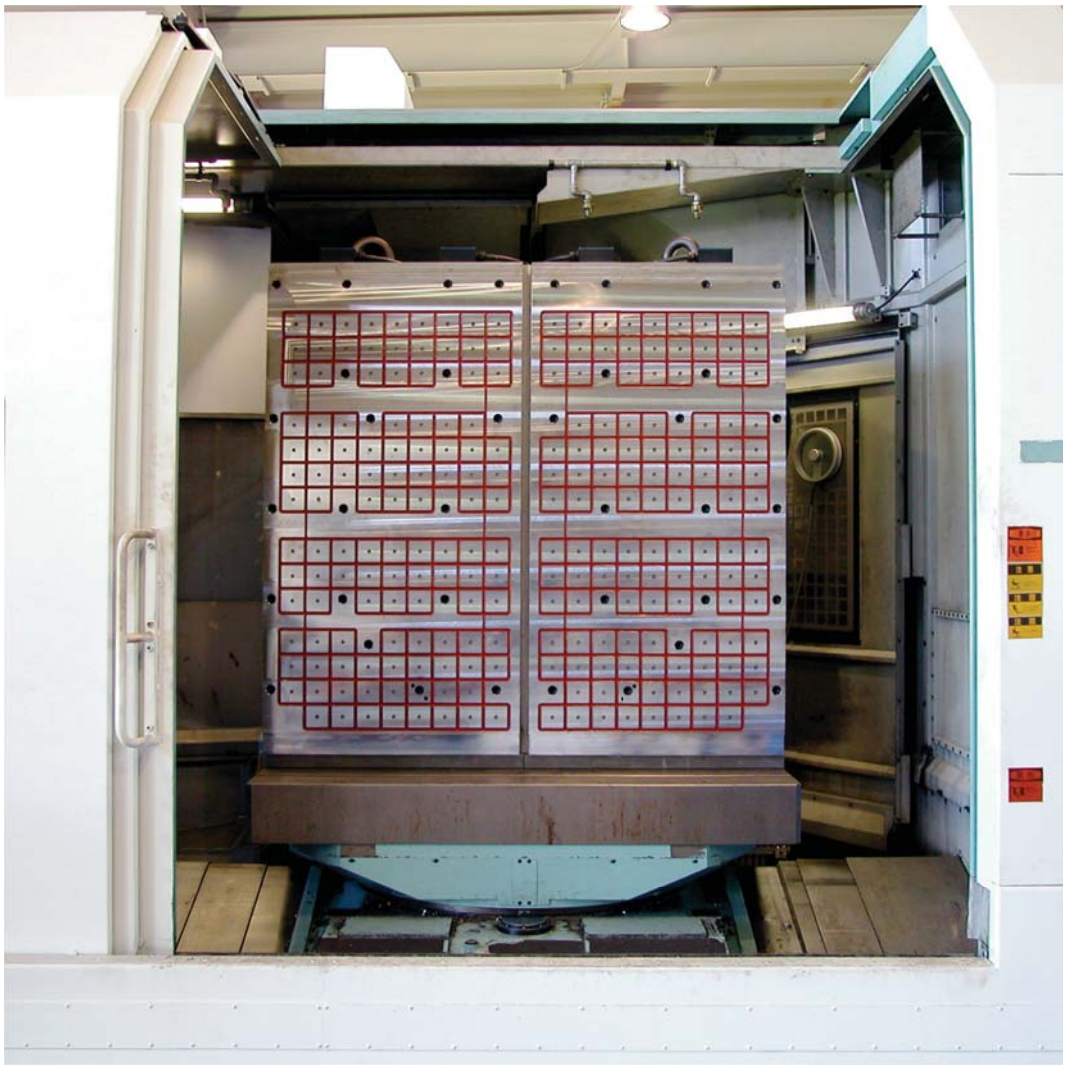
Pascal mag clamp

Clamp workpiece strongly with permanent magnet



Pascal

www.pascaleng.co.jp

Mag clamp applied for machining the workpiece

Pascal mag clamp

Pascal mag clamp is a workpiece clamping system which absorbs and fixes the ferrous metal (magnetic substance) with strong permanent magnets (Neodymium magnet Alnico magnet). It is no need to unify the workpiece size and it can clamp instantly at one touch operation. Energization required only when switching on and off. The electric power is not consumed during clamping the workpiece and there is no risk of workpiece fall due to the power outage.

Strong clamping force

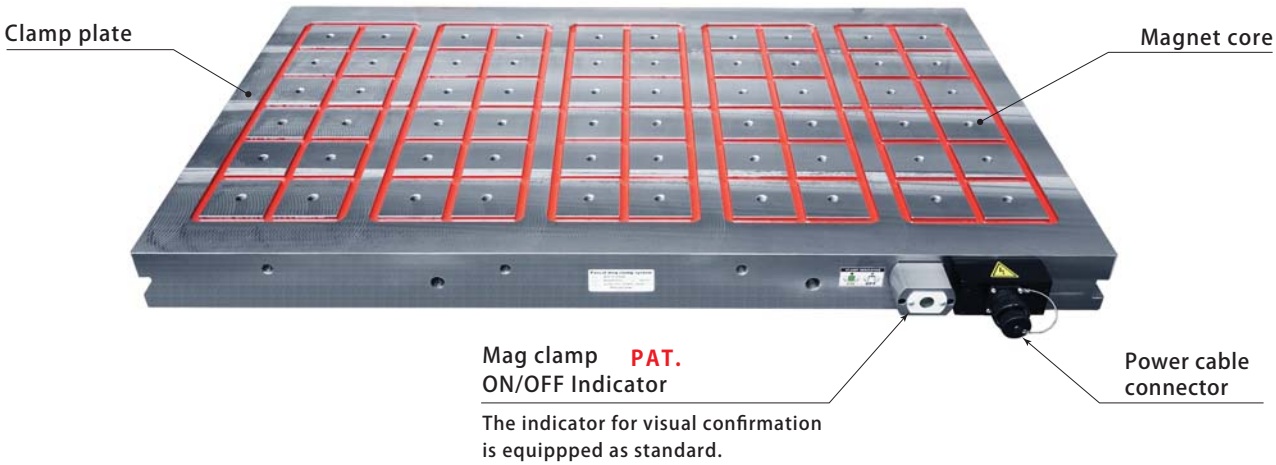
Workpiece area □ per 100mm **14.7 kN**

(Power distribution is not required during clamping)

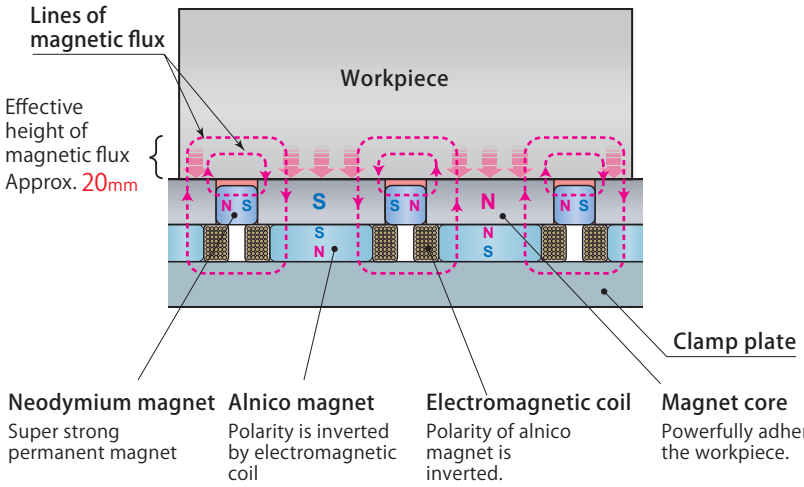
Residual magnetic force is very few.

Residual magnetic force at unclamping **20 gauss**

(Chips can be removed easily with air blow)

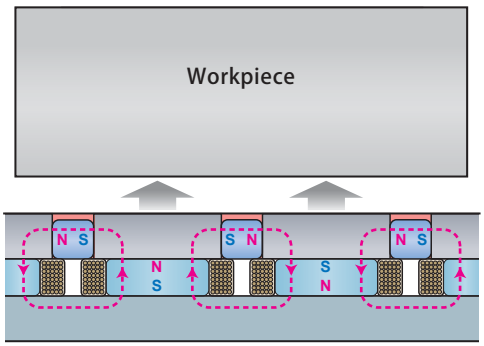


Clamp（Magnetized）



1. Electromagnetic coil is energized for **0.5** sec.
2. Polarity of alnico magnet is inverted.
3. Neodymium magnet and alnico magnet become homopolar.
4. Magnet core becomes a strong magnet to clamp the work.

Unclamp（Demagnetized）



1. Electromagnetic coil is energized for **0.5** sec.
2. Polarity of alnico magnet is inverted.
3. Magnetic flux of neodymium magnet and alnico magnet is not emitted from the surface of the magnet core so that the workpiece can be unclamped.

Model designation

Magnet clamp model

MGK 50 045032 P

1 Magnet core size (Clamping force)

- 70 : 70mm × 70mm page →5
- 50 : 50mm × 50mm page→6
- 32 : 32mm × 100mm page→7

2 Plate size ＊Indicated in 6 digits

- 045032 : 450mm × 315mm
- 063043 : 630mm × 425mm
- 083050 : 825mm × 500mm
- 103060 : 1030mm × 600mm

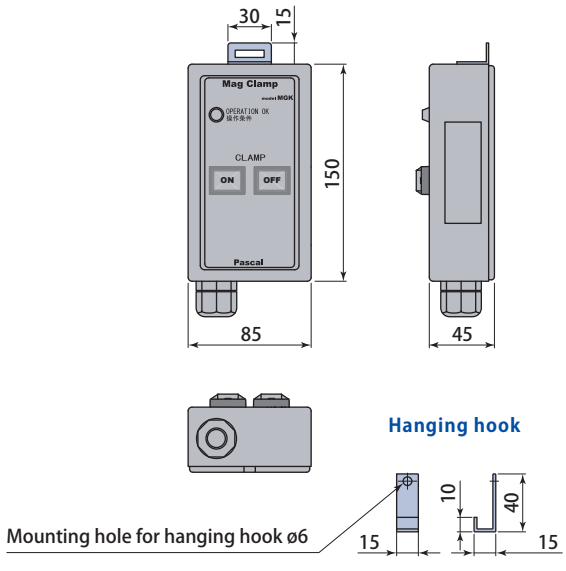
Operation panel and Control box are sold separately. Purchase one set of operation panel and control box per 1 system.

Set model for control panel and operation panel

ELD-F

Operation panel model

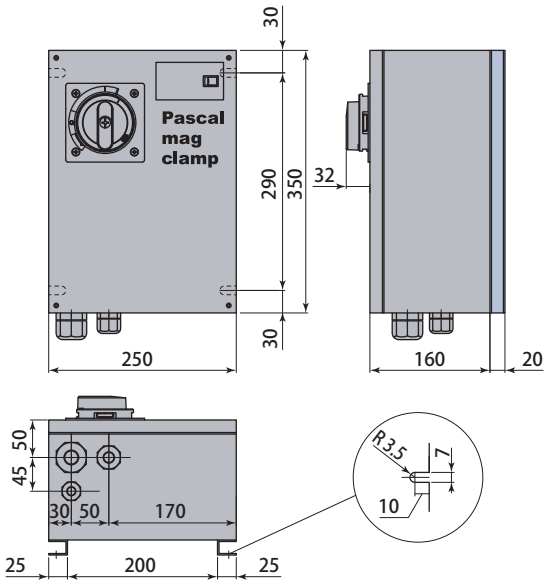
ESMD-F



Model		ESMD-F
Weight	kg	0.5

Control box model

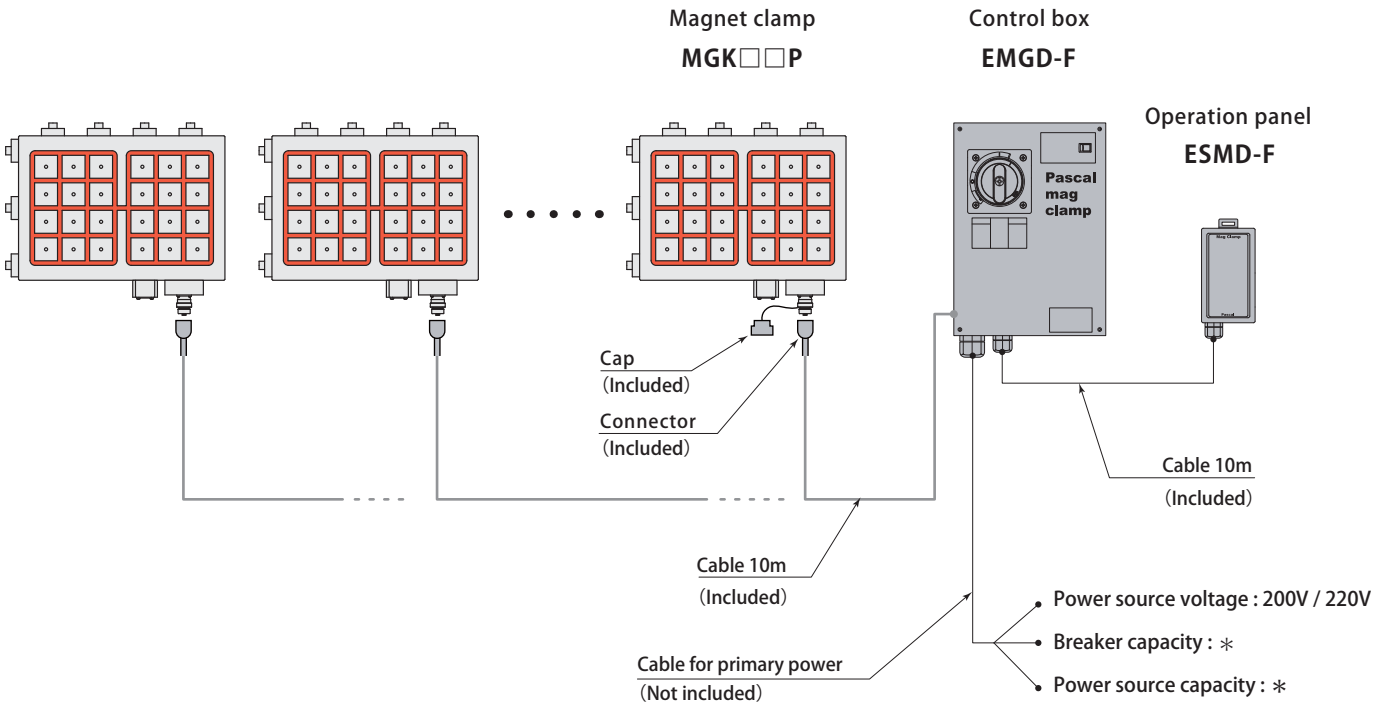
EMGD-F



Model		EMGD-F
Weight	kg	10

- Refer to **page →3 ～ 4** for System configuration example.
- Refer to **page →3 ～ 4** system configuration example for Included or Not included.

Individual control (In case of making energization one by one)



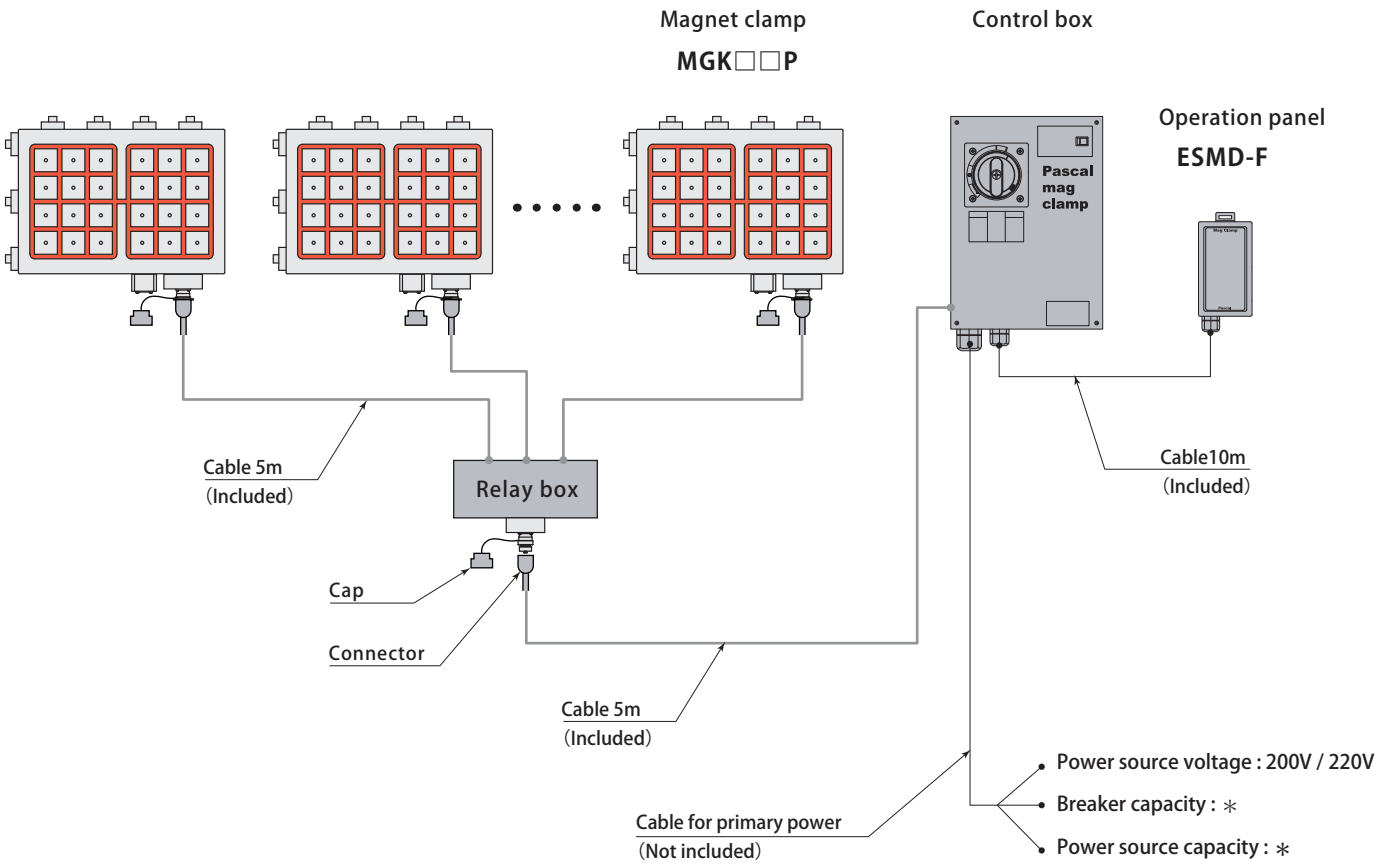
● After clamping has been completed, remove the connector with cable and cover with the cap.

＊ The breaker capacity and power supply capacity differ according to the model. Refer to **page →5 ～ 7** for details.

System components

Magnet clamp MGK	Included : Connector cap
Operation panel ESMD-F (Sold separately) Control box EMGD-F (Sold separately) (Set model ELD-F)	Included : Cable between operation panel and control box (10m), Cable between control box and double mag clamp (10m)
Cable for primary power	Not included (To be prepared by the customer)

Central control (In case of making energization to multiple mag clamps at the same time)



● After clamping has been completed, remove the connector with cable and cover with the cap.

This is special specification, contact Pascal for operation panel and control box.

System components

Magnet clamp MGK	Included : Connector cap
Operation panel ESMD-F (Sold separately) Control box EMGD-F (Sold separately) (Set model ELD-F)	Included : Cable between operation panel and control box (10m) , Cable between control box and relay box((5m)
Relay box (Sold separately)	Included : Cable between double mag clamp and relay box(5m), Connector cap
Cable for primary power	Not included (To be prepared by the customer)

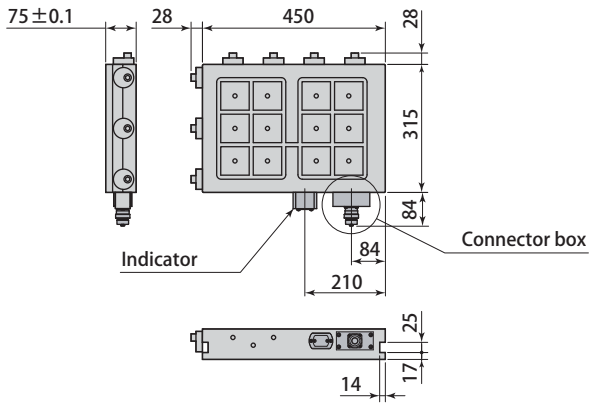
MGK 70 045032 P

1 Magnet core size

2 Plate size

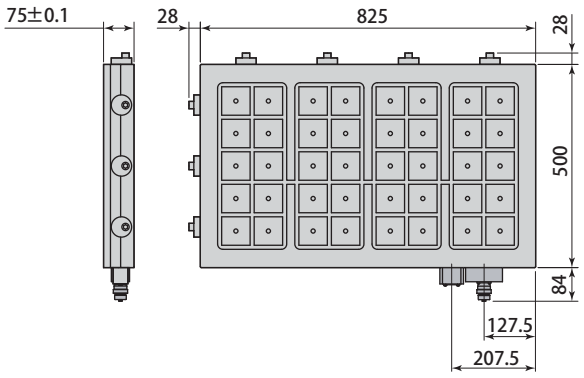
＊Indicated in 6 digits

MGK70045032P

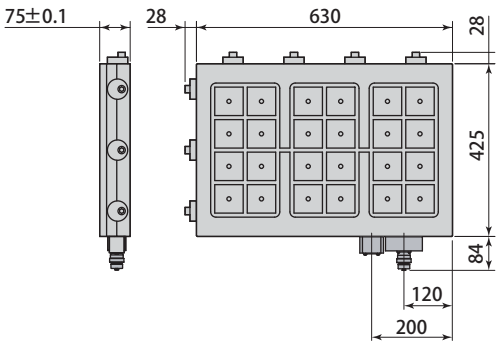


(Common for all models)

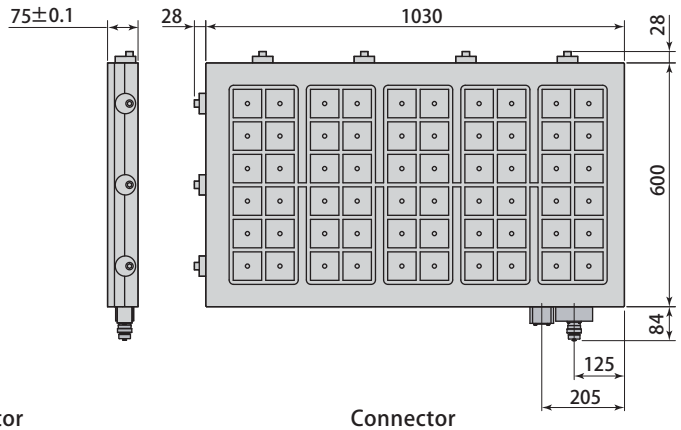
MGK70083050P

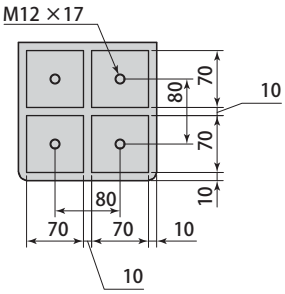


MGK70063043P



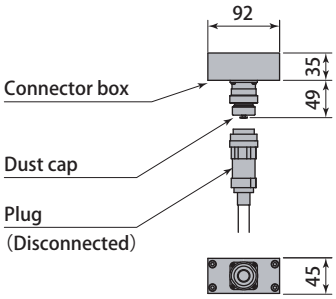
MGK70103060P

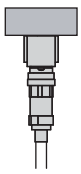




Indicator

Connector





Plug connected

Specifications

Model		MGK70045032P	MGK70063043P	MGK70083050P	MGK70103060P
Clamping force (for whole plate)	kN	88	176	294	441
2 Plate size	mm	450 × 315	630 × 425	825 × 500	1030 × 600
Plate thickness	mm	75 (Self cut length 5mm)			
Clamping force per one magnet core	kN	7.35			
1 Magnet core size	mm	70 × 70			
Magnet core number		12	24	40	60
Operating temperature	℃	0 ～ 80			
Height of magnetic flux	mm	20 (Work material)			
Power source voltage	V	AC200 / 220V ±5% (50/60Hz)			
Power source capacity	kVA	10	20	25	25
Breaker capacity	A	40	40	40	40
Weight	kg	85	160	245	365

● The operating temperature is temperature of clamp plate surface.

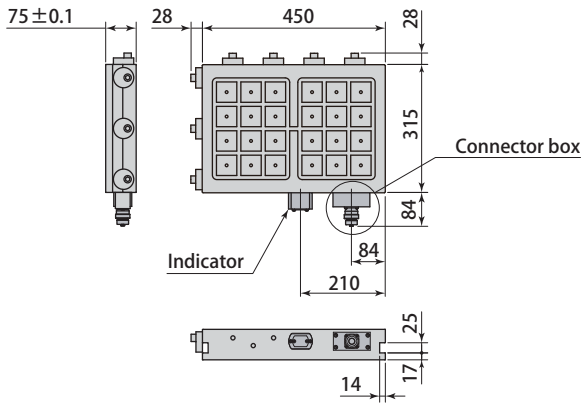
MGK 50 045032 P

1 Magnet core size

2 Plate size

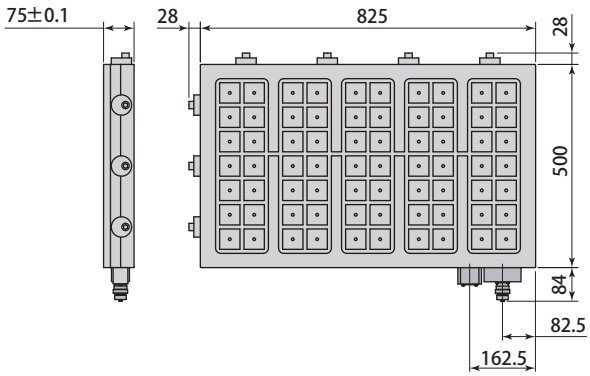
＊Indicated in 6 digits

MGK50045032P

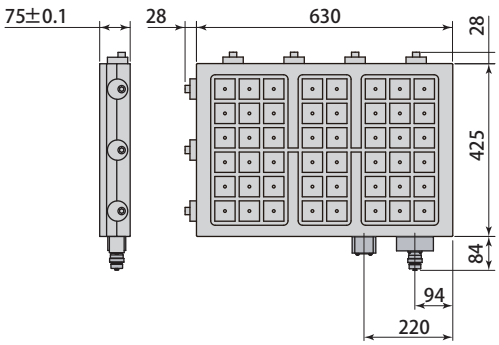


(Common for all models)

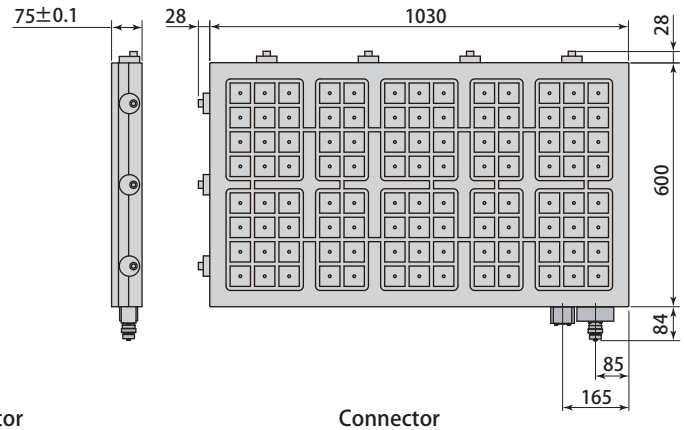
MGK50083050P

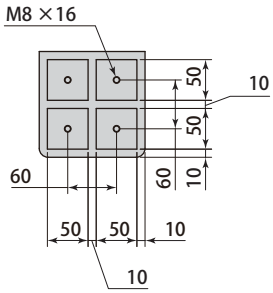


MGK50063043P



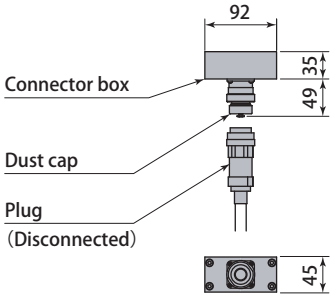
MGK50103060P

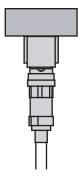




Indicator

Connector





Plug connected

Specifications

Model		MGK50045032P	MGK50063043P	MGK50083050P	MGK50103060P
Clamping force (for whole plate)	kN	59	118	172	255
2 Plate size	mm	450 × 315	630 × 425	825 × 500	1030 × 600
Plate thickness	mm	75 (Self cut length 5mm)			
Clamping force per one magnet core	kN	2.45			
1 Magnet core size	mm	50 × 50			
Magnet core number		24	48	70	104
Operating temperature	℃	0 ～ 80			
Height of magnetic flux	mm	20 (Work material)			
Power source voltage	V	AC200 / 220V ±5% (50/60Hz)			
Power source capacity	kVA	15	35	30	40
Breaker capacity	A	40	60	50	60
Weight	kg	85	160	245	365

● The operating temperature is temperature of clamp plate surface.

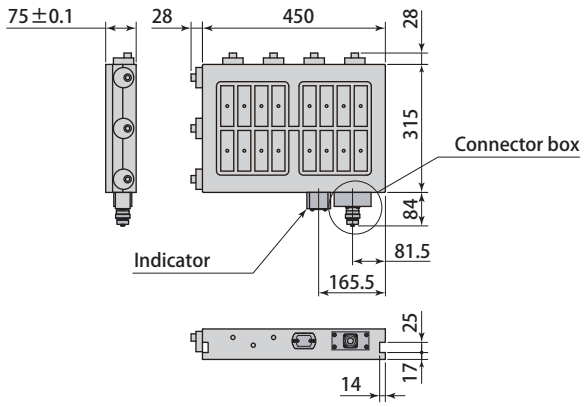
MGK 32 045032 P

1 Magnet core size

2 Plate size

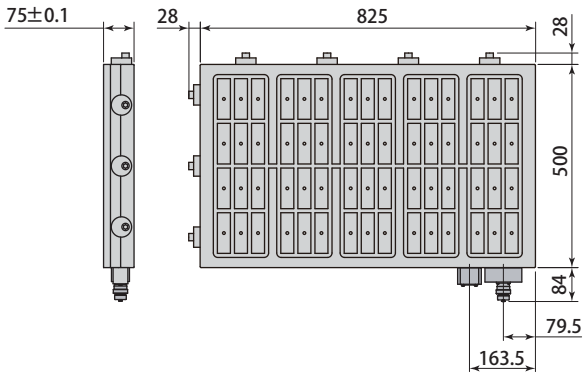
＊Indicated in 6 digits

MGK32045032P

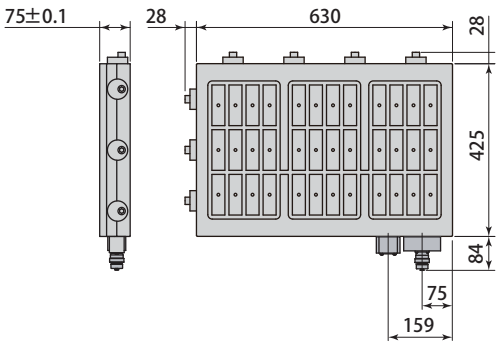


(Common for all models)

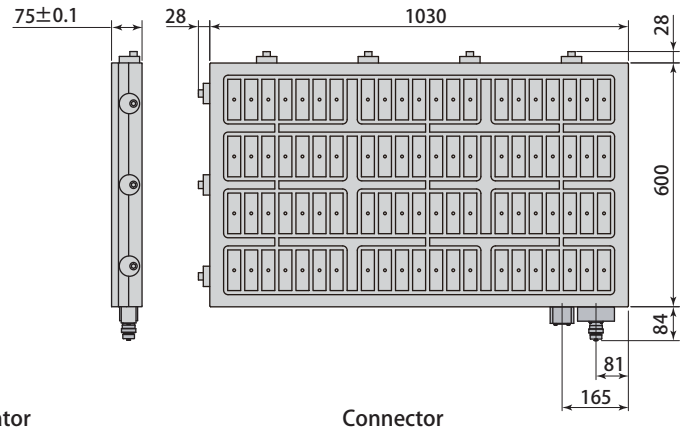
MGK32083050P

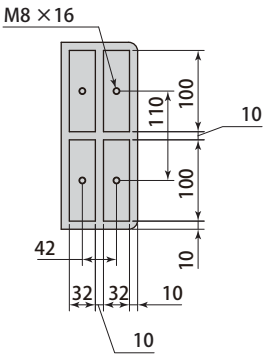


MGK32063043P



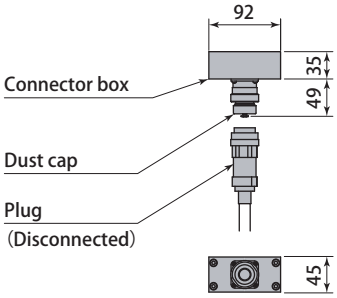
MGK32103060P

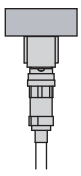




Indicator

Connector





Plug connected

Specifications

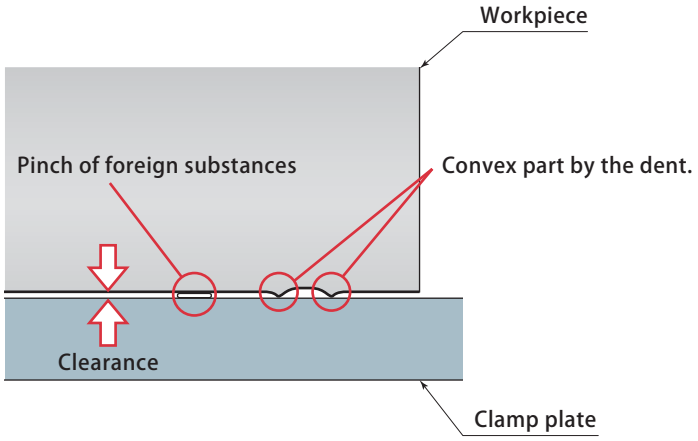
Model		MGK32045032P	MGK32063043P	MGK32083050P	MGK32103060P
Clamping force (for whole plate)	kN	55	123	206	288
2 Plate size	mm	450 × 315	630 × 425	825 × 500	1030 × 600
Plate thickness	mm	75 (Self cut length 5mm)			
Clamping force per one magnet core	kN	3.43			
1 Magnet core size	mm	32 × 100			
Magnet core number		16	36	60	84
Operating temperature	℃	0 ～ 80			
Height of magnetic flux	mm	20 (Work material)			
Power source voltage	V	AC200 / 220V ±5% (50/60Hz)			
Power source capacity	kVA	20	30	30	35
Breaker capacity	A	40	50	50	60
Weight	kg	85	160	245	365

● The operating temperature is temperature of clamp plate surface.

- Do not clamp a workpiece that is deformed or warped. Clamp force decreases due to the gap between the workpiece and clamp plate.
- Keep contact surfaces of workpiece and clamp plate always clean.
- In case that there are some dents on the contact surfaces of workpiece and clamp plate, remove it using the oilstone to be flat.

Check the below for your safety

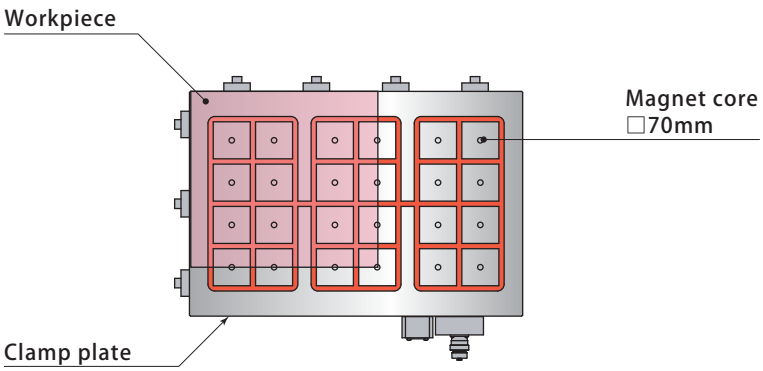
- Mag clamp generates a powerful magnetism. The person who is wearing a cardiac pacemaker must stay away from the clamp. Projecting height of magnetic flux above the clamp plate towards forward (to workpiece side) is just around 20 mm. However, Do not put a mobile phone, magnetic card or compact disc, etc. that are susceptible to magnetism close to the clamp plate to avoid a damage.
- Do not put any magnetic substance such as ferrous metal close to the adherence surface when mag clamp is at clamping (magnetized). Due to the power of magnet, it may be adhered to the clamp surface, which may cause injury of fingers or hands.



- Be sure to clamp a workpiece of which thickness is 25 mm or more. Although the projecting height of magnetic flux is around 20 mm, workpiece which is thinner than 25 mm may cause decrease in clamping force.

Calculation of rated clamping force

The clamping force of Mag clamp (the adhering force of magnetic clamp) varies according to the area size (number of magnet core) where the workpiece and clamp plate contact. When loading a small workpiece which does not contact all the magnet cores, the rated clamping force is obtainable by the calculation formula shown below. Refer to the following calculation example.



Example：Clamp plate model MGK70063043P

1. Magnet cores that the workpiece contacts with its area ＝ 9pcs
2. Magnet cores that the workpiece contacts with 1/2 of its area ＝ 6pcs
3. Magnet cores that the workpiece contacts with 1/4 of its area ＝ 1pc
4. Total magnet cores that the workpiece contacts

   ＝ 9pcs ＋ 6pcs × 1/2 ＋ 1pc × 1/4 ＝ 12.25pcs

5. Clamping force per magnet core ＝ 7.35 kN ／ pcs
6. Rated clamping force ＝ 7.35 kN ／ pcs × 12.25pcs ＝ 90 kN

- If there is a hole or cut-out at the bottom of workpiece, deduct the respective area from the total contact area (number of magnet core).
- The actual clamping force may be less than the rated force according to the conditions of workpiece. (Regarding to the decline of clamping force refer to **page →11**)

Decline of clamping force

According to the conditions of workpiece, the actual clamping force may become less than the rating. Before using mag clamp, be certain to calculate and acknowledge the decline of clamping force referring to the below tables and charts.

(Actual clamping force) = (Rated clamping force - Reduced force)

Material of workpiece

Material	Clamping force
SS400 S55C S45C-H ＊	100% (Rating)
S45C	95%
SK3 SUJ ＊	85%
SUS430 FC250 FCD600 ＊	80%
SKH51 SKD11	70%

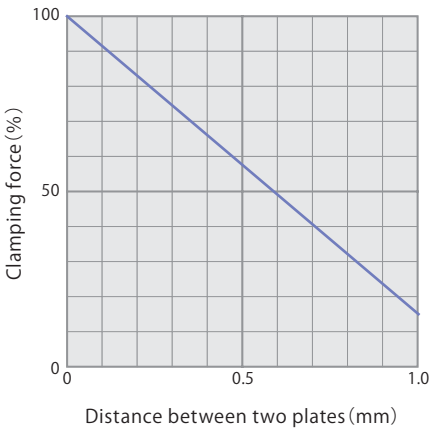
The clamping force lowers according to the materials of workpiece. S45C-H, SUJ, and FCD600 tends to be difficult to detach at unclamping because the residual magnetic flux on the workpiece affects this however it should be improved once the clearance is created between the workpiece and clamp plate.

Surface roughness of workpiece

Surface roughness (Max. height and surface roughness Rz)	Clamping force
Rz1.6～3.8	100% (Rating)
Rz7.5～15.5	Approx. 100%
Rz85～150	Approx. 90%

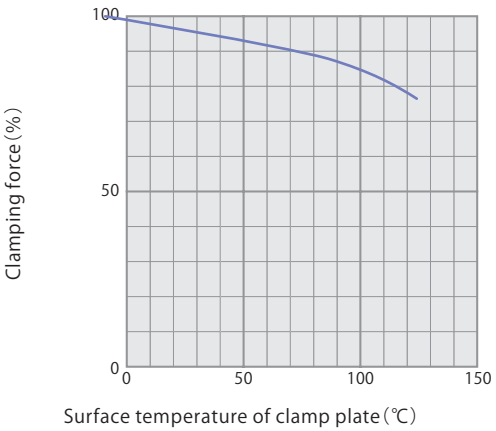
The clamping force lowers according to the grade of surface roughness in contact with the workpiece and clamp plate.

Distance between two plates (mm)

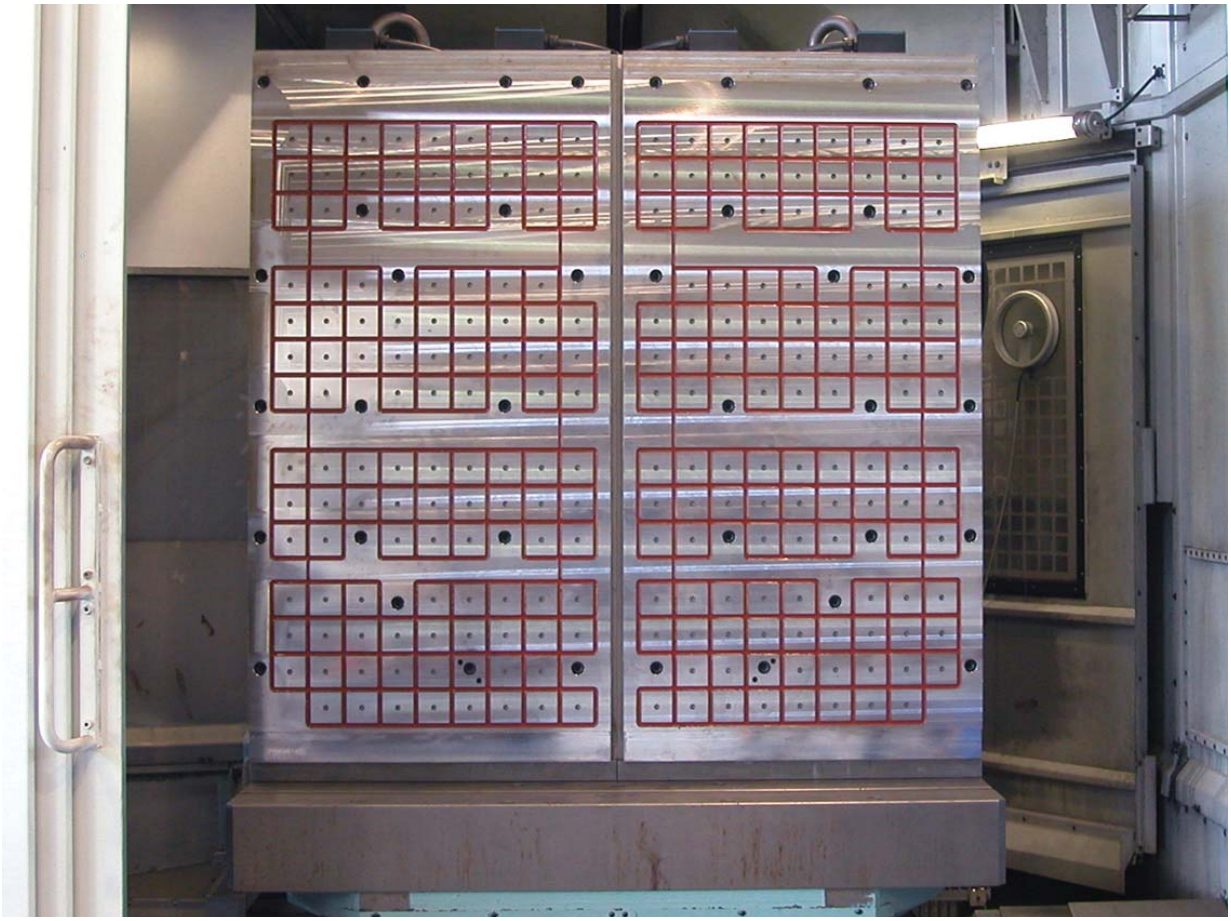


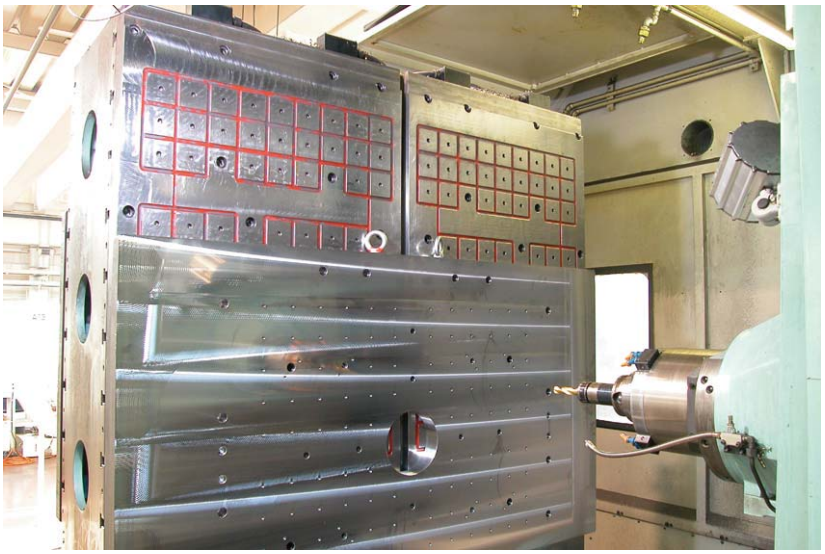
Do not clamp a workpiece that is deformed or warped. Clamp force decreases due to the gap between the workpiece and clamp plate.

Temperature of mold plate



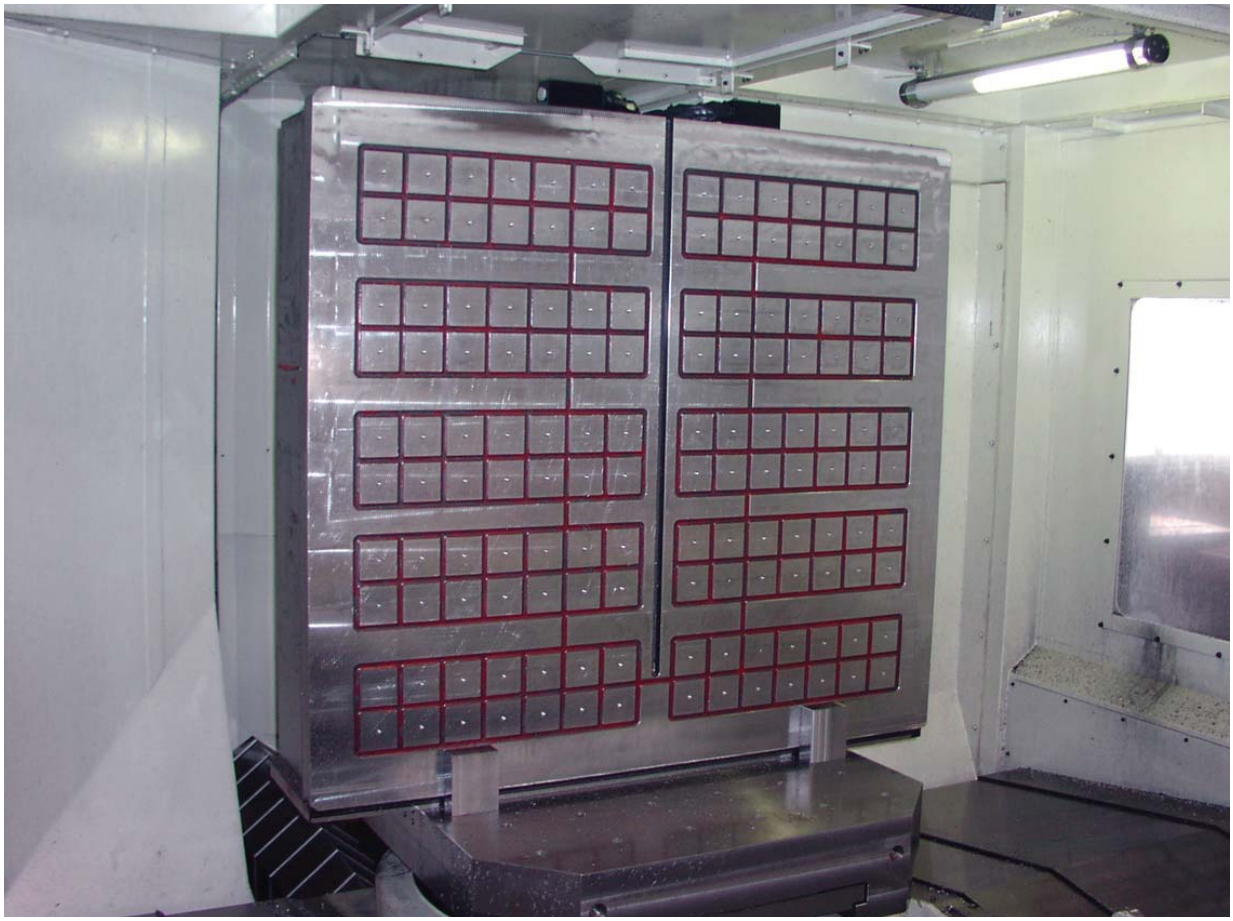
If the temperature of workpiece becomes high, the clamping force significantly decreases. Keep the workpiece temperature below 80℃ while it is clamped.

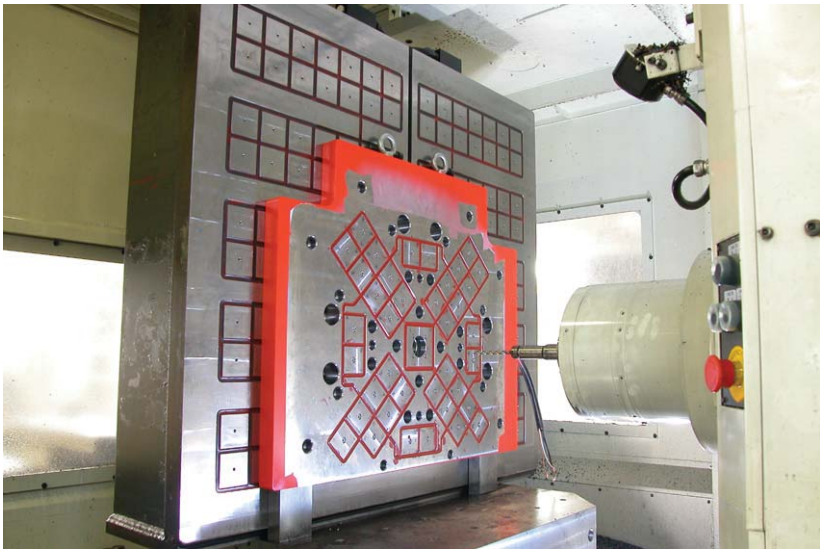




Horizontal machining center　Clamp plate		
Clamping force (for whole plate) ＊	kN	1788
Plate size	mm	height : 1800 × width : 1800
Magnet core size	mm	75 × 75
Magnet core number		228
Power source voltage	V	AC200 / 220V ± 5% (50/60Hz)
Power source capacity	kVA	100
Breaker capacity	A	200

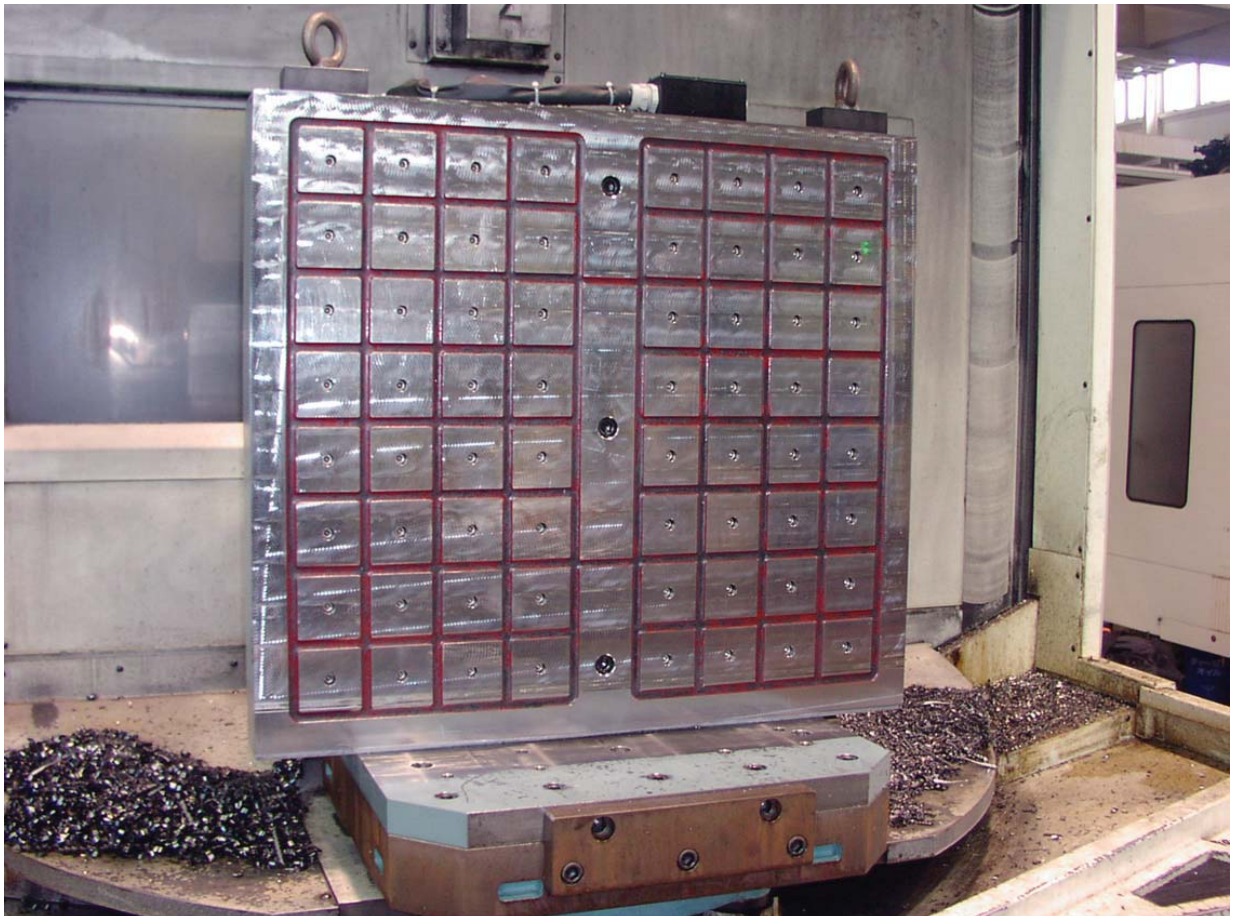
＊ Clamping force for whole the clamp plate in case that the workpiece contacts all the magnet cores.





Horizontal machining center　Clamp plate		
Clamping force (for whole plate) ＊	kN	1098
Plate size	mm	height : 1400 × width : 1500
Magnet core size	mm	75 × 75
Magnet core number		140
Power source voltage	V	AC200 / 220V ± 5% (50/60Hz)
Power source capacity	kVA	40
Breaker capacity	A	60

＊ Clamping force for whole the clamp plate in case that the workpiece contacts all the magnet cores.

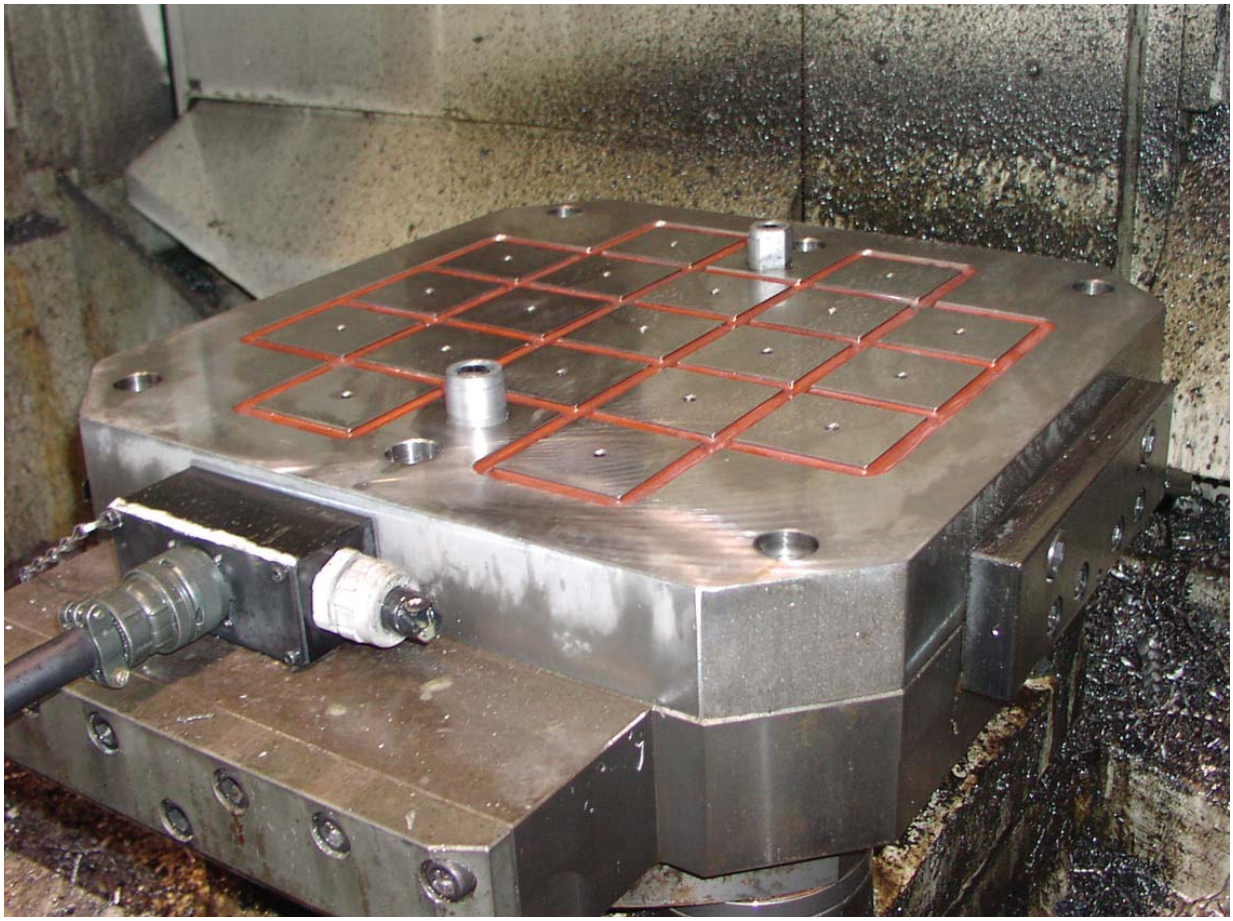


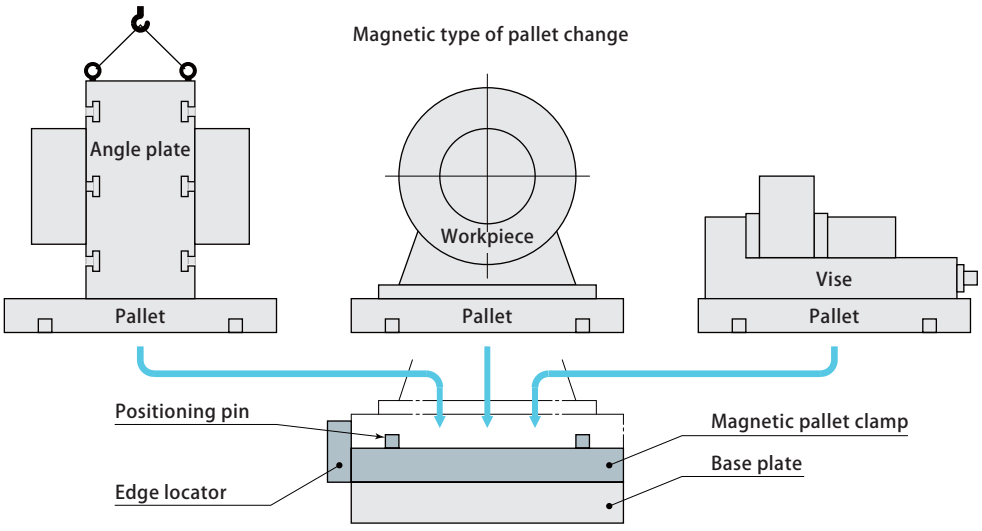
Horizontal machining center　Clamp plate		
Clamping force (for whole plate) ＊	kN	502
Plate size	mm	height : 790 × width : 880
Magnet core size	mm	75 × 75
Magnet core number		64
Power source voltage	V	AC200 / 220V ± 5% (50/60Hz)
Power source capacity	kVA	45
Breaker capacity	A	60

＊ Clamping force for whole the clamp plate in case that the workpiece contacts all the magnet cores.

Horizontal machining center Clamp plate		
Clamping force (for whole plate) ＊	kN	123
Plate size	mm	height : 630 × width : 425
Magnet core size	mm	32 × 100
Magnet core number		36
Power source voltage	V	AC200 / 220V ± 5% (50/60Hz)
Power source capacity	kVA	30
Breaker capacity	A	50

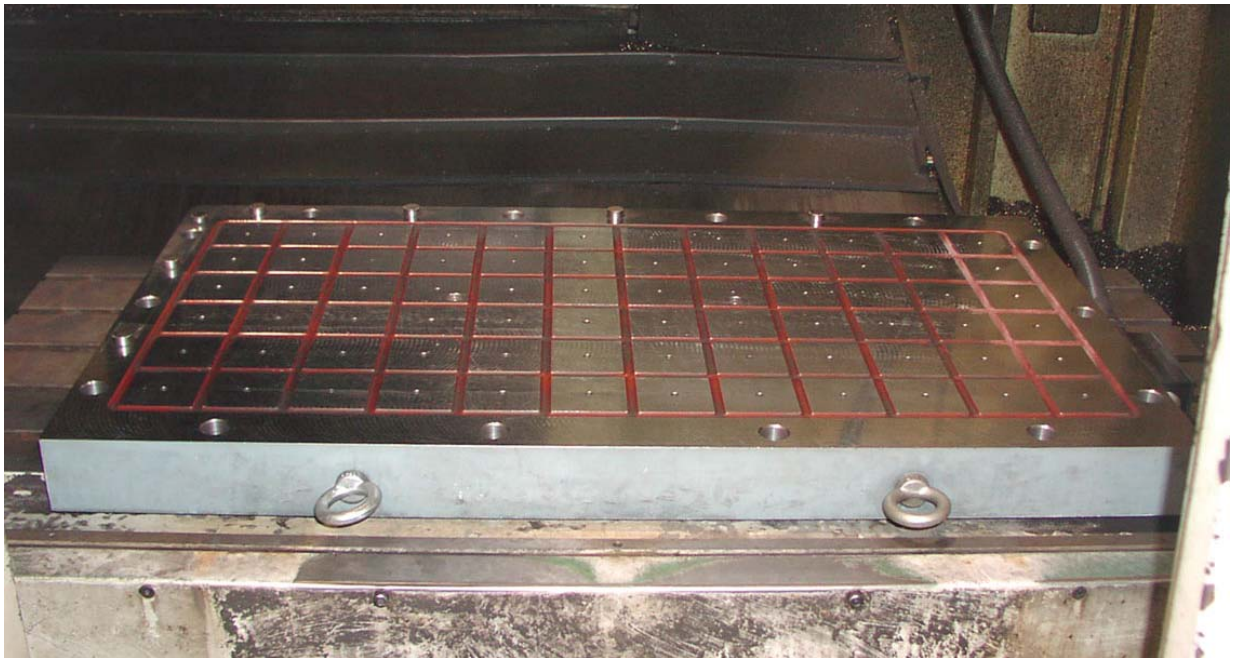
＊ Clamping force for whole the clamp plate in case that the workpiece contacts all the magnet cores.

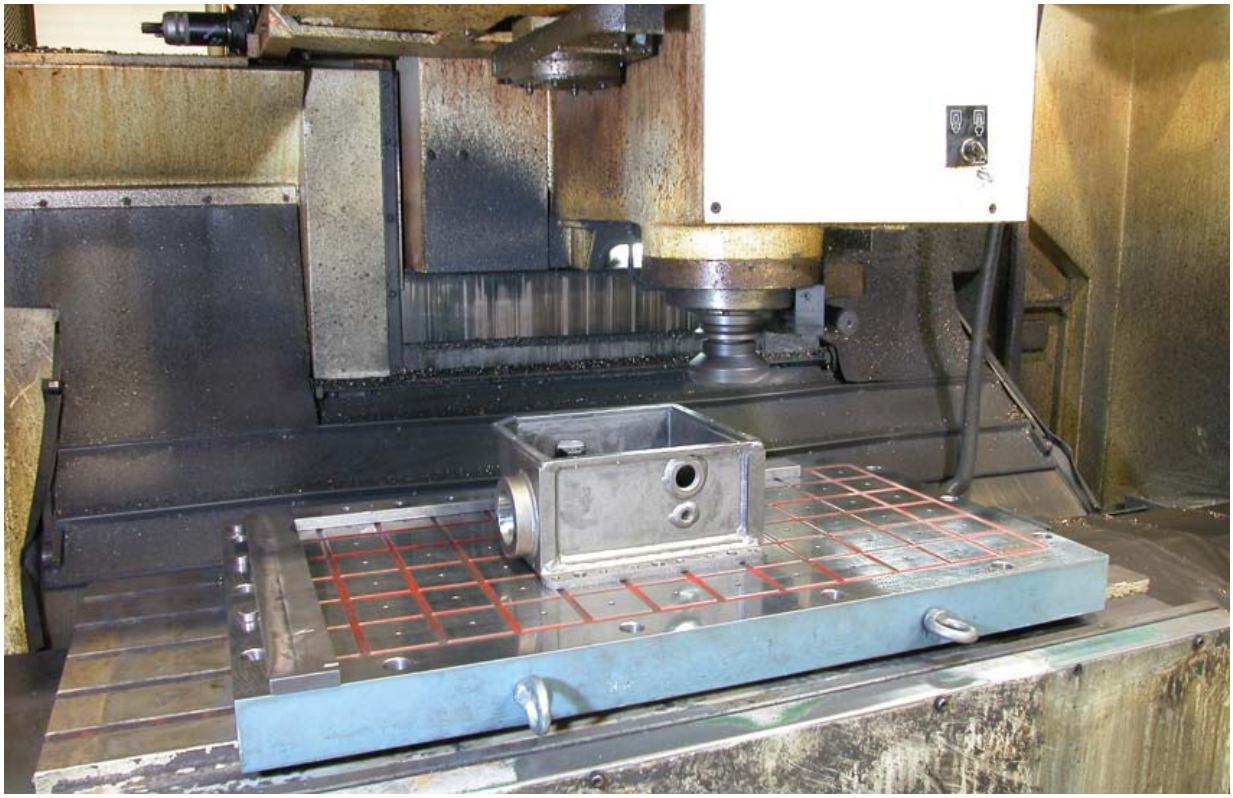




Horizontal machining center Clamp plate		
Clamping force (for whole plate) ＊	kN	140
Plate size	mm	depth : 500 × width : 500
Magnet core size	mm	70 × 70
Magnet core number		19
Power source voltage	V	AC200 / 220V ± 5% (50/60Hz)
Power source capacity	kVA	30
Breaker capacity	A	50

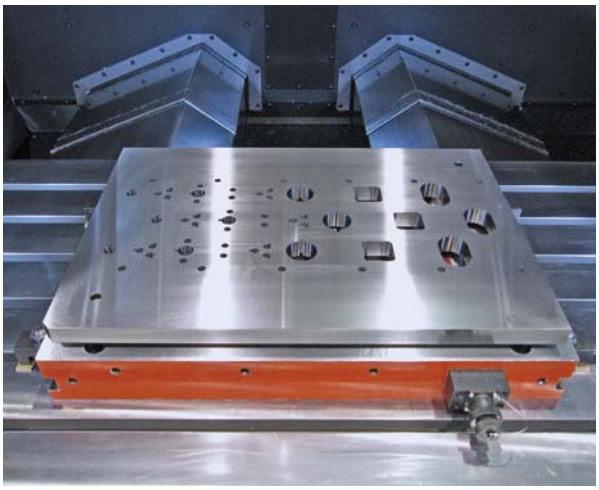
＊ Clamping force for whole the clamp plate in case that the workpiece contacts all the magnet cores.





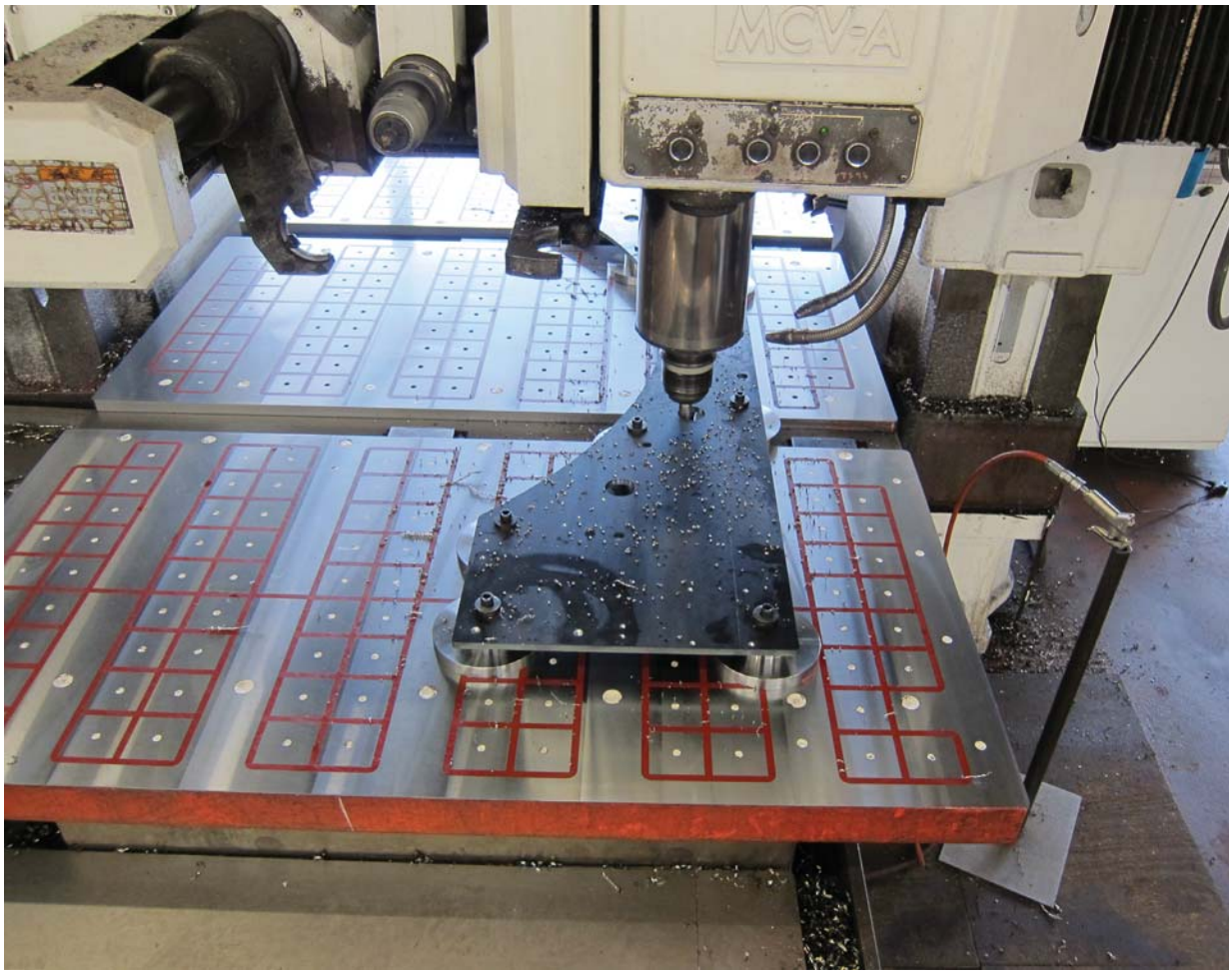
Vertical machining center Clamp plate		
Clamping force (for whole plate) ＊	kN	530
Plate size	mm	depth : 600 × width : 1060
Magnet core size	mm	70 × 70
Magnet core number		72
Power source voltage	V	AC200 / 220V ± 5% (50/60Hz)
Power source capacity	kVA	45
Breaker capacity	A	60

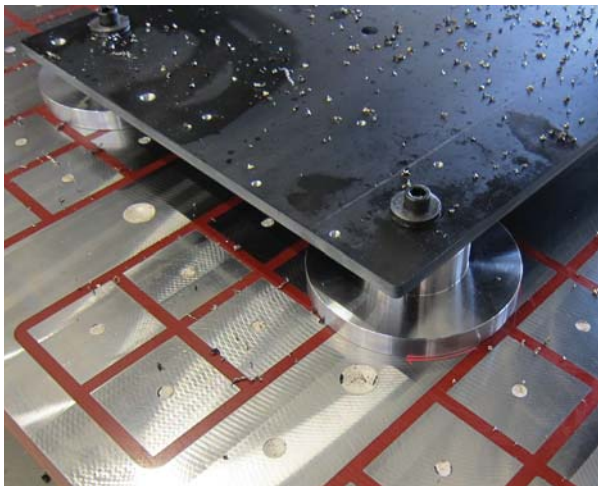
＊ Clamping force for whole the clamp plate in case that the workpiece contacts all the magnet cores.

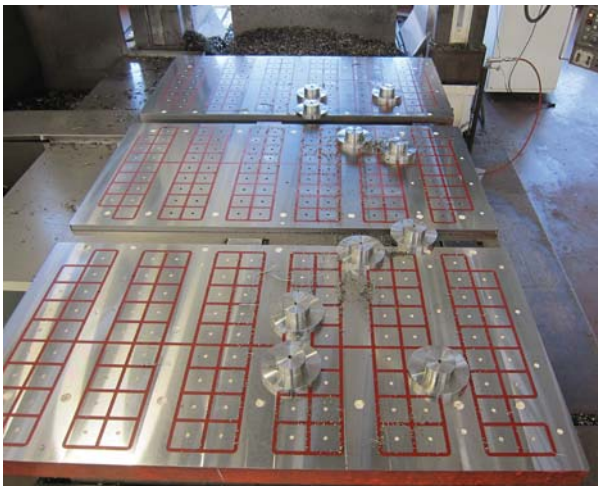


Vertical machining center Clamp plate		
Clamping force (for whole plate) ＊	kN	176
Plate size	mm	depth : 520 × width : 660
Magnet core size	mm	70 × 70
Magnet core number		24
Power source voltage	V	AC200 / 220V ± 5% (50/60Hz)
Power source capacity	kVA	20
Breaker capacity	A	40

＊ Clamping force for whole the clamp plate in case that the workpiece contacts all the magnet cores.

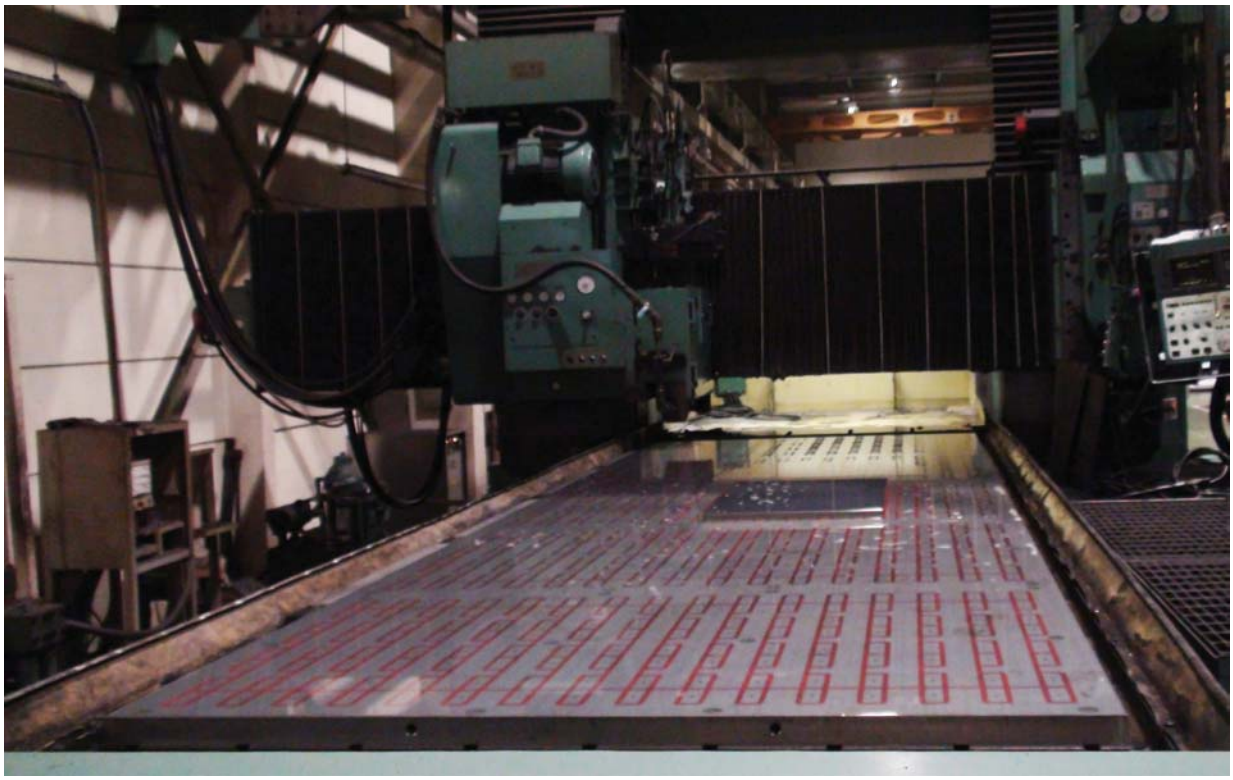






Planer type machining center Clamp plate		
Clamping force (for whole plate) ＊	kN	764 × 3 plates
Plate size	mm	depth : 800 × width : 1550 × 3 plates
Magnet core size	mm	70 × 70
Magnet core number		104 × 3 plates
Power source voltage	V	AC200 / 220V ± 5% (50/60Hz)
Power source capacity	kVA	45
Breaker capacity	A	60

＊ Clamping force for whole the clamp plate in case that the workpiece contacts all the magnet cores.



Planer type grinding machine Clamp plate		
Clamping force (for whole plate) ＊	kN	439 × 5 plates
Plate size	mm	depth : 1800 × width : 1200 × 5 plates
Magnet core size	mm	32 × 100
Magnet core number		128 × 5 plates
Power source voltage	V	AC200 / 220V ± 5% (50/60Hz)
Power source capacity	kVA	40
Breaker capacity	A	60

＊ Clamping force for whole the clamp plate in case that the workpiece contacts all the magnet cores.

Vertical lathe　Clamp plate		
Clamping force (for whole plate) ＊	kN	468
Plate size	mm	Outer diameter : ø3200　Inner diameter : ø2500
Magnet core size	mm	70 × 70
Magnet core number		16 × 4 plates
Power source voltage	V	AC200 / 220V ± 5% (50/60Hz)
Power source capacity	kVA	40
Breaker capacity	A	100

＊ Clamping force for whole the clamp plate in case that the workpiece contacts all the magnet cores.

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CERTIFICATE OF APPROVAL ISO9001

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