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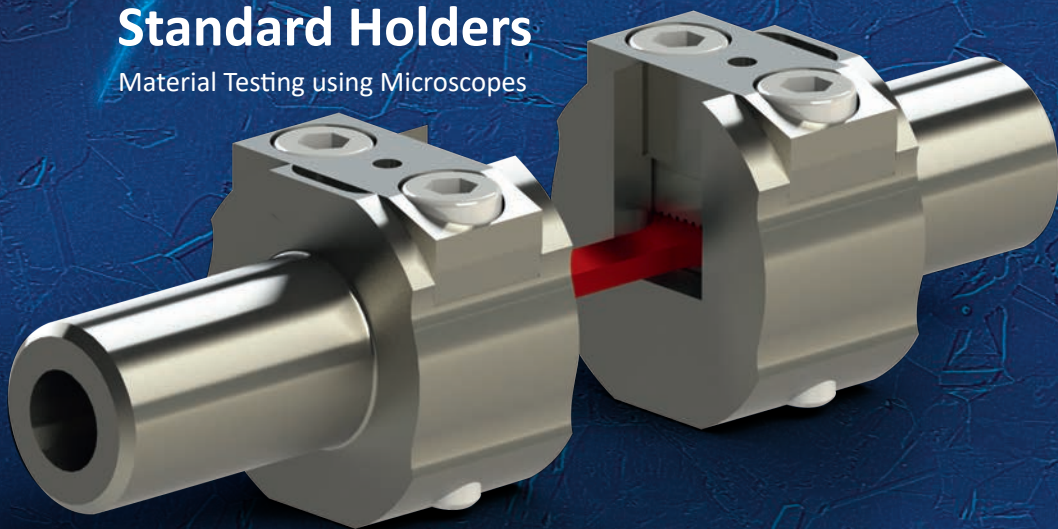
Kammrath &
Weiss GmbH



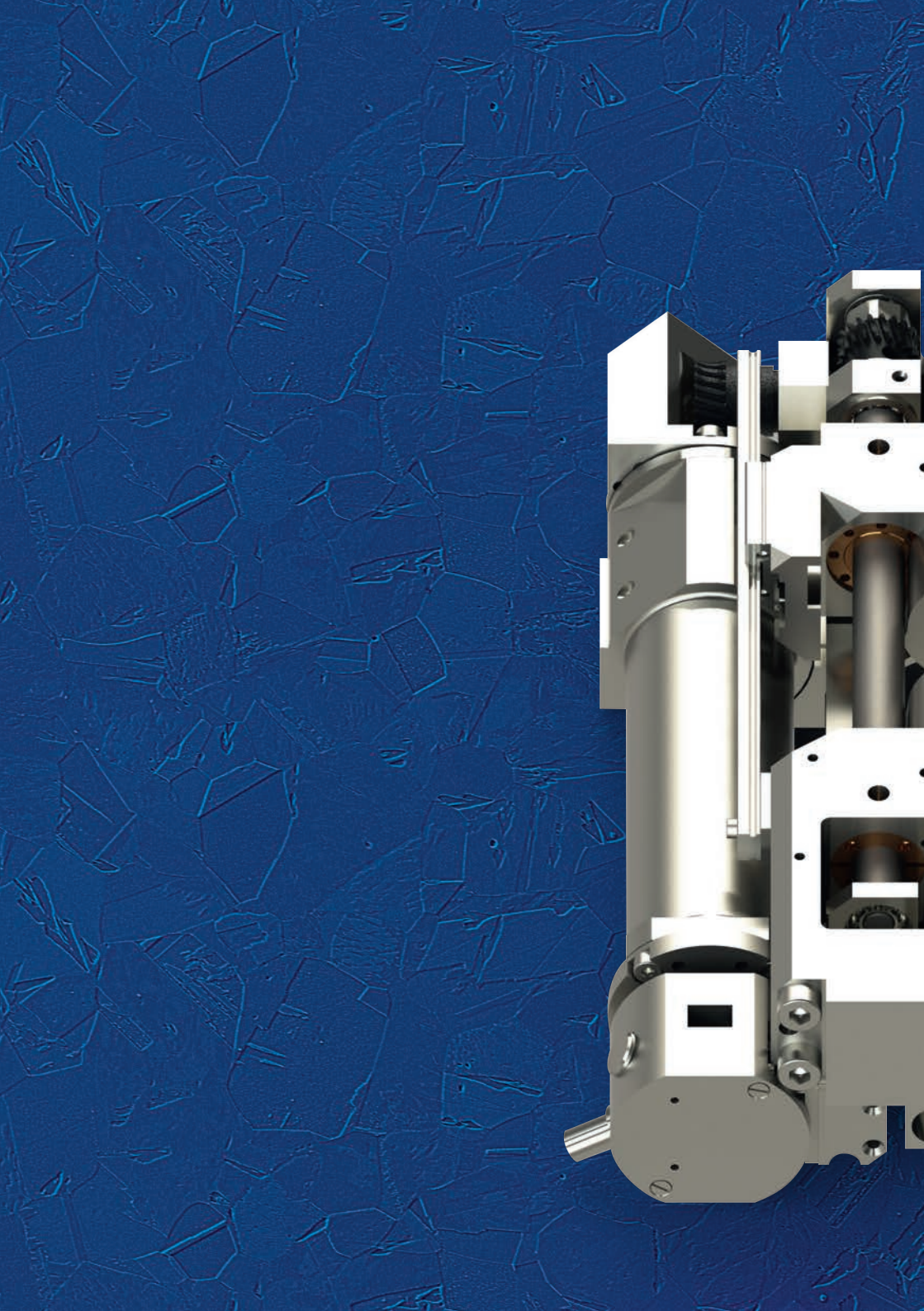
TENSILE
COMPRESSION
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SPECIAL

Standard Holders

Material Testing using Microscopes



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COMPRESSION

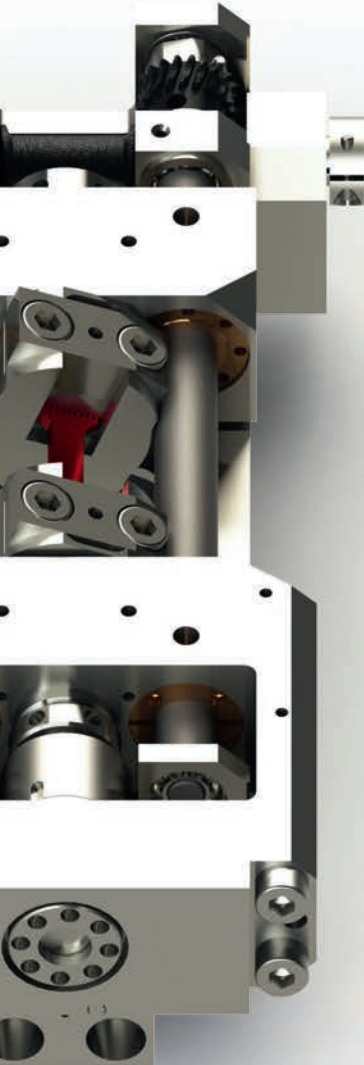
TENSILE & COMPRESSION

SPECIAL

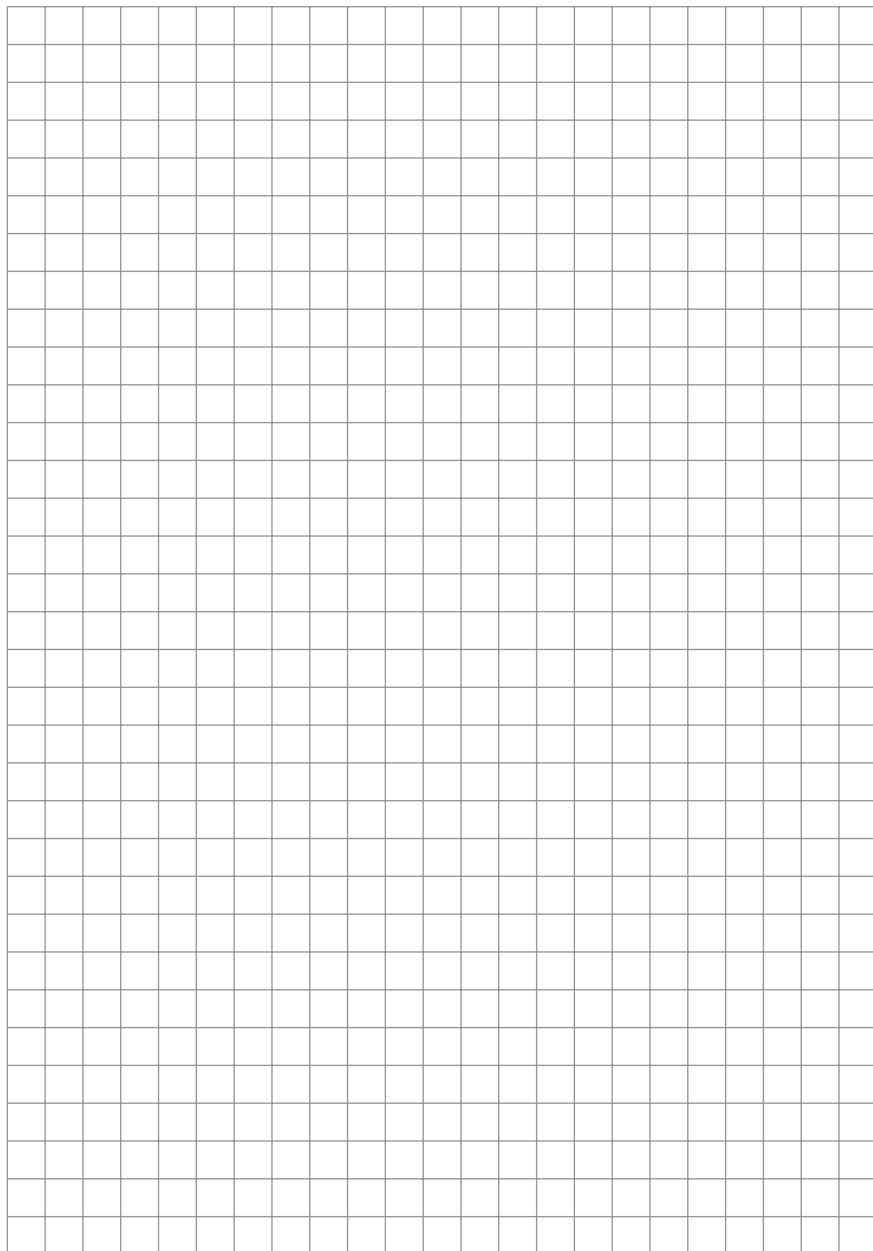
Kammrath & Weiss specializes in developing special devices, prototypes and customer-specific solutions in microscopy. All our products are proudly made in Germany since 1995.

The Holders listed in this catalog are designed for use with Kammrath & Weiss modules. If you do not find the right Holder for your work or you need further assistance, please contact us, we will be glad to support you.

All pictures shown are for illustration purpose only. Actual product may vary due to product enhancement.



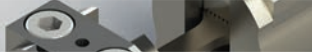
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Compression



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Tensile & Compression



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Special

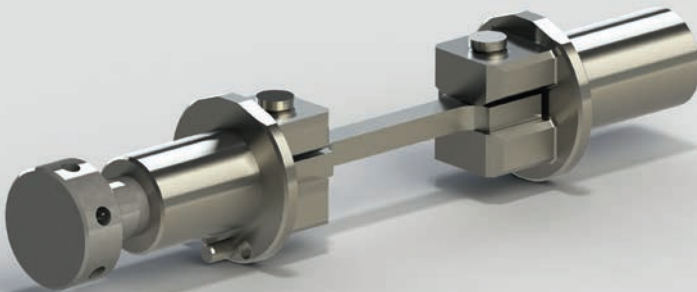


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Tensile

MZC-Za

- tensile tests only
- flat specimens with reamed holes
- medium forces

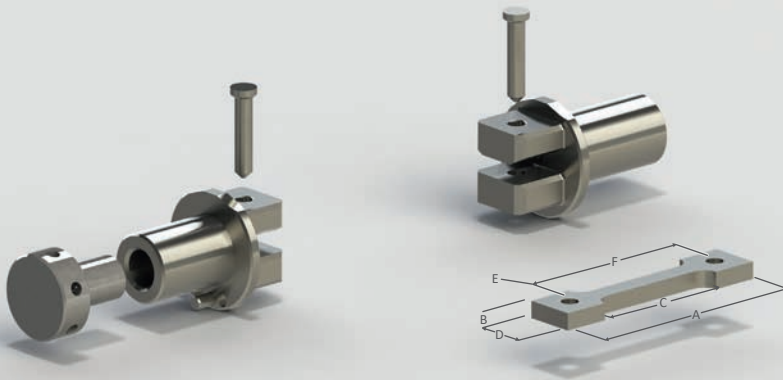


Picture may differ from original product.

Description

This is the classical tensile sample holder for dog-bone shaped samples with holes. The holder can be used in the tensile module as an exchangeable clamping device. The specimens should have uniform thickness. The length of the area of interest (narrow portion) may be varied within the range of the tensile testing module. Typical length range "C" is 10 to 40 mm and thickness "B" about 3 mm. "A" sample with an original length "L₀" of 20 mm can be strained 125%.

This self-aligning holder is for tensile testing only and the thread size of the holders depends on the load cell. Samples should be shaped to accept the pins. For dimensions please refer to the sketch on the right side above.

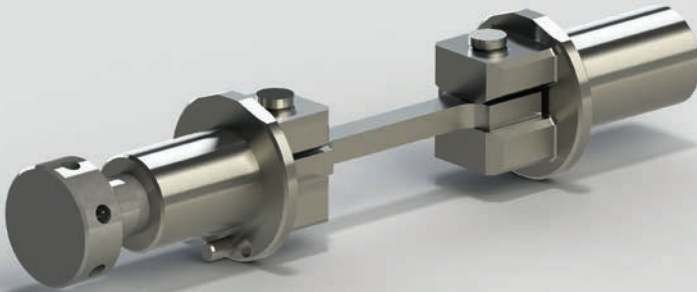


	Load Cell	10 N	1000 N	5000 N
Grippers	tensile tests	no	yes	yes
	compression tests	no	no	no
	thread Load cell		M10	M10
	maximum load		1000 N to 5000 N	
	included in a tensile-module		standard clamp with 5 kN Tensile-Module	
Specimen	purpose		tensile tests only, medium forces	
	A-overall length		30 to 60 mm	
	B-thickness		0.5 to 3 mm	
	C-length		10 to 40 mm	
	D-width at clamping ends		up to 10 mm	
	E-diameter of pivot holes		4 mm	
	F-distance of pivot holes		20 to 50 mm	
	specimen can be mounted with some tilt		EBSD capable	
	opt. cooling/heating Module usable		yes	yes

Tensile

MZC-Zb

- tensile tests only
- flat specimens with reamed holes
- high forces

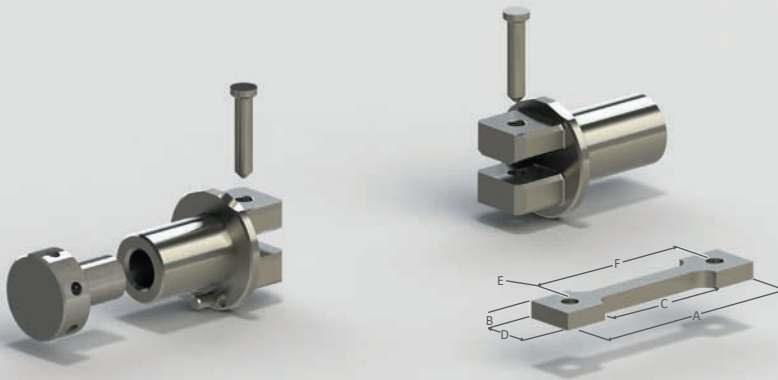


Picture may differ from original product.

Description

This is the classical tensile sample holder for dog-bone shaped samples with holes. But this time in a reinforced version for loads up to 15 kN. The holder can be used in the tensile module as an exchangeable clamping device. The specimens should have uniform thickness. The length of the area of interest (narrow portion) may be varied within the range of the tensile testing module. Typical length range "C" is 10 to 40 mm and thickness "B" about 5 mm. "A" sample with an original length "L0" of 20 mm can be strained 125%.

This self-aligning holder is for tensile testing only and the thread size of the holders depends on the load cell. Samples should be shaped to accept the pins. See sketch on the right side above.

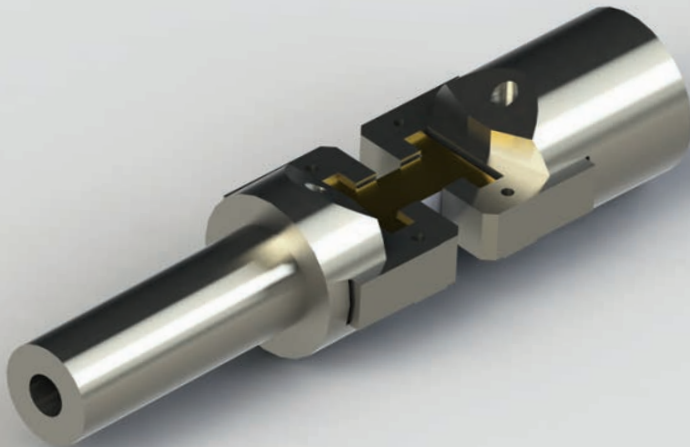


	Load Cell	10 N	10 000 N	15 000 N
Grippers	tensile tests	no	yes	on request
	compression tests	no	no	on request
	thread Load cell	no	M10	on request
	maximum load		10 000 N	on request
	included in a tensile-module		standard clamp with 10 kN or 15 kN Tensile-Module	
	purpose		tensile tests only, high forces	
Specimen	A-overall length		30 to 60 mm	
	B-thickness		0.5 to 4 mm	
	C-length		10 to 40 mm	
	D-width at clamping ends		up to 15 mm	
	E-diameter of pivot holes		5 mm	
	F-distance of pivot holes		20 to 50 mm	
	specimen can be mounted with some tilt		EBSD capable	
	opt. cooling/heating Module usable		yes	

Tensile

MZC-Zc

- tensile tests only
- for T-shaped specimens
- medium forces

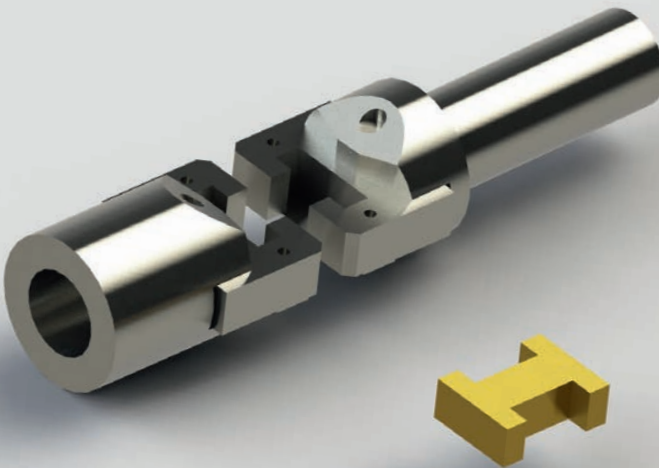


Picture may differ from original product.

Description

This holder can be used in the tensile module as an exchangeable clamping device. The set is made of two "nests" for the T-shaped sample. Both halves of this device are held in place by hardened pivots, in order to allow for self-alignment in the tensile direction. There are precision cylinders at the end of each one of the two holders that fit into honed orifices of the two yokes. Therefore the centerline of the specimen is aligned very precisely with the loading plane. If the dimensions of the series of specimens are made available. The holder will be designed and built accordingly.

The advantage of T-shaped specimens is, that this clamping principle completely avoids slipping of the test object. Its disadvantage is however, that the specimens must be machined to quite high precision. This device was designed for routine testing of series of identical objects. The example shown above, is a double T-shape. It fits a "nest" on both sides. The length of the area of interest in the middle of the specimen may vary, according to the user's individual requirements.

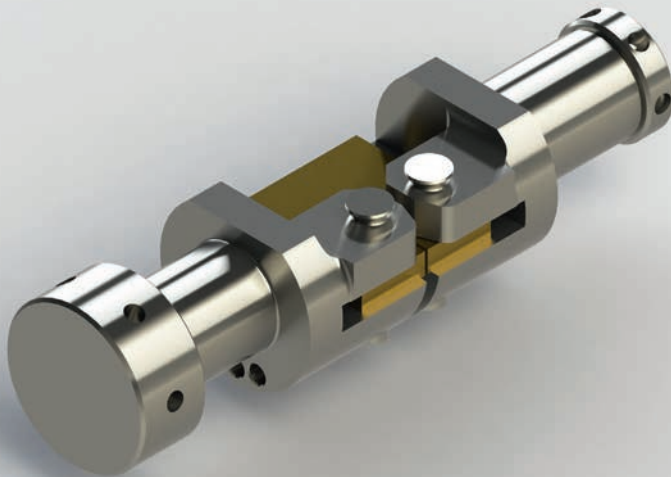


	Load Cell	10 N	1000 N	5 000 N
Grippers	tensile tests	no	yes	no
	compression tests	no	no	no
	thread load cell		M10	M10
	maximum load		1000 to 5000 N	
	included in a tensile module		on request	
	purpose		for T-shaped specimens	
Specimen	overall length		30 to 60 mm	
	thickness		up to 4 mm	
	width of the area of interest		5 mm (or according to user's requirements)	
	width of the head of T-shape		10 mm (or according to user's requirements)	
	diameter of pivot holes		no pivot holes	
	distance of pivot holes		no pivot holes	
	specimen can be mounted with some tilt		yes, +/- 20°	
	opt. cooling/heating Module usable		on request (not retrofittable)	

Tensile

MZC-Zd

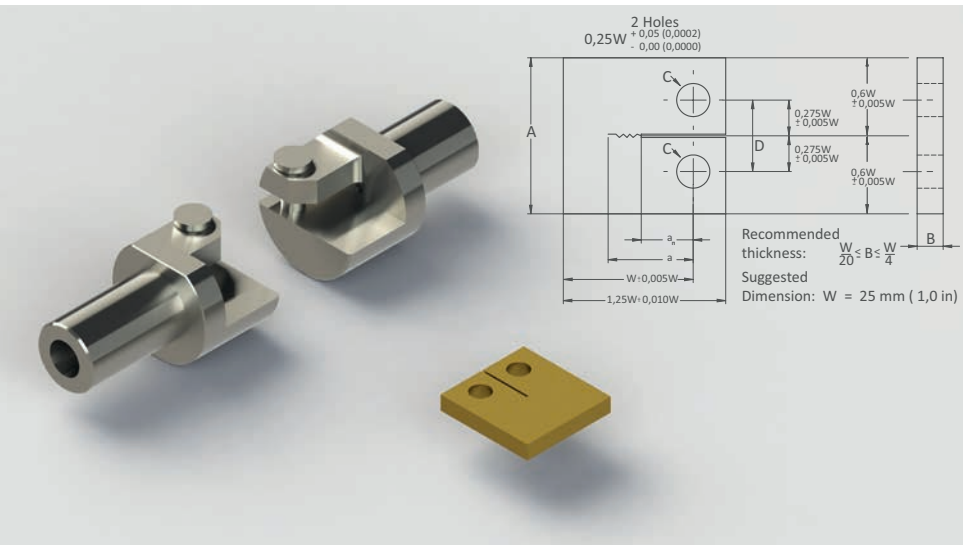
- tensile tests only
- for DCB and CT testing
- low or high forces



Picture may differ from original product.

Description

This holder can be used in the tensile module as an exchangeable holding pin device. Static or dynamic testing can be done with this holding pin mechanism. The set is made of two similar clamps with precision cylinders at the end of each one of the two holders that fit into honed orifices of the two yokes. Therefore the centerline of the specimen is aligned very precisely with the loading plane. The method of DCB (Dual Cantilever Beam) testing mainly shows the formation of an initial crack, and how it is advancing through the specimen. Metallic, composite materials or polymer samples can be examined. There are quite a number of specimen geometries known. All of them have some kind of a "notch", so that the crack initiation can be predicted. This notch can be oriented vertically or horizontally as shown above. Some procedures use a wedge to apply the force to the specimen. There is not much space available between the lead screws of the tensile testing module. Therefore, the example shown in the image above is an example of a very useful geometry. The specimen can be mounted horizontally or at some tilt angle. On the right page, you can see a standardized sample, where all dimensions can be calculated out of one dimension.

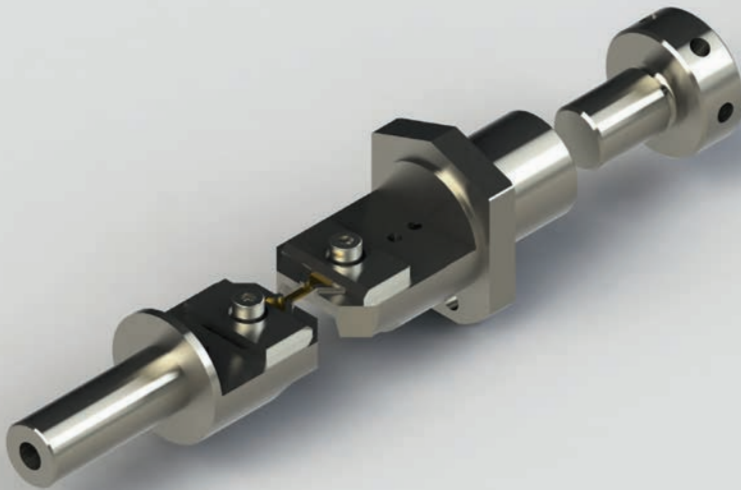


	Load Cell	100 N	500 N	2000 N
Grippers	tensile tests	yes	yes	yes
	compression tests	no	no	no
	thread load cell	M5	M5 or M10	M10
	maximum load	depends upon the installed load gauge		
	included in a tensile module	on request		
	purpose	for DCB (Dual Cantilever Beam) or CT (Compact Tension) Testing		
Specimen	A-overall length	1,25 W		
	B-recommended thickness	see formula in above drawing according		
	C-diameter of the alignment pivots	0,25 W		
	D-distance of pivot holes	0,55W (2x 0,275 W)		
	W-suggested min. dimension	W = 25 mm (1.0 in)		
	specimen can be mounted with some tilt	yes, +/- 20°		
	opt. cooling/heating Module usable	no	no	no

Tensile

MZC-Ze (usable without optional cooling/heating module)

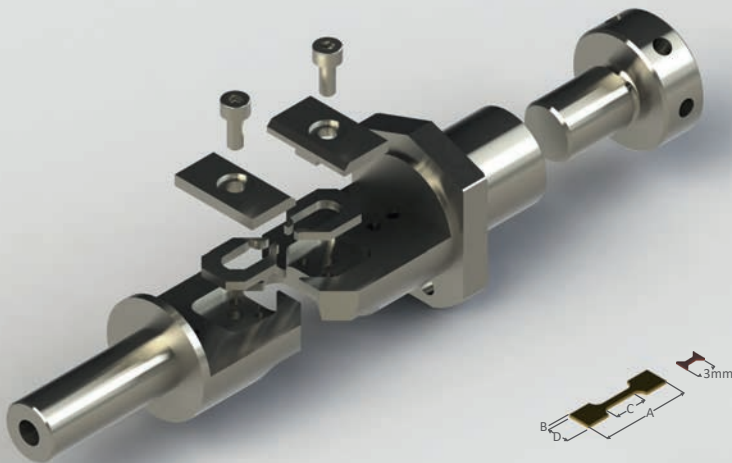
- tensile tests only
- for small samples
- low forces



Picture may differ from original product.

Description

This holder can be used in the tensile module as an exchangeable clamping device. If samples are too small or fragile to be clamped by a friction clamp, form fitting clamps can be used. This holder is designed in a way, that different inserts can be placed in the clamp to accommodate different shapes of samples in one holder. Form fitting clamps are only suitable for tensile (not compression) experiments. Shape and dimensions should be known in advance of ordering.

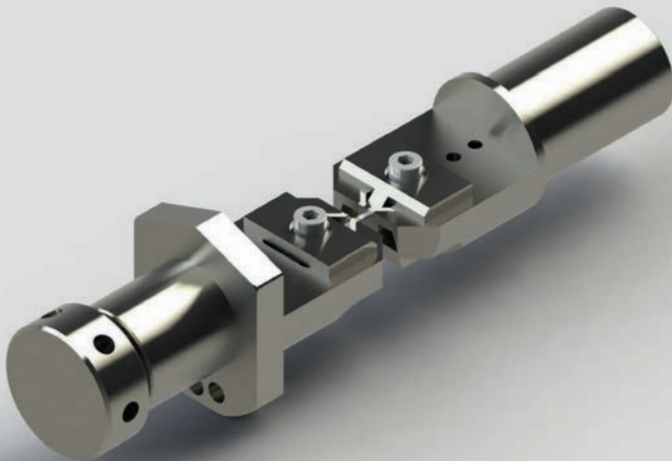


	Load Cell	10 N	500 N	5000 N
Grippers	tensile tests	yes	yes	no
	compression tests	no	no	no
	thread load cell	M5	M5 or M10	no
	maximum load	10 N to 500 N; depends upon material & load cell		
	included in a tensile module	on request		
	purpose	specimen holder with shaped inserts for small samples		
Specimen	A-overall length	3 to 40 mm		
	B-thickness	0,5 to 2 mm		
	C-length of narrow area	1,5 to 23 mm		
	D-width at clamping ends	depends of the shaped inserts		
	diameter of alignment pivots	no pivot holes		
	distance of pivot holes	no pivot holes		
	specimen can be mounted with some tilt	yes, +/- 20°		
	opt. cooling/heating Module usable	no		

Tensile

MZC-Zf (usable with optional cooling/heating module)

- tensile tests only
- for small samples
- low forces



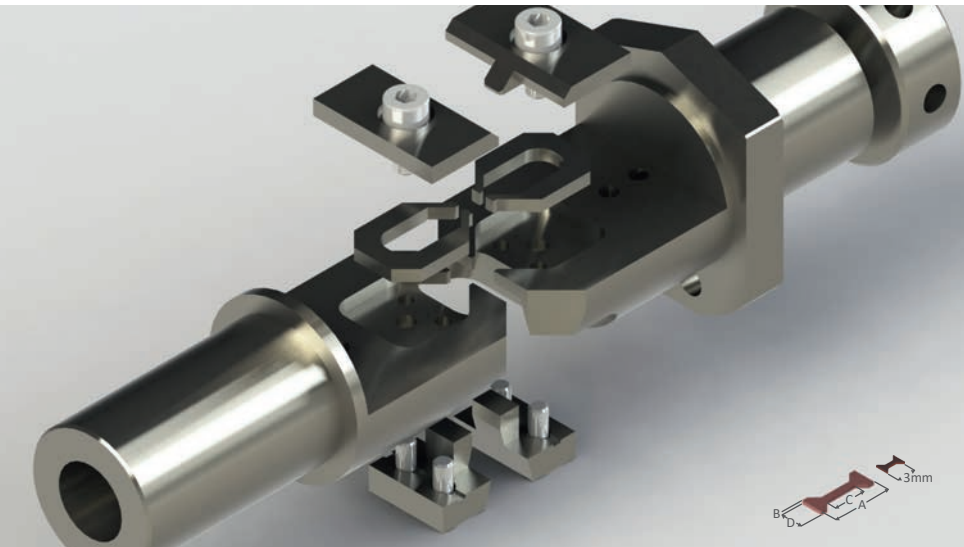
Picture may differ from original product.

Description

Holder to be used in the tensile module as an exchangeable clamping device. If samples become too small or too fragile to be clamped by a friction clamp, form fitting clamps can be used.

This holder is designed in a way, that different inserts can be placed in the clamp to accommodate different shapes of samples in one holder. Form fitting clamps are only suitable for tensile experiments. Shape and dimensions can be discussed.

This special design is suitable for the combined usage with special heating unit up to 800°C.

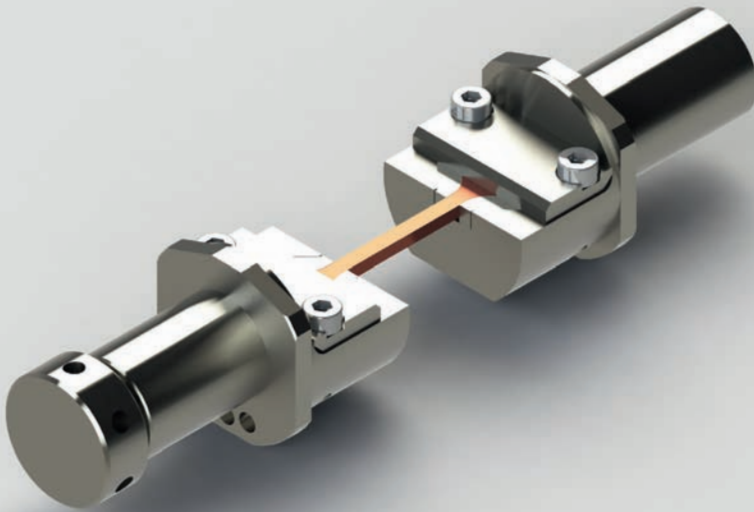


	Load Cell	10 N	500 N	5000 N
Grippers	tensile tests	yes	yes	no
	compression tests	no	no	no
	thread load cell	M5	M5 or M10	no
	maximum load	10 N to 500 N; depends upon material & load cell		
	included in a tensile module	on request		
	purpose	specimen holder with shaped inserts for small samples		
Specimen	A-overall length	3 to 40 mm		
	B-thickness	0,5 to 2 mm		
	C-length of narrow area	1,5 to 23 mm		
	D-width at clamping ends	depends of the shaped inserts		
	diameter of alignment pivots	no pivot holes		
	distance of pivot holes	no pivot holes		
	specimen can be mounted with some tilt	yes, +/- 20°		
	opt. cooling/heating Module usable	yes		

Tensile

MZC-Zg (usable with optional cooling/heating module)

- tensile tests only
- for big samples
- high forces

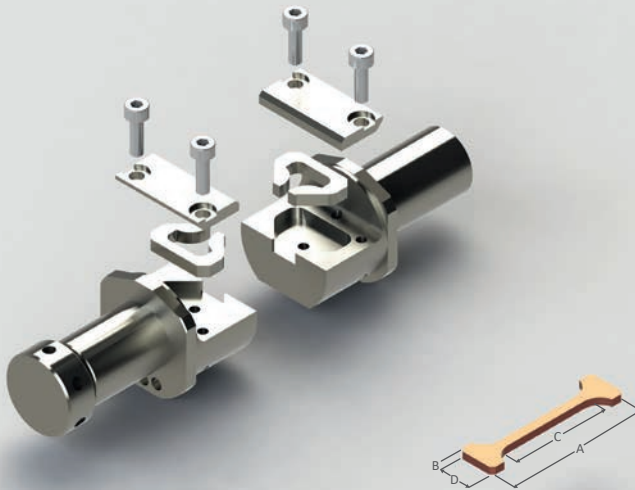


Picture may differ from original product.

Description

Holder to be used in the tensile module with high precise form fittings for tensile experiments. Shape and dimensions can be discussed. Our special design is build out of very strong steel, so that even higher loads up to 10 kN are possible.

This grip is usable in combination with our standard heater up to 800°C

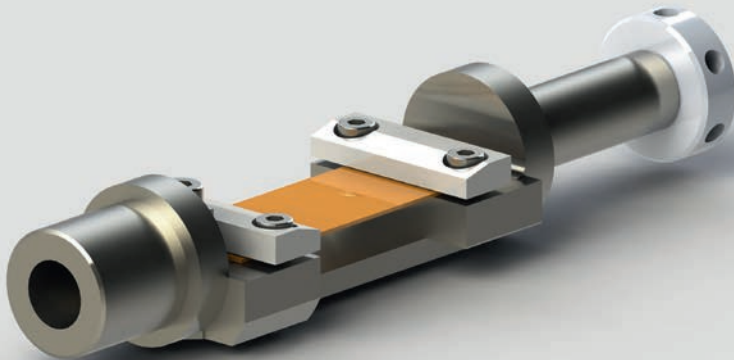


	Load Cell	1000 N	5000 N	10 000 N
Grippers	tensile tests	yes	yes	yes
	compression tests	no	no	no
	thread load cell	M10		
	maximum load	1000 N to 5000 N; depends upon material & load cell		
	included in a tensile module	on request		
	purpose	specimen holder with shaped inserts for big samples		
Specimen	A-overall length	10 to 40 mm		
	B-thickness	0,5 to 4 mm		
	C-length of narrow area	1,5 to 23 mm		
	D-width at clamping ends	depends of the shaped inserts		
	diameter of alignment pivots	no pivot holes		
	distance of pivot holes	no pivot holes		
	specimen can be mounted with some tilt	yes, +/- 20°		
	opt. cooling/heating Module usable	yes		

Tensile

MZC-Zh

- tensile tests only
- for foils, tissues, etc.
- low forces

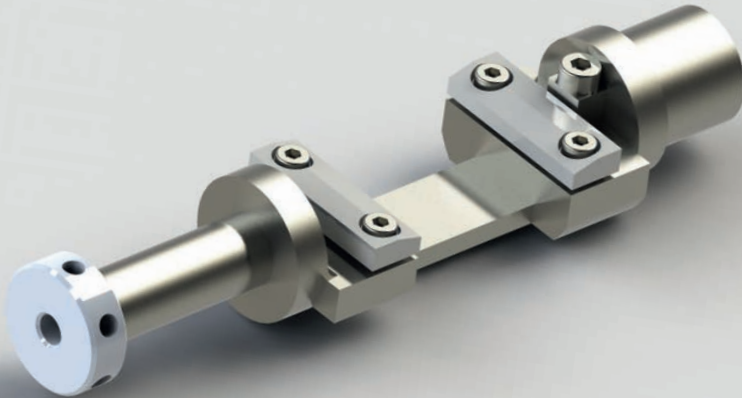


Picture may differ from original product.

Description

This holder can be used in the tensile module as an exchangeable clamping device. This holder is specially designed for thin foils or tissue material. Static or dynamic testing can be done with this clamping mechanism. Emphasis was made to ensure that samples can be clamped without damage during the test.

The set is made of two "micro vises" one is fixed to the far end yoke of the tensile tester, and the other one is mounted to the yoke where the load cell is mounted. The edges of the small vises are polished and rounded off at their edges, to avoid rupture directly at the front end of the clamping device. An alignment block is placed underneath the specimen during the mounting procedure, so that the specimen will not sag. The photo above is an example of how samples are mounted in the gripper. The center line of the specimen is aligned very precisely with the loading plane. The two micro vises can be mounted in a tilt position for better viewing in the microscope.

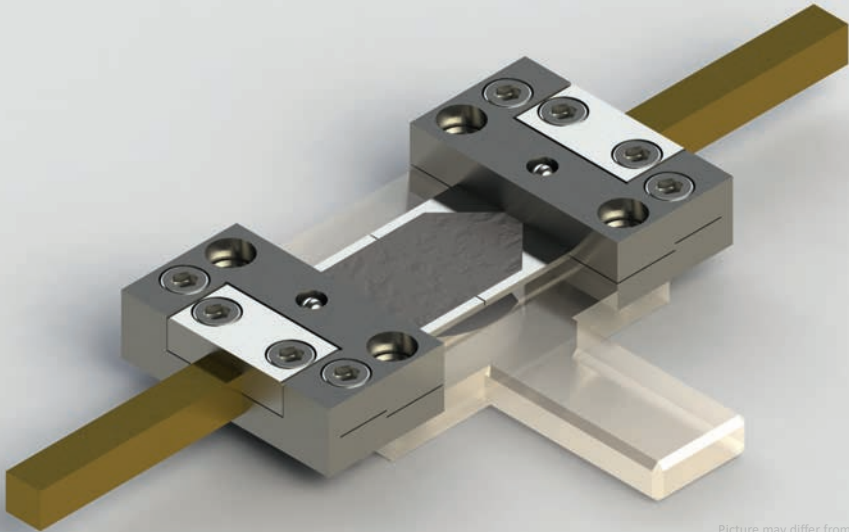


	Load Cell	10 N	500 N	10 000 N
Grippers	tensile tests	yes	yes	no
	compression tests	no	no	no
	thread load cell	M5	M5	
	maximum load	10 N to 500 N (depends on material and load cell)		
	included in a tensile module	on request		
Specimen	purpose	for foils and tissues etc.		
	overall length	30 to 60 mm		
	thickness	0.1 to 2 mm		
	length of narrow area	10 to 40 mm		
	width at clamping ends	4 mm to 12 mm		
	diameter of pivot holes	no pivot holes		
	distance of pivot holes	no pivot holes		
	specimen can be mounted with some tilt	yes, +/- 20°		
	opt. cooling/heating Module usable	on request (not retrofittable)		

Tensile

MZC-Zi (only in combination with K&W Fiber Tensile Module)

- tensile tests only
- for ultra-thin (rubber) samples
- very low forces

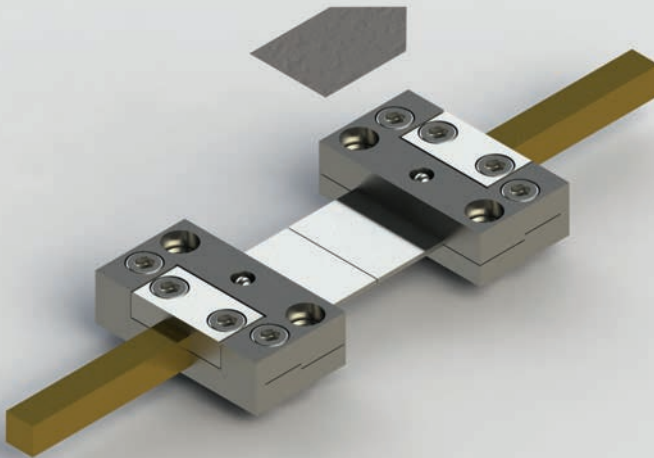


Picture may differ from original product.

Description

This holder is to be attached to the hyper sensitive load cell or fiber tensile module as an exchangeable clamping device. The specimens were cut in a microtome, and they come out in a somewhat irregular shape. To pick them up, a very fine paintbrush is used.

These slices are so thin that they are almost transparent, and can also be examined under load in a light microscope. The specimens are floated in alcohol, and caught with a very fine brush. They are then laid down across a see-through gap of 100 μm on the surface of the stainless steel plates, where the two halves meet (see sketch above). The alignment jig below the clamps is then removed. As the tensile experiment begins, and displacement proceeds, the gap will widen, as changes in the sample are observed and recorded. This procedure allows to install the sample without applying any uncontrolled force to the ultra-thin sample. There are different plates available to meet the requirements of various sample-materials.

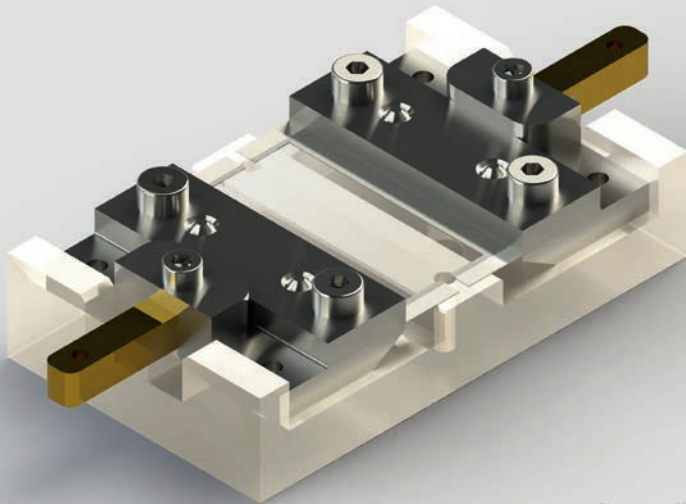


	Load Cell	1 N	10 N	20 N
Grippers	tensile tests	yes	no	no
	compression tests	no	no	no
	thread load cell	not available		
	maximum load	1 N		
	included in a tensile module	on request		
	purpose	ultra-thin cut rubber samples		
Specimen	overall length	appr. 8 mm		
	thickness	several μm		
	width	appr. 5 mm (lengths and width come out usually irregular)		
	length of narrow area	fixed length		
	diameter of pivot holes	no pivot holes		
	distance of pivot holes	no pivot holes		
	specimen can be mounted with some tilt	horizontal		
	opt. cooling/heating Module usable	yes		

Tensile

MZC-Zj (only in combination with K&W Fiber Tensile Module)

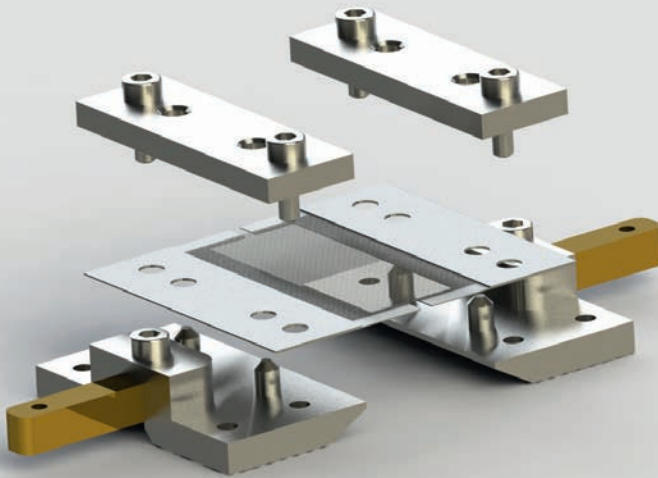
- tensile tests only
- for ultra-thin (fabric fiber) samples
- very low forces



Picture may differ from original product.

Description

This holder is to be attached to the fiber tensile module or the hyper sensitive load cell as an exchangeable clamping device. The fabric samples are attached to a paper envelope. The envelope is mounted to the grippers. Then the transfer and alignment jig is fixed to the grippers as well. The whole unit can now be transferred to the tensile module. Once it is fixed to the holders, the alignment jig above the clamps can then be removed. As the tensile experiment begins, and displacement proceeds, the gap will widen, as the changes in the sample are observed and recorded. This procedure allows to install the sample without applying any uncontrolled force to the ultra-thin sample. There are different plates available to meet the requirements of various sample materials.

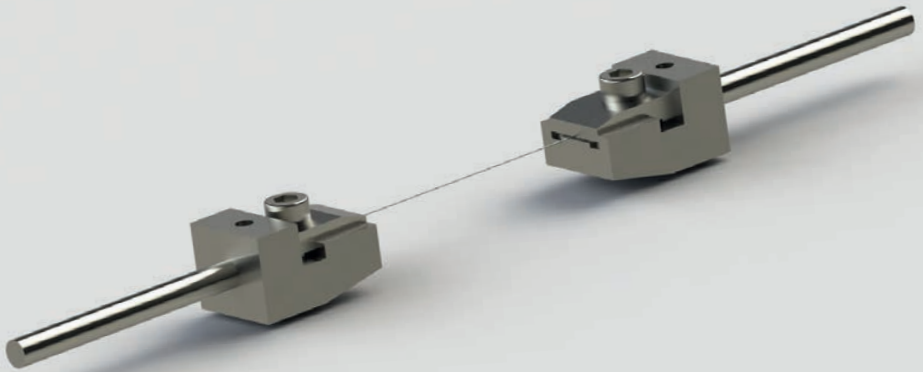


	Load Cell	1 N	10 N	20 N
Grippers	tensile tests	yes	no	no
	compression tests	no	no	no
	thread load cell	not available		
	maximum load	1 N		
	included in a tensile module	on request		
	purpose	ultra-thin fabric fiber samples		
Specimen	overall length	approx. 8 mm		
	thickness	several μm		
	width	approx. 20 mm (lengths and width come out usually irregular)		
	length of narrow area	fixed length		
	diameter of pivot holes	no pivot holes		
	distance of pivot holes	no pivot holes		
	specimen can be mounted with some tilt	horizontal		
	opt. cooling/heating Module usable	yes		

Tensile

MZC-Zk (only in combination with K&W Fiber Tensile Module)

- tensile tests only
- for thin wires, foils and similar objects
- very low forces

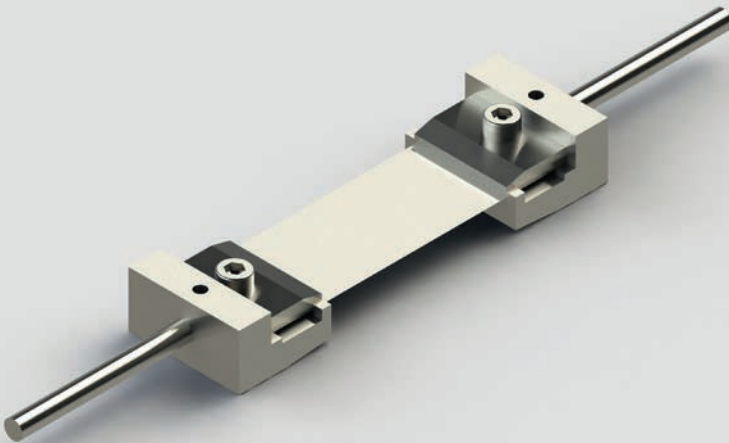


Picture may differ from original product.

Description

Clamping device for tensile testing of thin wires, foils and similar objects, being stretched up to several centimeter long.

This holder can be attached to the hyper sensitive load cell or the fiber tensile module as an exchangeable clamping device, instead of the standard fiber clamp. All four clamping surfaces are lined with a "soft-material", to ensure that the specimen will not break at the clamp. If for instance steel wires will be tested, then this lining can be copper or bronze. If biological or polymer material will be used, the lining can be carbon foil or blotting paper. For very long displacement, select samples with a shorter area of interest (narrow section).

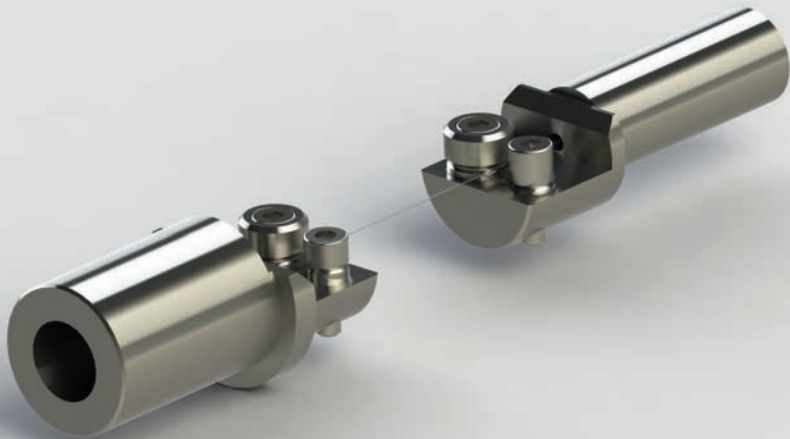


	Load Cell	1 N	10 N	500 N
Grippers	tensile tests	yes	no	no
	compression tests	no	no	no
	thread load cell	no	no	no
	maximum load	no		
	included in a tensile module	1 N		
	purpose	tensile testing of thin wires, foils and similar objects		
Specimen	overall length	20 mm		
	size	to be determined		
	maximum specimen length	50 mm		
	maximum specimen width	6 mm (if using foils)		
	maximum wire diameter			
	distance of pivot holes	no pivot holes		
	specimen can be mounted with some tilt	yes		
	opt. cooling/heating Module usable	yes		

Tensile

MZC-ZI (only in combination with K&W Fiber Tensile Module)

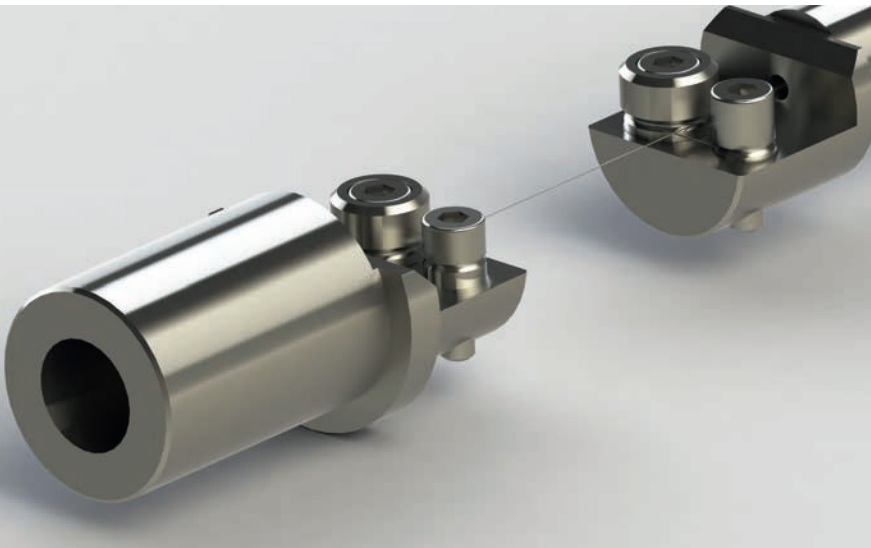
- tensile tests only
- for thin wires, filaments and similar objects
- low forces



Picture may differ from original product.

Description

This fiber specimen holder with ball bearing slide is used for fine wires or other filamentous-material. To be used in the tensile module as an exchangeable clamping device, as an alternative to the fiber clamp. Two screws with a cylindrical portion near their heads are mounted on each half of the device. One of these screws has a Teflon washer. The wire or thread is wound around the cylindrical end of the larger screw, and then laid down under the Teflon washer. Now the smaller screw will be tightened carefully. The Teflon surface will not break the wire, because it is a fairly soft material. The larger screw will not be tightened, so that only the small screw will do the clamping. Winding the wire around the cylindrical portion of the large screw.

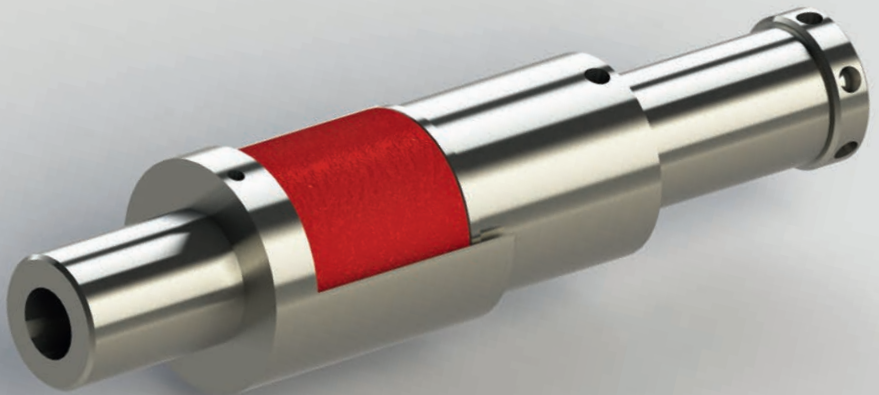


	Load Cell	10 N	100 N	500 N
Grippers	bending tests	no	no	no
	tensile tests	yes	yes	yes
	compression tests	no	no	no
	thread load cell	M5	M5	M5
	maximum load	10 N to usually < 500 N; depends upon installed load gauge		
	included in a tensile module	on request		
	purpose	thin wires, filaments and similar objects		
Specimen	overall length			
	maximum clamping width	2 mm		
	maximum free specimen length	as much as yoke separation will allow; usually 60 mm		
	minimum free specimen length	10 mm or as short as operator can handle, using tweezers		
	size of clamping heads	12 mm diameter, 20 mm overall length		
	distance of pivot holes	no pivot holes		
	specimen can be mounted with some tilt	yes, any angle		
	opt. cooling/heating Module usable	no		

Compression

MZC-Da/b (a = for big voluminous specimen) (b = for small, compact specimen which can shatter, splitter or crumble)

- for compression experiments
- for load cell calibration
- low or high forces

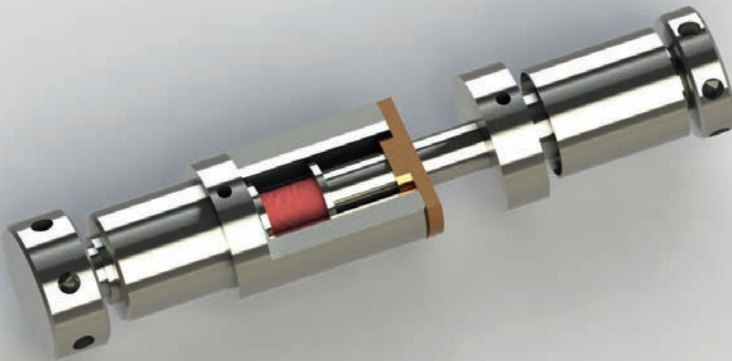


Picture may differ from original product.

Description

A sample holder to be used in the tensile module as an exchangeable compression device. The specimens must have plane-parallel ends, in order to avoid shear or bending action, which will spoil the results. If specimens are apt to shatter or crumble, place a petri-dish underneath the clamping, on the chamber floor to collect the debris.

This device was created for various compression experiments. Such tests can be done with almost any material: concrete, medical pills, wood, sintered metal, polymers, biological material such as bovine teeth, etc.

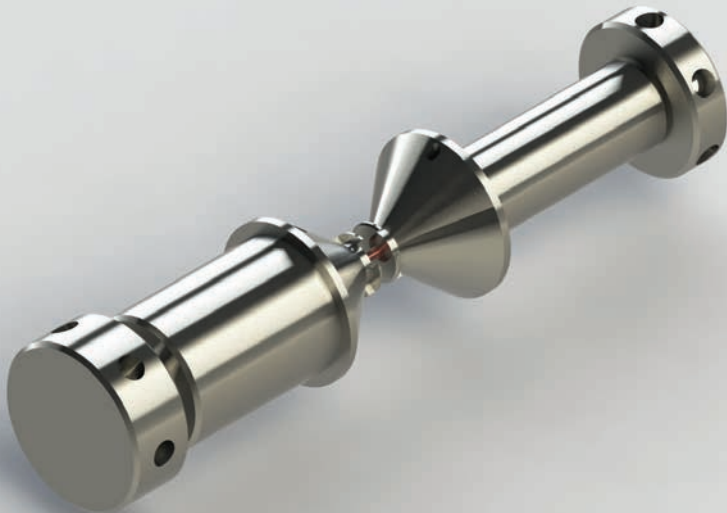


	Load Cell	50 N	500 N	2000 N
Grippers	tensile tests	no	no	no
	compression tests	yes	yes	yes
	thread load cell	M5	M5 or M10	M10
	maximum load	50 N to 2000 N; depends upon material and installed load cell		
	included in a tensile module	on request		
	purpose	compression experiments		
Specimen	overall length	5 mm to 25 mm		
	diameter or square section	approx. 5 mm to 20 mm diameter or square		
	width			
	length			
	diameter of the alignment pivots	no pivot holes		
	distance of pivot holes	no pivot holes		
	specimen can be mounted with some tilt	depending on the supporting clamps		
	opt. cooling/heating Module usable	no	no	no

Compression

MZC-Dc

- for compression experiments
- low and high forces
- small sampels

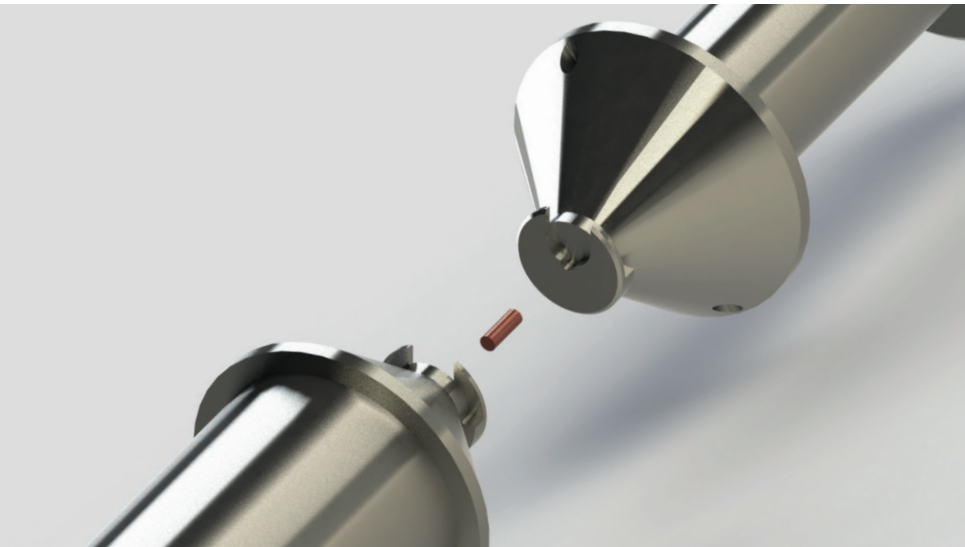


Picture may differ from original product.

Description

A sample holder to be used in the tensile module as an exchangeable compression device. Small clips at the front end will hold the compression samples in place at the centerline of the loading force, so they will not fall when there is no load.

This holder is also suitable for X-ray applications. For brittle samples where there is the chance that pieces can fall into the vacuum chamber MZC-D01a/b should be considered.

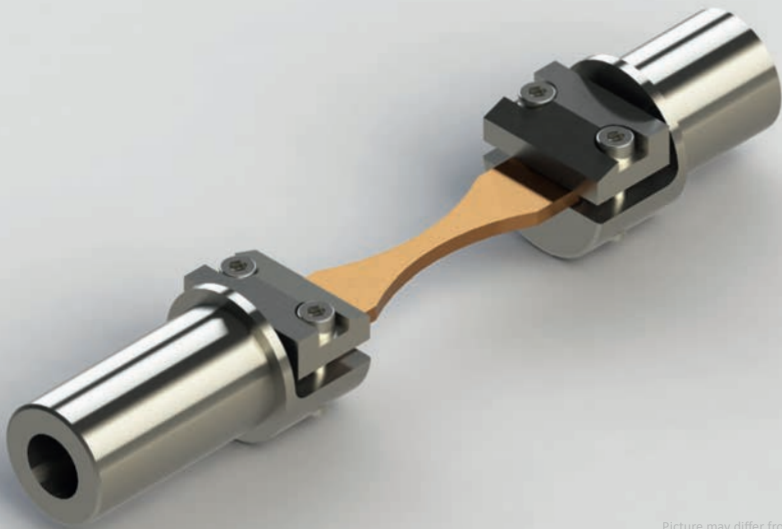


	Load Cell	10 N	200 N	500 N
Grippers	tensile tests	no	no	no
	compression tests	yes	yes	yes
	thread load cell	M5	M5	M5
	maximum load	10 N to 500 N; depends upon material and installed load cell		
	included in a tensile module	on request		
Specimen	purpose	compression specimen holder for low or high loads an small samples, e.g. $\varnothing 3$ mm		
	overall length	2 mm to 10 mm		
	diameter or square section	0,5 mm to 5 mm (depends of existing compression area of device)		
	width			
	length			
	diameter of the alignment pivots	no pivot holes		
	distance of pivot holes	no pivot holes		
	specimen can be mounted with some tilt	yes, any tilt angle		
	opt. cooling/heating Module usable	no		

Tensile & Compression

MZC-Ua

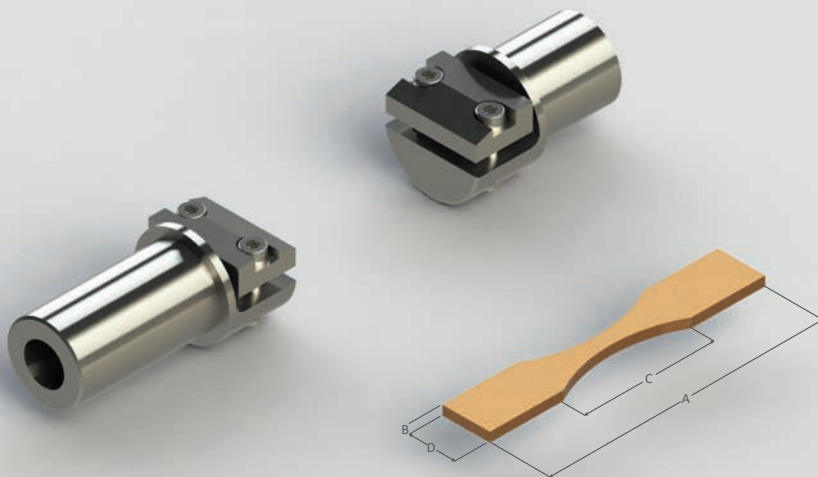
- for tensile & compression experiments
- for flat specimens without reamed holes
- low forces



Picture may differ from original product.

Description

A sample holder to be used in the tensile module as an exchangeable clamping device. The specimens should have uniform thickness. The length of the area of interest (narrow portion) may be varied within the range of the tensile testing module. Typical length range "C" is 10 to 40 mm. See sketch on the right.

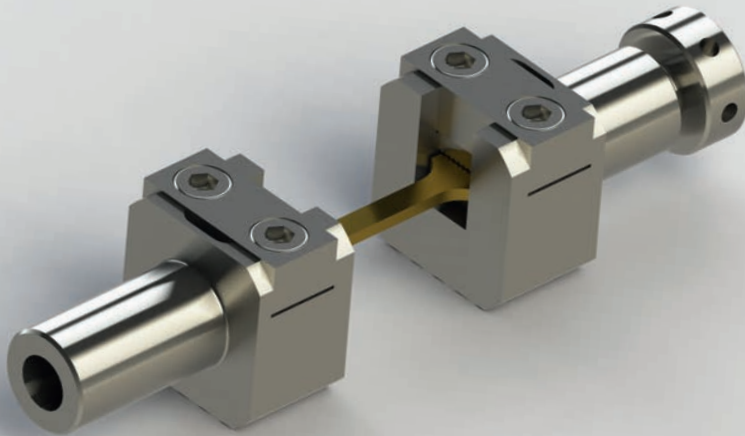


	Load Cell	10 N	500 N	10 000 N
Grippers	tensile tests	yes	yes	no
	compression tests	yes	yes	no
	thread load cell	M5	M5	
	maximum load	10 N to 500 N		
	included in a tensile module	standard for tensile/compression modules with load cells < 500 N		
Specimen	purpose	tensile and compression tests		
	A-overall length	30 to 60 mm		
	B-thickness	0,2 to 1 mm		
	C-length of narrow area	10 to 40 mm		
	D-width at clamping end	10 mm		
	E-diameter of pivot holes	no pivot holes		
	F-distance of pivot holes	no pivot holes		
	specimen can be mounted with some tilt	infinitely tilt able		
	opt. cooling/heating Module usable	yes	yes	

Tensile & Compression

MZC-Ub (square version for EBSD; 58mm & 60mm)

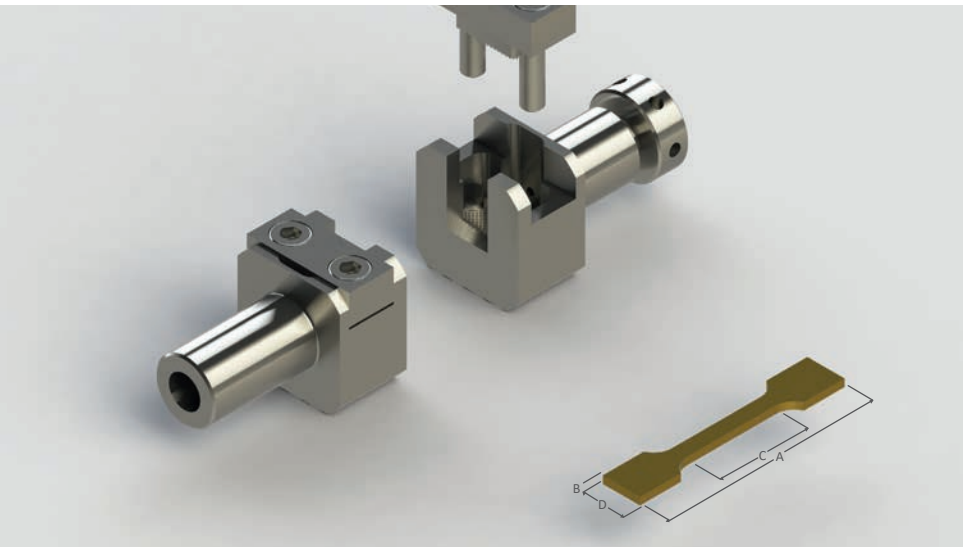
- for tensile & compression experiments
- for flat specimens without reamed holes
- high forces



Picture may differ from original product.

Description

A sample holder to be used in the wide spindle tensile module as an exchangeable clamping device. The specimens can be clamped at various tilt angles. The length of the area of interest (narrow portion) may be varied within the range of the tensile testing module. Typical length range is "C" 10 to 40 mm. See sketch on the right. For very long displacement, select samples with a shorter area of interest (narrow section).

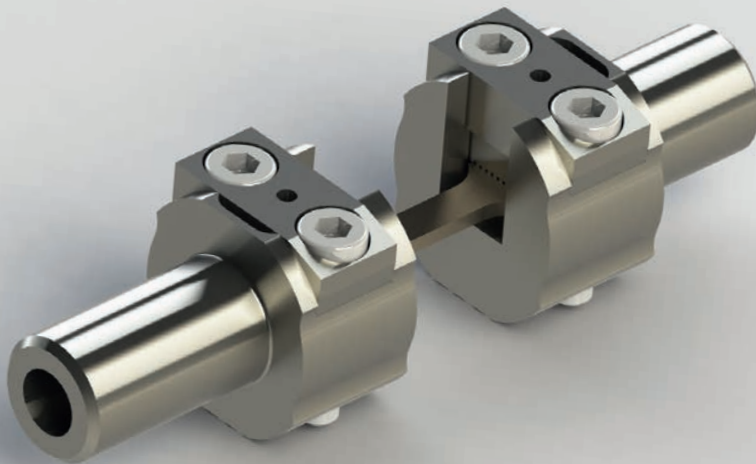


	Load Cell	1000 N	5000 N	10 000 N
Grippers	tensile tests	yes	yes	yes
	compression tests	yes	yes	yes
	thread load cell	M10	M10	M10
	maximum load	1000 N to 10 000 N		
	included in a tensile module	standard with option MZ.ZD and MZ.Mb		
Specimen	purpose	for flat, thick and heavy duty specimens		
	A-overall length	30 to 60 mm		
	B-thickness	0,5 to 5 mm		
	C-length of narrow area	10 to 40 mm		
	D-width at clamping end	10 mm		
	E-diameter of pivot holes	no pivot holes		
	F-distance of pivot holes	no pivot holes		
	specimen can be mounted with some tilt	yes, +/- 20°		
	opt. cooling/heating Module usable	yes	yes	yes

Tensile & Compression

MZC-Uc (round version for EBSD)

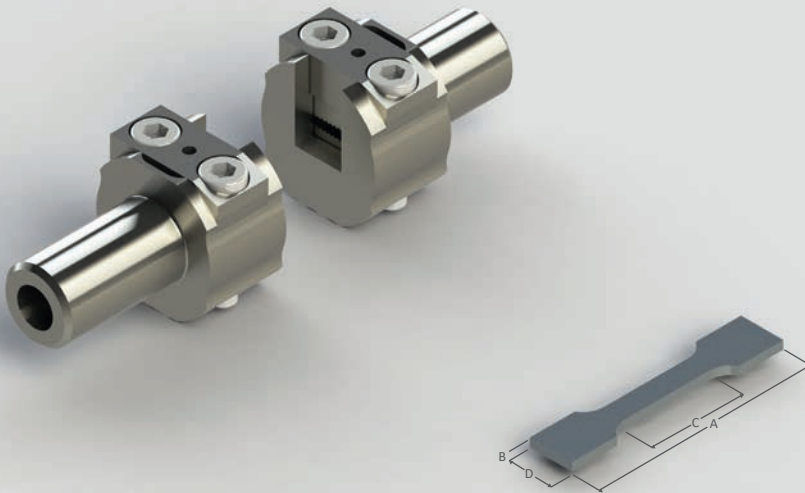
- for tensile & compression experiments
- for flat specimens without reamed holes
- high forces



Picture may differ from original product.

Description

A Sample holder to be used in the narrow spindle distance tensile module as an exchangeable clamping device. The specimens can be clamped at various tilt angles. The length of the area of interest (narrow portion) may be varied within the range of the tensile testing module. Typical length range is "C" 10 to 40 mm. See sketch on the right. For very long displacement, select samples with a shorter area of interest (narrow section).

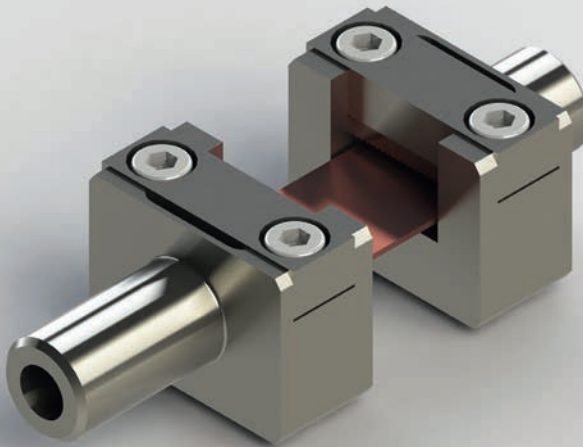


	Load Cell	1000 N	5000 N	10 000 N
Grippers	tensile tests	yes	yes	yes
	compression tests	yes	yes	yes
	thread load cell	M10	M10	M10
	maximum load	1000 N to 10 000 N		
	included in a tensile module	standard for tensile/compression module MZ.Ms and option MZ.ZD		
Specimen	purpose	for flat specimens in tensile/compression test in conjunction with EBSD		
	A-overall length	30 to 60 mm		
	B-thickness	0,5 to 4 mm		
	C-length of narrow area	10 to 40 mm		
	D-width at clamping end	10 mm		
	E-diameter of pivot holes	no pivot holes		
	F-distance of pivot holes	no pivot holes		
	specimen can be mounted with some tilt	yes, +/- 20°		
	opt. cooling/heating Module usable	yes	yes	yes

Tensile & Compression

MZC-Ud (wider version for broad specimens up to 18mm; only for broad tensile module MZ.Mb)

- for tensile & compression experiments
- for flat specimens without reamed holes
- high forces

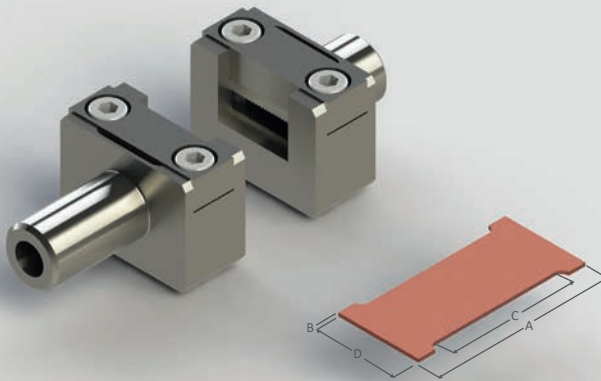


Picture may differ from original product.

Description

A Sample holder to be used in the wide spindle distance tensile module as an exchangeable clamping device. Tilted clamping is not possible (no EBSD) with this holder.

The specimens can be clamped at various tilt angles. The length of the area of interest (narrow portion) may be varied within the range of the tensile testing module. Typical length range is "C" 10 to 40 mm. See sketch on the right. For very long displacement, select samples with a shorter area of interest (narrow section).

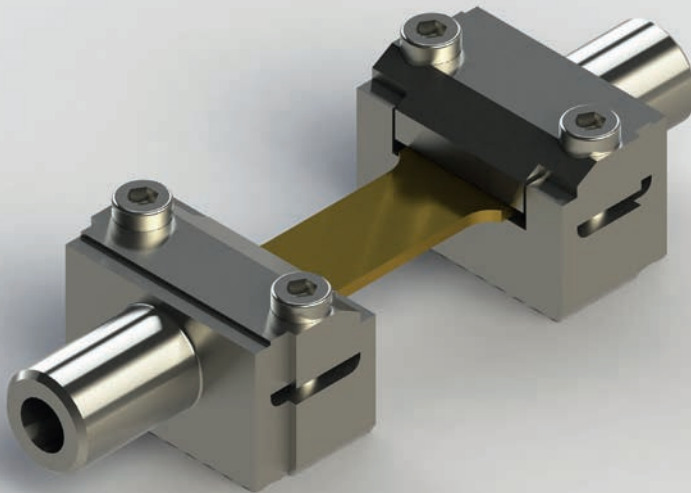


	Load Cell	500 N	5000 N	15 000 N
Grippers	tensile tests	no	yes	yes
	compression tests	no	yes	yes
	thread load cell		M10	M10
	maximum load		5000 N to 15 000 N	
	included in a tensile module		on Mz.Mb only	
	purpose	for wider than usual specimens up to 18 mm at highest loads		
Specimen	A-overall length		30 to 60 mm	
	B-thickness		0,5 to 5 mm	
	C-length of narrow area		10 to 40 mm	
	D-width at clamping end		up to 18 mm	
	E-diameter of pivot holes		no pivot holes	
	F-distance of pivot holes		no pivot holes	
	specimen can be mounted with some tilt		no	
	opt. cooling/heating Module usable		yes	yes

Tensile & Compression

MZC-Ue (extra wide version for broad specimens up to 24mm; only for broad tensile module MZ.Mb)

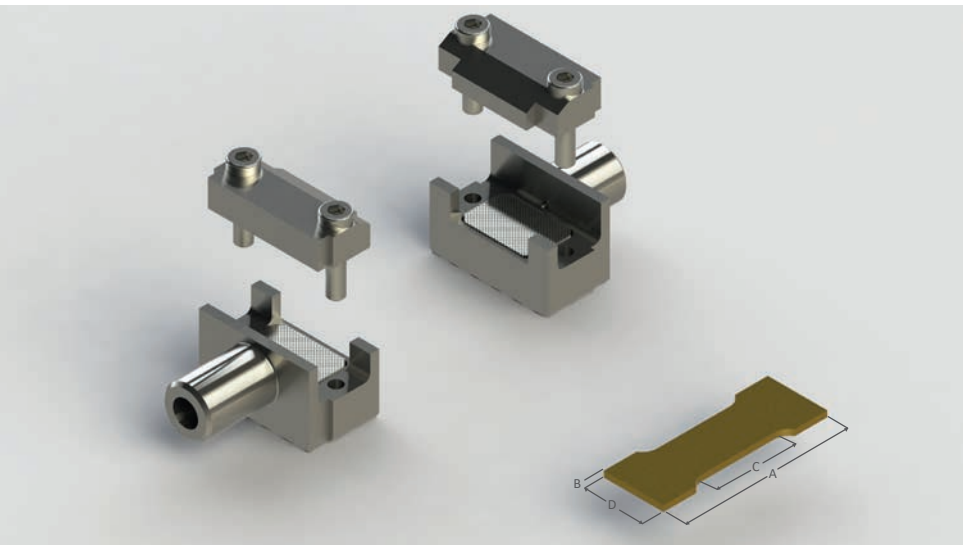
- for tensile & compression experiments
- for flat specimens without reamed holes
- high forces



Picture may differ from original product.

Description

A sample holder to be used in wide spindle tensile module as an exchangeable clamping device. This is the widest clamping version with an overall width of 32 mm. It can be used only with the wide spindle tensile tester. This clamping set is fixed at a horizontal position. Tilted clamping is not possible (no EBSD) with this holder. The length of the area of interest (narrow portion) may be varied within the range of the tensile testing module. Typical length range "C" is 10 to 40 mm. See sketch on the right. Below for very long displacement, select samples with a shorter area of interest (narrow section).

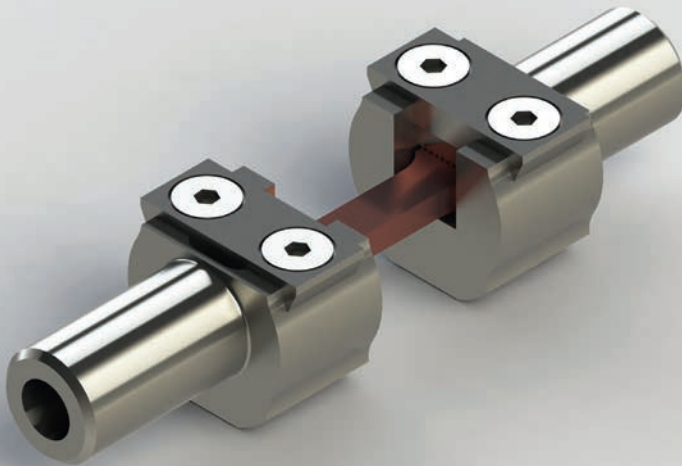


	Load Cell	1000 N	5000 N	15 000 N
Grippers	tensile tests	yes	yes	yes
	compression tests	yes	yes	yes
	thread load cell	M10	M10	M10
	maximum load	1000 N to 15 000 N		
	included in a tensile module	on request Mz.Mb only		
	purpose	for wider than usual specimens up to 24 mm at highest loads		
Specimen	A-overall length	30 to 60 mm		
	B-thickness	0,5 to 2 mm		
	C-length of narrow area	10 to 40 mm		
	D-width at clamping end	up to 24 mm		
	E-diameter of pivot holes	no pivot holes		
	F-distance of pivot holes	no pivot holes		
	specimen can be mounted with some tilt	no		
	opt. cooling/heating Module usable	yes	yes	yes

Tensile & Compression

MZC-Uf (for use in selected AFM's, light microscopes and for low working distances)

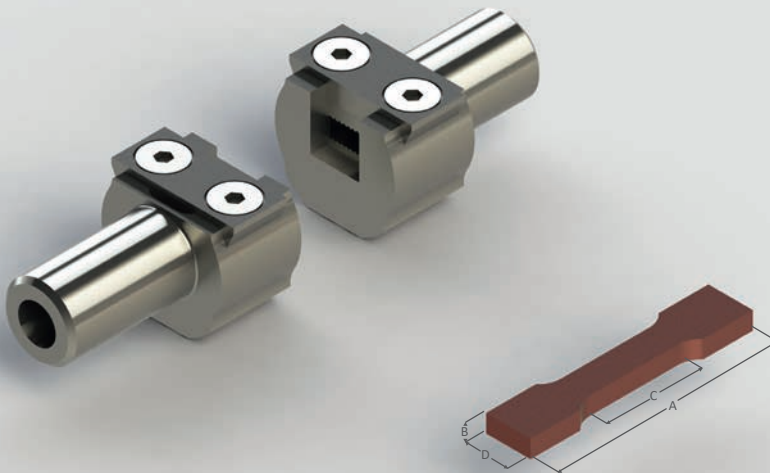
- for tensile & compression experiments
- for flat specimens without reamed holes
- high forces



Picture may differ from original product.

Description

Similar sample holder as MZC-U03, but with reduced height, to accommodate light-optical, or atomic force microscopes with low working distance. The specimens can be clamped at various tilt angles. The length of the area of interest (narrow portion) may be varied within the range of the tensile testing module. Typical length range "C" is 10 to 40 mm. See sketch on the right. For very long displacement, select samples with a shorter area of interest (narrow section).

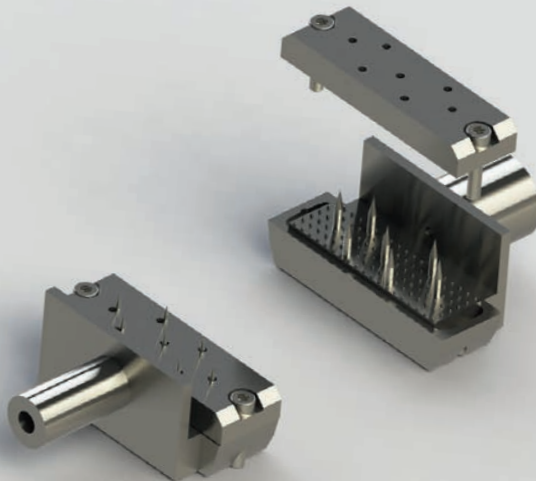


	Load Cell	1000 N	5000 N	10 000 N
Grippers	tensile tests	yes	yes	no
	compression tests	yes	yes	no
	thread load cell	M10	M10	
	maximum load	1000 N to 5 000 N		
	included in a tensile module	on request for tensile/compression module MZ.Ms		
Specimen	purpose	flat specimens in tensile/compression test in conjunction with EBSD or AFM		
	A-overall length	30 to 50 mm (up to 60 mm; depends on specimen)		
	B-thickness	0,5 to 4 mm		
	C-length of narrow area	10 to 30 mm		
	D-width at clamping end	10 mm		
	E-diameter of pivot holes	no pivot holes		
	F-distance of pivot holes	no pivot holes		
	specimen can be mounted with some tilt	yes, +/- 20°		
	opt. cooling/heating Module usable	yes		

Tensile & Compression

MZC-Ug

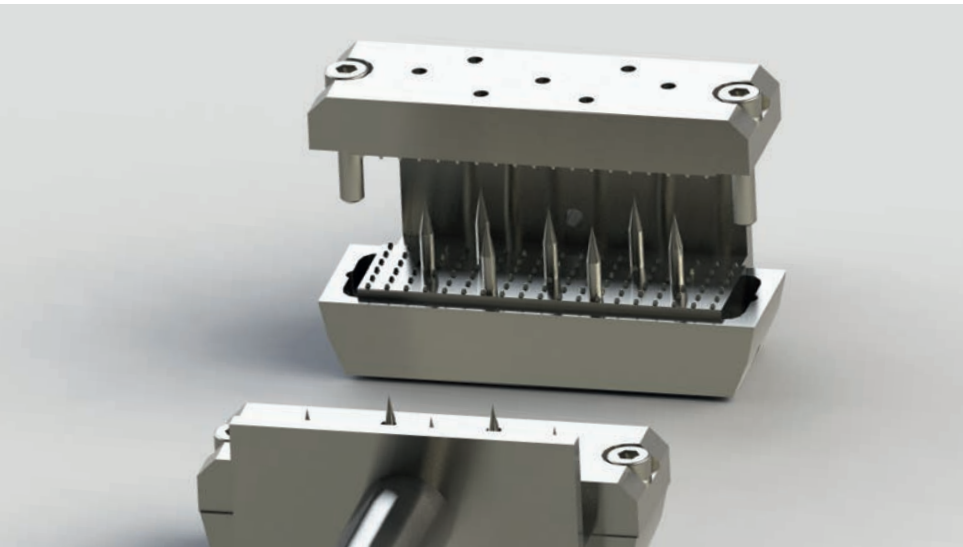
- for tensile & compression experiments
- for soft and pliable specimens
- low forces



Picture may differ from original product.

Description

A sample holder to be used in the tensile module as an exchangeable clamping device. The clamp shown here is frequently used for mechanical behavior of biological specimens. Specimens usually are soft, such as fruits cut in strips leather, etc. They should be examined in the environmental mode (low vacuum) of the SEM, unless they are perfectly dry. If SEM environmental mode is not available, then observations can be done with a light-microscope. Note the "Bite Plates" are equipped with exchangeable "teeth" that will hold the most soft or pliable specimen in place.

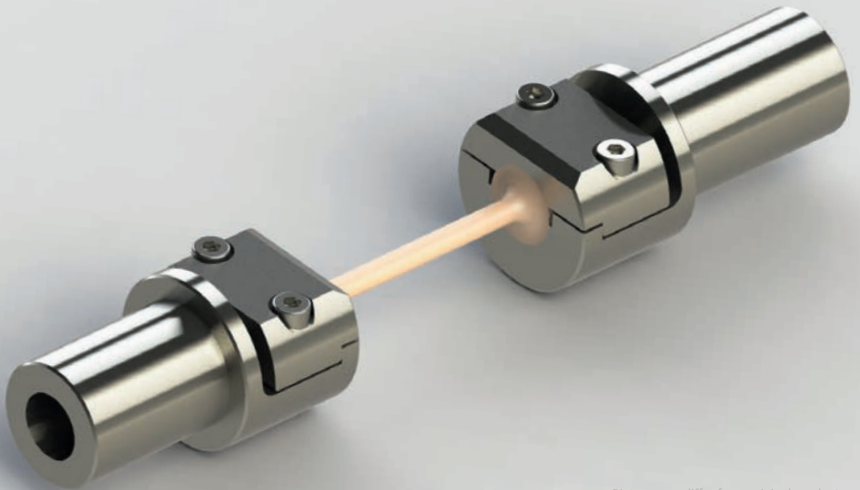


	Load Cell	10 N	500 N	10 000 N
Grippers	tensile tests	yes	yes	no
	compression tests	yes	yes	no
	thread load cell	M5	M5	
	maximum load	10 to 500 N (depends upon material and installed load cell)		
	included in a tensile module	on request, on MZ.Mb only		
Specimen	purpose	for biological sheet specimens		
	overall length	30 to 60 mm		
	thickness	1 to 5 mm		
	length of narrow area	10 to 40 mm		
	width at clamping end	40 mm		
	diameter of pivot holes	no pivot holes		
	distance of pivot holes	no pivot holes		
	specimen can be mounted with some tilt	no		
	opt. cooling/heating Module usable	yes	yes	

Tensile & Compression

MZC-Uh

- for tensile & compression experiments
- for round threaded specimens
- high forces

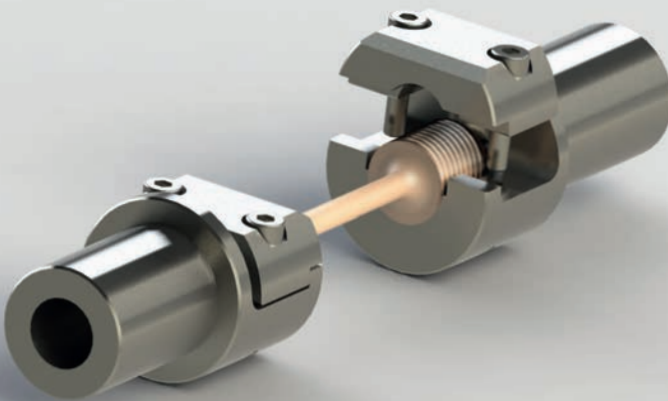


Picture may differ from original product.

Description

A sample holder to be used in the tensile module as an exchangeable clamping device. The set is made of two cylinders with threaded holes.

If the dimensions of the specimens are made available, a custom set of grips to fit will be manufactured and delivered with the main system. This clamping device was designed for routine testing of identical samples similar to the threaded-rod example shown above. Similar samples are often tested in machining or automotive plants. Their size may vary, but the machined ends should not change.

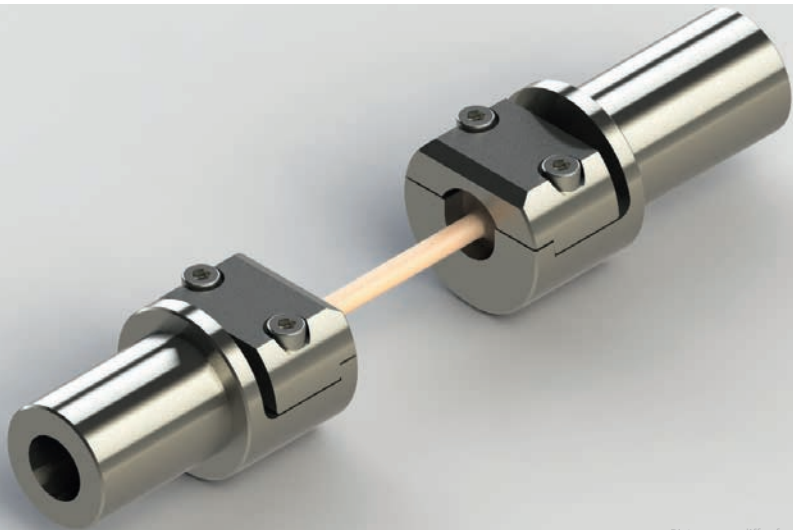


	Load Cell	1000 N	5000 N	10 000 N
Grippers	tensile tests	yes	yes	yes
	compression tests	yes	yes	yes
	thread load cell	M10	M10	M10
	maximum load	1000 to 10 000 N		
	included in a tensile module	on request		
	purpose	for threaded specimens		
Specimen	overall length	30 to 60 mm		
	specimen size	up to 10 mm rod with M10 threads machined to both ends		
	width of the area of interest			
	width at clamping ends	M10		
	diameter of pivot holes	no pivot holes		
	distance of pivot holes	no pivot holes		
	opt. cooling/heating Module usable	no		
	specimen can be mounted with some tilt	yes, any angle		

Tensile & Compression

MZC-Ui

- for tensile & compression experiments
- for round specimens
- high forces

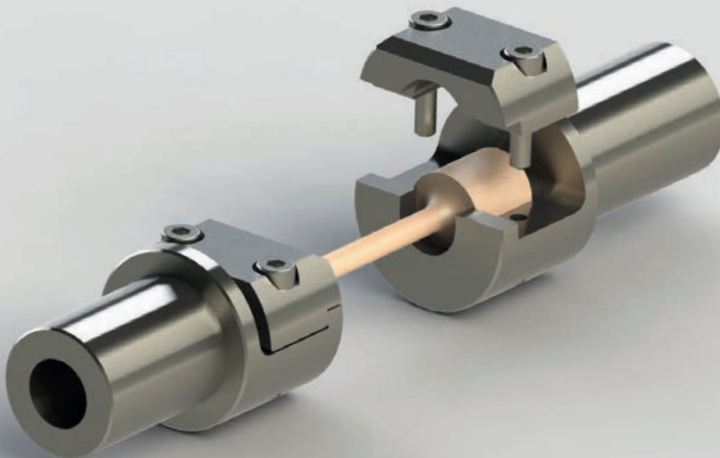


Picture may differ from original product.

Description

A sample holder to be used in the tensile module as an exchangeable clamping device. The set is made of two clamps ("micro vises") with a round "nest" at their lower side, to which the cylindrical ends of the specimen fit exactly. The geometry of the specimen must be known, because these holders are made to fit one particular specimen design.

This clamping device was designed for routine testing of identical samples similar to the round example shown below. Sample size may vary, but the machined ends should not change.

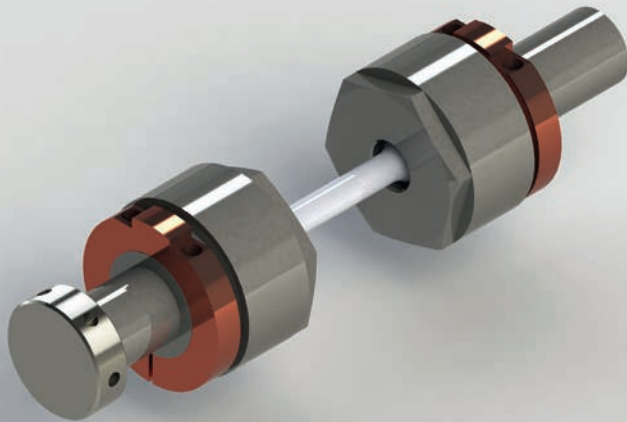


	Load Cell	1000 N	5000 N	10 000 N
Grippers	tensile tests	yes	yes	yes
	compression tests	yes	yes	yes
	thread load cell	M10	M10	M10
	maximum load	100 to 10 000 N		
	included in a tensile module	on request		
	purpose	for round specimens		
Specimen	overall length	30 to 60 mm		
	specimen size	up to 10 mm		
	width of the area of interest	10 to 40 mm		
	width at clamping ends	4 to 12 mm		
	diameter of pivot holes	no pivot holes		
	distance of pivot holes	no pivot holes		
	specimen can be mounted with some tilt	yes, any angle		
	opt. cooling/heating Module usable	no		

Tensile & Compression

MZC-Uj

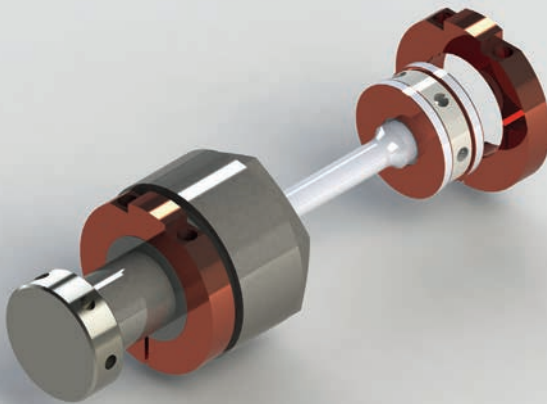
- for tensile & compression experiments
- for round threaded specimens
- high forces



Picture may differ from original product.

Description

A sample holder to be used in the tensile module as an exchangeable clamping device. The set is made for threaded metallic-samples. The clamp allows either to bias the sample with a voltage or heat it with electric current, while it is stressed by our tensile module.

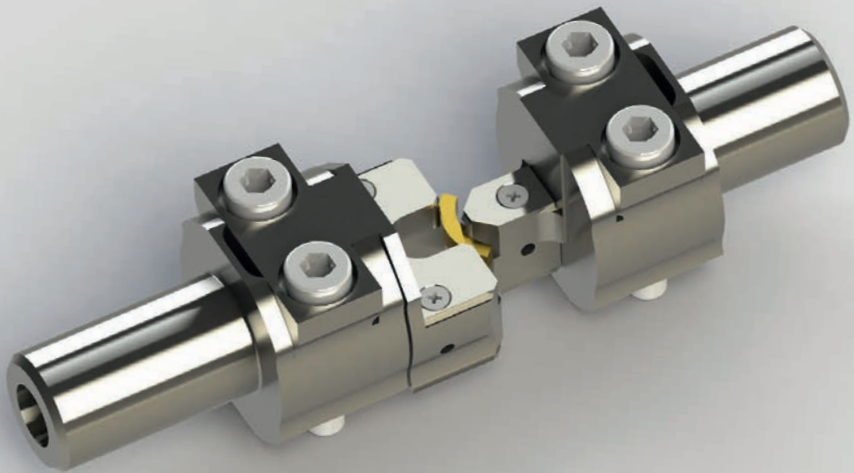


	Load Cell	1000 N	5000 N	10 000 N
Grippers	tensile tests	yes	yes	yes
	compression tests	yes	yes	yes
	thread load cell	M10	M10	M10
	maximum load	1000 to 10 000 N		
	included in a tensile module	on request		
	purpose	for threaded specimens		
Specimen	overall length	30 to 60 mm		
	specimen size	up to 10 mm rod with M10 threads machined to both ends		
	width of the area of interest			
	width at clamping ends	4 to 10 mm		
	diameter of pivot holes	no pivot holes		
	distance of pivot holes	no pivot holes		
	specimen can be mounted with some tilt	yes, any angle		
	opt. cooling/heating Module usable	no		

Special

MZC-Ba

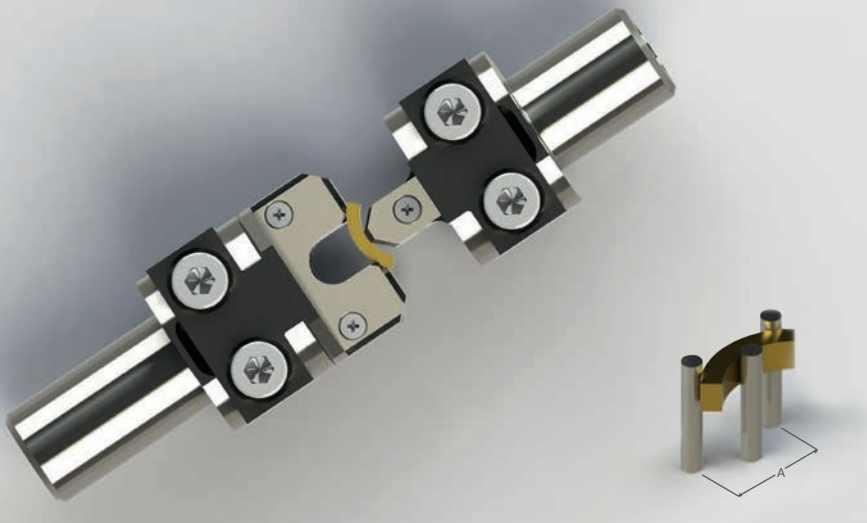
- for 3-point bending experiments
- for rectangular specimens
- high forces



Picture may differ from original product.

Description

This 3-point bending inserts can be used in the tensile module as an exchangeable test device. With this special adapter, in combination with the clamps MZC-U02 or MZC-U03, the tensile module can be used for bending tests. It is designed for testing rectangular specimens of various thickness, with the cut side viewed from above by the e-beam.

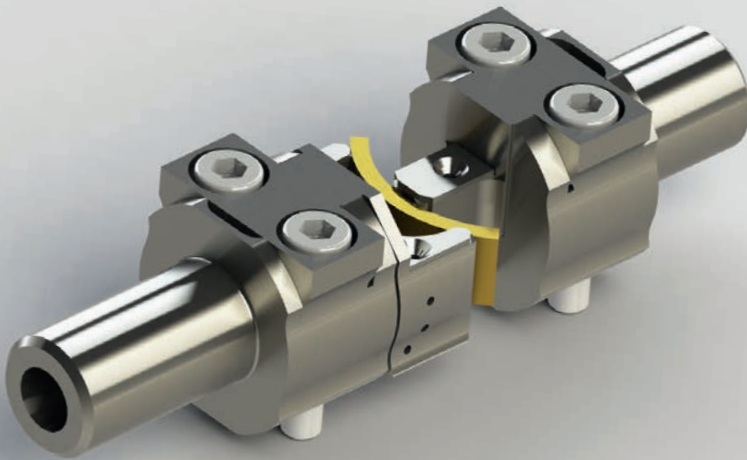


	Load Cell	10 N	1000 N	5000 N
Grippers	tensile tests	no	no	no
	compression tests	no	yes	yes
	thread load cell	M10		
	maximum load	1000 N to 5000 N; depends upon installed load cell		
	included in a tensile module	on request		
	purpose	3-point bending experiments		
Specimen	Specimen size for tensile module with:			
	38 mm spindle distance (MZ.Ms)	26 x 10 mm		
	58 mm spindle distance (MZ.Mb)	46 x 10 mm		
	60 mm spindle distance (Mz.Mb-L)	48 x 10 mm		
	specimen thickness	0,5 to 5mm		
	bending movement	up to 5 mm		
	A-distance of outer pins	22 mm		
	B-distance of inner pins (anvil)	single pin		
	specimen can be mounted with some tilt	yes, +/- 20°		
	opt. cooling/heating Module usable	no		

Special

MZC-Bb

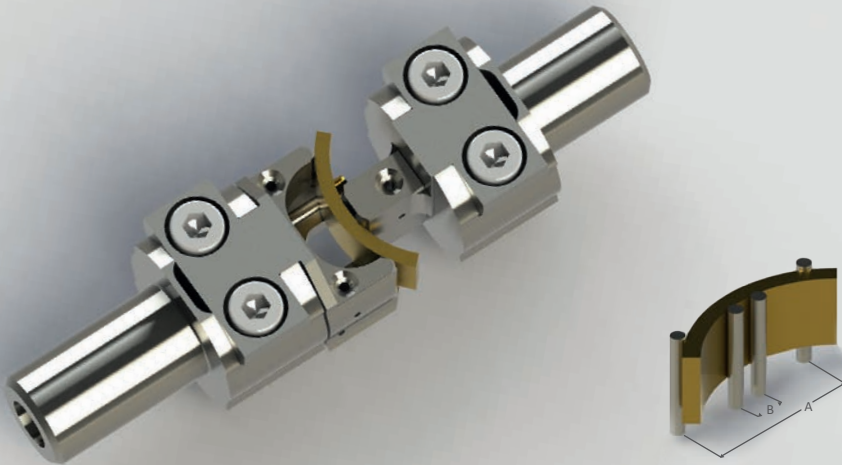
- for 4-point bending experiments
- for rectangular specimens
- high forces



Picture may differ from original product.

Description

This 4-point bending inserts can be used in the tensile module as an exchangeable test device. With this special adapter, in combination with the clamps MZC-U02 or MZC-U03, the tensile module can be used for bending tests. It is designed for testing rectangular specimens of various thickness, with the cut side viewed from above by the e-beam.

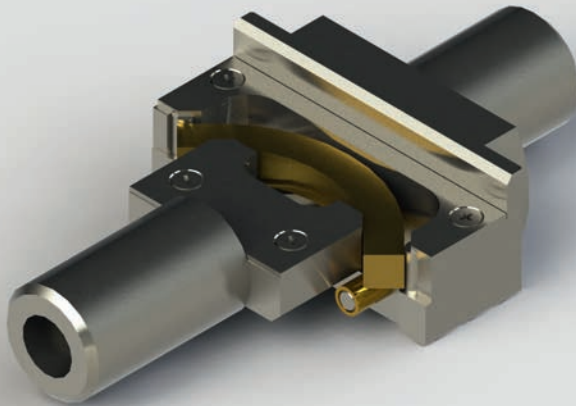


	Load Cell	10 N	1000 N	5000 N
Grippers	tensile tests	no	no	no
	compression tests	no	yes	yes
	thread load cell			M10
	maximum load		1000 N to 5000 N; depends upon installed load cell	
	included in a tensile module		on request	
	purpose	4-point bending experiments		
Specimen	Specimen size for tensile module with:			
	38 mm spindle distance (MZ.Ms)		26 x 10 mm	
	58 mm spindle distance (MZ.Mb)		46 x 10 mm	
	60 mm spindle distance (Mz.Mb-L)		48 x 10 mm	
	specimen thickness		0,5 to 5mm	
	bending movement		up to 5 mm	
	A-distance of outer pins		22 mm	
	B-distance of inner pins (anvil)		4 mm	
	specimen can be mounted with some tilt		yes +/- 20°	
	opt. cooling/heating Module usable		no	

Special

MZC-Bc

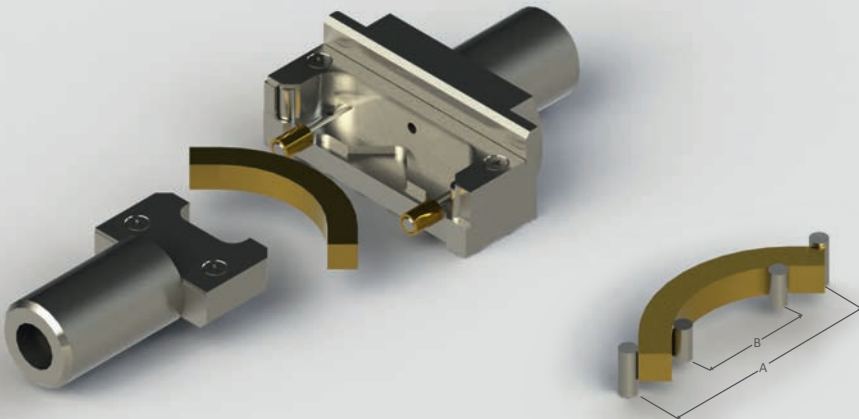
- for 4-point bending experiments
- for rectangular specimens
- high forces



Picture may differ from original product.

Description

This 4-point bending device can be used in the tensile module as an exchangeable test device. It is designed for testing rectangular specimens of various thickness, with the cut side viewed from above by the e-beam. The bending unit will be mounted directly to the load cell to give you more stiffness. The 2 inner bars can be set at varied distance between them.

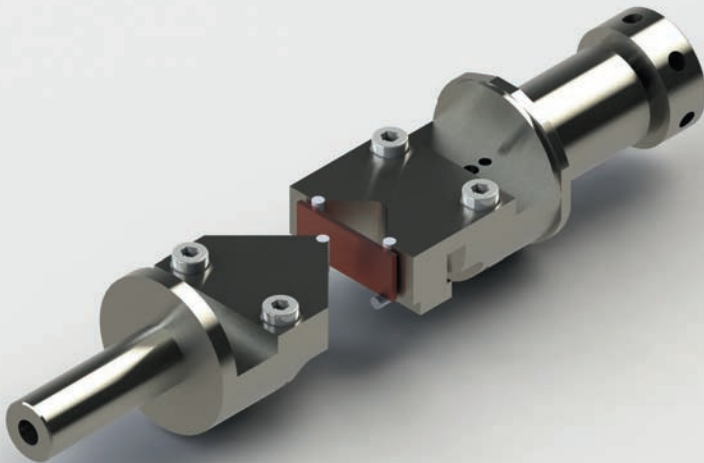


	Load Cell	10 N	1000 N	5000 N
Grippers	tensile tests	no	no	no
	compression tests	no	yes	yes
	thread load cell	M10		
	maximum load	1000 N to 5000 N; depends upon installed load cell		
	included in a tensile module	on request		
	purpose	4-point bending experiments		
Specimen	Specimen size for tensile module with:			
	38 mm spindle distance (MZ.Ms)	26 x 10 mm		
	58 mm spindle distance (MZ.Mb)	46 x 10 mm		
	60 mm spindle distance (Mz.Mb-L)	48 x 10 mm		
	specimen thickness	0,5 to 5mm		
	bending movement	up to 5 mm		
	A-distance of outer pins	22 mm		
	B-distance of inner pins (anvil)	4 mm		
	specimen can be mounted with some tilt	+20°/- 20°		
	opt. cooling/heating Module usable	no		

Special

MZC-Bd

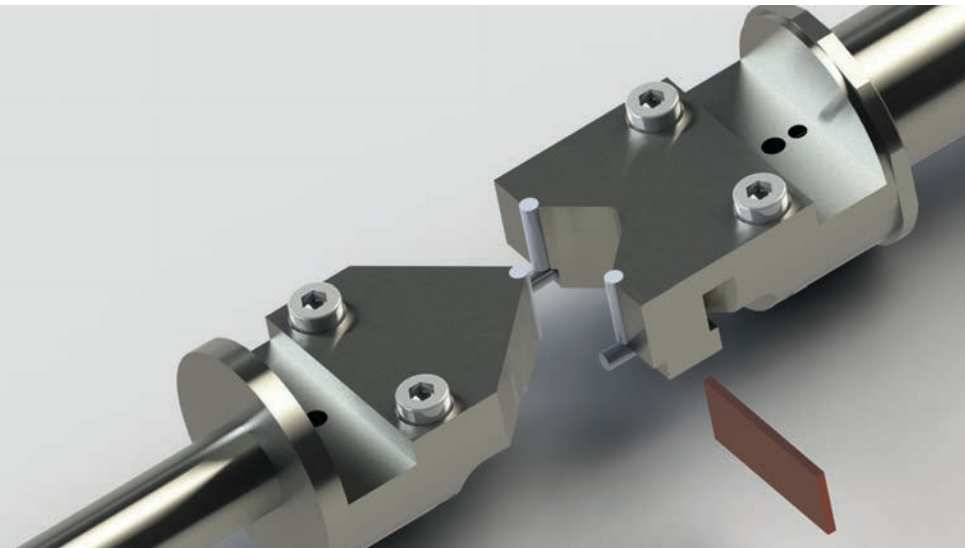
- for bending experiments
- for rectangular specimens
- low forces



Picture may differ from original product.

Description

This 3-point bending inserts can be used in the tensile Module as an exchangeable test device. It is designed for testing rectangular specimens of various thickness, with the cut side viewed from above by the e-beam. Can be used with MZC-U01 only. This is the low-force version of our 3-point bending unit.

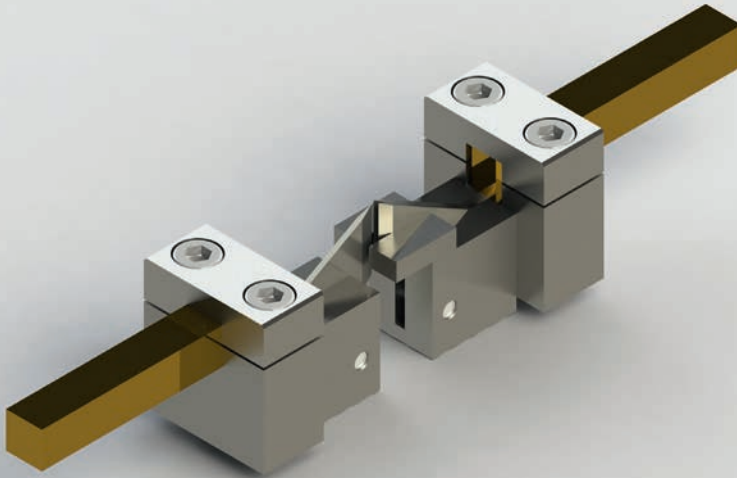


	Load Cell	10 N	200 N	500 N
Grippers	tensile tests	no	no	no
	compression tests	yes	yes	yes
	thread load cell		M5	
	maximum load	10 N to 500 N; depends upon installed load cell		
	included in a tensile module	on request		
	purpose	3-point bending experiments		
Specimen	Specimen size for tensile module with:			
	38 mm spindle distance (MZ.Ms)		26 x 10 mm	
	58 mm spindle distance (MZ.Mb)		46 x 10 mm	
	60 mm spindle distance (Mz.Mb-L)		48 x 10 mm	
	specimen thickness		0,5 to 2mm	
	bending movement		up to 5 mm	
	A-distance of outer pins		10 to 20 mm	
	B-distance of inner pins (anvil)		Single Pin	
	specimen can be mounted with some tilt		no	
	opt. cooling/heating Module usable		no	

Special

MZC-Be (only in combination with a K&W fiber tensile module)

- for bending experiments
- for fiber specimens
- very low forces

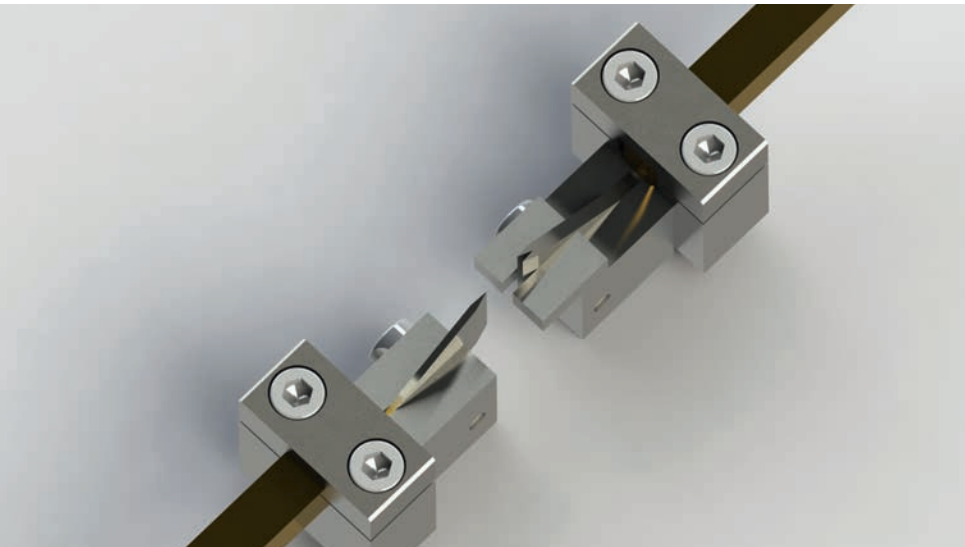


Picture may differ from original product.

Description

This very unique fixture can be mounted in the „Fiber Tensile Module“ instead of the standard fiber clamping. It was made especially according to a customer's request, to make use of the extremely fine load measuring capability off the fiber tester.

The objective is to bend fine wires, whiskers, or fibers of only a few microns, under SEM observation. Two razor blade edges are mounted side by side, 500 μm (or any longer required distance) apart from each other. A third blade is mounted at the opposite side, so that it can move into the gap between the other two blades. The operator makes the blades touch the specimen very gently. While the bending experiment is running, load and elongation are recorded, and visual, or video observation can be made.

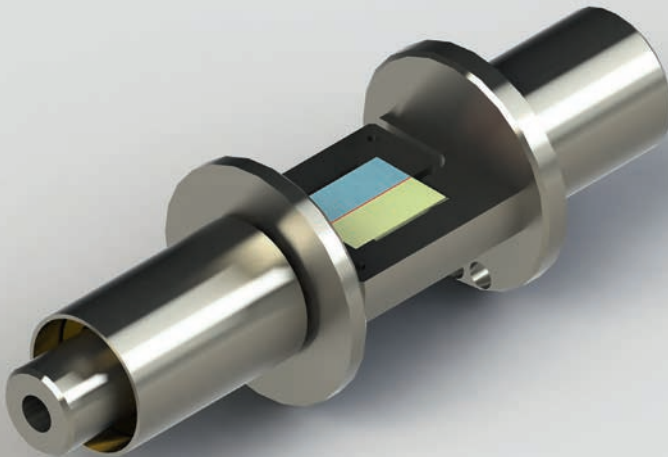


	Load Cell	1 N	200 N	500 N
Grippers	bending tests	yes	no	no
	tensile tests	no	no	no
	compression tests	no	no	no
	thread load cell	no		
	maximum load	max 1 N only		
	included in a tensile module	on request		
	purpose	bending experiments in "Fiber Tensile Module"		
Specimen	overall length	longer than 500 μm		
	size	up to 100 μm		
	bending movements	-		
	distance of pivot holes	no pivot holes		
	specimen can be mounted with some tilt	no		
	opt. cooling/heating Module usable	no		

Special

MZC-Sa

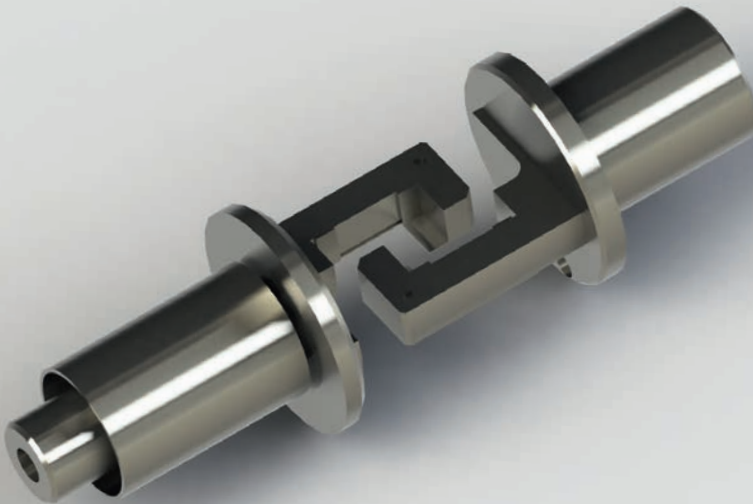
- for shear tests
- for solder- or cement interfaces
- high forces



Picture may differ from original product.

Description

A sample holder to be used in the tensile module as an exchangeable clamping device. The clamping device for this operation consists of two approximately C-shaped structures being mirror image to each other. The two objects marked blue and green in the sketch above are lined up in such a way, that the soldered or cemented surfaces are oriented precisely along the line through the pivot holes (vertical line shown in red). Two set screws make setting up easy, using a flat surface (e.g. a glass plate). In order to understand the mechanical behavior of solder- or cement joints, one must apply tensile force exactly along the interface between the two objects soldered or cemented together (see sketch above).

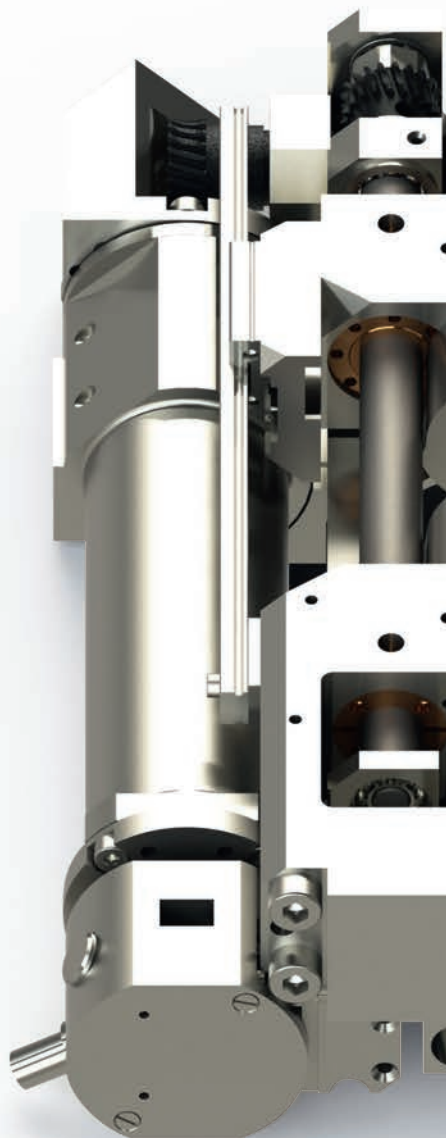


	Load Cell	100 N	500 N	2000 N
Grippers	tensile tests	no	yes	yes
	compression tests	no	no	no
	thread load cell		M5 or M10	M10
	maximum load	500 N to 2000 N; depends upon installed load gauge		
	included in a tensile module	on request		
	purpose	shear tests on solder- or cement interfaces		
Specimen	overall length	10 to 30 mm		
	thickness	4 mm (or according to user's requirements)		
	length of narrow area	4 mm (or according to user's requirements)		
	width at clamping end	25 mm (or according to user's requirements)		
	specimen can be mounted with some tilt	no		
	opt. cooling/heating Module usable	no		

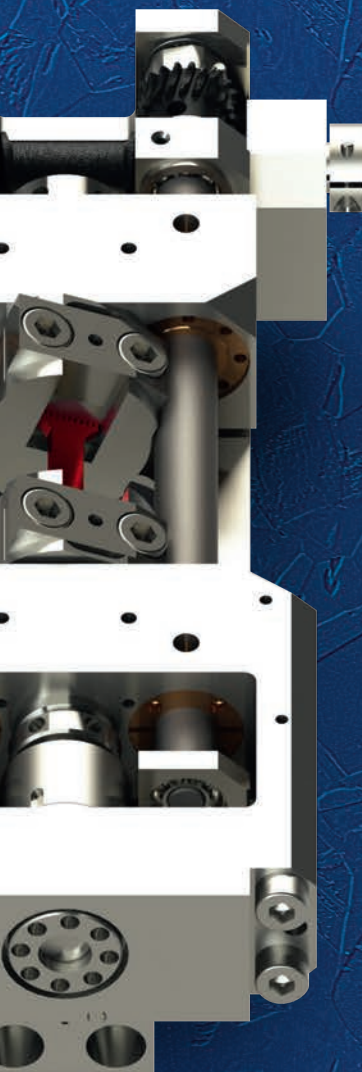
We're here to help and answer any question you might have, about our products, regardless how microscopic. We look forward to hearing from you.

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