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HILMA ■ STARK

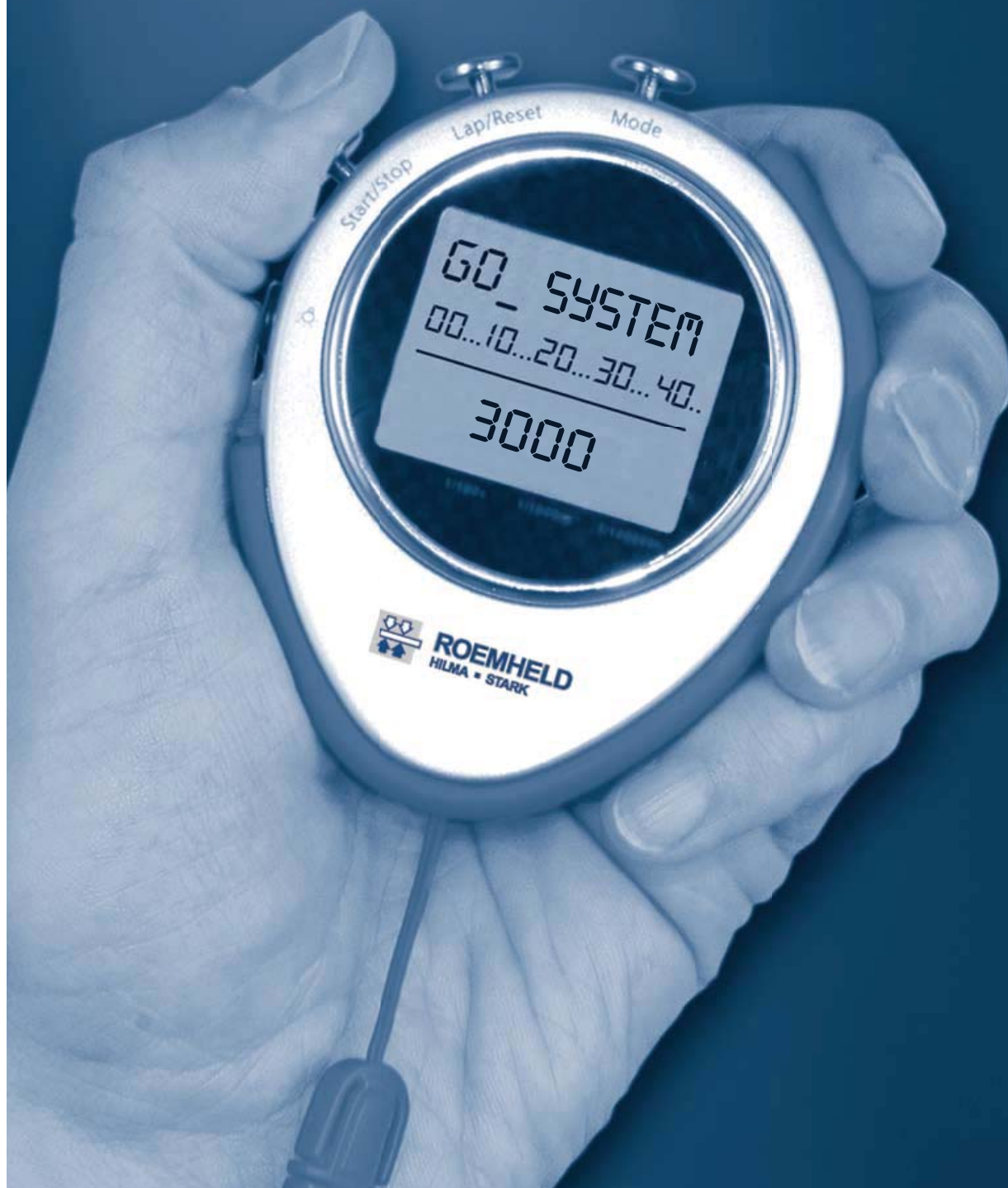


Zero point clamping system • system 3000

WM-020-333-00-en

P r o d u c t s | *f o r* | **p r o d u c t i v i t y**

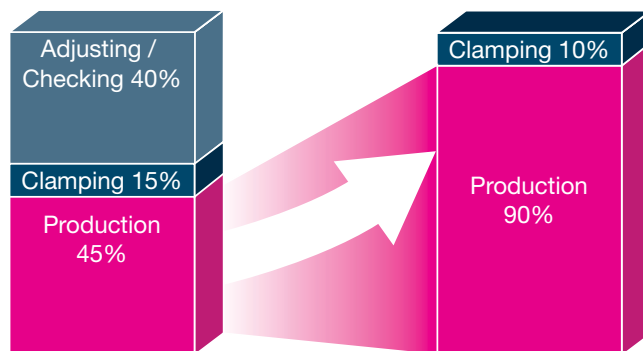
- unique
 - push-on
 - very strong
 - automatic
 - monitored
- flush mounted SPEEDY and spigot
 - handling without interfering contour
 - 50kN retention force
 - suitable for automation
 - all functions can be polled



GO!

Maximum productivity

- With the system 3000 you will increase your production times to a maximum.
- This clamping element stands for the highest requirements in automation.



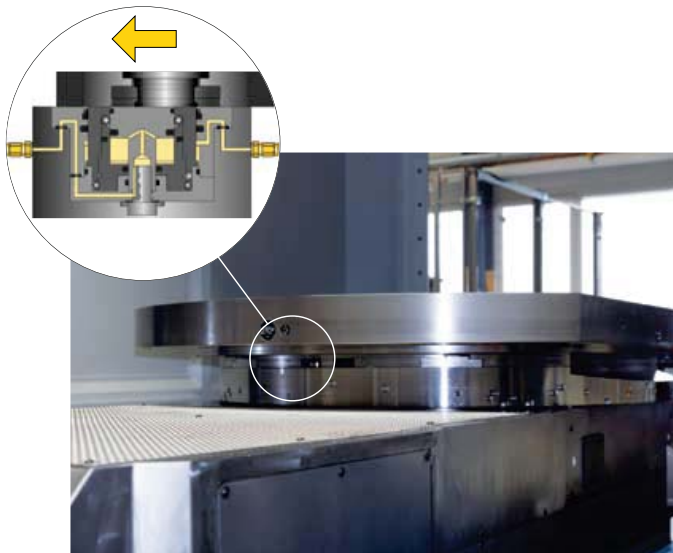
Maximum flexibility

- system 3000 has a uniform interface that can be arranged in various ways.
- system 3000 features a compact design, easy assembly as well as fast changing cycles.

Maximum safety

- Double-action zero point clamping system with small size and high clamping force.
- Easy handling, as the pallet can be moved to the clamping element with practically no lifting.

system 3000 – will pay for itself in a very short time.



Zero point clamping system

system ³⁰⁰⁰



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STARK clamping systems overview

Differentiation is by the method of actuation and varying size of the retractable nipples:

SPEEDY classic – clamp mechanically / release hydraulically

Most complete and versatile zero point clamping system.

- Four sizes and numerous variants



SPEEDY classic 1

Catalogue order no. WM-020-217-00-en



SPEEDY classic 2

Catalogue order no. WM-020-276-00-en



SPEEDY classic 3

Catalogue order no. WM-020-278-00-en



SPEEDY classic 4

Catalogue order no. WM-020-280-00-en

SPEEDY metec – clamp / release mechanically

Robust mechanical zero point clamping system for simple, low cost solutions.

- Three sizes



SPEEDY metec 1

Catalogue order no. WM-020-282-00-en



SPEEDY metec 2

Catalogue order no. WM-020-284-00-en



SPEEDY metec 3

Catalogue order no. WM-020-286-00-en

SPEEDY airtec – clamp mechanically / release pneumatically

Pneumatic zero point clamping system.

- One size and numerous variants



SPEEDY airtec 1

Catalogue order no. WM-020-288-00-en

SPEEDY hydratec – clamp / release hydraulically

Hydraulic, double-action zero point clamping system for very high clamping speeds.

- One size and numerous variants



SPEEDY hydratec 1

Catalogue order no. WM-020-290-00-en

system 3000 – clamp / release hydraulically

Double-action zero point clamping system with small size and high clamping force.

- One size and numerous variants



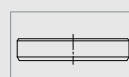
system ³⁰⁰⁰

Catalogue order no. WM-020-333-00-en

system 4000 – custom systems

Flexible zero point clamping system for mechanical, pneumatic and hydraulic applications.

- One size and numerous variants



system ⁴⁰⁰⁰

Catalogue order no. WM-020-067-00-en

Information

i.4

Zero point clamping system

system **3000**



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Contents system 3000

Information	STARK clamping systems overview Contents system 3000 Technical data Function description i.4 i.5 i.6 i.9
system 3000	<ul style="list-style-type: none"> ● Standard ● Standard ● Standard ● Standard 	Order no. 3000 850 1.1 3000 851 1.2 3000 852 1.3 3000 853 1.4
Clamping spigot	<ul style="list-style-type: none"> ● With zero point ● With equaliser ● Without centring ● With equaliser ± 1mm ● Without centring ± 1mm 	3000 818 2.1 3000 811 2.1 3000 812 2.2 3000 811-1 2.3 3000 812-1 2.4
Accessories	Ball ring ● Round wire ring with 36 balls	3000 901 2.4

Zero point clamping system

system ³⁰⁰⁰



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Technical data -

Transparency from the start

system 3000 Order no.		3000 850	3000 851	3000 852	3000 853
Catalogue page		1.1	1.2	1.3	1.4
Polling pin			●		
4 raised supports and clearing device		●	●		
Oil feed, flange		●	●	●	●
Oil feed, base					●
Maintenance interval	Cycles	500,000	500,000	500,000	500,000
Max. clamping force ¹	[N]	50,000	50,000	50,000	50,000
Min. release pressure	[bar]	20	20	20	20
Max. operating pressure	[bar]	200	200	200	200
Oil volume for clamping	[cm ³]	75	75	75	75
Oil volume for releasing	[cm ³]	23	23	23	23
Air volume - clearing device	[l/min.]	80/min 6bar	80/min 6bar		
Operating temperature	[°C]	+10 to +80	+10 to +80	+10 to +80	+10 to +80
Min. permissible clamping time	[s]	1	1	1	1
Min. permissible release time	[s]	1	1	1	1
Radial pre-positioning ²	[mm]	± 0.4	± 0.4	± 0.4	± 0.4
Axial pre-positioning	[mm]	+0.1	+0.1	+0.1	+0.1
Repeatability ³	[mm]	< 0.005	< 0.005	< 0.005	< 0.005
System accuracy ⁴	[mm]	< 0.01	< 0.01	< 0.01	< 0.01
Weight	[kg]	approx. 3.75	approx. 4.45	approx. 3.75	approx. 3.75

¹ Clamping force

Clamping force refers to the load up to which the zero point is guaranteed. The clamping force stated must not be exceeded. Due to the adjustable clamping force, there is a maximum, at the maximum clamping pressure (see table below).

² Radial pre-positioning

The loading device must, during manual and automated loading, yield without the application of force.

³ Repeatability

Repeatability refers as a rule to the accuracy with which the same pallet in a specific orientation is changed on the same interface.

⁴ System accuracy

System accuracy refers to the accuracy obtained on changing several pallets, e.g. on different machines.

Information

i.6

Zero point clamping system

system **3000**



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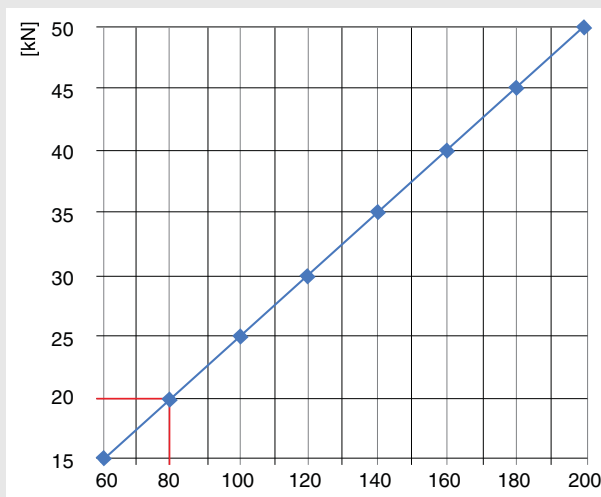
Variable clamping force with system 3000.

The continuously adjustable clamping force makes possible optimal clamping. By adjusting the clamping pressure, unnecessarily high forces are not applied. As a result the receptacles or pallets do not need to be as strong, depending on the machining - the result is advantages in handling and price.

A key aspect, e.g. during milling, is ensuring an adequate, but not excessively high clamping force during the machining to be able to absorb the machining forces. Clamping based on shape and force is ideal.

Depending on the clamping pressure, there is a clamping force of:

Clamping force / clamping pressure diagram



Example calculation:

Hydraulic clamping pressure = 80bar. According to the diagram this will give a clamping force of 20,000N.



Fail-safe:

The system 3000 is not self-locking. If all lines are switched to the tank the pallet can be removed with a low force of 300N.

Zero point clamping system

system 3000



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Technical data - Tilting torque example calculation

Profit from our specialist competence

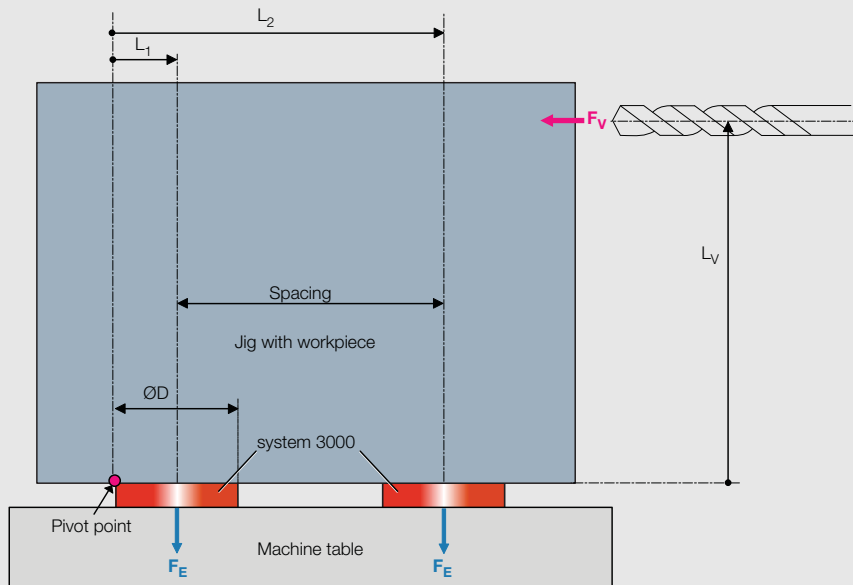


Example:

Fast closing clamp plate 4x system 3000 with 200 x 200 spacing and max. feed force of 7kN with distance of 400mm and clamping pressure 80bar.

Question:

Due to the predominance of roughing work, the system is to be checked for double safety. Are the insertion force, number of fast closing clamps and the selected spacing right for this application?



Solution:

$$M_E > 2 \times M_V ?$$

$$M_V = F_V \times L_V = 7.000\text{N} \times 0,4\text{m}$$

$$M_V = 2.800\text{Nm}$$

$$M_E = 2 \times (F_E \times L_1) + 2 \times (F_E \times L_2)$$

$$M_E = 2 \times F_E \times (L_1 + L_2)$$

$$L_1 = \text{ØD} / 2$$

$$L_2 = \text{ØD} / 2 + \text{Spacing}$$

$$L_1 + L_2 = \text{ØD} + \text{Spacing}$$

$$L_1 + L_2 = 0,12\text{m} + 0,200\text{m} = 0,32\text{m}$$

$$M_E = 2 \times F_E \times (L_1 + L_2) = 2 \times 20.000\text{N} \times 0,32\text{m}$$

$$M_E = 12800\text{Nm}$$

$$M_E / M_V > 2 ?$$

$$M_E / M_V = 12800\text{Nm} / 2.800\text{Nm}$$

$$M_E / M_V = 4,57 > 2$$

M_V : Moment from feed force

M_E : Moment from insertion force

F_V : Feed force (7.000N)

F_E : Insertion force (20.000N) at 80bar (s. p. i.7)

Spacing = 200mm = 0,20m

ØD: 125mm \approx 0,12m*

L_V : 400mm = 0,40m

With this design, safety by around a factor of 4,57-times is provided.

The pressure could be reduced to 34bar to reach the double safety.

(All dimensions to be entered in SI units (metres, Newtons))

*Insert at duct Ø85.

Zero point clamping system

system ³⁰⁰⁰



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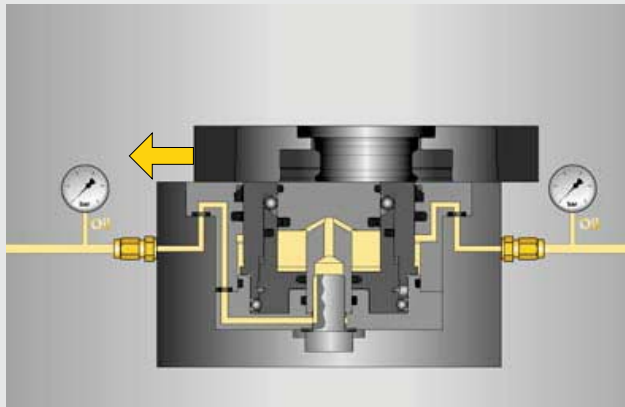
Function description SYSTEM 3000 –

Positioning and clamping in one function

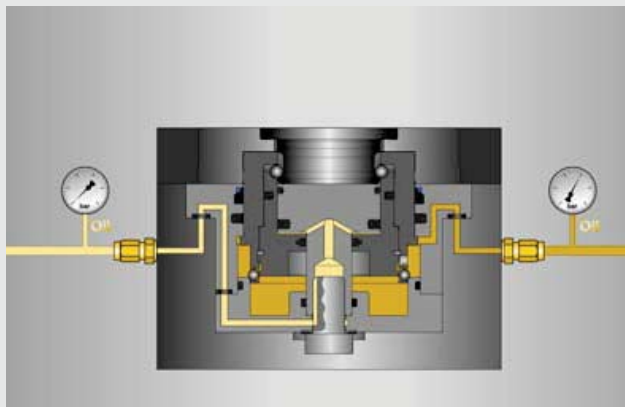


Principle of operation:

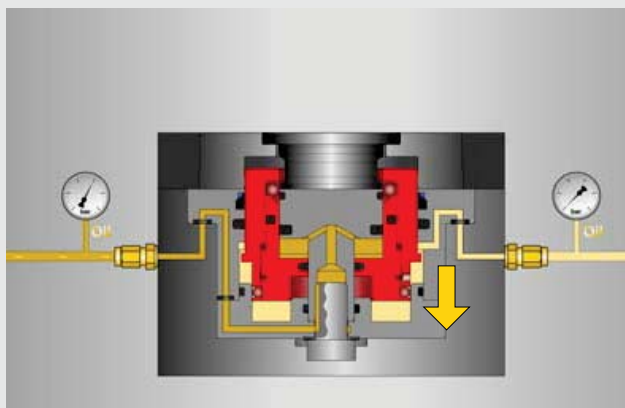
Move to system 3000:
Simple positioning of the pallet with radial pre-centring of $\pm 0.4\text{mm}$.



system 3000 clamped:
The piston is pressed up and during this process positions the pallet precisely. The inner piston follows (sequential control), the ball chain clamps the clamping spigot with its shape. The clamping pressure is now applied to the system.



Release system 3000:
On releasing the inner piston moves down, the ball chain releases the clamping spigot, then the outer piston is lowered and the pallet released.



Information

i.9

Zero point clamping system

system 3000



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Standard

- Module
- Raised supports
- Clearing device
- Pneumatic mount control
- Central locking



Characteristics:

Flush Mount fast closing clamp module made of high quality tool steel.

Due to the compact dimensions, requires little space. Can be installed as a module, in plates or directly in the machine table. Double-action fast closing clamp, hydraulically clamped and released. Due to its short cycle times, particularly suitable for automation.

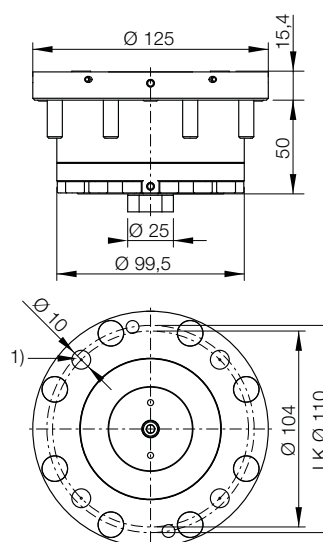
The oil feed is via the flange. Intelligent clearing system for cleaning the bearing surface and the precision bore. Mount control via differential pressure, blocking air possible.

Application:

For flush mounting in machines, machine pallets, plates, angles, cubes, mounting towers and swivelling yokes.

Can be used for all common machining tasks such as milling, grinding, eroding as well as on test stands and mounting devices.

Ideal for automated loading.



Z 3000 850

1) Raised supports with central clearing device (0.4mm high)

Order no.	Retention force	Clamping force	Pressure max. *	Weight	Data sheet
3000 850	50,000N	50,000N	200bar	3.75kg	D039

* For pressure for releasing and clamping the system 3000 see also page i.6 and i.7.



Practical example:

Mounted directly into the machine table. The pallet moves sideways, practically without lifting, onto the clamping element.



system 3000

1.1

Zero point clamping system

system 3000



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Standard

- Module
- Raised supports
- Clearing device
- Pneumatic mount control
- Polling feature
- Central locking



Characteristics:

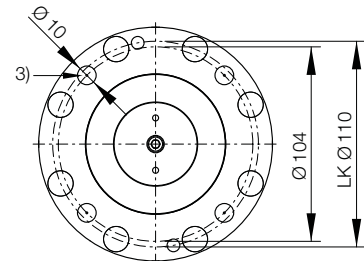
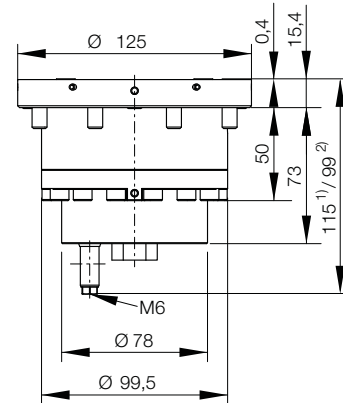
Flush Mount fast closing clamp module made of high quality tool steel.

Due to the compact dimensions, requires little space. Can be installed as a module, in plates or directly in the machine table. Double-action fast closing clamp. Is clamped and released hydraulically. Due to its short cycle times, particularly suitable for automation. The oil feed is via the flange. Intelligent clearing system for cleaning the bearing surface and the precision bore. Mount control via differential pressure, blocking air possible.

Application:

For flush mounting in machines, machine pallets, plates, angles, cubes, mounting towers and swivelling yokes.

Can be used for all common machining tasks such as milling, grinding, eroding as well as on test stands and mounting devices. Ideal for automated loading.



Z 3000 851

- 1) Polling pin released
- 2) Polling pin clamped
- 3) Raised supports with central clearing device (0.4mm high)

Order no.	Retention force	Clamping force	Pressure max. *	Weight	Data sheet
3000 851	50,000N	50,000N	200bar	4.45kg	D039

* For pressure for releasing and clamping the system 3000 see also page i.6 and i.7.



Practical example:

system 3000 completely recessed into machine table.



system 3000

1.2

Zero point clamping system

system **3000**



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Standard

- Module
- Bearing ring
- Central locking



Characteristics:

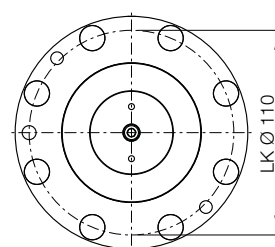
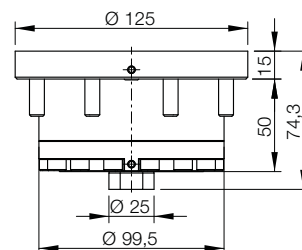
Flush Mount fast closing clamp module made of high quality tool steel.

Due to the compact dimensions, requires little space. Can be installed as a module, in plates or directly in the machine table. Double-action fast closing clamp. Is clamped and released hydraulically. Due to its short cycle times, particularly suitable for automation. The oil feed is via the flange.

Application:

For flush mounting in machine pallets, plates, angles, cubes, towers and swivelling yokes.

Can be used for all common machining tasks such as milling, turning, grinding, eroding as well as on test stands for mounting devices. Ideal for automated loading.



Z 3000 852

Order no.	Retention force	Clamping force	Pressure max. *	Weight	Data sheet
3000 852	50,000N	50,000N	200bar	3.75kg	D092

* For pressure for releasing and clamping the system 3000 see also page i.6 and i.7.



Practical example:



Integrated system 3000 with cones for pre-centring.



Usage of the system 3000 in a custom machine in the automotive manufacturing sector. The task of the fast changing element is to clamp and position a work-piece carrier in an integrated universal press up to 50kN. The stipulated cycle times for the press-fitting processes are 5 seconds.



The advantage of the element in this example is the magnitude of the clamping force in relation to the installation volume as well as the dirt-resistant smooth surface. A further option is the contact-free polling of the clamping element.

system 3000

1.3

Zero point clamping system

system 3000



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Standard

- Module
- Bearing ring
- Central locking
- Pipe connection



Characteristics:

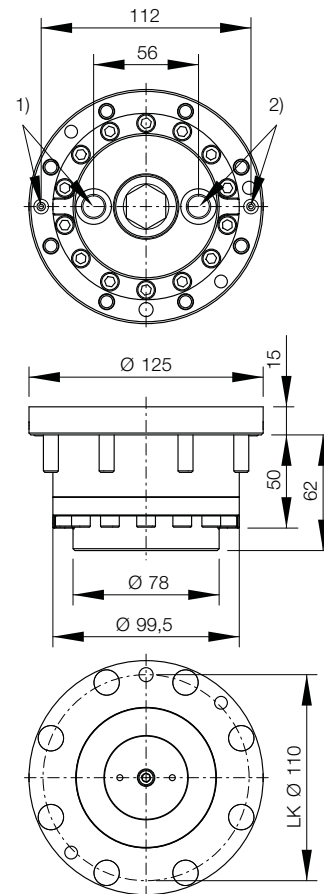
Flush Mount fast closing clamp module made of high quality tool steel.

Due to the compact dimensions, requires little space. Can be installed as a module, in plates or directly in the machine table. Double-action fast closing clamp. Is clamped and released hydraulically. Due to its short cycle times, particularly suitable for automation. The oil feed is via the flange or the base.

Application:

For flush mounting in machine pallets, plates, angles, cubes, towers and swiveling yokes.

Can be used for all common machining tasks such as milling, turning, grinding, eroding as well as on test stands for mounting devices. Ideal for automated loading.



Z 3000 853

- 1) Release connection via O-ring or thread 1/4"
- 2) Clamp connection via O-ring or thread 1/4"

Order no.	Retention force	Clamping force	Pressure max. *	Weight	Data sheet
3000 853	50,000N	50,000N	200bar	3.75kg	D092

* For pressure for releasing and clamping the system 3000 see also page i.6 and i.7.

system 3000

1.4

Zero point clamping system

system 3000



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Clamping spigot

- With zero point
- With retaining ring

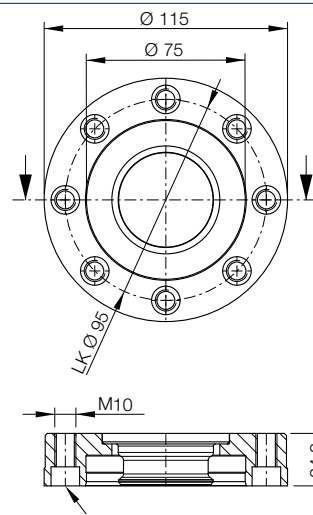


Characteristics:

Clamping spigot with zero point.

Application:

For positioning and clamping on machine pallets, machine vices, chucks, jigs, direct workpiece clamping.



Z 3000 818

1) 8 counterbores for screws DIN 912, M8

Order no.	Screw quality	Tightening torque at the screw	Weight	Data sheet
3000 818	min. 10.9	48Nm	1.5kg	D093

Clamping spigot

- With equaliser
- With retaining ring

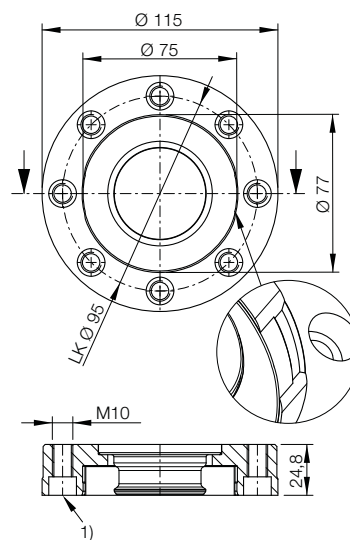


Characteristics:

Clamping spigot with equaliser.

Application:

For positioning and clamping on machine pallets, machine vices, chucks, jigs, direct workpiece clamping.



Z 3000 811

1) 8 counterbores for screws DIN 912, M8

Order no.	Screw quality	Tightening torque at the screw	Weight	Data sheet
3000 811	min. 10.9	48Nm	1.5kg	D093

Clamping spigot

2.1

Zero point clamping system

system 3000



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Clamping spigot

● With retaining ring

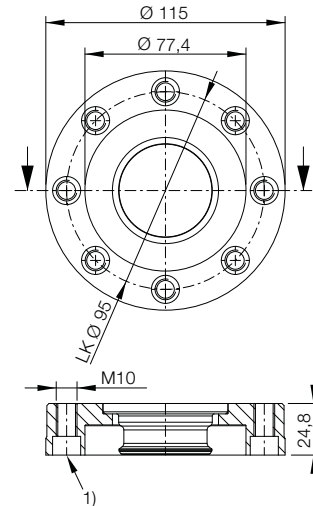


Characteristics:

Clamping spigot without centring.

Application:

For positioning and clamping on machine pallets, machine vices, chucks, jigs, direct workpiece clamping.

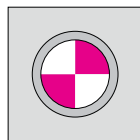


Z 3000 812

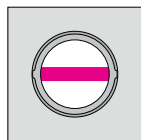
1) 8 counterbores for screws DIN 912, M8

Order no.	Screw quality	Tightening torque at the nipple	Tightening torque at the screw	Weight	Data sheet
3000 812	min. 10.9	73Nm	48Nm	1.5kg	D093

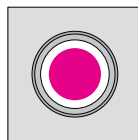
Zero point clamping



1)



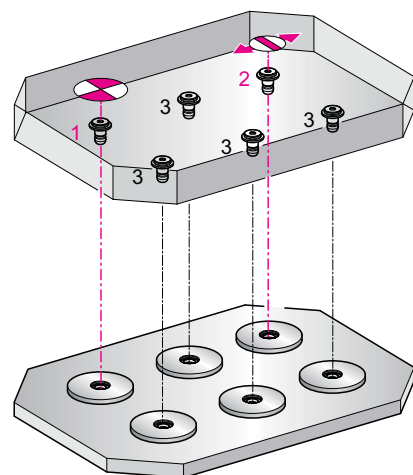
2)



3)

- 1) Clamping spigot with zero point
- 2) Clamping spigot with equaliser
- 3) Clamping spigot without centring

Clamping spigot with zero point at the top left corner of the pallet



Application:

Equalisation of thermal expansion and manufacturing tolerances.

Clamping spigot

2.2

Zero point clamping system

system 3000



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Clamping spigot

- With equaliser ± 1 mm
- With retaining ring

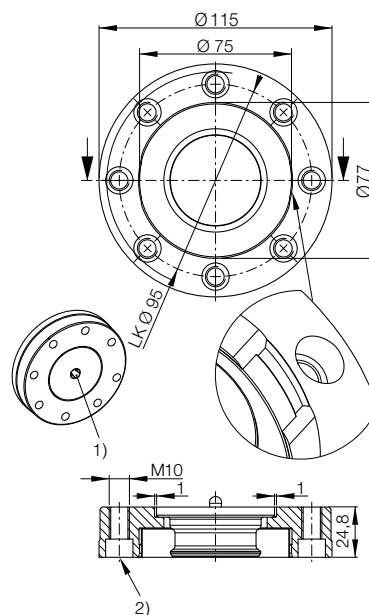


Characteristics:

Clamping spigot with equaliser ± 1 mm.

Application:

For positioning and clamping on machine pallets, machine vices, chucks, jigs, direct workpiece clamping.



Z 3000 811-1

1) Spring pressure piece

2) 8 counterbores for screws DIN 912, M8

Order no.	Screw quality	Tightening torque at the screw	Weight	Data sheet
3000 811-1	min. 10.9	48Nm	1.5kg	D093



Clamping spigot with retainer and ± 1 mm equaliser

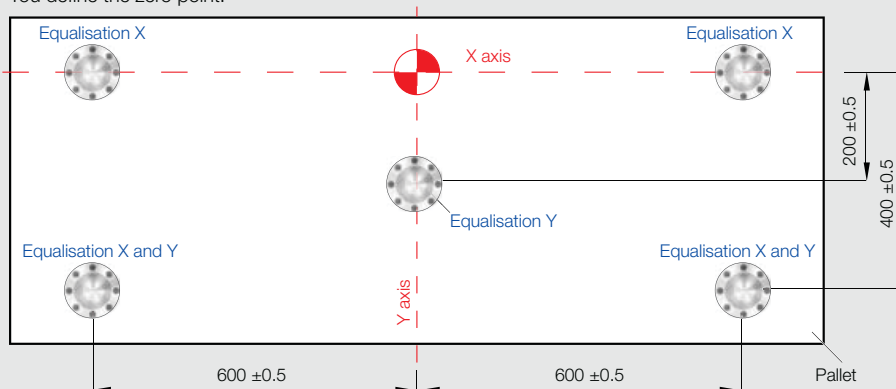
Manufacturing tolerances ± 0.5 mm?

Due to the equalisation it is sufficient to position the elements with generous tolerances. The entire system has zero point accuracy.

Thermal expansion?

The system can compensate for changes in length up to ± 1 mm in total.

You define the zero point!



Example, other arrangement variants possible.

Clamping spigot

2.3

Zero point clamping system

system 3000



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Clamping spigot

- Without centring ± 1 mm
- With retaining ring



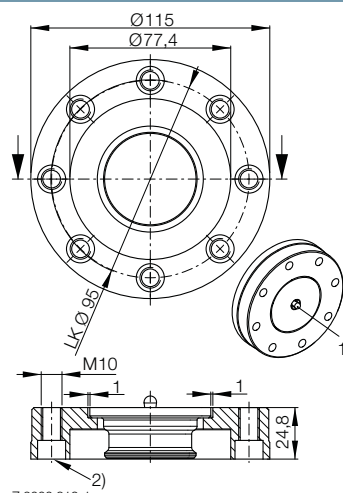
Info: For sketch see previous page.

Characteristics:

Clamping spigot without centring ± 1 mm.

Application:

For positioning and clamping on machine pallets, machine vices, chucks, jigs, direct workpiece clamping.



Z 3000 812-1

1) Spring pressure piece

2) 8 counterbores for screws DIN 912, M8

Order no.	Screw quality	Tightening torque at the nipple	Tightening torque at the screw	Weight	Data sheet
3000 812-1	min. 10.9	73Nm	48Nm	1.5kg	D093

Ball ring for system 3000



Characteristics:

Ball ring component with round wire ring and 36 balls with flats.

Application:

For clamping and releasing the clamping spigot.

Order no.

3000 901



Your advantages:

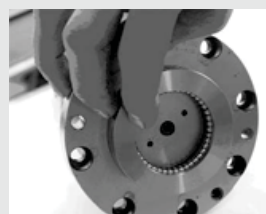
Easy replacement in accordance with operating instructions WM-020-309.



1) Pull off the ball ring using two fingers.



2) Lightly grease the ball ring prior to assembly. Fit the bottom end of the replacement ball ring in the groove.



3) Snap ball ring into the groove.

Clamping spigot

2.4

Only the original ...



...fits together!

For this reason our customers receive:

- A manufacturer's guarantee
- A function guarantee
- Warranty protection
- A range of fits

