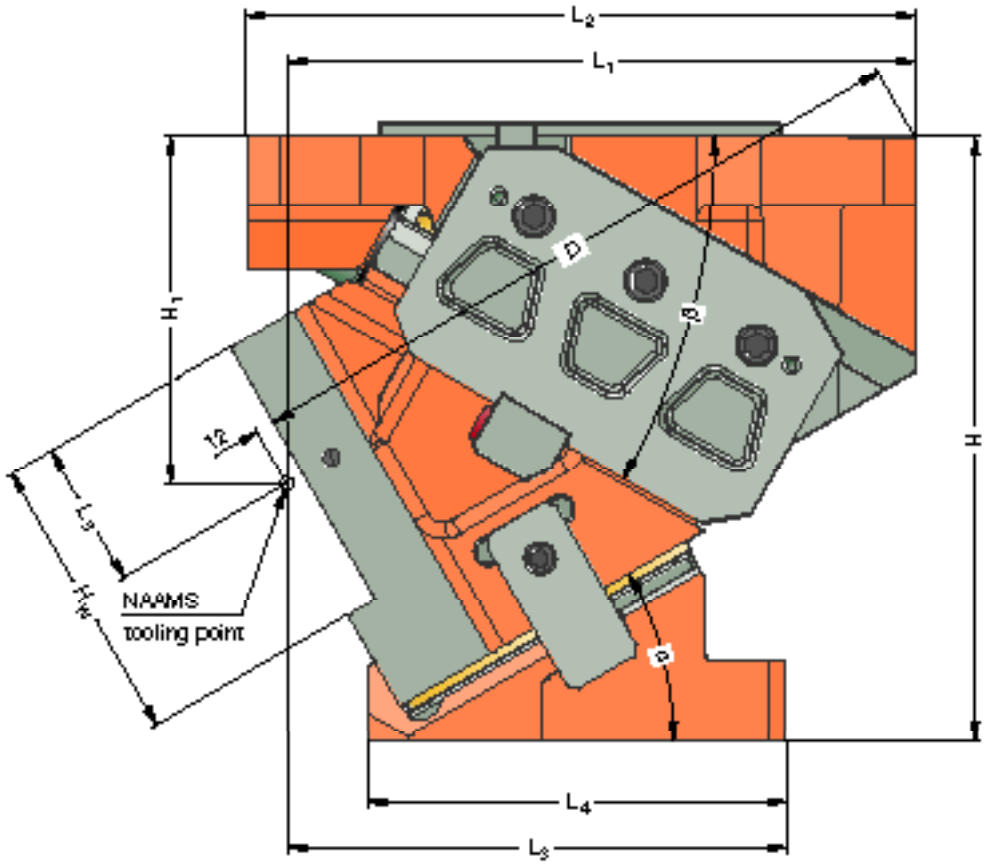
Height 180 mm	Width 400 mm						
	60	60	60	40	60	60	60
36	121	159	276	347	276	159	121
36	186	244	425	533	425	244	186
36	251	329	573	719	573	329	251
36	308	345	559	914	559	345	308
36	309	346	560	916	560	346	309

AERIAL FCC 2016.24.050.

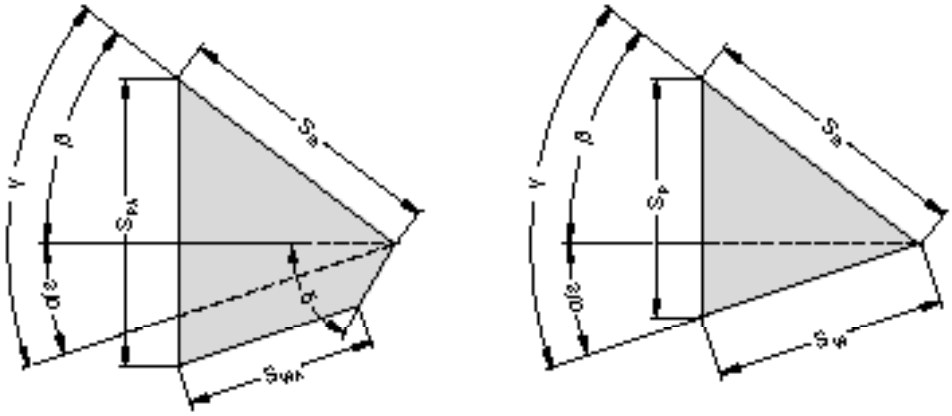
Working width:	500 mm
Performance class:	1150 kN

AERIAL FCC
2016.24.050.
SIZE TABLE





AERIAL FCC
2016.24.050.
SIZE TABLE



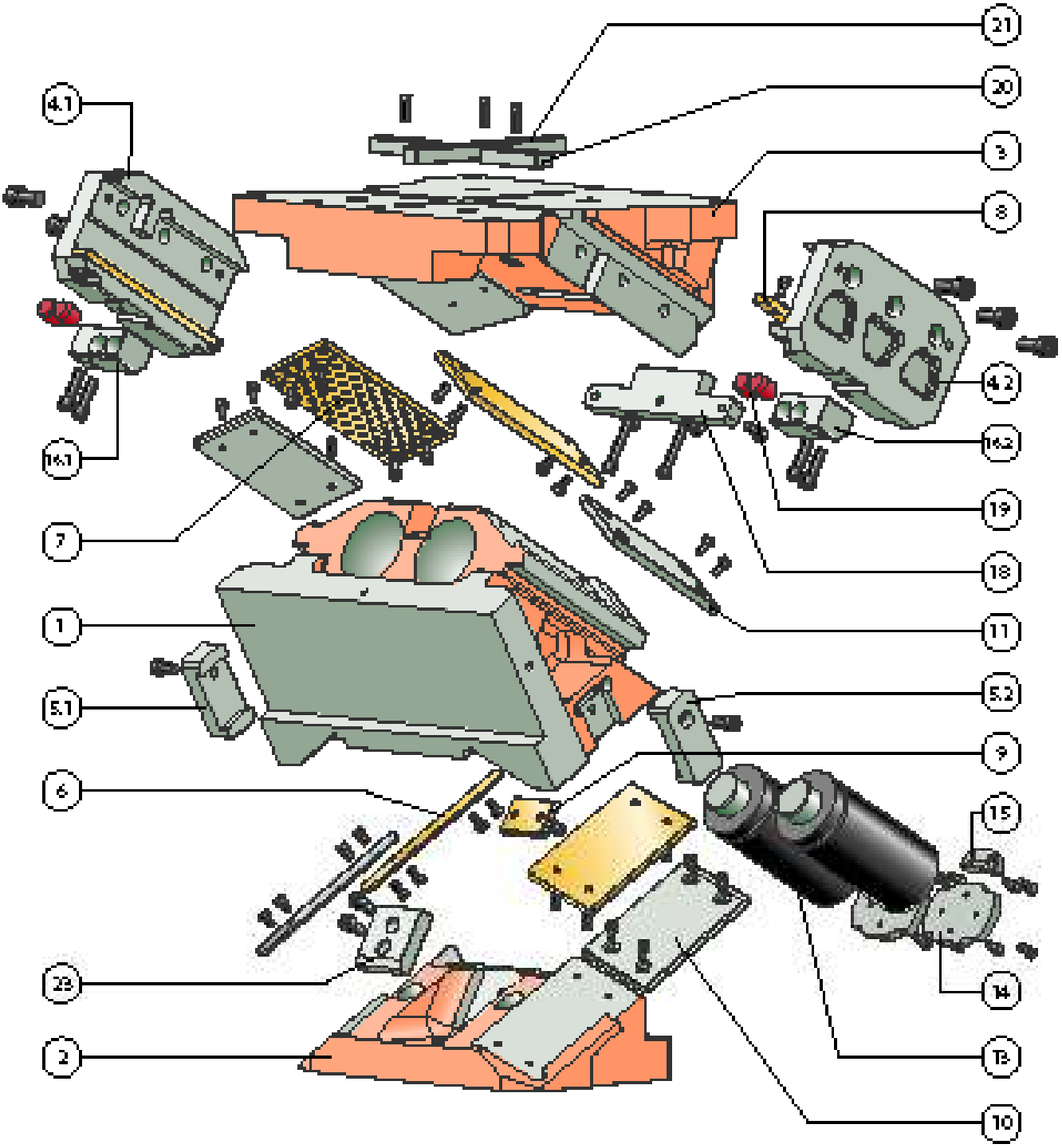
Order number	L	B	H	H_1	H_W	L_1	L_2	L_3	L_4	L_5	D	α	β	δ	S_W*	S_{WA}*	S_S	S_P*	S_{PA}*
2016.24.050.	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[°]	[°]	[°]	[mm]	[mm]	[mm]	[mm]	[mm]
00.2000.00	423	500	375	180	180	415	415	285	280	105	403.0	0	50	30	-	28.6	58	-	49.4
05.2000.00	415	500	375	185	180	415	415	285	280	90	417.5	5	45	35	-	32.9	58	-	49.6
10.2000.00	419	500	375	190	180	415	415	285	267	90	429.7	10	45	40	-	33.9	58	-	53.3
15.2000.00	435	500	375	200	180	415	415	285	258	90	446.4	15	40	45	-	38.7	58	-	54.4
20.2000.00	439	500	375	195	180	415	415	285	267	90	439.3	20	35	50	-	43.7	58	-	55.9
25.2000.00	417	500	375	205	180	390	415	310	270	90	428.1	25	35	55	-	46.1	58	-	60.9
30.2000.00	417	500	375	215	180	390	415	310	260	90	432.3	30	30	60	-	52.2	58	-	63.8
35.2000.00	428	500	375	225	180	390	415	310	247	83	436.5	35	30	65	-	56.2	58	-	70.3
40.2000.00	439	500	375	235	180	390	415	310	240	90	437.8	40	25	70	-	64.2	58	-	75.1
45.2000.00	455	500	375	245	180	340	455	310	225	90	401.7	45	25	75	-	70.7	58	-	84.1
50.2000.00	450	500	375	265	180	340	450	310	223	105	409.6	50	20	-	84.8	-	58	84.8	-
55.2000.00	450	500	375	285	180	340	450	310	232	110	416.5	55	20	-	95.0	-	58	97.7	-
60.2000.00	450	500	375	300	180	340	450	310	229	115	417.8	60	15	-	112.0	-	58	112.0	-
65.2000.00	450	500	375	300	180	340	450	340	250	110	403.6	65	15	-	102.9	-	45	104.9	-
70.2000.00	450	500	375	300	180	340	450	340	228	100	386.2	70	15	-	127.1	-	45	131.1	-
75.2000.00	450	500	375	300	180	325	450	325	213	100	361.9	75	10	-	114.2	-	30	115.5	-

* Values rounded

Fastening cam base:
Hexagon socket head cap screws DIN EN ISO 4762 — 6x M20 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735 — 2x Ø20

Fastening cam driver :
Hexagon socket head cap screws DIN EN ISO 4762 — 4x M20 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735 — 4x Ø20

AERIAL FCC
2016.24.050.
EXPLODED VIEW



Subject to alterations

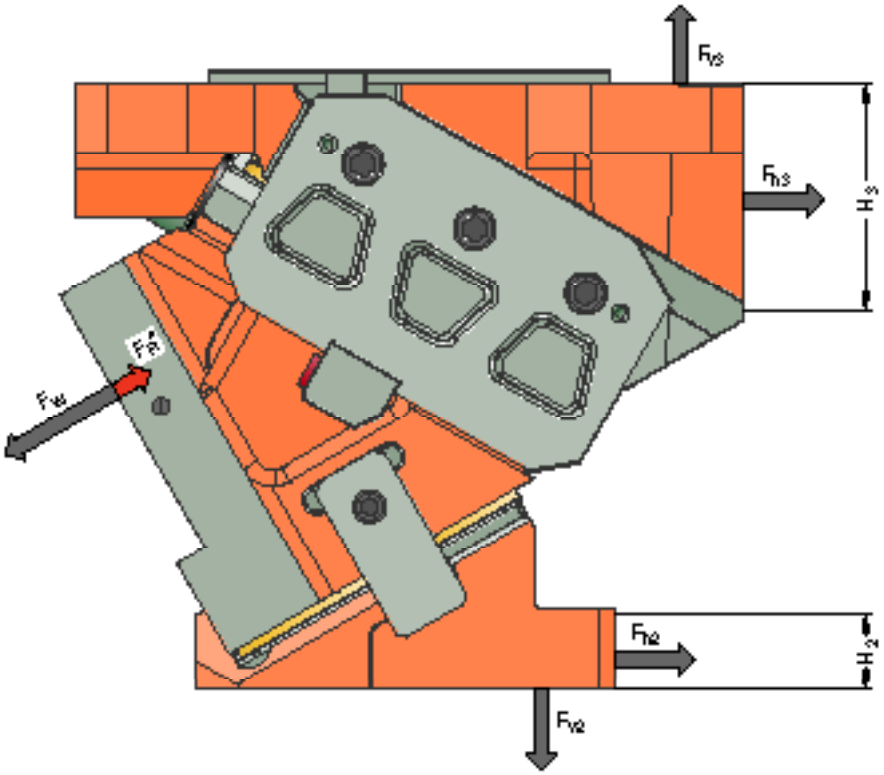
AERIAL FCC
2016.24.050.
PARTS LIST

Position	Piece	Designation	Material	spare part
1	1	Slider	GGG60	--
2	1	Cam driver	GGG60	--
2.1				
2.2				
3	1	Cam base	GGG60	--
4.1	1	Clamp, left	1.7225	x
4.2	1	Clamp, right	1.7225	x
5.1	1	Positive return, left	1.7225	x
5.2	1	Positive return, right	1.7225	x
6	2	Sliding plate	Bronze with solid lubricant	x
7	2	Sliding plate	Bronze with solid lubricant	x
8	2	Sliding plate	Bronze with solid lubricant	x
9*	2	Sliding plate	Bronze with solid lubricant	x
10	2	Sliding plate	1.7131	x
11	2	Sliding plate	1.7131	x
12				
13	2	Gas spring	2487.12.03000.□□□	x
14	2	Stop plate	1.7225	x
15	2	Safety plate	1.1191	x
16.1	1	Cam slide stop, left	1.1191	x
16.2	1	Cam slide stop, right	1.1191	x
17				
18	1	Lockout system		x
19	4	Damping element	Elastomer	x
20	2	Feather key (T-nut)		x
21	1	Feather key (T-nut)		x
22				
23*	1	Pre-acceleration		x
24				

* up to and including 45° with pre-acceleration

For inquiries or when ordering spare parts (x), we require the following data:
- ▶ Cam unit order no.
- ▶ Cam unit serial no.
- ▶ Item number / Designation / Spare part

AERIAL FCC
2016.24.050.
SYSTEM AND SURROUNDING FORCES



Order number	α [°]	F_W [kN]	F_R* [kN]	F_{h2} [kN]	F_{v2} [kN]	F_{h3} [kN]	F_{v3} [kN]	H_2 [mm]	H_3 [mm]
2016.24.050.00.2000.00	0	1155	108.4	0	969	1155	969	30	179
2016.24.050.05.2000.00	5	1155	109.0	84	965	1066	1066	40	172
2016.24.050.10.2000.00	10	1155	120.3	140	796	997	997	40	174
2016.24.050.15.2000.00	15	1155	120.9	209	781	906	1080	40	137
2016.24.050.20.2000.00	20	1155	121.4	277	760	809	1155	40	155
2016.24.050.25.2000.00	25	1155	125.0	282	604	765	1092	40	170
2016.24.050.30.2000.00	30	1155	125.0	333	578	667	1155	40	146
2016.24.050.35.2000.00	35	1155	125.0	309	441	637	1104	40	143
2016.24.050.40.2000.00	40	1155	125.0	346	413	539	1155	60	115
2016.24.050.45.2000.00	45	1155	125.0	297	297	519	1114	70	140
2016.24.050.50.2000.00	50	1155	125.0	322	270	420	1155	80	117
2016.24.050.55.2000.00	55	1155	125.0	254	178	409	1124	80	109
2016.24.050.60.2000.00	60	1155	125.0	268	155	309	1155	90	103
2016.24.050.65.2000.00	65	1155	125.0	185	86	304	1133	89	83
2016.24.050.70.2000.00	70	1155	125.0	95	35	300	1120	116	100
2016.24.050.75.2000.00	75	1155	125.0	98	26	201	1142	146	77

* Retraction force values correspond to the spring-generated retraction force at the working point

The forces F_{h2}, F_{V2} as well as F_{h3}, F_{V3} act on the tool environment at maximum working force F_W.

AERIAL FCC
2016.24.050.
FORCE DIAGRAM

shouldered

0°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	140	190	227	272	316	272	227	190	140
36	143	264	375	507	640	507	375	264	143
36	145	317	472	659	846	659	472	317	145
36	148	357	546	773	1000	773	546	357	148
36	151	397	620	887	1006	887	620	397	151

5°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	138	210	268	333	398	333	268	210	138
36	146	268	378	511	643	511	378	268	146
36	154	325	480	667	853	667	480	325	154
36	159	366	553	779	1004	779	553	366	159
36	164	406	626	891	1155	891	626	406	164

10°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	137	209	274	353	431	353	274	209	137
36	150	271	381	541	646	541	381	271	150
36	163	334	489	675	861	675	489	334	163
36	170	375	561	784	1008	784	561	375	170
36	176	416	633	894	1155	894	633	416	176

15°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	135	207	272	351	430	351	272	207	135
36	153	275	385	517	649	517	385	275	153
36	172	342	497	683	868	683	497	342	172
36	180	384	568	790	1012	790	568	384	180
36	189	425	640	897	1155	897	640	425	189

20°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	143	214	280	358	436	358	280	214	143
36	157	278	389	521	653	521	389	278	157
36	172	342	498	684	870	684	498	342	172
36	170	376	563	788	1012	788	563	376	170
36	168	409	629	892	1155	892	629	409	168

25°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	150	222	287	365	443	365	287	222	150
36	161	282	393	525	657	525	393	282	161
36	172	343	498	685	872	685	498	343	172
36	159	368	558	786	1013	786	558	368	159
36	147	393	617	886	1155	886	617	393	147

Support with feather key

0°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	63	82	109	160	210	160	109	82	63
36	64	82	110	161	212	161	110	82	64
36	64	82	110	163	214	163	110	82	64
36	66	82	110	173	237	173	110	82	66
36	68	82	110	173	237	173	110	82	68

5°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	64	88	116	173	230	173	116	88	64
36	65	88	116	175	233	175	116	88	65
36	66	88	116	177	235	177	116	88	66
36	68	88	116	180	245	180	116	88	68
36	69	88	116	180	245	180	116	88	69

10°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	64	88	112	186	250	186	112	88	64
36	66	88	112	189	253	189	112	88	66
36	68	88	112	192	256	192	112	88	68
36	69	88	112	198	265	198	112	88	69
36	71	88	112	204	274	204	112	88	71

15°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	65	89	117	200	270	200	117	89	65
36	68	89	117	203	273	203	117	89	68
36	70	89	117	206	277	206	117	89	70
36	71	89	117	208	279	208	117	89	71
36	73	89	117	210	281	210	117	89	73

20°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	72	93	128	189	250	189	128	93	72
36	74	93	130	192	253	192	130	93	74
36	76	93	133	194	256	194	133	93	76
36	77	93	135	197	260	197	135	93	77
36	79	93	137	201	264	201	137	93	79

25°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	79	97	126	178	230	178	126	97	79
36	80	97	128	180	233	180	128	97	80
36	82	97	130	183	235	183	130	97	82
36	83	97	133	187	241	187	133	97	83
36	85	97	136	192	248	192	136	97	85

AERIAL FCC
2016.24.050.
FORCE DIAGRAM

shouldered

30°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	151	229	294	372	450	372	294	229	151
36	165	286	397	529	662	529	397	286	165
36	172	343	499	686	873	686	499	343	172
36	149	360	553	783	1014	783	553	360	149
36	126	378	606	881	1155	881	606	378	126

35°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	144	219	287	369	450	369	287	219	144
36	161	284	396	530	665	530	396	284	161
36	178	349	505	692	880	692	505	349	178
36	166	374	563	790	1017	790	563	374	166
36	154	399	621	888	1155	888	621	399	154

40°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	131	209	280	365	450	365	280	209	131
36	157	282	396	532	668	532	396	282	157
36	183	355	511	699	886	699	511	355	183
36	183	387	574	797	1021	797	574	387	183
36	182	420	636	896	1155	896	636	420	182

45°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	118	199	273	362	442	362	273	199	118
36	154	280	395	533	671	533	395	280	154
36	186	361	517	705	893	705	517	361	186
36	200	401	584	804	1024	804	584	401	200
36	210	441	651	903	1155	903	651	441	210

50°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	122	201	272	349	420	349	272	201	122
36	148	279	399	542	685	542	399	279	148
36	174	358	525	726	927	726	525	358	174
36	183	393	584	812	1041	812	584	393	183
36	193	428	642	898	1155	898	642	428	193

55°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	126	202	259	328	397	328	259	202	126
36	143	279	402	550	699	550	402	279	143
36	160	356	534	747	961	747	534	356	160
36	167	385	583	820	1058	820	583	385	167
36	175	415	632	894	1155	894	632	415	175

Support with feather key

30°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	86	105	125	167	210	167	125	105	86
36	86	105	126	169	212	169	126	105	86
36	86	105	128	171	214	171	128	105	86
36	86	105	161	177	223	177	161	105	86
36	86	105	135	183	231	183	135	105	86

35°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	82	93	111	180	266	180	111	93	82
36	85	101	127	220	288	220	127	101	85
36	86	101	133	235	310	235	133	101	86
36	86	101	135	241	318	241	135	101	86
36	86	101	135	248	325	248	135	101	86

40°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	90	92	113	175	322	175	113	92	90
36	92	101	125	221	364	221	125	101	92
36	94	110	145	237	406	237	145	110	94
36	94	110	145	280	413	280	145	110	94
36	94	110	145	280	419	280	145	110	94

45°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	92	127	182	222	378	222	182	127	92
36	95	129	203	283	440	283	203	129	95
36	100	131	224	313	502	313	224	131	100
36	100	131	224	313	508	313	224	131	100
36	100	131	224	313	513	313	224	131	100

50°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	93	105	129	187	363	187	129	105	93
36	103	125	153	207	486	207	153	125	103
36	105	137	169	296	609	296	169	137	105
36	107	140	173	325	617	325	173	140	107
36	107	140	173	325	625	325	173	140	107

55°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	105	113	132	187	347	187	132	113	105
36	107	132	160	263	531	263	160	132	107
36	122	150	185	315	630	315	185	150	122
36	127	156	185	339	659	339	185	156	127
36	132	156	185	339	659	339	185	156	132

Subject to alterations

AERIAL FCC
2016.24.050.
FORCE DIAGRAM

shouldered

60°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	124	185	241	308	375	308	241	185	124
36	138	278	406	559	712	559	406	278	138
36	145	353	542	768	995	768	542	353	145
36	151	377	582	829	1075	829	582	377	151
36	158	401	623	889	1155	889	623	401	158

65°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	128	186	238	301	363	301	238	186	128
36	147	290	413	560	707	560	413	290	147
36	167	363	542	756	970	756	542	363	167
36	181	397	592	828	1063	828	592	397	181
36	195	430	643	899	1155	899	643	430	195

70°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	132	186	235	293	352	293	235	186	132
36	146	271	385	521	658	521	385	271	146
36	161	357	536	744	946	744	536	357	161
36	209	416	603	827	1051	827	603	416	209
36	233	458	663	909	1155	909	663	458	233

75°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	136	186	231	286	340	286	231	186	136
36	145	253	351	468	585	468	351	253	145
36	155	320	470	651	831	651	470	320	155
36	202	400	579	794	1009	794	579	400	202
36	250	479	683	919	1155	919	683	479	250

Support with feather key

60°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	105	111	131	170	332	170	131	111	105
36	109	126	150	225	483	225	150	126	109
36	120	157	208	298	822	298	208	157	120
36	138	180	227	420	835	420	227	180	138
36	140	180	227	420	849	420	227	180	140

65°

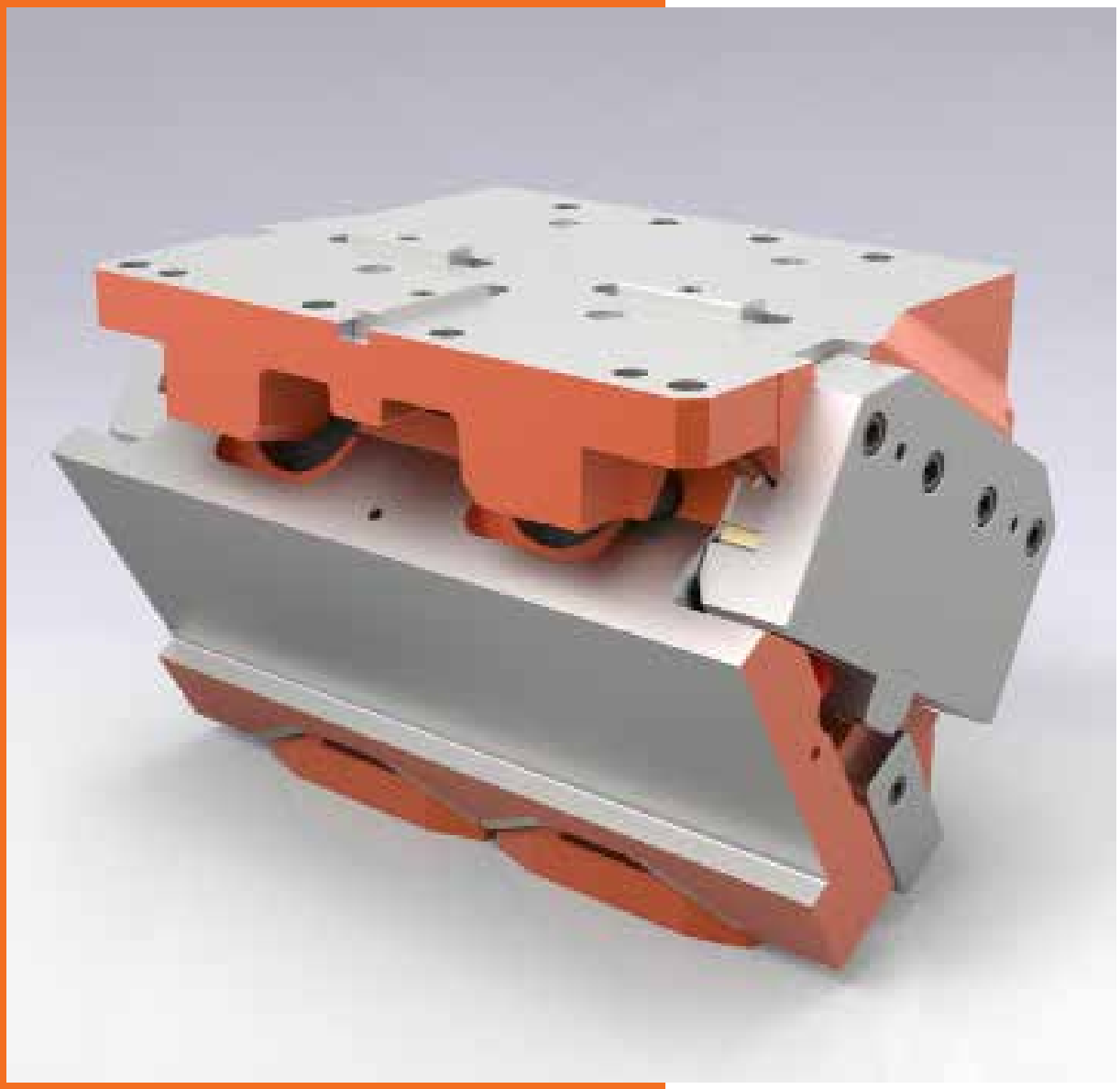
Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	123	126	151	169	260	169	151	126	123
36	127	147	173	228	502	228	173	147	127
36	153	193	221	279	750	279	221	193	153
36	165	201	268	449	880	449	268	201	165
36	177	207	268	473	880	473	268	207	177

70°

Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	125	150	181	227	240	227	181	150	125
36	143	175	207	263	500	263	207	175	143
36	160	223	245	325	753	325	245	223	160
36	193	245	360	521	890	521	360	245	193
36	215	245	390	553	890	553	390	245	215

75°

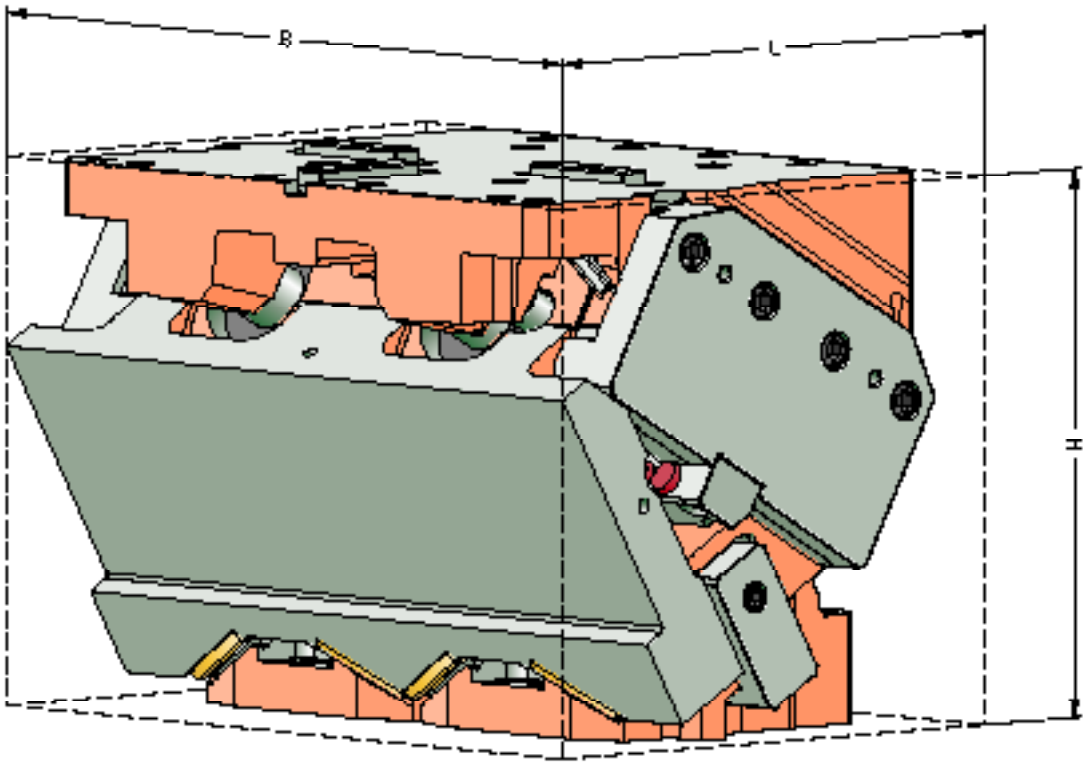
Height 180 mm	Width 500 mm								
	50	50	60	60	60	60	60	50	50
36	126	157	220	230	290	230	220	157	126
36	141	175	220	260	557	260	220	175	141
36	155	278	419	551	831	551	419	278	155
36	202	303	478	691	1038	691	478	303	202
36	250	325	536	702	1155	702	536	325	250

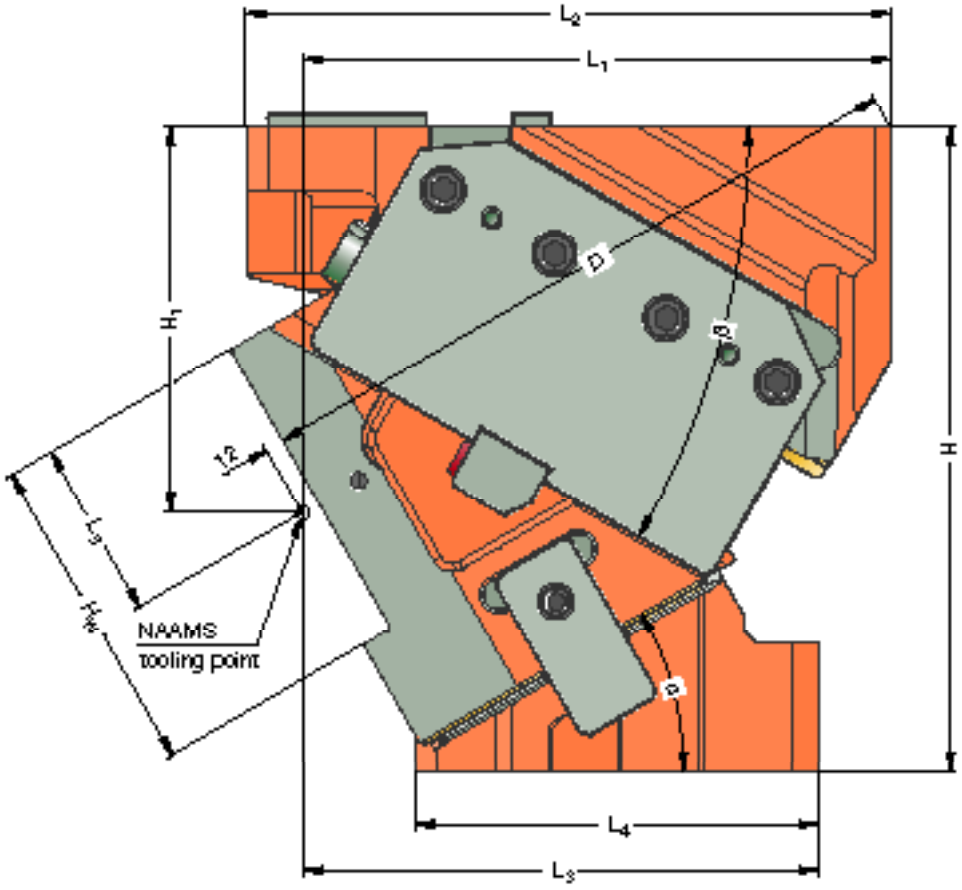


AERIAL FCC 2016.24.060.

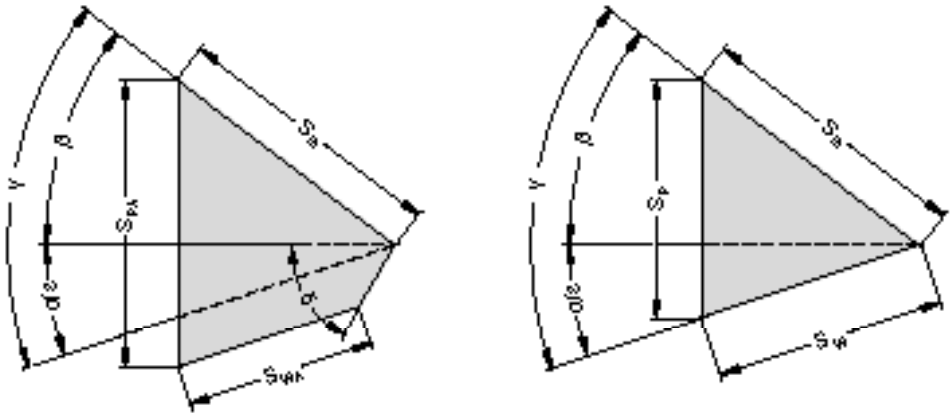
Working width:	600 mm
Performance class:	1200 kN

AERIAL FCC
2016.24.060.
SIZE TABLE





AERIAL FCC
2016.24.060.
SIZE TABLE



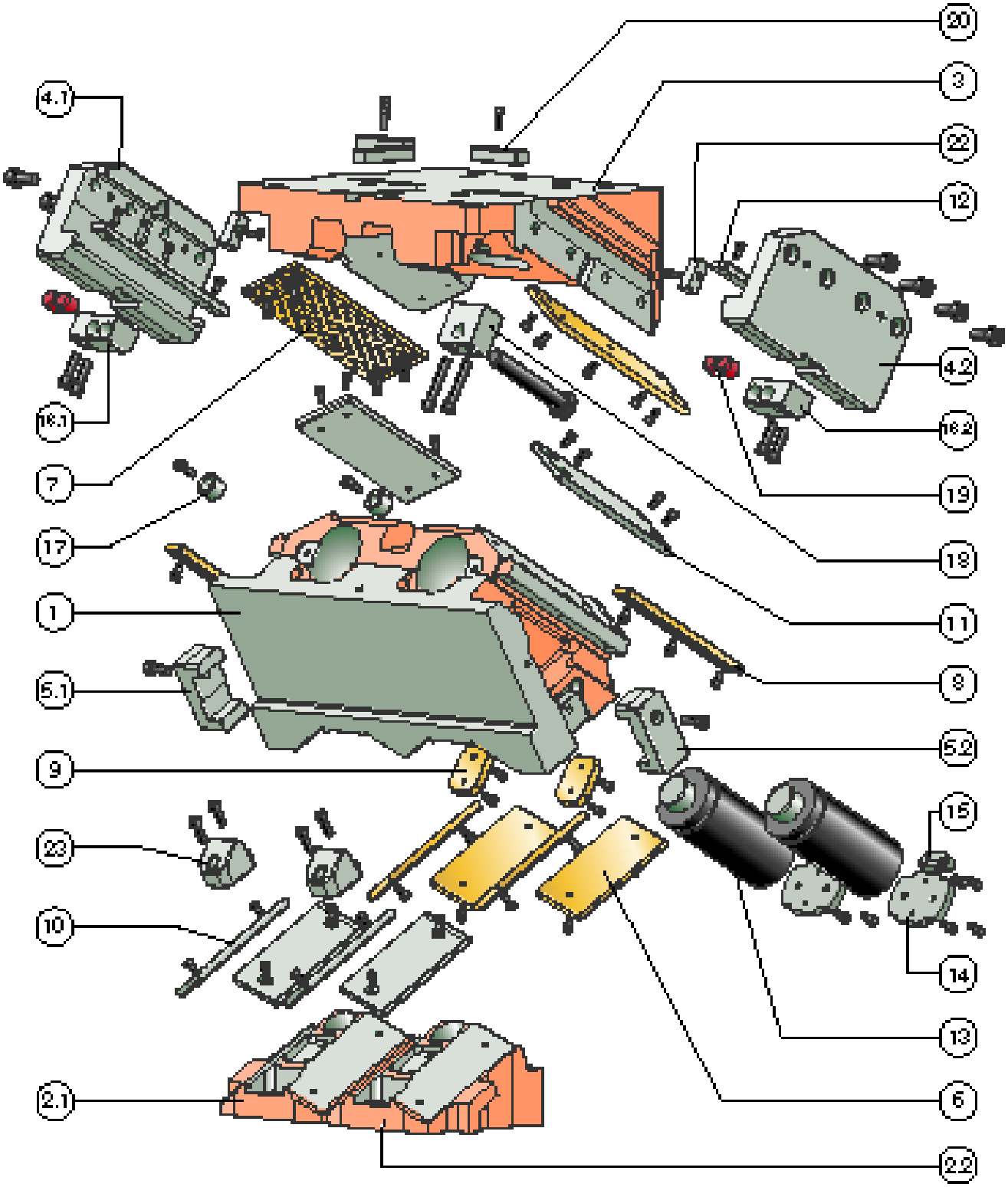
Order number	L	B	H	H_1	H_W	L_1	L_2	L_3	L_4	L_5	D	α	β	δ	S_W*	S_{WA}*	S_S	S_P*	S_{PA}*
2016.24.060.	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[°]	[°]	[°]	[mm]	[mm]	[mm]	[mm]	[mm]
00.2000.00	388	600	400	185	200	380	385	260	255	110	368.0	0	50	45	-	25.0	58	-	56.7
05.2000.00	385	600	400	200	200	380	385	275	258	110	384.0	5	45	50	-	25.0	58	-	62.3
10.2000.00	387	600	400	210	200	380	385	275	245	110	398.7	10	45	45	-	25.0	58	-	61.8
15.2000.00	397	600	400	220	200	380	385	285	245	110	412.0	15	40	50	-	35.0	58	-	59.0
20.2000.00	391	600	400	230	200	365	380	310	260	110	409.7	20	35	45	-	35.0	58	-	59.9
25.2000.00	401	600	400	240	200	365	380	310	250	110	420.2	25	35	50	-	35.0	58	-	66.8
30.2000.00	410	600	400	240	200	365	400	320	250	110	424.1	30	30	45	-	35.0	58	-	66.4
35.2000.00	418	600	400	250	200	365	415	360	280	110	430.4	35	30	50	-	40.0	58	-	72.8
40.2000.00	435	600	400	260	200	365	435	360	275	110	434.7	40	25	55	-	50.0	58	-	77.0
45.2000.00	435	600	400	270	200	365	435	360	265	110	437.0	45	25	60	-	55.0	58	-	87.1
50.2000.00	460	600	400	280	200	320	455	325	225	140	408.1	50	20	-	84.8	-	58	84.8	-
55.2000.00	460	600	400	290	200	320	455	325	215	140	409.1	55	20	-	95.0	-	58	97.7	-
60.2000.00	470	600	400	305	200	310	455	325	215	140	407.1	60	15	-	112.0	-	58	112.0	-
65.2000.00	495	600	400	315	200	310	495	305	185	140	404.5	65	15	-	102.9	-	45	104.9	-
70.2000.00	495	600	400	330	200	310	495	305	180	140	404.1	70	15	-	127.1	-	45	131.1	-
75.2000.00	495	600	400	340	200	310	495	305	175	140	396.6	75	10	-	114.2	-	30	115.5	-

* Values rounded

Fastening cam base:
Hexagon socket head cap screws DIN EN ISO 4762 — 8x M20 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735 — 2x Ø20

Fastening cam driver :
Hexagon socket head cap screws DIN EN ISO 4762 — 8x M16 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735 — 4x Ø16

AERIAL FCC
2016.24.060.
EXPLODED VIEW



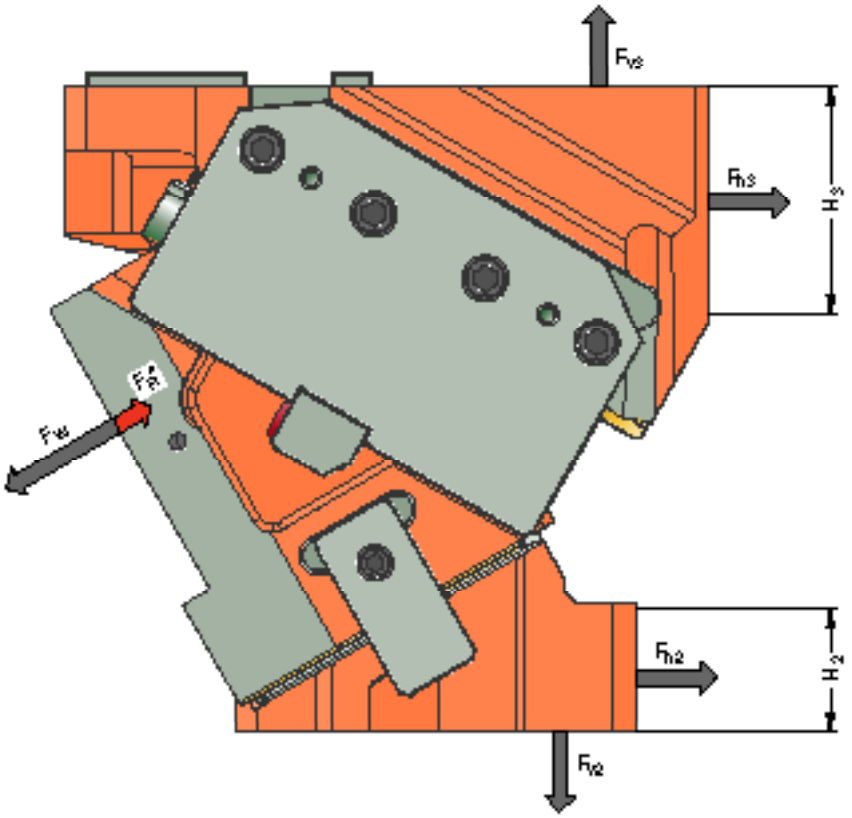
AERIAL FCC
2016.24.060.
PARTS LIST

Position	Piece	Designation	Material	spare part
1	1	Slider	GGG60	--
2				
2.1	1	Cam driver, left	GGG60	--
2.2	1	Cam driver, right	GGG60	--
3	1	Cam base	GGG60	--
4.1	1	Clamp, left	1.7225	x
4.2	1	Clamp, right	1.7225	x
5.1	1	Positive return, left	1.7225	x
5.2	1	Positive return, right	1.7225	x
6	4	Sliding plate	Bronze with solid lubricant	x
7	2	Sliding plate	Bronze with solid lubricant	x
8	2	Sliding plate	Bronze with solid lubricant	x
9*	2	Sliding plate	Bronze with solid lubricant	x
10	4	Sliding plate	1.7131	x
11	2	Sliding plate	1.7131	x
12	2	Sliding plate	1.7131	x
13	2	Gas spring	2487.12.03000.□□□	x
14	2	Stop plate	1.7225	x
15	2	Safety plate	1.1191	x
16.1	1	Cam slide stop, left	1.1191	x
16.2	1	Cam slide stop, right	1.1191	x
17	1	Spacer	1.1191	x
18	1	Lockout system		x
19	4	Damping element	Elastomer	x
20	3	Feather key (T-nut)		x
21				
22	2	Feather key (T-nut)		x
23*	2	Pre-acceleration		x
24				

* up to and including 45° with pre-acceleration

For inquiries or when ordering spare parts (x), we require the following data:
- ► Cam unit order no.
- ► Cam unit serial no.
- ► Item number / Designation / Spare part

AERIAL FCC
2016.24.060.
SYSTEM AND SURROUNDING FORCES



Order number	α [°]	F_W [kN]	F_R* [kN]	F_{h2} [kN]	F_{v2} [kN]	F_{h3} [kN]	F_{v3} [kN]	H_2 [mm]	H_3 [mm]
2016.24.060.00.2000.00	0	1202	108.8	0	1009	1202	1009	40	220
2016.24.060.05.2000.00	5	1202	109.4	88	1005	1110	1110	40	210
2016.24.060.10.2000.00	10	1202	120.7	146	829	1038	1038	40	210
2016.24.060.15.2000.00	15	1202	121.3	218	813	943	1124	40	193
2016.24.060.20.2000.00	20	1202	121.7	288	791	842	1202	40	180
2016.24.060.25.2000.00	25	1202	125.0	293	629	796	1137	40	180
2016.24.060.30.2000.00	30	1202	125.0	347	601	694	1202	40	145
2016.24.060.35.2000.00	35	1202	125.0	321	459	663	1149	45	145
2016.24.060.40.2000.00	40	1202	125.0	360	429	561	1202	65	101
2016.24.060.45.2000.00	45	1202	125.0	309	309	541	1159	90	64
2016.24.060.50.2000.00	50	1202	125.0	335	281	437	1202	120	58
2016.24.060.55.2000.00	55	1202	125.0	264	185	426	1169	120	80
2016.24.060.60.2000.00	60	1202	125.0	279	161	322	1202	130	92
2016.24.060.65.2000.00	65	1202	125.0	192	90	316	1179	140	82
2016.24.060.70.2000.00	70	1202	125.0	99	36	312	1165	140	73
2016.24.060.75.2000.00	75	1202	125.0	102	27	210	1188	150	66

* Retraction force values correspond to the spring-generated retraction force at the working point

The forces F_{h2}, F_{V2} as well as F_{h3}, F_{V3} act on the tool environment at maximum working force F_W.

AERIAL FCC
2016.24.060.
FORCE DIAGRAM

shouldered

0°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	90	216	302	385	473	385	302	216	90
40	98	240	374	494	619	494	374	240	98
40	107	265	422	586	756	586	422	265	107
40	117	351	554	765	983	765	554	351	117
40	126	406	662	927	1202	927	662	406	126

5°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	92	219	299	382	469	382	299	219	92
40	101	262	378	498	623	498	378	262	101
40	110	306	457	615	778	615	457	306	110
40	121	361	563	772	990	772	563	361	121
40	131	416	668	930	1202	930	668	416	131

10°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	95	216	296	379	465	379	296	216	95
40	104	266	382	503	628	503	382	266	104
40	114	315	468	626	791	626	468	315	114
40	125	371	571	780	996	780	571	371	125
40	135	426	675	933	1202	933	675	426	135

15°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	97	214	293	376	461	376	293	214	97
40	107	270	386	507	632	507	386	270	107
40	117	325	479	638	803	638	479	325	117
40	129	380	580	787	1002	787	580	380	129
40	140	435	681	937	1202	937	681	435	140

20°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	95	219	295	375	457	375	295	219	95
40	106	275	392	514	641	514	392	275	106
40	118	331	489	654	825	654	489	331	118
40	131	375	580	793	1013	793	580	375	131
40	145	419	670	931	1202	931	670	419	145

25°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	93	215	298	374	454	374	298	215	93
40	106	280	399	522	650	522	399	280	106
40	119	336	500	670	847	670	500	336	119
40	134	370	580	798	1024	798	580	370	134
40	147	403	660	926	1202	926	660	403	147

Support with feather key

0°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	45	63	68	93	118	93	68	63	45
40	48	63	70	93	118	93	70	63	48
40	51	63	70	93	118	93	70	63	51
40	52	63	70	93	118	93	70	63	52
40	53	63	70	93	118	93	70	63	53

5°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	47	68	75	105	136	105	75	68	47
40	49	68	79	105	136	105	79	68	49
40	51	68	79	105	136	105	79	68	51
40	52	68	79	105	136	105	79	68	52
40	53	68	79	105	136	105	79	68	53

10°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	48	74	82	117	154	117	82	74	48
40	50	74	95	117	154	117	95	74	50
40	51	74	95	117	154	117	95	74	51
40	52	74	95	117	154	117	95	74	52
40	53	74	95	117	154	117	95	74	53

15°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	50	79	89	130	172	130	89	79	50
40	50	79	99	130	172	130	99	79	50
40	51	79	109	130	172	130	109	79	51
40	52	79	109	130	172	130	109	79	52
40	53	79	109	130	172	130	109	79	53

20°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	51	85	96	143	191	143	96	85	51
40	53	85	110	143	191	143	110	85	53
40	55	85	110	143	191	143	110	85	55
40	58	85	110	143	191	143	110	85	58
40	60	85	110	143	191	143	110	85	60

25°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	53	91	103	156	211	156	103	91	53
40	56	91	112	156	211	156	112	91	56
40	59	91	112	156	211	156	112	91	59
40	63	91	112	156	211	156	112	91	63
40	68	91	112	156	211	156	112	91	68

AERIAL FCC
2016.24.060.
FORCE DIAGRAM

shouldered

30°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	90	207	300	373	450	373	300	207	90
40	105	285	405	530	659	530	405	285	105
40	119	341	510	686	868	686	510	341	119
40	137	364	580	803	1035	803	580	364	137
40	126	387	649	920	1202	920	649	387	126

35°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	94	205	313	388	466	388	313	205	94
40	105	294	415	541	671	541	415	294	105
40	117	347	517	694	876	694	517	347	117
40	140	378	590	811	1039	811	590	378	140
40	154	409	663	928	1202	928	663	409	154

40°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	97	202	306	402	482	402	306	202	97
40	106	303	425	552	683	552	425	303	106
40	114	354	524	701	884	701	524	354	114
40	144	392	601	818	1043	818	601	392	144
40	174	430	678	935	1202	935	678	430	174

45°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	101	199	297	399	497	399	297	199	101
40	106	307	435	563	695	563	435	307	106
40	111	360	531	708	893	708	531	360	111
40	147	405	611	825	1047	825	611	405	147
40	183	451	692	942	1202	942	692	451	183

50°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	92	184	276	372	471	372	276	184	92
40	100	282	452	594	740	594	452	282	100
40	109	380	563	754	952	754	563	380	109
40	142	415	628	848	1077	848	628	415	142
40	176	451	692	942	1202	942	692	451	176

55°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	83	169	256	345	438	345	256	169	83
40	95	257	420	589	764	589	420	257	95
40	106	345	584	800	1012	800	584	345	106
40	138	425	644	871	1107	871	644	425	138
40	169	451	692	942	1202	942	692	451	169

Support with feather key

30°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	54	97	111	169	230	169	111	97	54
40	59	97	130	185	283	185	130	97	59
40	63	97	130	185	283	185	130	97	63
40	69	97	130	185	283	185	130	97	69
40	76	97	130	185	283	185	130	97	76

35°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	61	98	125	190	259	190	125	98	61
40	67	98	132	220	300	220	132	98	67
40	74	98	132	220	300	220	132	98	74
40	74	98	132	220	300	220	132	98	74
40	74	98	132	220	300	220	132	98	74

40°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	67	101	139	211	287	211	139	101	67
40	67	101	141	211	318	211	141	101	67
40	67	101	141	211	350	211	141	101	67
40	67	101	141	211	350	211	141	101	67
40	67	101	141	211	350	211	141	101	67

45°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	67	108	152	186	315	186	152	108	67
40	67	108	153	196	336	196	153	108	67
40	67	108	153	240	357	240	153	108	67
40	67	108	153	240	357	240	153	108	67
40	67	108	153	240	357	240	153	108	67

50°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	65	145	164	242	323	242	164	145	65
40	65	164	168	275	370	275	168	164	65
40	65	176	168	309	417	309	168	176	65
40	65	176	168	309	445	309	168	176	65
40	65	176	168	309	445	309	168	176	65

55°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	67	115	175	211	330	211	175	115	67
40	67	115	196	302	403	302	196	115	67
40	67	115	196	316	466	316	196	115	67
40	67	115	196	316	466	316	196	115	67
40	67	115	196	316	466	316	196	115	67

Subject to alterations

AERIAL FCC
2016.24.060.
FORCE DIAGRAM

shouldered

60°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	74	155	235	318	404	318	235	155	74
40	89	232	376	525	679	525	376	232	89
40	104	310	517	731	954	731	517	310	104
40	133	414	660	894	1136	894	660	414	133
40	163	451	692	942	1202	942	692	451	163

65°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	71	153	235	319	408	319	235	153	71
40	86	231	376	527	684	527	376	231	86
40	100	309	518	736	961	736	518	309	100
40	122	397	671	913	1156	913	671	397	122
40	145	466	702	947	1202	947	702	466	145

70°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	68	151	234	321	411	321	234	151	68
40	82	230	377	530	689	530	377	230	82
40	96	308	520	740	968	740	520	308	96
40	112	380	648	926	1176	926	648	380	112
40	127	451	713	953	1202	953	713	451	127

75°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	64	149	234	322	414	322	234	149	64
40	79	228	378	533	694	533	378	228	79
40	93	307	522	744	975	744	522	307	93
40	101	363	624	896	1178	896	624	363	101
40	110	419	723	958	1202	958	723	419	110

Support with feather key

60°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	74	128	186	240	338	240	186	128	74
40	74	128	223	265	437	265	223	128	74
40	74	128	223	378	536	378	223	128	74
40	74	128	223	380	614	380	223	128	74
40	74	128	223	380	614	380	223	128	74

65°

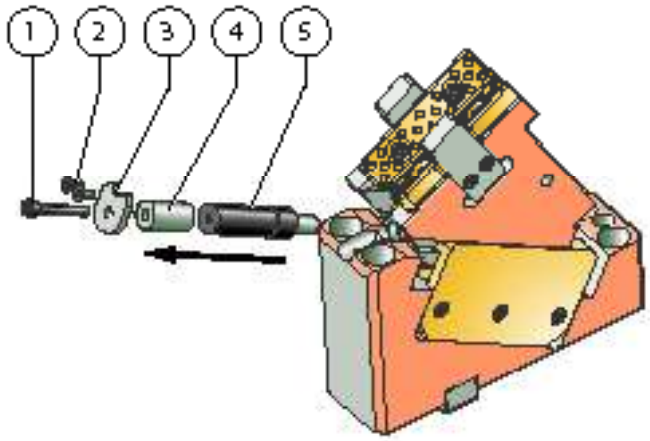
Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	71	133	203	291	383	291	203	133	71
40	77	133	251	383	519	383	251	133	77
40	77	133	251	392	643	392	251	133	77
40	77	133	251	392	643	392	251	133	77
40	77	133	251	392	643	392	251	133	77

70°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	67	151	220	321	411	321	220	151	67
40	82	173	280	437	601	437	280	173	82
40	96	175	280	439	640	439	280	175	96
40	124	178	280	439	640	439	280	178	124
40	124	178	280	439	640	439	280	178	124

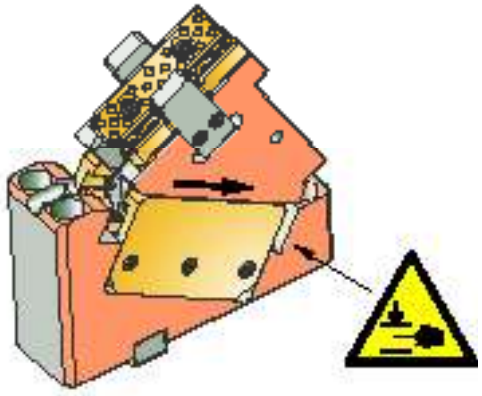
75°

Height 200 mm	Width 600 mm								
	65	65	65	70	70	70	65	65	65
40	64	149	234	273	414	273	234	149	64
40	79	149	308	350	578	350	308	149	79
40	93	149	378	513	743	513	378	149	93
40	104	149	372	548	862	548	372	149	104
40	104	149	366	548	832	548	366	149	104



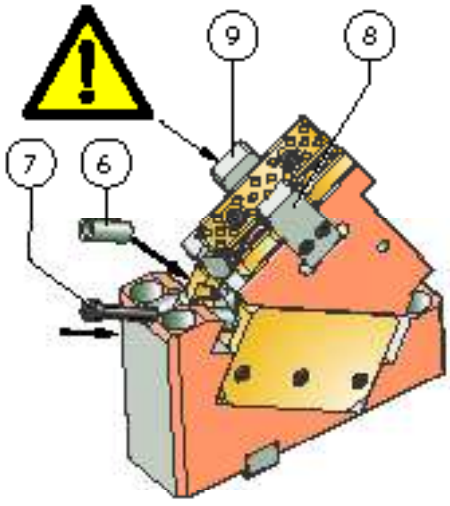
Step 1
► Remove screws **(1+2)**
► Remove stop plate **(3)** of the gas spring
► Remove spacer **(4)** and gas spring **(5)** from the bore

CAUTION
The gas spring may only be removed if the spring is released. After removing the stop plate for the gas spring, observe that there is a risk of crushing between the cam unit driver and the cam unit base due to independent movement of the cam unit driver.



Step 2
► Slide the cam unit driver into the front position

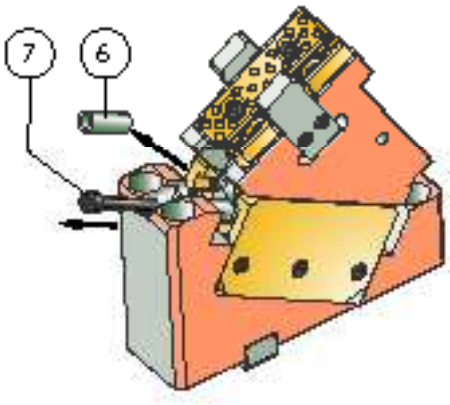
CAUTION
Risk of crushing between the cam unit driver and the cam unit base by movement of the cam unit driver.



Step 3
► Insert the lockout sleeve **(6)**
► Secure the cam unit driver with the screw **(7)**

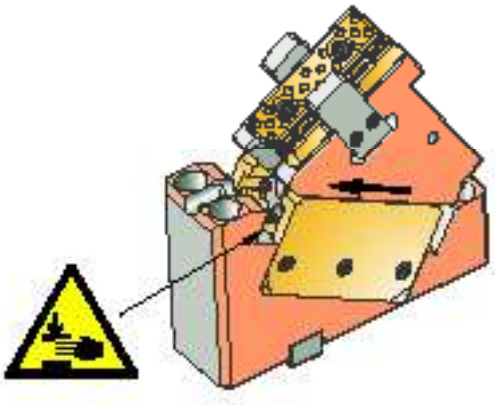
This position corresponds to the closed position (working position) in the tool.

CAUTION
In the classic tool setup process (pressing the cam driver in the die), the positive return left **(9)** and right **(8)** must additionally be removed in order to avoid damaging the cam unit, cam driver and die.



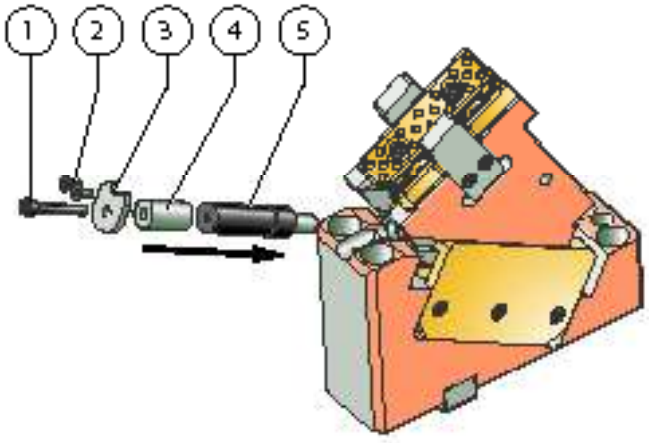
Step 4
Restore the cam unit function after completion of the work (setup, work surface machining).

► Remove screw **(7)**
► Remove the lockout sleeve **(6)**



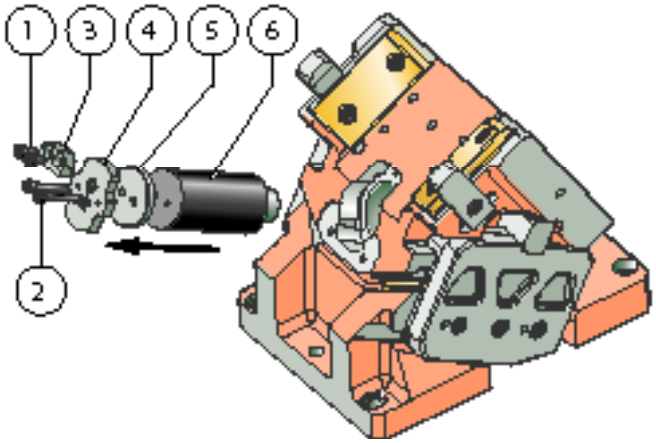
Step 5
► Slide the cam unit driver backwards

CAUTION
Risk of crushing between the cam unit driver and the cam unit base by movement of the cam unit driver.



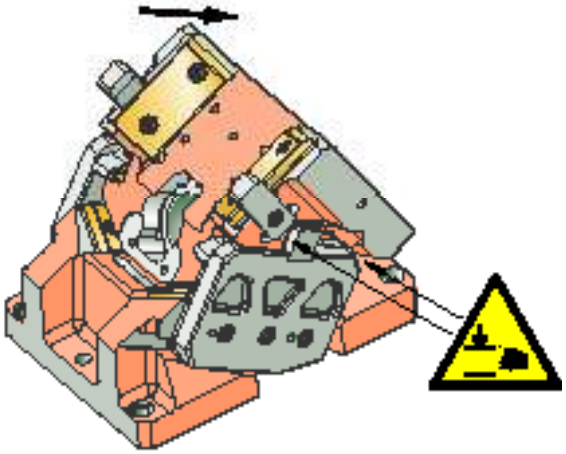
Step 6
► Insert gas spring **(5)** and spacer **(4)**
► Insert stop plate **(3)** for gas spring and secure with screws **(2+1)**

Screws must be secured against loosening by means of adhesive or suitable lock washers.



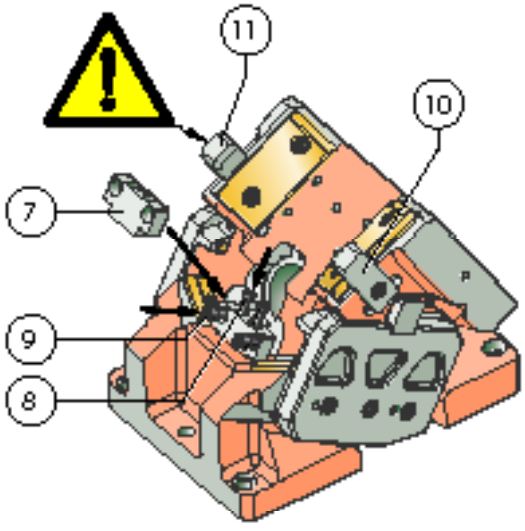
Step 1
► Remove screws **(1 + 2)**
► Remove lock washer **(3)** (from cam unit width 220m)
► Remove the stop plate **(4)** of the gas spring
► Remove spacer **(5)** only up to cam unit width 260 mm) and gas spring **(6)** from the bore

CAUTION
The gas spring may only be removed if the spring is released. After removing the stop plate for the gas spring, observe that there is a risk of crushing between the cam unit driver, stop, and cam unit base due to independent movement of the cam unit driver.



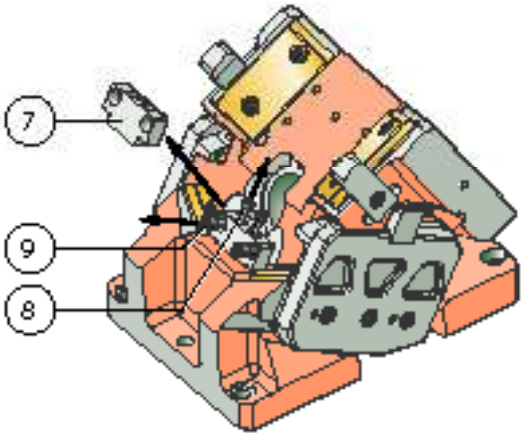
Step 2
► Slide the cam unit driver into the front position

CAUTION
Risk of crushing between the cam unit driver, stop, and cam unit base by movement of the cam unit driver.



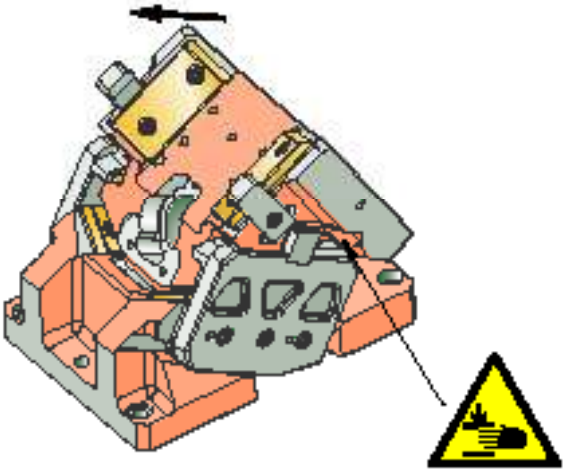
Step 3
► Insert lockout system **(7)** and fix with screws **(8)**
► Insert the spacer (not shown) between the lockout and the cam unit driver (cam unit width 110 and 150 mm)
► Fix the cam unit driver with the screws **(9)**
This position corresponds to the closed position (working position) in the die.

CAUTION
In the classic tool setup process (pressing the cam driver in the die), the positive return right (10) and left (11) must be removed in order to avoid damaging the cam unit, cam driver and die.



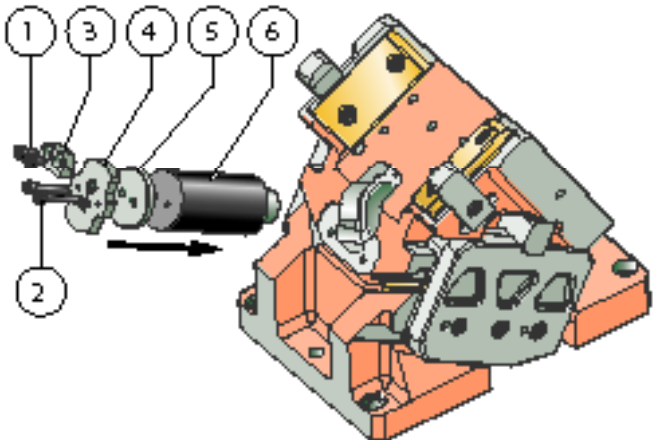
Step 4
Restore the cam unit function after completion of the work (setup, work surface machining).

- ► Remove screws **(9)**
- ► Remove spacer (not shown) (cam unit width 110 and150 mm)
- ► Loosen the screws **(8)** and remove the lockout system **(7)**



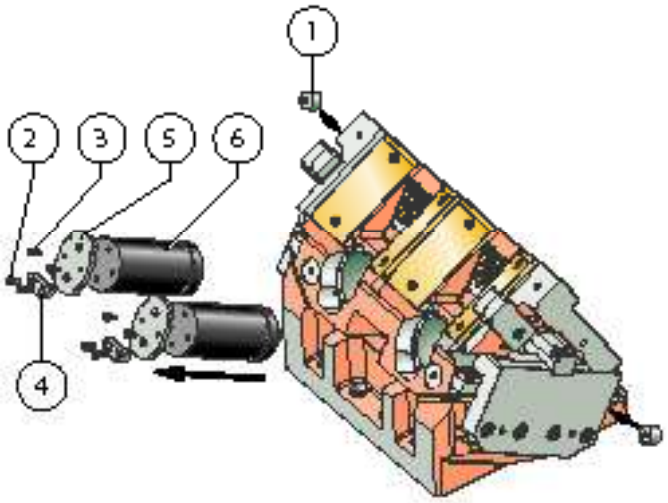
Step 5
- ► Slide the cam unit driver backwards

CAUTION
Risk of crushing between the cam unit driver, stop, and cam unit base by movement of the cam unit driver.



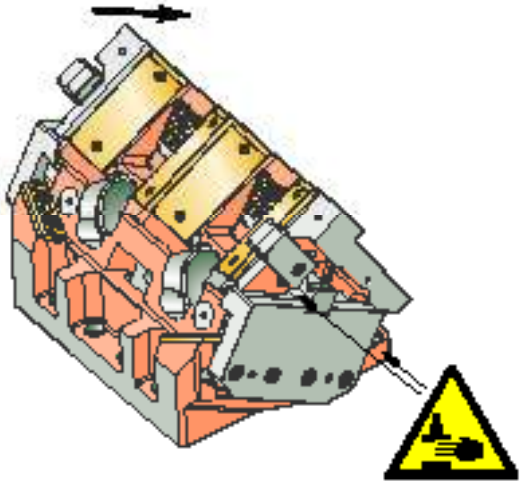
Step 6
- ► Insert the gas spring **(6)** and the spacer **(5)** (only up to the slide width 260 mm)
- ► Insert the stop plate **(4)** for the gas spring
- ► Insert lock washer **(3)** (from cam unit width 220m)
- ► Fix stop plate and lock washer with screws **(2 + 1)**

Screws must be secured against loosening by means of adhesive or suitable lock washers.



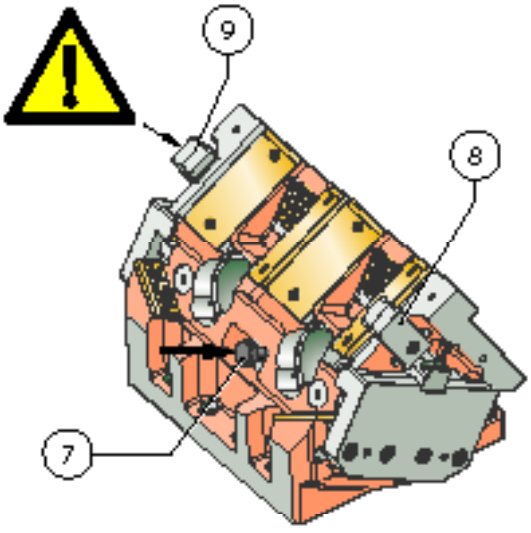
Step 1
- ► Insert the spacer **(1)** and secure with screws (not shown)
- ► Remove screws **(2 + 3)**
- ► Remove lock washers **(4)**
- ► Remove the stop plates **(5)** of the gas springs
- ► Remove the gas springs **(6)** from the bore

CAUTION
The gas spring may only be removed if the spring is released. After removing the stop plate for the gas spring, observe that there is a risk of crushing between the cam unit driver, stop, and cam unit base due to independent movement of the cam unit driver.



Step 2
- ► Slide the cam unit driver into the front position

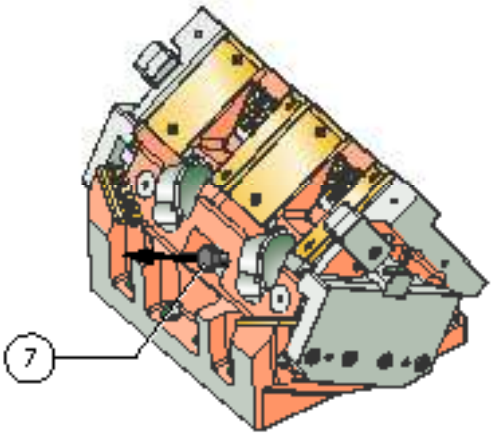
CAUTION
Risk of crushing between the cam unit driver, stop, and cam unit base by movement of the cam unit driver.



Step 3
- ► Fix cam unit driver with lockout screw **(7)** in the front position

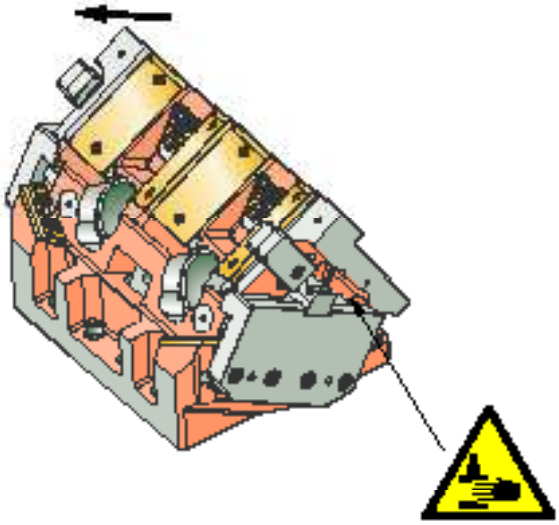
This position corresponds to the closed position (working position) in the tool.

CAUTION
In the classic tool setup process (pressing the cam driver in the tool), the positive return right **(8)** and left **(9)** must be removed in order to avoid damaging the cam unit, cam driver and tool.



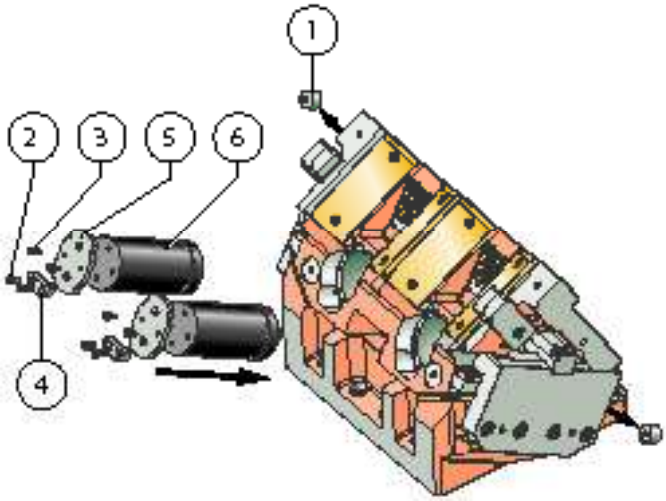
Step 4
Restore the cam unit function after completion of the work (setup, work surface machining).

► Remove lockout screws **(7)**



Step 5
► Slide the cam unit driver backwards

CAUTION
Risk of crushing between the cam unit driver, stop, and cam unit base by movement of the cam unit driver.

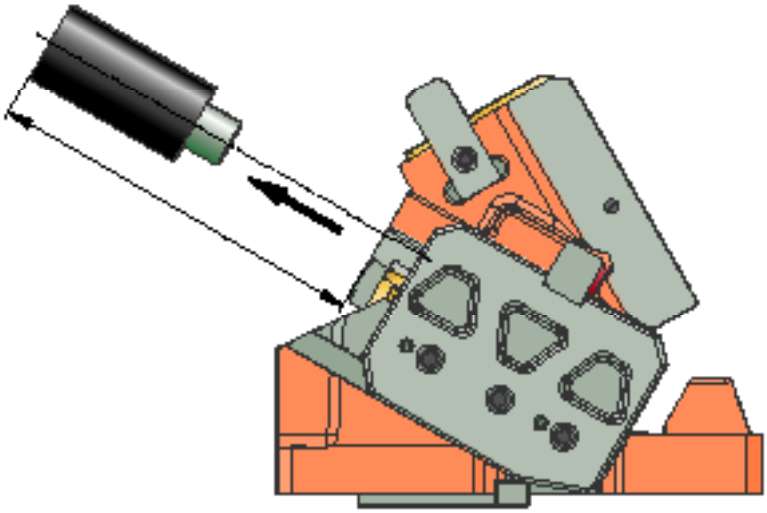


Step 6
► Insert gas springs **(6)** in bores
► Insert the stop plates **(5)** for the gas springs
► Insert lock washers **(4)**
► Fix stop plate and lock washer with screws **(3 + 2)**
► Remove spacer **(1)**

Screws must be secured against loosening by means of adhesive or suitable lock washers.

AERIAL FCC
2016.24.
ASSEMBLY IN THE TOOL

Series 2016.24. cam units are designed so that the screws and pins for positioning and securing the cam unit components in the die are accessible in the open position of the cam unit.
This accessibility can be restricted or completely prevented by tooling on the cam unit working surface.
In such cases, the disassembly / assembly of the fitted cam unit is possible by disassembling the clamp:

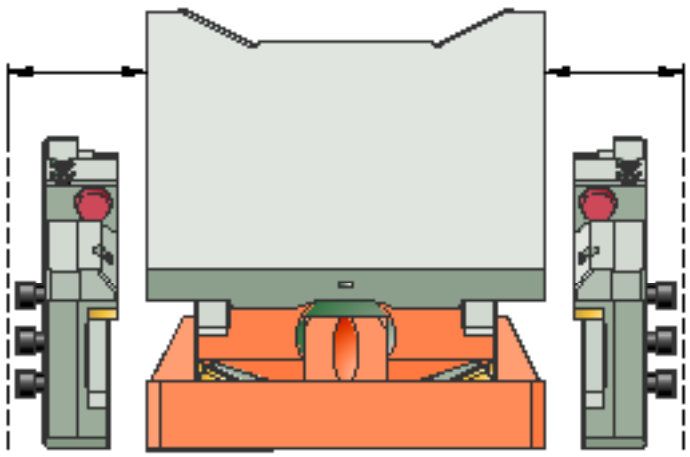


Step 1

► Remove the gas spring before disassembling the cam unit.
In the die, the corresponding mechanical clearances must be taken into account backwards.

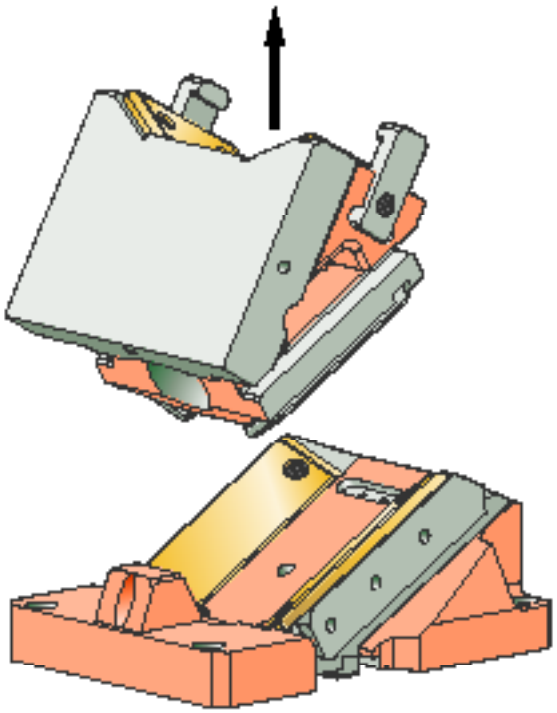
CAUTION

The gas spring may only be removed if the spring is released. After removing the stop plate for the gas spring, observe that there is a risk of crushing between the cam unit driver and the cam unit base due to independent movement of the cam unit driver.

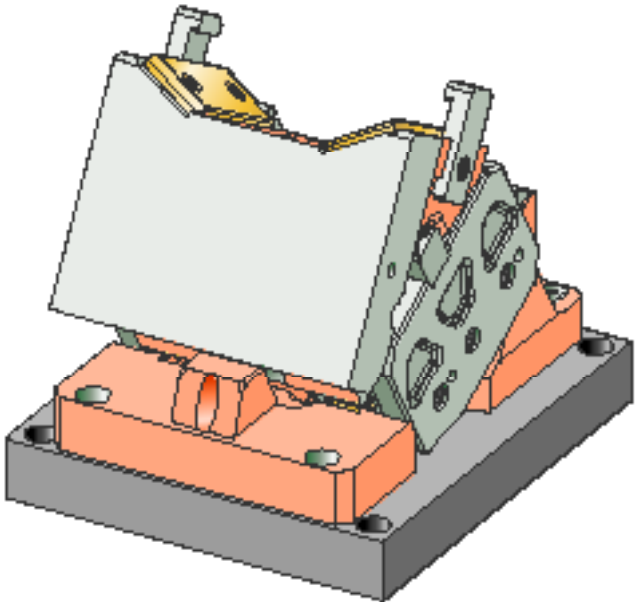


Step 2

► Loosen and remove the left and right guide clamps. No removal of positioning pins required!
In the die, the corresponding mechanical clearances must be provided at the sides.



Step 3
► Lift the (equipped) cam unit upwards.
The cam unit base can remain in the upper die



In the case of installation space problems in the die, an additional mounting plate can also be used as an alternative. The cam unit is positioned and fixed on this mounting plate, the positioning and fastening possibilities to the die lie outside the compact cam unit structure, and are thus easily accessible from above for the necessary fitting aids.
Mounting plates are to be provided by the tool shop if necessary, they are not included in the delivery scope of FIBRO cam units.

INTRODUCTION
AND TABLE OF CONTENTS

ENGINEERING

2016.24. AERIAL FCC BAK — DAIMLER, VOLVO, VOLKSWAGEN GROUP

2016.25. AERIAL FCC BAK — DAIMLER, VOLVO, VOLKSWAGEN GROUP

2016.207. AERIAL ECO LINE

2016.208. AERIAL ECO LINE

CUSTOMER-SPECIFIC
SERVICES

APPENDIX

EMERGENCY SITUATION /
CONTACTS

AERIAL FCC
2016.25.

AERIAL FCC
2016.25.

FIBRO FCC cam units series 2016.25. are a continuation of the FCC Series from a width of 700 mm and higher. This series also impresses with its excellent load bearing as well as the highest precision even after a high number of pressing.
All sliding elements of the cam unit correspond to the VDI standard. The sliding elements are shouldered to absorb thrust. The return springs are accessible from the back side of the cam unit, so that they can be dismounted from the die without removing the cam unit.
FIBRO FCC cam units series 2016.25. meet the requirements of the BAK product specifications.

Various ordering options are available for FIBRO FCC cam units series 2016.25.
- The working surface can be optionally equipped with or without shoulder
- Up to an angle of 45°, the cam units are equipped with a pre-acceleration, whereby a choice can be made between roll or plate pre-acceleration.

FIBRO cam units series 2016.25. are machined on the outer surfaces of the back side of the working surface. This makes it possible to machine the working surface of the cam unit with a simple clamping.
FIBRO FCC cam units series 2016.25. are, of course, available ex works, manufactured according to customer requirements. This meets the highest requirements of modern tool and die makers.

Design features:
- Double prismatic guide against cam driver, square positioned guiding elements against cam base.
- Sliding surfaces hardened steel / bronze with solid lubricant
- Gas springs
- Positive locking connections

FIBRO FCC cam units series 2016.25. are available in the widths from 700 to 1050 mm and in the angular variants 0° to 75 ° (gradation 5°).

Order number	Width [mm]	Performance class [kN]*	Page
2016.25.070.☐☐.☐000.02	700	1600	179
2016.25.075.☐☐.☐000.02	750	1600	179
2016.25.080.☐☐.☐000.02	800	1700	189
2016.25.085.☐☐.☐000.02	850	1700	189
2016.25.090.☐☐.☐000.02	900	1800	199
2016.25.095.☐☐.☐000.02	950	1800	199
2016.25.100.☐☐.☐000.02	1000	2000	209
2016.25.105.☐☐.☐000.02	1050	2000	209

* For exact power values, please refer to the force diagrams of the corresponding cam units

Order options:
.1000 Working surface standard, roll pre-acceleration
.2000 Working surface offset (shoulder on working surface), roll pre-acceleration
.3000 Working surface standard, plate pre-acceleration
.4000 Working surface offset (shoulder on working surface), plate pre-acceleration

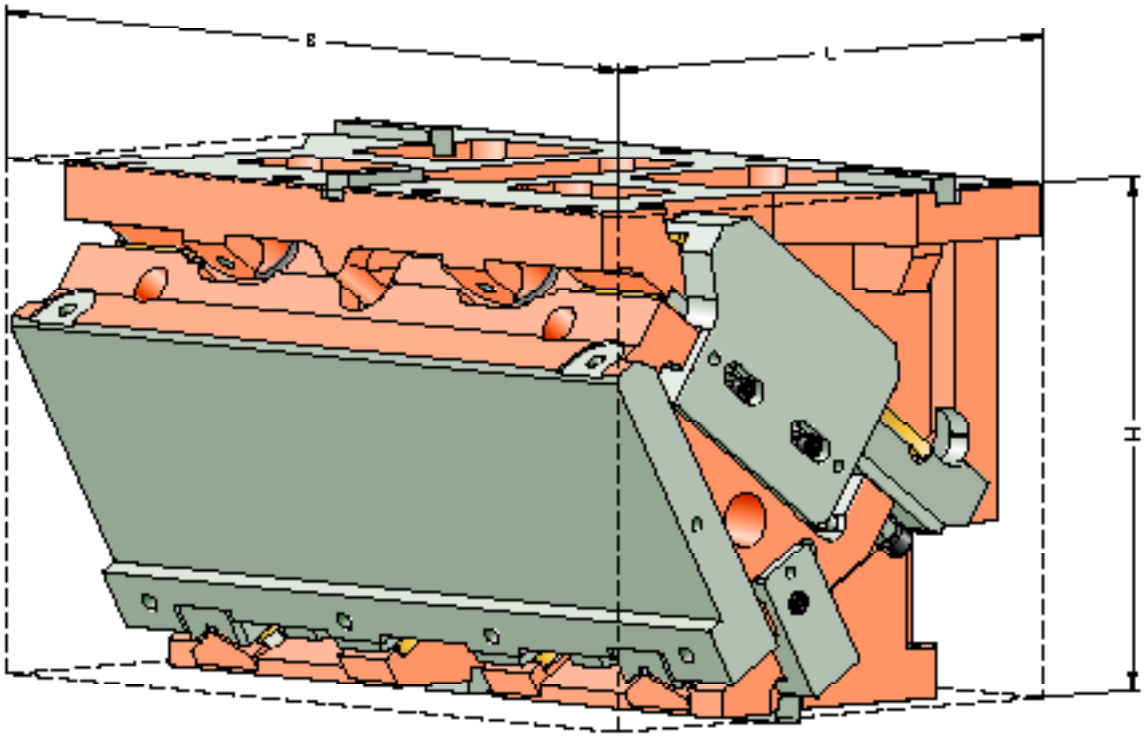
Ordering example:

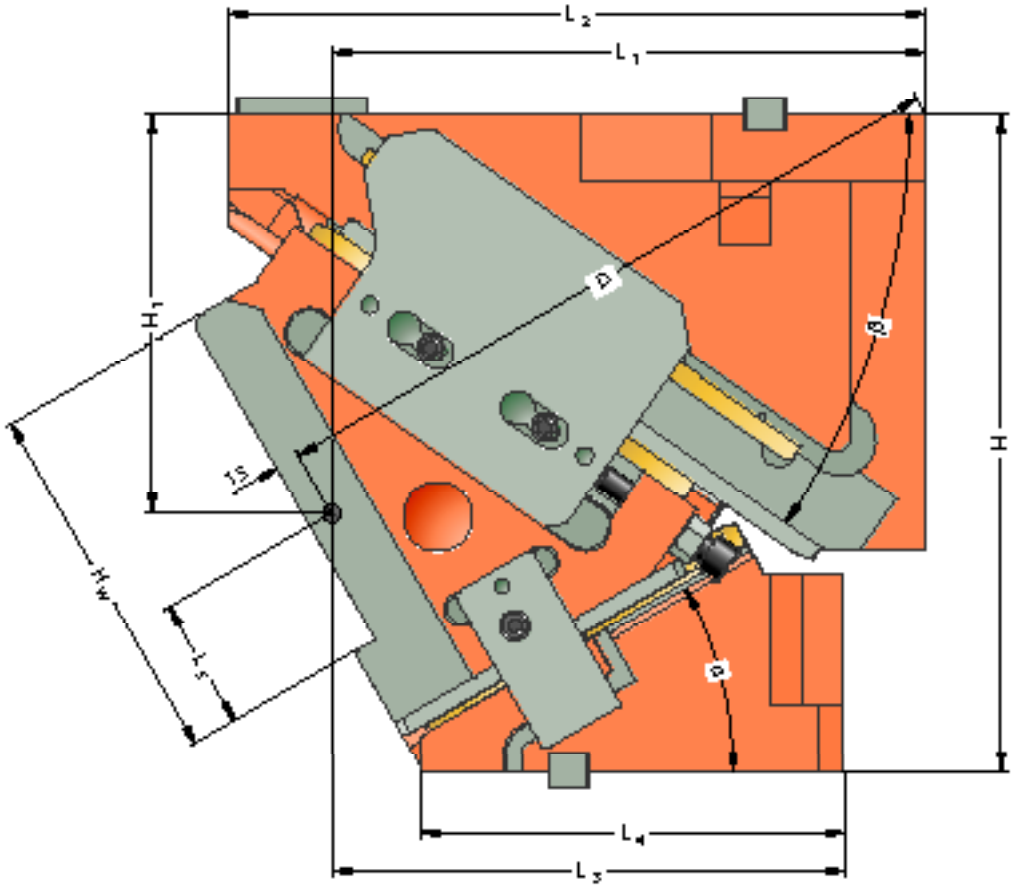
FIBRO cam unit FCC, aerial, width 850 mm	=	2016.25.085.☐☐.☐000.02
Cam unit angle α = 35°	=	35.
Working surface offset (shoulder on working surface), plate pre-acceleration	=	4000.
Order number	=	2016.25.085. 35. 4000.02

AERIAL FCC
2016.25.070./.075.

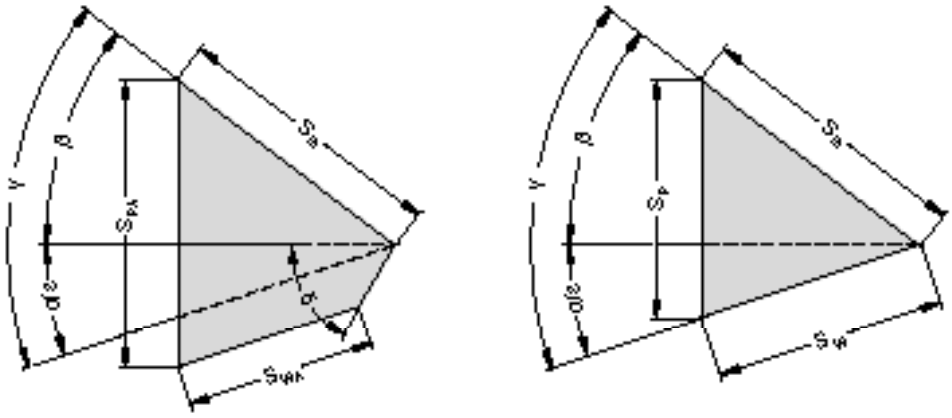
Working width:	700/750 mm
Performance class:	1600 kN

AERIAL FCC
2016.25.070./.075.
SIZE TABLE





AERIAL FCC
2016.25.070./.075.
SIZE TABLE



Order No.	L**	B***	H	H_1	H_W	L_1	L_2	L_3	L_4	L_5	D*	α	β	δ	S_W*	S_{WA}*	S_S	S_P*	S_{PA}*
2016.25.7□0.	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[°]	[°]	[°]	[mm]	[mm]	[mm]	[mm]	[mm]
00.□000.02	395	7□0	400	208	220	365	370	280	305	80	395	0	50	45	-	45.7	100	-	95.2
05.□000.02	409.1	7□0	400	209	220	367.03	385	297.03	308	80	413.8	5	45	50	-	53.8	100	-	95.8
10.□000.02	428	7□0	400	208.61	220	374.12	385	304.12	302	80	434.7	10	45	45	-	56.6	100	-	95.5
15.□000.02	441.4	7□0	400	218.84	220	376.22	405	316.22	300	80	450	15	40	50	-	65.5	100	-	97.2
20.□000.02	449.3	7□0	400	229.69	220	373.27	410	298.27	270	80	459.3	20	40	45	-	68.8	100	-	99.8
25.□000.02	456.6	7□0	400	236.16	220	370.22	420	305.22	263	80	465.3	25	35	50	-	74.3	95	-	98.4
30.□000.02	458	7□0	400	243.22	220	362.01	425	312.01	258	80	465.1	30	35	45	-	79.5	95	-	103.2
35.□000.02	458.5	7□0	400	250.86	220	353.6	440	318.6	253	80	463.5	35	30	50	-	81.4	85	-	97.5
40.□000.02	462.9	7□0	400	259.08	220	349.93	450	324.93	247	80	464.6	40	25	55	-	93.0	85	-	104.0
45.□000.02	461.2	7□0	400	262.83	220	340.96	455	330.96	243	80	456.9	45	20	60	-	100.2	80	-	105.7
50.□000.02	483.2	7□0	400	267.09	220	356.64	480	336.64	264	80	463.9	50	10	-	107.2	-	70	94.3	-
55.□000.02	475.1	7□0	400	271.83	220	331.93	460	341.93	260	80	443.1	55	10	-	103.0	-	60	94.8	-
60.□000.02	480	7□0	400	277.01	220	316.78	470	326.78	237	80	428.3	60	10	-	108.3	-	55	103.4	-
65.□000.02	490	7□0	400	282.6	220	281.17	440	331.17	234	80	404.9	65	0	-	106.5	-	45	96.5	-
70.□000.02	505	7□0	400	288.54	220	265.05	435	335.05	232	80	391.8	70	0	-	117.0	-	40	109.9	-
75.□000.02	515	7□0	400	294.81	220	248.39	425	338.39	230	80	379.1	75	0	-	115.9	-	30	112.0	-

* Values rounded
** Values L, D measured for option with shouldered working surface
*** 7□0 = 7**0**0 or 7**5**0 mm

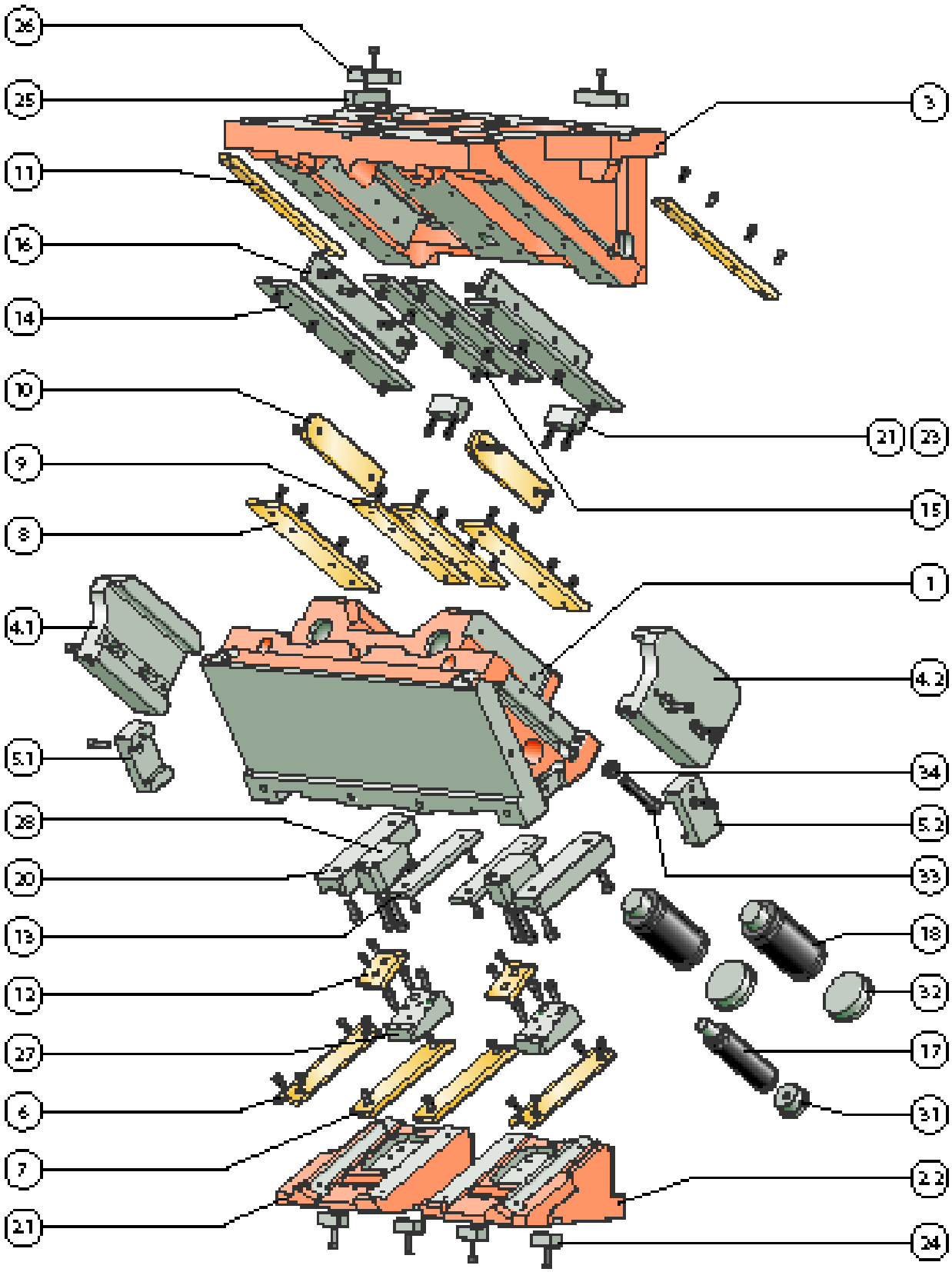
Mounting cam base:

Hexagon socket head cap screws DIN EN ISO 4762	8x M20 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x ø16

Mounting cam driver:

Hexagon socket head cap screws DIN EN ISO 4762	2x4 M16 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x2 ø12

AERIAL FCC
2016.25.070./.075.
EXPLODED VIEW



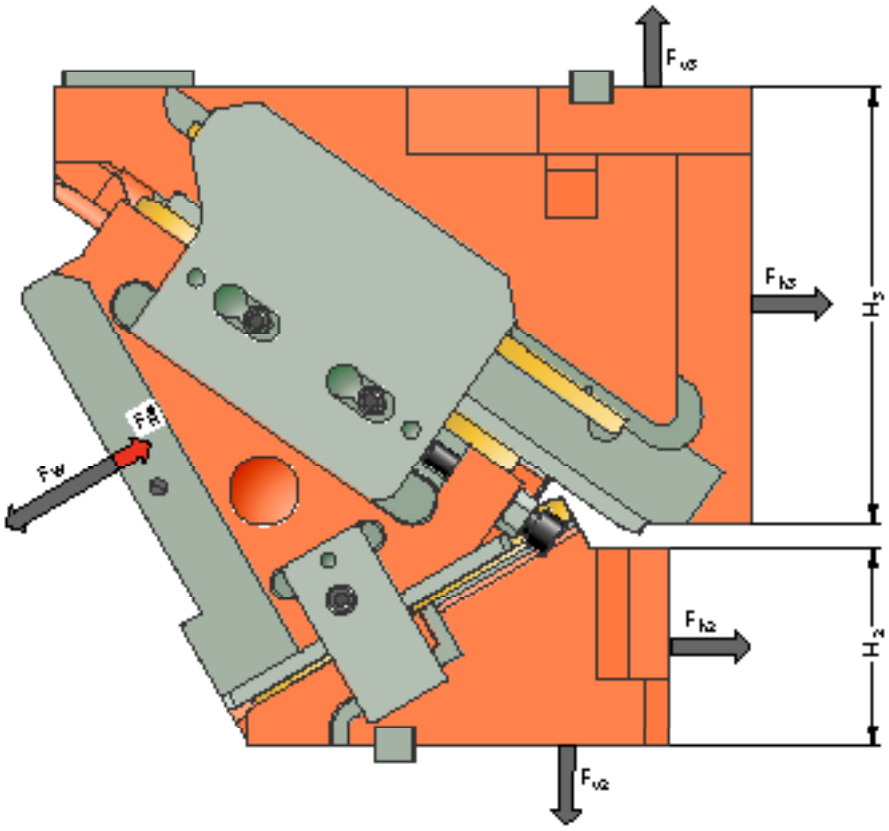
AERIAL FCC
2016.25.070./.075.
PARTS LIST

Position	Piece	Designation	Material	spare part
1	1	Slider		
2.1	1	Driver, left		
2.2	1	Driver, right		
3	1	Slider base		
4.1	1	Clamp, left		x
4.2	1	Clamp, right		x
5.1	1	Positive return, left		x
5.2	1	Positive return, right		x
6	4	Sliding plate VDI	Bronze with solid lubricant	x
7	2	Sliding plate VDI	Bronze with solid lubricant	x
8	2	Sliding plate VDI	Bronze with solid lubricant	x
9	2	Sliding plate VDI	Bronze with solid lubricant	x
10	2	Sliding plate VDI	Bronze with solid lubricant	x
11	2	Sliding plate VDI	Bronze with solid lubricant	x
12**	2	Sliding plate VDI	Bronze with solid lubricant	x
13	2	Sliding plate VDI	Steel	x
14	2	Sliding plate VDI	Steel	x
15	2	Sliding plate VDI	Steel	x
16	2	Sliding plate VDI	Steel	x
17	1	Gas spring	2487.12.00750.125	x
18	2	Gas spring	2487.12.02400. □□□	x
19				x
20	2	Prismatic guide		x
21	2	Stop plate		x
22				
23	2	Damper		x
24	4	Feather key (T-nut)		x
25	1	Feather key (T-nut)		x
26	2	Feather key (T-nut)		x
27**	2	Construction piece		x
28**	2	Slide pad		x
29* (not shown)	2	Curve wedge		x
30* (not shown)	2	Roller block		x
31	1	Locking screw		x
32	2	Locking screw		x
33	2	Ball-head screw		x
34	2	Hexagon nut		x

up to and including 45° with pre-acceleration
Optionally:
* Roll pre-acceleration (.1000. /.2000.)
** Plate pre-acceleration (.3000. /.4000.)

For inquiries or when ordering spare parts (x), we require the following data:
- Cam unit order no.
- Cam unit serial number
- Item number / Designation / Spare part

AERIAL FCC
2016.25.070./.075.
SYSTEM AND SURROUNDING FORCES



Order number	α [°]	F_W [kN]	F_R* [kN]	F_{h2} [kN]	F_{v2} [kN]	F_{h3} [kN]	F_{v3} [kN]	H_2 [mm]	H_3 [mm]
2016.25.07☐.00.☐000.02	0	1600	101.0	0	1343	1600	1343	40	300
2016.25.07☐.05.☐000.02	5	1600	102.9	117	1337	1477	1477	40	275
2016.25.07☐.10.☐000.02	10	1600	114.5	195	1103	1381	1381	75	275
2016.25.07☐.15.☐000.02	15	1600	116.1	290	1082	1256	1496	80	255
2016.25.07☐.20.☐000.02	20	1600	131.4	316	868	1188	1415	90	245
2016.25.07☐.25.☐000.02	25	1600	130.3	390	837	1060	1513	110	215
2016.25.07☐.30.☐000.02	30	1600	151.2	373	646	1013	1446	120	210
2016.25.07☐.35.☐000.02	35	1600	147.2	428	611	883	1529	140	210
2016.25.07☐.40.☐000.02	40	1600	148.1	480	572	746	1600	150	190
2016.25.07☐.45.☐000.02	45	1600	146.2	528	528	604	1659	170	170
2016.25.07☐.50.☐000.02	50	1600	124.1	708	594	321	1819	170	120
2016.25.07☐.55.☐000.02	55	1600	137.6	611	428	307	1739	180	115
2016.25.07☐.60.☐000.02	60	1600	170.7	504	291	296	1677	180	110
2016.25.07☐.65.☐000.02	65	1600	135.5	676	315	0	1765	190	85
2016.25.07☐.70.☐000.02	70	1600	163.1	547	199	0	1703	205	85
2016.25.07☐.75.☐000.02	75	1600	191.8	414	111	0	1656	220	85

* Retraction force values correspond to the spring-generated retraction force at the working point point

The forces F_{h2}, F_{V2} as well as F_{h3}, F_{V3} act on the tool environment at maximum working force F_W.

AERIAL FCC
2016.25.070./.075.
FORCE DIAGRAM

shouldered

0°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	60	77	211	654	211	77	60
45	72	97	336	1044	336	97	72
45	83	117	543	1435	543	117	83
45	94	136	653	1633	653	136	94
45	105	156	451	1207	451	156	105

5°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	65	84	242	732	242	84	65
45	78	108	370	1100	370	108	78
45	89	129	566	1469	566	129	89
45	99	143	650	1620	650	143	99
45	108	158	458	1219	458	158	108

10°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	69	92	274	810	274	92	69
45	83	119	404	1156	404	119	83
45	95	141	589	1502	589	141	95
45	103	150	648	1607	648	150	103
45	112	160	466	1231	466	160	112

15°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	75	101	312	905	312	101	75
45	90	132	446	1234	446	132	90
45	104	156	624	1564	624	156	104
45	110	160	657	1623	657	160	110
45	117	164	482	1267	482	164	117

20°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	79	109	344	984	344	109	79
45	96	143	481	1291	481	143	96
45	110	169	648	1598	648	169	110
45	115	167	655	1610	655	167	115
45	121	166	490	1279	490	166	121

25°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	84	117	376	1064	376	117	84
45	102	154	515	1348	515	154	102
45	116	181	672	1632	672	181	116
45	120	174	652	1597	652	174	120
45	124	168	497	1292	497	168	124

Support with feather key

0°

Height 225 mm	Width 700 mm						
	40	40	40	20	40	40	40
45	48	46	63	131	63	46	48
45	58	58	101	209	101	58	58
45	66	70	163	287	163	70	66
45	75	82	196	327	196	82	75
45	84	94	135	241	135	94	84

5°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	52	51	80	176	80	51	52
45	62	65	122	264	122	65	62
45	71	77	187	352	187	77	71
45	79	86	215	389	215	86	79
45	87	95	151	293	151	95	87

10°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	55	55	99	227	99	55	55
45	67	71	145	324	145	71	67
45	76	85	212	421	212	85	76
45	83	90	233	450	233	90	83
45	89	96	168	345	168	96	89

15°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	60	61	122	290	122	61	60
45	72	79	174	395	174	79	72
45	83	94	243	500	243	94	83
45	88	96	256	519	256	96	88
45	94	99	188	405	188	99	94

20°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	63	65	145	354	145	65	63
45	77	86	202	465	202	86	77
45	88	101	272	575	272	101	88
45	92	100	275	580	275	100	92
45	97	100	206	460	206	100	97

25°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	67	70	169	426	169	70	67
45	82	93	232	539	232	93	82
45	93	109	302	653	302	109	93
45	96	105	293	639	293	105	96
45	99	101	224	517	224	101	99

AERIAL FCC
2016.25.070./.075.
FORCE DIAGRAM

shouldered

30°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	84	119	390	1092	390	119	84
45	103	158	525	1341	525	158	103
45	117	185	664	1591	664	185	117
45	119	173	620	1511	620	173	119
45	122	162	482	1245	482	162	122

35°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	88	125	417	1157	417	125	88
45	107	167	553	1382	553	167	107
45	122	195	680	1608	680	195	122
45	123	178	612	1484	612	178	123
45	124	162	485	1245	485	162	124

40°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	90	127	425	1170	425	127	90
45	110	167	566	1407	566	167	110
45	125	193	674	1595	674	193	125
45	123	176	599	1462	599	176	123
45	121	160	474	1227	474	160	121

45°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	93	132	441	1206	441	132	93
45	115	170	590	1460	590	170	115
45	130	195	681	1614	681	195	130
45	125	178	599	1467	599	178	125
45	120	161	472	1232	472	161	120

50°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	95	133	450	1220	450	133	95
45	118	170	603	1486	603	170	118
45	133	193	674	1601	674	193	133
45	125	176	586	1444	586	176	125
45	116	159	462	1213	462	159	116

55°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	97	135	458	1234	458	135	97
45	121	170	617	1512	617	170	121
45	136	191	668	1589	668	191	136
45	125	174	574	1421	574	174	125
45	113	158	451	1195	451	158	113

Support with feather key

30°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	67	74	187	480	187	74	67
45	82	98	252	590	252	98	82
45	94	114	319	700	319	114	94
45	96	107	298	665	298	107	96
45	98	100	231	548	231	100	98

35°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	70	80	213	555	213	80	70
45	86	107	282	663	282	107	86
45	98	125	347	772	347	125	98
45	98	114	312	712	312	114	98
45	99	104	247	597	247	104	99

40°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	72	84	230	609	230	84	72
45	88	110	305	732	305	110	88
45	100	127	364	830	364	127	100
45	98	116	324	760	324	116	98
45	97	106	256	638	256	106	97

45°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	75	89	252	676	252	89	75
45	92	116	336	818	336	116	92
45	104	132	388	904	388	132	104
45	100	121	341	822	341	121	100
45	96	110	269	690	269	110	96

50°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	76	93	270	732	270	93	76
45	94	119	362	892	362	119	94
45	107	135	404	961	404	135	107
45	100	123	352	866	352	123	100
45	93	112	277	728	277	112	93

55°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	78	98	288	790	288	98	78
45	97	122	388	967	388	122	97
45	109	138	421	1017	421	138	109
45	100	126	362	910	362	126	100
45	90	113	284	764	284	113	90

Subject to alterations

AERIAL FCC
2016.25.070./.075.
FORCE DIAGRAM

shouldered

60°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	101	140	475	1271	475	140	101
45	126	173	642	1566	642	173	126
45	142	193	674	1606	674	193	142
45	127	176	572	1425	572	176	127
45	112	159	449	1198	449	159	112

65°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	105	145	492	1309	492	145	105
45	132	176	667	1622	667	176	132
45	147	195	679	1623	679	195	147
45	129	177	570	1427	570	177	129
45	110	160	446	1201	446	160	110

70°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	104	143	487	1287	487	143	104
45	131	171	663	1604	663	171	131
45	146	188	654	1566	654	188	146
45	125	171	542	1365	542	171	125
45	104	154	423	1150	423	154	104

75°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	105	143	490	1289	490	143	105
45	133	169	670	1615	670	169	133
45	148	184	642	1539	642	184	148
45	124	167	525	1330	525	167	124
45	99	150	408	1120	408	150	99

Support with feather key

60°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	81	104	313	864	313	104	81
45	101	128	424	1065	424	128	101
45	113	143	445	1092	445	143	113
45	101	130	378	969	378	130	101
45	89	117	296	815	296	117	89

65°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	84	110	339	943	339	110	84
45	105	134	461	1168	461	134	105
45	118	148	469	1168	469	148	118
45	103	135	393	1028	393	135	103
45	88	121	308	865	308	121	88

70°

Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	83	111	350	978	350	111	83
45	105	133	477	1219	477	133	105
45	117	146	471	1190	471	146	117
45	100	133	390	1038	390	133	100
45	83	120	304	874	304	120	83

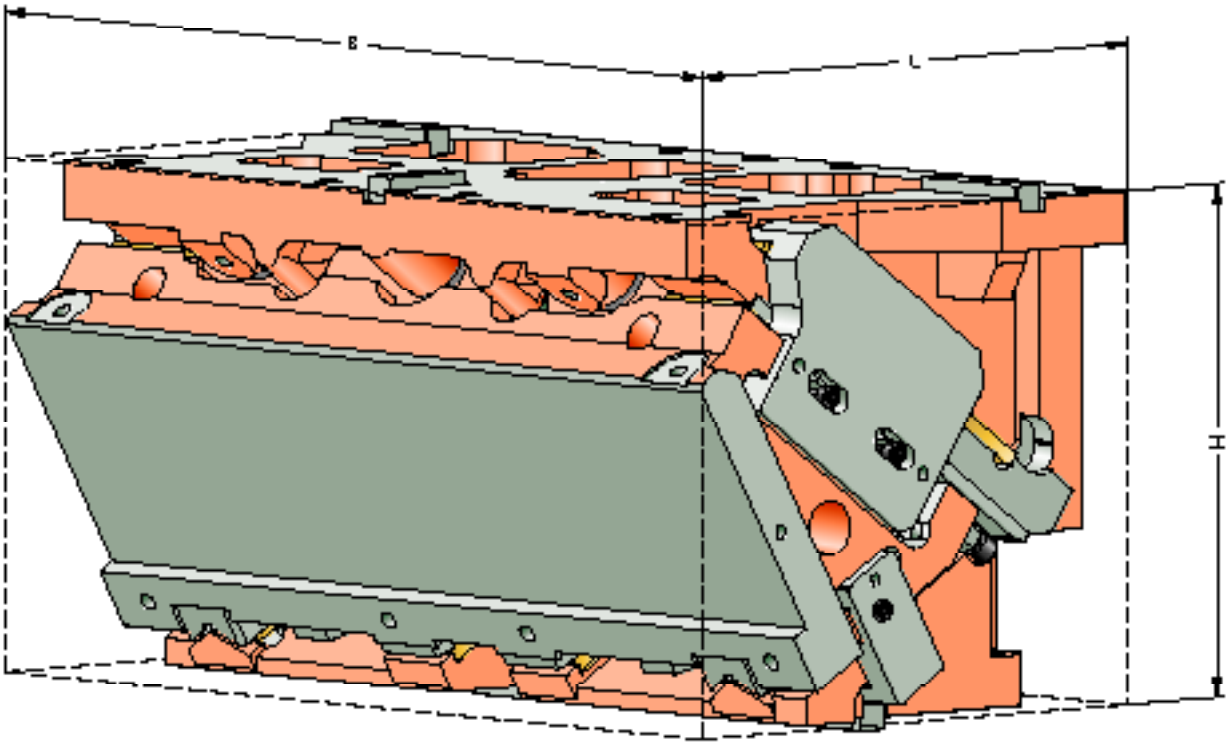
75°

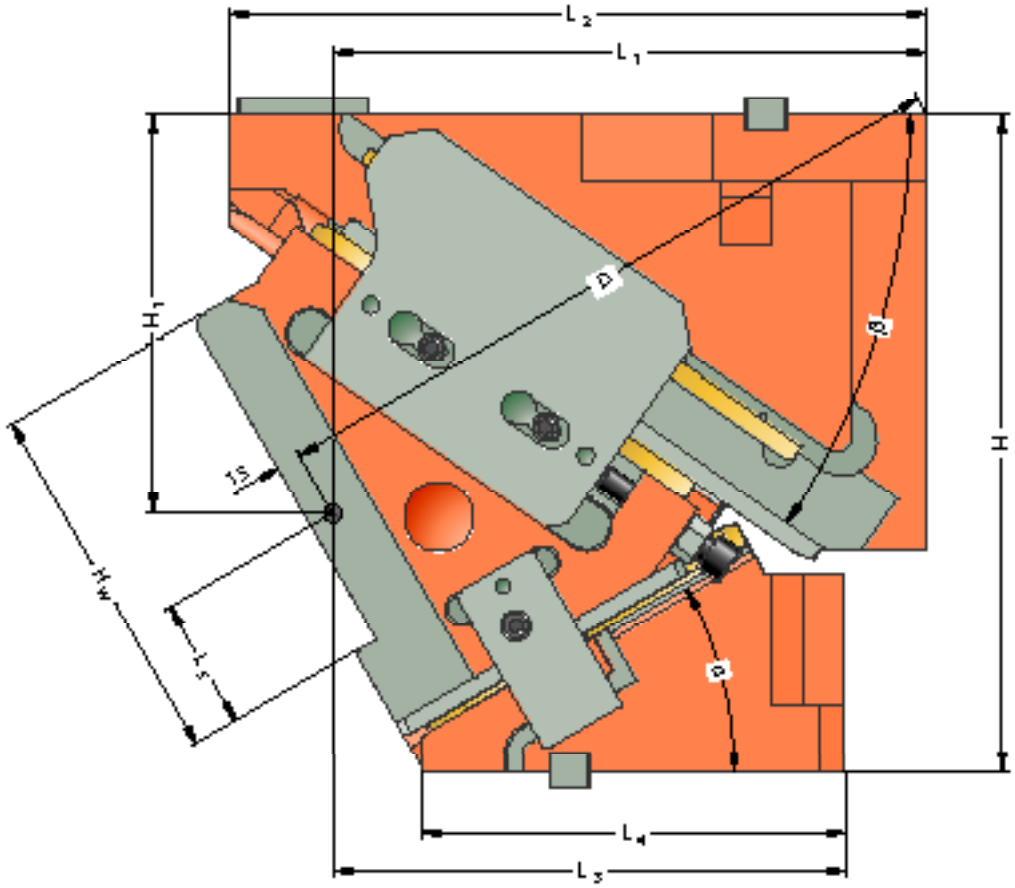
Height 225 mm	Width 700 mm						
	105	105	105	70	105	105	105
45	84	115	368	1031	368	115	84
45	106	135	502	1292	502	135	106
45	118	147	481	1231	481	147	118
45	99	134	394	1064	394	134	99
45	80	120	306	896	306	120	80

AERIAL FCC 2016.25.080./085.

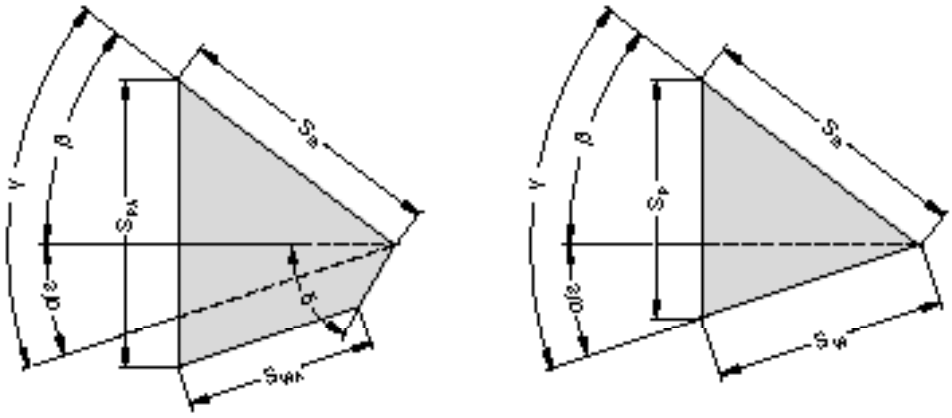
Working width:	800/850 mm
Performance class:	1700 kN

AERIAL FCC
2016.25.080./.085.
SIZE TABLE





AERIAL FCC
2016.25.080./.085.
SIZE TABLE



Order No.	L**	B***	H	H_1	H_W	L_1	L_2	L_3	L_4	L_5	D**	α	β	δ	S_W*	S_{WA}*	S_S	S_P*	S_{PA}*
2016.25.8□0.	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[°]	[°]	[°]	[mm]	[mm]	[mm]	[mm]	[mm]
00.□000.02	395	8□0	400	208	220	365	370	280	305	80	395	0	50	45	-	45.7	100	-	95.2
05.□000.02	409.1	8□0	400	209	220	367.03	385	297.03	308	80	413.84	5	45	50	-	53.8	100	-	95.8
10.□000.02	428	8□0	400	208.61	220	374.12	385	304.12	302	80	434.66	10	45	45	-	56.6	100	-	95.5
15.□000.02	441.4	8□0	400	218.84	220	376.22	405	316.22	300	80	450.04	15	40	50	-	65.5	100	-	97.2
20.□000.02	449.3	8□0	400	229.69	220	373.27	410	298.27	270	80	459.32	20	40	45	-	68.8	100	-	99.8
25.□000.02	456.6	8□0	400	236.16	220	370.22	420	305.22	263	80	465.33	25	35	50	-	74.3	95	-	98.4
30.□000.02	458	8□0	400	243.22	220	362.01	425	312.01	258	80	465.12	30	35	45	-	79.5	95	-	103.2
35.□000.02	458.5	8□0	400	250.86	220	353.6	440	318.6	253	80	463.54	35	30	50	-	81.4	85	-	97.5
40.□000.02	462.9	8□0	400	259.08	220	349.93	450	324.93	247	80	464.59	40	25	55	-	93.0	85	-	104.0
45.□000.02	461.2	8□0	400	262.83	220	340.96	455	330.96	243	80	456.94	45	20	60	-	100.2	80	-	105.7
50.□000.02	483.2	8□0	400	267.09	220	356.64	480	336.64	264	80	463.85	50	10	-	107.2	-	70	94.3	-
55.□000.02	475.1	8□0	400	271.83	220	331.93	460	341.93	260	80	443.05	55	10	-	103.0	-	60	94.8	-
60.□000.02	480	8□0	400	277.01	220	316.78	470	326.78	237	80	428.29	60	10	-	108.3	-	55	103.4	-
65.□000.02	490	8□0	400	282.6	220	281.17	440	331.17	234	80	404.94	65	0	-	106.5	-	45	96.5	-
70.□000.02	505	8□0	400	288.54	220	265.05	435	335.05	232	80	391.79	70	0	-	117.0	-	40	109.9	-
75.□000.02	515	8□0	400	294.81	220	248.39	425	338.39	230	80	379.05	75	0	-	115.9	-	30	112.0	-

* Values rounded
** Values L, D measured for option with shouldered working surface
*** 8□0 = 800 or 850 mm

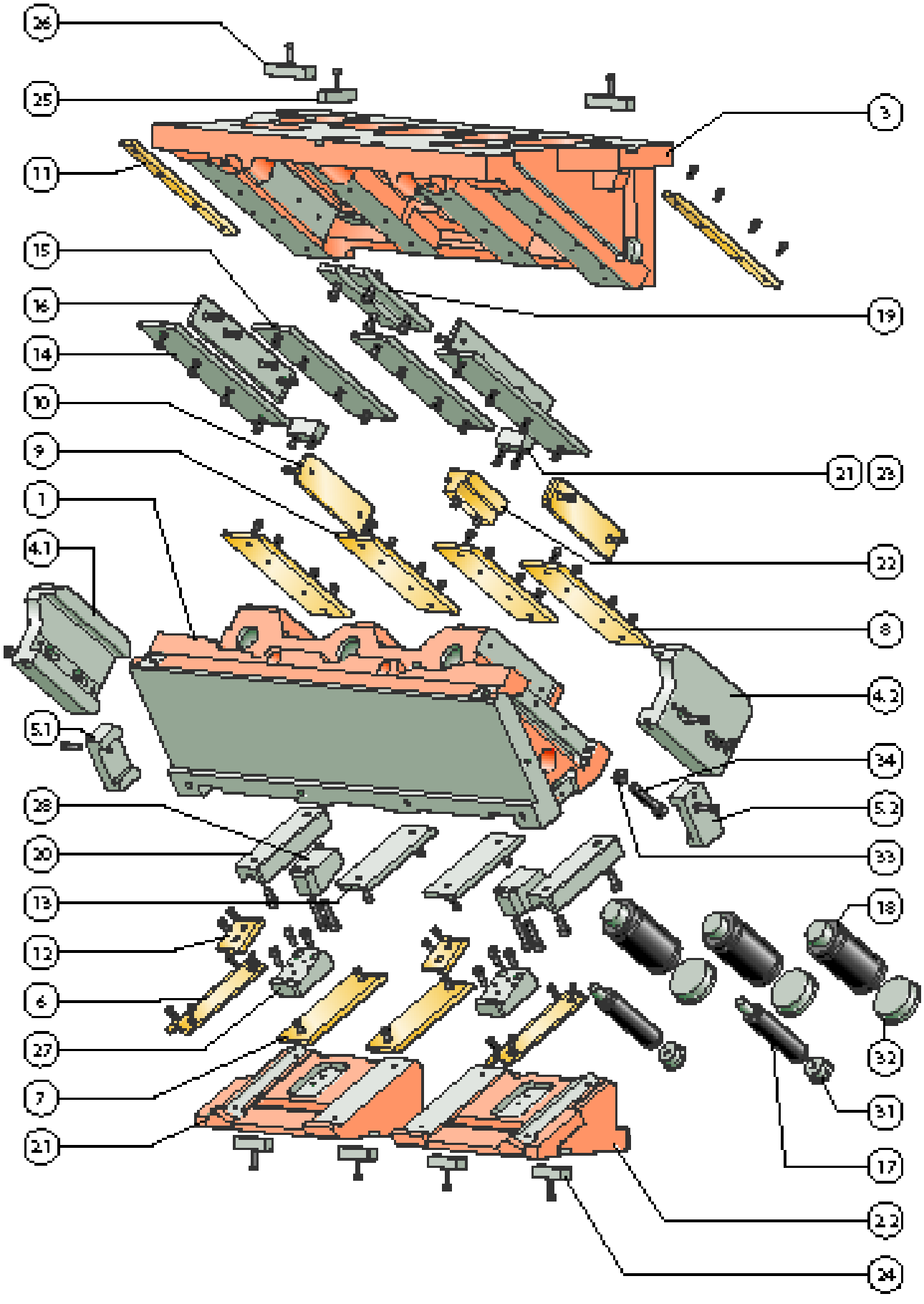
Mounting cam base:

Hexagon socket head cap screws DIN EN ISO 4762	8x M20 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x ø16

Mounting cam driver:

Hexagon socket head cap screws DIN EN ISO 4762	2x4 M16 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x2 ø12

AERIAL FCC
2016.25.080./.085.
EXPLODED VIEW



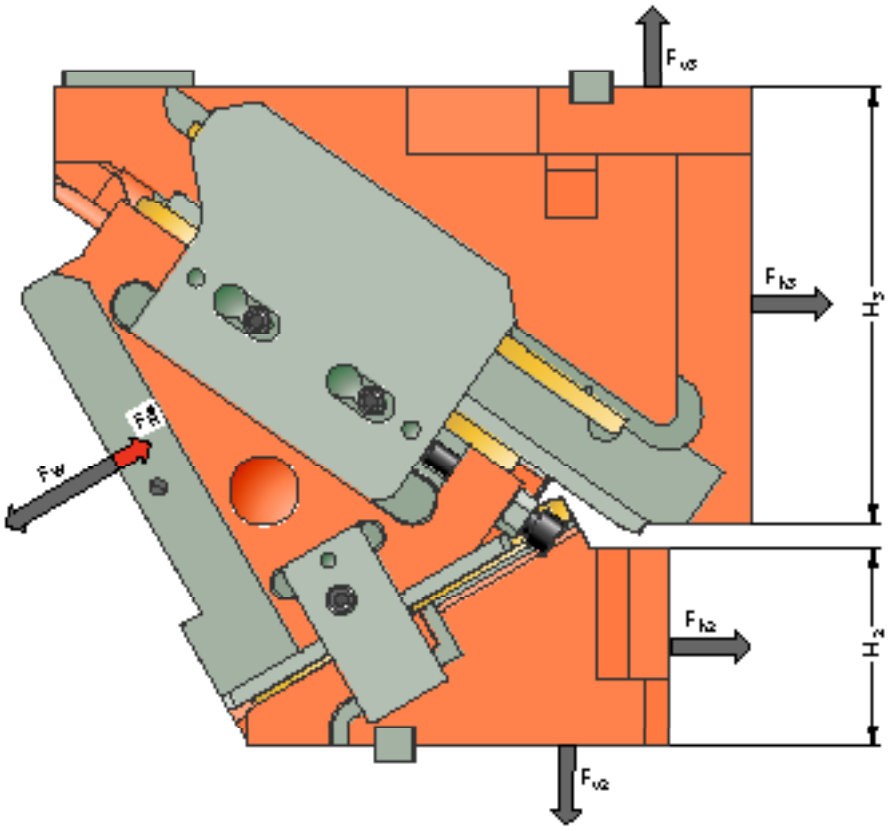
AERIAL FCC
2016.25.080./.085.
PARTS LIST

Position	Piece	Designation	Material	spare part
1	1	Slider		
2.1	1	Driver, left		
2.2	1	Driver, right		
3	1	Slider cam base		
4.1	1	Clamp, left		x
4.2	1	Clamp, right		x
5.1	1	Positive return, left		x
5.2	1	Positive return, right		x
6	4	Sliding plate VDI	Bronze with solid lubricant	x
7	2	Sliding plate VDI	Bronze with solid lubricant	x
8	2	Sliding plate VDI	Bronze with solid lubricant	x
9	2	Sliding plate VDI	Bronze with solid lubricant	x
10	2	Sliding plate VDI	Bronze with solid lubricant	x
11	2	Sliding plate VDI	Bronze with solid lubricant	x
12**	2	Sliding plate VDI	Bronze with solid lubricant	x
13	2	Sliding plate VDI	Steel	x
14	2	Sliding plate VDI	Steel	x
15	2	Sliding plate VDI	Steel	x
16	2	Sliding plate VDI	Steel	x
17	2	Gas spring	2487.12.00500.125	x
18	3	Gas spring	2487.12.02400.□□□	x
19	2	Cover strip		x
20	2	Prismatic guide		x
21	2	Stop plate		x
22	1	Centre guide		x
23	2	Damper		x
24	4	Feather key (T-nut)		x
25	1	Feather key (T-nut)		x
26	2	Feather key (T-nut)		x
27**	2	Construction piece		x
28**	2	Slide pad		x
29* (not shown)	2	Curve wedge		x
30* (not shown)	2	Roller block		x
31	2	Locking screw		x
32	3	Locking screw		x
33	2	Ball-head screw		x
34	2	Hexagon nut		x

up to and including 45° with pre-acceleration
Optionally:
* Roll pre-acceleration (.1000. /.2000.)
** Plate pre-acceleration (.3000. /.4000.)

For inquiries or when ordering spare parts (x), we require the following data:
- Cam unit order no.
- Cam unit serial number
- Item number / Designation / Spare part

AERIAL FCC
2016.25.080./.085.
SYSTEM AND SURROUNDING FORCES



Order number	α [°]	F_W [kN]	F_R* [kN]	F_{h2} [kN]	F_{v2} [kN]	F_{h3} [kN]	F_{v3} [kN]	H_2 [mm]	H_3 [mm]
2016.25.08□.02.□000.02	0	1700	149.3	0	1426	1700	1426	40	300
2016.25.08□.05.□000.02	5	1700	152.3	124	1421	1569	1569	40	275
2016.25.08□.10.□000.02	10	1700	169.6	207	1172	1467	1467	75	275
2016.25.08□.15.□000.02	15	1700	172.3	308	1150	1334	1590	80	255
2016.25.08□.20.□000.02	20	1700	195.1	407	1119	1190	1700	90	245
2016.25.08□.25.□000.02	25	1700	193.9	415	890	1126	1608	110	215
2016.25.08□.30.□000.02	30	1700	225.1	396	687	1076	1537	120	210
2016.25.08□.35.□000.02	35	1700	219.4	455	649	938	1624	140	210
2016.25.08□.40.□000.02	40	1700	221.1	510	607	793	1700	150	190
2016.25.08□.45.□000.02	45	1700	218.6	561	561	642	1763	170	170
2016.25.08□.50.□000.02	50	1700	186.1	752	631	341	1933	170	120
2016.25.08□.55.□000.02	55	1700	206.6	649	455	326	1847	180	115
2016.25.08□.60.□000.02	60	1700	256.5	536	309	314	1782	180	110
2016.25.08□.65.□000.02	65	1700	204.3	718	335	0	1876	190	85
2016.25.08□.70.□000.02	70	1700	246.0	581	212	0	1809	205	85
2016.25.08□.75.□000.02	75	1700	289.9	440	118	0	1760	220	85

* Retraction force values correspond to the spring-generated retraction force at the working point point

The forces F_{h2}, F_{V2} as well as F_{h3}, F_{V3} act on the tool environment at maximum working force F_W.

AERIAL FCC
2016.25.080./.085.
FORCE DIAGRAM

shouldered

0°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	76	113	335	869	335	113	76
45	94	145	491	1310	491	145	94
45	108	169	689	1680	689	169	108
45	114	169	703	1705	703	169	114
45	120	169	504	1306	504	169	120

5°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	79	118	354	926	354	118	79
45	97	152	512	1345	512	152	97
45	112	178	705	1703	705	178	112
45	117	175	705	1704	705	175	117
45	123	172	514	1322	514	172	123

10°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	81	123	374	984	374	123	81
45	100	160	533	1380	533	160	100
45	116	186	721	1725	721	186	116
45	121	180	708	1703	708	180	121
45	126	174	524	1339	524	174	126

15°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	82	126	387	1022	387	126	82
45	102	165	545	1389	545	165	102
45	117	191	723	1715	723	191	117
45	122	182	698	1671	698	182	122
45	126	173	524	1331	524	173	126

20°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	84	130	402	1069	402	130	84
45	104	170	561	1410	561	170	104
45	120	198	732	1721	732	198	120
45	124	186	694	1655	694	186	124
45	128	174	529	1334	529	174	128

25°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	87	136	425	1135	425	136	87
45	108	179	587	1457	587	179	108
45	125	208	754	1759	754	208	125
45	128	193	703	1670	703	193	128
45	132	178	543	1363	543	178	132

Support with feather key

0°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	61	68	100	174	100	68	61
45	75	87	147	262	147	87	75
45	87	101	207	336	207	101	87
45	91	101	211	341	211	101	91
45	96	102	151	261	151	102	96

5°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	63	71	117	222	117	71	63
45	78	91	169	323	169	91	78
45	90	107	233	409	233	107	90
45	94	105	233	409	233	105	94
45	98	103	170	317	170	103	98

10°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	65	74	135	275	135	74	65
45	80	96	192	386	192	96	80
45	93	112	259	483	259	112	93
45	97	108	255	477	255	108	97
45	101	104	189	375	189	104	101

15°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	66	75	151	327	151	75	66
45	82	99	212	444	212	99	82
45	94	115	282	549	282	115	94
45	97	109	272	535	272	109	97
45	101	104	204	426	204	104	101

20°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	67	78	169	385	169	78	67
45	83	102	235	508	235	102	83
45	96	119	307	620	307	119	96
45	99	112	291	596	291	112	99
45	102	104	222	480	222	104	102

25°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	70	81	191	454	191	81	70
45	87	108	264	583	264	108	87
45	100	125	339	704	339	125	100
45	103	116	316	668	316	116	103
45	106	107	244	545	244	107	106

AERIAL FCC
2016.25.080./.085.
FORCE DIAGRAM

shouldered

30°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	90	141	445	1191	445	141	90
45	112	187	608	1491	608	187	112
45	128	217	769	1781	769	217	128
45	132	198	705	1669	705	198	132
45	135	180	553	1379	553	180	135

35°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	87	138	438	1178	438	138	87
45	108	183	594	1440	594	183	108
45	125	213	741	1702	741	213	125
45	128	192	669	1575	669	192	128
45	130	172	531	1318	531	172	130

40°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	90	139	451	1202	451	139	90
45	112	184	608	1467	608	184	112
45	129	212	738	1695	738	212	129
45	128	191	658	1556	658	191	128
45	127	170	522	1303	522	170	127

45°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	93	142	469	1238	469	142	93
45	117	186	629	1509	629	186	117
45	134	214	742	1705	742	214	134
45	130	191	655	1552	655	191	130
45	125	169	518	1300	518	169	125

50°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	96	144	486	1274	486	144	96
45	122	188	649	1551	649	188	122
45	139	215	746	1714	746	215	139
45	131	191	650	1547	650	191	131
45	124	167	513	1298	513	167	124

55°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	99	147	504	1311	504	147	99
45	127	191	670	1594	670	191	127
45	144	217	750	1723	750	217	144
45	133	192	646	1542	646	192	133
45	122	166	509	1295	509	166	122

Support with feather key

30°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	72	87	213	524	213	87	72
45	89	116	292	656	292	116	89
45	103	134	369	784	369	134	103
45	105	123	339	734	339	123	105
45	108	112	265	607	265	112	108

35°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	70	88	224	566	224	88	70
45	87	117	303	691	303	117	87
45	100	136	378	817	378	136	100
45	102	123	341	756	341	123	102
45	104	110	271	633	271	110	104

40°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	72	92	244	625	244	92	72
45	90	121	328	763	328	121	90
45	103	140	399	882	399	140	103
45	102	126	356	809	356	126	102
45	102	112	282	677	282	112	102

45°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	74	96	267	693	267	96	74
45	94	127	358	845	358	127	94
45	107	145	423	955	423	145	107
45	104	130	373	869	373	130	104
45	100	115	295	728	295	115	100

50°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	77	101	292	765	292	101	77
45	97	132	390	931	390	132	97
45	111	151	448	1028	448	151	111
45	105	134	390	928	390	134	105
45	99	117	308	779	308	117	99

55°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	80	106	318	839	318	106	80
45	101	137	422	1020	422	137	101
45	116	156	473	1103	473	156	116
45	106	138	407	987	407	138	106
45	97	120	321	829	321	120	97

Subject to alterations

AERIAL FCC
2016.25.080./.085.
FORCE DIAGRAM

shouldered

60°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	102	148	517	1335	517	148	102
45	131	191	685	1622	685	191	131
45	148	217	747	1716	747	217	148
45	133	190	636	1523	636	190	133
45	118	163	499	1279	499	163	118

65°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	103	148	526	1347	526	148	103
45	133	190	693	1634	693	190	133
45	151	214	737	1692	737	214	151
45	133	187	619	1488	619	187	133
45	114	159	485	1252	485	159	114

70°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	106	149	539	1371	539	149	106
45	137	190	708	1661	708	190	137
45	155	214	734	1685	734	214	155
45	133	185	609	1469	609	185	133
45	111	156	476	1237	476	156	111

75°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	109	152	557	1409	557	152	109
45	142	193	730	1705	730	193	142
45	160	215	737	1693	737	215	160
45	135	185	604	1463	604	185	135
45	109	155	471	1233	471	155	109

Support with feather key

60°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	81	110	341	908	341	110	81
45	104	141	452	1103	452	141	104
45	119	160	493	1167	493	160	119
45	107	141	420	1035	420	141	107
45	95	121	330	870	330	121	95

65°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	83	113	363	970	363	113	83
45	107	144	478	1176	478	144	107
45	121	163	508	1218	508	163	121
45	106	142	427	1072	427	142	106
45	91	121	335	901	335	121	91

70°

Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	84	117	388	1042	388	117	84
45	110	148	510	1263	510	148	110
45	124	167	528	1280	528	167	124
45	106	144	438	1116	438	144	106
45	89	122	342	940	342	122	89

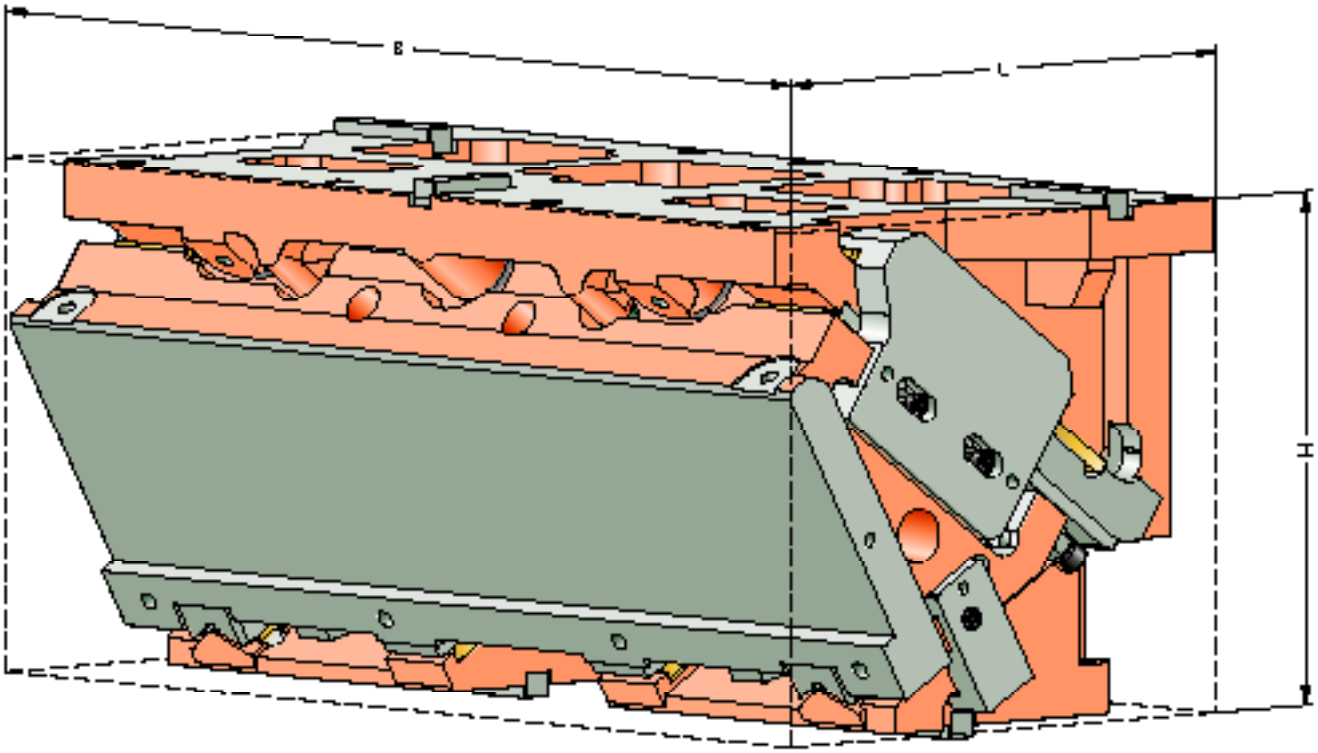
75°

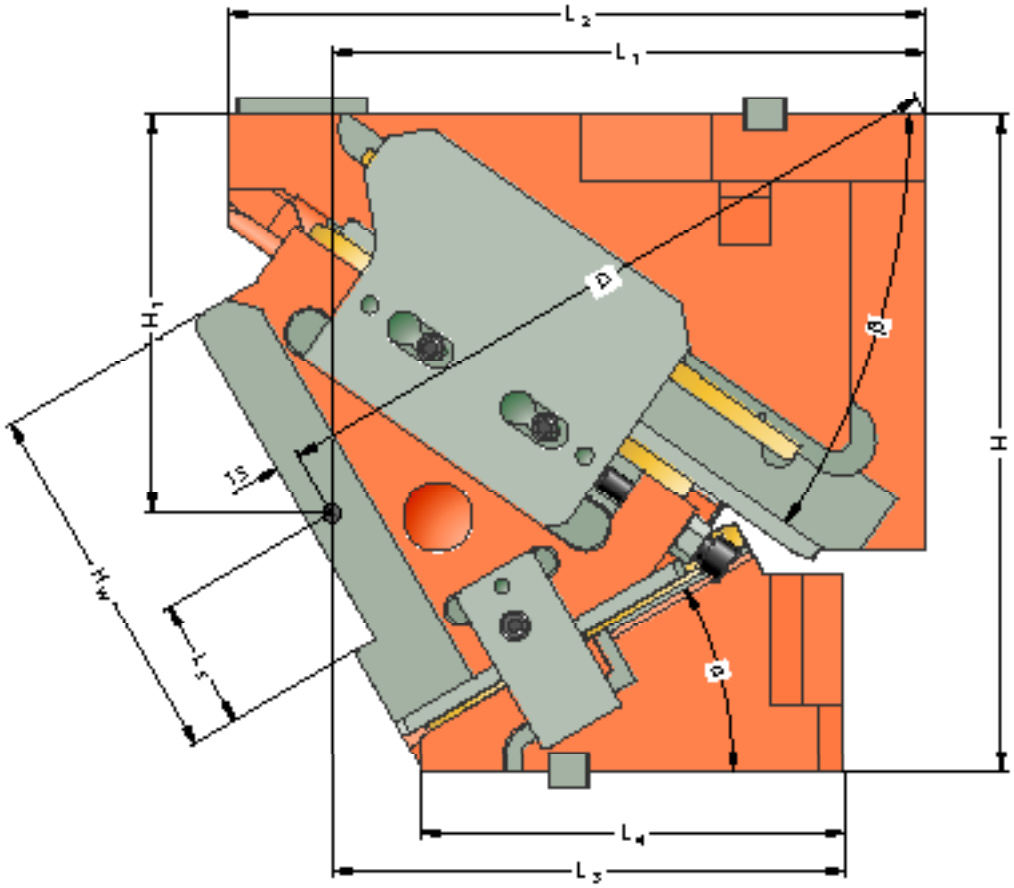
Height 225 mm	Width 800 mm						
	120	120	120	80	120	120	120
45	87	122	418	1127	418	122	87
45	114	154	547	1364	547	154	114
45	128	172	553	1355	553	172	128
45	108	148	453	1171	453	148	108
45	87	124	353	987	353	124	87

AERIAL FCC
2016.25.090./095.

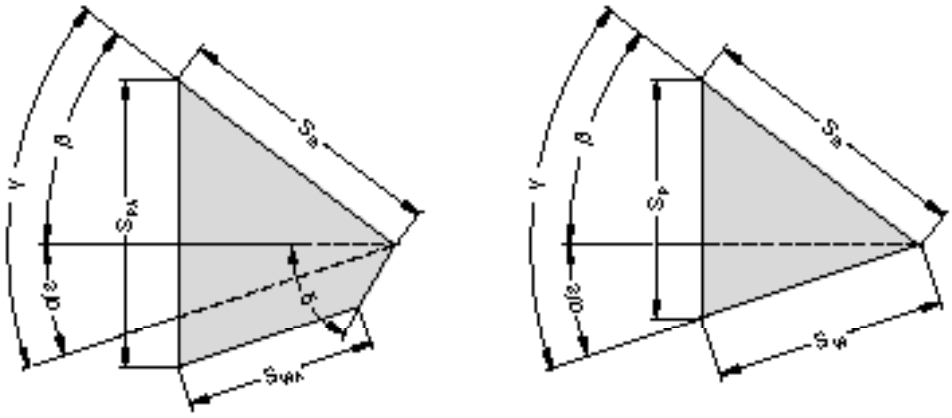
Working width:	900/950 mm
Performance class:	1800 kN

AERIAL FCC
2016.25.090./.095.
SIZE TABLE





AERIAL FCC
2016.25.090./.095.
SIZE TABLE



Order No.	L**	B***	H	H_1	H_W	L_1	L_2	L_3	L_4	L_5	D**	α	β	δ	S_W*	S_{WA}*	S_S	S_P*	S_{PA}*
2016.25.09□.	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[°]	[°]	[°]	[mm]	[mm]	[mm]	[mm]	[mm]
00.□000.02	395	9□0	400	208	220	365	370	280	305	80	395	0	50	45	-	45.7	100	-	95.2
05.□000.02	409.1	9□0	400	209	220	367.03	385	297.03	308	80	413.84	5	45	50	-	53.8	100	-	95.8
10.□000.02	428	9□0	400	208.61	220	374.12	385	304.12	302	80	434.66	10	45	45	-	56.6	100	-	95.5
15.□000.02	441.4	9□0	400	218.84	220	376.22	405	316.22	300	80	450.04	15	40	50	-	65.5	100	-	97.2
20.□000.02	449.3	9□0	400	229.69	220	373.27	410	298.27	270	80	459.32	20	40	45	-	68.8	100	-	99.8
25.□000.02	456.6	9□0	400	236.16	220	370.22	420	305.22	263	80	465.33	25	35	50	-	74.3	95	-	98.4
30.□000.02	458	9□0	400	243.22	220	362.01	425	312.01	258	80	465.12	30	35	45	-	79.5	95	-	103.2
35.□000.02	458.5	9□0	400	250.86	220	353.6	440	318.6	253	80	463.54	35	30	50	-	81.4	85	-	97.5
40.□000.02	462.9	9□0	400	259.08	220	349.93	450	324.93	247	80	464.59	40	25	55	-	93.0	85	-	104.0
45.□000.02	461.2	9□0	400	262.83	220	340.96	455	330.96	243	80	456.94	45	20	60	-	100.2	80	-	105.7
50.□000.02	483.2	9□0	400	267.09	220	356.64	480	336.64	264	80	463.85	50	10	-	107.2	-	70	94.3	-
55.□000.02	475.1	9□0	400	271.83	220	331.93	460	341.93	260	80	443.05	55	10	-	103.0	-	60	94.8	-
60.□000.02	480	9□0	400	277.01	220	316.78	470	326.78	237	80	428.29	60	10	-	108.3	-	55	103.4	-
65.□000.02	490	9□0	400	282.6	220	281.17	440	331.17	234	80	404.94	65	0	-	106.5	-	45	96.5	-
70.□000.02	505	9□0	400	288.54	220	265.05	435	335.05	232	80	391.79	70	0	-	117.0	-	40	109.9	-
75.□000.02	515	9□0	400	294.81	220	248.39	425	338.39	230	80	379.05	75	0	-	115.9	-	30	112.0	-

* Values rounded
** Values L, D measured for option with shouldered working surface
*** 9□0 = 900 or 950 mm

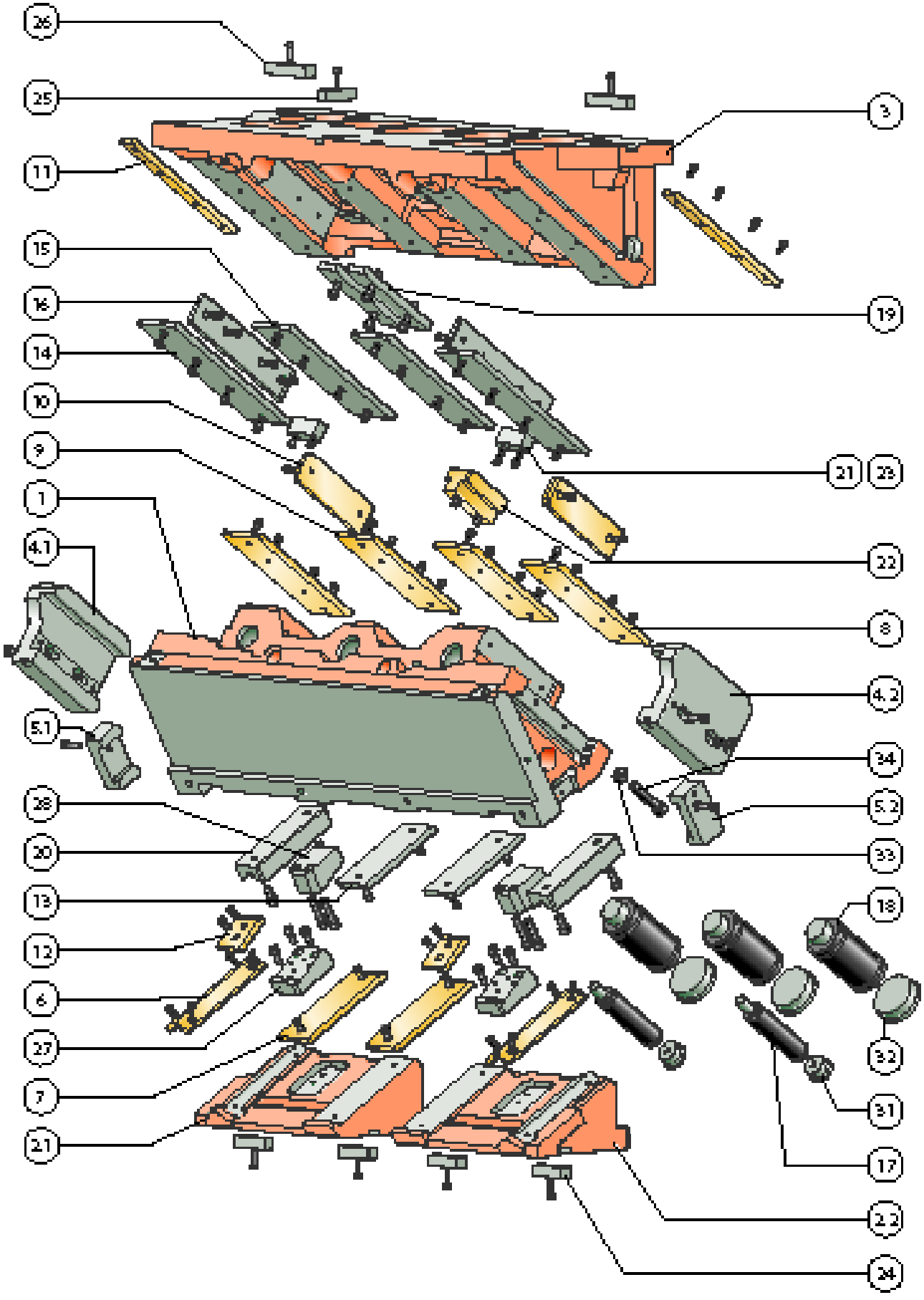
Mounting cam base:

Hexagon socket head cap screws DIN EN ISO 4762	8x M20 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x ø16

Mounting cam driver:

Hexagon socket head cap screws DIN EN ISO 4762	2x4 M16 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x2 ø12

AERIAL FCC
2016.25.090./.095.
EXPLODED VIEW



Subject to alterations

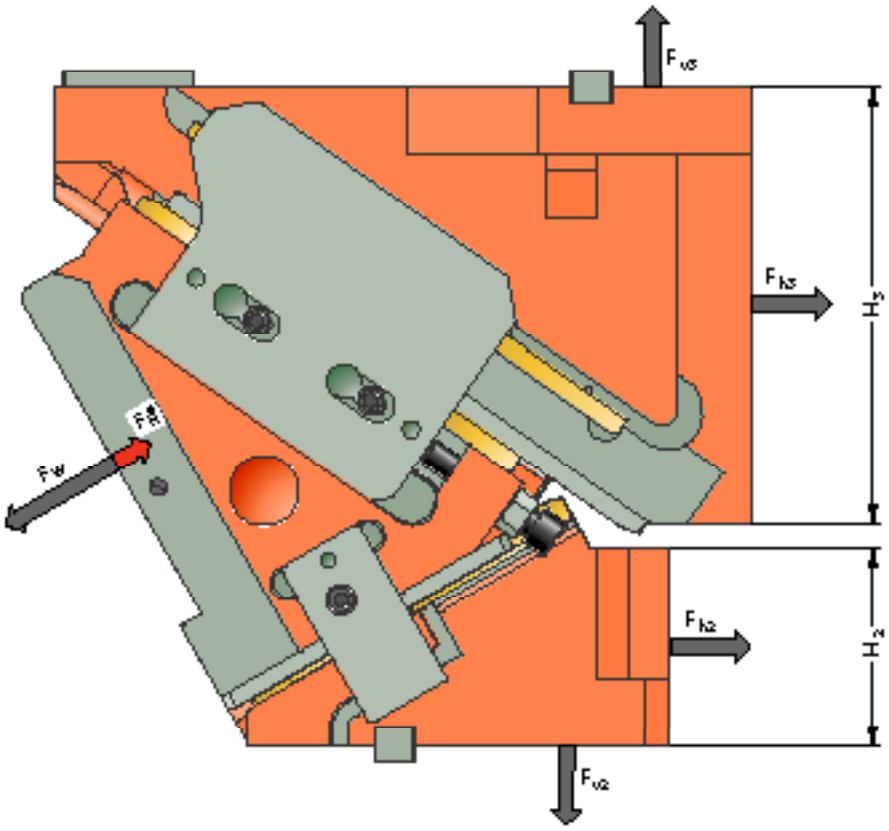
AERIAL FCC
2016.25.090./.095.
PARTS LIST

Position	Piece	Designation	Material	spare part
1	1	Slider		
2.1	1	Driver, left		
2.2	1	Driver, right		
3	1	Slider cam base		
4.1	1	Clamp, left		x
4.2	1	Clamp, right		x
5.1	1	Positive return, left		x
5.2	1	Positive return, right		x
6	4	Sliding plate VDI	Bronze with solid lubricant	x
7	2	Sliding plate VDI	Bronze with solid lubricant	x
8	2	Sliding plate VDI	Bronze with solid lubricant	x
9	2	Sliding plate VDI	Bronze with solid lubricant	x
10	2	Sliding plate VDI	Bronze with solid lubricant	x
11	2	Sliding plate VDI	Bronze with solid lubricant	x
12**	2	Sliding plate VDI	Bronze with solid lubricant	x
13	2	Sliding plate VDI	Steel	x
14	2	Sliding plate VDI	Steel	x
15	2	Sliding plate VDI	Steel	x
16	2	Sliding plate VDI	Steel	x
17	2	Gas spring	2487.12.00500.125	x
18	3	Gas spring	2487.12.02400.□□□	x
19	2	Cover strip		x
20	2	Prismatic guide		x
21	2	Stop plate		x
22	1	Centre guide		x
23	2	Damper		x
24	4	Feather key (T-nut)		x
25	1	Feather key (T-nut)		x
26	2	Feather key (T-nut)		x
27**	2	Construction piece		x
28**	2	Slide pad		x
29* (not shown)	2	Curve wedge		x
30* (not shown)	2	Roller block		x
31	2	Locking screw		x
32	3	Locking screw		x
33	2	Ball-head screw		x
34	2	Hexagon nut		x

up to and including 45° with pre-acceleration
Optionally:
* Roll pre-acceleration (.1000. /.2000.)
** Plate pre-acceleration (.3000. /.4000.)

For inquiries or when ordering spare parts (x), we require the following data:
- Cam unit order no.
- Cam unit serial number
- Item number / Designation / Spare part

AERIAL FCC
2016.25.090./.095.
SYSTEM AND SURROUNDING FORCES



Order number	α [°]	F_W [kN]	F_R* [kN]	F_{h2} [kN]	F_{v2} [kN]	F_{h3} [kN]	F_{v3} [kN]	H_2 [mm]	H_3 [mm]
2016.25.09□.00.□000.02	0	1800	149.3	0	1510	1800	1510	40	300
2016.25.09□.05.□000.02	5	1800	152.3	132	1505	1662	1662	40	275
2016.25.09□.10.□000.02	10	1800	169.6	219	1241	1554	1554	75	275
2016.25.09□.15.□000.02	15	1800	172.3	326	1217	1412	1683	80	255
2016.25.09□.20.□000.02	20	1800	195.1	431	1184	1260	1800	90	245
2016.25.09□.25.□000.02	25	1800	193.9	439	942	1192	1703	110	215
2016.25.09□.30.□000.02	30	1800	225.1	420	727	1139	1627	120	210
2016.25.09□.35.□000.02	35	1800	219.4	481	688	993	1720	140	210
2016.25.09□.40.□000.02	40	1800	221.1	540	643	839	1800	150	190
2016.25.09□.45.□000.02	45	1800	218.6	594	594	679	1866	170	170
2016.25.09□.50.□000.02	50	1800	186.1	796	668	361	2047	170	120
2016.25.09□.55.□000.02	55	1800	206.6	688	481	345	1956	180	115
2016.25.09□.60.□000.02	60	1800	256.5	567	328	333	1886	180	110
2016.25.09□.65.□000.02	65	1800	204.3	761	355	0	1986	190	85
2016.25.09□.70.□000.02	70	1800	246.0	616	224	0	1916	205	85
2016.25.09□.75.□000.02	75	1800	289.9	466	125	0	1863	220	85

* Retraction force values correspond to the spring-generated retraction force at the working point point

The forces F_{h2}, F_{V2} as well as F_{h3}, F_{V3} act on the tool environment at maximum working force F_W.

AERIAL FCC
2016.25.090./.095.
FORCE DIAGRAM

shouldered

0°	Width 900 mm						
	135	135	135	90	135	135	135
Height 225 mm 45	87	141	434	1023	434	141	87
Height 225 mm 45	109	183	610	1486	610	183	109
Height 225 mm 45	126	209	788	1813	788	209	126
Height 225 mm 45	126	190	707	1667	707	190	126
Height 225 mm 45	126	171	524	1320	524	171	126

5°	Width 900 mm						
	135	135	135	90	135	135	135
Height 225 mm 45	87	143	441	1057	441	143	87
Height 225 mm 45	110	186	618	1498	618	186	110
Height 225 mm 45	127	214	795	1823	795	214	127
Height 225 mm 45	128	194	714	1678	714	194	128
Height 225 mm 45	129	174	536	1339	536	174	129

10°	Width 900 mm						
	135	135	135	90	135	135	135
Height 225 mm 45	87	144	443	1080	443	144	87
Height 225 mm 45	110	188	620	1496	620	188	110
Height 225 mm 45	127	216	795	1815	795	216	127
Height 225 mm 45	128	196	715	1673	715	196	128
Height 225 mm 45	130	175	542	1346	542	175	130

15°	Width 900 mm						
	135	135	135	90	135	135	135
Height 225 mm 45	88	146	450	1113	450	146	88
Height 225 mm 45	111	192	627	1508	627	192	111
Height 225 mm 45	128	221	802	1825	802	221	128
Height 225 mm 45	130	199	722	1684	722	199	130
Height 225 mm 45	132	178	553	1365	553	178	132

20°	Width 900 mm						
	135	135	135	90	135	135	135
Height 225 mm 45	88	147	452	1136	452	147	88
Height 225 mm 45	110	194	629	1505	629	194	110
Height 225 mm 45	128	223	802	1817	802	223	128
Height 225 mm 45	131	201	723	1679	723	201	131
Height 225 mm 45	133	179	559	1371	559	179	133

25°	Width 900 mm						
	135	135	135	90	135	135	135
Height 225 mm 45	87	148	454	1157	454	148	87
Height 225 mm 45	110	196	630	1502	630	196	110
Height 225 mm 45	128	225	801	1809	801	225	128
Height 225 mm 45	131	203	723	1673	723	203	131
Height 225 mm 45	135	180	565	1377	565	180	135

Support with feather key

0°	Width 900 mm						
	135	135	135	90	135	135	135
Height 225 mm 45	69	84	130	205	130	84	69
Height 225 mm 45	88	110	183	297	183	110	88
Height 225 mm 45	101	126	236	363	236	126	101
Height 225 mm 45	101	114	212	333	212	114	101
Height 225 mm 45	101	103	157	264	157	103	101

5°	Width 900 mm						
	135	135	135	90	135	135	135
Height 225 mm 45	70	86	145	254	145	86	70
Height 225 mm 45	88	112	204	360	204	112	88
Height 225 mm 45	102	128	262	437	262	128	102
Height 225 mm 45	102	116	236	403	236	116	102
Height 225 mm 45	103	104	177	321	177	104	103

10°	Width 900 mm						
	135	135	135	90	135	135	135
Height 225 mm 45	70	86	160	302	160	86	70
Height 225 mm 45	88	113	223	419	223	113	88
Height 225 mm 45	102	130	286	508	286	130	102
Height 225 mm 45	103	117	257	468	257	117	103
Height 225 mm 45	104	105	195	377	195	105	104

15°	Width 900 mm						
	135	135	135	90	135	135	135
Height 225 mm 45	70	88	175	356	175	88	70
Height 225 mm 45	89	115	245	482	245	115	89
Height 225 mm 45	103	133	313	584	313	133	103
Height 225 mm 45	104	120	282	539	282	120	104
Height 225 mm 45	106	107	216	437	216	107	106

20°	Width 900 mm						
	135	135	135	90	135	135	135
Height 225 mm 45	70	88	190	409	190	88	70
Height 225 mm 45	88	116	264	542	264	116	88
Height 225 mm 45	102	134	337	654	337	134	102
Height 225 mm 45	105	121	304	604	304	121	105
Height 225 mm 45	107	107	235	494	235	107	107

25°	Width 900 mm						
	135	135	135	90	135	135	135
Height 225 mm 45	70	89	204	463	204	89	70
Height 225 mm 45	88	117	284	601	284	117	88
Height 225 mm 45	102	135	360	724	360	135	102
Height 225 mm 45	105	122	325	669	325	122	105
Height 225 mm 45	108	108	254	551	254	108	108

AERIAL FCC
2016.25.090./.095.
FORCE DIAGRAM

shouldered

30°

Height 225 mm	Width 900 mm						
	135	135	135	90	135	135	135
45	88	151	461	1190	461	151	88
45	111	199	638	1514	638	199	111
45	129	230	808	1819	808	230	129
45	133	206	730	1684	730	206	133
45	137	183	576	1396	576	183	137

35°

Height 225 mm	Width 900 mm						
	135	135	135	90	135	135	135
45	88	151	463	1210	463	151	88
45	110	201	639	1510	639	201	110
45	129	232	807	1810	807	232	129
45	133	208	730	1678	730	208	133
45	138	184	582	1401	582	184	138

40°

Height 225 mm	Width 900 mm						
	135	135	135	90	135	135	135
45	91	152	480	1244	480	152	91
45	115	202	655	1539	655	202	115
45	134	233	807	1808	807	233	134
45	134	207	722	1661	722	207	134
45	135	180	574	1389	574	180	135

45°

Height 225 mm	Width 900 mm						
	135	135	135	90	135	135	135
45	93	153	498	1278	498	153	93
45	120	203	671	1568	671	203	120
45	138	234	807	1806	807	234	138
45	135	205	713	1645	713	205	135
45	132	177	566	1377	566	177	132

50°

Height 225 mm	Width 900 mm						
	135	135	135	90	135	135	135
45	97	155	521	1325	521	155	97
45	125	206	693	1613	693	206	125
45	145	237	815	1821	815	237	145
45	138	206	712	1645	712	206	138
45	130	175	563	1378	563	175	130

55°

Height 225 mm	Width 900 mm						
	135	135	135	90	135	135	135
45	100	155	539	1360	539	155	100
45	130	207	709	1642	709	207	130
45	150	238	815	1819	815	238	150
45	139	204	703	1629	703	204	139
45	127	171	555	1366	555	171	127

Support with feather key

30°

Height 225 mm	Width 900 mm						
	135	135	135	90	135	135	135
45	70	93	221	524	221	93	70
45	89	124	306	666	306	124	89
45	103	143	388	800	388	143	103
45	106	128	351	741	351	128	106
45	110	113	277	614	277	113	110

35°

Height 225 mm	Width 900 mm						
	135	135	135	90	135	135	135
45	70	97	236	581	236	97	70
45	88	129	326	725	326	129	88
45	103	148	411	869	411	148	103
45	107	133	372	805	372	133	107
45	110	118	297	672	297	118	110

40°

Height 225 mm	Width 900 mm						
	135	135	135	90	135	135	135
45	72	100	259	647	259	100	72
45	92	133	354	800	354	133	92
45	107	154	436	940	436	154	107
45	107	136	390	864	390	136	107
45	108	119	310	722	310	119	108

45°

Height 225 mm	Width 900 mm						
	135	135	135	90	135	135	135
45	75	104	284	716	284	104	75
45	96	138	382	878	382	138	96
45	111	159	460	1011	460	159	111
45	108	140	407	921	407	140	108
45	106	120	322	771	322	120	106

50°

Height 225 mm	Width 900 mm						
	135	135	135	90	135	135	135
45	78	108	313	795	313	108	78
45	100	144	416	968	416	144	100
45	116	166	489	1093	489	166	116
45	110	144	427	987	427	144	110
45	104	122	338	827	338	122	104

55°

Height 225 mm	Width 900 mm						
	135	135	135	90	135	135	135
45	80	112	340	870	340	112	80
45	104	149	447	1051	447	149	104
45	120	171	513	1164	513	171	120
45	111	147	443	1042	443	147	111
45	102	123	349	874	349	123	102

Subject to alterations

AERIAL FCC
2016.25.090./.095.
FORCE DIAGRAM

shouldered

60°

Height 225 mm	Width 900 mm						
	135	135	135	90	135	135	135
45	103	156	557	1394	557	156	103
45	134	208	725	1672	725	208	134
45	155	238	815	1816	815	238	155
45	140	203	694	1613	694	203	140
45	125	168	546	1354	546	168	125

65°

Height 225 mm	Width 900 mm						
	135	135	135	90	135	135	135
45	105	157	575	1428	575	157	105
45	139	209	741	1701	741	209	139
45	160	239	815	1814	815	239	160
45	141	202	686	1596	686	202	141
45	122	164	538	1342	538	164	122

70°

Height 225 mm	Width 900 mm						
	135	135	135	90	135	135	135
45	108	157	593	1462	593	157	108
45	144	210	757	1730	757	210	144
45	164	240	815	1811	815	240	164
45	142	200	677	1580	677	200	142
45	119	160	530	1330	530	160	119

75°

Height 225 mm	Width 900 mm						
	135	135	135	90	135	135	135
45	111	158	611	1497	611	158	111
45	148	211	773	1759	773	211	148
45	169	241	815	1809	815	241	169
45	143	199	669	1563	669	199	143
45	116	157	522	1318	522	157	116

Support with feather key

60°

Height 225 mm	Width 900 mm						
	135	135	135	90	135	135	135
45	82	115	368	948	368	115	82
45	108	154	479	1137	479	154	108
45	124	176	538	1235	538	176	124
45	112	150	458	1097	458	150	112
45	100	124	361	921	361	124	100

65°

Height 225 mm	Width 900 mm						
	135	135	135	90	135	135	135
45	84	119	397	1028	397	119	84
45	111	159	511	1225	511	159	111
45	128	182	562	1306	562	182	128
45	112	153	473	1149	473	153	112
45	97	125	371	966	371	125	97

70°

Height 225 mm	Width 900 mm						
	135	135	135	90	135	135	135
45	87	123	427	1111	427	123	87
45	115	164	545	1315	545	164	115
45	132	187	587	1377	587	187	132
45	113	156	488	1201	488	156	113
45	95	125	382	1011	382	125	95

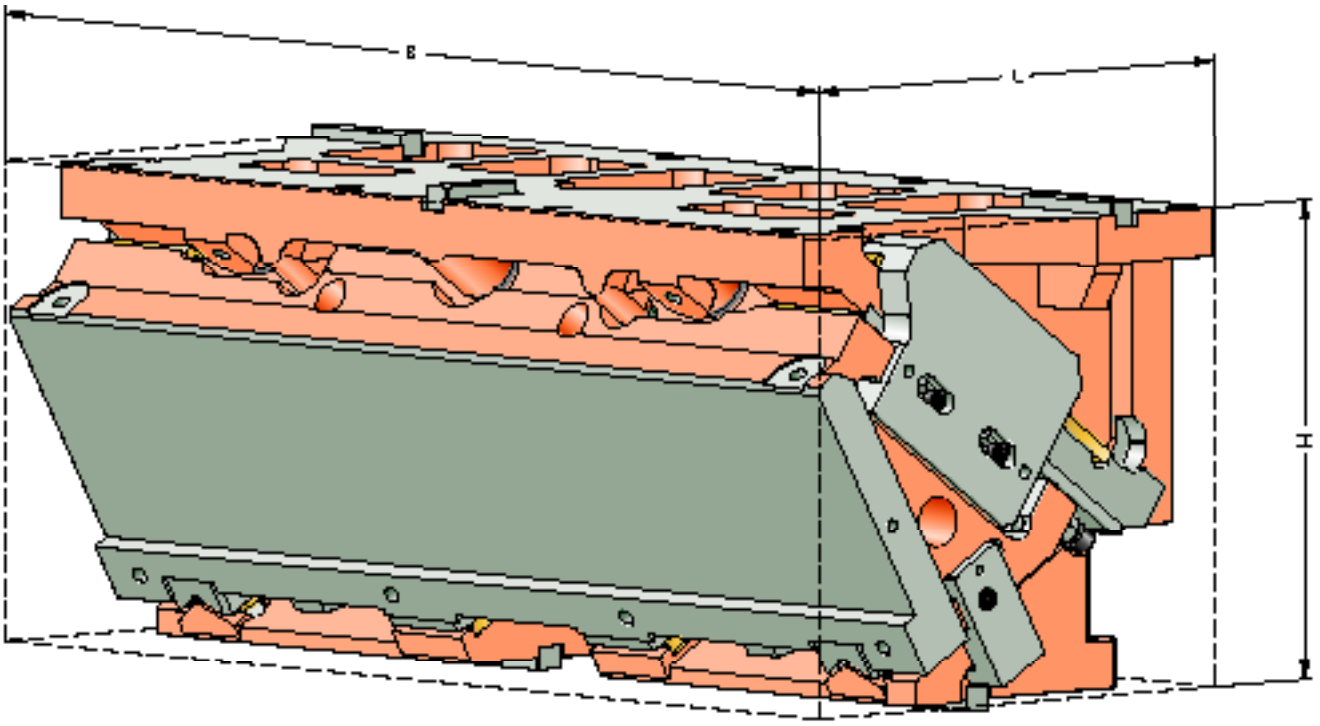
75°

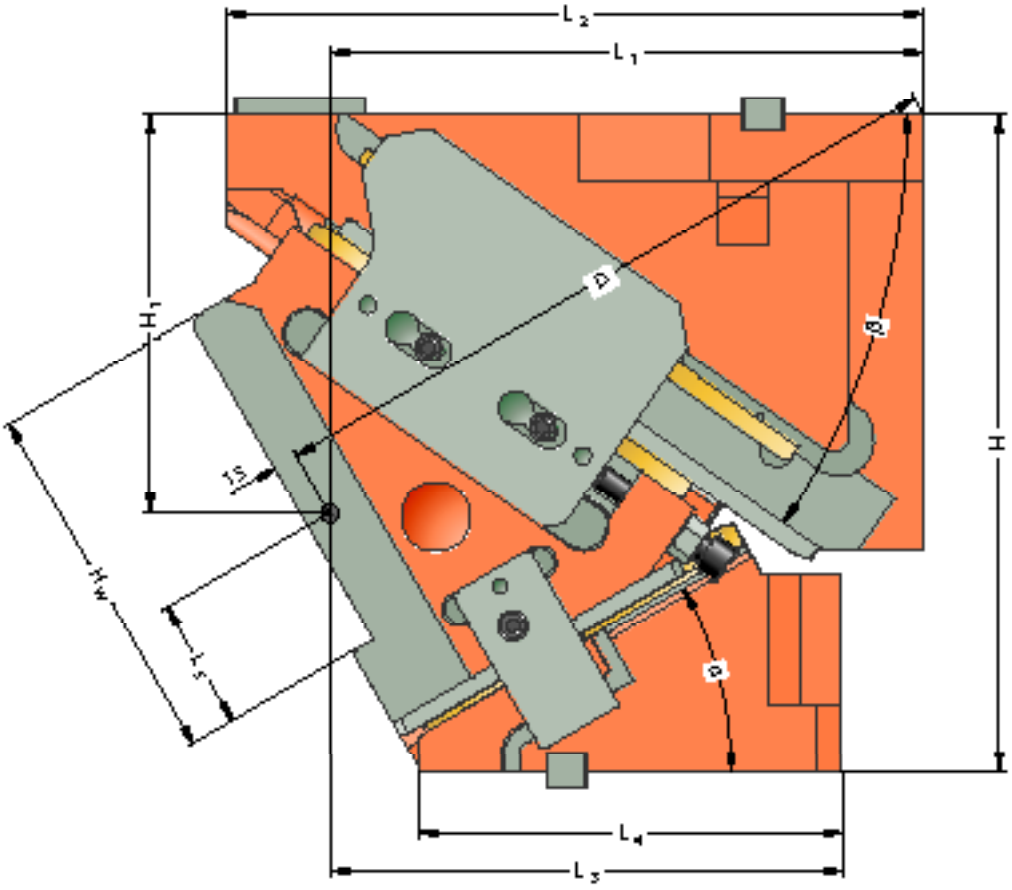
Height 225 mm	Width 900 mm						
	135	135	135	90	135	135	135
45	89	126	458	1197	458	126	89
45	119	169	580	1407	580	169	119
45	136	193	612	1447	612	193	136
45	114	159	501	1251	501	159	114
45	93	125	391	1054	391	125	93

AERIAL FCC 2016.25.100./105.

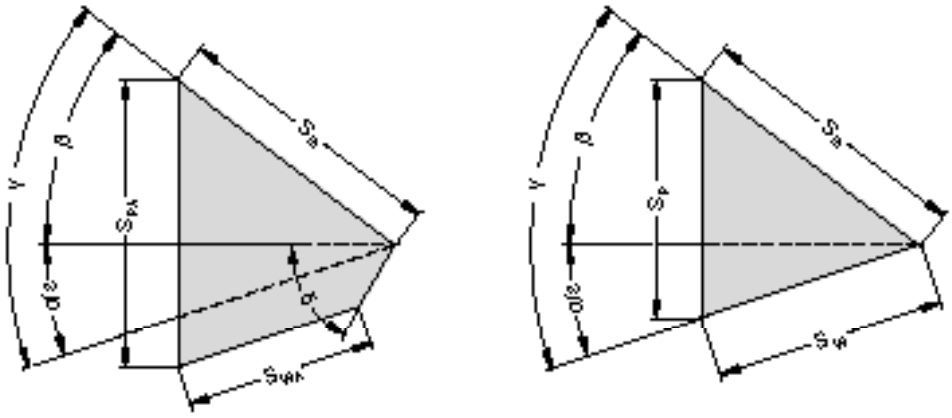
Working width:	1000/1050 mm
Performance class:	2000 kN

AERIAL FCC
2016.25.100./.105.
SIZE TABLE





AERIAL FCC
2016.25.100./.105.
SIZE TABLE



Order No.	L**	B***	H	H_1	H_W	L_1	L_2	L_3	L_4	L_5	D**	α	β	δ	S_W*	S_{WA}*	S_S	S_P*	S_{PA}*
2016.25.10□.	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[°]	[°]	[°]	[mm]	[mm]	[mm]	[mm]	[mm]
00.□000.02	395	10□0	400	208	220	365	370	280	305	80	395	0	50	45	-	45.7	100	-	95.2
05.□000.02	409.1	10□0	400	209	220	367.03	385	297.03	308	80	413.8	5	45	50	-	53.8	100	-	95.8
10.□000.02	428	10□0	400	208.61	220	374.12	385	304.12	302	80	434.7	10	45	45	-	56.6	100	-	95.5
15.□000.02	441.4	10□0	400	218.84	220	376.22	405	316.22	300	80	450	15	40	50	-	65.5	100	-	97.2
20.□000.02	449.3	10□0	400	229.69	220	373.27	410	298.27	270	80	459.3	20	40	45	-	68.8	100	-	99.8
25.□000.02	456.6	10□0	400	236.16	220	370.22	420	305.22	263	80	465.3	25	35	50	-	74.3	95	-	98.4
30.□000.02	458	10□0	400	243.22	220	362.01	425	312.01	258	80	465.1	30	35	45	-	79.5	95	-	103.2
35.□000.02	458.5	10□0	400	250.86	220	353.6	440	318.6	253	80	463.5	35	30	50	-	81.4	85	-	97.5
40.□000.02	462.9	10□0	400	259.08	220	349.93	450	324.93	247	80	464.6	40	25	55	-	93.0	85	-	104.0
45.□000.02	461.2	10□0	400	262.83	220	340.96	455	330.96	243	80	456.9	45	20	60	-	100.2	80	-	105.7
50.□000.02	483.2	10□0	400	267.09	220	356.64	480	336.64	264	80	463.9	50	10	-	107.2	-	70	94.3	-
55.□000.02	475.1	10□0	400	271.83	220	331.93	460	341.93	260	80	443.1	55	10	-	103.0	-	60	94.8	-
60.□000.02	480	10□0	400	277.01	220	316.78	470	326.78	237	80	428.3	60	10	-	108.3	-	55	103.4	-
65.□000.02	490	10□0	400	282.6	220	281.17	440	331.17	234	80	404.9	65	0	-	106.5	-	45	96.5	-
70.□000.02	505	10□0	400	288.54	220	265.05	435	335.05	232	80	391.8	70	0	-	117.0	-	40	109.9	-
75.□000.02	515	10□0	400	294.81	220	248.39	425	338.39	230	80	379.1	75	0	-	115.9	-	30	112.0	-

* Values rounded
** Values L, D measured for option with shouldered working surface
*** 10□0 = 1000 or 1050 mm

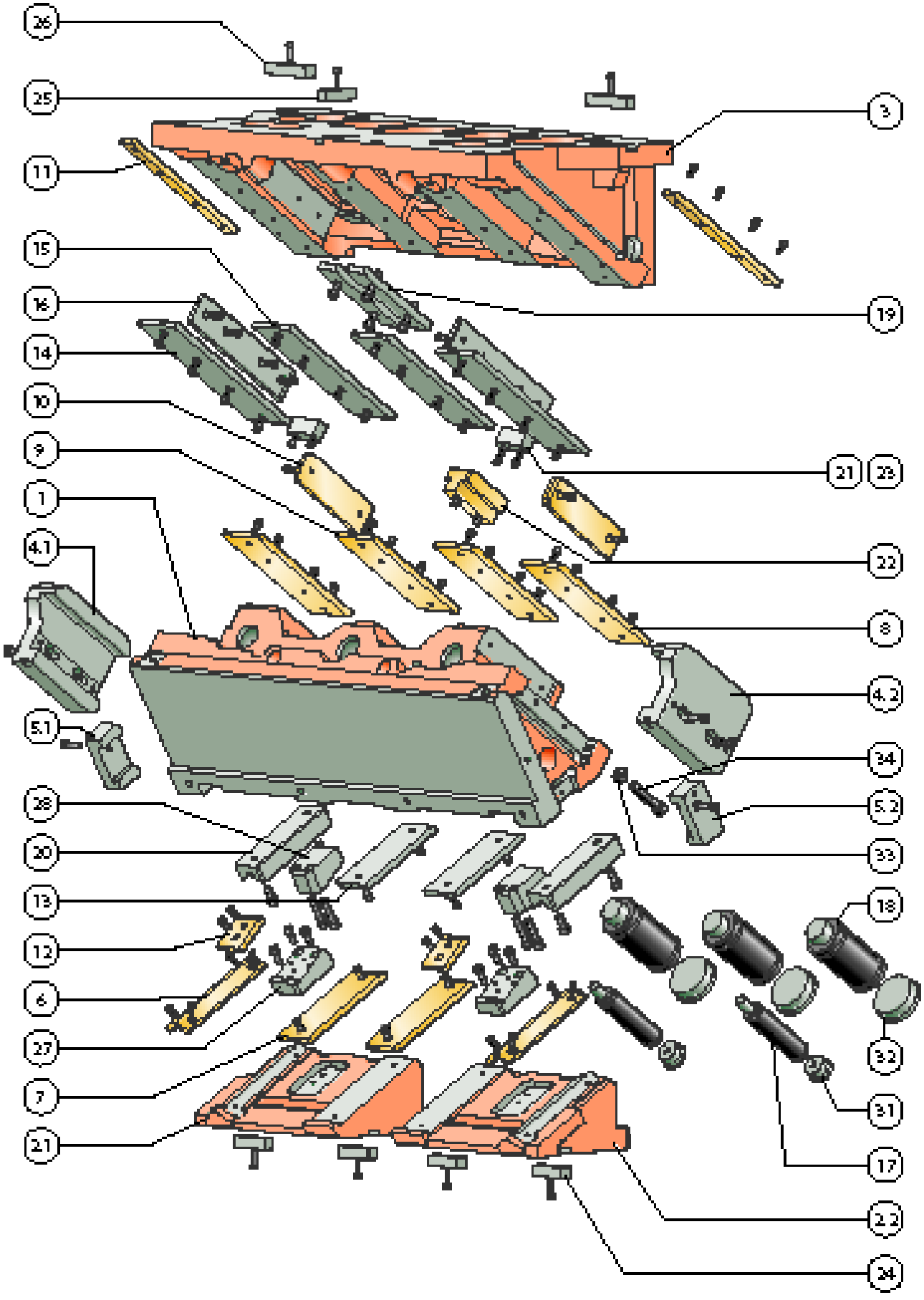
Mounting cam base:

Hexagon socket head cap screws DIN EN ISO 4762	8x M20 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x ø16

Mounting cam driver:

Hexagon socket head cap screws DIN EN ISO 4762	2x4 M16 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x2 ø12

AERIAL FCC
2016.25.100./.105.
EXPLODED VIEW



Subject to alterations

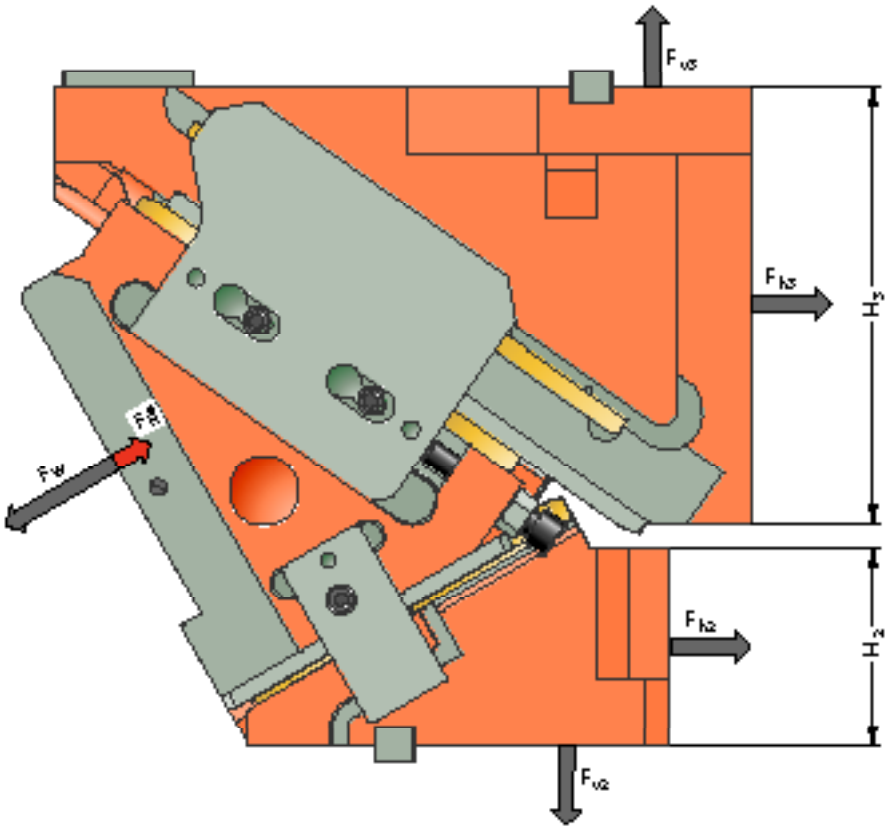
AERIAL FCC
2016.25.100./.105.
PARTS LIST

Position	Piece	Designation	Material	spare part
1	1	Slider		
2.1	1	Driver, left		
2.2	1	Driver, right		
3	1	Slider cam base		
4.1	1	Clamp, left		x
4.2	1	Clamp, right		x
5.1	1	Positive return, left		x
5.2	1	Positive return, right		x
6	4	Sliding plate VDI	Bronze with solid lubricant	x
7	2	Sliding plate VDI	Bronze with solid lubricant	x
8	2	Sliding plate VDI	Bronze with solid lubricant	x
9	2	Sliding plate VDI	Bronze with solid lubricant	x
10	2	Sliding plate VDI	Bronze with solid lubricant	x
11	2	Sliding plate VDI	Bronze with solid lubricant	x
12**	2	Sliding plate VDI	Bronze with solid lubricant	x
13	2	Sliding plate VDI	Steel	x
14	2	Sliding plate VDI	Steel	x
15	2	Sliding plate VDI	Steel	x
16	2	Sliding plate VDI	Steel	x
17	2	Gas spring	2487.12.00500.125	x
18	3	Gas spring	2487.12.02400.□□□	x
19	2	Cover strip		x
20	2	Prismatic guide		x
21	2	Stop plate		x
22	1	Centre guide		x
23	2	Damper		x
24	4	Feather key (T-nut)		x
25	1	Feather key (T-nut)		x
26	2	Feather key (T-nut)		x
27**	2	Construction piece		x
28**	2	Slide pad		x
29* (not shown)	2	Curve wedge		x
30* (not shown)	2	Roller block		x
31	2	Locking screw		x
32	3	Locking screw		x
33	2	Ball-head screw		x
34	2	Hexagon nut		x

up to and including 45° with pre-acceleration
Optionally:
* Roll pre-acceleration (.1000. /.2000.)
** Plate pre-acceleration (.3000. /.4000.)

For inquiries or when ordering spare parts (x), we require the following data:
- Cam unit order no.
- Cam unit serial number
- Item number / Designation / Spare part

AERIAL FCC
2016.25.100./.105.
SYSTEM AND SURROUNDING FORCES



Order number	α [°]	F_W [kN]	F_R* [kN]	F_{h2} [kN]	F_{v2} [kN]	F_{h3} [kN]	F_{v3} [kN]	H_2 [mm]	H_3 [mm]
2016.25.10□.00.□000.02	0	2000	149.3	0	1678	2000	1678	40	300
2016.25.10□.05.□000.02	5	2000	152.3	146	1672	1846	1846	40	275
2016.25.10□.10.□000.02	10	2000	169.6	243	1379	1726	1726	75	275
2016.25.10□.15.□000.02	15	2000	172.3	362	1353	1569	1870	80	255
2016.25.10□.20.□000.02	20	2000	195.1	479	1316	1400	2000	90	245
2016.25.10□.25.□000.02	25	2000	193.9	488	1047	1325	1892	110	215
2016.25.10□.30.□000.02	30	2000	225.1	466	808	1266	1808	120	210
2016.25.10□.35.□000.02	35	2000	219.4	535	764	1103	1911	140	210
2016.25.10□.40.□000.02	40	2000	221.1	599	714	933	2000	150	190
2016.25.10□.45.□000.02	45	2000	218.6	659	659	755	2074	170	170
2016.25.10□.50.□000.02	50	2000	186.1	885	742	401	2274	170	120
2016.25.10□.55.□000.02	55	2000	206.6	764	535	383	2173	180	115
2016.25.10□.60.□000.02	60	2000	256.5	630	364	370	2096	180	110
2016.25.10□.65.□000.02	65	2000	204.3	845	394	0	2207	190	85
2016.25.10□.70.□000.02	70	2000	246.0	684	249	0	2128	205	85
2016.25.10□.75.□000.02	75	2000	289.9	518	139	0	2071	220	85

* Retraction force values correspond to the spring-generated retraction force at the working point point

The forces F_{h2}, F_{V2} as well as F_{h3}, F_{V3} act on the tool environment at maximum working force F_W.

AERIAL FCC
2016.25.100./.105.
FORCE DIAGRAM

shouldered

0°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	101	174	549	1217	549	174	101
45	129	227	751	1722	751	227	129
45	149	257	919	2021	919	257	149
45	144	219	743	1707	743	219	144
45	138	180	567	1393	567	180	138

5°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	100	174	543	1230	543	174	100
45	128	227	747	1713	747	227	128
45	148	258	918	2020	918	258	148
45	144	221	755	1730	755	221	144
45	140	184	581	1416	581	184	140

10°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	99	173	538	1242	538	173	99
45	126	228	742	1703	742	228	126
45	146	259	917	2019	917	259	146
45	144	223	768	1753	768	223	144
45	142	187	595	1439	595	187	142

15°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	97	173	532	1254	532	173	97
45	124	228	737	1694	737	228	124
45	145	260	917	2017	917	260	145
45	145	226	780	1776	780	226	145
45	144	191	608	1463	608	191	144

20°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	96	173	527	1267	527	173	96
45	123	228	732	1685	732	228	123
45	143	261	916	2016	916	261	143
45	145	228	793	1798	793	228	145
45	146	195	622	1486	622	195	146

25°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	95	173	522	1279	522	173	95
45	121	228	728	1676	728	228	121
45	142	262	916	2014	916	262	142
45	145	230	805	1821	805	230	145
45	148	198	635	1509	635	198	148

Support with feather key

0°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	81	104	165	243	165	104	81
45	103	136	225	344	225	136	103
45	119	154	276	404	276	154	119
45	115	131	223	341	223	131	115
45	111	108	170	279	170	108	111

5°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	80	104	179	295	179	104	80
45	102	136	246	411	246	136	102
45	118	155	303	485	303	155	118
45	115	133	249	415	249	133	115
45	112	110	192	340	192	110	112

10°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	79	104	194	348	194	104	79
45	101	137	267	477	267	137	101
45	117	156	330	565	330	156	117
45	115	134	276	491	276	134	115
45	114	112	214	403	214	112	114

15°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	78	104	208	401	208	104	78
45	100	137	287	542	287	137	100
45	116	156	358	645	358	156	116
45	116	135	304	568	304	135	116
45	115	115	237	468	237	115	115

20°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	77	104	221	456	221	104	77
45	98	137	308	607	308	137	98
45	115	157	385	726	385	157	115
45	116	137	333	647	333	137	116
45	117	117	261	535	261	117	117

25°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	76	104	235	512	235	104	76
45	97	137	327	670	327	137	97
45	114	157	412	806	412	157	114
45	116	138	362	728	362	138	116
45	119	119	286	604	286	119	119

AERIAL FCC
2016.25.100./.105.
FORCE DIAGRAM

shouldered

30°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	94	173	516	1291	516	173	94
45	120	229	723	1667	723	229	120
45	140	263	915	2013	915	263	140
45	145	232	818	1844	818	232	145
45	150	202	649	1533	649	202	150

35°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	93	173	511	1304	511	173	93
45	118	229	718	1658	718	229	118
45	139	264	915	2012	915	264	139
45	146	234	830	1867	830	234	146
45	152	205	663	1556	663	205	152

40°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	96	173	535	1350	535	173	96
45	124	231	736	1690	736	231	124
45	145	266	918	2014	918	266	145
45	147	233	823	1853	823	233	147
45	150	201	655	1547	655	201	150

45°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	99	173	558	1396	558	173	99
45	129	232	754	1722	754	232	129
45	151	268	921	2016	921	268	151
45	149	232	816	1839	816	232	149
45	147	196	648	1537	648	196	147

50°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	103	173	582	1442	582	173	103
45	135	234	772	1755	772	234	135
45	158	270	925	2019	925	270	158
45	151	231	809	1825	809	231	151
45	144	191	641	1528	641	191	144

55°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	106	173	606	1488	606	173	106
45	141	236	790	1787	790	236	141
45	164	272	928	2021	928	272	164
45	152	229	801	1811	801	229	152
45	141	186	633	1518	633	186	141

Support with feather key

30°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	75	107	248	568	248	107	75
45	96	142	347	733	347	142	96
45	112	163	439	886	439	163	112
45	116	144	393	811	393	144	116
45	120	125	312	674	312	125	120

35°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	74	111	261	626	261	111	74
45	95	146	366	796	366	146	95
45	111	169	466	966	466	169	111
45	117	150	423	896	423	150	117
45	122	131	338	747	338	131	122

40°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	77	114	289	702	289	114	77
45	99	152	397	879	397	152	99
45	116	175	496	1047	496	175	116
45	118	154	444	964	444	154	118
45	120	132	354	804	354	132	120

45°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	79	117	318	782	318	117	79
45	104	158	430	965	430	158	104
45	121	182	525	1129	525	182	121
45	119	158	465	1030	465	158	119
45	117	133	369	861	369	133	117

50°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	82	121	349	865	349	121	82
45	108	164	463	1053	463	164	108
45	126	189	555	1211	555	189	126
45	121	161	485	1095	485	161	121
45	115	134	384	917	384	134	115

55°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	85	124	382	952	382	124	85
45	113	170	498	1144	498	170	113
45	131	196	585	1294	585	196	131
45	122	165	505	1159	505	165	122
45	113	134	399	972	399	134	113

Subject to alterations

AERIAL FCC
2016.25.100./.105.
FORCE DIAGRAM

shouldered

60°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	109	173	629	1534	629	173	109
45	146	237	808	1820	808	237	146
45	170	274	931	2024	931	274	170
45	154	228	794	1797	794	228	154
45	138	182	626	1509	626	182	138

65°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	113	173	653	1580	653	173	113
45	152	239	826	1852	826	239	152
45	176	277	935	2026	935	277	176
45	156	227	787	1783	787	227	156
45	135	177	618	1499	618	177	135

70°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	116	173	677	1627	677	173	116
45	157	241	844	1884	844	241	157
45	182	279	938	2029	938	279	182
45	157	225	780	1770	780	225	157
45	132	172	611	1490	611	172	132

75°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	120	173	700	1673	700	173	120
45	163	243	862	1917	862	243	163
45	188	281	941	2031	941	281	188
45	159	224	772	1756	772	224	159
45	129	168	604	1480	604	168	129

Support with feather key

60°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	88	128	415	1043	415	128	88
45	117	176	533	1237	533	176	117
45	136	203	615	1376	615	203	136
45	123	169	524	1222	524	169	123
45	110	134	413	1026	413	134	110

65°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	90	131	451	1138	451	131	90
45	122	182	570	1333	570	182	122
45	141	210	645	1459	645	210	141
45	124	172	543	1284	543	172	124
45	108	135	427	1079	427	135	108

70°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	93	135	487	1236	487	135	93
45	126	188	608	1432	608	188	126
45	146	217	675	1542	675	217	146
45	126	176	561	1345	561	176	126
45	106	134	440	1132	440	134	106

75°

Height 225 mm	Width 1000 mm						
	150	150	150	100	150	150	150
45	96	138	525	1338	525	138	96
45	130	194	647	1534	647	194	130
45	151	225	706	1625	706	225	151
45	127	179	579	1405	579	179	127
45	103	134	453	1184	453	134	103

INTRODUCTION
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ENGINEERING

2016.24. AERIAL FCC BAK — DAIMLER, VOLVO, VOLKSWAGEN GROUP

2016.25. AERIAL FCC BAK — DAIMLER, VOLVO, VOLKSWAGEN GROUP

2016.207. AERIAL ECO LINE

2016.208. AERIAL ECO LINE

CUSTOMER-SPECIFIC
SERVICES

APPENDIX

EMERGENCY SITUATION /
CONTACTS

AERIAL ECO LINE
2016.207.

AERIAL ECO LINE
2016.207.

FIBRO ECO LINE cam units series 2016.207. are an economical alternative for cam unit dies with high lifetime requirements. When properly maintained, these cam units allow a high number of cycles with sufficient precision over the entire nominal lifetime.

The gas springs for the cam return stroke can be exchanged without disassembling the cam unit with sufficient free space in the tool.

From a cam unit width of 165 mm, the cam units of the ECO LINE 2016.207. series are equipped with a roll pre-acceleration up to an angle of 25°.

The optional machining of the working surface per your specifications fulfil the requirements for typical toolmaking tolerances.

Design features:
- Prismatic guide against cam driver, flat guide against cam base
- Sliding surfaces hardened steel / bronze with solid lubricant
- Gas springs

FIBRO ECO LINE cam units series 2016.207. are available in the widths from 70 to 400 mm and in the angular variants 0° to 60 ° (gradation 5°).

Order number	Width [mm]	Performance class [kN]*	Page
2016.207.□□.007.□□□.21	70	100	223
2016.207.□□.008.□□□.21	80	150	229
2016.207.□□.016.□□□.21	165	300	235
2016.207.□□.020.□□□.21	200	350	241
2016.207.□□.030.□□□.21	300	450	247
2016.207.□□.040.□□□.21	400	450	253

* For exact power values, please refer to the specifications of the respective cam unit type

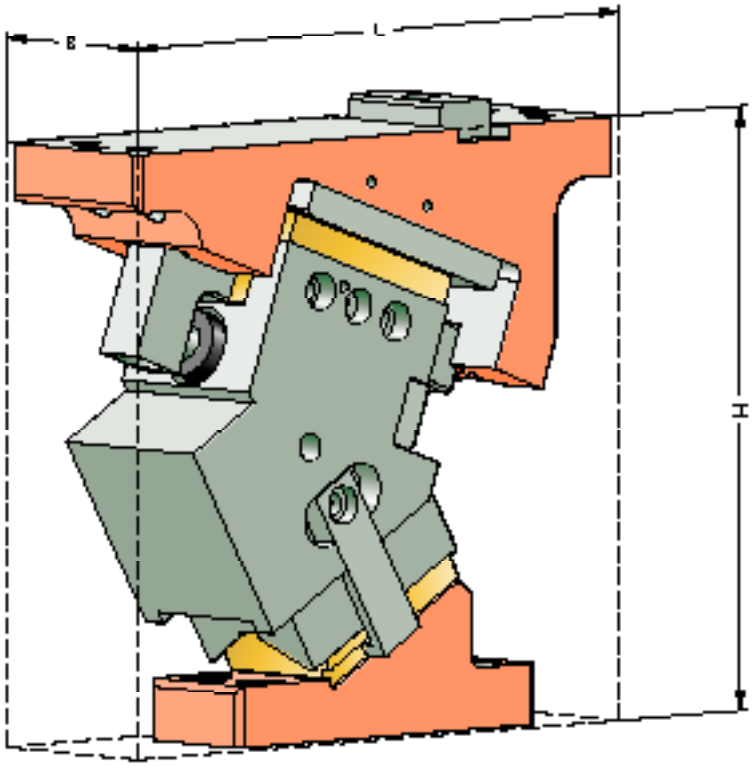
Ordering example:

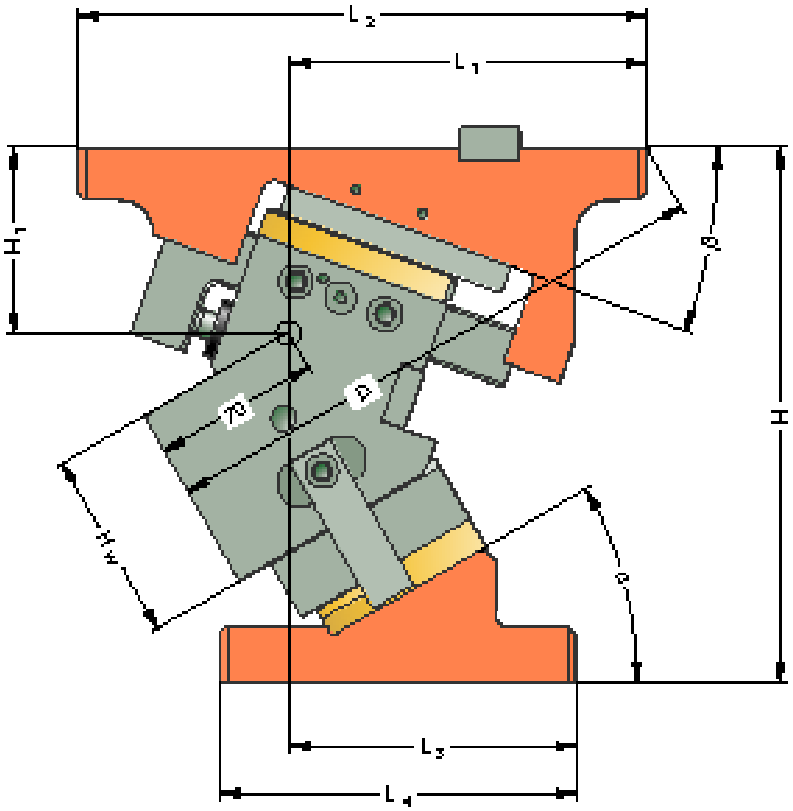
FIBRO ECO LINE cam unit, aerial, width 165 mm	=	2016.207.□□.016.□□□.21
Cam unit angle α = 60°	=	60.
Cam unit stroke according to flow diagram (no option)	=	100.
Order number	=	2016.207. 60. 016. 100. 21

AERIAL
ECO LINE
2016.207.□□.007.

Working width:	70 mm
Performance class:	100 kN

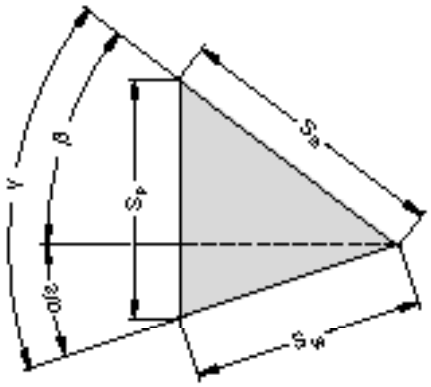
AERIAL ECO LINE
2016.207.□□.007.
SIZE TABLE





Subject to alterations

AERIAL ECO LINE
2016.207.□□.007.
SIZE TABLE



Order number	L [mm]	B [mm]	H [mm]	H_1 [mm]	H_W [mm]	L_1* [mm]	L_2 [mm]	L_3* [mm]	L_4 [mm]	L_5 [mm]	D* [mm]	α [°]	β [°]	S_W* [mm]	S_S [mm]	S_P* [mm]
2016.207.00.007.019.21	252	70	225	85	75	167.4	240	65.4	150	0	237.4	0	50	19.3	30	23.0
2016.207.05.007.021.21	242	70	225	80.2	75	165.1	240	73.1	150	0	241.5	5	45	21.3	30	23.1
2016.207.10.007.023.21	240	70	225	76.6	75	163.9	240	82.9	150	0	244.7	10	40	23.3	30	23.3
2016.207.15.007.025.21	240	70	225	78.5	75	149.9	240	92.9	150	0	235.1	15	35	25.4	30	23.8
2016.207.20.007.027.21	240	70	225	75.7	75	158.8	240	106.8	150	0	245.1	20	30	27.6	30	24.5
2016.207.25.007.030.21	240	70	225	75.9	75	160	240	118	150	0	247.1	25	25	30.0	30	25.4
2016.207.30.007.032.21	240	70	225	78	75	150.9	240	120.9	150	0	239.7	30	20	32.6	30	26.5
2016.207.35.007.035.21	240	70	225	77.1	75	153.3	240	136.3	150	0	239.8	35	15	35.4	30	28.1
2016.207.40.007.038.21	240	70	225	80.1	75	151.2	240	147.2	150	0	237.3	40	10	38.6	30	30.0
2016.207.45.007.042.21	242	70	225	81.8	75	148.7	240	150.7	150	0	232.9	45	5	42.3	30	32.5
2016.207.50.007.046.21	261	70	225	81.5	75	146	240	167	150	0	226.3	50	0	46.7	30	35.8
2016.207.55.007.052.21	263	70	225	88.7	75	150.4	240	173.4	150	0	228.9	55	0	52.3	30	42.8
2016.207.60.007.060.21	275	70	225	95.2	75	150.8	240	185.8	150	0	227.9	60	0	60.0	30	52.0

* Values rounded

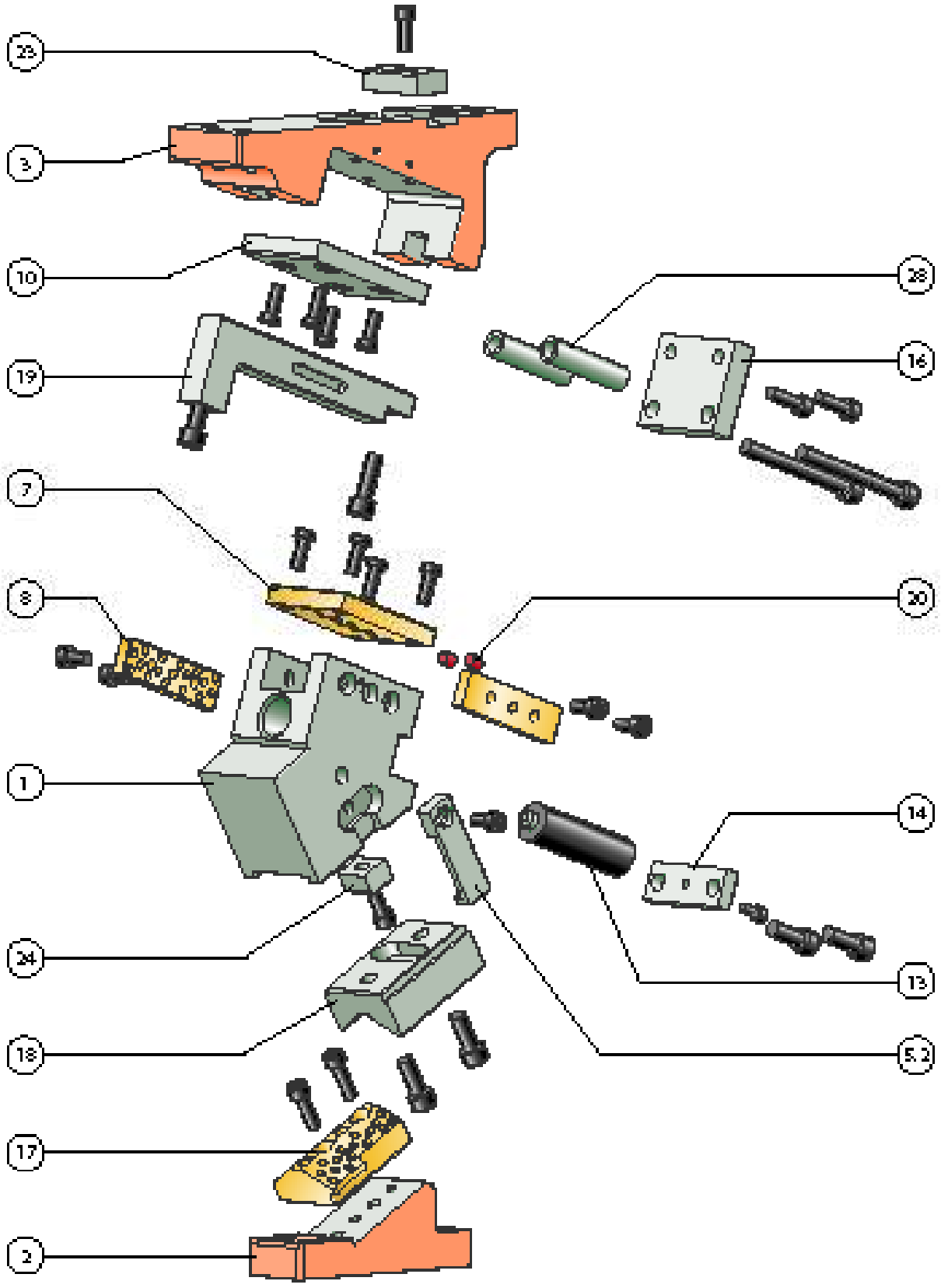
Mounting cam base:

Hexagon socket head cap screws DIN EN ISO 4762	4x M10 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x ø10

Mounting cam driver:

Hexagon socket head cap screws DIN EN ISO 4762	4x M10 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x ø10

AERIAL ECO LINE
2016.207.□□.007.
EXPLODED VIEW

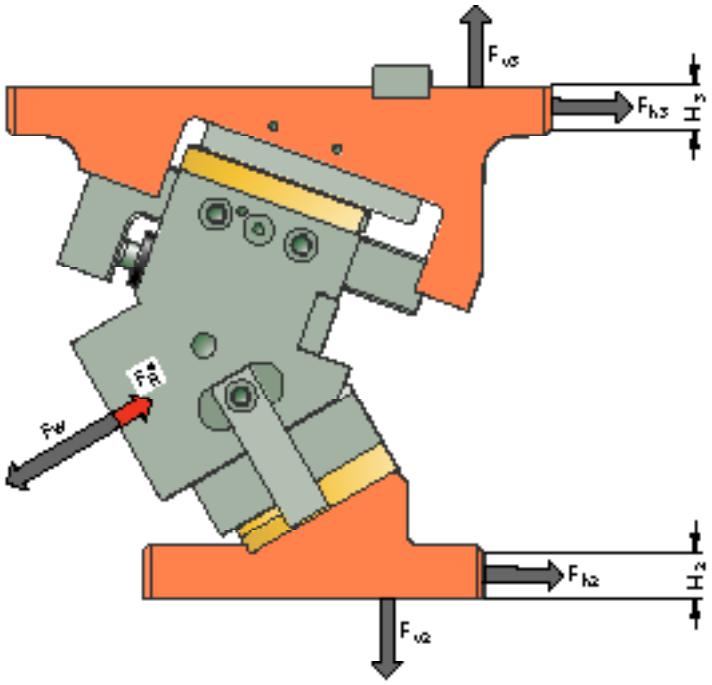


AERIAL ECO LINE
2016.207.□□.007.
PARTS LIST

Position	Piece	Designation	Material	spare part
1	1	Body		
2	1	Driver		
3	1	Base		
4.1				
4.2				
5.1				x
5.2	1	Positive return, right		x
6				
7	1	Sliding plate	Bronze with solid lubricant	x
8	2	Sliding plate	Bronze with solid lubricant	x
9				
10	1	Sliding plate	Steel	x
11				
12				
13	1	Gas spring		x
14	1	Stop plate		x
15				
16	1	Lockout system		x
17	1	Slide pad	Bronze with solid lubricant	x
18	1	Prismatic guide	Steel	x
19	1	Centre guide		x
20	2	Damper		x
21				
22				
23	1	Feather key		x
24	1	Feather key		x
25				
26				
27				
28	2	Spacer		x

For inquiries or when ordering spare parts (x), we require the following data:
- Cam unit order no.
- Cam unit serial no.
- Item number / Designation / Spare part

AERIAL ECO LINE
2016.207.□□.007.
SYSTEM AND SURROUNDING FORCES



Order number	α [°]	F_W [kN]	F_R* [kN]	F_{h2} [kN]	F_{v2} [kN]	F_{h3} [kN]	F_{v3} [kN]	H_2 [mm]	H_3 [mm]
2016.207.00.007.019.21	0	98	2.3	0	82	98	82	20	19
2016.207.05.007.021.21	5	98	2.3	7	82	90	90	20	19
2016.207.10.007.023.21	10	98	2.4	14	81	82	98	20	19
2016.207.15.007.025.21	15	98	2.4	21	79	73	105	20	19
2016.207.20.007.027.21	20	98	2.4	28	77	64	111	20	19
2016.207.25.007.030.21	25	98	2.4	35	75	54	116	20	19
2016.207.30.007.032.21	30	98	2.4	41	71	44	120	20	19
2016.207.35.007.035.21	35	98	2.4	47	67	33	124	20	19
2016.207.40.007.038.21	40	98	2.5	53	63	22	126	20	19
2016.207.45.007.042.21	45	98	2.5	58	58	11	127	20	19
2016.207.50.007.046.21	50	98	2.5	63	53	0	128	20	19
2016.207.55.007.052.21	55	98	2.7	56	39	0	120	20	19
2016.207.60.007.060.21	60	98	3.1	49	28	0	113	20	19

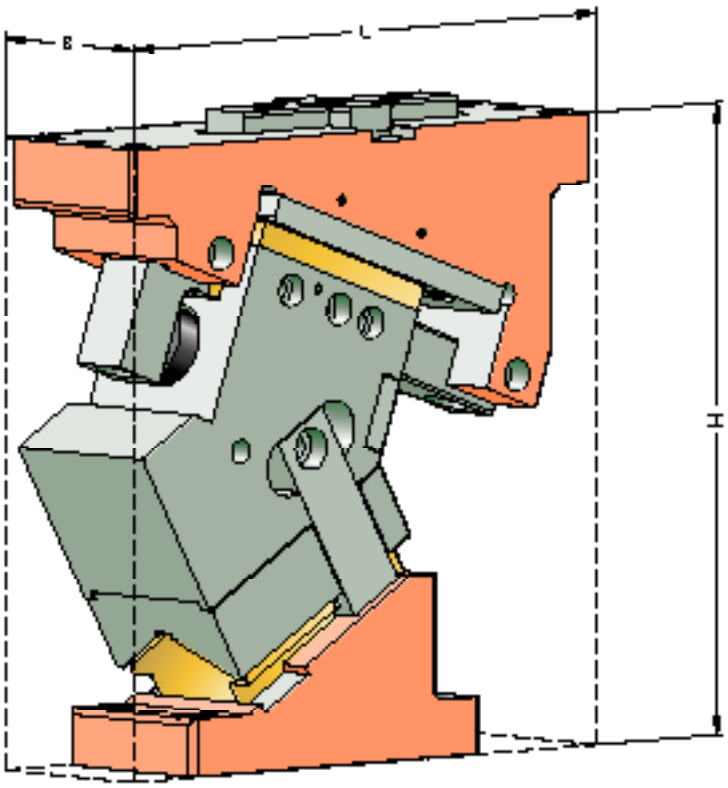
* Retraction force values correspond to the spring-generated retraction force at the working point

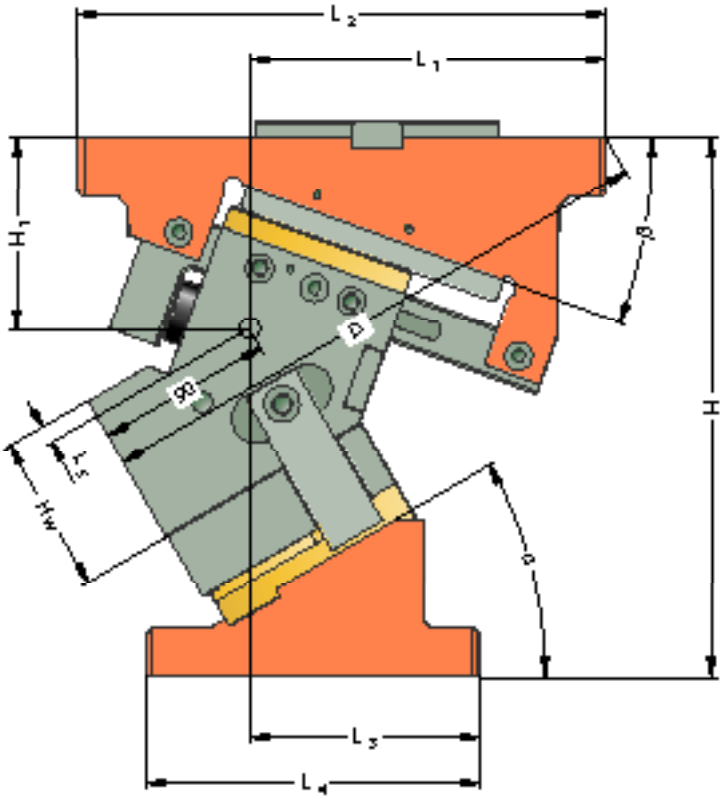
The forces F_{h2}, F_{V2} as well as F_{h3}, F_{V3} act on the tool environment at maximum working force F_W.

AERIAL
ECO LINE
2016.207.□□.008.

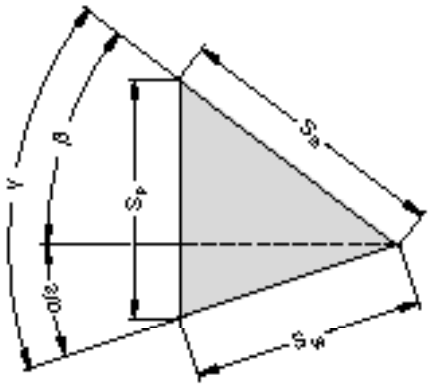
Working width:	80 mm
Performance class:	150 kN

AERIAL ECO LINE
2016.207.□□.008.
SIZE TABLE





AERIAL ECO LINE
2016.207.□□.008.
SIZE TABLE



Order number	L [mm]	B [mm]	H [mm]	H_1 [mm]	H_W [mm]	L_1* [mm]	L_2 [mm]	L_3* [mm]	L_4 [mm]	L_5 [mm]	D* [mm]	α [°]	β [°]	S_W* [mm]	S_S [mm]	S_P* [mm]
2016.207.00.008.032.21	305	80	275	119	75	190	270	55	170	9	280	0	50	32.1	50	38.3
2016.207.05.008.035.21	295	80	275	117.1	75	190.9	270	65.9	170	9	290.4	5	45	35.5	50	38.4
2016.207.10.008.038.21	280	80	275	111.1	75	187.3	270	77.3	170	9	293.7	10	40	38.9	50	38.9
2016.207.15.008.042.21	281	80	275	106.1	75	191.2	270	86.2	170	9	302.2	15	35	42.4	50	39.7
2016.207.20.008.046.21	276	80	275	102.2	75	188.5	270	93.5	170	9	302.1	20	30	46.1	50	40.8
2016.207.25.008.050.21	272	80	275	99.4	75	186.1	270	106.1	170	9	300.7	25	25	50.0	50	42.3
2016.207.30.008.054.21	270	80	275	97.7	75	181.9	270	116.9	170	9	296.4	30	20	54.3	50	44.2
2016.207.35.008.059.21	270	80	275	97.1	75	181.8	270	126.8	170	9	294.6	35	15	59.0	50	46.8
2016.207.40.008.064.21	270	80	275	96.8	75	177.6	270	142.6	170	9	288.3	40	10	64.3	50	50.0
2016.207.45.008.070.21	270	80	275	99.3	75	177.5	270	147.5	170	9	285.7	45	5	70.4	50	54.2
2016.207.50.008.077.21	270	80	275	102.1	75	173.1	270	158.1	170	9	279.5	50	0	77.8	50	59.6
2016.207.55.008.087.21	270	80	275	106	75	172.4	270	172.4	170	9	275.7	55	0	87.2	50	71.4
2016.207.60.008.100.21	270	80	275	112.5	75	181.2	270	181.2	170	9	278	60	0	100.0	50	86.6

* Values rounded

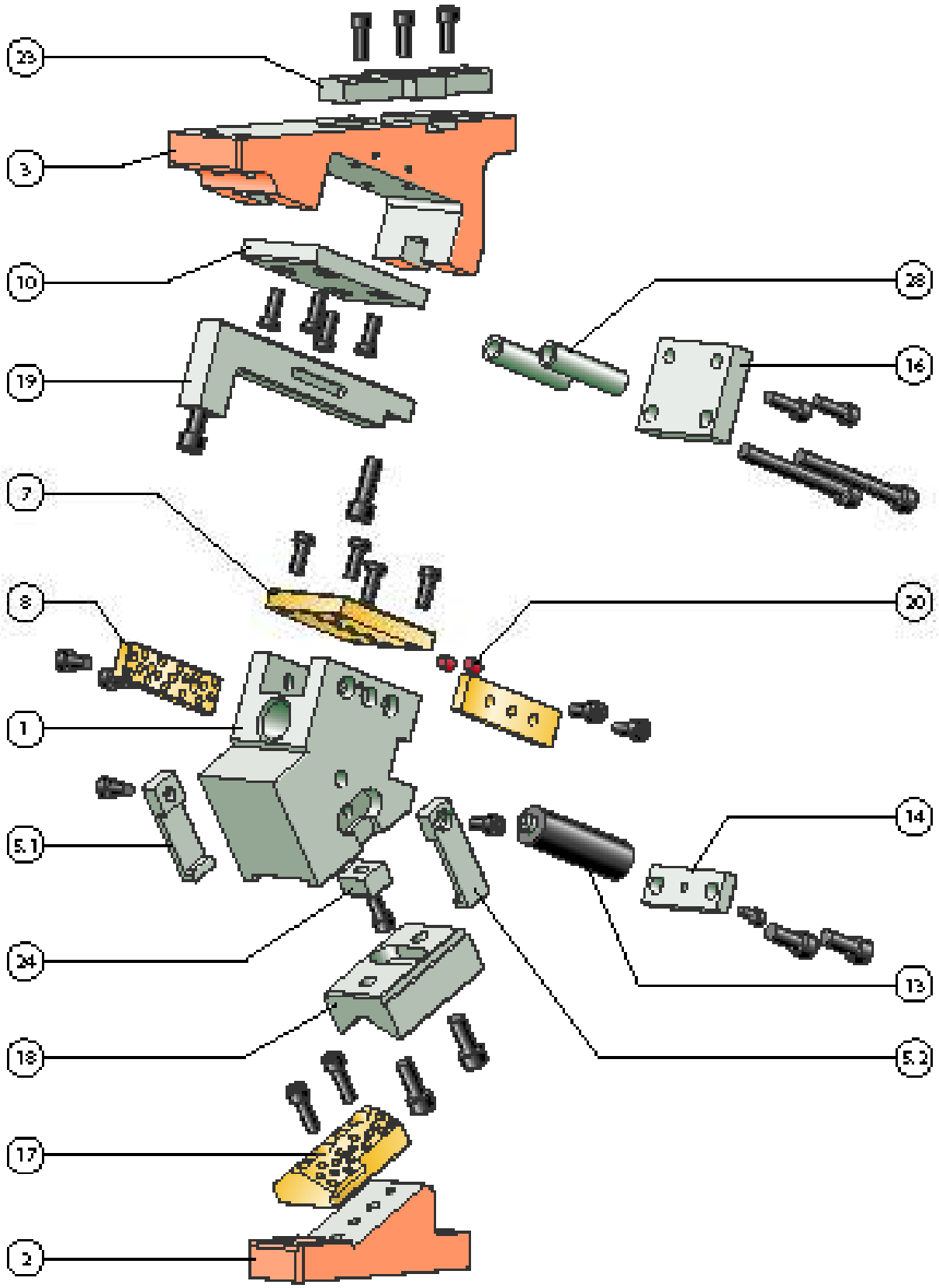
Mounting cam base:

Hexagon socket head cap screws DIN EN ISO 4762	4x M12 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x ø12

Mounting cam driver:

Hexagon socket head cap screws DIN EN ISO 4762	4x M12 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x ø12

AERIAL ECO LINE
2016.207.□□.008.
EXPLODED VIEW

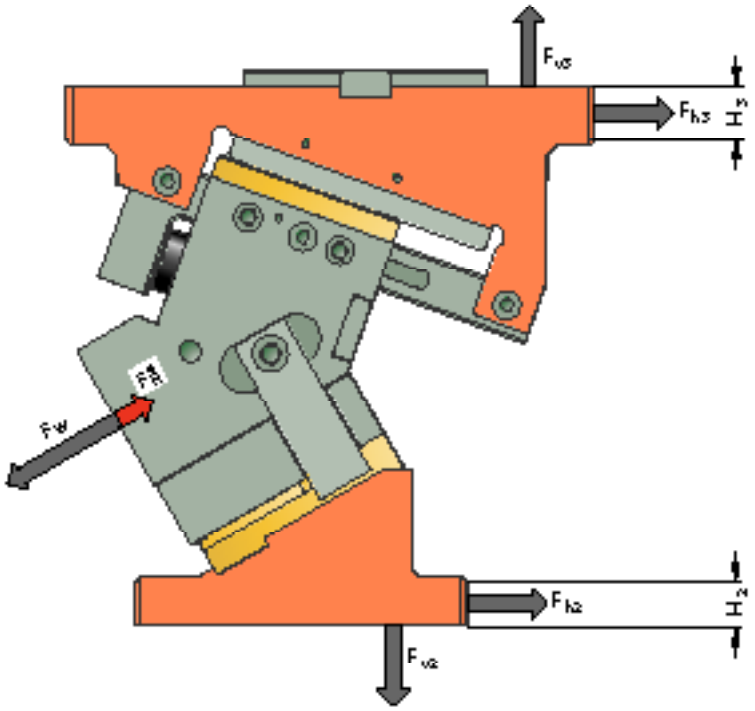


AERIAL ECO LINE
2016.207.□□.008.
PARTS LIST

Position	Piece	Designation	Material	spare part
1	1	Body		
2	1	Driver		
3	1	Base		
4.1				
4.2				
5.1	1	Positive return, left		x
5.2	1	Positive return, right		x
6				
7	1	Sliding plate	Bronze with solid lubricant	x
8	2	Sliding plate	Bronze with solid lubricant	x
9				
10	1	Sliding plate	Steel	x
11				
12				
13	1	Gas spring		x
14	1	Stop plate		x
15				
16	1	Lockout system		x
17	1	Slide pad	Bronze with solid lubricant	x
18	1	Prismatic guide	Steel	x
19	1	Centre guide		x
20	2	Damper		x
21				
22				
23	3	Feather key		x
24	1	Feather key		x
25				
26				
27				
28	2	Spacer		x

For inquiries or when ordering spare parts (x), we require the following data:
- Cam unit order no.
- Cam unit serial no.
- Item number / Designation / Spare part

AERIAL ECO LINE
2016.207.□□.008.
SYSTEM AND SURROUNDING FORCES



Order number	α [°]	F_W [kN]	F_R* [kN]	F_{h2} [kN]	F_{v2} [kN]	F_{h3} [kN]	F_{v3} [kN]	H_2 [mm]	H_3 [mm]
2016.207.00.008.032.21	0	166	2.4	0	139	166	139	22	27
2016.207.05.008.035.21	5	166	2.4	12	139	153	153	22	27
2016.207.10.008.038.21	10	166	2.4	24	137	139	166	22	27
2016.207.15.008.042.21	15	166	2.4	36	135	124	178	22	27
2016.207.20.008.046.21	20	166	2.5	48	131	108	188	22	27
2016.207.25.008.050.21	25	166	2.5	59	126	92	196	22	27
2016.207.30.008.054.21	30	166	2.5	70	121	74	204	22	27
2016.207.35.008.059.21	35	166	2.5	80	114	56	209	22	27
2016.207.40.008.064.21	40	166	2.5	90	107	38	213	22	27
2016.207.45.008.070.21	45	166	2.5	98	98	19	216	22	27
2016.207.50.008.077.21	50	166	2.5	107	90	0	217	22	27
2016.207.55.008.087.21	55	166	2.7	95	67	0	203	22	27
2016.207.60.008.100.21	60	166	3.0	83	48	0	192	22	27

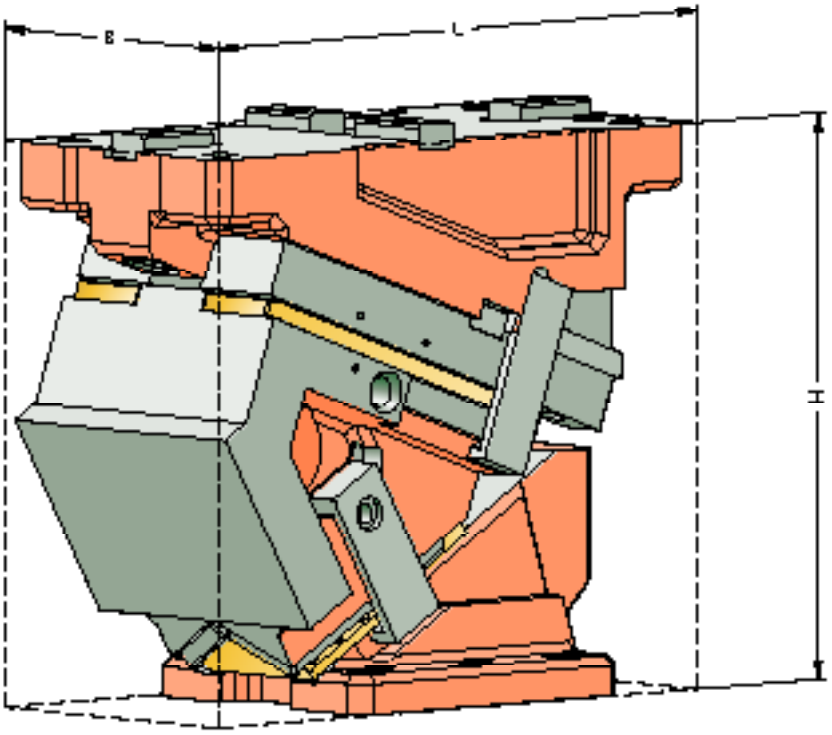
* Retraction force values correspond to the spring-generated retraction force at the working point

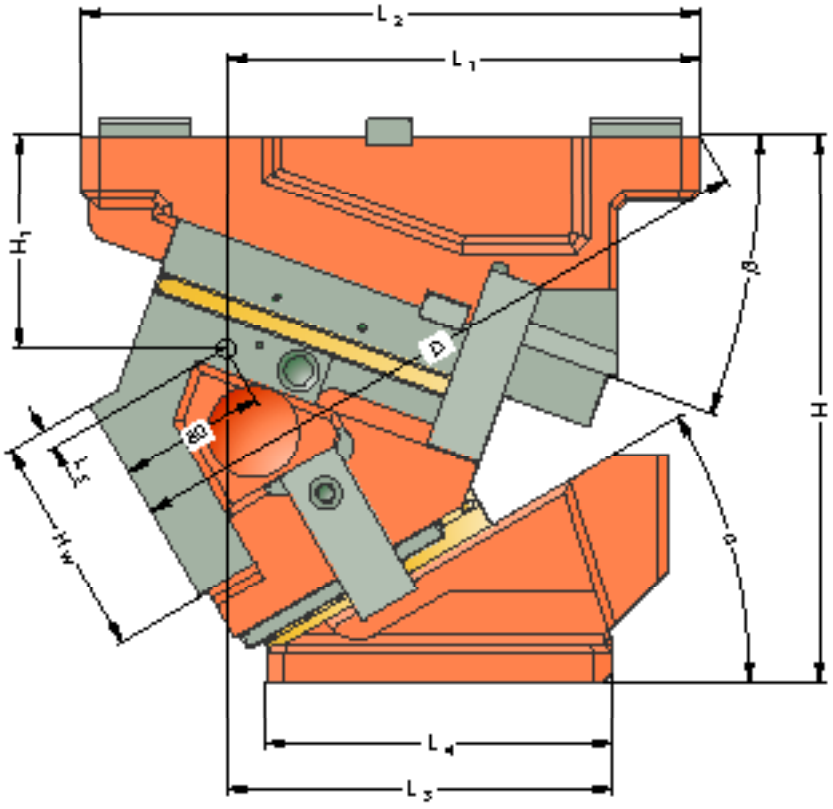
The forces F_{h2}, F_{V2} as well as F_{h3}, F_{V3} act on the tool environment at maximum working force F_W.

AERIAL
ECO LINE
2016.207.□□.016.

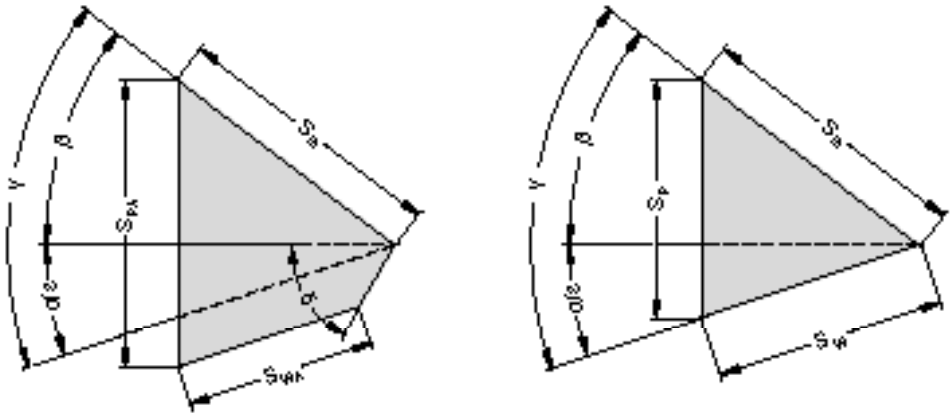
Working width:	165 mm
Performance class:	300 kN

AERIAL ECO LINE
2016.207.□□.016.
SIZE TABLE





AERIAL ECO LINE
2016.207.□□.016.
SIZE TABLE



Order number	L [mm]	B [mm]	H [mm]	H_1 [mm]	H_W [mm]	L_1 [mm]	L_2 [mm]	L_3 [mm]	L_4 [mm]	L_5 [mm]	D [mm]	α [°]	β [°]	S_W* [mm]	S_{WA}* [mm]	S_S [mm]	S_P* [mm]
2016.207.00.016.032.21	340	165	300	107	120	255.8	340	182.8	190	10	335.8	0	50	-	24.5	50	48.2
2016.207.05.016.035.21	340	165	300	103.9	120	254.7	340	196.7	190	10	342.8	5	45	-	22.3	50	53.5
2016.207.10.016.038.21	340	165	300	107	120	256.8	340	205.8	190	10	351.4	10	40	-	24.8	50	52.7
2016.207.15.016.042.21	340	165	300	111.4	120	249.9	340	217.9	190	10	350.2	15	35	-	29.3	50	52.0
2016.207.20.016.046.21	340	165	300	112	120	254.1	340	226.1	190	10	357.1	20	30	-	34.0	50	52.2
2016.207.25.016.050.21	340	165	300	113.9	120	256.2	340	198.2	190	10	360.3	25	25	-	38.8	50	52.7
2016.207.30.016.054.21	340	165	300	116.9	120	260	340	212	190	10	363.6	30	20	54.3	-	50	44.2
2016.207.35.016.059.21	340	165	300	121.2	120	258.5	340	225.5	190	10	361.3	35	15	59.0	-	50	46.8
2016.207.40.016.064.21	350	165	300	126.6	120	253.6	340	238.6	190	10	355.7	40	10	64.3	-	50	50.0
2016.207.45.016.070.21	365	165	300	133.2	120	251.2	340	251.2	190	10	351.8	45	5	70.4	-	50	54.2
2016.207.50.016.077.21	355	165	300	140.8	120	248.2	340	263.2	190	10	347.4	50	0	77.8	-	50	59.6
2016.207.55.016.087.21	372	165	300	139	120	258.9	340	290.9	190	10	342.4	55	0	87.2	-	50	71.4
2016.207.60.016.100.21	385	165	300	145.5	120	261.6	340	306.6	190	15	336.8	60	0	100.0	-	50	86.6

* Values rounded

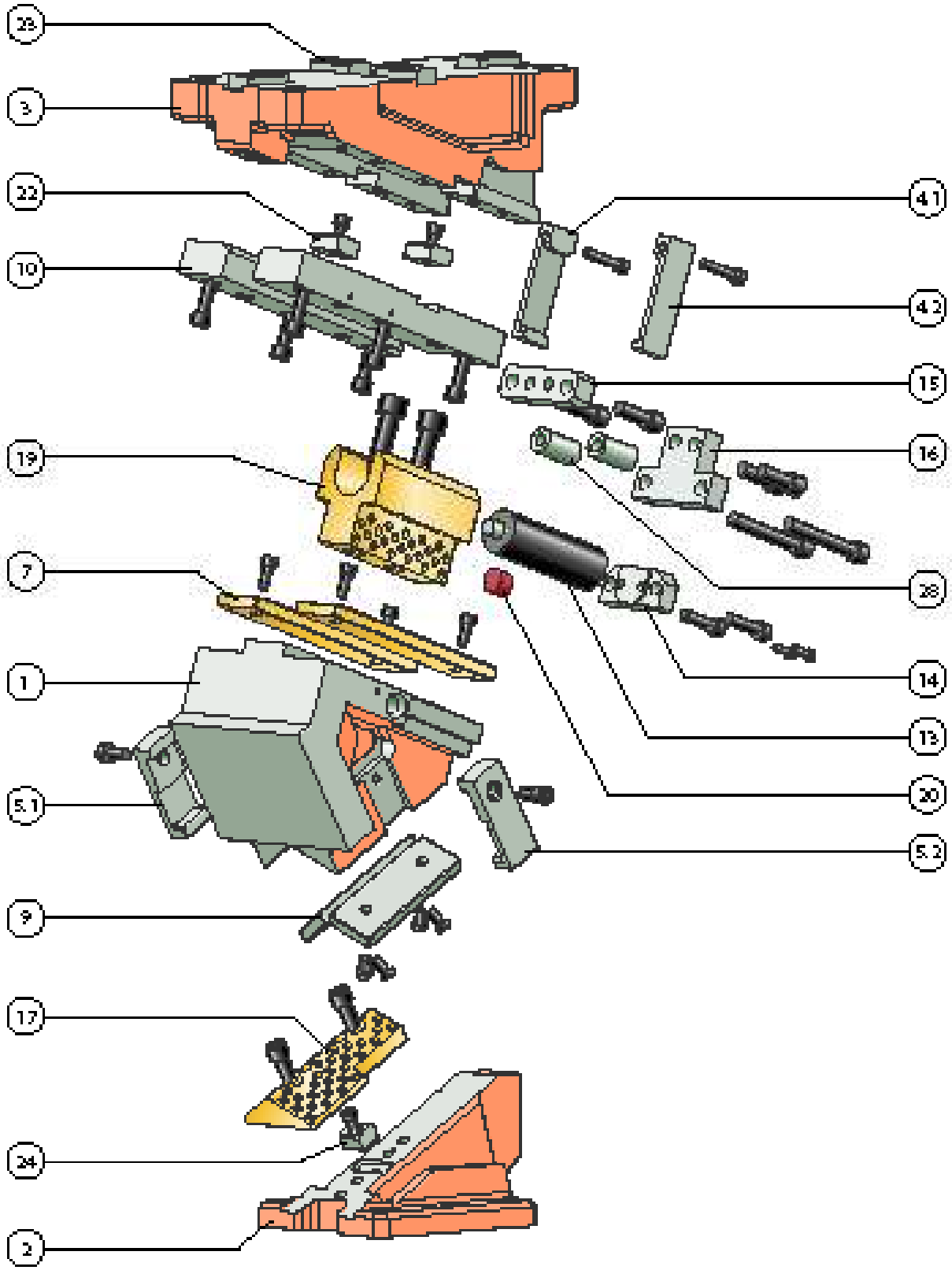
Mounting cam base:

Hexagon socket head cap screws DIN EN ISO 4762	4x M16 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x ø16

Mounting cam driver:

Hexagon socket head cap screws DIN EN ISO 4762	4x M16 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x ø16

AERIAL ECO LINE
2016.207.□□.016.
EXPLODED VIEW

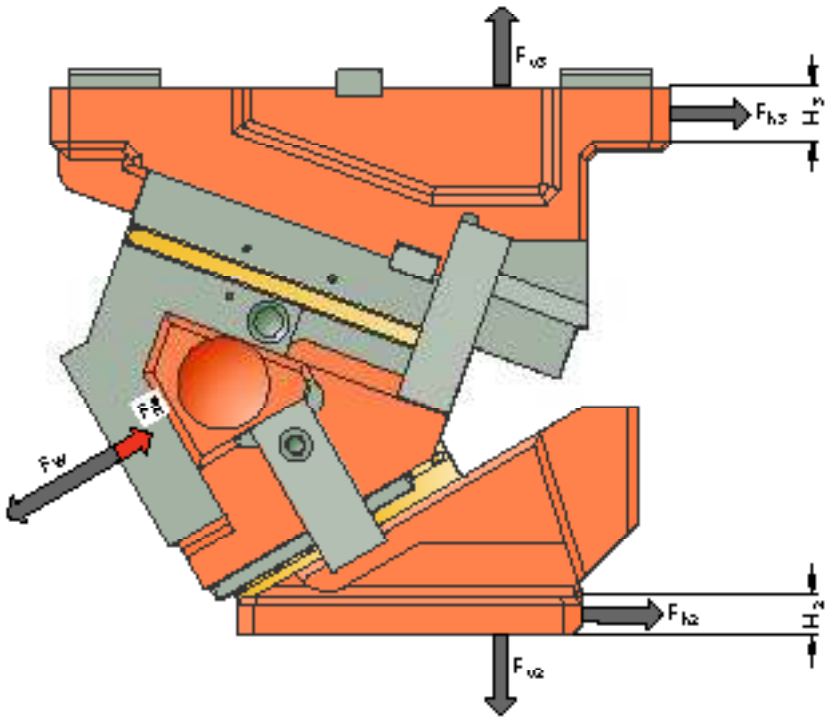


AERIAL ECO LINE
2016.207.□□.016.
PARTS LIST

Position	Piece	Designation	Material	spare part
1	1	Body		
2	1	Driver		
3	1	Base		
4.1	1	Clamp, left		x
4.2	1	Clamp, right		x
5.1	1	Positive return, left		x
5.2	1	Positive return, right		x
6				
7	2	Sliding plate	Bronze with solid lubricant	x
8				
9	2	Sliding plate	Steel	x
10	2	Sliding plate	Steel	x
11				
12				
13	1	Gas spring		x
14	1	Stop plate		x
15	1	Stop piece		x
16	1	Lockout system		x
17	1	Slide pad	Bronze with solid lubricant	x
18				
19	1	Centre guide	Bronze with solid lubricant	x
20	1	Damper		x
21				
22	2	Feather key		x
23	4	Feather key		x
24	1	Feather key		x
25				
26				
27				
28	2	Spacer		x

For inquiries or when ordering spare parts (x), we require the following data:
- Cam unit order no.
- Cam unit serial no.
- Item number / Designation / Spare part

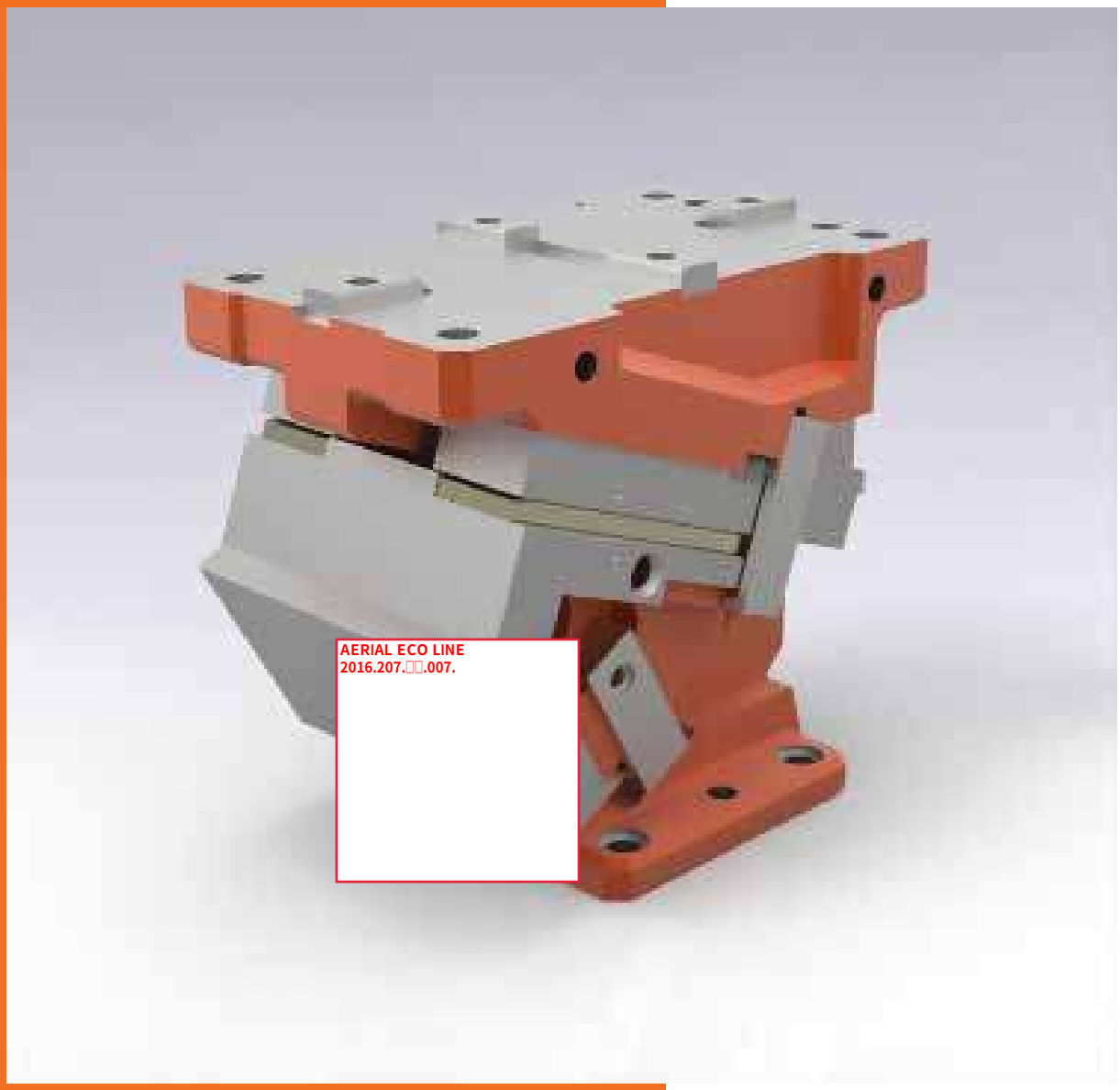
AERIAL ECO LINE
2016.207.□□.016.
SYSTEM AND SURROUNDING FORCES



Order number	α [°]	F_W [kN]	F_R* [kN]	F_{h2} [kN]	F_{v2} [kN]	F_{h3} [kN]	F_{v3} [kN]	H_2 [mm]	H_3 [mm]
2016.207.00.016.032.21	0	294	3.9	0	247	294	247	23	30
2016.207.05.016.035.21	5	294	4.0	22	246	271	271	23	30
2016.207.10.016.038.21	10	294	4.0	43	243	247	294	28	30
2016.207.15.016.042.21	15	294	4.0	64	238	220	314	30	30
2016.207.20.016.046.21	20	294	4.0	84	232	192	332	30	30
2016.207.25.016.050.21	25	294	4.0	104	224	162	348	21	30
2016.207.30.016.054.21	30	294	4.0	123	214	131	361	21	30
2016.207.35.016.059.21	35	294	4.0	141	202	99	371	21	30
2016.207.40.016.064.21	40	294	3.9	159	189	67	378	21	30
2016.207.45.016.070.21	45	294	3.9	174	174	33	382	21	30
2016.207.50.016.077.21	50	294	3.9	189	159	0	384	116	30
2016.207.55.016.087.21	55	294	4.3	169	118	0	359	110	30
2016.207.60.016.100.21	60	294	4.8	147	85	0	339	115	30

* Retraction force values correspond to the spring-generated retraction force at the working point

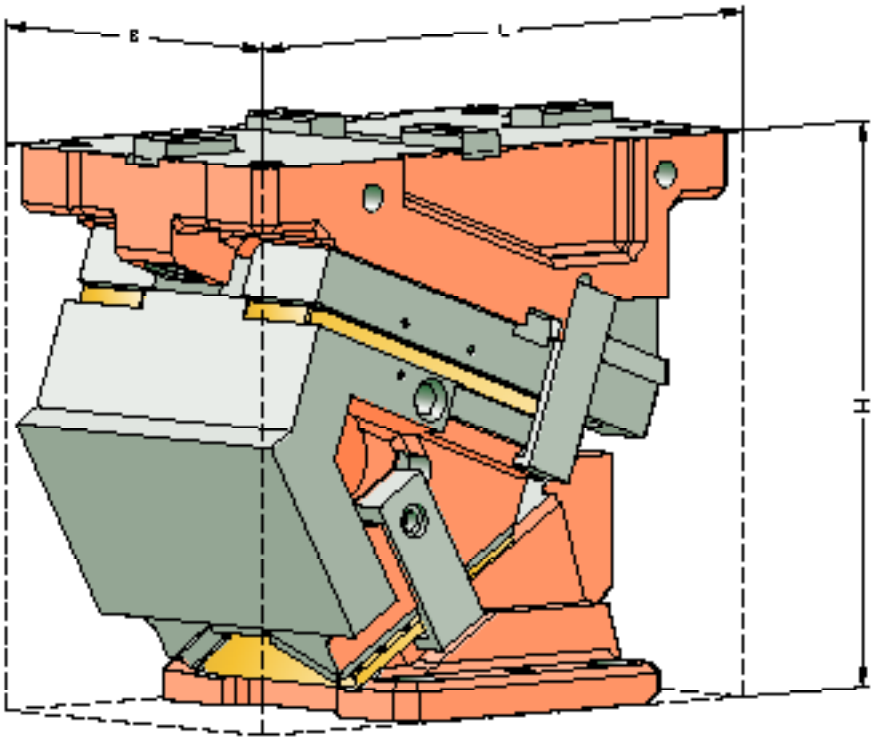
The forces F_{h2}, F_{V2} as well as F_{h3}, F_{V3} act on the tool environment at maximum working force F_W.

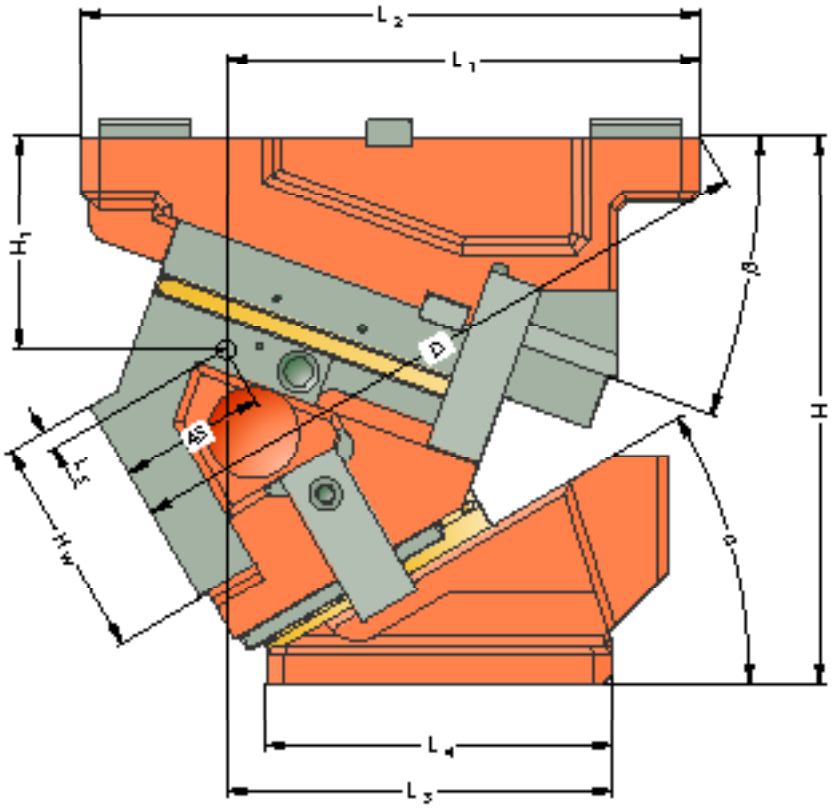


AERIAL
ECO LINE
2016.207.□□.020.

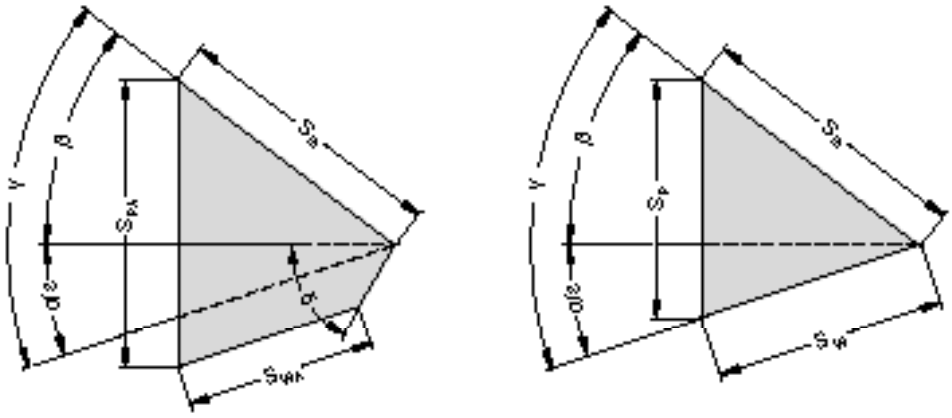
Working width:	200 mm
Performance class:	350 kN

AERIAL ECO LINE
2016.207.□□.020.
SIZE TABLE





AERIAL ECO LINE
2016.207.□□.020.
SIZE TABLE



Order number	L [mm]	B [mm]	H [mm]	H_1 [mm]	H_W [mm]	L_1 [mm]	L_2 [mm]	L_3 [mm]	L_4 [mm]	L_5 [mm]	D [mm]	α [°]	β [°]	S_W* [mm]	S_{WA}* [mm]	S_S [mm]	S_P* [mm]
2016.207.00.020.032.21	340	200	300	101	120	290.8	340	217.8	190	4	335.8	0	50	-	24.5	50	48.2
2016.207.05.020.035.21	340	200	300	101	120	290.1	340	232.1	190	4	342.8	5	45	-	22.3	50	53.5
2016.207.10.020.038.21	340	200	300	107.2	120	292.3	340	241.3	190	4	351.4	10	40	-	24.8	50	52.7
2016.207.15.020.042.21	340	200	300	114.7	120	285.3	340	250.3	190	4	350.2	15	35	-	29.3	50	52.0
2016.207.20.020.046.21	340	200	300	118.4	120	289	340	261	190	4	357.1	20	30	-	34.0	50	52.2
2016.207.25.020.050.21	340	200	300	123.2	120	290.4	340	232.4	190	4	360.3	25	25	-	38.8	50	52.7
2016.207.30.020.054.21	340	200	300	129.4	120	293.3	340	245.3	190	4	363.6	30	20	54.3	-	50	44.2
2016.207.35.020.059.21	340	200	300	136.4	120	290.6	340	257.6	190	4	361.3	35	15	59.0	-	50	46.8
2016.207.40.020.064.21	350	200	300	144.5	120	284.3	340	269.3	190	4	355.7	40	10	64.3	-	50	50.0
2016.207.45.020.070.21	365	200	300	153.7	120	280.2	340	280.2	190	4	351.8	45	5	70.4	-	50	54.2
2016.207.50.020.077.21	355	200	300	163.7	120	275.3	340	290.3	190	4	347.4	50	0	77.8	-	50	59.6
2016.207.55.020.087.21	372	200	300	170	120	275.7	340	307.7	190	6	342.4	55	0	87.2	-	50	71.4
2016.207.60.020.100.21	385	200	300	180.3	120	271.3	340	316.3	190	6	336.8	60	0	100.0	-	50	86.6

* Values rounded

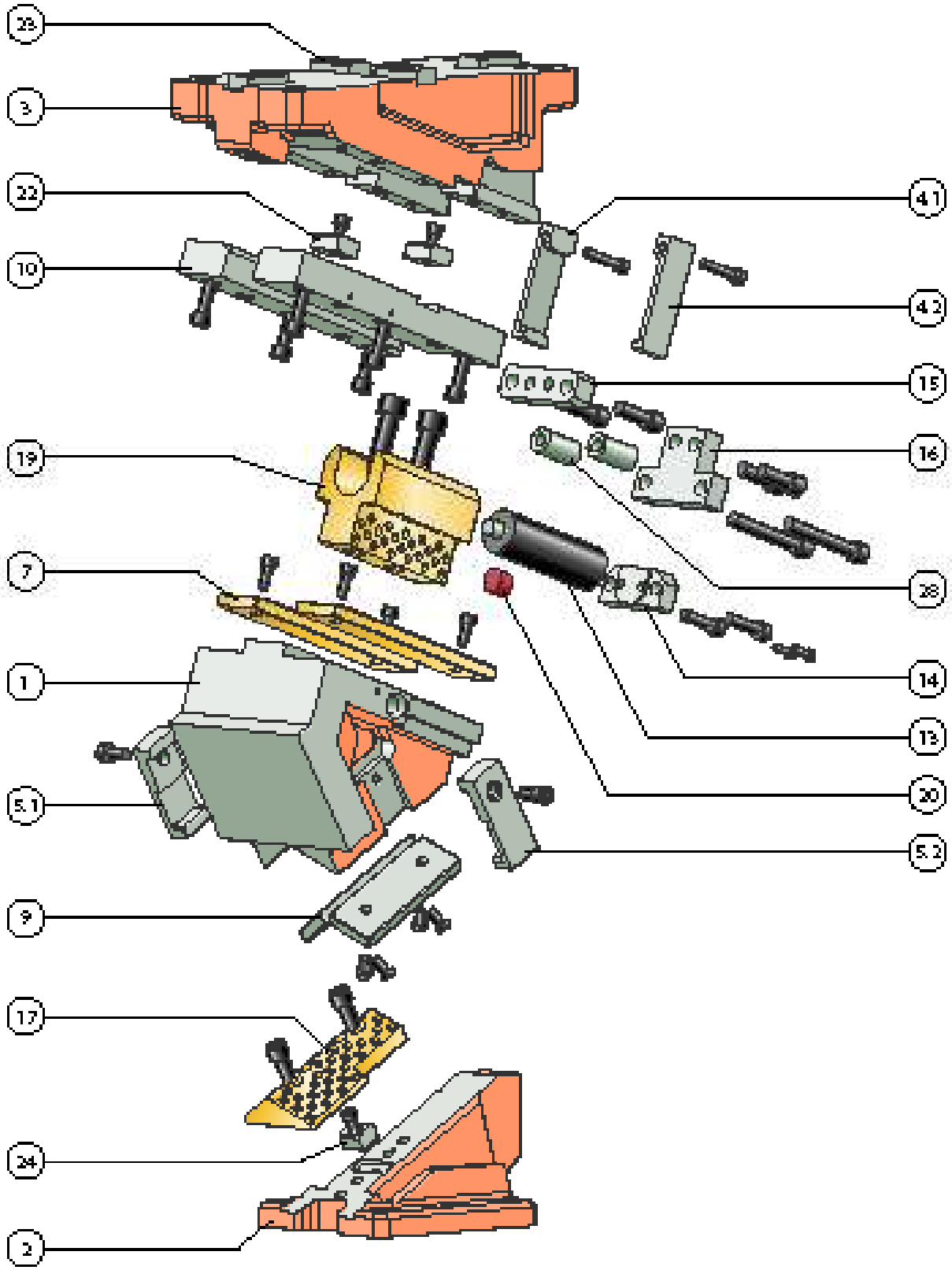
Mounting cam base:

Hexagon socket head cap screws DIN EN ISO 4762	4x M16 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x ø16

Mounting cam driver:

Hexagon socket head cap screws DIN EN ISO 4762	4x M16 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x ø16

AERIAL ECO LINE
2016.207.□□.020.
EXPLODED VIEW

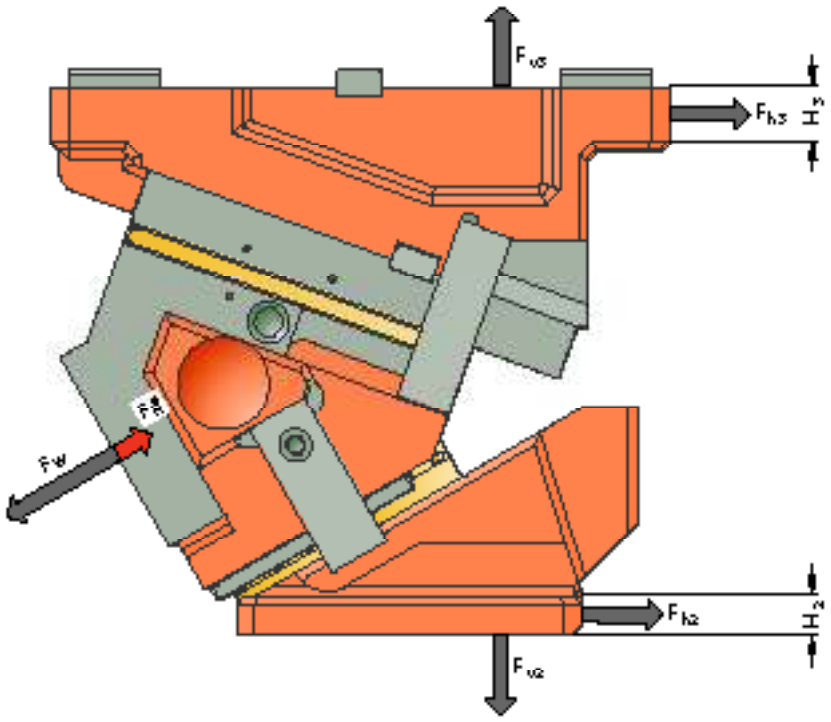


AERIAL ECO LINE
2016.207.□□.020.
PARTS LIST

Position	Piece	Designation	Material	spare part
1	1	Body		
2	1	Driver		
3	1	Base		
4.1	1	Clamp, left		x
4.2	1	Clamp, right		x
5.1	1	Positive return, left		x
5.2	1	Positive return, right		x
6				
7	2	Sliding plate	Bronze with solid lubricant	x
8				
9	2	Sliding plate	Steel	x
10	2	Sliding plate	Steel	x
11				
12				
13	1	Gas spring		x
14	1	Stop plate		x
15	1	Stop piece		x
16	1	Lockout system		x
17	1	Slide pad	Bronze with solid lubricant	x
18				
19	1	Centre guide	Bronze with solid lubricant	x
20	1	Damper		x
21				
22	2	Feather key		x
23	4	Feather key		x
24	1	Feather key		x
25				
26				
27				
28	2	Spacer		x

For inquiries or when ordering spare parts (x), we require the following data:
- Cam unit order no.
- Cam unit serial no.
- Item number / Designation / Spare part

AERIAL ECO LINE
2016.207.□□.020.
SYSTEM AND SURROUNDING FORCES



Order number	α [°]	F_W [kN]	F_R* [kN]	F_{h2} [kN]	F_{v2} [kN]	F_{h3} [kN]	F_{v3} [kN]	H_2 [mm]	H_3 [mm]
2016.207.00.020.032.21	0	353	8.5	0	296	353	296	15	30
2016.207.05.020.035.21	5	353	8.5	26	295	326	326	23	30
2016.207.10.020.038.21	10	353	8.6	51	292	296	353	28	30
2016.207.15.020.042.21	15	353	8.6	77	286	264	377	30	30
2016.207.20.020.046.21	20	353	8.6	101	278	230	399	60	30
2016.207.25.020.050.21	25	353	8.6	125	268	195	418	21	30
2016.207.30.020.054.21	30	353	8.6	148	257	158	433	21	30
2016.207.35.020.059.21	35	353	8.6	170	243	119	445	21	30
2016.207.40.020.064.21	40	353	8.6	190	227	80	454	21	30
2016.207.45.020.070.21	45	353	8.6	209	209	40	459	21	30
2016.207.50.020.077.21	50	353	8.6	227	190	0	461	116	30
2016.207.55.020.087.21	55	353	9.5	202	142	0	431	110	30
2016.207.60.020.100.21	60	353	10.7	177	102	0	408	115	30

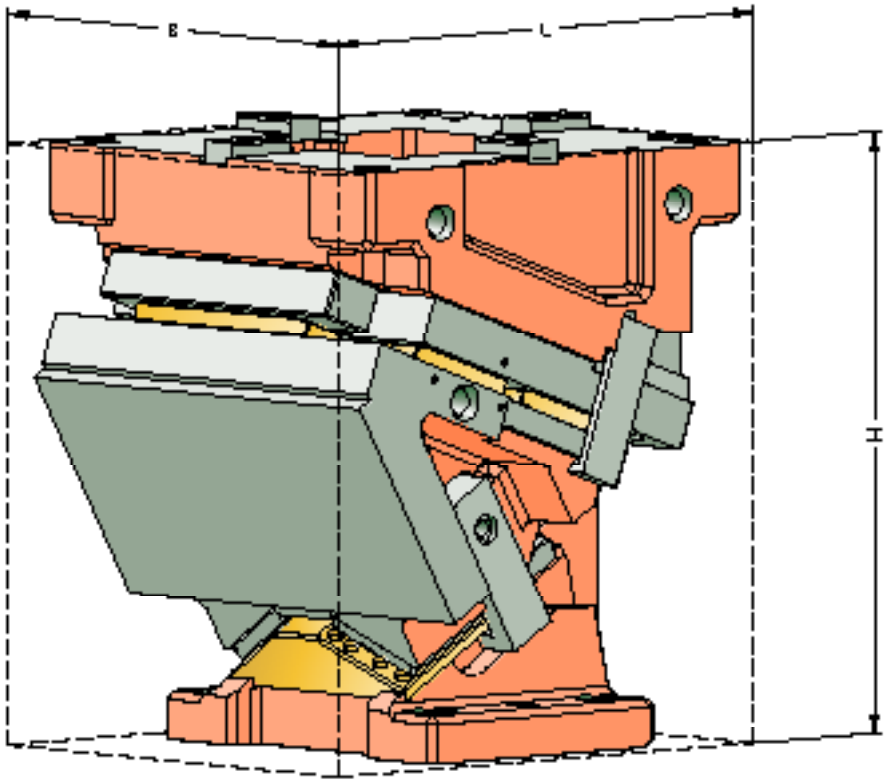
* Retraction force values correspond to the spring-generated retraction force at the working point

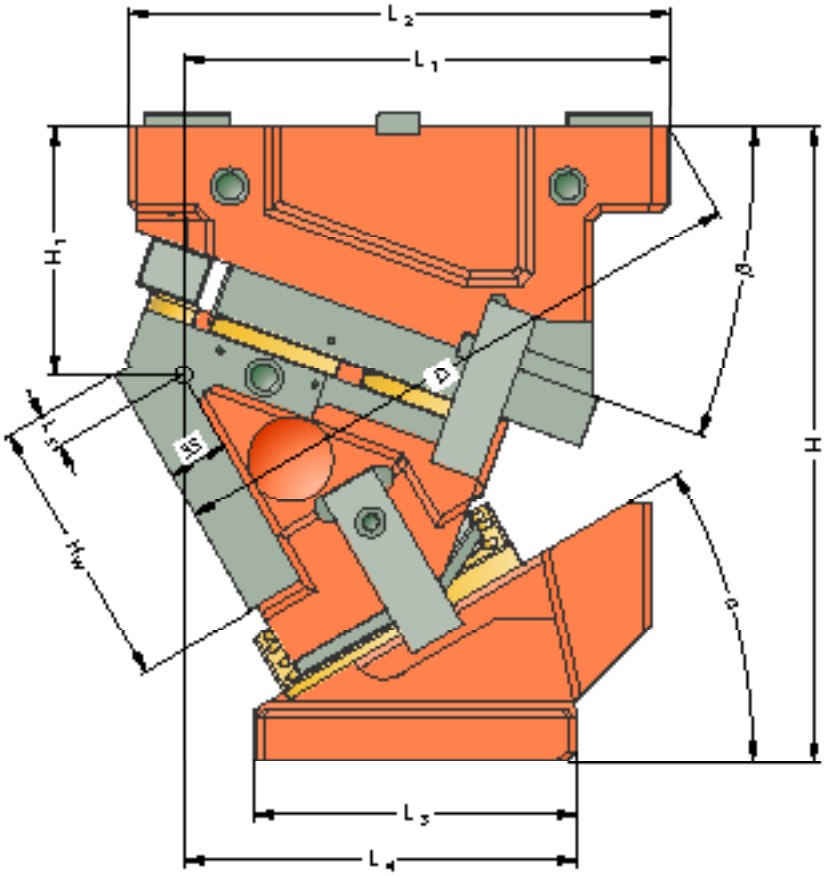
The forces F_{h2}, F_{V2} as well as F_{h3}, F_{V3} act on the tool environment at maximum working force F_W.

AERIAL
ECO LINE
2016.207.□□.030.

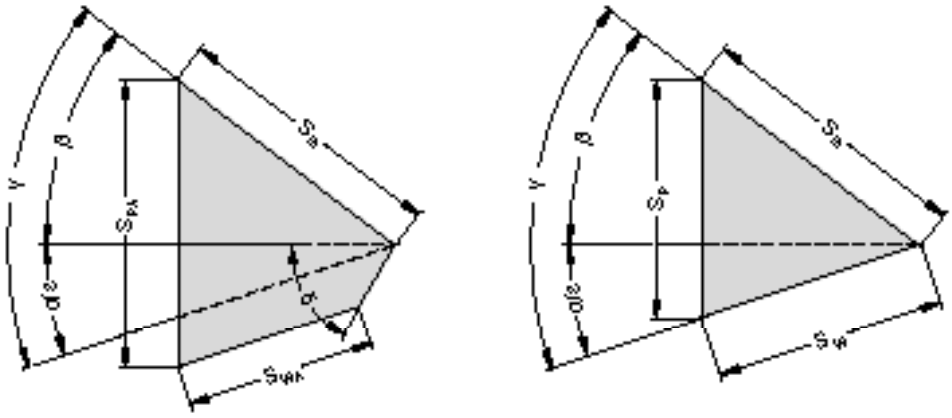
Working width:	300 mm
Performance class:	450 kN

AERIAL ECO LINE
2016.207.□□.030.
SIZE TABLE





AERIAL ECO LINE
2016.207.□□.030.
SIZE TABLE



Order number	L [mm]	B [mm]	H [mm]	H_1 [mm]	H_W [mm]	L_1 [mm]	L_2 [mm]	L_3 [mm]	L_4 [mm]	L_5 [mm]	D [mm]	α [°]	β [°]	S_W* [mm]	S_{WA}* [mm]	S_S [mm]	S_P* [mm]
2016.207.00.030.038.21	328	300	375	118	160	278	320	195	190	20	313.0	0	50	-	29.5	60	59.3
2016.207.05.030.042.21	320	300	375	121.1	160	280.5	320	210.5	190	20	325.0	5	45	-	18.9	60	63.9
2016.207.10.030.046.21	324.1	300	375	125.5	160	286.2	320	226.2	190	20	338.6	10	40	-	24.1	60	63.4
2016.207.15.030.050.21	325.8	300	375	131.3	160	286.9	320	241.9	190	20	346.1	15	35	-	29.1	60	63.8
2016.207.20.030.055.21	327	300	375	138.4	160	287.4	320	202.4	190	20	352.4	20	30	-	34.7	60	63.7
2016.207.25.030.060.21	334.7	300	375	142	160	294.5	320	219.5	190	20	362.0	25	25	-	40.3	60	64.8
2016.207.30.030.065.21	327.8	300	375	146.7	160	287.5	320	232.5	190	20	357.4	30	20	65.1	-	60	53.1
2016.207.35.030.070.21	345.5	300	375	155.5	160	294.4	320	249.4	190	20	365.3	35	15	70.8	-	60	56.1
2016.207.40.030.077.21	303.5	300	375	160.1	160	285.8	320	260.8	190	20	356.9	40	10	77.1	-	60	60.0
2016.207.45.030.084.21	349.7	300	375	168.6	160	285.9	320	278.9	190	20	356.4	45	5	84.5	-	60	65.0
2016.207.50.030.079.21	355	300	375	186.1	160	265	320	300	190	25	347.9	50	0	79.3	-	51	60.8
2016.207.55.030.088.21	405	300	375	210.5	160	252.5	320	337.5	190	10	347.2	55	0	88.9	-	51	72.8
2016.207.60.030.102.21	405	300	375	224.7	160	262.8	320	347.8	190	10	356.0	60	0	102.0	-	51	88.3

* Values rounded

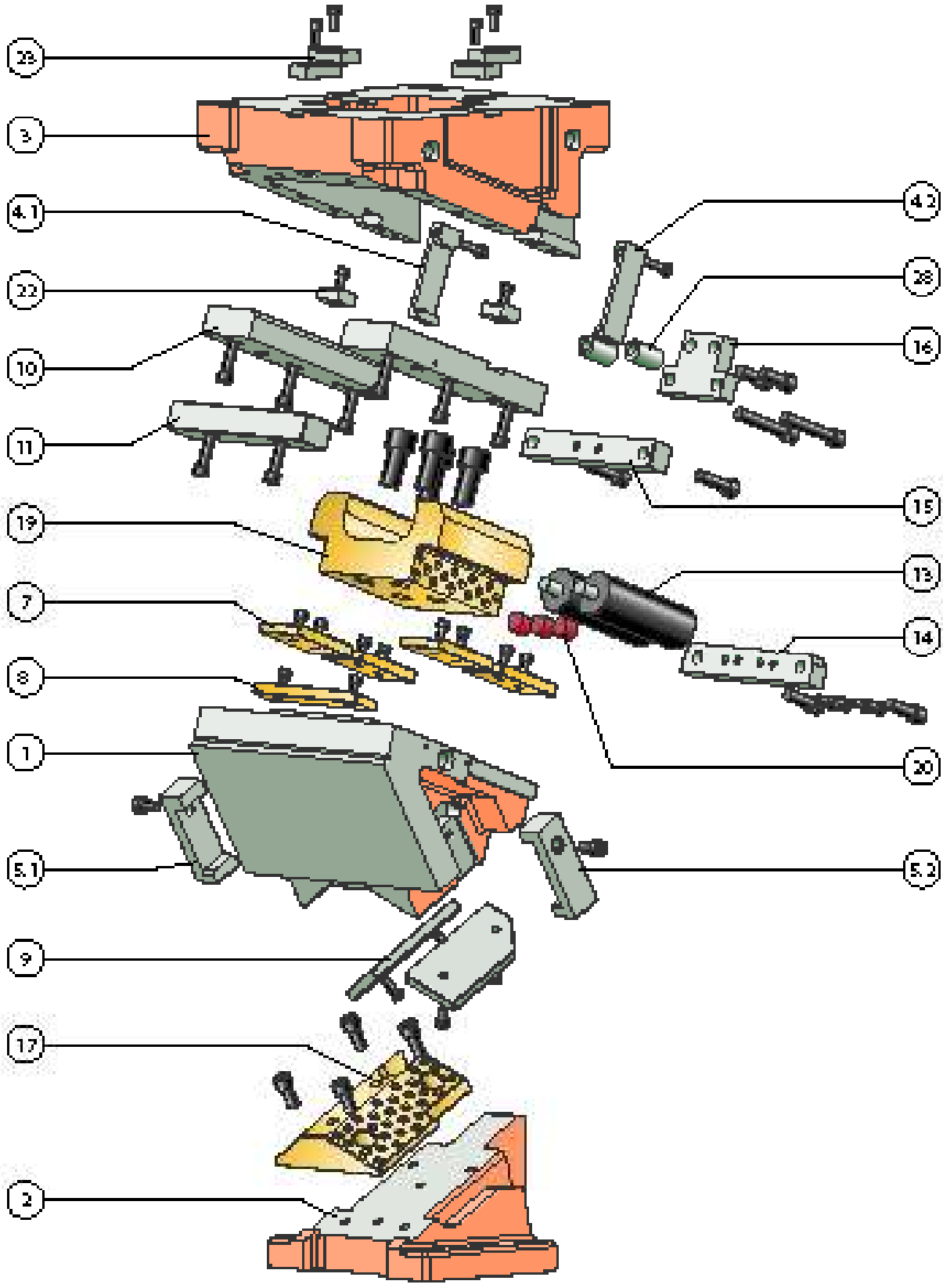
Mounting cam base:

Hexagon socket head cap screws DIN EN ISO 4762	4x M20 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x ø16

Mounting cam driver:

Hexagon socket head cap screws DIN EN ISO 4762	4x M20 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x ø20

AERIAL ECO LINE
2016.207.□□.030.
EXPLODED VIEW

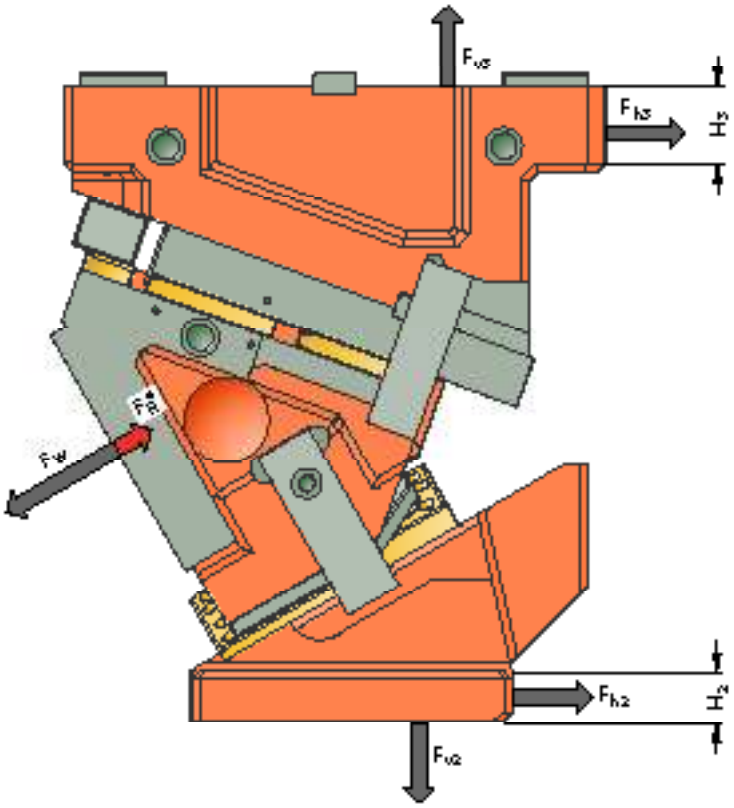


AERIAL ECO LINE
2016.207.□□.030.
PARTS LIST

Position	Piece	Designation	Material	spare part
1	1	Body		
2	1	Driver		
3	1	Base		
4.1	1	Clamp, left		x
4.2	1	Clamp, right		x
5.1	1	Positive return, left		x
5.2	1	Positive return, right		x
6				
7	4	Sliding plate	Bronze with solid lubricant	x
8	1	Sliding plate	Bronze with solid lubricant	x
9	2	Sliding plate	Steel	x
10	2	Sliding plate	Steel	x
11	1	Sliding plate	Steel	x
12				
13	2	Gas spring		x
14	1	Stop plate		x
15	1	Stop piece		x
16	1	Lockout system		x
17	1	Slide pad	Bronze with solid lubricant	x
18				
19	1	Centre guide	Bronze with solid lubricant	x
20	3	Damper		x
21				x
22	2	Feather key		x
23	4	Feather key		x
24				
25				
26				
27				
28	2	Spacer		x

For inquiries or when ordering spare parts (x), we require the following data:
- Cam unit order no.
- Cam unit serial no.
- Item number / Designation / Spare part

AERIAL ECO LINE
2016.207.□□.030.
SYSTEM AND SURROUNDING FORCES



Order number	α [°]	F_W [kN]	F_R* [kN]	F_{h2} [kN]	F_{v2} [kN]	F_{h3} [kN]	F_{v3} [kN]	H_2 [mm]	H_3 [mm]
2016.207.00.030.038.21	0	451	16.9	0	378	451	378	30	45
2016.207.05.030.042.21	5	451	17.0	33	377	416	416	35	45
2016.207.10.030.046.21	10	451	17.0	66	373	378	451	40	45
2016.207.15.030.050.21	15	451	17.1	98	366	338	482	55	45
2016.207.20.030.055.21	20	451	17.1	129	356	294	510	25	45
2016.207.25.030.060.21	25	451	17.1	160	343	249	534	25	45
2016.207.30.030.065.21	30	451	17.1	189	328	201	553	30	45
2016.207.35.030.070.21	35	451	17.1	217	310	152	569	30	45
2016.207.40.030.077.21	40	451	17.1	243	290	102	580	30	45
2016.207.45.030.084.21	45	451	17.1	268	268	51	586	30	45
2016.207.50.030.079.21	50	451	16.3	290	243	0	589	170	45
2016.207.55.030.088.21	55	451	17.9	259	181	0	551	170	45
2016.207.60.030.102.21	60	451	20.1	226	130	0	521	150	45

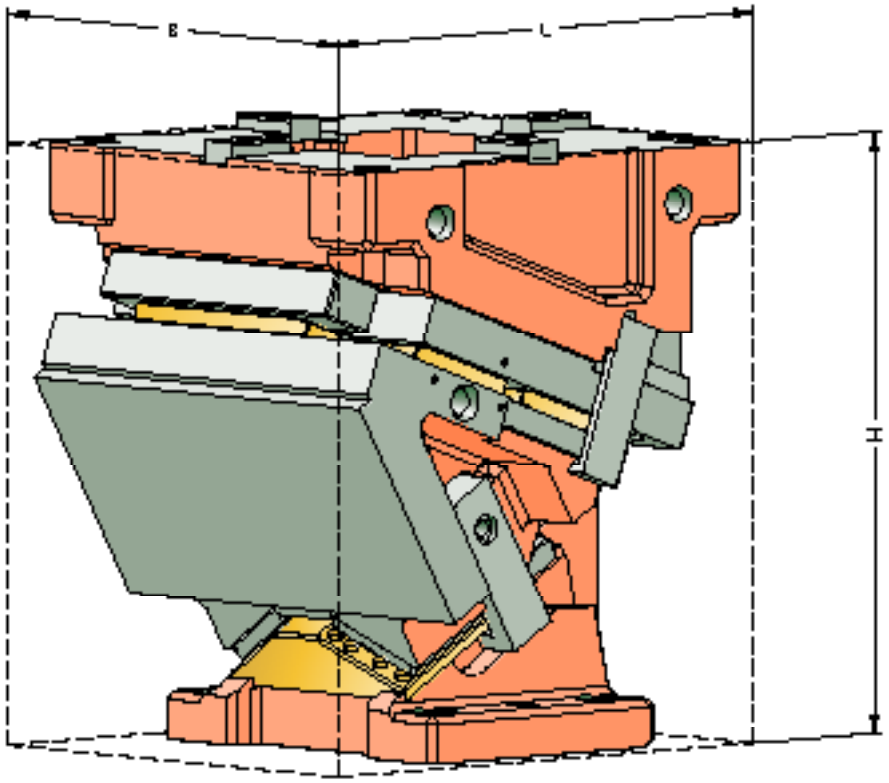
* Retraction force values correspond to the spring-generated retraction force at the working point

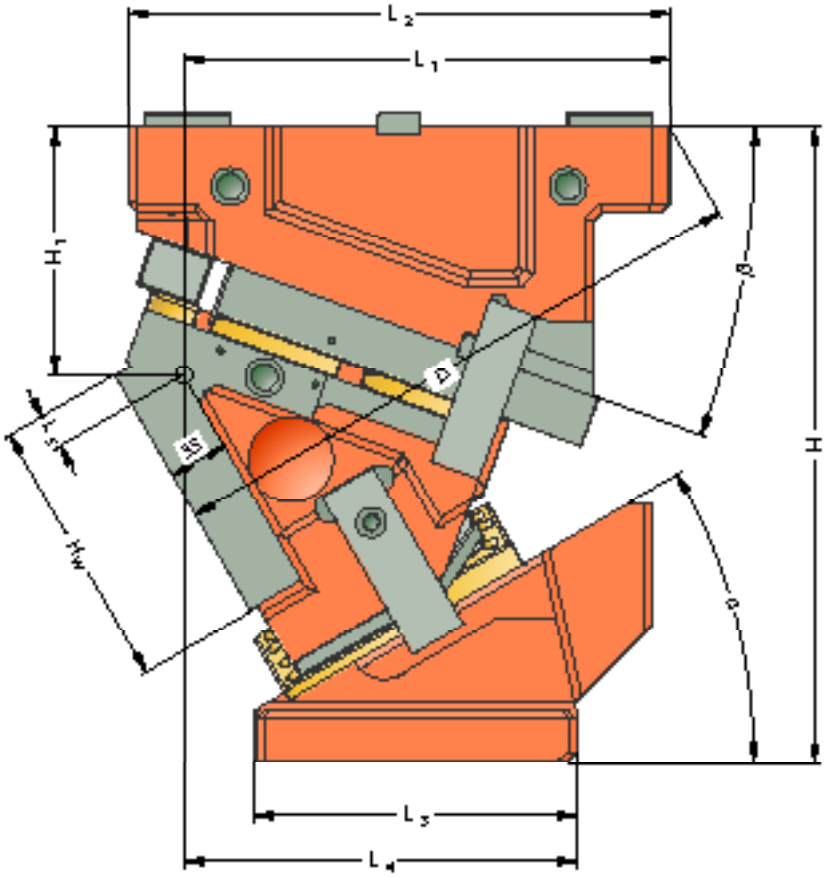
The forces F_{h2}, F_{V2} as well as F_{h3}, F_{V3} act on the tool environment at maximum working force F_W.

AERIAL
ECO LINE
2016.207.□□.040.

Working width:	400 mm
Performance class:	450 kN

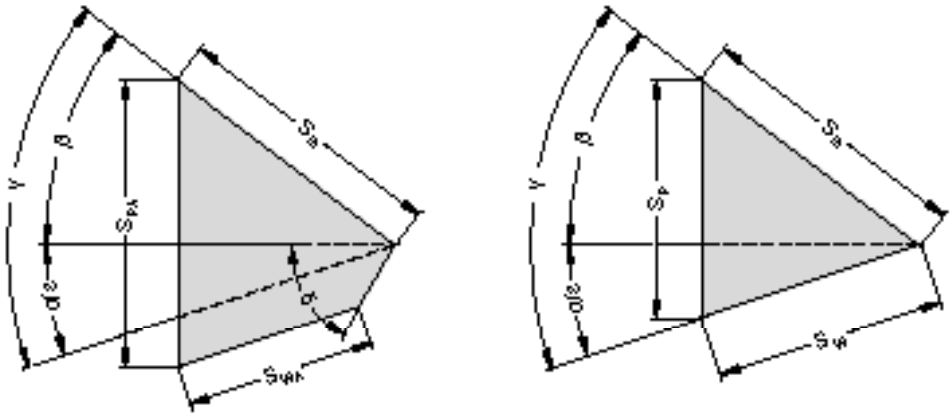
AERIAL ECO LINE
2016.207.□□.040.
SIZE TABLE





Subject to alterations

AERIAL ECO LINE
2016.207.□□.040.
SIZE TABLE



Order number	L [mm]	B [mm]	H [mm]	H_1 [mm]	H_W [mm]	L_1 [mm]	L_2 [mm]	L_3 [mm]	L_4 [mm]	L_5 [mm]	D [mm]	α [°]	β [°]	S_W* [mm]	S_{WA}* [mm]	S_S [mm]	S_P* [mm]
2016.207.00.040.038.21	328	400	375	118	160	278	320	195	190	20	313.0	0	50	-	29.5	60	59.3
2016.207.05.040.042.21	320	400	375	121.1	160	280.5	320	210.5	190	20	325.0	5	45	-	18.9	60	63.9
2016.207.10.040.046.21	324.1	400	375	125.5	160	286.2	320	226.2	190	20	338.6	10	40	-	24.1	60	63.4
2016.207.15.040.050.21	325.8	400	375	131.3	160	286.9	320	241.9	190	20	346.1	15	35	-	29.1	60	63.8
2016.207.20.040.055.21	327	400	375	138.4	160	287.4	320	202.4	190	20	352.4	20	30	-	34.7	60	63.7
2016.207.25.040.060.21	334.7	400	375	142	160	294.5	320	219.5	190	20	362.0	25	25	-	40.3	60	64.8
2016.207.30.040.065.21	327.8	400	375	146.7	160	287.5	320	232.5	190	20	357.4	30	20	65.1	-	60	53.1
2016.207.35.040.070.21	345.5	400	375	155.5	160	294.4	320	249.4	190	20	365.3	35	15	70.8	-	60	56.1
2016.207.40.040.077.21	303.5	400	375	160.1	160	285.8	320	260.8	190	20	356.9	40	10	77.1	-	60	60.0
2016.207.45.040.084.21	349.7	400	375	168.6	160	285.9	320	278.9	190	20	356.4	45	5	84.5	-	60	65.0
2016.207.50.040.079.21	355	400	375	186.1	160	265	320	300	190	25	347.9	50	0	79.3	-	51	60.8
2016.207.55.040.088.21	405	400	375	210.5	160	252.5	320	337.5	190	10	347.2	55	0	88.9	-	51	72.8
2016.207.60.040.102.21	405	400	375	224.7	160	262.8	320	347.8	190	10	356.0	60	0	102.0	-	51	88.3

* Values rounded

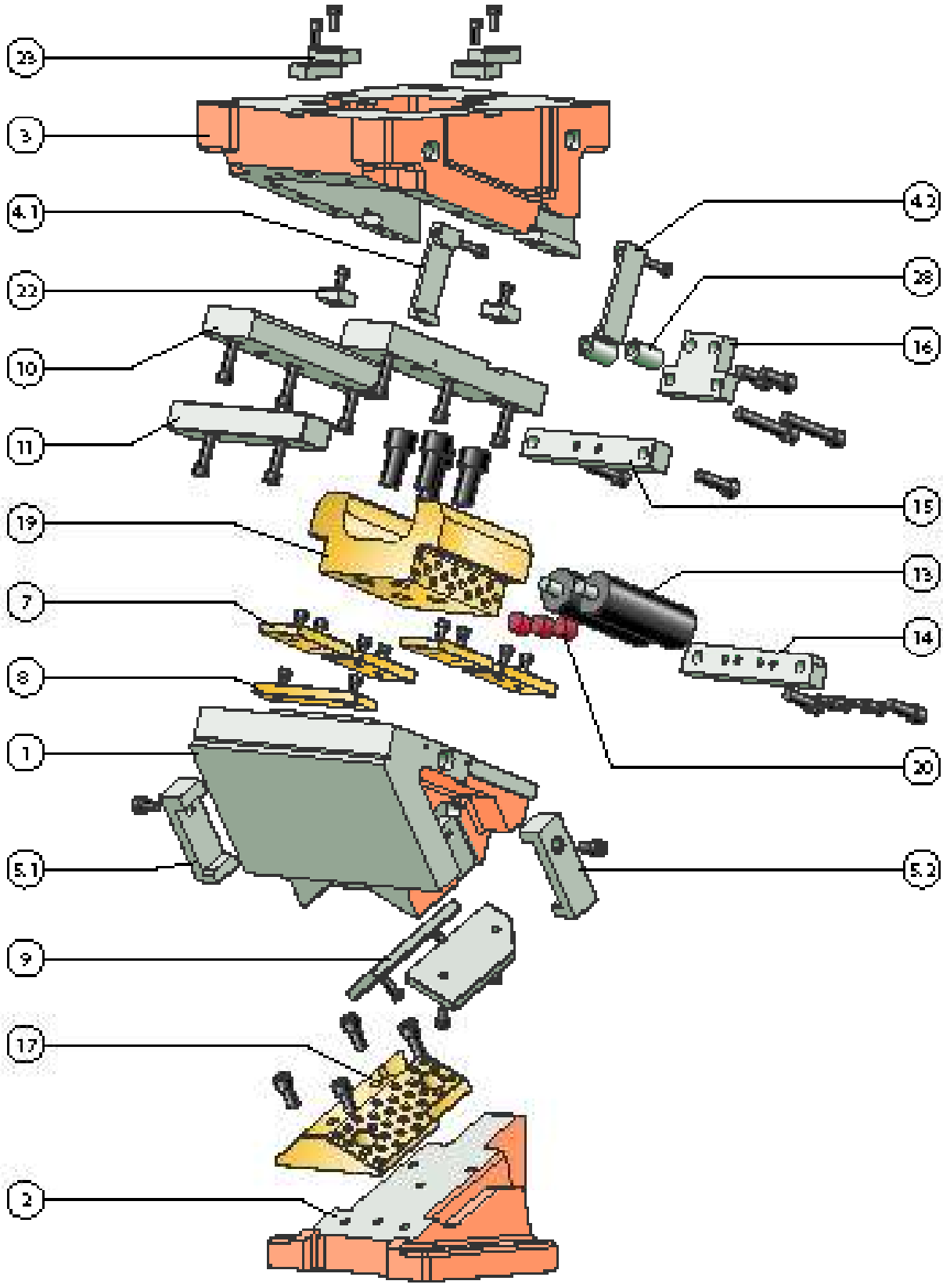
Mounting cam base:

Hexagon socket head cap screws DIN EN ISO 4762	4x M20 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x ø16

Mounting cam driver:

Hexagon socket head cap screws DIN EN ISO 4762	4x M20 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x ø20

AERIAL ECO LINE
2016.207.□□.040.
EXPLODED VIEW

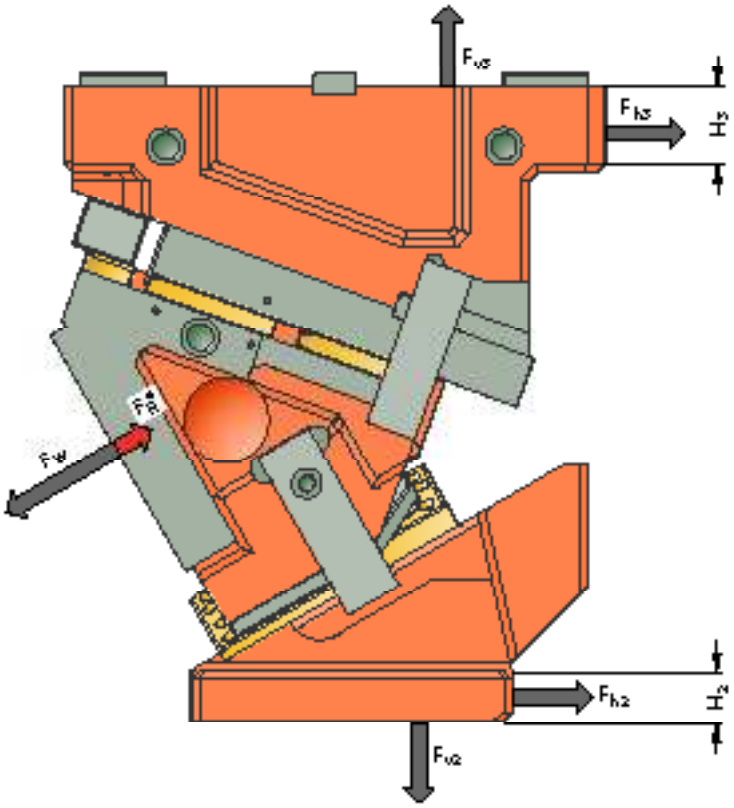


AERIAL ECO LINE
2016.207.□□.040.
PARTS LIST

Position	Piece	Designation	Material	spare part
1	1	Body		
2	1	Driver		
3	1	Base		
4.1	1	Clamp, left		x
4.2	1	Clamp, right		x
5.1	1	Positive return, left		x
5.2	1	Positive return, right		x
6				
7	4	Sliding plate	Bronze with solid lubricant	x
8	1	Sliding plate	Bronze with solid lubricant	x
9	2	Sliding plate	Steel	x
10	2	Sliding plate	Steel	x
11	1	Sliding plate	Steel	x
12				
13	2	Gas spring		x
14	1	Stop plate		x
15	1	Stop piece		x
16	1	Lockout system		x
17	1	Slide pad	Bronze with solid lubricant	x
18				
19	1	Centre guide	Bronze with solid lubricant	x
20	3	Damper		x
21				x
22	2	Feather key		x
23	4	Feather key		x
24				
25				
26				
27				
28	2	Spacer		x

For inquiries or when ordering spare parts (x), we require the following data:
- Cam unit order no.
- Cam unit serial no.
- Item number / Designation / Spare part

AERIAL ECO LINE
2016.207.□□.040.
SYSTEM AND SURROUNDING FORCES



Order number	α [°]	F_W [kN]	F_R^* [kN]	F_{h2} [kN]	F_{v2} [kN]	F_{h3} [kN]	F_{v3} [kN]	H_2 [mm]	H_3 [mm]
2016.207.00.040.038.21	0	451	16.9	0	378	451	378	30	45
2016.207.05.040.042.21	5	451	17.0	33	377	416	416	35	45
2016.207.10.040.046.21	10	451	17.0	66	373	378	451	40	45
2016.207.15.040.050.21	15	451	17.1	98	366	338	482	55	45
2016.207.20.040.055.21	20	451	17.1	129	356	294	510	25	45
2016.207.25.040.060.21	25	451	17.1	160	343	249	534	25	45
2016.207.30.040.065.21	30	451	17.1	189	328	201	553	30	45
2016.207.35.040.070.21	35	451	17.1	217	310	152	569	30	45
2016.207.40.040.077.21	40	451	17.1	243	290	102	580	30	45
2016.207.45.040.084.21	45	451	17.1	268	268	51	586	30	45
2016.207.50.040.079.21	50	451	16.3	290	243	0	589	170	45
2016.207.55.040.088.21	55	451	17.9	259	181	0	551	170	45
2016.207.60.040.102.21	60	451	20.1	226	130	0	521	150	45

* Retraction force values correspond to the spring-generated retraction force at the working point

The forces F_{h2}, F_{V2} as well as F_{h3}, F_{V3} act on the tool environment at maximum working force F_W.

INTRODUCTION
AND TABLE OF CONTENTS

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2016.24. AERIAL FCC BAK — DAIMLER, VOLVO, VOLKSWAGEN GROUP

2016.25. AERIAL FCC BAK — DAIMLER, VOLVO, VOLKSWAGEN GROUP

2016.207. AERIAL ECO LINE

2016.208. AERIAL ECO LINE

CUSTOMER-SPECIFIC
SERVICES

APPENDIX

EMERGENCY SITUATION /
CONTACTS

AERIAL
ECO LINE
2016.208.

AERIAL ECO LINE
2016.208.

FIBRO ECO LINE cam units series 2016.208. extend the ECO LINE valve series up to a width of 1000 mm. When properly maintained, these cam units allow a high number of cycles with sufficient precision over the entire nominal lifetime.

The gas springs for the cam unit return stroke can be exchanged without dismounting the cam unit with sufficient free space in the tool.

FIBRO ECO LINE cam unit series 2016.208. are equipped with a roll pre-acceleration up to an angle of 40°.

The optional machining of the working surface per your specifications fulfil the requirements for typical toolmaking tolerances.

Design features:
- Double Prismatic guide against cam driver, flat guide against base.
- Sliding surfaces hardened steel / bronze with solid lubricant
- Gas springs

FIBRO ECO LINE cam units series 2016.208. are available in the widths from 500 to 1000 mm and in the angular variants 0° to 60° (gradation 5°).

Order number	Width [mm]	Performance class [kN]*	Page
2016.208.□□.050.□□□.21	500	300	263
2016.208.□□.060.□□□.21	600	300	269
2016.208.□□.070.□□□.21	700	475	275
2016.208.□□.080.□□□.21	800	475	281
2016.208.□□.090.□□□.21	900	625	287
2016.208.□□.100.□□□.21	1000	625	293

* For exact power values, please refer to the specifications of the respective cam unit type

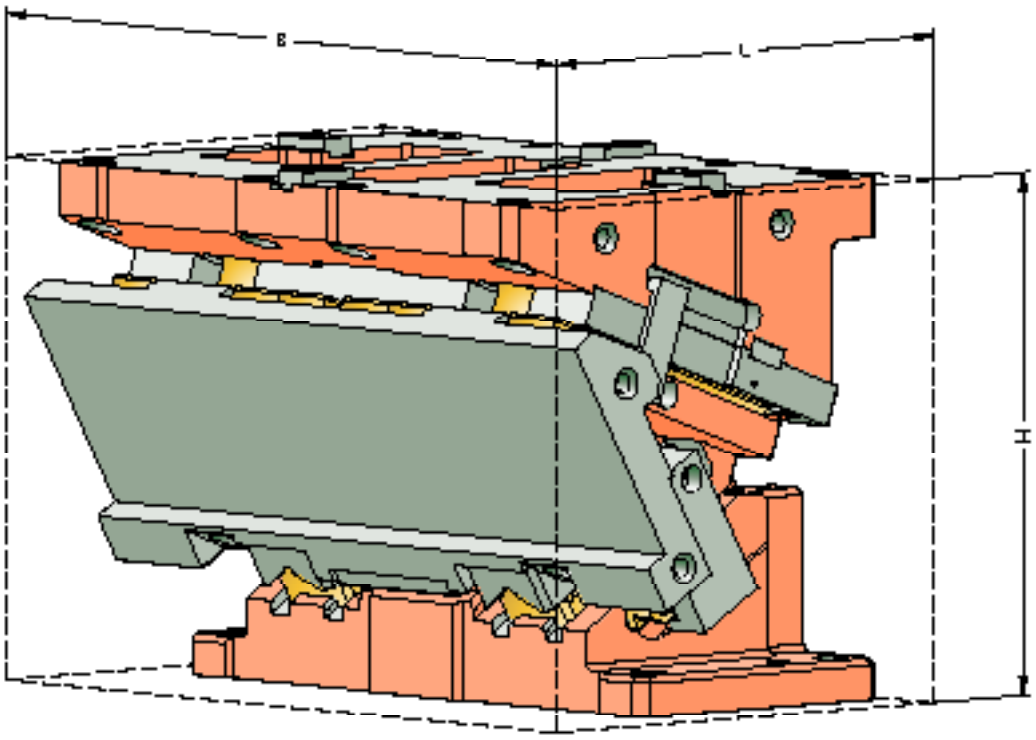
Ordering example:

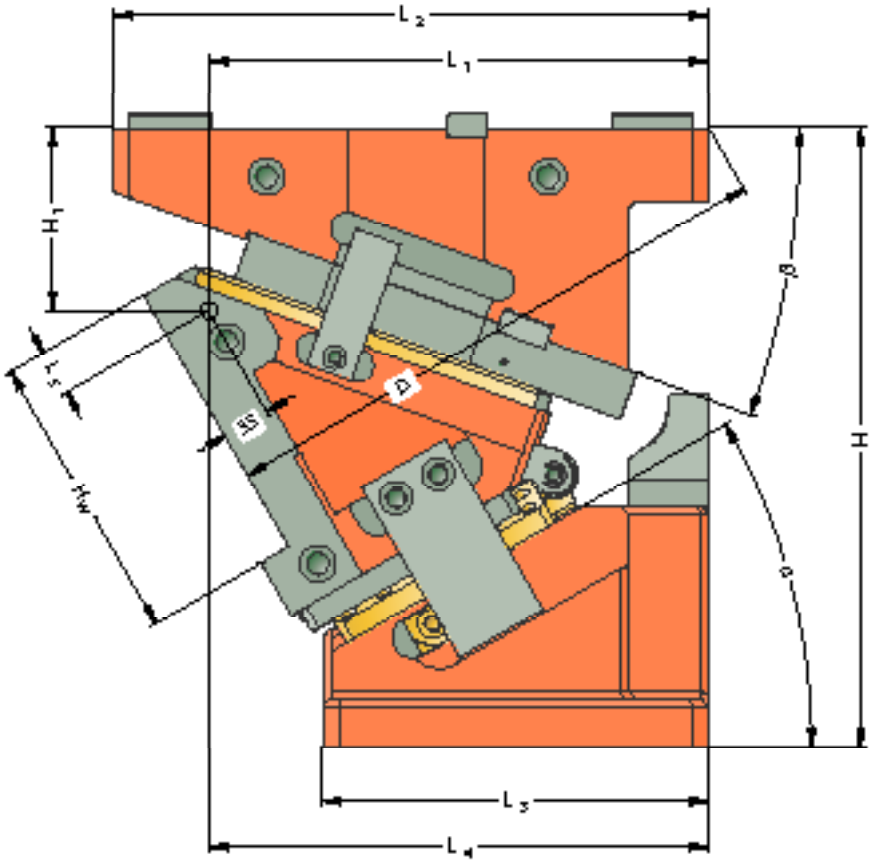
FIBRO ECO LINE cam unit, aerial, width 900 mm	=	2016.208.□□.090.□□□.21
Cam unit angle α = 20°	=	20.
Cam unit stroke according to flow diagram (no option)	=	055.
Order number	=	2016.208. 20. 090. 055. 21

AERIAL
ECO LINE
2016.208.□□.050.

Working width:	500 mm
Performance class:	300 kN

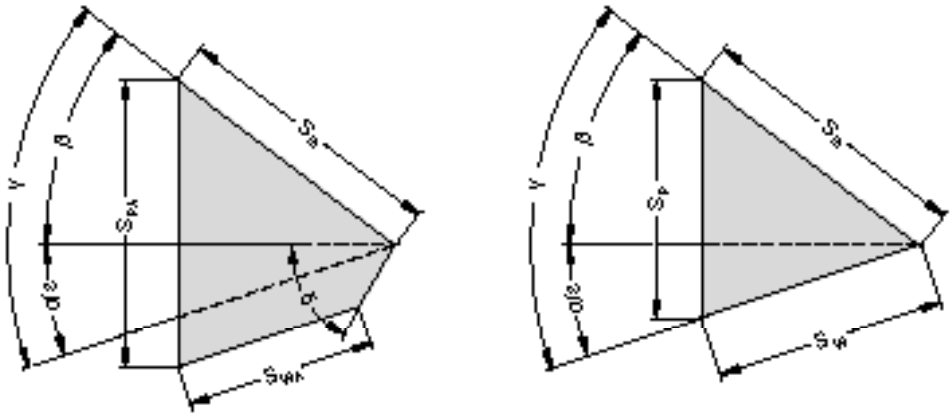
AERIAL ECO LINE
2016.208.□□.050.
SIZE TABLE





Subject to alterations

AERIAL ECO LINE
2016.208.□□.050.
SIZE TABLE



Order number 2016.208.	L [mm]	B [mm]	H [mm]	H_1 [mm]	H_W [mm]	L_1 [mm]	L_2 [mm]	L_3 [mm]	L_4 [mm]	L_5 [mm]	D [mm]	α [°]	β [°]	S_W* [mm]	S_{WA}* [mm]	S_S [mm]	S_P* [mm]	S_{PA}* [mm]
00.050.038.21	370	500	385	85	180	293	370	198	240	28	323	0	50	-	36.8	60	-	48.0
05.050.042.21	370	500	385	83.9	180	397.3	370	217.3	240	28	333.4	5	45	-	40.0	60	-	57.5
10.050.046.21	370	500	385	84.5	180	301.5	370	236.5	240	28	341.6	10	40	-	45.0	60	-	54.9
15.050.050.21	370	500	385	86.8	180	305.7	370	255.7	240	28	347.7	15	35	-	45.1	60	-	59.4
20.050.055.21	370	500	385	90.7	180	309.6	370	274.6	240	28	351.9	20	30	-	53.5	60	-	57.7
25.050.060.21	370	500	385	96.3	180	308	370	293	240	28	349.9	25	25	-	56.3	60	-	67.5
30.050.065.21	370	500	385	113.5	180	310.9	370	310.9	240	28	356	30	20	-	42.9	60	-	66.1
35.050.070.21	385	500	385	122.2	180	313.2	370	328.2	240	28	356.6	35	15	-	57.1	60	-	77.8
40.050.077.21	400	500	385	132.3	180	314.6	370	344.6	240	28	356	40	10	-	73.7	60	-	76.3
45.050.084.21	410	500	385	143.9	180	320	370	360	240	28	358	45	5	84.5	-	60	65.0	-
50.050.093.21	430	500	385	156.7	180	314.4	370	374.4	240	28	352.2	50	0	93.3	-	60	71.5	-
55.050.104.21	430	500	385	170.8	180	327.6	370	387.6	240	28	357.8	55	0	104.6	-	60	85.7	-
60.050.120.21	438.8	500	385	185.9	180	339.5	370	399.5	240	28	360.8	60	0	120.0	-	60	103.9	-

* Values rounded

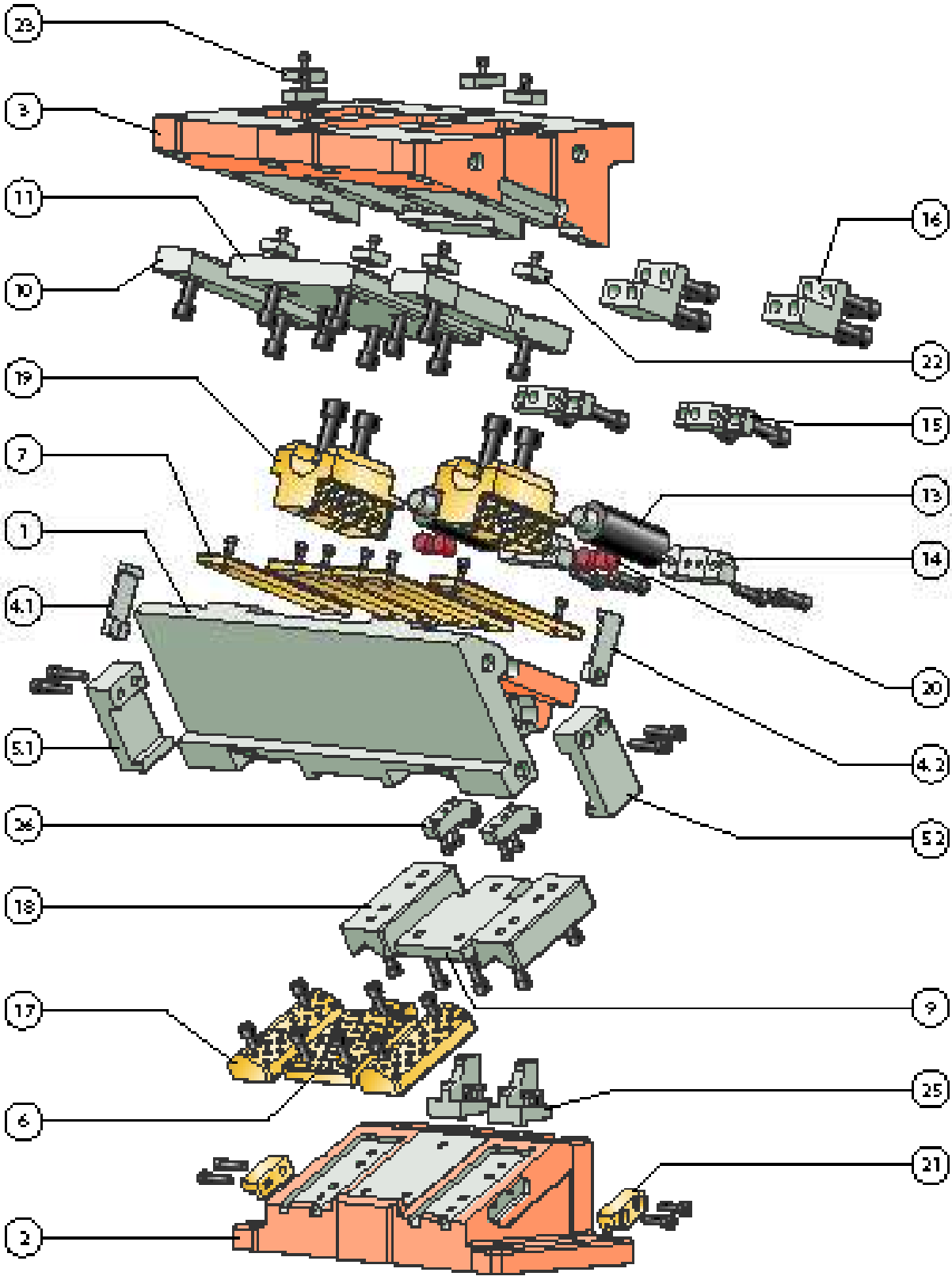
Mounting cam base:

Hexagon socket head cap screws DIN EN ISO 4762	8x M20 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x ø16

Mounting cam driver:

Hexagon socket head cap screws DIN EN ISO 4762	4x M16 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x ø16

AERIAL ECO LINE
2016.208.□□.050.
EXPLODED VIEW



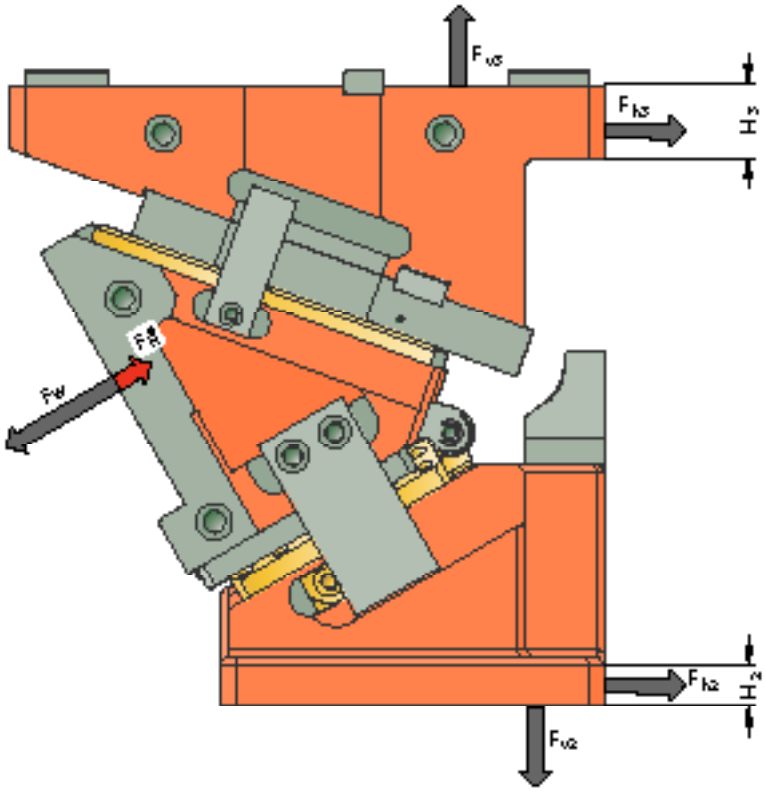
AERIAL ECO LINE
2016.208.□□.050.
PARTS LIST

Position	Piece	Designation	Material	spare part
1	1	Cam body		
2	1	Cam driver		
3	1	Cam base		
4.1	1	Clamp, left		x
4.2	1	Clamp, right		x
5.1	1	Positive return, left		x
5.2	1	Positive return, right		x
6	1	Sliding plate	Bronze with solid lubricant	x
7	6	Sliding plate	Bronze with solid lubricant	x
8				
9	1	Sliding plate	Steel	x
10	2	Sliding plate	Steel	x
11	1	Sliding plate	Steel	x
12				
13	2	Gas spring		x
14	2	Stop plate		x
15	2	Stop piece		x
16	2	Lockout system		x
17	2	Slide pad	Bronze with solid lubricant	x
18	2	Prismatic guide	Steel	x
19	2	Centre guide	Bronze with solid lubricant	x
20	4	Damper		x
21	2	Insert	Bronze with solid lubricant	x
22	4	Feather key		x
23	4	Feather key		x
24				
25*	2	Curve wedge		x
26*	2	Roller block		x
27				
28				

* up to and including 40° with pre-acceleration

For inquiries or when ordering spare parts (x), we require the following data:
- Cam unit order no.
- Cam unit serial number
- Item number / Designation / Spare part

AERIAL ECO LINE
2016.208.□□.050.
SYSTEM AND SURROUNDING FORCES



Order number	α [°]	F_W [kN]	F_R* [kN]	F_{h2} [kN]	F_{v2} [kN]	F_{h3} [kN]	F_{v3} [kN]	H_2 [mm]	H_3 [mm]
2016.208.00.050.038.21	0	314	35.4	0	263	314	263	65	45
2016.208.05.050.042.21	5	314	35.5	23	262	290	290	75	45
2016.208.10.050.046.21	10	314	35.6	46	259	263	314	90	45
2016.208.15.050.050.21	15	314	35.7	68	254	235	336	110	45
2016.208.20.050.055.21	20	314	35.7	90	248	205	355	125	45
2016.208.25.050.060.21	25	314	35.7	111	239	173	371	140	45
2016.208.30.050.065.21	30	314	35.7	132	228	140	385	145	45
2016.208.35.050.070.21	35	314	35.7	151	216	106	396	150	45
2016.208.40.050.077.21	40	314	35.7	169	202	71	404	170	45
2016.208.45.050.084.21	45	314	35.7	186	186	36	408	175	45
2016.208.50.050.093.21	50	314	35.7	202	169	0	410	190	45
2016.208.55.050.104.21	55	314	39.3	180	126	0	383	205	45
2016.208.60.050.120.21	60	314	44.2	157	91	0	363	205	45

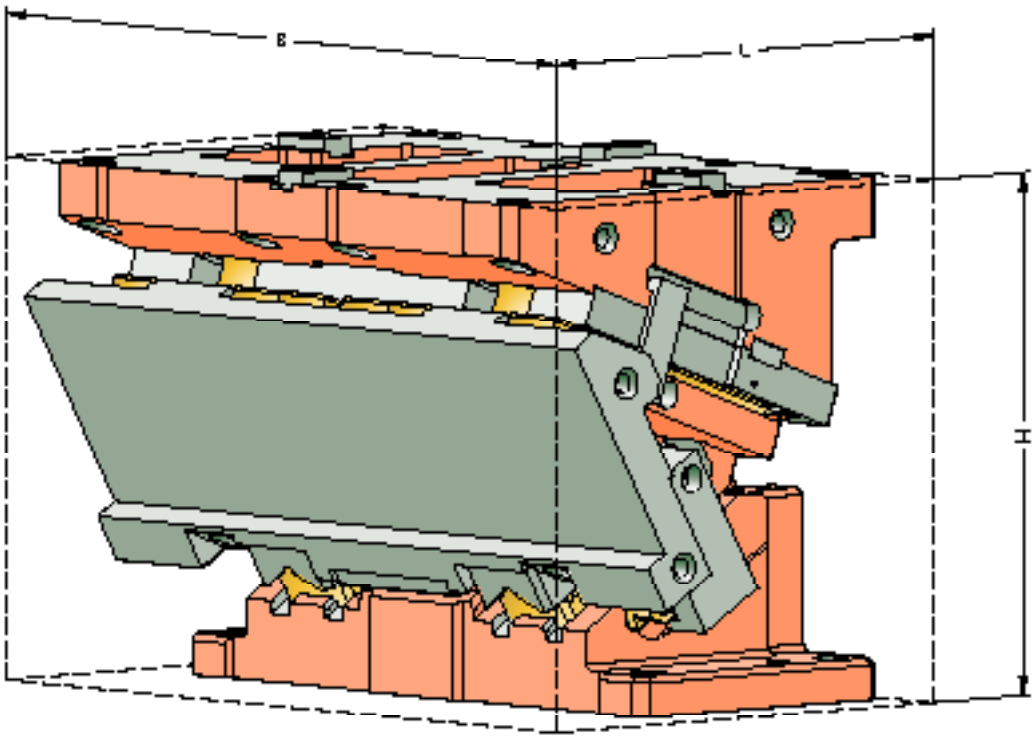
* Retraction force values correspond to the spring-generated retraction force at the working point

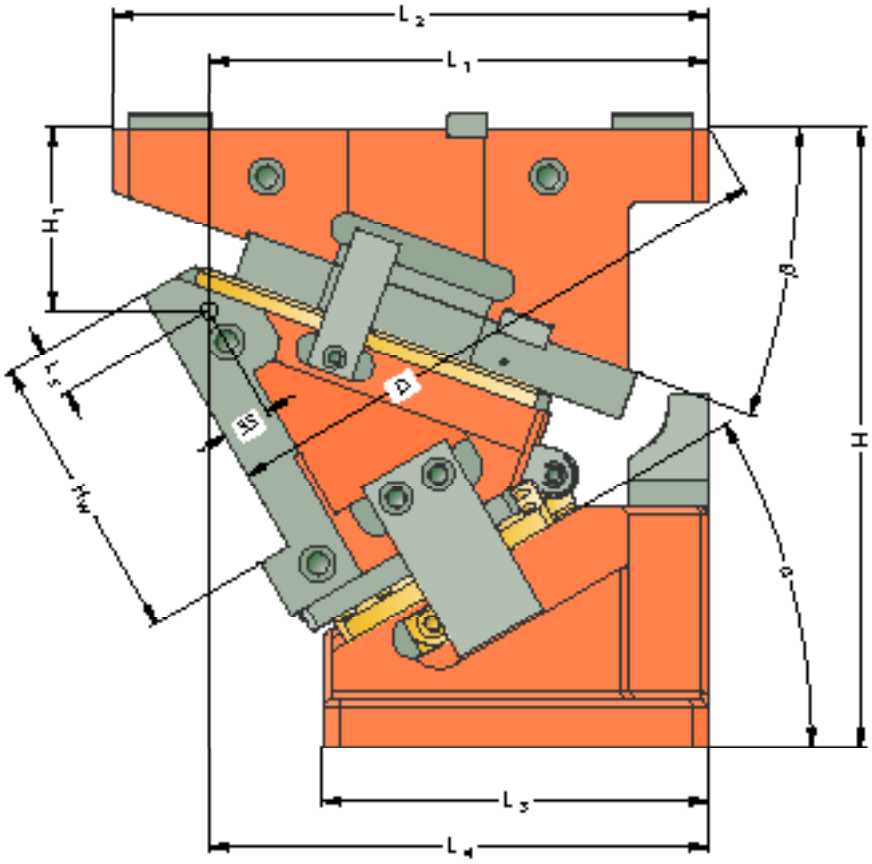
The forces F_{h2}, F_{V2} as well as F_{h3}, F_{V3} act on the tool environment at maximum working force F_W.

AERIAL
ECO LINE
2016.208.□□.060.

Working width:	600 mm
Performance class:	300 kN

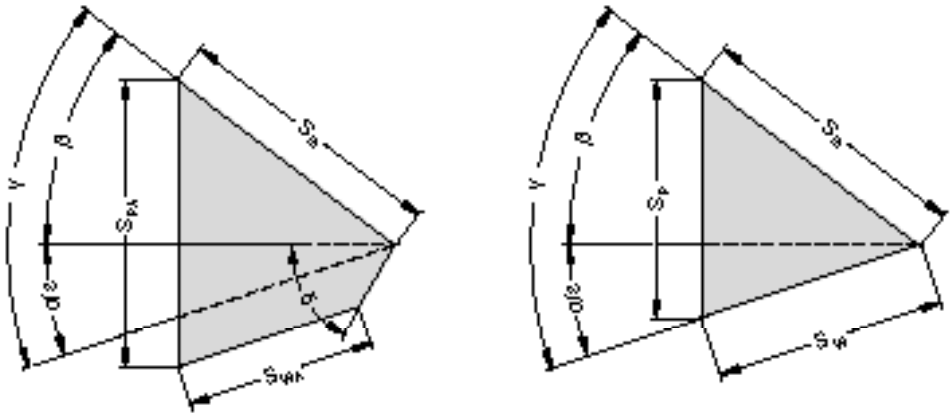
AERIAL ECO LINE
2016.208.□□.060.
SIZE TABLE





Subject to alterations

AERIAL ECO LINE
2016.208.□□.060.
SIZE TABLE



Order number 2016.208.	L [mm]	B [mm]	H [mm]	H_1 [mm]	H_W [mm]	L_1 [mm]	L_2 [mm]	L_3 [mm]	L_4 [mm]	L_5 [mm]	D [mm]	α [°]	β [°]	S_W* [mm]	S_{WA}* [mm]	S_S [mm]	S_P* [mm]	S_{PA}* [mm]
00.060.038.21	370	600	385	85	180	293	370	198	240	28	323	0	50	-	36.8	60	-	48.0
05.060.042.21	370	600	385	83.9	180	397.3	370	217.3	240	28	333.4	5	45	-	40.0	60	-	57.5
10.060.046.21	370	600	385	84.5	180	301.5	370	236.5	240	28	341.6	10	40	-	45.0	60	-	54.9
15.060.060.21	370	600	385	86.8	180	305.7	370	255.7	240	28	347.7	15	35	-	45.1	60	-	59.4
20.060.055.21	370	600	385	90.7	180	309.6	370	274.6	240	28	351.9	20	30	-	53.5	60	-	57.7
25.060.060.21	370	600	385	96.3	180	308	370	293	240	28	349.9	25	25	-	56.3	60	-	67.5
30.060.065.21	370	600	385	113.5	180	310.9	370	310.9	240	28	356	30	20	-	42.9	60	-	66.1
35.060.070.21	385	600	385	122.2	180	313.2	370	328.2	240	28	356.6	35	15	-	57.1	60	-	77.8
40.060.077.21	400	600	385	132.3	180	314.6	370	344.6	240	28	356	40	10	-	73.7	60	-	76.3
45.060.084.21	410	600	385	143.9	180	320	370	360	240	28	358	45	5	84.5	-	60	65.0	-
50.060.093.21	430	600	385	156.7	180	314.4	370	374.4	240	28	352.2	50	0	93.3	-	60	71.5	-
55.060.104.21	430	600	385	170.8	180	327.6	370	387.6	240	28	357.8	55	0	104.6	-	60	85.7	-
60.060.120.21	438.8	600	385	185.9	180	339.5	370	399.5	240	28	360.8	60	0	120.0	-	60	103.9	-

* Values rounded

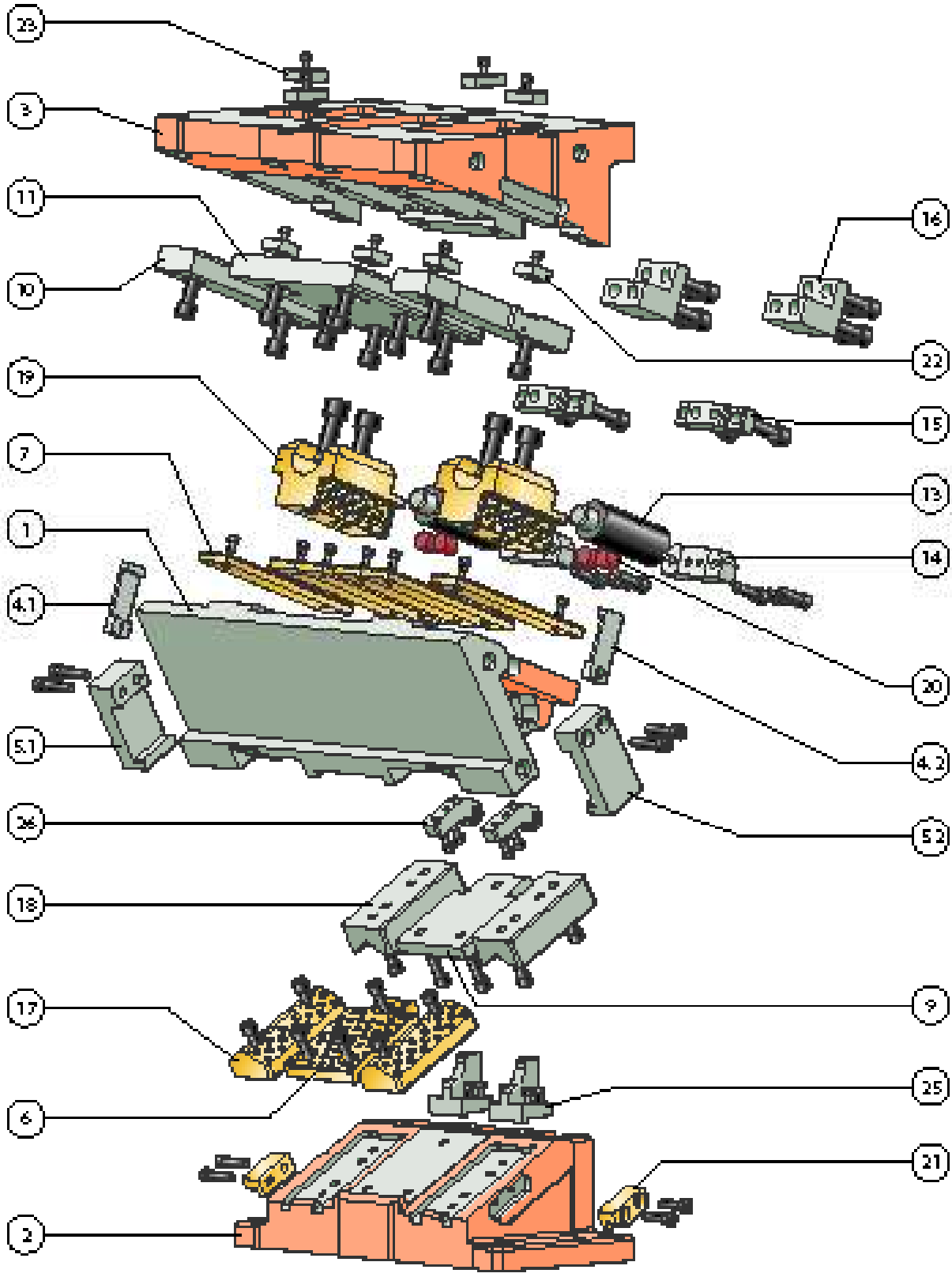
Mounting cam base:

Hexagon socket head cap screws DIN EN ISO 4762	8x M20 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x ø16

Mounting cam driver:

Hexagon socket head cap screws DIN EN ISO 4762	4x M16 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x ø16

AERIAL ECO LINE
2016.208.□□.060.
EXPLODED VIEW



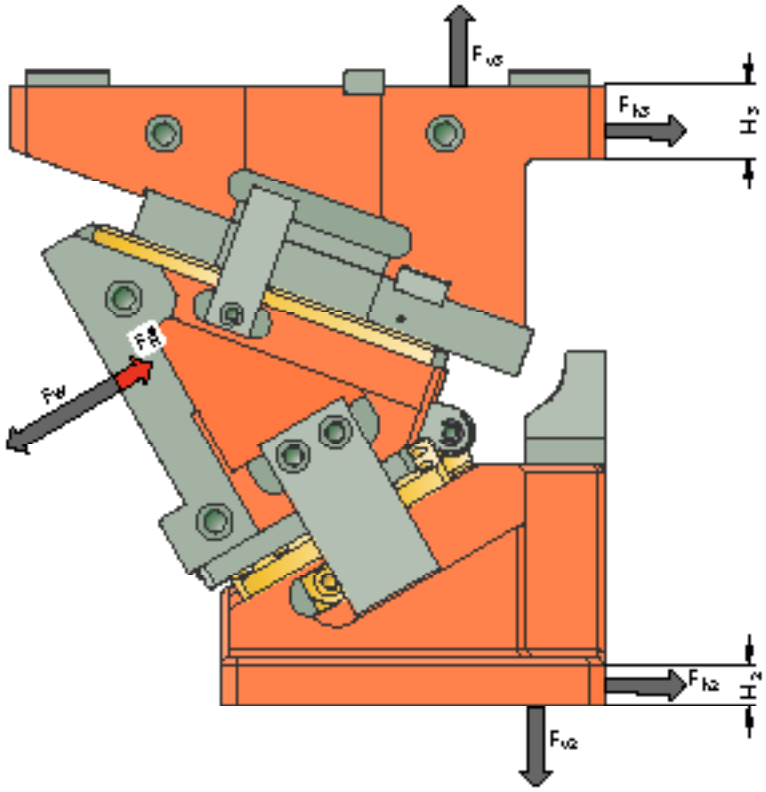
AERIAL ECO LINE
2016.208.□□.060.
PARTS LIST

Position	Piece	Designation	Material	spare part
1	1	Cam body		
2	1	Cam driver		
3	1	Cam base		
4.1	1	Clamp, left		x
4.2	1	Clamp, right		x
5.1	1	Positive return, left		x
5.2	1	Positive return, right		x
6	1	Sliding plate	Bronze with solid lubricant	x
7	6	Sliding plate	Bronze with solid lubricant	x
8				
9	1	Sliding plate	Steel	x
10	2	Sliding plate	Steel	x
11	1	Sliding plate	Steel	x
12				
13	2	Gas spring		x
14	2	Stop plate		x
15	2	Stop piece		x
16	2	Lockout system		x
17	2	Slide pad	Bronze with solid lubricant	x
18	2	Prismatic guide	Steel	x
19	2	Centre guide	Bronze with solid lubricant	x
20	4	Damper		x
21	2	Insert	Bronze with solid lubricant	x
22	4	Feather key		x
23	4	Feather key		x
24				
25*	2	Curve wedge		x
26*	2	Roller block		x
27				
28				

* up to and including 40° with pre-acceleration

For inquiries or when ordering spare parts (x), we require the following data:
- Cam unit order no.
- Cam unit serial number
- Item number / Designation / Spare part

AERIAL ECO LINE
2016.208.□□.060.
SYSTEM AND SURROUNDING FORCES



Order number	α [°]	F_W [kN]	F_R* [kN]	F_{h2} [kN]	F_{v2} [kN]	F_{h3} [kN]	F_{v3} [kN]	H_2 [mm]	H_3 [mm]
2016.208.00.060.038.21	0	314	35.4	0	263	314	263	65	45
2016.208.05.060.042.21	5	314	35.5	23	262	290	290	75	45
2016.208.10.060.046.21	10	314	35.6	46	259	263	314	90	45
2016.208.15.060.060.21	15	314	35.7	68	254	235	336	110	45
2016.208.20.060.055.21	20	314	35.7	90	248	205	355	125	45
2016.208.25.060.060.21	25	314	35.7	111	239	173	371	140	45
2016.208.30.060.065.21	30	314	35.7	132	228	140	385	145	45
2016.208.35.060.070.21	35	314	35.7	151	216	106	396	150	45
2016.208.40.060.077.21	40	314	35.7	169	202	71	404	170	45
2016.208.45.060.084.21	45	314	35.7	186	186	36	408	175	45
2016.208.50.060.093.21	50	314	35.7	202	169	0	410	190	45
2016.208.55.060.104.21	55	314	39.3	180	126	0	383	205	45
2016.208.60.060.120.21	60	314	44.2	157	91	0	363	205	45

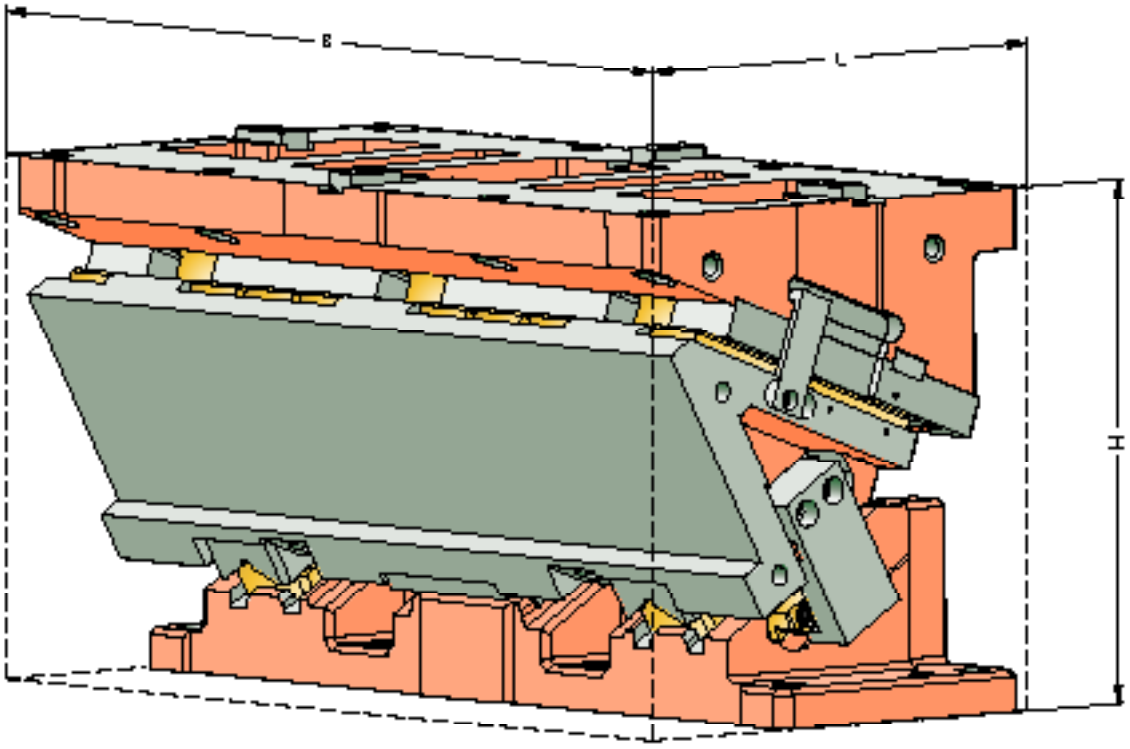
* Retraction force values correspond to the spring-generated retraction force at the working point

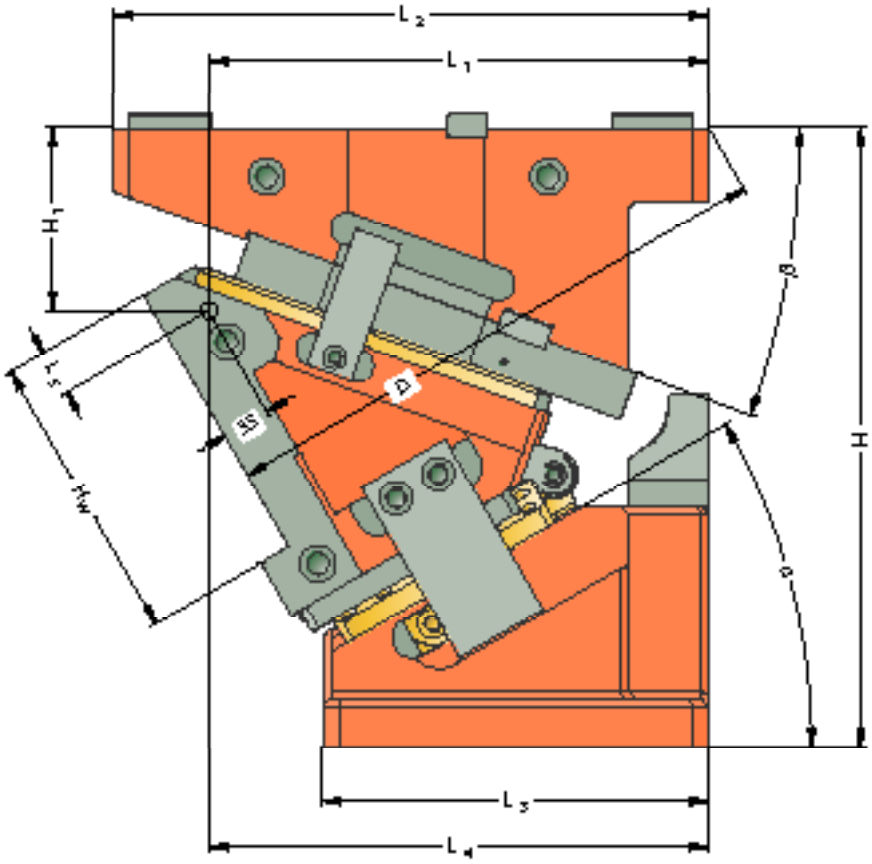
The forces F_{h2}, F_{V2} as well as F_{h3}, F_{V3} act on the tool environment at maximum working force F_W.

AERIAL
ECO LINE
2016.208.□□.070.

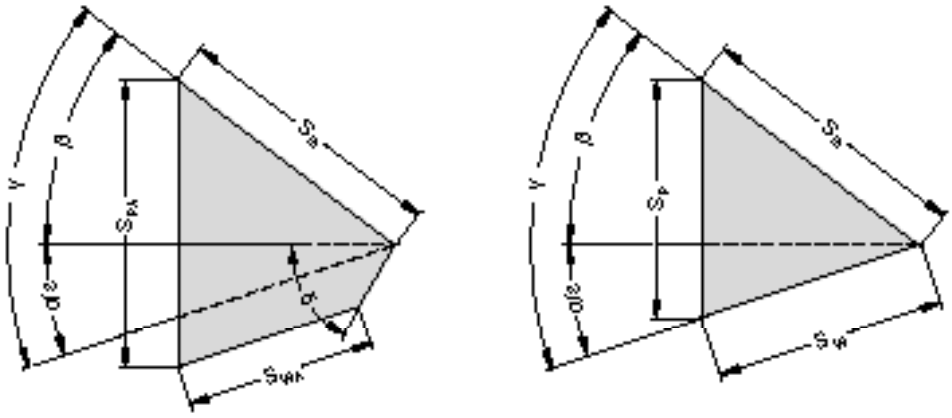
Working width:	700 mm
Performance class:	475 kN

AERIAL ECO LINE
2016.208.□□.070.
SIZE TABLE





AERIAL ECO LINE
2016.208.□□.070.
SIZE TABLE



Order number 2016.208.	L [mm]	B [mm]	H [mm]	H_1 [mm]	H_W [mm]	L_1 [mm]	L_2 [mm]	L_3 [mm]	L_4 [mm]	L_5 [mm]	D [mm]	α [°]	β [°]	S_W* [mm]	S_{WA}* [mm]	S_S [mm]	S_P* [mm]	S_{PA}* [mm]
00.070.038.21	370	700	385	85	180	293	370	198	240	28	323	0	50	-	36.8	60	-	48.0
05.070.042.21	370	700	385	83.9	180	397.3	370	217.3	240	28	333.4	5	45	-	40.0	60	-	57.5
10.070.046.21	370	700	385	84.5	180	301.5	370	236.5	240	28	341.6	10	40	-	45.0	60	-	54.9
15.070.070.21	370	700	385	86.8	180	305.7	370	255.7	240	28	347.7	15	35	-	45.1	60	-	59.4
20.070.055.21	370	700	385	90.7	180	309.6	370	274.6	240	28	351.9	20	30	-	53.5	60	-	57.7
25.070.060.21	370	700	385	96.3	180	308	370	293	240	28	349.9	25	25	-	56.3	60	-	67.5
30.070.065.21	370	700	385	113.5	180	310.9	370	310.9	240	28	356	30	20	-	42.9	60	-	66.1
35.070.070.21	385	700	385	122.2	180	313.2	370	328.2	240	28	356.6	35	15	-	57.1	60	-	77.8
40.070.077.21	400	700	385	132.3	180	314.6	370	344.6	240	28	356	40	10	-	73.7	60	-	76.3
45.070.084.21	410	700	385	143.9	180	320	370	360	240	28	358	45	5	84.5	-	60	65.0	-
50.070.093.21	430	700	385	156.7	180	314.4	370	374.4	240	28	352.2	50	0	93.3	-	60	71.5	-
55.070.104.21	430	700	385	170.8	180	327.6	370	387.6	240	28	357.8	55	0	104.6	-	60	85.7	-
60.070.120.21	438.8	700	385	185.9	180	339.5	370	399.5	240	28	360.8	60	0	120.0	-	60	103.9	-

* Values rounded

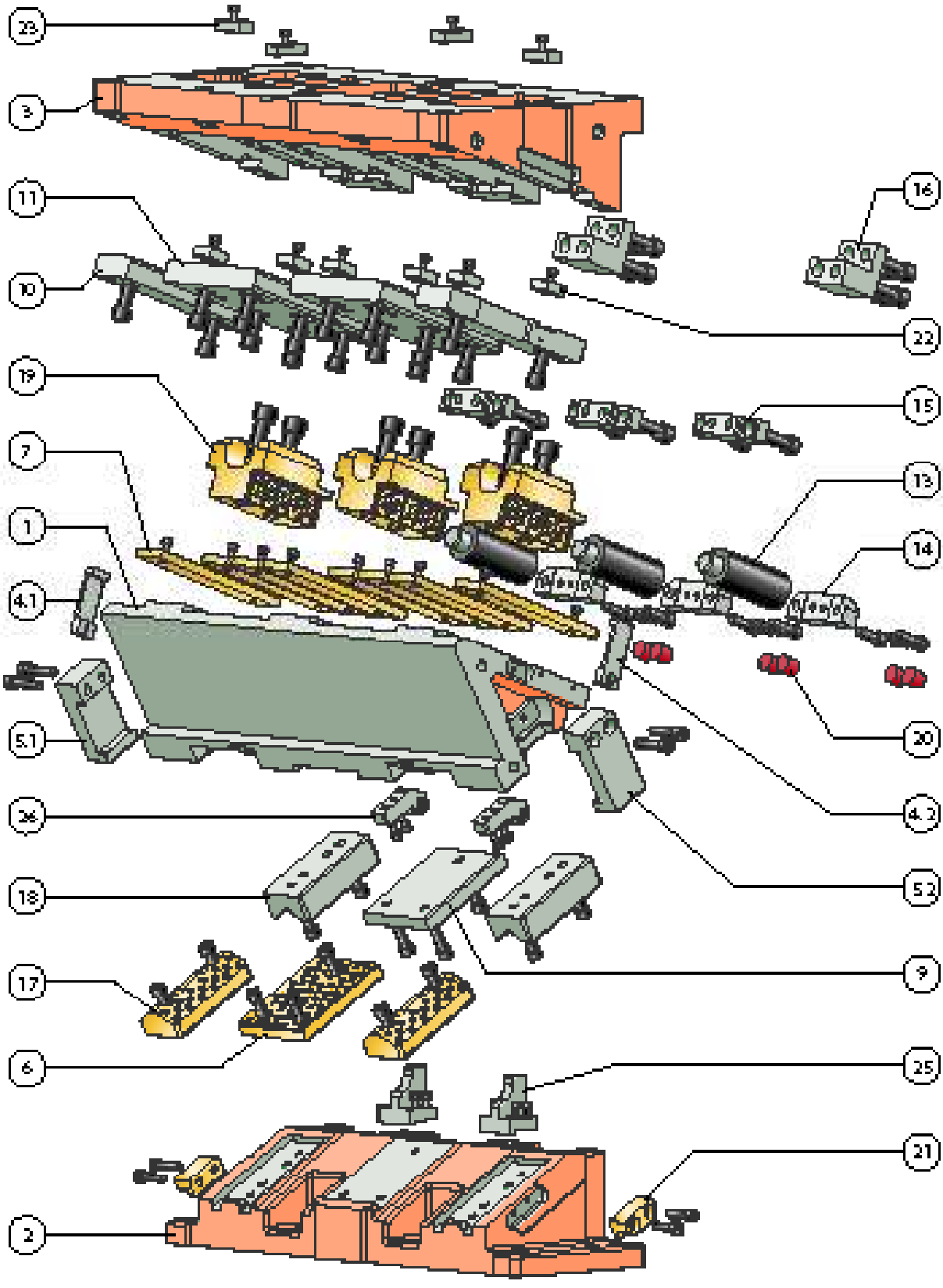
Mounting cam base:

Hexagon socket head cap screws DIN EN ISO 4762	8x M20 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x ø16

Mounting cam driver:

Hexagon socket head cap screws DIN EN ISO 4762	6x M16 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x ø16

AERIAL ECO LINE
2016.208.□□.070.
EXPLODED VIEW



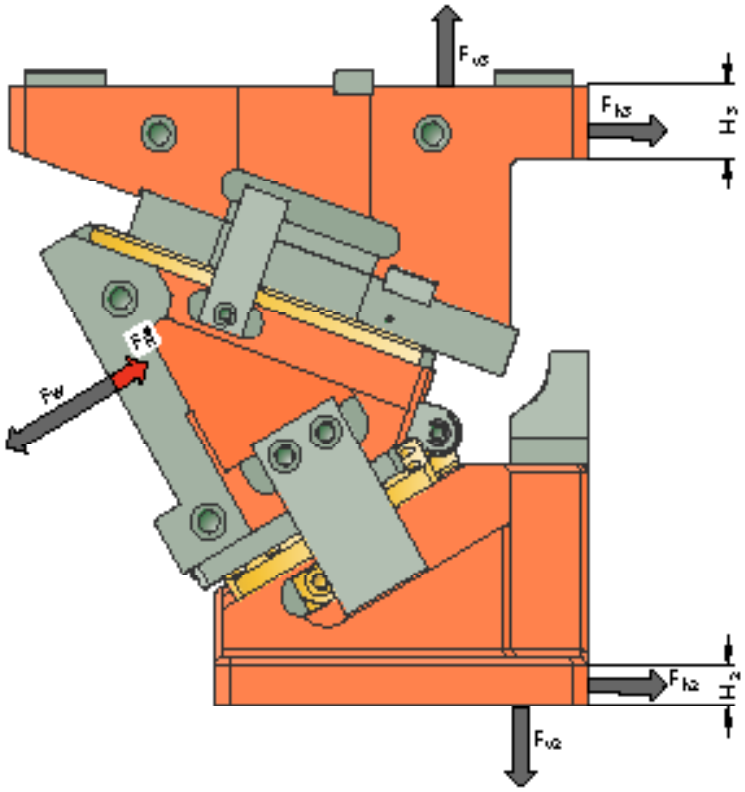
AERIAL ECO LINE
2016.208.□□.070.
PARTS LIST

Position	Piece	Designation	Material	spare part
1	1	Cam body		
2	1	Cam driver		
3	1	Cam base		
4.1	1	Clamp, left		x
4.2	1	Clamp, right		x
5.1	1	Positive return, left		x
5.2	1	Positive return, right		x
6	1	Sliding plate	Bronze with solid lubricant	x
7	8	Sliding plate	Bronze with solid lubricant	x
8				
9	1	Sliding plate	Steel	x
10	2	Sliding plate	Steel	x
11	2	Sliding plate	Steel	x
12				
13	3	Gas spring		x
14	3	Stop plate		x
15	3	Stop piece		x
16	2	Lockout system		x
17	2	Slide pad	Bronze with solid lubricant	x
18	2	Prismatic guide	Steel	x
19	3	Centre guide	Bronze with solid lubricant	x
20	6	Damper		x
21	2	Insert	Bronze with solid lubricant	x
22	6	Feather key		x
23	4	Feather key		x
24				
25*	2	Curve wedge		x
26*	2	Roller block		x
27				
28				

* up to and including 40° with pre-acceleration

For inquiries or when ordering spare parts (x), we require the following data:
- Cam unit order no.
- Cam unit serial number
- Item number / Designation / Spare part

AERIAL ECO LINE
2016.208.□□.070.
SYSTEM AND SURROUNDING FORCES



Order number	α [°]	F_W [kN]	F_R* [kN]	F_{h2} [kN]	F_{v2} [kN]	F_{h3} [kN]	F_{v3} [kN]	H_2 [mm]	H_3 [mm]
2016.208.00.070.038.21	0	470	53.9	0	394	470	394	65	45
2016.208.05.070.042.21	5	470	54.2	34	393	434	434	75	45
2016.208.10.070.046.21	10	470	54.4	68	388	394	470	90	45
2016.208.15.070.070.21	15	470	54.5	102	381	352	503	110	45
2016.208.20.070.055.21	20	470	54.6	135	371	307	531	125	45
2016.208.25.070.060.21	25	470	54.6	167	357	259	556	140	45
2016.208.30.070.065.21	30	470	54.6	197	342	210	577	145	45
2016.208.35.070.070.21	35	470	54.6	226	323	159	593	150	45
2016.208.40.070.077.21	40	470	54.6	254	302	107	604	170	45
2016.208.45.070.084.21	45	470	54.6	279	279	53	611	175	45
2016.208.50.070.093.21	50	470	54.6	302	254	0	614	190	45
2016.208.55.070.104.21	55	470	60.3	270	189	0	574	205	45
2016.208.60.070.120.21	60	470	68.1	235	136	0	543	205	45

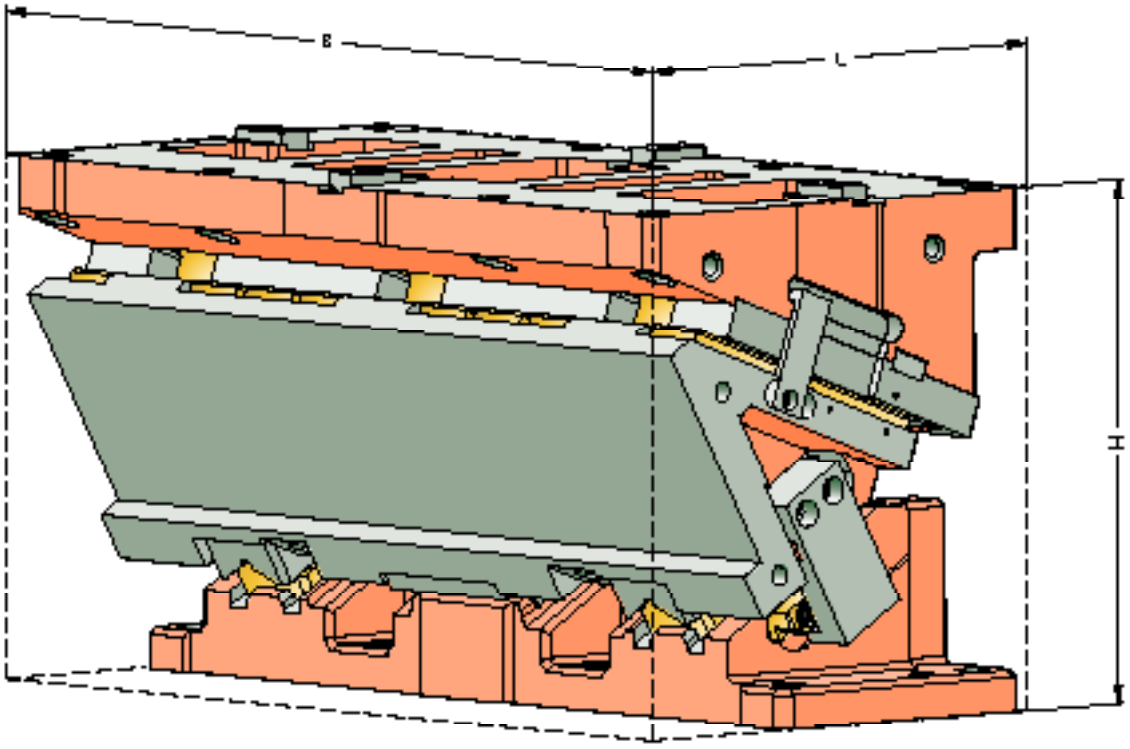
* Retraction force values correspond to the spring-generated retraction force at the working point

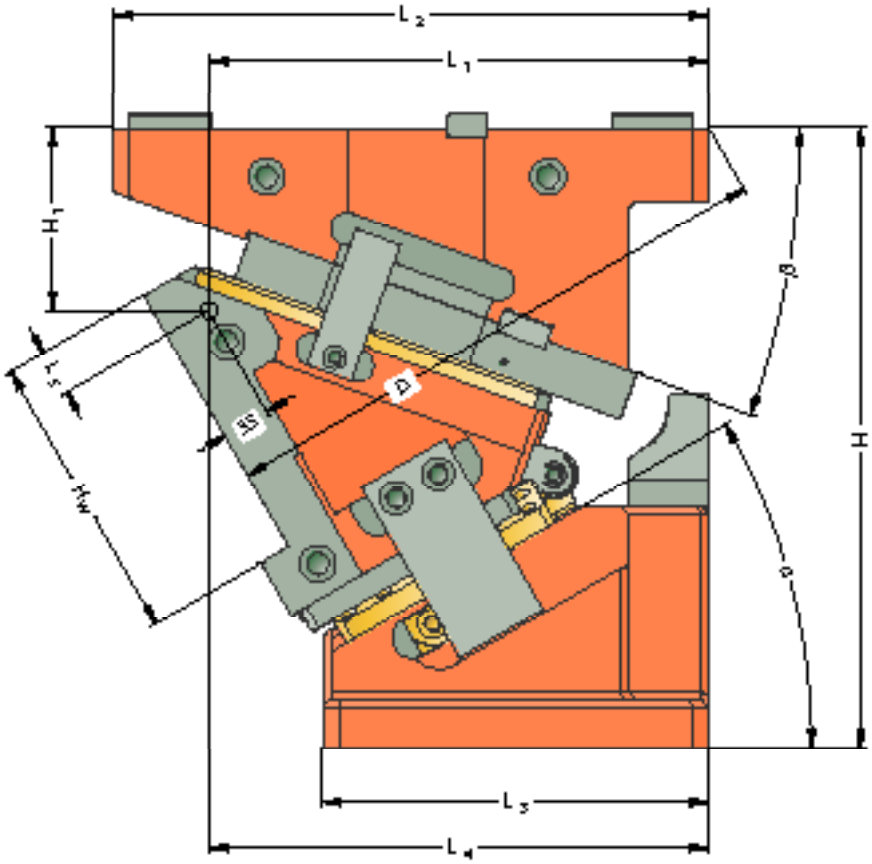
The forces F_{h2}, F_{V2} as well as F_{h3}, F_{V3} act on the tool environment at maximum working force F_W.

AERIAL
ECO LINE
2016.208.□□.080.

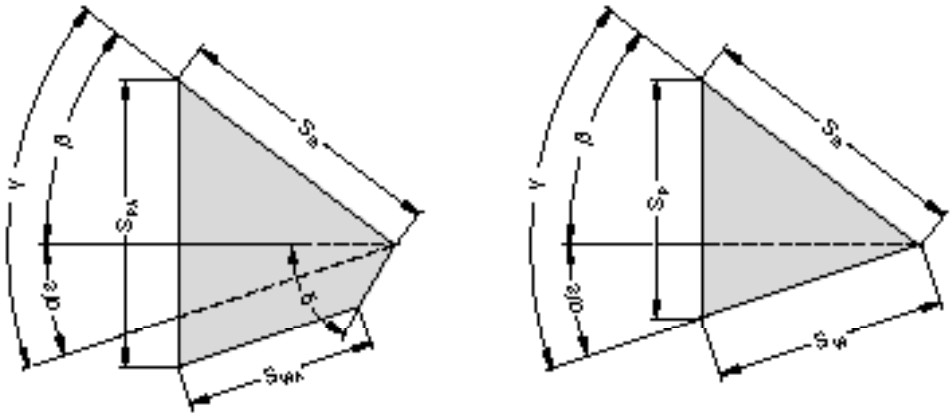
Working width:	800 mm
Performance class:	475 kN

AERIAL ECO LINE
2016.208.□□.080.
SIZE TABLE





AERIAL ECO LINE
2016.208.□□.080.
SIZE TABLE



Order number 2016.208.	L [mm]	B [mm]	H [mm]	H_1 [mm]	H_W [mm]	L_1 [mm]	L_2 [mm]	L_3 [mm]	L_4 [mm]	L_5 [mm]	D [mm]	α [°]	β [°]	S_W* [mm]	S_{WA}* [mm]	S_S [mm]	S_P* [mm]	S_{PA}* [mm]
00.080.038.21	370	800	385	85	180	293	370	198	240	28	323	0	50	-	36.8	60	-	48.0
05.080.042.21	370	800	385	83.9	180	397.3	370	217.3	240	28	333.4	5	45	-	40.0	60	-	57.5
10.080.046.21	370	800	385	84.5	180	301.5	370	236.5	240	28	341.6	10	40	-	45.0	60	-	54.9
15.080.070.21	370	800	385	86.8	180	305.7	370	255.7	240	28	347.7	15	35	-	45.1	60	-	59.4
20.080.055.21	370	800	385	90.7	180	309.6	370	274.6	240	28	351.9	20	30	-	53.5	60	-	57.7
25.080.060.21	370	800	385	96.3	180	308	370	293	240	28	349.9	25	25	-	56.3	60	-	67.5
30.080.065.21	370	800	385	113.5	180	310.9	370	310.9	240	28	356	30	20	-	42.9	60	-	66.1
35.080.070.21	385	800	385	122.2	180	313.2	370	328.2	240	28	356.6	35	15	-	57.1	60	-	77.8
40.080.077.21	400	800	385	132.3	180	314.6	370	344.6	240	28	356	40	10	-	73.7	60	-	76.3
45.080.084.21	410	800	385	143.9	180	320	370	360	240	28	358	45	5	84.5	-	60	65.0	-
50.080.093.21	430	800	385	156.7	180	314.4	370	374.4	240	28	352.2	50	0	93.3	-	60	71.5	-
55.080.104.21	430	800	385	170.8	180	327.6	370	387.6	240	28	357.8	55	0	104.6	-	60	85.7	-
60.080.120.21	438.8	800	385	185.9	180	339.5	370	399.5	240	28	360.8	60	0	120.0	-	60	103.9	-

* Values rounded

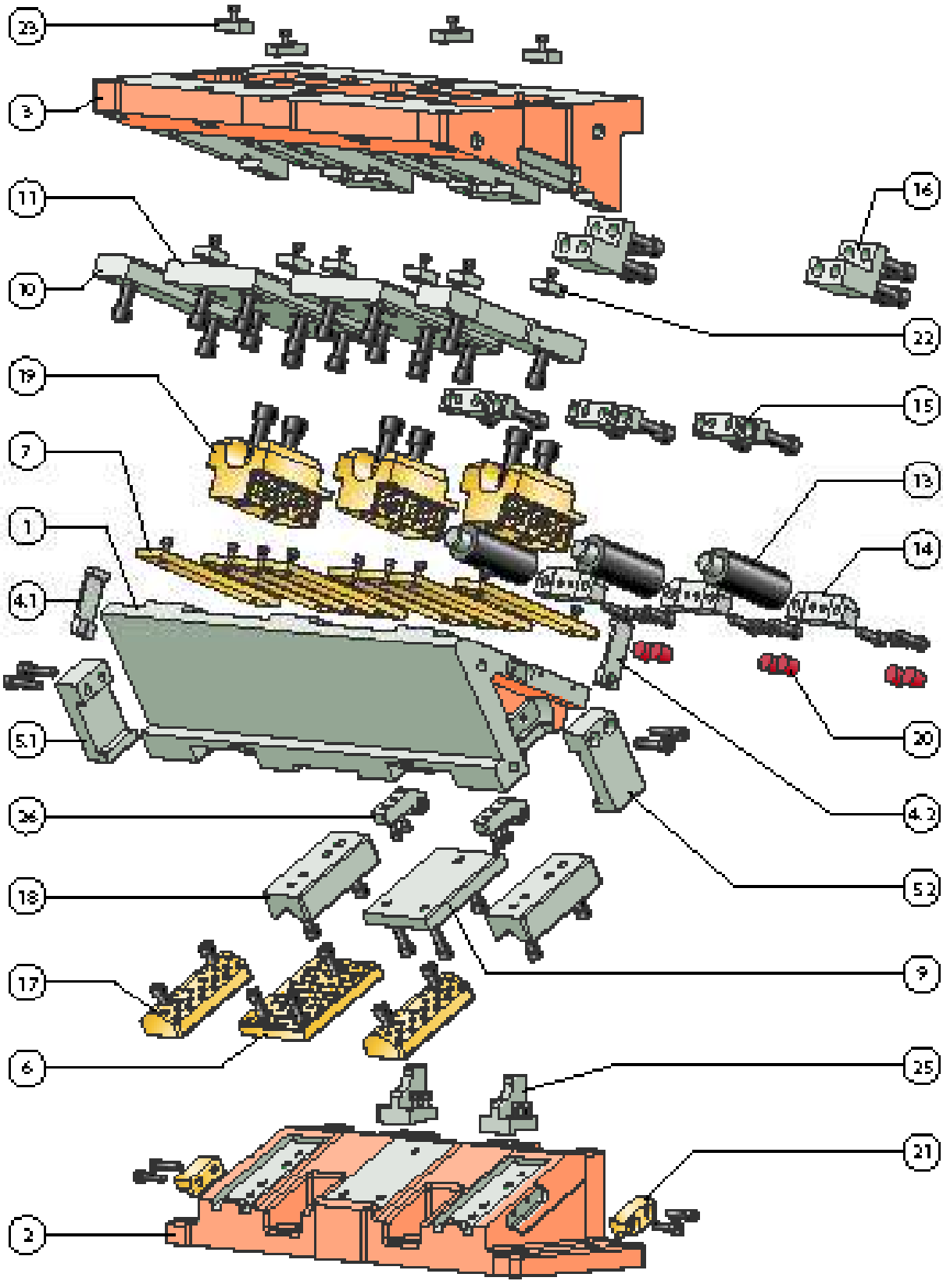
Mounting cam base:

Hexagon socket head cap screws DIN EN ISO 4762	8x M20 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x ø16

Mounting cam driver:

Hexagon socket head cap screws DIN EN ISO 4762	6x M16 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x ø16

AERIAL ECO LINE
2016.208.□□.080.
EXPLODED VIEW



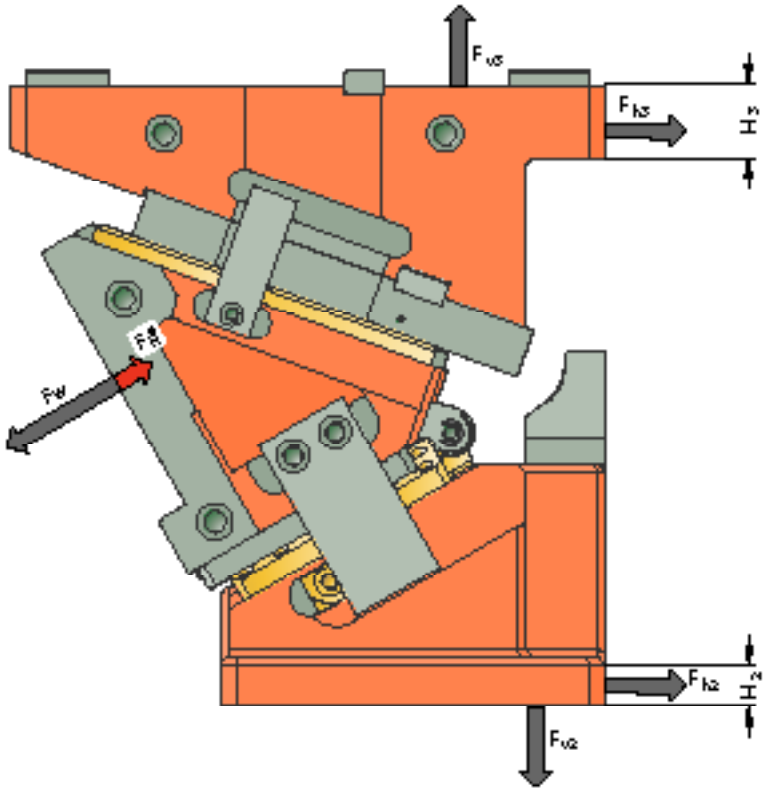
AERIAL ECO LINE
2016.208.□□.080.
PARTS LIST

Position	Piece	Designation	Material	spare part
1	1	Cam body		
2	1	Cam driver		
3	1	Cam base		
4.1	1	Clamp, left		x
4.2	1	Clamp, right		x
5.1	1	Positive return, left		x
5.2	1	Positive return, right		x
6	1	Sliding plate	Bronze with solid lubricant	x
7	8	Sliding plate	Bronze with solid lubricant	x
8				
9	1	Sliding plate	Steel	x
10	2	Sliding plate	Steel	x
11	2	Sliding plate	Steel	x
12				
13	3	Gas spring		x
14	3	Stop plate		x
15	3	Stop piece		x
16	2	Lockout system		x
17	2	Slide pad	Bronze with solid lubricant	x
18	2	Prismatic guide	Steel	x
19	3	Centre guide	Bronze with solid lubricant	x
20	6	Damper		x
21	2	Insert	Bronze with solid lubricant	x
22	6	Feather key		x
23	4	Feather key		x
24				
25*	2	Curve wedge		x
26*	2	Roller block		x
27				
28				

* up to and including 40° with pre-acceleration

For inquiries or when ordering spare parts (x), we require the following data:
- Cam unit order no.
- Cam unit serial number
- Item number / Designation / Spare part

AERIAL ECO LINE
2016.208.□□.080.
SYSTEM AND SURROUNDING FORCES



Order number	α [°]	F_W [kN]	F_R* [kN]	F_{h2} [kN]	F_{v2} [kN]	F_{h3} [kN]	F_{v3} [kN]	H_2 [mm]	H_3 [mm]
2016.208.00.080.038.21	0	470	53.9	0	394	470	394	65	45
2016.208.05.080.042.21	5	470	54.2	34	393	434	434	75	45
2016.208.10.080.046.21	10	470	54.4	68	388	394	470	90	45
2016.208.15.080.080.21	15	470	54.5	102	381	352	503	110	45
2016.208.20.080.055.21	20	470	54.6	135	371	307	531	125	45
2016.208.25.080.060.21	25	470	54.6	167	357	259	556	140	45
2016.208.30.080.065.21	30	470	54.6	197	342	210	577	145	45
2016.208.35.080.070.21	35	470	54.6	226	323	159	593	150	45
2016.208.40.080.077.21	40	470	54.6	254	302	107	604	170	45
2016.208.45.080.084.21	45	470	54.6	279	279	53	611	175	45
2016.208.50.080.093.21	50	470	54.6	302	254	0	614	190	45
2016.208.55.080.104.21	55	470	60.3	270	189	0	574	205	45
2016.208.60.080.120.21	60	470	68.1	235	136	0	543	205	45

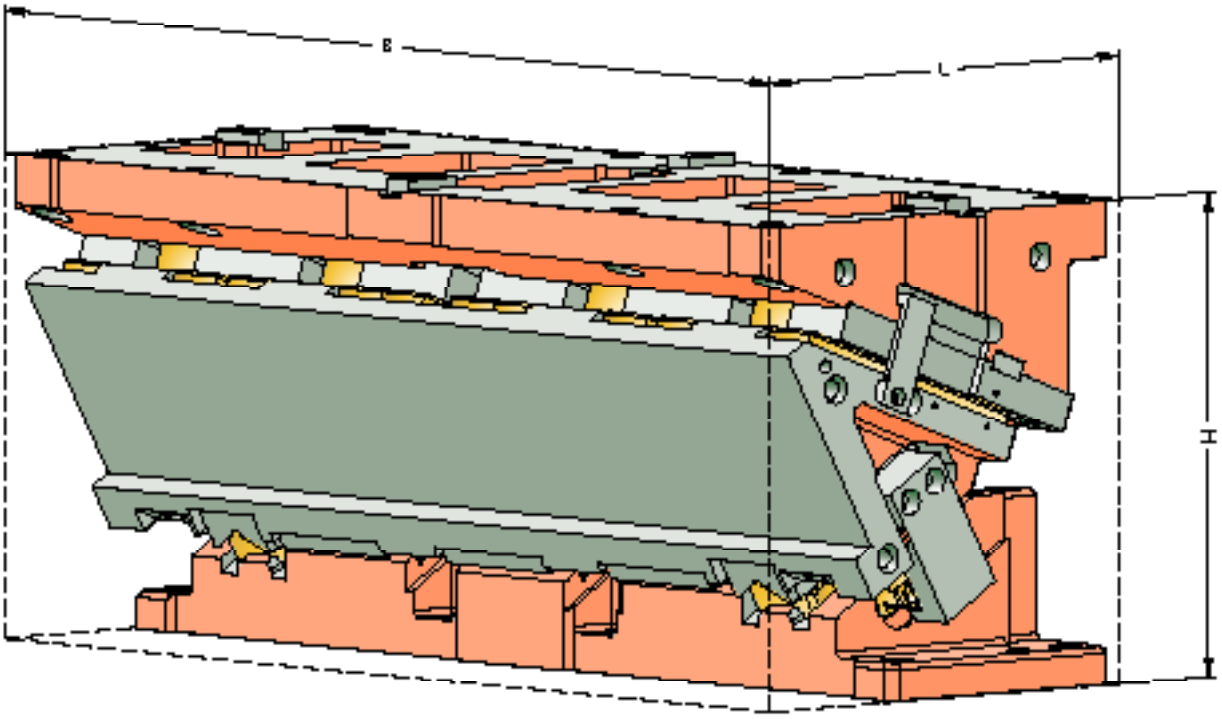
* Retraction force values correspond to the spring-generated retraction force at the working point

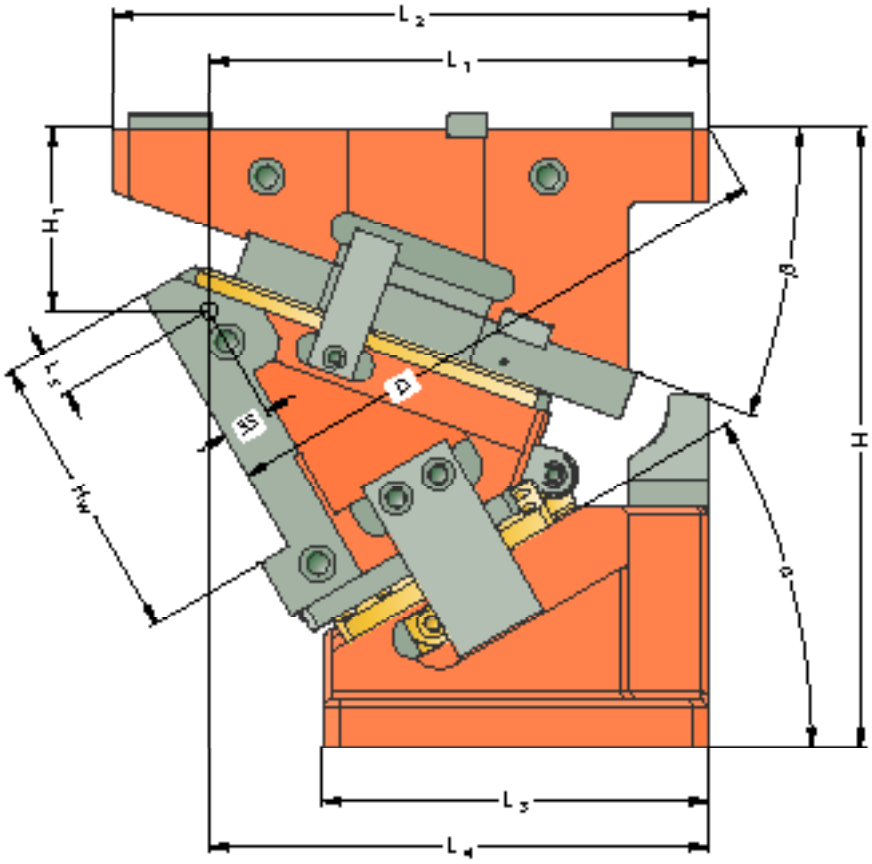
The forces F_{h2}, F_{V2} as well as F_{h3}, F_{V3} act on the tool environment at maximum working force F_W.

AERIAL
ECO LINE
2016.208.□□.090.

Working width:	900 mm
Performance class:	625 kN

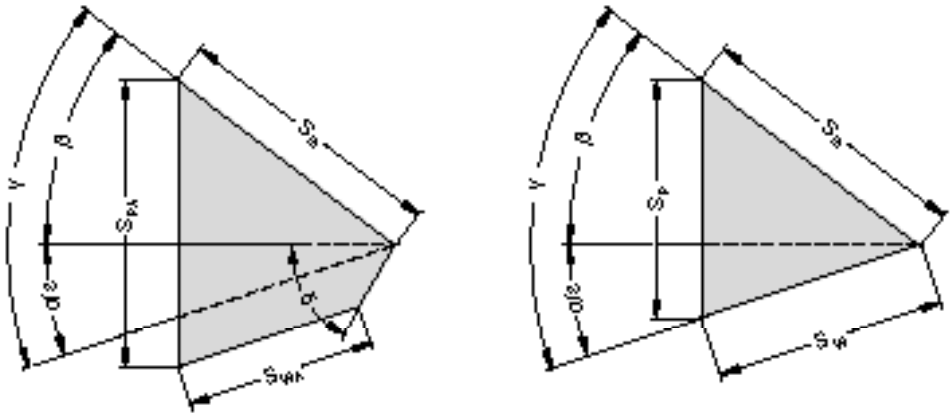
AERIAL ECO LINE
2016.208.□□.090.
SIZE TABLE





Subject to alterations

AERIAL ECO LINE
2016.208.□□.090.
SIZE TABLE



Order number 2016.208.	L [mm]	B [mm]	H [mm]	H_1 [mm]	H_W [mm]	L_1 [mm]	L_2 [mm]	L_3 [mm]	L_4 [mm]	L_5 [mm]	D [mm]	α [°]	β [°]	S_W* [mm]	S_{WA}* [mm]	S_S [mm]	S_P* [mm]	S_{PA}* [mm]
00.090.038.21	370	900	385	85	180	293	370	198	240	28	323	0	50	-	36.8	60	-	48.0
05.090.042.21	370	900	385	83.9	180	397.3	370	217.3	240	28	333.4	5	45	-	40.0	60	-	57.5
10.090.046.21	370	900	385	84.5	180	301.5	370	236.5	240	28	341.6	10	40	-	45.0	60	-	54.9
15.090.090.21	370	900	385	86.8	180	305.7	370	255.7	240	28	347.7	15	35	-	45.1	60	-	59.4
20.090.055.21	370	900	385	90.7	180	309.6	370	274.6	240	28	351.9	20	30	-	53.5	60	-	57.7
25.090.060.21	370	900	385	96.3	180	308	370	293	240	28	349.9	25	25	-	56.3	60	-	67.5
30.090.065.21	370	900	385	113.5	180	310.9	370	310.9	240	28	356	30	20	-	42.9	60	-	66.1
35.090.070.21	385	900	385	122.2	180	313.2	370	328.2	240	28	356.6	35	15	-	57.1	60	-	77.8
40.090.077.21	400	900	385	132.3	180	314.6	370	344.6	240	28	356	40	10	-	73.7	60	-	76.3
45.090.084.21	410	900	385	143.9	180	320	370	360	240	28	358	45	5	84.5	-	60	65.0	-
50.090.093.21	430	900	385	156.7	180	314.4	370	374.4	240	28	352.2	50	0	93.3	-	60	71.5	-
55.090.104.21	430	900	385	170.8	180	327.6	370	387.6	240	28	357.8	55	0	104.6	-	60	85.7	-
60.090.120.21	438.8	900	385	185.9	180	339.5	370	399.5	240	28	360.8	60	0	120.0	-	60	103.9	-

* Values rounded

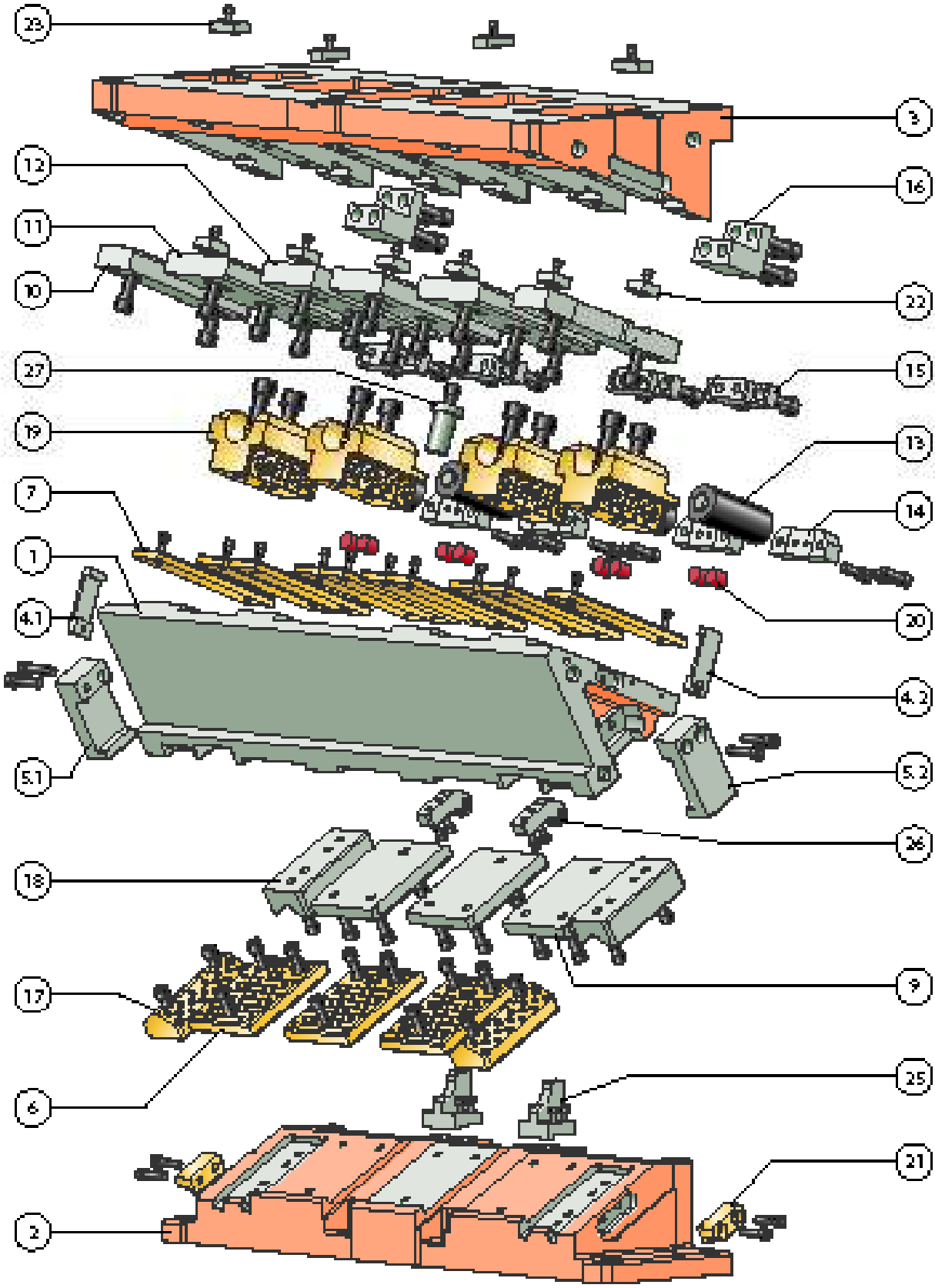
Mounting cam base:

Hexagon socket head cap screws DIN EN ISO 4762	8x M20 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x ø16

Mounting cam driver:

Hexagon socket head cap screws DIN EN ISO 4762	7x M16 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x ø16

AERIAL ECO LINE
2016.208.□□.090.
EXPLODED VIEW



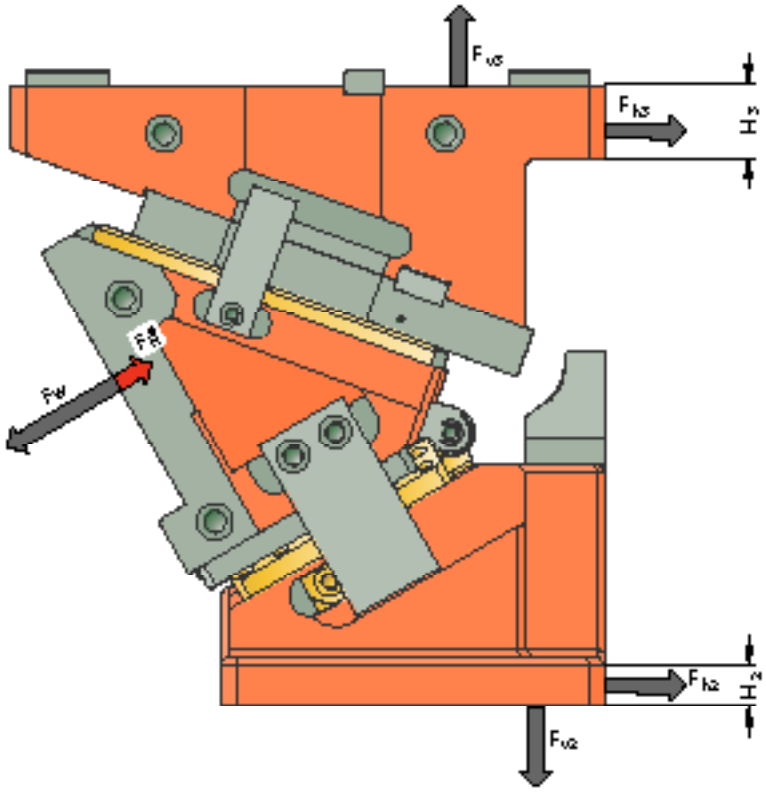
AERIAL ECO LINE
2016.208.□□.090.
PARTS LIST

Position	Piece	Designation	Material	spare part
1	1	Cam body		
2	1	Cam driver		
3	1	Cam base		
4.1	1	Clamp, left		x
4.2	1	Clamp, right		x
5.1	1	Positive return, left		x
5.2	1	Positive return, right		x
6	3	Sliding plate	Bronze with solid lubricant	x
7	10	Sliding plate	Bronze with solid lubricant	x
8				
9	3	Sliding plate	Steel	x
10	2	Sliding plate	Steel	x
11	2	Sliding plate	Steel	x
12	2	Sliding plate	Steel	x
13	4	Gas spring		x
14	4	Stop plate		x
15	4	Stop piece		x
16	2	Lockout system		x
17	2	Slide pad	Bronze with solid lubricant	x
18	2	Prismatic guide	Steel	x
19	4	Centre guide	Bronze with solid lubricant	x
20	8	Damper		x
21	2	Insert	Bronze with solid lubricant	x
22	6	Feather key		x
23	4	Feather key		x
24				
25*	2	Curve wedge		x
26*	2	Roller block		x
27	1	Safety bolt		x
28				

* up to and including 40° with pre-acceleration

For inquiries or when ordering spare parts (x), we require the following data:
- Cam unit order no.
- Cam unit serial number
- Item number / Designation / Spare part

AERIAL ECO LINE
2016.208.□□.090.
SYSTEM AND SURROUNDING FORCES



Order number	α [°]	F_W [kN]	F_R* [kN]	F_{h2} [kN]	F_{v2} [kN]	F_{h3} [kN]	F_{v3} [kN]	H_2 [mm]	H_3 [mm]
2016.208.00.090.038.21	0	627	72.4	0	526	627	526	65	45
2016.208.05.090.042.21	5	627	72.8	46	524	579	579	75	45
2016.208.10.090.046.21	10	627	73.1	91	518	526	627	90	45
2016.208.15.090.090.21	15	627	73.2	136	508	469	670	110	45
2016.208.20.090.055.21	20	627	73.4	180	494	409	709	125	45
2016.208.25.090.060.21	25	627	73.4	222	477	346	742	140	45
2016.208.30.090.065.21	30	627	73.5	263	456	280	769	145	45
2016.208.35.090.070.21	35	627	73.5	302	431	212	791	150	45
2016.208.40.090.077.21	40	627	73.5	338	403	142	806	170	45
2016.208.45.090.084.21	45	627	73.6	372	372	71	815	175	45
2016.208.50.090.093.21	50	627	73.6	403	338	0	818	190	45
2016.208.55.090.104.21	55	627	81.3	360	252	0	765	205	45
2016.208.60.090.120.21	60	627	91.6	314	181	0	724	205	45

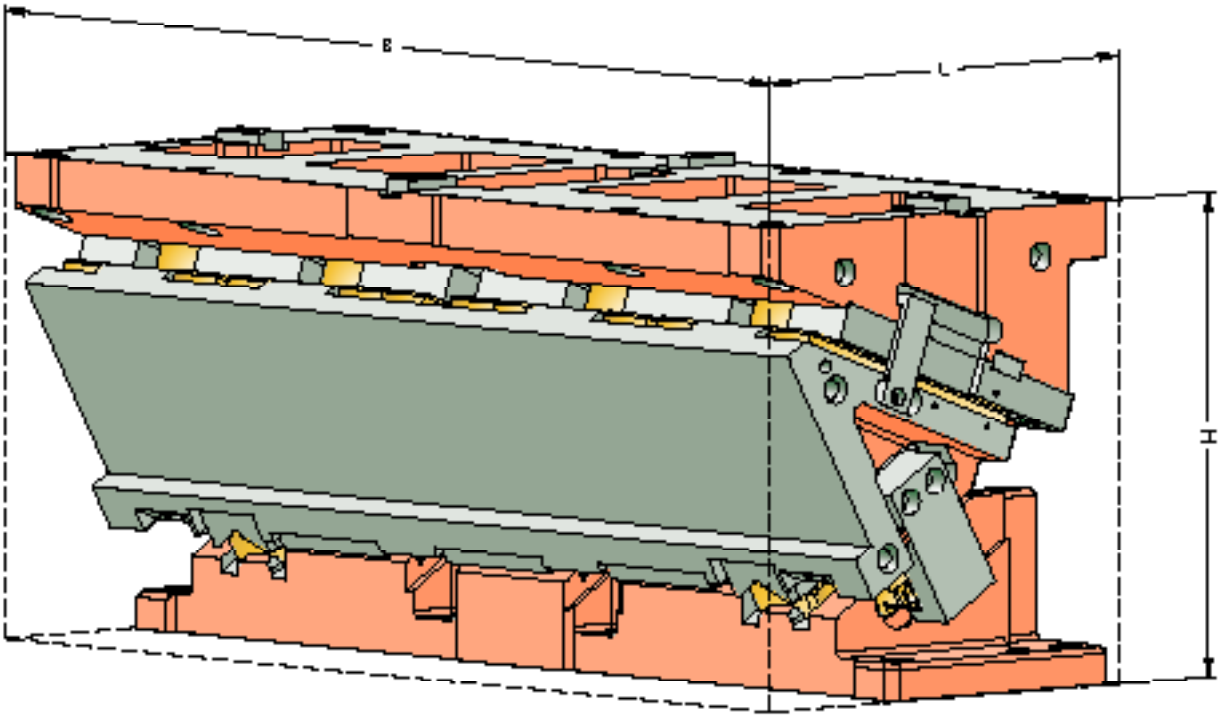
* Retraction force values correspond to the spring-generated retraction force at the working point

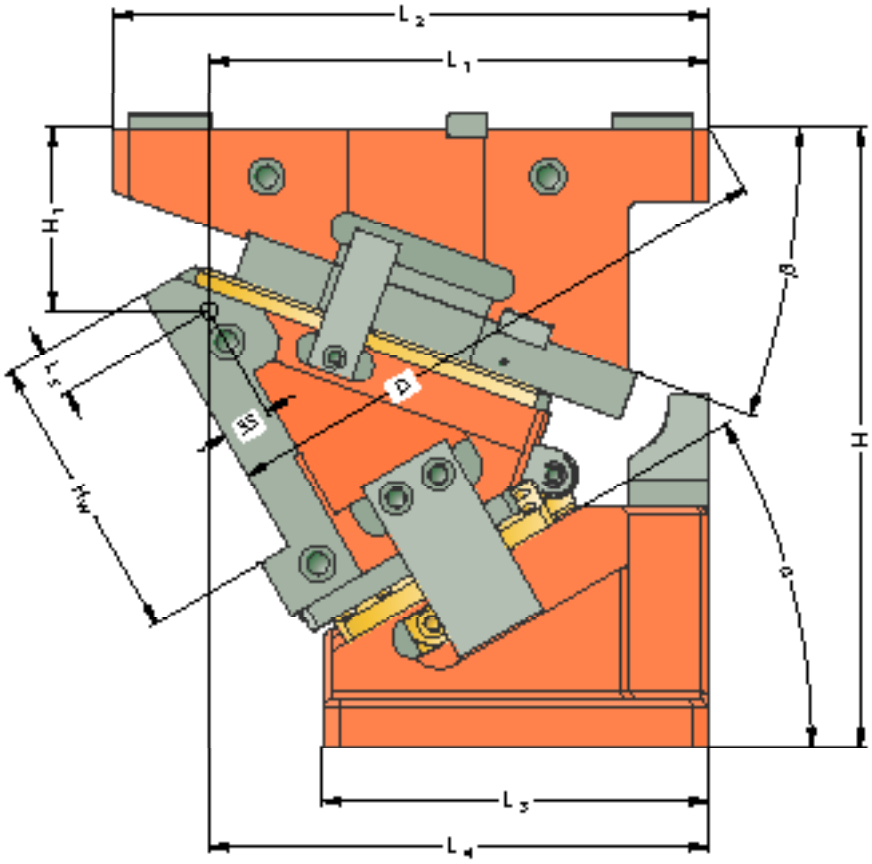
The forces F_{h2}, F_{V2} as well as F_{h3}, F_{V3} act on the tool environment at maximum working force F_W.

AERIAL
ECO LINE
2016.208.□□.100.

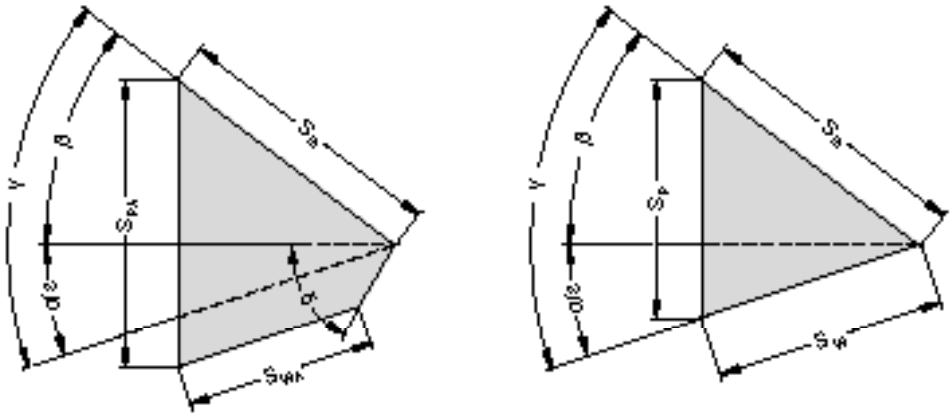
Working width:	1000 mm
Performance class:	625 kN

AERIAL ECO LINE
2016.208.□□.100.
SIZE TABLE





AERIAL ECO LINE
2016.208.□□.100.
SIZE TABLE



Order number 2016.208.	L [mm]	B [mm]	H [mm]	H_1 [mm]	H_W [mm]	L_1 [mm]	L_2 [mm]	L_3 [mm]	L_4 [mm]	L_5 [mm]	D [mm]	α [°]	β [°]	S_W* [mm]	S_{WA}* [mm]	S_S [mm]	S_P* [mm]	S_{PA}* [mm]
00.100.038.21	370	1000	385	85	180	293	370	198	240	28	323	0	50	-	36.8	60	-	48.0
05.100.042.21	370	1000	385	83.9	180	397.3	370	217.3	240	28	333.4	5	45	-	40.0	60	-	57.5
10.100.046.21	370	1000	385	84.5	180	301.5	370	236.5	240	28	341.6	10	40	-	45.0	60	-	54.9
15.100.100.21	370	1000	385	86.8	180	305.7	370	255.7	240	28	347.7	15	35	-	45.1	60	-	59.4
20.100.055.21	370	1000	385	90.7	180	309.6	370	274.6	240	28	351.9	20	30	-	53.5	60	-	57.7
25.100.060.21	370	1000	385	96.3	180	308	370	293	240	28	349.9	25	25	-	56.3	60	-	67.5
30.100.065.21	370	1000	385	113.5	180	310.9	370	310.9	240	28	356	30	20	-	42.9	60	-	66.1
35.100.070.21	385	1000	385	122.2	180	313.2	370	328.2	240	28	356.6	35	15	-	57.1	60	-	77.8
40.100.077.21	400	1000	385	132.3	180	314.6	370	344.6	240	28	356	40	10	-	73.7	60	-	76.3
45.100.084.21	410	1000	385	143.9	180	320	370	360	240	28	358	45	5	84.5	-	60	65.0	-
50.100.093.21	430	1000	385	156.7	180	314.4	370	374.4	240	28	352.2	50	0	93.3	-	60	71.5	-
55.100.104.21	430	1000	385	170.8	180	327.6	370	387.6	240	28	357.8	55	0	104.6	-	60	85.7	-
60.100.120.21	438.8	1000	385	185.9	180	339.5	370	399.5	240	28	360.8	60	0	120.0	-	60	103.9	-

* Values rounded

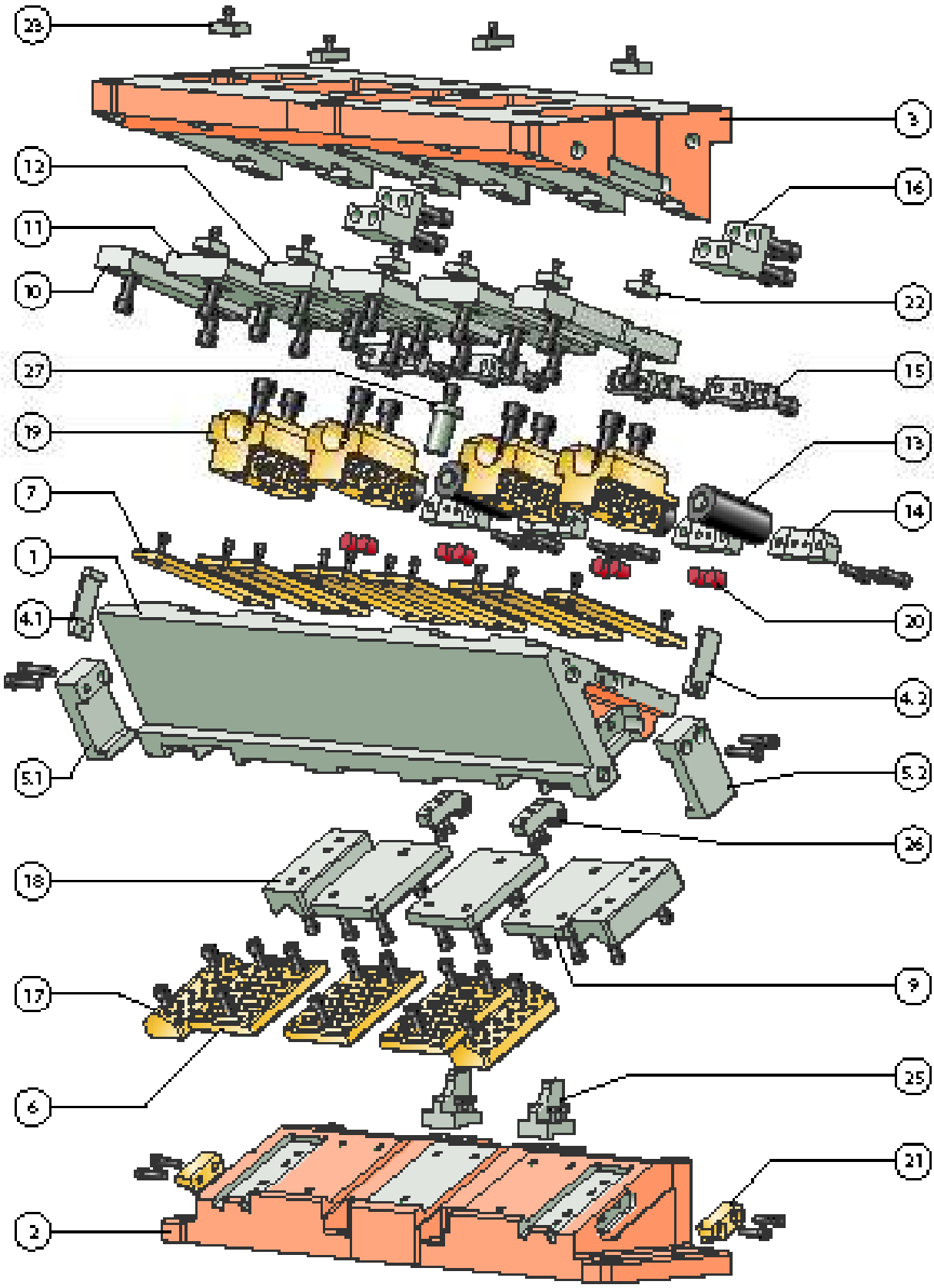
Mounting cam base:

Hexagon socket head cap screws DIN EN ISO 4762	8x M20 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x ø16

Mounting cam driver:

Hexagon socket head cap screws DIN EN ISO 4762	7x M16 / Strength class min. 8.8
Dowel pins DIN EN ISO 8735	2x ø16

AERIAL ECO LINE
2016.208.□□.100.
EXPLODED VIEW



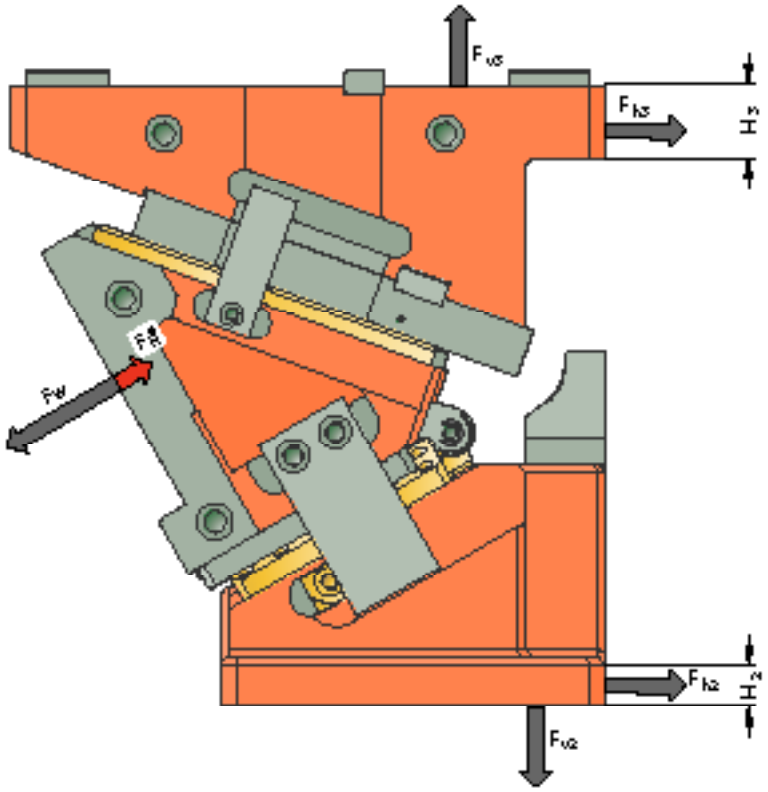
AERIAL ECO LINE
2016.208.□□.100.
PARTS LIST

Position	Piece	Designation	Material	spare part
1	1	Cam body		
2	1	Cam driver		
3	1	Cam base		
4.1	1	Clamp, left		x
4.2	1	Clamp, right		x
5.1	1	Positive return, left		x
5.2	1	Positive return, right		x
6	3	Sliding plate	Bronze with solid lubricant	x
7	10	Sliding plate	Bronze with solid lubricant	x
8				
9	3	Sliding plate	Steel	x
10	2	Sliding plate	Steel	x
11	2	Sliding plate	Steel	x
12	2	Sliding plate	Steel	x
13	4	Gas spring		x
14	4	Stop plate		x
15	4	Stop piece		x
16	2	Lockout system		x
17	2	Slide pad	Bronze with solid lubricant	x
18	2	Prismatic guide	Steel	x
19	4	Centre guide	Bronze with solid lubricant	x
20	8	Damper		x
21	2	Insert	Bronze with solid lubricant	x
22	6	Feather key		x
23	4	Feather key		x
24				
25*	2	Curve wedge		x
26*	2	Roller block		x
27	1	Safety bolt		x
28				

* up to and including 40° with pre-acceleration

For inquiries or when ordering spare parts (x), we require the following data:
- Cam unit order no.
- Cam unit serial number
- Item number / Designation / Spare part

AERIAL ECO LINE
2016.208.□□.100.
SYSTEM AND SURROUNDING FORCES



Order number	α [°]	F_W [kN]	F_R* [kN]	F_{h2} [kN]	F_{v2} [kN]	F_{h3} [kN]	F_{v3} [kN]	H_2 [mm]	H_3 [mm]
2016.208.00.100.038.21	0	627	72.4	0	526	627	526	65	45
2016.208.05.100.042.21	5	627	72.8	46	524	579	579	75	45
2016.208.10.100.046.21	10	627	73.1	91	518	526	627	90	45
2016.208.15.100.100.21	15	627	73.2	136	508	469	670	110	45
2016.208.20.100.055.21	20	627	73.4	180	494	409	709	125	45
2016.208.25.100.060.21	25	627	73.4	222	477	346	742	140	45
2016.208.30.100.065.21	30	627	73.5	263	456	280	769	145	45
2016.208.35.100.070.21	35	627	73.5	302	431	212	791	150	45
2016.208.40.100.077.21	40	627	73.5	338	403	142	806	170	45
2016.208.45.100.084.21	45	627	73.6	372	372	71	815	175	45
2016.208.50.100.093.21	50	627	73.6	403	338	0	818	190	45
2016.208.55.100.104.21	55	627	81.3	360	252	0	765	205	45
2016.208.60.100.120.21	60	627	91.6	314	181	0	724	205	45

* Retraction force values correspond to the spring-generated retraction force at the working point

The forces F_{h2}, F_{V2} as well as F_{h3}, F_{V3} act on the tool environment at maximum working force F_W.

INTRODUCTION
AND TABLE OF CONTENTS

ENGINEERING

2016.24. AERIAL FCC BAK — DAIMLER, VOLVO, VOLKSWAGEN GROUP

2016.25. AERIAL FCC BAK — DAIMLER, VOLVO, VOLKSWAGEN GROUP

2016.207. AERIAL ECO LINE

2016.208. AERIAL ECO LINE

CUSTOMER-SPECIFIC
SERVICES

APPENDIX

EMERGENCY SITUATION /
CONTACTS

CUSTOMER-SPECIFIC SERVICES
SPECIAL MACHINING

Catalogue cam units are equipped with a tool-specific machining for the tool in the mounting surface so that the required components can be fixed on the mounting surface. This machining is performed in the classical process of the toolmaking, often in a certain maturity of the tool itself as well. Process responsibility and risk lie with the executing tool shop.

As a service, FIBRO offers the complete machining of catalogue cam units according to customer specifications. The machining is closely matched to the customer requirements of their tooling process. In addition to conventional qualities, which serve the requirements of classical tooling processes, FIBRO also offers a high-precision finishing of cam units, which are equipped on cam units to be ready for operation (efp*). efp* equipped cam units allow the cam unit to be mounted in the tool with a subsequent initial test press stroke in the tool without further adjustment measures of the cam unit. As a result of processing at FIBRO as extended workbench, we assume the responsibility for the entire cam unit manufacturing process.

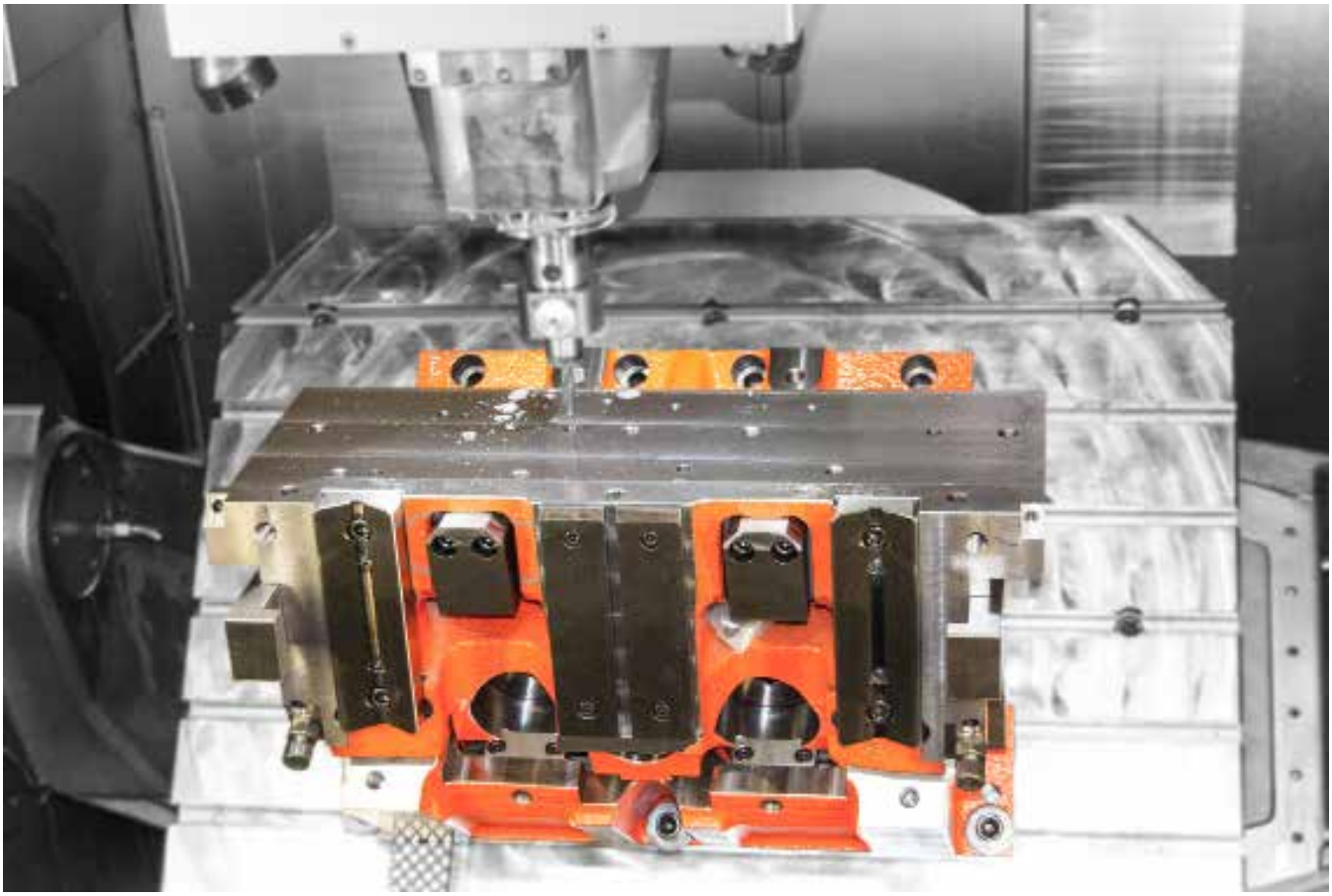


Figure 31: Special machining of cam units according to customer data

The tool-specific machining of cam units by FIBRO allows you to further rectify your processes in toolmaking. In addition to relieving logistical capacities, the machining, testing and cleaning of the cam units in your facility is also dispensed with. You keep limited capacities in your mechanical manufacturing and assembly free for other tasks, thus reducing the processing time of the tools and ultimately saving costs.

CUSTOMER-SPECIFIC SERVICES
SPECIAL MACHINING

If you want a tool-specific machining of the cam unit working surface, you can clarify your process-specific requirements, ideally at an early stage before the first order. The cam unit working surface is machined according to the data you provide. Our process is set up for the processing of 3D data in a variety of formats. We prefer to accept data in the format CATIA V5, but we can also process other native and data exchange formats such as step. In order to transfer important information for production, the data must be processed according to a clearly agreed methodology. As a well-established standard, the colour coding of the machined objects has been established according to the colour coding in accordance with the basic guideline for equipment constructions of the German automotive industry (see register APPENDIX "CAD colour coding ..."). Naturally, you can also take your own factory standards into account. The selected standard will be clearly agreed upon with us and clarified in advance.

In the course of an order, we will require the working stock number (tool number) as well as the item numbers of the cam units with special machining. For the respective cam units, the tool-specific machining of the working surface must be noted on the order as an additional text in the order (e.g. "Machining according to CAD data"). The order must be received in time so that the desired delivery date can be met. The regular delivery time for cam units with a specific machining of the mounting surface is 5 to 8 weeks. The actual delivery date depends on the availability of the approved production data. These should be received by us 15 working days before the desired delivery date in the agreed quality. A delayed receipt of the data may lead to a delay in delivery.

Please note that modified requirements to the machining can no longer be ensured after approved production data has already been provided, and this can result in the accepted delivery dates being postponed.

We will be glad to advise you on further questions and we will send you an appropriate offer if you wish.

*efp = equiped for press

CUSTOMER-SPECIFIC SERVICES
CUSTOMER-SPECIFIC CAM UNITS

In many toolmaking areas, purchased cam units are established as a cost-efficient option. Standard solutions can be used for a wide range of applications thanks to a diversified range of cam unit series.

Complex component geometries, overlaps with mechanisation devices or modified geometrical requirements on cam units do not permit the use of standard cam units in various cases. Tool-specifically configured cam units from FIBRO represent an alternative to the self-constructed and self-made cam units used here. This allows application-specific requirements to be combined with the advantages of standard purchase cam units.

Take advantage of our expertise

FIBRO develops tool-specific cam units according to the same technical standards as catalogue cam units. By inquiring at an early stage, we can closely accompany you in the development of dies, and you also have the possibility to design an optimal solution for your application. Our tool-specific cam units means there is no longer any additional logistical effort required in your procurement processes as well as in the parts supply in the workshop. The installation of the tool-specific configured cam unit corresponds to the process sequences of catalogue cam units, assembly and tuning measures within a self-made cam unit are no longer required. The analytical design of these cam units is the basic requirement for a smooth application over the intended life cycle of the cam unit. However, should undesirable wear occur during the tool lifetime, a rapid spare part supply is ensured by the use of a maximum number of standard parts in the cam unit. Through the entire tool development and assembly process, as well as the entire lifetime of the cam unit, FIBRO is thus your competent contact person for all your cam unit questions.

Features customised cam units

Tool-specific configured cam units from FIBRO generally have the same properties and qualities as our catalogue cam units. In general, we can realize working widths up to 1100 mm for you. The conversion possibilities of working widths greater than 1100 mm must be clarified in advance.

What is the process?

Tool-specific cam units are always used when a standard cam unit cannot meet the requirements of the tool. These can be very simple changes, such as a widened working surface, but also very complex scope of changes, such as complete offset cam unit components, multiple working surfaces, modified stiffnesses, etc.

The descriptions as exact as possible of your requirements for the cam unit are the basis for an target-oriented engineering of your tool-specific cam unit. In addition to the desired design principle (on which series your customer-specific cam unit will be based), we will also require a detailed description of the extent of change. Alternatively, you have the possibility to describe your problem to us in the tool and to provide us with design data from your tool (for example, part position, method plan, maximum possible space for the cam unit) as well as the tool environment (e.g. restrictions on mechanisation devices). In this case, FIBRO can handle the entire engineering of the customer-specific cam unit for you.

Of course, you also have the possibility to send us modified CAD data from our catalogue cam units, from which we can then extract the properties of your tool-specific cam unit. The plausibility and feasibility test as well as the manufacturing technology preparation with resultant possible technical modifications are made in our facility due to reasons of the warranty.

CUSTOMER-SPECIFIC SERVICES
CUSTOMER-SPECIFIC CAM UNITS

Normally, you will receive a CAD design draft of the tool-specific cam unit within 3 working days of your request. In the data format CATIA V5, or alternatively in the neutral exchange format STEP, as well as the article number associated with the cam unit. Via these, it is possible for us to clearly assign further arrangements during course of the project, and the cam unit can be procured from us in this way. In parallel to the design, our sales department will work out an offer for you for the tool-specific cam unit.

The manufacturing-technical detailing as well as the production of the tool-specific cam unit only occurs after you give a production go-ahead. After this production go-ahead, bigger changes, for example a change in the cam unit angle are still only conditionally possible according to the progress of the production, and at this point absolutely require an agreement with us. Changes after the production go-ahead may result in additional costs and delays in delivery.
Due to manufacturing reasons, you should give the production go-ahead of the tool-specific cam unit 8 weeks before your desired delivery time. A delayed production go-ahead can lead to a delay in delivery; shorter delivery periods must be agreed with us at an early stage.

If you have any additional questions, our technology and sales departments will be happy to assist you.
Contact persons, see the “EMERGENCY SITUATION / CONTACTS” tab.

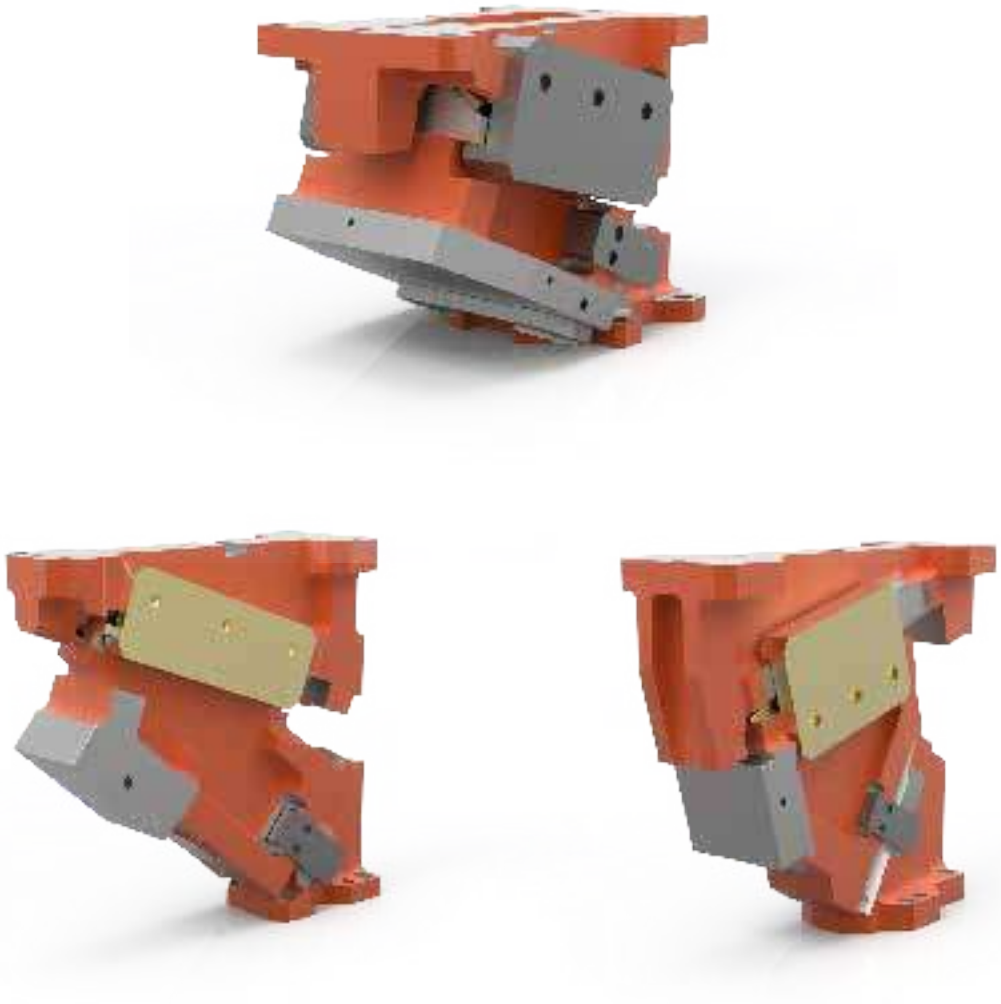


Figure 32: Selection of various customer-specific cam units

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APPENDIX
LUBRICATION INSTRUCTIONS

Always prevent the slider and driver surface from running dry, even during the breaking-in of the tools.
An initial lubrication is necessary.

Note: VDI 3378, Observe lubrication of large stamping dies

Recommended: Lithium saponified greases without MoS_2 and graphite additives, e.g.:

DEA:	PARAGON EP1
ESSO:	EXXON multi-purpose grease
MOBIL:	LicAl ÖL 8561
AVIA:	Multi-purpose grease
Fuchs:	Renolin ZAF 46 MB Öl

APPENDIX
CAD COLOUR CODING FOR MACHINING ACCORDING TO OEM STANDARD

Machining type	Comment	CATIA V5 RGB values			
		Colour	Red	Green	Blue
Areas dependent to method plan	All machining which is not performed according to solid model, but according to separate data record	Olive green	175	255	175
Smoothing/ finishing	Fine machining (for further details, see work instructions)	Pink	255	175	175
Roughing	Rough machining	Red-brown	095	000	000
Fitting bore H11	Also special milling processing	Blue	095	095	175
Fitting bore H8	Also special milling processing	Purple	095	000	095
Fitting bore H7	Also special milling processing	Blue	000	000	255
Fitting bore H6	Also special milling processing	Dark blue	000	095	175
Threads	Metric right thread according to DIN/ISO	yellow	255	255	000
Fine threads	Metric fine thread (right) according to DIN/ISO	Orange	255	175	000
Spiral lock / special thread	All other special threads	Orange	255	095	000
Special bore / stepped bore	Complex bores, combination of bores	Magenta	255	000	255
Free bore / simple bore	Through holes, etc., other countersinks	Cyan	000	175	175
Change areas	Sphere or Solid with transparency 192	Light blue	000	127	255
Assembly bores	Assembly features	White	255	255	255

APPENDIX
SHEET METAL MATERIALS IN VEHICLE CONSTRUCTION

Standard designation	Other Designations	Trade names	Standard	Rm [N/mm²]
Deep drawing steels, cold-rolled				
DC01	St12 / FeP01		EN 10130	270..410
DC03	RRSt13		EN 10130	270..370
DC04	St14 / Fep04		EN 10130	270..350
DC05			EN 10130	270..330
DC06	IF18		EN 10130	270..330
DC07			EN 10130	250..310
DC01+ZE	St12 / FeP01		EN 10152	270..410
DC03+ZE	RRSt13		EN 10152	270..370
DC04+ZE	St14 / Fep04		EN 10152	270..350
DC05+ZE			EN 10152	270..330
DC06+ZE	IF18		EN 10152	270..350
DC07+ZE			EN 10152	250..310
DX51D+Z			EN 10346	270..500
DX52D+Z			EN 10346	270..420
DX53D+Z			EN 10346	270..380
DX54D+Z			EN 10346	260..350
DX56D+Z			EN 10346	260..350
Deep drawing steels, hot-rolled				
DD11		alform 200 N	EN 10111	max. 440
DD12		alform 200 N	EN 10111	max. 420
DD13		alform 180 N	EN 10111	max. 400
DD14		alform 180 N	EN 10111	max. 380
high-strength phosphor-alloyed steels, cold-rolled				
HC180P	EN 10268	280..360		
HC220P /+ZE	H220P /+ZE	Z StE 220P /+ZE	EN 10268	320..400
HC260P /+ZE	H260P /+ZE	Z StE 260P /+ZE	EN 10268	360..440
HC300P /+ZE	H300P /+ZE	Z StE 300P /+ZE	EN 10268	400..480
HC220PD+Z	H220PD+Z	Z StE 220P+Z	EN 10292	320..400
HC260PD+Z	H260PD+Z	Z StE 260P+Z	EN 10292	370..450
HC300PD+Z	H300PD+Z	Z StE 300P+Z	EN 10292	400..480
high-strength bake-hardening steels, cold-rolled				
HC180B /+ZE	H180B+ZE	Z StE 180 BH+ZE	EN 10268	300..360
HC220B /+ZE	H220B+ZE	Z StE 220 BH+ZE	EN 10268	320..400
HC260B /+ZE	H260B+ZE	Z StE 260 BH+ZE	EN 10268	360..440
HC300B /+ZE	H300B+ZE	Z StE 300 BH+ZE	EN 10268	400..480
HC180BD+Z	H180BD+Z	Z StE 180 BH+Z	EN 10292	300..360
HC220BD+Z	H220BD+Z	Z StE 220 BH+Z	EN 10292	340..400
HC260BD+Z	H260BD+Z	Z StE 260 BH+Z	EN 10292	360..440
HC300BD+Z	H300BD+Z	Z StE 300 BH+Z	EN 10292	400..480

Information provided without guarantee

APPENDIX
SHEET METAL MATERIALS IN VEHICLE CONSTRUCTION

Standard designation	Other Designations	Trade names	Standard	Rm [N/mm²]
higher strength bake-hardening steels (rolling condition not specified)				
HX180BD+Z			EN 10268	290..360
HX220BD+Z			EN 10268	320..400
HX260BD+Z			EN 10268	360..440
HX300BD+Z			EN 10268	400..480
higher isotropic steels, cold-rolled				
HC220I /+ZE	Z StE 220 I /+ZE	HIZ 220 /ZE	EN 10268	300..380
HC260I /+ZE	Z StE 250 I /+ZE	HIZ 260 /ZE	EN 10268	320..400
HC280I /+ZE	Z StE 280 I /+ZE	HIZ 300 /ZE	EN 10268	340..440
HC300I			EN 10268	340..440
HC220ID+Z	Z StE 220 I+Z	HIZ 220+Z	EN 10268	300..380
HC260ID+Z	Z StE 250 I+Z	HIZ 260+Z	EN 10268	300..380
HC280ID+Z	Z StE 280 I+Z	HIZ 300+Z	EN 10268	340..440
higher-strength IF steels, cold-rolled				
HC160Y /+ZE			EN 10268	340..400
HC180Y /+ZE	H180Y /+ZE		EN 10268	340..400
HC220Y /+ZE	H220Y /+ZE		EN 10268	350..420
HC260Y /+ZE	H260Y /+ZE		EN 10268	380..440
HC160YD+Z	H160YD+Z		EN 10292	340..400
HC180YD+Z	H180YD+Z		EN 10292	340..400
HC220YD+Z	H220YD+Z		EN 10292	370..410
HC260YD+Z	H260YD+Z		EN 10292	380..440
higher strength IF steels (rolling condition not specified)				
HX160YD+Z			EN 10268	300..360
HX180YD+Z			EN 10268	330..390
HX220YD+Z			EN 10268	340..420
HX260YD+Z			EN 10268	380..440
HX300YD+Z			EN 10268	390..470
high-strength, micro-alloyed steels, cold-rolled				
HC260LA /+ZE	H260LA /+ZE	Z StE 260/+ZE	EN 10268	350..450
HC300LA /+ZE	H300LA /+ZE	Z StE 300/+ZE	EN 10268	380..480
HC340LA /+ZE	H340LA /+ZE	Z StE 340/+ZE	EN 10268	410..510
HC380LA /+ZE	H380LA /+ZE	Z StE 380/+ZE	EN 10268	440..560
HC420LA /+ZE	H420LA /+ZE	Z StE 420/+ZE	EN 10268	470..590
HC460LA /+ZE			EN 10268	500..640
HC500LA /+ZE			EN 10268	530..690

Information provided without guarantee

APPENDIX
SHEET METAL MATERIALS IN VEHICLE CONSTRUCTION

Standard designation	Other Designations	Trade names	Standard	Rm [N/mm²]
higher-strength, micro-alloyed steels (rolling condition not specified)				
HX260LAD+Z			DIN EN 10346	350..430
HX300LAD+Z			DIN EN 10346	380..480
HX340LAD+Z			DIN EN 10346	410..510
HX380LAD+Z			DIN EN 10346	440..560
HX420LAD+Z			DIN EN 10346	470..590
HX460LAD+Z			DIN EN 10346	500..640
HX500LAD+Z			DIN EN 10346	530..690
higher-strength dual-phase steels, cold-rolled				
	H260X /+ZE /+Z	DP 450	prEN 10338	>450
	H270X /+ZE /+Z	DP-K 27/50	prEN 10338	>500
	H310X /+ZE /+Z	DP-K 31/60	prEN 10338	>600
	H380X /+ZE /+Z	DP-K 38/60	prEN 10338	>600
HCT450X+ZE			prEN 10338	>450
HCT500X /+ZE /+Z	H300X /+ZE /+Z	DP-K 30/50	prEN 10338	>500
HCT600X /+ZE /+Z	H340X /+ZE /+Z	DP-K 34/50	prEN 10338	>600
higher-strength dual-phase steels, cold-rolled				
HCT780X /+ZE /+Z			prEN 10338	>780
higher-strength dual-phase steels, hot-rolled				
HDT580X	DD33X /+ZE /+Z	DP600	prEN 10338	580..670
Complex phase steels, cold-rolled				
HCT600C			prEN 10338	>600
HCT780C+ZE /+Z			prEN 10338	>780
HCT980C+ZE /+Z			prEN 10338	>980
Complex phase steels, hot-rolled				
HDT780C	D680C /+ZE /+Z	CP800	prEN 10338	780
	D680C /+ZE /+Z	CP900	prEN 10338	>880
	D720C /+ZE /+Z		prEN 10338	950..1130
Ferrite-bainite phase steels, hot-rolled				
HDT450F			prEN 10338	450
HDT560F			prEN 10338	560

Information provided without guarantee

APPENDIX
SHEET METAL MATERIALS IN VEHICLE CONSTRUCTION

Standard designation	Other Designations	Trade names	Standard	Rm [N/mm²]
TRIP steels (Transition Included Plasticity), cold-rolled				
H380T /+ZE /+Z	RA-K 38/60		WSDB 18	>600
H400T /+ZE /+Z	RA-K 40/70	TRIP 700	WSDB 18	>700
H420T /+ZE /+Z	RA-K 42/80	TRIP 800	WSDB 18	>800
HC600T /+ZE /+Z			prEN 10338	>600
HCT690T+ZE			prEN 10338	>690
HCT780T+ZE			prEN 10338	>780
Martensitic steels, hot-rolled				
	D750MS /+ZE		not standardised	1000..1200
HDT1200M	D900MS /+ZE	MS-W 1200	prEN 10338	1200..1400
	D1050MS /+ZE		not standardised	1350..1550
	D750MS /+Z		not standardised	1000..1200
	D900MS /+Z	MS1200	not standardised	1200..1400
high-strength micro-alloyed steels, hot-rolled				
S315MC /+ZE /+Z		alform 315 M	DIN EN 10149-2	390..510
S355MC /+ZE /+Z		alform 355 M	DIN EN 10149-2	430..550
S420MC /+ZE /+Z		alform 420 M	DIN EN 10149-2	480..620
S460MC /+ZE /+Z		alform 460 M	DIN EN 10149-2	520..670
S500MC /+ZE /+Z		alform 500 M	DIN EN 10149-2	550..700
S550MC /+ZE /+Z		alform 500 M	DIN EN 10149-2	600..760
S600MC /+ZE /+Z		alform 600 M	DIN EN 10149-2	650..820
S650MC /+ZE /+Z		alform 650 M	DIN EN 10149-2	700..880
S700MC /+ZE /+Z		alform 700 M	DIN EN 10149-2	750..930
Hardening and heat treatable/ tempering steels, cold-rolled, unalloyed				
15+LC		C15E	DIN EN 10084	<475
C35+LC		C35E	DIN EN 10084	<550
C45+LC		C45E	DIN EN 10084	<595
C60+LC		C60E	DIN EN 10084	<650

Information provided without guarantee

APPENDIX
DICTIONARY, ENGLISH – GERMAN

A

accuracy of measurement	Maßgenauigkeit
aerial cam	oben hängender Schieber
alloyed	legiert
attachment lug, clamp	Klammer

B

back-up	Schulter
back-up thrusted	Schulterung
beam / transport beam / side bar	Greiferbalken
bend (to …)	biegen
blank	Platine
blank die	Platinenschneidwerkzeug
blank holder	Blechhalter
blank thickness	Blechdicke
blanking pressure	Presskraft
blanking pressure / trim force	Schneidkraft
border hardening	randhärten
brass	Messing
bronze with non-liquid lubricant	Bronze mit Festschmierstoff
buck	Aufsatz
burr	Schnittgrat
bush	Buchse
button	Schneidbuchse

C

cam base	Schieberbett
cam base angle	Schieberbettwinkel
cam diagram	Schieber-(ablauf-)diagramm
cam driver	Treiber
cam lock out	Schieberverriegelung
cam slide pad	Schieberniederhalter
cam slide return	Schieberrückholung
cam slide stop / cam buffer	Schieberanschlag
cam slide unit / wedge drive	Keilschieber
cam slider / slide	Schieberteil
cam stroke	Schieberhub
cam stroke plate	Überlaufkeil
cam width	Schieberbreite
cam, wedge drive	Schieber

APPENDIX
DICTIONARY, ENGLISH – GERMAN

carburize (to …)	einsatzhärten
cast	Guss
center of force	Kraftschwerpunkt
center of gravity	Schwerpunkt
change index	Änderungsindex
clamping gripper	Klemmgreifer
clamping surface, lower	Aufspannfläche unten
clamping surface, upper	Aufspannfläche oben
clearance	Führungsspiel
clinch (to …)	bördeln
coat (to …)	beschichten
coil spring	Spiralfeder
common level	gemeinsame Ebene
core	Kern
crossbar	Saugerbalken
crossbar transfer press	Saugerbalkentransferpresse
cutting clearence	Schneidspalt

D

damper / damping element / shock absorber	Dämpfer
diagonal measurement	Diagonalmaß
die	Matrize
die acceptance	Werkzeugabnahme
die closed	Werkzeug geschlossen
die diagram	Werkzeugablaufdiagramm
die mount cam	unten laufender Schieber
die, tool	Werkzeug
dowel	Stift
dowel	Zylinderstift
dowel hole	Stiftloch
draw (to …)	ziehen
draw die	Ziehwerkzeug
drill (to …)	bohren
drill (to …)	drehen
driver angle	Treiberwinkel

E

execution	Ausführung

F

feather key	Passfeder
filler cam	Füllschieber
fit (to …)	passen
flange up	hochstellen
flash, burr	Grat
floater	Luftboden
flowchart	Ablaufdiagramm
force	Kraft
force diagram	Lastdiagramm
form buck	Formaufsatz
form die	Formwerkzeug
full assembled	vollbestückt

G

gas spring	Gasdruckfeder
general information	Beschreibung
grey cast iron	Grauguss
grind (to …)	schleifen
gripper	Greifer
guide bearing	Führungslager
guide block	Führungsaufnahme
guide bush	Führungsbuchse
guide pin	Führungssäule
guide plate / wear plate	Führungsplatte
guide roller	Führungsrolle
guide strip	Führungsleiste
guiding element / sliding element	Führungselement

H

harden (to …)	härten
hardened	gehärtet
high alloyed	hochlegiert
high wear	hochbeansprucht
horizontal force	Horizontalkraft n

I

identification plate	Kennzeichenschild
impact plate	Anschlagplatte
included angle	eingeschlossener Winkel

APPENDIX
DICTIONARY, ENGLISH – GERMAN

included angle	Schieberteilwinkel
induction harden	induktionshärten
interference curve	Freigängigkeitskurve
item number	Position

K

key, wedge	Keil
keyway	Keilsitz

L

label	Schild
length	Länge
length of trim line	Beschnittlänge
light duty	leichte Ausführung
lock out	Lock out
lock out	Verriegelung
lock out plate	Lock out Platte
lock out tube	Lock out Hülse
lock out tube	Verriegelungshülse
lower die	Gussunterteil
lower die	Unterteil
lower die	Werkzeugunterteil
lubricant insert	Festschmierstoff
lubrication	Schmierung

M

machine (to …)	bearbeiten
machining	Bearbeitung
maintenance	Instandhaltung
mill (to …)	fräsen
mount (to …)	montieren
mounting surface	Montagefläche
mounting surface, bottom	Aufspannplattte unten
mounting surface, top	Aufspannplatte oben

N

nodular graphite iron	Sphäroguss
normalize	glühen

O

order code / order no.	Bestell-Nummer

P

pad	Niederhalter
pad travel	Niederhalterweg
pattern	Gießmodell
pattern release	Modellfreigabe
pierce (to …)	lochen
pierce die	Lochwerkzeug
piercing bush, button	Lochbuchse
pillar, guide pin	Säule
pin, bolt	Bolzen
positiv locking	Formschluss
positive return	Zwangsrückholer, Zwangsrückzug
pre-accelleration	Vorbeschleunigung
pre-accelleration angle	Vorbeschleunigungswinkel
pre-accelleration stroke	Vorbeschleunigungshub
press fit	Presspassung
press stroke	Pressenhub
press tonnage	Pressen-Nennkraft
prism	Prisma
progressive die	Folge-(verbund-) werkzeug
protrusion	Überhang
punch	Lochstempel
punch	Schneidstempel
punch	Stempel
punch	Ziehstempel
punch retainer	Stempelhalteplatte
punch stipper	Stempelabstreifer
punching force	Kraft für Lochen
punching tool / trim die	Schneidwerkzeug

R

reference point	Bezugspunkt
release	Zeichnungsfreigabe
release (to …)	freigeben
restrike (to …)	nachschlagen
restrike steel	Nachschlagbacken
retraction force	Rückzugskraft

return	Rückstellung
return force	Rückstellkraft
rework, modify (to …)	nacharbeiten
rubber spring	Gummifeder

S

scrap	Schrott
scrap chute	Abfallrutsche
shaft screw	Passschraube
sharp edges removed	Kante gebrochen
shear strength	Scherfestigkeit
shock absorber / damping element	Stoßdämpfer
shut height	Bauhöhe
shut height	Einbauhöhe
sidebar transfer press	Greifertransferpresse
slide	Gleitfläche
slide direction	Gleitrichtung
slide fit	Gleitsitz
slide plane	Gleitebenen
sliding pad / wear plate	Gleitplatte
slug	Lochbutzen
spare part	Ersatzteil
spare part list	Ersatzteilliste
spark, wire cut (to …)	erodieren
spot (to …)	tuschieren
spotting press	Tuschierpresse
spring	Feder
spring force	Federkraft
spring stroke	Federhub
steel hardened	Stahl gehärtet
stick	klemmen
stock list	Stückliste
strip layout	Streifenbild
stripper	Abstreifer
stripper force	Abstreifkraft
stroke	Hub
suction cup	Sauger

APPENDIX
DICTIONARY, ENGLISH – GERMAN

T

take thrust out (to …)	Schub abfangen
tapped hole	Gewindebohrung
tensile strenght	Zugfestigkeit
term	Bezeichnung
thrust	Schub
tight fit	Presssitz
time	Zeit
tool steel	Werkzeugstahl
torque	Drehmoment
towing hole	Transportgewinde
transfer press	Stufenpresse
trim (to …)	beschneiden
trim buck	Schneidaufsatz
trim die	Beschneidewerkzeug
trim line	Beschneidekante
trim steel	Messer
trim steel	Schneidmesser
type	Bauart

U

upper die	Gussoberteil
upper die	Oberteil
upper die	Werkzeugoberteil
urethan spring	Kunststofffeder
urethan stripper	Kunststoffabstreifer

V

vertical force	Vertikalkraft
v-guide	Prismaführung

W

wear	Verschleiß
weld (to …)	schweißen
working angle / cam	Schieber-(arbeits-)winkel
working area / mounting surface	Schieberarbeitsfläche
working force	Arbeitskraft
working force	Betriebslast
working stroke / cam stroke	Schieber-(arbeits-)hub

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APPENDIX

EMERGENCY SITUATION /
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EMERGENCY SITUATION / CONTACTS

FIBRO cam units are marked with a unique, unmistakable serial number.
Since October 2017, these serial numbers, together with all other important names, are grouped together on a type plate (see fig.).
Until September 2017 the serial numbers were engraved directly on the cam units.

The type plate is located on the side of your cam unit.

Legend:		
Art. No:	article number	(order number)
Std:	Standard	(standard)
W/A:	width/angle	(width/angle)
Serial:	serial number	(serial number)
Pos:	position	(Position)
GS:	gas spring	(gas spring)
GS:	gas spring	(gas spring)

In order to help you as quickly as possible, we require both the article number and the unique serial number when ordering individual spare parts as well as when replacing a complete cam unit in case of a crash.

In these cases, please always include the serial number for a quick handling of your needs.

If an acute emergency occurs, for example, in the form of a tool crash, we are there for you.
In the event of a crash, you can reach us as follows:

via phone: **+49 (6266) 73-112**

via email: **cam.crash@fibro.de**

EMERGENCY SITUATION / CONTACTS

FIBRO offers you a comprehensive service in the field of cam units to help you with advice and action if necessary.

- Spare parts deliveries ex stock
- The fastest possible delivery of replacement cam units in the event of a crash
- Construction support

If you have any questions concerning our cam unit program, please contact:

Markus Meyer
Head of Cam Unit Applications
cam.engineering@fibro.de
+49 (6266) 73-210

Georg Schreck
Product Manager Cam Unit Applications
cam.engineering@fibro.de
+49 (6266) 73-210

Markus Steinhilber
Key Account Manager Cam Unit Applications
m.steinhilber@fibro.de
+49 (151) 64975857

EMERGENCY SITUATION / CONTACTS

For offers and price information, please contact your regional supply centre:

Germany	Postal code region 1… – 6…	**ac1.normalien@fibro.de**
	Postal code region 7… – 0…	**ac2.normalien@fibro.de**
International	Eastern Europe, Africa, Asia	**ac3.normalien@fibro.de**
	Western Europe, North and South America	**ac4.normalien@fibro.de**

For orders, date information and general service questions, please contact your local sales centre:

Germany	Postal code region 1… – 6…	**vc1.normalien@fibro.de**
	Postal code region 7… – 0…	**vc2.normalien@fibro.de**
International	Eastern Europe, Africa, Asia	**vc3.normalien@fibro.de**
	Western Europe, North and South America, Australia	**vc4.normalien@fibro.de**

... or contact your on-site partner, please see pages 4-7.

FIBRO

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Order No. 2.2914.01.0618.0100000