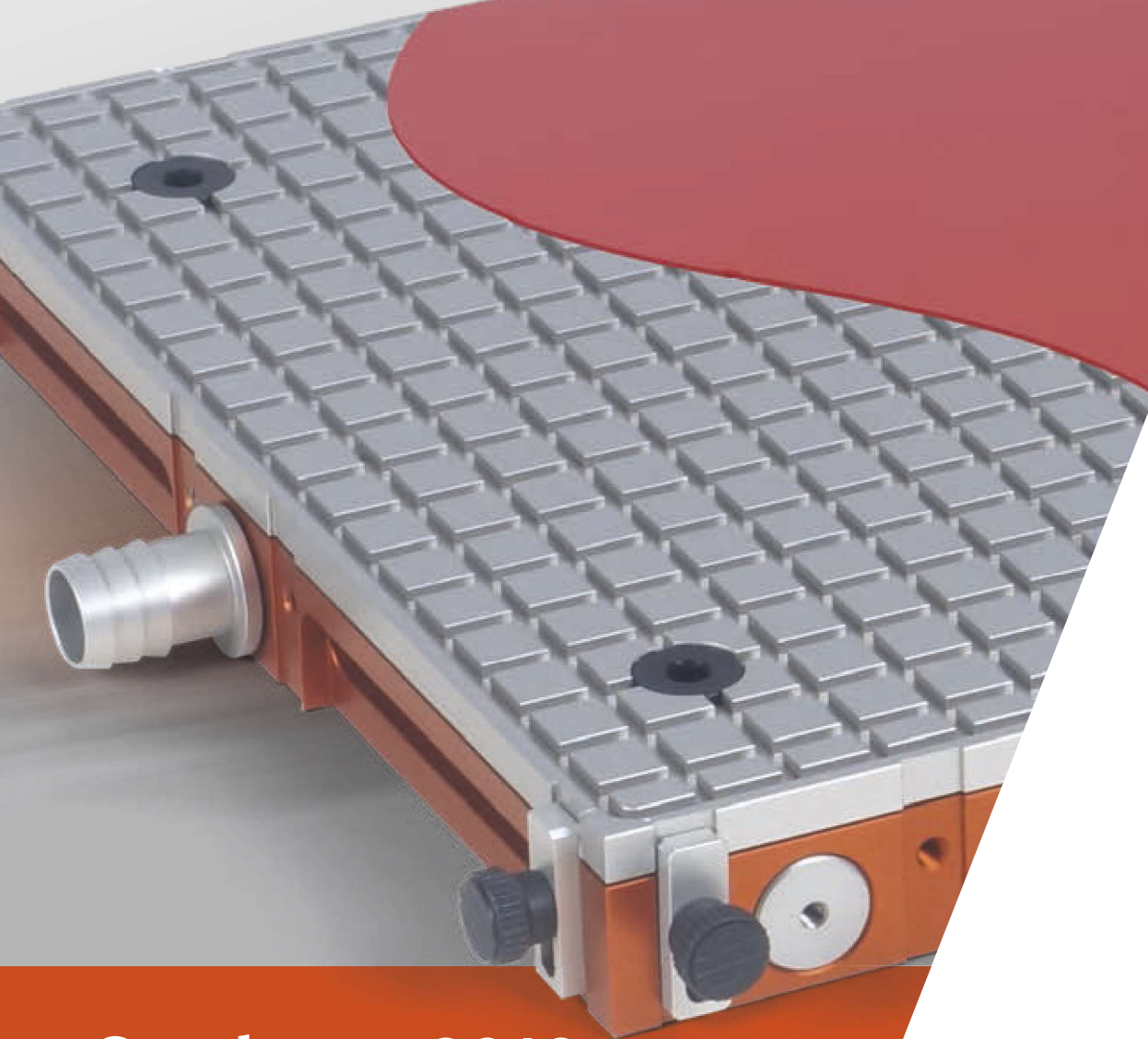


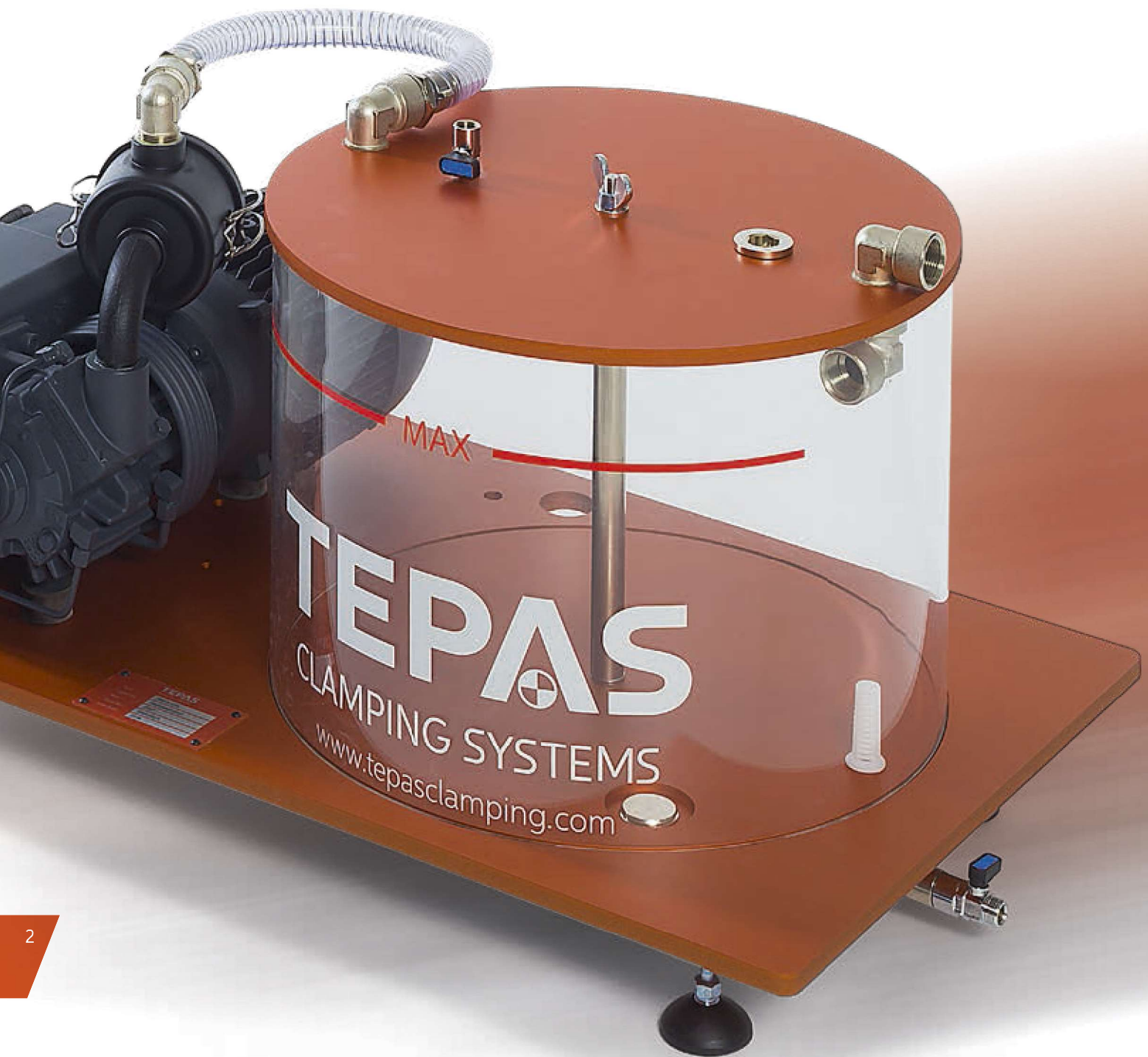
# Vacuum Clamping



**Catalogue 2019**



**TEPAS**  
CLAMPING SYSTEMS



Innovative products developed with a focus on creativity, with a desire to improve through people with specialist knowledge.

This is exactly what Tepas Clamping Systems is all about!

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## THE BENEFITS OF VACUUM CLAMPING TECHNOLOGY

**NO CLAMPING FORCES IN WORKPIECE**

**NO CLAMP DAMAGE**

**3 OR 5 SIDES FREELY ACCESSIBLE**

**FAST AND FLEXIBLE**

**NON-MAGNETIC**

**SUITABLE FOR ALMOST ALL MATERIALS**

**VIBRATION-FREE**

**ALSO SUITABLE FOR THIN WORKPIECES  
AND FILM**

**FULL CUT-THROUGH OF WORKPIECES  
POSSIBLE**



## Suitable for:

Turning  
Milling  
Drilling  
Tapping  
Reaming  
Engraving

Countersinking  
Grinding  
Polishing  
Eroding  
Inspecting  
Measuring

Printing  
Covering  
Steel  
Stainless steel  
Titanium  
Aluminium

Non-ferrous metals  
Plastic  
Glass  
Wood  
Graphite  
Ceramic

## A COMPLETE VACUUM CLAMPING SYSTEM

The vacuum clamping systems of Tepas Clamping Systems can easily be connected to one another. A fully functioning system consists of just 3 products

1. VACUUM PUMP
2. HOSE SET
3. VACUUM CHUCK

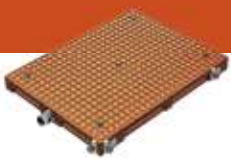




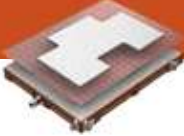


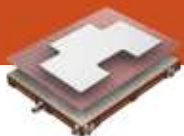



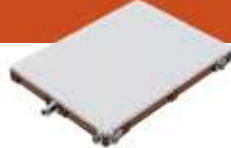



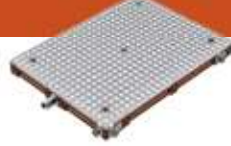


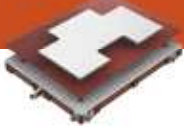
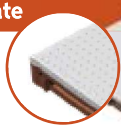

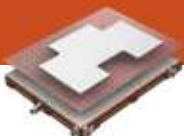


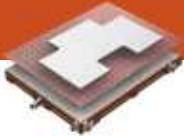




A more extensive system with several vacuum chucks can consist of:

1. VACUUM PUMP UNIT
2. HOSE SET
3. DISTRIBUTION BLOCK
4. VACUUM CHUCKS 4 IN TOTAL

# SELECTION TABLE VACUUM CHUCKS

	Only surface machining.		Simple outside contour	
	Without mat	With mat	Without mat	With mat
<b>TGC GridChuck</b>				
	TGC	TGC + TVM		TGC + TVM
<b>TPC PerfoChuck</b>				
		TPC + TPM		TPC + TPM
<b>TUC µmChuck</b>				
"Machining without fluids!"		TUC + TPM		TUC + TPM
<b>TEC EcoChuck</b>				
	TEC	TEC + TVM		TEC + TVM
<b>TBC+TCP BaseChuck with CustomPlate</b>				
	TBC/TCP	TBC/TCP + TVM	TBC/TCP	TBC/TCP + TVM
<b>TBC+TGP BaseChuck with GridPlate</b>				
	TBC/TGP	TBC/TGP + TVM	TBC/TGP	TBC/TGP + TVM
<b>TBC+TPP BaseChuck with PerfoPlate</b>				
		TBC/TPP + TPM		TBC/TPP + TPM
<b>TBC+TUP BaseChuck with µmPlate</b>				
"Machining without fluids!"		TBC/TUP + TPM		TBC/TUP + TPM



Complex outside contour

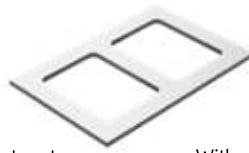
with cut-through

Film



Without mat

With mat



Without mat

With mat

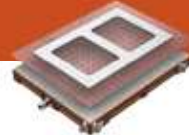


Without mat

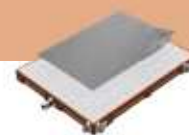
With mat



TPC + TPM



TPC + TPM



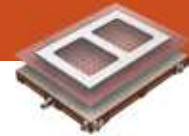
TPC



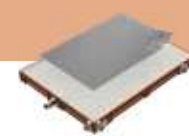
TPC + TAM



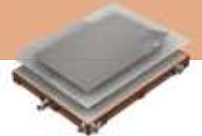
TUC + TPM



TUC + TPM



TUC



TUC + TAM



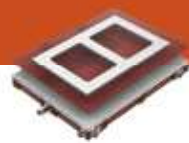
TBC/TCP



TBC/TCP + TVM



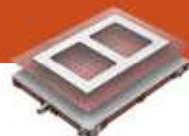
TBC/TCP



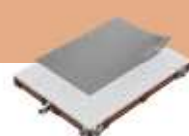
TBC/TCP + TVM



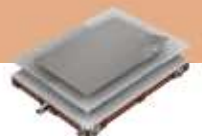
TBC/TPP + TPM



TBC/TPP + TPM



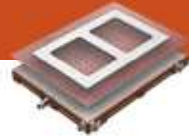
TBC/TPP



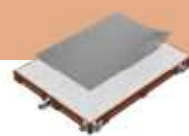
TBC/TPP + TAM



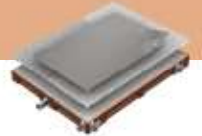
TBC/TUP + TPM



TBC/TUP + TPM



TBC/TUP

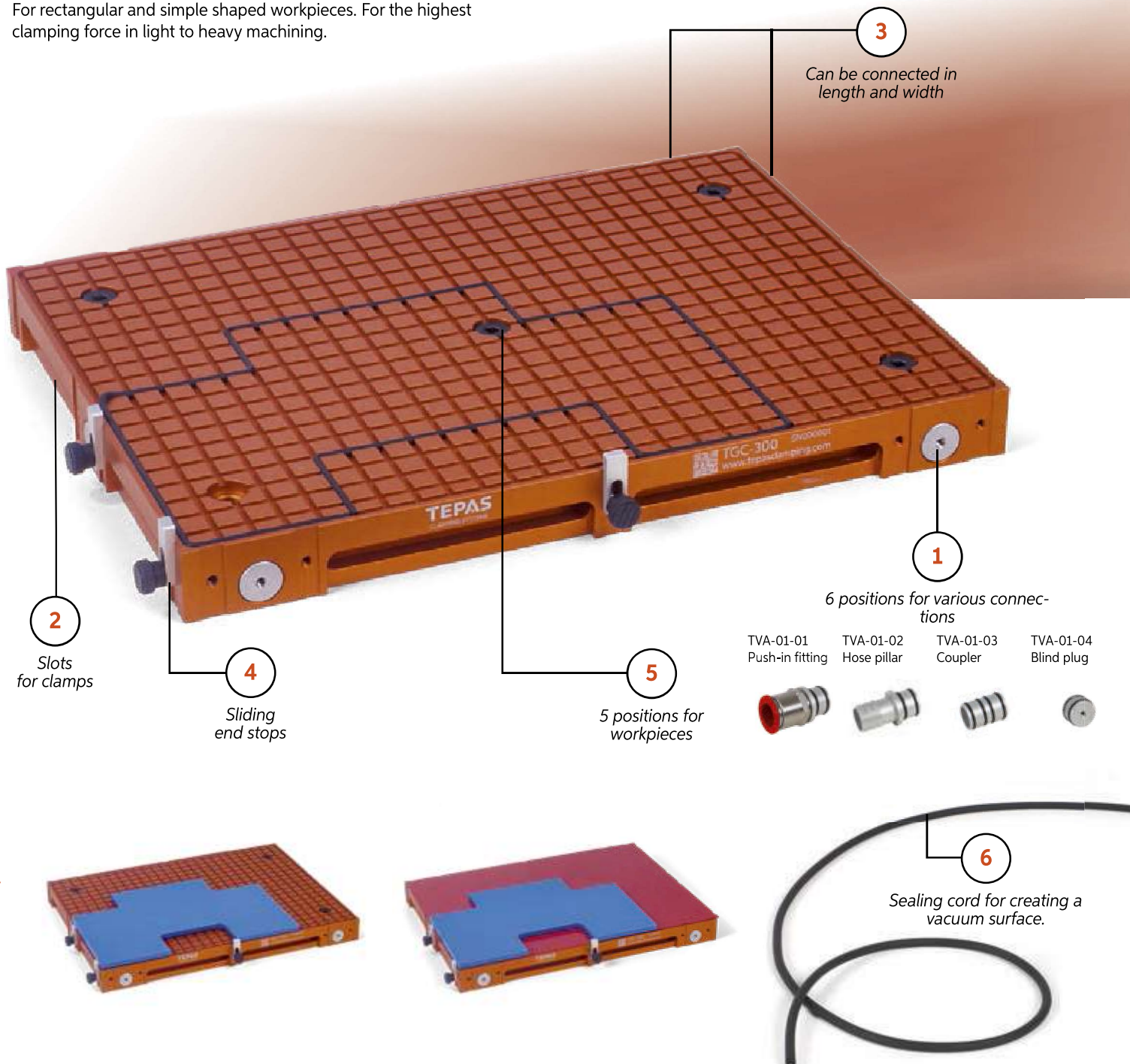


TBC/TUP + TAM

# GRIDCHUCK VACUUM CHUCK WITH GRID

## The vacuum chuck with the highest clamping force!

For rectangular and simple shaped workpieces. For the highest clamping force in light to heavy machining.



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## How it works

The sealing cord creates a vacuum surface allowing clamping without vacuum leakage and allowing the highest clamping force to be achieved.

## The benefits

The highest clamping force is possible due to leak-free clamping.  
Suitable for both light and heavy machining. The sealing cord seals unevenness, including in rough workpieces, ensuring reliable clamping.

## Can be used with almost all zero point clamping systems

With end stops for precise positioning of workpieces.  
With longitudinal slots for direct mounting on the machine table with clamps.

## Clamping and positioning

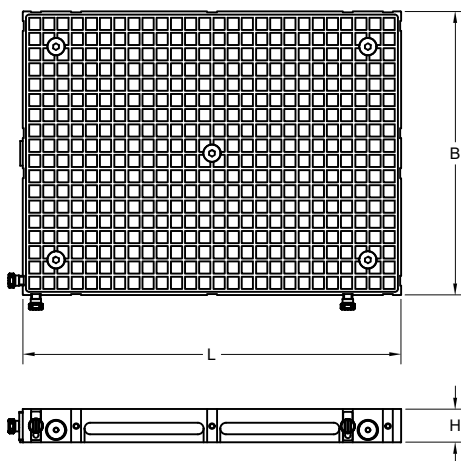
Can be used with almost all zero point clamping systems. With end stops for precise positioning of workpieces. With longitudinal slots for direct mounting on the machine table with clamps.

# TEPAS

CLAMPING SYSTEMS

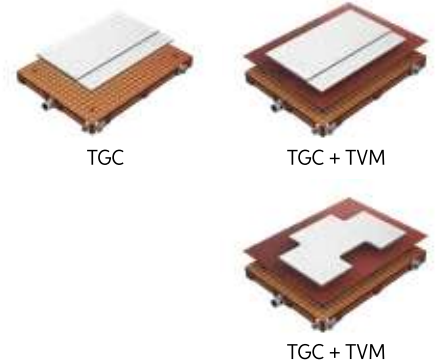
DRILLING  
MILLING  
GRINDING  
TURNING  
ENGRAVING

## Dimensions



Article no.	Model	L mm	B (Width) mm	H mm	Grid mm	Pack.
6001.0300	TGC-300	400	300	35	16	1
6001.0400	TGC-400	600	400	35	16	1

## Field of application



## Included

- 1 piece **TVA-01-01** Hose pillar with Push-In fitting for  $\varnothing 11/16$  vacuum PU hose
- 1 piece **TVA-01-03** Coupler vacuum feedthrough when connecting vacuum chucks
- 5 pieces **TVA-01-04** Blind plugs
- 3 pieces **TVA-01-05** End stops
- 2 pieces **TVA-01-06** Aluminium clamps (4 pieces with TGC-400)
- 3 pieces **TVA-01-08** Control knob for end stop
- 5 pieces **TVA-01-09** Plug for clamping surface
- 10m **TVA-10-35** Sealing cord  $\varnothing 3.5$ mm
- 2m **TVA-20-2** Vacuum PU hose, 11/16mm

## Accessories





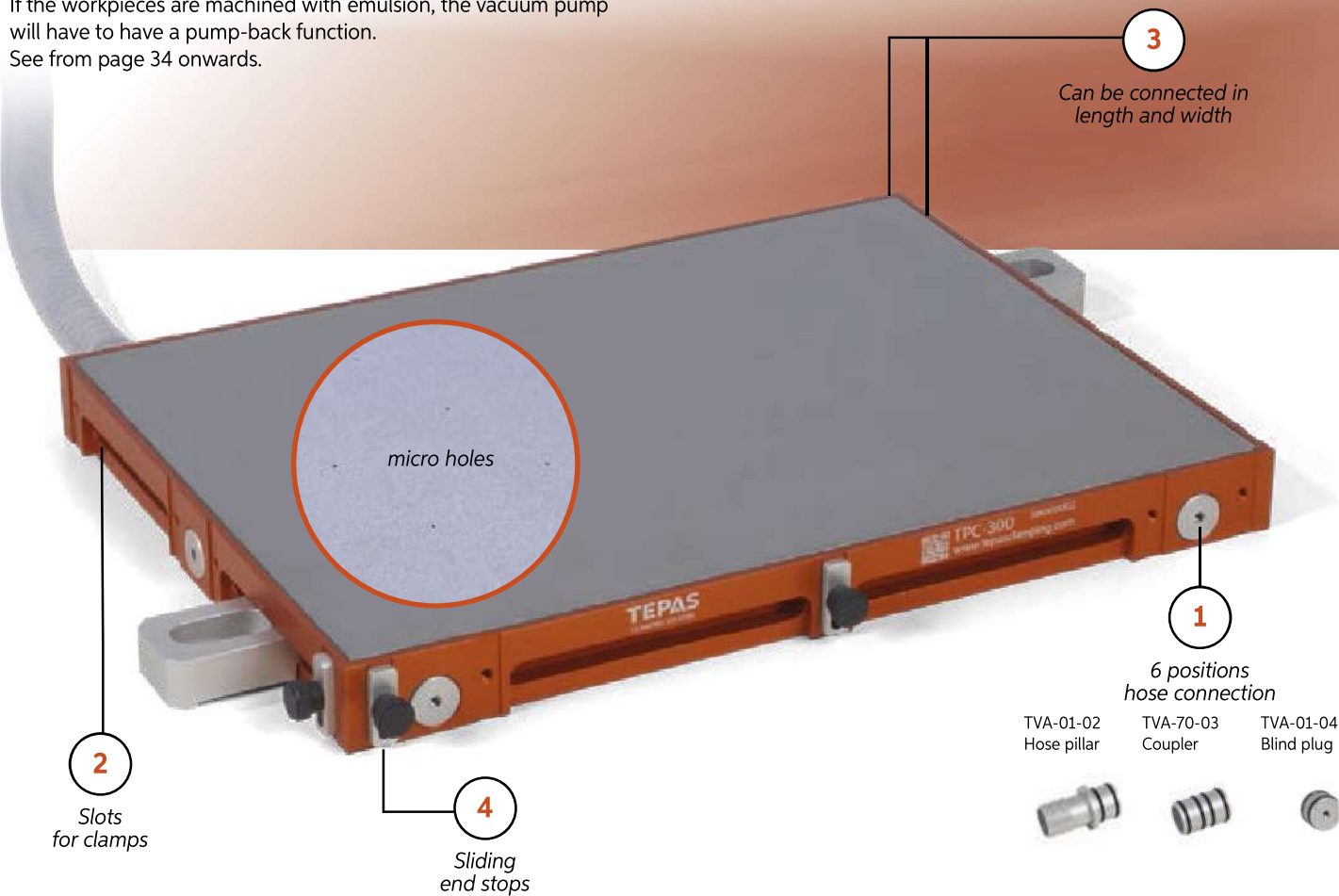
# PERFOCHUCK VACUUM CHUCK WITH MICRO HOLES

## The flexible vacuum chuck with high clamping force!

For rectangular and simple and complex shaped workpieces. For flexible clamping with average clamping force.

## Work with emulsion

If the workpieces are machined with emulsion, the vacuum pump will have to have a pump-back function. See from page 34 onwards.

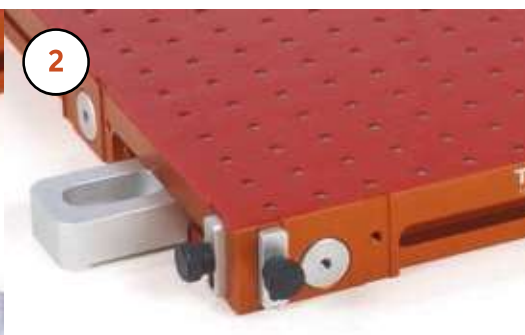


12



## Practical example of cut-through.

70x40mm plastic workpiece fully cut through.





## How it works

These vacuum chucks can only be used with the Tepas VacuMat or PerfoMat mats. Micro holes have been made in the clamping surface of these vacuum chucks. The very small micro holes limit the leakage of the vacuum with smaller workpieces or when workpieces are cut through. The Tepas PerfoMat mats have larger holes that enlarge the vacuum surface.

## The benefits

Limited vacuum leakage meaning a high clamping force can be achieved. Suitable for both light and heavy machining. Cutting through is possible without the vacuum chuck being damaged, when VacuMat or PerfoMat are used.

## Clamping and positioning

Can be used with almost all zero point clamping systems. With end stops for precise positioning of workpieces. With longitudinal slots for direct mounting on the machine table with clamps.

## Modular construction

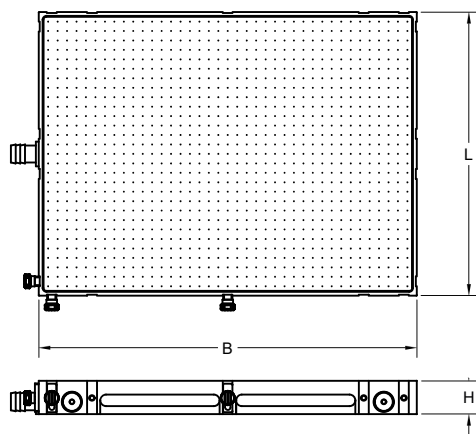
These vacuum chucks can be mounted together to increase the vacuum surface without hoses. The vacuum is fed through with couplers so that only one hose connection is required.

# TEPAS

CLAMPING SYSTEMS

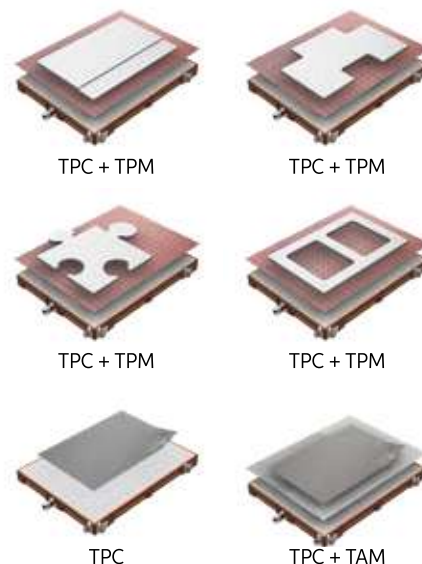
**DRILLING**  
**MILLING**  
**GRINDING**  
**TURNING**  
**ENGRAVING**

## Dimensions



Article no.	Model	L mm	B (Width) mm	H mm	Pack.
6002.0300	TPC-300	400	300	35	1
6002.0400	TPC-400	600	400	35	1

## Field of application



## Included

- 1 piece **TVA-01-02** Hose pillar ø19/25 vacuum spiral wire hose
- 1 piece **TVA-01-03** Coupler vacuum feedthrough when connecting vacuum chucks
- 5 pieces **TVA-01-04** Blind plugs
- 3 pieces **TVA-01-05** End stops
- 2 pieces **TVA-01-06** Aluminium clamps (4 pieces with TPC-400)
- 1 piece **TVA-01-08** Control knob for blind plugs
- 2m **TVA-21-4** Vacuum spiral hose, 19/25mm

## Accessories



4

5

With PerfoMat S

6

Included accessories

# μmCHUCK VACUUM CHUCKS WITH MICROPOROUS CLAMPING SURFACE

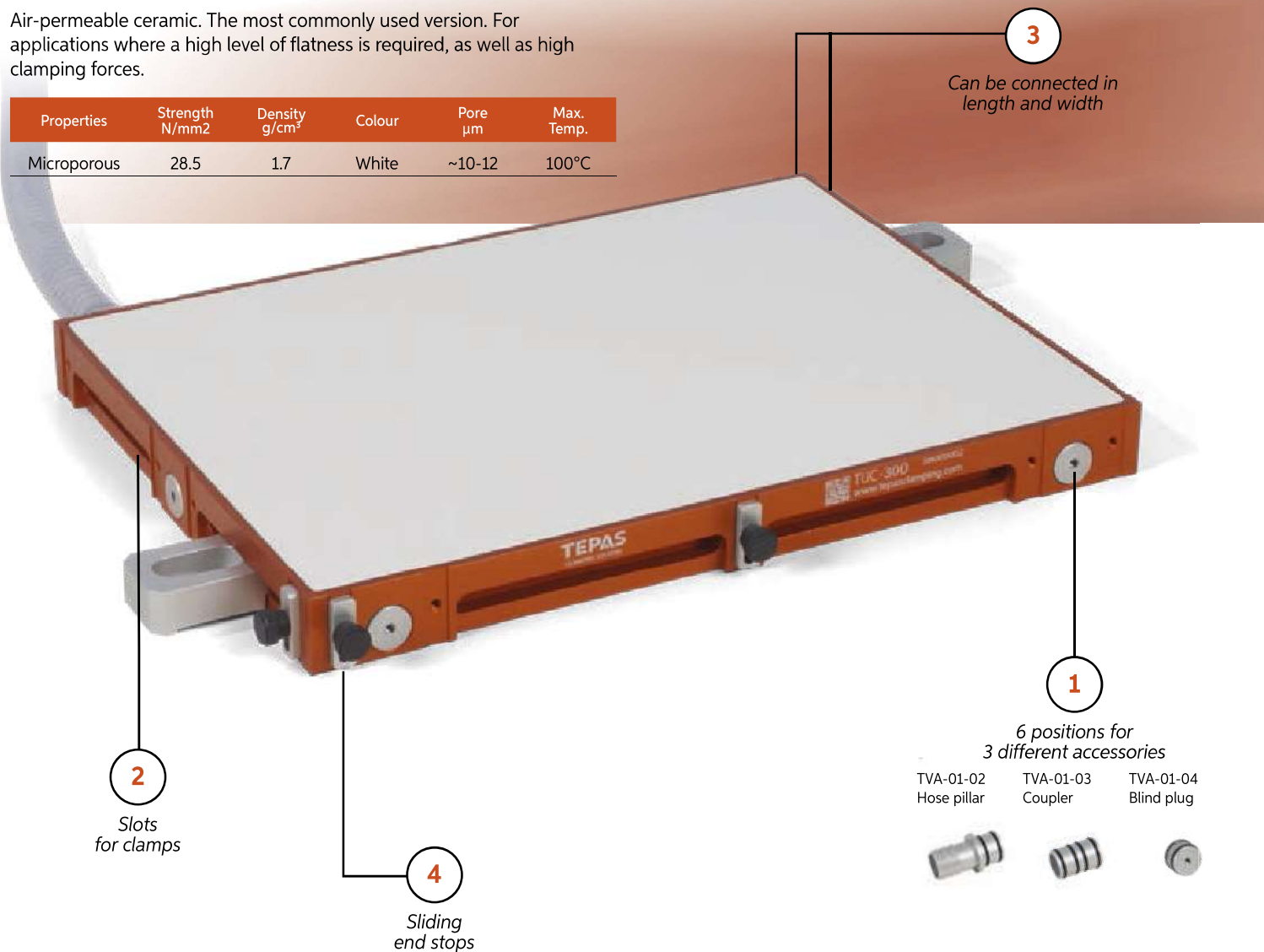
## The problem-solving vacuum chuck!

If vacuum clamping with the GridChuck or PerfoChuck is not possible, this vacuum chuck with microporous clamping surface will often provide a solution.

### CE100White

Air-permeable ceramic. The most commonly used version. For applications where a high level of flatness is required, as well as high clamping forces.

Properties	Strength N/mm <sup>2</sup>	Density g/cm <sup>3</sup>	Colour	Pore μm	Max. Temp.
Microporous	28.5	1.7	White	~10-12	100°C



## How it works

The air-permeable clamping surface reduces high vacuum leakages, whereby the vacuum pump is able to create a vacuum.

## The benefits

Very high flatness of the clamping surface in  $\mu\text{m}$  range is possible. No deformation of the workpiece as there are no grooves or holes in the clamping surface.

With the Tepas VacuMat and PerfoMat a very wide range of applications is possible.

Microporous clamping surfaces are water-resistant, however coolant can seal the surface meaning there is no longer a vacuum. Therefore, do not use a coolant emulsion but machine dry.

## Clamping and positioning

Can be used with almost all zero point clamping systems. With end stops for precise positioning of workpieces. With longitudinal slots for direct mounting on the machine table with clamps.

## Modular construction

These vacuum chucks can be mounted together to increase the vacuum surface without hoses. The vacuum is fed through with couplers so that only one hose connection is required.

## Workpieces

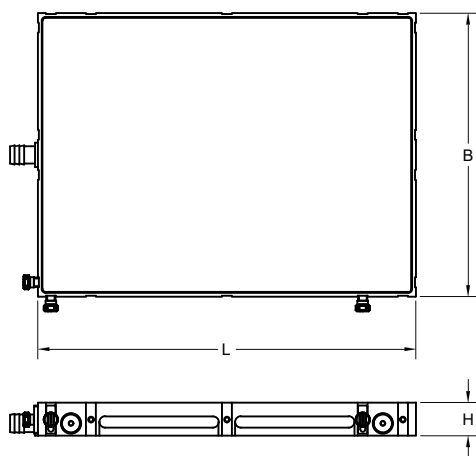
Film, paper, rubber, boards, plates and strips.

# TEPAS

CLAMPING SYSTEMS

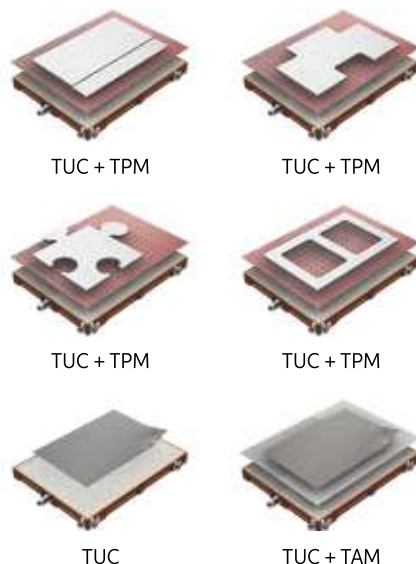
DRILLING  
MILLING  
ENGRAVING  
MEASURING  
INSPECTING

## Dimensions



Article no.	Model	L mm	B (Width) mm	H mm	Pack.
6003.0300	TUC-300	400	300	35	1
6003.0400	TUC-400	600	400	35	1

## Field of application



## Included

- 1 piece **TVA-01-02** Hose pillar  $\varnothing 19/25$  vacuum spiral wire hose
- 1 piece **TVA-01-03** Coupler for vacuum feedthrough when connecting vacuum chucks
- 5 pieces **TVA-01-04** Blind plugs
- 3 pieces **TVA-01-05** End stops
- 2 pieces **TVA-01-06** Aluminium clamps (4 pieces with TPC-400)
- 1 piece **TVA-01-08** Control knob for blind plugs
- 4 pieces **TVA-01-09** Plug for clamping surface
- 2m **TVA-21-4** Vacuum spiral hose, 19/25mm

## Accessories



4

5

With PerfoMat S

6

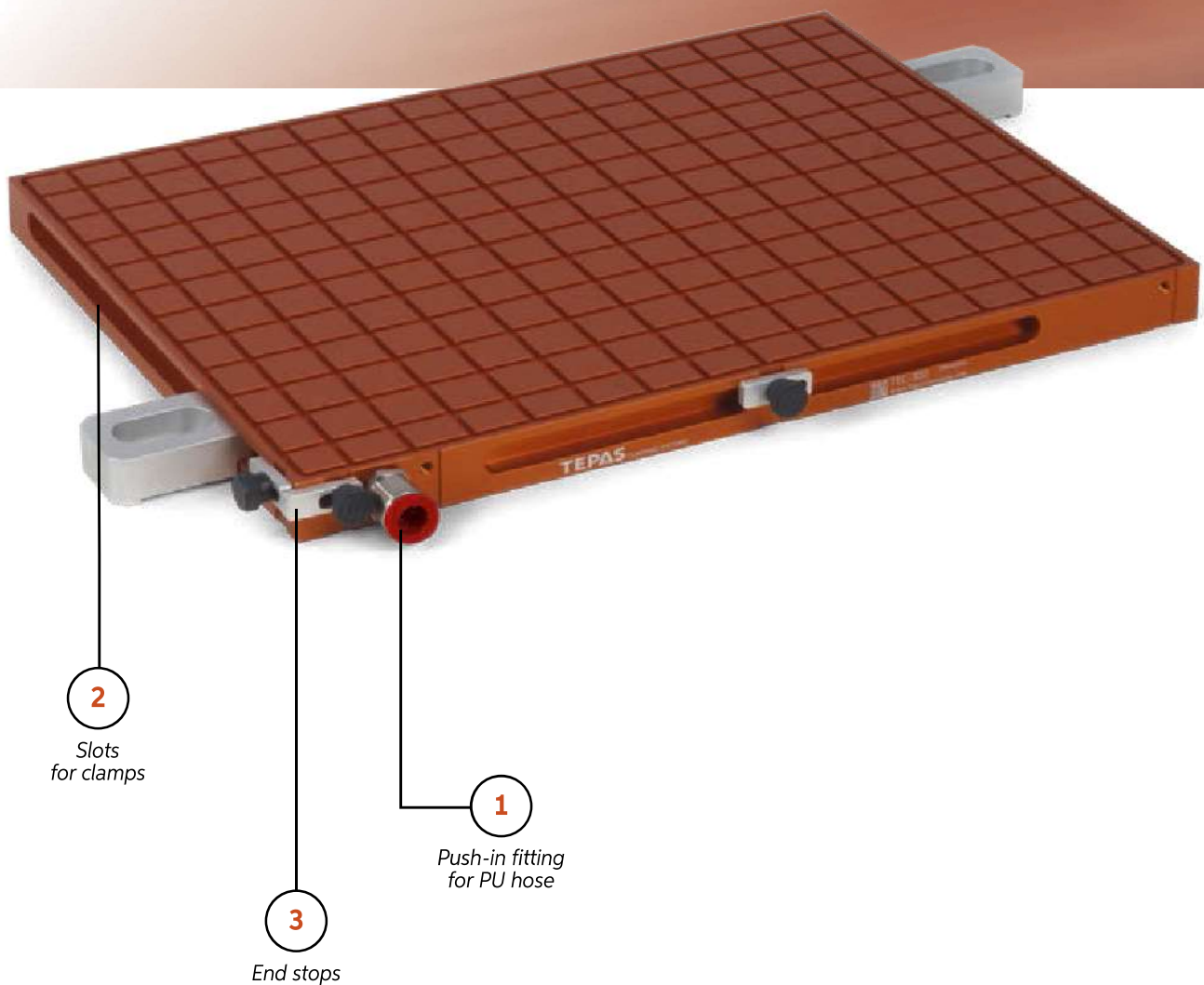
Included  
accessories



# ECOCHUCK VACUUM CHUCKS

## The most economical vacuum chuck!

If you are just starting out with vacuum clamping or if you would like the most economical vacuum chuck, the EcoChuck would be the right choice for you.



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## How it works

The sealing cord creates a vacuum surface allowing clamping without vacuum leakage and allowing the highest clamping force to be achieved.

## The benefits

The highest clamping force is possible due to leak-free clamping.

Suitable for both light and heavy machining.

The sealing cord seals unevenness, including in rough workpieces, ensuring reliable clamping.

Simple extra-low construction.

## Modular construction

Connecting vacuum chucks isn't possible with the EcoChuck. If clamping plates have to be connected, the GridChuck offers the right solution.

Can be used with almost all zero point clamping systems.

With end stops for precise positioning of workpieces.

With longitudinal slots for direct mounting on the machine table with clamps.

## Workpieces

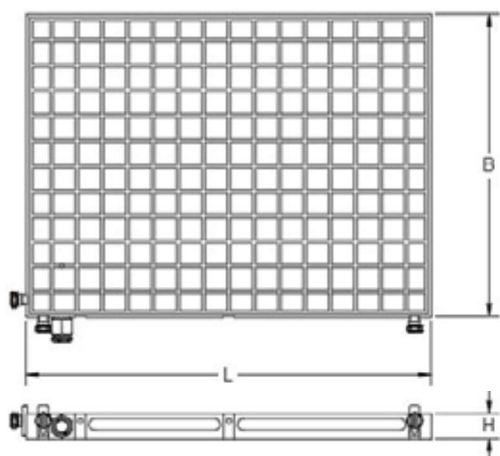
Film, paper, rubber, boards, plates and strips.

# TEPAS

CLAMPING SYSTEMS

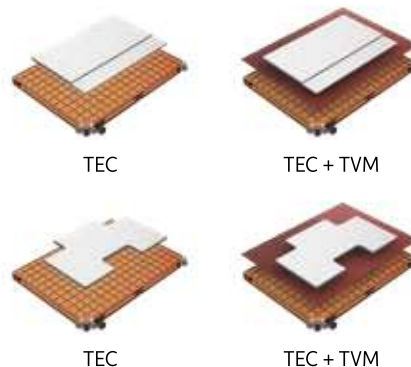
## DRILLING MILLING ENGRAVING MEASURING INSPECTING

## Dimensions



Article no.	Model	L mm	B (Width) mm	H mm	Grid mm	Pack.
6010.0300	TEC-300	400	300	25	25	1

## Field of application



## Included

- 1 piece **TVA-01-01** Push-in coupling with Push-In fitting for ø12mm PU hose TVA-20-1
- 3 pieces **TVA-01-05** End stops
- 2 pieces **TVA-01-06** Aluminium clamps (4 pieces with TEC-400)
- 3 pieces **TVA-01-08** Control knob for end stop
- 2m **TVA-20-1** ø12mm PU hose

## Accessories

- TVA-01-05 End stop
- TVA-01-06 Clamp
- TVA-01-08 Control knob



4

The sealing cord can be cut to required size

5

Vacuum surface itself can be tailored accordingly.

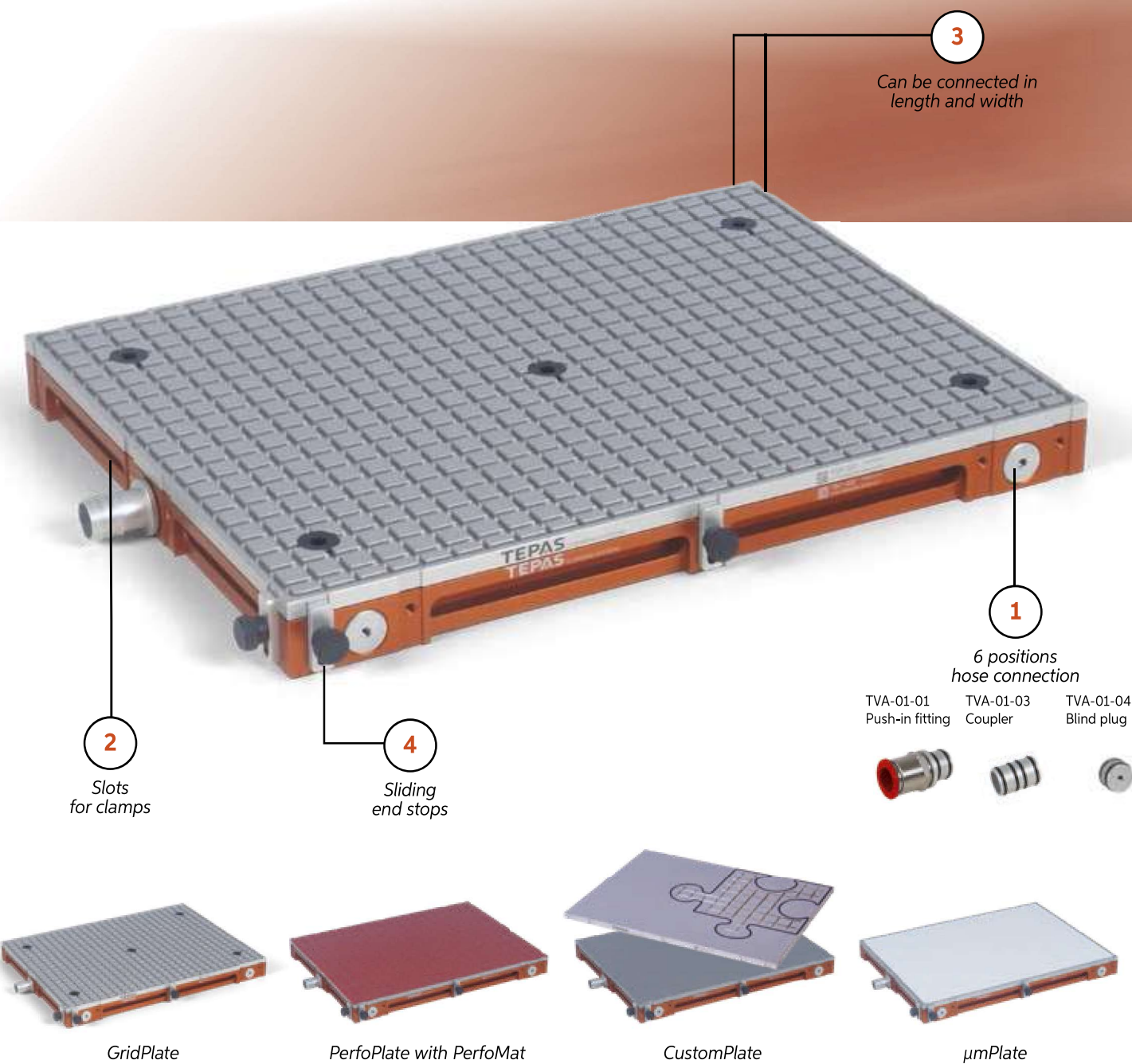
6

Included accessories

# BASECHUCK MODULAR VACUUM CHUCK

## All vacuum clamping options in one system

The BaseChuck creates a base on which adapter plates are placed, which enable the correct vacuum clamping method to be used for every workpiece.



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## How it works

Adapter plates are placed on the BaseChuck. Every adapter plate has its own vacuum clamping method.

Every type of vacuum chuck is also available as an adapter plate:

- GridPlate for the highest clamping force.
- PerfoPlate with micro holes for the highest level of flexibility.
- µmPlate as problem-solver for the highest level of flatness.
- CustomPlates for workpiece-specific clamping.

## The benefits

The correct vacuum clamping method is available for every workpiece shape and every type of machining.

- Cheaper to buy than investing in multiple vacuum chucks.
- BaseChuck can remain clamped, so less set-up time
- Adapter plates are positioned precisely.

## Clamping and positioning

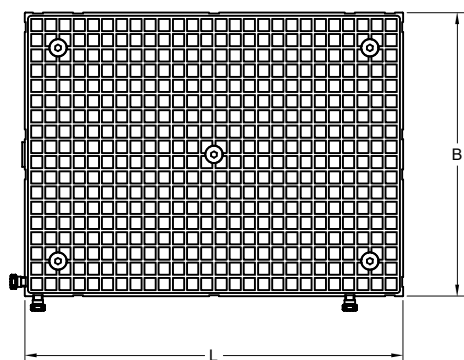
Can be used with almost all zero point clamping systems. With end stops for precise positioning of workpieces. With longitudinal slots for direct mounting on the machine table with clamps.

# TEPAS

CLAMPING SYSTEMS

DRILLING  
MILLING  
ENGRAVING  
MEASURING  
INSPECTING

## Dimensions



Article no.	Model	L mm	B (Width) mm	H mm	Pack.
6201.0200	TBC-200	300	200	35	1
6201.0300	TBC-300	400	300	35	1
6201.0400	TBC-400	600	400	35	1

## Included

- 1 piece **TVA-01-02** Hose pillar ø19/25 vacuum spiral wire hose
- 1 piece **TVA-01-03** Coupler vacuum feedthrough when connecting vacuum chucks
- 5 pieces **TVA-01-04** Blind plugs
- 3 pieces **TVA-01-05** End stops
- 2 pieces **TVA-01-06** Aluminium clamps (4 pieces with TPC-400)
- 3 pieces **TVA-01-08** Control knob for end stop
- 2m **TVA-21-4** Vacuum spiral hose, 19/25mm

## Accessories



4



5

With PerfoMat S



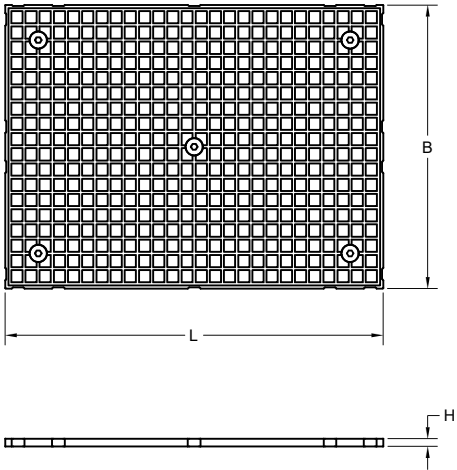
6

Included  
accessories



# VACUUM ADAPTER PLATES

## Available adapter plates



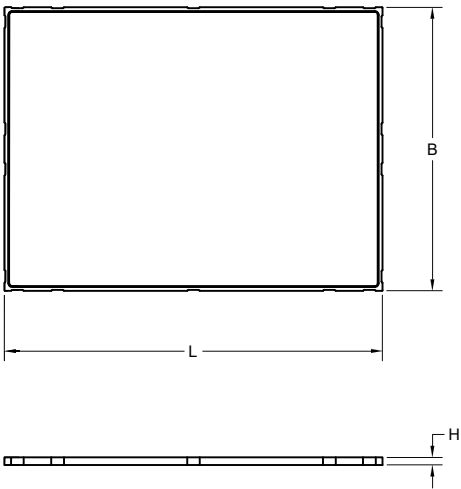
### GridPlate with grid

Article no.	Model	L mm	B (Width) mm	H mm	Pack.
6221.0200	TGP-200	300	200	8	1
6221.0300	TGP-300	400	300	8	1
6221.0400	TGP-400	600	400	8	1

### Included

5 pieces **TVA-01-09** Plug for clamping surface  
10m **TVA-10-35** Sealing cord  $\varnothing 3.5\text{mm}$

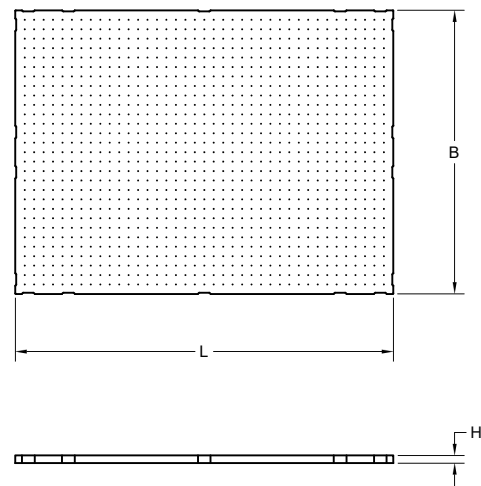
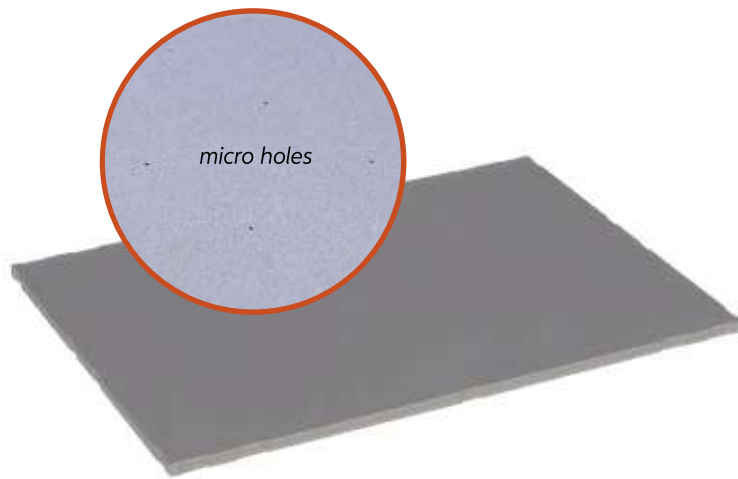
20



### µmPlate, with microporous clamping surface

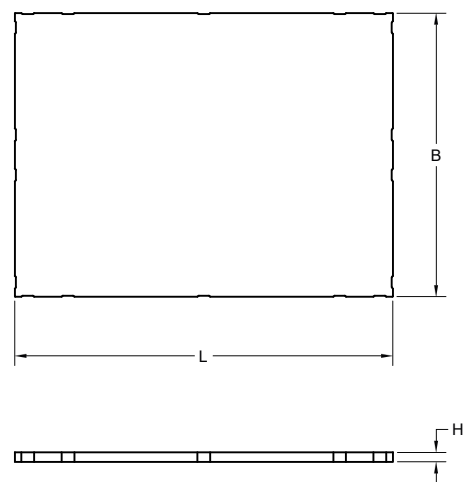
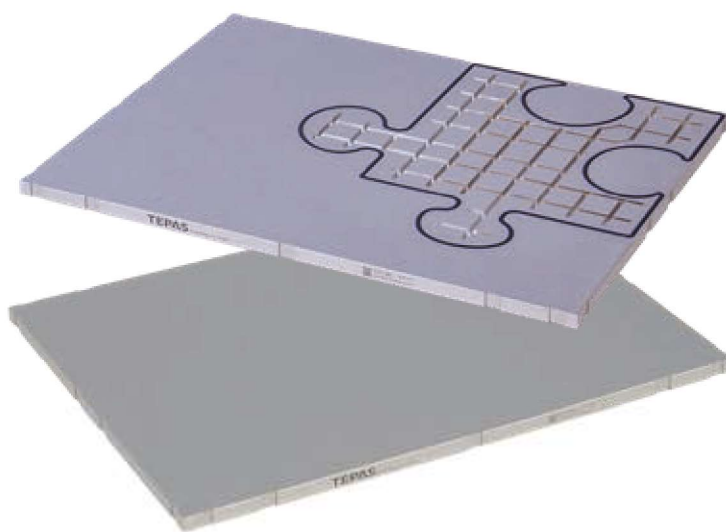
Article no.	Model	L mm	B (Width) mm	H mm	Pack.
6223.0200	TUP-200	300	200	8	1
6223.0300	TUP-300	400	300	8	1
6223.0400	TUP-400	600	400	8	1





## PerfoPlate, with micro holes

Article no.	Model	L mm	B (Width) mm	H mm	Pack.
6222.0200	TPP-200	300	200	8	1
6222.0300	TPP-300	400	300	8	1
6222.0400	TPP-400	600	400	8	1



## CustomPlates for workpiece-specific clamping.

Article no.	Model	L mm	B (Width) mm	H mm	Pack.
6224.0200	TCP-200	300	200	10	1
6224.0300	TCP-300	400	300	10	1
6224.0400	TCP-400	600	400	10	1

# TEPAS VACUMAT

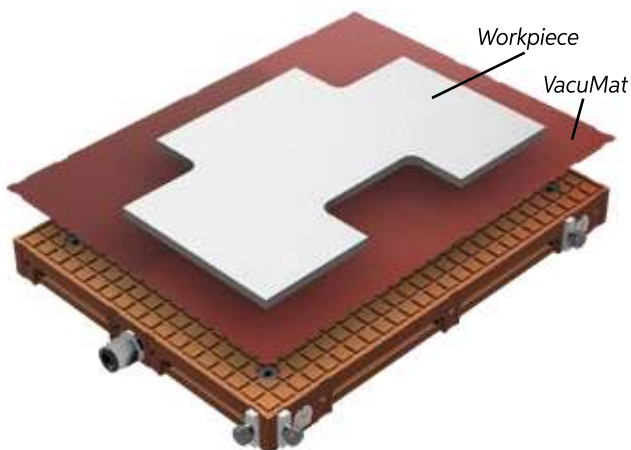
## Extra clamping force and cutting through is possible!

The Tepas VacuMat mats provide extra resistance to slipping of the workpiece **without glue residues** etc., sticking to the workpieces. The Tepas VacuMat mats on all Tepas vacuum chucks allow workpieces to easily be cut through.

### Use with TGC grid vacuum chucks

Machining of simple shapes.

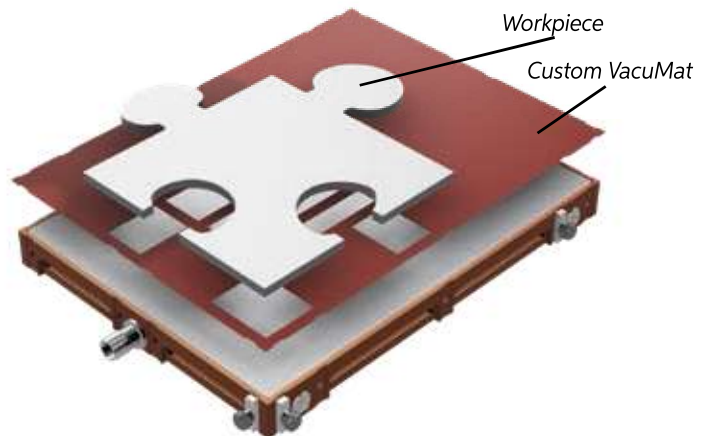
In simple patterns, the areas of cut-through can be separated from the vacuum surface with the sealing cord.



GridChuck

### Use with TPC and TUC vacuum chucks

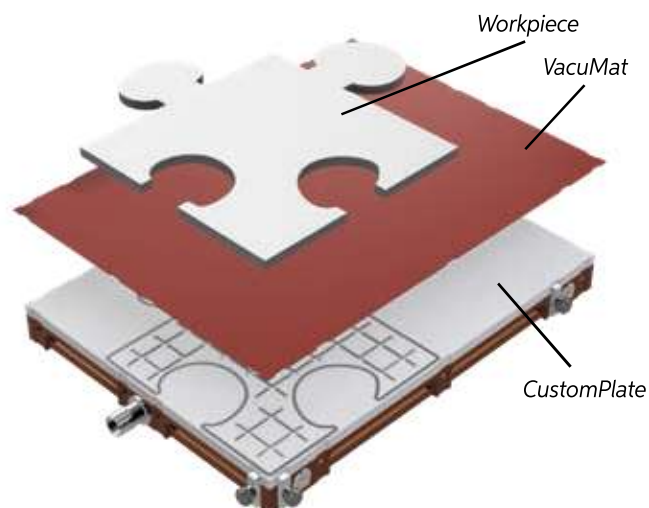
In the vacuum chucks with micro holes and the vacuum chucks with microporous clamping surface, even the vacuum surface can be determined. By opening the mat where vacuum is required, you can decide exactly where there should and shouldn't be a vacuum.



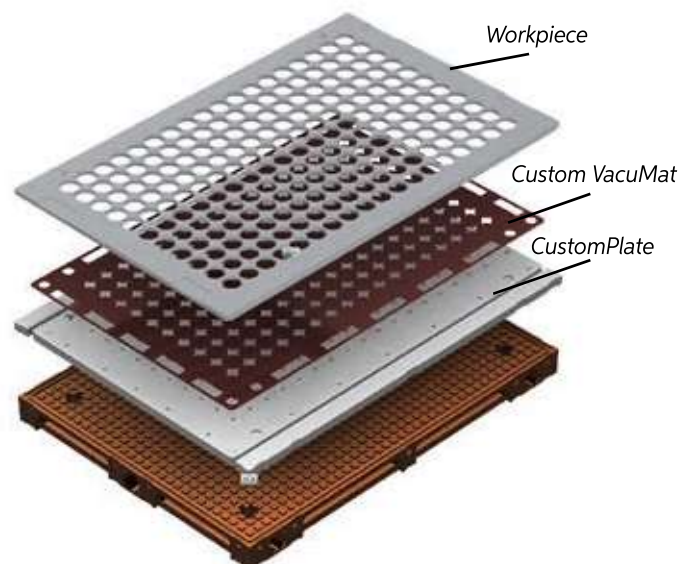
PerfoChuck

### Machining of more complex shapes

In more complex shapes, a workpiece-specific adapter plate will offer a solution.



BaseChuck



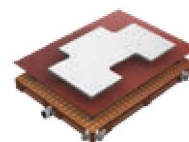
BaseChuck



## Field of application



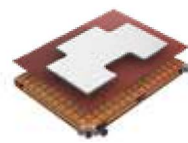
TGC + TVM



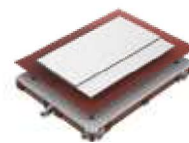
TGC + TVM



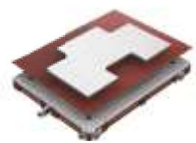
TEC + TVM



TEC + TVM

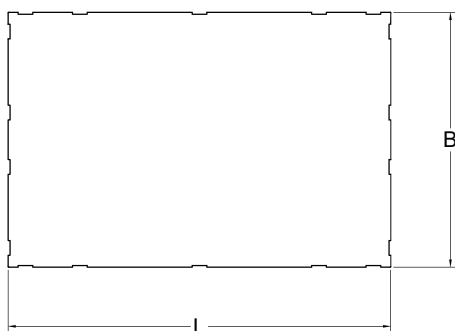


TBC/TGP + TVM



TBC/TGP + TVM

## Dimensions



## Tepas VacuMat

Article no.	Model	L mm	B (Width) mm	H mm	Pack.
6400.0200	TVM-200	300	200	1	3
6400.0300	TVM-300	400	300	1	3
6400.0400	TVM-400	600	400	1	3

## Tepas VacuMat per roll

Article no.	Model	L mm	B (Width) mm	H mm	Pack.
6400.0920	TVM-920	2000	400	1	1
6400.0990	TVM-990	9100	400	1	1



# TEPAS PERFOMAT

## Vacuum clamping without sealing!

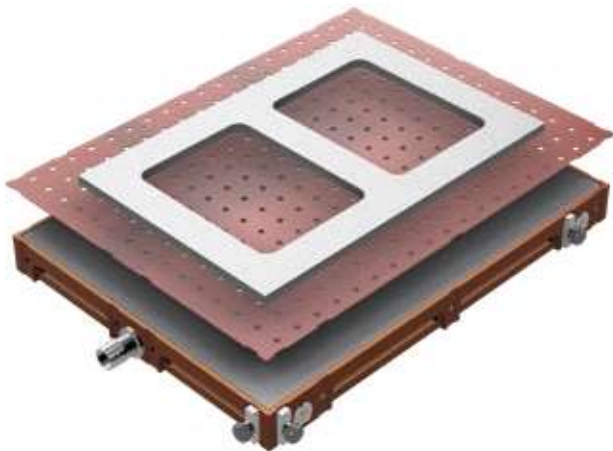
The Tepas PerfoMat negates the need for sealing, therefore fast, safe and simple clamping!

The PerfoMat mats on the PerfoChuck and  $\mu$ mChuck vacuum chucks allow workpieces to easily be cut through.



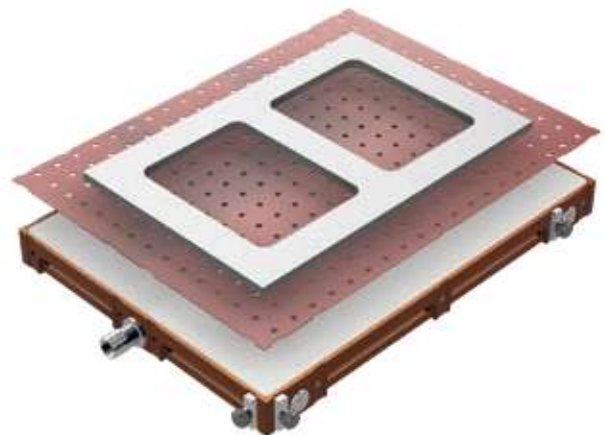
## How it works with the PerfoChuck

The leakage is reduced significantly by the micro holes of the PerfoChuck vacuum chucks. Because of its larger holes, the PerfoMat enlarges the vacuum surface and significantly increases the slip resistance of the workpiece. In combination with a vacuum pump with pump-back function, this is suitable for applications with coolant emulsion (wet) or with micro-lubrication.



## How it works with the $\mu$ mChuck

The leakage is reduced significantly by the clamping surface of the  $\mu$ mChuck vacuum chucks. The PerfoMat again reduces the leakage, as a result of which, despite the leakage, the vacuum pump can create a vacuum. Suitable for applications without coolant emulsion (dry).



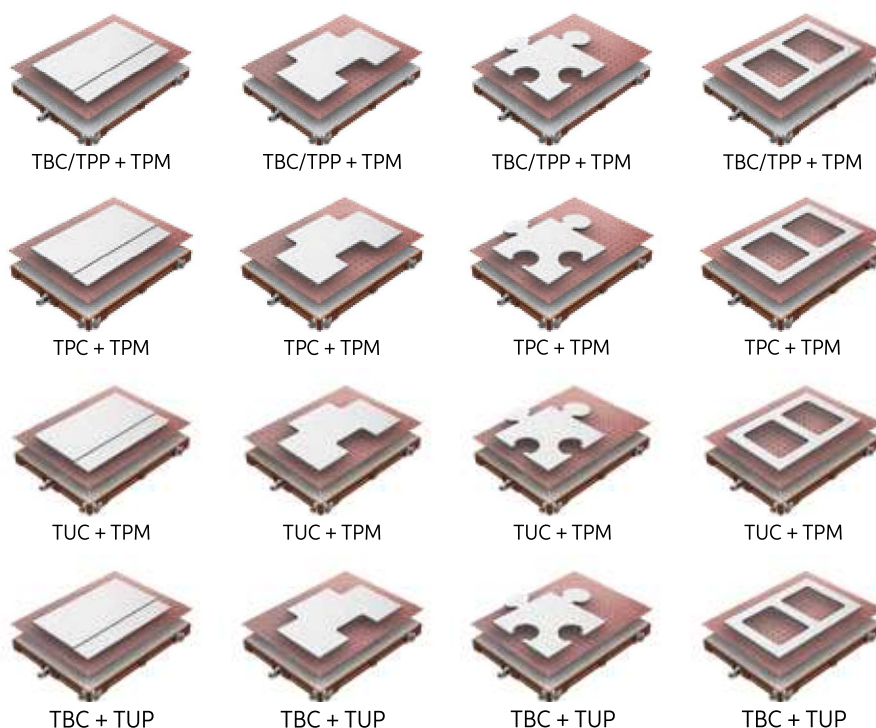
## The benefits

- Fastest clamping because no sealing cord, etc. is used.
- The slip resistance of PerfoMat results in reliable clamping.
- Without modifications, workpieces can be fully cut through.
- PerfoMat can easily be replaced after heavy use.

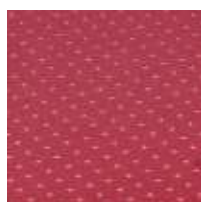
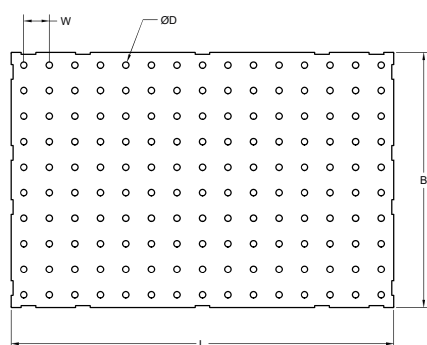
## The models

- PerfoMat Standard with standard pattern
- PerfoMat Fine with finer pattern and smaller holes
- PerfoMat Wide with wider pattern and larger holes

## Field of application



## Dimensions



## PerfoMat Fine

Article no.	Model	L mm	B (Width) mm	H mm	W mm	D mm	Pack.
6410.2200	TPM-F-200	300	200	1	10	3	1
6410.2300	TPM-F-300	400	300	1	10	3	1
6410.2400	TPM-F-400	600	400	1	10	3	1

## PerfoMat Medium

Article no.	Model	L mm	B (Width) mm	H mm	W mm	D mm	Pack.
6410.0200	TPM-M-200	300	200	1	20	5	1
6410.0300	TPM-M-300	400	300	1	20	5	1
6410.0400	TPM-M-400	600	400	1	20	5	1

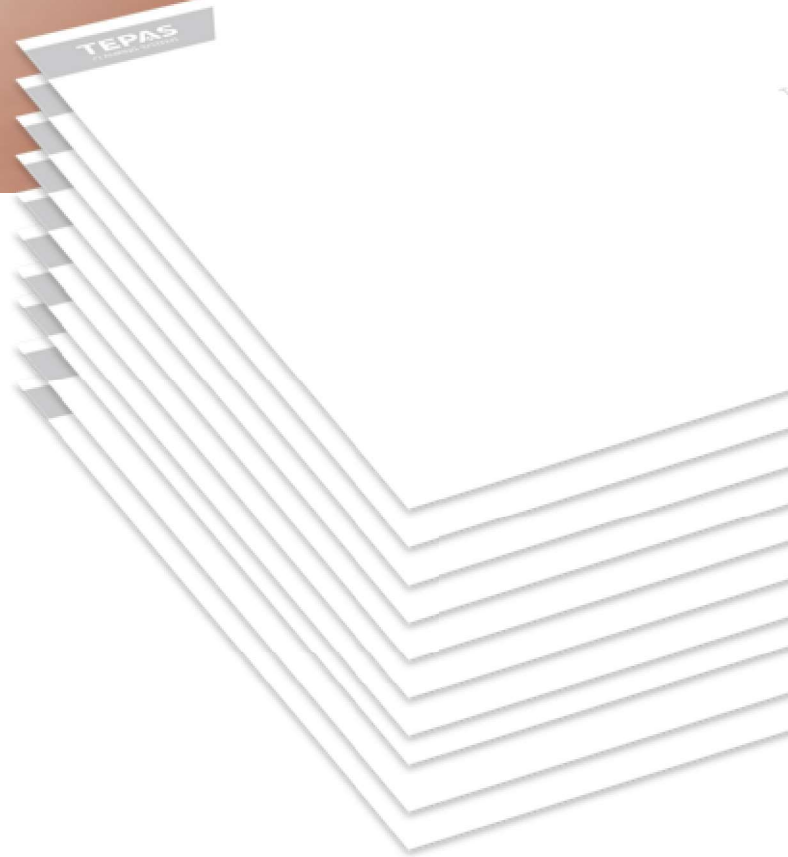
## PerfoMat Wide

Article no.	Model	L mm	B (Width) mm	H mm	W mm	D mm	Pack.
6410.4200	TPM-W-200	300	200	1	30	10	1
6410.4300	TPM-W-300	400	300	1	30	10	1
6410.4400	TPM-W-400	600	400	1	30	10	1

# TEPAS AIRMAT

## **Vacuum clamping of films without sealing.**

The Tepas AirMat allows films to be fully cut through. Because of the milling in the cardboard mats, the underlying vacuum chuck (preferably the Tepas  $\mu$ mChuck) is not damaged.



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## **How it works with the $\mu$ mChuck**

The cardboard Tepas AirMat is placed on the  $\mu$ mChuck vacuum chuck or  $\mu$ mPlate adapter plate. The product to be machined is placed on that, after which this is clamped by vacuum.

## **The benefits**

- Fast clamping of thin films without specific clamping being required.
- AirMat ensures higher slip resistance.
- Without modifications, workpieces can be fully cut through.

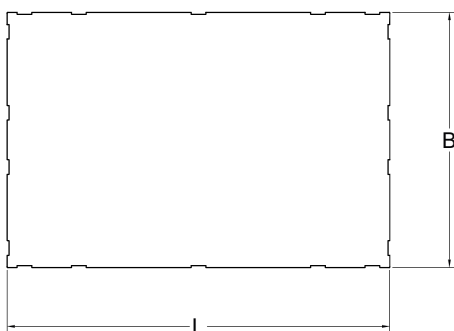
## **Suitable for:**

- Thin workpieces, such as film and paper.
- Light machining such as micro-milling and similar.
- Milling, sawing, drilling, printing, etc.





## Dimensions



## Tepas AirMat

Article no.	Model	L mm	B (Width) mm	H mm	Pack.
6430.0200	TAM-200	300	200	0	10
6430.0300	TAM-300	400	300	0	10
6430.0400	TAM-400	600	400	0	10

# SPECIFIC VACUUM CHUCKS

**Example: BaseChuck with specific TCP adapter plate and specific TVM VacuMat**



**Example: customer-specific dimensions**

Tepas GridChuck 500x500mm with 12.5mm grid and reference slots beneath.



**Example: multiple vacuum chuck**



**Example of special vacuum chucks**

CustomPlate modified with specific dimensions of Metapor® for high-accuracy surface machining of unique workpieces.



**Example: vacuum chucks with zero point clamping system for 5-axis machining centre**



**Example: special adapter plate**

CustomPlate modified with specific grid for a workpiece with a simple shape. Flat machining of metal workpieces with very high tensile strength.



# REQUEST FORM

Copy/scan this page and complete in full.  
You can email or post your request.

T +31 (0)76 572 03 00 E office@tepasclamping.com Dukaatstraat 14, 4879 AD Etten-Leur

## Type of vacuum table

\* For each request, tick 1 type

- ☐ GridChuck
- ☐ PerfoChuck
- ☐  $\mu$ mChuck
- ☐ BaseChuck
- ☐ GridPlate
- ☐ PerfoPlate
- ☐  $\mu$ mPlate
- ☐ CustomPlate
- ☐ Other: \_\_\_\_\_

## Dimensions

B Width \_\_\_\_\_ mm

L Length \_\_\_\_\_ mm

H Height \_\_\_\_\_ mm

## Description of the application

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## Description of the machining

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## Comments

Workpiece drawings included? Yes/No

## Options

- ☐ Recording for zero point clamping systems

Brand \_\_\_\_\_

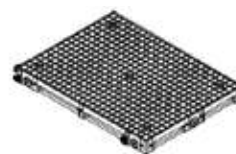
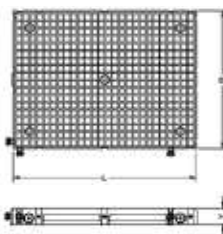
Type \_\_\_\_\_

Dimensions \_\_\_\_\_

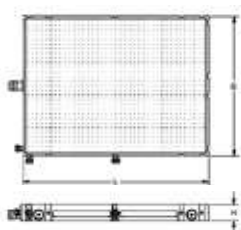
## Distributor's details

Your distributor \_\_\_\_\_

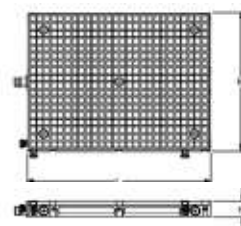
Distributor's contact person \_\_\_\_\_



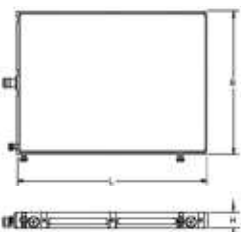
GridChuck Grid  
vacuum chucks in  
specific dimensions



PerfoChuck  
vacuum chucks with  
micro holes in  
specific dimensions



$\mu$ mChuck  
vacuum chucks with  
porous surface in  
specific dimensions



BaseChuck  
Vacuum chucks with  
adapter plates

## Your information

Company name \_\_\_\_\_

Contact person \_\_\_\_\_

Address \_\_\_\_\_

Postcode \_\_\_\_\_

Town/city \_\_\_\_\_

Country \_\_\_\_\_

Tel. number \_\_\_\_\_

Fax number \_\_\_\_\_

Email address \_\_\_\_\_

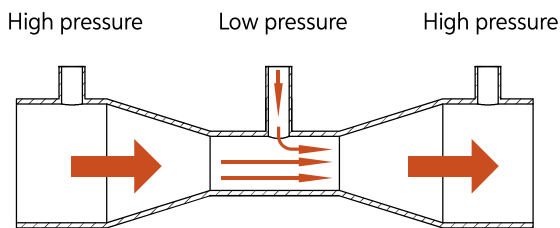
Website \_\_\_\_\_



# THE TEPAS PUMPS PROGRAMME

## Venturi valve

A venturi valve creates a vacuum with the help of air flow. There is a narrowing in the air duct. As the air flow accelerates when it passes through the narrowing, there is a reduction in pressure in the narrowing (the venturi effect). By means of a side connection in this narrowing, air can be drawn in, thus creating a vacuum.



### Advantages

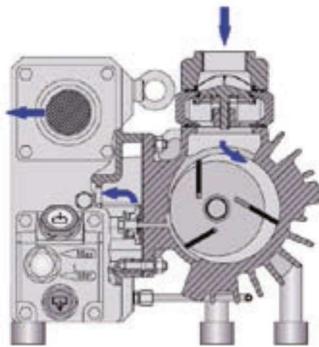
- Very low investment
- Small
- Simple
- Thin hose (compressed air instead of vacuum)

### Disadvantages

- Uses compressed air - relatively expensive
- Can distribute emulsion as vapour
- No consistent vacuum pressure
- Higher noise level

## Oil-lubricated vacuum pumps

A rotor is fitted to the shaft of the vacuum pump. The shaft of the vacuum pump is driven by the motor through a flexible coupling. This rotor is arranged eccentrically in relation to the cylinder, therefore there is a difference in volume on the two sides of the rotor. Vanes slide in grooves in the rotor, such that, combined with an oil film, the chambers are sealed. At the same time, air is drawn in and compressed.



### Advantages

- Average/low investment
- High vacuum up to 0.1mbar
- Can run for >24 hours uninterrupted
- Robust and operational reliability
- Long lifetime

### Disadvantages

- Cannot withstand leakage (>30%)
- Minimum pressure 300mbar (70% vacuum)
- Oil can be contaminated with moisture

## Dry-running rotary vane vacuum pumps

The dry-running rotary vane pumps work on the same principle as the oil-lubricated vacuum pumps, however; these pumps are able to withstand significant leakage. Because there is no oil, there will continue to be a small leakage between the vanes, as a result of which a dry-running pump creates less of a vacuum (85%) than an oil-lubricated vacuum pump (~98%). The vanes are made from graphite as opposed to plastic, because of which these have a self-lubricating action.



### Advantages

- Less maintenance
- No risk of oil contamination
- Oil-free

### Disadvantages

- Lower vacuum 150mbar (85%)
- Sensitive to moisture
- Shorter lifetime

# SELECTION TABLE

**TEPAS**  
CLAMPING SYSTEMS



	Venturi valve	Oil-lubricated	Dry running
Investment	Low	Average	Average
Energy consumption (costs)	High	Low	Low
Reliability	Low	High	High
Depth of vacuum	max. 80%	99.8%	88%
Dry machining	V	V	V
Wet machining		V	limited
Maintenance	None	Average	Low
Noise level	~75dB	~66 dB(A)	61-66 dB(A)
Minimum vacuum	0%	70%	0%

LEAKAGE IN CLAMPING			
		NONE	SIGNIFICANT
DRY MACHINING	Infrequent use		
	Intensive use	TVS-O	TVS-D
	Highest use reliability	TVU-3-O	TVU-3-D
WET MACHINING	Infrequent use		
	Intensive use	TVU-1-O	TVU-1-O
	Highest use reliability	TVU-3-O	TVU-3-D
	Highest use reliability and automated/unattended machining	TVU-4-O	TVU-4-D

For leakage-free clamping	
up to ~1,200cm <sup>2</sup> (vacuum chucks up to 300x400mm)	10m <sup>3</sup> /hour
up to ~2,500cm <sup>2</sup> (vacuum chucks up to 400x600mm)	21m <sup>3</sup> /hour
up to 2m <sup>2</sup>	63m <sup>3</sup> /hour

For clamping with PerfoChuck/Plate and µmChuck/µmPlate	
up to ~1,200cm <sup>2</sup> (vacuum chucks up to 300x400mm)	25m <sup>3</sup> /hour
up to ~2,500cm <sup>2</sup> (vacuum chucks up to 400x600mm)	40m <sup>3</sup> /hour

## OIL-LUBRICATED VACUUM PUMPS

### TVP-O separate vacuum pumps

Separate oil-lubricated vacuum pumps with no electrical cable and other accessories. They are characterised by their compact shape and powerful performance and are designed for locations with little space.



TVP-O21



TVP-O40



TVP-O63



## Perfectly aligned and easy to maintain

Due to the directly installed drive motor, this is extremely compact and is therefore the ideal built-in pump. The standard vacuum pumps fitted with highly durable rotor vanes, guarantee a long lifetime and the specially developed oil mist filter cartridges enable excellent oil separation of even the smallest oil particles from the exhaust air. Maintenance is easy to perform. Aside from replacing the oil and exchanging the oil mist filter cartridges at the specified maintenance intervals, very little maintenance is required.

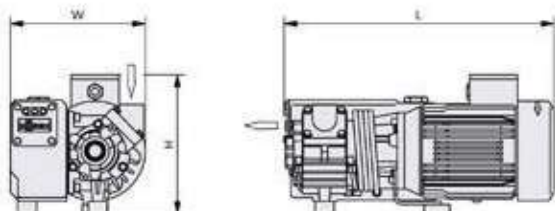
# TEPAS

CLAMPING SYSTEMS

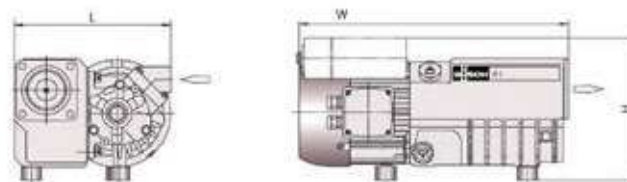
## Highlights

- Clean oil through gas ballast filter.
- Stable.
- Reliable.

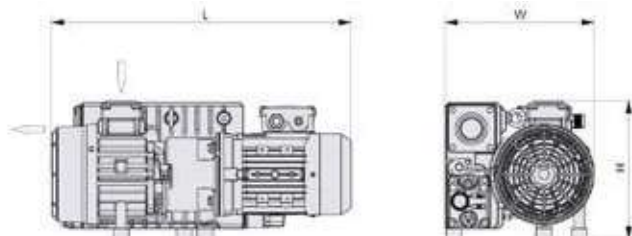
**TVP-O16**



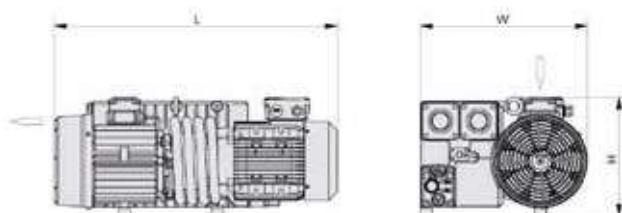
**TVP-O21**



**TVP-O40**



**TVP-O63**



Article no.	Model	m³/hour	max. vacuum	hPa mbar	Clamping force kg/cm² (*1)	V	kW	Kg	Pack.
6601.0160	TVP-O16	16	98.0%	2	0.98	230	0.55	18	1
6601.0210	TVP-O21	20	99.0%	1	0.99	230	0.75	20	1
6601.0211	TVP-O21	20	99.0%	1	0.99	400	0.75	20	1
6601.0401	TVP-O40	40	99.9%	0.1	0.999	400	1.4	42	1
6601.0631	TVP-O63	63	99.9%	0.1	0.999	400	2	55	1

\*1 The clamping force is calculated with an air pressure of 1,000mbar and 100% leakproof clamping of the workpiece.

## Included

- Operating manual

## Accessories

TVA-22-2 Vacuum hose set  
Page 58

TVA-77-01 Vacuum oil  
Page 65

TVA-70-01 Air filter housing  
Page 064



# OIL-LUBRICATED VACUUM PUMPS

## TVS-O vacuum pump sets

"Plug-and-play" vacuum pump set. Oil-lubricated vane pump for machining workpieces without fluids, such as emulsion.



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TVS-O21



TVS-O40



TVS-O63

## Fast, easy and economical

Provided that no fluids are used during the machining process that can enter the vacuum pump, the Tepas TVS-O vacuum pump sets are easy to use. They guarantee the highest possible clamping force of the workpieces. A corresponding TVA-22 hose set and one of the Tepas vacuum chucks make "Plug-and-Play" starting possible with vacuum clamping.

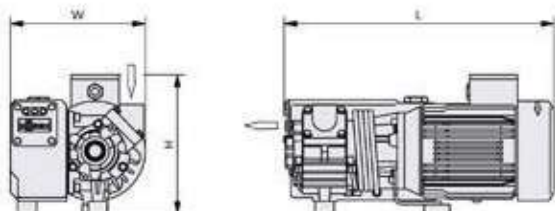
# TEPAS

CLAMPING SYSTEMS

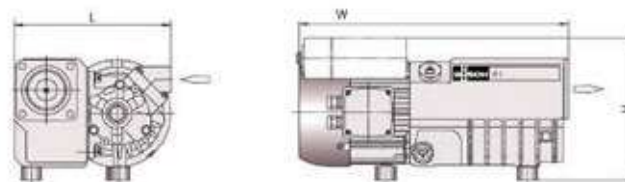
## Highlights

- Air filter housing with polyester filter.
- Thermally protected switch (EU only).
- At a later stage, using an extension kit, this can be expanded into a unit with fluid separator (see next page).

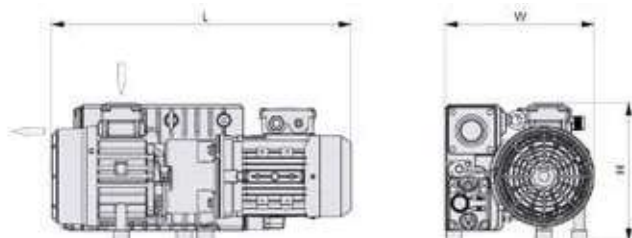
TVS-O16



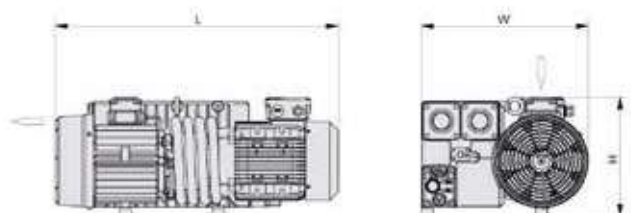
TVS-O21



TVS-O40



TVS-O63



Article no.	Model	m³/hour	max. vacuum	hPa mbar	Clamping force kg/cm² (*1)	V	kW	Kg	Pack.
6601.1160	TVS-O16	16	98.0%	2	0.98	230	0.55	18	1
6601.1210	TVS-O21	20	99.0%	1	0.99	230	0.75	20	1
6601.1211	TVS-O21	20	99.0%	1	0.99	400	0.75	20	1
6601.1401	TVS-O40	40	99.9%	0.1	0.999	400	1.4	42	1
6601.1631	TVS-O63	63	99.9%	0.1	0.999	400	2	55	1

\*1 The clamping force is calculated with an air pressure of 1,000mbar and 100% leakproof clamping of the workpiece.

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## Included

- Air filter housing with polyester filter
- 3 metres of electrical cable with thermally protected switch (EU only)\*
- 500ml vacuum oil
- Download manual from the website

## Accessories

TVA-22-2 Vacuum hose set  
Page 58

TGC-300 Vacuum chucks  
Page 10

TVA-78-02 Maintenance set  
Page 65



## OIL-LUBRICATED VACUUM PUMPS

### TVU-1-O vacuum units with fluid separator

Vacuum unit for machining workpieces where fluids, such as emulsions, are used. These units have a modular design, enabling expansion at a later date.

The 36-litre separator tank is suitable for separating 26 litres of fluid which is also taken in during the vacuum process.





## The basis for vacuum with fluid separator

As soon as, during the vacuum process, there is a possibility that fluid can also be drawn in, this fluid has to be separated before it reaches the vacuum pump. These TVU-1-O vacuum units form the basis for all vacuum processes, in which a fluid separator is necessary. The vacuum unit is modularly designed, enabling the pump to be expanded at a later stage with accessories, such as level sensors, vacuum switches and wheels. Even this most comprehensive TVU-4-O vacuum unit is based on this unit. They guarantee the highest possible clamping force of the workpieces.

**TEPAS**  
CLAMPING SYSTEMS

### Highlights

- Modular construction; this unit forms the basis for expansions at a later date.
- 36/26 litres fluid separator.
- Oil-lubricated vane pump generates up to 99% vacuum.



### Expansion

With optional  
wheels and push handle  
Page 56



### Expansion

With optional  
vacuum and level sensor  
Page 63

Article no.	Model	m <sup>3</sup> /hour	max. vacuum	hPa mbar	Clamping force kg/cm <sup>2</sup> <sup>(*)</sup>	V	kW	Pack.
6602.0160	TVU-1-O16	16	98.0%	2	0.98	230	0.55	1
6602.0210	TVU-1-O21	20	99.0%	1	0.99	230	0.75	1
6602.0211	TVU-1-O21	20	99.0%	1	0.99	400	0.75	1

\*1 The clamping force is calculated with an air pressure of 1,000mbar and 100% leakproof clamping of the workpiece.

### Included

- Fluid separator 36/26 litres
- Air filter housing with polyester filter
- 3m of electrical cable
- Electrical plug (EU countries only)
- 500ml vacuum oil
- Download manual from the website

### Accessories

TVA-55-11 Vacuum switch  
Page 63

TVA-56-02 Level sensor  
Page 63

TBC-300 Vacuum chucks  
Page 18



# OIL-LUBRICATED VACUUM PUMPS

## TVU-2-O vacuum units with fluid separator and second shelf

Oil-lubricated vacuum pump set with fluid separator for applications with fluids, such as coolant emulsion. With a second shelf. In the TVU-2-O40 and TVU-2-O63, the pumps are mounted on the lowest shelf.

### Expansion

With optional vacuum and level sensor  
Page 63



TVU-2-O21



TVU-2-O63

## Mobile with large pumps

Vacuum units with fluid separator for applications where fluids, such as emulsions, are used. Mobile design with 2 levels. Upwards of 40m<sup>3</sup>/hour pumps, these are mounted on the lowest shelf. These units can easily be expanded with a control box to which a level sensor and/or vacuum sensor can be connected. The 5 metres of signal cable which is also included, can be connected to your machine, to enable the sensor protection to communicate with your machine control. Ideal for use of vacuum with automated processes.

## Highlights

- Modular construction, therefore suitable for expansions at a later date.
- Easy to expand with control for sensors.
- Mobile model.

## Modular construction

These vacuum units can be assembled from the TVU-1-O21 vacuum unit with the TPA-001 wheel set (page 54) and TPA-021 push handle set.

Article no.	Model	m <sup>3</sup> /hour	max. vacuum	hPa mbar	Clamping force kg/cm <sup>2</sup> (*1)	V	kW	Pack.
6602.2160	TVU-2-O16	16	98.0%	2	0.98	230	0.55	1
6602.2210	TVU-2-O21	20	99.0%	1	0.99	230	0.75	1
6602.2211	TVU-2-O21	20	99.0%	1	0.99	400	0.75	1
6602.2401	TVU-2-O40	40	99.9%	0.1	0.999	400	1.4	1
6602.2631	TVU-2-O63	63	99.9%	0.1	0.999	400	2	1

\*1 The clamping force is calculated with an air pressure of 1,000mbar and 100% leakproof clamping of the workpiece.

## Included

- Fluid separator 36/26 litres
- Air filter housing with polyester filter
- 3m of electrical cable
- Electrical plug (EU countries only)
- 500ml vacuum oil
- Wheels and push handle
- Download manual from the website

## Accessories

TVA-501 Control unit  
Page 56

TVA-55-02 Vacuum switch  
Page 63

TBC-300 Vacuum chucks  
Page 18



## OIL-LUBRICATED VACUUM PUMPS

### TVU-3-O vacuum units with fluid separator and 3 shelves

Mobile vacuum unit with oil-lubricated vacuum pump. With fluid separator for applications with fluids such as coolant emulsion. With 3 shelves for maximum storage space.



TVU-3-O21



TVU-3-O63



## Mobile extended vacuum unit

Extended vacuum unit with fluid separator for applications with fluids such as emulsions. This mobile unit has 3 shelves for maximum storage space. Upwards of 40m<sup>3</sup>/hour pumps, these are mounted on the lowest shelf. These units can easily be expanded with a control box to which a level sensor and/or vacuum sensor can be connected. The 5 metres of signal cable which is also included, can be connected to your machine, to enable the sensor protection to communicate with your machine control. Ideal for use of vacuum with automated processes.

## Highlights

- Modular construction, therefore suitable for expansions at a later date.
- Easy to expand with control for sensors.
- Mobile model with 3 shelves for maximum storage space.

## Modular construction

These vacuum units can be assembled from the TVU-1-O21 vacuum unit with the TPA-001 wheel set (page 54), TPA-021 push handle set and TPA-101 level increase.

Article no.	Model	m <sup>3</sup> /hour	max. vacuum	hPa mbar	Clamping force kg/cm <sup>2</sup> (*1)	V	kW	Pack.
6602.3160	TVU-3-O16	16	98.0%	2	0.98	230	0.55	1
6602.3210	TVU-3-O21	20	99.0%	1	0.99	230	0.75	1
6602.3211	TVU-3-O21	20	99.0%	1	0.99	400	0.75	1
6602.3401	TVU-3-O40	40	99.9%	0.1	0.999	400	1.4	1
6602.3631	TVU-3-O63	63	99.9%	0.1	0.999	400	2	1

\*1 The clamping force is calculated with an air pressure of 1,000mbar and 100% leakproof clamping of the workpiece.

## Included

- Fluid separator 36/26 litres
- Air filter housing with polyester filter
- 3m of electrical cable
- Electrical plug (EU countries only)
- 500ml vacuum oil
- Wheel set and push handle set
- Download manual from the website

## Accessories

TVA-22 Hose sets  
Page 58 onwards

TVA-77 Vacuum oil  
Page 65 onwards

TBC-300 Vacuum chucks  
Page 18



## OIL-LUBRICATED VACUUM PUMPS

### TVU-4-O vacuum units with fluid separator and pump-back function

Unique vacuum unit with automatic pump emptying function. With fluid separator for applications with fluids such as coolant emulsion. With 3 shelves for maximum storage space. With oil-lubricated vacuum pump.



TVU-4-O21

## With pump-back function

This vacuum unit is suitable for a continuous process in applications where fluids are used. Separated fluids, such as emulsions, are automatically pumped back without the vacuum process being interrupted. There is also integrated level protection and a vacuum sensor that can be connected to your machine control by means of the control.

## Highlights

- With automatic pump-back function.
- With sensors for connection with machine control.
- To be used with vacuum chucks where leakage is present, such as the Tepas PerfoChuck and PerfoPlate.

Article no.	Model	m <sup>3</sup> /hour	max. vacuum	hPa mbar	Clamping force kg/cm <sup>2</sup> (*1)	V	kW	Pack.
6602.4160	TVU-4-O16	16	98.0%	2	0.98	230	0.55	1
6602.4210	TVU-4-O21	20	99.0%	1	0.99	230	0.75	1
6602.4211	TVU-4-O21	20	99.0%	1	0.99	400	0.75	1
6602.4401	TVU-4-O40	40	99.9%	0.1	0.999	400	1.4	1
6602.4631	TVU-4-O63	63	99.9%	0.1	0.999	400	2	1

\*1 The clamping force is calculated with an air pressure of 1,000mbar and 100% leakproof clamping of the workpiece.

## Included

- Fluid separator 2x 36/26 litres with pump-back function
- 5 metres of signal cable for connection with machine control
- 3m of electrical cable
- Electrical plug (EU countries only)
- Download manual from the website

## Accessories

TVA-22 Hose sets  
Page 58 onwards



TVA-76-02 Cleaner  
Page 65



TVA-78-02 Maintenance set  
Page 65



## DRY-RUNNING VACUUM PUMPS

### **TVP-D separate vacuum pumps**

Separate dry-running vacuum pumps with no mains cable or other accessories. The main characteristics of these dry-running rotary vane vacuum pumps: compact, reliable and extremely powerful. The oil-free design means the pumps are ideal for industrial applications, for which fast and reliable vacuum is necessary.



**TVP-D16**



**TVP-D40**



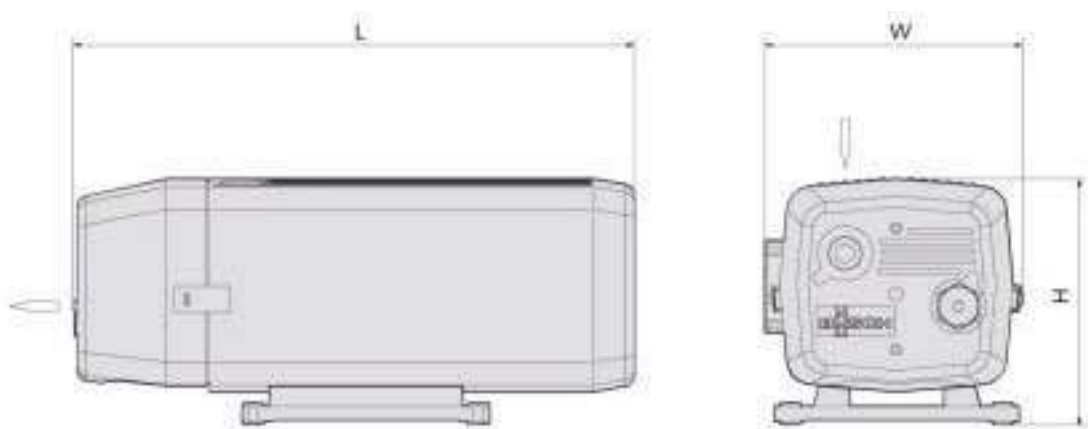
## Application-orientated and easy to maintain

These rotary vane vacuum pumps are characterised by oil-free operation and high availability and operational reliability. This is the result of a design with, amongst other things, wear-resistant and self-lubricating rotary vanes made of special graphite, a robust construction and long life lubricated bearings. Maintenance is simple and can be carried out by the actual operator. In addition to regular checks and the replacement of vanes and filters on time, no additional maintenance is required.

## Highlights

- Can withstand vacuum leakage.
- Easy to maintain.

**TEPAS**  
CLAMPING SYSTEMS



Article no.	Model	m <sup>3</sup> /hour	max. vacuum	hPa mbar	Clamping force kg/cm <sup>2</sup> (*1)	V	kW	Kg	Pack.
6631.0160	TVP-D16	16	85.0%	150	0.85	230	0.55	25	1
6631.0161	TVP-D16	16	85.0%	150	0.85	400	0.55	25	1
6631.0250	TVP-D25	25	85.0%	150	0.85	230	0.9	31	1
6631.0251	TVP-D25	25	85.0%	150	0.85	400	0.9	31	1
6631.0400	TVP-D40	40	85.0%	150	0.85	230	1.25	38	1
6631.0401	TVP-D40	40	85.0%	150	0.85	400	1.25	38	1

\*1 The clamping force is calculated with an air pressure of 1,000mbar and 100% leakproof clamping of the workpiece.

## Included

- Operating manual

## Accessories

TVA-21-4 Vacuum hose  
Page 58

TVA-22-2 Vacuum hose set  
Page 58

TVA-70-01 Air filter housing  
Page 64



## DRY-RUNNING VACUUM PUMPS

### TVS-D vacuum pump sets

"Plug-and-play" vacuum pump set. Dry-running rotary vane pump for machining workpieces without fluids, such as emulsion. Ideal for situations where leakage is present, such as with the Tepas Perfo-Chuck, PerfoPlate and the Tepas  $\mu$ Chuck/ $\mu$ mPlate.



TVS-D16



TVS-D40

## Fast, easy and economical

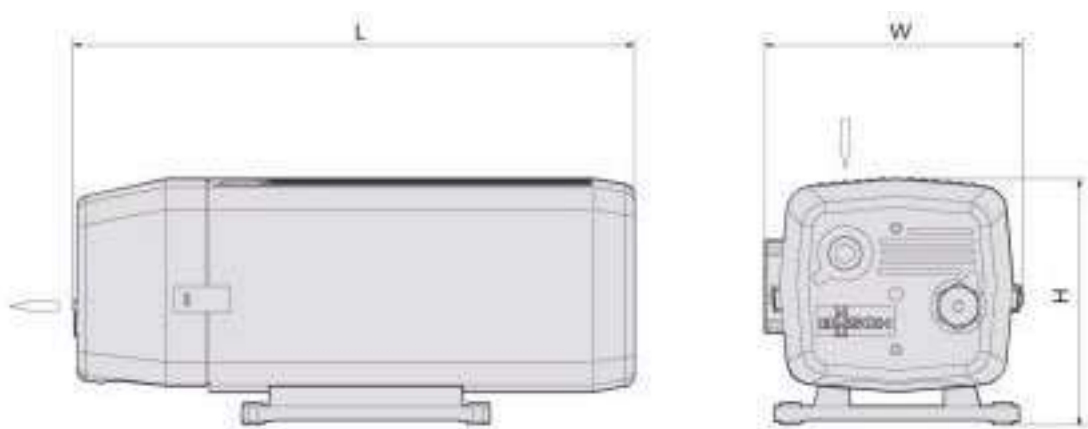
Provided that no leak-tight clamping situations are possible and provided that no fluids are used during the machining process that could enter the vacuum pump, the Tepas TVS-D vacuum pump sets are easy to use. They guarantee the highest possible clamping force of the workpieces. A corresponding TVA-22 hose set and one of the Tepas vacuum chucks make "Plug-and-Play" starting possible with vacuum clamping.

# TEPAS

CLAMPING SYSTEMS

## Highlights

- Air filter housing with polyester filter
- Thermally protected switch (EU only).



Article no.	Model	m³/hour	max. vacuum	hPa mbar	Clamping force kg/cm² (*1)	V	kW	Kg	Pack.
6631.1160	TVS-D16	16	85.0%	150	0.85	230	0.55	27	1
6631.1161	TVS-D16	16	85.0%	150	0.85	400	0.55	27	1
6631.1250	TVS-D25	25	85.0%	150	0.85	230	0.9	33	1
6631.1251	TVS-D25	25	85.0%	150	0.85	400	0.9	33	1
6631.1400	TVS-D40	40	85.0%	150	0.85	230	1.25	40	1
6631.1401	TVS-D40	40	85.0%	150	0.85	400	1.25	40	1

\*1 The clamping force is calculated with an air pressure of 1,000mbar and 100% leakproof clamping of the workpiece.

## Included

- Air filter housing with polyester filter
- 3 metres of electrical cable with thermally protected switch (EU only)
- Download manual from the website

## Accessories

TVA-22-2 Vacuum hose set  
Page 58

TPC-300 Vacuum chucks  
Page 12

TVA-55-01 Vacuum switch  
Page 63



## DRY-RUNNING VACUUM PUMPS

### TVU-1-D vacuum units with fluid separator

Vacuum unit for machining workpieces where leakage is present in the clamping and fluids, such as emulsions, are used. These units have a modular design, enabling expansion at a later date. The 36-litre separator tank is suitable for separating 26 litres of fluid which is also taken in during the vacuum process.



TVU-1-D16 230V



## The basis for vacuum with fluid separator

An oil-lubricated vacuum pump cannot withstand large amounts of vacuum leakage and must generate at least 70% vacuum. If there is too much vacuum leakage and fluid can be drawn in during the vacuum process, these TVU-1-D vacuum units are the ideal basis for these vacuum processes. The vacuum unit is modularly designed, enabling the pump to be expanded at a later stage with accessories, such as level sensors, vacuum switches and wheels. Even this most comprehensive TVU-4-D vacuum unit is based on this unit. They guarantee the highest possible clamping force of the workpieces.

**TEPAS**  
CLAMPING SYSTEMS

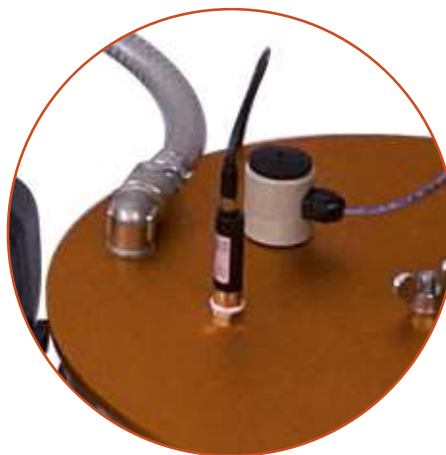
### Highlights

- Modular construction; this unit forms the basis for expansions at a later date.
- 36/26 litres fluid separator.
- Dry-running rotary vane pump for clamping with vacuum leakage.



### Expansion

With optional wheels and push handle  
Page 56



### Expansion

With optional vacuum and level sensor  
Page 63

Article no.	Model	m <sup>3</sup> /hour	max. vacuum	hPa mbar	Clamping force kg/cm <sup>2</sup> (*1)	V	kW	Kg	Pack.
6632.0160	TVU-1-D16	16	85.0%	150	0.85	230	0.55	27	1
6632.0161	TVU-1-D16	16	85.0%	150	0.85	400	0.55	27	1

\*1 The clamping force is calculated with an air pressure of 1,000mbar and 100% leakproof clamping of the workpiece.

### Included

- Fluid separator 36/26 litres
- Air filter housing with polyester filter
- 3m of electrical cable
- Electrical plug (EU countries only)
- Download manual from the website

### Accessories

TVA-55-11 Vacuum switch  
Page 63

TVA-56-02 Level sensor  
Page 63

TGC-300 Vacuum chucks  
Page 10



## DRY-RUNNING VACUUM PUMPS

### TVU-2-D vacuum units with fluid separator and second shelf

Vacuum unit with a second shelf for machining workpieces where leakage is present in the clamping and fluids, such as emulsions, are used.



TVU-2-D40

## Mobile with large pumps

Vacuum units with fluid separator for applications where fluids, such as emulsions, are used. With dry-running rotary vane pump, which is very suitable for applications where leakage is present in the clamping and potentially <70% vacuum can be achieved. Mobile design with 2 levels. These units can easily be expanded with a control box to which a level sensor and/or vacuum sensor can be connected. The 5 metres of signal cable which is also included, can be connected to your machine, to enable the sensor protection to communicate with your machine control. Ideal for use of vacuum with automated processes.

## Highlights

- Modular construction, therefore suitable for expansions at a later date.
- Easy to expand with control for sensors.
- Mobile model.

## Modular construction

These units have a modular design, enabling expansion at a later date. In the TVU-2-D25 and TVU-2-D40, the pumps are mounted on the lowest shelf. The 36-litre separator tank is suitable for separating 26 litres of fluid which is also taken in during the vacuum process.

Article no.	Model	m <sup>3</sup> /hour	max. vacuum	hPa mbar	Clamping force kg/cm <sup>2</sup> (*)	V	kW	Pack.
6632.2160	TVU-2-D16	16	85.0%	150	0.85	230	0.55	1
6632.2161	TVU-2-D16	16	85.0%	150	0.85	400	0.55	1
6632.2250	TVU-2-D25	25	85.0%	150	0.85	230	0.9	1
6632.2251	TVU-2-D25	25	85.0%	150	0.85	400	0.9	1
6632.2400	TVU-2-D40	40	85.0%	150	0.85	230	1.25	1
6632.2401	TVU-2-D40	40	85.0%	150	0.85	400	1.25	1

\*1 The clamping force is calculated with an air pressure of 1,000mbar and 100% leakproof clamping of the workpiece.

## Included

- Fluid separator 36/26 litres
- Air filter housing with polyester filter
- 3m of electrical cable
- Electrical plug (EU countries only)
- Wheels and push handle
- Download manual from the website

## Accessories

TPA-501 Control unit  
Page 56

TVA-55-02 Vacuum switch  
Page 63

TBC-300 Vacuum chucks  
Page 18



## DRY-RUNNING VACUUM PUMPS

### TVU-3-D vacuum units with fluid separator and 3 shelves

Vacuum unit with third shelf for machining workpieces where leakage is present in the clamping and fluids, such as emulsions, are used.



TVU-3-D16



TVU-3-D40



## Mobile extended vacuum unit

Vacuum units with fluid separator for applications where fluids, such as emulsions, are used. With dry-running rotary vane pump, which is very suitable for applications where leakage is present in the clamping and potentially <70% vacuum can be achieved. Mobile design with 3 levels. These units can easily be expanded with a control box to which a level sensor and/or vacuum sensor can be connected. The 5 metres of signal cable which is also included, can be connected to your machine, to enable the sensor protection to communicate with your machine control. Ideal for use of vacuum with automated processes.

## Highlights

- Modular construction, therefore suitable for expansions at a later date.
- Easy to expand with control for sensors.
- Mobile model with 3 shelves for maximum storage space.

## Modular construction

These units have a modular design, enabling expansion at a later date. In the TVU-3-D25 and TVU-3-D40, the pumps are mounted on the lowest shelf.

Article no.	Model	m <sup>3</sup> /hour	max. vacuum	hPa mbar	Clamping force kg/cm <sup>2</sup> (*1)	V	kW	Pack.
6632.3160	TVU-3-D16	16	85.0%	150	0.85	230	0.55	1
6632.3161	TVU-3-D16	16	85.0%	150	0.85	400	0.55	1
6632.3250	TVU-3-D25	25	85.0%	150	0.85	230	0.9	1
6632.3251	TVU-3-D25	25	85.0%	150	0.85	400	0.9	1
6632.3400	TVU-3-D40	40	85.0%	150	0.85	230	1.25	1
6632.3401	TVU-3-D40	40	85.0%	150	0.85	400	1.25	1

\*1 The clamping force is calculated with an air pressure of 1,000mbar and 100% leakproof clamping of the workpiece.

## Included

- Fluid separator 36/26 litres
- Air filter housing with polyester filter
- 3m of electrical cable
- Electrical plug (EU countries only)
- Wheels and push handle
- Download manual from the website

## Accessories

TVA-22 Hose sets  
Page 58 onwards

TVA-77 Vacuum oil  
Page 65 onwards

TBC-300 Vacuum chucks  
Page 18



## DRY-RUNNING VACUUM PUMPS

### TVU-4-O vacuum units with fluid separator and pump-back function

Unique vacuum unit with automatic pump emptying function. With fluid separator for applications with fluids such as coolant emulsion. With 3 shelves for maximum storage space. With dry-running vacuum pump for applications where leakage is present in the clamping.



TVU-4-D40

## With pump-back function

This vacuum unit is suitable for a continuous process in applications where fluids are used. Separated fluids, such as emulsions, are automatically pumped away without the vacuum process being interrupted. There is also integrated level protection and a vacuum sensor that can be connected to your machine control by means of the control.

## Highlights

- With automatic pump-back function.
- With sensors for connection with machine control.
- To be used with vacuum chucks where leakage is present.

## Modular construction

In the TVU-4-D25 and TVU-4-D40, the pumps are mounted on the lowest shelf.

Article no.	Model	m <sup>3</sup> /hour	max. vacuum	hPa mbar	Clamping force kg/cm <sup>2</sup> (*1)	V	kW	Pack.
6632.4160	TVU-4-D16	16	85.0%	150	0.85	230	0.55	1
6632.4161	TVU-4-D16	16	85.0%	150	0.85	400	0.55	1
6632.4250	TVU-4-D25	25	85.0%	150	0.85	230	0.9	1
6632.4251	TVU-4-D25	25	85.0%	150	0.85	400	0.9	1
6632.4400	TVU-4-D40	40	85.0%	150	0.85	230	1.25	1
6632.4401	TVU-4-D40	40	85.0%	150	0.85	400	1.25	1

\*1 The clamping force is calculated with an air pressure of 1,000mbar and 100% leakproof clamping of the workpiece.

## Included

- Fluid separator 2x 36/26 litres with pump-back function
- 5m of signal cable for connection with machine control
- 5m of electrical cable
- Electrical plug (EU countries only)
- Download manual from the website

## Accessories

TVA-22 Hose sets  
Page 58 onwards

TBC-300 Vacuum chucks  
Page 18

TVA-78-02 Maintenance set  
Page 65



# ACCESSORIES

## ACCESSORIES FOR PUMP UNITS

### TPA-001 wheel set

Wheel set for TVU-1 pump units. Consisting of 2 fixed wheels and 2 castors with brake. Incl. mounting materials. Excl. Key SW13. A wheel set is included with the TVU-2, TVU-3 and TVU-4 pump units.



Article no.	Model	Pack.
6688.0001	TPA-001	1

### TPA-501 Control unit

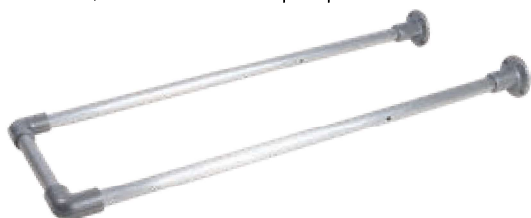
Control unit for connecting up to 2 sensors. Sensors that can be connected are the TVA-54-52 vacuum sensor and TVA-56-02 level sensor. The control unit can be connected to, for example, a processing machine. In the absence of electrical power, a fault signal is given.



Article no.	Model	V	For series	Pack.
6688.0501	TPA-501	230V	TPA-54 220V	1
6688.0502	TPA-502	230V	TPA-55 240V	1

### TPA-021 push handle set

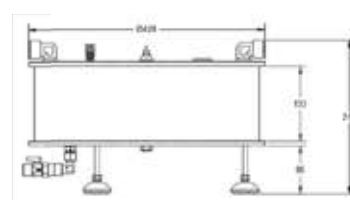
Push handle set and assembly set with which a push handle can be mounted on a TVU-1 pump unit. A push handle set is included with the TVU-2, TVU-3 and TVU-4 pump units.



Article no.	Model	Pack.
6688.0021	TPA-021	1

### TPA-201 separate separator tank 15 litres

Separate separator to separate fluid from the vacuum system.



Article no.	Model	D	H	litres	Pack.
6688.2010	TPA-201	420	272	~15	1

### TPA-101 level increase

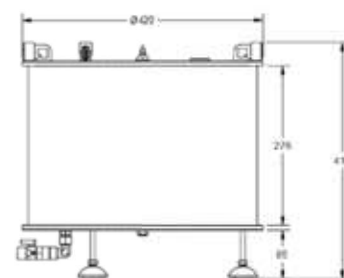
Level increase for TVU-1 and TVU-2 pump unit at 355mm, consisting of: 1 mounting plate, 2 clamps with flanges, 4 single clamps and mounting materials.



Article no.	Model	Pack.
6688.0101	TPA-101	1

### TPA-202 separate separator tank 26 litres

Separate separator to separate fluid from the vacuum system.



Article no.	Model	D	H	litres	Pack.
6688.2020	TPA-202	420	272	~26	1



## TVA-01 standard accessories of vacuum chucks

### Coupler Push-In fitting

Push-in coupling with Push-In fitting for ø12mm PU hose TVA-20-1.



Article no.	Model	Pack.
6800.0101	TVA-01-01	1

### Coupling with hose pillar

Push-in coupling with 19mm hose pillar for internal 19mm vacuum spiral hose TVA-21-4.



Article no.	Model	D mm	Pack.
6800.0102	TVA-01-02	19	1

### Coupler

Push-in coupling for vacuum feedthrough if several vacuum chucks are connected to one another.



Article no.	Model	Pack.
6800.0103	TVA-01-03	1

### Blind plug

Push-in coupling for sealing vacuum channels.



Article no.	Model	Pack.
6800.0104	TVA-01-04	1

### End stop

Sliding end stops for precise positioning of workpieces.



Article no.	Model	Pack.
6800.0105	TVA-01-05	1

### Clamp

Clamp for mounting vacuum chucks which fit into the designated clamping slots.



Article no.	Model	Pack.
6800.0106	TVA-01-06	1

### Clamping element for connecting vacuum chucks

Clamping element for mounting vacuum chucks if several vacuum chucks are connected to one another.



Article no.	Model	Pack.
6800.0107	TVA-01-07	1

### Control knob

Control knob for mounting end stops and removing blind plugs.



Article no.	Model	Pack.
6800.0108	TVA-01-08	1

### Plug

For sealing vacuum bores in the clamping surface.



Article no.	Model	Pack.
6800.0109	TVA-01-09	1

### Clamp

For hose pillars TVA-01-01 or TVA-01-02.



Article no.	Model	Pack.
6800.0110	TVA-01-10	1

# ACCESSORIES

## TVA-30 Fitting for EcoChuck vacuum chucks

Push-In fitting can be fitted directly in all EcoChuck vacuum chucks.



Article no.	Model	hose Ø mm	G	B (Width) mm	L mm	Pack.
6800.3011	TVA-30-11	12	1/4"	7	31.5	1

## TVA-02 T-nut set

T-nut with bolt and flat ring for TVA-01-06 clamping chucks.



Article no.	Model	M	Pack.
6800.0214	TVA-02-14	12	1
6800.0216	TVA-02-16	12	1
6800.0218	TVA-02-18	12	1

## TVA-03 T-nut set for clamping element

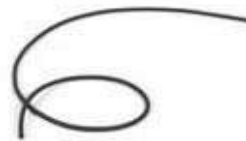
T-nut with bolt, flat rings and cup washers for TVA-01-07 clamping elements, which are used for connecting vacuum chucks.



Article no.	Model	M	Pack.
6800.0314	TVA-03-14	5	1
6800.0316	TVA-03-16	5	1
6800.0318	TVA-03-18	5	1

## TVA-10 Vacuum sealing cord

To create a vacuum surface with GridChuck vacuum chucks or workpiece-specific vacuum chucks.



Article no.	Model	D mm	Pack.
6800.1020	TVA-10-20	2	>10m
6800.1025	TVA-10-25	2.5	>10m
6800.1030	TVA-10-30	3	>10m
6800.1035	TVA-10-35	3.5	>10m
6800.1040	TVA-10-40	4	>10m
6800.1050	TVA-10-50	5	>10m
6800.1060	TVA-10-60	6	>10m
6800.1080	TVA-10-80	8	>10m

## TVA-20 Vacuum PU hose

PolyUrethane hose suitable for vacuum. Available per metre upwards of a 5-metre length.



Article no.	Model	Di mm	Do mm	Pack.
6800.2001	TVA-20-1	8	12	>5m
6800.2002	TVA-20-2	11	16	>5m

## TVA-21 Vacuum spiral wire hose

Transparent vacuum hose with steel spiral insert. Available per metre.



Article no.	Model	Di mm	Do mm	Pack.
6800.2103	TVA-21-3	12	19	>5m
6800.2104	TVA-21-4	19	25	>5m
6800.2105	TVA-21-5	25	34	1m
6800.2106	TVA-21-6	32	40	1m

## TVA-22 Hose sets with vacuum gauge

Can be connected directly to the Tepas vacuum pumps and all Tepas vacuum chucks.



PU hose



Spiral wire hose

With vacuum PU hose

Article no.	Model	Di mm	Do mm	L m	Pack.
6800.2201	TVA-22-1	8	12	3	1
6800.2202	TVA-22-2	11	16	3	1

With vacuum spiral wire hose

Article no.	Model	Di mm	Do mm	L m	Pack.
6800.2203	TVA-22-3	12	19	3	1
6800.2204	TVA-22-4	19	25	3	1

## TVA-23 Hose sets with electronic vacuum switch

Can be connected directly to the Tepas vacuum pumps and all Tepas vacuum chucks. With TVA-55-11 digital vacuum switch.



Article no.	Model	Di mm	Do mm	L m	Pack.
6800.2302	TVA-23-2	11	16	3	1
6800.2304	TVA-23-4	19	25	3	1

## TVA-25 Vacuum feedthrough sets

Set with quick-action couplings for vacuum feedthrough through, for example, the wall of a machine.



With Push-In fittings for vacuum PU hose

Article no.	Model	Di mm	Do mm	Pack.
6800.2501	TVA-25-1	8	12	1
6800.2502	TVA-25-2	11	16	1

## TVA-25 Vacuum feedthrough sets

Set with quick-action couplings for vacuum feedthrough through, for example, the wall of a machine.

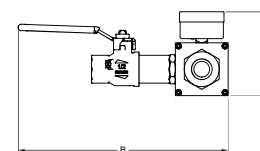
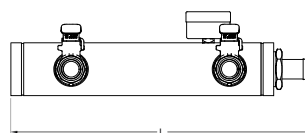


With quick-action couplings for vacuum spiral wire hose

Article no.	Model	Di mm	Do mm	L	Pack.
6800.2503	TVA-25-3	12	19		1
6800.2504	TVA-25-4	19	25		1

## TVA-26 Distribution blocks

For the distribution of several vacuum hoses on 1 central hose.



With Push-In fittings

Article no.	Model	L mm	B (Width) mm	H mm	Pack.
6800.2602	TVA-26-02	287	200	80	1
6800.2603	TVA-26-03	437	200	80	1
6800.2604	TVA-26-04	580	200	80	1



With quick-action couplings

Article no.	Model	L mm	B (Width) mm	H mm	Pack.
6800.2612	TVA-26-12	287	200	80	1
6800.2613	TVA-26-13	437	200	80	1
6800.2614	TVA-26-14	580	200	80	1

# ACCESSORIES

## TVA-30 Push-In fittings

For connecting PU vacuum hose.



Article no.	Model	CH1 mm	CH2 inches	Pack.
6800.3011	TVA-30-11	12	1/4"	1
6800.3012	TVA-30-12	12	3/8"	1
6800.3013	TVA-30-13	12	1/2"	1
6800.3022	TVA-30-22	16	3/8"	1
6800.3023	TVA-30-23	16	1/2"	1

## TVA-30 Quick-action couplings for vacuum spiral wire hose



With internal thread

Article no.	Model	G inches	Pack.
6800.3041	TVA-30-41	1/4"	1
6800.3042	TVA-30-42	3/8"	1
6800.3043	TVA-30-43	1/2"	1

With external thread

Article no.	Model	G inches	Pack.
6800.3051	TVA-30-51	1/4"	1
6800.3052	TVA-30-52	3/8"	1
6800.3053	TVA-30-53	1/2"	1

## TVA-30 Quick-action coupling with large hole

To be used in vacuum pumps upwards of 40m³/hour.



Article no.	Model	G inches	Pack.
6800.3074	TVA-30-74	3/4"	1

## TVA-31 Plug-in nipple with hose pillar

For use with standard quick-action couplings.



Article no.	Model	D mm	Pack.
6800.3102	TVA-31-02	12	1

## TVA-31 Plug-in nipple with thread

For use with standard quick-action couplings.



With external thread

Article no.	Model	D inches	Pack.
6800.3121	TVA-31-21	1/4"	1
6800.3122	TVA-31-22	3/8"	1
6800.3123	TVA-31-23	1/2"	1

With internal thread

Article no.	Model	G inches	Pack.
6800.3131	TVA-31-31	1/4"	1
6800.3132	TVA-31-32	3/8"	1
6800.3133	TVA-31-33	1/2"	1

## TVA-31 Plug-in nipple with thread

For use with standard quick-action couplings.



With external thread

Article no.	Model	D inches	Pack.
6800.3144	TVA-31-44	3/4"	1

With internal thread

Article no.	Model	G inches	Pack.
6800.3154	TVA-31-54	3/4"	1



## TVA-32 Hose pillar with thread

For connecting vacuum spiral wire hose.

With external thread



Article no.	Model	D1 mm	G inches	Pack.
6800.3201	TVA-32-01	8	1/4"	1
6800.3202	TVA-32-02	8	3/8"	1
6800.3204	TVA-32-04	12	1/4"	1
6800.3205	TVA-32-05	12	3/8"	1
6800.3206	TVA-32-06	12	1/2"	1
6800.3209	TVA-32-09	19	3/4"	1

With internal thread

Article no.	Model	D1 mm	G inches	Pack.
6800.3221	TVA-32-21	8	1/4"	1
6800.3222	TVA-32-22	8	3/8"	1
6800.3225	TVA-32-25	12	3/8"	1
6800.3226	TVA-32-26	12	1/2"	1

## TVA-33 Double thread nipple, internal thread

For general mounting of couplings, etc.



Article no.	Model	G1 inches	G2 inches	Pack.
6800.3331	TVA-33-31	1/4"	1/4"	1
6800.3332	TVA-33-32	3/8"	3/8"	1
6800.3333	TVA-33-33	1/2"	1/2"	1
6800.3334	TVA-33-34	3/4"	3/4"	1

Reducer nipple

Article no.	Model	G1 inches	G2 inches	Pack.
6800.3341	TVA-33-41	3/8"	1/4"	1
6800.3342	TVA-33-42	1/2"	1/4"	1
6800.3343	TVA-33-43	1/2"	3/8"	1
6800.3344	TVA-33-44	3/4"	1/2"	1

## TVA-33 Reducer nipple with external and internal thread

For general mounting of couplings, etc.



Article no.	Model	G1 inches	G2 inches	Pack.
6800.3350	TVA-33-50	1/4"	1/8"	1
6800.3351	TVA-33-51	3/8"	1/4"	1
6800.3352	TVA-33-52	1/2"	1/4"	1
6800.3353	TVA-33-53	1/2"	3/8"	1
6800.3355	TVA-33-55	3/4"	3/8"	1
6800.3356	TVA-33-56	3/4"	1/2"	1

## TVA-33 Double thread nipple, external thread

For general mounting of couplings, etc.



Article no.	Model	G1 inches	G2 inches	Pack.
6800.3301	TVA-33-01	1/4"	1/4"	1
6800.3302	TVA-33-02	3/8"	3/8"	1
6800.3303	TVA-33-03	1/2"	1/2"	1
6800.3304	TVA-33-04	3/4"	3/4"	1

Reducer nipple

Article no.	Model	G1 inches	G2 inches	Pack.
6800.3312	TVA-33-12	1/2"	1/4"	1
6800.3313	TVA-33-13	1/2"	3/8"	1
6800.3314	TVA-33-14	3/4"	3/8"	1
6800.3315	TVA-33-15	3/4"	1/2"	1

## TVA-34 T distributor

For general mounting of couplings, etc.



With internal thread

Article no.	Model	G1 inches	G2 inches	G3 inches	Pack.
6800.3401	TVA-34-01	1/4"	1/4"	1/4"	1
6800.3402	TVA-34-02	3/8"	3/8"	3/8"	1
6800.3403	TVA-34-03	1/2"	1/2"	1/2"	1
6800.3404	TVA-34-04	3/4"	3/4"	3/4"	1

With 2x external thread and 1x internal thread

Article no.	Model	G1 inches	G2 inches	G3 inches	Pack.
6800.3411	TVA-34-11	1/4"	1/4"	1/4"	1
6800.3412	TVA-34-12	3/8"	3/8"	3/8"	1
6800.3413	TVA-34-13	1/2"	1/2"	1/2"	1
6800.3414	TVA-34-14	3/4"	3/4"	3/4"	1

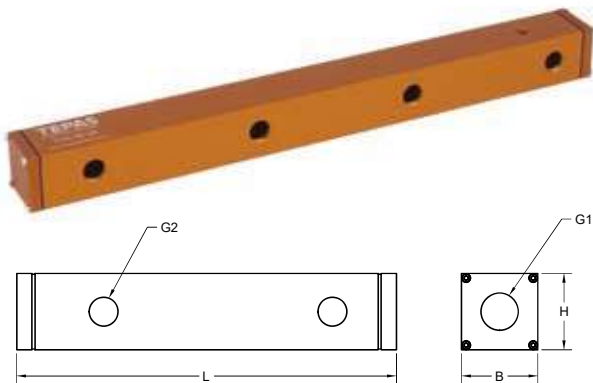
With 1x external thread and 2x internal thread

Article no.	Model	G1 inches	G2 inches	G3 inches	Pack.
6800.3421	TVA-34-21	1/4"	1/4"	1/4"	1
6800.3422	TVA-34-22	3/8"	3/8"	3/8"	1
6800.3423	TVA-34-23	1/2"	1/2"	1/2"	1
6800.3424	TVA-34-24	3/4"	3/4"	3/4"	1

# ACCESSORIES

## TVA-34 Distribution blocks without couplings

Can be fitted with own couplings. Aluminium 50x50mm (BxH - Width x Height).



Article no.	Model	G1 inches	G2 inches	Connections	Pack.
6800.3452	TVA-34-52	3/4"	1/2"	2	1
6800.3453	TVA-34-53	3/4"	1/2"	3	1
6800.3454	TVA-34-54	3/4"	1/2"	4	1

## TVA-35 Sealing rings

For sealing without tape or glue.



Article no.	Model	G1 inches	Pack.
6800.3501	TVA-35-01	1/4"	1
6800.3502	TVA-35-02	3/8"	1
6800.3503	TVA-35-03	1/2"	1
6800.3504	TVA-35-04	3/4"	1

## TVA-35 Hose clamps

Pinch clamps.



Article no.	Model	D1 mm	D2 mm	Pack.
6800.3551	TVA-35-51	18	21	1
6800.3552	TVA-35-52	23	27	1
6800.3553	TVA-35-53	34	37	1
6800.3554	TVA-35-54	40	43	1

## TVA-36 Rotary union



Article no.	Model	G1 inches	Pack.
6800.3602	TVA-36-02	1/4"	1
6800.3603	TVA-36-03	3/8"	1
6800.3604	TVA-36-04	1/2"	1
6800.3605	TVA-36-05	3/4"	1

## TVA-37 Blind plugs

Blind plug with NBR sealing ring.



Article no.	Model	G1 inches	Pack.
6800.3701	TVA-37-01	1/4"	1
6800.3702	TVA-37-02	3/8"	1
6800.3703	TVA-37-03	1/2"	1
6800.3704	TVA-37-04	3/4"	1
6800.3705	TVA-37-05	1"	1

## TVA-51 Vacuum valves

Ball valves with aeration.



Hand lever valve

Article no.	Model	G1 inches	Pack.
6800.5102	TVA-51-02	1/4"	1
6800.5103	TVA-51-03	3/8"	1
6800.5104	TVA-51-04	1/2"	1
6800.5105	TVA-51-05	3/4"	1

Mini ball valve

Article no.	Model	G1 inches	Pack.
6800.5132	TVA-51-32	1/4"	1
6800.5133	TVA-51-33	3/8"	1

## TVA-52 Vacuum gauges

With glycerine.



Hand lever valve

Article no.	Model	G1 inches	L mm	method of mounting	Pack.
6800.5201	TVA-52-01	1/4"	50	be- neath	1
6800.5251	TVA-52-51	1/4"	50	behind	1

Protective cap

Article no.	Model	G1 inches	L mm	Pack.
6800.5281	TVA-51-82		50	1

## TVA-54 Vacuum regulator

Mechanically adjustable vacuum regulator.



Article no.	Model	G1 inches	L/min	Pack.
6800.5402	TVA-54-02	1/4"	265	1

## TVA-54 Electronic vacuum switch

Electronic mechanically adjustable vacuum switch.



Article no.	Model	G1 inches	Volts	Pack.
6800.5452	TVA-54-52	1/4"	max. 250	1

## TVA-55 Electronic vacuum switch

Electronic digitally adjustable vacuum switch.



Article no.	Model	G1 inches	E	bar	V	Pack.
6800.5501	TVA-55-01	1/8"	M8x1	-1/0	10-30	1
6800.5502	TVA-55-02	1/8"	M8x1	-1/0	10-30	1
6800.5511	TVA-55-11	1/8"	M8x1	-1/0	10-30	1

## TVA-55 Data cable

For electronic vacuum switch.



Article no.	Model	E	L	design	Pack.
6800.5551	TVA-55-51	M8x1	5m	straight	1
6800.5552	TVA-55-52	M8x1	5m	per- pendic- ular	1

## TVA-56 Level sensor

Electronic level sensor, 2 or 3 pins.



Article no.	Model	G	L mm	number of pins	Pack.
6800.5602	TVA-56-02	3/4"	max. 300	2	1
6800.5603	TVA-56-03	3/4"	max. 300	3	1

# ACCESSORIES

## TVA-56 Data cable

For electronic level sensor.



Article no.	Model	L	Pack.
6800.5693	TVA-56-93	3m	1

## TVA-72 Oil filter



Article no.	Model	for m³/h	Pack.
6800.7202	TVA-72-02	40-63	1

## TVA-70 Air filter housing with air filter

Steel air filter housing including polyester air filter.



Article no.	Model	for m³/h	G inches	Pack.
6800.7001	TVA-70-01	16-21	3/4"	1
6800.7002	TVA-70-02	40-63	1.1/4"	1

## TVA-73 Oil-mist filter cartridge

For oil-lubricated vacuum pumps.



Article no.	Model	for m³/h	Pack.
6800.7301	TVA-73-01	16-21	1
6800.7302	TVA-73-02	40	1
6800.7303	TVA-73-03	63	1

## TVA-71 Air filter

Polyester finish.



Article no.	Model	for m³/h	Pack.
6800.7101	TVA-71-01	16-40	1
6800.7102	TVA-71-02	40-63	1

## TVA-74 Internal filter

For dry-running vacuum pumps.



Article no.	Model	for m³/h	Pack.
6800.7401	TVA-74-01	16-40	1



## TVA-76 Cleaner

For the regular cleaning of vacuum units with fluid separator or pump-back function.



Article no.	Model	contents ltr	Pack.
6800.7601	TVA-76-01	1	1
6800.7602	TVA-76-02	5	1

## TVA-77 Vacuum oil

For oil-lubricated vacuum pumps.



Article no.	Model	for m <sup>3</sup> /h	Pack.
6800.7701	TVA-77-01	16-21	1
6800.7702	TVA-77-02	40-63	1

## TVA-77-51 Vacuum grease

Grease for greasing O-rings of hose pillars, couplers and blind plugs.



Article no.	Model	ml	Pack.
6800.7751	TVA-77-51	12	1

## TVA-78 Maintenance sets

For oil-lubricated vacuum pumps.



For oil-lubricated vacuum pumps.

Article no.	Model	for m <sup>3</sup> /h	Pack.
6800.7801	TVA-78-01	16	1
6800.7802	TVA-78-02	21	1
6800.7803	TVA-78-03	40	1
6800.7804	TVA-78-04	63	1

For dry-running vacuum pumps.

Article no.	Model	for m <sup>3</sup> /h	Pack.
6800.7805	TVA-78-05	16-40	1

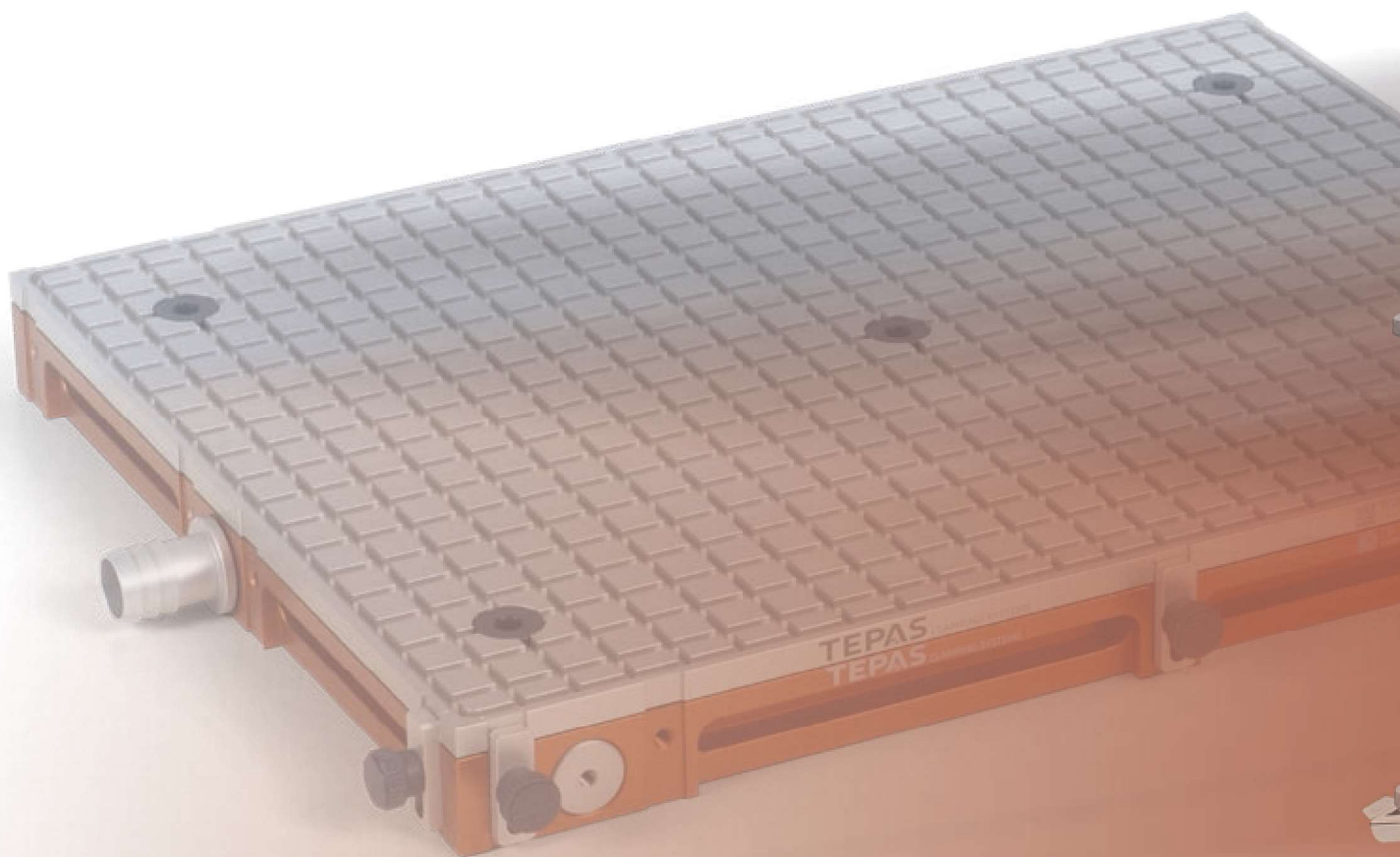
## TVA-80 Air-permeable plates

Made from sintered ceramic, type CE100W.



Article no.	Model	D mm	L mm	B (Width) mm	Pack.
6800.8010	TVA-80-10	10	500	500	1
6800.8015	TVA-80-15	15	500	500	1
6800.8020	TVA-80-20	20	500	500	1
6800.8025	TVA-80-25	25	500	500	1
6800.8030	TVA-80-30	30	500	500	1
6800.8035	TVA-80-35	35	500	500	1
6800.8040	TVA-80-40	40	500	500	1
6800.8050	TVA-80-50	50	500	500	1
6800.8060	TVA-80-60	60	500	500	1
6800.8070	TVA-80-70	70	500	500	1
6800.8080	TVA-80-80	80	500	500	1
6800.8087	TVA-80-87	100	500	500	1
6800.8088	TVA-80-88	400	500	500	1

# Vacuum Clamping







Dukaatstraat 14

4879 AD Etten-Leur,

The Netherlands

T +31 (0)76 572 03 00

E [office@tepasclamping.com](mailto:office@tepasclamping.com)

I [www.tepasclamping.com](http://www.tepasclamping.com)

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