



Integrated systems for production

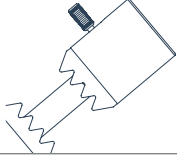
STANDARD BREYL™

Manual Clamp



Integrated systems for production

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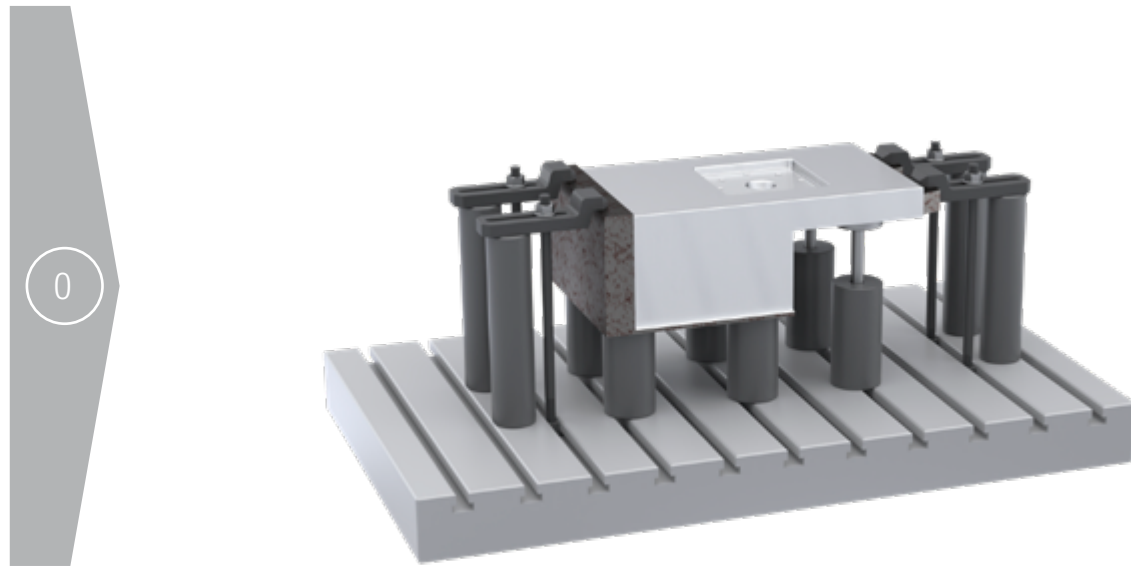
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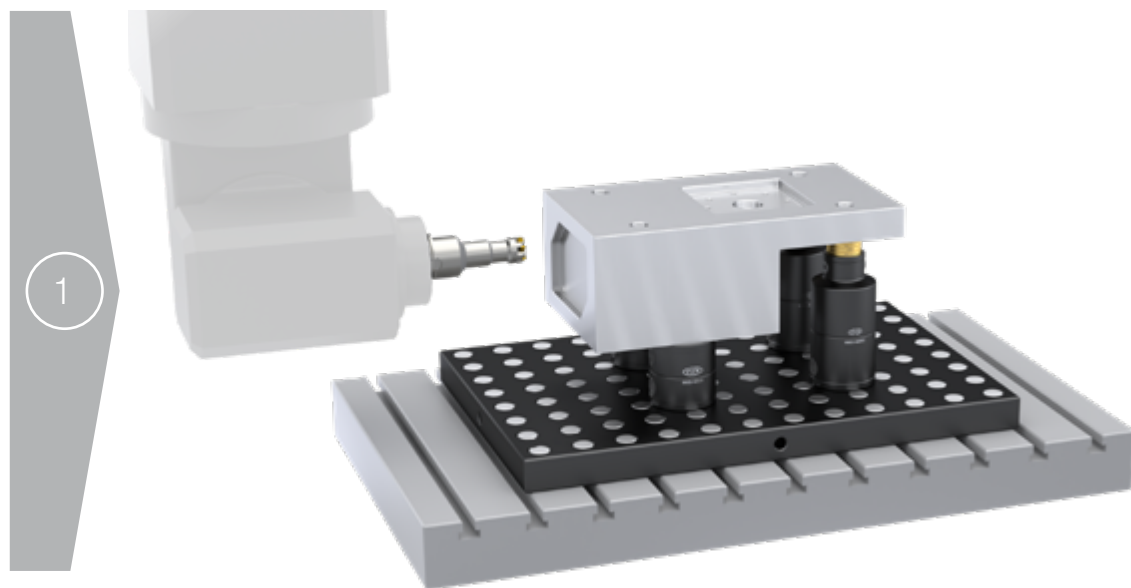
CLAMPING METHODS COMPARISON

FCS CLAMPING METHOD - MAIN BENEFITS

TRADITIONAL CLAMPING



FCS CLAMPING METHOD BREYL MANUAL CLAMP



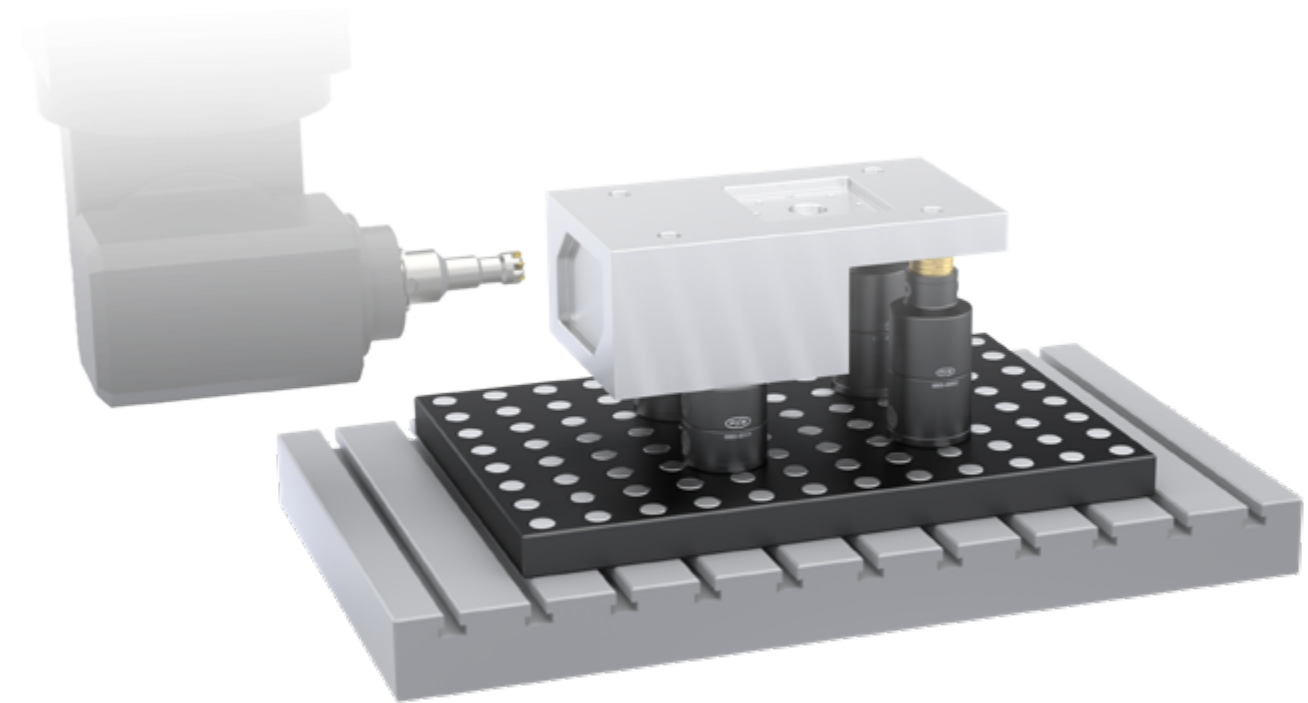
FCS CLAMPING METHOD BREYL MANUAL CLAMP WITH MULTI-PALLET



FCS CLAMPING METHOD

BREYL MANUAL CLAMP

Standardization and process efficiency improvement



WORKPIECE POSITIONING AND ORIENTATION



MODULARITY



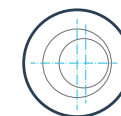
SIZE RANGE



HIGH CLAMPING FORCE



HIGH ACCURACY



SEAT READJUSTMENT



ADJUSTABLE COMPONENTS



PROCESS VIRTUALIZATION

MACHINING ACCESSIBILITY
(5 free-faces)

LOW AND EASY MAINTENANCE



SET-UP TIME OPTIMIZATION

FCS CLAMPING METHOD - MAIN BENEFITS

**WORKPIECE POSITIONING AND ORIENTATION**

The clamping system framework allows to keep track of the position and orientation of the workpiece with high accuracy along the production process.

**MODULARITY**

It allows to create different clamping configurations by matching standardized modules.

**SIZE RANGE**

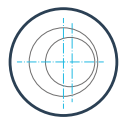
The clamping components have different sizes to be proportionally used for clamping workpieces of various dimensions.

**HIGH CLAMPING FORCE**

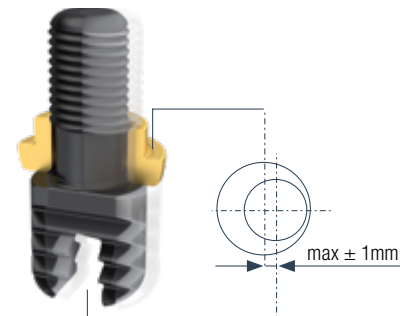
High clamping force reachable with low tightening torque.

**HIGH ACCURACY**

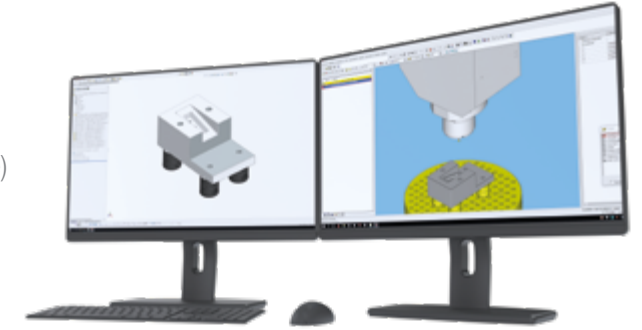
Material type, fabrication method and quality control allow to reach high accuracy components and the accuracy is preserved over the time (reliability).

**SEAT READJUSTMENT**

Following to a thermal distortion, the workpiece clamping seats could shift out of the clamping grid. By re-machining just the counterbore of the clamping seats (increasing the diameter and shifting the center accordingly) a displacement of the center up to $\pm 1\text{mm}$ can be recovered.

**PROCESS VIRTUALIZATION**

It allows to solve issues upstream (in the CAD/CAM stage) that would otherwise arise downstream (in the production dept.)

**MACHINING ACCESSIBILITY (5 free-faces)**

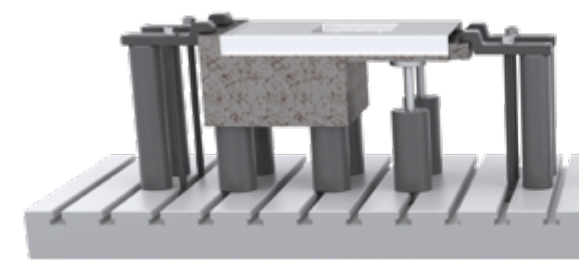
High accessibility to machine the workpiece (minimized interference issues).

**LOW AND EASY MAINTENANCE**

The clamping components are easy to clean, and the spare parts are designed to be replaced in case of need.

**SET-UP TIME OPTIMIZATION**

Lower set-up time (up to 75% less), due to the earlier CAD/CAM set-up virtualization and the easy assembly and disassembly operations which don't require skilled operators. The set-up time estimation (usually in the range of 10-20min) helps to plan a more accurate machines workload schedule.



Traditional method
(strap clamps and jacks)

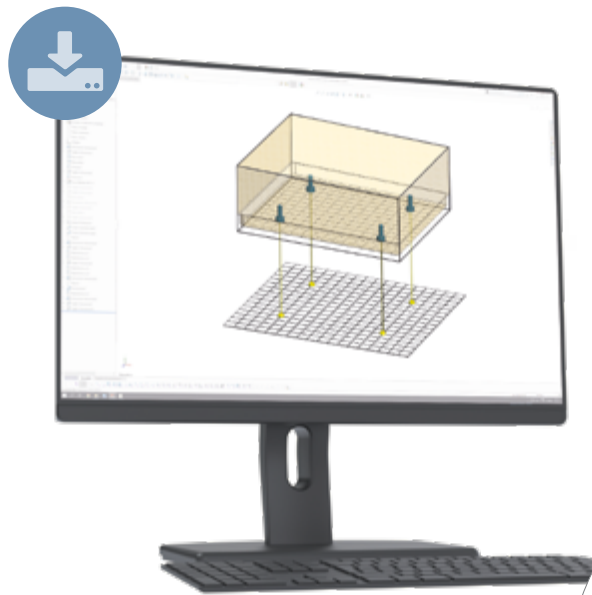


FCS clamping system

VIRTUAL activities

1 CAD

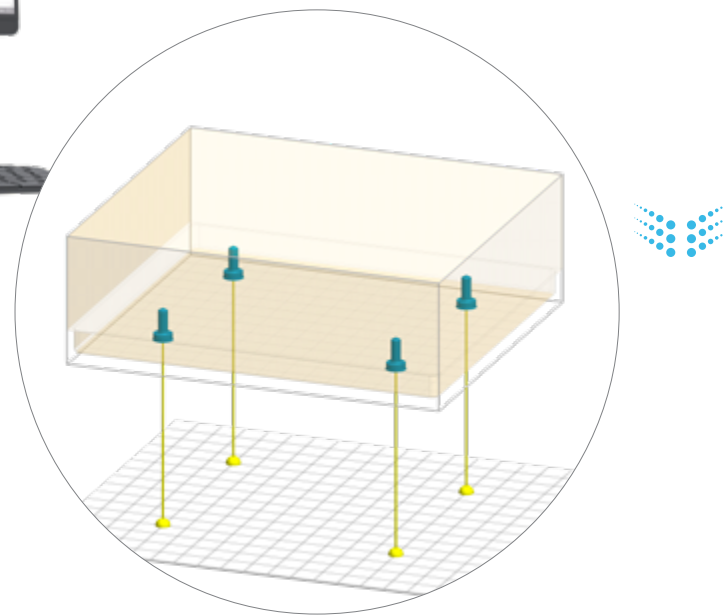
- 3D Modelling of the workpiece, including also the clamping seats



The surfaces on which the clamping seats shall be designed, are defined according to the production process needs (CAM).

On each clamping surface, the clamping seats will be designed based on the:

- Standard Breyll (clamping seats geometry)
- General guide for selecting the proper seats
- Space availability in the workpiece to be verified by the designer

**3D CLAMPING LIBRARY**

Available on FCS SUPPORT

**STANDARD BREYLL**

Available on WEB SITE, FCS SUPPORT and here below

**GENERAL GUIDE FOR SELECTING THE PROPER SEATS**

Available on FCS SUPPORT and here below

**3D ASSEMBLY SIMULATOR**

Available on FCS SUPPORT

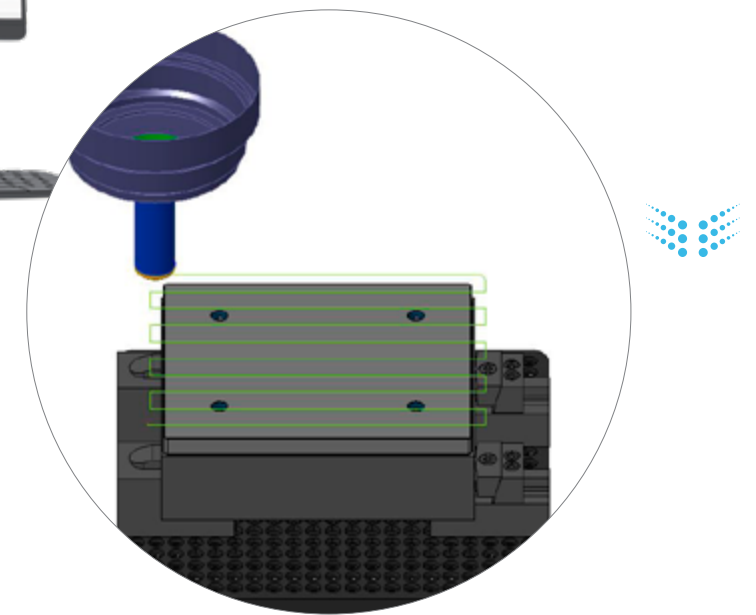
2 CAM

- Virtual clamping of the workpiece per each production phase



- CNC machine selection
- Clamping surface selection and clamping seats verification
- Distance of the workpiece from the machine table
- Stacks composition
- Clamping forces verification

- CAM path simulation and CNC data output

**FCS Support**

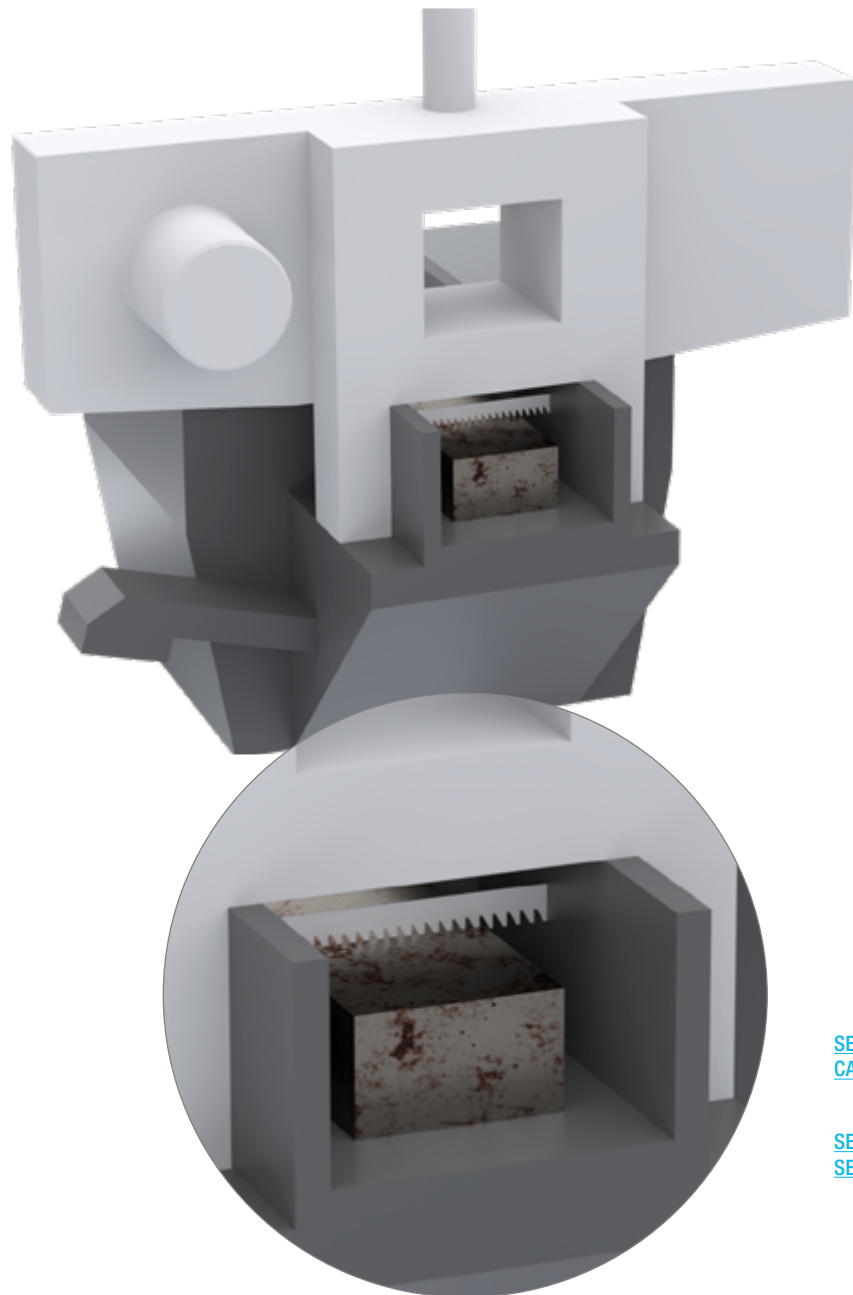
<https://support.fcssystem.com>

**WEB SITE**

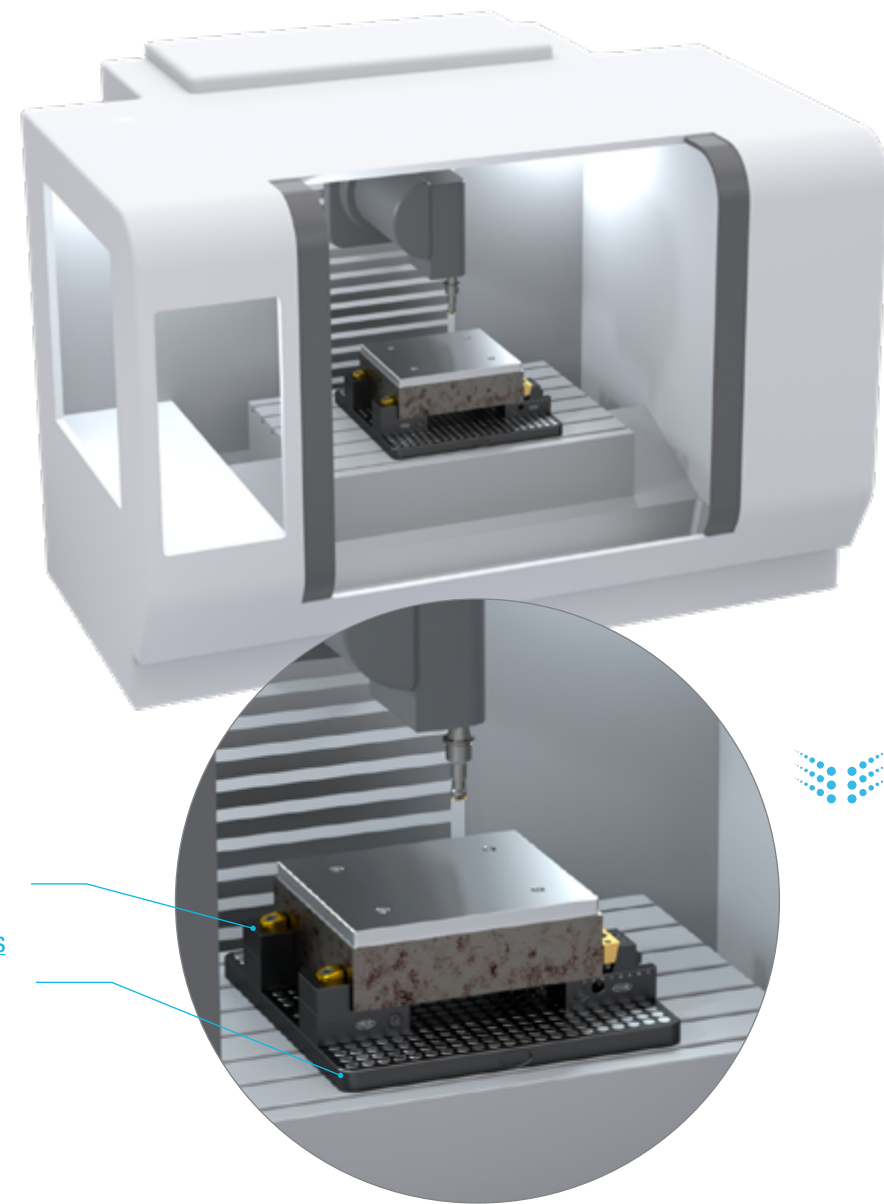
<https://www.fcssystem.com>

REAL activities**3 RAW BLOCK PREPARATION**

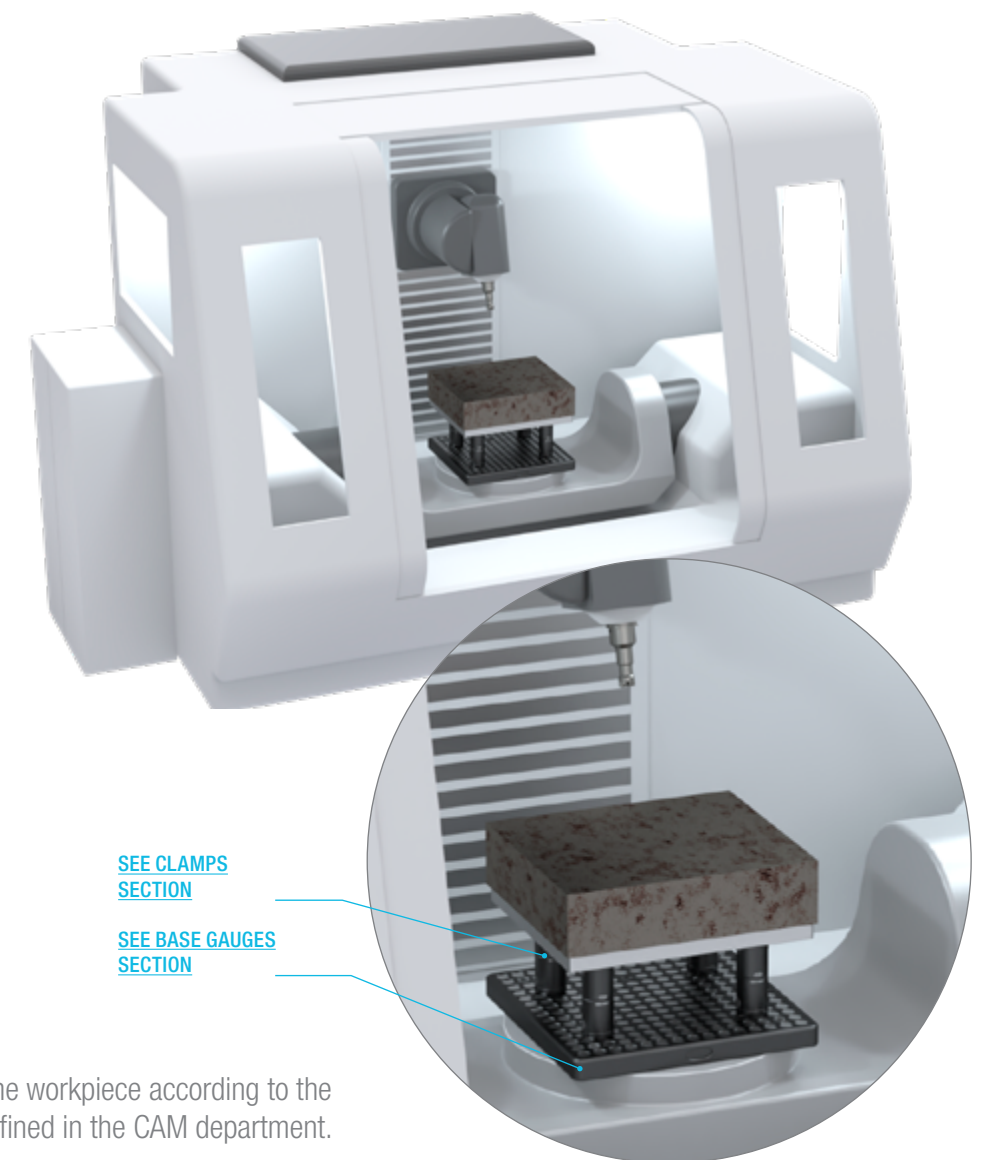
- Cutting operation

**4 1st MACHINING PHASE**

- Workpiece clamped by Modular Vises

**5 2nd AND FOLLOWING MACHINING PHASES**

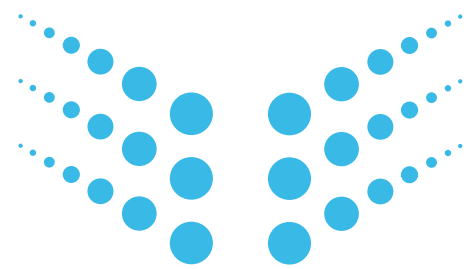
- Workpiece clamped by Bodies, Rings and Rods, etc.



The worker shall clamp the workpiece according to the instructions previously defined in the CAM department.

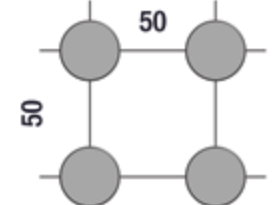
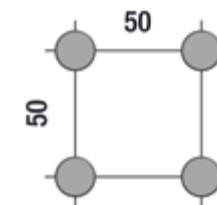
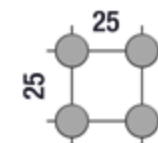
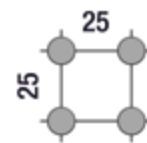
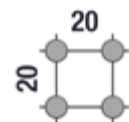
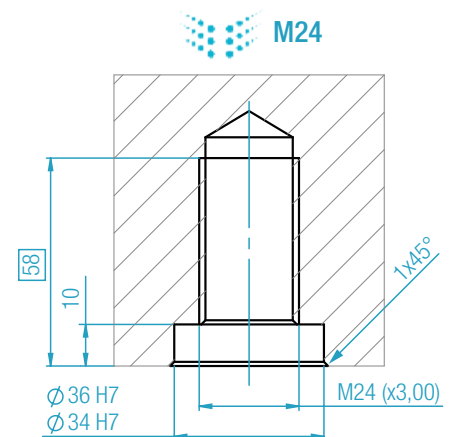
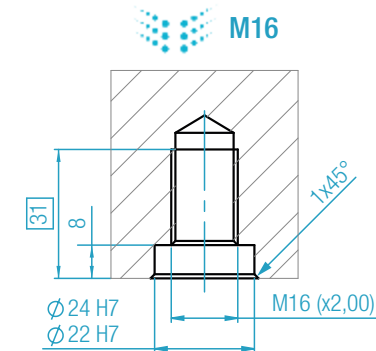
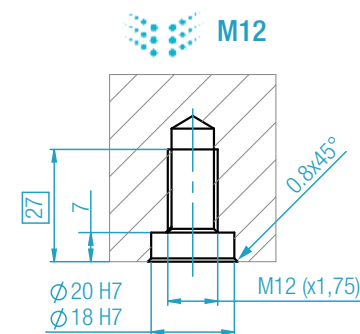
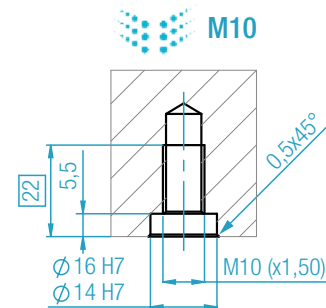
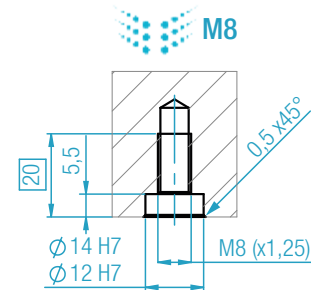
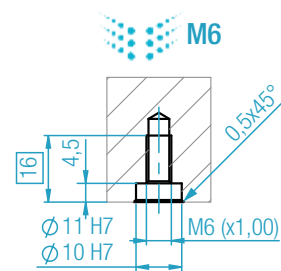
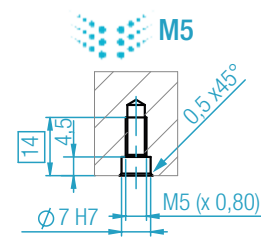
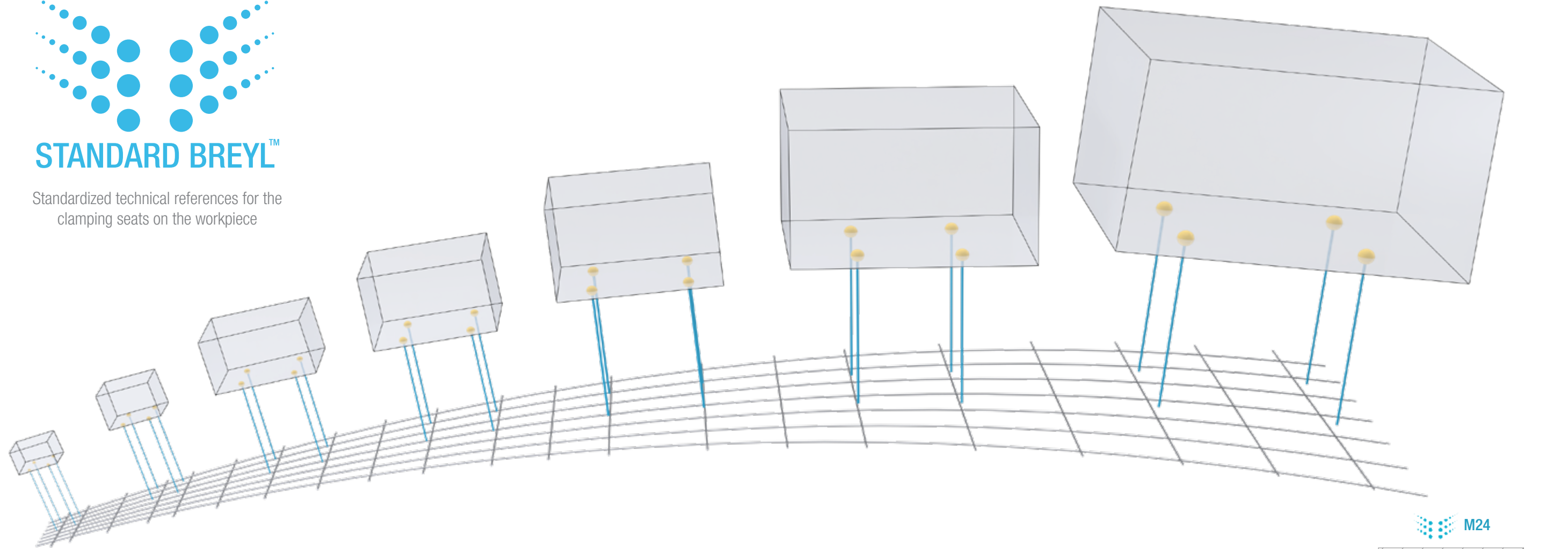
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Standardized technical references for the clamping seats on the workpiece



All units are in mm unless otherwise specified

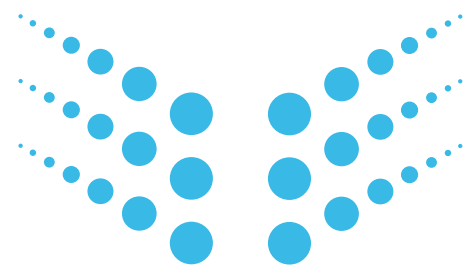
Minimum seat length required

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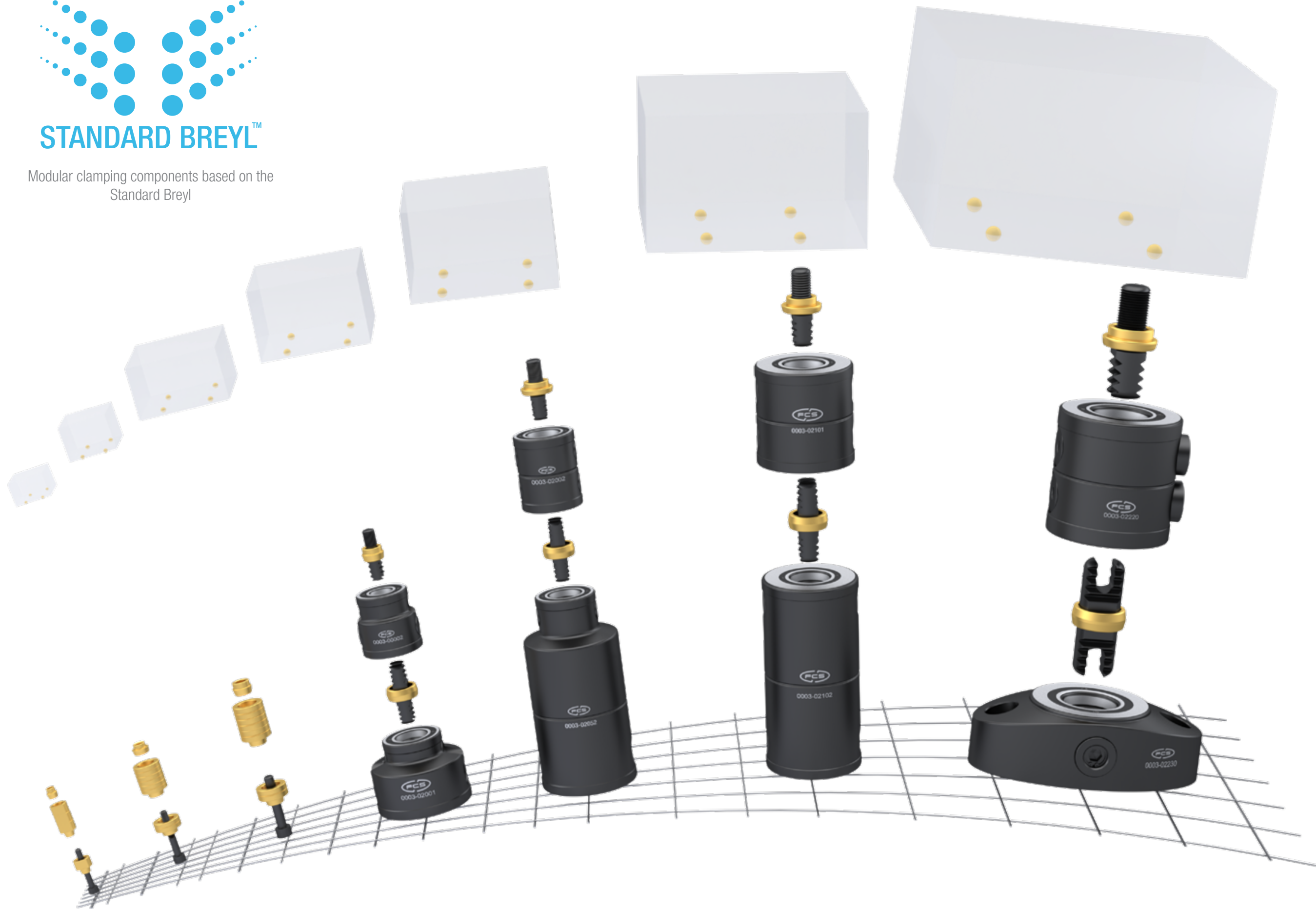
MODULAR COMPONENTS

MODULAR COMPONENTS



STANDARD BREYLL™

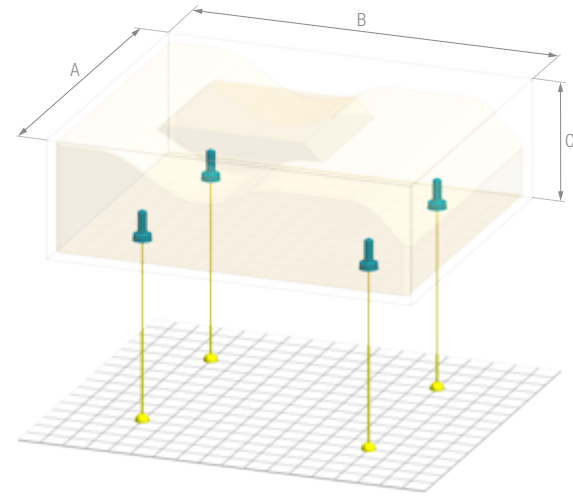
Modular clamping components based on the Standard Breyll



CLAMPING SEATS SELECTION

CLAMPING SEATS SELECTION

GENERAL GUIDE FOR SELECTING SIZE, POSITION AND QUANTITY OF THE CLAMPING SEATS



Choose the seats size, in accordance with the workpiece dimensions. The surface AxB represents the clamping surface*. Take as reference the a_{max} value. The thinner is the height of the workpiece, the lower the "a" value should be. The value of "b" shall vary from b_{min} ** to the b_{max} value. The seats quantity represents the recommended total quantity of seats for the clamping surface AxB. The minimum quantity of clamping seats is equal to 2. If the clamping requirements cannot be achieved by means of existing components, a customized solution can be developed.

WORKPIECE SIZE UP TO		SEATS SIZE		SEATS POSITIONS				SEATS QUANTITY
A x B (mm)	C (mm)	M (mm)	STEP (mm)	a_{min} (mm)	a_{max} (mm)	$b_{min}=2M$ (mm)	b_{max} (mm)	Min. quantity of seats
240x240	180	M5	10	20	140	10	50	$\left(\frac{A - 2b_{max} + 1}{a_{max}} \right) \times \left(\frac{B - 2b_{max} + 1}{a_{max}} \right)$ <p style="text-align: center;">Rounding up</p>
282x282	210	M6	15	30	150	12	66	
376x376	280	M8	20	40	200	16	88	
470x470	340	M10	25	50	250	20	110	
638x 638	470	M12	25	50	350	24	144	
1100x1100	810	M16	50	100	700	32	200	
1400x1400	1030	M24	50	100	800	48	300	

OUT OF RANGE

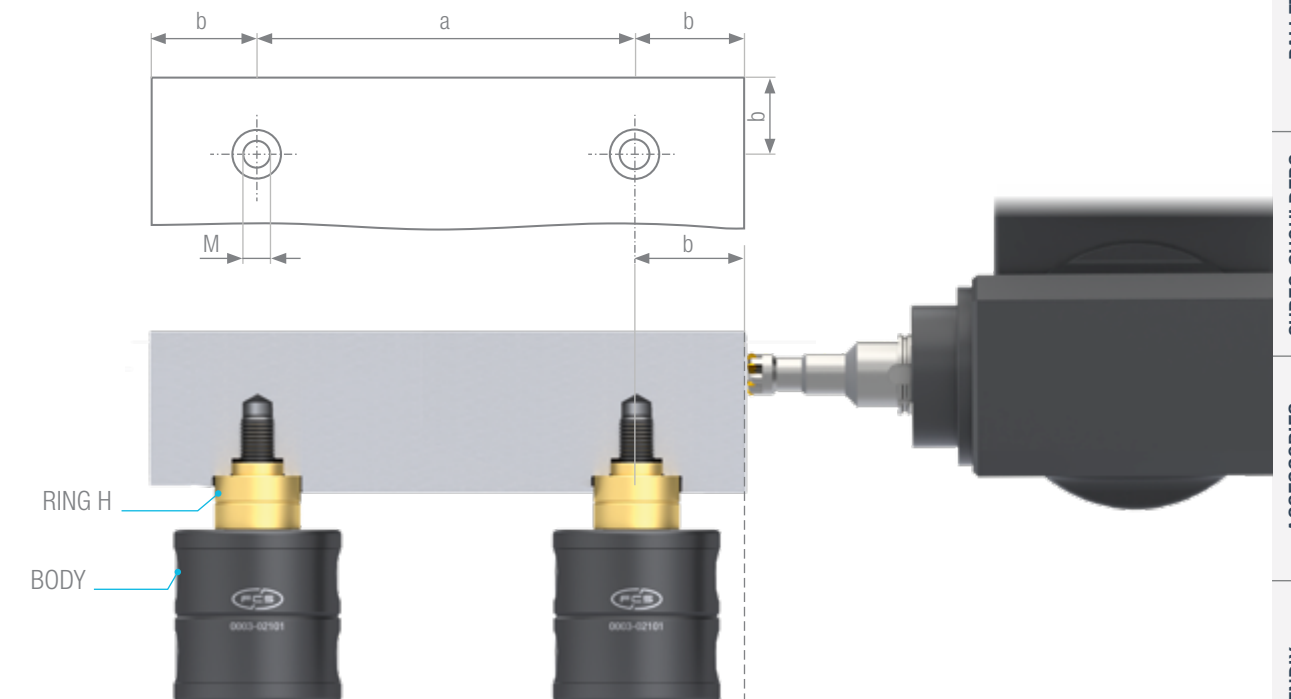
- The minimum clampable workpiece size is 20x30.
- If the clamping surface is bigger than 1400x14000, the workpiece could be anyhow clamped using the M24 with the proper seats quantity.

* If the clamping surface AxB is rectangular, the proper "M" value is driven by the higher dimension between A and B, as exemplified here below:

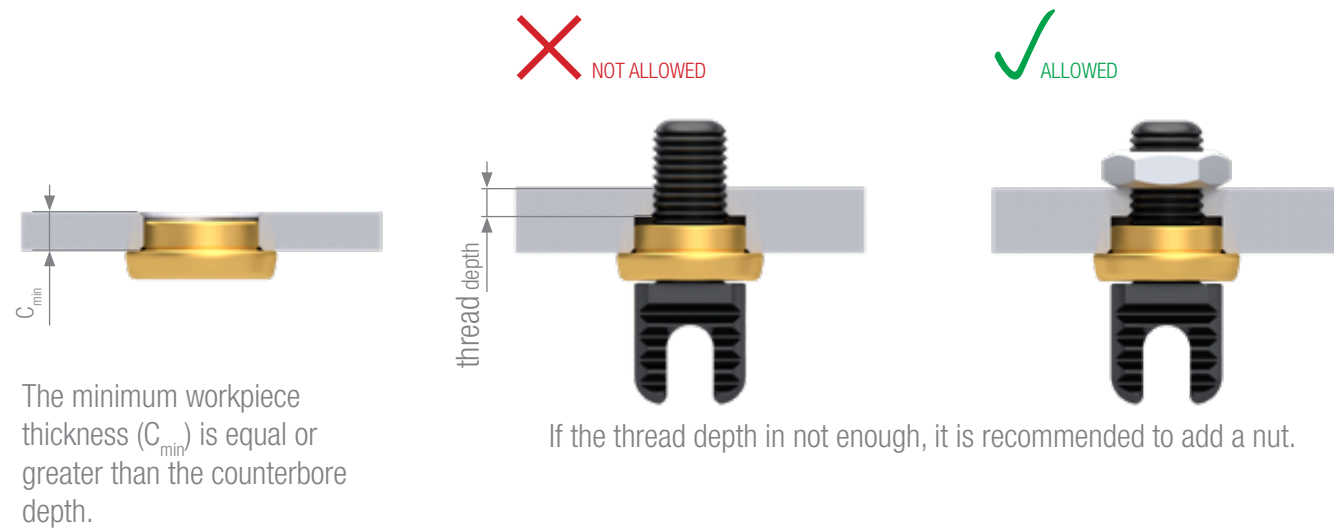


Choose in the A x B column the range 638x638 (which is immediately bigger than 500). The corresponding value of "M" will be 12. Consequently the M12 is the proper value to clamp a workpiece with dimension 100x500. As final step it is recommended to verify the **note.

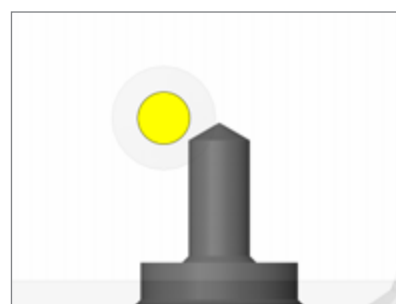
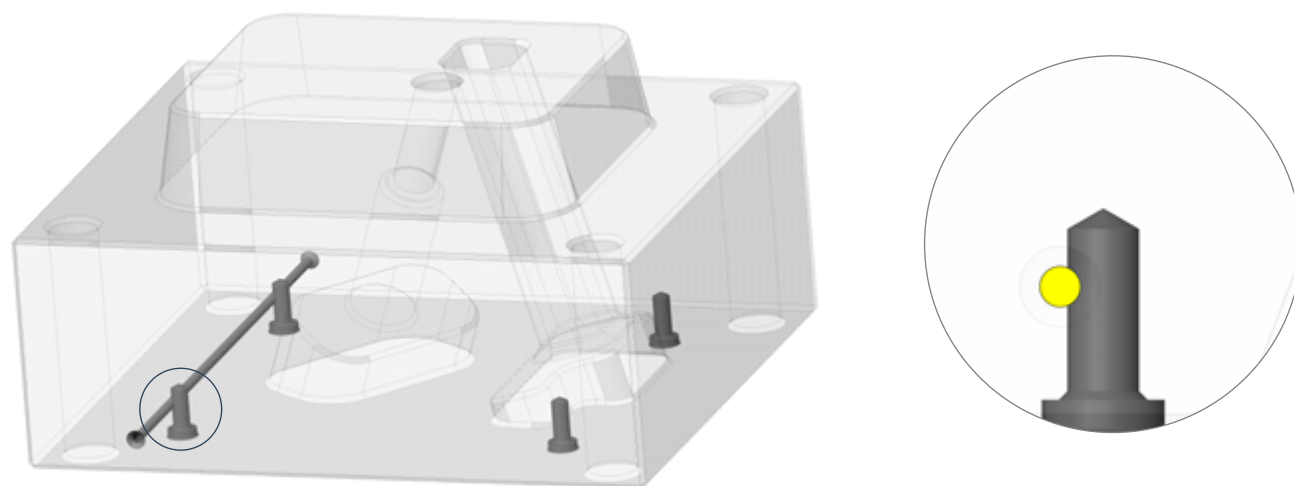
** Make sure that the "b" value is enough to avoid any risk of collision (of the cutting tool with the clamping components).



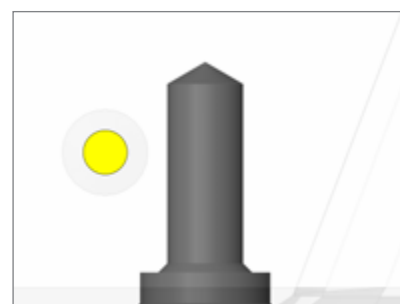
SPACE AVAILABILITY



In case the clamping seat intersects internal holes or cavities, the available options are:



Reduce the M size

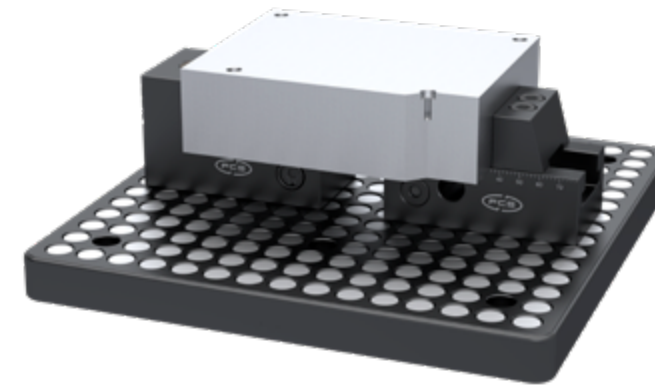


Change the position of the clamping seats

If the clamping seats can not remain in the finished product, they can be removed after machining using the sacrificial material approach.

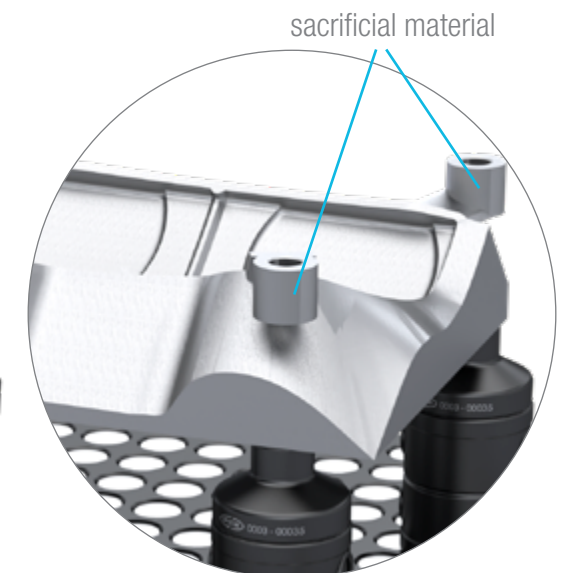
1

PHASE 1



2

PHASE 2



3

PHASE 3



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THIRD SUPPORT POINTS

PALLETS

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NEW TICKET
Asking for a technical assistance request



3D MODELS
Downloading the 3D files in .step format for CAD/CAM

MATCHING CLAMPING COMPONENTS
Exploring the possible components combinations

PRODUCTS PRESENTATION
Downloading/viewing catalogues and brochures

- On-line reserved service to:
- Get full access to FCS products information
 - Ask for technical assistance



CLAMPING APPLICATION EXAMPLES

CLAMPING APPLICATION EXAMPLES

BASE GAUGES

CLAMPS

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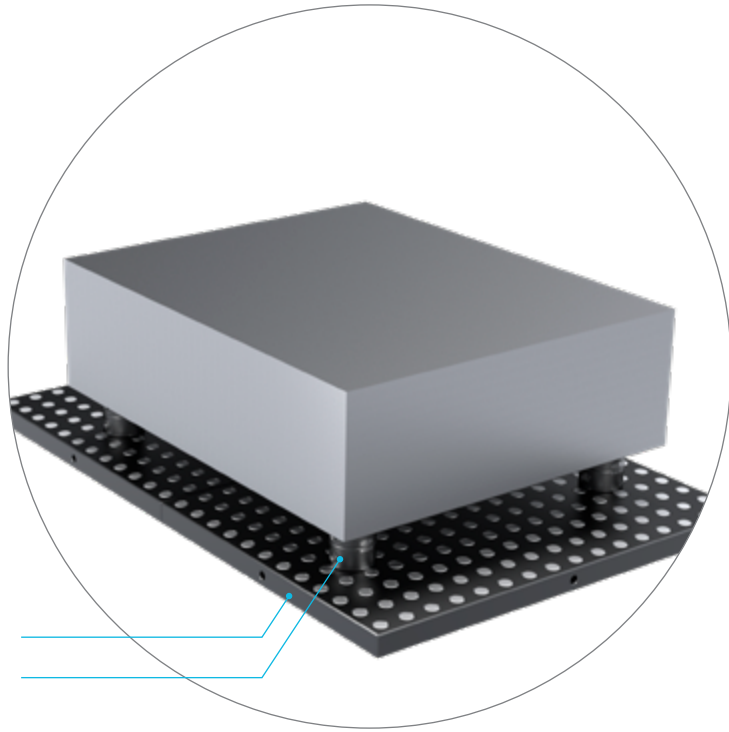
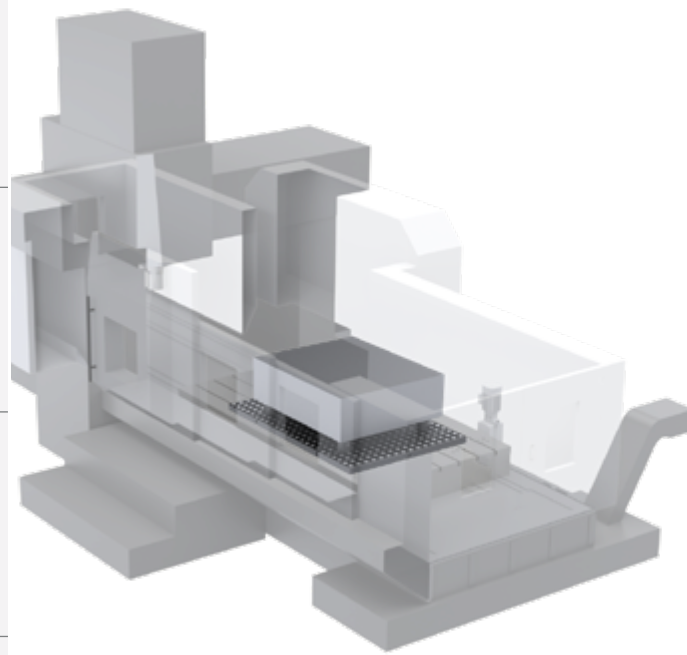
PALLETS

CUBES-SHOULDERS
BEAMS

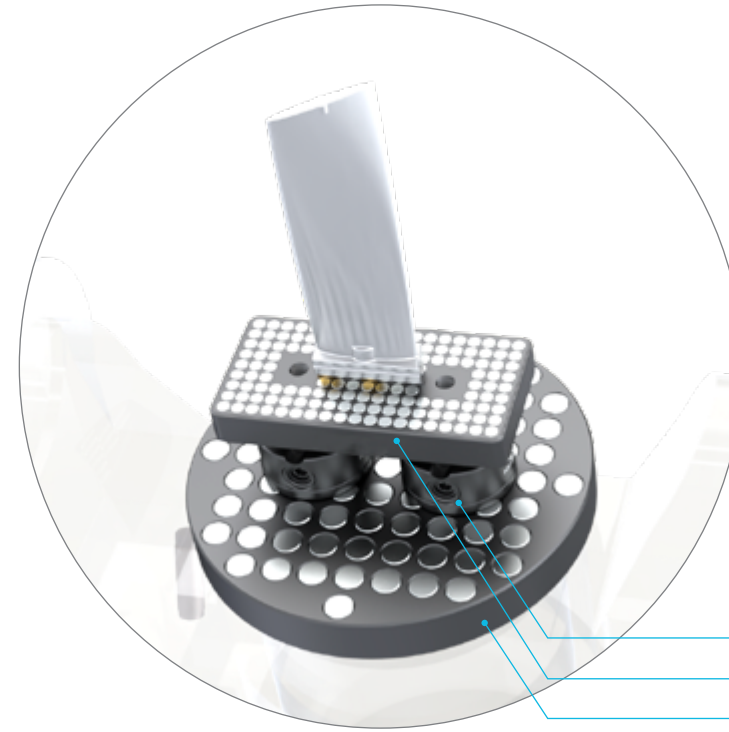
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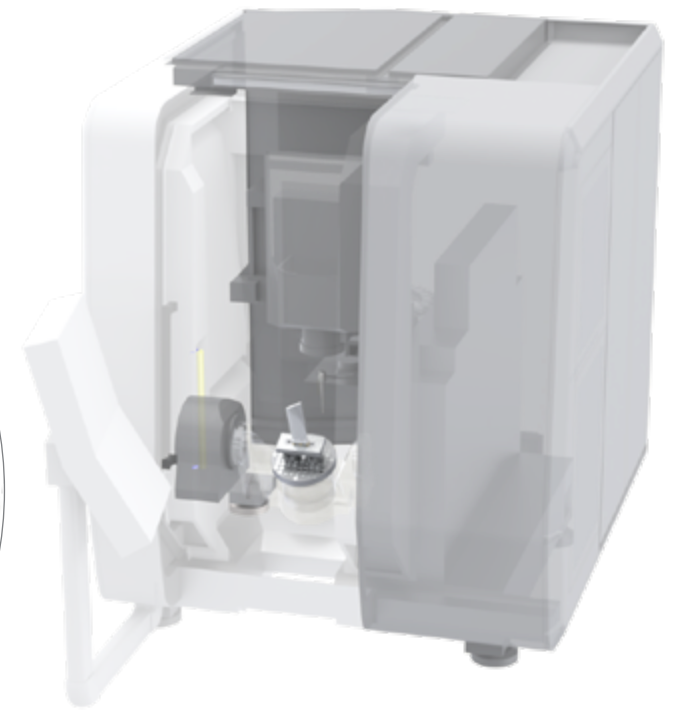
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BASE GAUGES

CLAMPS

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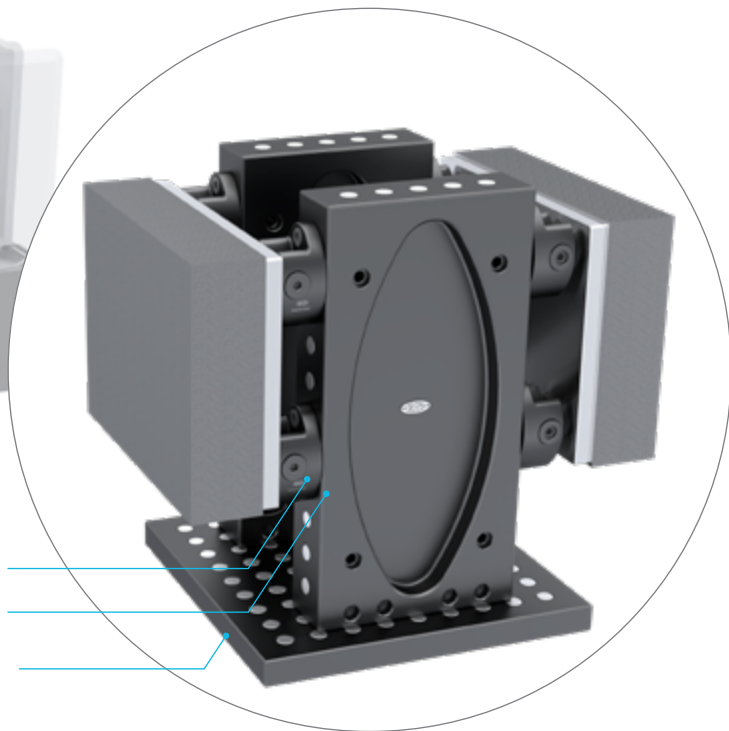
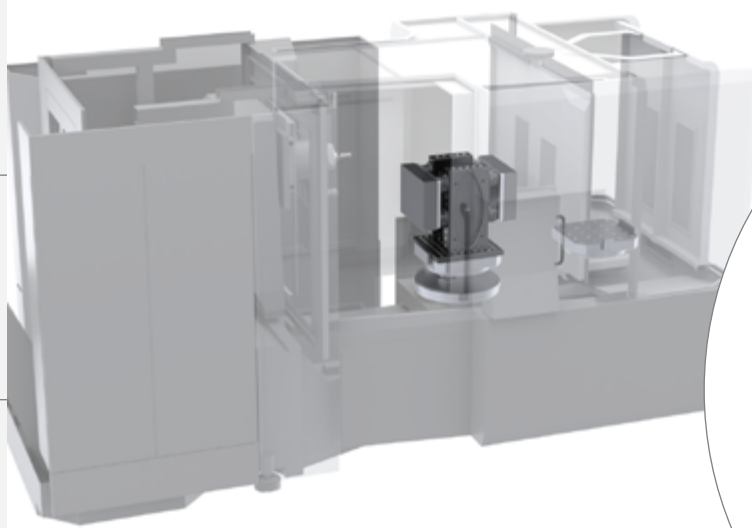
PALLETS

CUBES-SHOULDERS
BEAMS

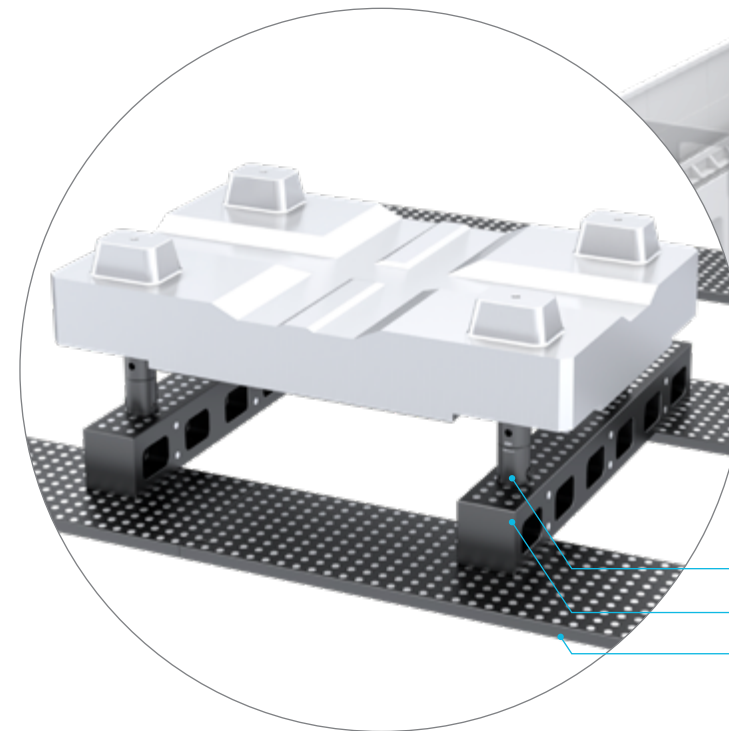
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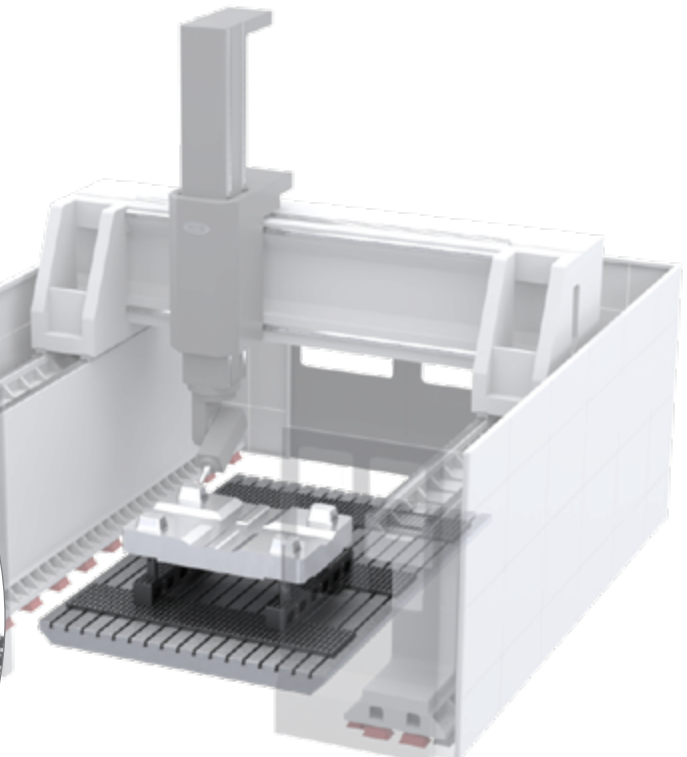
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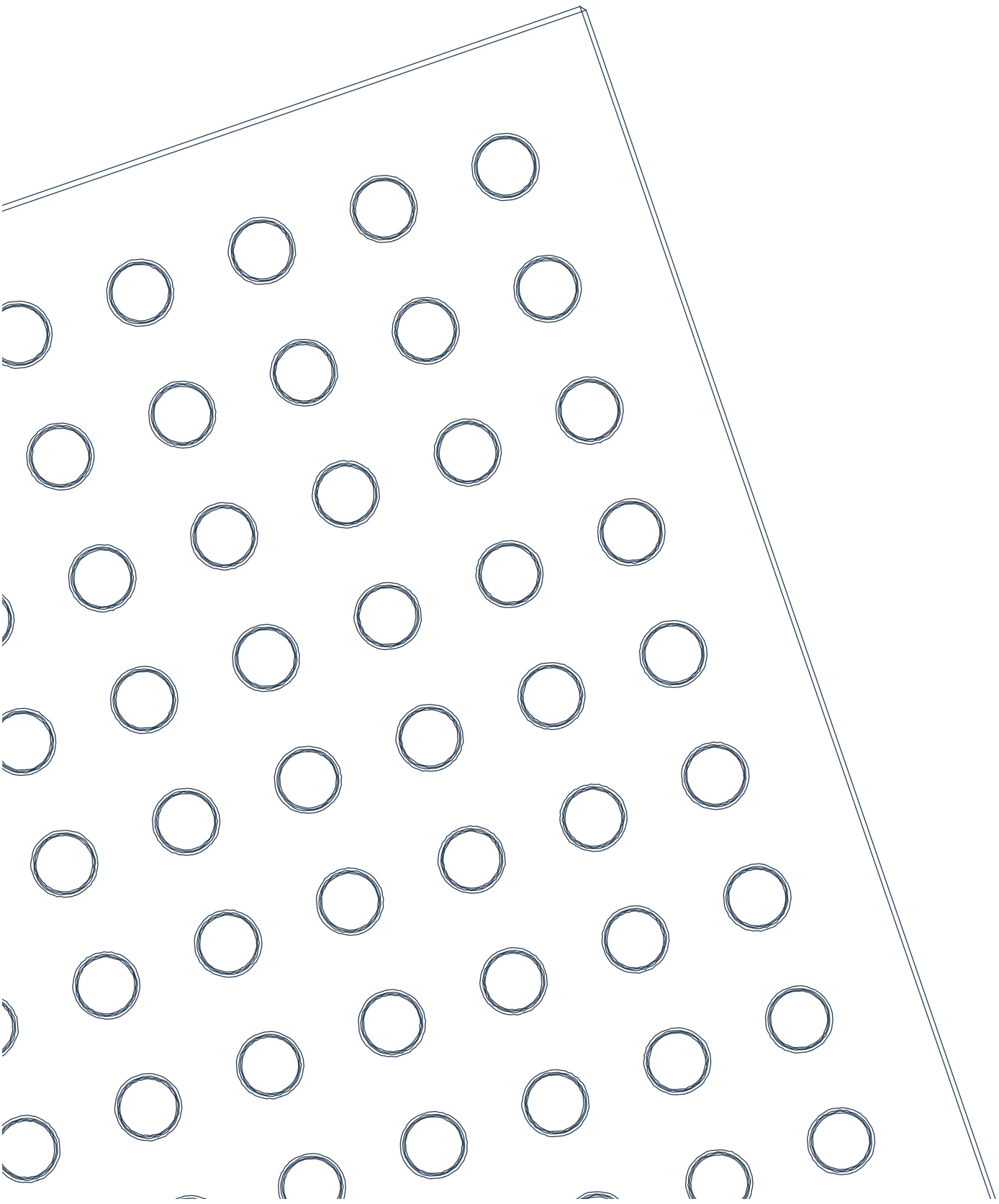


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BASE GAUGES



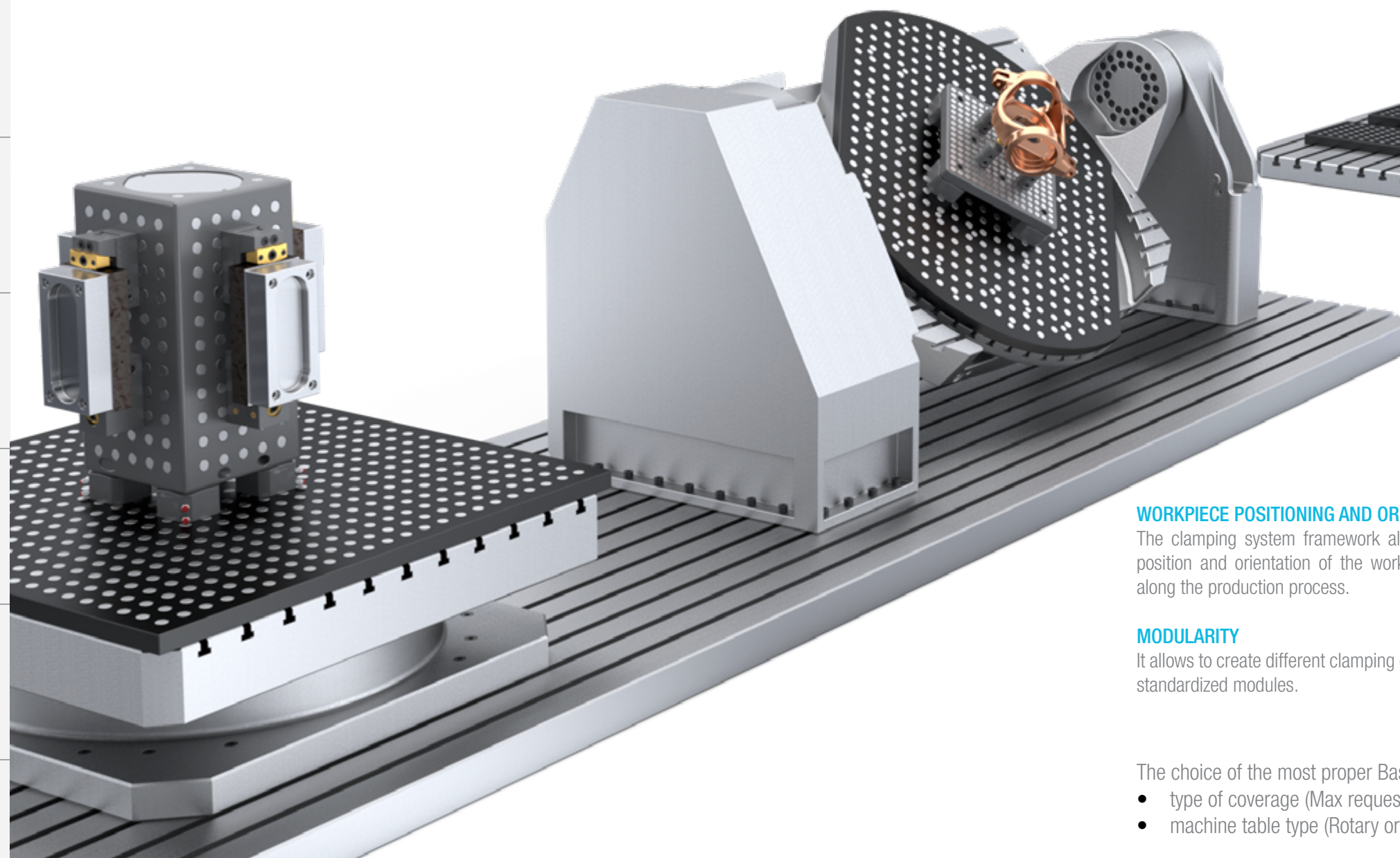
Integrated systems for production

BASE GAUGES

Steel plate having an **accurate grid of holes (M12 GRID STEP 25, M16 GRID STEP 50)**, to be fixed permanently on machine table as bottom **reference plate** for the clamping system.

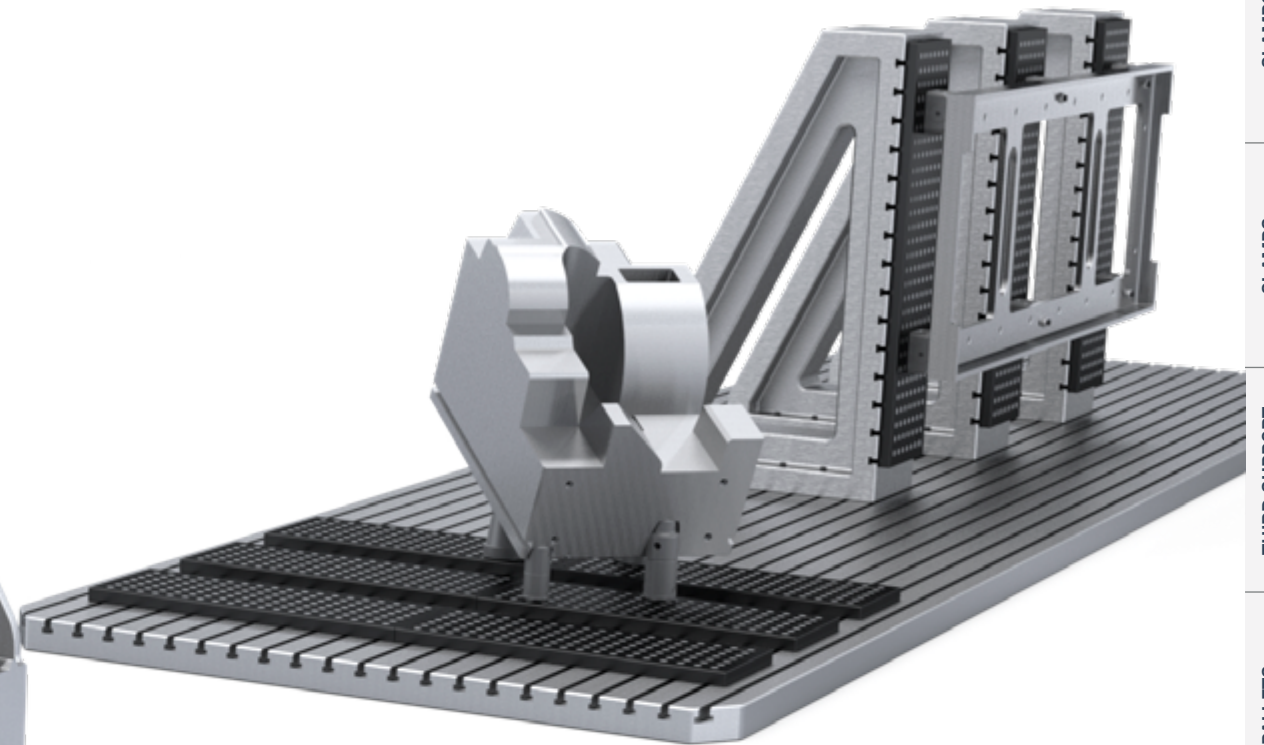
The workpiece to be machined (Milling, Drilling, Electrical Discharge Machining, etc.), controlled (Coordinate Measuring Machine) or handled, is clamped on a Base Gauge by means of interconnectable and modular clamping components. The clamping system framework (Base Gauges, interconnection components and clamping seats on the workpiece), allows the ability to keep track of the position and orientation of the workpiece. Types of machine table coverage (by means of Base Gauges): Max requested coverage and Stripes coverage (Dynamic).

MAX REQUESTED COVERAGE of the machine table
Allows to reach the maximum percentage of coverage area.



STRIPES COVERAGE (DYNAMIC) of the machine table

Allows to reduce the coverage area (cost reduction) maintaining high level of clamping flexibility.



HIGH ACCURACY

Material type, fabrication method and quality control allow to reach high accuracy components and the accuracy is preserved over the time (reliability).

SIZE RANGE

The clamping components have different sizes to be proportionally used for clamping workpieces of various dimensions.

LOW AND EASY MAINTENANCE

The clamping components are easy to clean, and the spare parts are designed to be easily replaced in case of need.

WORKPIECE POSITIONING AND ORIENTATION

The clamping system framework allows to keep track of the position and orientation of the workpiece with high accuracy along the production process.

MODULARITY

It allows to create different clamping configurations by matching standardized modules.

The choice of the most proper Base Gauges configuration for a specific machine table, depends mainly on the:

- type of coverage (Max requested coverage or Stripes coverage);
- machine table type (Rotary or Fixed) and machine table geometry (shape and size).

INTRODUCTION AND KEY FEATURES

ACCURACY

BASE GAUGES

MATERIAL TYPE

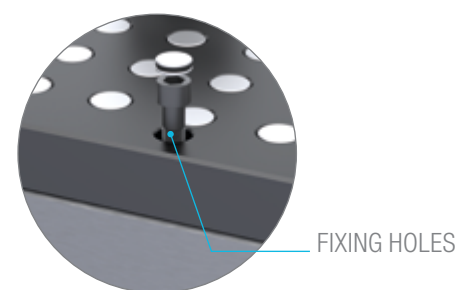
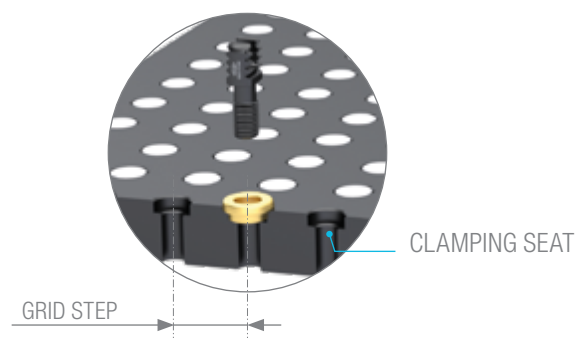
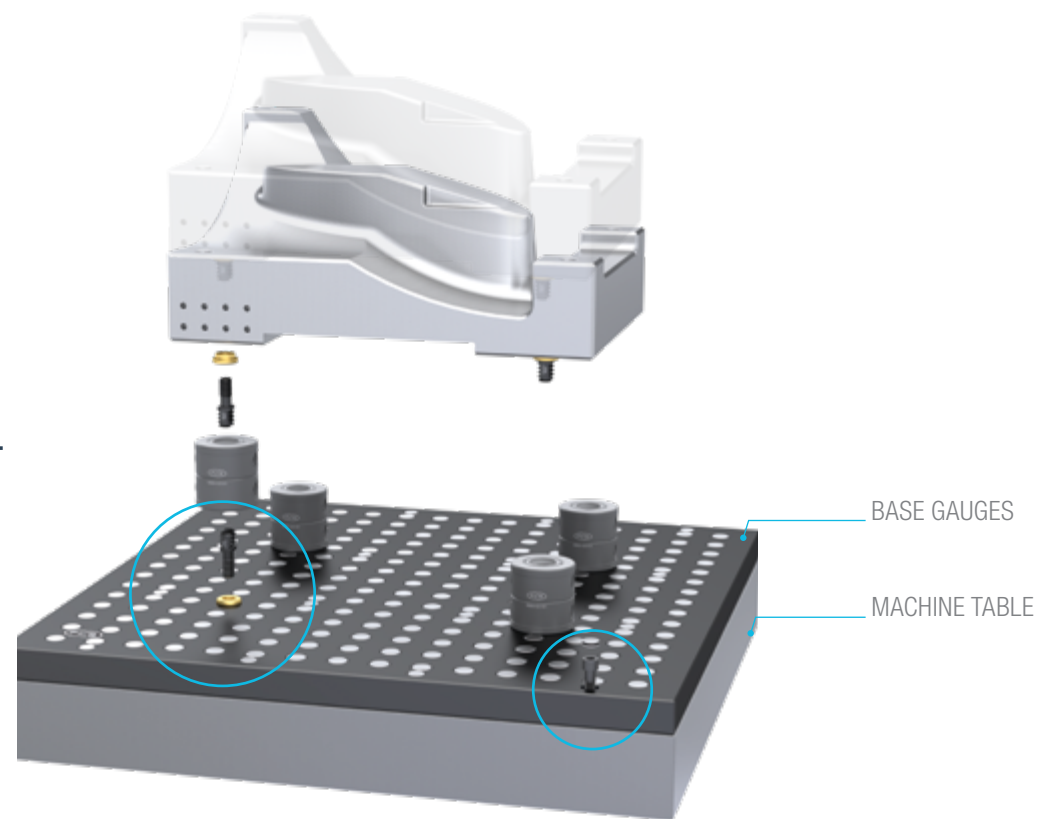
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HEAT TREATMENT

Hardening and tempering

SURFACE TREATMENT

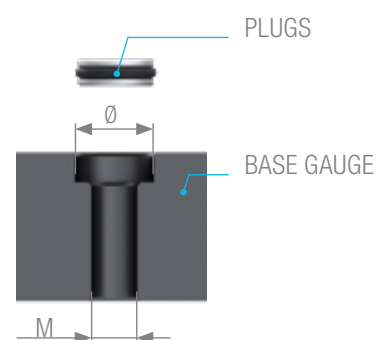
Burnishing



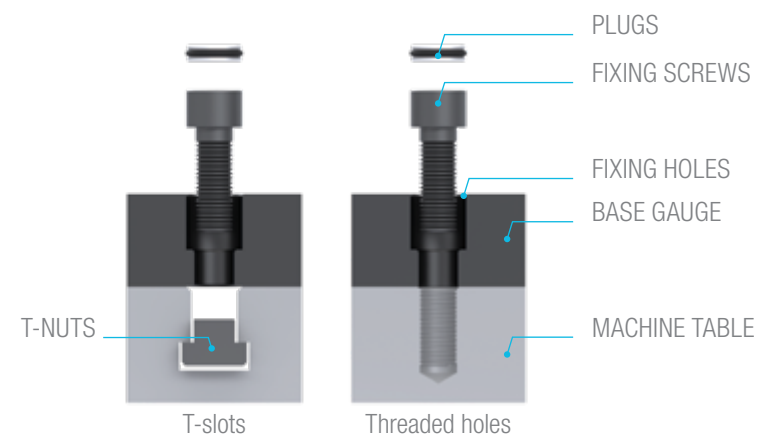
SEAT AND GRID STEP SIZE

M16 Ø24 GRID STEP 50

M12 Ø20 GRID STEP 25 (as special solution)

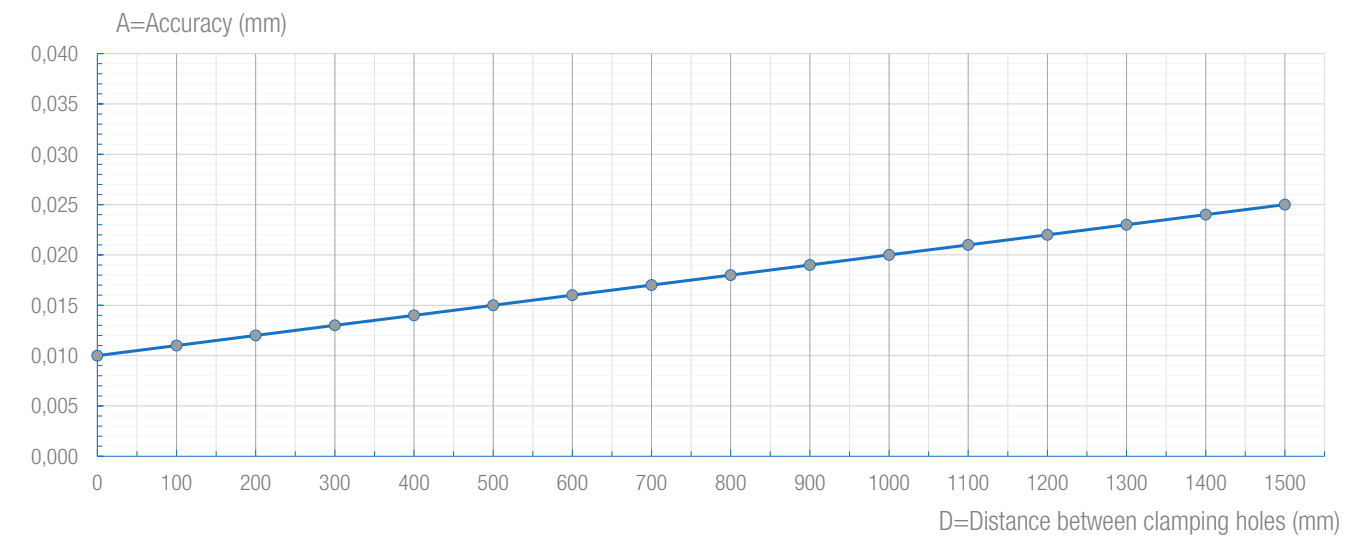


TYPE OF FIXING

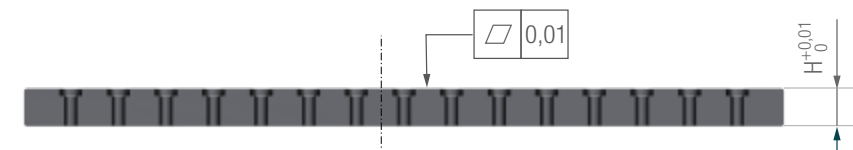


GRID STEP ACCURACY

Positional tolerance of the clamping seat



GENERAL ACCURACY

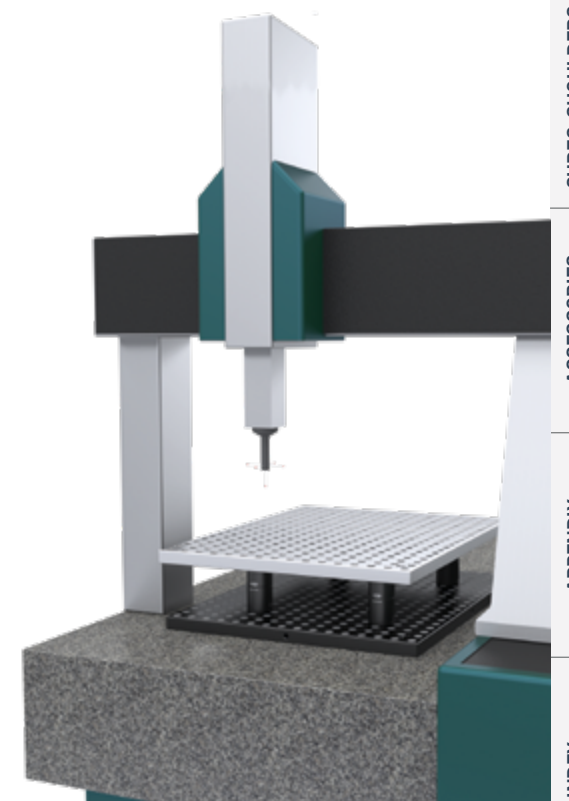


Note:

In order to maintain the thickness and the parallelism of the Base gauge, the machine table flatness must be lower than 0,01mm. The Base gauge will follow the machine table flatness.

QUALITY REPORT

Every single Base Gauge is univocally identified by a marking number and controlled by a CMM (Coordinate Measuring Machine); the quality report certifies the Base Gauge, accuracy and it can be used as reference for the pre-alignment (during the mounting procedure).

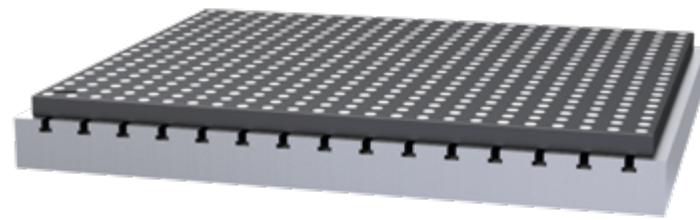


TYPES OF BASE GAUGES

TYPES OF BASE GAUGES

STANDARD

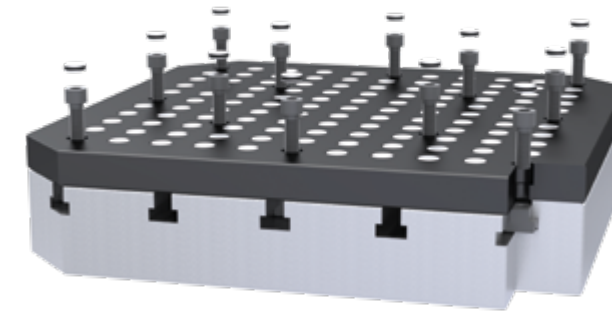
Make to stock



Fixing holes, fixing screws and T-nuts (if any), are not included.

STANDARD MODIFIED

Modify to order

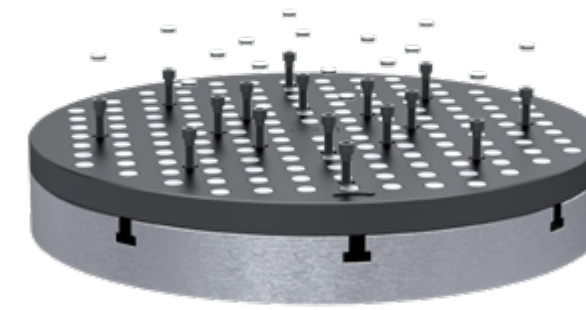


Fixing holes, fixing screws and T-nuts (if any) are included.

In order to fulfill specific needs, in terms of particular shape/dimensions, a standard Base Gauge can be modified by machining.

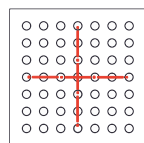
SPECIAL

Make to order



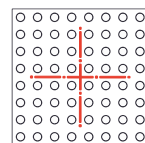
Fixing holes, fixing screws and T-nuts (if any), are included.

A Special Base Gauge represents the highest level of customization to reach coverage solutions not otherwise obtainable by means of standard or standard modified Base Gauges or if obtainable but with a greater expense. With a special Base Gauge the requested shape, dimensions and seat size/grid step (M12, M16), can be reached.



BASE GAUGE TR-TYPE
M16 Ø24 GRID STEP 50 - H40

DIMENSION (mm)	SET CODE	PLUG	SET WEIGHT (Kg)
400x400	0019-04300	49	47.4
* 1000x400	0018-05010	133	118.7
* 1500x400	0018-05000	203	177.9
500x500	0019-04309	81	73.7
600x600	0019-04301	121	106.6
800x800	0019-04302	225	189.4
1000x800	0019-04303	285	236.9
1200x800	0019-04306	345	284.4
1000x1000	0019-04304	361	296.4
1200x1000	0019-04307	437	355.2
1200x1200	0019-04308	529	426.4
1500x1200	0019-04305	667	532.0



BASE GAUGE TF-TYPE
M16 Ø24 GRID STEP 50 - H40

DIMENSION (mm)	SET CODE	PLUG	SET WEIGHT (Kg)
600x400	0019-04200	96	69.7
500x500	0019-04209	100	72.9
600x500	0019-04201	120	87.4
800x600	0019-04202	192	141.0
* 1000x500	0019-04203	200	147.0
1000x600	0019-04212	240	176.3
* 1500x500	0019-04210	300	220.1
1000x800	0019-04204	320	235.3
1500x600	0019-04211	360	264.5
1000x1000	0019-04206	400	299.3
1200x1000	0019-04207	480	353.1
1500x1200	0019-04205	720	529.8

PULLER PLUG

0015-04800

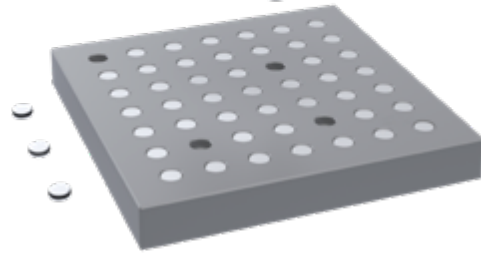
Dedicated tool for removing plugs



* Recommended for stripes coverage (Dynamic)
SET CODE = Base Gauges + Plugs

PLUG

0015-04500



	Info required to configure a Base Gauge*		Conditions of supply			
	Shape and size of the machine table	T-slots / Thread holes (size and layout)	Plugs	Fixing holes	Fixing screws	T-nuts
STANDARD Base Gauge	✓		✓			
MODIFIED STANDARD Base Gauge	✓	✓	✓	✓	✓	✓
SPECIAL Base Gauge	✓	✓	✓	✓	✓	✓

The 3D model of the machine table includes the required info.

TYPES OF COVERAGE

TYPES OF COVERAGE

INTRODUCTION

BASE GAUGES

CLAMPS

CLAMPS ADJUSTABLE

THIRD SUPPORT POINTS

PALLETS

CUBES-SHOULDERS BEAMS

ACCESSORIES SPARE PARTS

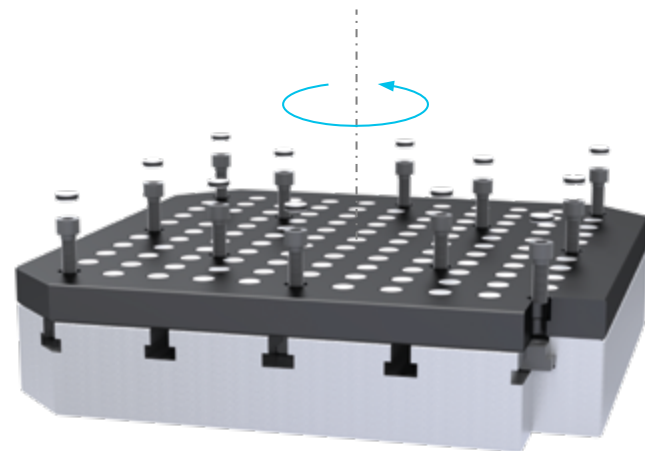
APPENDIX

INDEX

MAX REQUESTED COVERAGE of the machine table

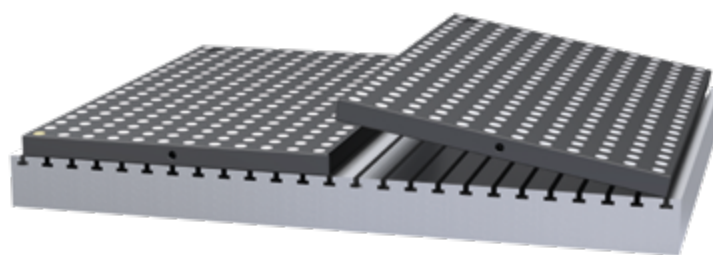
Allows to reach the maximum percentage of coverage area.
Recommended for machine table smaller than 2000x2000mm.

ROTARY MACHINE TABLE



On rotary machine tables it is recommended to apply TR BASE GAUGES in order to have a clamping seat located in the machine table center. The goal is to reach the maximum percentage of coverage by one standard TR Base Gauge. Sometimes an over coverage can be considered as well, if it doesn't cause any collision issues.
If 100% coverage is requested and it is not reachable by one standard TR Base Gauge, a solution can be applying a standard modified (if the machine table is smaller than 1500x1200) or a special Base Gauge solution.

FIXED MACHINE TABLE

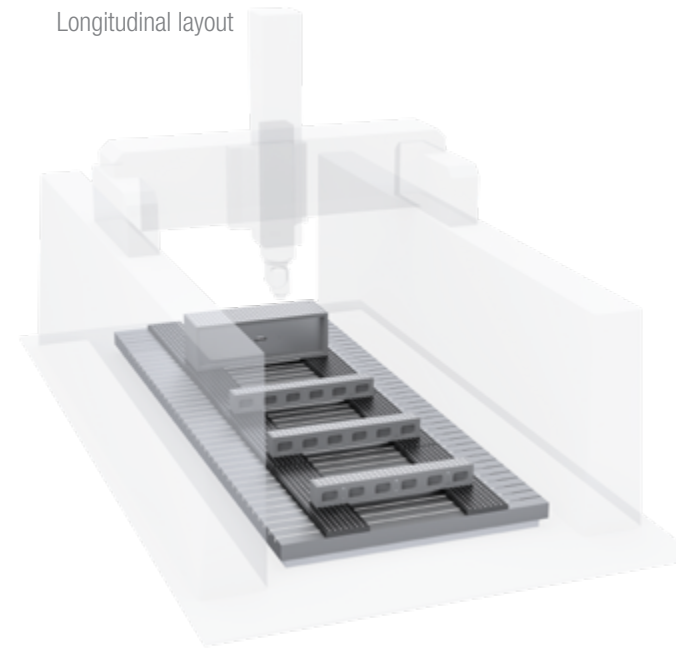


On fixed machine tables it is recommended to apply TF Base Gauges. One or more TF Base Gauges can be combined in order to reach the maximum percentage of coverage (ensuring the continuity of the grid). Sometimes an over coverage can be considered as well, if it doesn't cause any collision issues.
With the same percentage of coverage it is recommended the solution with the minimum quantity of bases.
If 100% coverage is requested and it is not reachable by combining one or more standard TF Base Gauges, a solution can be applying a standard modified or a special Base Gauge solution.

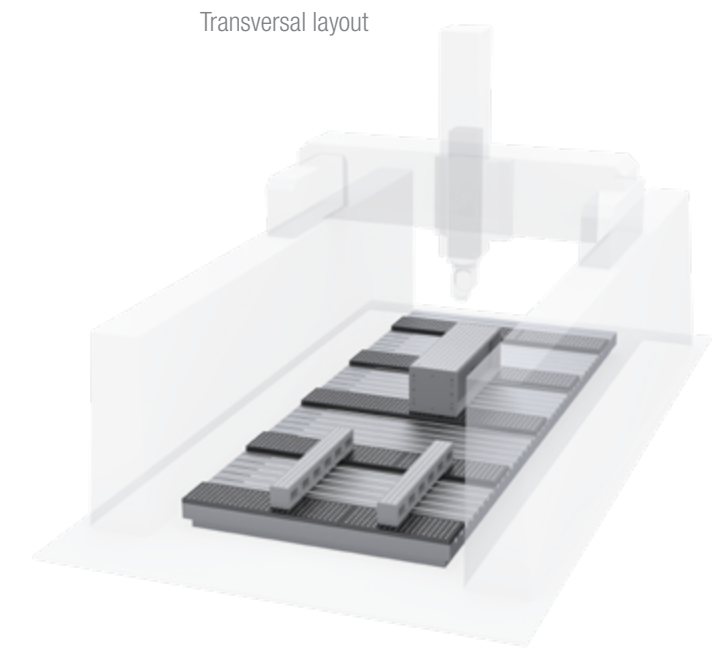
STRIPES COVERAGE (DYNAMIC) of the machine table

Allows to reduce the coverage area (cost reduction) while maintaining a high level of clamping flexibility.
Recommended for machine table bigger than 2000x2000mm.

Longitudinal layout



Transversal layout



Such type of coverage is also identified as "DYNAMIC" solution, due to the fact that are available clamping components such as Beams and Shoulder clampable in many positions between two stripes.

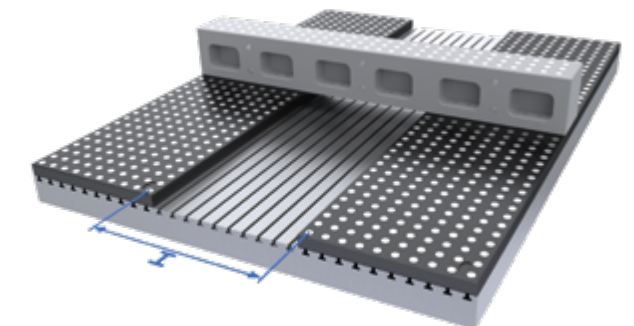
ROTARY MACHINE TABLE

On rotary machine tables it is recommended to apply TR Base Gauges (Nr. of stripes = odd, Nr. of Bases/each stripe=odd) in order to have a clamping seat located in the machine table center.

Recommended Base Gauges for stripes coverage (Dynamic):

BASE GAUGE TR-TYPE
M16 Ø24 GRID STEP 50 - H40

DIMENSION (mm)	SET CODE	PLUG
1000x400	0018-05010	133
1500x400	0018-05000	203



l=Distance between two closer stripes
l=300*, 400*, 500, 600, 700, 800, 900mm
* most frequent values

FIXED MACHINE TABLE

On fixed machine tables both TR or TF Base Gauges can be applied.
Recommended Base Gauges for stripes coverage (Dynamic):

BASE GAUGE TR-TYPE
M16 Ø24 GRID STEP 50 - H40

DIMENSION (mm)	SET CODE	PLUG
1000x400	0018-05010	133
1500x400	0018-05000	203

BASE GAUGE TF-TYPE
M16 Ø24 GRID STEP 50 - H40

DIMENSION (mm)	SET CODE	PLUG
1000x500	0019-04203	200
1500x500	0019-04210	300

INTRODUCTION

BASE GAUGES

CLAMPS

CLAMPS ADJUSTABLE

THIRD SUPPORT POINTS

PALLETS

CUBES-SHOULDERS BEAMS

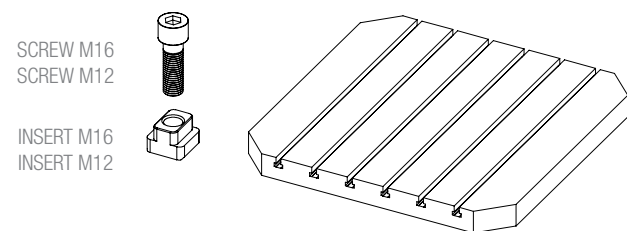
ACCESSORIES SPARE PARTS

APPENDIX

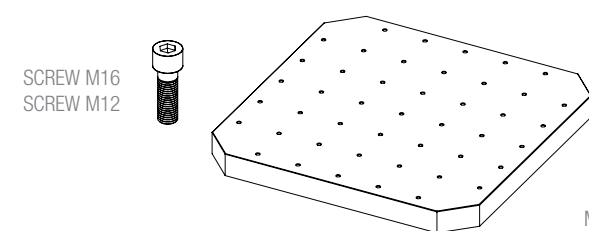
INDEX



SEE NEXT PAGES



MACHINE TABLE WITH T-SLOT



MACHINE TABLE WITH FIXING HOLES

BASE GAUGE M16

BASE GAUGE M16

THIRD SUPPORT POINT MOD.03

**PALLET PYRAMID M5
PALLET CLAMP M10**

CUBE

**SHOULDER M16 H600
SHOULDER M16 H1200**

**SMART
CUBE**

**SEE MODULAR
CATALOGUE**

**SEE GRIP VISE
CATALOGUE**

**SEE CLAMP Ø160
CATALOGUE**

PALLET M12

PALLET PYRAMID M6

**SHOULDER
M16 H1100**

BEAM M16 H200

BEAM M16 H500

**ROD M16
L35 HO
0002-01200**

**ROD H
M16
* (multiple options)**

**RING
M16 Ø24 HO
0001-00501**

**RING H
M16 Ø40 H25
(multiple options)**

**RING
M16 Ø24 HO
0001-00501**

*** SEE RING-ROD M16 PAGES**

**Nr.8 SCREWS
M12x50 12.9**

**Nr.4 SCREWS
M12x50 12.9**

**Nr. 6 SCREWS
M16x85 12.9**

**Nr.4 SCREWS
M16x75 12.9**

**Nr.8 SCREWS
M16x75 12.9**

**Nr.8 RING
M16 Ø24 HO
0001-00501**

**Nr.4 RING
M16 Ø24 HO
0001-00501**

**Nr.6 RING
M16 Ø24 HO
0001-00501**

**Nr.4 RING
M16 Ø24 HO
0001-00501**

**Nr.8 RING
M16 Ø24 HO
0001-00501**

**Nr.8 REDUCTION M16-M12
4521-01612**

**Nr.4 REDUCTION M16-M12
4521-01612**

**STANDARD BASE GAUGE TR/TR TYPE
(max requested coverage)**

**STANDARD MODIFIED BASE GAUGE TR/TF TYPE
(max requested coverage)**

**SPECIAL BASE GAUGE TR/TF TYPE
(max requested coverage)**

**STANDARD BASE GAUGE TR/TF TYPE
(stripes coverage - dynamic)**

**SCREW M16
SCREW M12**

**INSERT M16
INSERT M12**

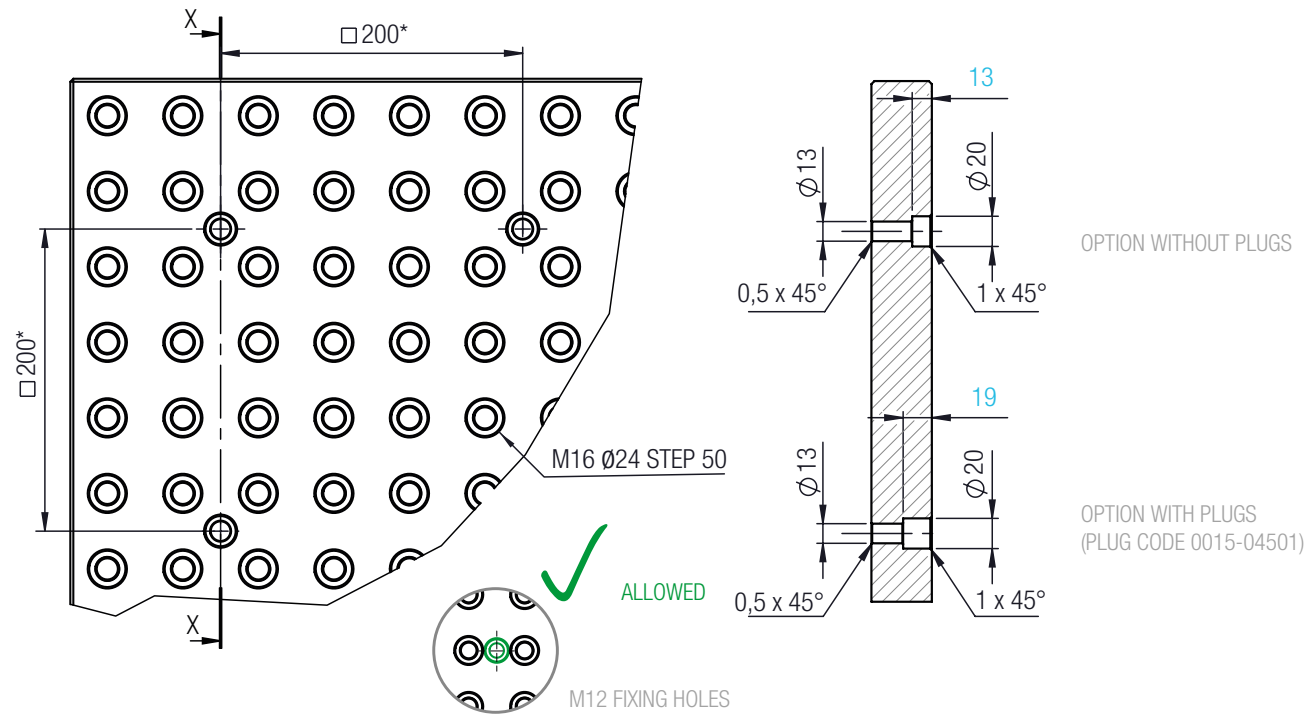
MACHINE TABLE WITH T-SLOT

**SCREW M16
SCREW M12**

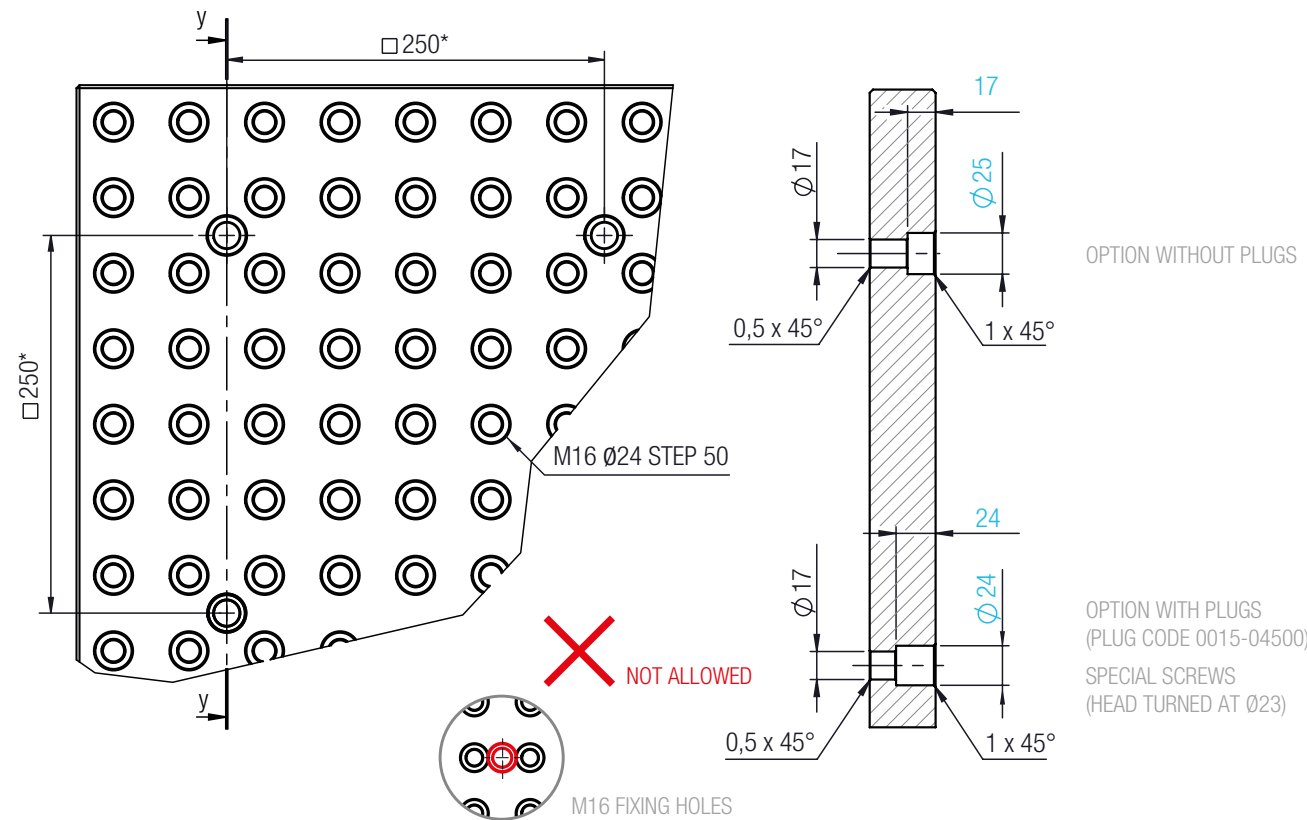
MACHINE TABLE WITH FIXING HOLES

BASE GAUGES M16 Ø24 GRID STEP 50 - FIXING HOLES

FIXING HOLES FOR SCREWS M12

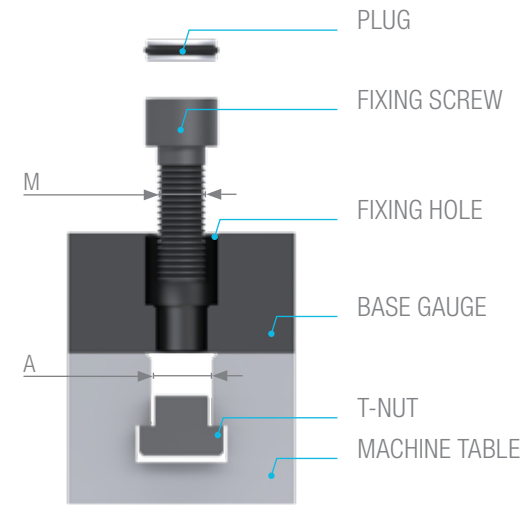
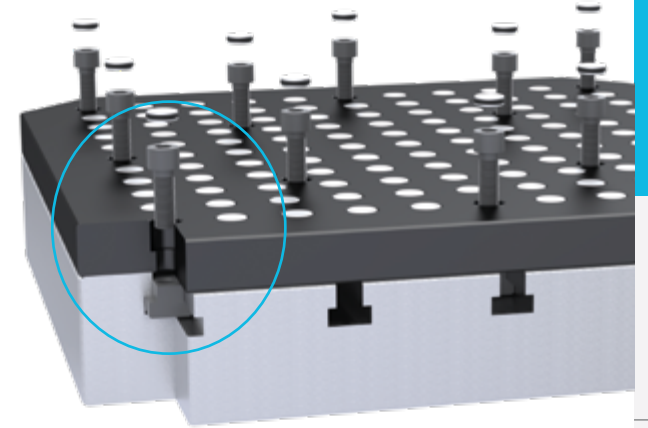


FIXING HOLES FOR SCREWS M16



* Recommended distance between fixing holes

BASE GAUGES M16 Ø24 GRID STEP 50 - T-SLOT AND T-NUTS




T-slot size (A)	T-nuts (B)	
10		For further details concerning fixing holes and T-nuts, contact FCS technical dept.
12		
14	M12	Most common applications
16	M12	
18	M12	
	M16	
20	M12	
	M16	
22	M12	For further details concerning fixing holes and T-nuts, contact FCS technical dept.
	M16	
24	M16	
28	M16	
30		
32		
36		
42		

CLAMPING FORCES AND TIGHTENING TORQUES

TIGHTENING TORQUES

CLAMPING FORCE

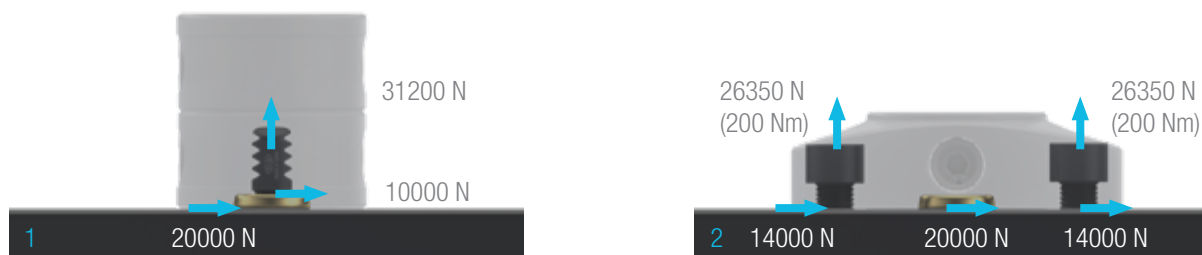
Base Gauge M16 STEP 50




	HOLDING FORCE (N)	SUPPPORTING FORCE (N/mm ²)	LATERAL FORCE (N)
1	31200	30	30000
2	52700		48000

The indicated values:

- is obtained considering that the Base Gauge is fixed on the machine table;
- refer to the Base Gauge grid capacity. They do not consider the clamping capacity of the fixing screws.



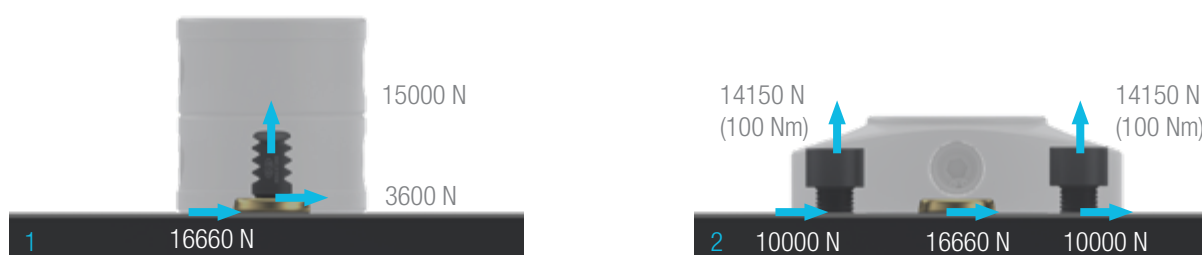
Base Gauge M12 STEP 25



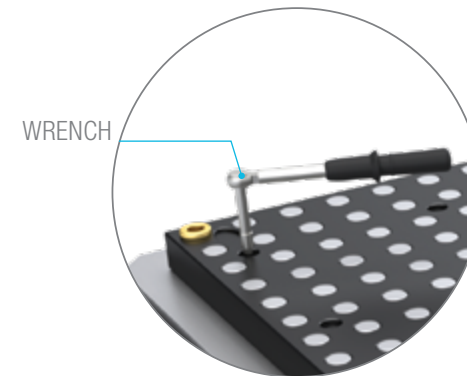
	HOLDING FORCE (N)	SUPPPORTING FORCE (N/mm ²)	LATERAL FORCE (N)
1	15000	30	20200
2	28300		36660

The indicated values:

- is obtained considering that the Base Gauge is fixed on the machine table;
- refer to the Base Gauge grid capacity. They do not consider the clamping capacity of the fixing screws.



TIGHTENING TORQUE



FIXING SCREWS	HEX (mm)	TORQUE* (Nm)
M12 12.9	12	130
M16 12.9	14	200

*Tightening torque: max recommended values reachable by means of a manual wrench. With regard to the M16 12.9 the torque value could be increased up to 330 Nm.

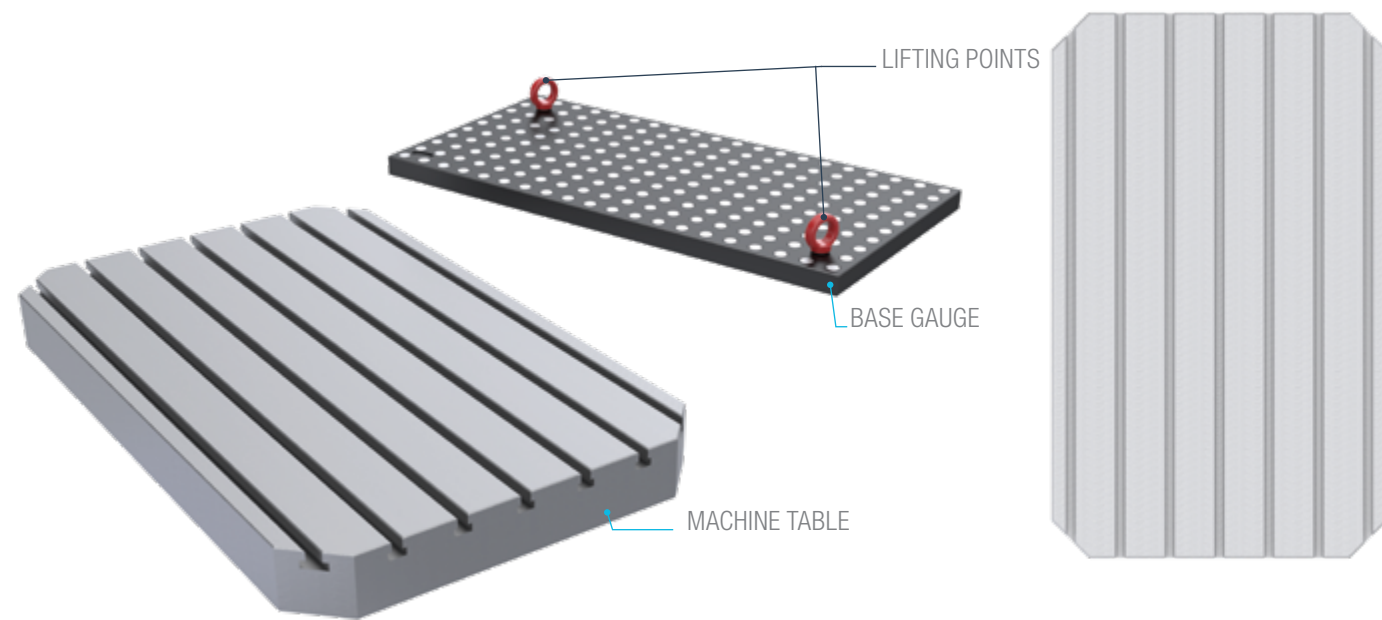
Note:

Do not use the side surfaces of the Base Gauge as reference surface for the alignment. A side surface of the Base Gauge can be used just for a rough pre-alignment with an accuracy of 0,01mm.

FIXING PROCEDURE OF THE BASE GAUGES ON THE MACHINE TABLE

a) CLEANING

Clean the machine table (compressed air gun, sharpening stone for polishing, cleaning cloth, etc).
Clean the Base Gauge bottom surface (sharpening stone for polishing and a cleaning cloth). Pay attention to carry-out the deburring (chamfering) of the fixing holes on the lower surfaces if any.

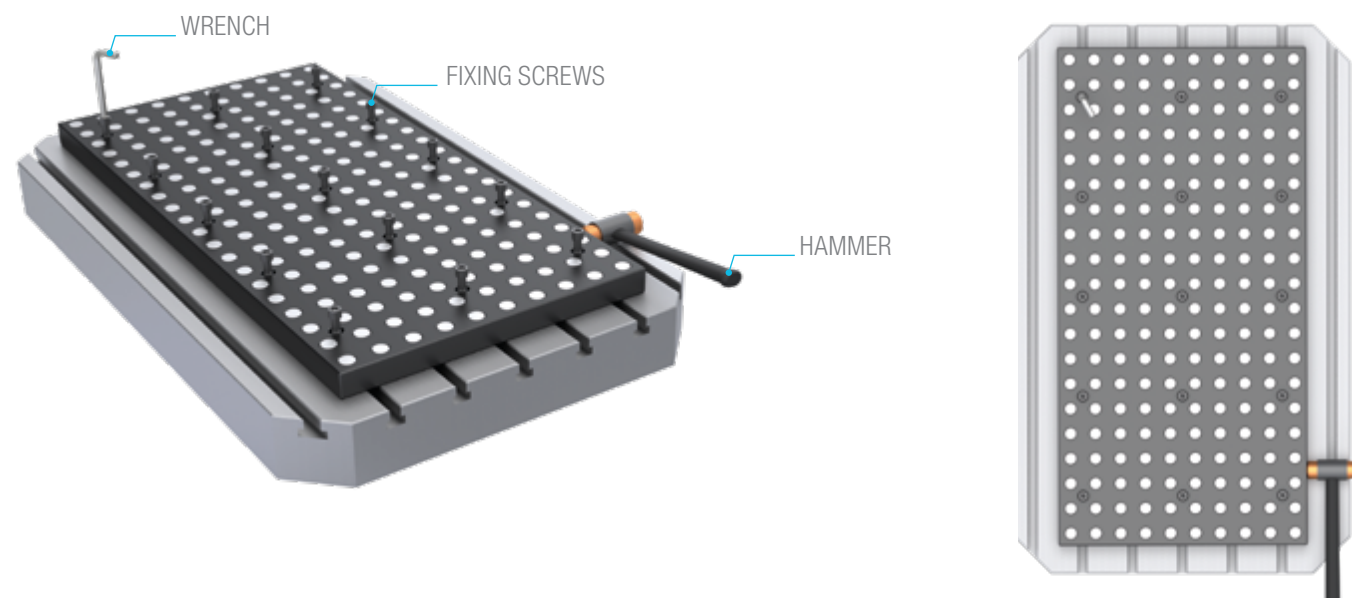


Note:

In order to maintain the thickness and the parallelism of the Base gauge, the machine table flatness must be lower than 0,01mm.
The Base gauge will follow the machine table flatness.

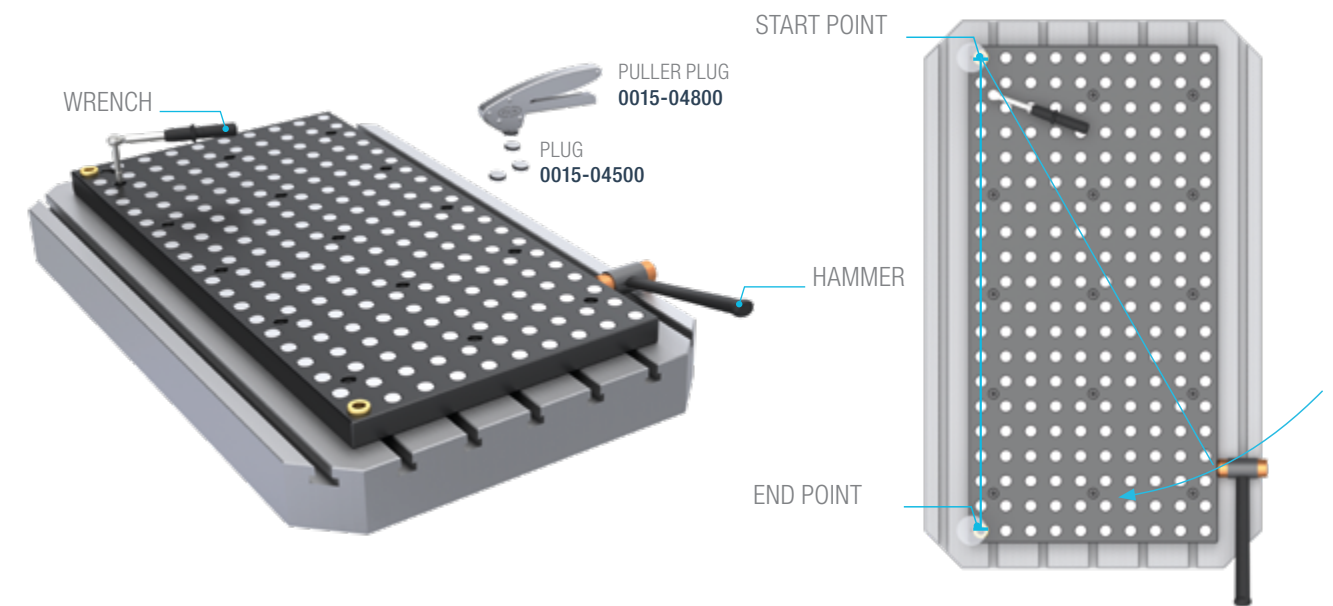
b) POSITIONING AND PRE-FIXING

Place down the Base Gauge on the machine table, matching the fixing holes in the respective fixing locations.
Set in and tighten the fixing screws partially (in the T-nuts/thread holes). The Base Gauge can be moved for matching the holes by beating it properly using a plastic or a copper head hammer

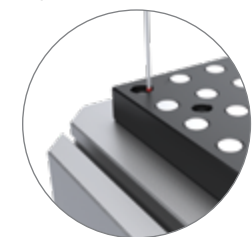


c) ALIGNMENT AND FIXING

Choose a clamping hole in the corner of the Base Gauge as reference. Remove the plug with the Puller plug (code 0015-04800). Tighten a little bit more ($\approx 10\text{Nm}$ for screws M12 and M16) the closest fixing screw to the above reference clamping hole, in order to stabilize the Base Gauge.

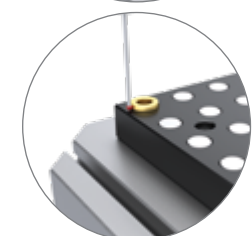


Choose one of the following options for making this reference clamping hole as zero point (START) using a dial gauge/measuring probe:



ALIGNMENT BY COUNTERBORES

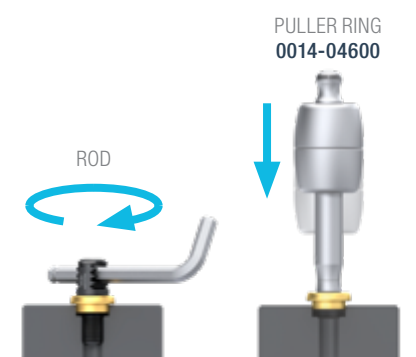
The counterbore of the clamping seat (inner cylindrical surface with diameter $d=24\text{mm}$).



ALIGNMENT BY RINGS

Outer surface of the ring (previously inserted into the counterbore).
Alternatives methods to Set the Ring into the clamping seat:

- By the Rod: once the Ring is just positioned on the seat, insert it by screwing the Rod up to to the end limit;
- By the Puller Ring code 0014-04600.



Move the dial gauge/measuring probe to the opposite corner along the longer side of the Base Gauge to inspect and compare the position of a second hole (END) chosen in the same grid line of the reference hole. Re-adjust the Base Gauge (by beating it properly using a plastic or a copper head hammer just on the side surfaces), in order to eliminate the difference (and in case of TR Base Gauge make sure that the center hole is positioned with accuracy). Tighten the fixing screws all the way according to the recommended torque.

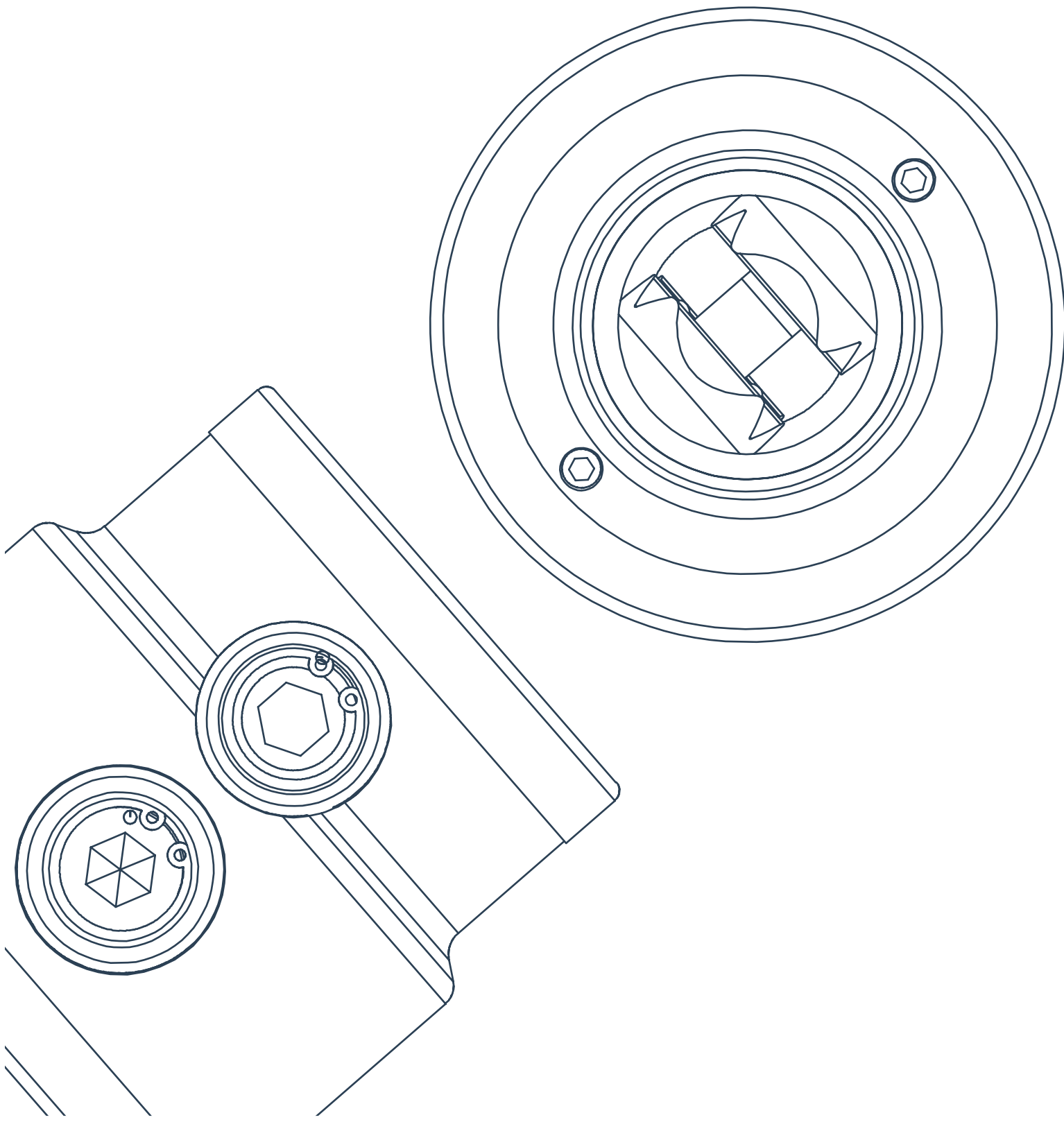
FIXING SCREWS	HEX (mm)	TORQUE* (Nm)
M12 12.9	12	130
M16 12.9	14	200

* Tightening torque: max recommended values reachable by means of a manual wrench.
With regard to the M16 12.9 the torque value could be increased up to to 330 Nm.

Note:

Do not use the side surfaces of the Base Gauge as reference surface for the alignment. A side surface of the Base Gauge can be used just for a rough pre-alignment with an accuracy of 0,01mm.

CLAMPS



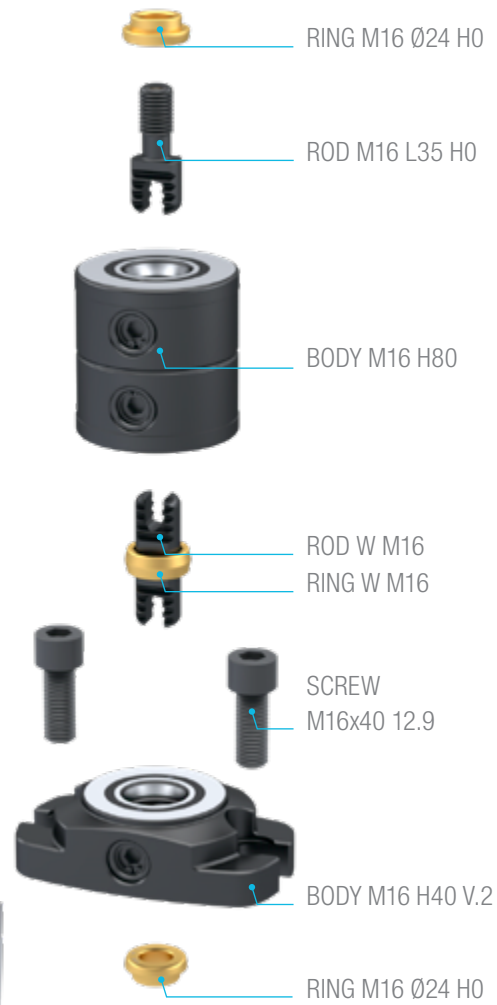
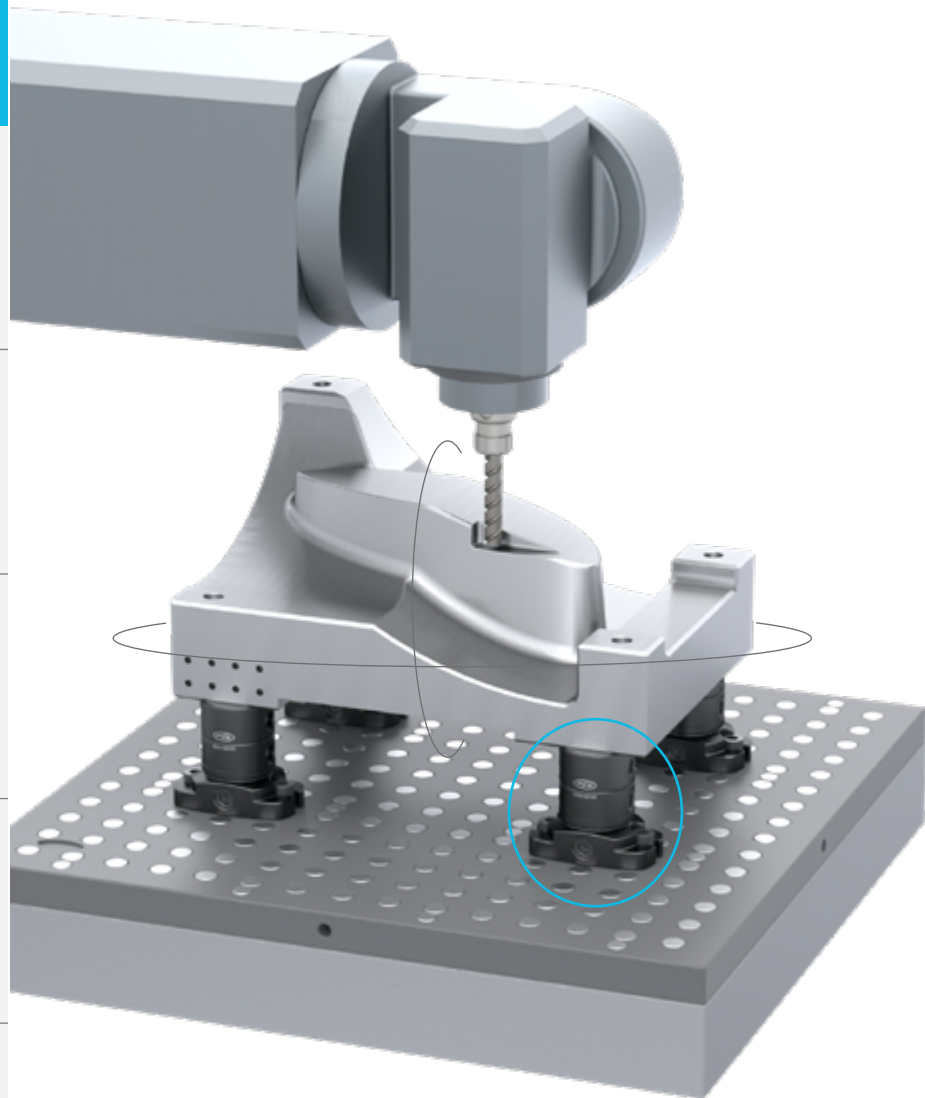
Integrated systems for production

INTRODUCTION AND KEY FEATURES

INTRODUCTION AND KEY FEATURES

CLAMPS: BODIES, RINGS AND RODS

Clamping components allow to support/rise, hold and locate the workpiece making it a single block with the machine table.



SET-UP TIME OPTIMIZATION

Lower Set-up time (up to 75% less), due to the earlier CAD/CAM Set-up virtualization and the easy assembly and disassembly operations which don't require skilled operators. The Set-up time estimation (usually in the range of 10÷20min) helps to plan a more accurate machines workload schedule.

MACHINING ACCESSIBILITY (5 free-faces)

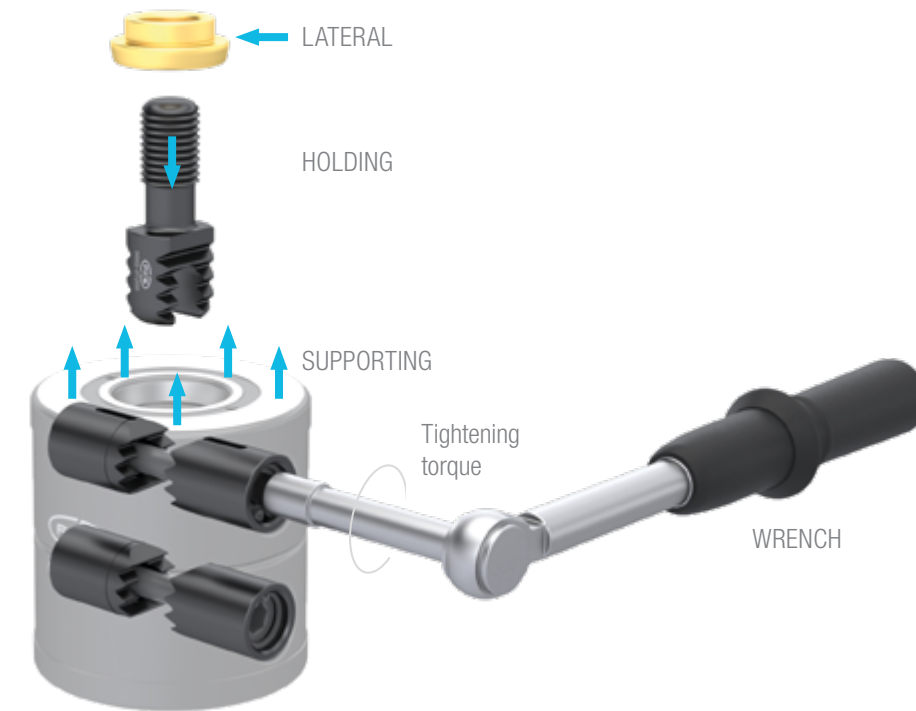
High accessibility to machine the workpiece (minimized interference issues).

HIGH ACCURACY

Material type, fabrication method and quality control allow to reach high accuracy components and the accuracy is preserved over the time (reliability).

WORKPIECE POSITIONING AND ORIENTATION

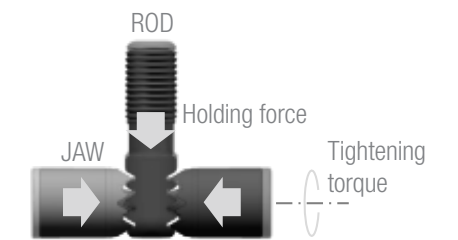
The clamping system framework allows to keep track of the position and orientation of the workpiece with high accuracy along the production process.



HIGH CLAMPING FORCE

High clamping force reachable with low tightening torque. Based on a simplified model, the components shall mainly act as follows:

- Ring as locating (shear force);
- Rod as holding (tensile force);
- Body as supporting (compressive force).



SIZE RANGE

The clamping components have different sizes to be proportionally used for clamping workpieces of various dimensions.

MODULARITY

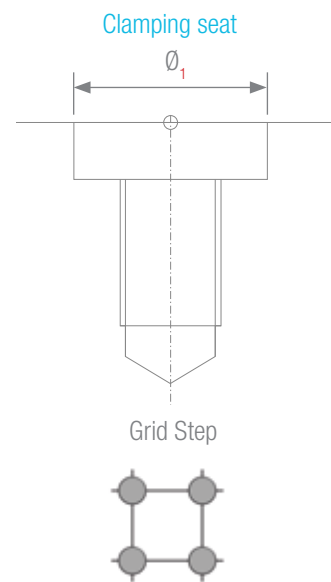
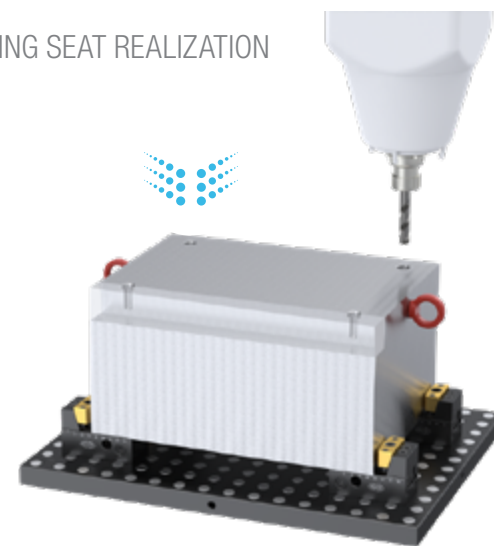
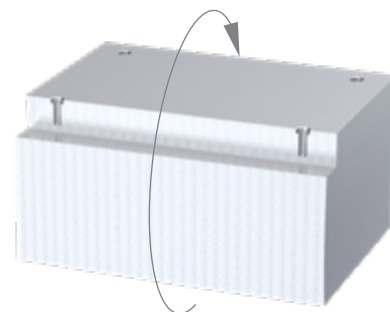
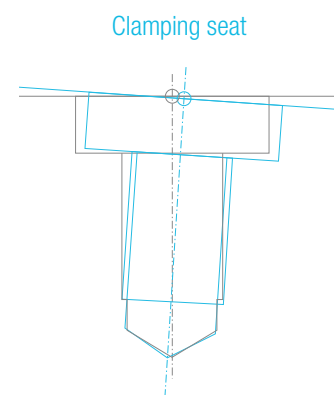
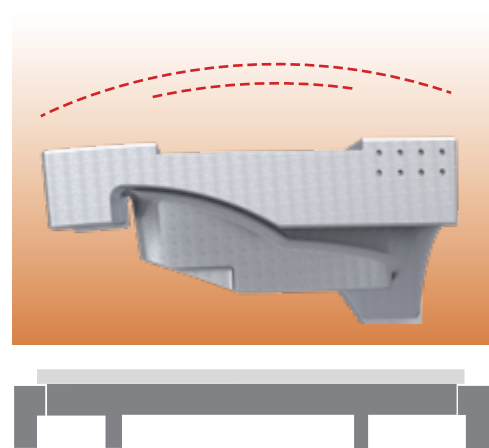
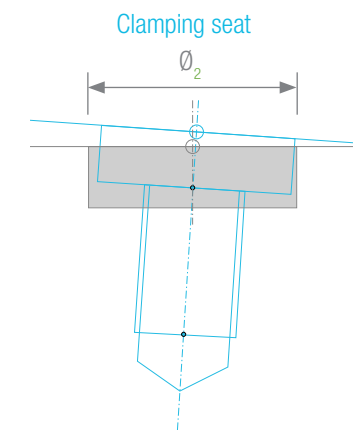
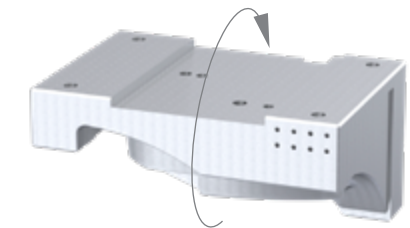
It allows to create different clamping configurations by matching standardized modules.

LOW AND EASY MAINTENANCE

The clamping components are easy to clean, and the spare parts are designed to be easily replaced in case of need.

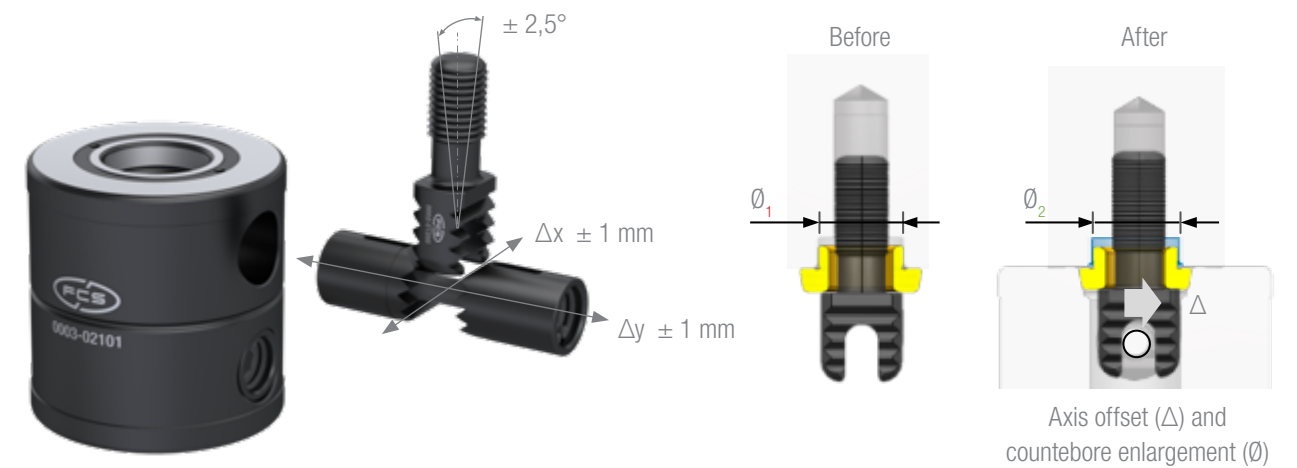


MACHINING PROCESS - SEAT READJUSTMENT

1 PHASE 1
FACING AND CLAMPING SEAT REALIZATION2 PHASE 2
MACHINING3 PHASE 3
HEAT TREATMENT4 PHASE 4
SEATS READJUSTMENT5 PHASE 5
MACHINING

SEAT READJUSTMENT

Following to a thermal distortion, the workpiece clamping seats could shift out of the clamping grid. By re-machining just the counterbore of the clamping seats (increasing the diameter and shifting the center accordingly) a displacement of the center up to ± 1 mm can be recovered.

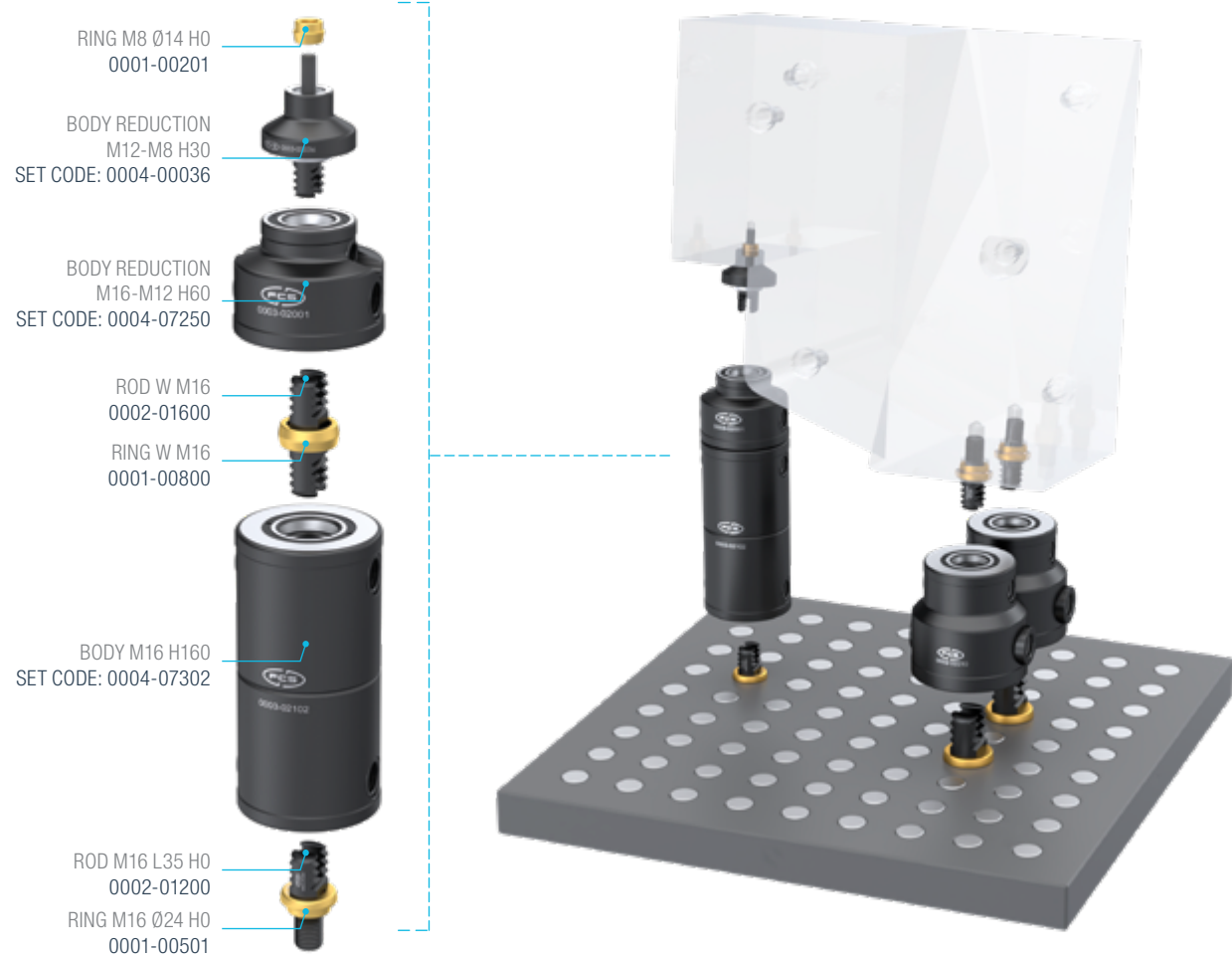


REDUCTIONS

RINGS H

BODY REDUCTIONS

Body whose upper connection is smaller than the lower one. It is used to get a reduced clamping seat on workpiece side.

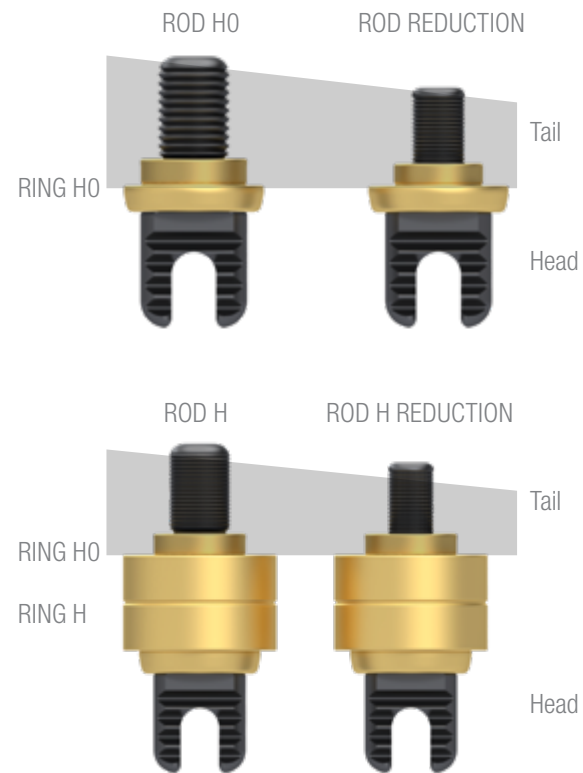


ROD AND RING REDUCTIONS

Rod and Ring allow to make a clamping seat reduction. A Rod reduction H0 (with the corresponding Ring reduction) is useful to make a reduction without rising the stack (no height changing).

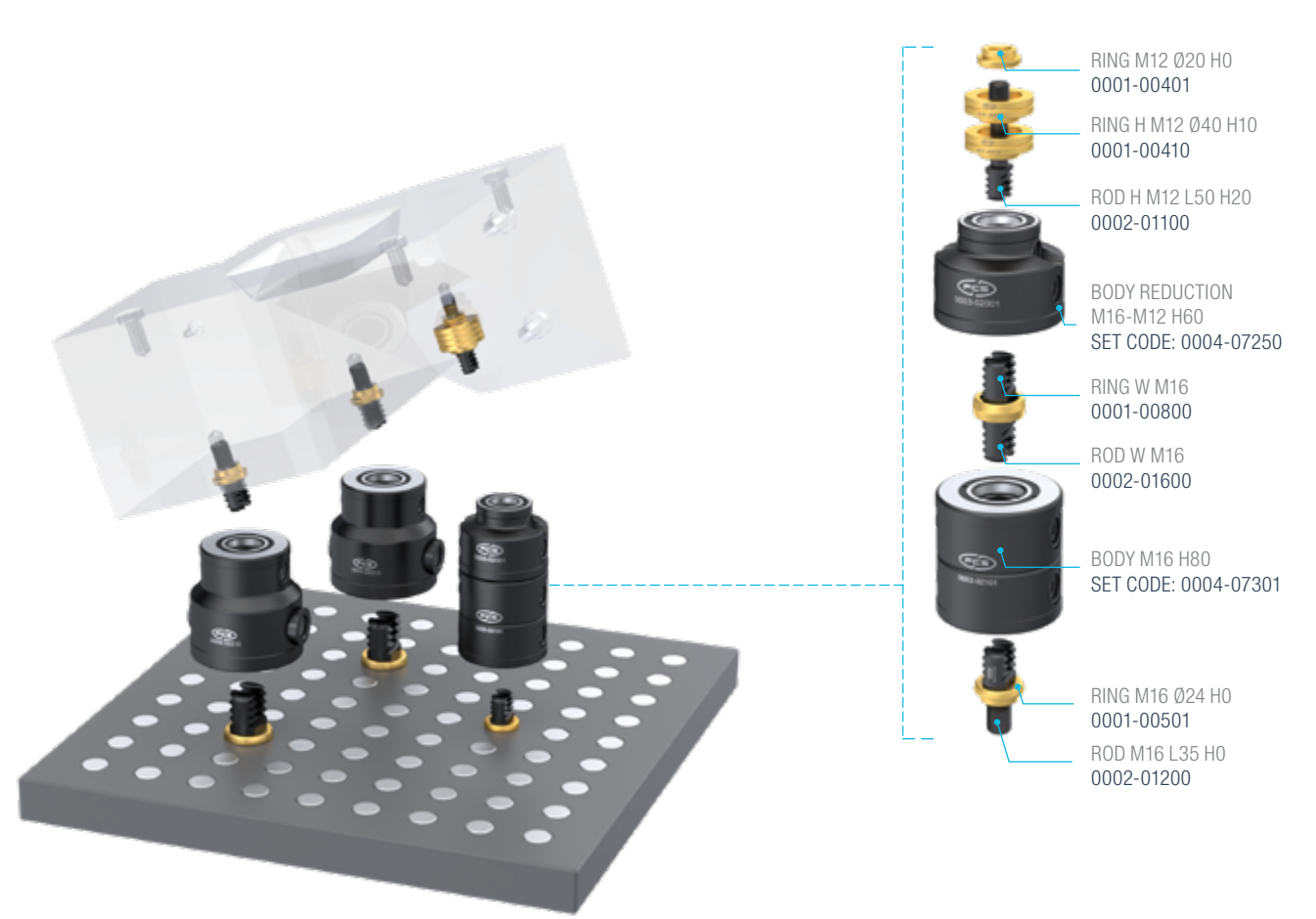
Otherwise, to increase the height of the stack, the Rod H Reduction can be used with the corresponding Ring H.

Note:
 FURTHER REDUCTION METHOD: a clamping seat reduction and a grid step reduction can also be obtained using a Pallet.
[SEE PALLETS SECTION](#)



RINGS H

Spacer with diameter and height lower than the corresponding Bodies

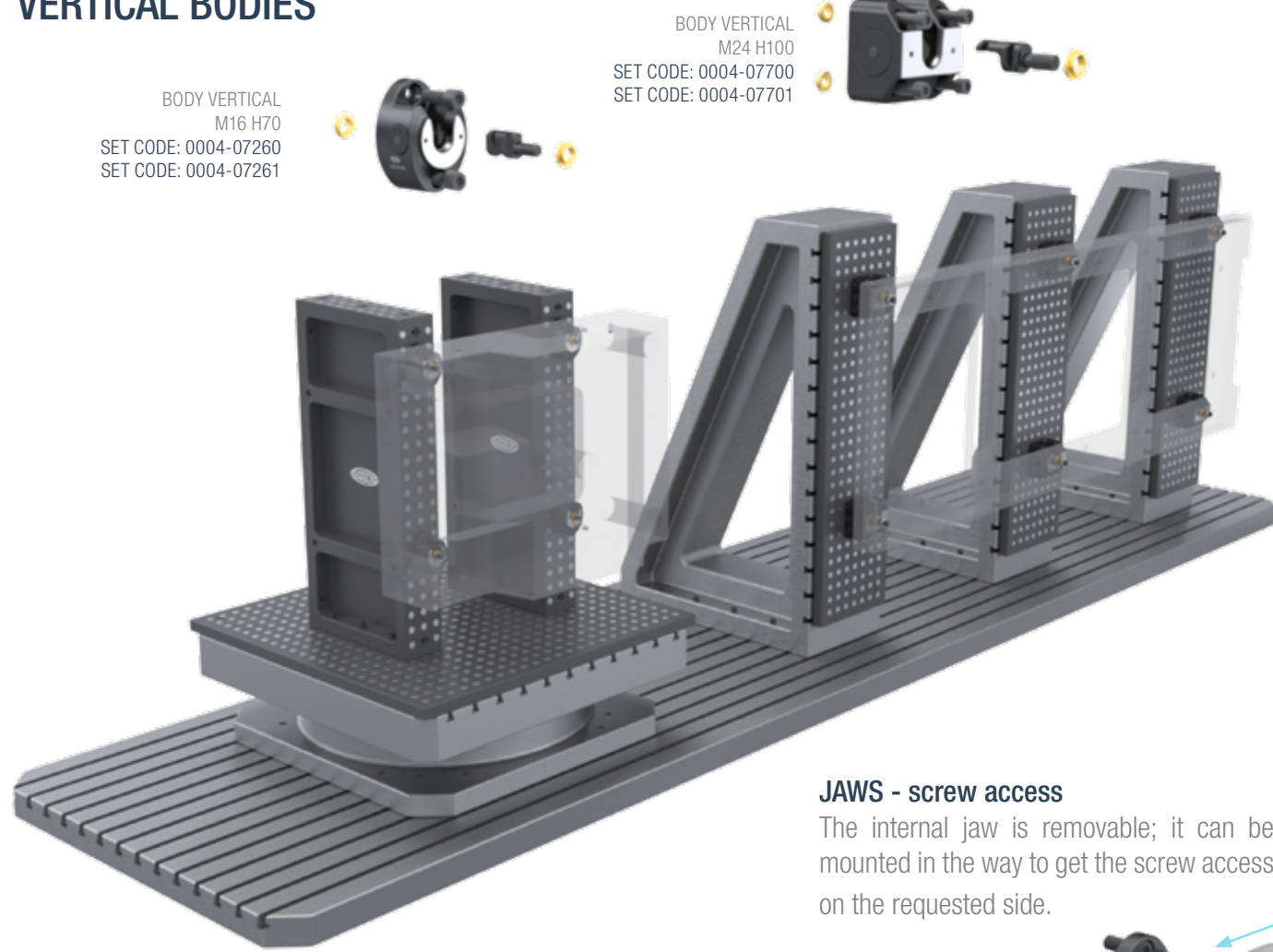


The Ring H allows to reduce the material to be removed to carry out the clamping seat specially for rake, complex, or different-level workpiece surface. Furthermore, using the Ring H, a better access to reach the screw for locking/unlocking the Jaw/Rod can be obtained.

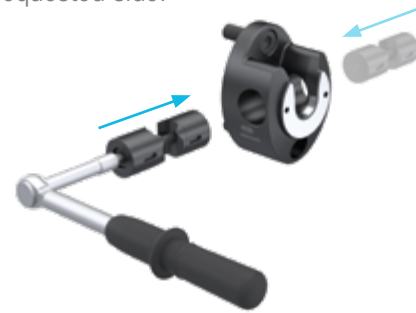
VERTICAL CLAMPS

FURTHER CLAMPING APPLICATIONS

VERTICAL BODIES

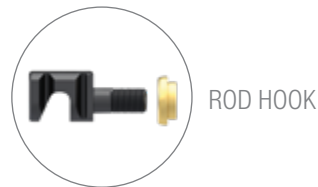
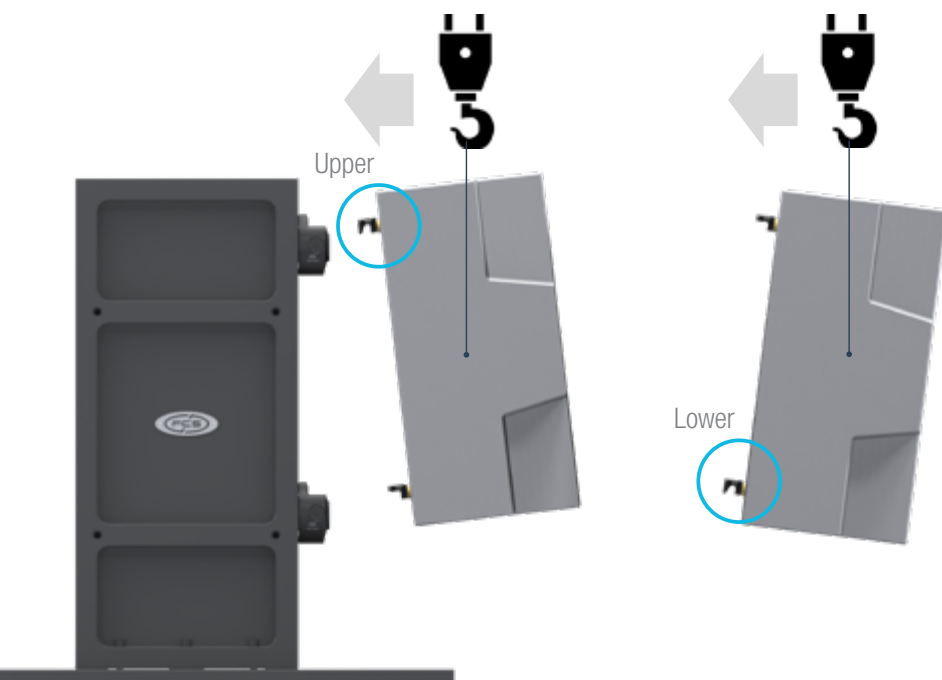


JAWS - screw access
 The internal jaw is removable; it can be mounted in the way to get the screw access on the requested side.

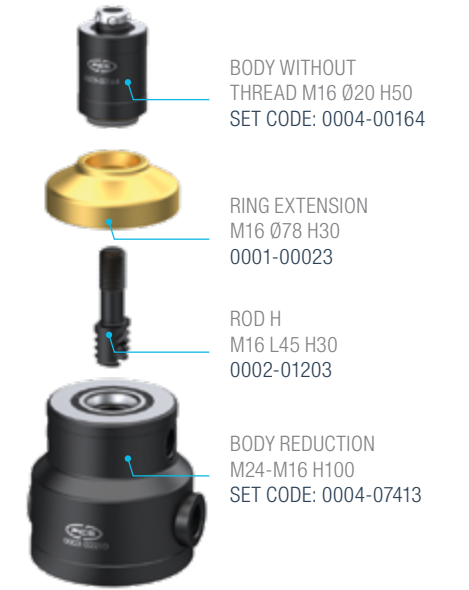
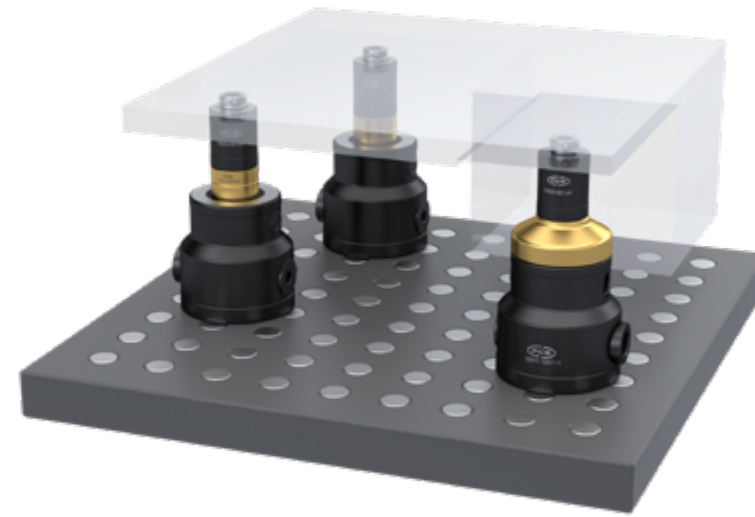


TYPES OF RODS - different positioning on the workpiece

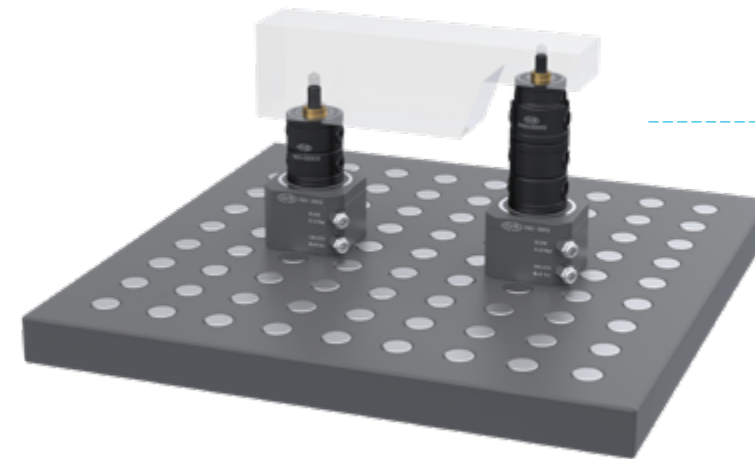
Place the hook shape Rod (hinge joint) on the position that will first be connected to the Bodies (as show in the picture).



BODY WITHOUT THREAD



AUTOMATIC - MANUAL INTERCONNECTIONS

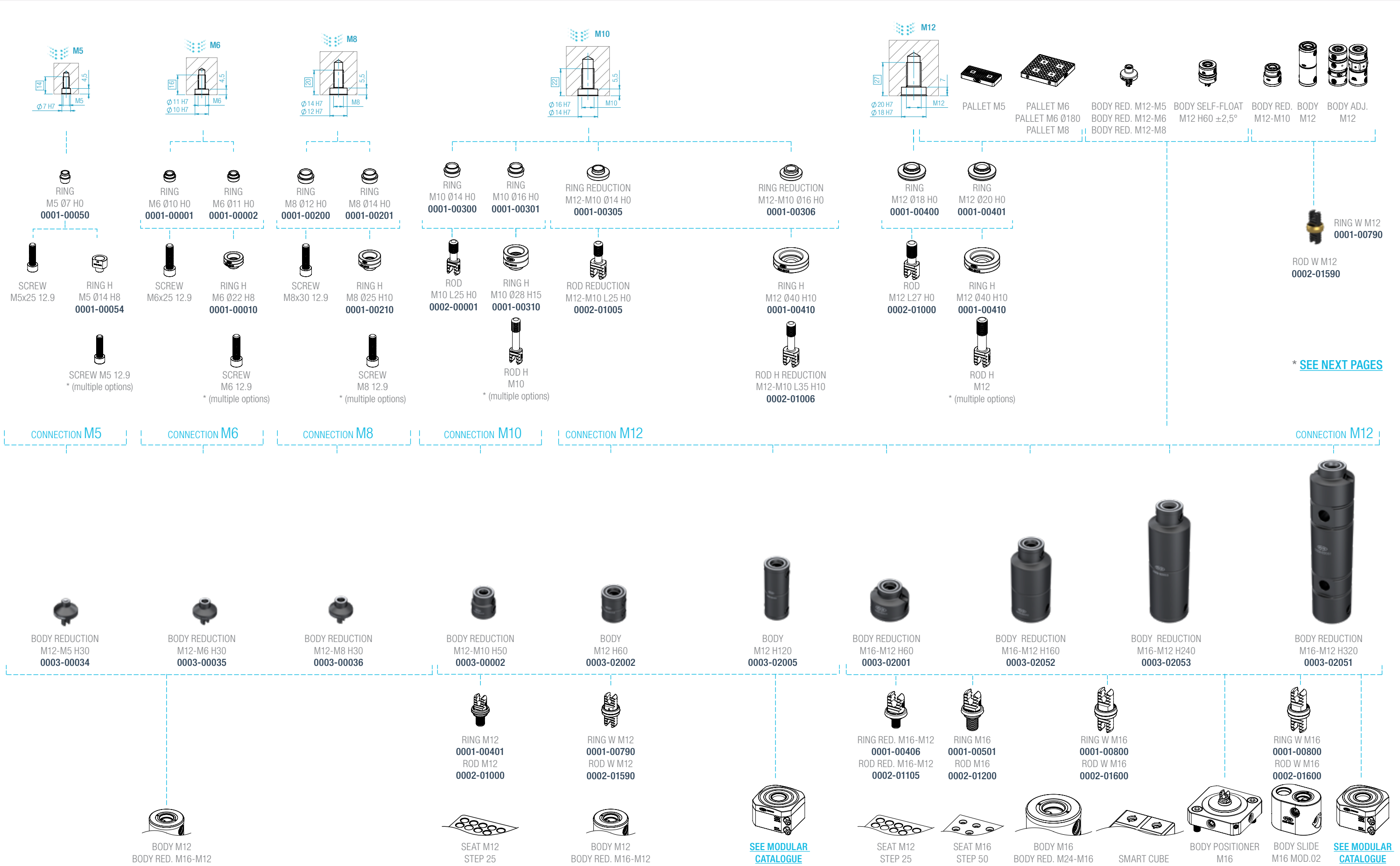


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CLAMP M12-M5 | M12-M6 | M12-M8 | M12-M10 | M12

CLAMP M16-M12



Note: For multicomponents clamping application refer to 3D Assembly Simulator. For the complete Kit refer to the corresponding SET CLAMP.

RING-ROD M6 | M8 | M10

RING-ROD M12-M10 | M12

CONNECTION M5

- RING M5 Ø7 H0 0001-00050
- SCREW M5x25 12.9
- RING H M5 Ø14 H8 0001-00054
- SCREW M5 12.9 *(multiple options)
- BODY REDUCTION M12-M5 H30

CONNECTION M6

- RING M6 Ø10 H0 0001-00001
- RING M6 Ø11 H0 0001-00002
- SCREW M6x25 12.9
- RING H M6 Ø22 H8 0001-00010
- SCREW M6 12.9 *(multiple options)
- BODY REDUCTION M12-M6 H30

CONNECTION M8

- RING M8 Ø12 H0 0001-00200
- RING M8 Ø14 H0 0001-00201
- SCREW M8x30 12.9
- RING H M8 Ø25 H10 0001-00210
- SCREW M8 12.9 *(multiple options)
- BODY REDUCTION M12-M8 H30

CONNECTION M10

- RING M10 Ø14 H0 0001-00300
- RING M10 Ø16 H0 0001-00301
- ROD M10 L25 H0 0002-00001
- RING H M10 Ø28 H15 0001-00310
- ROD H M10 L40 H15 0002-00002
- ROD H M10 L55 H30 0002-00003
- BODY RED. M12-M10

CONNECTION M12

- RING REDUCTION M12-M10 Ø14 H0 0001-00305
- RING REDUCTION M12-M10 Ø16 H0 0001-00306
- RING REDUCTION M12-M10 L25 H0 0002-01005
- RING H M12 Ø40 H10 0001-00410
- ROD H REDUCTION M12-M10 L35 H10 0002-01006
- RING M12 Ø18 H0 0001-00400
- RING M12 Ø20 H0 0001-00401
- ROD M12 L27 H0 0002-01000
- RING H M12 Ø40 H10 0001-00410
- ROD H M12 L40 H10 0002-01050
- ROD H M12 L50 H20 0002-01100
- ROD H M12 L60 H30 0002-01125
- ROD H M12 L70 H40 0002-01150
- BODY M12 BODY RED. M16-M12

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- BODY REDUCTION M12-M5 H30
- BODY REDUCTION M12-M6 H30
- BODY REDUCTION M12-M8 H30
- BODY RED. M12-M10
- BODY M12 BODY RED. M16-M12

CLAMP M16

CLAMP M24-M16

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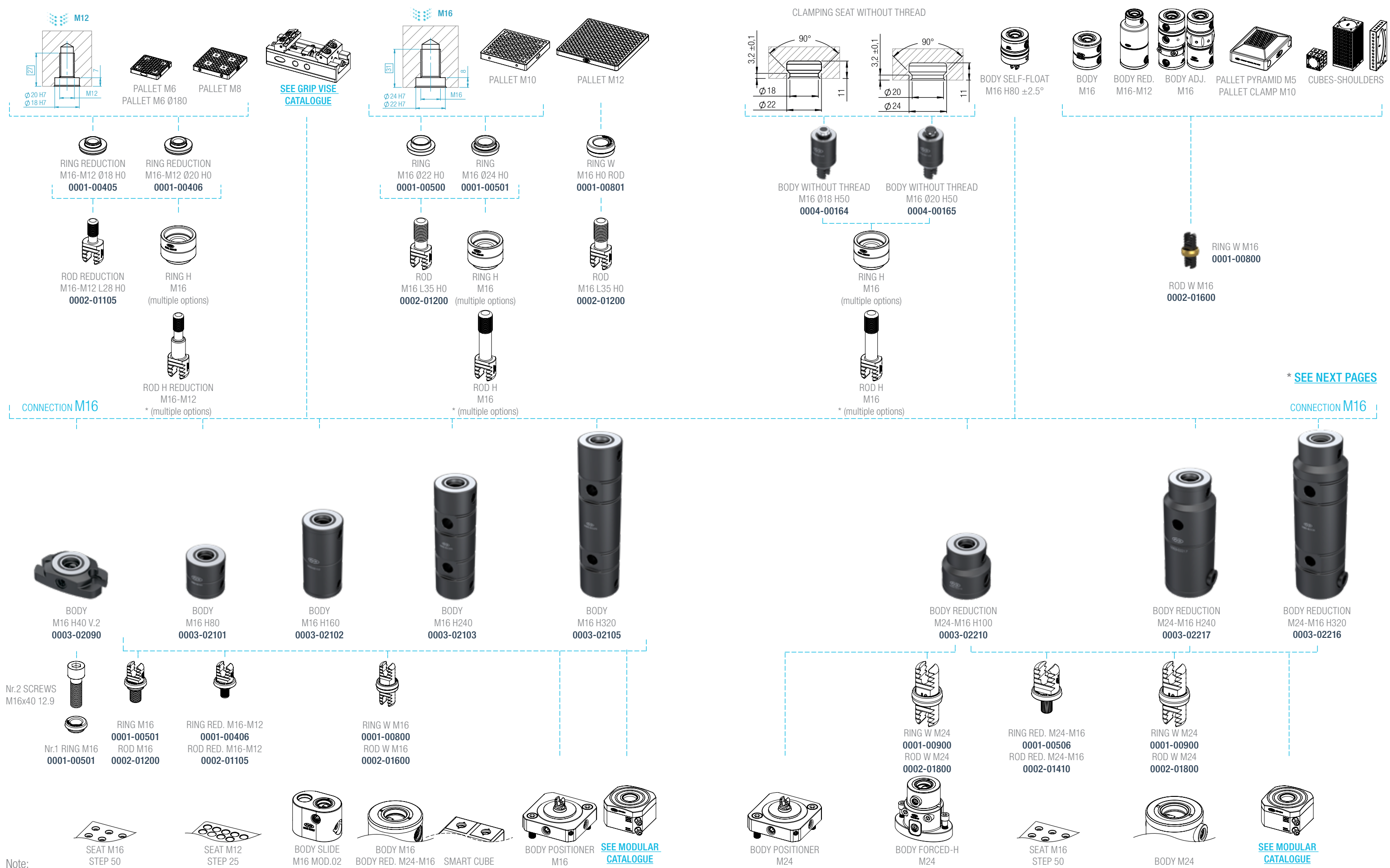
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Note: For multicomponents clamping application refer to 3D Assembly Simulator. For the complete Kit refer to the corresponding SET CLAMP.

RING-ROD M16-M12

RING-ROD M16

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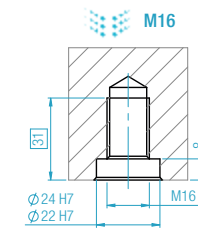
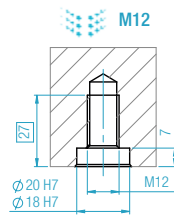
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M12

RING REDUCTION M16-M12 Ø18 H0 0001-00405

RING REDUCTION M16-M12 Ø20 H0 0001-00406

H0 H12.5 H25 H37.5 H50 H62.5 H75 H87.5 H100

RING H M16 Ø40 H12.5 0001-00535

RING H M16 Ø40 H25 0001-00540

ROD REDUCTION M16-M12 L28 H0 0002-01105

ROD H REDUCTION M16-M12 L42.5 H12.5 0002-01106

ROD H REDUCTION M16-M12 L55 H25 0002-01110

ROD H REDUCTION M16-M12 L67.5 H37.5 0002-01115

ROD H REDUCTION M16-M12 L80 H50 0002-01120

ROD H REDUCTION M16-M12 L92.5 H62.5 0002-01126

ROD H REDUCTION M16-M12 L105 H75 0002-01130

ROD H REDUCTION M16-M12 L117.5 H87.5 0002-01135

ROD H REDUCTION M16-M12 L130 H100 0002-01140

M16

RING M16 Ø22 H0 0001-00500

RING M16 Ø24 H0 0001-00501

H0 H12.5 H25 H37.5 H50 H62.5 H75 H87.5 H100

RING H M16 Ø40 H12.5 0001-00535

RING H M16 Ø40 H25 0001-00540

ROD M16 L35 H0 0002-01200

ROD H M16 L47.5 H12.5 0002-01211

ROD H M16 L60 H25 0002-01250

ROD H M16 L72.5 H37.5 0002-01251

ROD H M16 L85 H50 0002-01300

ROD H M16 L97.5 H62.5 0002-01301

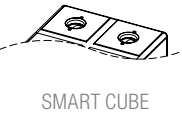
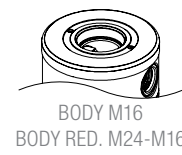
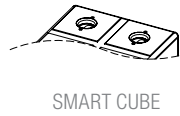
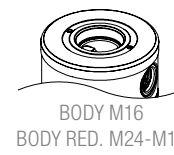
ROD H M16 L110 H75 0002-01310

ROD H M16 L122.5 H87.5 0002-01311

ROD H M16 L135 H100 0002-01320

CONNECTION M16

CONNECTION M16



CLAMP M24

CLAMP M24

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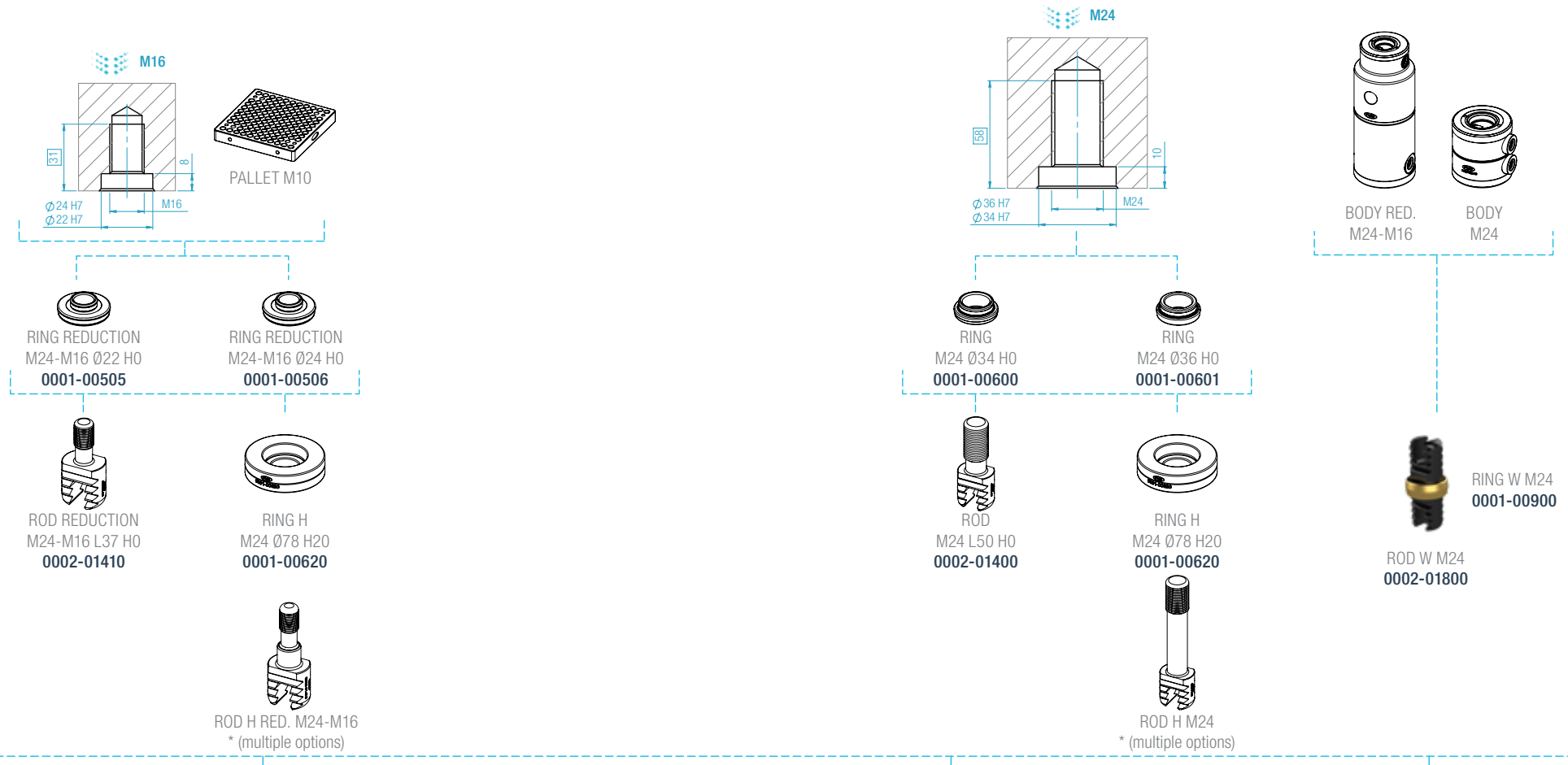
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* SEE NEXT PAGES

CONNECTION M24

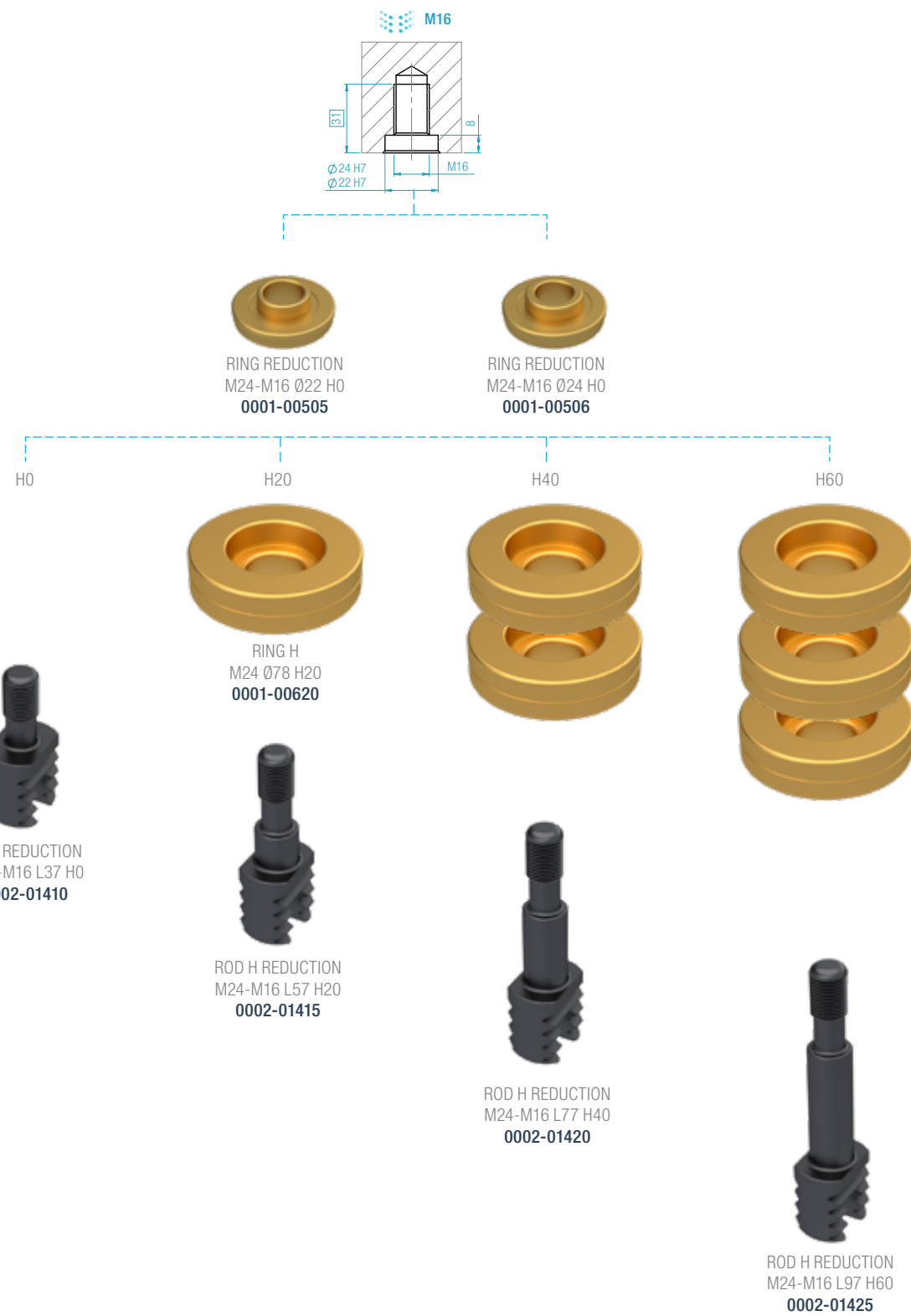
CONNECTION M24



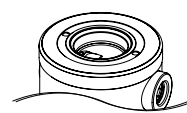
Note: For multicomponents clamping application refer to 3D Assembly Simulator. For the complete Kit refer to the corresponding SET CLAMP.

RING-ROD M24-M16

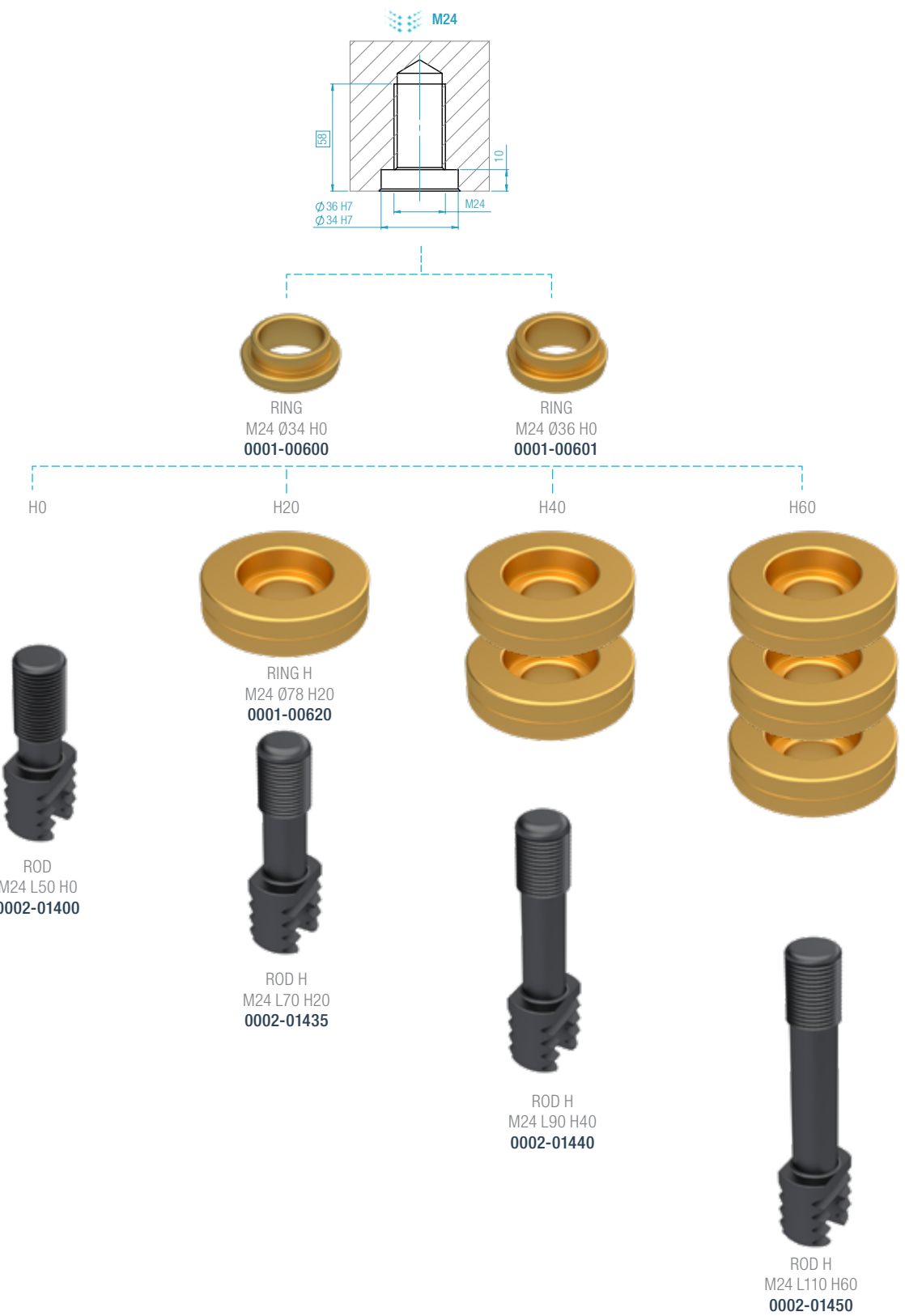
RING-ROD M24



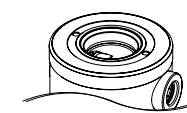
CONNECTION M24



BODY M24

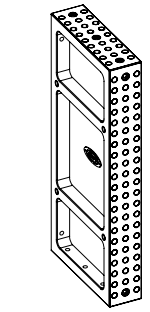


CONNECTION M24

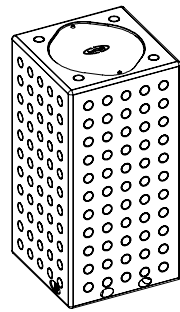


BODY M24

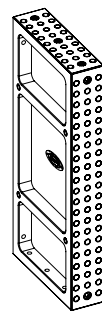
CLAMP VERTICAL



SHOULDERS



CUBE M16



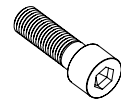
SHOULDER (excluded H600)



BODY VERTICAL M16 H70
0003-02600



Nr.1 RING M16 Ø24 H0
0001-00501



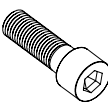
Nr. 1 SCREW M16x40 12.9
Nr.1 SCREW M16x50 12.9



BODY VERTICAL M24 H100
0003-02700



Nr.4 RING M16 Ø24 H0
0001-00501



Nr.4 SCREWS M16x90 12.9

Note:
For multicomponents clamping application refer to 3D Assembly Simulator. For the complete Kit refer to the corresponding SET CLAMP.

RING - ROD VERTICAL



ROD VERTICAL M16 L35 H0 HOOK
0002-01350



ROD VERTICAL M16 L35 H0
0002-01375



ROD H VERTICAL M16 L60 H25 HOOK
0002-01352



ROD H VERTICAL M16 L60 H25
0002-01377



ROD VERTICAL W M16 HOOK
0002-01380



ROD VERTICAL W M16
0002-01381



ROD VERTICAL M24 L55 H0 HOOK
0002-01475



ROD VERTICAL M24 L55 H0
0002-01490



RING M16 Ø24 H0
0001-00501



RING H M16 Ø40 H25
0001-00540



RING M16 Ø22 H0
0001-00500



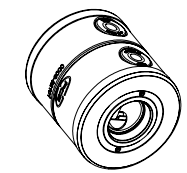
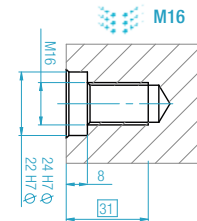
RING W M16
0001-00800



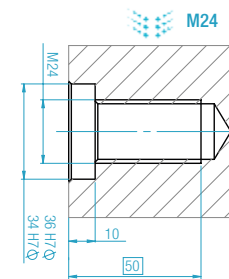
RING M24 Ø34 H0
0001-00600



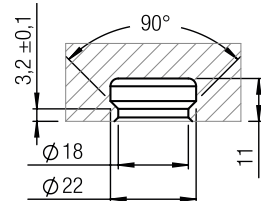
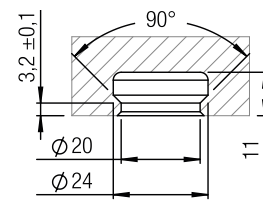
RING M24 Ø36 H0
0001-00601



BODY M16 H80
BODY RED. M16-M12 H60



CLAMPING SEAT WITHOUT THREAD



BODY WITHOUT THREAD
M16 Ø20 H50
0003-00164



BODY WITHOUT THREAD
M16 Ø18 H50
0003-00165

H0

H25

H30



ROD
M16 L16 H0
0002-01202



RING H
M16 Ø40 H25
0001-00540



RING EXTENSION
M16 Ø78 H30
0001-00023

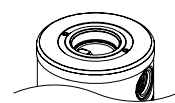


ROD H
M16 L40 H25
0002-01201



ROD H
M16 L45 H30
0002-01203

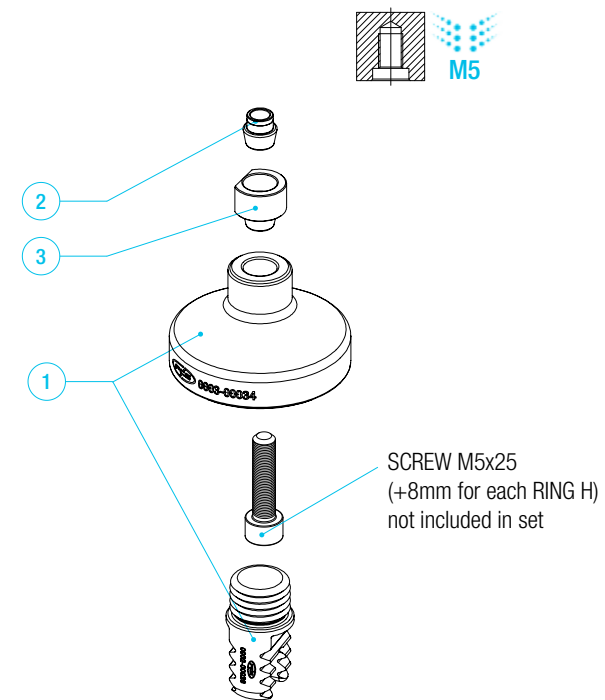
CONNECTION M16



BODY M16
BODY RED. M24-M16

SET CODE 0004-00034

SET BODY REDUCTION M12-M5 H30

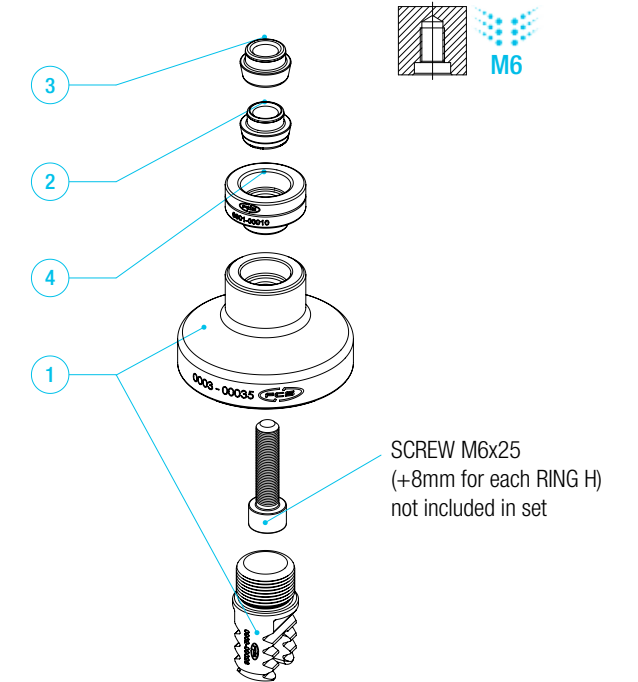


Description	Qty	CODE
1 BODY REDUCTION M12-M5 H30	1	0003-00034
2 RING M5 Ø7 H0	1	0001-00050
3 RING H M5 Ø14 H8	1	0001-00054

set weight 0.3 kg

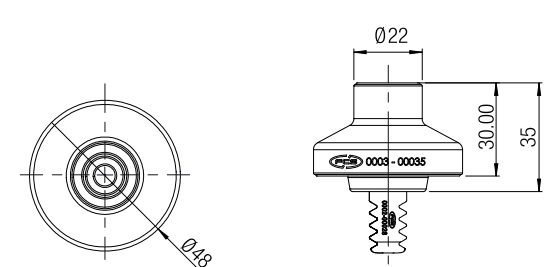
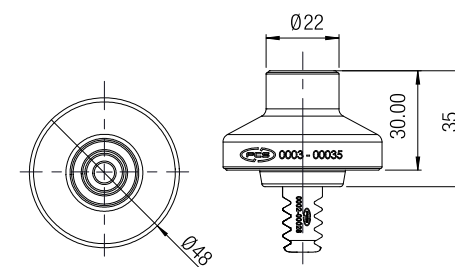
SET CODE 0004-00035

SET BODY REDUCTION M12-M6 H30



Description	Qty	CODE
1 BODY REDUCTION M12-M6 H30	1	0003-00035
2 RING M6 Ø10 H0	1	0001-00001
3 RING M6 Ø11 H0	1	0001-00002
4 RING H M6 Ø22 H8	1	0001-00010

set weight 0.3 kg

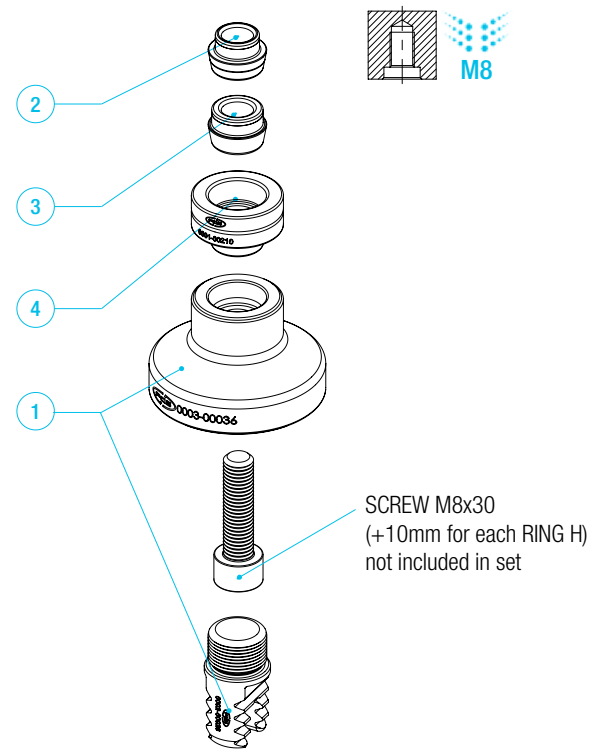


SET CLAMP

SET CLAMP

SET CODE 0004-00036

SET BODY REDUCTION M12-M8 H30

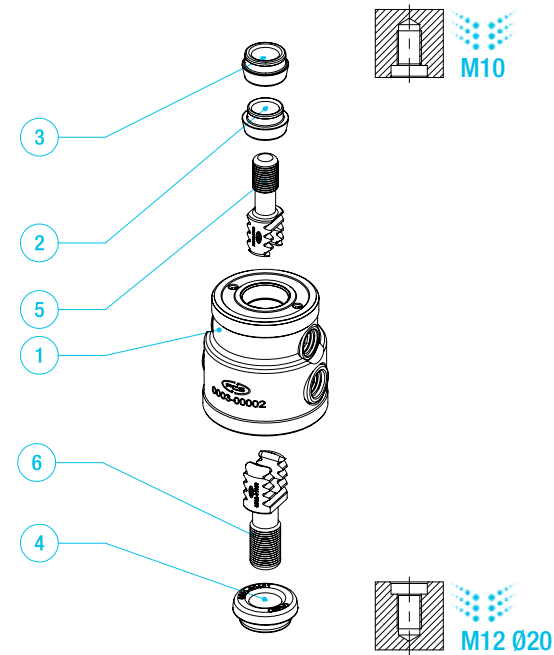


Description	Qty	CODE
1 BODY REDUCTION M12-M8 H30	1	0003-00036
2 RING M8 Ø12 H0	1	0001-00200
3 RING M8 Ø14 H0	1	0001-00201
4 RING H M8 Ø25 H10	1	0001-00210

set weight 0.3 kg

SET CODE 0004-00002

SET BODY REDUCTION M12-M10 H50

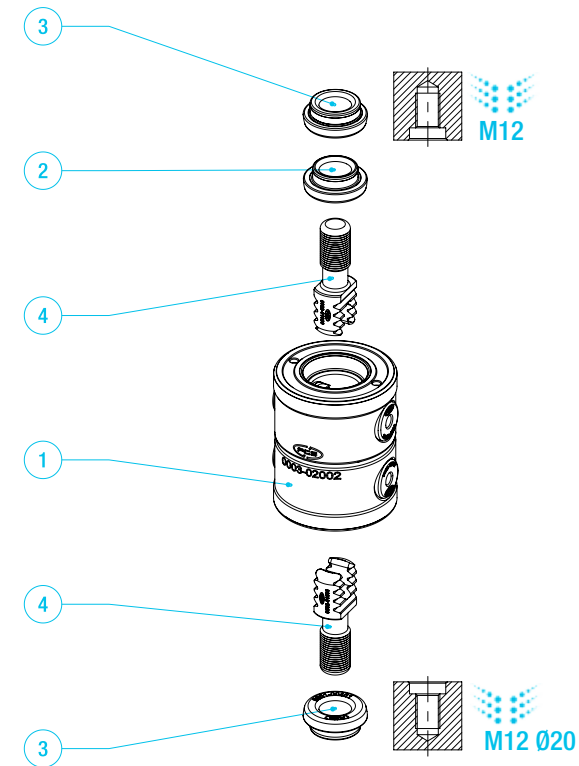


Description	Qty	CODE
1 BODY REDUCTION M12-M10 H50	1	0003-00002
2 RING M10 Ø14 H0	1	0001-00300
3 RING M10 Ø16 H0	1	0001-00301
4 RING M12 Ø20 H0	1	0001-00401
5 ROD M10 L25 H0	1	0002-00001
6 ROD M12 L27 H0	1	0002-01000

set weight 0.6 kg

SET CODE 0004-07255

SET BODY M12 H60

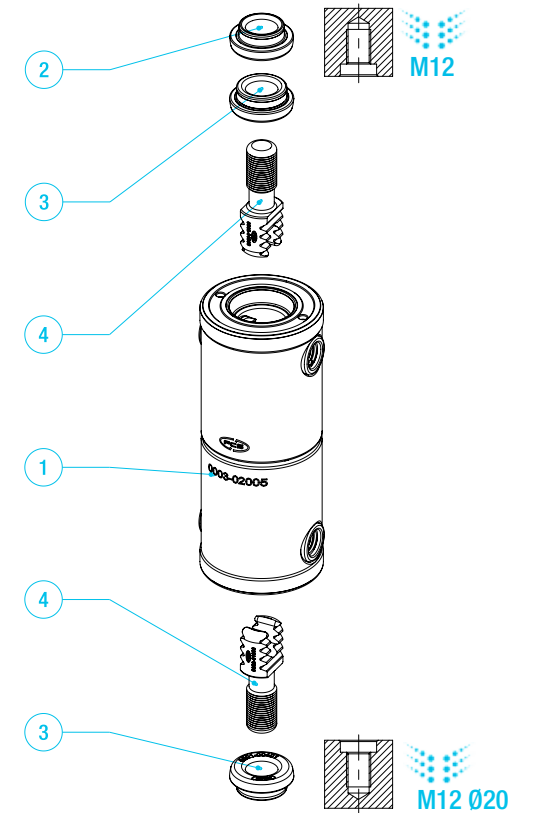


Description	Qty	CODE
1 BODY M12 H60	1	0003-02002
2 RING M12 Ø18 H0	1	0001-00400
3 RING M12 Ø20 H0	2	0001-00401
4 ROD M12 L27 H0	2	0002-01000

set weight 0.8 kg

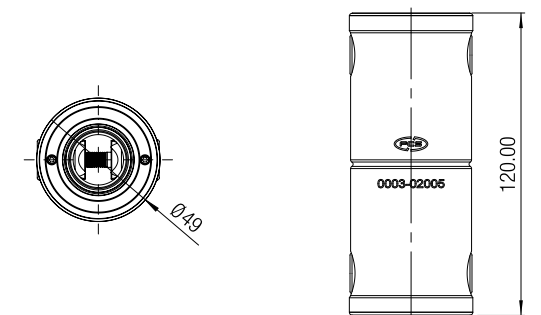
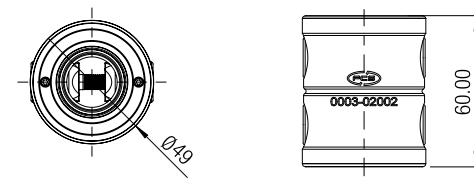
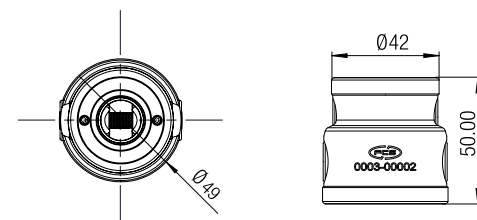
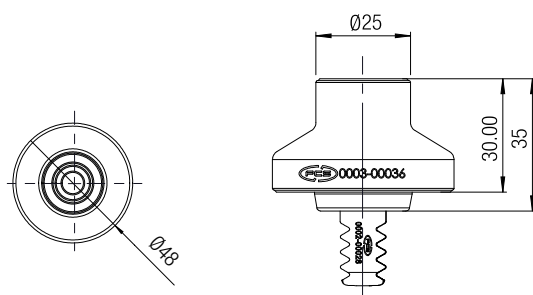
SET CODE 0004-07256

SET BODY M12 H120



Description	Qty	CODE
1 BODY M12 H120	1	0003-02005
2 RING M12 Ø18 H0	1	0001-00400
3 RING M12 Ø20 H0	2	0001-00401
4 ROD M12 L27 H0	2	0002-01000

set weight 1.5 kg

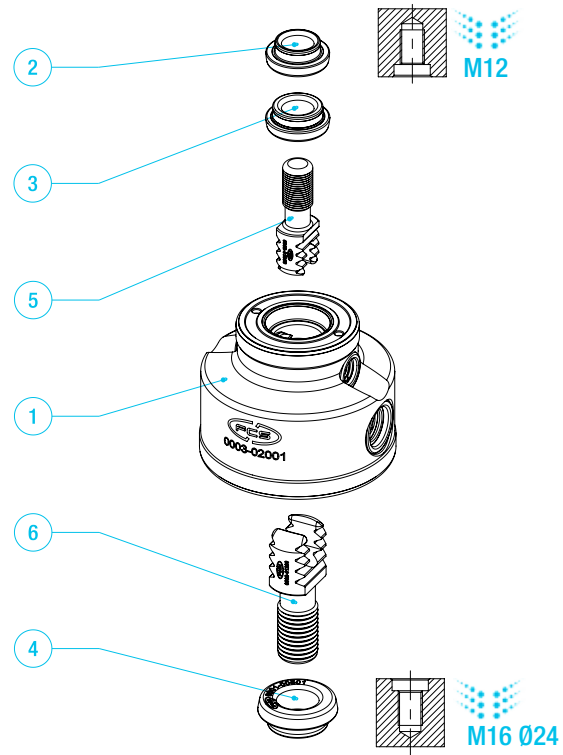


SET CLAMP

SET CLAMP

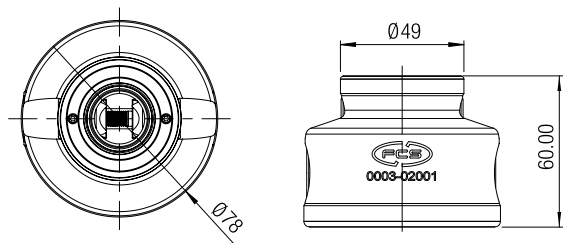
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SET BODY REDUCTION M16-M12 H60



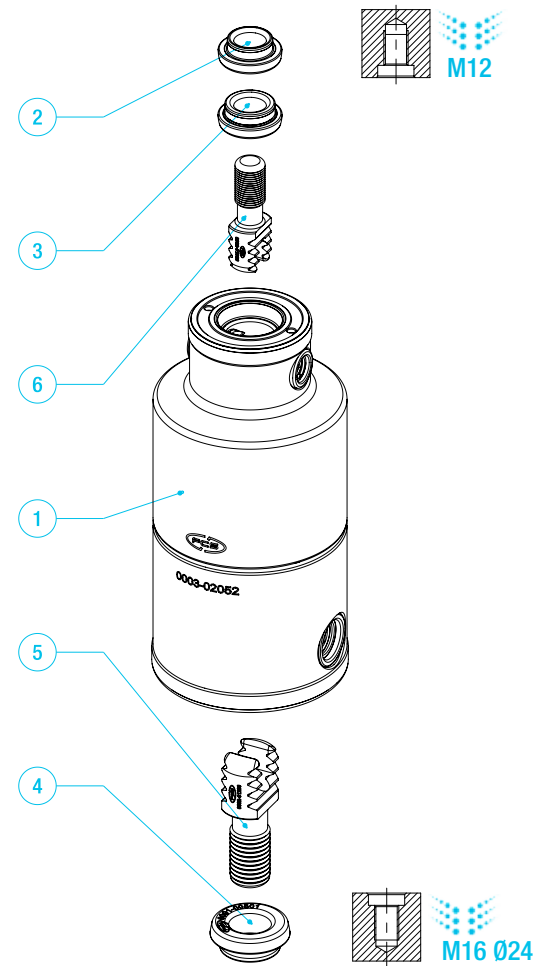
Description	Qty	CODE
1 BODY REDUCTION M16-M12 H60	1	0003-02001
2 RING M12 Ø18 H0	1	0001-00400
3 RING M12 Ø20 H0	1	0001-00401
4 RING M16 Ø24 H0	1	0001-00501
5 ROD M12 L27 H0	1	0002-01000
6 ROD M16 L35 H0	1	0002-01200

set weight 1.7 kg



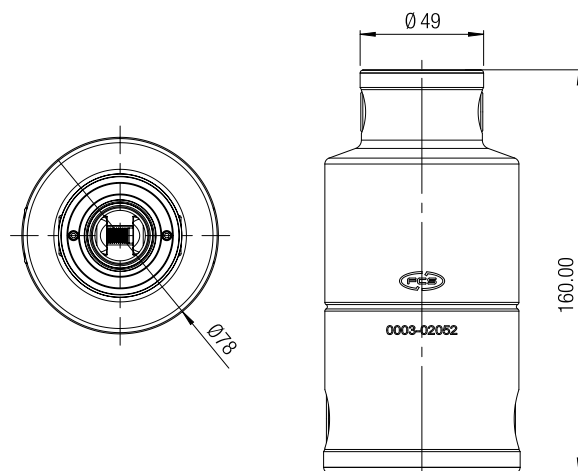
SET CODE 0004-07252

SET BODY REDUCTION M16-M12 H160



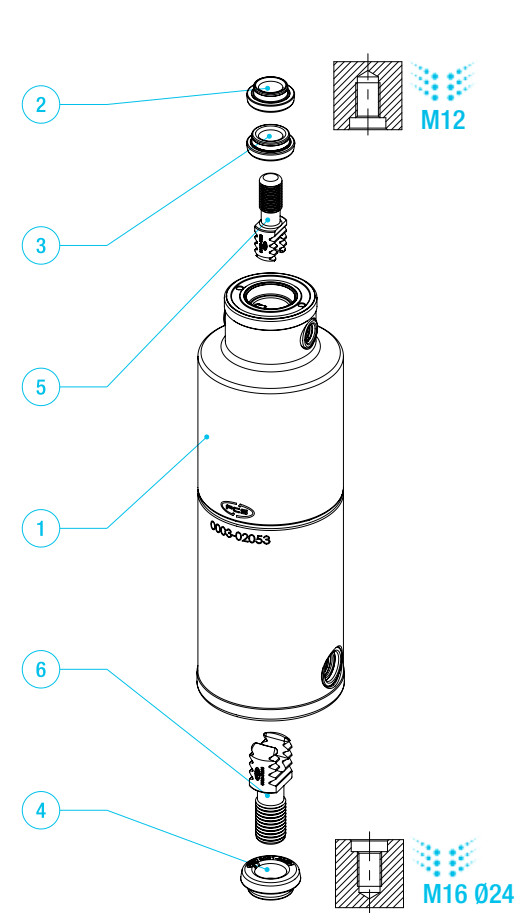
Description	Qty	CODE
1 BODY REDUCTION M16-M12 H160	1	0003-02052
2 RING M12 Ø18 H0	1	0001-00400
3 RING M12 Ø20 H0	1	0001-00401
4 RING M16 Ø24 H0	1	0001-00501
5 ROD M16 L35 H0	1	0002-01200
6 ROD M12 L27 H0	1	0002-01000

set weight 4.8 kg



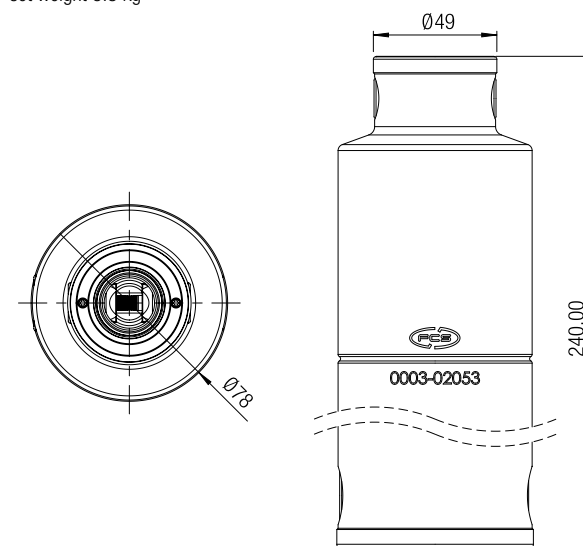
SET CODE 0004-07253

SET BODY REDUCTION M16-M12 H240



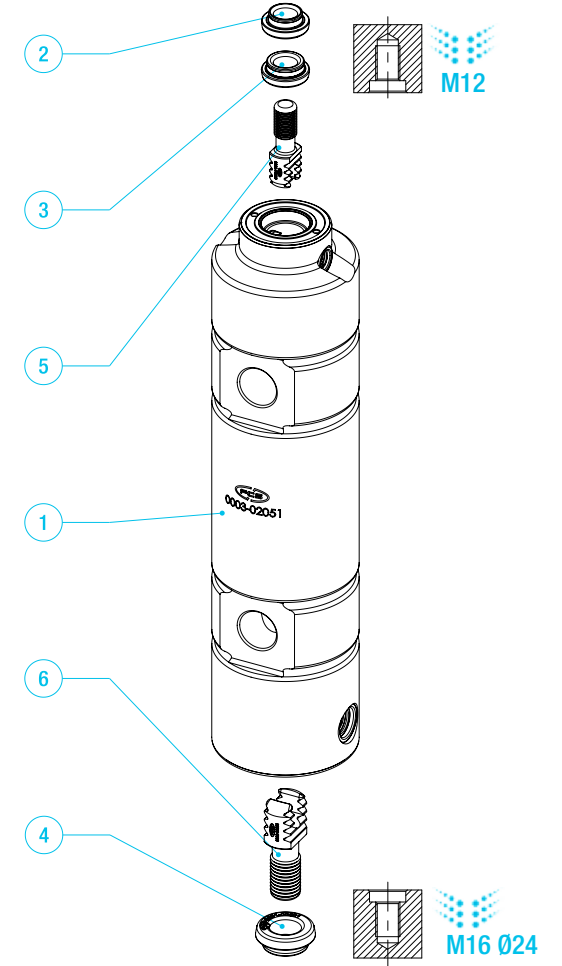
Description	Qty	CODE
1 BODY REDUCTION M16-M12 H240	1	0003-02053
2 RING M12 Ø18 H0	1	0001-00400
3 RING M12 Ø20 H0	1	0001-00401
4 RING M16 Ø24 H0	1	0001-00501
5 ROD M12 L27 H0	1	0002-01000
6 ROD M16 L35 H0	1	0002-01200

set weight 8.3 kg



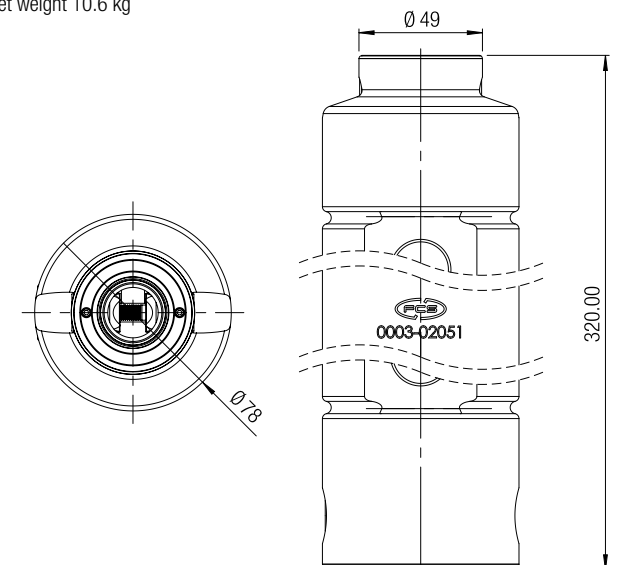
SET CODE 0004-07251

SET BODY REDUCTION M16-M12 H320



Description	Qty	CODE
1 BODY REDUCTION M16-M12 H320	1	0003-02051
2 RING M12 Ø18 H0	1	0001-00400
3 RING M12 Ø20 H0	1	0001-00401
4 RING M16 Ø24 H0	1	0001-00501
5 ROD M12 L27 H0	1	0002-01000
6 ROD M16 L35 H0	1	0002-01200

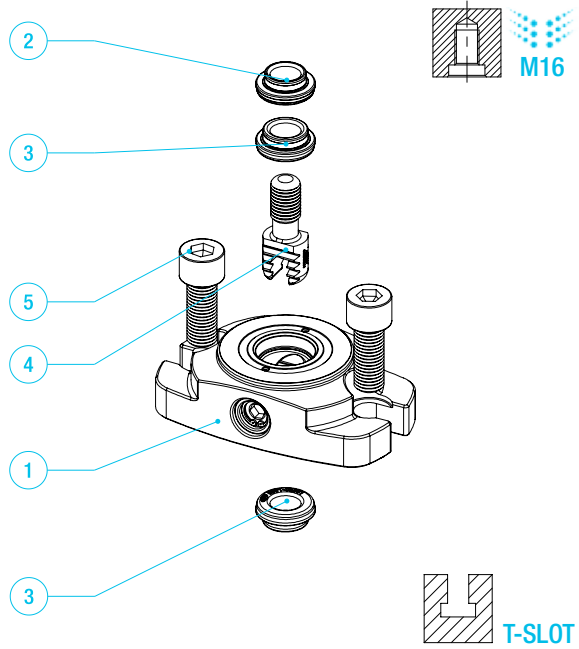
set weight 10.6 kg



SET CLAMP

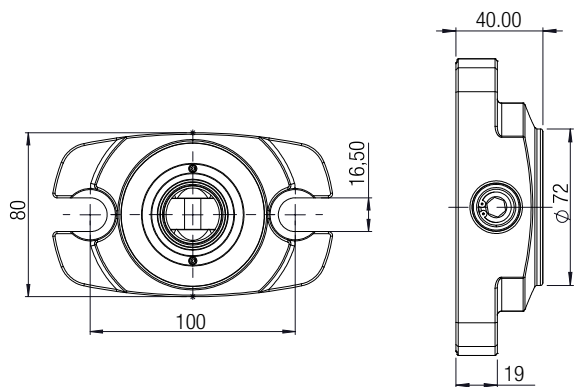
SET CLAMP

SET CODE 0004-07290
SET BODY M16 H40 V.2

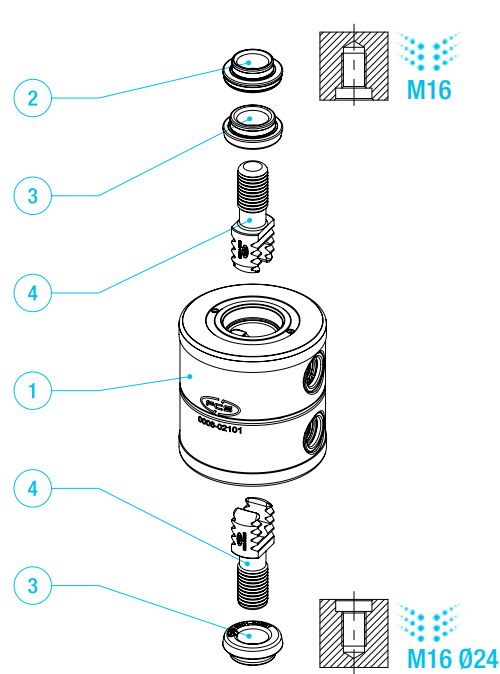


Description	Qty	CODE
1 BODY M16 H40 V.2	1	0003-02090
2 RING M16 Ø22 H0	1	0001-00500
3 RING M16 Ø24 H0	2	0001-00501
4 ROD M16 L35 H0	1	0002-01200
5 SCREW ISO 4762 M16x40 12.9 BURNISHED	2	4521-16040

set weight 2.4 kg

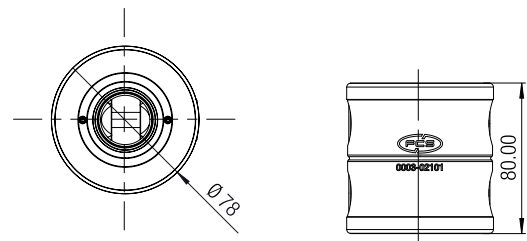


SET CODE 0004-07301
SET BODY M16 H80

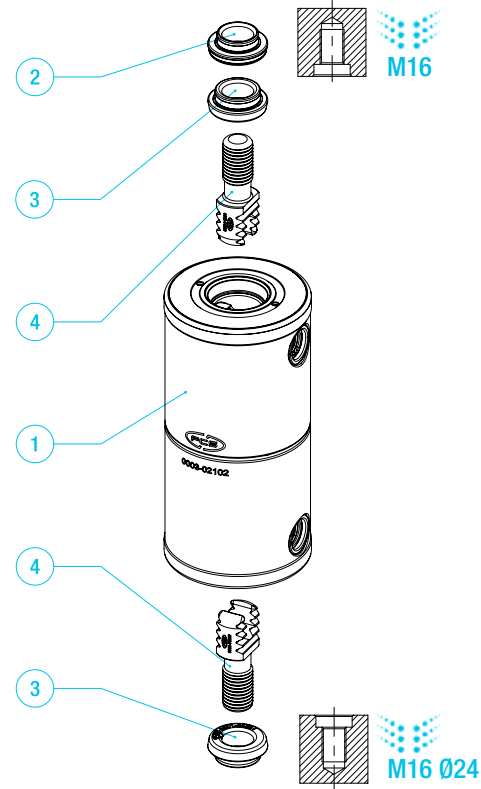


Description	Qty	CODE
1 BODY M16 H80	1	0003-02101
2 RING M16 Ø22 H0	1	0001-00500
3 RING M16 Ø24 H0	2	0001-00501
4 ROD M16 L35 H0	2	0002-01200

set weight 2.8 kg

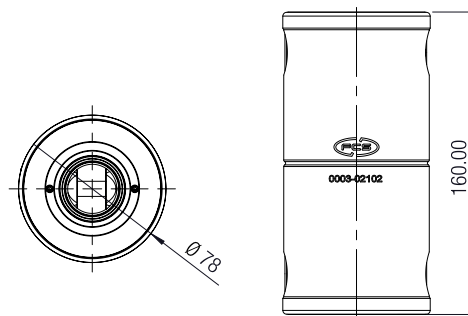


SET CODE 0004-07302
SET BODY M16 H160

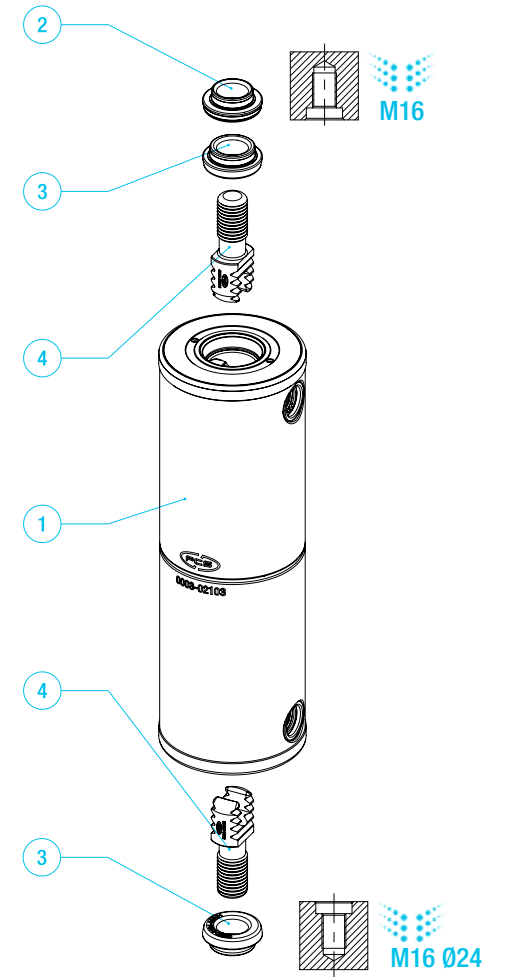


Description	Qty	CODE
1 BODY M16 H160	1	0003-02102
2 RING M16 Ø22 H0	1	0001-00500
3 RING M16 Ø24 H0	2	0001-00501
4 ROD M16 L35 H0	2	0002-01200

set weight 5.4 kg

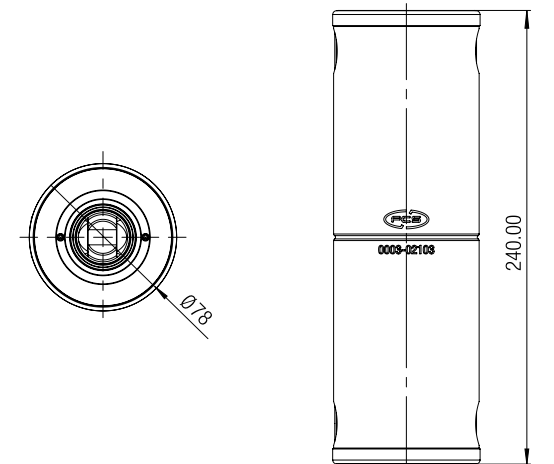


SET CODE 0004-07303
SET BODY M16 H240



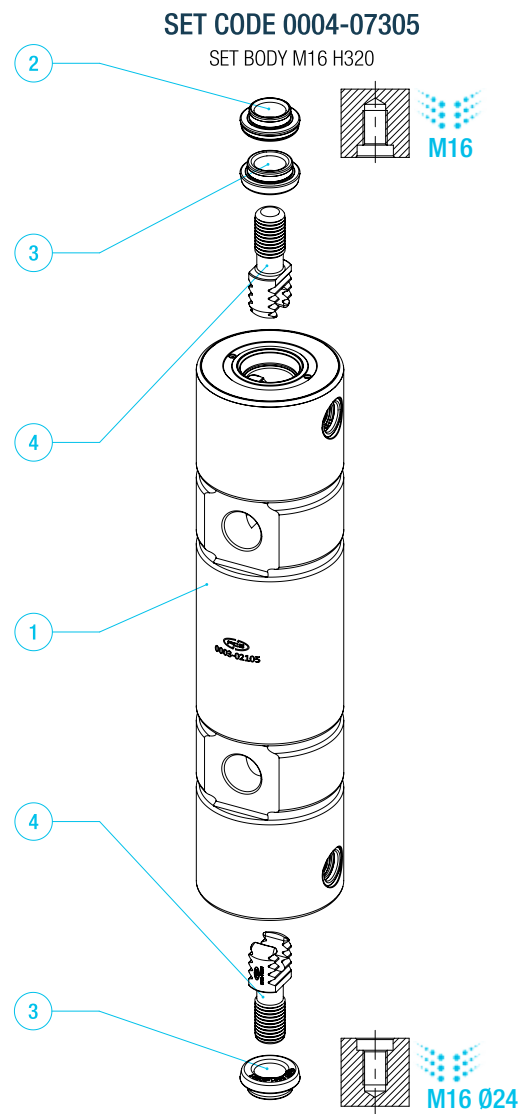
Description	Qty	CODE
1 BODY M16 H240	1	0003-02103
2 RING M16 Ø22 H0	1	0001-00500
3 RING M16 Ø24 H0	2	0001-00501
4 ROD M16 L35 H0	2	0002-01200

set weight 8.4 kg



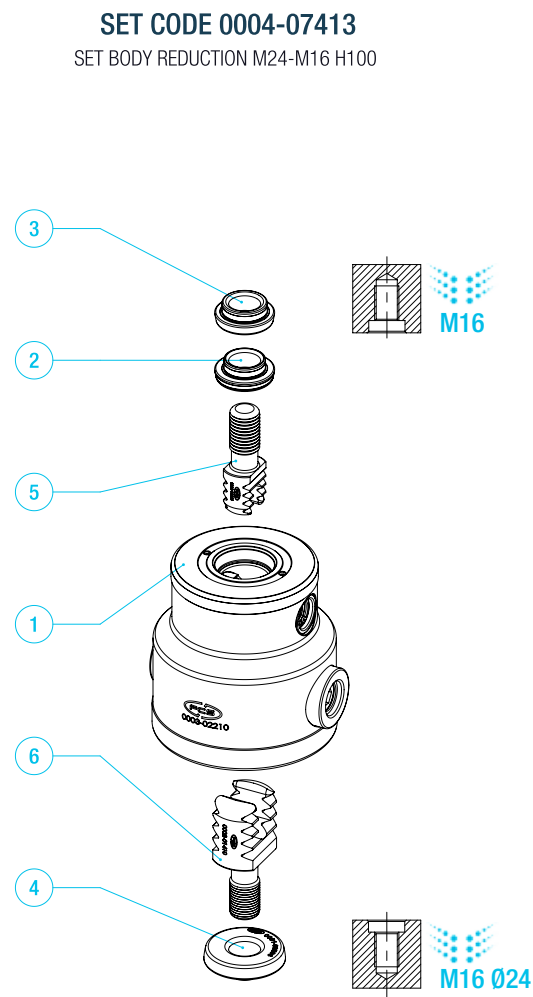
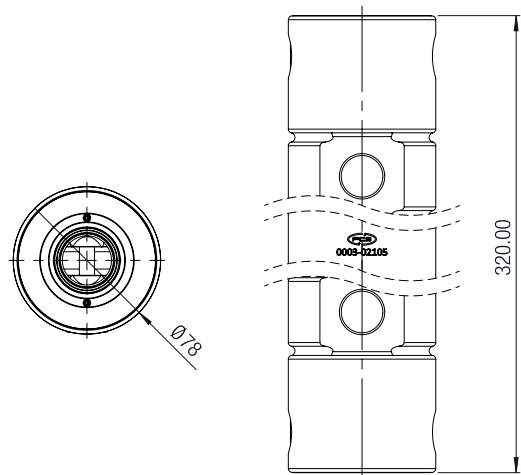
SET CLAMP

SET CLAMP



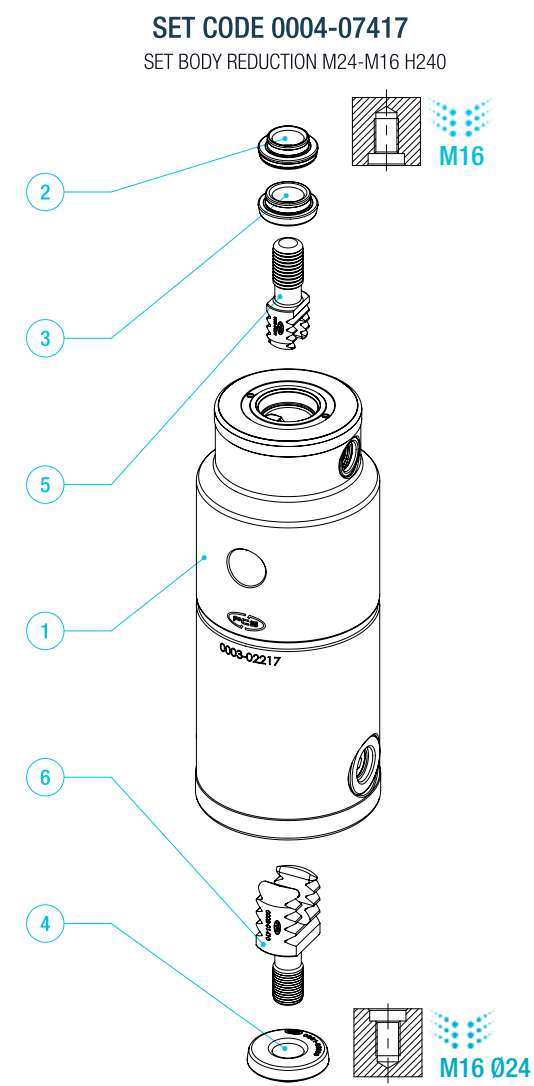
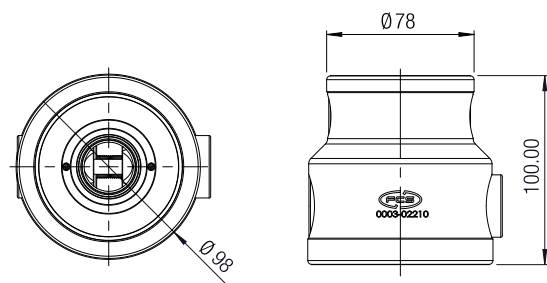
Description	Qty	CODE
1 BODY M16 H320	1	0003-02105
2 RING M16 Ø22 H0	1	0001-00500
3 RING M16 Ø24 H0	2	0001-00501
4 ROD M16 L35 H0	2	0002-01200

set weight 10.7 kg



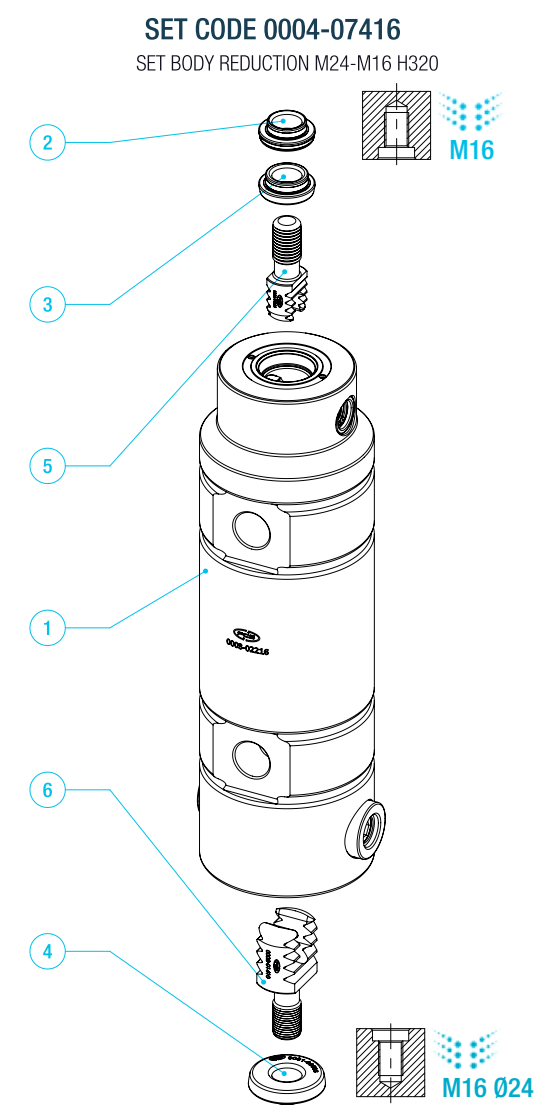
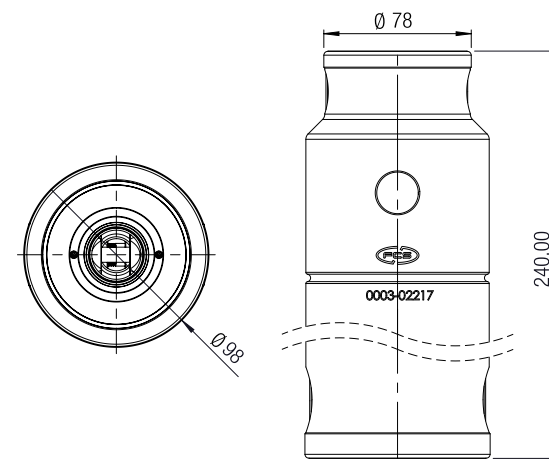
Description	Qty	CODE
1 BODY REDUCTION M24-M16 H100	1	0003-02210
2 RING M16 Ø22 H0	1	0001-00500
3 RING M16 Ø24 H0	1	0001-00501
4 RING REDUCTION M24-M16 Ø24 H0	1	0001-00506
5 ROD M16 L35 H0	1	0002-01200
6 ROD REDUCTION M24-M16 L37 H0	1	0002-01410

set weight 4.7 kg



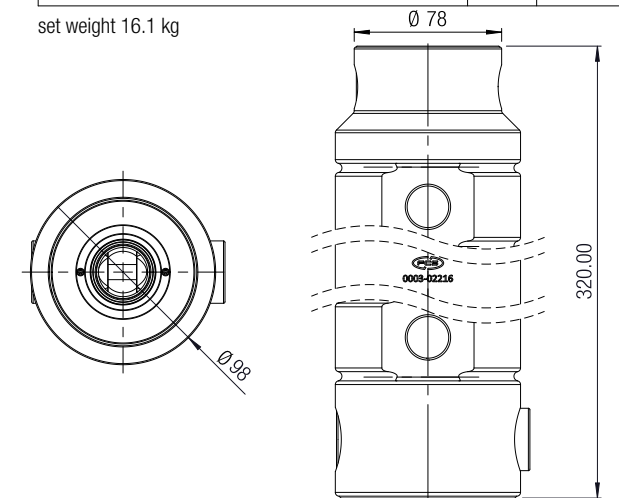
Description	Qty	CODE
1 BODY REDUCTION M24-M16 H240	1	0003-02217
2 RING M16 Ø22 H0	1	0001-00500
3 RING M16 Ø24 H0	1	0001-00501
4 RING REDUCTION M24-M16 Ø24 H0	1	0001-00506
5 ROD M16 L35 H0	1	0002-01200
6 ROD REDUCTION M24-M16 L37 H0	1	0002-01410

set weight 12.1 kg



Description	Qty	CODE
1 BODY REDUCTION M24-M16 H320	1	0003-02216
2 RING M16 Ø22 H0	1	0001-00500
3 RING M16 Ø24 H0	1	0001-00501
4 RING REDUCTION M24-M16 Ø24 H0	1	0001-00506
5 ROD M16 L35 H0	1	0002-01200
6 ROD REDUCTION M24-M16 L37 H0	1	0002-01410

set weight 16.1 kg

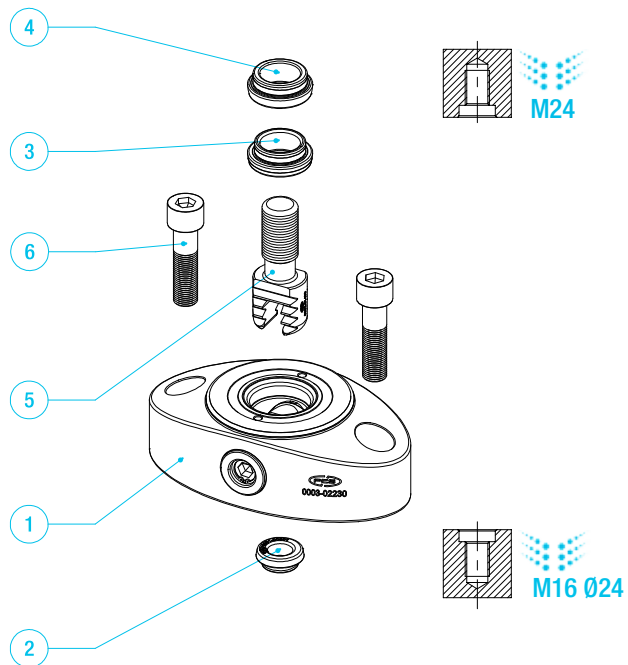


SET CLAMP

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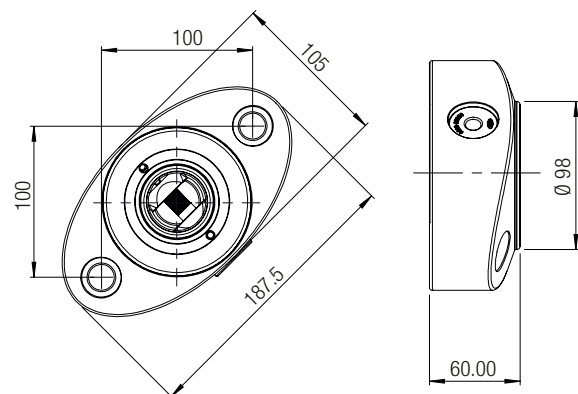
SET CODE 0004-07430

SET BODY M24 H60



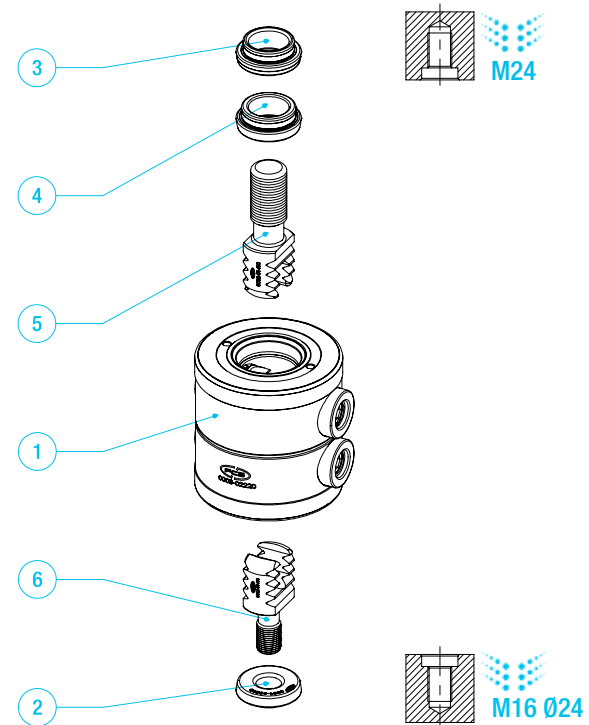
	Description	Qty	CODE
1	BODY M24 H60	1	0003-02230
2	RING M16 Ø24 HO	1	0001-00501
3	RING M24 Ø34 HO	1	0001-00600
4	RING M24 Ø36 HO	1	0001-00601
5	ROD M24 L55 HO	1	0002-01400
6	SCREW ISO 4762 M16x60 12.9 BURNISHED	2	4521-16060

set weight 6.5 kg



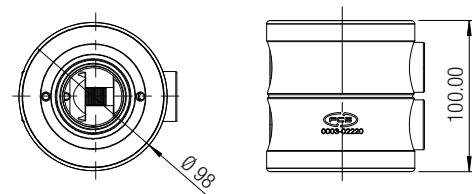
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SET BODY M24 H100



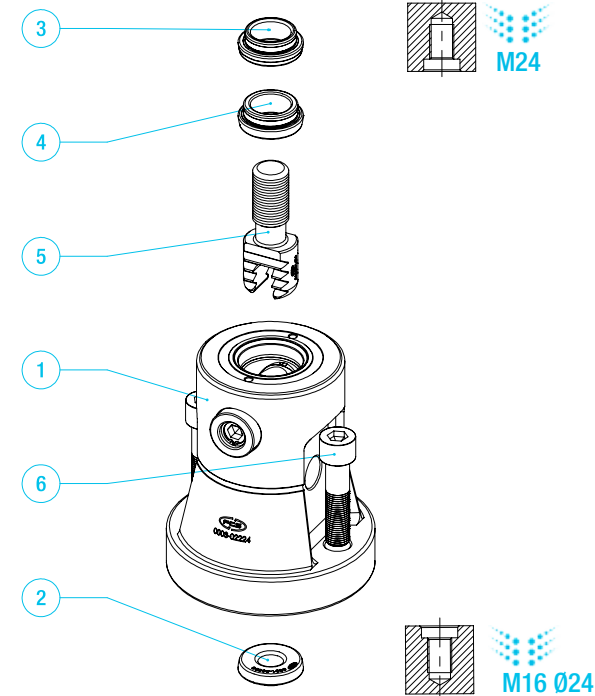
	Description	Qty	CODE
1	BODY M24 H100	1	0003-02220
2	RING REDUCTION M24-M16 Ø24 HO	1	0001-00506
3	RING M24 Ø34 HO	1	0001-00600
4	RING M24 Ø36 HO	1	0001-00601
5	ROD M24 L55 HO	1	0002-01400
6	ROD REDUCTION M24-M16 L37 HO	1	0002-01410

set weight 5.8 kg



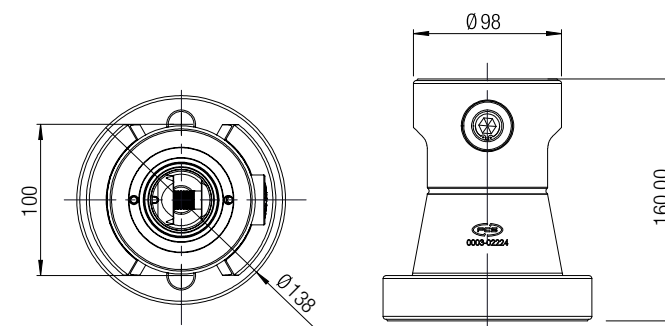
SET CODE 0004-07424

SET BODY M24 H160



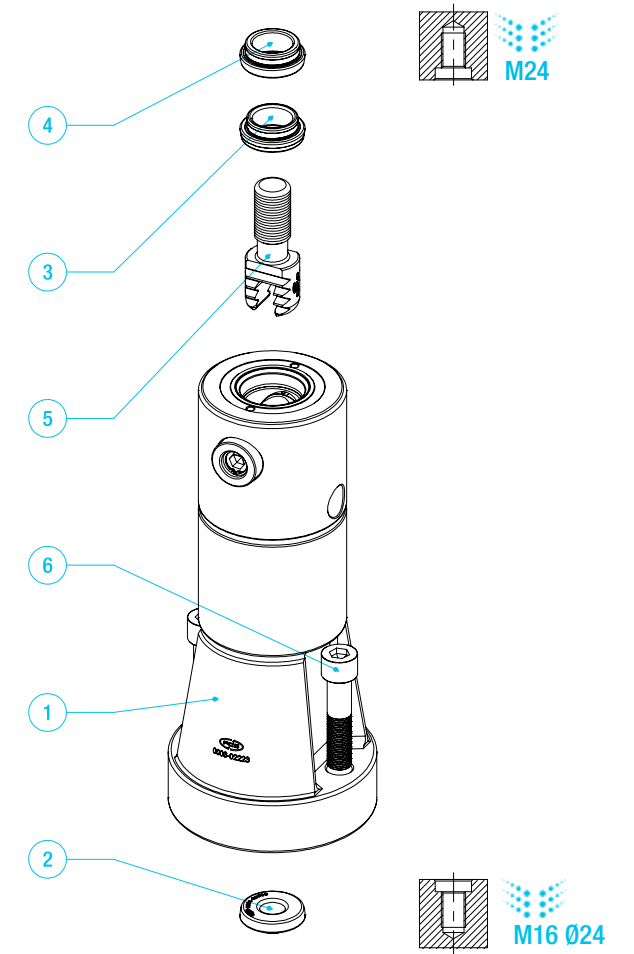
	Description	Qty	CODE
1	BODY M24 H160	1	0003-02224
2	RING REDUCTION M24-M16 Ø24 HO	1	0001-00506
3	RING M24 Ø34 HO	1	0001-00600
4	RING M24 Ø36 HO	1	0001-00601
5	ROD M24 L55 HO	1	0002-01400
6	SCREW ISO 4762 M16x65 12.9 BURNISHED	2	4521-16065

set weight 10.0 kg



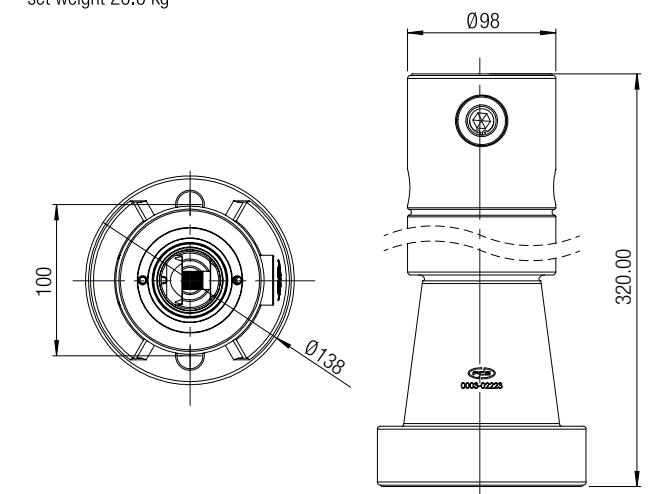
SET CODE 0004-07425

SET BODY M24 H320



	Description	Qty	CODE
1	BODY M24 H320	1	0003-02223
2	RING REDUCTION M24-M16 Ø24 HO	1	0001-00506
3	RING M24 Ø34 HO	1	0001-00600
4	RING M24 Ø36 HO	1	0001-00601
5	ROD M24 L55 HO	1	0002-01400
6	SCREW ISO 4762 M16x70 12.9 BURNISHED	2	4521-16070

set weight 20.0 kg



SET CLAMP

SET CLAMP

SET CODE 0004-07260

SET BODY VERTICAL M16 H70 ROD HOOK

SET CODE 0004-07261

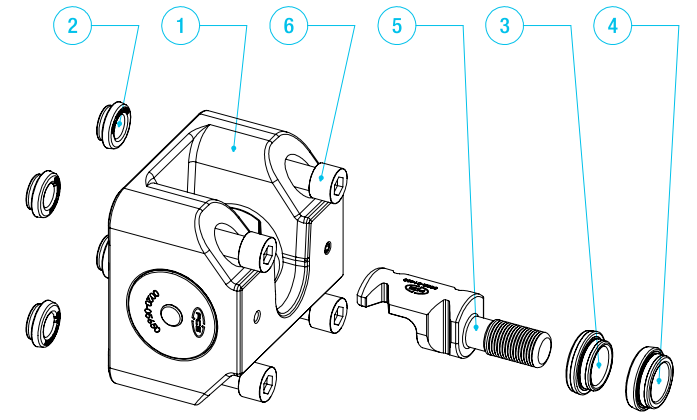
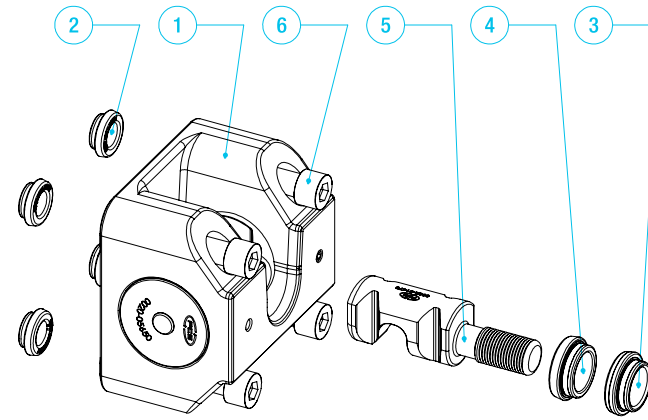
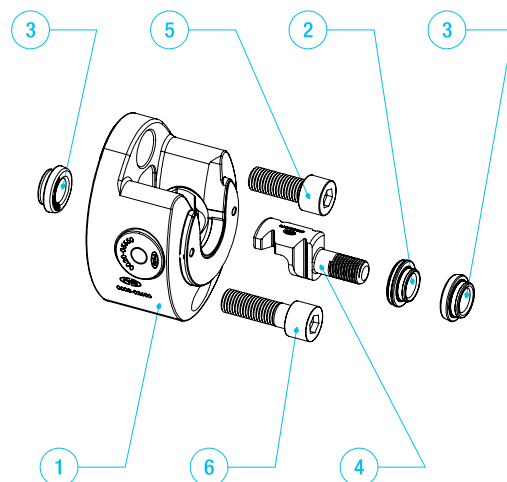
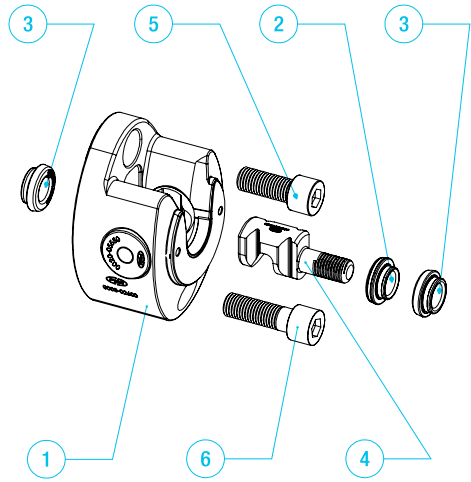
SET BODY VERTICAL M16 H70

SET CODE 0004-07700

SET BODY VERTICAL M24 H100 ROD HOOK

SET CODE 0004-07701

SET BODY VERTICAL M24 H100



Description	Qty	CODE
1 BODY VERTICAL M16 H70	1	0003-02600
2 RING M16 Ø22 HO	1	0001-00500
3 RING M16 Ø24 HO	2	0001-00501
4 ROD VERTICAL M16 L35 HO HOOK	1	0002-01350
5 SCREW ISO 4762 M16x40 12,9 BURNISHED	1	4521-16040
6 SCREW ISO 4762 M16x50 12,9 BURNISHED	1	4521-16050

set weight 4.2 kg

Description	Qty	CODE
1 BODY VERTICAL M16 H70	1	0003-02600
2 RING M16 Ø22 HO	1	0001-00500
3 RING M16 Ø24 HO	2	0001-00501
4 ROD VERTICAL M16 L35 HO	1	0002-01375
5 SCREW ISO 4762 M16x40 12,9 BURNISHED	1	4521-16040
6 SCREW ISO 4762 M16x50 12,9 BURNISHED	1	4521-16050

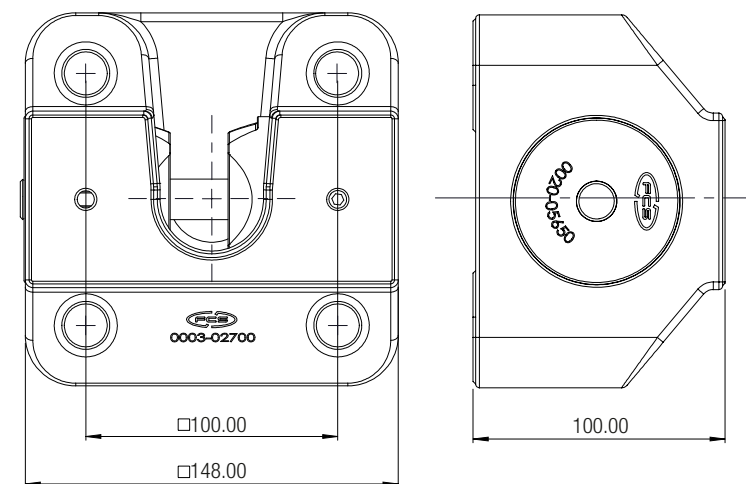
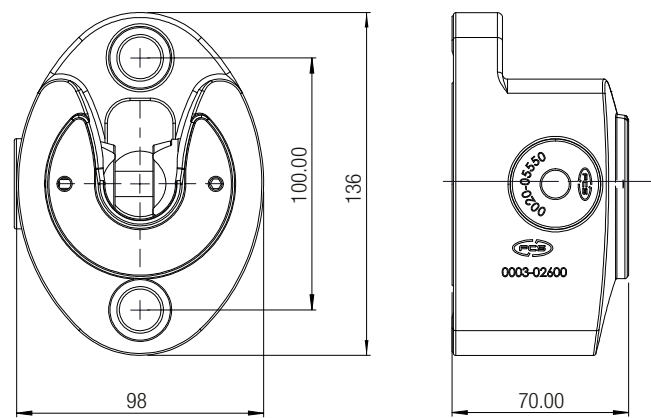
set weight 4.2 kg

Description	Qty	CODE
1 BODY VERTICAL M24 H100	1	0003-02700
2 RING M16 Ø24 HO	4	0001-00501
3 RING M24 Ø34 HO	1	0001-00600
4 RING M24 Ø36 HO	1	0001-00601
5 ROD VERTICAL M24 L55 HO HOOK	1	0002-01475
6 SCREW ISO 4762 M16x90 12,9 BURNISHED	4	4521-16090

set weight 12.5 kg

Description	Qty	CODE
1 BODY VERTICAL M24 H100	1	0003-02700
2 RING M16 Ø24 HO	4	0001-00501
3 RING M24 Ø34 HO	1	0001-00600
4 RING M24 Ø36 HO	1	0001-00601
5 ROD VERTICAL M24 L55 HO	1	0002-01490
6 SCREW ISO 4762 M16x90 12,9 BURNISHED	4	4521-16090

set weight 12.5 kg

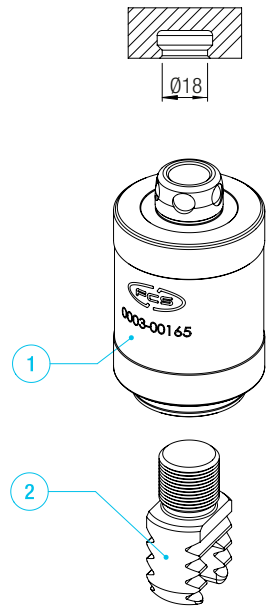


SET CLAMP

CLAMPING FORCES AND TIGHTENING TORQUES

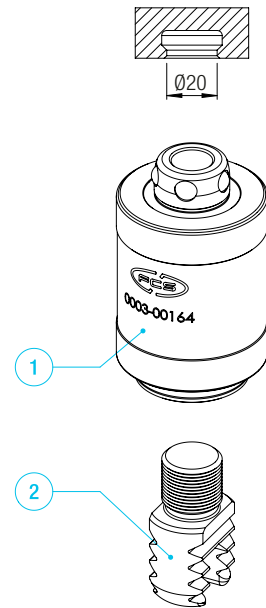
SET CODE 0004-00165

SET BODY WITHOUT THREAD M16 Ø18 H50



SET CODE 0004-00164

SET BODY WITHOUT THREAD M16 Ø20 H50

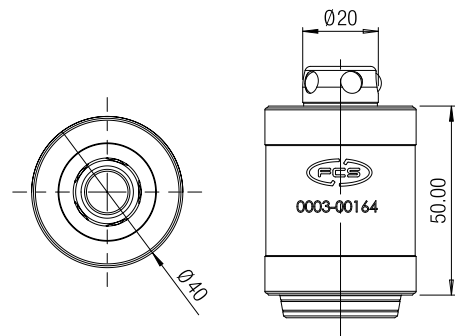
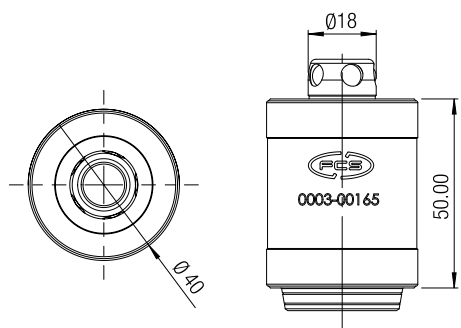


Description	Qty	CODE
1 BODY WITHOUT THREAD M16 Ø18 H50	1	0003-00165
2 ROD M16 L16 H0	1	0002-01202

set weight 0.6 kg

Description	Qty	CODE
1 BODY WITHOUT THREAD M16 Ø20 H50	1	0003-00164
2 ROD M16 L16 H0	1	0002-01202

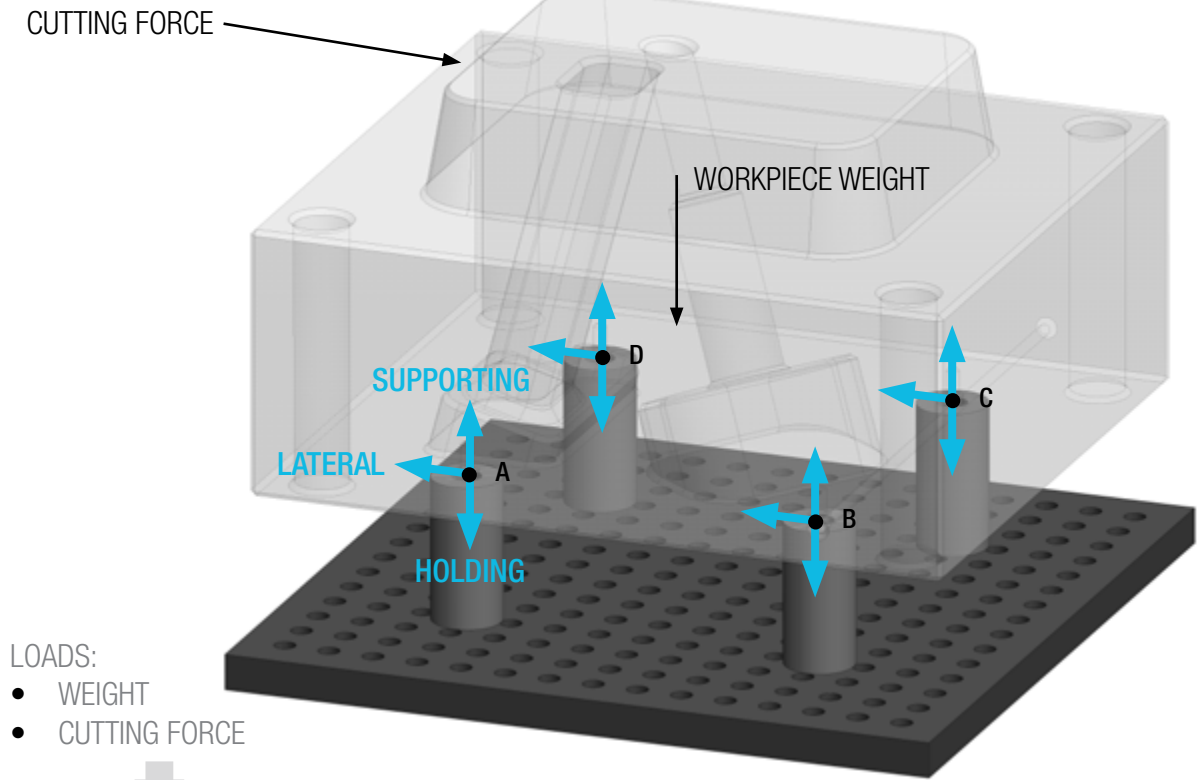
set weight 0.6 kg



HOLDING FORCE AND TIGHTENING TORQUE

The loads acting on the workpiece (cutting force and weight) are counteracted by the clamping reactions. The clamping reactions can not exceed the corresponding admissible clamping force values (which are provided in the following pages).

The clamping forces can be divided in longitudinal (**HOLDING** and **SUPPORTING**) and **LATERAL** forces.

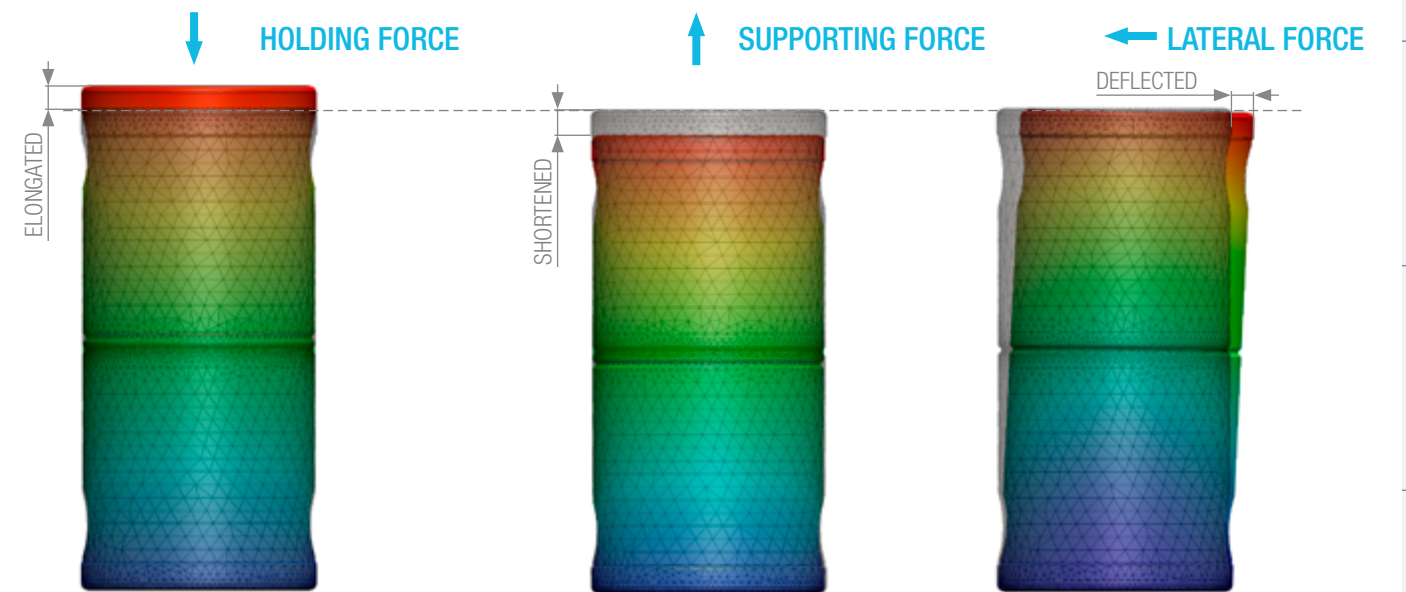


- LOADS:
- WEIGHT
 - CUTTING FORCE

REACTION TO LOADS ≤ ALLOWABLE FORCES

- (R)
- HOLDING FORCE (F_H)
 - SUPPORTING FORCE (F_S)
 - LATERAL FORCE (F_L)

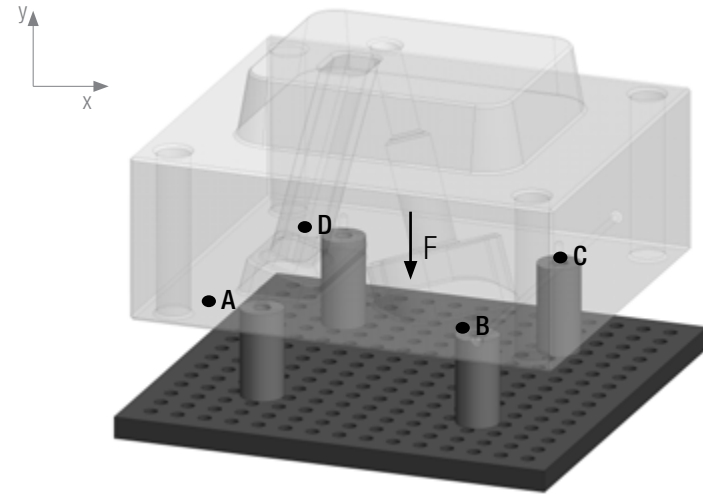
This verifications shall be applied for each clamping point A,B,C, D.



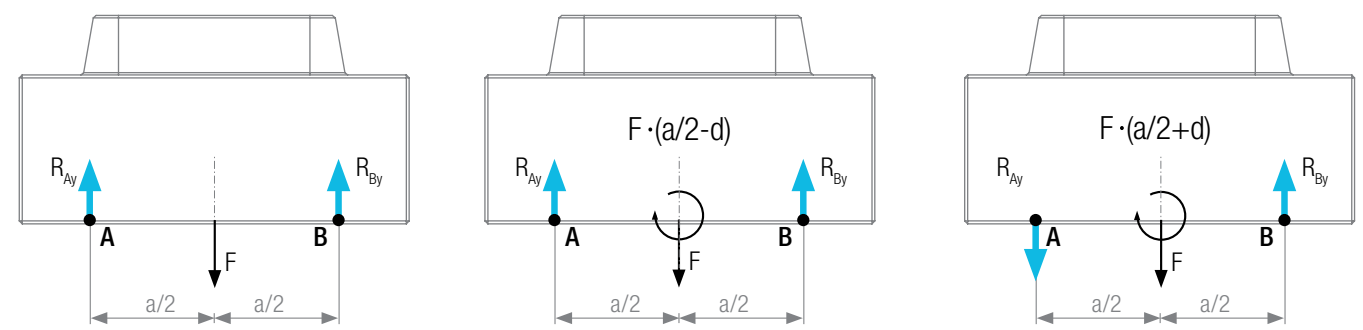
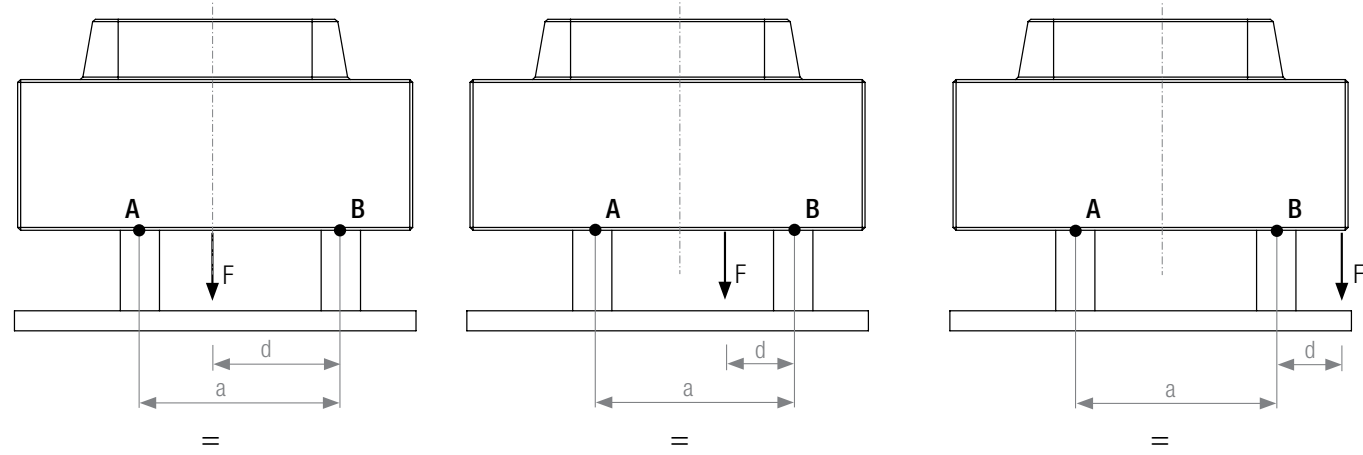
REACTION TO LOADS EXAMPLES

REACTION TO LOADS EXAMPLES

HORIZONTAL CLAMPING



SYMBOL	DESCRIPTION
F	LOADS (WORKPIECE WEIGHT, CUTTING TOOL FORCE)
F _H	HOLDING FORCE
F _S	SUPPORTING FORCE
F _L	LATERAL FORCE
R	REACTION TO LOADS
A, B, C, D	CLAMPING POINTS
a	DISTANCE BETWEEN CLAMPING POINTS
d	DISTANCE OF THE FORCE



$$R_{Ay} = R_{By} = R_{Cy} = R_{Dy} = \frac{F}{4} \leq F_s$$

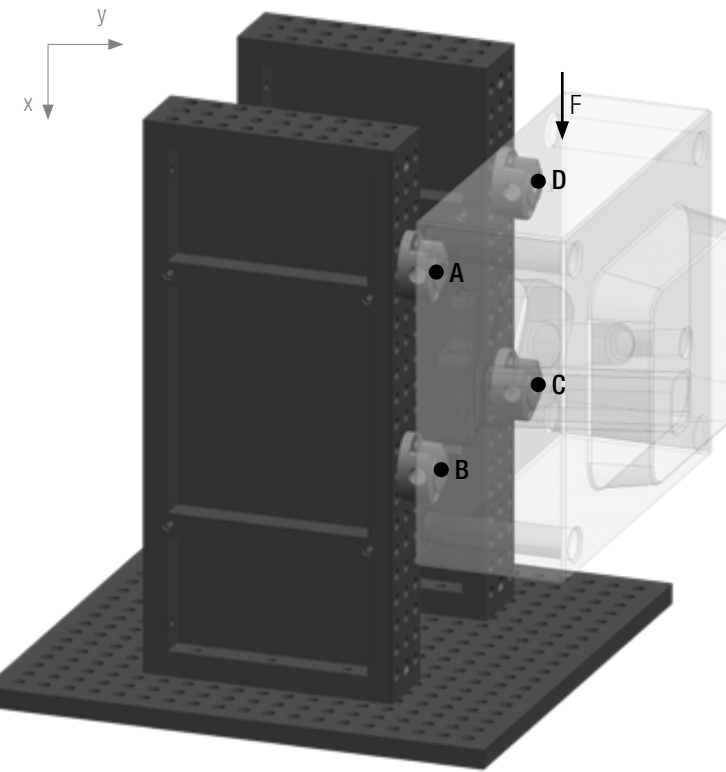
$$R_{Ay} = R_{Dy} = \frac{F \cdot d}{2 \cdot a} \leq F_H$$

$$R_{By} = R_{Cy} = \frac{F \cdot (a-d)}{2 \cdot a} \leq F_s$$

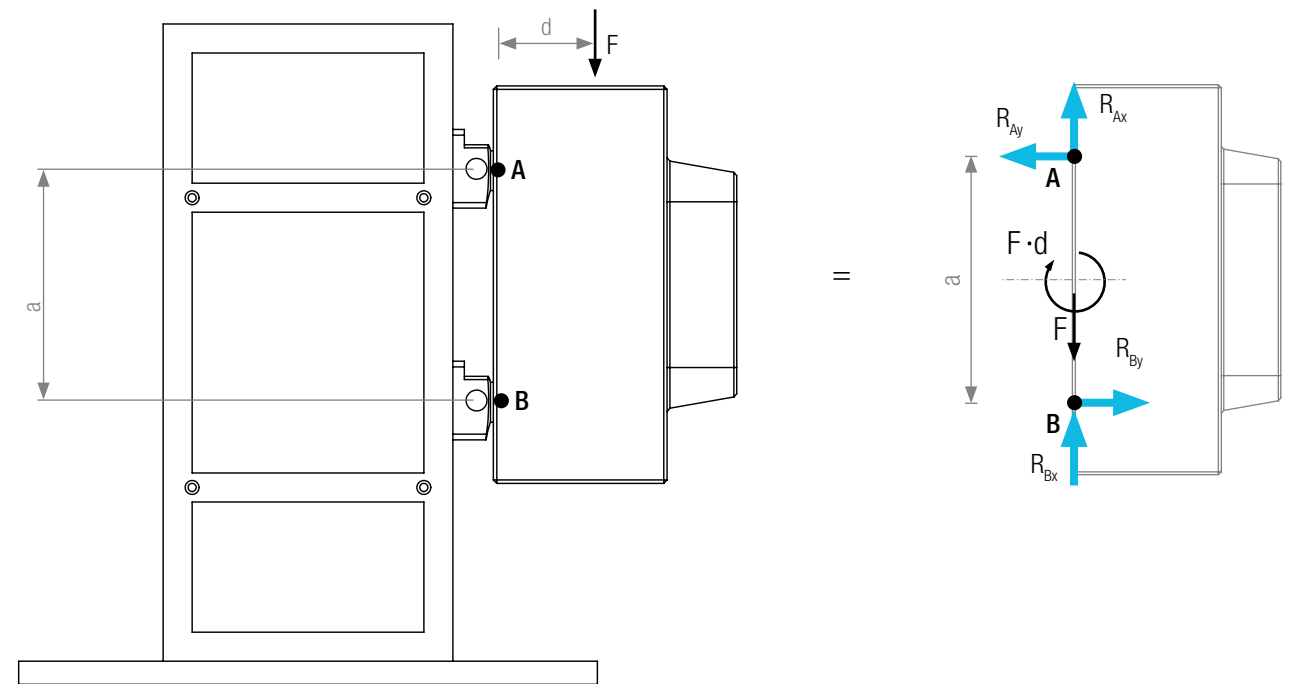
$$R_{Ay} = R_{Dy} = \frac{F \cdot d}{2 \cdot a} \leq F_H$$

$$R_{By} = R_{Cy} = \frac{F \cdot (a+d)}{2 \cdot a} \leq F_s$$

VERTICAL CLAMPING



SYMBOL	DESCRIPTION
F	LOADS (WORKPIECE WEIGHT, CUTTING TOOL FORCE)
F _H	HOLDING FORCE
F _S	SUPPORTING FORCE
F _L	LATERAL FORCE
R	REACTION TO LOADS
A, B, C, D	CLAMPING POINTS
a	DISTANCE BETWEEN CLAMPING POINTS
d	DISTANCE OF THE FORCE



$$R_{Ay} = R_{Dy} = \frac{F \cdot d}{2 \cdot a} \leq F_H$$

$$R_{By} = R_{Cy} = \frac{F \cdot d}{2 \cdot a} \leq F_s$$

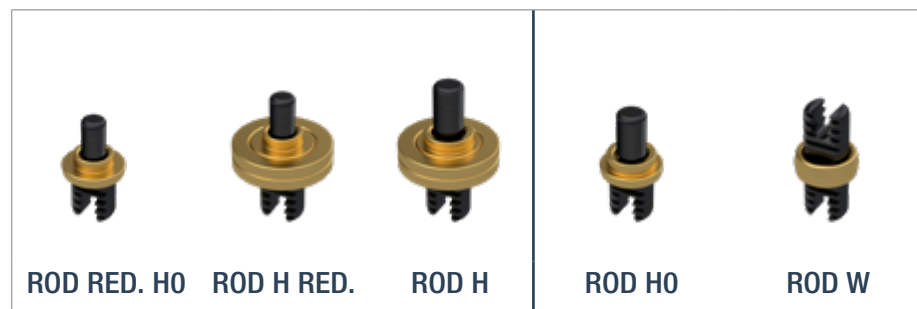
$$R_{Ax} = R_{Bx} = R_{Cx} = R_{Dx} = \frac{F}{4} \leq F_L$$

CLAMPING FORCES AND TIGHTENING TORQUES

CLAMPING FORCES AND TIGHTENING TORQUES

HOLDING FORCE AND TIGHTENING TORQUE

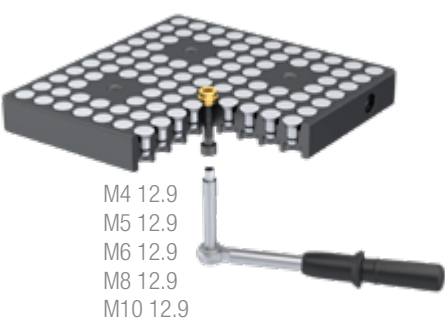
Max tensile load that the clamping system is able to withstand



JAW SIZE	HEX	TORQUE (Nm)	HOLDING FORCE (N)	TORQUE (Nm)	HOLDING FORCE (N)
JAW M10	5	10	9500	12	9500
JAW M12	5	12	9500	15	15000
JAW M16	8	45	15000	55	31200
JAW M24	10	75	31200	100	37600
JAW VERTICAL M16	10	75	32500	100	39000
JAW VERTICAL M24	14	-	-	200	60000

The holding force is transmitted to the Rod by applying a specific tightening torque according to the Jaw size and the Rod type.
The holding force value can vary depending on the actual application (mainly on the friction condition).

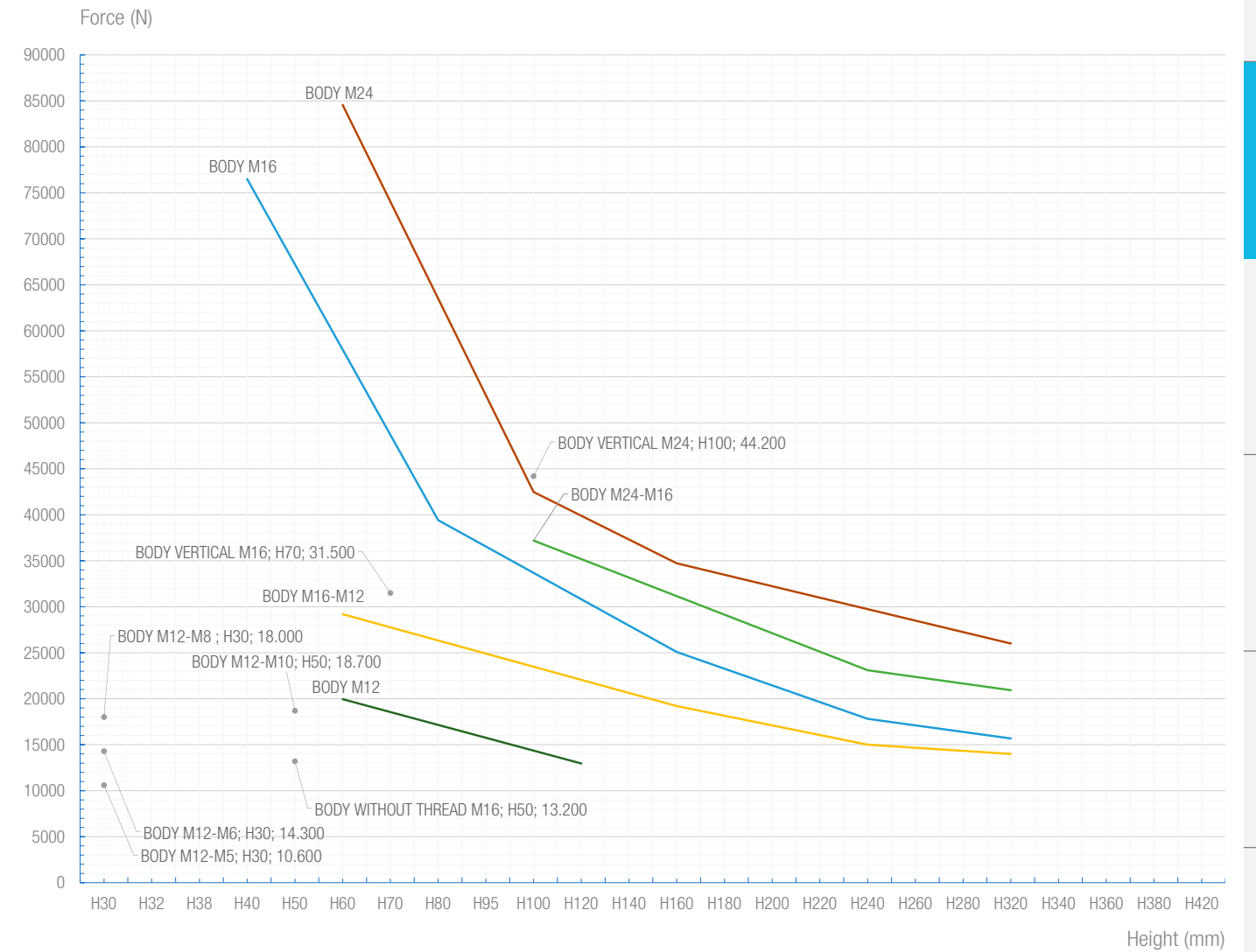
FIXING SCREWS	HEX (mm)	TORQUE (Nm)	HOLDING FORCE (N)
M4 12.9	3	5	1450
M5 12.9	4	10	2350
M6 12.9	5	15	3350
M8 12.9	6	30	6100
M10 12.9	8	60	9700
M12 12.9	10	100	14150
M16 12.9	14	160	26350
		200	



SUPPORTING FORCE

Max compressive force that the clamping system is able to withstand

BODY



RING H

RING H SIZE	SUPPORTING FORCE (N)
RING H M5 Ø14 H8	13600*8/H _{Ring}
RING H M6 Ø22 H8	34740*8/H _{Ring}
RING H M8 Ø25 H10	36220*10/H _{Ring}
RING H M10 Ø28 H15	38520*15/H _{Ring}
RING H M12 Ø40 H10	79580*10/H _{Ring}
RING H M16 Ø40 H25	38250*25/H _{Ring}
RING H M24 Ø78 H20	182000*20/H _{Ring}

H_{Ring} = height of the total number of Ring H used on the stack (mm).



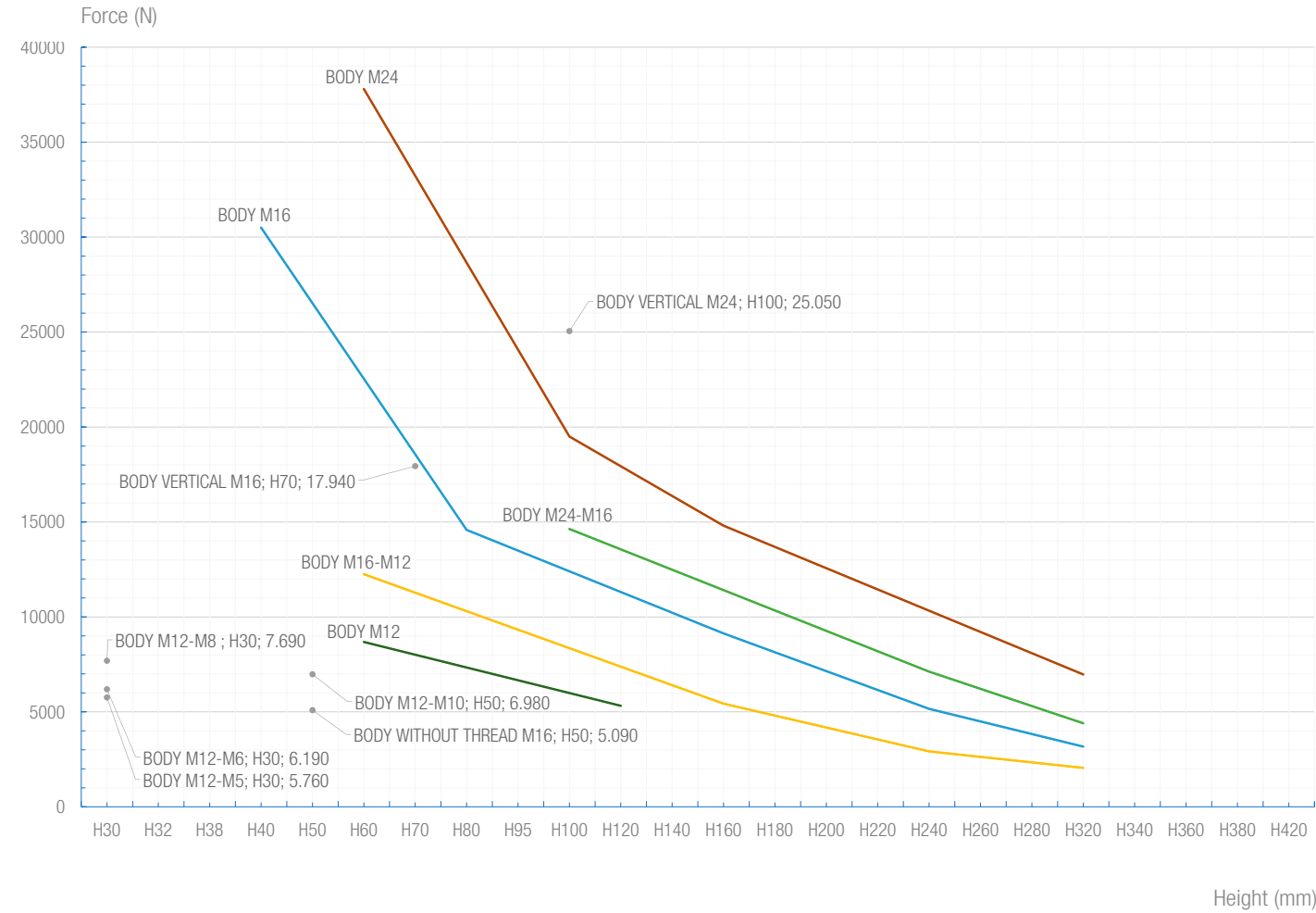
CLAMPING FORCES AND TIGHTENING TORQUES

CLAMPING FORCES AND TIGHTENING TORQUES

LATERAL FORCE

Max shear load that the clamping system is able to withstand

BODY



RING H

RING H SIZE	LATERAL FORCE (N)	
	On Body	On Pallet
RING H M5 Ø14 H8	-	$4100 * (0,3 + 5,6/H_{Ring})^3$
RING H M6 Ø22 H8	$F_{Body} * (1 - 0,7H_{Ring}/H)^3$	$13520 * (0,3 + 5,6/H_{Ring})^3$
RING H M8 Ø25 H10	$F_{Body} * (1 - 0,7H_{Ring}/H)^3$	$12590 * (0,3 + 7/H_{Ring})^3$
RING H M10 Ø28 H15	$F_{Body} * (1 - 0,7H_{Ring}/H)^3$	$10260 * (0,3 + 10,5/H_{Ring})^3$
RING H M12 Ø40 H10	$F_{Body} * (1 - 0,7H_{Ring}/H)^3$	-
RING H M16 Ø40 H25	$F_{Body} * (1 - 0,7H_{Ring}/H)^3$	-
RING H M24 Ø78 H20	$F_{Body} * (1 - 0,7H_{Ring}/H)^3$	-



H_{Ring} = Height of the total number of Ring H used on the stack (mm).
 F_{Body} = Lateral force of the Body; see above diagram (N).
 H = Total height of the stack (mm).

CLAMPING FORCES OF STACKS

SINGLE-COMPONENT STACK

The clamping force value of each component is given by the corresponding table and diagram.

Example

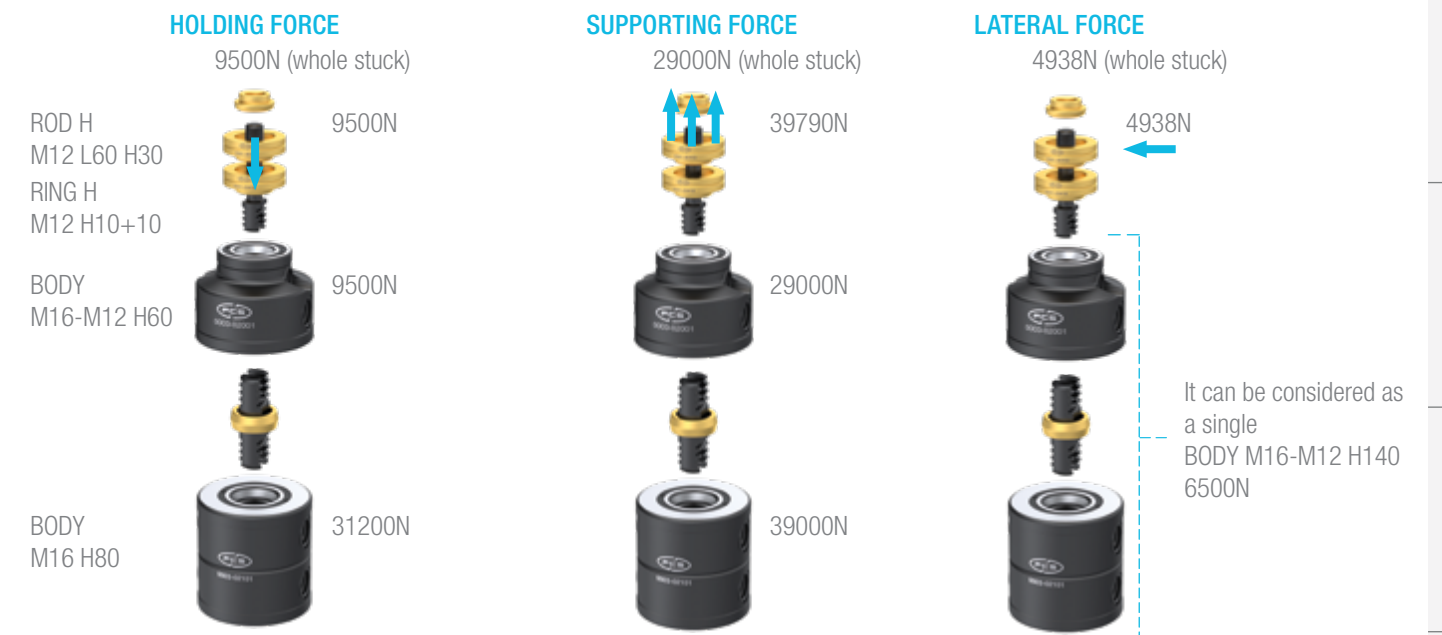
BODY M16 H80



MULTI-COMPONENTS STACK

See the instructions below

Example



The Holding force of the entire stack is equal to the holding force of its weakest component; the value of each component is given by the Holding force table.

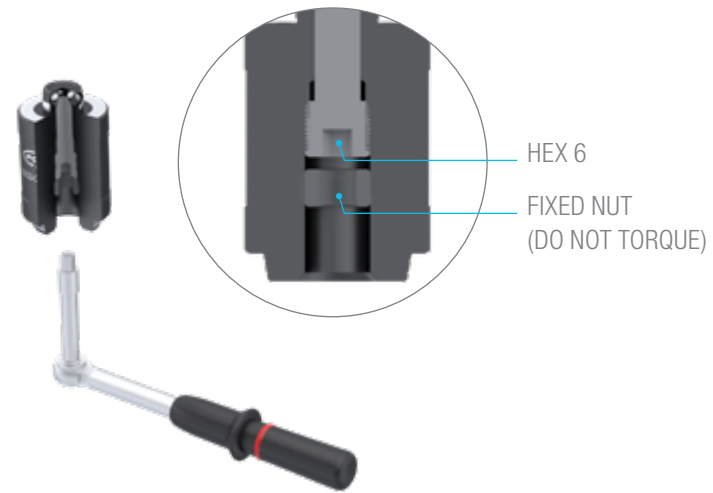
The Supporting force of the entire stack is equal to the holding force of its weakest component; the value of each component is given by the Supporting force diagram (Body) and table (Ring H).

The lateral force of the entire stack is lower than the weakest component; the values are given by the lateral force diagram (Body) and table (Ring H). A multi-Bodies stack can in some case be considered as a single Body and the corresponding value can be read from the lateral force diagram.

CLAMPING FORCES AND TIGHTENING TORQUES

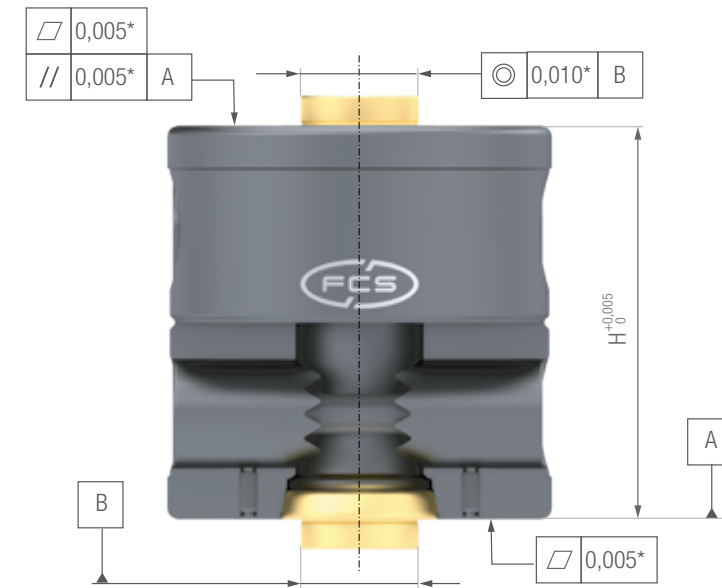
ACCURACY

WITHOUT THREAD



	HEX	TORQUE (Nm)		HOLDING FORCE (N)		SUPPORTING FORCE (N)	LATERAL FORCE (N)
		SOFT MATERIAL HRC<30	HARD MATERIAL HRC>30	SOFT MATERIAL HRC<30	HARD MATERIAL HRC>30		
BODY WITHOUT THREAD M16 Ø18 H50	6	30	35	17400	20300	13200	5090
BODY WITHOUT THREAD M16 Ø20 H50							

ACCURACY



*This value is valid for Bodies with height up to 80mm

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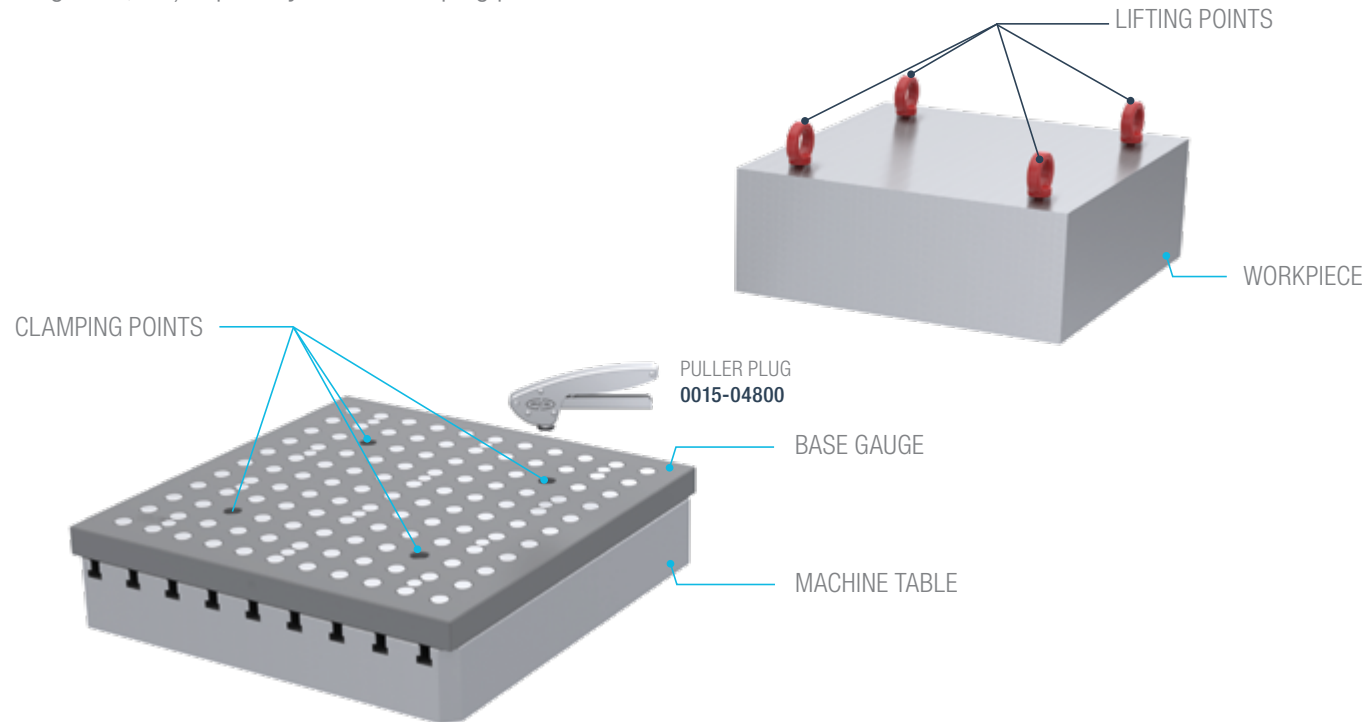
CLAMPING PROCEDURE

CLAMPING PROCEDURE

MOUNTING PROCEDURE

a) CLEANING

On the identified clamping points of the Base gauge, remove the plugs using the Puller plug. Clean the Base Gauge and the clamping surface of the workpiece (compressed air gun, sharpening stone for polishing, cleaning cloth, etc) especially on the clamping points area.

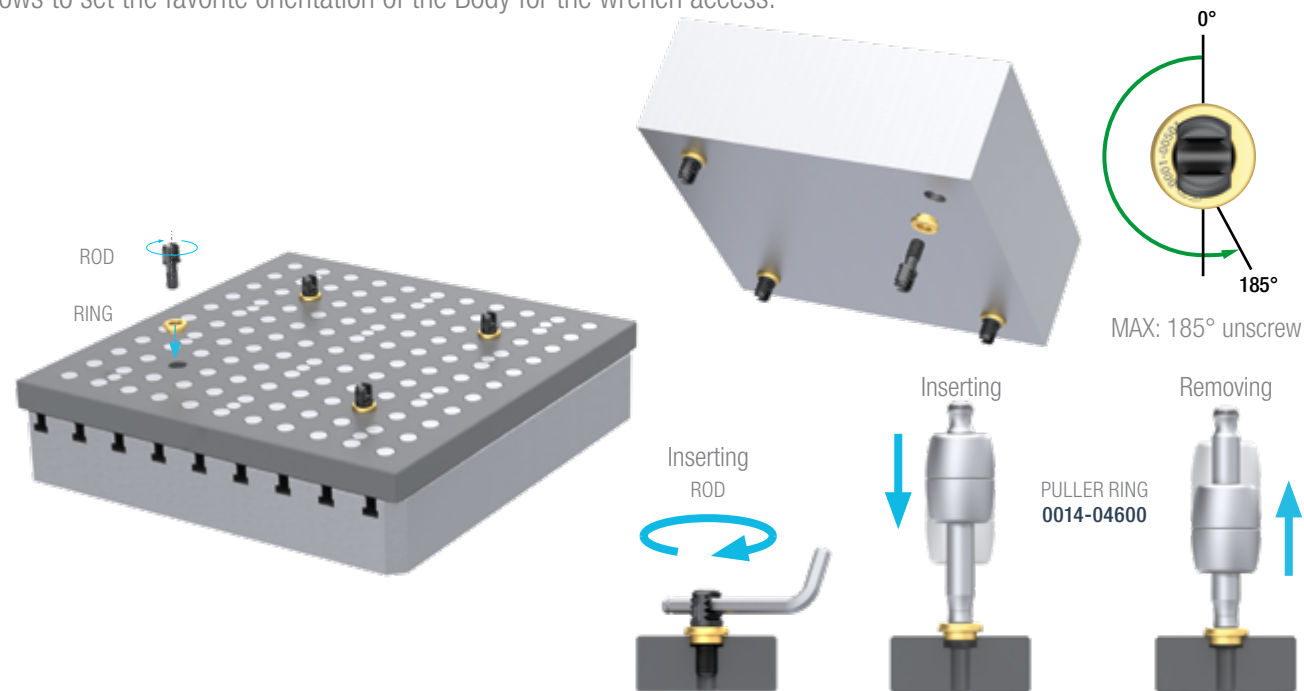


b) INSERTING OF THE RINGS AND SCREWING THE RODS

Insert the Rings straight into the counterbores of the clamping seats using:

- the Rod: once the Ring is just positioned on the seat, insert it by screwing the Rod up to the end limit;
- the Puller Ring code 0014-04600 (and the corresponding Adapter if requested).

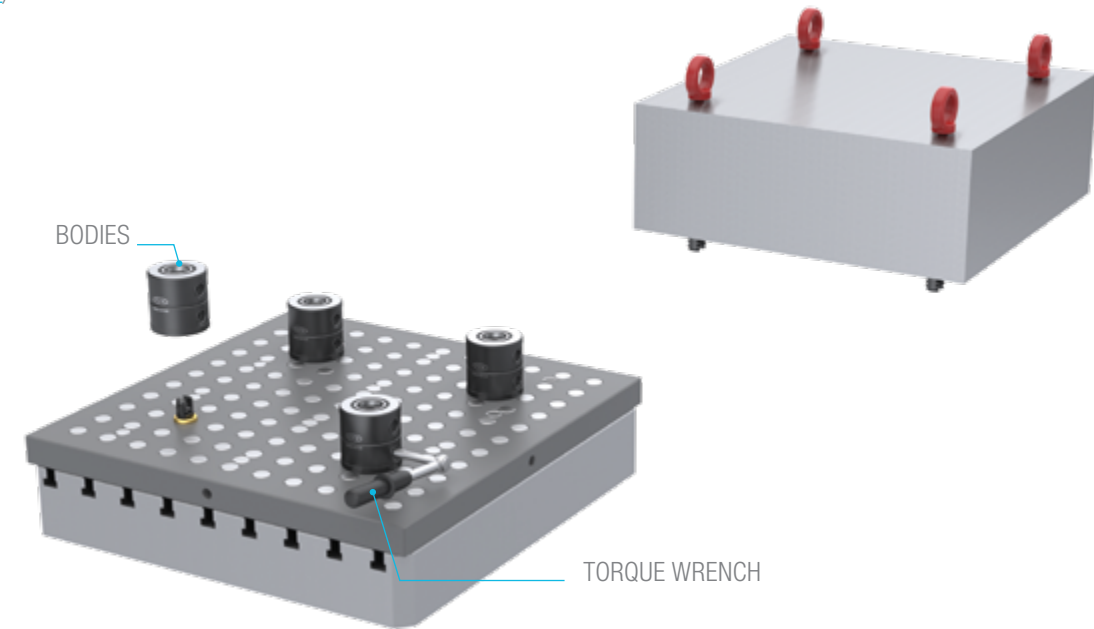
Make sure the Ring goes fully into the counterbore. Do not force the Ring into the counterbore if it is not properly placed straight. Remove it with the Puller ring and re-insert it properly. Screw the Rod up to the end limit. The orientation of the Rod can be adjusted by unscrewing it up to max 185° back. This allows to set the favorite orientation of the Body for the wrench access.



c) MOUNTING OF THE REMAINING CLAMPING COMPONENTS

Mount the remaining clamping components (Bodies, Pallets, etc.) on the Base Gauges making sure that their mating surfaces are clean.

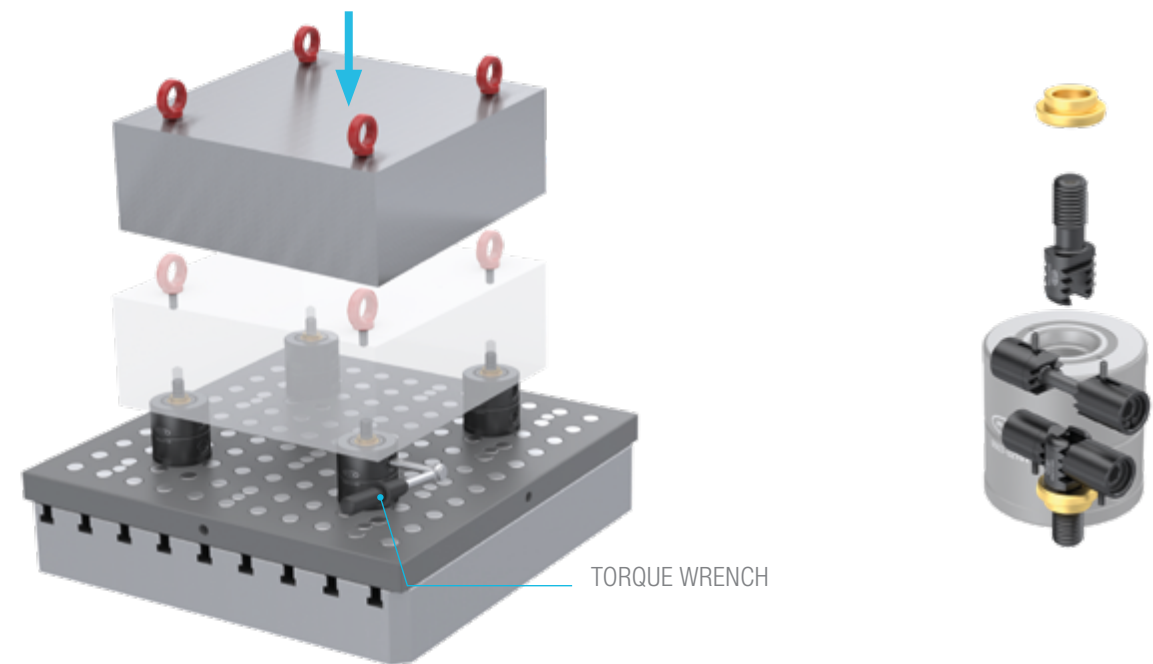
Tighten the jaws of the mated clamping components (using the recommended tightening torques: [SEE THE CORRESPONDING SECTION](#))



d) WORKPIECE: POSITIONING AND CLAMPING

Place the workpiece on the top of the clamping stack. Pay attention to orient correctly the Rods according to the internal Jaw of the Bodies.

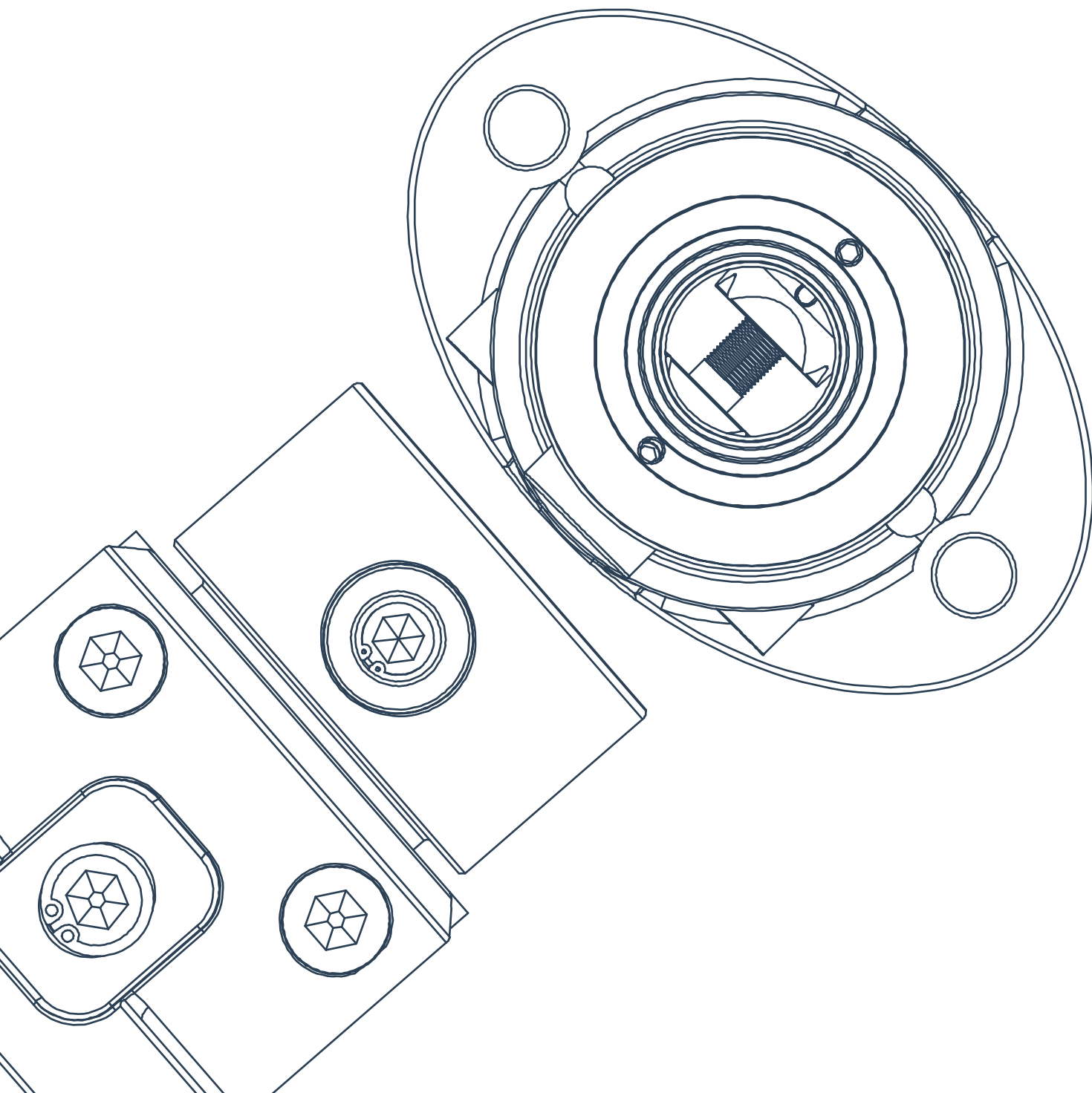
Tighten the jaws close to the workpiece side (using the recommended tightening torques: [SEE THE CORRESPONDING SECTION](#))



DISMOUNTING PROCEDURE

Before lifting the workpiece pay attention to untighten all the jaws close to the workpiece side.

CLAMPS ADJUSTABLE



Integrated systems for production

INTRODUCTION AND KEY FEATURES

INTRODUCTION AND KEY FEATURES

BODIES ADJUSTABLE

Bodies that allow a variable displacement of the clamping seats

TYPES OF DISPLACEMENT

Translation:

- On the horizontal plane (along x or y only or along any axis)
- Along the vertical axis (z axis)

Rotation:

- Rotation around any horizontal axis



LOCKING/UN-LOCKING SYSTEM

The position reached by the displacement can be locked (and un-locked) by screws; these screws can be specific screws (to be used for this purpose only) or they can be the same screws of the internal jaw of the Bodies.

BODIES ADJUSTABLE CATEGORIES

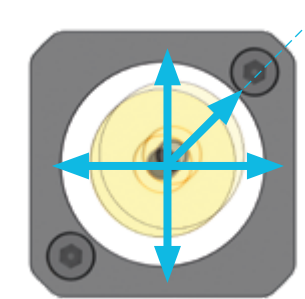
BODY SLIDE

Allows a self translation on the horizontal plane.



BODY POSITIONER

Allows a forced translation on the horizontal plane.



BODY H AND FLOAT

Allows a self rotation around any horizontal axis and/or a self/forced translation along the vertical axis.



TYPES OF ADJUSTMENT

Forced-adjustment:

The operator can adjust the Body by means of adjustment mechanisms (screws, ring nuts).

Self-adjustment:

The Body self-adapts to the required configuration.

For further key features [SEE CLAMPS SECTION](#).

ADJUSTABLE COMPONENTS

Sliding, floating and height adjustable components are useful to allow/reach displacement of the clamping seat not otherwise achievable.

MODULARITY

It allows to create different clamping configurations by matching standardized modules.

SIZE RANGE

The clamping components have different sizes to be proportionally used for clamping workpieces of various dimensions.



LOW AND EASY MAINTENANCE

The clamping components are easy to clean, and the spare parts are designed to be easily replaced in case of need.

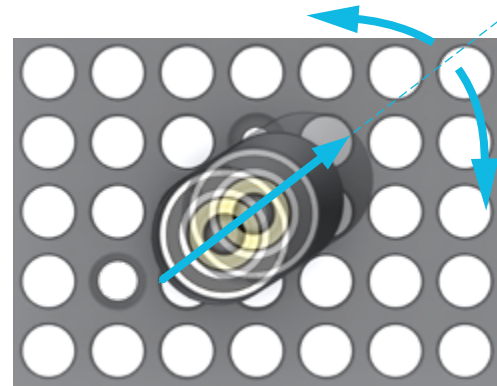
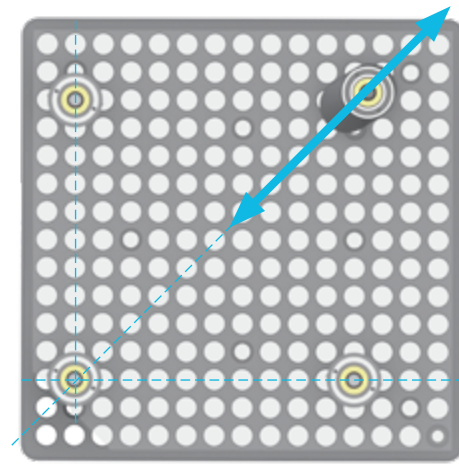
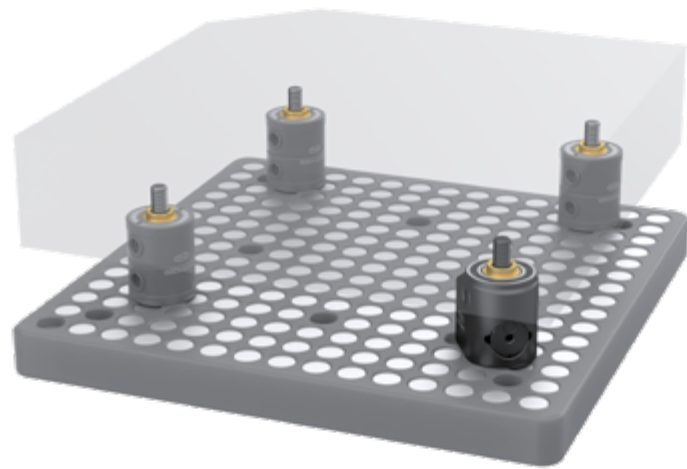
BODIES SLIDE - PRODUCTS RANGE AND APPLICATION EXAMPLES

BODIES SLIDE - APPLICATION EXAMPLES

BODIES SLIDE

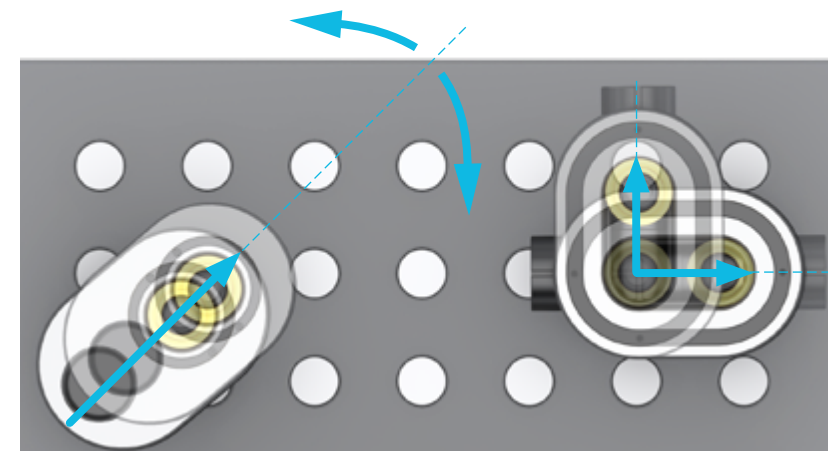
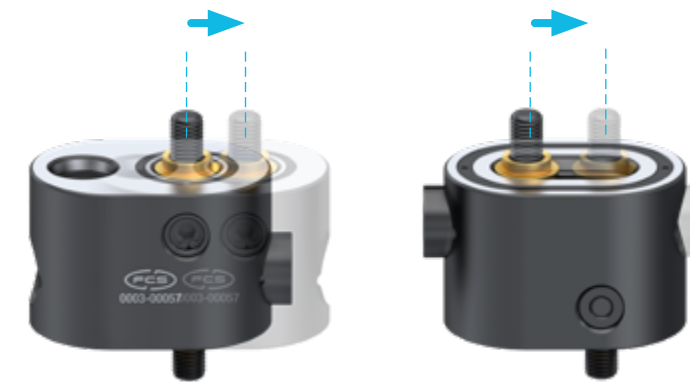
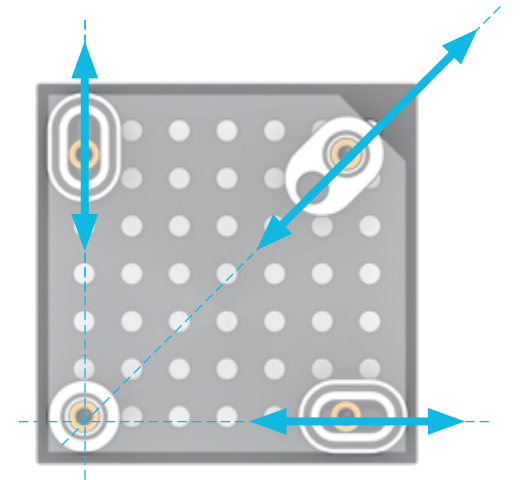
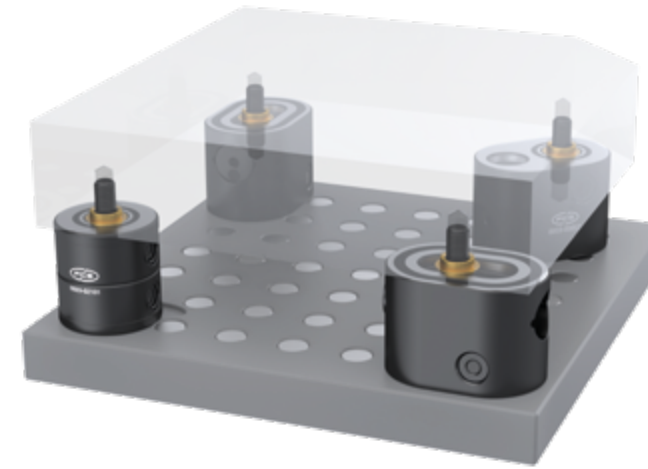
ITEMS	DESCRIPTION	SLIDE	ADJUST.	DISPLACEMENT	ADJUST. RANGE
	BODY SLIDE M12 H60	A	Self	Translation along any axis on the horizontal plane	From 0 to 21
	BODY SLIDE M16 H80 MOD.02	A	Self	Translation along any axis on the horizontal plane	From 0 to 37
		B	Self	Translation along x or y only on the horizontal plane	From 0 to 37

BODY SLIDE M12 H60



Slide A

BODY SLIDE M16 H80 MOD.02





Slide A

Slide B

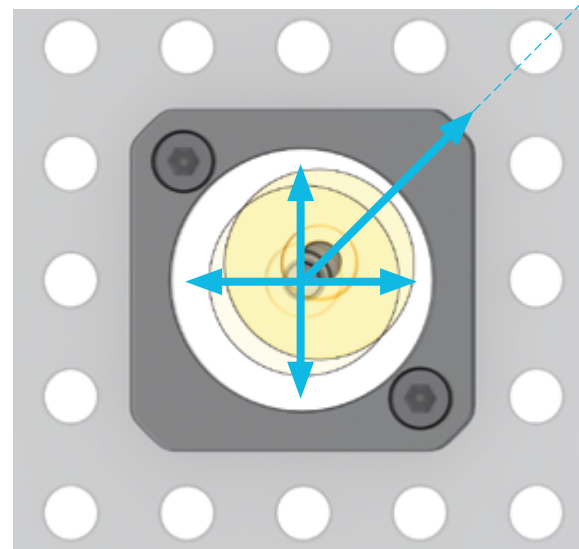
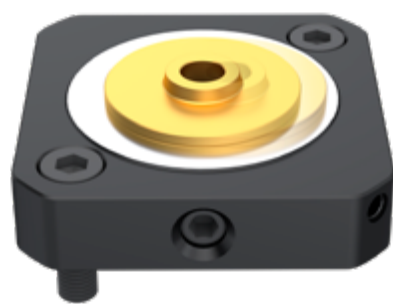
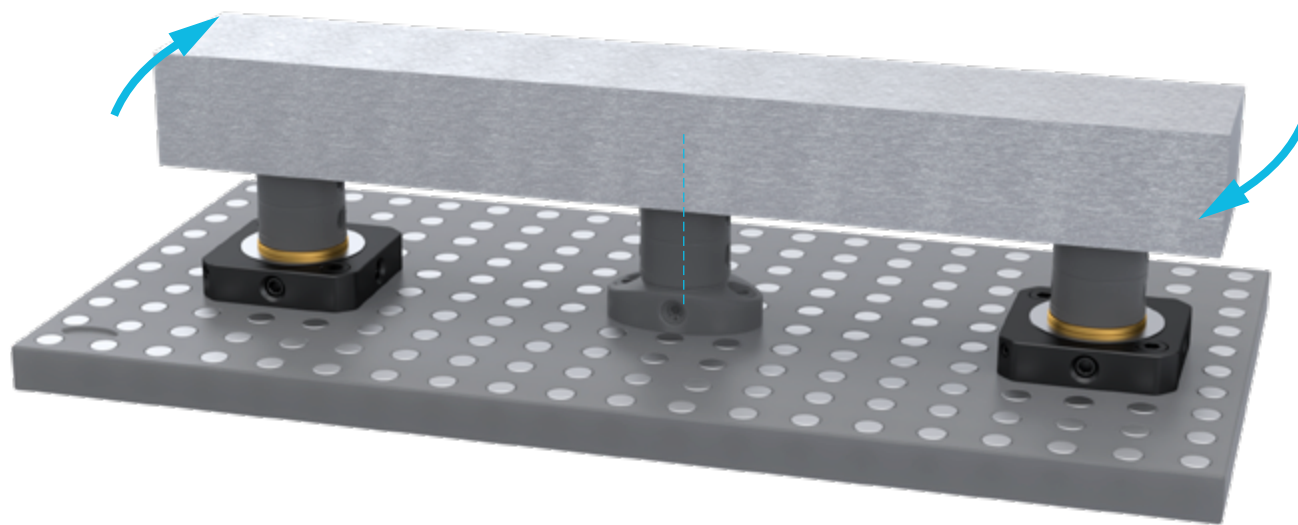
BODIES POSITIONER - PRODUCTS RANGE AND APPLICATION EXAMPLES

BODIES H-FLOAT - PRODUCTS RANGE AND APPLICATION EXAMPLES

BODIES POSITIONER

ITEMS	DESCRIPTION	ADJUST.	DISPLACEMENT	ADJUST. RANGE
	BODY POSITIONER M16 H40	Forced	Translation along any axis on the horizontal plane	From -7.5 to +7.5
	BODY POSITIONER M24 H60	Forced	Translation along any axis on the horizontal plane	From -7.5 to +7.5

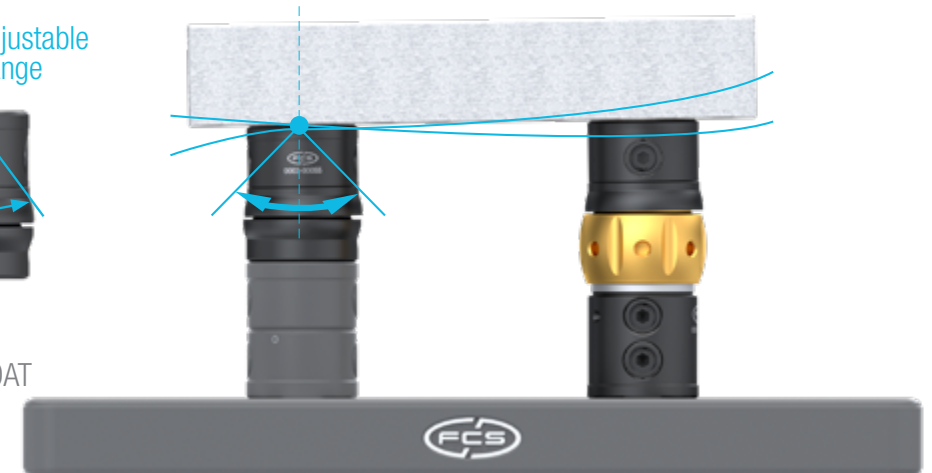
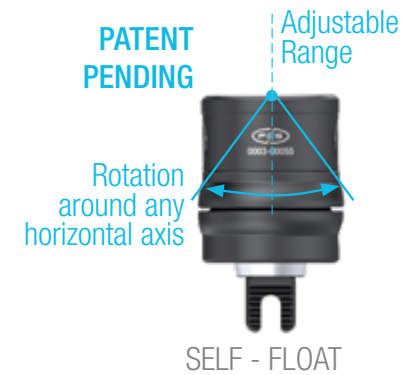
BODY POSITIONER M16 H40
BODY POSITIONER M24 H60



BODIES H-FLOAT

ITEMS	DESCRIPTION	ADJUST.	DISPLACEMENT	ADJUST. RANGE
	BODY SELF-FLOAT M12 H60 $\pm 2.5^\circ$	Self	Rotation around any horizontal axis	From -2.5° to $+2.5^\circ$
	BODY FORCED-H M12 H120 ± 2.5	Self	Rotation around any horizontal axis	From -2.5° to $+2.5^\circ$
		Forced	Translation along z (vertical axis)	From -2.5 to +2.5
	BODY SELF-H M12 H120 ± 2.5	Self	Rotation around any horizontal axis	From -2.5° to $+2.5^\circ$
		Self	Translation along z (vertical axis)	From -2.5 to +2.5
	BODY SELF-FLOAT M16 H80 $\pm 2.5^\circ$	Self	Rotation around any horizontal axis	From -2.5° to $+2.5^\circ$
	BODY FORCED-H M16 H160 ± 5	Self	Rotation around any horizontal axis	From -2.5° to $+2.5^\circ$
		Forced	Translation along z (vertical axis)	From -5 to +5
	BODY SELF-H M16 H160 ± 5	Self	Rotation around any horizontal axis	From -2.5° to $+2.5^\circ$
		Self	Translation along z (vertical axis)	From -5 to +5
	BODY H-ADJUSTABLE M16 H160 ± 5	Forced	Translation along z (vertical axis)	From -5 to +5
	BODY FORCED-H M24 H160 ± 5	Forced	Translation along z (vertical axis)	From -5 to +5

BODY SELF-FLOAT M12 H60 $\pm 2.5^\circ$
BODY SELF-FLOAT M16 H80 $\pm 2.5^\circ$



BODIES H-FLOAT - APPLICATION EXAMPLES

BODIES H-FLOAT - APPLICATION EXAMPLES

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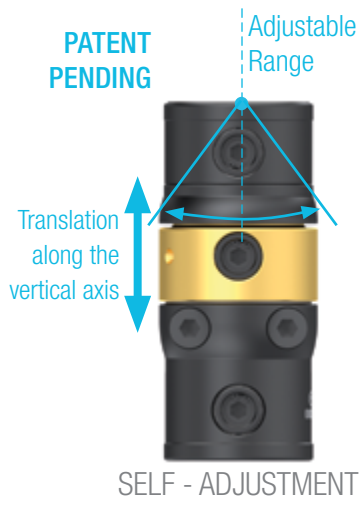
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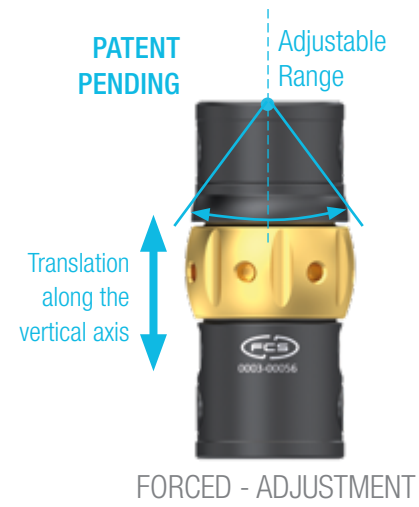
BODY SELF-H M12 H120 ±2.5
BODY SELF-H M16 H160 ±5



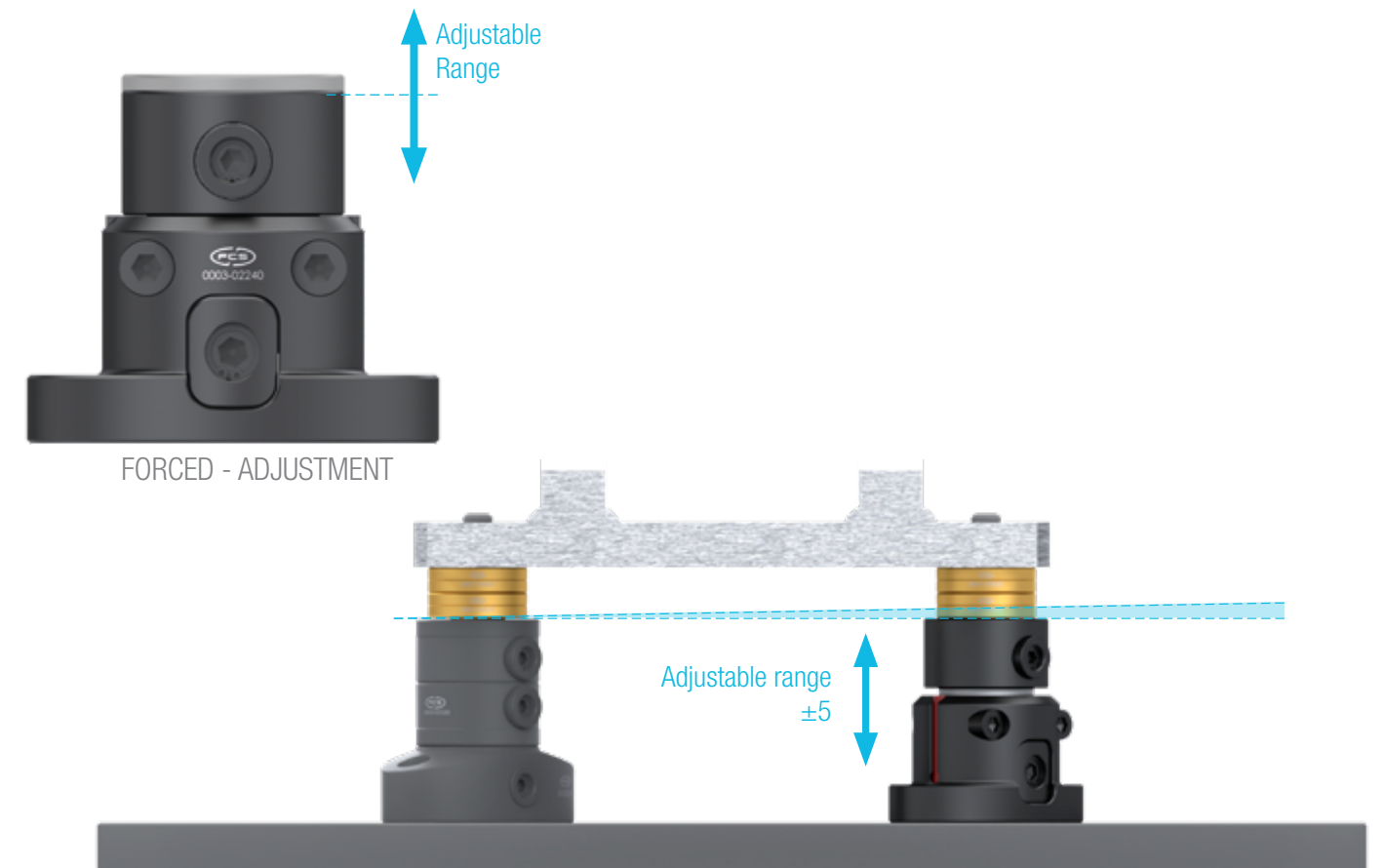
BODY H-ADJUSTABLE M16 H160 ±5



BODY FORCED-H M12 H120 ±2.5
BODY FORCED-H M16 H160 ±5

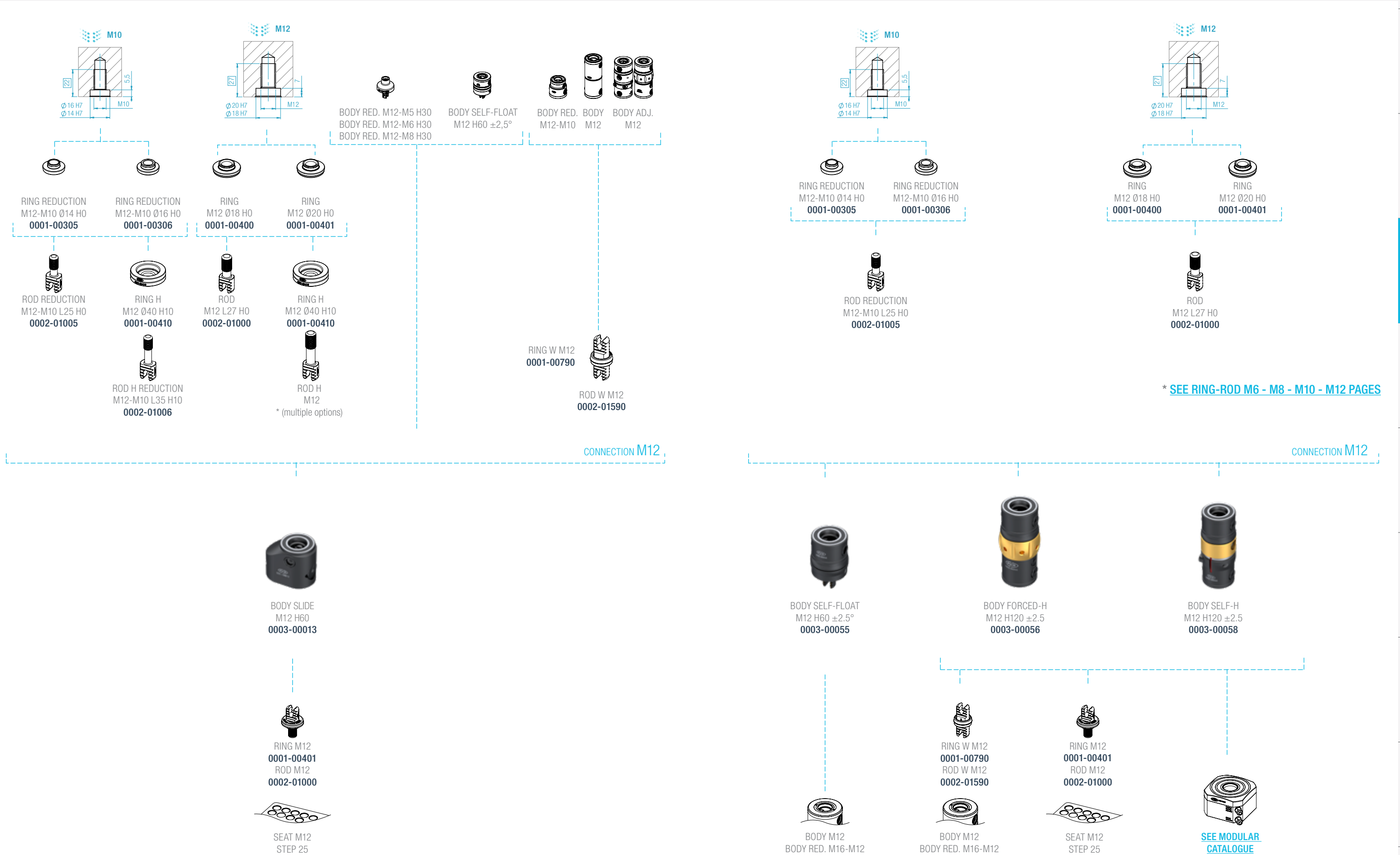


BODY FORCED-H M24 H160 ±5



CLAMP ADJUSTABLE M12

CLAMP ADJUSTABLE M12



Note:
For multicomponents clamping application refer to 3D Assembly Simulator. For the complete Kit refer to the corresponding SET CLAMP.

* SEE RING-ROD M6 - M8 - M10 - M12 PAGES

SEE MODULAR CATALOGUE

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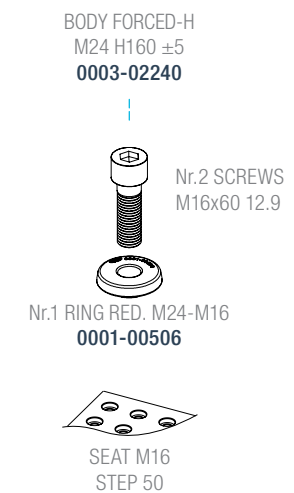
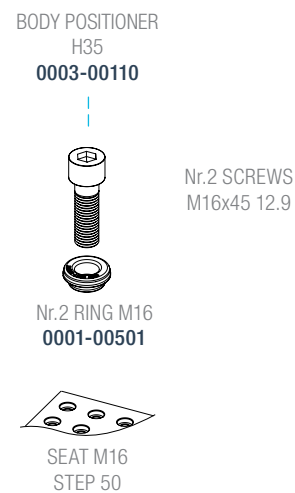
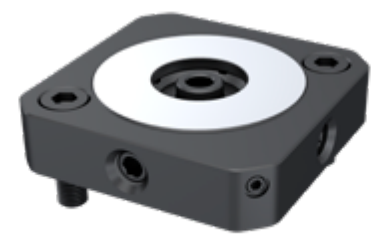
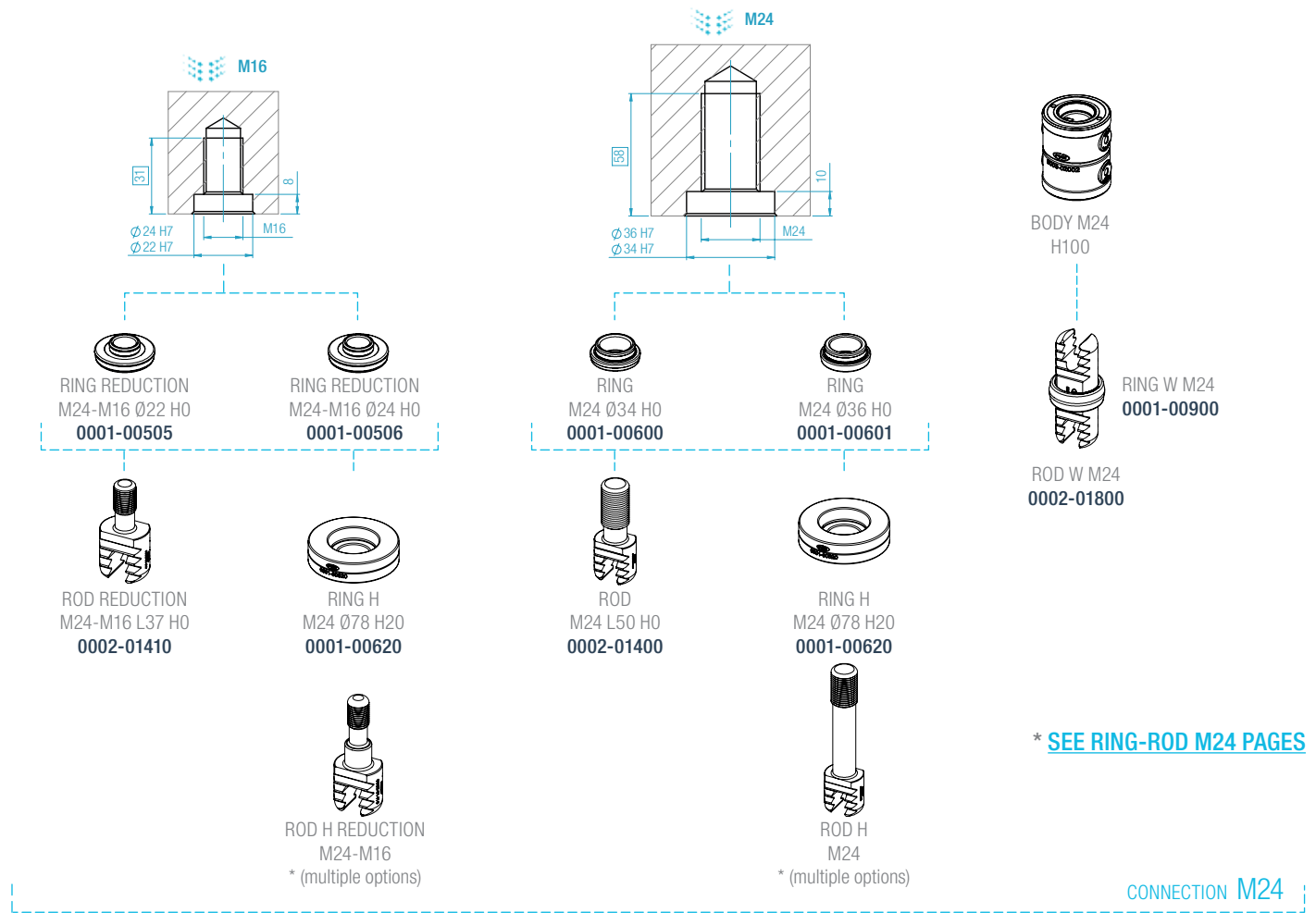
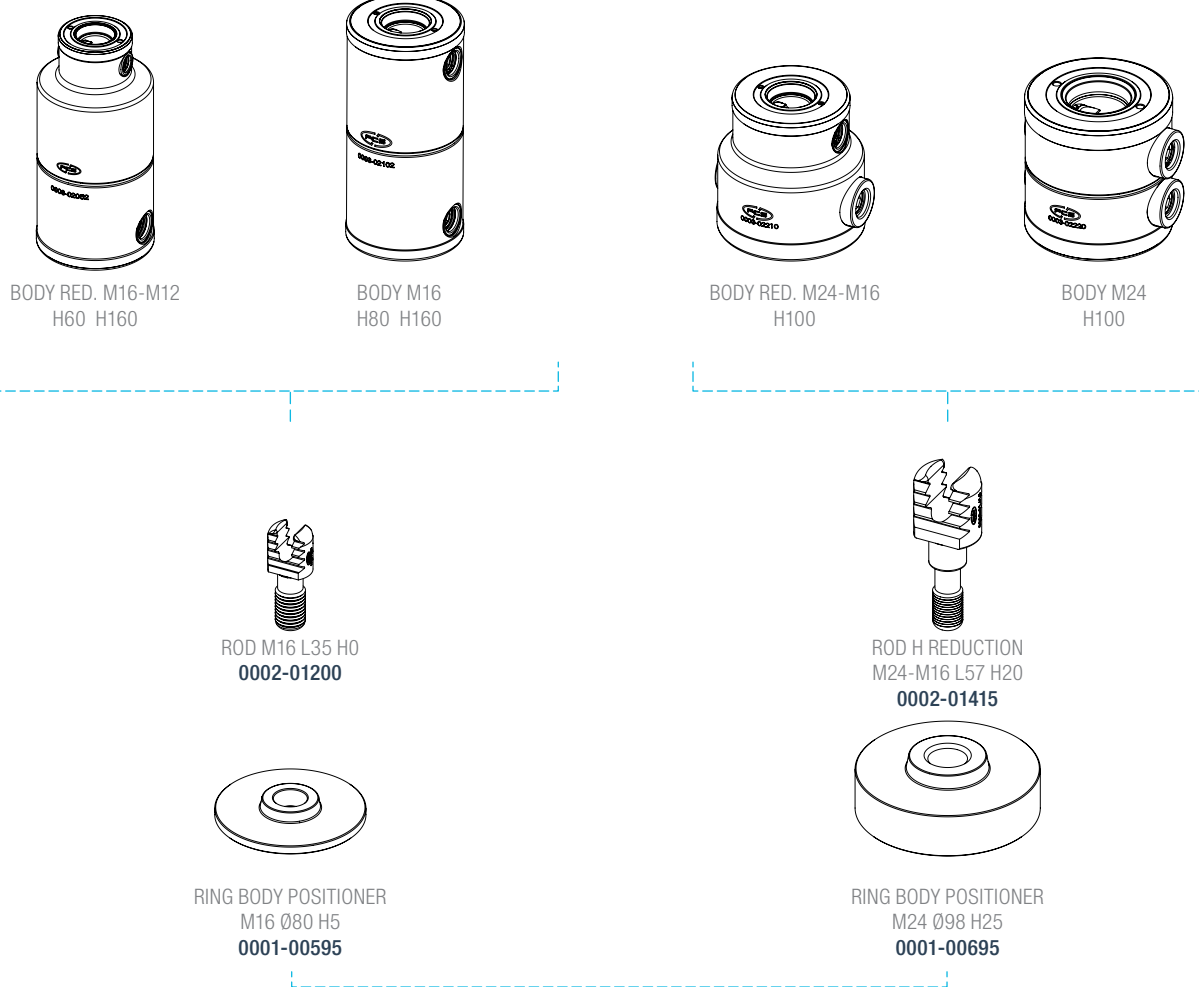
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Note: For multicomponents clamping application refer to 3D Assembly Simulator. For the complete Kit refer to the corresponding SET CLAMP.

SET CLAMP ADJUSTABLE

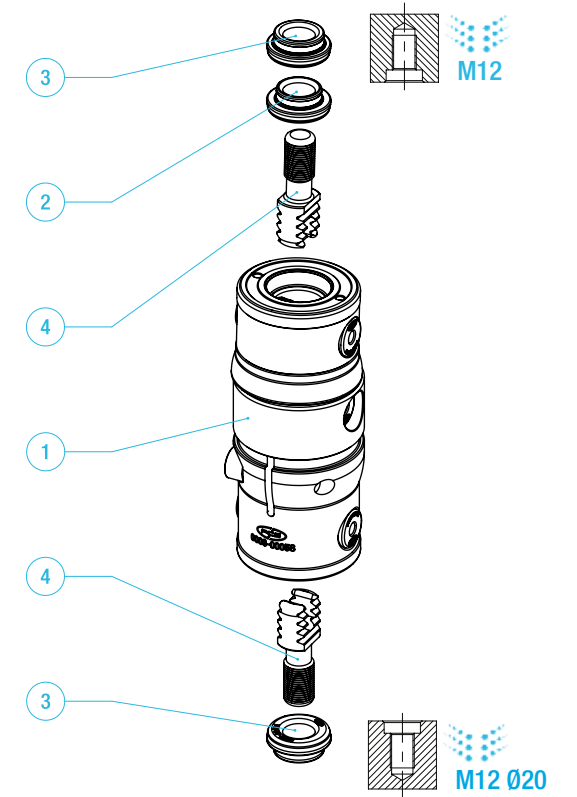
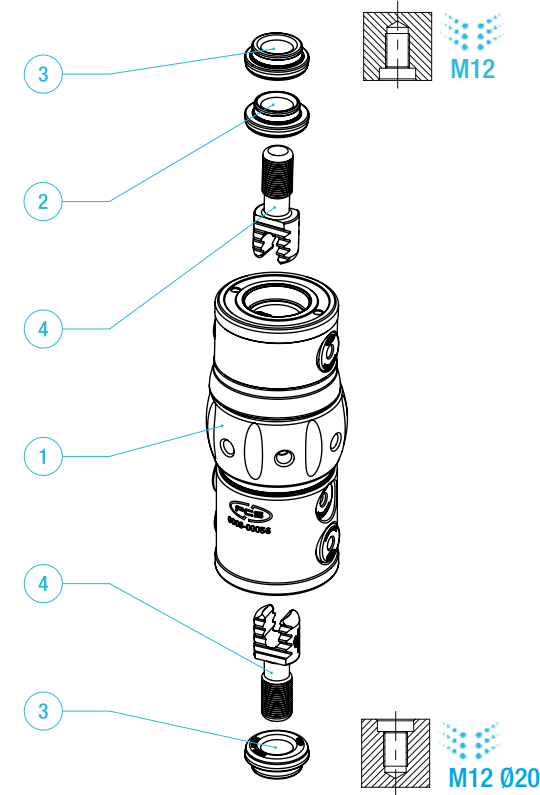
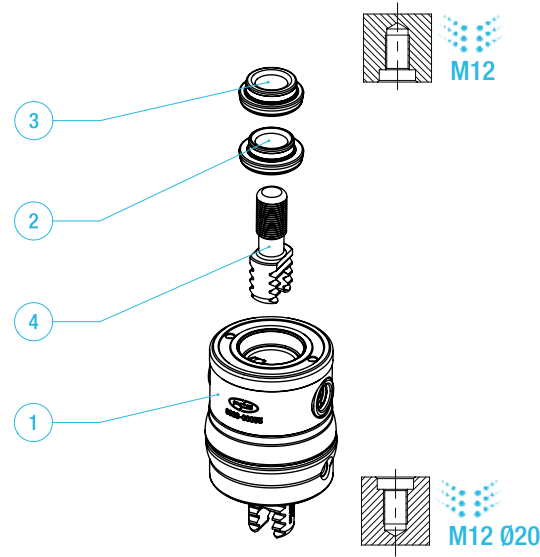
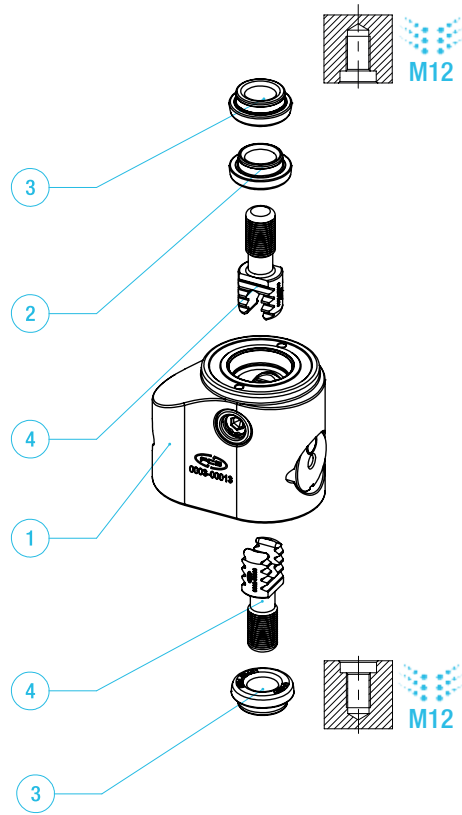
SET CLAMP ADJUSTABLE

SET CODE 0004-00005
SET BODY SLIDE M12 H60

SET CODE 0004-00055
SET BODY SELF-FLOAT M12 H60 ±2.5°

SET CODE 0004-00056
SET BODY FORCED-H M12 H120 ±2.5

SET CODE 0004-00058
SET BODY SELF-H M12 H120 ±2.5



Description	Qty	CODE
1 BODY SLIDE M12 H60	1	0003-00013
2 RING M12 Ø18 H0	1	0001-00400
3 RING M12 Ø20 H0	2	0001-00401
4 ROD M12 L27 H0	2	0002-01000

set weight 1.2 kg

Description	Qty	CODE
1 BODY SELF-FLOAT M12 H60 ±2.5°	1	0003-00055
2 RING M12 Ø18 H0	1	0001-00400
3 RING M12 Ø20 H0	1	0001-00401
4 ROD M12 L28 H0	1	0002-01000

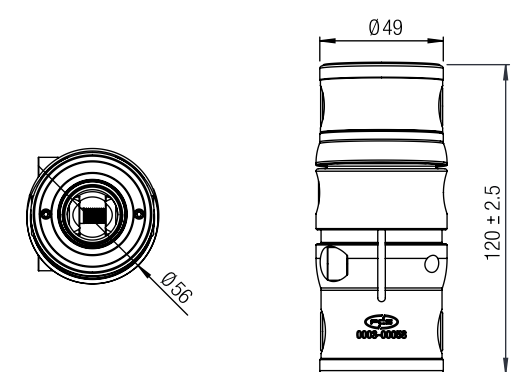
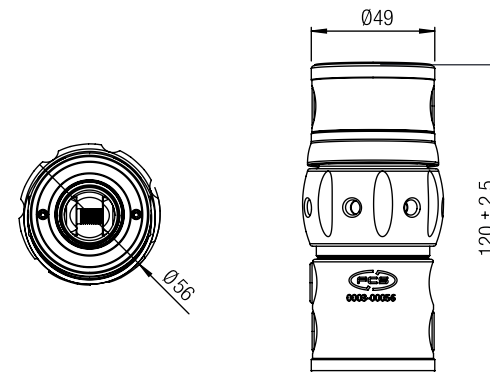
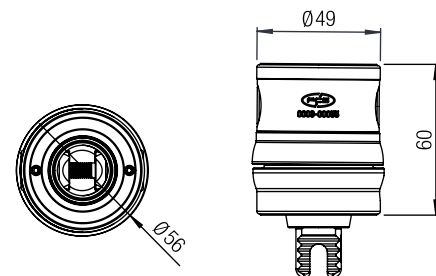
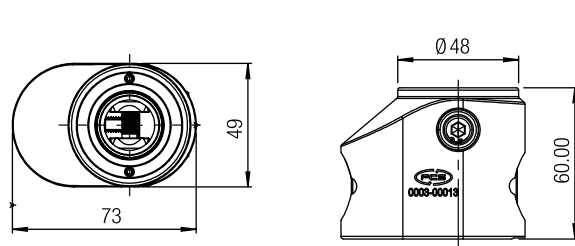
set weight 0.9 kg

Description	Qty	CODE
1 BODY FORCED-H M12 H120 ±2.5	1	0003-00056
2 RING M12 Ø18 H0	1	0001-00400
3 RING M12 Ø20 H0	2	0001-00401
4 ROD M12 L28 H0	2	0002-01000

set weight 1.7 kg

Description	Qty	CODE
1 BODY SELF-H M12 H120 ±2.5	1	0003-00058
2 RING M12 Ø18 H0	1	0001-00400
3 RING M12 Ø20 H0	2	0001-00401
4 ROD M12 L28 H0	2	0002-01000

set weight 1.7 kg

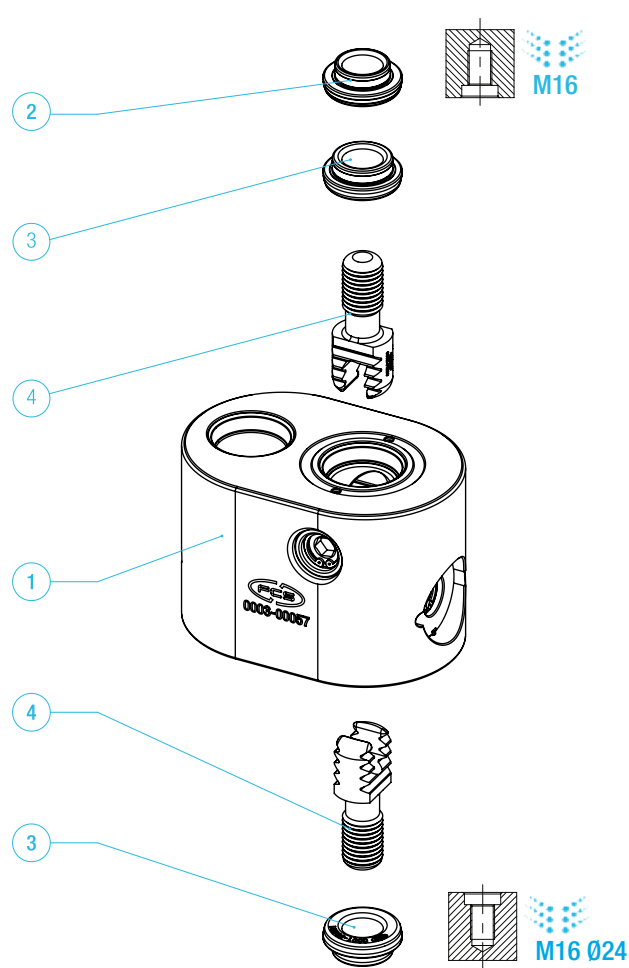


SET CLAMP ADJUSTABLE

SET CLAMP ADJUSTABLE

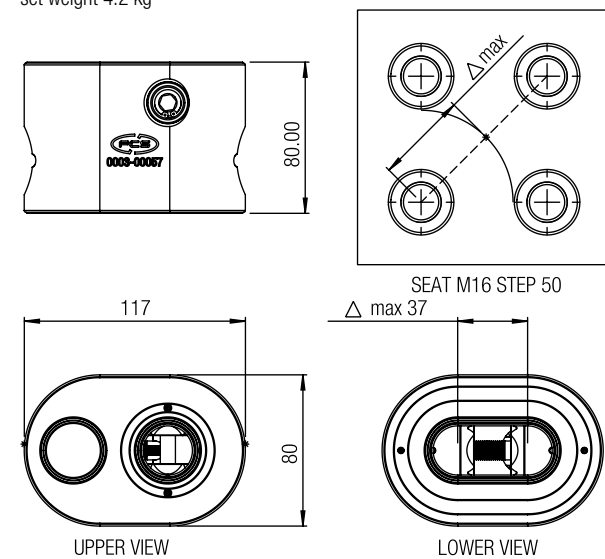
SET CODE 0004-00057

SET BODY SLIDE M16 H80 MOD.02



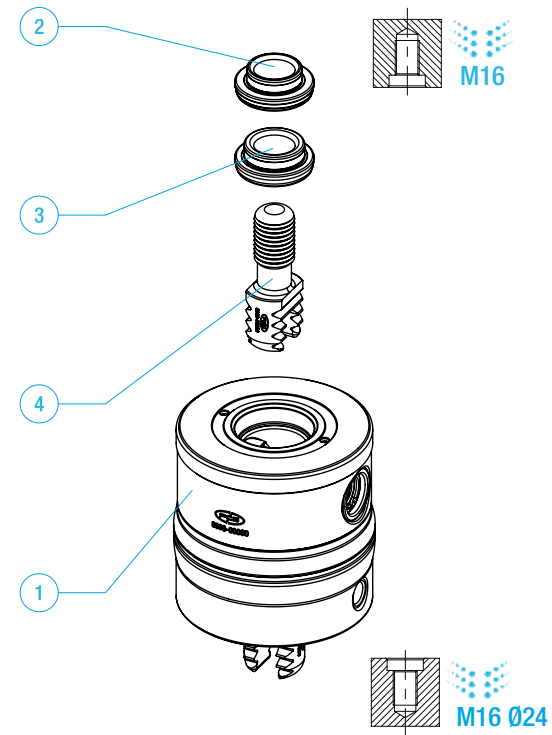
Description	Qty	CODE
1 BODY SLIDE M16 H80 MOD.02	1	0003-00057
2 RING M16 Ø22 H0	1	0001-00500
3 RING M16 Ø24 H0	2	0001-00501
4 ROD M16 L35 H0	2	0002-01200

set weight 4.2 kg



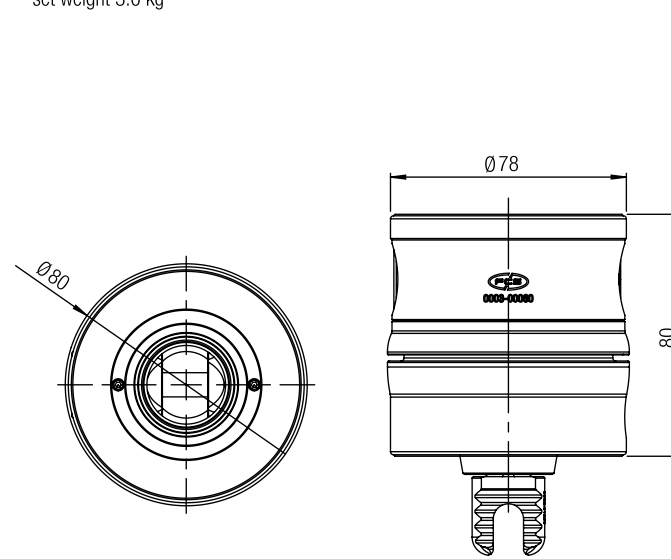
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SET BODY SELF-FLOAT M16 H80 ±2.5°



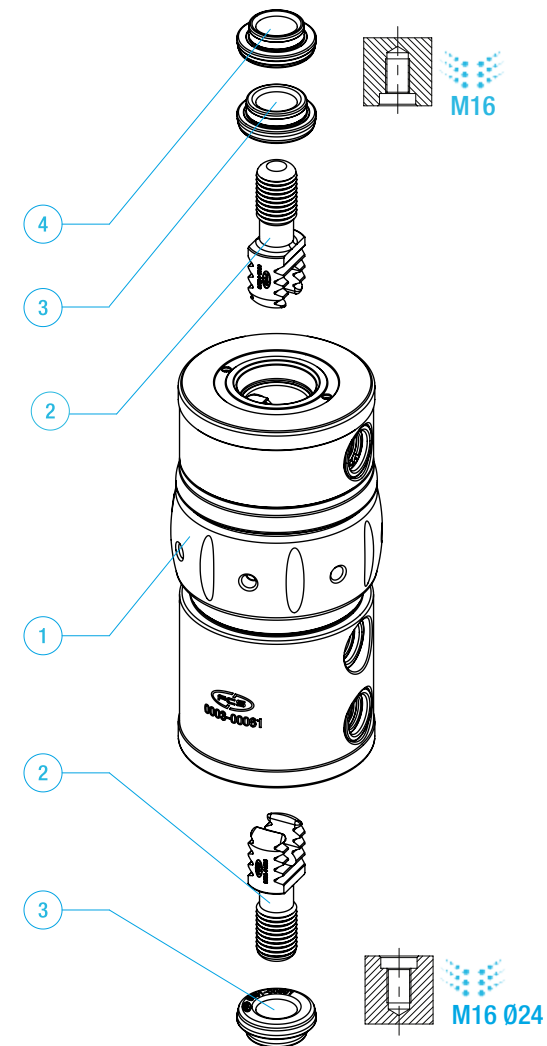
Description	Qty	CODE
1 BODY SELF-FLOAT M16 H80 ±2.5°	1	0003-00060
2 RING M16 Ø22 H0	1	0001-00500
3 RING M16 Ø24 H0	1	0001-00501
4 ROD M16 L35 H0	1	0002-01200

set weight 3.0 kg



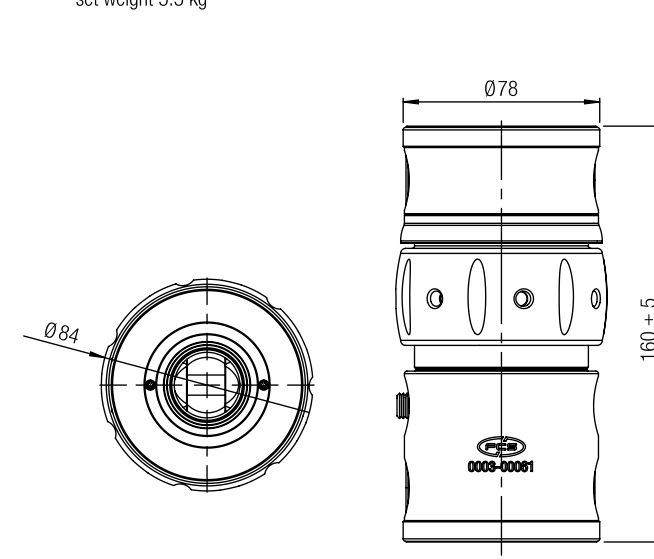
SET CODE 0004-00061

SET BODY FORCED-H M16 H160 ±5



Description	Qty	CODE
1 BODY FORCED-H M16 H160 ±5	1	0003-00061
2 ROD M16 L35 H0	2	0002-01200
3 RING M16 Ø24 H0	2	0001-00501
4 RING M16 Ø22 H0	1	0001-00500

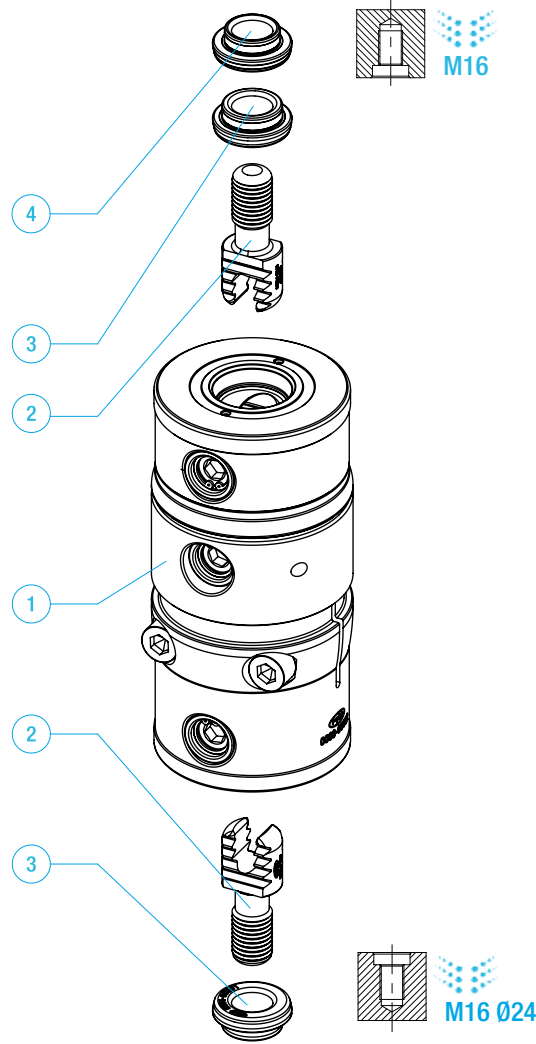
set weight 5.5 kg



SET CLAMP ADJUSTABLE

SET CLAMP ADJUSTABLE

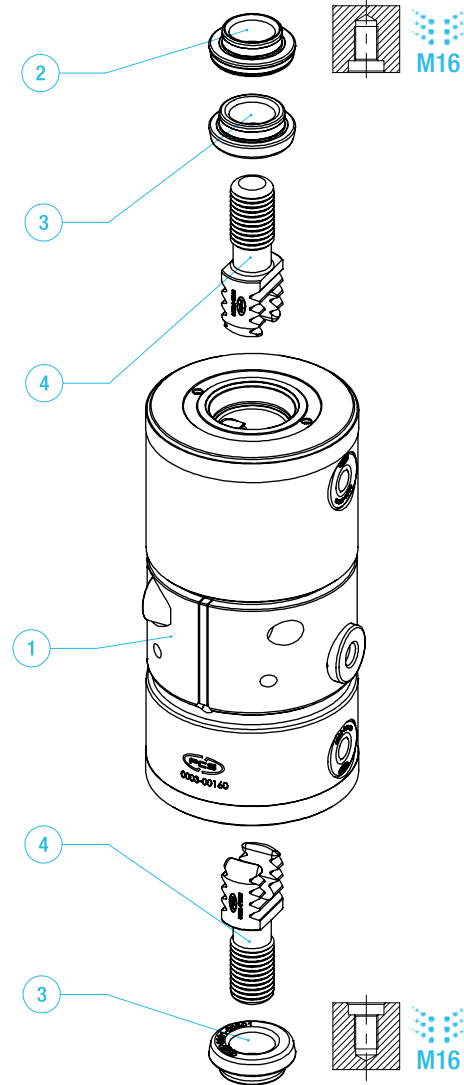
SET CODE 0004-00062
SET BODY SELF-H M16 H160 ±5



Description	Qty	CODE
1 BODY SELF-H M16 H160 ±5	1	0003-00062
2 ROD M16 L35 H0	2	0002-01200
3 RING M16 Ø24 H0	2	0001-00501
4 RING M16 Ø22 H0	1	0001-00500

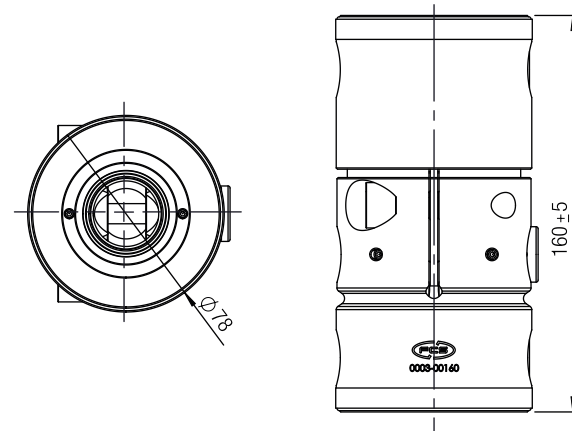
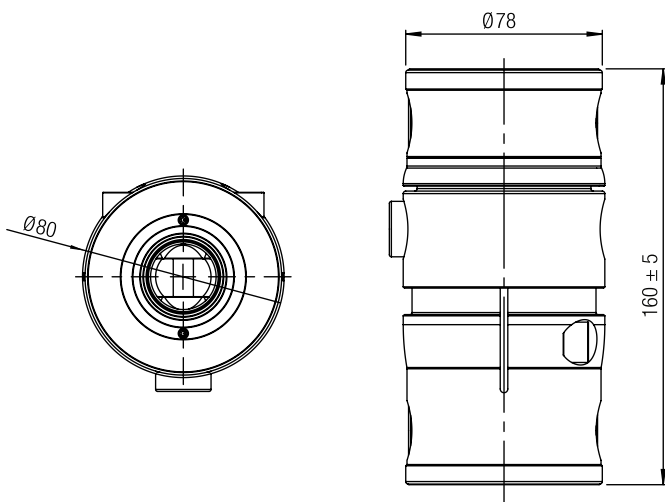
set weight 5.5 kg

SET CODE 0004-00160
SET BODY ADJUSTABLE M16 H160

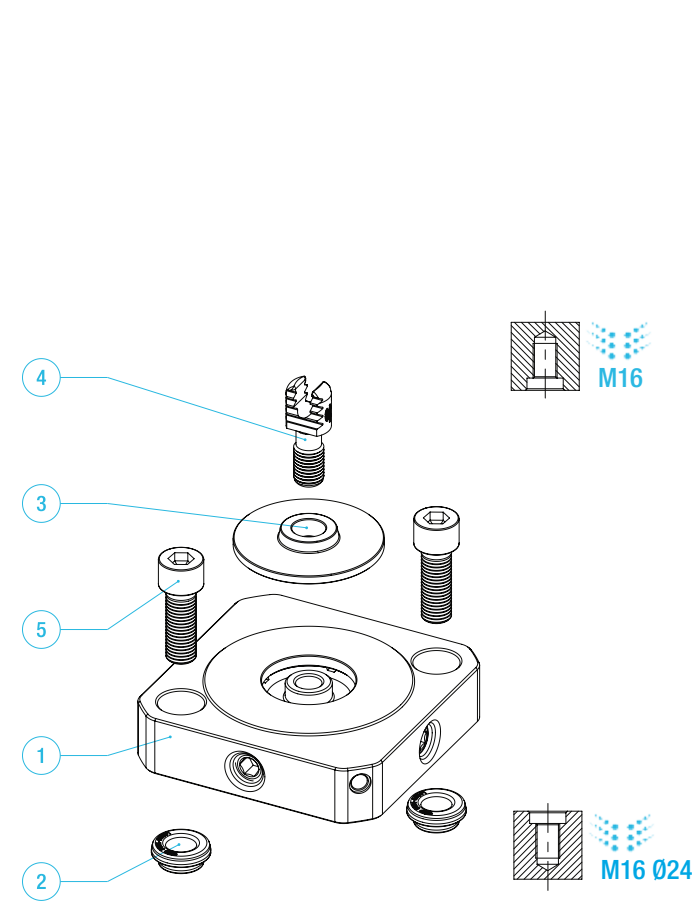


Description	Qty	CODE
1 BODY H-ADJUSTABLE M16 H160 ±5	1	0003-00160
2 RING M16 Ø22 H0	1	0001-00500
3 RING M16 Ø24 H0	2	0001-00501
4 ROD M16 L35 H0	2	0002-01200

set weight 2.4 kg

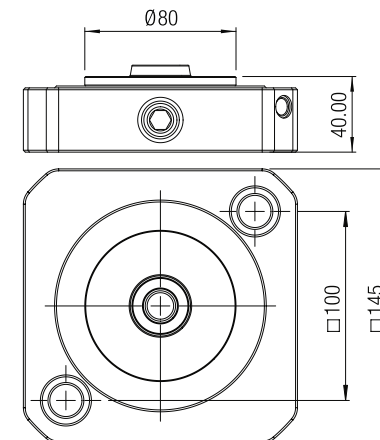


SET CODE 0004-00110
SET BODY POSITIONER M16 H40

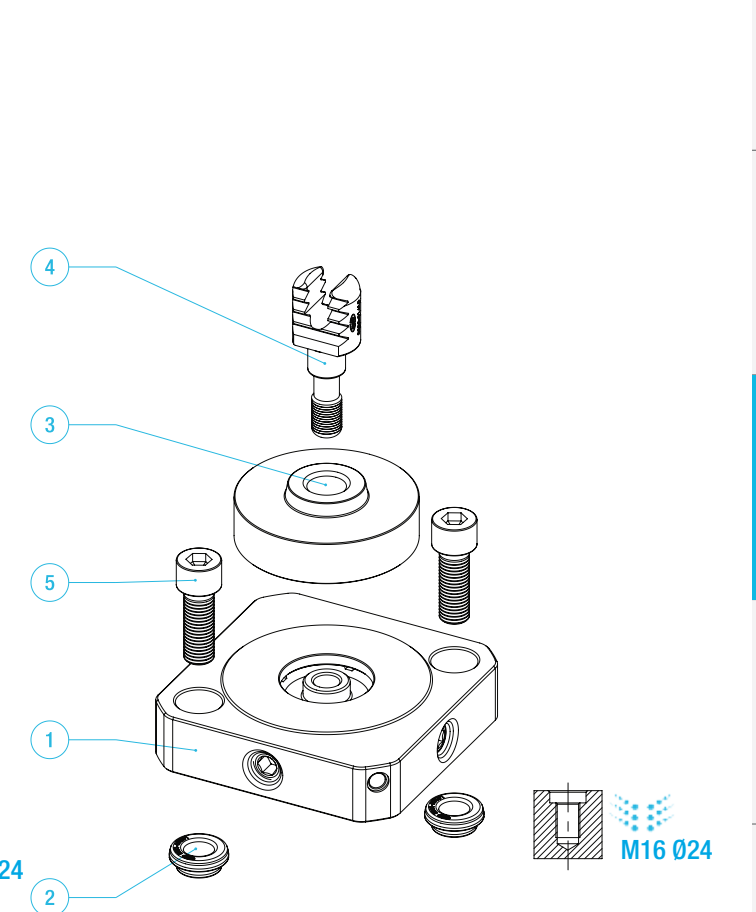


Description	Qty	CODE
1 BODY POSITIONER H35	1	0003-00110
2 RING M16 Ø24 H0	2	0001-00501
3 RING BODY POSITIONER M16 Ø80 H5	1	0001-00595
4 ROD M16 L35 H0	1	0002-01200
5 SCREW ISO 4762 M16x45 12.9 BURNISHED	2	4521-16045

set weight 5.0 kg

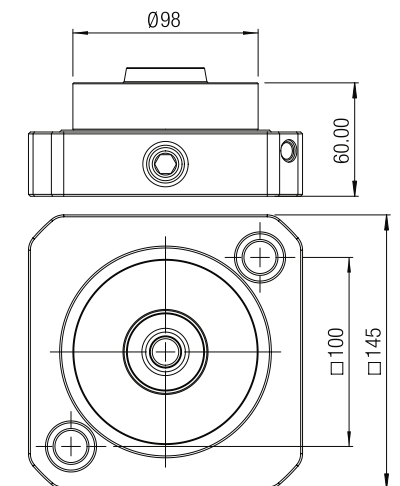


SET CODE 0004-00112
SET BODY POSITIONER M24 H60



Description	Qty	CODE
1 BODY POSITIONER H35	1	0003-00110
2 RING M16 Ø24 H0	2	0001-00501
3 RING BODY POSITIONER M24 Ø98 H25	1	0001-00695
4 ROD H REDUCTION M24-M16 L57 H20	1	0002-01415
5 SCREW ISO 4762 M16x45 12.9 BURNISHED	2	4521-16045

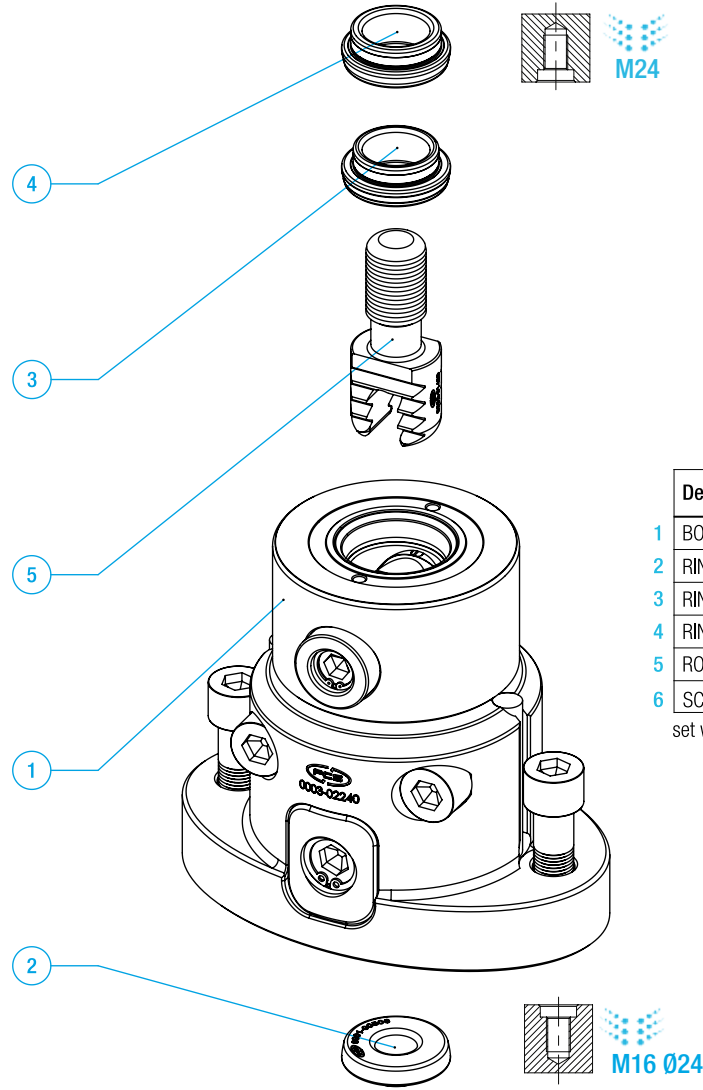
set weight 6.5 kg



SET CLAMP ADJUSTABLE

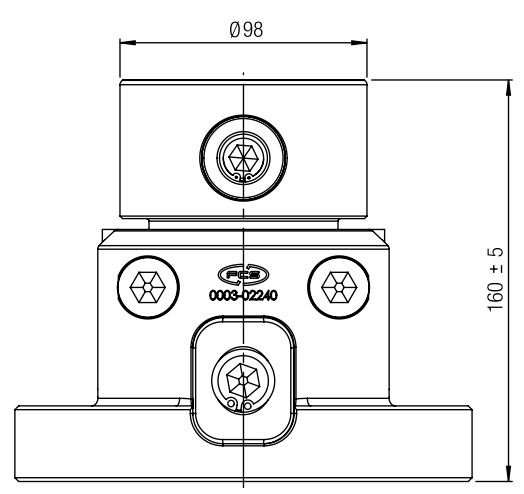
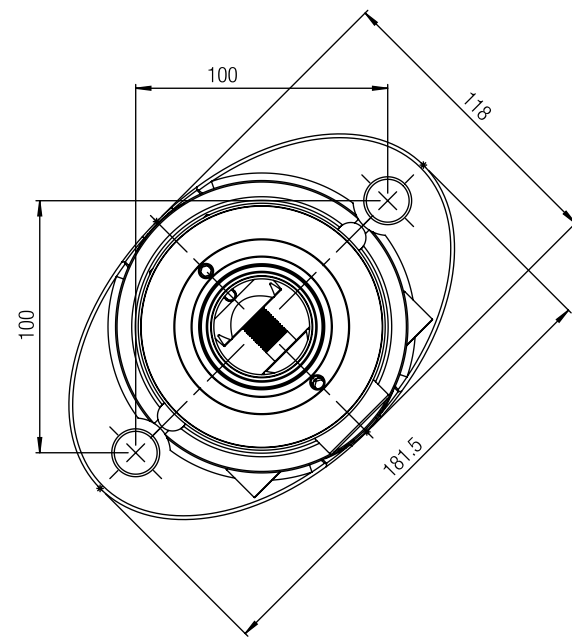
SET CLAMP ADJUSTABLE

SET CODE 0004-07440
 SET BODY FORCED-H M24 H160 ±5

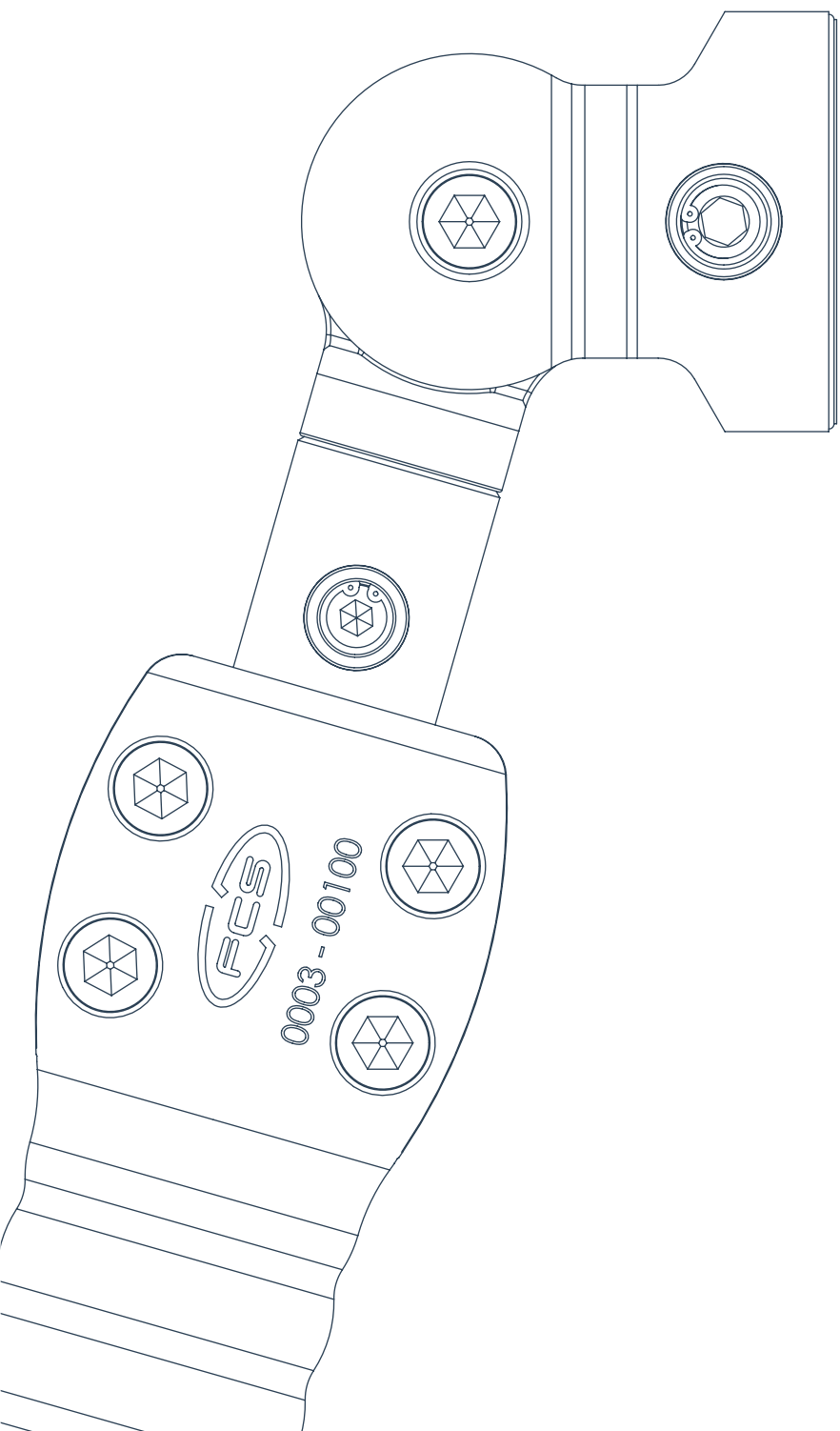


Description	Qty	CODE
1 BODY FORCED-H M24 H160 ±5	1	0003-02240
2 RING REDUCTION M24-M16 Ø24 H0	1	0001-00506
3 RING M24 Ø34 H0	1	0001-00600
4 RING M24 Ø36 H0	1	0001-00601
5 ROD M24 L50 H0	1	0002-01400
6 SCREW ISO 4762 M16x60 12.9 BURNISHED	2	4521-16060

set weight 12.5 kg



THIRD SUPPORT POINT



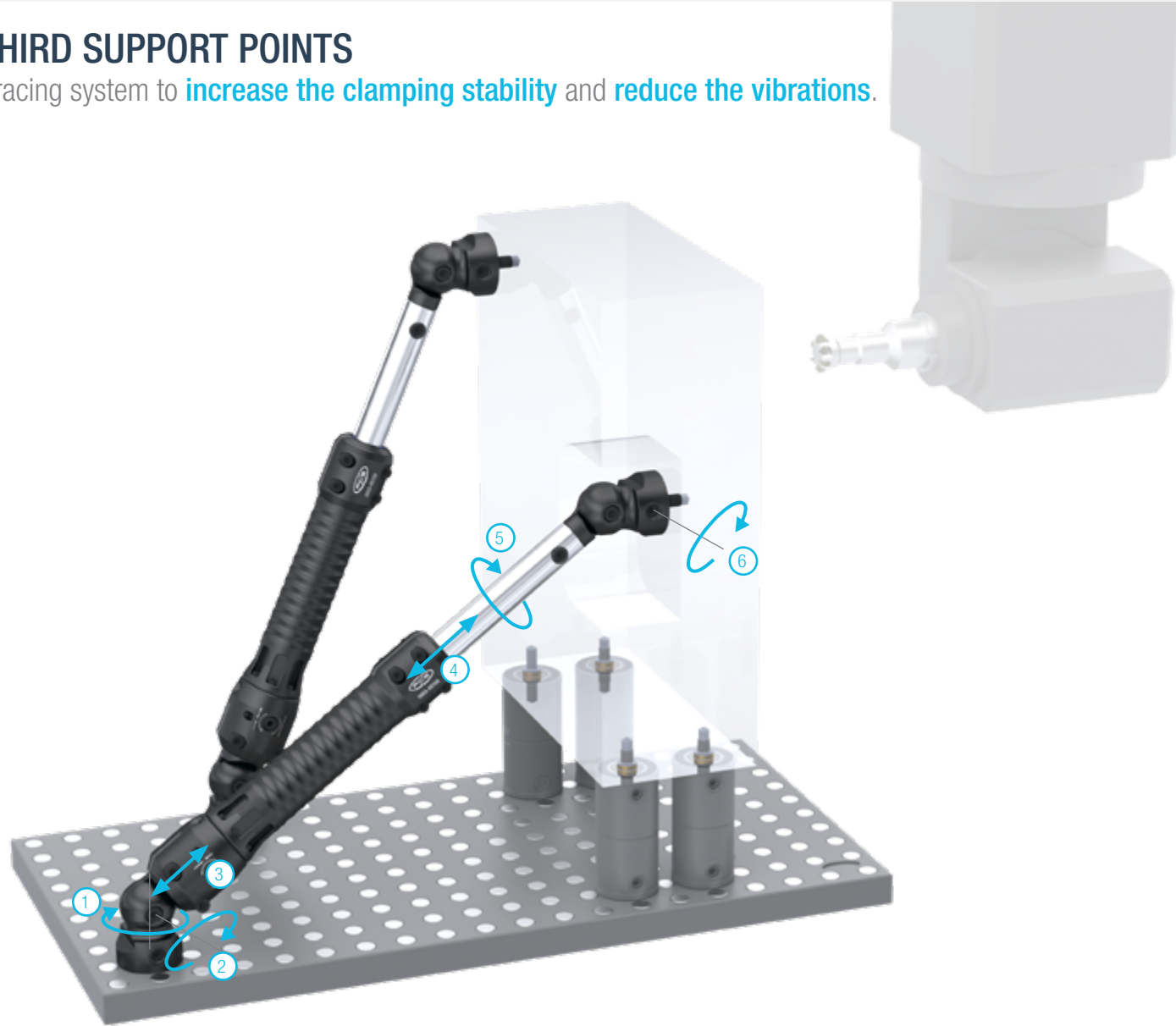
Integrated systems for production

INTRODUCTION AND KEY FEATURES

INTRODUCTION AND KEY FEATURES

THIRD SUPPORT POINTS

Bracing system to **increase the clamping stability** and **reduce the vibrations**.



Six different adjustable displacements allow an high flexibility of clamping applications

	DISPLACEMENT	ADJUST. RANGE
1	Base rotation	0-360°
2	Base inclination	0-180°
3	Micro-stroke adjustment	0-10 mm
4	Stroke adjustment	0-250 mm
5	Stem rotation	0-360°
6	Upper rotation	0-180°

MODULARITY

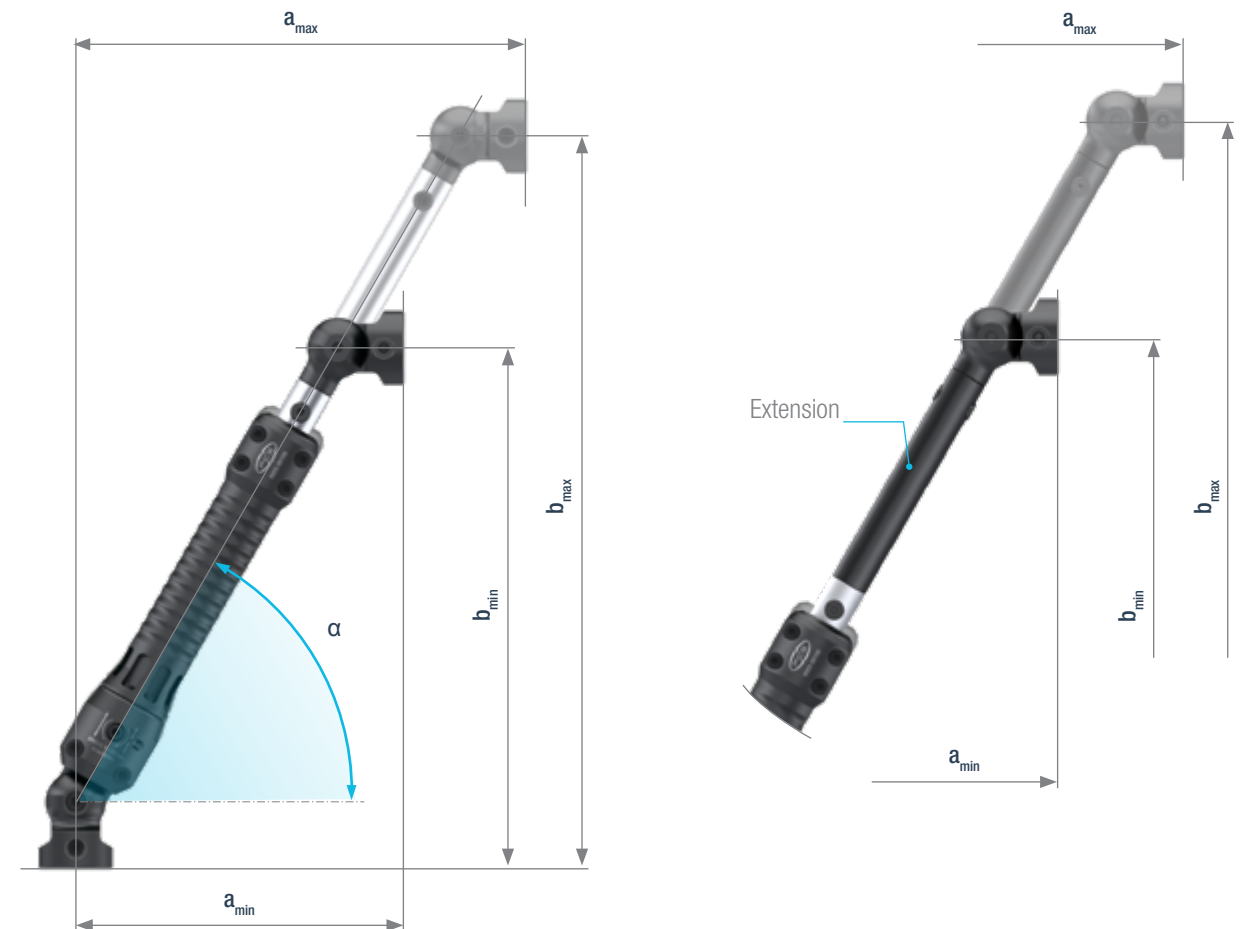
It allows to create different clamping configurations by matching standardized modules.

ADJUSTABLE COMPONENTS

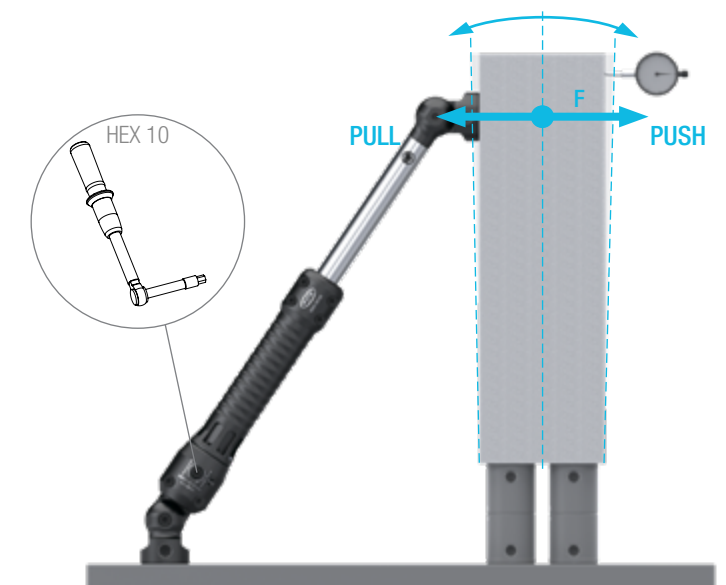
Sliding, pofloating and height adjustable components are useful to allow/reach displacement of the clamping seat not otherwise achievable.

LOW AND EASY MAINTENANCE

The clamping components are easy to clean, and the spare parts are designed to be easily replaced in case of need.



α degree	WITHOUT EXTENSION				WITH EXTENSION			
	a _{min} (mm)	b _{min} (mm)	a _{max} (mm)	b _{max} (mm)	a _{min} (mm)	b _{min} (mm)	a _{max} (mm)	b _{max} (mm)
60	345	547	475	771	470	763	600	987
45	459	459	642	642	636	636	819	819
30	547	345	771	475	763	470	987	600



THIRD SUPPORT POINT MOD.3 - APPLICATION EXAMPLES

THIRD SUPPORT POINT MOD.3 - APPLICATION EXAMPLES

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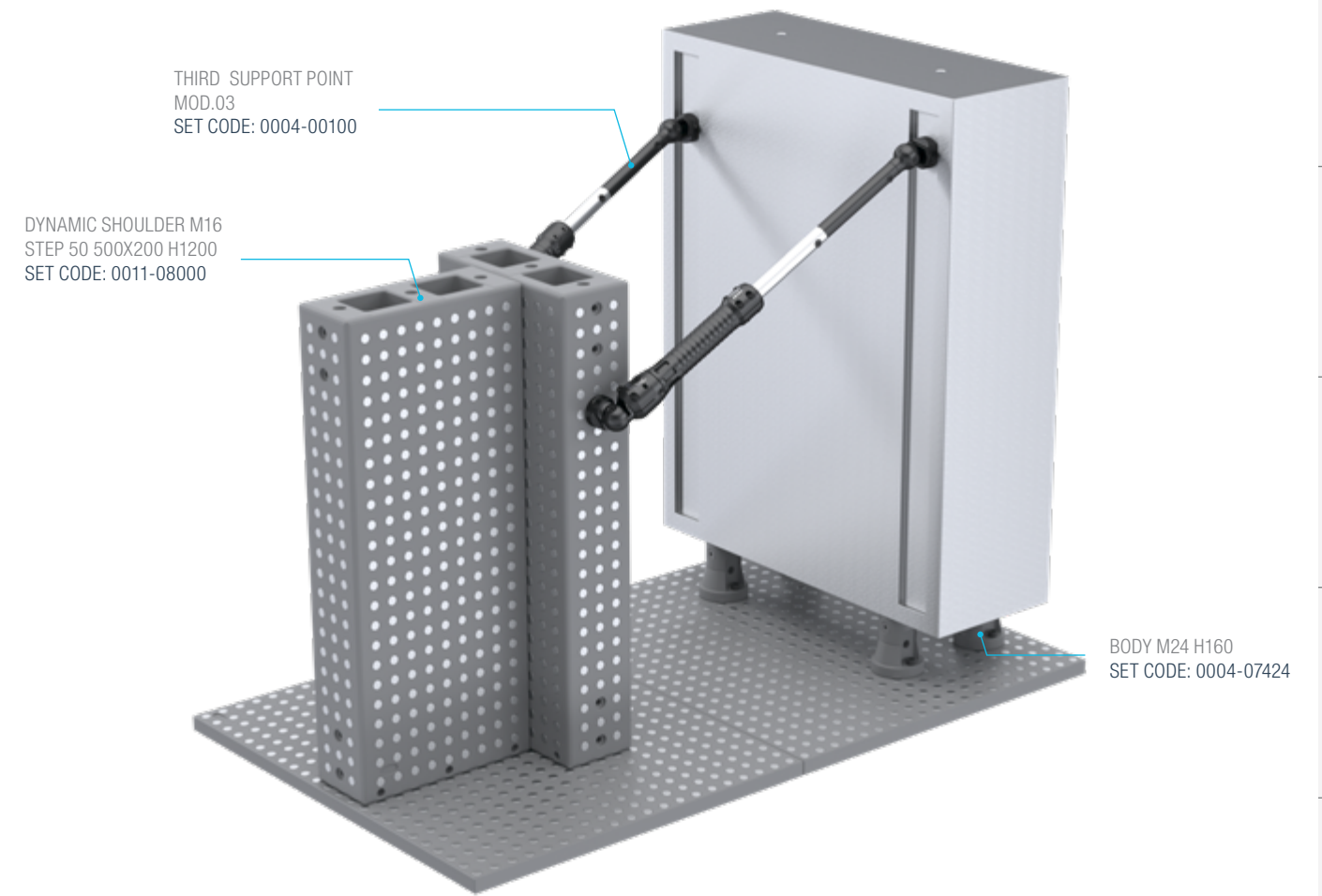
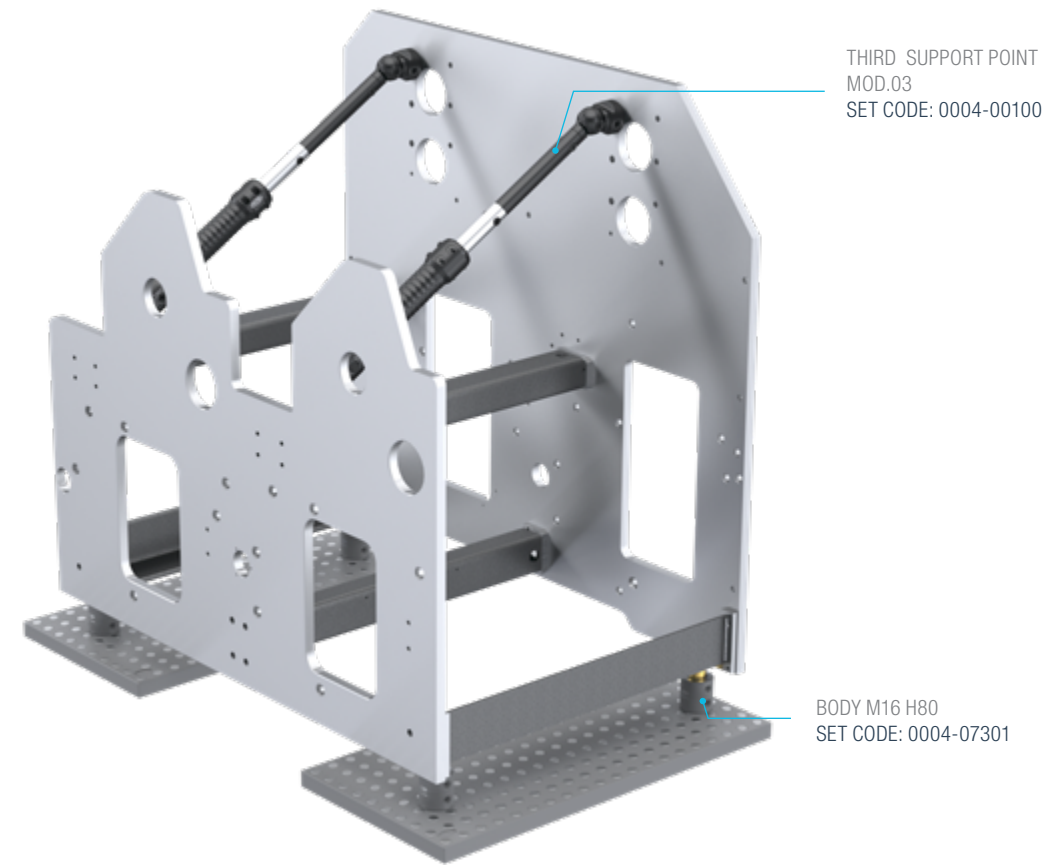
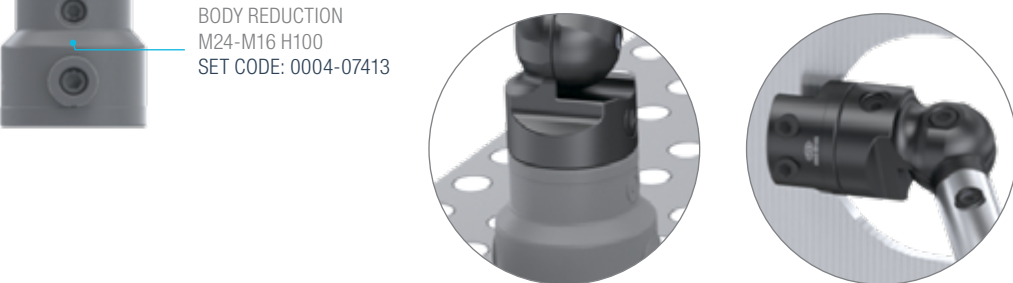
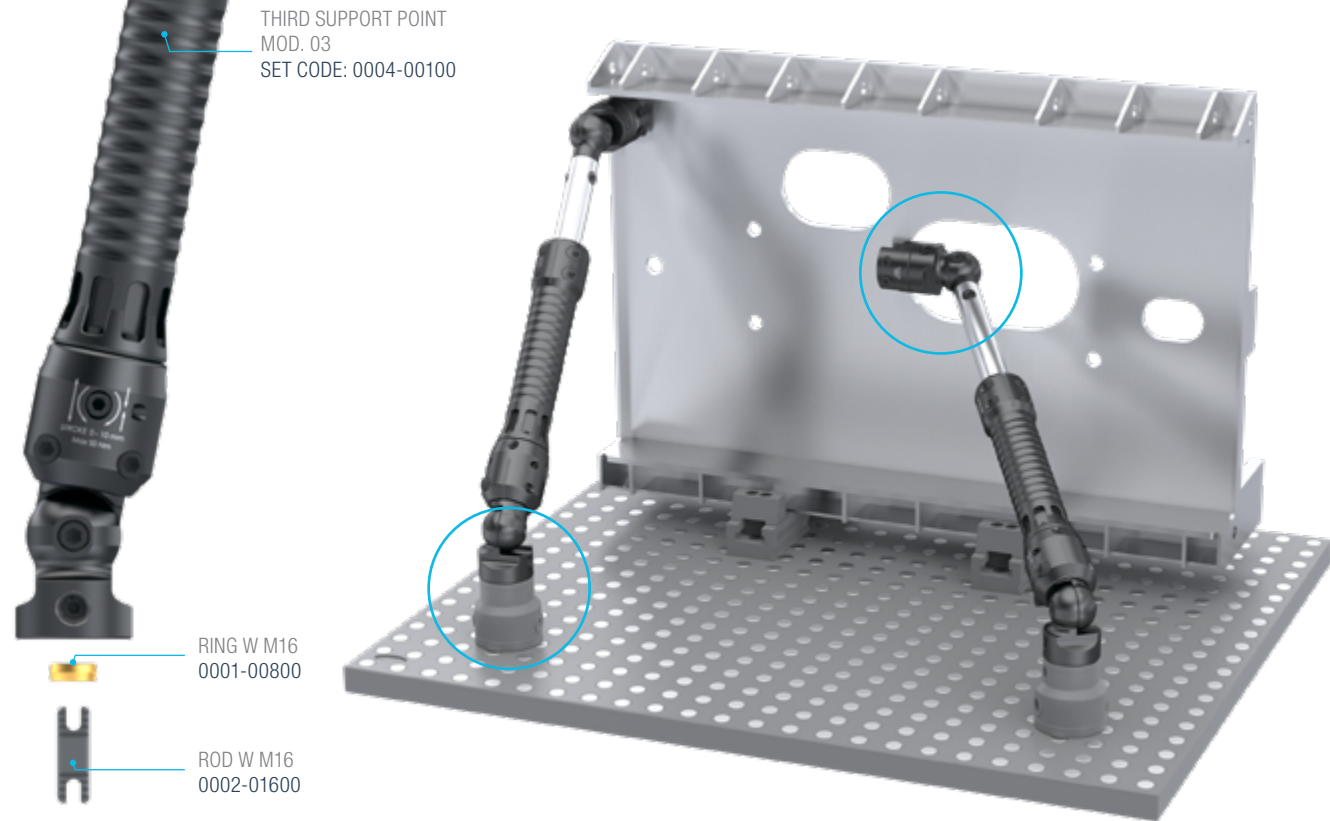
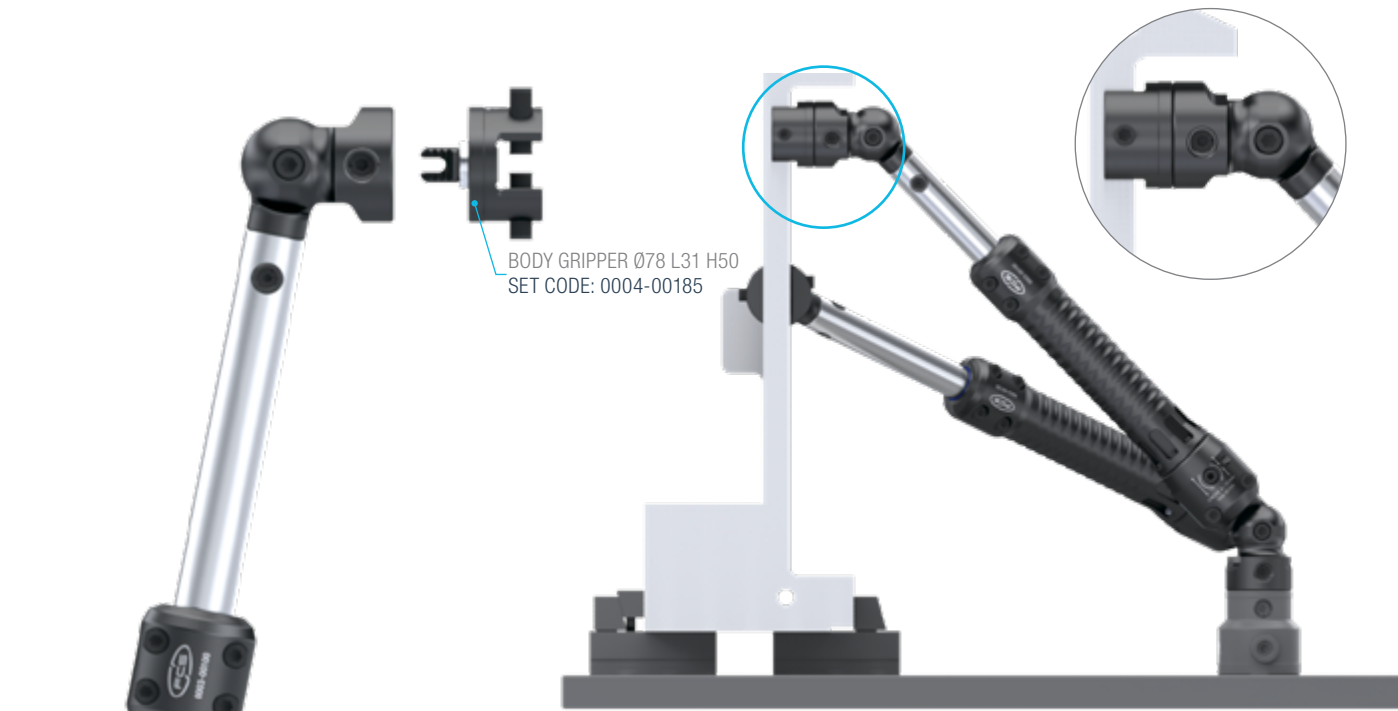
PALLETS

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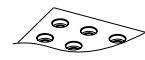
THIRD SUPPORT POINT MOD.03



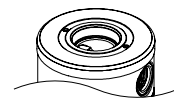
RING M16
0001-00501
ROD M16
0002-01200



RING W M16
0001-00800
ROD W M16
0002-01600



SEAT M16
STEP 50



BODY M16
BODY RED. M24-M16



ROD REDUCTION
M16-M12 L28 H0
0002-01105



ROD
M16 L35 H0
0002-01200



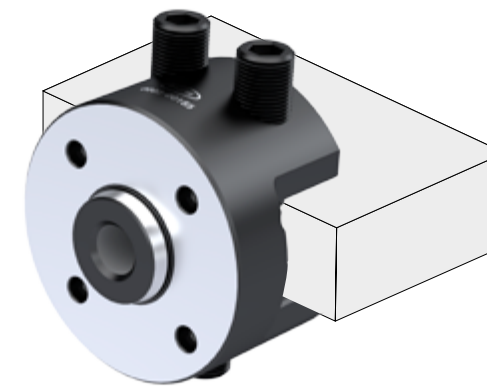
ROD H
M16 L60 H25
0002-01250



ROD
M16 L16 H0
0002-01202



FLANGE ADAPTER
M16-M24 049 H25
0001-00043



BODY GRIPPER
078 L31 H50
0003-00185



RING
M12 018 H0
0001-00400



RING
M12 020 H0
0001-00401



RING
M16 022 H0
0001-00500



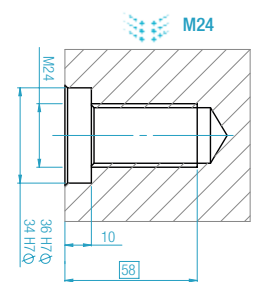
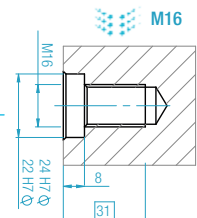
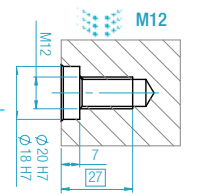
RING
M16 024 H0
0001-00501



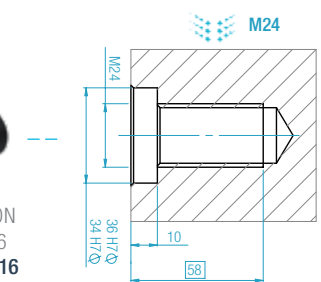
RING
M24 034 H0
0001-00600



RING
M24 036 H0
0001-00601



REDUCTION
M24-M16
4521-02416



THIRD SUPPORT POINT MOD.03

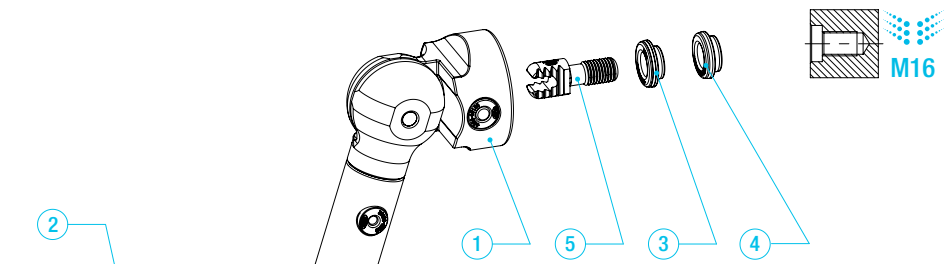
SET THIRD SUPPORT POINT MOD.03

SET THIRD SUPPORT POINT MOD.03

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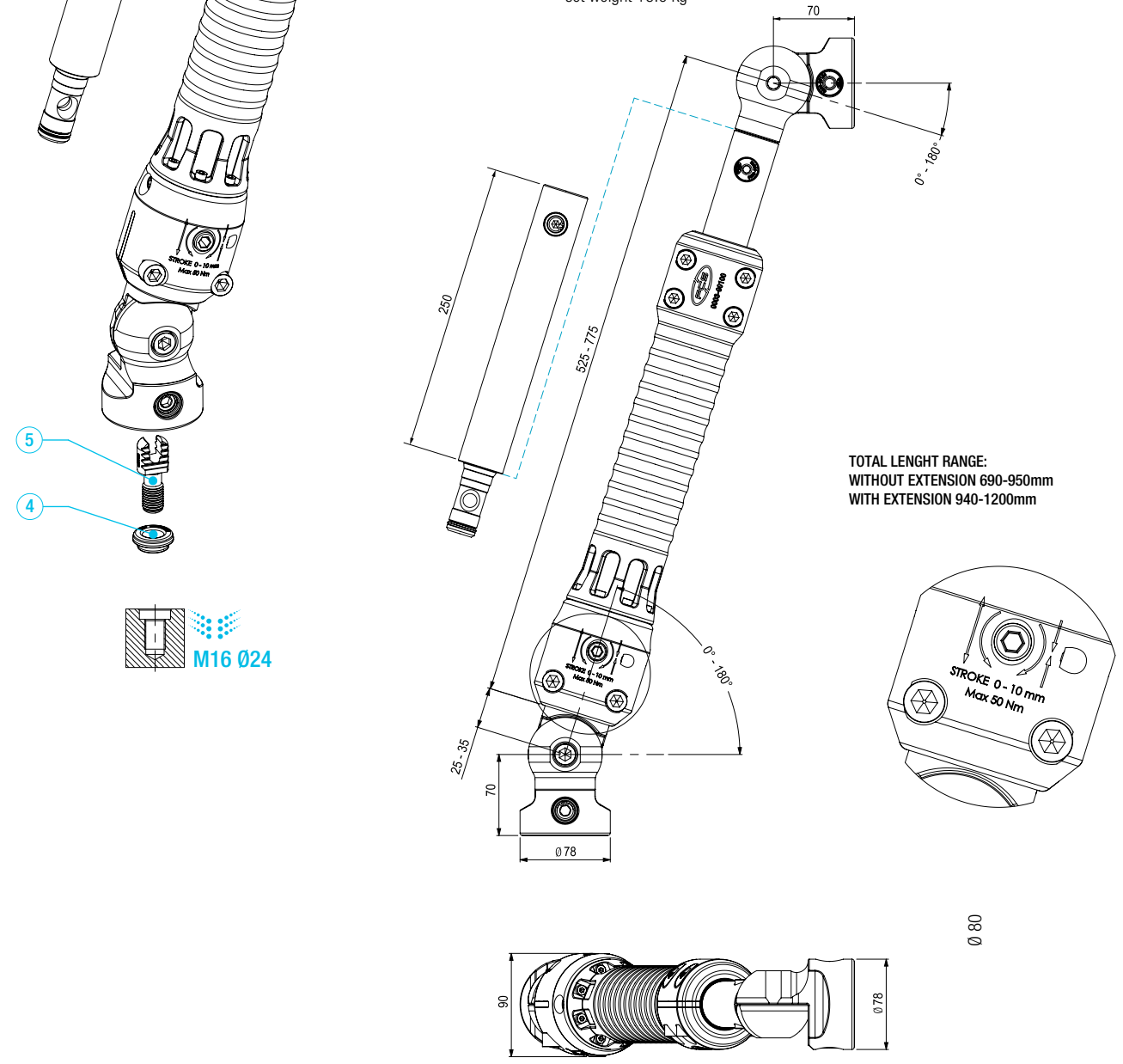
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SET CODE 0004-00100 SET THIRD SUPPORT POINT MOD.03



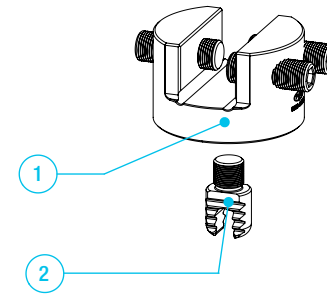
Description	Qty	CODE
1 THIRD SUPPORT POINT MOD.03	1	0003-00100
2 EXTENSION L250	1	0003-00053
3 RING M16 Ø22 H0	1	0001-00500
4 RING M16 Ø24 H0	2	0001-00501
5 ROD M16 L35 H0	2	0002-01200

set weight 16.0 kg

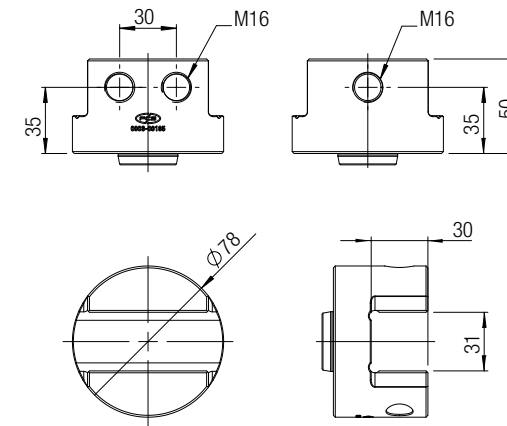


TOTAL LENGTH RANGE:
WITHOUT EXTENSION 690-950mm
WITH EXTENSION 940-1200mm

SET CODE 0004-00185 SET BODY GRIPPER Ø78 L31 H50

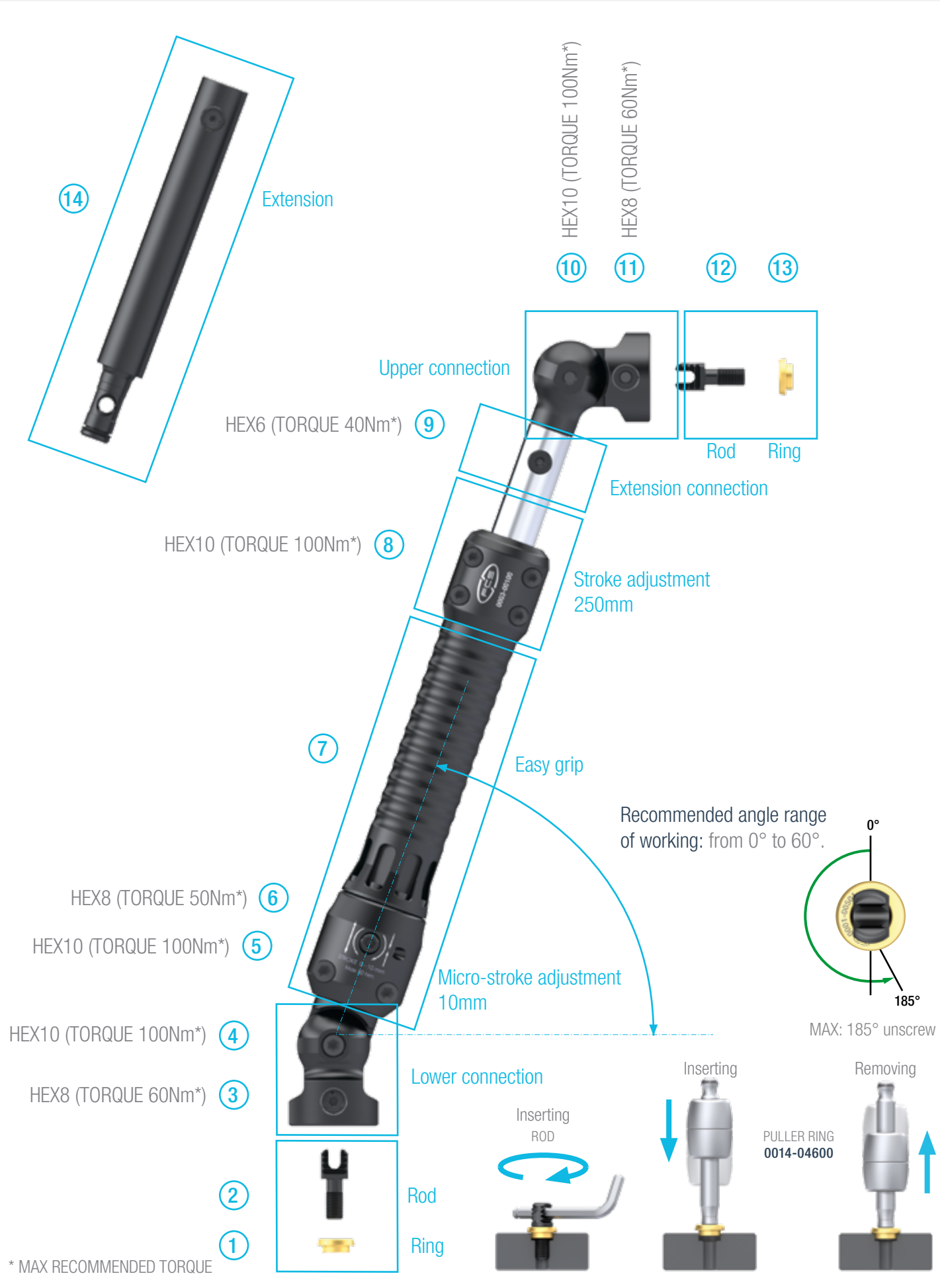


Description	Qty	CODE
1 BODY GRIPPER Ø78 L31 H50	1	0003-00185
2 ROD M16 L16 H0	1	0002-01202



CLAMPING PROCEDURE

CLAMPING PROCEDURE



MOUNTING PROCEDURE

Before applying see below cleaning and maintenance instructions.

- Rings and Rods**
Set the Rings into the seats (on both lower and upper side) (1, 13), using the following two alternatives:
- by using the Rod (2, 12): once the Ring is just positioned on the seat, insert it by screwing the Rod up to the end limit;
- by using the Puller Ring.
- Screw the Rods (2, 12) up to the end stop (if it has not already done previously).
Pay attention to turn back the Rods (max 185°) in order to reach the proper orientation with the Third Support Point.

Preliminary setting operations of the screws

- Make sure to screw the HEX6 in the extension connection (9).
- Set the HEX8 (6) of the micro-stroke adjustment in the middle of the range ±5mm.
- Unscrew the remaining screws (3, 4, 5, 8, 10, 11).

Upper connection - Lower connection

- Move the lower connection into the Rod and partially tighten the HEX8 (3).
- Move the upper connection into the Rod and partially tighten the HEX8 (11).
- Partially tighten the HEX10 (4, 10).
- Fully tighten the HEX8 (3, 11) at the recommended torque 60Nm.
- Fully Tighten the HEX10 (4, 10) at the recommended torque 100Nm.

Stroke adjustment

- Fully tighten the HEX10 (8) at the recommended torque 100Nm.

Micro-stroke adjustment

- If necessary a micro pull or push action can be applied by the HEX8 (6) max torque 50Nm as follows:
- partially tighten the HEX10 (4, 10) at 10Nm;
- make sure the HEX10 (5) is fully unscrewed;
- micro push action: unscrew the HEX8 (6) or;
- micro pull action: screw the HEX8 (6);
- fully tighten the HEX10 (4, 10) at the recommended torque 100Nm.
Even if do not use the "micro-stroke adjustment" procedure, make sure to fully tighten the HEX10 (5) at the recommended torque 100Nm.

PROCEDURE FOR REMOVAL

- Untighten the HEX8 (3, 11) and the HEX10 (4, 10).

CLEANING AND MAINTENANCE

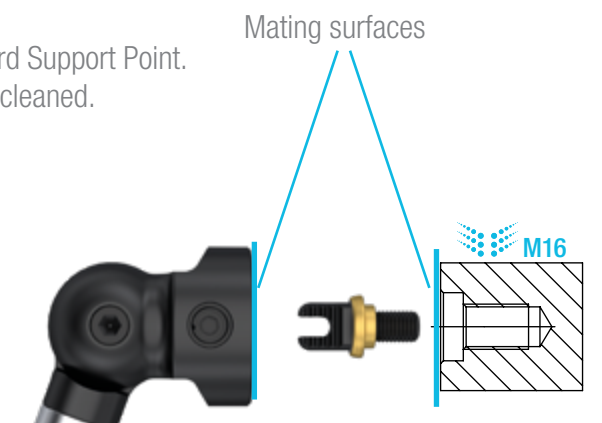
It is recommended to keep clean and properly lubricated the Third Support Point. Before applying, make sure that the mating surfaces have been cleaned.

EXTENSION REMARKS

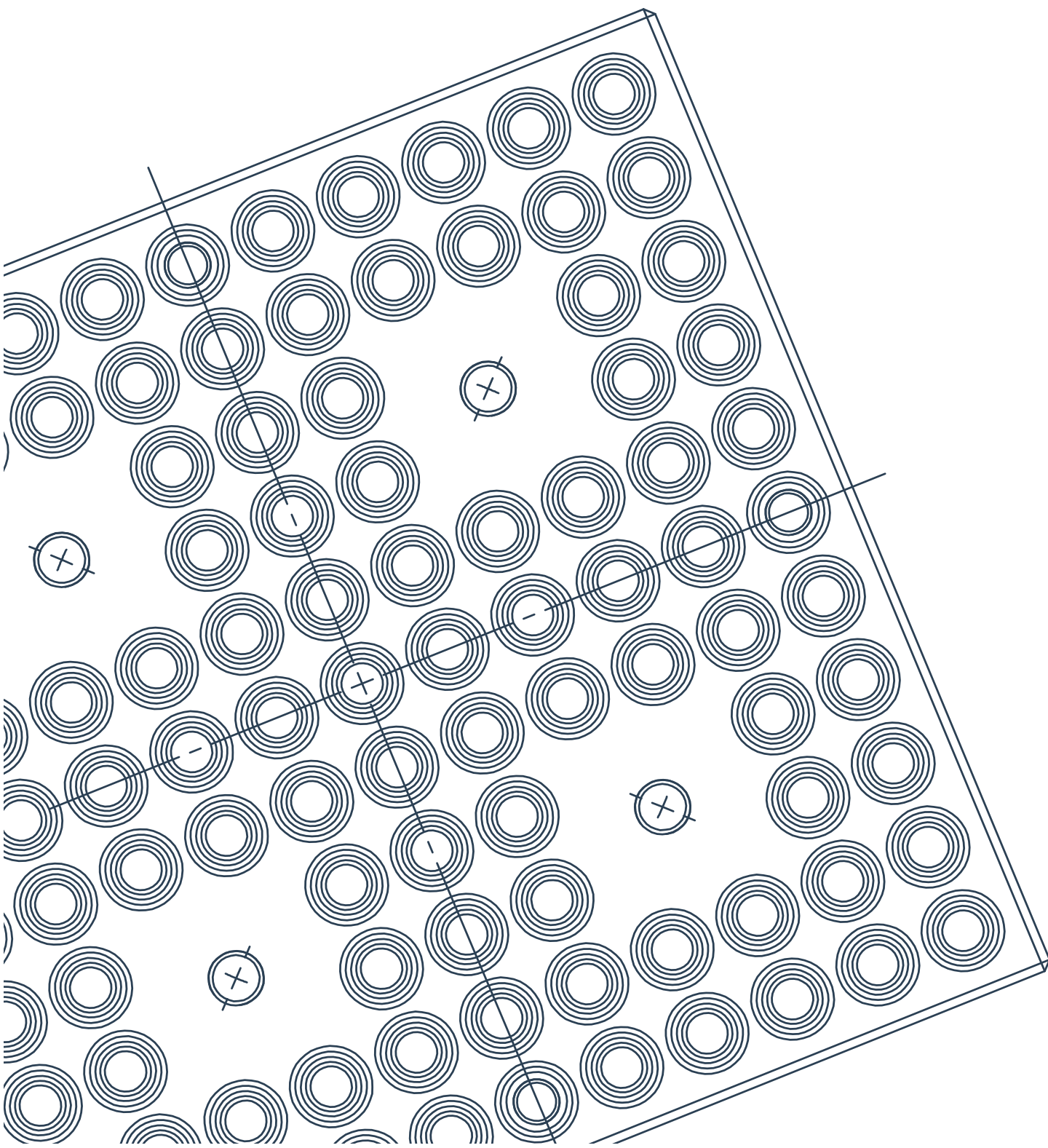
Max two extensions can be added (14).

RECOMMENDED ANGLE RANGE OF WORKING

From 0° to 60°.



PALLETS



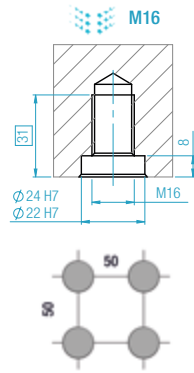
Integrated systems for production

INTRODUCTION AND KEY FEATURES

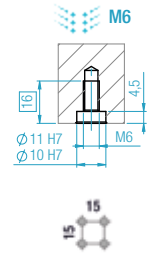
PALLETS

Steel plate having an accurate grid of holes with the aim of having on the workpiece side:

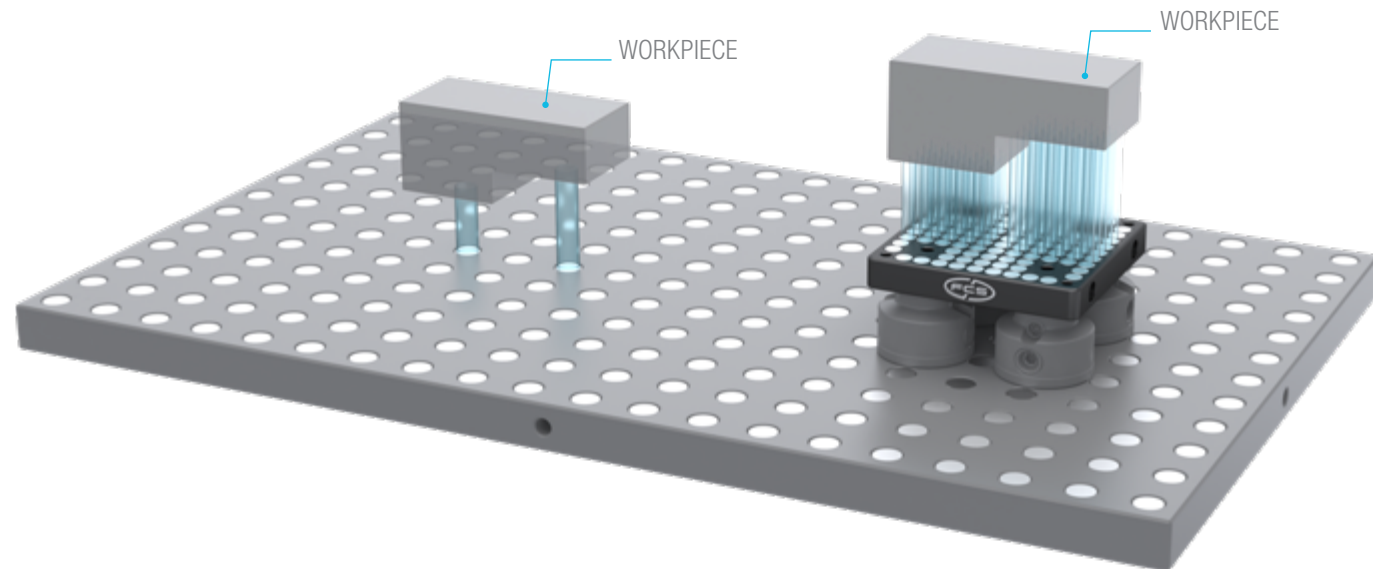
- **Smaller clamping seats**
- **Smaller Grid Step**



Without Pallet



With Pallet



Note:
FURTHER REDUCTION METHOD: using a Body reduction or a Rod and Ring reduction, a clamping seat reduction can be obtained without any change of the grid step.

[SEE CLAMPS SECTION](#)

HIGH ACCURACY

Material type, fabrication method and quality control allow to reach high accuracy components and the accuracy is preserved over the time (reliability).

WORKPIECE POSITIONING AND ORIENTATION

The clamping system framework allows to keep track of the position and orientation of the workpiece with high accuracy along the production process.

MODULARITY

It allows to create different clamping configurations by matching standardized modules.

SIZE RANGE

The clamping components have different sizes to be proportionally used for clamping workpieces of various dimensions.

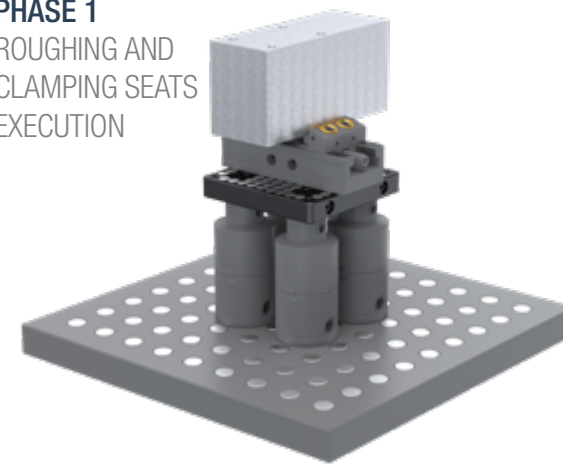
LOW AND EASY MAINTENANCE

The clamping components are easy to clean, and the spare parts are designed to be easily replaced in case of need.

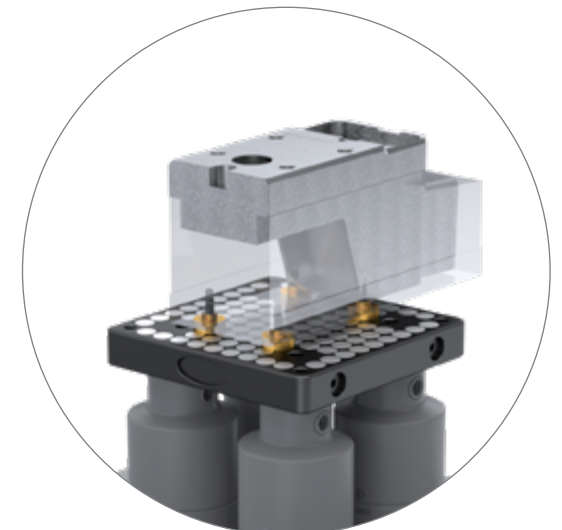
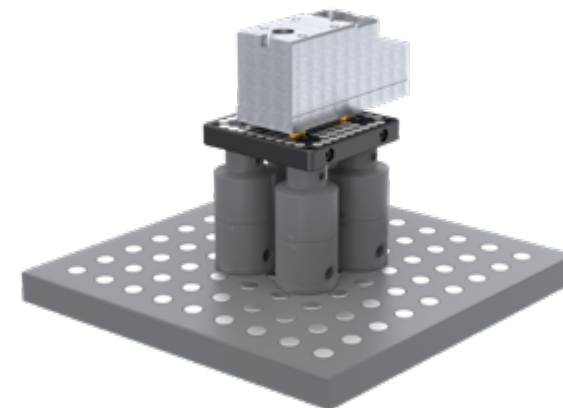
INTRODUCTION AND KEY FEATURES

PALLET APPLICATION ALONG THE WORKPIECE PRODUCTION PROCESS

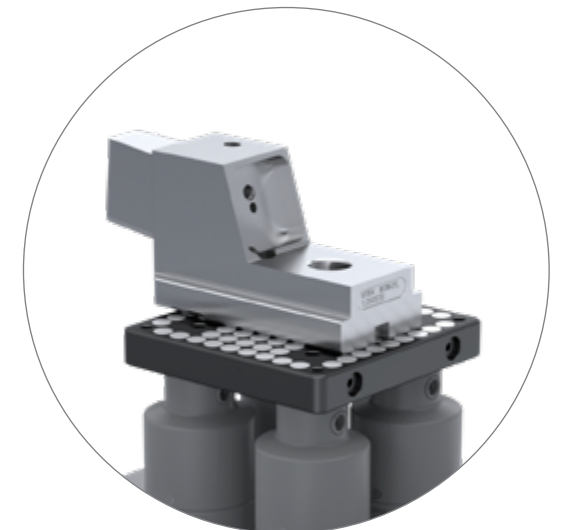
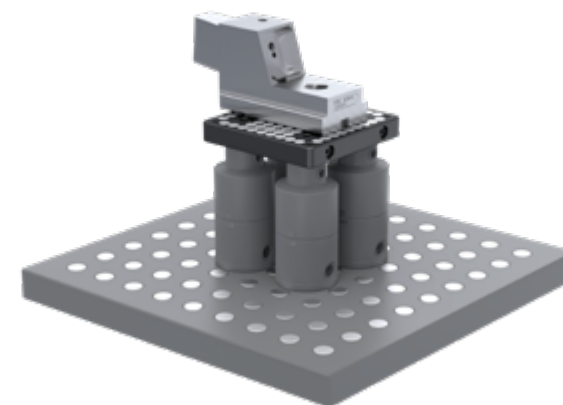
1

PHASE 1
ROUGHING AND
CLAMPING SEATS
EXECUTION

2

PHASE 2
FINISHING

3

PHASE 3
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INTRODUCTION

INTRODUCTION

BASE GAUGES

BASE GAUGES

CONNECTION BY STANDARD SCREW (SOCKET HEAD CAP SCREWS 12.9)

Option available for all the Pallets except for M12

CONNECTION BY ROD

Option available only for the Pallet M12

Pallet raised on Bodies

Pallet raised on Bodies

CLAMPS

CLAMPS

CLAMPS ADJUSTABLE

CLAMPS ADJUSTABLE

THIRD SUPPORT POINTS

THIRD SUPPORT POINTS

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CUBES-SHOULDERS BEAMS

ACCESSORIES SPARE PARTS

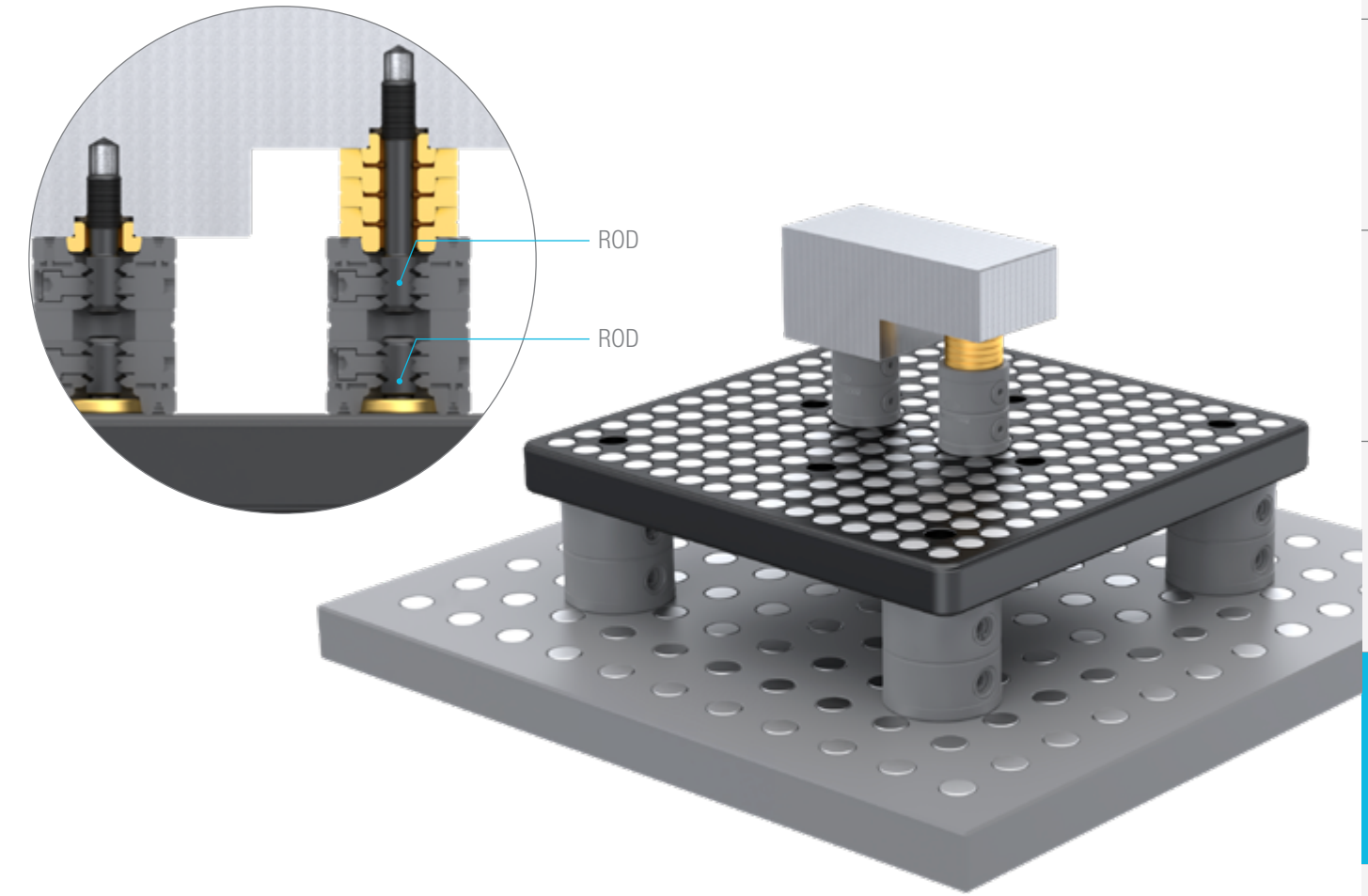
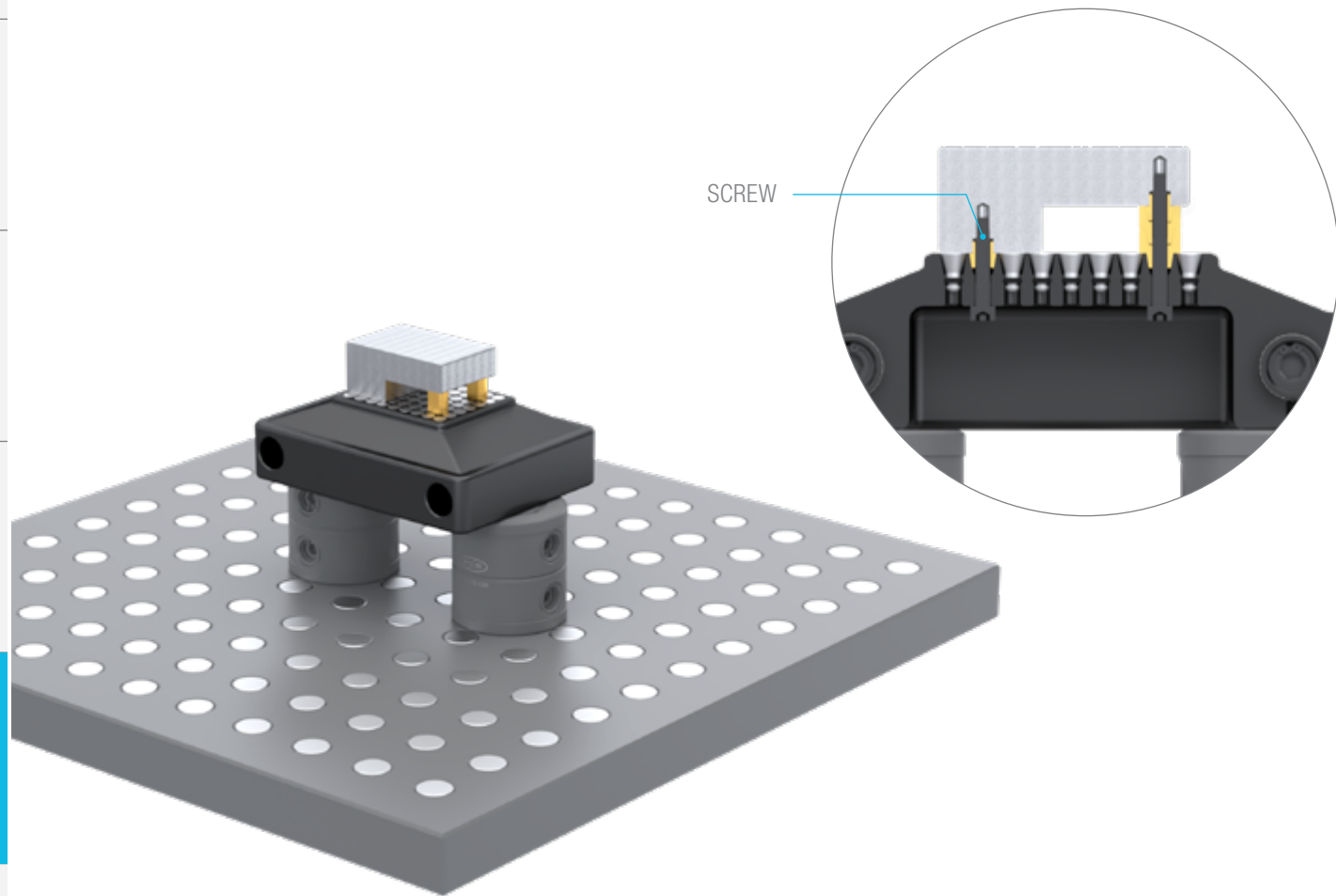
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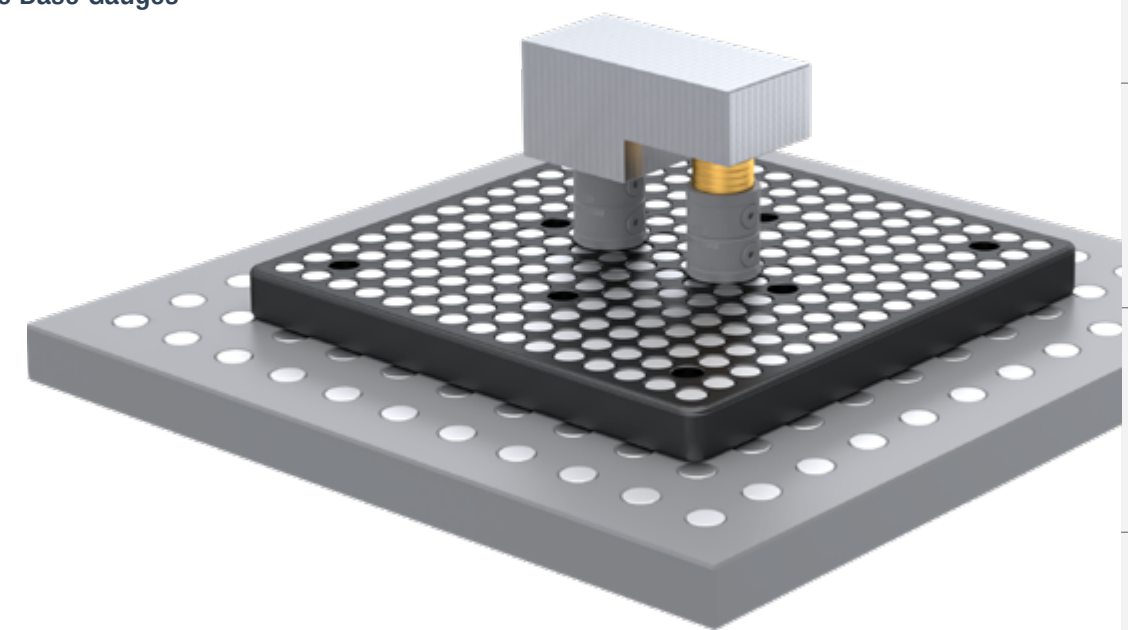
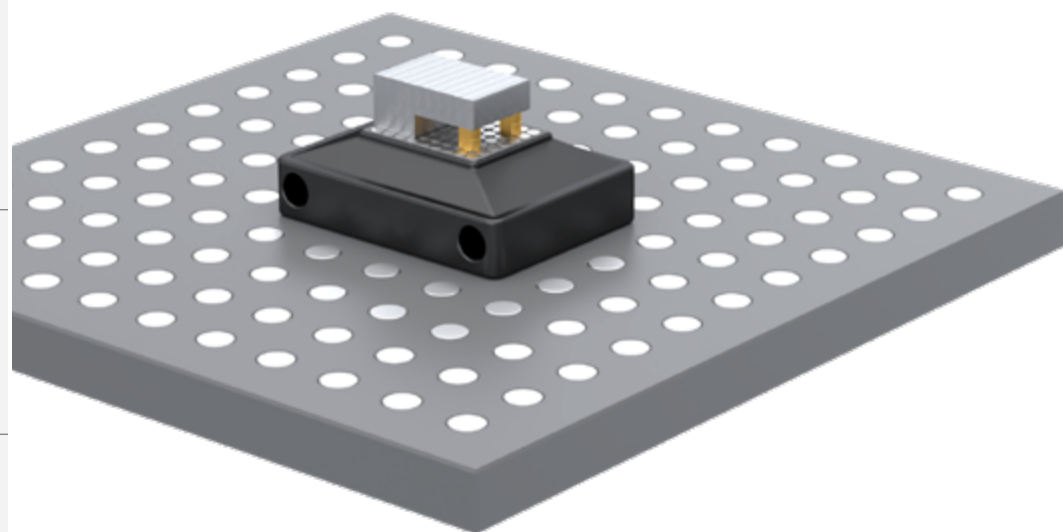
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Pallet held down on the Base Gauges

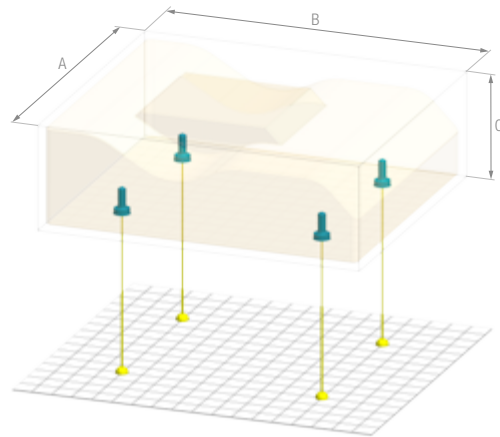
Pallet held down on the Base Gauges



PALLETS - PRODUCTS RANGE AND APPLICATION EXAMPLES

PALLETS - APPLICATION EXAMPLES

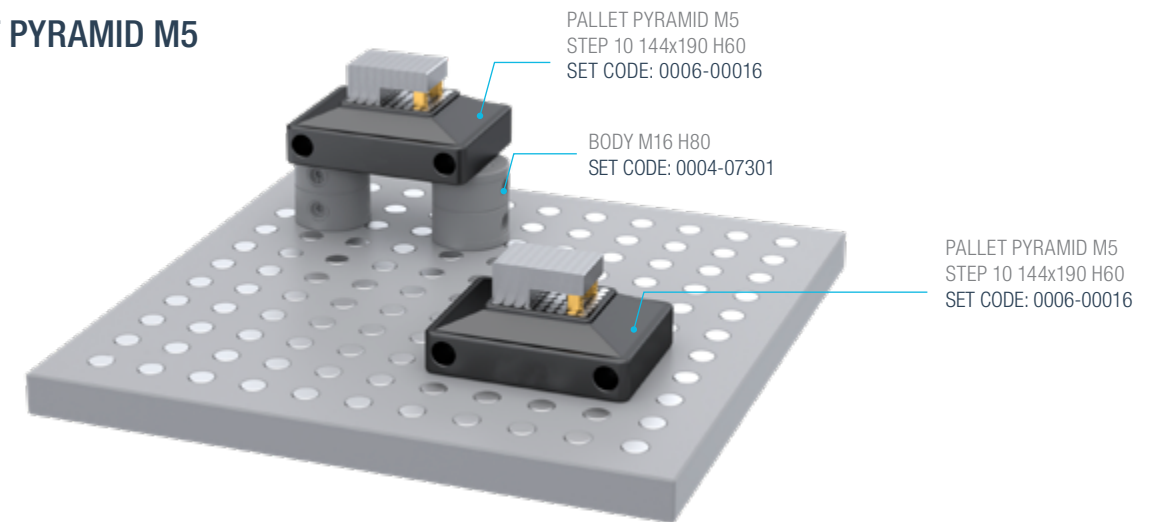
PALLETS



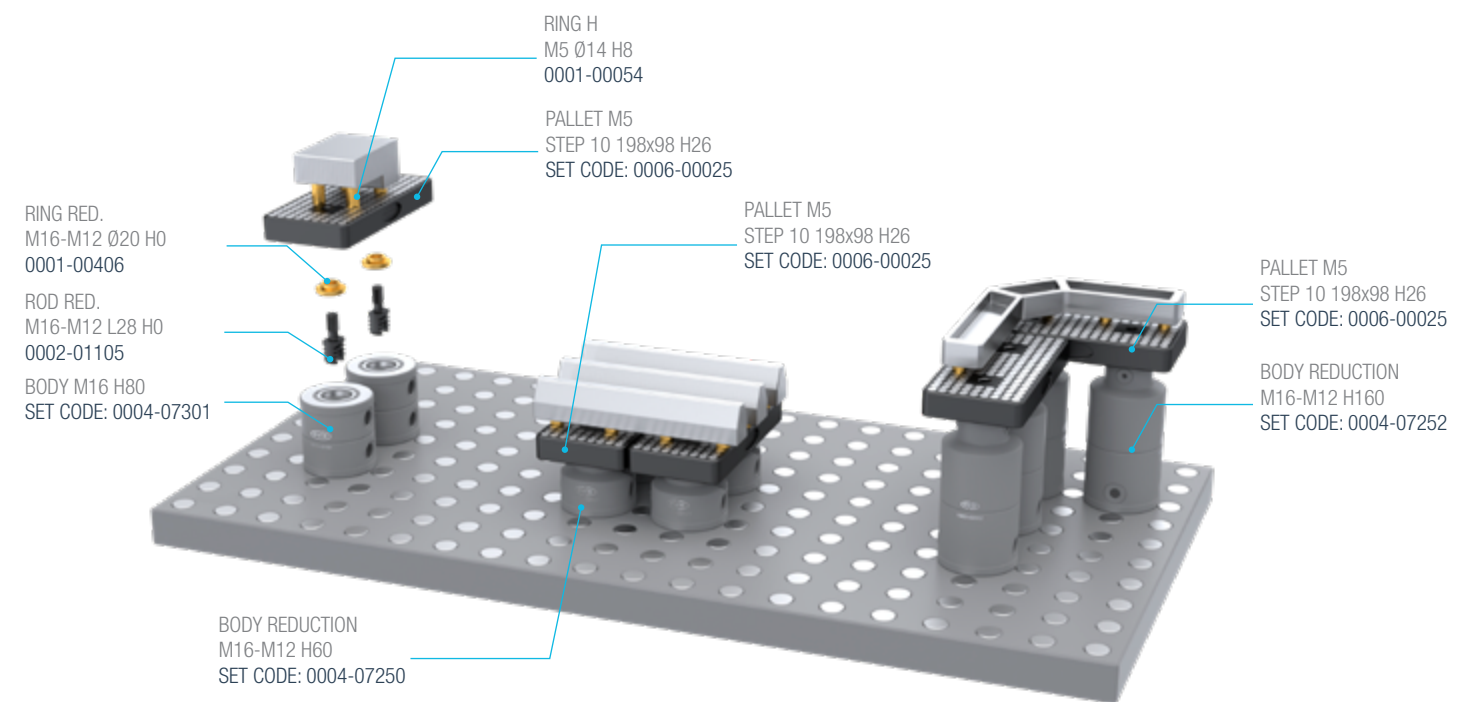
ITEMS	DESCRIPTION	SET PALLET	PALLET CLAMPING SURFACE (mm)	WORKPIECE SIZE UP TO		HELD DOWN THE PALLET ON THE BASE GAUGES	PLUG	SET WEIGHT (kg)
				A x B (mm)	C (mm)			
	PALLET PYRAMID M5 STEP 10 144x190 H60	0006-00016	80x100	160x180	120	✓	QTY. 63 00015-00009	6.4
	PALLET M5 STEP 10 198x98 H26	0006-00025	98x198	180x280	160		QTY. 153 0015-00009	3.1
	PALLET PYRAMID M6 STEP 15 195x195 H100	0006-02001	115x115	222x222	160	✓	QTY. 49 0015-04510	11.1
	PALLET M6 STEP 15 176x176 H26	0006-07001	176x176	282x282	210		QTY. 101 0015-04510	5.2
	PALLET M6 STEP 15 Ø180 H26	0006-00030	176x176	282x282	210		QTY.81 0015-4510	4.2
	PALLET M8 STEP 20 230x230 H30	0006-07101	230x230	376x376	280		QTY. 101 0015-04520	10.2
	PALLET M10 STEP 25 296x296 H40	0006-07210	296x296	470x470	340		QTY. 113 0015-04530	23.9
	PALLET CLAMP M10 STEP 25 296x296 H40	0006-07200	296x296	470x470	340	✓	QTY. 101 0015-04530	23.2
	PALLET M12 STEP 25 396x396 H35 (usable as base gauge)	0006-00001	396x396	638x638	400	✓	QTY. 217 0015-04501	37.3

Note:
For all the Pallets, the connection with the workpiece is done by a standard screw (socket head cap screws 12.9), excepts for Pallet M12.
Only on the Pallet M12 the connection is done by Rods M12.

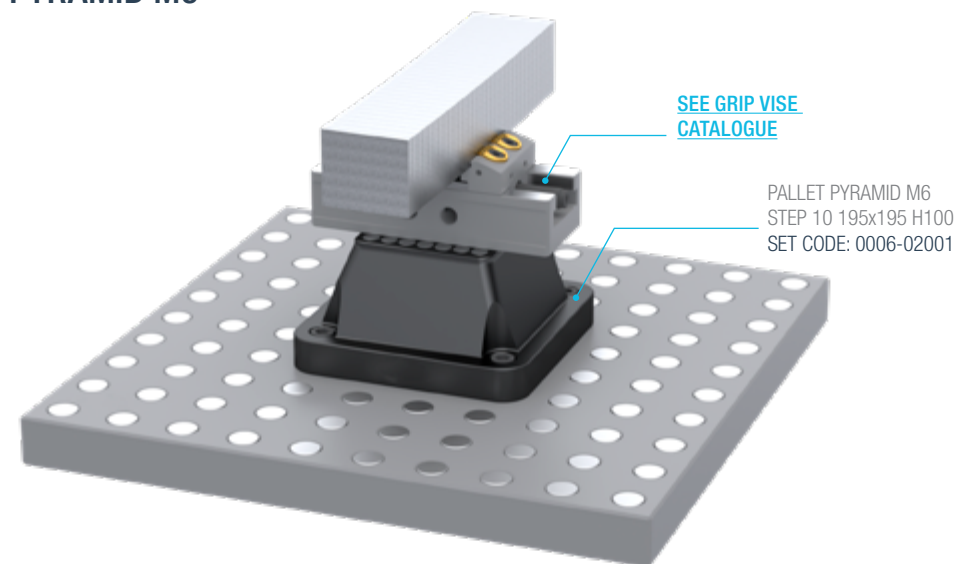
PALLET PYRAMID M5



PALLET M5



PALLET PYRAMID M6



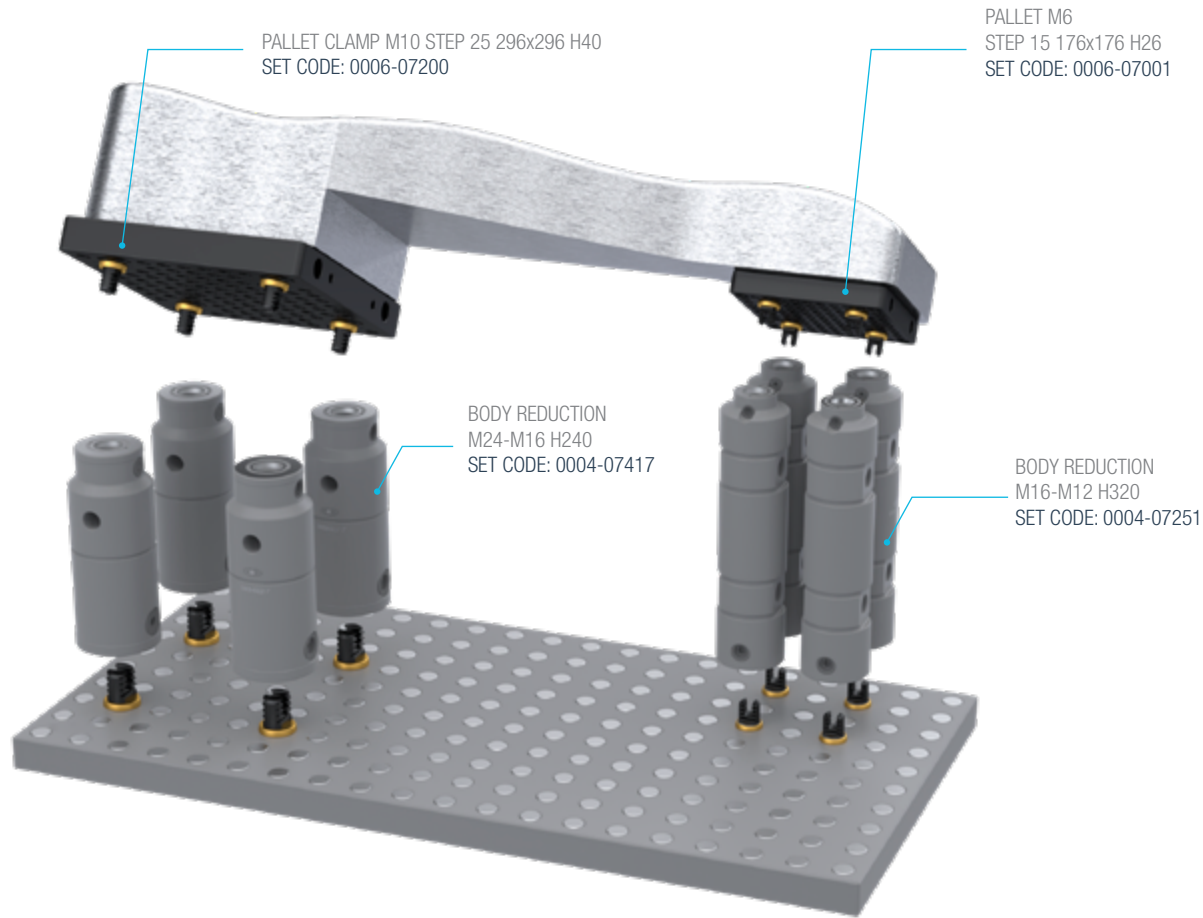
PALLETS - APPLICATION EXAMPLES

PALLETS - APPLICATION EXAMPLES

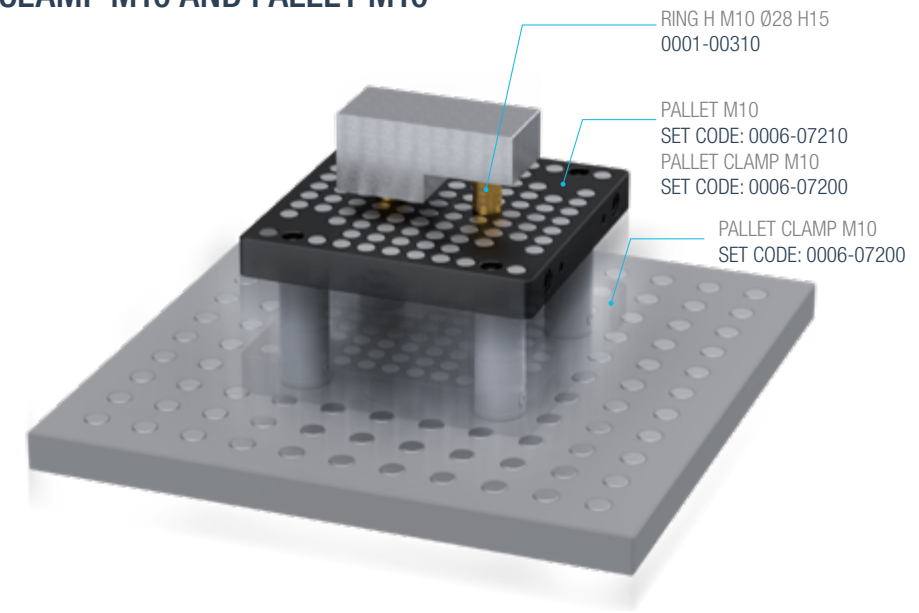
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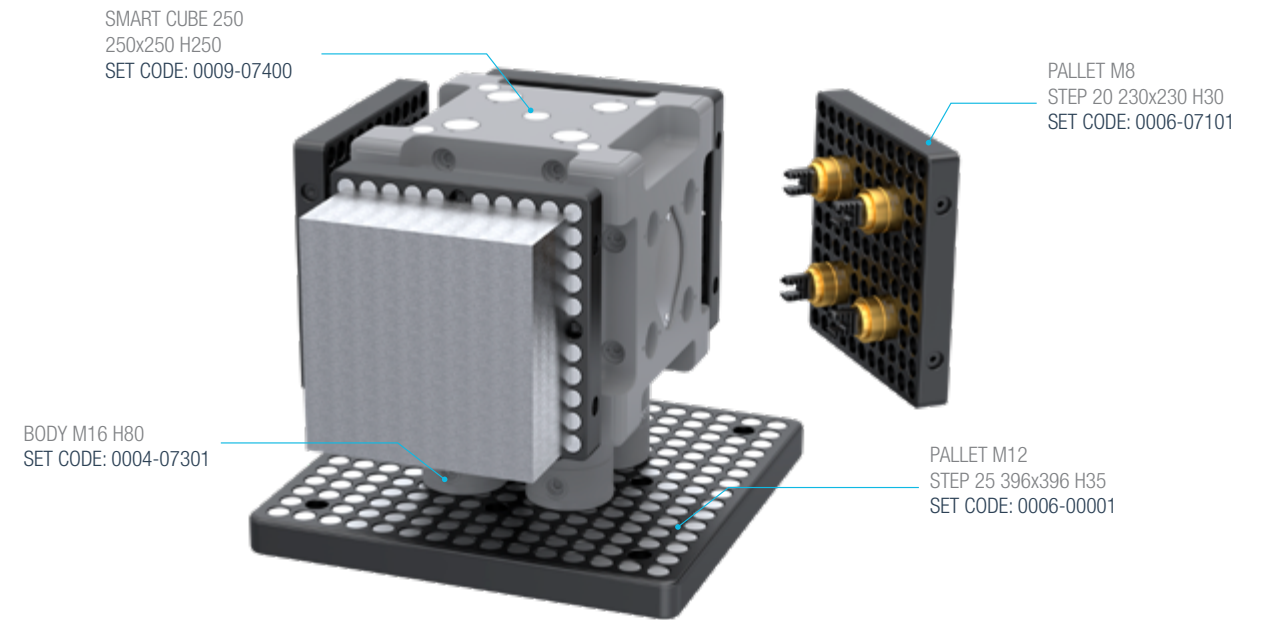
WORKPIECE CLAMPED BY DIFFERENT PALLETS (CLAMPING SEATS)



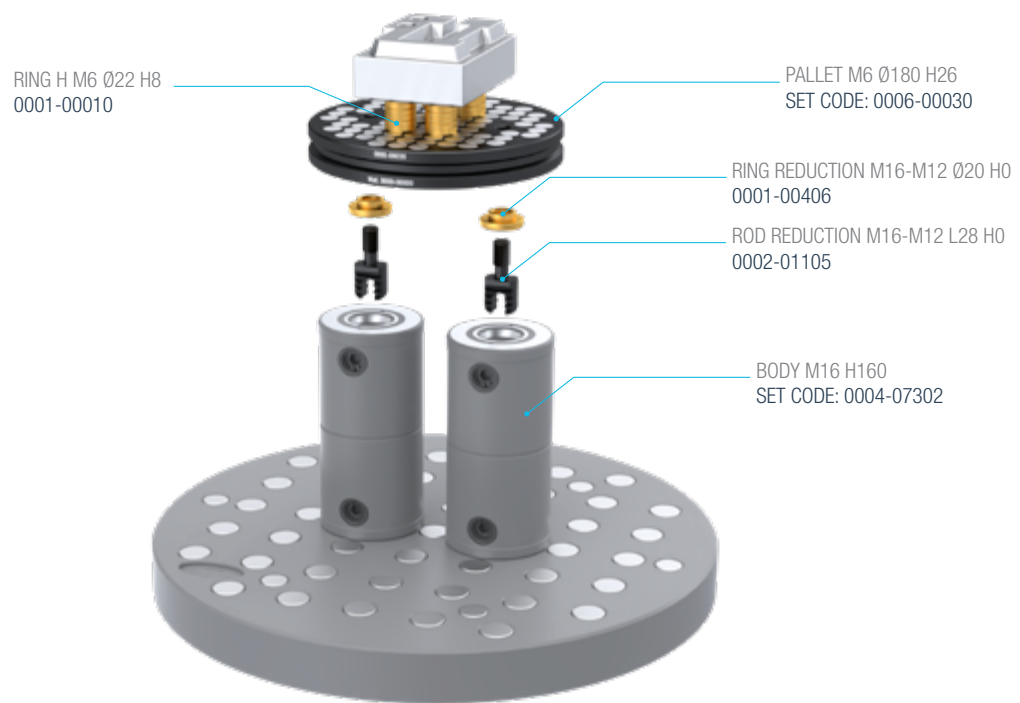
PALLET CLAMP M10 AND PALLET M10



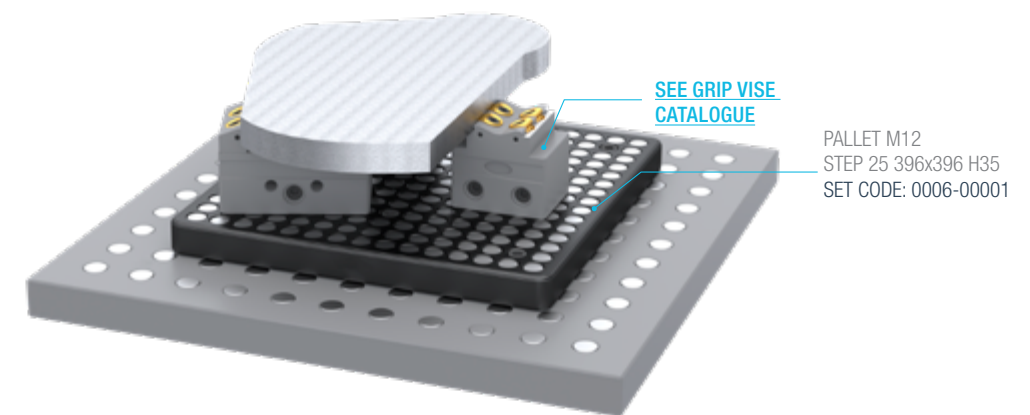
PALLET M8 AND PALLET M12



PALLET M6 Ø180 H26



PALLET M12







CLAMP Ø160

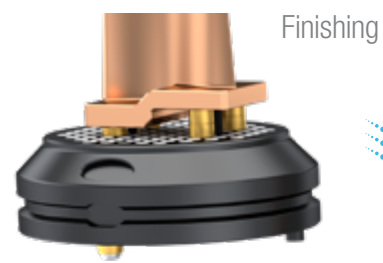
CLAMP Ø160

PALLET CLAMP Ø160 INTERCHANGEABLE SYSTEM ALONG THE WORKPIECE PRODUCTION PROCESS

The versatility of the system allows to clamp the workpiece in any production step and to easily handle the Pallet replacement.

The clamping seats keep track of the workpiece positioning and are defined in accordance with the STANDARD BREYL.

ITEMS	DESCRIPTION	SET PALLET	PALLET CLAMPING SURFACE (mm)	WORKPIECE SIZE UP TO		PLUG	SET WEIGHT (kg)
				A x B (mm)	C (mm)		
	PALLET Ø160 M5 STEP 10 H50	0006-00011	Ø128	Ø200	400	QTY. 97 0015-00009	4.1
	PALLET Ø160 PYRAMID M5 STEP 10 H83	0006-00013	Ø88	Ø140	280	QTY. 45 0015-00009	3.5
	PALLET Ø160 M6 STEP 15 H50	0006-00017	Ø128	Ø200	400	QTY. 45 0015-04510	3.6
	PALLET Ø160 PYRAMID M6 STEP 15 H83	0006-00018	Ø88	Ø140	280	QTY. 21 0015-04510	3.4



 PALLET M5 Grid step 10
PALLET M6 Grid step 15



Pallet mono-oriented by a locating pin (Ring and screw)



PALLET M5

PALLET M6 | M8

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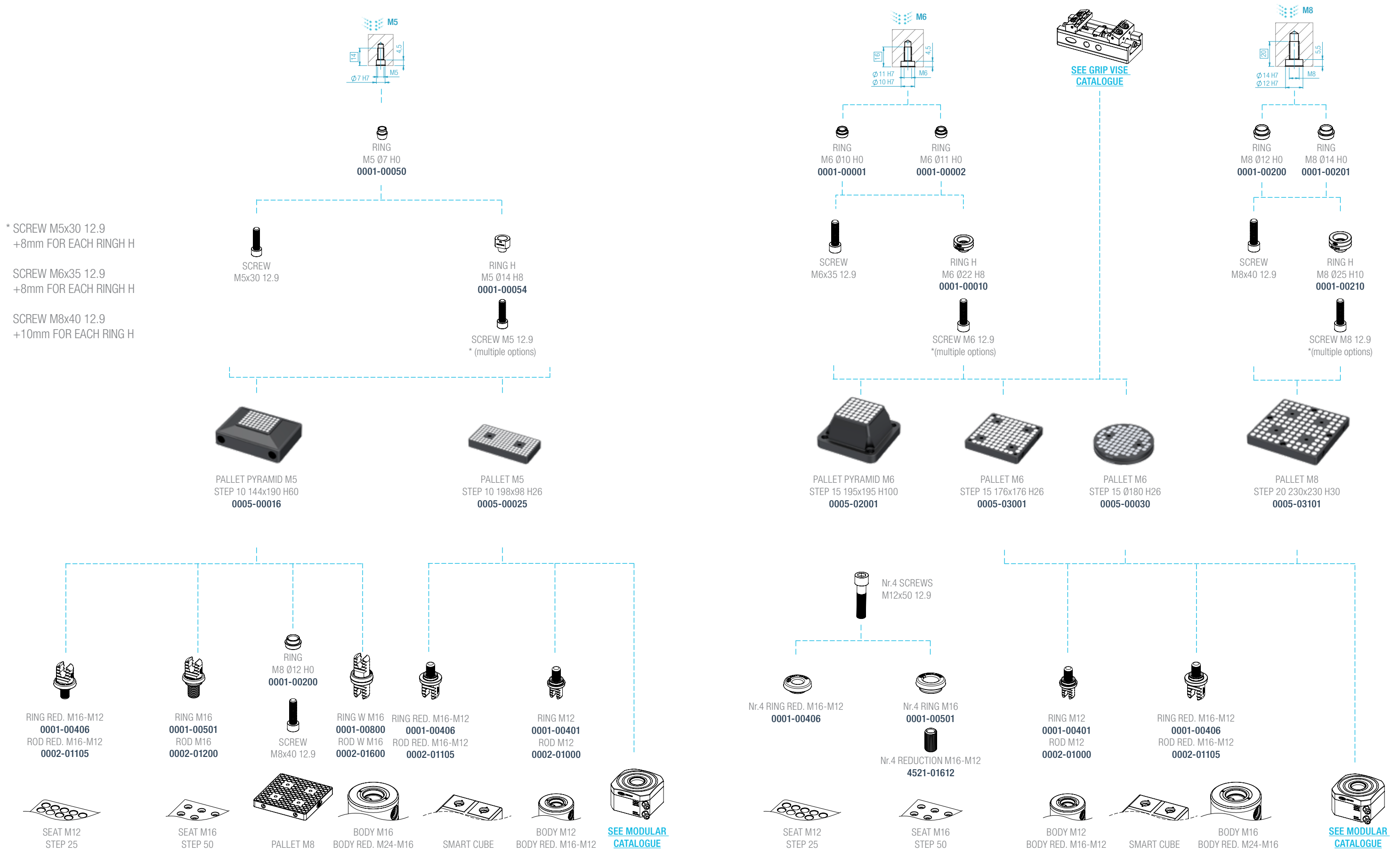
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Note:
For multicomponents clamping application refer to 3D Assembly Simulator. For the complete Kit refer to the corresponding SET CLAMP.

PALLET M10

PALLET M12

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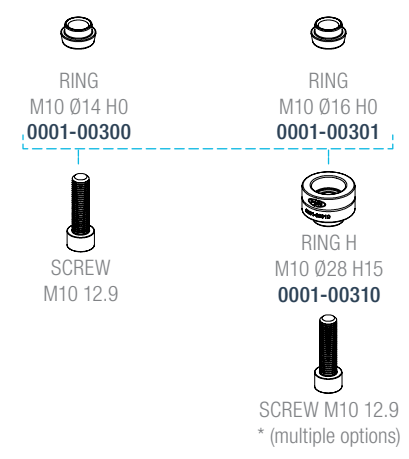
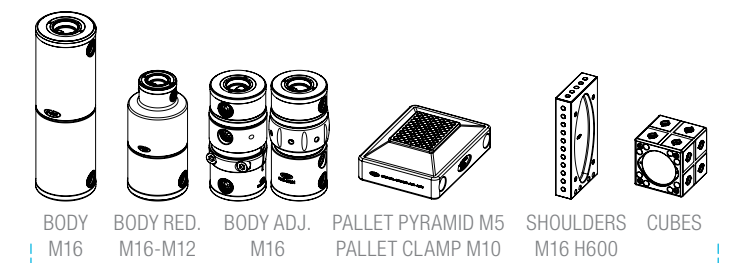
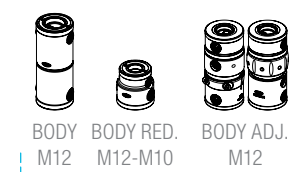
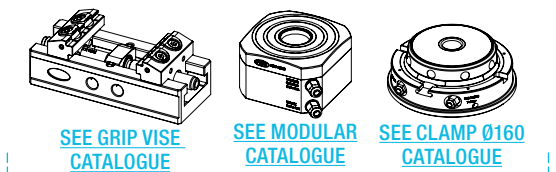
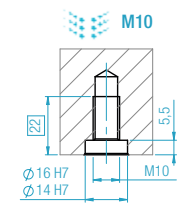
PALLETS

CUBES-SHOULDERS BEAMS

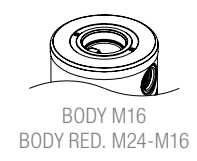
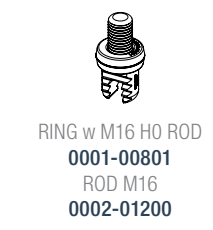
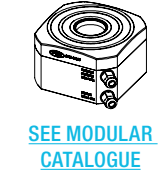
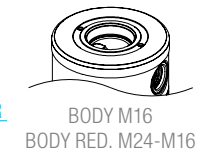
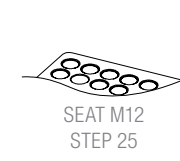
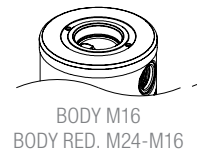
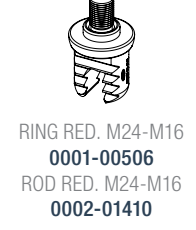
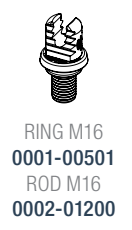
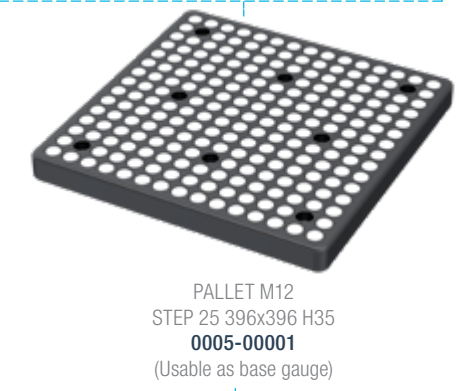
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* SCREW M10x50 12.9 +15mm FOR EACH RING H



Note: For multicomponents clamping application refer to 3D Assembly Simulator. For the complete Kit refer to the corresponding SET CLAMP.

PALLET CLAMP Ø160

PALLET CLAMP Ø160

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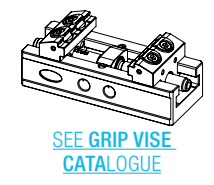
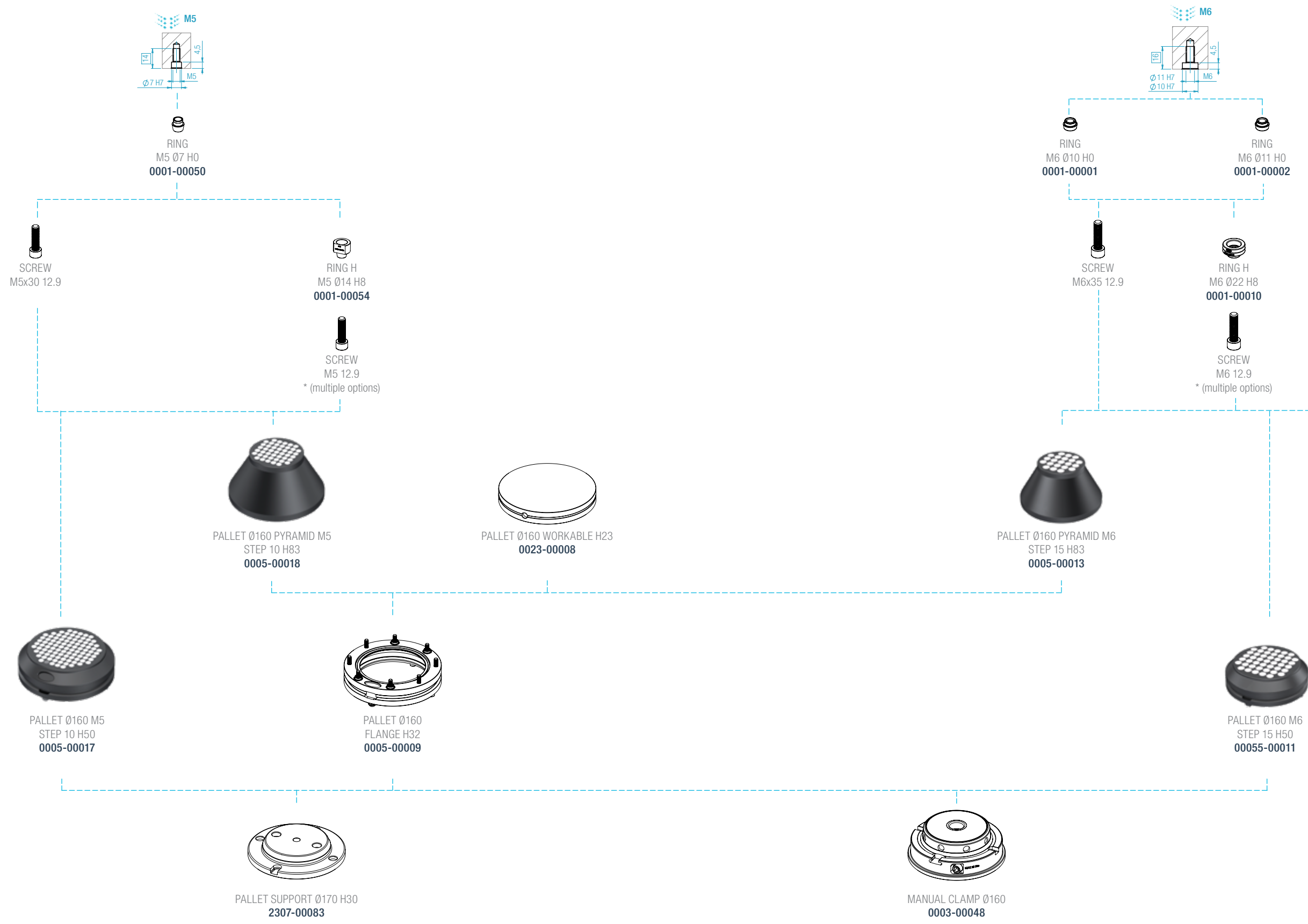
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* SCREW M5x30 12.9 +8mm FOR EACH RING H

SCREW M6x35 12.9 +8mm FOR EACH RING H

Note:
For multicomponents clamping application refer to 3D Assembly Simulator. For the complete Kit refer to the corresponding SET CLAMP.

RING-ROD M5 | M6 | M8

RING-ROD M10 | M12 | M16-M12



Note:
For multicomponents clamping application refer to 3D Assembly Simulator. For the complete Kit refer to the corresponding SET CLAMP.

* SCREW M5x30 12.9 +8mm FOR EACH RINGH H

SCREW M6x35 12.9 +8mm FOR EACH RINGH H

SCREW M8x40 12.9 +10mm FOR EACH RING H

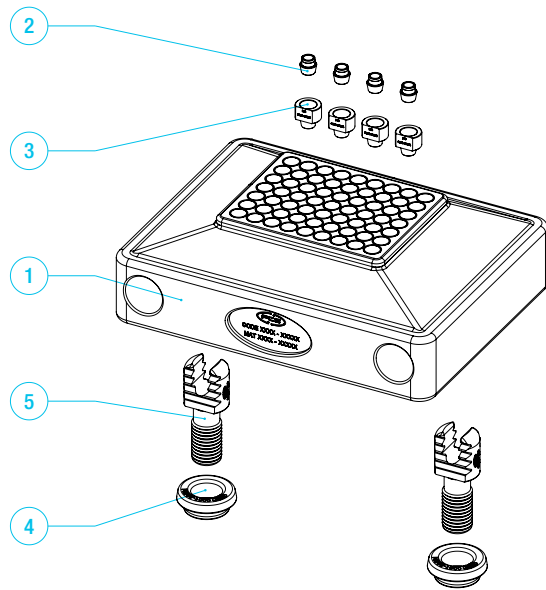
SCREW M10x50 12.9 +15mm FOR EACH RINGH H

SET PALLET

SET PALLET

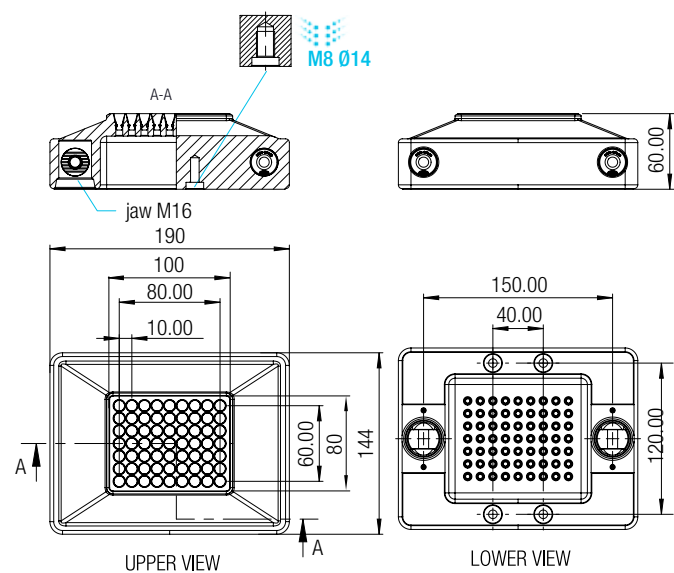
SET CODE 0006-00016

SET PALLET PYRAMID M5 STEP 10 144x190 H60



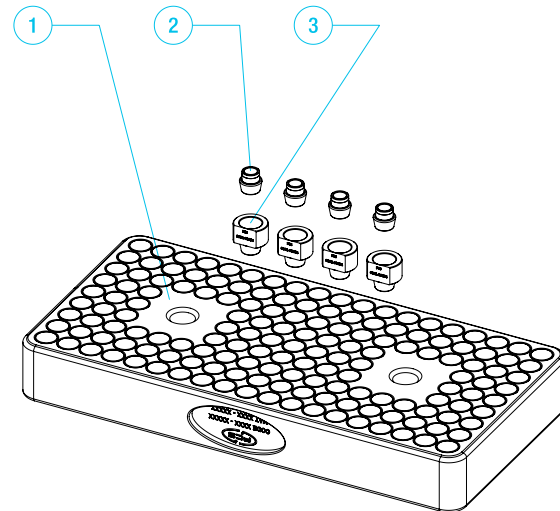
Description	Qty	CODE
1 PALLET PYRAMID M5 STEP 10 140x190 H60	1	0005-00016
2 RING M5 Ø7 H0	4	0001-00050
3 RING H M5 Ø14 H8	4	0001-00054
4 RING M16 Ø24 H0	2	0001-00501
5 ROD M16 L35 H0	2	0002-01200

set weight 6.4 kg



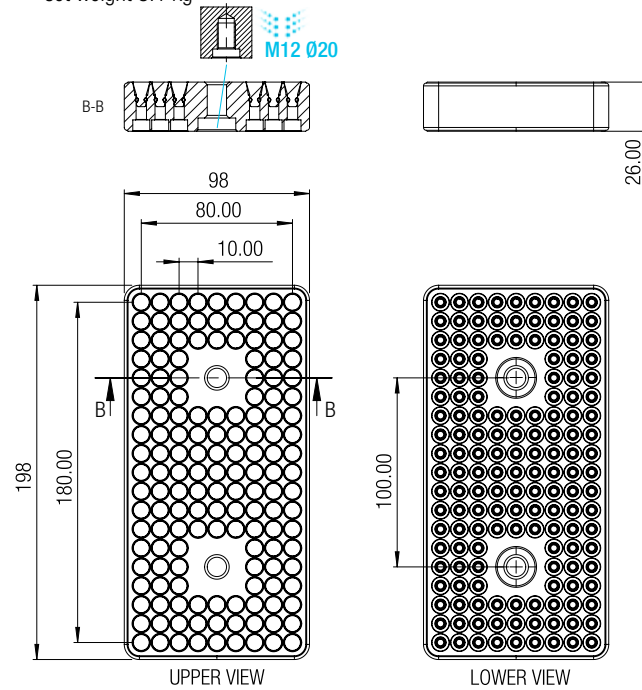
SET CODE 0006-00025

SET PALLET M5 STEP 10 198x98 H26



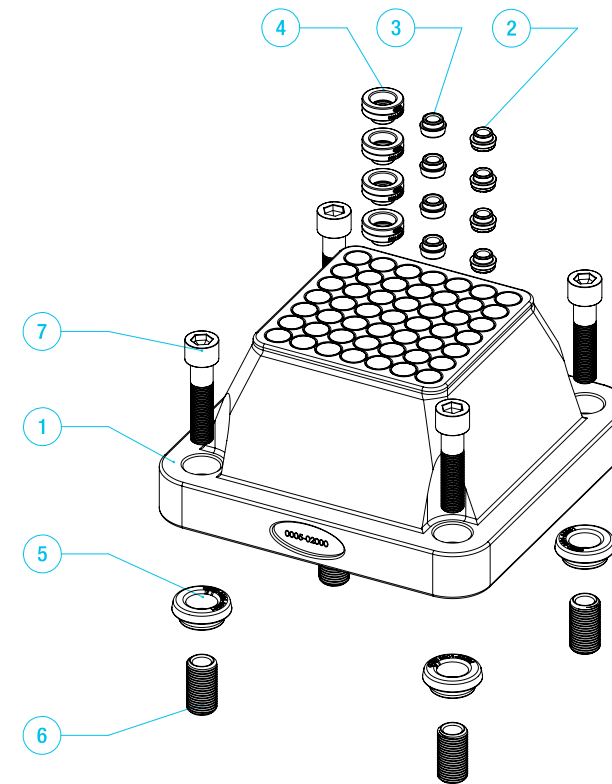
Description	Qty	CODE
1 PALLET M5 STEP10 198x98 H26	1	0005-00025
2 RING M5 Ø7 H0	4	0001-00050
3 RING H M5 Ø14 H8	4	0001-00054

set weight 3.1 kg



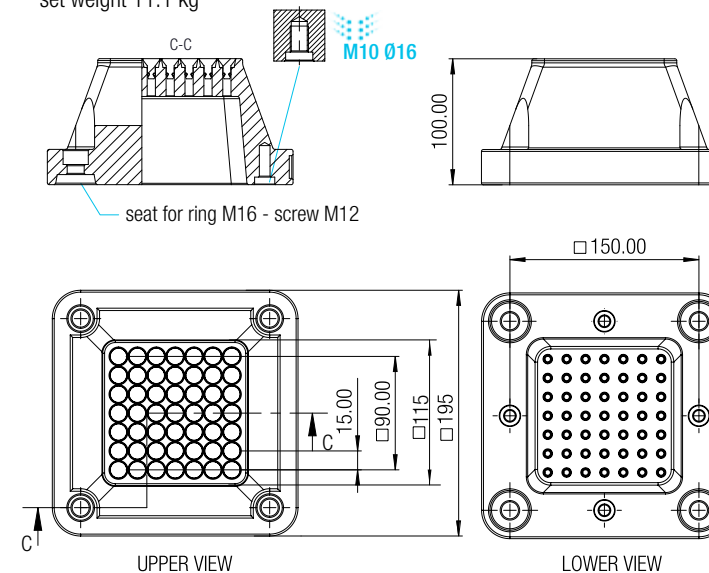
SET CODE 0006-02001

SET PALLET PYRAMID M6 STEP 15 195x195 H100



Description	Qty	CODE
1 PALLET PYRAMID M6 STEP 15 195x195 H100	1	0005-02001
2 RING M6 Ø10 H0	4	0001-00001
3 RING M6 Ø11 H0	4	0001-00002
4 RING H M6 Ø22 H8	4	0001-00010
5 RING M16 Ø24 H0	4	0001-00501
6 REDUCTION M16-M12	4	4521-01612
7 SCREW ISO 4762 M12x50 12.9 BURNISHED	4	4521-12050

set weight 11.1 kg

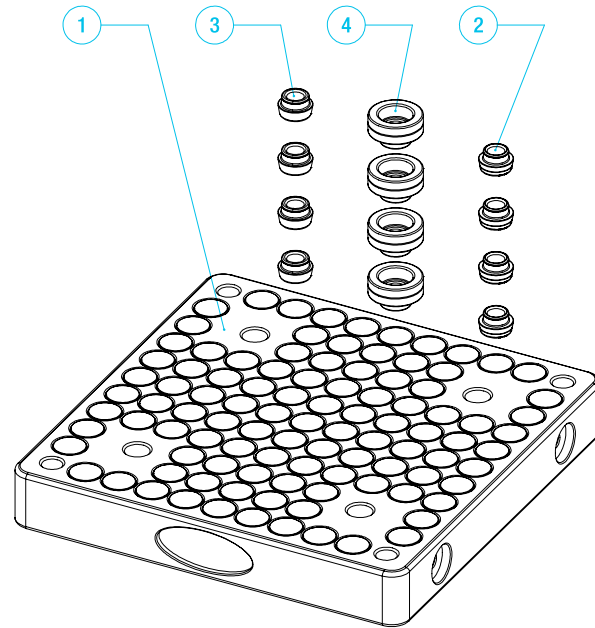


SET PALLET

SET PALLET

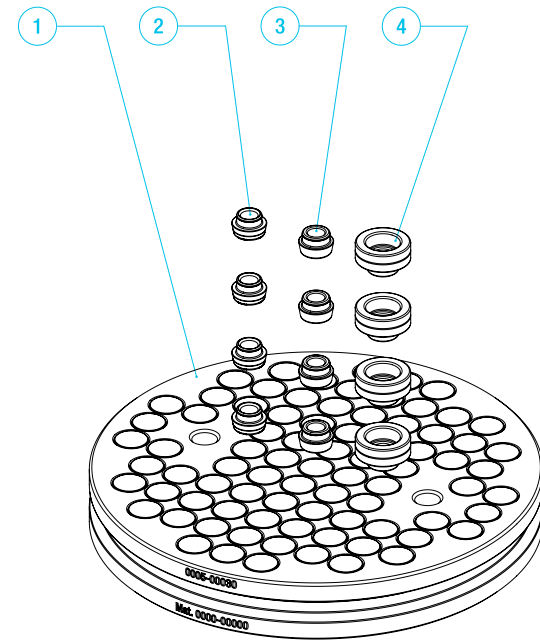
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SET PALLET M6 STEP 15 176x176 H26



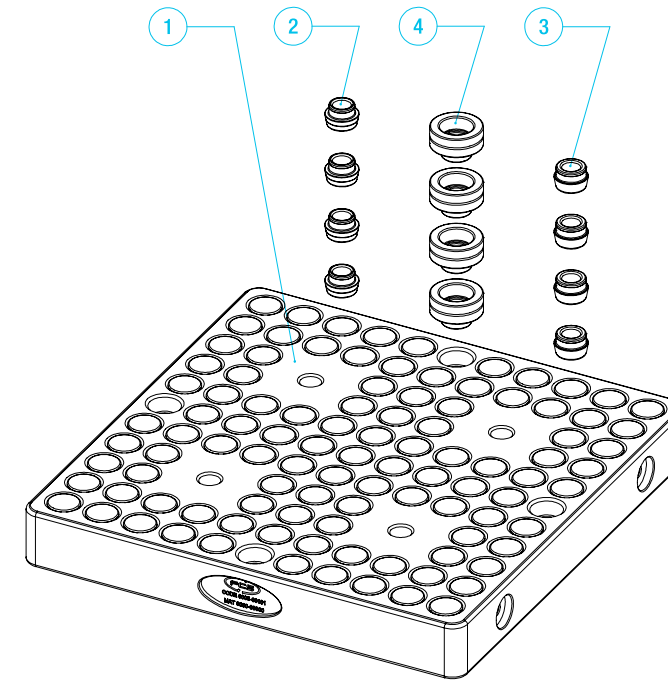
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SET PALLET M6 STEP 15 Ø180 H26



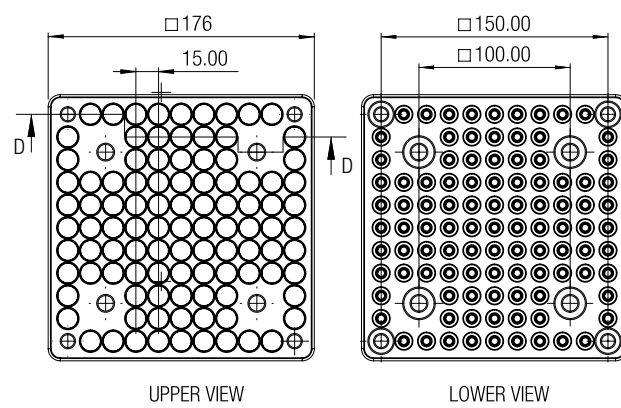
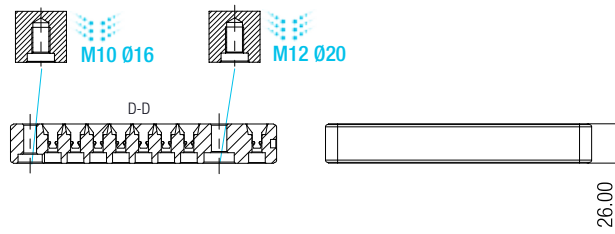
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SET PALLET M8 STEP 20 230x230 H30



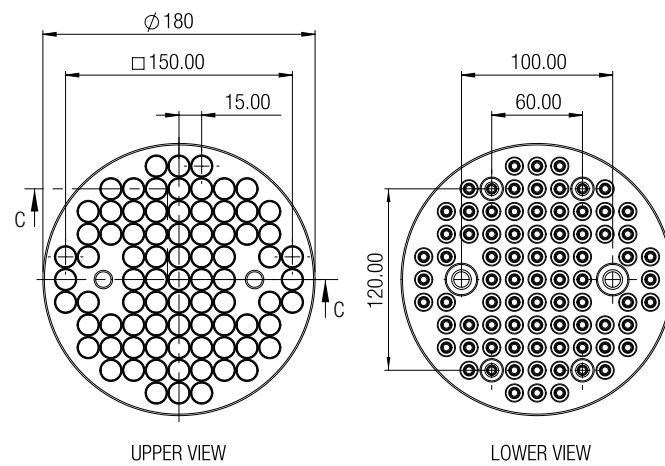
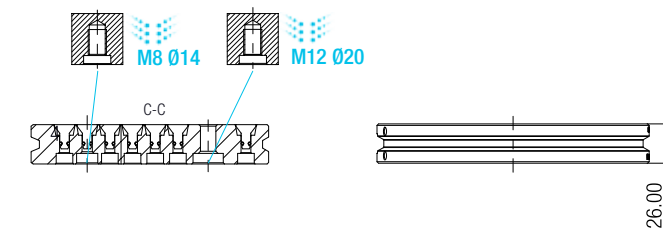
Description	Qty	CODE
1 PALLET M6 STEP 15 176x176 H26	1	0005-03001
2 RING M6 Ø10 H0	4	0001-00001
3 RING M6 Ø11 H0	4	0001-00002
4 RING H M6 Ø22 H8	4	0001-00010

set weight 5.2 kg



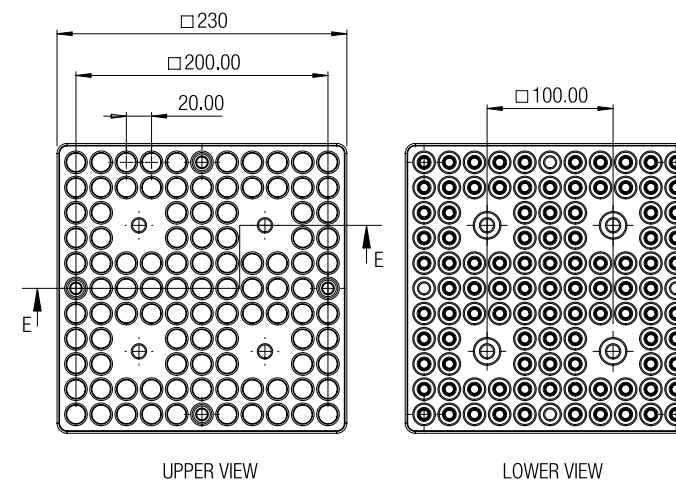
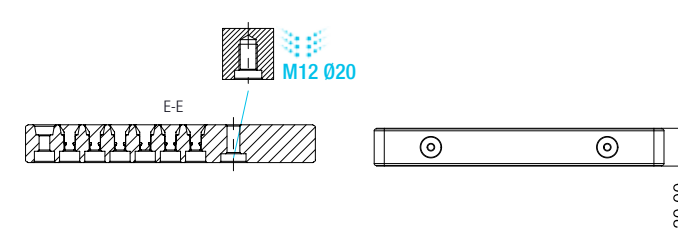
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1 PALLET M6 STEP 15 Ø180 H26	1	0005-00030
2 RING M6 Ø10 H0	4	0001-00001
3 RING M6 Ø11 H0	4	0001-00002
4 RING H M6 Ø22 H8	4	0001-00010

set weight 4.3 kg



Description	Qty	CODE
1 PALLET M8 STEP 20 230x230 H30	1	0005-03101
2 RING M8 Ø12 H0	4	0001-00200
3 RING M8 Ø14 H0	4	0001-00201
4 RING H M8 Ø25 H10	4	0001-00210

set weight 10.2 kg

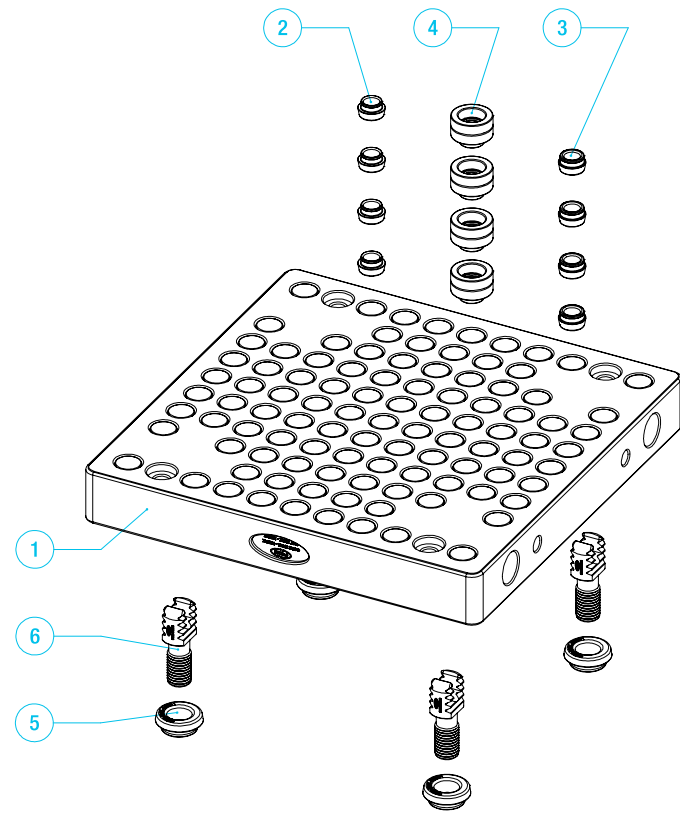


SET PALLET

SET PALLET

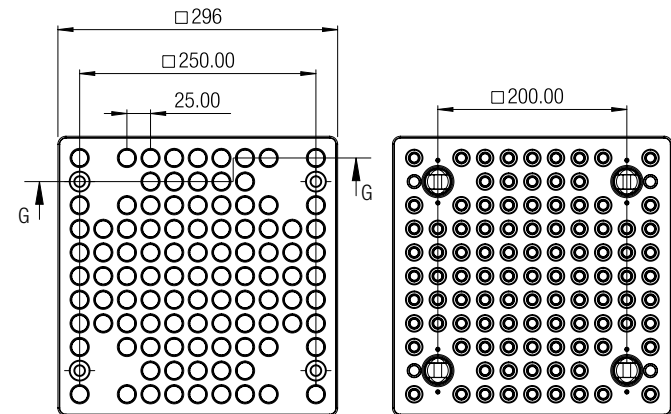
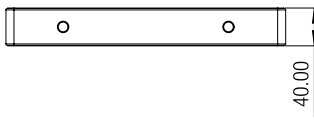
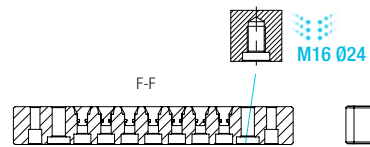
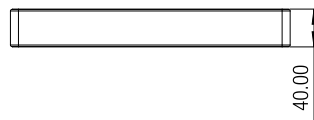
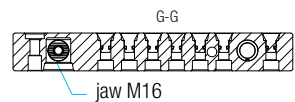
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SET PALLET CLAMP M10 STEP 25 296x296 H40



Description	Qty	CODE
1 PALLET CLAMP M10 STEP 25 296x296 H40	1	0005-03200
2 RING M10 Ø14 H0	4	0001-00300
3 RING M10 Ø16 H0	4	0001-00301
4 RING H M10 Ø28 H15	4	0001-00310
5 RING M16 Ø24 H0	4	0001-00501
6 ROD M16 L35 H0	4	0002-01200

set weight 23.9 kg

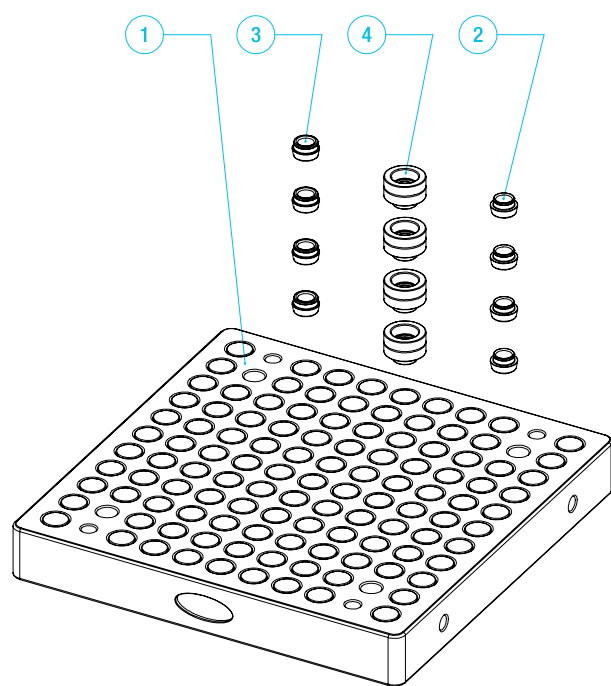


UPPER VIEW

LOWER VIEW

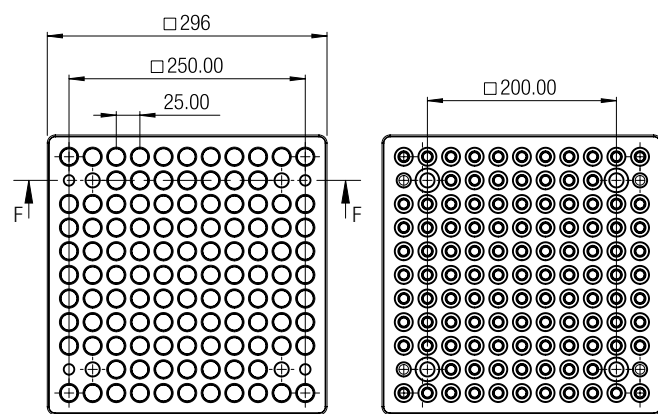
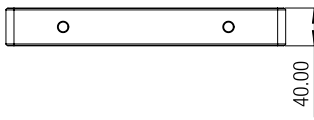
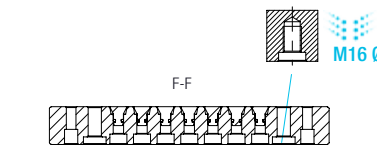
SET CODE 0006-07210

SET PALLET M10 STEP 25 296x296 H40



Description	Qty	CODE
1 PALLET M10 STEP 25 296x296 H40	1	0005-03210
2 RING M10 Ø14 H0	4	0001-00300
3 RING M10 Ø16 H0	4	0001-00301
4 RING H M10 Ø28 H15	4	0001-00310

set weight 23.2 kg

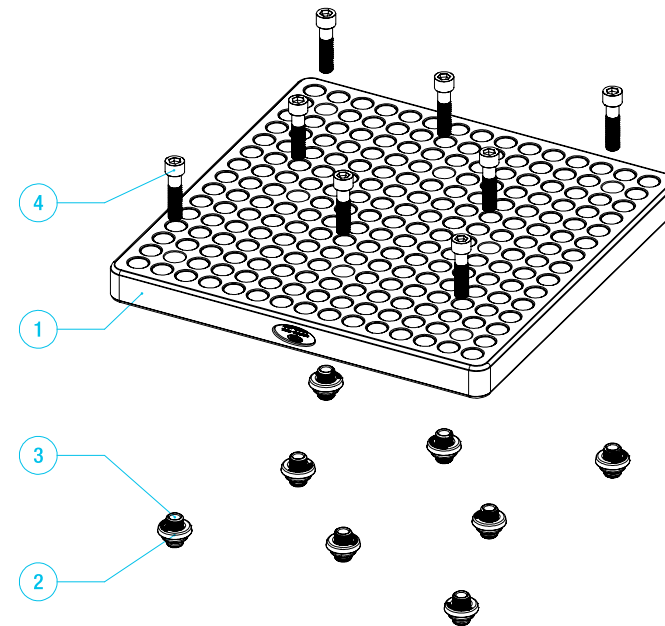


UPPER VIEW

LOWER VIEW

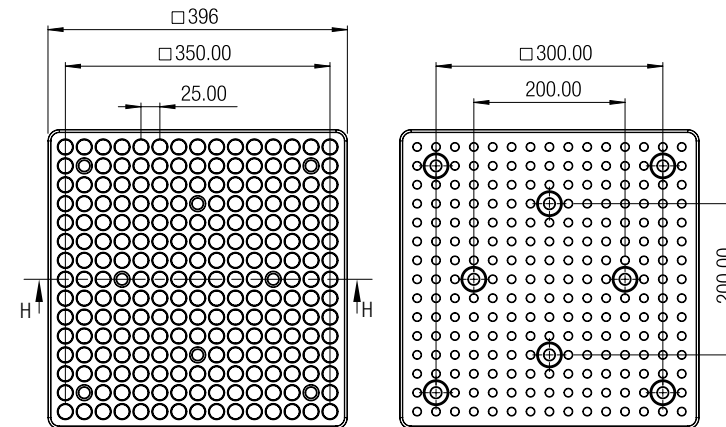
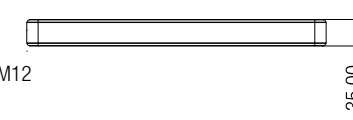
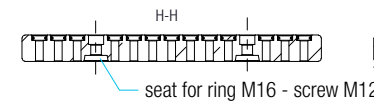
SET CODE 0006-00001

SET PALLET M12 STEP 25 396x396 H35



Description	Qty	CODE
1 PALLET M12 STEP 25 396x396 H35	1	0005-00001
2 RING M16 Ø24 H0	8	0001-00501
3 REDUCTION M16-M12	8	4521-01612
4 SCREW M12x50 12.9 BURNISHED	8	4521-12050

set weight 37.3 kg



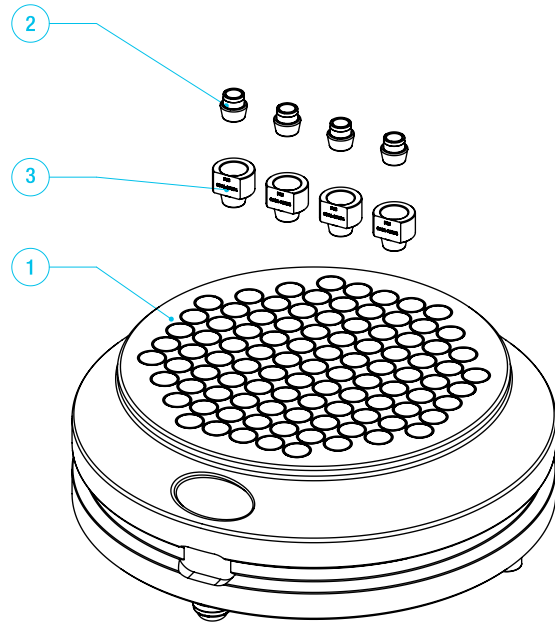
UPPER VIEW

LOWER VIEW

SET PALLET Ø160

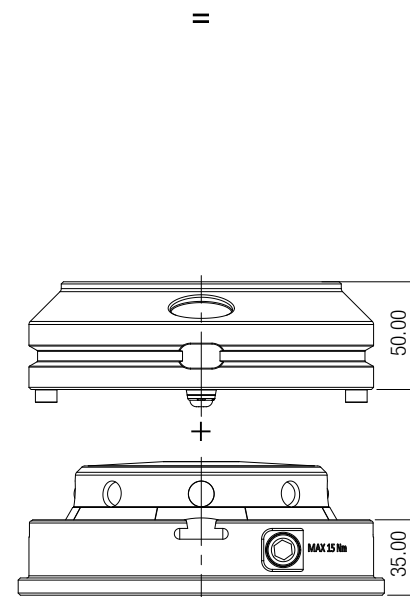
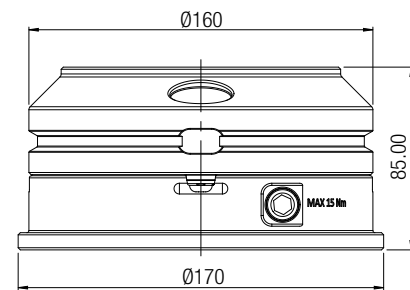
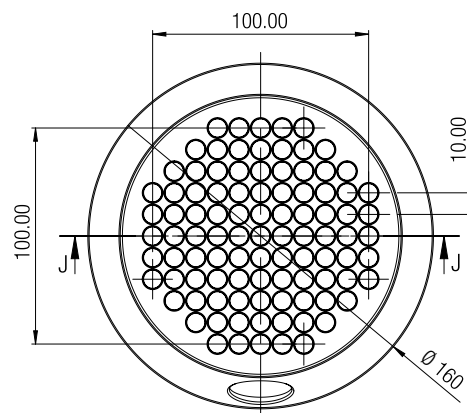
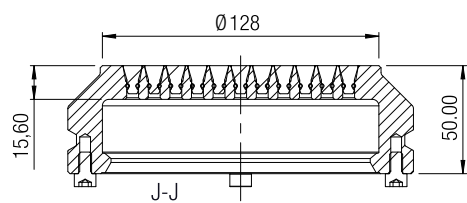
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SET PALLET Ø160 M5 STEP 10 H50



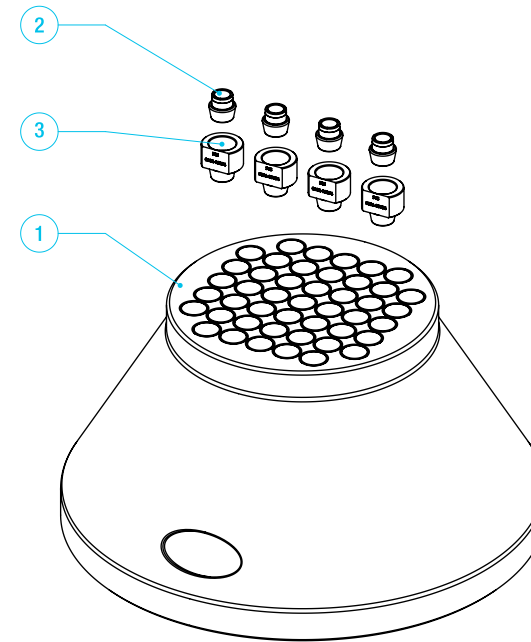
Description	Qty	CODE
1 PALLET Ø160 M5 STEP 10 H50	1	0005-00017
2 RING M5 Ø7 H0	4	0001-00050
3 RING M5 Ø14 H8	4	0001-00054

set weight 3,6 kg (+ 7,3 kg for MANUAL CLAMP Ø160 or 6,8 kg for AUTOMATIC)



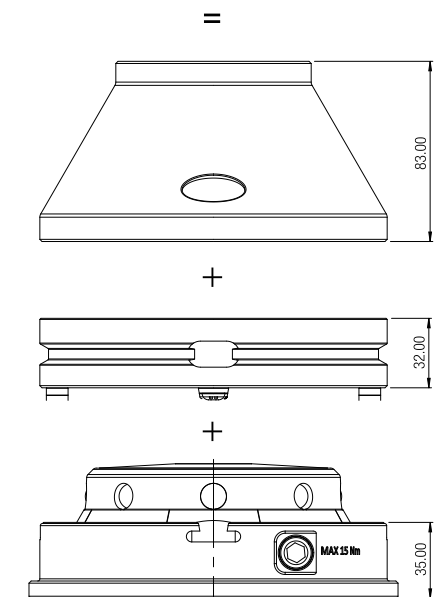
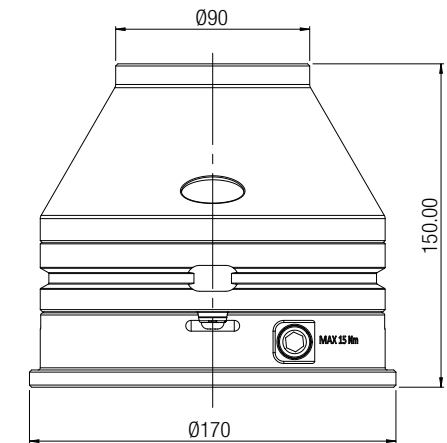
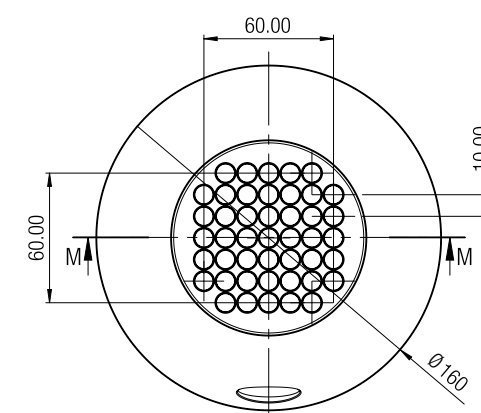
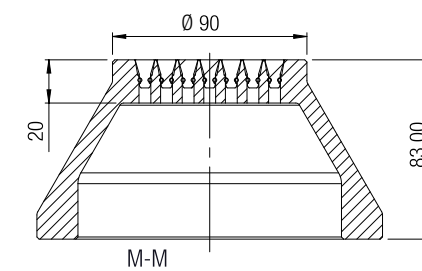
SET CODE 0006-00018

SET PALLET Ø160 PYRAMID M5 STEP 10 H83



Description	Qty	CODE
1 PALLET Ø160 PYRAMID M5 STEP 10 H83	1	0005-00018
2 RING M5 Ø7 H0	4	0001-00050
3 RING M5 Ø14 H8	4	0001-00054

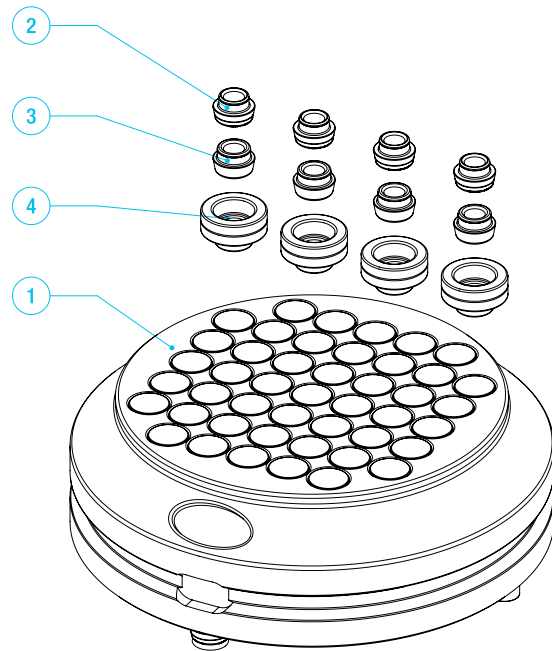
set weight 3,4 kg (+ 7,3 kg for MANUAL CLAMP Ø160 or 6,8 kg for AUTOMATIC)



SET PALLET Ø160

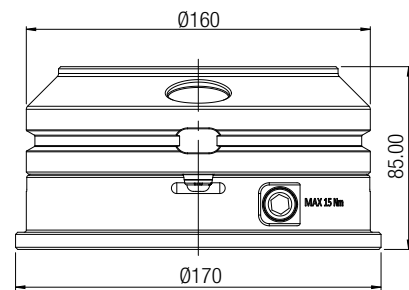
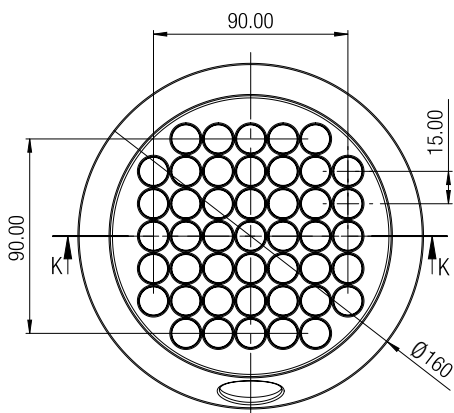
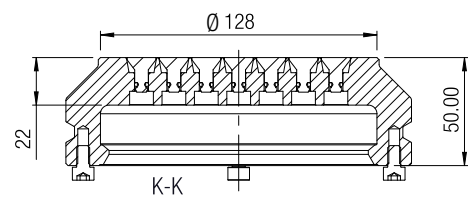
SET CODE 0006-00011

SET PALLET Ø160 M6 STEP 15 H50

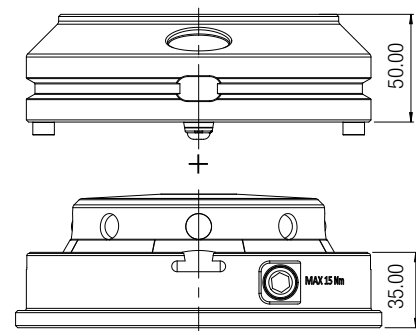


Description	Qty	CODE
1 PALLET Ø160 M6 STEP 15 H50	1	0005-00011
2 RING M6 Ø10 H0	4	0001-00001
3 RING M6 Ø11 H0	4	0001-00002
4 RING H M6 Ø22 H8	4	0001-00010

set weight 4.1 kg (+ 7.3 kg for MANUAL CLAMP Ø160 or 6.8 kg for AUTOMATIC)

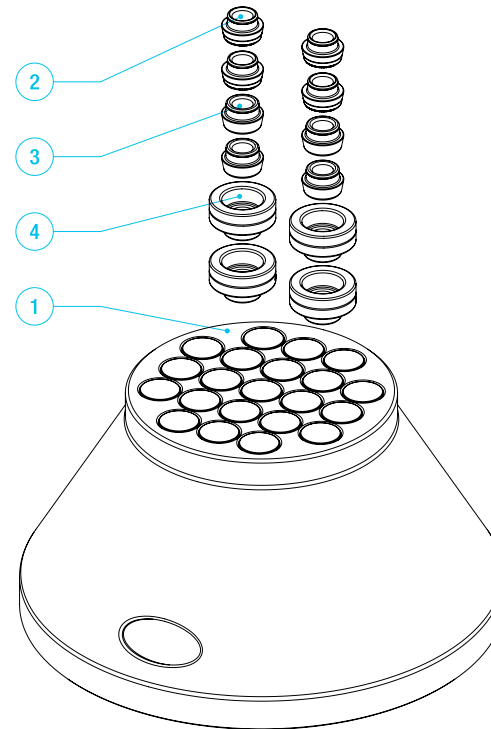


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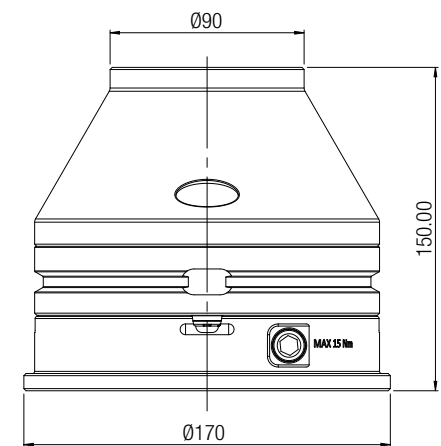
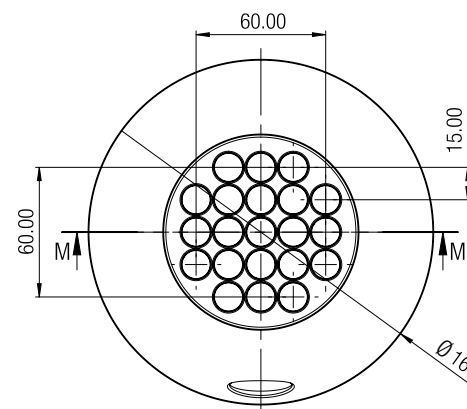
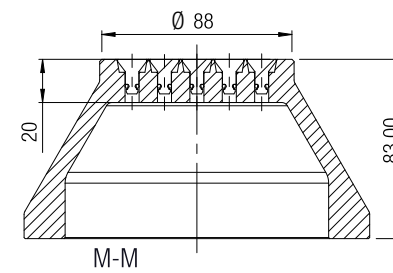
SET CODE 0006-00013

SET PALLET Ø160 PYRAMID M6 STEP 15 H83

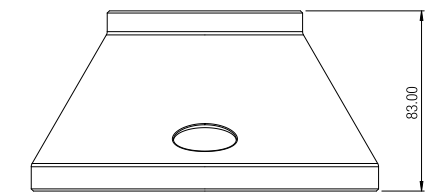


Description	Qty	CODE
1 PALLET Ø160 PYRAMID M6 STEP 15 H83	1	0005-00013
2 RING M6 Ø10 H0	4	0001-00001
3 RING M6 Ø11 H0	4	0001-00002
4 RING H M6 Ø22 H8	4	0001-00010

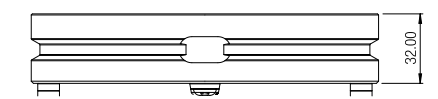
set weight 3.5 kg (+ 7.3 kg for MANUAL CLAMP Ø160 or 6.8 kg for AUTOMATIC)



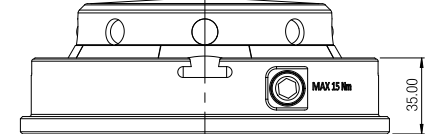
=



+



+



SET PALLET Ø160

CLAMPING FORCES AND TIGHTENING TORQUES

ACCURACY

HOLDING FORCE AND TIGHTENING TORQUE

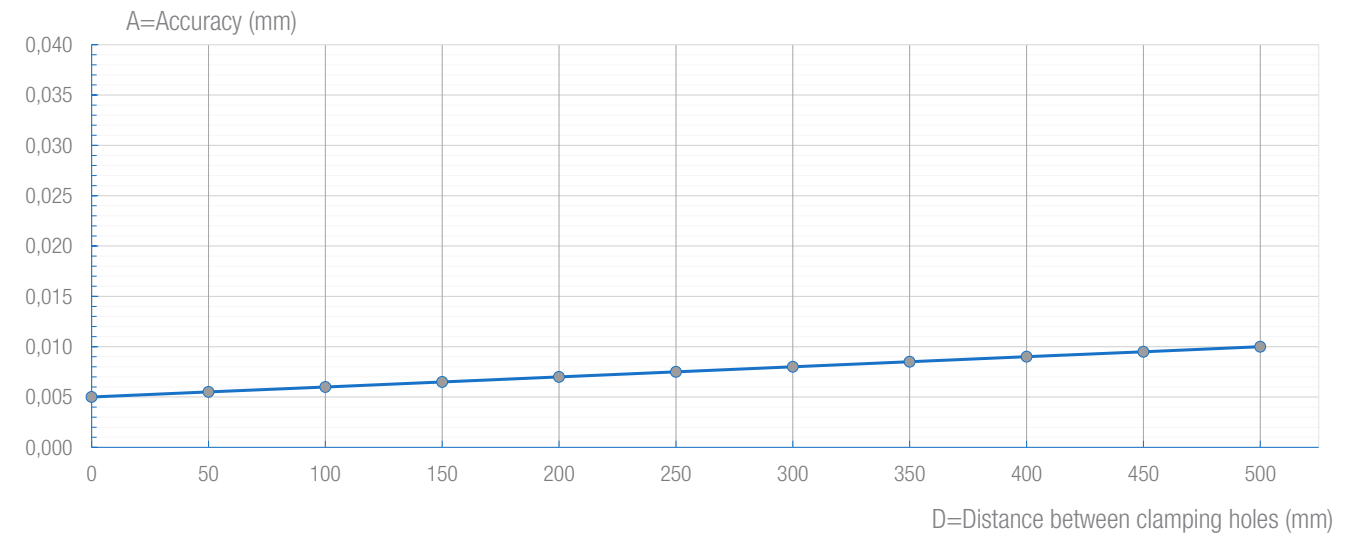
Max tensile load to which the clamping system is able to withstand



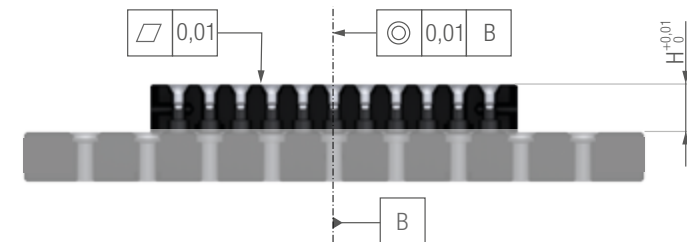
ITEMS	HOLDING FORCE (N)	SUPPORTING FORCE (N/mm ²)	LATERAL FORCE (N)
PALLET PYRAMID M5 STEP 10 144x190 H60	2000	2000	5610
PALLET M5 STEP 10 198x98 H26	9000	9000	5610
PALLET PYRAMID M6 STEP 10 195x195 H100	5500	5500	8440
PALLET M6 STEP 15 176x176 H26	5000	5000	8440
PALLET M6 STEP 15 Ø180 H26	5000	5000	8440
PALLET M8 STEP 20 230x230 H30	8200	8200	12550
PALLET M10 STEP 25 296x296 H40	5800	5800	17250
PALLET CLAMP M10 STEP 25 296x296 H40	5800	5800	17250
PALLET M12 STEP 25 396x396 H35 (usable as base gauge)	6300	6300	20260

GRID STEP ACCURACY

Positional tolerance of the clamping seat

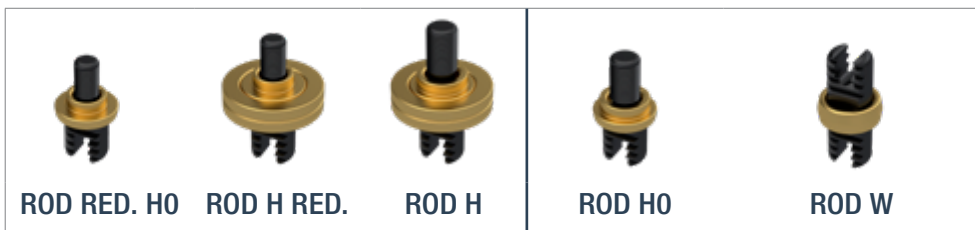
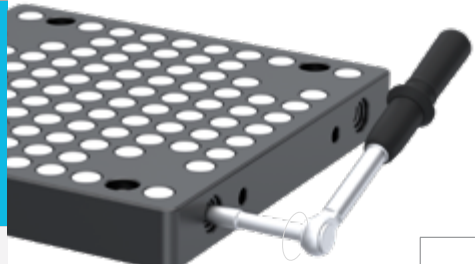
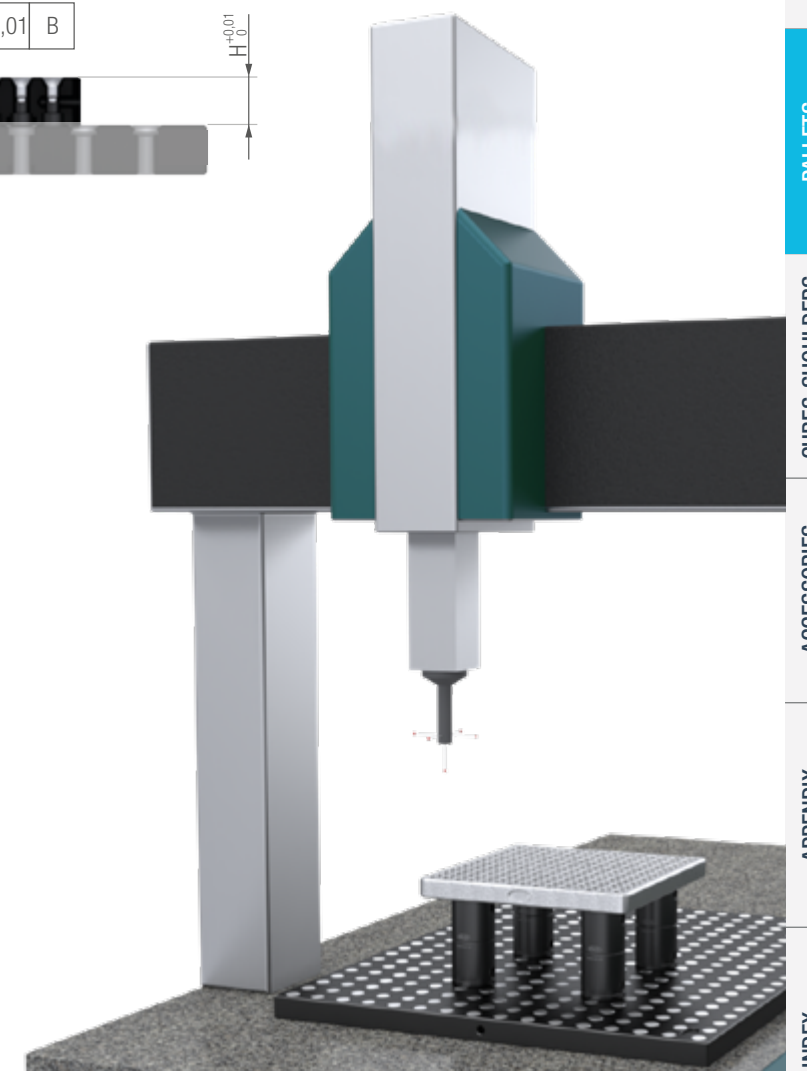


ACCURACY

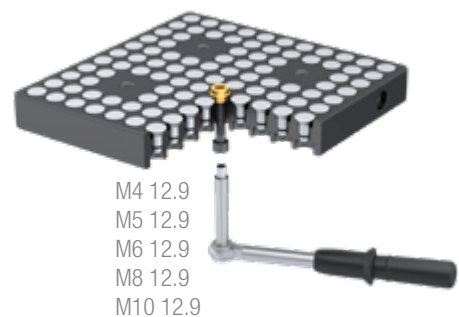


QUALITY REPORT

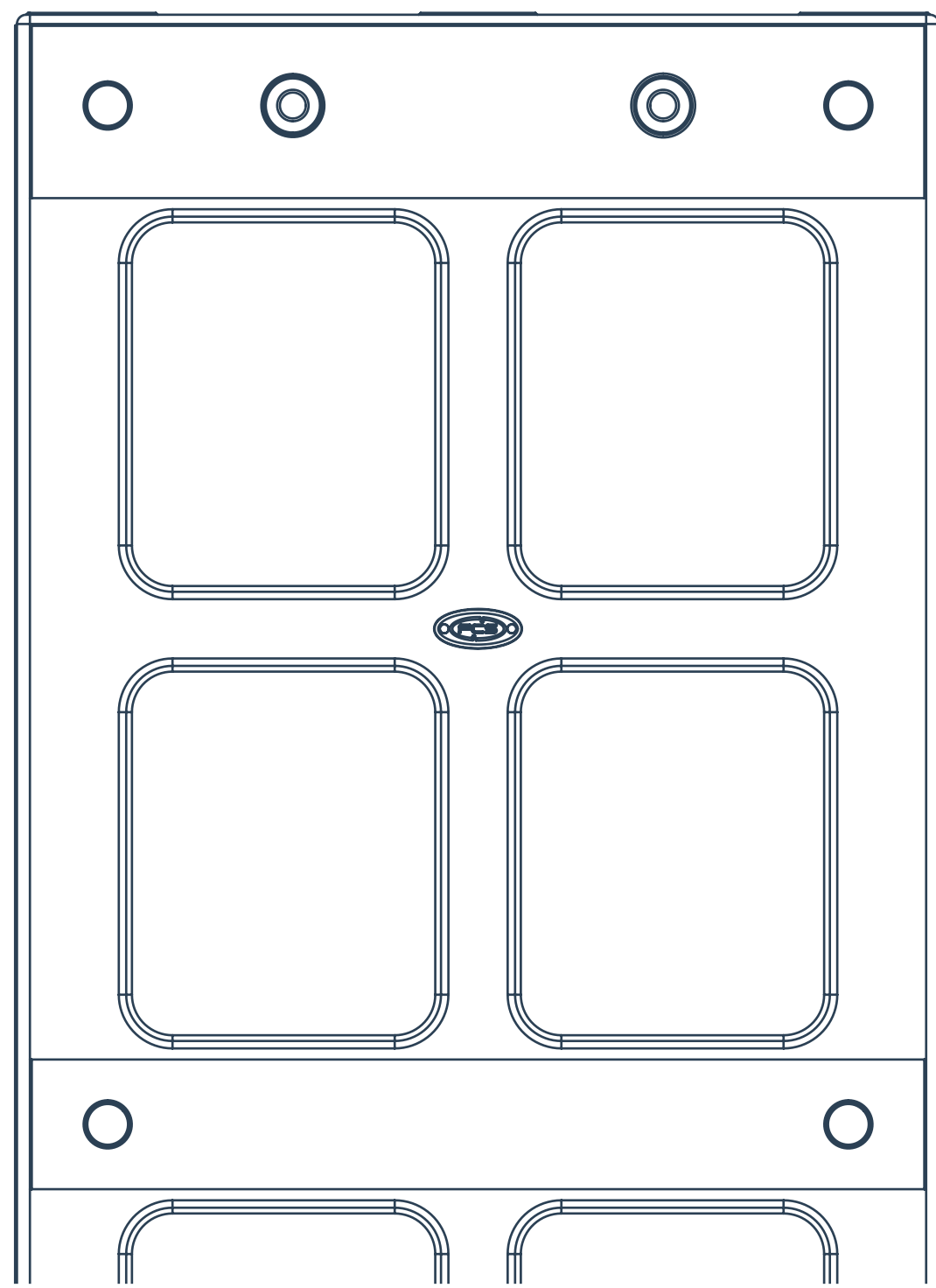
Every single Pallet is univocally identified by a marking number and controlled by a CMM (Coordinate Measuring Machine); the quality report certifies the Pallet accuracy.



JAW SIZE	HEX	TORQUE (Nm)	TORQUE (Nm)
JAW M16	8	45	55



FIXING SCREWS	HEX (mm)	TORQUE(Nm)
M4 12.9	3	5
M5 12.9	4	10
M6 12.9	5	15
M8 12.9	6	30
M10 12.9	8	60



CUBES SHOULDERS BEAMS



Integrated systems for production

INTRODUCTION AND KEY FEATURES

INTRODUCTION AND KEY FEATURES

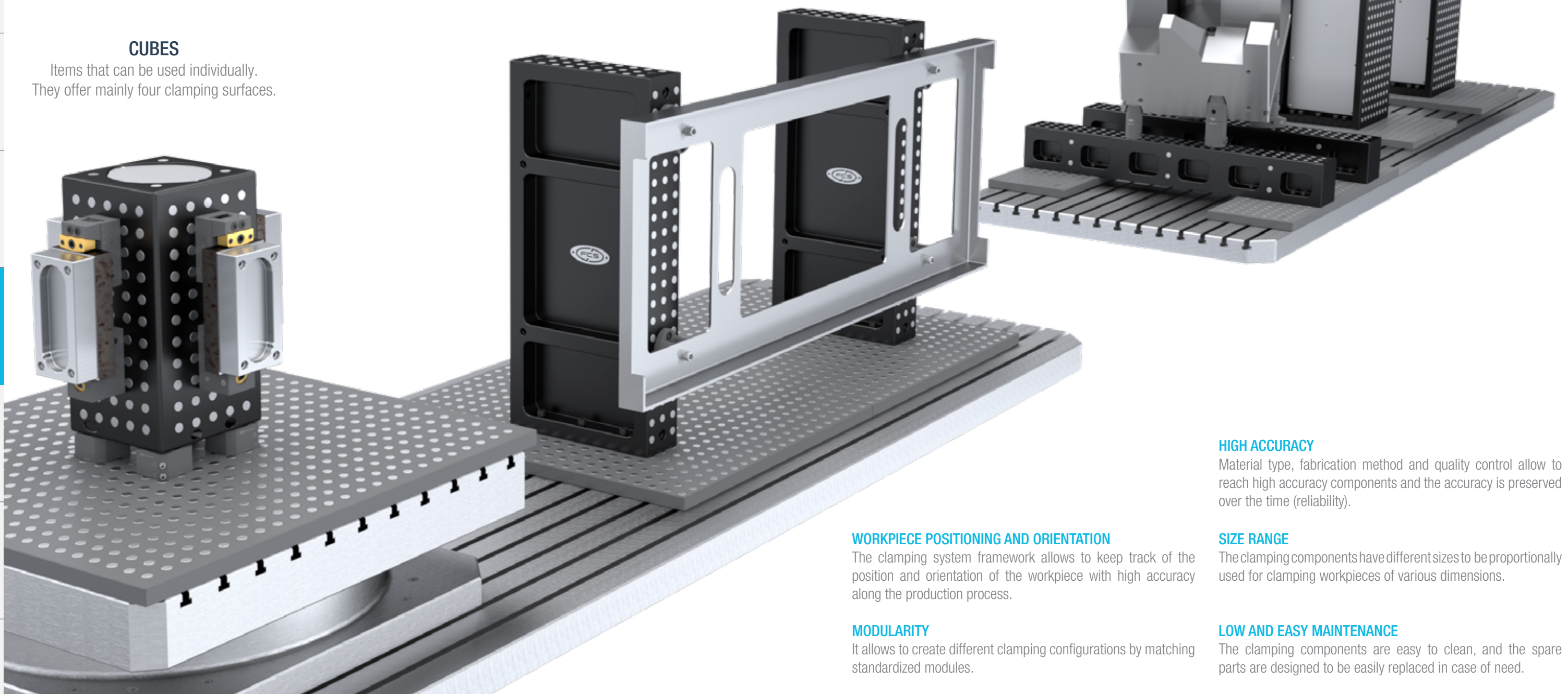
CUBES, SHOULDERS AND BEAMS

Clamping components for **vertical applications** or **to clamp workpieces in a higher position**.

BEAMS
Items mostly used to clamp workpieces in a higher position specially in case of stripes coverage (as bridge between stripes).

SHOULDERS
Items mostly used combined (two or more). They offer mainly two clamping surfaces.

CUBES
Items that can be used individually. They offer mainly four clamping surfaces.



WORKPIECE POSITIONING AND ORIENTATION

The clamping system framework allows to keep track of the position and orientation of the workpiece with high accuracy along the production process.

MODULARITY

It allows to create different clamping configurations by matching standardized modules.

HIGH ACCURACY

Material type, fabrication method and quality control allow to reach high accuracy components and the accuracy is preserved over the time (reliability).

SIZE RANGE

The clamping components have different sizes to be proportionally used for clamping workpieces of various dimensions.

LOW AND EASY MAINTENANCE

The clamping components are easy to clean, and the spare parts are designed to be easily replaced in case of need.





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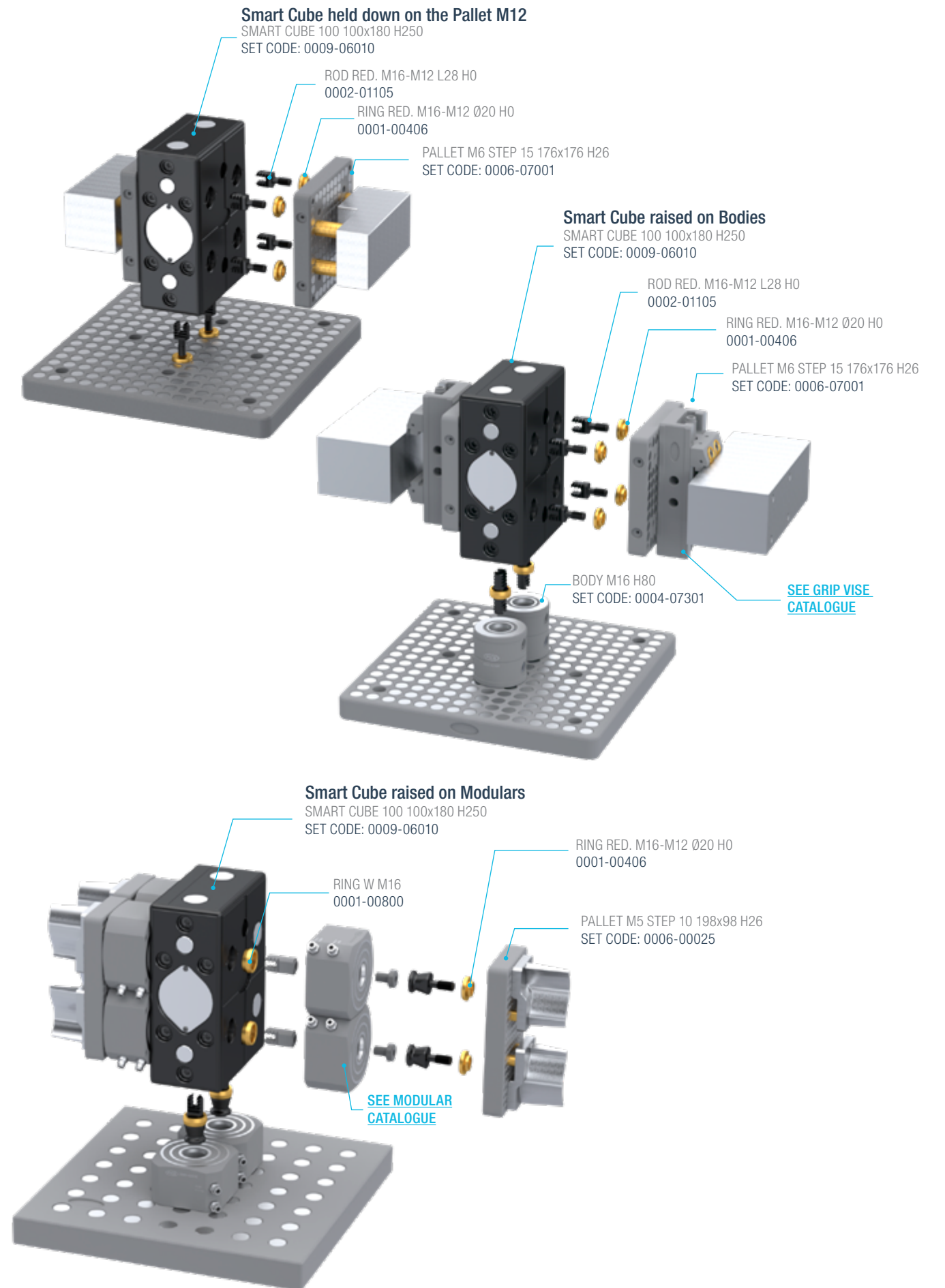
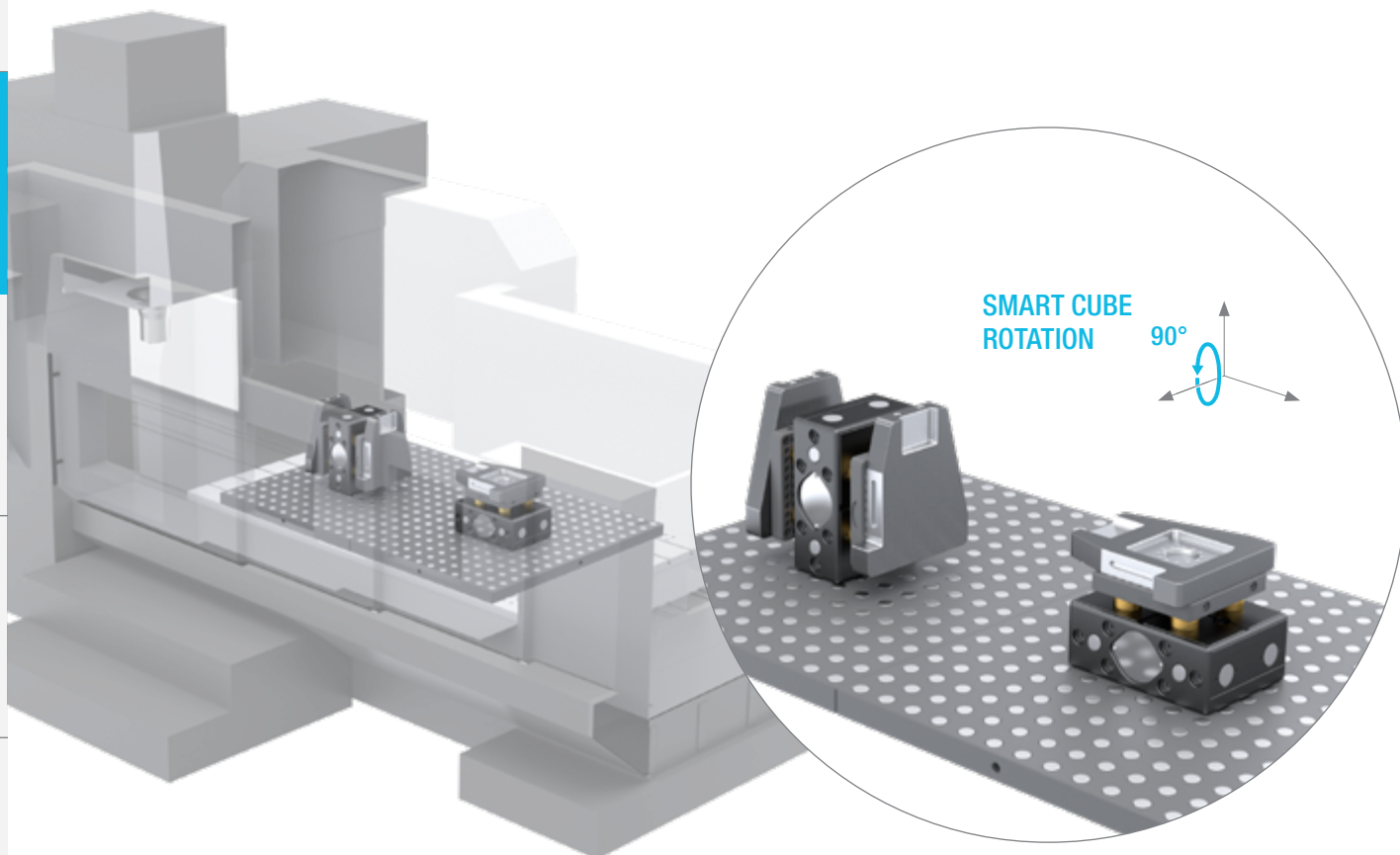
CUBES - PRODUCTS RANGE AND APPLICATION EXAMPLES

CUBES - APPLICATION EXAMPLES

CUBES

ITEMS	DESCRIPTION	SET CODE	OPTION TO BE RAISED ON BODY	PLUG	SET WEIGHT (kg)
	SMART CUBE 100 100x180 H250	0009-06010	✓	QTY. 6 0015-04500 QTY. 12 0015-04540	27.5
	SMART CUBE 200 200x200 H200	0009-07500	✓	QTY. 8 0015-04501 QTY. 16 0015-04540	36.9
	SMART CUBE 250 250x250 H250	0009-07400	✓	QTY. 1 0015-04500 QTY. 24 0015-04540 QTY. 8 0015-04501	78.9
	SMART CUBE 350 200x200 H350	0009-00002	✓	QTY. 16 0015-04540 QTY. 11 0015-04500	67.1

SMART CUBE 100 100x180 H250



CUBES - APPLICATION EXAMPLES

CUBES - APPLICATION EXAMPLES

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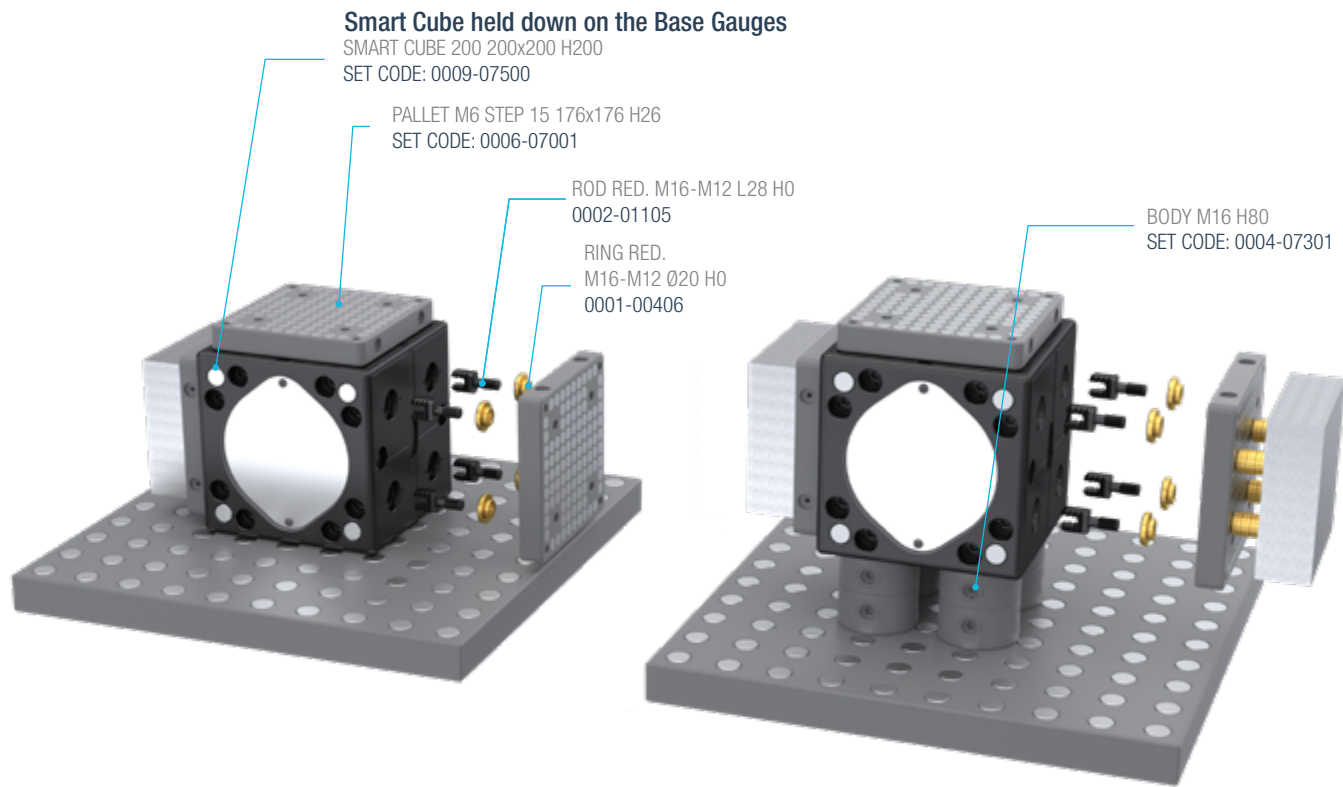
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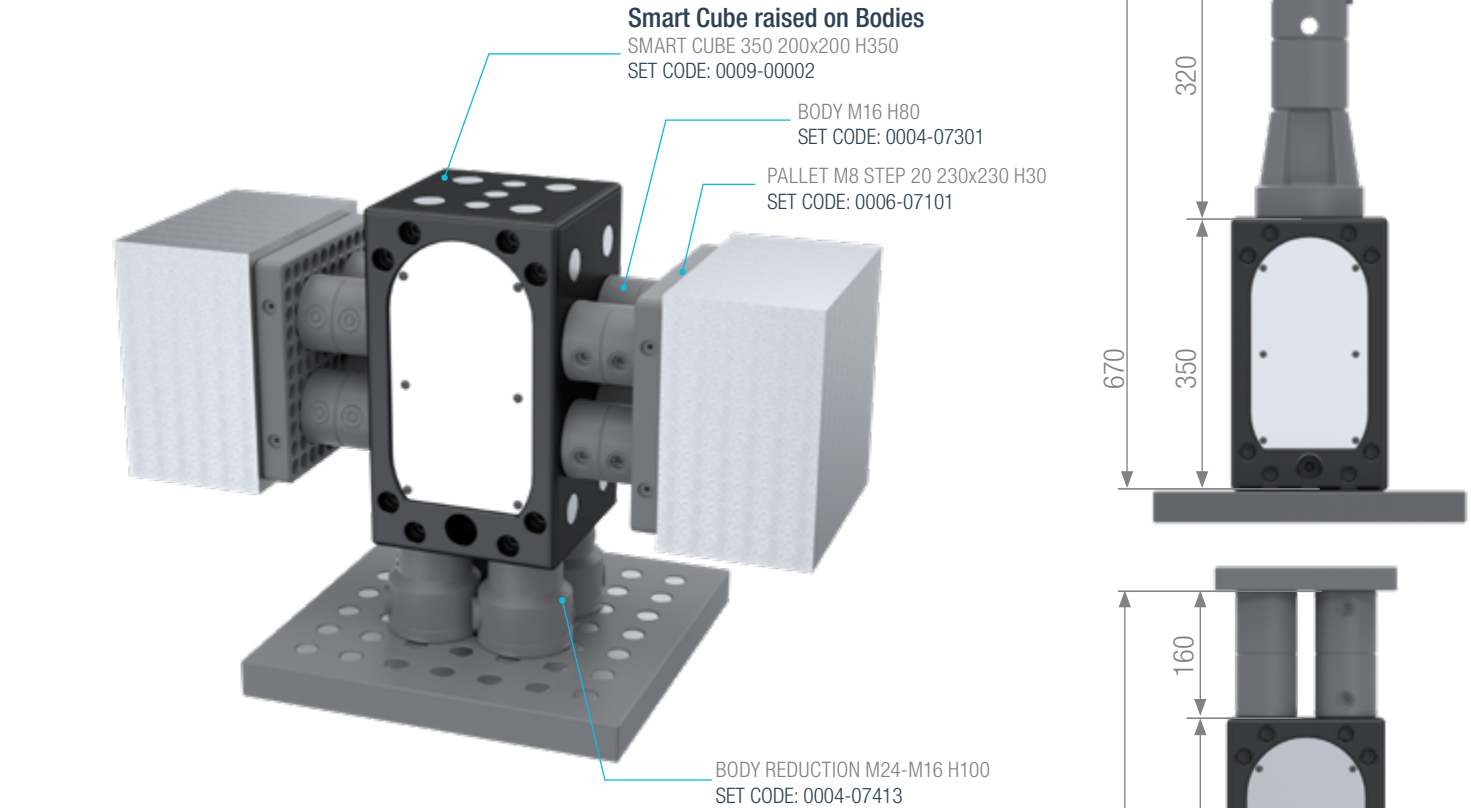
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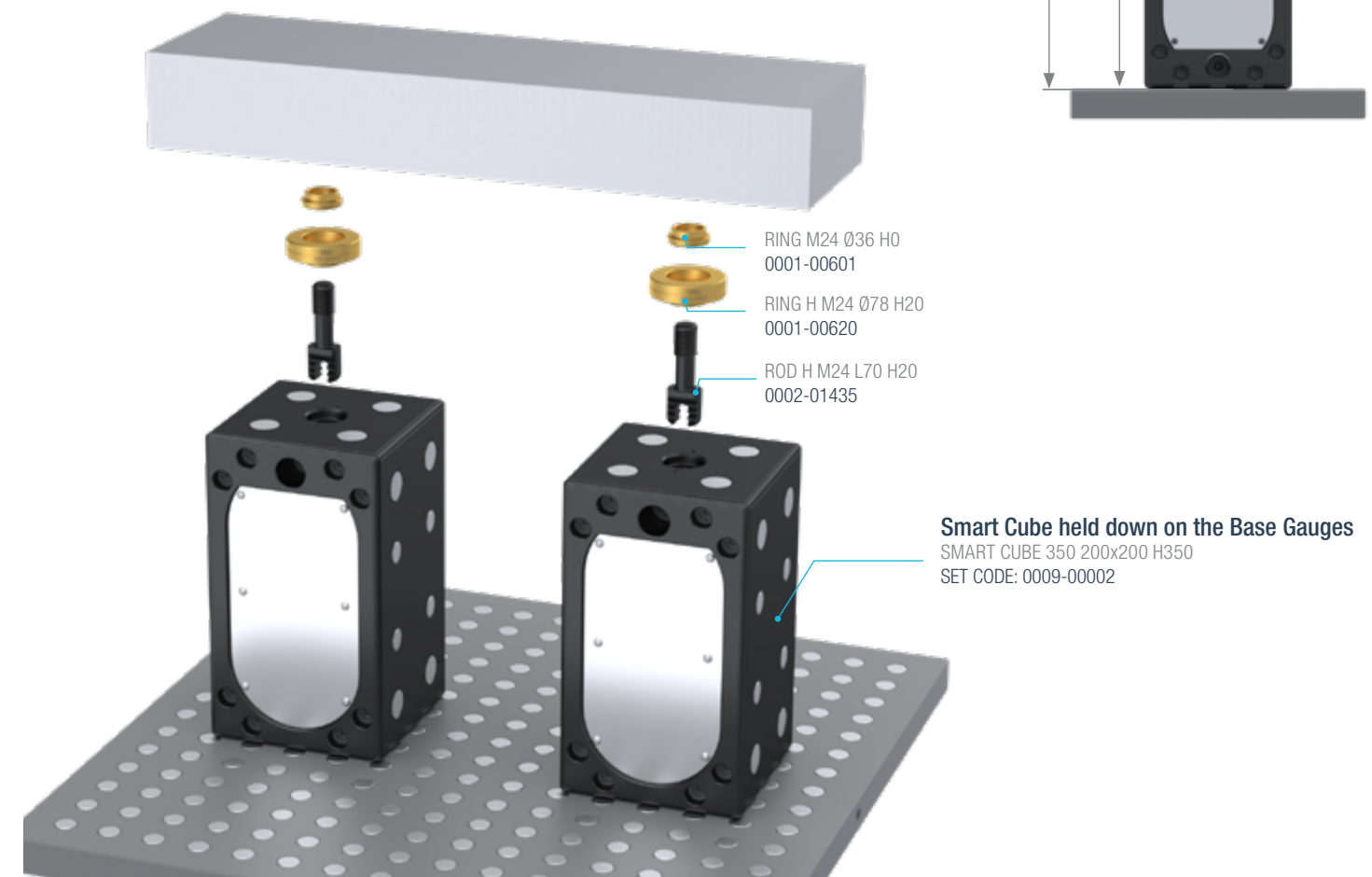
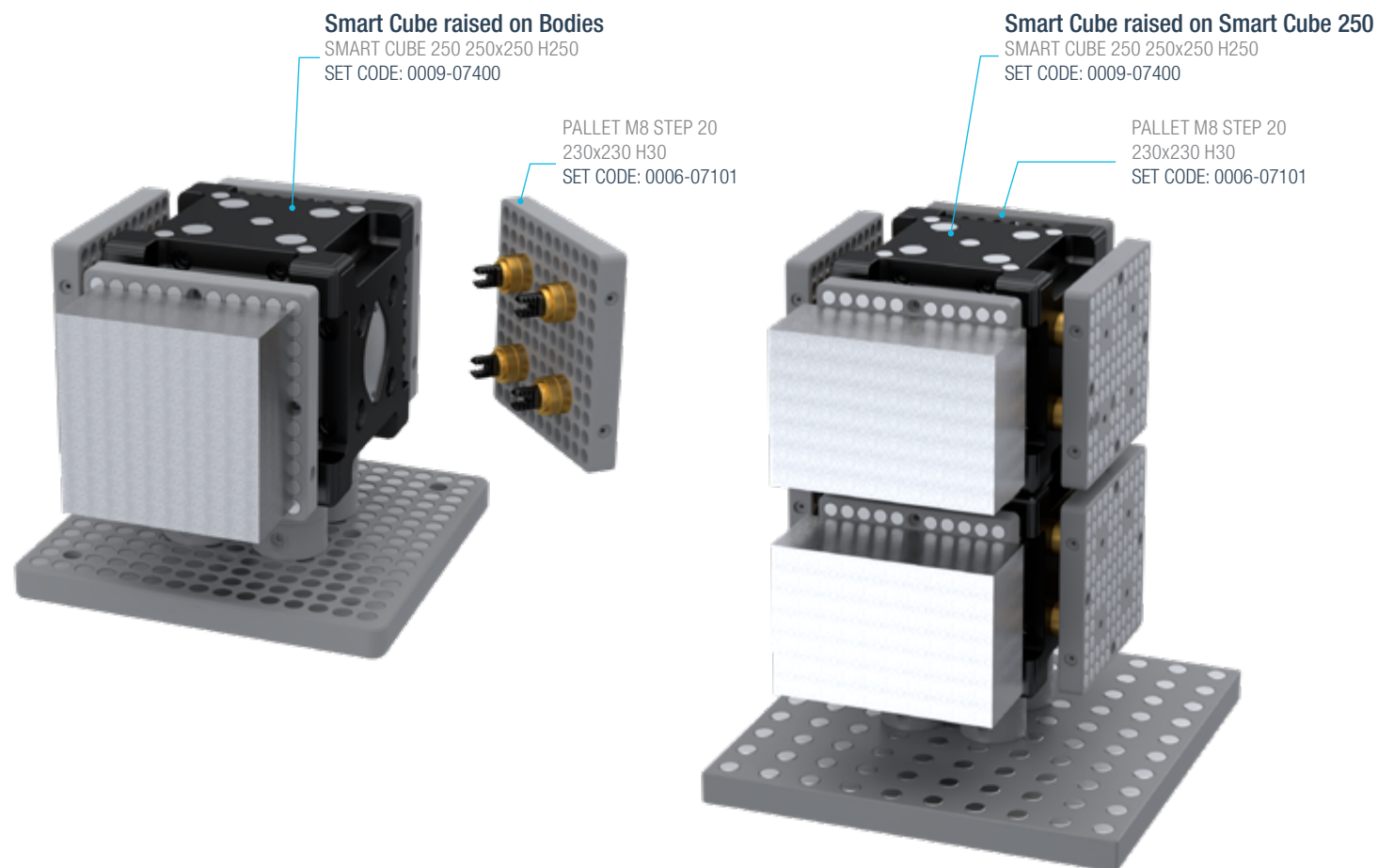
SMART CUBE 200 200x200 H200



SMART CUBE 350 200x200 H350



SMART CUBE 250 250x250 H250



CUBES - PRODUCTS RANGE AND APPLICATION EXAMPLES

CUBES - APPLICATION EXAMPLES

CUBES

ITEMS	DESCRIPTION	SET CODE	OPTION TO BE RAISED ON BODY	PLUG	SET WEIGHT (kg)
	CUBE M12 STEP 25 300x300 H600	0009-07600	✓	QTY. 4 0015-04500 QTY. 968 0015-04501	216.8
	CUBE M16 STEP 50 300x300 H600	0009-07501	✓	QTY. 224 0015-04500	2301.1

CUBE M12 STEP 25
300x300 H600

Cube raised on Bodies
CUBE M12 STEP 25 300x300 H600
SET CODE: 0009-07600

[SEE MODULAR CATALOGUE](#)

Cube raised on Bodies
SPECIAL CUBE M12

[SEE GRIP VISE CATALOGUE](#)

BODY RED. M24-M16 H100
SET CODE: 0004-07413

ROD RED. M24-M16 L37 HO
0002-01410

RING RED. M24-M16 Ø24 HO
0001-00506

CUBE M16 STEP 50
300x300 H600

Smart Cube held down on the Base Gauges

CUBE M16 STEP 50 300x300 H600
SET CODE: 0009-07501

[SEE GRIP VISE CATALOGUE](#)

ROD M16 L35 HO
0002-01200

RING M16 Ø24 HO
0001-00501

Cube in horizontal position and raised on Bodies

CUBE M16 STEP 50 300x300 H600
SET CODE: 0009-07501

RING W M16
0001-00800
ROD W M16
0002-01600

BODY RED. M16-M12 H60
SET CODE 0004-07250


ROD M12 L27 HO
0002-01000

RING M12 Ø20 HO
0001-00401

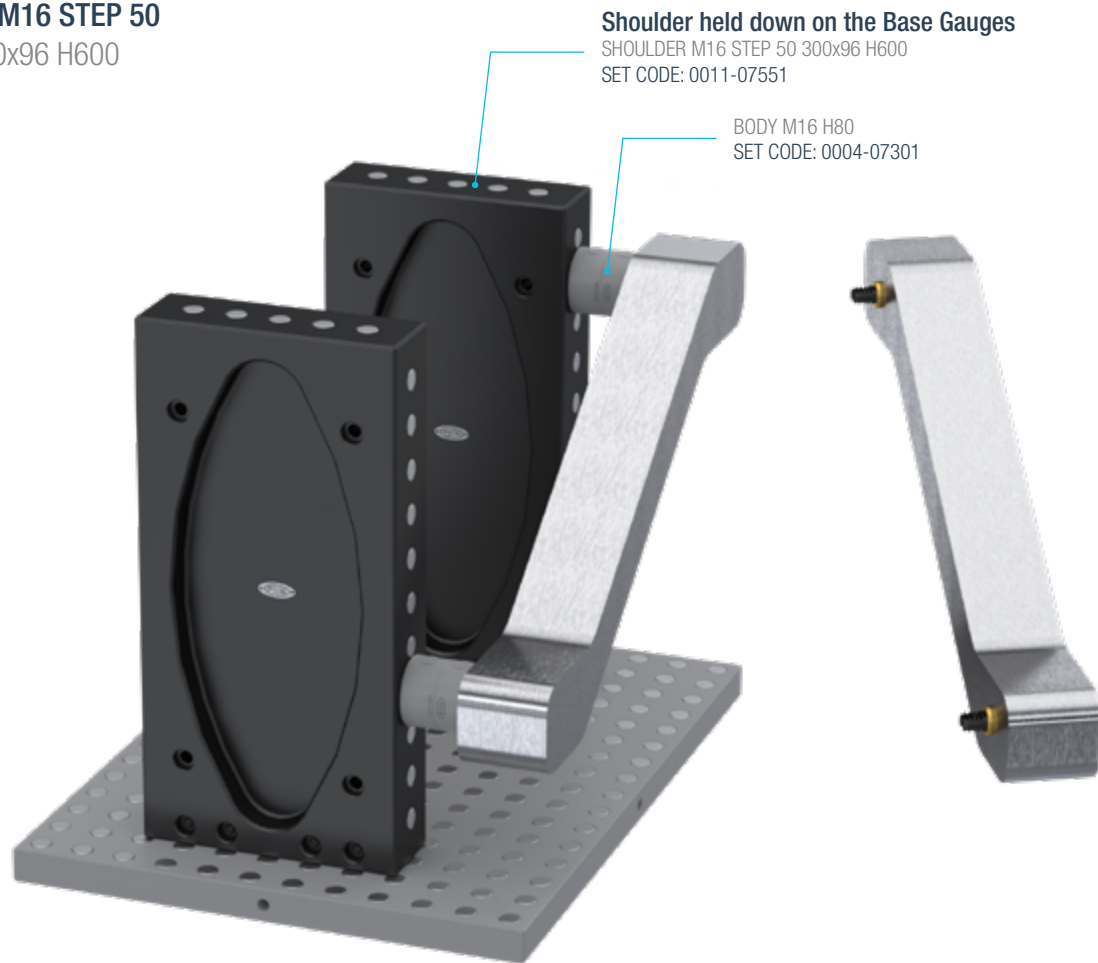
SHOULDERS - PRODUCTS RANGE AND APPLICATION EXAMPLES

SHOULDERS - APPLICATION EXAMPLES

SHOULDERS

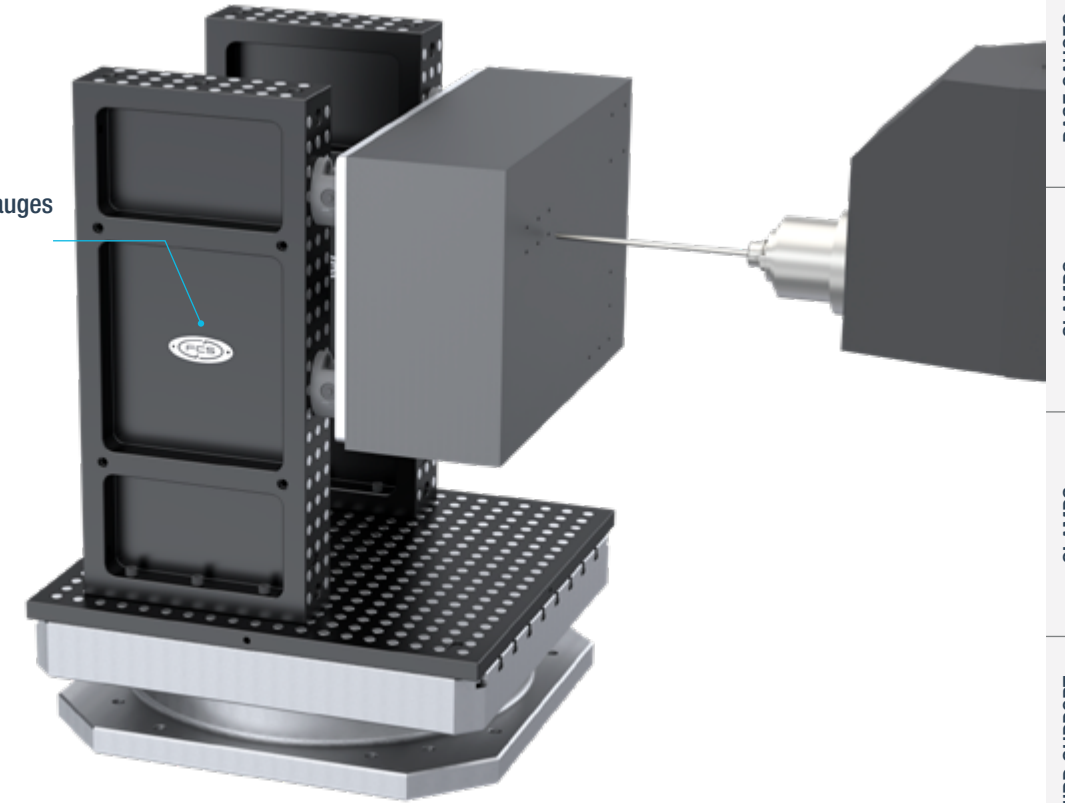
ITEMS	DESCRIPTION	SET CODE	OPTION TO BE RAISED ON BODY	PLUG	SET WEIGHT (kg)
	SHOULDER M16 STEP 50 300x96 H600	0011-07551	✓	QTY. 27 0015-04500	86.4
	SHOULDER M16 STEP 50 500x146 H1100	0011-07552		QTY. 146 0015-04500	300.2
	DYNAMIC SHOULDER M16 STEP 50 500x200 H1200	0011-08000	✓	QTY. 343 0015-04500	576.4

SHOULDER M16 STEP 50
STEP 50 300x96 H600

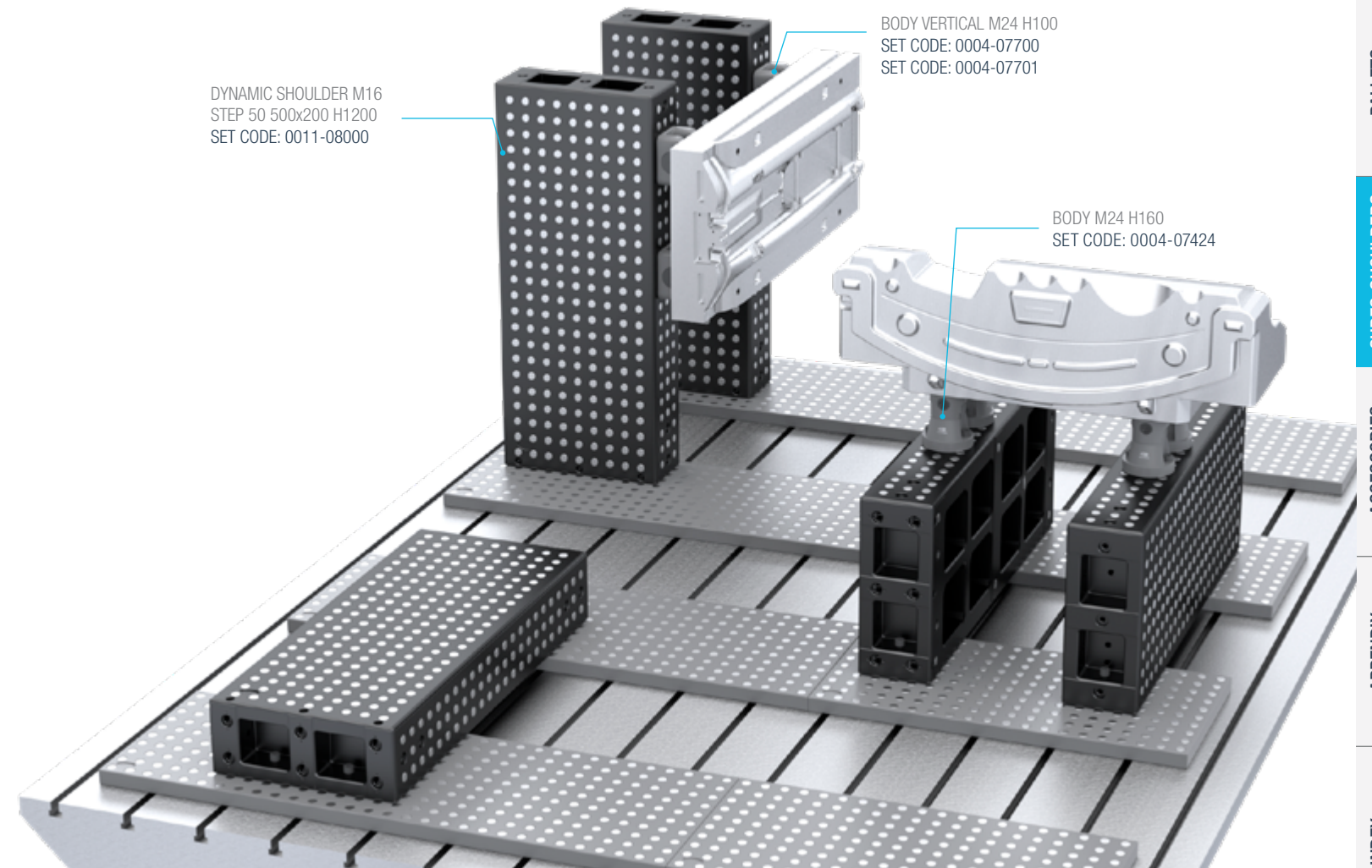


SHOULDER M16 STEP 50
STEP 50 500x146 H1100

Shoulder held down on the Base Gauges
SHOULDER M16 STEP 50 500x146 H1100
SET CODE: 0011-07552



DYNAMIC SHOULDER M16
STEP 50 500x200 H1200

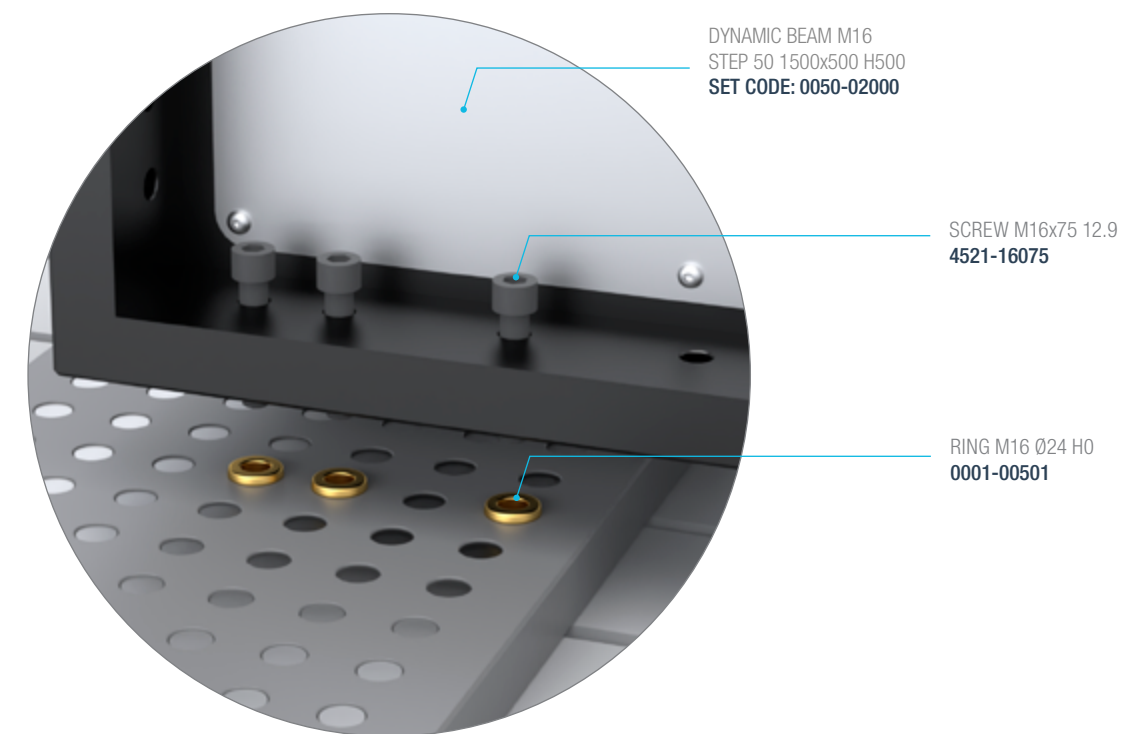
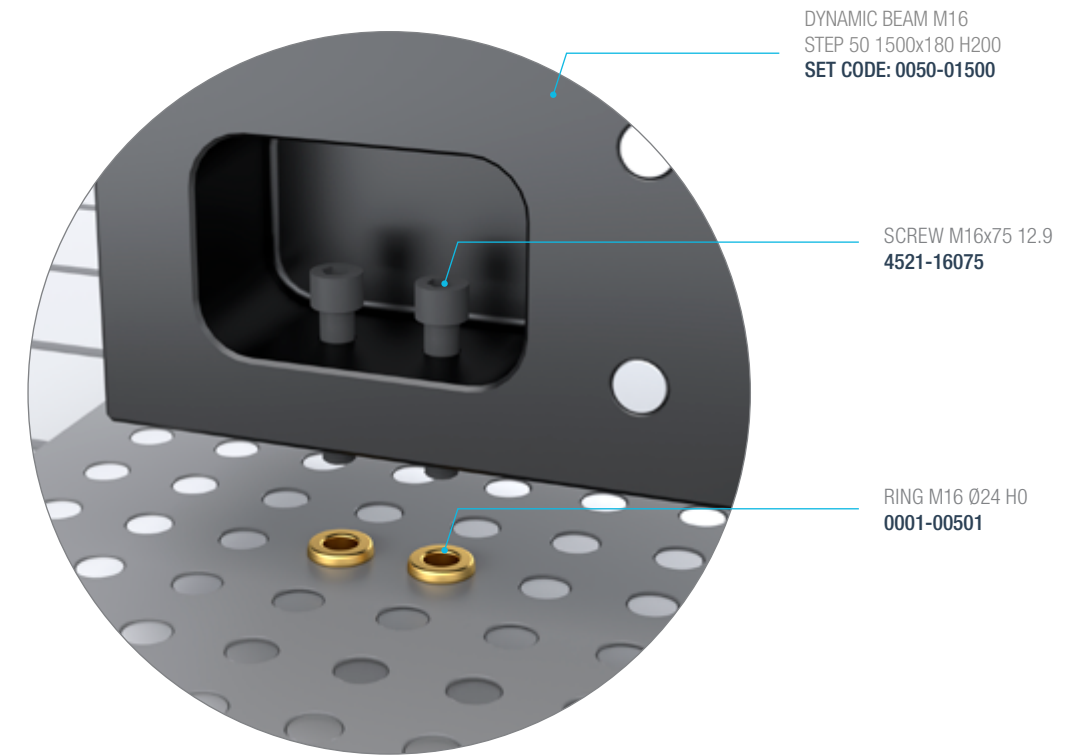
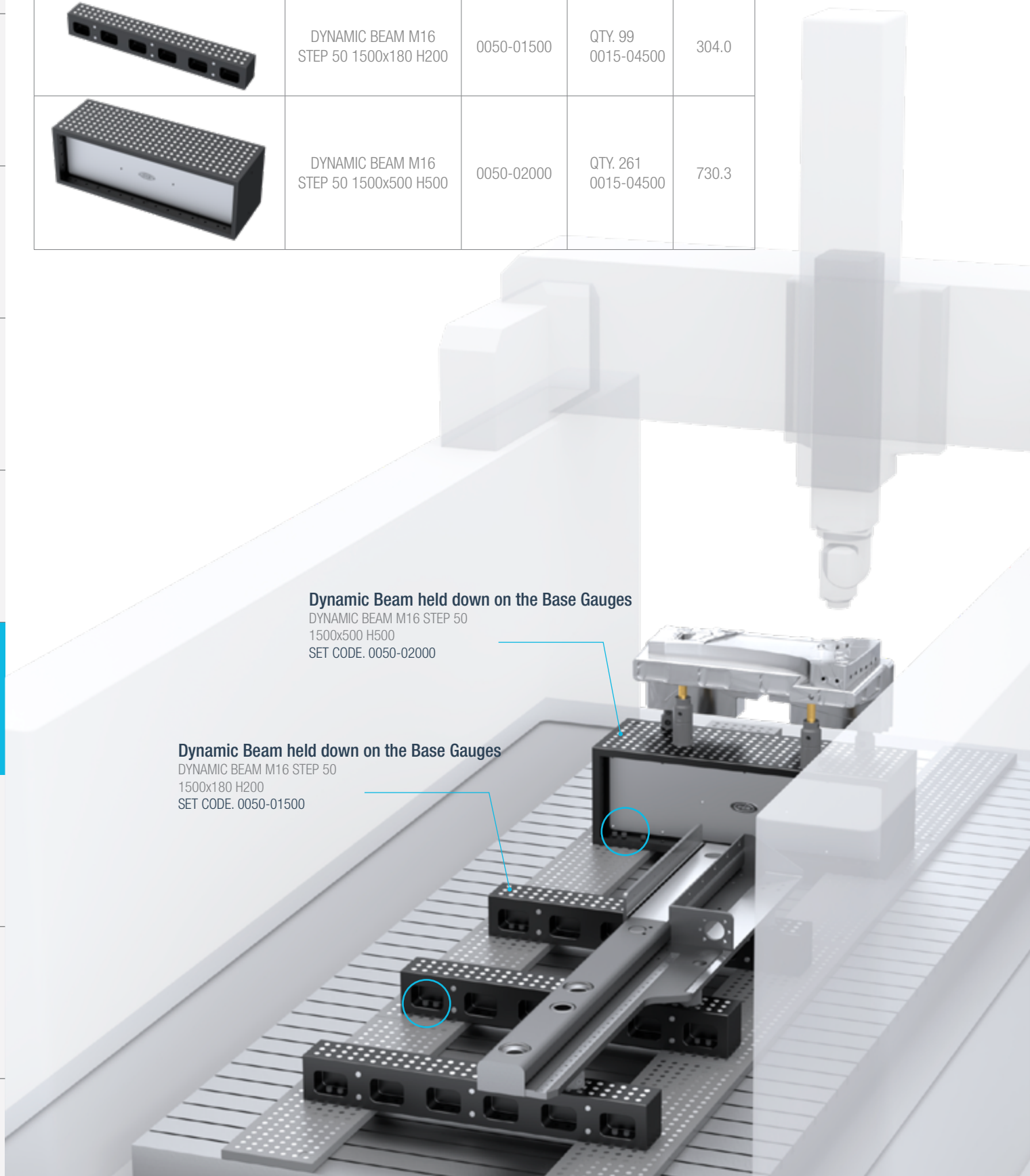


BEAMS - PRODUCTS RANGE AND APPLICATION EXAMPLES

BEAMS - APPLICATION EXAMPLES

BEAMS

ITEMS	DESCRIPTION	SET CODE	PLUG	SET WEIGHT (kg)
	DYNAMIC BEAM M16 STEP 50 1500x180 H200	0050-01500	QTY. 99 0015-04500	304.0
	DYNAMIC BEAM M16 STEP 50 1500x500 H500	0050-02000	QTY. 261 0015-04500	730.3



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SMART CUBE 250 | 350

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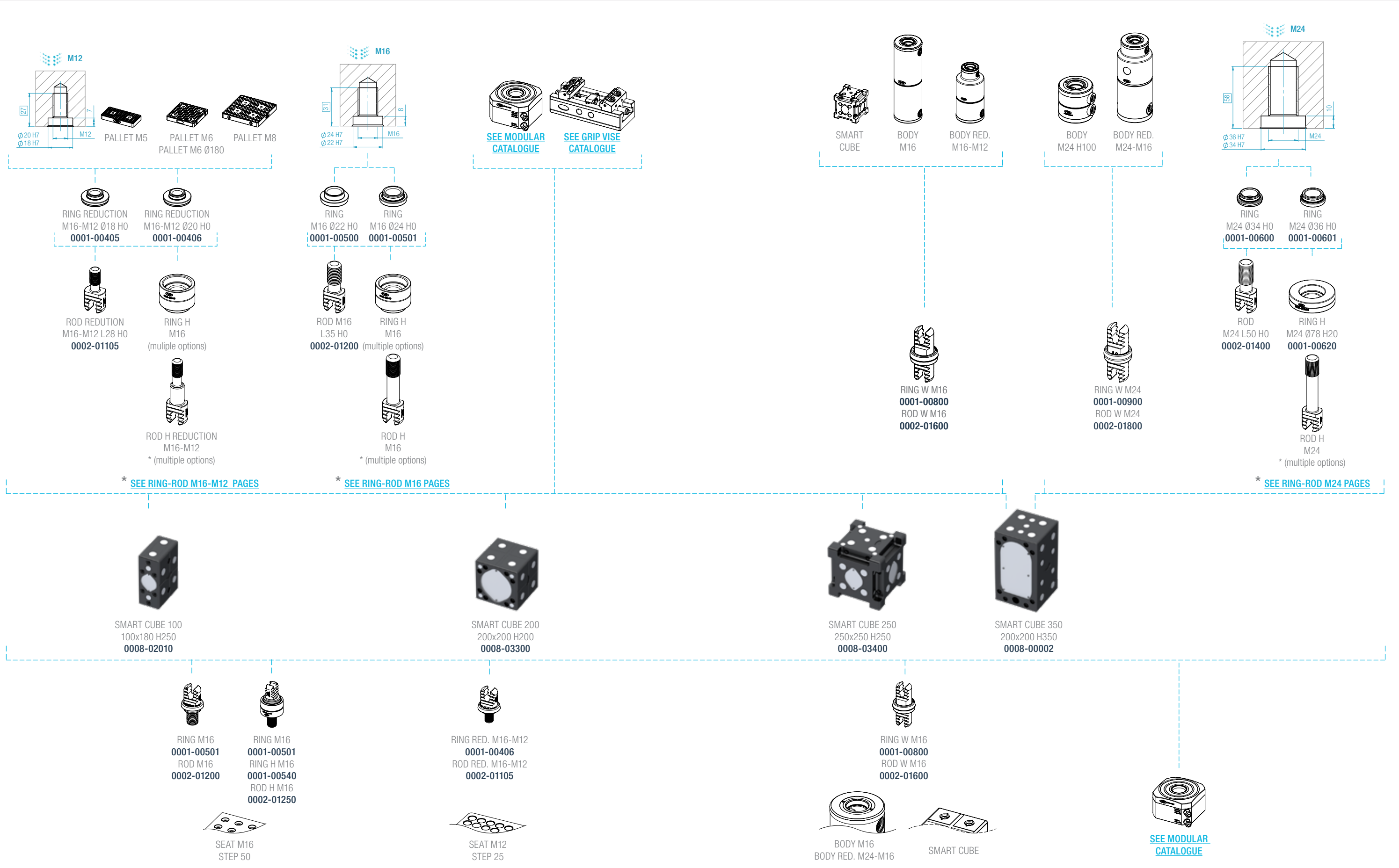
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Note: For multicomponents clamping application refer to 3D Assembly Simulator. For the complete Kit refer to the corresponding SET CLAMP.

CUBE M12

CUBE M16

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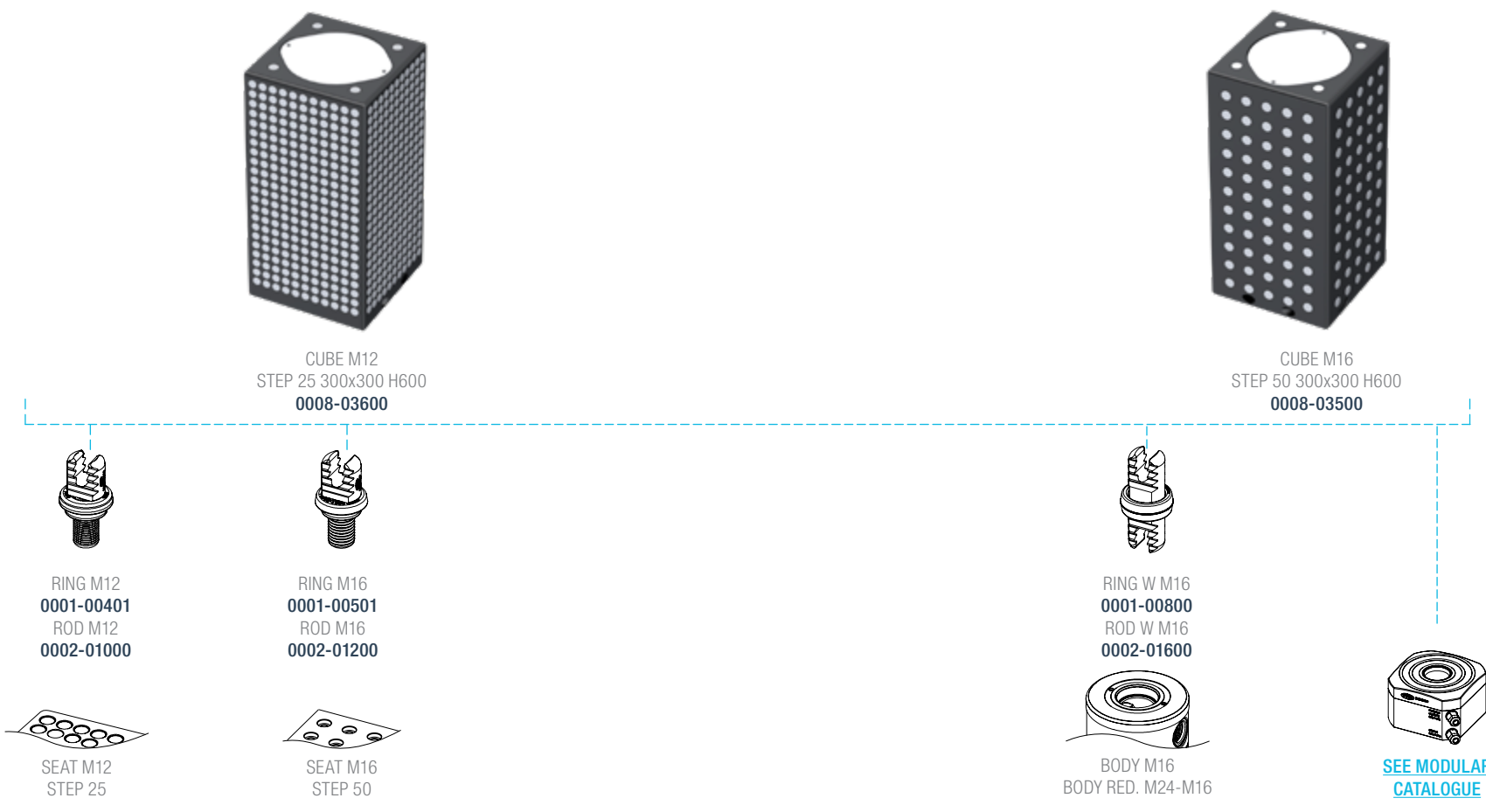
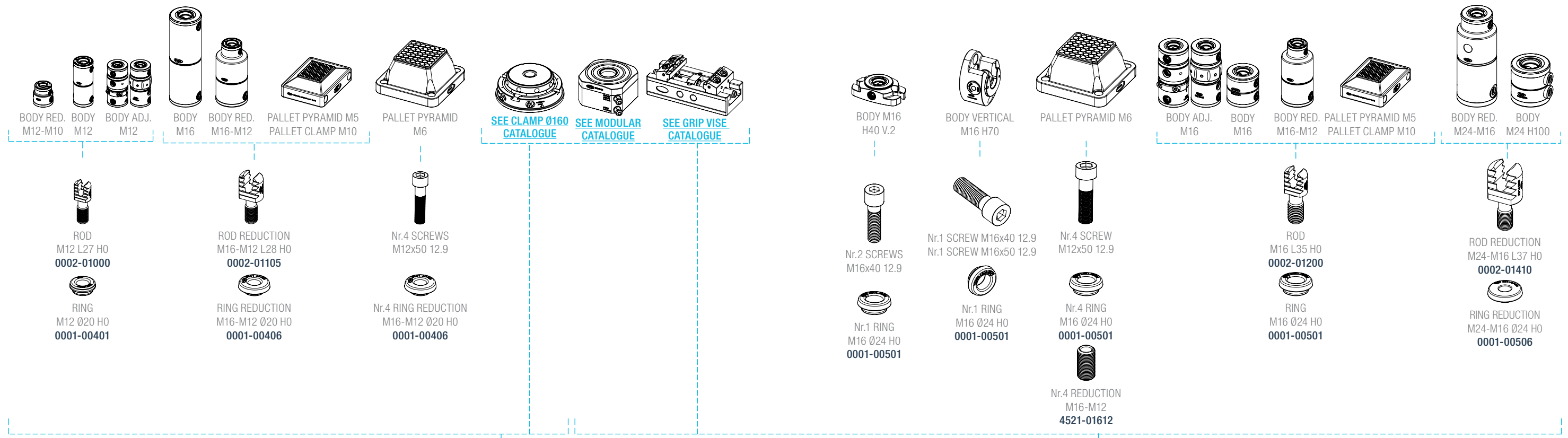
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Note: For multicomponents clamping application refer to 3D Assembly Simulator. For the complete Kit refer to the corresponding SET CLAMP.

SHOULDER M16

SHOULDER M16

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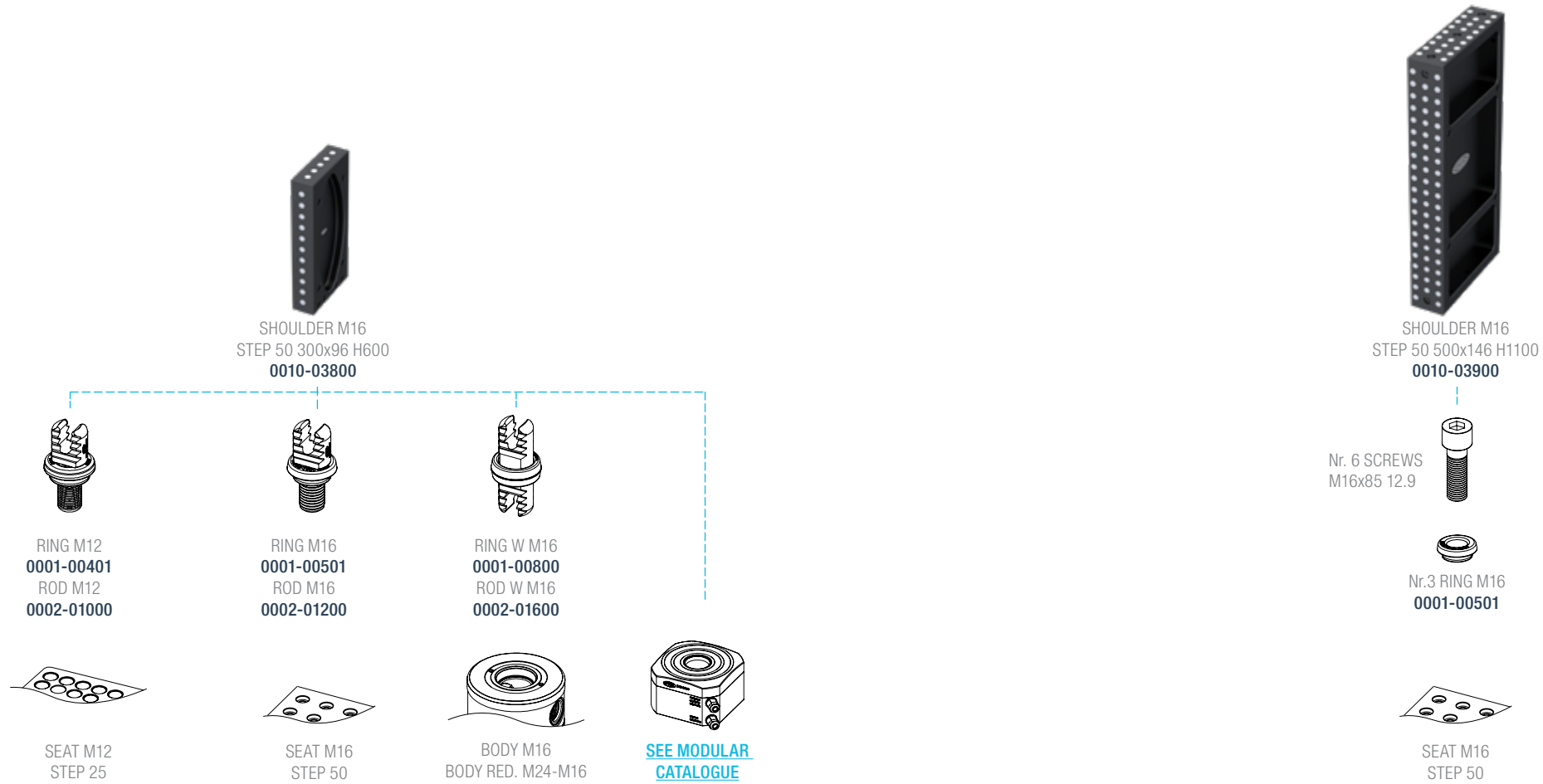
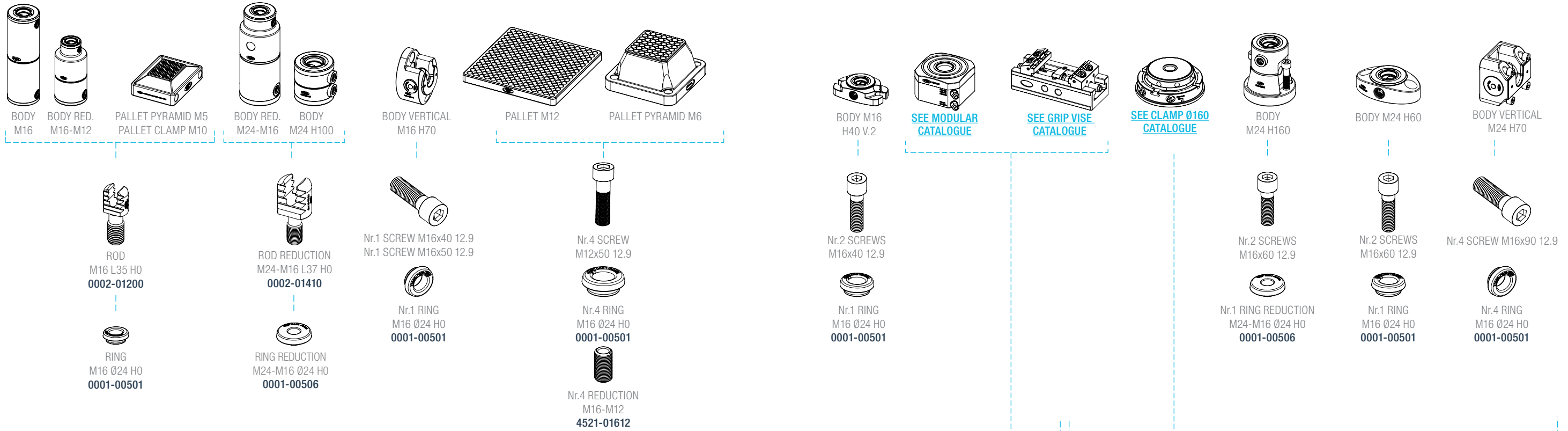
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Note: For multicomponents clamping application refer to 3D Assembly Simulator. For the complete Kit refer to the corresponding SET CLAMP.

SHOULDER DYNAMIC M16

DYNAMIC BEAM M16

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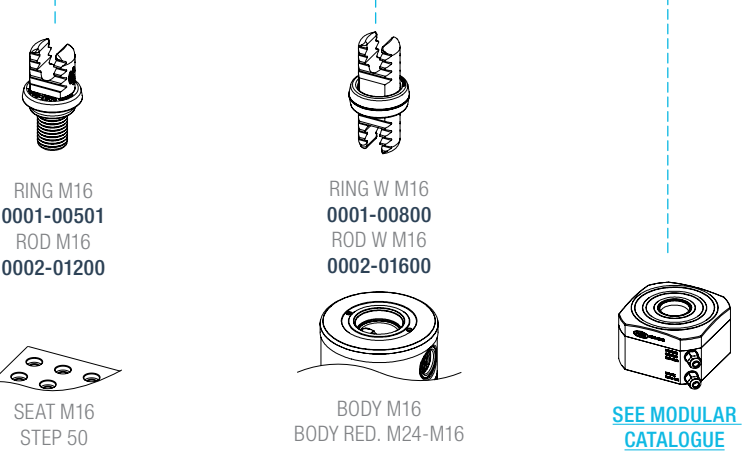
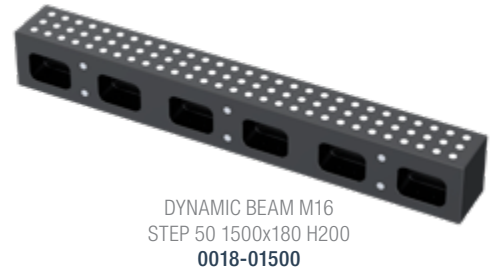
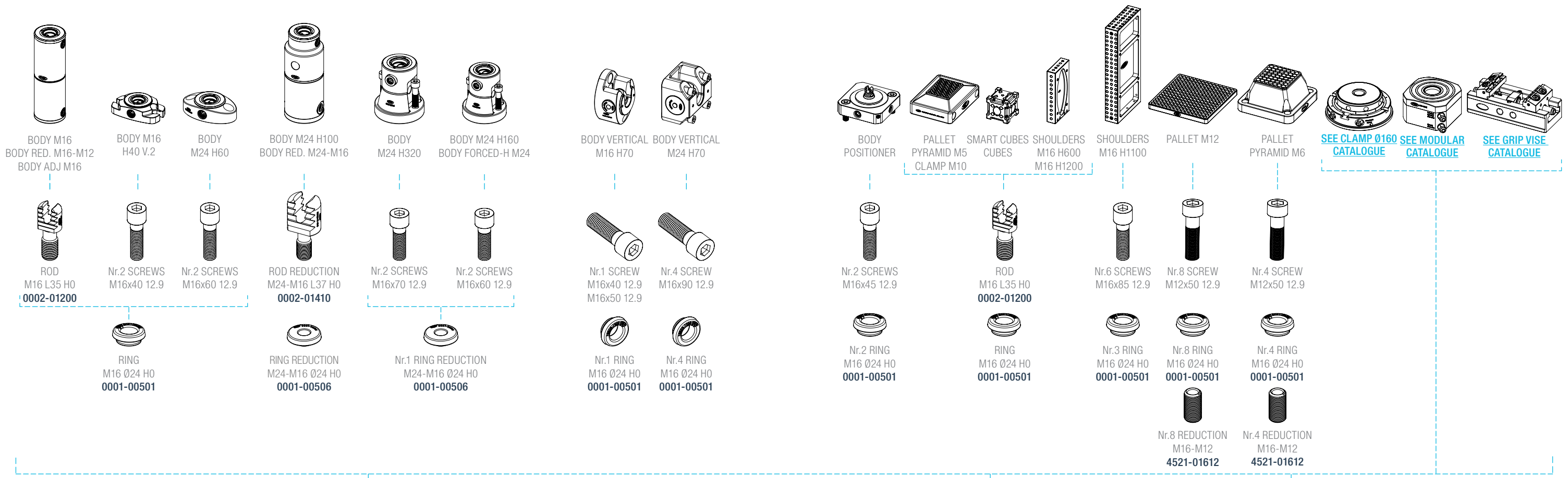
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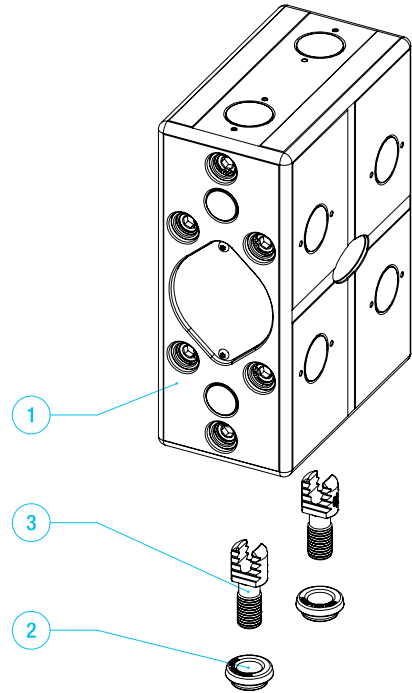
Note: For multicomponents clamping application refer to 3D Assembly Simulator. For the complete Kit refer to the corresponding SET CLAMP.

SET SMART CUBE

SET SMART CUBE

SET CODE 0009-06010

SET SMART CUBE 100 100x180 H250

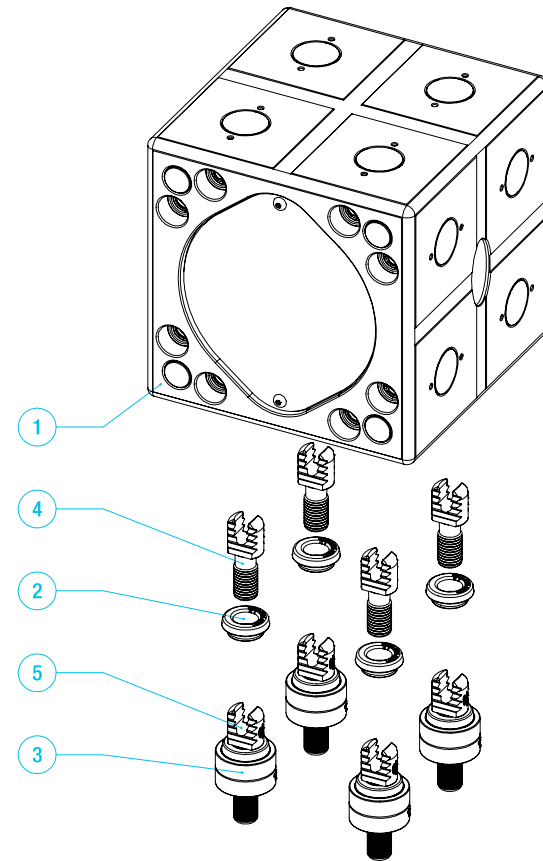


Description	Qty	CODE
1 SMART CUBE 100 100x180 H250	1	0008-02010
2 RING M16 Ø24 H0	2	0001-00501
3 ROD M16 L35 H0	2	0002-01200

set weight 27.5 kg

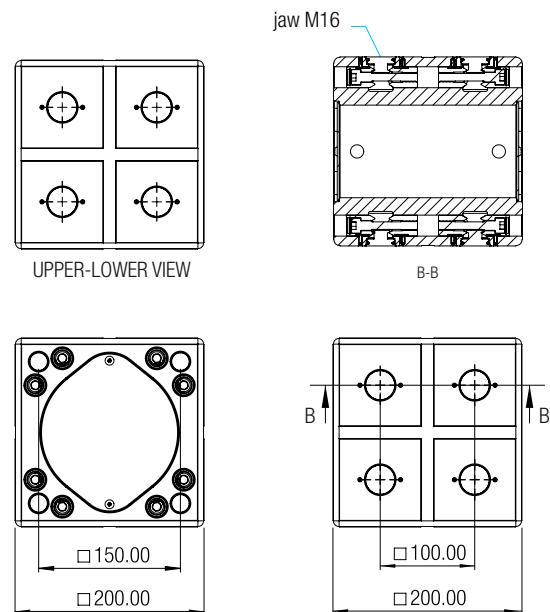
SET CODE 0009-07500

SET SMART CUBE 200 200x200 H200



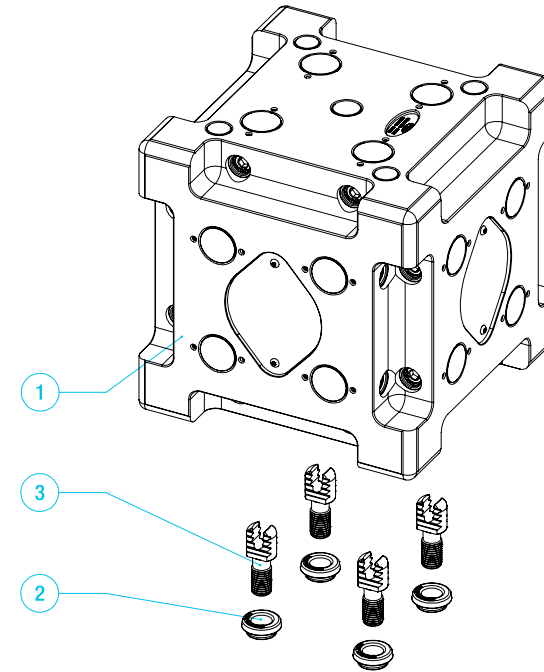
Description	Qty	CODE
1 SMART CUBE 200 200x200 H200	1	0008-03300
2 RING M16 Ø24 H0	4	0001-00501
3 RING H M16 Ø40 H25	4	0001-00540
4 ROD M16 L35 H0	4	0002-01200
5 ROD H M16 L60 H25	4	0002-01250

set weight 36.9 kg



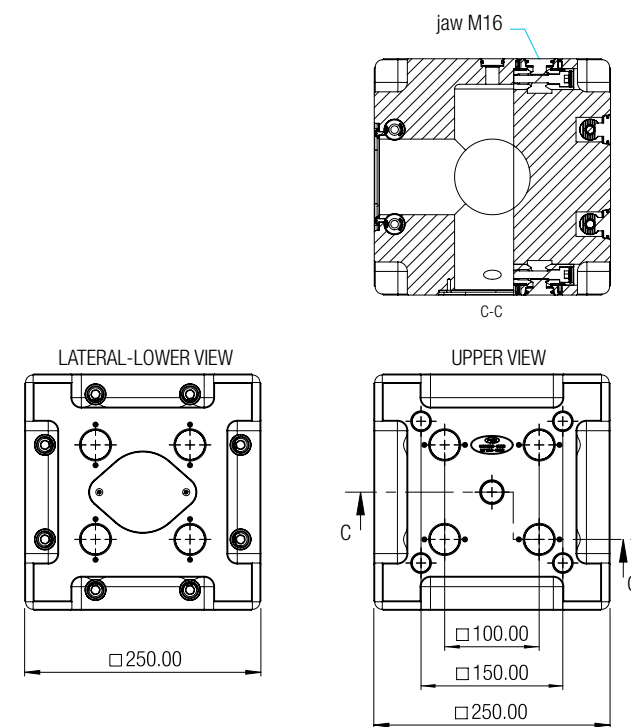
SET CODE 0009-07400

SET SMART CUBE 250 250x250 H250



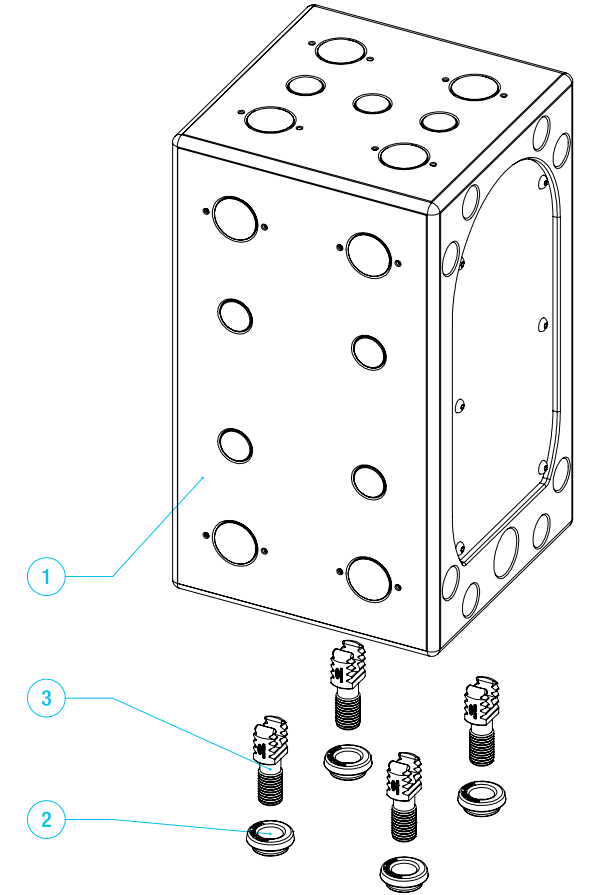
Description	Qty	CODE
1 SMART CUBE 250 250x250 H250	1	0008-03400
2 RING M16 Ø24 H0	4	0001-00501
3 ROD M16 L35 H0	4	0002-01200

set weight 78.9 kg



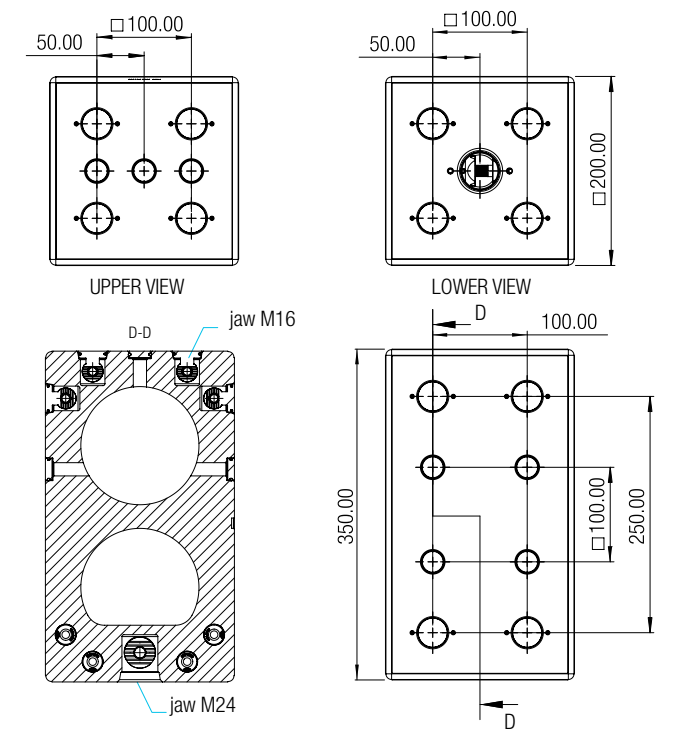
SET CODE 0009-00002

SET SMART CUBE 350 200x200 H350



Description	Qty	CODE
1 SMART CUBE 350 200x200 H350	1	0008-00002
2 RING M16 Ø24 H0	4	0001-00501
3 ROD M16 L35 H0	4	0002-01200

set weight 67.1 kg

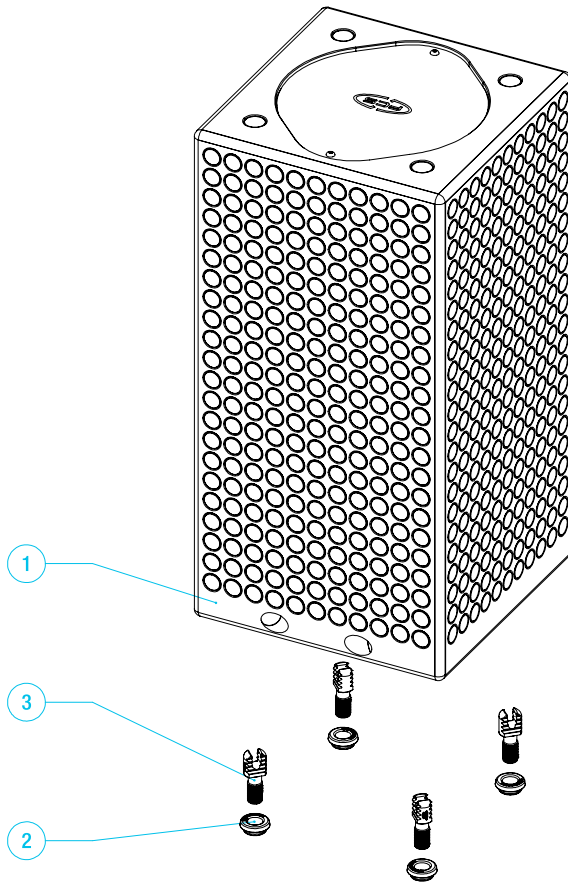


SET CUBE

SET SHOULDER

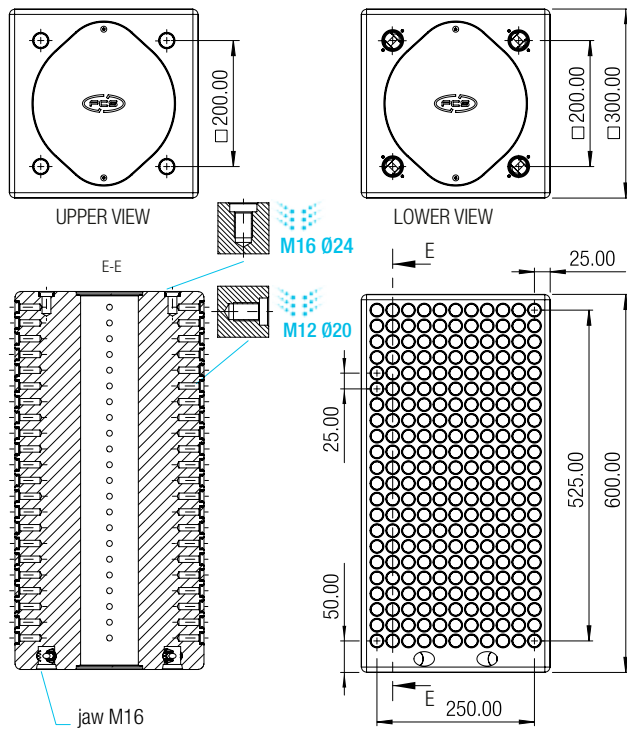
SET CODE 0009-07600

SET CUBE M12 STEP 25 300x300 H600



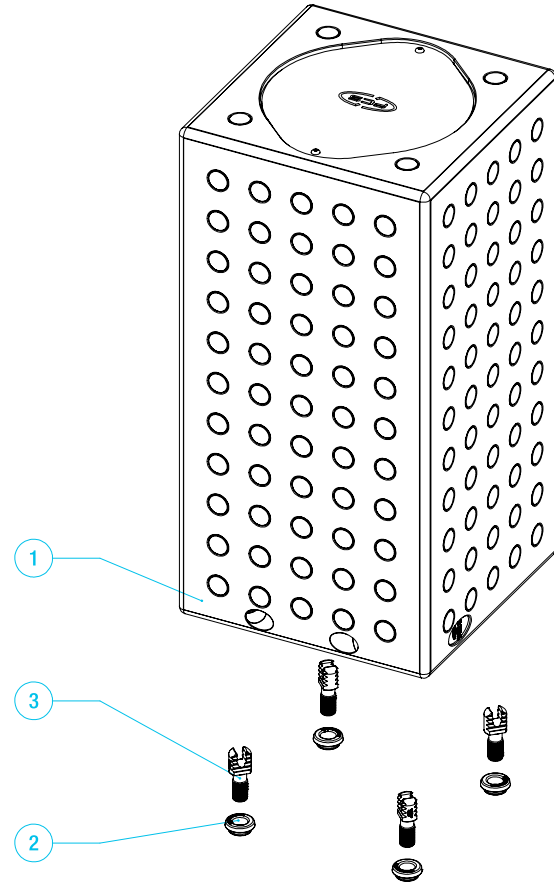
Description	Qty	CODE
1 CUBE M12 STEP 25 300x300 H600	1	0008-03600
2 RING M16 Ø24 H0	4	0001-00501
3 ROD M16 L35 H0	4	0002-01200

set weight 216.8 kg



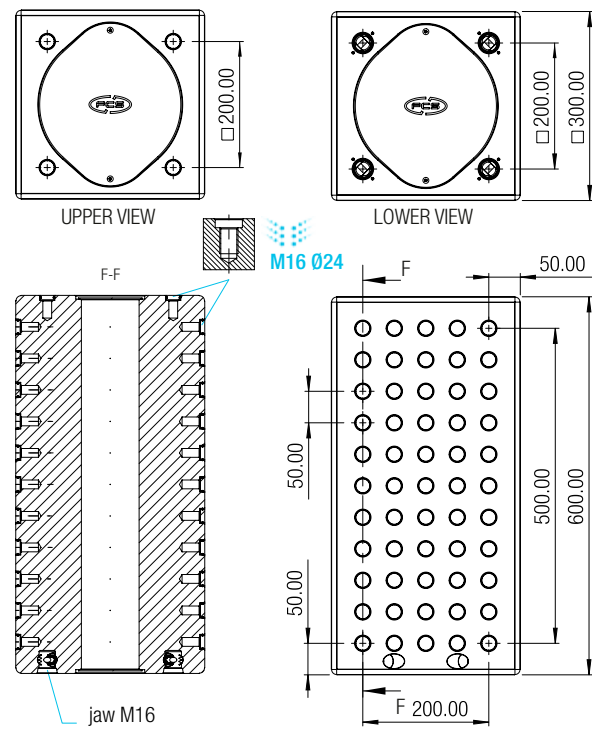
SET CODE 0009-07501

SET CUBE M16 STEP 50 300x300 H600



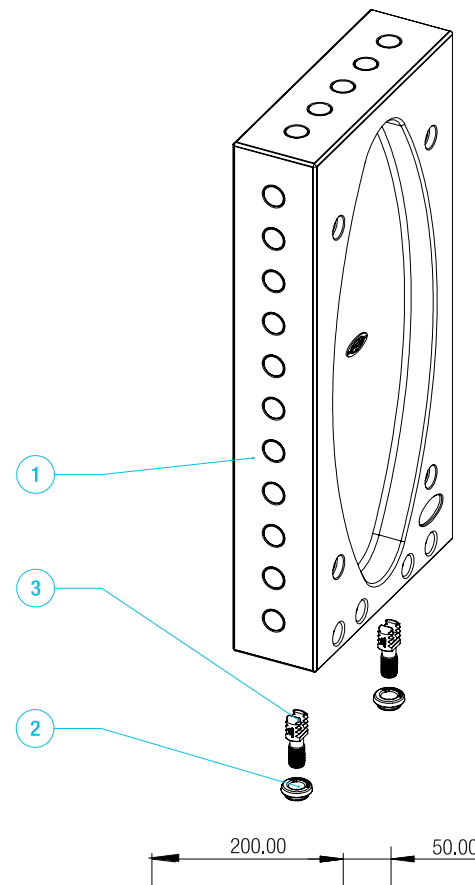
Description	Qty	CODE
1 CUBE M16 STEP 50 300x300 H600	1	0008-03500
2 RING M16 Ø24 H0	4	0001-00501
3 ROD M16 L35 H0	4	0002-01200

set weight 230.1 kg



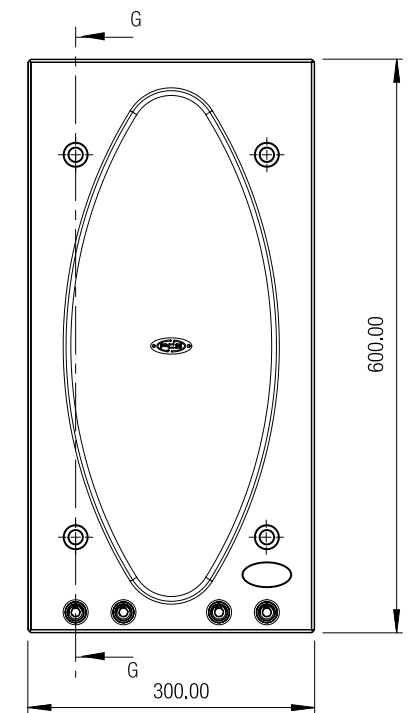
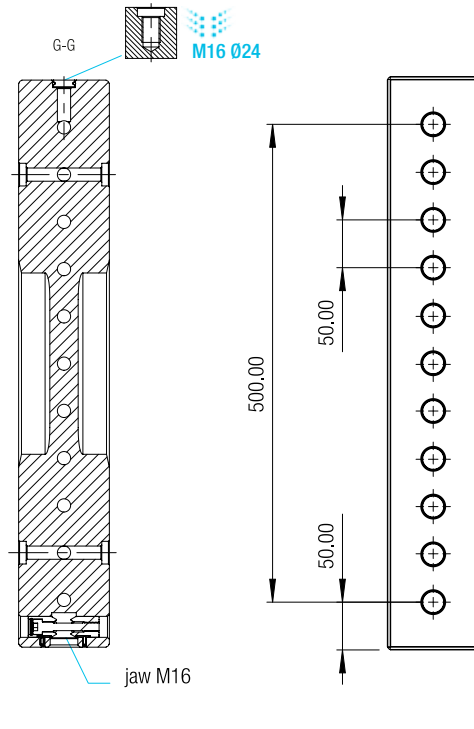
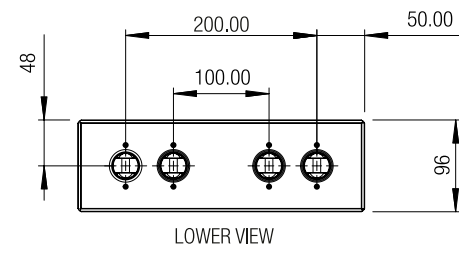
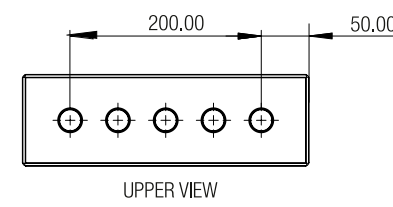
SET CODE 0011-07551

SET SHOULDER M16 STEP 50 300x96 H600



Description	Qty	CODE
1 SHOULDER M16 STEP 50 300x96 H600	1	0010-03800
2 RING M16 Ø24 H0	2	0001-00501
3 ROD M16 L35 H0	2	0002-01200

set weight 86.4 kg



SET SHOULDER

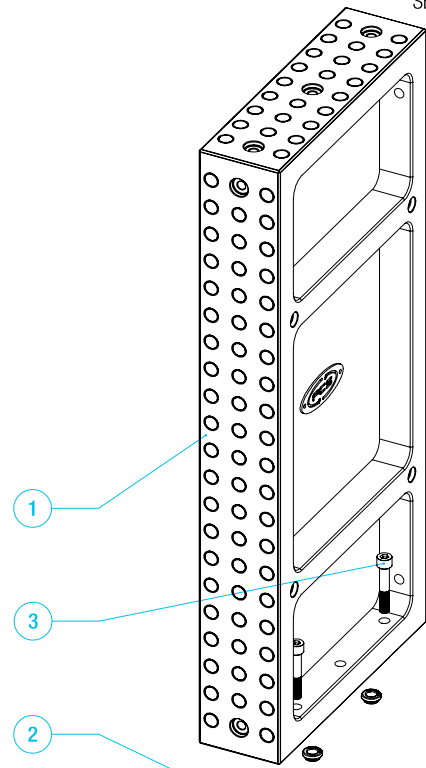
SET SHOULDER

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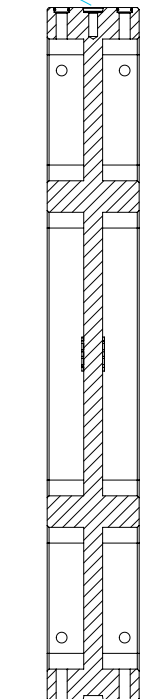
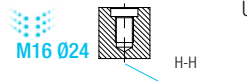
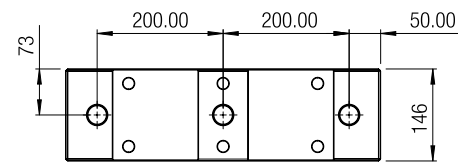
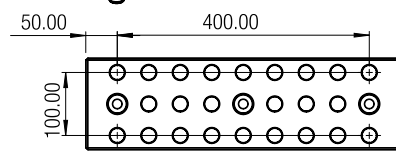
SET CODE 0011-07552

SET SHOULDER M16 STEP 50 500x146 H1100

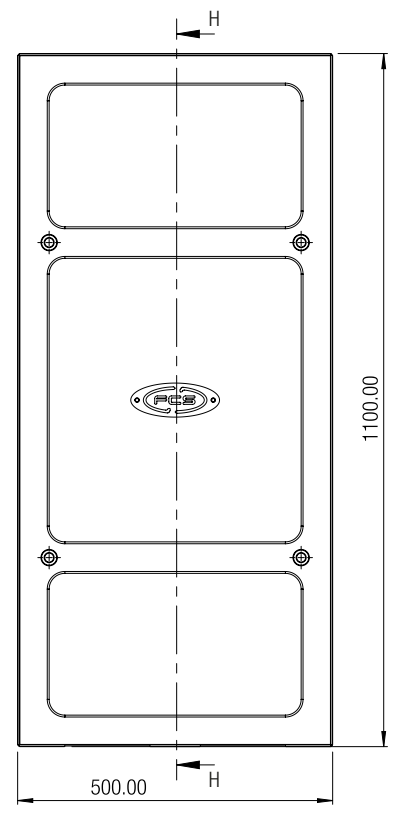
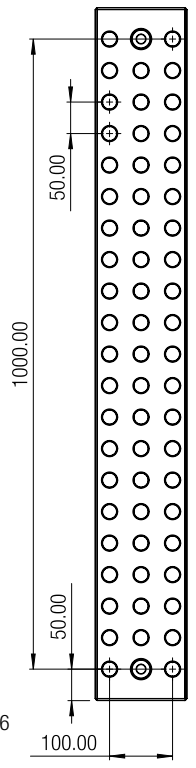


Description	Qty	CODE
1 SHOULDER M16 STEP 50 500x146 H1100	1	0010-03900
2 RING M16 Ø24 H0	3	0001-00501
3 SCREW ISO 4762 M16x85 12.9 BURNISHED	6	4521-16085

set weight 300.2 kg

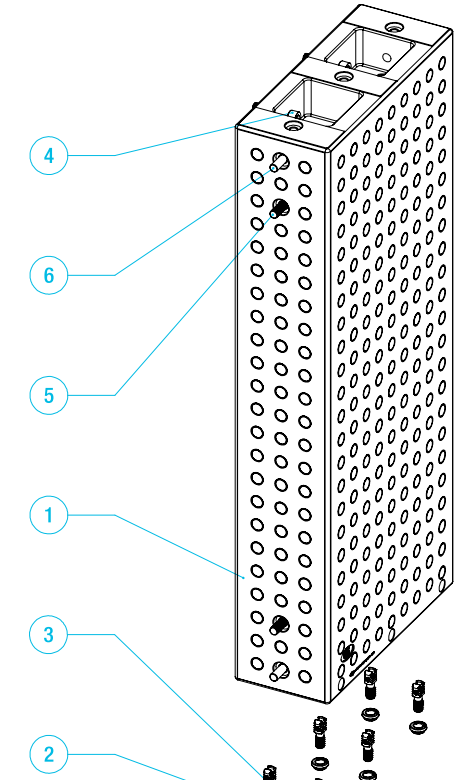


seat for ring M16 screw M16



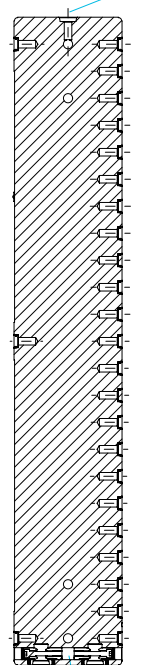
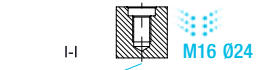
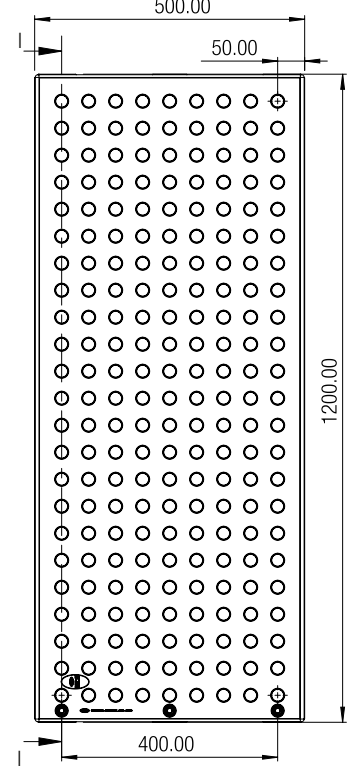
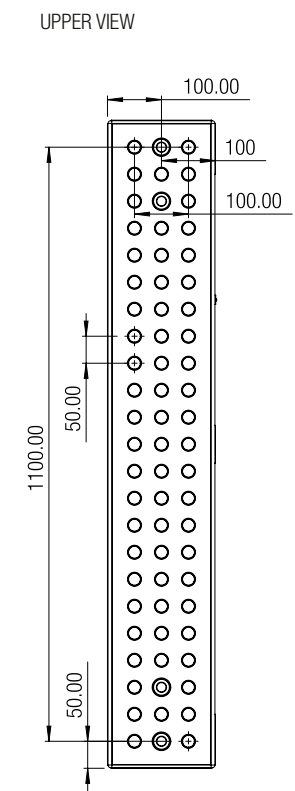
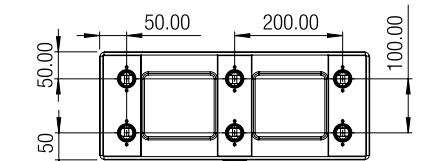
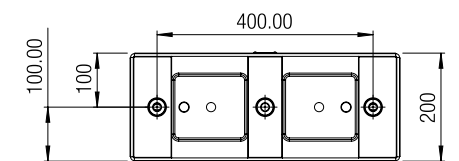
SET CODE 0011-08000

SET SHOULDER DYNAMIC M16 STEP 50 500x200 H1200



Description	Qty	CODE
1 SHOULDER DYNAMIC M16 STEP 50 500x200 H1200	1	0010-04000
2 RING M16 Ø24 H0	6	0001-00501
3 ROD M16 L35 H0	6	0002-01200
4 SCREW ISO 4762 M16x75 12.9 BURNISHED	4	4521-16075
5 SCREW ISO 4762 M16x90 12.9 BURNISHED	2	4521-16090
6 SCREW ISO 4762 M16x110 12.9 BURNISHED	2	4521-16110

set weight 576.4 kg



jaw M16

SET DYNAMIC BEAM

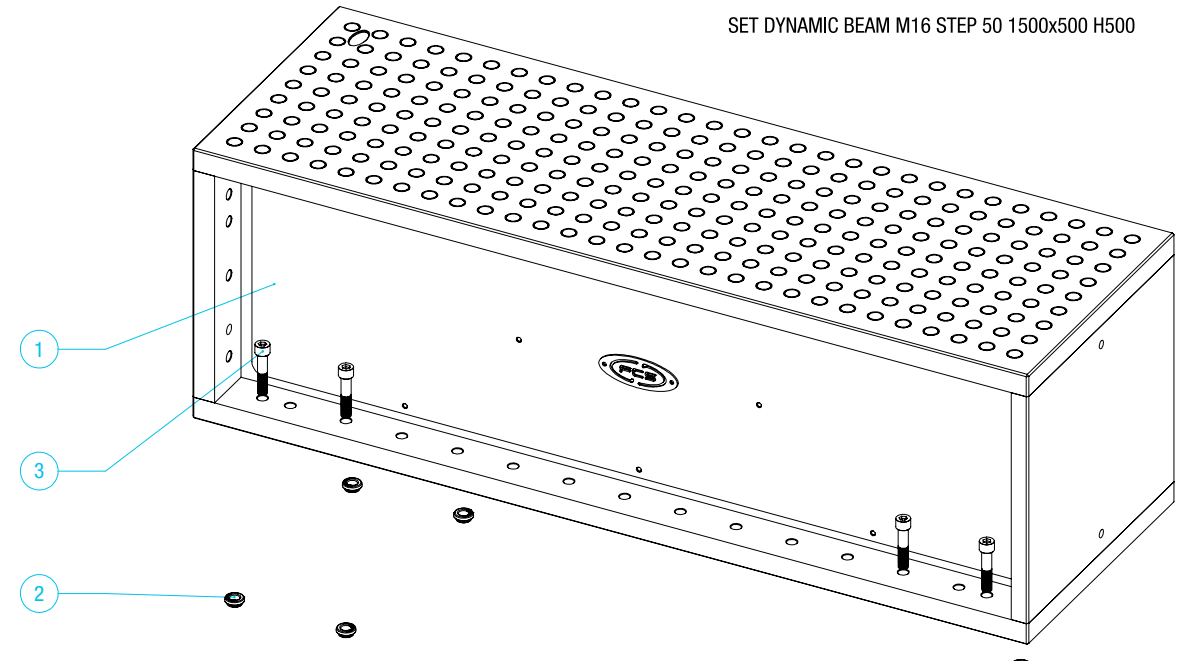
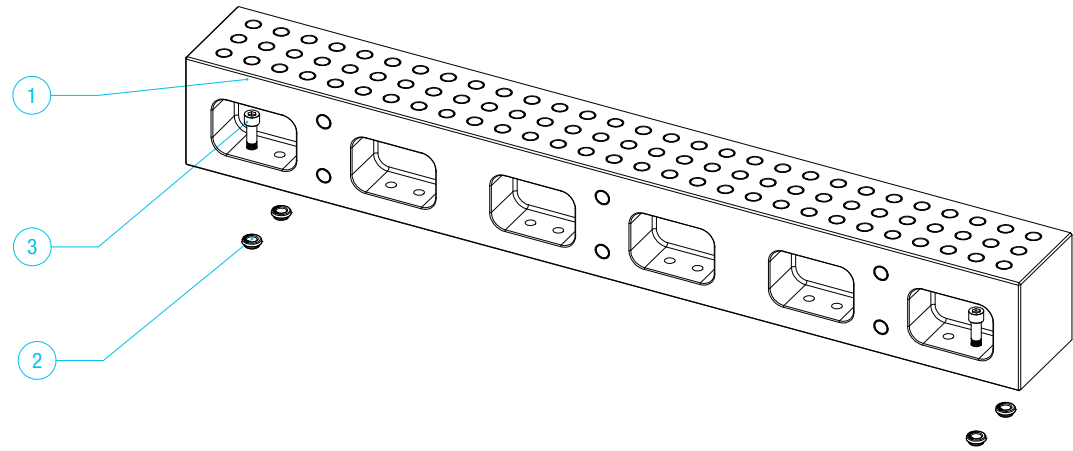
SET DYNAMIC BEAM

SET CODE 0050-01500

SET DYNAMIC BEAM M16 STEP 50 1500x180 H200

SET CODE 0050-02000

SET DYNAMIC BEAM M16 STEP 50 1500x500 H500

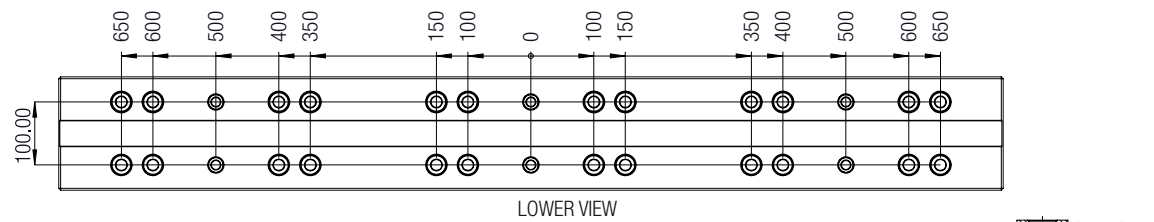


Description	Qty	CODE
1 DYNAMIC BEAM 200 M16 STEP 50 180x1500 H200	1	0018-01500
2 RING M16 Ø24 H0	4	0001-00501
3 SCREW ISO 4762 M16x75 12.9 BURNISHED	4	4521-16075

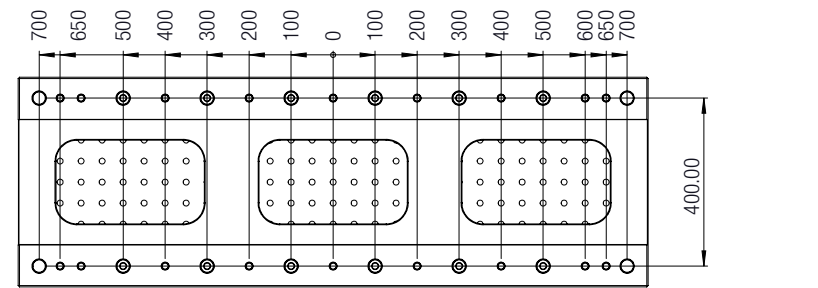
set weight 304.0 kg

Description	Qty	CODE
1 DYNAMIC BEAM 500 M16 STEP 50 500x1500 H500	1	0018-02000
2 RING M16 Ø24 H0	8	0001-00501
3 SCREW ISO 4762 M16x75 12.9 BURNISHED	8	4521-16075

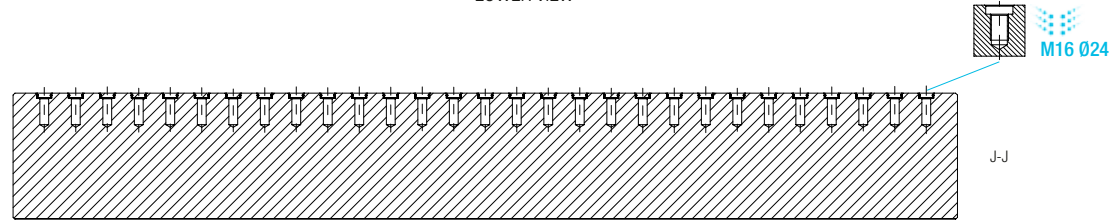
set weight 730.3 kg



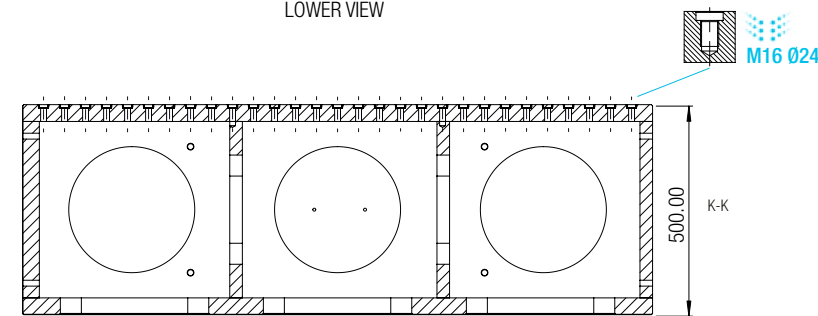
LOWER VIEW



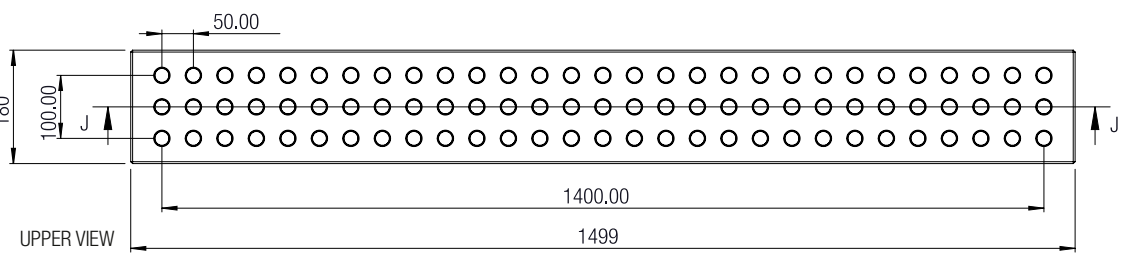
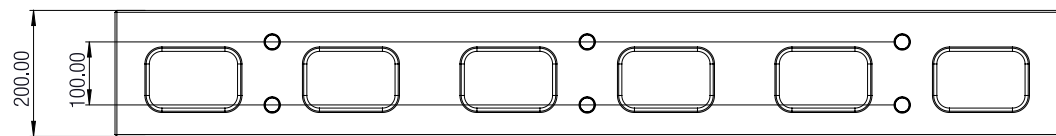
LOWER VIEW



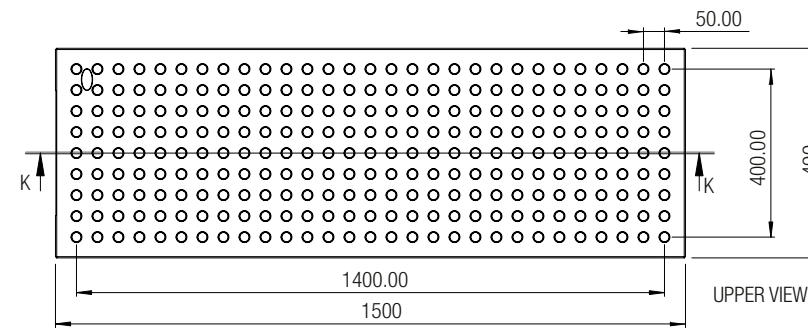
M16 Ø24



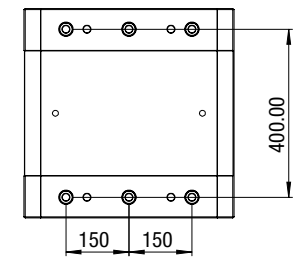
M16 Ø24



UPPER VIEW



UPPER VIEW



CLAMPING FORCES AND TIGHTENING TORQUES

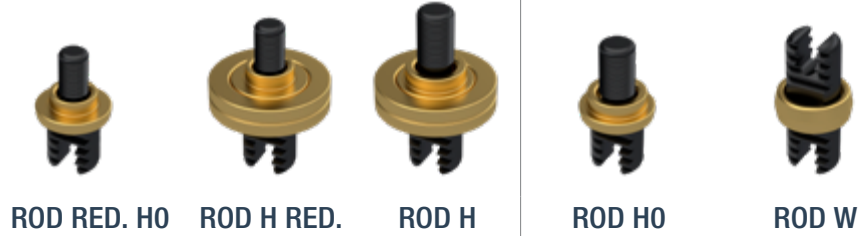
CLAMPING FORCES AND TIGHTENING TORQUES

HOLDING FORCE AND TIGHTENING TORQUE

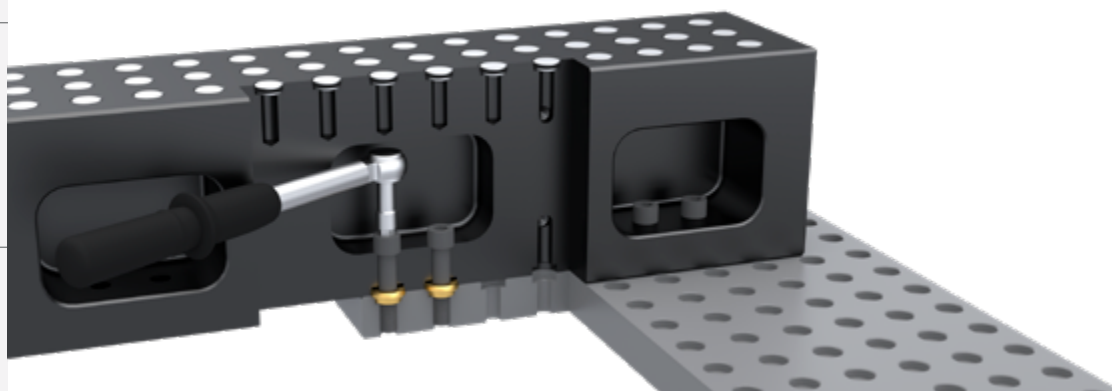
Max tensile load to which the clamping system is able to withstand



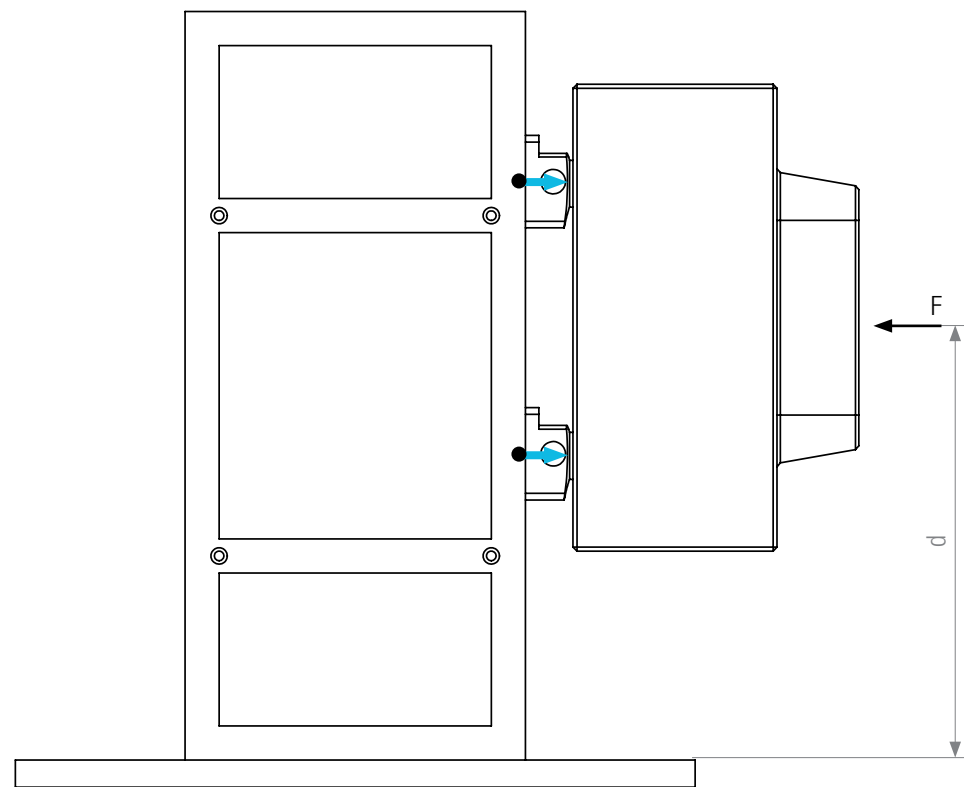
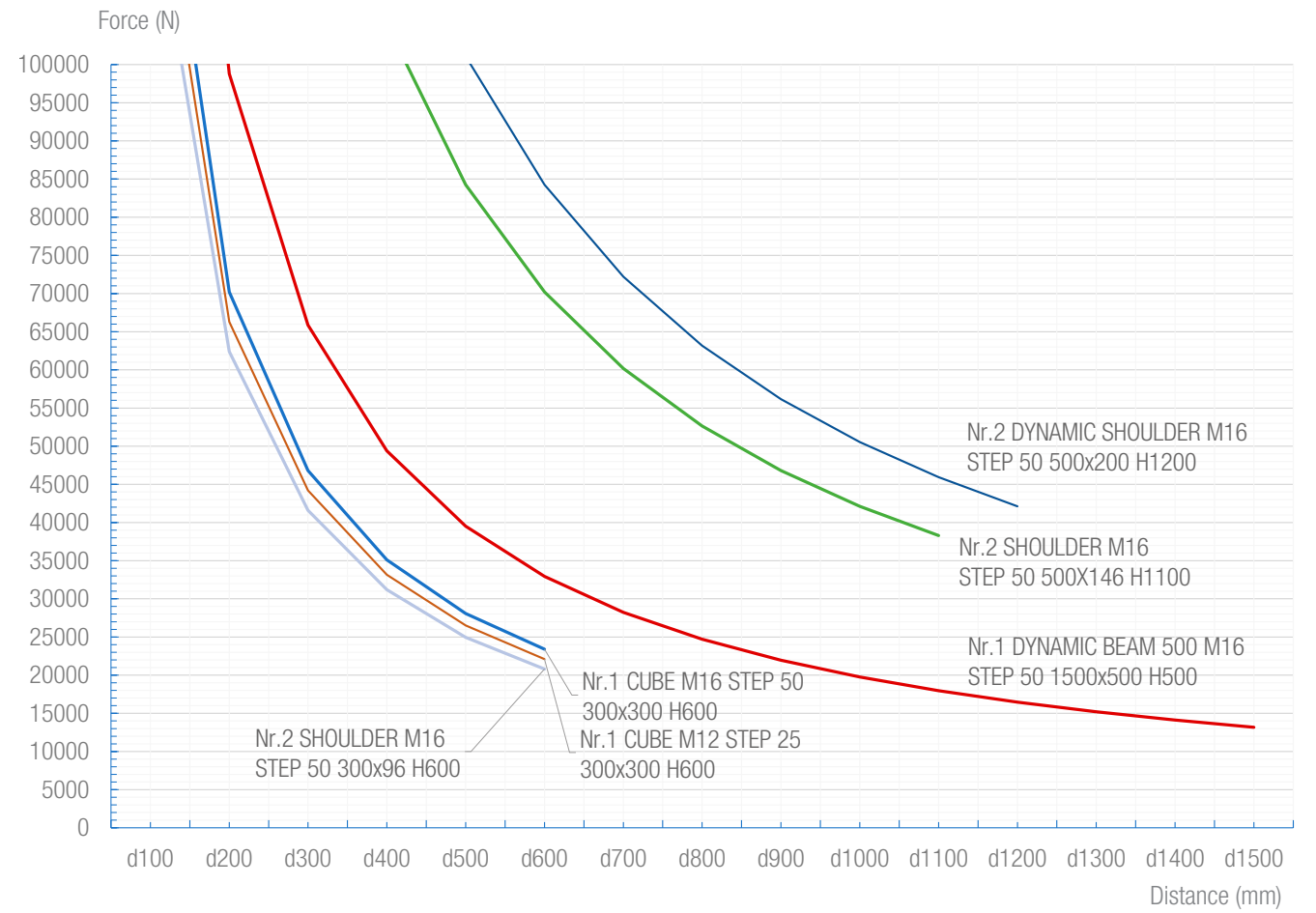
JAW SIZE	HEX	TORQUE (Nm)	HOLDING FORCE (N)	TORQUE (Nm)	HOLDING FORCE (N)
JAW M16	8	45	15000	55	31200



FIXING SCREWS	HEX (mm)	TORQUE (Nm)	HOLDING FORCE (N)
M12 12.9	10	100	14150
M16 12.9	14	200	26350



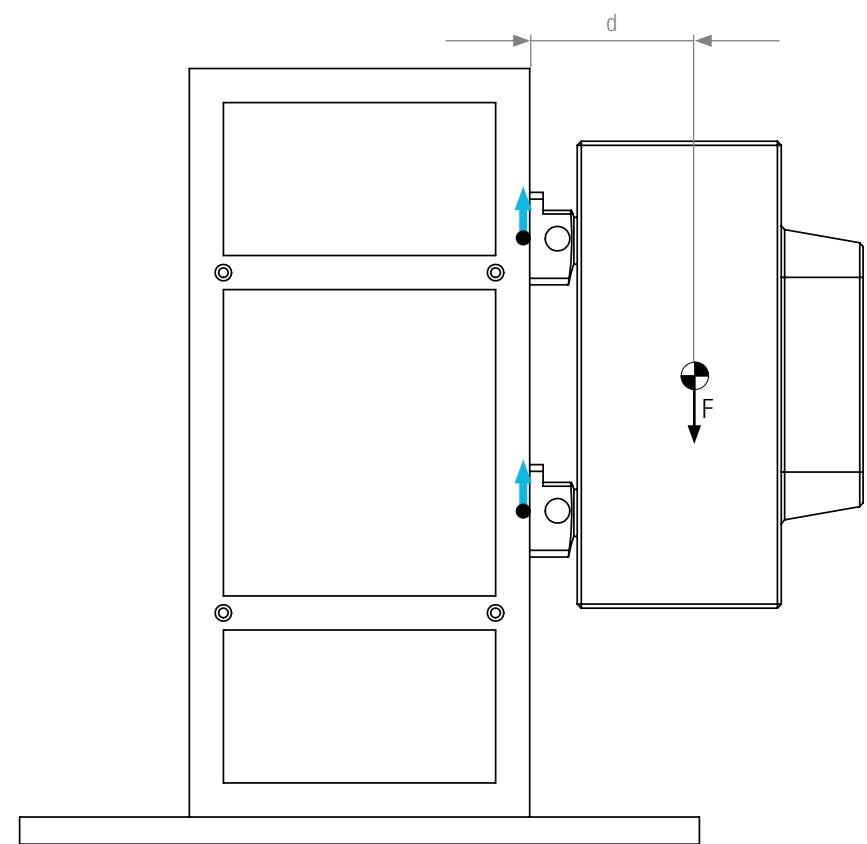
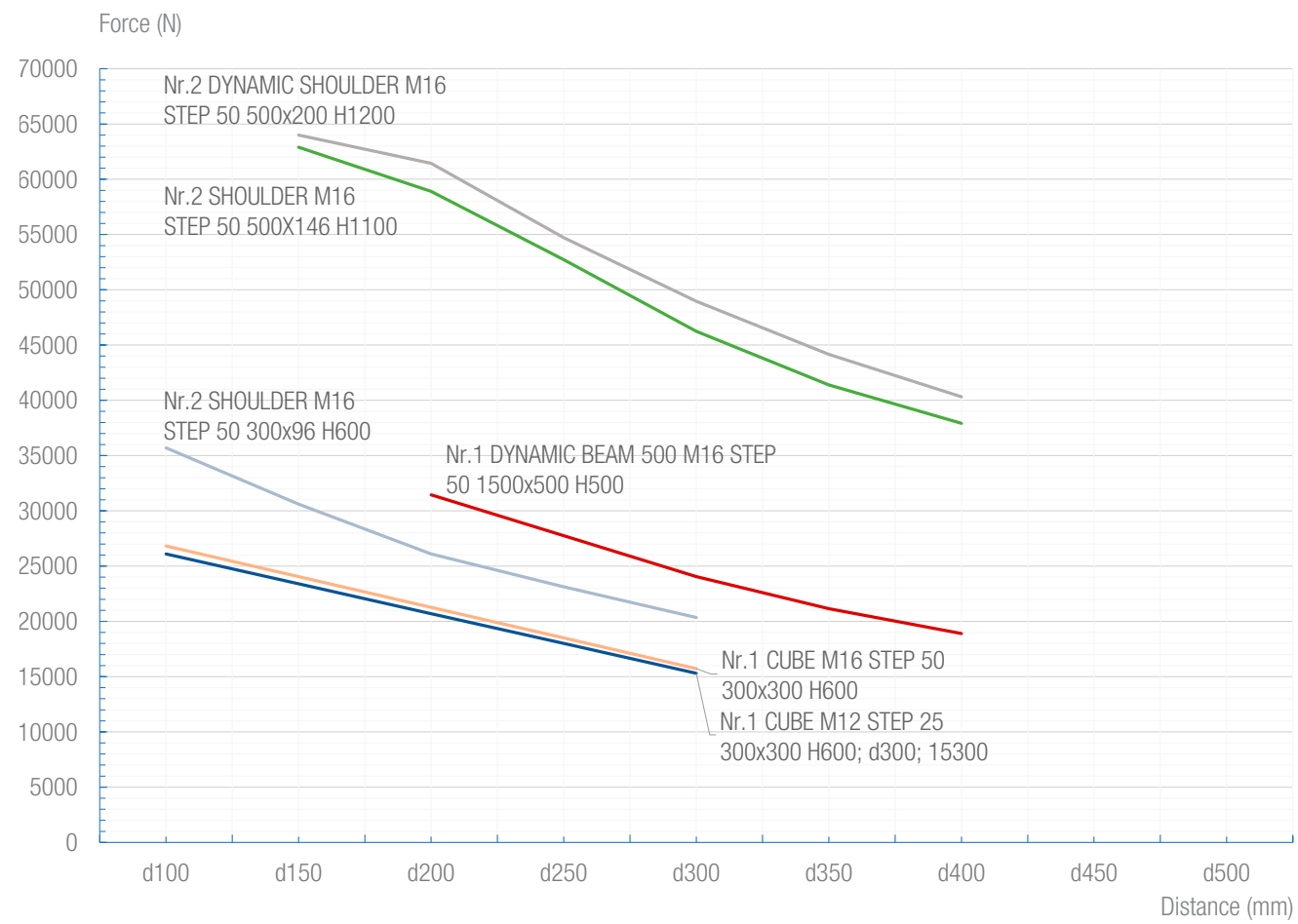
HOLDING FORCE AND SUPPORTING FORCE



CLAMPING FORCES AND TIGHTENING TORQUES

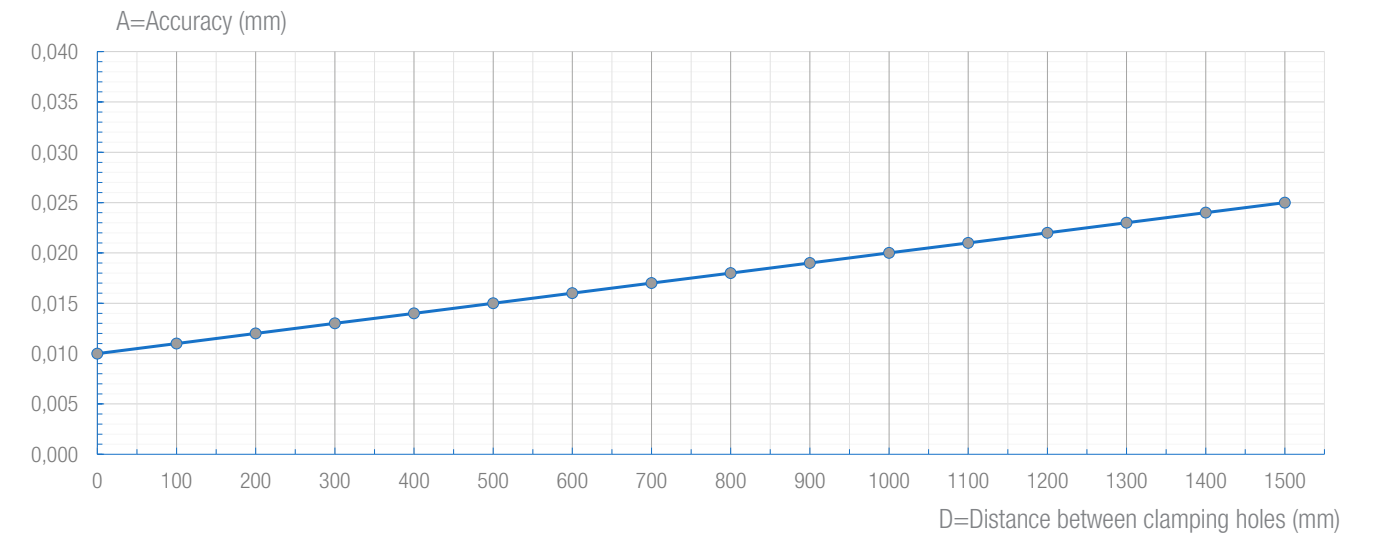
ACCURACY

LATERAL FORCE



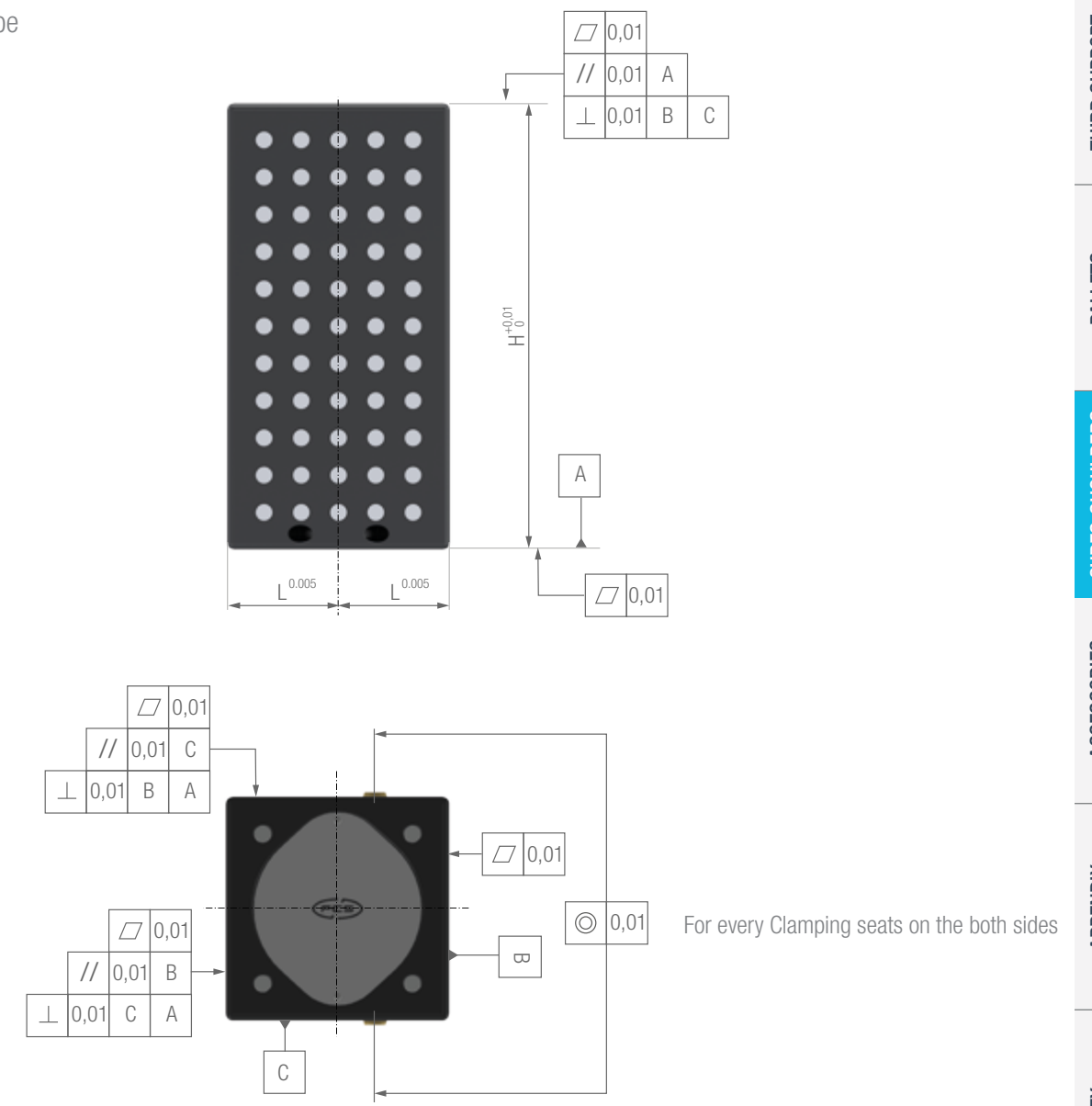
GRID STEP ACCURACY

Positional tolerance of the clamping seat



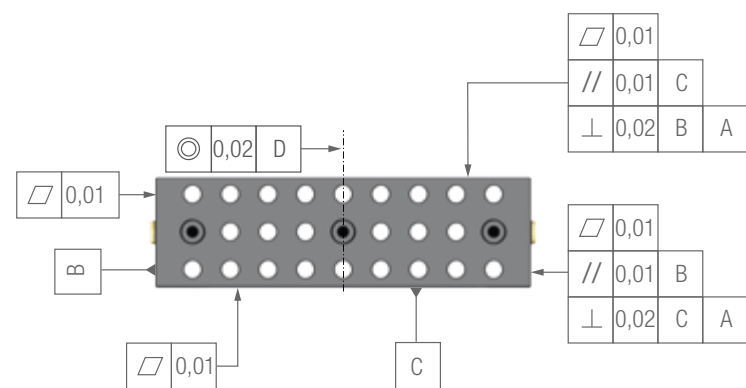
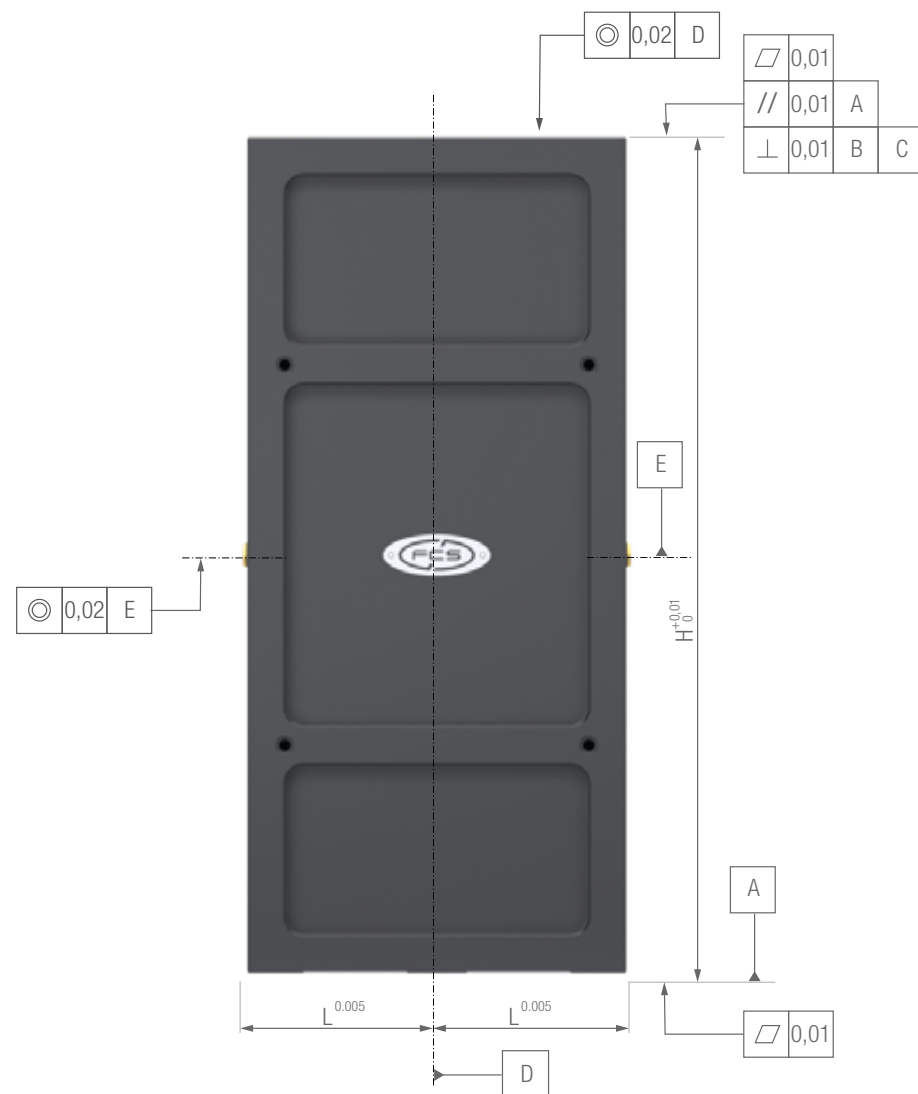
ACCURACY

Smart Cube and Cube



ACCURACY

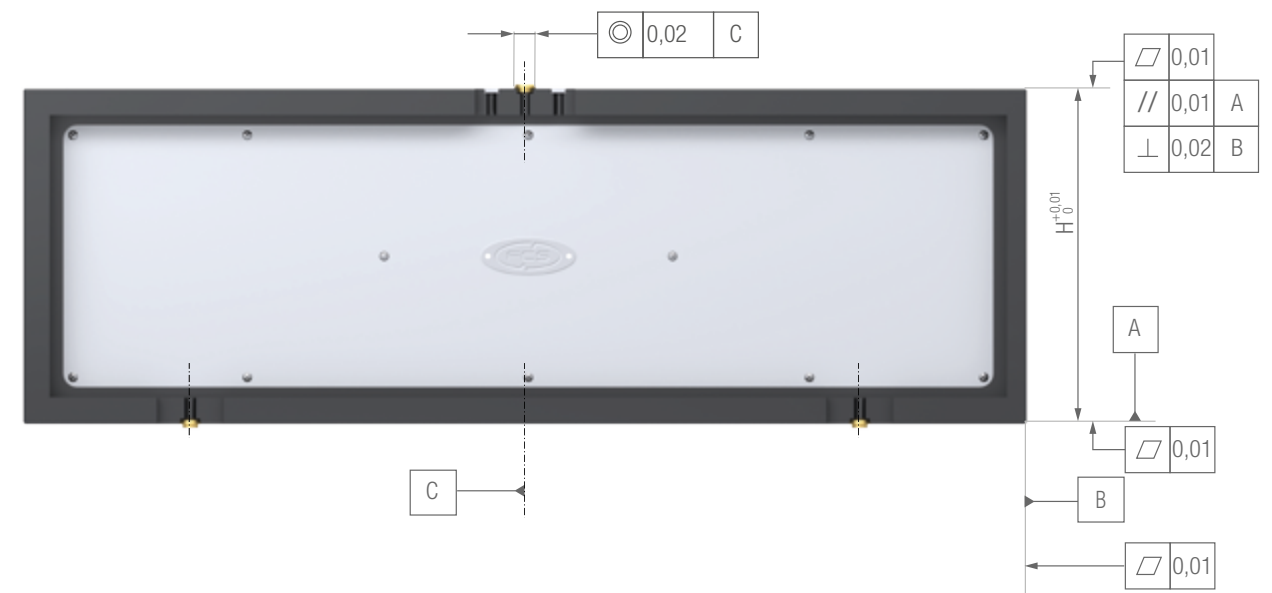
Shoulder



For Dynamic Shoulder only

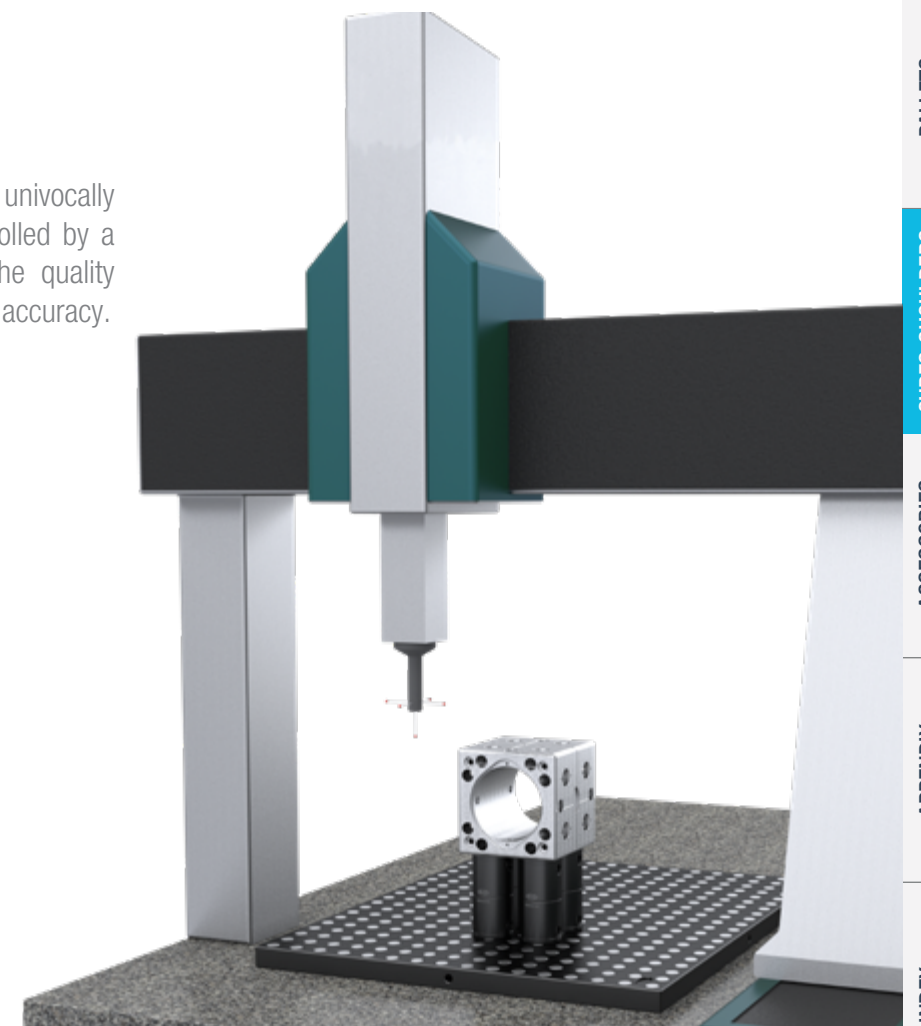
ACCURACY

Beam

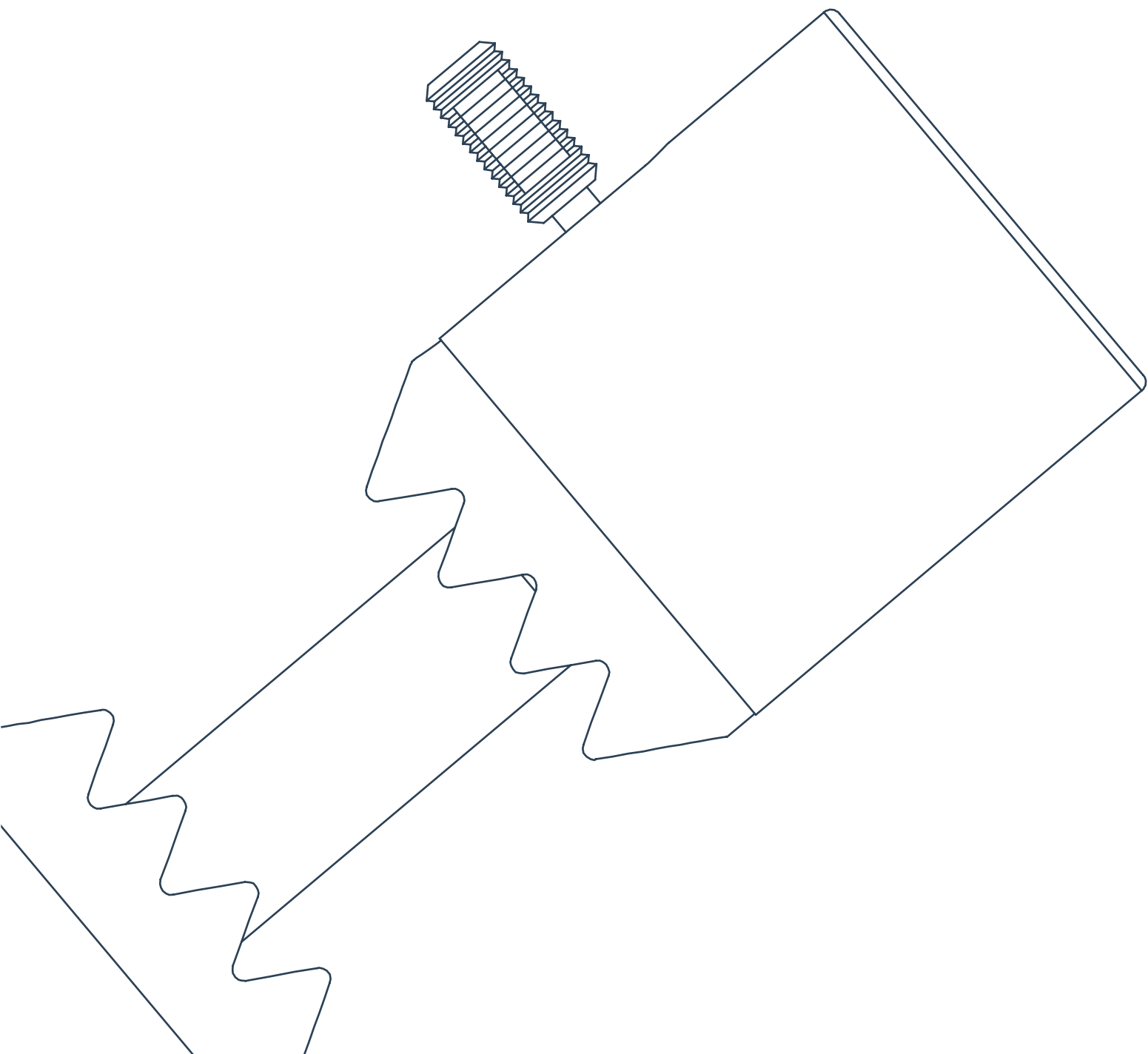


QUALITY REPORT

Every single Cube, Shoulder or Beam is univocally identified by a marking number and controlled by a CMM (Coordinate Measuring Machine); the quality report certifies the Cube, Shoulder or Beam accuracy.



ACCESSORIES SPARE PARTS

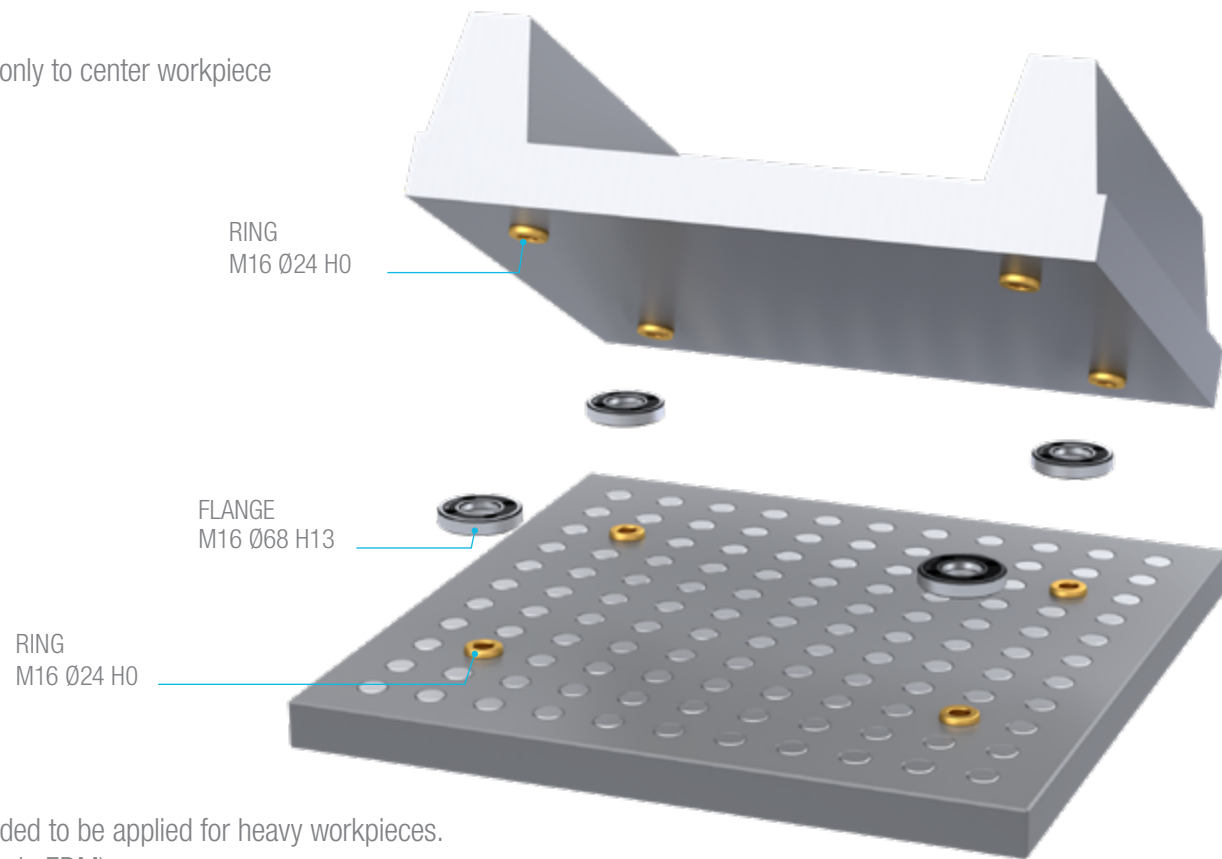


Integrated systems for production

FLANGE

FLANGE

Application only to center workpiece



(Raccomended to be applied for heavy workpieces.
For example in EDM)

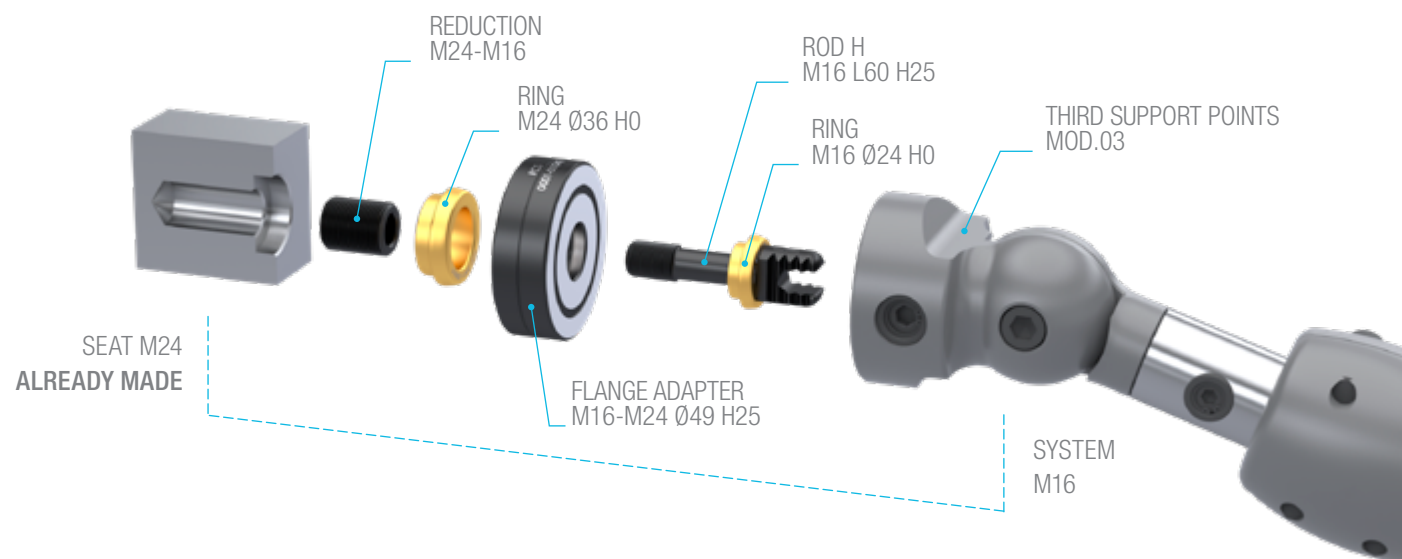
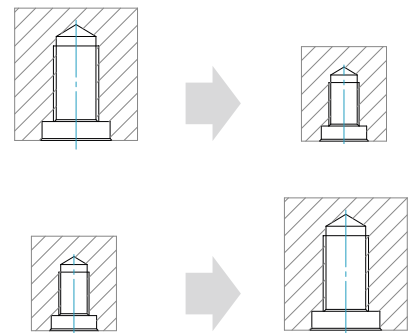
FLANGE ADAPTER

Three different methods are available to make a **reduction**:

- BODIES REDUCTION
- RINGS-RODS REDUCTION
- PALLETS

If it is required to make a **increase** (to use a larger size seat),
are available the following two Flange Adapter:

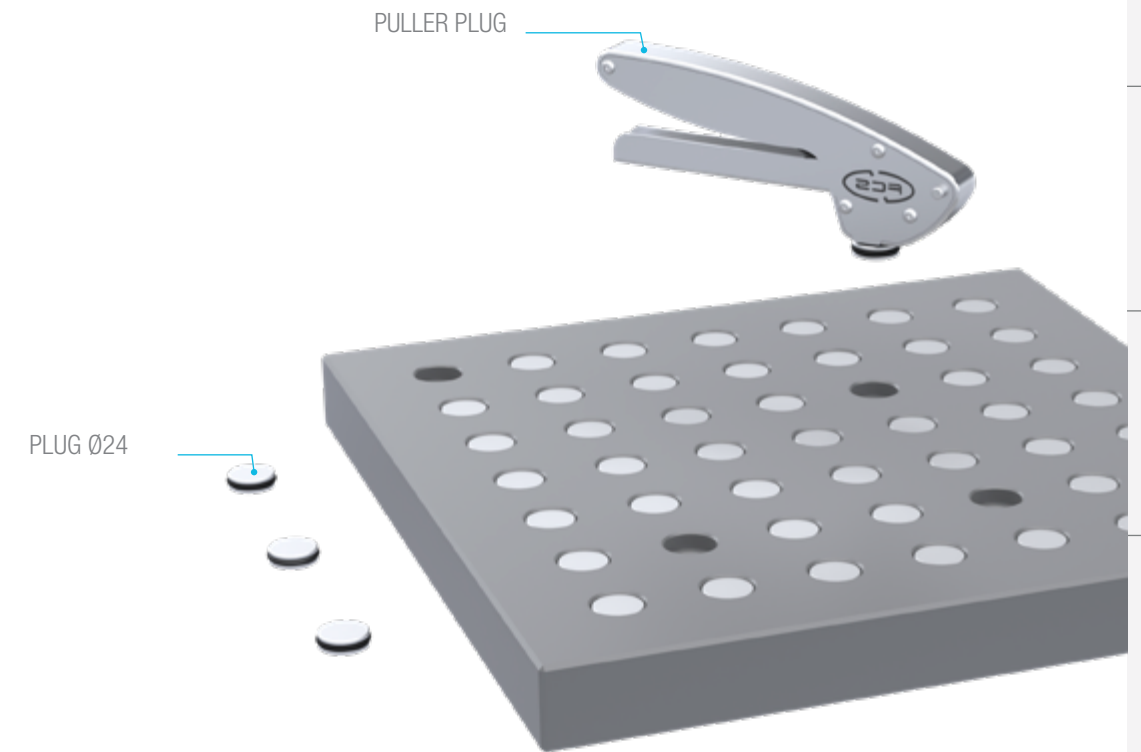
- FLANGE ADAPTER M12-M16 Ø49 H20
- FLANGE ADAPTER M16-M24 Ø78 H25



PULLER PLUGS AND PULLER RINGS

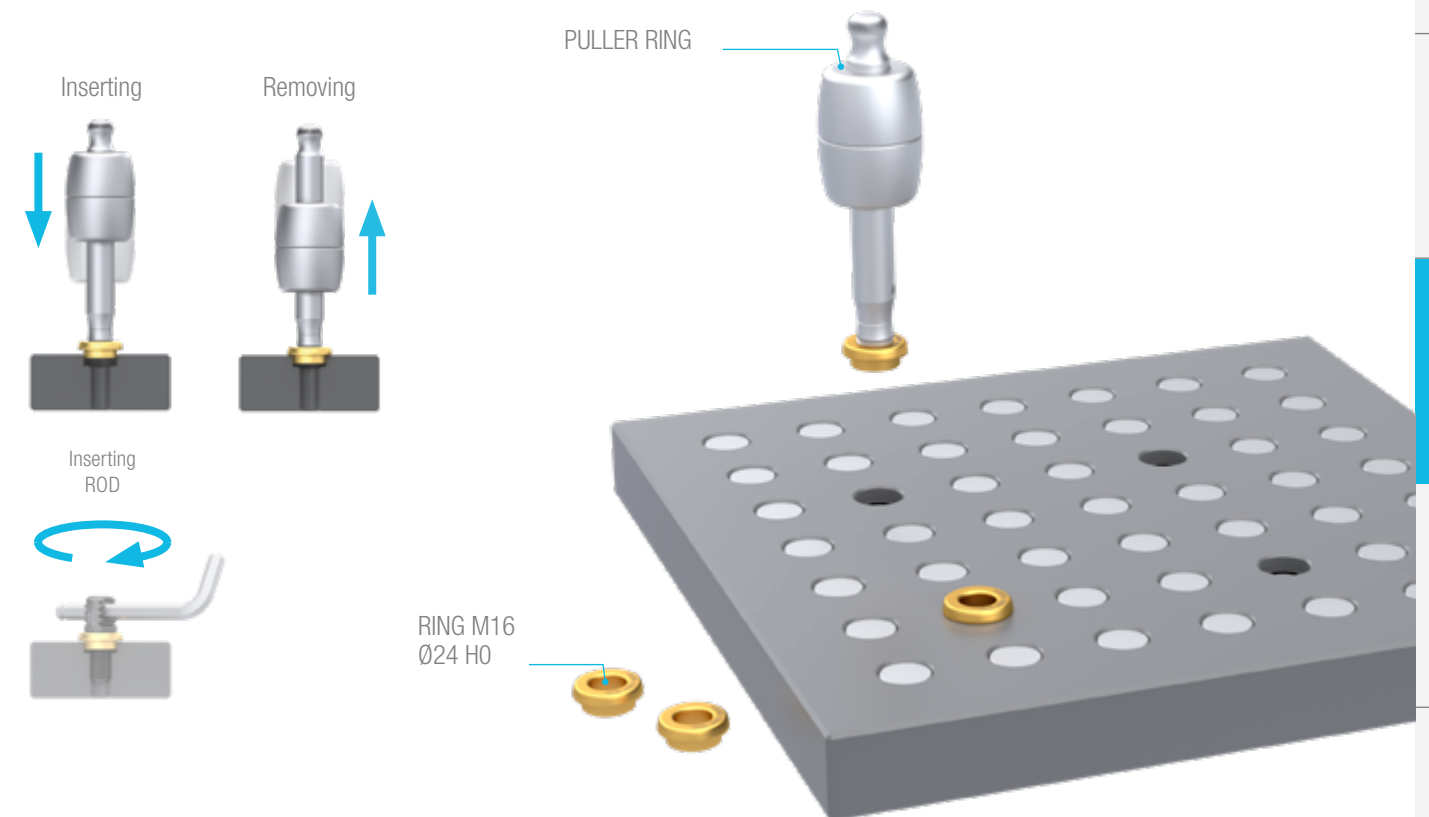
PULLER PLUG

Dedicated tool to remove FCS plugs



PULLER RING

Dedicated tool for insert or remove FCS rings

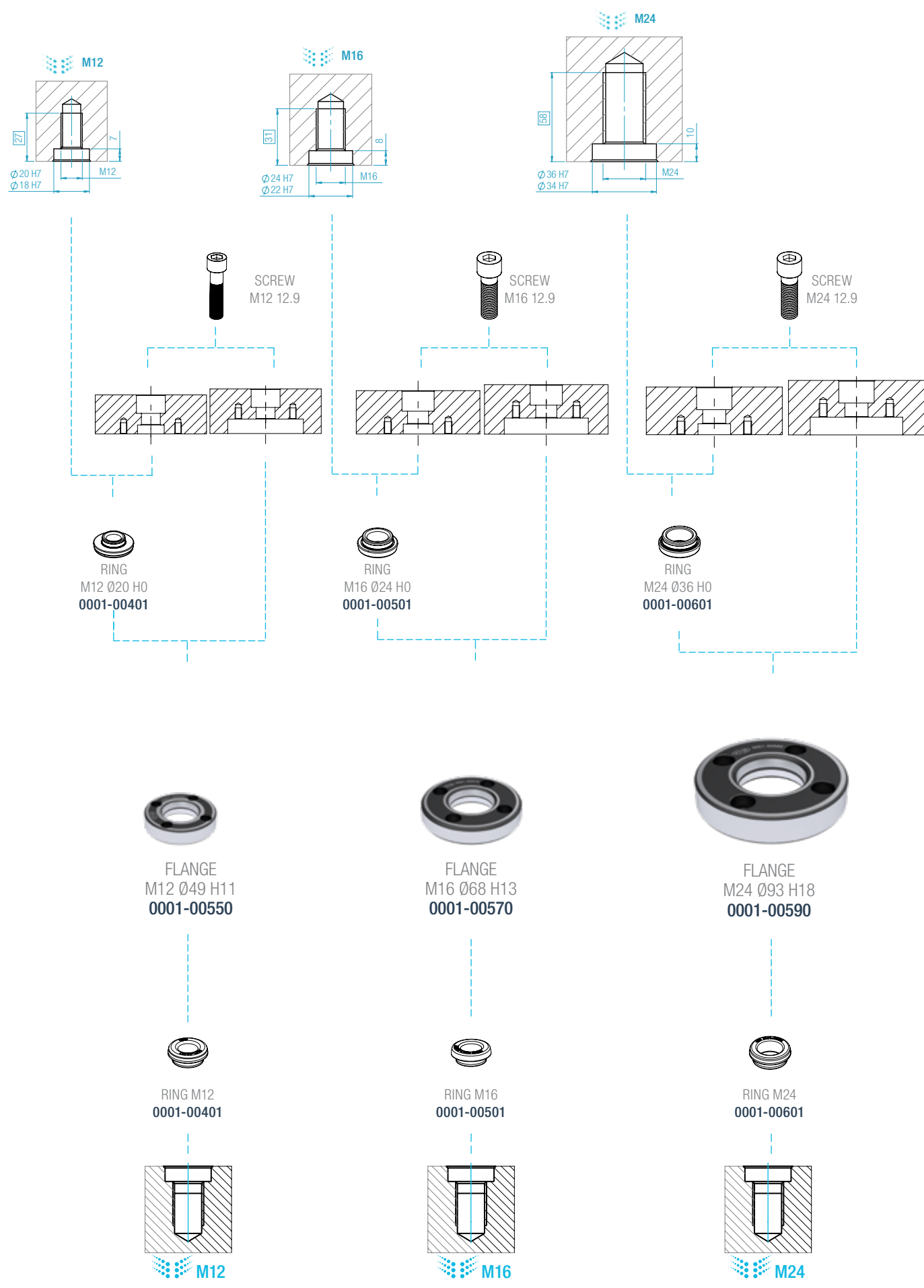


FLANGE

FLANGE ADAPTER

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SET FLANGE

SET FLANGE

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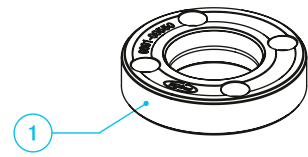
CUBES-SHOULDERS
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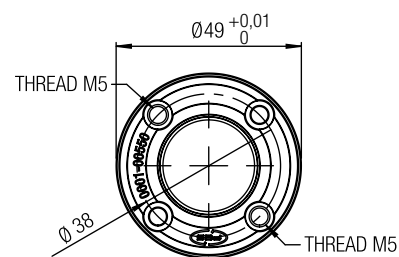
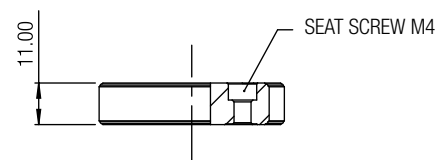
INDEX

0001-00550
FLANGE M12 Ø49 H11

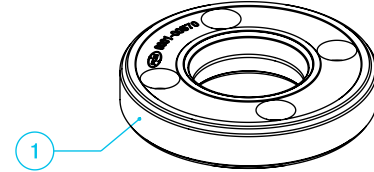


Description	Qty	CODE
1 FLANGE M12 D.49 H11	1	0001-00550

weight 0.1 kg

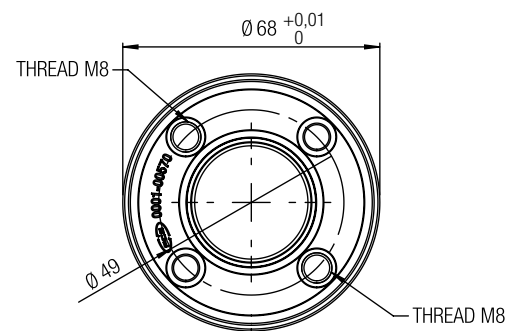
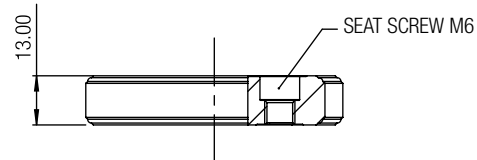


0001-00570
FLANGE M16 Ø68 H13

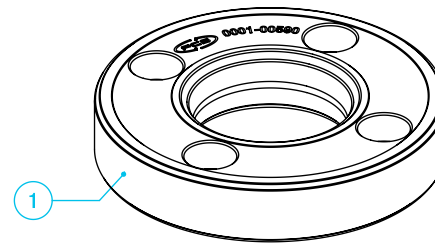


Description	Qty	CODE
1 FLANGE M16 D.68 H13	1	0001-00570

weight 0.3 kg

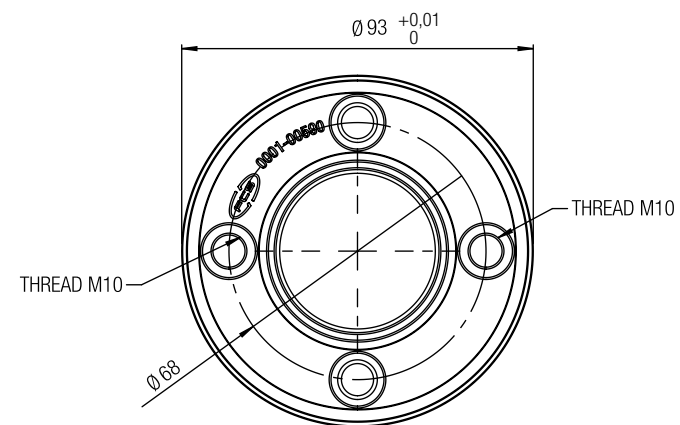
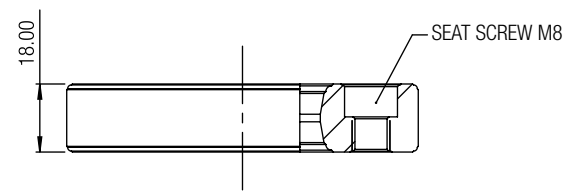


0001-00590
FLANGE M24 Ø93 H18



Description	Qty	CODE
1 FLANGE M24 D.93 H18	1	0001-00590

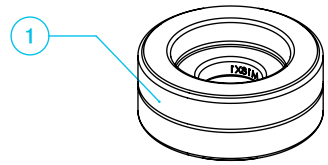
weight 0.7 kg



SET FLANGE ADAPTER

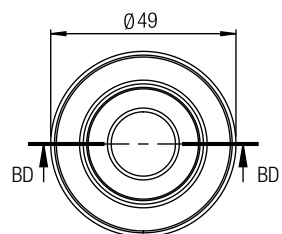
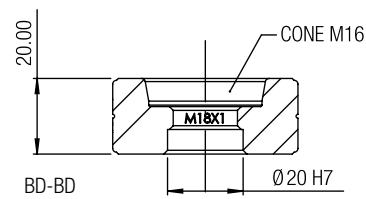
ACCESSORIES

0001-00042
FLANGE ADAPTER M12-M16 Ø49 H20

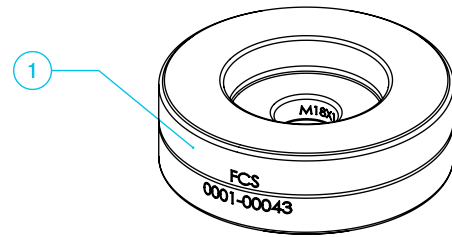


Description	Qty	CODE
1 FLANGE ADAPTER M12-M16 D.49 H20	1	0001-00042

weight 0.2 kg

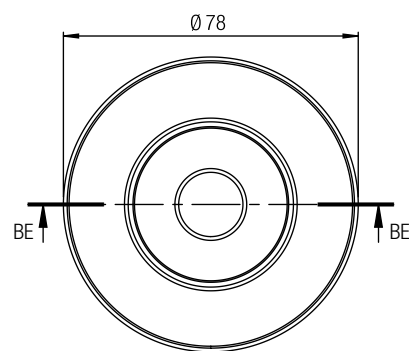
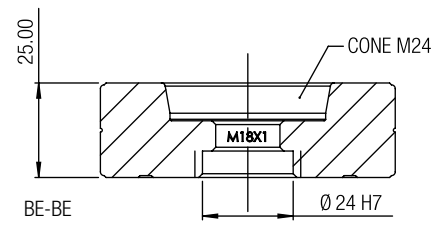


0001-00043
FLANGE ADAPTER M16-M24 Ø78 H25

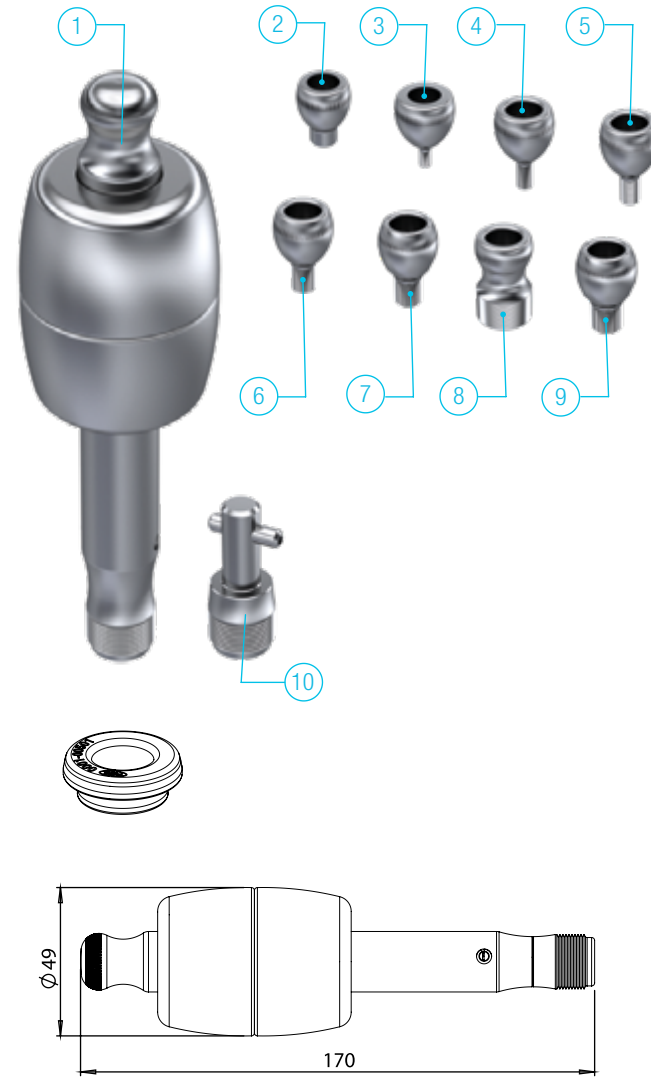


Description	Qty	CODE
1 FLANGE ADAPTER M16-M24 D.78 H25	1	0001-00043

weight 0.8 kg

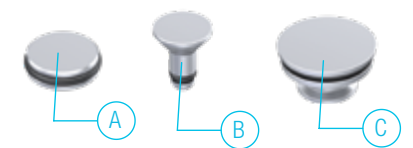
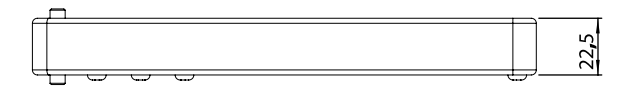
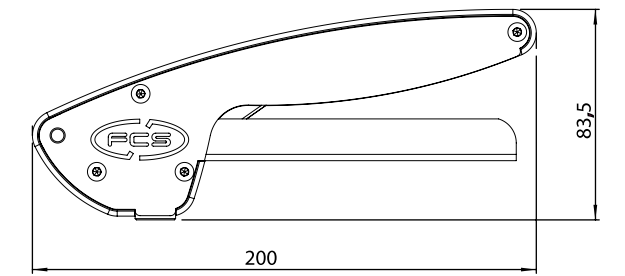


PULLER RING
SET CODE 0014-00010



	DESCRIPTION	QTY	CODE
1	PULLER RING	1	0014-04600
2	PULLER ADAPTER HT	1	0014-04670
3	PULLER ADAPTER M5	1	0014-04680
4	PULLER ADAPTER M6	1	0014-04610
5	PULLER ADAPTER M8	1	0014-04620
6	PULLER ADAPTER M10	1	0014-04630
7	PULLER ADAPTER M12	1	0014-04640
8	PULLER ADAPTER M24	1	0014-04650
9	PULLER ADAPTER WITHOUT THREAD	1	0014-04645
10	THREADED SPARE PART (puller ring)	1	0014-00003

PULLER PLUG
0015-04800



	DESCRIPTION	CODE
A	PLUG Ø20	0015-04501
A	PLUG Ø24	0015-04500
B	PLUG PALLET HT	0015-04505
B	PLUG PALLET M5	0015-00009
B	PLUG PALLET M6	0015-04510
B	PLUG PALLET M8	0015-04520
B	PLUG PALLET M10	0015-04530
C	PLUG JAW M12	0015-04535
C	PLUG JAW M16	0015-04540

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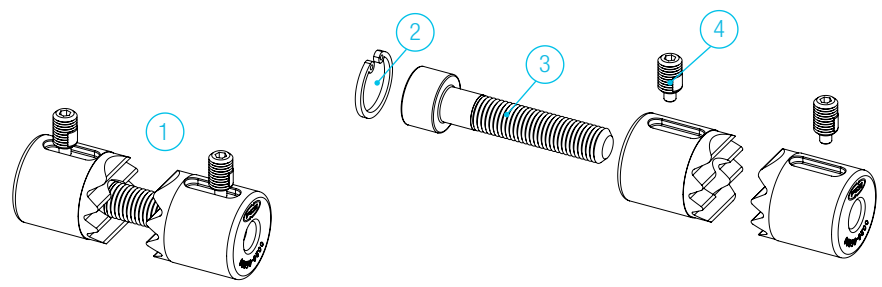
PALLETS

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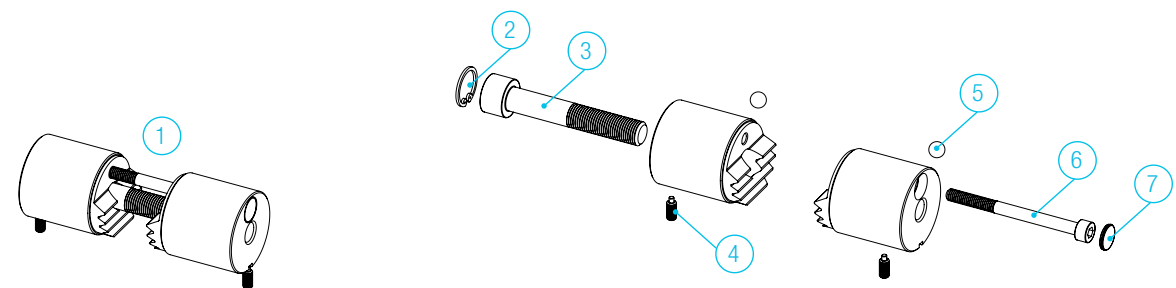
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JAW

DESCRIPTION	1 KIT CODE	2 SEEGER	3 SCREW	4 GRUB SCREW
JAW M10	0020-05000	J11 4529-20011	M6x30 12.9 4521-06030UN	4521-05024
JAW M12	0020-05050	J11 4529-20011	M6x35 12.9 4521-06035UN	4521-05024
JAW M16	0020-05150	J16 4529-20016	4521-05122	4521-05124
JAW M24	0020-05250	J25 4529-20025	M12x70 12.9 4521-12070	4521-05324
JAW VERTICAL M16	0020-05550	J22 4529-05222	4521-12081	4521-05224
JAW VERTICAL M24	0020-05650	J25 4529-20025	M16x120 12.9 4521-16120	4521-05324



JAW


DESCRIPTION	1 KIT CODE	2 SEEGER	3 SCREW	4 GRUB SCREW	5 BALL	6 SCREW	7 PLUG
JAW SLIDE-ADJUSTABLE M12	0020-05651	J11 4529-20011	M6x45 12.9 4521-06045	4521-05024	0013-00001	M4x35 12.9 4521-04035	2307-06521
JAW SLIDE-ADJUSTABLE M16	0020-05450	J16 4529-20016	M10x60 12.9 4521-10060	4521-05124	0013-00001	M5x60 12.9 4521-05060	2307-06520

2 EN ISO 4762 BURNISHED

3 DIN 472

6 EN ISO 4762

ROD

ITEMS	DESCRIPTION	DIMENSION	CODE
	ROD M12-M16x2 H0 (Body reduction M12-M6 M12-M8)	H0	0002-00028

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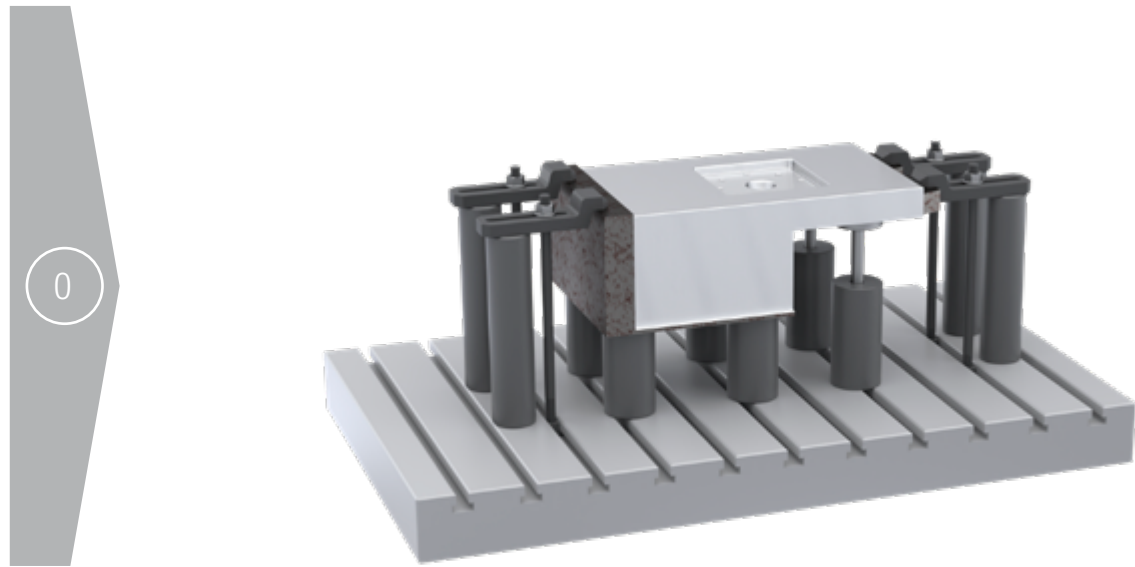


Integrated systems for production

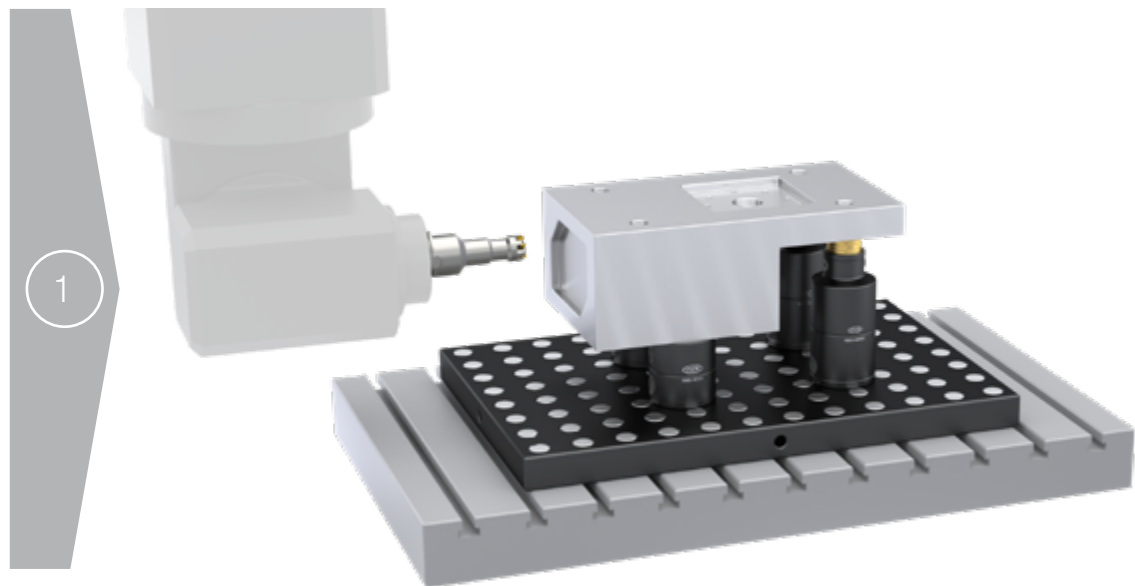
CLAMPING METHODS COMPARISON

PROCESS EFFICIENCY IMPROVEMENT

TRADITIONAL CLAMPING



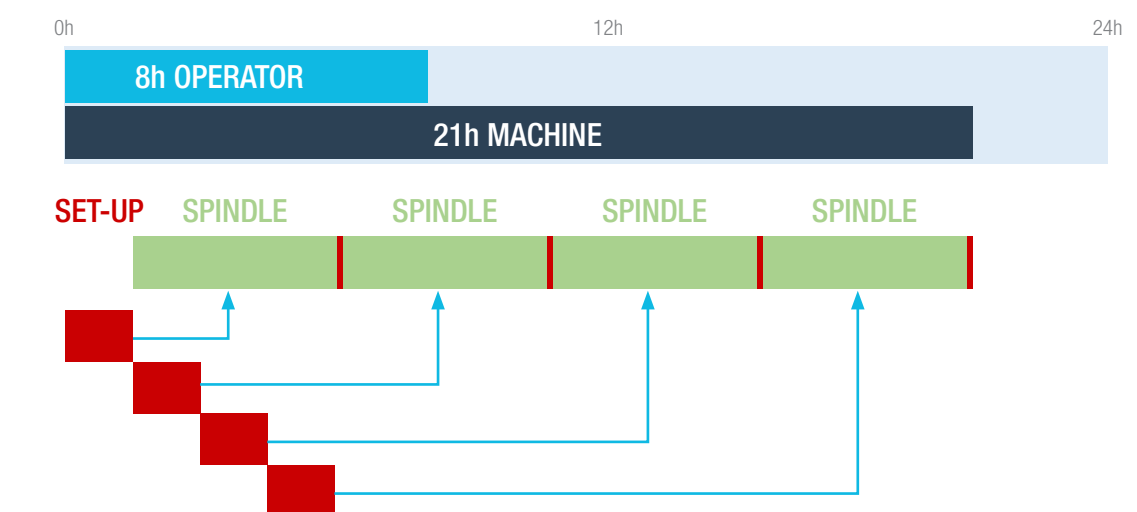
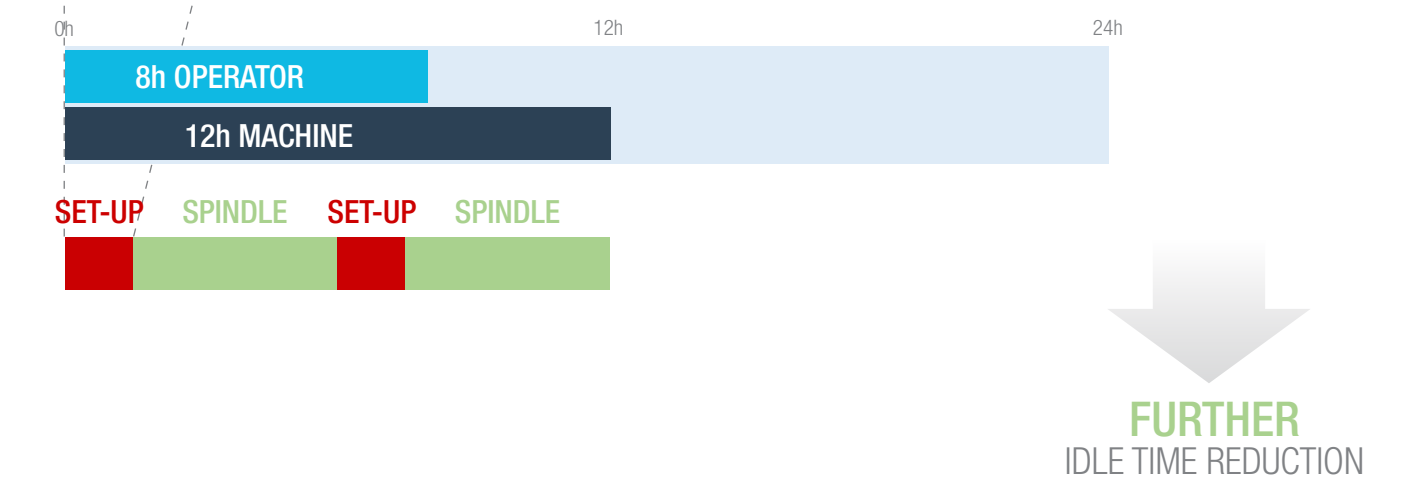
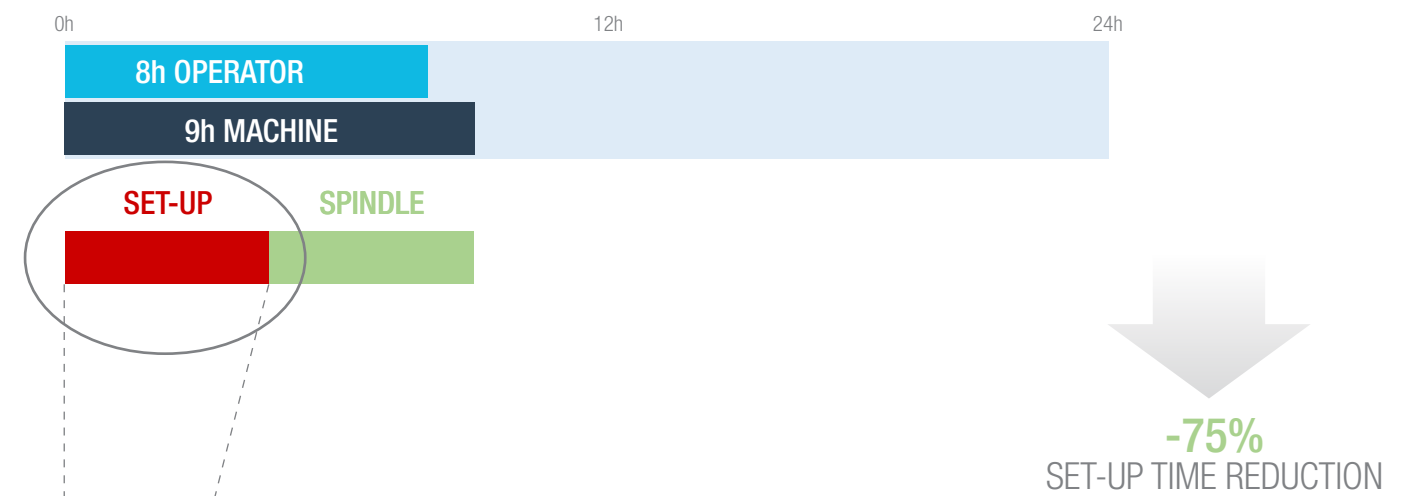
FCS CLAMPING METHOD BREYL MANUAL CLAMP



FCS CLAMPING METHOD BREYL MANUAL CLAMP WITH MULTI-PALLET



Based on the same human resources, the workpieces quantity will increase.
Based on the same workpiece quantity to be produced, the human and machine costs will decrease and production time will be shorter.

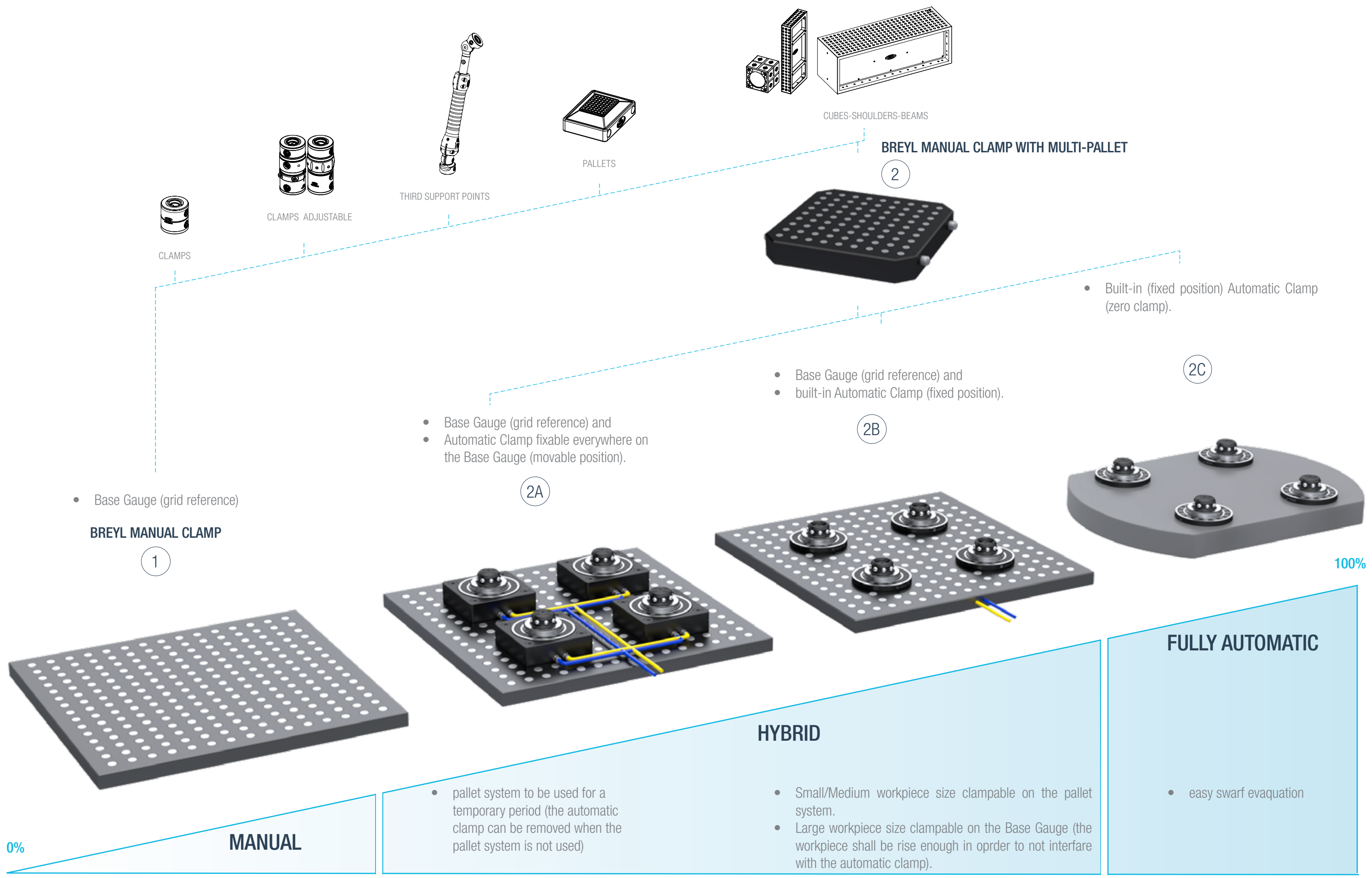


OPTIONS TO EQUIP A MACHINE TABLE USING FCS CLAMPING SYSTEM

OPTIONS TO EQUIP A MACHINE TABLE USING FCS CLAMPING SYSTEM

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CLAMPING FORCE: ANALYSIS METHOD

CLAMPING FORCE: ANALYSIS METHOD

CLAMPING FORCE: ANALYSIS METHOD

The clamping framework function is to clamp the workpiece to the machine table by withstanding the loads (weight and cutting tool force), and minimizing the workpiece displacement (vibrations included) without forcing its geometry. Whenever is possible, it recommends to clamp the workpiece on the largest surface (lowest position of the center of gravity) in order to get the max stability. When loads are applied to the workpiece, reactions are generated in the clamping components. These reactions cannot exceed the clamping forces limits. Such limits are static allowable values below which the clamping components are able to carry loads with a very low deformation (in order to keep a high machining accuracy).

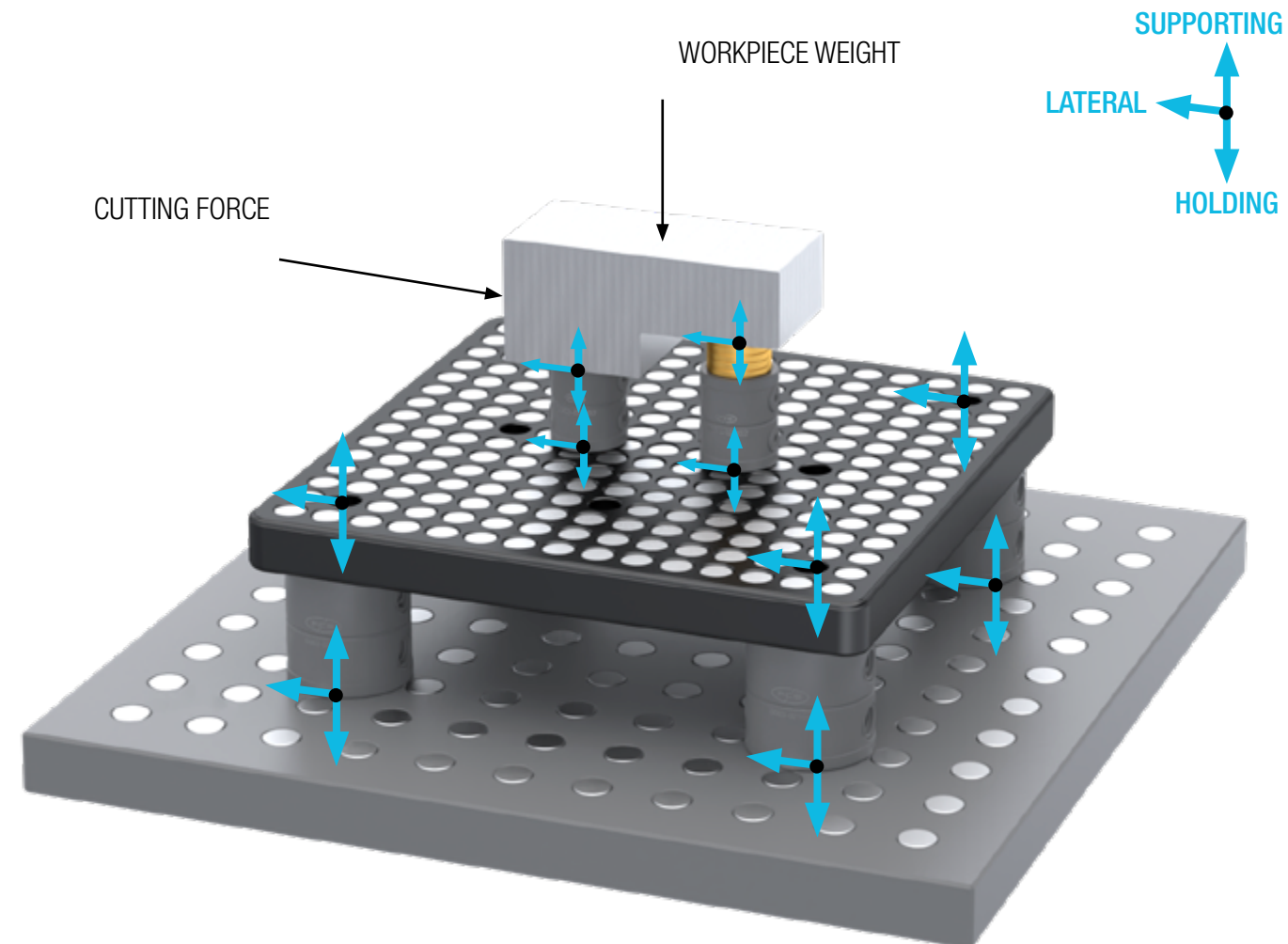
Based on the above-mentioned criteria, the following simplified analysis method suggests to:

- Identify the connection points;
- Calculate the clamping reactions in the connection points, along the longitudinal and the lateral direction;
- Verify the following:

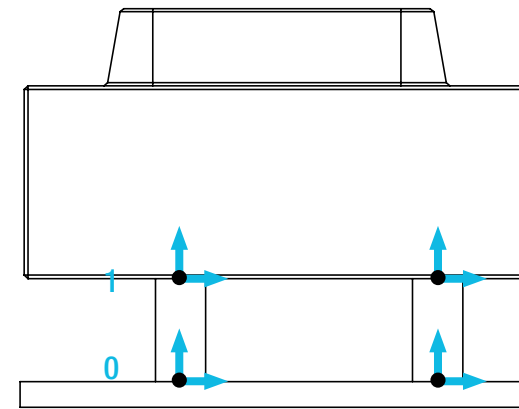
REACTION TO LOADS \leq ALLOWABLE FORCES

- (R)
- HOLDING FORCE (F_H)
 - SUPPORTING FORCE (F_s)
 - LATERAL FORCE (F_L)

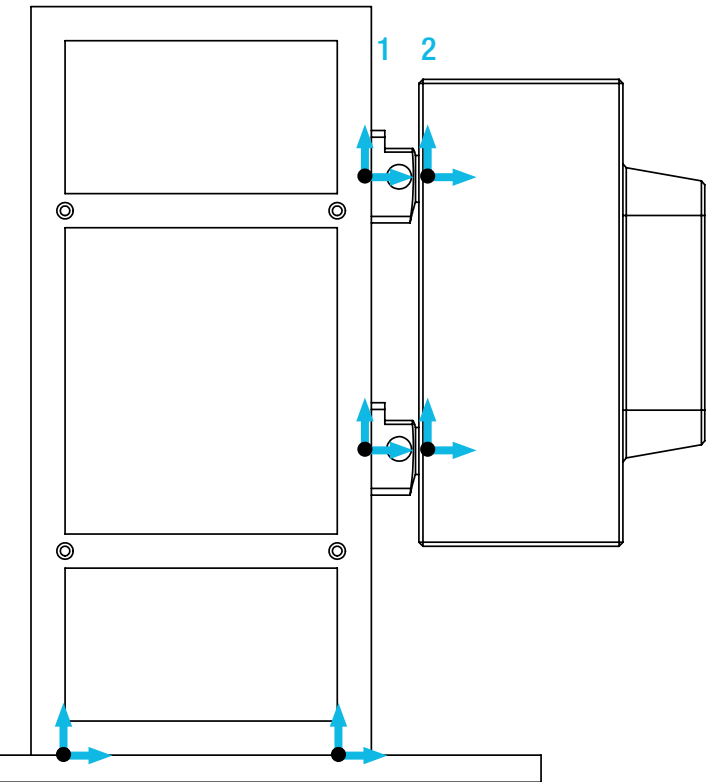
The clamping (allowable) forces are divided in longitudinal (**HOLDING** and **SUPPORTING**) and **LATERAL** and their values are provided in the corresponding clamping components section.



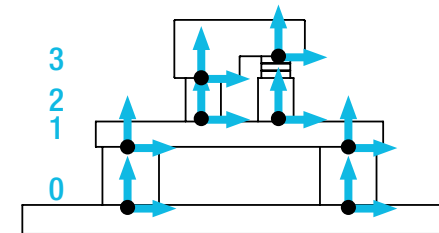
APPLICATION EXAMPLE 1



APPLICATION EXAMPLE 3



APPLICATION EXAMPLE 2



APPLICATION EXAMPLES	CONNECTION SURFACE	CLAMPING FORCE SOURCE (Holding, supporting, lateral) Refer to the following sections
1	0	Base Gauge
	1	Clamp
2	0	Base Gauge
	1	Clamp
	2	Pallet
	3	Clamp
3	0	Base Gauge
	1	Shoulder, Cubes, Beams
	2	Clamp

BREYL BASIC KITS

BREYL BASIC KITS

THREAD	WORKPIECE SIZE UP TO		VISES			
	M	AxB (mm)	C (mm)	PREVIEW	DESCRIPTION	QTY
M5	240x240	180		SYSTEM GRIP VISE 150x80 MS L150 JAW 80 H5	1	2310-15051
				SYSTEM GRIP VISE 100x80 DF JAW 80 H5	1	2310-10001
M6	282x282	210		SYSTEM GRIP VISE 150x80 MS L150 JAW 80 H5	1	2310-15051
				SYSTEM GRIP VISE 100x80 DF JAW 80 H5	1	2310-10001
M8	376x376	280		MODULAR GRIP VISE 150x80 JAW 80 H5	2	2310-00020
M10	470x470	340		MODULAR GRIP VISE 150x80 JAW 80 H5	2	2310-00020
M12	638x638	470		MODULAR GRIP VISE 150x80 JAW 80 H5	2	2310-00020
M16	1100x1100	810		MODULAR GRIP VISE 150x80 JAW 80 H5	2	2310-00020
M24	1400x1400	1030		MODULAR GRIP VISE 150x80 JAW 80 H5	2	2310-00020

RECOMMENDED BREYL BASIC KIT			
PREVIEW	DESCRIPTION	QTY	CODE
	SET PALLET M5 STEP 10 198x98 H26	1	0006-00025
	SET BODY REDUCTION M16-M12 H160	2	0004-07252
	PULLER PLUG	1	0015-04800
	PULLER RING	1	0014-04600
	PULLER ADAPTER M5	1	0014-04680
	SET PALLET M6 STEP 15 176x176 H26	1	0006-07001
	SET BODY REDUCTION M16-M12 H160	4	0004-07252
	PULLER PLUG	1	0015-04800
	PULLER RING	1	0014-04600
	PULLER ADAPTER M6	1	0014-04610
	SET PALLET M8 STEP 20 230x230 H30	1	0006-07101
	SET BODY REDUCTION M16-M12 H160	4	0004-07252
	PULLER PLUG	1	0015-04800
	PULLER RING	1	0014-04600
	PULLER ADAPTER M8	1	0014-04620
	SET PALLET M10 STEP 25 296x296 H40	1	0006-07210
	SET BODY M16 H160	4	0004-07302
	PULLER PLUG	1	0015-04800
	PULLER RING	1	0014-04600
	PULLER ADAPTER M10	1	0014-04630
	SET BODY REDUCTION M16-M12 H160	4	0004-07252
	PULLER PLUG	1	0015-04800
	PULLER RING	1	0014-04600
	PULLER ADAPTER M12	1	0014-04640
	SET BODY M16 H160	4	0004-07302
	PULLER PLUG	1	0015-04800
	PULLER RING	1	0014-04600
	SET BODY M24 H160	4	0004-07424
	PULLER PLUG	1	0015-04800
	PULLER RING	1	0014-04600
	PULLER ADAPTER M24	1	0014-04650

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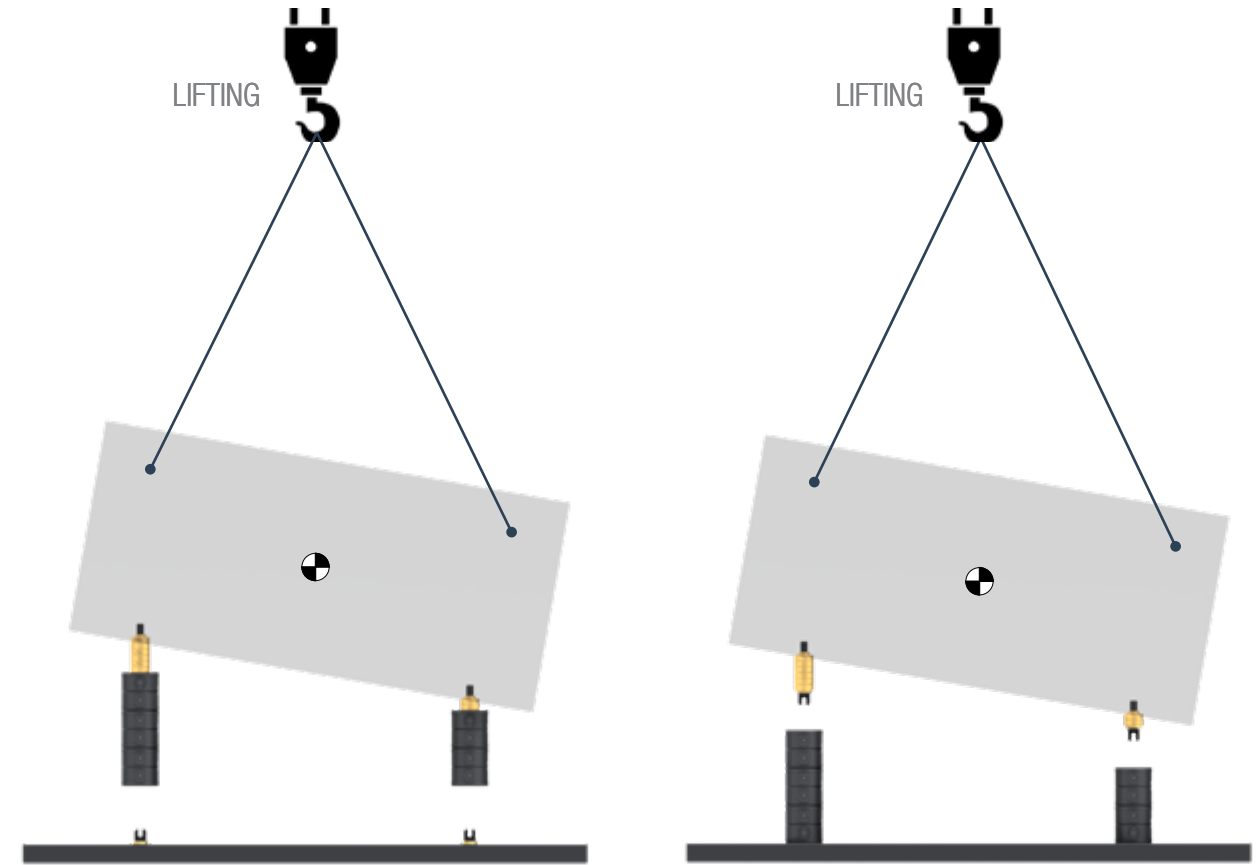
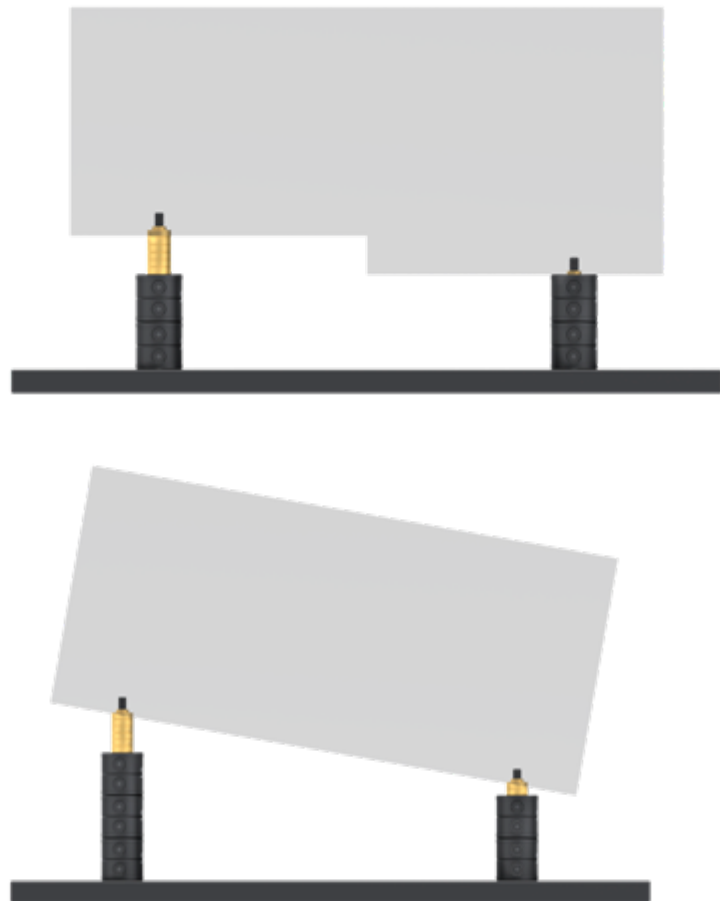
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BREYL BASIC KITS

WORKPIECE REMOVING METHODS

The Basic kits, listed above, represent a general guide for selecting the clamping components in accordance with the corresponding workpiece dimensions. In order to meet specific needs, they can be modified/adjusted considering also the following key points:

- The Basic kits do not include the Base gauge; for the proper selection of the Base Gauge refer to the [BASE GAUGES SECTION](#).
- For further info for the Vises range and features, refer to the [GRIP VISE CATALOGUE](#).
- For further technical info to identified the proper stacks (Bodies and Rings H), refer to the [CLAMPS SECTION](#); the height of the stacks shall be considered according to the machine travels.



Bodies unclamped on the bottom. The workpiece can be removed together the clamping components.

Bodies unclamped on the top. The workpiece is removed leaving the Bodies connected to the Base Gauge.

- For any further info refer to FCS SUPPORT/FCS technical department.

- On-line reserved service to:
- Get full access to FCS products information
 - Ask for technical assistance

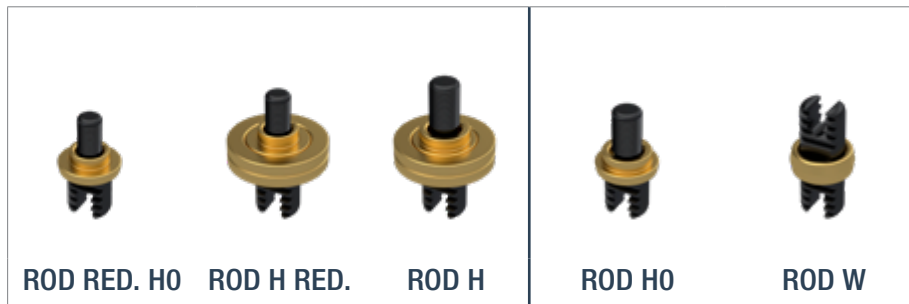
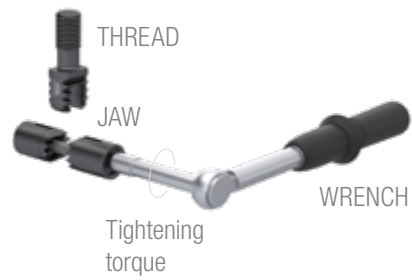
 **FCS Support**
<https://support.fcssystem.com>

 **WEB SITE**
<https://www.fcssystem.com>



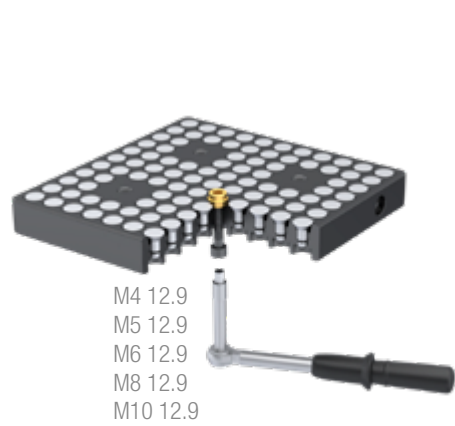
TIGHTENING TORQUES - SUMMARY CHART FOR OPERATORS

RODS

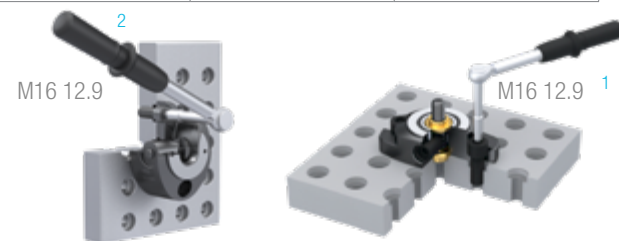


JAW SIZE	HEX	TORQUE (Nm)	TORQUE (Nm)
JAW M10	5	10	12
JAW M12	5	12	15
JAW M16	8	45	55
JAW M24	10	75	100
JAW VERTICAL M16	10	75	100
JAW VERTICAL M24	14	-	200

SCREWS



FIXING SCREWS	HEX (mm)	TORQUE (Nm)
M4 12.9	3	5
M5 12.9	4	10
M6 12.9	5	15
M8 12.9	6	30
M10 12.9	8	60
M12 12.9	10	100
M16 12.9	14	160
		200



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BASE GAUGES

ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE	
	BASE GAUGE TR M16 STEP 50 400x400 H40	400x400 H40	0007-04300	0019-04300	
	BASE GAUGE TR M16 STEP 50 500x500 H40	500x500 H40	0007-04309	0019-04309	
	BASE GAUGE TR M16 STEP 50 600x600 H40	600x600 H40	0007-04301	0019-04301	
	BASE GAUGE TR M16 STEP 50 800x800 H40	800x800 H40	0007-04302	0019-04302	
	BASE GAUGE TR M16 STEP 50 1000x400 H40	* 1000x400 H40	0012-05010	0018-05010	
	BASE GAUGE TR M16 STEP 50 1000x800 H40	1000x800 H40	0007-04303	0019-04303	
	BASE GAUGE TR M16 STEP 50 1000x1000 H40	1000x1000 H40	0007-04304	0019-04304	
	BASE GAUGE TR M16 STEP 50 1200x800 H40	1200x800 H40	0007-04306	0019-04306	
	BASE GAUGE TR M16 STEP 50 1200x1000 H40	1200x1000 H40	0007-04307	0019-04307	
	BASE GAUGE TR M16 STEP 50 1200x1200 H40	1200x1200 H40	0007-04308	0019-04308	
	BASE GAUGE TR M16 STEP 50 1500x400 H40	* 1500x400 H40	0012-05000	0018-05000	
	BASE GAUGE TR M16 STEP 50 1500x1200 H40	1500x1200 H40	0007-04305	0019-04305	
		BASE GAUGE TF M16 STEP 50 500x500 H40	500x500 H40	0007-04209	0019-04209
		BASE GAUGE TF M16 STEP 50 600x400 H40	600x400 H40	0007-04200	0019-04200
BASE GAUGE TF M16 STEP 50 600x500 H40		600x500 H40	0007-04201	0019-04201	
BASE GAUGE TF M16 STEP 50 800x600 H40		800x600 H40	0007-04202	0019-04202	
BASE GAUGE TF M16 STEP 50 1000x500 H40		* 1000x500 H40	0007-04203	0019-04203	
BASE GAUGE TF M16 STEP 50 1000x600 H40		1000x600 H40	0007-04212	0019-04212	
BASE GAUGE TF M16 STEP 50 1000x800 H40		1000x800 H40	0007-04204	0019-04204	
BASE GAUGE TF M16 STEP 50 1000x1000 H40		1000x1000 H40	0007-04206	0019-04206	
BASE GAUGE TF M16 STEP 50 1200x1000 H40		1200x1000 H40	0007-04207	0019-04207	
BASE GAUGE TF M16 STEP 50 1500x500 H40		* 1500x500 H40	0007-04210	0019-04210	
BASE GAUGE TF M16 STEP 50 1500x600 H40		1500x600 H40	0007-04211	0019-04211	
BASE GAUGE TF M16 STEP 50 1200x1500 H40		1500x1200 H40	0007-04205	0019-04205	

* Recommended for stripes coverage (DYNAMIC)

BODIES

ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	BODY REDUCTION M12-M5 H30	Ø48 H30	0003-00034	0004-00034
	BODY REDUCTION M12-M6 H30	Ø48 H30	0003-00035	0004-00035
	BODY REDUCTION M12-M8 H30	Ø48 H30	0003-00036	0004-00036
	BODY REDUCTION M12-M10 H50	Ø49 H50	0003-00002	0004-00002
	BODY M12 H60	Ø49 H60	0003-02002	0004-07255
	BODY M12 H120	Ø49 H120	0003-02005	0004-07256
	BODY REDUCTION M16-M12 H60	Ø78 H60	0003-02001	0004-07250
	BODY REDUCTION M16-M12 H160	Ø78 H160	0003-02052	0004-07252
	BODY REDUCTION M16-M12 H240	Ø78 H240	0003-02053	0004-07253
	BODY REDUCTION M16-M12 H320	Ø78 H320	0003-02051	0004-07251
	BODY M16 H40 V.2	136x80 H40	0003-02090	0004-07290
	BODY M16 H80	Ø78 H80	0003-02101	0004-07301
	BODY M16 H160	Ø78 H160	0003-02102	0004-07302
	BODY M16 H240	Ø78 H240	0003-02103	0004-07303
	BODY M16 H320	Ø78 H320	0003-02105	0004-07305
	BODY REDUCTION M24-M16 H100	Ø98 H100	0003-02210	0004-07413
	BODY REDUCTION M24-M16 H240	Ø98 H240	0003-02217	0004-07417
	BODY REDUCTION M24-M16 H320	Ø98 H320	0003-02216	0004-07416
	BODY M24 H60	187.5x105 H60	0003-02230	0004-07430


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ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	BODY M24 H100	Ø98 H100	0003-02220	0004-07422
	BODY M24 H160	Ø138 H160	0003-02224	0004-07424
	BODY M24 H320	Ø138 H320	0003-02223	0004-07425
	BODY VERTICAL M16 H70 ROD HOOK	98x136 H70	0003-02600	0004-07260
	BODY VERTICAL M16 H70	98x136 H70	0003-02600	0004-07261
	BODY VERTICAL M24 H100 ROD HOOK	148x148 H100	0003-02700	0004-07700
	BODY VERTICAL M24 H100	148x148 H100	0003-02700	0004-07701
	BODY WITHOUT THREAD M16 Ø20 H50	Ø20 H50	0003-00164	0004-00164
	BODY WITHOUT THREAD M16 Ø18 H50	Ø18 H50	0003-00165	0004-00165
	BODY M16 H40 (while stocks last)	136x80 H40	0003-02100	0004-07300
	BODY T-SLOT M16 H40 (while stocks last)	160x80 H40	0003-00139	0004-00139

RING REDUCTION HO

ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	RING REDUCTION M12-M10 Ø14 HO	Ø14 HO	0001-00305	-
	RING REDUCTION M12-M10 Ø16 HO	Ø16 HO	0001-00306	-
	RING REDUCTION M16-M12 Ø18 HO	Ø18 HO	0001-00405	-
	RING REDUCTION M16-M12 Ø20 HO	Ø20 HO	0001-00406	-
	RING REDUCTION M24-M16 Ø22 HO	Ø22 HO	0001-00505	-
	RING REDUCTION M24-M16 Ø24 HO	Ø24 HO	0001-00506	-

RING HO

ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	RING M5 Ø7 HO	Ø7 HO	0001-00050	-
	RING M6 Ø10 HO	Ø10 HO	0001-00001	-
	RING M6 Ø11 HO	Ø11 HO	0001-00002	-
	RING M8 Ø12 HO	Ø12 HO	0001-00200	-
	RING M8 Ø14 HO	Ø14 HO	0001-00201	-
	RING M10 Ø14 HO	Ø14 HO	0001-00300	-
	RING M10 Ø16 HO	Ø16 HO	0001-00301	-
	RING M12 Ø18 HO	Ø18 HO	0001-00400	-
	RING M12 Ø20 HO	Ø20 HO	0001-00401	-
	RING M16 Ø22 HO	Ø22 HO	0001-00500	-
	RING M16 Ø24 HO	Ø24 HO	0001-00501	-
	RING M24 Ø34 HO	Ø34 HO	0001-00600	-
	RING M24 Ø36 HO	Ø36 HO	0001-00601	-



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RING H

ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	RING H M5 Ø14 H8	Ø14 H8	0001-00054	-
	RING H M6 Ø22 H8	Ø22 H8	0001-00010	-
	RING H M8 Ø25 H10	Ø25 H10	0001-00210	-
	RING H M10 Ø28 H15	Ø28 H15	0001-00310	-
	RING H M12 Ø40 H10	Ø40 H10	0001-00410	-
	RING H M16 Ø40 H12.5	Ø40 H12.5	0001-00535	-
	RING H M16 Ø40 H25	Ø40 H25	0001-00540	-
	RING H M24 Ø78 H20	Ø78 H20	0001-00620	-
	RING H M24 Ø78 H60 (while stocks last)	Ø78 H60	0001-00610	-
	RING M16 EXTENSION Ø78 H30 (body without thread M16)	Ø78 H30	0001-00023	-


RING W

ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	RING W M12	-	0001-00790	-
	RING W M16	-	0001-00800	-
	RING W M24	-	0001-00900	-
	RING W M16 H0 ROD	-	0001-00801	-


RING HT

ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	RING HT Ø5 H0 (while stocks last)	-	0001-00009	-
	RING HT Ø5 H5 (while stocks last)	Ø13 H5	0001-00014	-
	RING HT Ø5 H10 (while stocks last)	Ø13 H10	0001-00015	-
	RING HT Ø5 H15 (while stocks last)	Ø13 H15	0001-00016	-

ROD REDUCTION H0

ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	ROD REDUCTION M12-M10 L25 H0	L25 H0	0002-01005	-
	ROD REDUCTION M16-M12 L28 H0	L28 H0	0002-01105	-
	ROD REDUCTION M24-M16 L37 H0	L37 H0	0002-01410	-

ROD H0

ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	ROD M10 L25 H0	L25 H0	0002-00001	-
	ROD M12 L27 H0	L27 H0	0002-01000	-
	ROD M16 L35 H0	L35 H0	0002-01200	-
	ROD M16 L40 H0	L40 H0	0002-01201	-
	ROD M16 L16 H0 (Body without thread M16)	L16 H0	0002-01202	-
	ROD M24 L50 H0	L50 H0	0002-01400	-
	ROD M12-M16x2 H0 (Body reduction M12-M8 and M12-M6)	H0	0002-00028	-

ROD H REDUCTION

ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	ROD H REDUCTION M12-M10 L35 H10	L35 H10	0002-01006	-
	ROD H REDUCTION M16-M12 L42.5 H12.5	L42.5 H12.5	0002-01106	-
	ROD H REDUCTION M16-M12 L55 H25	L55 H25	0002-01110	-
	ROD H REDUCTION M16-M12 L67.5 H37.5	L67.5 H37.5	0002-01115	-
	ROD H REDUCTION M16-M12 L80 H50	L80 H50	0002-01120	-
	ROD H REDUCTION M16-M12 L92.5 H62.5	L92.5 H62.5	0002-01126	-
	ROD H REDUCTION M16-M12 L105 H75	L105 H75	0002-01130	-
	ROD H REDUCTION M16-M12 L117.5 H87.5	L117.5 H87.5	0002-01135	-
	ROD H REDUCTION M16-M12 L130 H100	L130 H100	0002-01140	-
	ROD H REDUCTION M24-M16 L57 H20	L57 H20	0002-01415	-
	ROD H REDUCTION M24-M16 L77 H40	L77 H40	0002-01420	-
	ROD H REDUCTION M24-M16 L97 H60	L97 H60	0002-01425	-




INDEX - CLAMPS

INDEX - CLAMPS



ROD H

ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	ROD H M10 L40 H15	L40 H15	0002-00002	-
	ROD H M10 L55 H30	L55 H30	0002-00003	-
	ROD H M12 L40 H10	L40 H10	0002-01050	-
	ROD H M12 L50 H20	L50 H20	0002-01100	-
	ROD H M12 L60 H30	L60 H30	0002-01125	-
	ROD H M12 L70 H40	L70 H40	0002-01150	-
	ROD H M16 L45 H30 (ring extension Ø78 H30)	L45 H30	0002-01203	-
	ROD H M16 L47.5 H12.5	L47.5 H12.5	0002-01211	-
	ROD H M16 L60 H25	L60 H25	0002-01250	-
	ROD H M16 L72.5 H37.5	L72.5 H37.5	0002-01251	-
	ROD H M16 L85 H50	L85 H50	0002-01300	-
	ROD H M16 L97.5 H62.5	L97.5 H62.5	0002-01301	-
	ROD H M16 L110 H75	L110 H75	0002-01310	-
	ROD H M16 L122.5 H87.5	L122.5 H87.5	0002-01311	-
	ROD H M16 L135 H100	L135 H100	0002-01320	-
	ROD H M24 L70 H20	L70 H20	0002-01435	-
	ROD H M24 L90 H40	L90 H40	0002-01440	-
	ROD H M24 L110 H60	L110 H60	0002-01450	-



ROD W

ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	ROD W M12	-	0002-01590	-
	ROD W M16	-	0002-01600	-
	ROD W M24	-	0002-01800	-
	ROD W M16 VISES	-	0002-00008	-
	ROD W M16 MODULAR M16	-	0002-00009	-



ROD VERTICAL

ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	ROD VERTICAL M16 L35 H0 HOOK	L35 H0	0002-01350	-
	ROD VERTICAL M24 L55 H0 HOOK	L55 H0	0002-01475	-
	ROD VERTICAL M16 L35 H0	L35 H0	0002-01375	-
	ROD VERTICAL M24 L55 H0	L55 H0	0002-01490	-

ROD H VERTICAL

ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	ROD H VERTICAL M16 L60 H25 HOOK	L60 H25	0002-01352	-
	ROD H VERTICAL M16 L60 H25	L60 H25	0002-01377	-

ROD VERTICAL W

ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	ROD VERTICAL W M16 HOOK	-	0002-01380	-
	ROD VERTICAL W M16	-	0002-01381	-

ROD GAS

ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	ROD M12-G1/2 L28 H0	L28 H0	0002-01010	-
	ROD M16-G1/2 L30 H0	L30 H0	0002-01210	-




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INDEX - THIRD SUPPORT POINTS

BODIES ADJUSTABLE

ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	BODY SLIDE M12 H60	73x49 H60	0003-00013	0004-00005
	BODY SELF-FLOAT M12 H60 ±2.5°	Ø52 H60	0003-00055	0004-00055
	BODY FORCED-H M12 H120 ±2.5	Ø56 H120 ±2.5	0003-00056	0004-00056
	BODY SELF-H M12 H120 ±2.5	Ø49 H120 ±2.5	0003-00058	0004-00058
	BODY SLIDE M16 H80 MOD.02	117x80 H80	0003-00057	0004-00057
	BODY SELF-FLOAT M16 H80 ±2.5°	Ø80 H80	0003-00060	0004-00060
	BODY FORCED-H M16 H160 ±5	Ø84 H160 ±5	0003-00061	0004-00061
	BODY SELF-H M16 H160 ±5	Ø80 H160 ±5	0003-00062	0004-00062
	BODY H-ADJUSTABLE M16 H160 ±5	Ø78 H160 ±5	0003-00160	0004-00160
	BODY POSITIONER M16 H40	145x145 H40	0003-00110	0004-00110
	BODY POSITIONER M24 H60	145x145 H60	0003-00110	0004-00112
	BODY FORCED-H M24 H160 ±5	181.5x118 H160 ±5	0003-02240	0004-07440
	RING H-ADJUSTABLE M12 H25 ±0.3 (while stocks last)	Ø18 / Ø20 H25	0003-00172	0004-00173
	RING H-ADJUSTABLE M16 H25 ±0.3 (while stocks last)	Ø22 / Ø24 H25	0003-00172	0004-00174
	BODY SLIDE M16 H80 (while stocks last)	117x80 H80	0003-00012	0004-00012

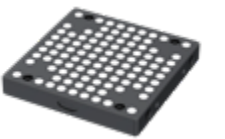
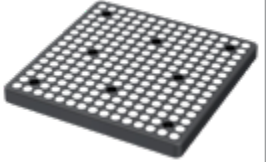
THIRD SUPPORT POINTS

ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	THIRD SUPPORT POINT MOD.03	Ø90 L700-950	0003-00100	0004-00100
	EXTENSION THIRD SUPPORT POINT MOD.03 L250	Ø40 L250	0003-00053	
	BODY GRIPPER Ø78 L31 H50	Ø78 L31 H50	0003-00185	0004-00185

INDEX - PALLETS

INDEX - PALLETS

PALLETS

ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	PALLET PYRAMID M5 STEP 10 144x190 H60	144x190 H60	0005-00016	0006-00016
	PALLET M5 STEP 10 198x98 H26	198x98 H26	0005-00025	0006-00025
	PALLET PYRAMID M6 STEP 15 195x195 H100	195x195 H100	0005-02001	0006-02001
	PALLET M6 STEP 15 176x176 H26	176x176 H26	0005-03001	0006-07001
	PALLET M6 STEP 15 Ø180 H26	Ø180 H26	0005-00030	0006-00030
	PALLET M8 STEP 20 230x230 H30	230x230 H30	0005-03101	0006-07101
	PALLET M10 STEP 25 296x296 H40	296x296 H40	0005-03210	0006-07210
	PALLET CLAMP M10 STEP 25 296x296 H40	296x296 H40	0005-03200	0006-07200
	PALLET M12 STEP 25 396x396 H35 (usable as Base Gauge)	396x396 H35	0005-00001	0006-00001
	PALLET PYRAMID HT STEP 10 144x190 H60 (while stocks last)	144x190 H60	0005-00003	0006-00003

CLAMPS Ø160

ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	PALLET Ø160 M5 STEP 10 H50	Ø160 H50	0005-00017	0006-00017
	PALLET Ø160 PYRAMID M5 STEP 10 H83	Ø160 H83	0005-00018	0006-00018
	PALLET Ø160 M6 STEP 15 H50	Ø160 H50	0005-00011	0006-00011
	PALLET Ø160 PYRAMID M6 STEP 15 H83	Ø160 H83	0005-00013	0006-00013
	PALLET Ø160 FLANGE	Ø160 H32	0005-00009	0006-00009
	PALLET Ø160 WORKABLE	Ø160 H23	0023-00008	-
	MANUAL CLAMP Ø160	Ø170 H60	0003-00048	0004-00048
	AUTOMATIC CLAMP Ø160	Ø170 H60	2303-00160	2303-00161
	PALLET Ø160 HT (while stocks last)	Ø160 H50	0005-00010	0006-00010
	PALLET Ø160 PYRAMID HT (while stocks last)	Ø160 H83	0005-00014	0006-00014

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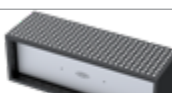
CUBES

ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	SMART CUBE 100 100x180 H250	100x180 H250	0008-02010	0009-06010
	SMART CUBE 200 200x200 H200	200x200 H200	0008-03300	0009-07500
	SMART CUBE 250 250x250 H250	250x250 H250	0008-03400	0009-07400
	SMART CUBE 350 200x200 H350	200x200 H350	0008-00002	0009-00002
	CUBE M12 STEP 25 300x300 H600	300x300 H600	0008-03600	0009-07600
	CUBE M16 STEP 50 300x300 H600	300x300 H600	0008-03500	0009-07501






SHOULDERS

ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	SHOULDER M16 STEP 50 300x96 H600	300x96 H600	0010-03800	0011-07551
	SHOULDER M16 STEP 50 500x146 H1100	500x146 H1100	0010-03900	0011-07552
	SHOULDER DYNAMIC M16 STEP 50 500x200 H1200	500x200 H1200	0010-04000	0011-08000





BEAMS

ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	DYNAMIC BEAM M16 STEP 50 1500x180 H200	1500x180 H200	0018-01500	0050-01500
	DYNAMIC BEAM M16 STEP 50 1500x500 H500	1500x500 H500	0018-02000	0050-02000

FLANGE

ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	FLANGE M12 Ø49 H11	Ø49 H11	0001-00550	-
	FLANGE M16 Ø68 H13	Ø68 H13	0001-00570	-
	FLANGE M24 Ø93 H18	Ø93 H16	0001-00590	-
	FLANGE ADAPTER M12-M16 Ø49 H20	Ø49 H20	0001-00042	-
	FLANGE ADAPTER M16-M24 Ø78 H25	Ø78 H25	0001-00043	-

ACCESSORIES

ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	PULLER PLUG	-	0015-04800	-
	PLUG Ø20	-	0015-04501	-
	PLUG Ø24	-	0015-04500	-
	PLUG PALLET HT	-	0015-04505	-
	PLUG PALLET M5	-	0015-00009	-
	PLUG PALLET M6	-	0015-04510	-
	PLUG PALLET M8	-	0015-04520	-
	PLUG PALLET M10	-	0015-04530	-
	PLUG JAW M12	-	0015-04535	-
	PLUG JAW M16	-	0015-04540	-

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ACCESSORIES

ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	PULLER RING	-	0014-04600	0014-00010
	PULLER ADAPTER HT (while stocks last)	-	0014-04670	
	PULLER ADAPTER M5	-	0014-04680	
	PULLER ADAPTER M6	-	0014-04610	
	PULLER ADAPTER M8	-	0014-04620	
	PULLER ADAPTER M10	-	0014-04630	
	PULLER ADAPTER M12	-	0014-04640	
	PULLER ADAPTER M24	-	0014-04650	
	PULLER ADAPTER WITHOUT THREAD	-	0014-04645	
	THREADED SPARE PART (puller Ring)	-	0014-00003	

JAWS





ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	JAW M10	-	0020-05000	-
	JAW M12	-	0020-05050	-
	JAW M16	-	0020-05150	-
	JAW M24	-	0020-05250	-
	JAW VERTICAL M16	-	0020-05550	-
	JAW VERTICAL M24	-	0020-05650	-
	JAW SLIDE-ADJUSTABLE M12	-	0020-05651	-
	JAW SLIDE-ADJUSTABLE M16	-	0020-05450	-

SCREW

ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	SCREW ISO 4762 M4x35 12.9 BURNISHED	M4x35	4521-04035	-
	SCREW ISO 4762 M5x25 12.9 BURNISHED	M5x25	4521-05025	-
	SCREW ISO 4762 M5x30 12.9 BURNISHED	M5x30	4521-05030	-
	SCREW ISO 4762 M5x60 12.9 BURNISHED	M5x60	4521-05060	-
	SCREW ISO 4762 M6x25 12.9 BURNISHED	M6x25	4521-06025	-
	SCREW ISO 4762 M6x30 12.9 BURNISHED	M6x30	4521-06030	-
	SCREW ISO 4762 M6x35 12.9 BURNISHED	M6x35	4521-06035	-
	SCREW ISO 4762 M6x45 12.9 BURNISHED	M6x45	4521-06045	-
	SCREW ISO 4762 M8x30 12.9 BURNISHED	M8x30	4521-08030	-
	SCREW ISO 4762 M8x40 12.9 BURNISHED	M8x40	4521-08040	-
	SCREW ISO 4762 M10x50 12.9 BURNISHED	M8x50	4521-10050	-
	SCREW ISO 4762 M10x60 12.9 BURNISHED	M10x60	4521-10060	-
	SCREW ISO 4762 M12x50 12.9 BURNISHED	M12x50	4521-12050	-
	SCREW ISO 4762 M12x70 12.9 BURNISHED	M12x70	4521-12070	-
	SCREW ISO 4762 M16x40 12.9 BURNISHED	M16x40	4521-16040	-
	SCREW ISO 4762 M16x45 12.9 BURNISHED	M16x45	4521-16045	-
	SCREW ISO 4762 M16x50 12.9 BURNISHED	M16x50	4521-16050	-
	SCREW ISO 4762 M16x60 12.9 BURNISHED	M16x60	4521-16060	-
	SCREW ISO 4762 M16x65 12.9 BURNISHED	M16x65	4521-16065	-
	SCREW ISO 4762 M16x70 12.9 BURNISHED	M16x70	4521-16070	-
	SCREW ISO 4762 M16x75 12.9 BURNISHED	M16x75	4521-16075	-
	SCREW ISO 4762 M16x80 12.9 BURNISHED	M16x80	4521-16080	-
	SCREW ISO 4762 M16x85 12.9 BURNISHED	M16x85	4521-16085	-
	SCREW ISO 4762 M16x90 12.9 BURNISHED	M16x90	4521-16090	-
SCREW ISO 4762 M16x110 12.9 BURNISHED	M16x110	4521-16110	-	
SCREW ISO 4762 M16x120 12.9 BURNISHED	M16x120	4521-16120	-	

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SPECIAL SCREW

ITEMS	DESCRIPTION	DIMENSION	CODE	SET CODE
	REDUCTION M16-M12	-	4521-01612	-
	REDUCTION M24-M16	-	4521-02416	-
	SPECIAL SCREW JAW M16	-	4521-05122	-
	SPECIAL SCREW JAW VERTICAL M16	-	4521-12081	-

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