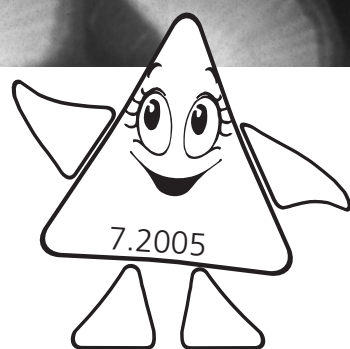
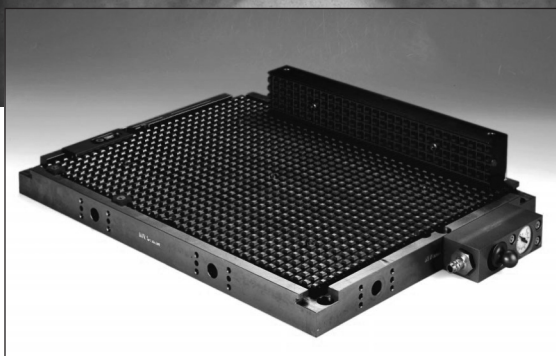


**Workholding
by vacuum**

TRIAG

***miva*CLAMP**



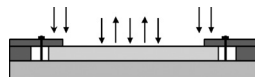
Why holding workpiece with vacuum? *miva*CLAMP

Comparison among mechanical and vacuum workholding devices

Workpiece mechanically clamped

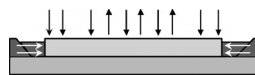
Clamping of plates, using clamps

edges fixed only - Vibrations in center of workpiece - Subsequent operations required



Clamping of plates, using clamping jaws.

Also high pressure applied to workpiece, holding effect at the edges - Risk of deformation and vibrations



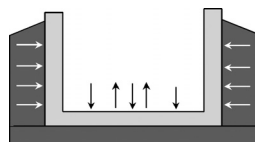
Clamping of cubic-shaped items, using vise.

Stress applied - Risk of pressure marks in workpiece.



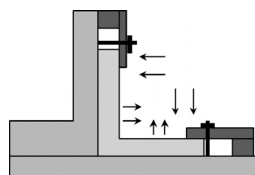
Clamping of U-profile, using vise.

Risk of deformation and vibrations during processing.



Clamping of angled workpiece, using clamps.

Disturbing clamps, vibrations, subsequent operation!



Workpiece held with vacuum

The arrows show the holding force direction:
Mech. clamping = pressure applied to workpiece.

result:

- stress applied to workpiece
- pressure marks in soft materials
- deforming of delicate workpieces
- risk of vibrations

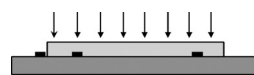
vacuum-plate = pressure upon vacuum-plate

by the surrounding atmosphere, resulting in:

- equal distribution of holding force over the entire workpiece holding surface
- machining with no risk of vibrations
- free, clear loading and processing area

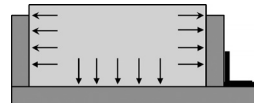
Holding of plates, using vacuum-plate

Holding force equally spread all over the workpiece holding area - No vibrations - Free processing area.



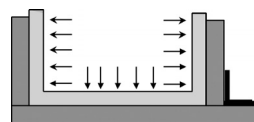
Holding of cubic-shaped item, using vacuum-plate and (2) vertical vacuum-walls.

Workpiece held from 3 (up to 5) directions. No stress applied - No stress applied - No pressure marks.



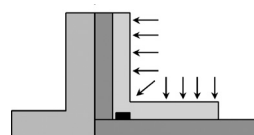
Holding of U-profile, using vacuum-plate and (2) vertical vacuum-walls.

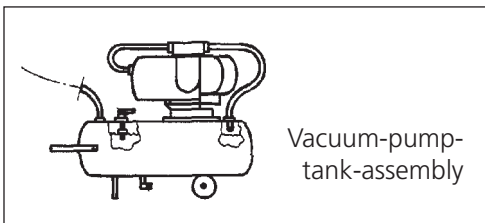
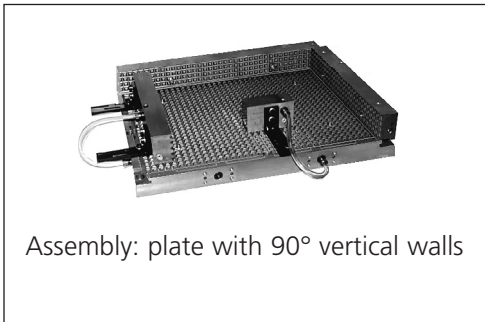
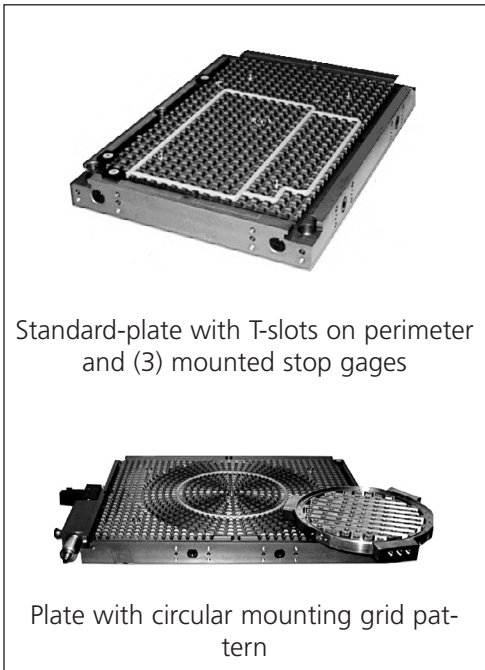
Uniform, stressfree holding from (3) directions - No risk of deformations or vibrations during processing.



Holding of angled workpiece, using vacuum-plate and (1) vertical vacuum-wall.

Uniform stressfree holding - No risk of vibrations - No clamps, free, clear work area for easier, faster loading and processing.





System members and accessories

Vacuum plates

- Standard design for single- and multiple purposes 7
- Modules to build-up plates of any size 8, 9
- to hold tiny or shaped items (adapter plate) 7, 8
- Lay-out and tolerances 5
- How MIVA works 5, 6
- Types and dimensions 7-9
- Holding force 4
- Mounting on machines tables 5
- Mounting on magnetic base plates 5, 7
- Mounting on grid base plates 5
- Plate sets complete with pump and accessories
- Components and descriptions 14
- Sets (with part listing) ready to go 15-16

Additional lateral workpiece support

- Extension module used as vertical wall 10

Workpiece locating and holding

- How to gage correctly 6
- How to mount sealing cord correctly 6

Vacuum pumps and control units

- Central programmable control desk 11
- Control unit, manually operated 11
- External On-OFF push button control unit 11
- Pressure sensor switch 11
- Vacuum-pumps and pump-assemblies 13

Accessories and spares

- Gages 6, 7
- Quick hose coupling 12
- Suction-valve MIVA 12
- Sealing cord 12
- Connector bar 10
- Link-up-plug 10
- Sealings 12
- Edge bar with T-slot 9
- Vacuum distributor 12
- Connector tubing 10, 12
- Vacuum hose 12

Comparison among various vacuum systems

Efficiency

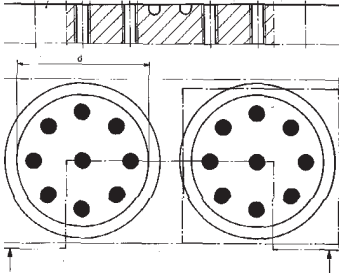


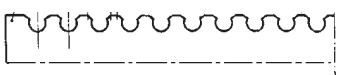
Plate with suction bores
each section of \varnothing 40 mm
having 9 bores of \varnothing 4mm
Rate of efficiency = 9%



Plate having slots
slots 2mm, supporting area
8mm
Rate of efficiency = 25 %



**Platte having U-shaped
grooves**
grid 10x10mm, grooves 3mm
Rate of efficiency = 51 %



MIVA waffle pattern,
grid 6.5mm, grooves 5mm,
Rate of efficiency = 92 %

Holding force

A. Theoretical holding force

To allow for a safety factor for atmospheric pressure variations and for leaks within the vacuum-circuit, we calculate an available pressure of 0.85 (12.1 psi) equalling 8.5 N/cm².

We call that amount of pressure as theoretically attainable 100 %

Example:

Workpiece = 300 cm₂ holding surface (150 x 200)
46.5 sq.inch, approx. 6"x8")
Force = pressure x surface holding area (N/cm₂ x cm₂)
Holding force = 8.5 N/cm₂ x 300 cm₂ = 2550 N
(12.1 psi x 46.5 sq.inch = 562 lbs)

The theoretically calculated holding force relating to that workpiece amounts therefore to 2550 N (562 lbs) = 100 %.

For physical reasons, the theoretical holding force never exceeds therefore 8.5 N/cm₂ (12.1 psi) but is equally distributed all over the workpiece holding surface

B. Effective holding force

The theoretically calculated holding force is based upon a hollow space underneath the entire workpiece. This is not possible, since the workpiece must be supported, we must therefore subtract the area supporting the workpiece.

In other words: the larger the workpiece supporting area, thus reducing the hollow space representing the holding area, the lesser the holding force.

As a matter of fact, the effective holding force depends entirely upon the rate of efficiency of the vacuum system

The unique shape of the MIVA workpiece supporting area (waffle-pattern) with minimized supporting area and maximized vacuum-area guarantees maximum attainable holding force with a rate of efficiency of 92%, equalling 2346 N (517 lbs) holding force applied to the workpiece of 300 cm₂ (46.5 sq.inch) holding surface.

Main lay-out and tolerances

1 Vacuum plate

Vacuum plates are made from high tensile aluminium alloy, are ribbed for rigidity and „hard coat“ treated for long tool life.

MIVA plates can be coupled longitudinally and transversely form any size holding plate to suit workpieces, limited by machine table size only. All plates are provided with (8) link-up terminals, (2) at each side at identical centers of 208mm (8.2”), thus allowing to join all plates to each other, regardless their overall dimensions.

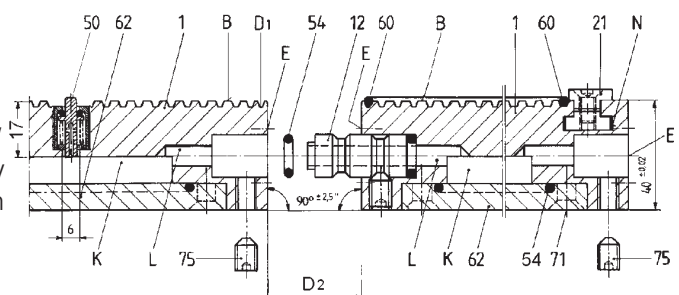
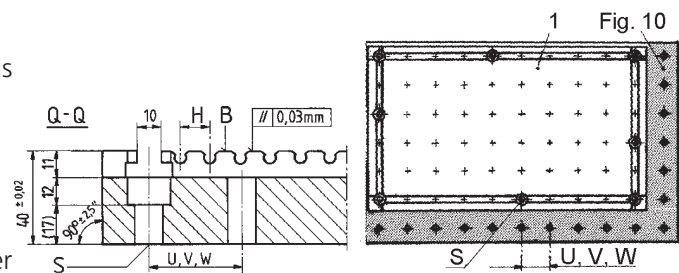
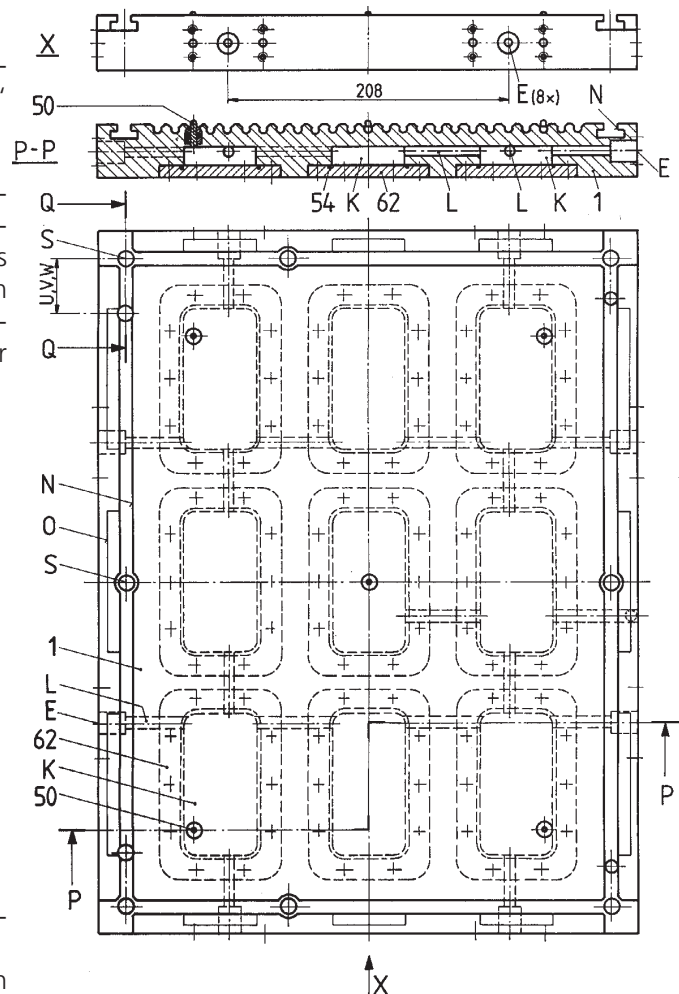
Tolerances:

- Height 40mm ± 0,03mm
- Flatness over all ± 0,05 mm
- Angel 90° ± 2,5”

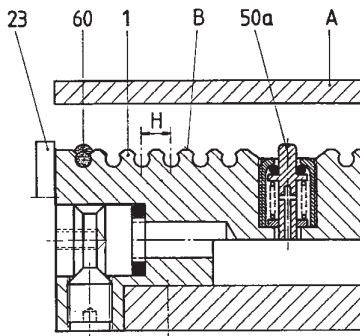
Legend

- B** Workpiece supporting surface
- D1** Sealing groove
- D2** Joint between adjacent modules
- E** MIVA link-terminal (see page 13)
- H** Mounting grid pitch
- K** Vacuum-chamber
- L** Vacuum-inlet
- N** T-slot on perimeter to mount gages, vertical vacuum walls and other accessories
- O** To provide vacuum plates with additional suction holes refer at to the guiding marks „O” to bore them above the vacuum chambers. Seal new holes with MIVA valves item 50
- S** Mounting holes Ø 12H7/18.5mm to suit various grid base plates.
- U** 50mm centers, dowel pin bore Ø 12H7
- V** 40mm centers, dowel pin bore Ø 12H7
- W** 30mm centers, dowel pin bore Ø 10H7 see section-drwg. Q-Q and Fig. 10 for detail. Plates with other mounting hole Ø and/or other hole centers upon request

- 1** Vacuum plate
- 12** Link-up plug
- 21** Stop gage
- 50** Patent. MIVA valve
- 54** O-ring sealing (see page 15)
- 60** Sealing cord (see page 15)
- 62** Backing plate made from aluminium „hard-coat“ treated; on option made from steel, chemically nickel plated, allows you to mount the vacuum plate to a magnetic chuck (on a grinding machine)
- 75** Hex. socket screw

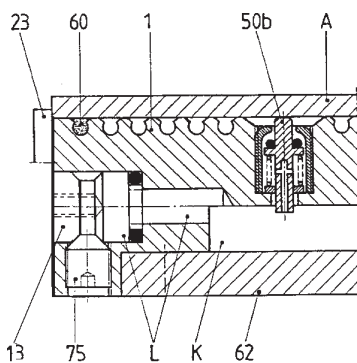


Pat. valve - Mounting of gages and sealing cord



Workpiece „A“ not fixed

- 1** Vacuum plate
- 23** Reversible stop gage
- B** MIVA workpiece supporting surface
- H** MIVA mounting grid pitch
 - minimized supporting area
 - maximized vacuum space
 - grid pitch 6.5mm or 13mm (_" or _")
- 50a** MIVA valve, sealing
 - closed vacuum circuit, no open suction holes
 - no coolant entry
 - permanent vacuum up to the workpiece supporting surface for instant workholding
- 60** Sealing cord made from silicone-rubber
 - mounted and pinched into MIVA sealing groove
 - no bonding - no cleaning necessary

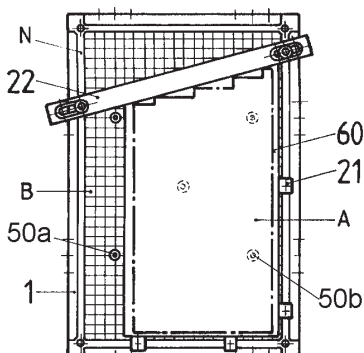


Workpiece „A“ fixed

- 1** Vacuum plate
- 23** Reversible stop gage
- 50b** MIVA valve, activated
- K** Vacuum-chamber
- L** Vacuum-inlet
- 13** Sealing plug
- 75** Securing screw
- 62** Backing plate

How to mount stop gages and sealing cord correctly

- 1** Vacuum plate
 - A** Workpiece
 - B** Workpiece supporting surface
 - N** T-slot on perimeter to secure stop gages
 - 21** Stop gages
 - 22** Adjustable stop rails
 - Stop gages for accurate positioning of workpieces and to prevent them from lateral movement during processing
- Machine always, without exception, toward stop gages**



- 50a** Suction holes not covered with workpieces are sealed with patented MIVA valves. No repeated opening and closing of open suction holes (with all the risks of leaking after a certain time) necessary, the MIVA vacuum circuit is due to the built in springloaded MIVA valves always closed.
- 50b** The workpiece, located above suction holes, opens automatically the springloaded MIVA valve for vacuum access.
- 60** Correct mounting of silicone-rubber sealing cord.
 - The holding force of a vacuum-system increases proportionally to the surface area being outlined by the sealing cord.
 - For max. holding force applied to workpiece, the sealing cord therefore must follow the perimeter of the workpiece.

Standard design

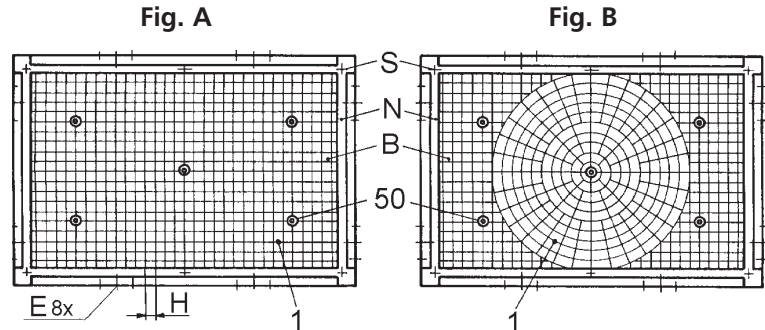
1 Vacuum plates

Vacuum plates

- with T-slot „N” on perimeter
- counterbored mounting holes „S” to fit grid base plates, with grid pitch 30, 40 or 50 mm, (for details see page 5)

Accessories (included)

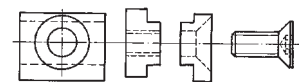
- (4) Stop gages item 21
- (2) Adjustable stop rails item 22



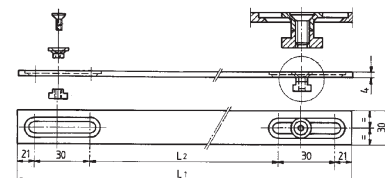
Vacuum plates, others than listed, upon request. Overall size max, 400 x 600 mm		Dimensions Width x Length mm	Hole centers (see page 5) U,V,W mm	Order-no. Surface grid pitch „H”	
				6,5mm	13mm
1.01		280 x 400	30 + 40	01 240 42*	01 240 41*
1.02		280 x 400	50	01 240 52	01 240 51
1.03	Fig. A	350 x 520	30	01 350 32	01 350 31
1.04	MIVA waffle pattern	350 x 520	40	01 350 42	01 350 41
1.05		350 x 520	50	01 350 52*	01 350 51*
1.06		400 x 520	30 + 40	01 450 42*	01 450 41*
1.07		400 x 520	50	01 450 52	01 450 51
1.11		280 x 400	30 + 40	01 241 42*	01 241 41*
1.12		280 x 400	50	01 241 52	01 241 51
1.13	Fig. B	350 x 520	30	01 351 32	01 351 31
1.14	MIVA circular pattern to hold mainly disk shaped workpieces	350 x 520	40	01 351 42	01 351 41
1.15		350 x 520	50	01 351 52*	01 351 51*
1.16		400 x 520	30 + 40	01 451 42*	01 451 41*
1.17		400 x 520	50	01 451 52	01 451 51
1.18	Extra cost for plates and modules	280 x 400		09 240 11	
	provided with steel backing plates	350 x 520		09 350 11	
		400 x 520		09 450 11	

* on stock

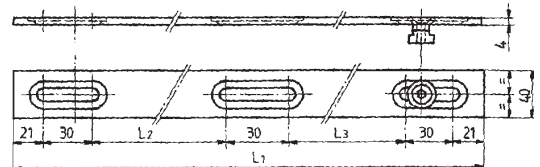
21	Stop gage	Length/Width/Height	Order-no.
		20 x 16 x 4mm	08 020 00
	Accessories: (1) each screw + nut		



22	Stop rails	L1 mm	L2 mm	L3 mm	Order-no.
	for plates				
22.12	280 x 400mm	340	238		08 280 10
22.13	350 x 520mm	416	314		08 350 10
22.14	400 x 520mm	460	358		08 400 10
	Accessories: (2-3) each set screws and nuts				
	for plate-combinations with or without T-slots on center				

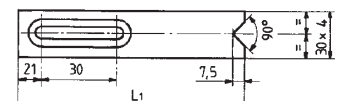


22.15	280 + 280mm	620	229	259	08 560 30
22.16	350 + 350mm	766	305	329	08 700 30
22.17	360 + 360mm	780	309	339	08 720 30
22.18	350 + 400mm	813	349	332	08 750 30
22.19	400 + 400mm	860	349	379	08 800 30



Short stop rail

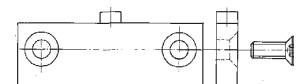
22.21	Accessories:	100	08 100 20
22.22	(1) each set screw	150	08 150 20
22.23	and nut	200	08 200 20



23 Reversible stop gage (point or linear contact gage)

Touch of point or line 70 x 28 x 8mm 08 060 00
Accessories: (2) set screws

Gages, other dimensions than listed, upon request.



to build-up vacuum plates of any size

1 Vacuum modules

Square modules

Fig. C Corner module

- 2 edges T-slot
- 2 edges sealing groove

Fig. D Central module

- 1 edge T-slot
- 3 edges sealing groove

For stop gages see page 7

Stop gages are not included in price of any module (contrary to plates shown on page 7), except with module item 1.22 as specified below)

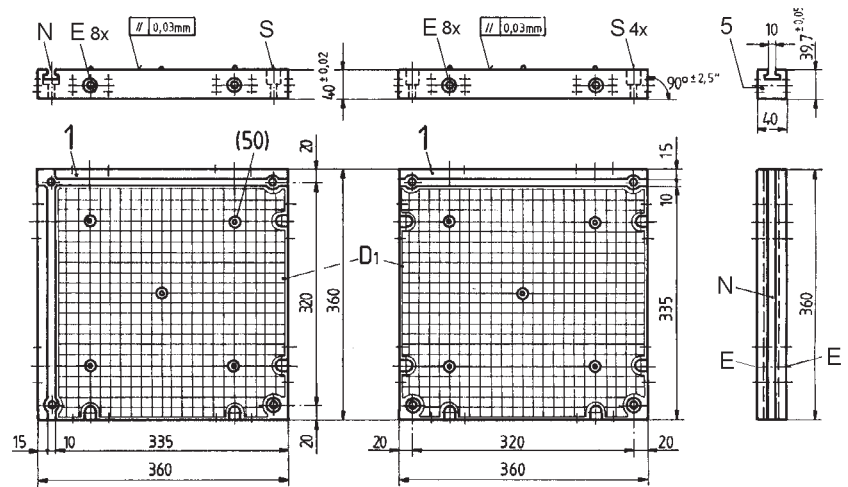


Fig.

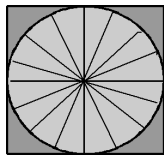
Item

Dimensions
Width x Length
mm

Hole centers
(see page 5)
U,V,W mm

Order-no.
Surface grid pitch „H“
6,5mm 13mm

Fig.	Item	Dimensions Width x Length mm	Hole centers (see page 5) U,V,W mm	Order-no. Surface grid pitch „H“ 6,5mm 13mm
C	Corner module	1.19 360 x 360	40	17 330 42* o
D	Central module	1.20 360 x 360	40	15 330 42* o
E	with curcular grid pattern	1.21 360 x 360	40	14 331 42* o
	4 edges sealing groove	1.22 360 x 360	40	01 401 42* o



360x360mm (14"x14")
with accessories included:
(4) Edge bars 40x360mm
(2) Stop rails
(4) Stop gages









* stock item o not available

1.23 Extra cost for modules Fig. C, D und E provided with steel backing plates

09 330 11

Rectangular modules, overall dimensions similar to vacuum plates fig. A and B

Fig.	Item	Dimensions Width x Length mm	Hole centers (see page 5) U,V,W mm	Order-no. Surface grid pitch „H“ 6,5mm 13mm
F	3 edges T-slot	1.24 280 x 400	30+40	12 240 42 12 240 41
	1 edge sealing groove	1.25 280 x 400	50	12 240 52 12 240 51
		1.26 350 x 520	30	12 350 32 12 350 31
		1.27 350 x 520	40	12 350 42 12 350 41
		1.28 350 x 520	50	12 350 52 12 350 51
		1.29 400 x 520	30+40	12 450 42 12 450 41
		1.30 400 x 520	50	12 450 52 12 450 51
G	3 edges T-slot	1.31 280 x 400	30+40	12 243 42 12 243 41
	1 edge sealing groove	1.32 280 x 400	50	12 243 52 12 243 51
		1.33 350 x 520	30	12 353 32 12 353 31
		1.34 350 x 520	40	12 353 42 12 353 41
		1.35 350 x 520	50	12 353 52 12 353 51
		1.36 400 x 520	30+40	12 453 42 12 453 41
		1.37 400 x 520	50	12 453 52 12 453 51
H	2 small edges T-slot	1.38 280 x 400	30+40	13 240 42 13 240 41
	length sealing groove	1.39 280 x 400	50	13 240 52 13 240 51
		1.40 350 x 520	30	13 350 32 13 350 31
		1.41 350 x 520	40	13 350 42 13 350 41
		1.42 350 x 520	50	13 350 52 13 350 51
		1.43 400 x 520	30+40	13 450 42 13 450 41
		1.44 400 x 520	50	13 450 52 13 450 51

Item	Dimensions Width x Length mm	Hole centers (see page 5) U,V,W mm	Order-no.		Fig.
			Surface grid pitch „H“		
1			6,5mm	13mm	
1.45	280 x 400	30+40	13 243 42	13 243 41	
1.46	280 x 400	50	13 243 52	13 243 51	
1.47	350 x 520	30	13 353 32	13 353 31	
1.48	350 x 520	40	13 353 42	13 353 41	
1.49	350 x 520	50	13 353 52	13 353 51	
1.50	400 x 520	30+40	13 453 42	13 453 41	
1.51	400 x 520	50	13 453 52	13 453 51	
1.52	280 x 400	30+40	17 240 42	17 240 41	
1.53	280 x 400	50	17 240 52	17 240 51	
1.54	350 x 520	30	17 350 32	17 350 31	
1.55	350 x 520	40	17 350 42	17 350 41	
1.56	350 x 520	50	17 350 52	17 350 51	
1.57	400 x 520	30+40	17 450 42	17 450 41	
1.58	400 x 520	50	17 450 52	17 450 51	
1.59	280 x 400	30+40	17 243 42	17 243 41	
1.60	280 x 400	50	17 243 52	17 243 51	
1.61	350 x 520	30	17 353 32	17 353 31	
1.62	350 x 520	40	17 353 42	17 353 41	
1.63	350 x 520	50	17 353 52	17 353 51	
1.64	400 x 520	30+40	17 453 42	17 453 41	
1.65	400 x 520	50	17 453 52	17 453 51	
1.66	280 x 400	30+40	15 240 42	15 240 41	
1.67	280 x 400	50	15 240 52	15 240 51	
1.68	350 x 520	30	15 350 32	15 350 31	
1.69	350 x 520	40	15 350 42	15 350 41	
1.70	350 x 520	50	15 350 52	15 350 51	
1.71	400 x 520	30+40	15 450 42	15 450 41	
1.72	400 x 520	50	15 450 52	15 450 51	
1.73	280 x 400	30+40	15 243 42	15 243 41	
1.74	280 x 400	50	15 243 52	15 243 51	
1.75	350 x 520	30	15 353 32	15 353 31	
1.76	350 x 520	40	15 353 42	15 353 41	
1.77	350 x 520	50	15 353 52	15 353 51	
1.78	400 x 520	30+40	15 453 42	15 453 41	
1.79	400 x 520	50	15 453 52	15 453 51	
1.80	280 x 400	30+40	14 240 42	14 240 41	
1.81	280 x 400	50	14 240 52	14 240 51	
1.82	350 x 520	30	14 350 32	14 350 31	
1.83	350 x 520	40	14 350 42	14 350 41	
1.84	350 x 520	50	14 350 52	14 350 51	
1.85	400 x 520	30+40	14 450 42	14 450 41	
1.86	400 x 520	50	14 450 52	14 450 51	

Extra cost for modules provided with steel backing plates (see page 7, item 1.18)

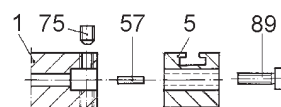
Vacuum-modules, others than listed, upon request. size max 400 x 600mm (15.75" x 23.6"). Edge bars to suit.

5 Edge bar, with 10mm wide T-slot with (4) terminals „E“

5.1	40 x 280	To mount at or between vacuum modules not having built in T-slots	14 280 00
5.2	40 x 350		14 350 00
5.3	40 x 360		14 360 00
5.4	40 x 400		14 400 00
5.5	40 x 520		14 520 00

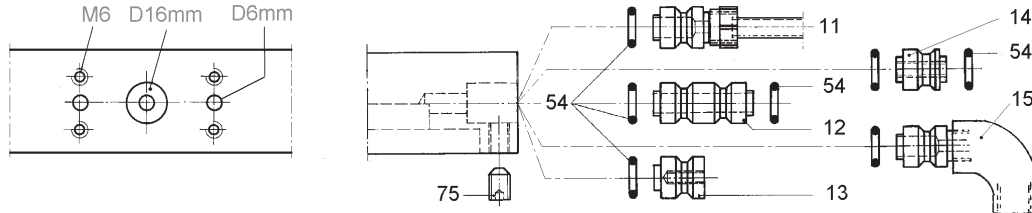
Accessories: (2) Dowel pins item 57
(2/4) Set screws item 89

Legend:
1) Plate
5) Edge bar
75) Set screw
57) Dowel pin
89) Screw



Components providing mechanical link-up and vacuum supply

Vacuum-plates and vacuum modules are provided with (8) link-up terminals „E“ as shown below. (2) terminals at each side on 208 mm (8.2“) centers, regardless the overall dimensions of the plates or modules.



Components and applications

Item	Description	Order-no.
------	-------------	-----------

11 Connector-tubing with fittings

Accessories: (2) O-rings item 54.1

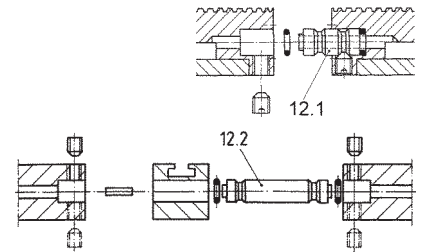
- | | | |
|------|--------------|-----------|
| 11.1 | Length 150mm | 09 401 00 |
| 11.2 | Length 300mm | 09 402 00 |
| 11.3 | Length 420mm | 09 403 00 |



12 Link-up plug

Accessories: (2) O-rings item 54.1

- | | | |
|------|--|-----------|
| 12.1 | Length 40mm (1.6“)
- standard design (for adjacent link-up) | 09 100 00 |
| 12.2 | Length 80mm (3.2“)
- extended item to link-up (2) plates or modules with T-slot bar (item 5) in between | 09 100 80 |

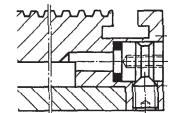


13 Sealing plug

- to seal inactive link-up bore-holes

Accessories: (1) O-ring item 54.1

09 200 00



14 Vacuum circuit connector

- to control units, see page 14

Accessories: (2) O-ring item 54.1

09 300 00



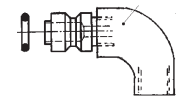
15 Elbow fitting

- to mount to electro-magnetic-valve

- to mount to pressure sensor switch

Accessories: (1) O-ring item 54.1

09 400 00



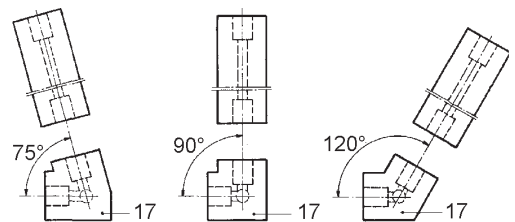
17 Connector bar, length 280mm (11“)

to assemble vacuum plates and extension modules to vacuum plates

Accessories: (2) link-up plugs item 12.1

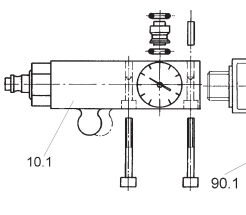
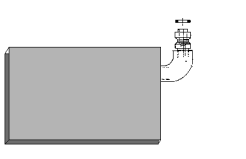
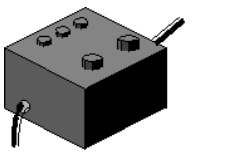
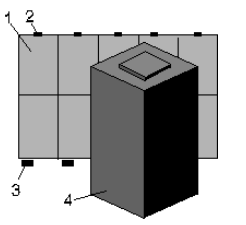
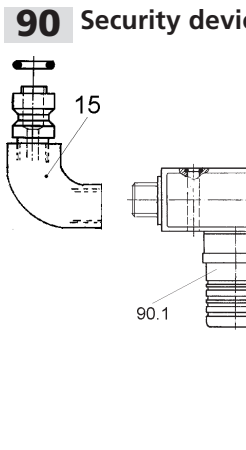
(8) Fastening screws, (2) Dowel pins

- | | | |
|------|--|-----------|
| 17.1 | Angle 75° | 06 280 75 |
| 17.2 | Angle 90° | 06 280 90 |
| 17.3 | Angle 105° | 06 281 05 |
| 17.4 | Angle 120° | 06 281 20 |
| 17.5 | Angle 135° | 06 281 35 |
| 17.6 | Angle 150° | 06 281 50 |
| 17.7 | Angle 165° | 06 281 60 |
| | Bars with other angles, increasing from 70° up to 179° (in steps of 1 full degree), upon request | |
| 17.8 | Angle adjustable from 70° to 180° | 06 280 00 |



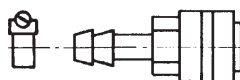
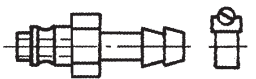
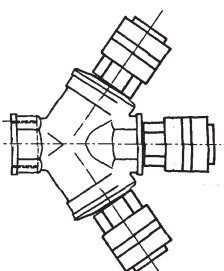

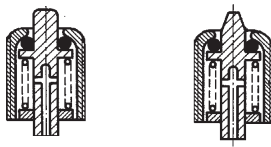
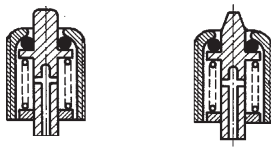
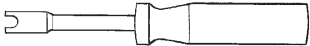

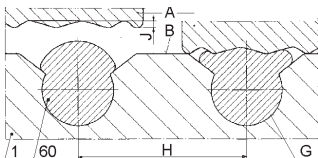
Adjustable connector bars are provided with graduations for gross adjustment. For precision adjustment sine bar recommended. Securing with quick clamping handles.

Control + Safety devices

10 Control units	Item Description	Order-no.
	<p>10.1 Control unit, manually operated ON-OFF switch for direct mounting to vacuum plates and vacuum modules at any one of the (8) terminals „E” <i>Accessories:</i> (1) Vacuum circuit connector, item 14 (4) Securing screws M6 (2) Dowel pins</p>	05 001 00
	<p>10.2 Assembly control-unit (10.1) and pressure sensor switch (90.1) for technical data and accessories see items 10.1 and 90.1</p>	05 002 00
	<p>10.3 Electro-magnetic valve with elbow fitting (item 15) for direct mounting to vacuum plates or vacuum modules at any one of the (8) terminals „E”, power supply 24V DC, wired to and operated from central control desk, item 10.6/10.7</p>	05 010 00
	<p>External ON-OFF push button control unit including:</p> <ul style="list-style-type: none"> - Electro-magnetic valve - Pressure sensor switch, item 90.1 - (2) meter (6_Ft) each vacuum hose and electrowire at both ends - <i>signal control lamps:</i> <ul style="list-style-type: none"> 1) green = vacuum yes 2) red = vacuum no 3) red = excessive fluid level in tank 	05 400 00 05 410 00
	<p>10.4 - Unit for power supply 230V AC, 50Hz - Unit for power supply 120V AC, 60Hz</p> <p>10.6 Central programmable control desk with LC display</p> <ul style="list-style-type: none"> - Memory and preset control capability - Presetable pressure control - Preprogrammable at the factory upon request - Tension inside 24 VDC - Basic unit, allows you to operate (5) stations - for power supply 230VAC, 50Hz - for power supply 12'VAC, 60Hz 	05 500 00 05 510 00
	<p>10.8 Additional module, allows you to operate another 7 stations <i>Components:</i> <ul style="list-style-type: none"> 1) Vacuum plate 2) Pressure control sensor switch, item 3) Electro-magnetic-valve, item 10.3 4) Control desk Vacuum hose (or tubes) and electr. wiring included, vacuum plates, valves and pressure sensor switch not included.</p>	05 500 07
	<p>90.1 Pressure sensor switch with adjustable threshold value, preset at factory to: on: at minus .5 bar (at minus 7.1 psi) off: at minus .4 bar (at minus 5.7 psi)</p> <p>Power supply (24-250 V, 50-60 Hz) Connecting point „R” for wiring to trigger a signal (light or whistle) or to switch the machine tool off via its control system, normally using function M 00 (machine stop), in the event of a drop of vacuum.</p> <p>90.2 Assembly pressure sensor switch (90.1) with elbow fitting (15) for direct mounting to vacuum plates or vacuum modules at any one of the (8) terminals „E”. <i>Assembly wired to central control desk.</i></p>	05 002 02
		05 002 05

Vacuum -distribution and -sealing

mivaCLAMP

Item	Description	Dimensions	Order-no.	
28	Quick hose coupling including clip		05 200 00	
29	Vacuum hose - for vacuum supply from plates to accessories (vertical walls, pivot arm) - per meter (per 3 Ft.) (for ready-made items see page 13) - for vacuum supply from pump to plate	ID 6mm ID 10mm	09 406 00 09 410 00	
31	Hose nozzle including clip		09 410 10	
32	Vacuum distributor, 3-fold provided with (3) quick couplings		09 410 03	
50	mivaCLAMP-valve, patented		07 001 00	
50.1	Valve for assembly to plates + modules - mounting from top above vacuumchambers - to seal suction holes	thread M 12 x 0,5		
50.2	Special key - to assemble and disassemble valves item 50.1		11 007 00	
51	mivaCLAMP-valve, patented Valve for assembly to adpter plates - mounting from bottom side at any location - to seal suction holes	thread M 12 x 0,5	07 002 00	
54	Sealings			
54.1	O-ring to suit link-up items	∅ 10x3mm	11 110 03	
54.2	O-ring to suit honeycombs/endpieces	∅ 60x3mm	11 160 03	
54.3	O-ring to suit vacuum plate chambers	∅ 102x3mm	11 102 03	
60	Silicone-rubber sealing cord - resistant to oils, acids, coolants dielectrics, activated water (EDM) and heat up to 200°C (392° F)			
60.1	Sealing cord ∅ 6,5mm (.26") - J max. 0,6mm (.024")	per 25m	11 101 00	
60.2	Sealing cord ∅ 4mm (.15") - J max. 0,4mm (.016")	per 25m	11 201 00	
	Endless sealing cords ∅ 4mm (.16")			
60.3	- to suit honeycombs	per 10 Stk.	11 201 02	
60.4	- to suit endpieces convex	per 10 Stk.	11 211 02	
60.5	- to suit endpieces concave	per 10 Stk.	11 221 02	
61	Rubber sealing cord ∅ 3mm (.12") - oil resistant - to fit some adapter plates	per 5m	11 300 00	

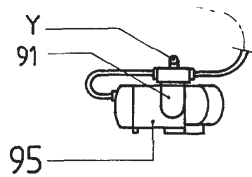
Legend:

- 1) Vacuum plate
- 60) Sealing cord
- A) Workpiece
- B) Workpiece supporting surface area
- G) Design of sealing groove (waffle-pattern), no sharp edges, no risk to destroy sealing cord
- H) Mounting grid pitch:
6,5 or 13mm
- J) max. workpiece surface roughness to git

Vacuum supply

Rotary vacuum - pump portable unit

95



Components:

- 91) Liquid separator
- 95) Pump
- Y) Handle

Item Description

Pump for dry machining or machining using drizzle-coolant

- pressure limit 20mbar (.28 psi)
- efficiency 98%
- liquid separator with sintermetallfilter
- handle
- (3) rubber feet
- (2) m (6.5 Ft) vacuum hose and quick hose coupling
- not for machining using flowing coolant

Suction Capacity

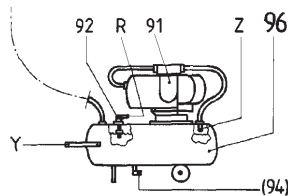
Order-no.

	- maintenance-free motor provided with capacitor starter for single phase		
95.1*	- 230 V ± 5%, 50/60 Hz, 370 W	6/7.2 m ² /h	04 220 50
95.2*	- 120 V ± 5%, 60 Hz, 6 Amps.	254 cu.Ft	04 110 50

Pump-assembly for machining with flowing coolant

Rotary vacuum-pumptank assembly

96



Components:

- 91) Liquid separator
- 92) Float switch
- 94) Water outlet cock
- R) Supply for electrowire
- Y) Handle

- pressure limit 20mbar (.28 psi)
- efficiency 98%
- liquid separator with sintermetallfilter
- pump mounted on a movable 50 liter (13 US gallon) tank being both, vakuu-reservoir and water-collector
- float switch for water level control
- maintenance-free motors
- single-phase motors with capacitor starter

to cover maximum holding surface:

- built by (1) plate or plate-assembly, or
- display over several single plates mounted to various machine-tools

	<i>max. surface 1.8m (19 sq.Ft)</i>		
96.01°	3 x 230/400V, 50/60 Hz, 1.4/1.8Amps.	6/7.2 m ² /h	04 380 00
96.02*	1-phase 230V ± 5%, 50/60 Hz, 370W	6/7.2 m ² /h	04 220 00
96.04*	1-phase 120V ± 5%, 60Hz, 6Amps.	254 cu.Ft	04 110 00
	<i>max. surface 3.5 (37 sq.Ft)</i>		
96.05°	3 x 230/400V, 50/60 Hz, 2.1/1.2Amps.	10/12 m ² /h	04 380 10
96.06	1-phase 230V ± 5%, 50/60 Hz, 370W	10/12 m ² /h	04 220 10
96.07	1-phase 120V ± 5%, 60Hz, 6.1Amps.	423 cu.Ft	04 110 10
	<i>max. surface 5.0 m (53 sq.Ft)</i>		
96.09°	3 x 230/400V, 50/60 Hz, 2.6/1.5Amps.	16/19 m ² /h	04 380 16
96.10	1-phase 230V ± 5%, 50/60 Hz, 550W	16/19 m ² /h	04 220 16
96.11	1-phase 120V ± 5%, 60Hz, 8Amps.	671 cu.Ft	04 110 16
	<i>max. surface 7.5 m (80 sq.Ft)</i>		
96.13	3 x 230/400V ± 5%, 50Hz only, 750W	25m ² /h	04 400 25
96.14	3 x 220-254/380-440V ± 5%, 60Hz only	1058 cu.Ft	04 440 25

* Ex stock available

° Pumps - items 96.01, 96.05 and 96.09 - are equipped with universal motor for star-delta starting, nominal voltage 230/400V, to accept the following mains supplies: 3 x 200-240 / 346-415V ± 5%, 50Hz, or 3 x 200-266 / 346-460V ± 5%, 60Hz

To cover workholding surface areas larger than listed above, we recommend the parallel use of (2) or more of the vacuum-pump-tank-assemblies. In case of failure of (1) pump, for reasons what so ever, production is still guaranteed with the remaining items. For plate-assemblies with holding surface exceeding 20_m (215 sq.Ft) we will be able to quote for pumps with suction up to 100m_/h (4232 cu.Ft) or more.

Description and detail to sets listed on pages 16 - 17

mivaCLAMP series 2000 with vacuum pump-tank-assembly

- ❖ Machining - horizontally and/or vertically - of workpieces using flowing coolant
- ❖ Employment into liquids (on EDM-machines)
- ❖ Vacuum-pump mounted on movable tank being both, vacuum-reservoir and water collector, with integrated float-switch wired (from point R) to the control of the machine to switch the machine-tool off in the event of too high water level, normally using function M 01.
- ❖ Control unit, mounted close to the workpiece holding surface area, provided with a pressure sensor switch wired (from point „R“) to the control of the machine to switch the machine-tool off in the event of a drop in vacuum, normally using function M01 (machine stop)

Components

Illustrations: series 2000

- A Workpiece
- B Workpiece supporting area
- E mivaCLAMP Link-up-terminal
- H mivaCLAMP mounting grid 6.5or13mm
- N T-slot to secure accessories (gages)

- R Supply to connect electrowire
- S Mounting bore holes
- Y Handle

1 Vacuum plate

10.1 Control unit

10.2 Control/pressure sensor switch unit

- 14 Vacuum circuit connector
- 21 Stop gage
- 22 Stop rail
- 23 Reversible stop gage (option)

28 Quick hose coupling

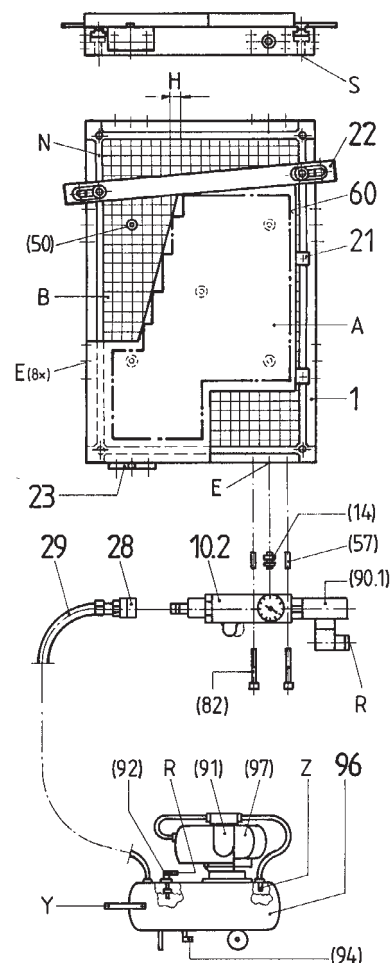
29 Vacuum hose

- 50 Patented MIVA valve
- 57 Dowel pin
- 60 Silicone-rubber sealing cord
- 82 HS head cap screw

90.1 Pressure sensor switch

(with supply „R“ to connect wiring)


- 91 Liquid separator
- 92 Float switch with supply „R“
- 94 Water outlet cock
- 95 Vacuum pump, portable
- 96 Vacuum pump-tank-assembly
- 97 Spare vacuum pump





mivaCLAMP vacuum for holding parts made from steel, stainless steel, non ferrous, carbide, precious metals, aluminium, plastics, hard rubber, hard wood, glass, ceramics, graphite, stone, etc.

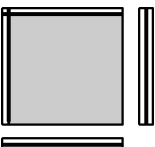
Workholding sets series 2000

Sets complete, ready to go, for lay-out refer to page 15


		Item	Qty.	Description	Dimension	Order-no.	
vacuum area	230 x 350mm	1	1	Vacuum plate Fig. A, grid 6.5 mm	280 x 400 x 40mm	01 240 42	
overall size	280 x 400mm		1	Vacuum plate Fig. A, grid 13mm	280 x 400 x 40mm	01 240 41	
		22	2	Stop rail 280mm	340 x 30 x 4mm	included in	
		21	4	Stop gage	20 x 16 x 4mm	plate price	
		10.2	1	Control / pressure sensor switch unit		05 002 00	
		28	1	Quick hose coupling		05 200 00	
		29	1	Vacuum hose ø 10 mm	5m, (16Ft)	09 410 00	
		60	1	Sealing cord ø 4mm for grid 6.5mm	25m, (82Ft)	11 201 00	
			1	Sealing cord ø 6.5mm for grid 13mm	25m, (82Ft)	11 101 00	
		96	1	Vacuum pump-tank-assembly	230VAC, 6m ² /h	04 220 00	
	Set - no. 2001	Set with pump for 230V, 50-60HZ, plate with grid pitch 6.5mm					94 240 42
	Set - no. 2301	Set with pump for 230V, plate with grid pitch 13 mm					94 240 41


vacuum area	306 x 470mm	1	1	Vacuum plate Fig. A, grid 6.5mm	350 x 520 x 40mm	01 350 52	
overall size	350 x 520mm		1	Vacuum plate Fig. A, grid 13mm	350 x 520 x 40mm	01 350 51	
		22	2	Stop rail 350 mm	416 x 30 x 4mm	included in	
		21	4	Stop gage	20 x 16 x 4mm	plate price	
		10.2	1	Control / pressure sensor switch unit		05 002 00	
		28	1	Quick hose coupling		05 200 00	
		29	1	Vacuum hose ø 10 mm	5m, (16Ft)	09 410 00	
		60	1	Sealing cord ø 4mm for grid 6.5mm	25m, (82Ft)	11 201 00	
			1	Sealing cord ø 6.5mm for grid 13mm	25m, (82Ft)	11 101 00	
		96	1	Vacuum pump-tank-assembly	230V AC 6m ² /h	04 220 00	
	Set - no. 2002	Set with pump for 230V, 50-60Hz, plate with grid pitch 6.5mm					94 350 52
	Set - no. 2302	Set with pump for 230V, 50-60Hz, plate with grid pitch 13mm					94 350 51

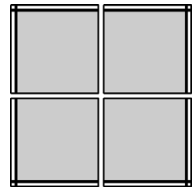
vacuum area	350 x 470mm	1	1	Vacuum plate Fig. A, grid 6.5mm	400 x 520 x 40mm	01 450 42	
overall size	400 x 520mm		1	Vacuum plate Fig. A, grid 13mm	400 x 520 x 40mm	01 450 41	
		22	2	Stop rail 400mm	460 x 30 x 4mm	included in	
		21	4	Stop gage	20 x 16 x 4mm	plate price	
		10.2	1	Control / pressure sensor switch unit		05 002 00	
		28	1	Quick hose coupling		05 200 00	
		29	1	Vacuum hose ø 10mm	5m, (16Ft)	09 410 00	
		60	1	Sealing cord ø 4mm for grid 6.5mm	25m, (82Ft)	11 201 00	
			1	Sealing cord ø 6.5mm for grid 13mm	25m, (82Ft)	11 101 00	
		96	1	Vacuum pump-tank-assembly	230V AC, 6m ² /h	04 220 00	
	Set - no. 2003	Set with pump for 230V, 50-60Hz, plate with grid pitch 6.5mm					94 450 42
	Set - no. 2303	Set with pump for 230V, 50-60Hz, plate with grid pitch 13mm					94 450 41

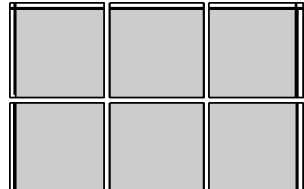
vacuum area	335 x 335mm	1	1	Vacuum module Fig. C, grid 6.5mm	360 x 360 x 40mm	17 330 42	
overall size	400 x 400mm	5	2	Edge bar with T-slot	40 x 360 x 40mm	14 360 00	
		22	2	Stop rail 400 mm	460 x 30 x 4mm	08 400 10	
		21	4	Stop gage	20 x 16 x 4mm	08 020 00	
		10.2	1	Control / pressure sensor switch unit		05 002 00	
		28	1	Quick hose coupling		05 200 00	
		29	1	Vacuum hose ø 10mm	5m, (16Ft)	09 410 00	
		60	1	Sealing cord ø 4mm for grid 6.5mm	25m, (82Ft)	11 201 00	
		96	1	Vacuum pump-tank-assembly	230VAC, 6m ² /h	04 220 00	
	Set - no. 2011	Set with pump for 230V, 50-60Hz, plate with grid pitch 6.5mm					94 011 42

Sets, ready to go, based upon vacuummodules 360 x 360 mm (14" x 14")

Item	Qty.	Description	Dimension	Order-no.		
1	2	Vacuum module Fig. C	360 x 360 x 40mm	17 330 42	vacuum area 335 x 670mm overall size 400 x 720mm	
5	2	Edge bar with T-slot	40 x 360 x 40mm	14 360 00		
22	2	Stop rail 400mm	460 x 30 x 4mm	08 400 10		
21	4	Stop gage	20 x 16 x 4mm	08 020 00		
10.2	1	Control / pressure sensor switch		05 002 00		
28	1	unit		05 200 00		
29	1	Quick coupling	5m, (16Ft)	09 410 00		
60	1	Vacuum hose ø 10mm	25m, (82Ft)	11 201 00		
96.02	1	Sealing cord ø 4mm	230V AC, 6m ² /h	04 220 00		
Set with pump for 230V, 50-60Hz				94 012 42		Set - no. 2012

1	2	Vacuum module Fig. C	360 x 360 x 40mm	17 330 42	vacuum area 335 x 1030mm overall size 400 x 1080mm	
1	1	Vacuum module Fig. D	360 x 360 x 40mm	15 330 42		
5	3	Edge bar with T-slot	40 x 360 x 40mm	14 360 00		
22	2	Stop rail 400 mm	460 x 30 x 4mm	08 400 10		
21	4	Stop gage	20 x 16 x 4mm	08 020 00		
10.2	1	Control / pressure sensor switch		05 002 00		
28	1	Unit		05 200 00		
29	1	Quick coupling	5m, (16Ft)	09 410 00		
60	1	Vacuum hose ø 10 mm	25m, (82Ft)	11 201 00		
96	1	Sealing cord ø 4mm	230 VAC, 6m ² /h	04 220 00		
Set with pump for 230V, 50-60Hz				94 013 42		Set - no. 2013

1	4	Vacuum module Fig. C.	360 x 360 x 40mm	17 330 42	vacuum area 670 x 670mm overall size 720 x 720mm	
22	2	Stop rail 720 mm	780 x 40 x 4mm	08 720 30		
21	4	Stop gage	20 x 16 x 4mm	08 020 00		
10.2	1	Control / pressure sensor switch		05 002 00		
28	1	unit		05 200 00		
29	1	Quick coupling	5m, LW 10mm	09 410 00		
60	1	Vacuum hose ø 10mm	25m, ø 4mm	11 201 00		
96	1	Sealing cord ø 4mm	230 VAC, 6m ² /h	04 220 00		
Set with pump for 230V, 50-60Hz				94 024 42		Set - no. 2024

1	4	Vacuum module Fig. C	360 x 360 x 40mm	17 330 42	vacuum area 670 x 1030mm overall size 720 x 1030mm
1	2	Vacuum module Fig. D	360 x 360 x 40mm	15 330 42	
22	2	Stop rail 720 mm	780 x 40 x 4mm	08 720 30	
21	4	Stop gage	20 x 16 x 4mm	08 020 00	
10.2	1	Control / pressure sensor switch		05 002 00	
28	1	unit		05 200 00	
29	1	Quick coupling	5m, (16Ft)	09 410 00	
60	1	Vacuum hose ø 10 mm	25m, (82Ft)	11 201 00	
96	1	Sealing cord ø 4 mm	230 VAC, 6m ² /h	04 220 00	
Set with pump for 230V, 50-60Hz				94 026 42	

Square modules, Fig. C, D, and E, 360 x 360mm are manufactured with surface grid pitch „H“ 6,5mm only. To built up large workholding areas of any size and shape to suit sorkpieces, rectangular modules, Fig. F - O (see pages 8 + 9), are manufactured in both surface grid pitches „H“ 6.5 mm and 13 mm.