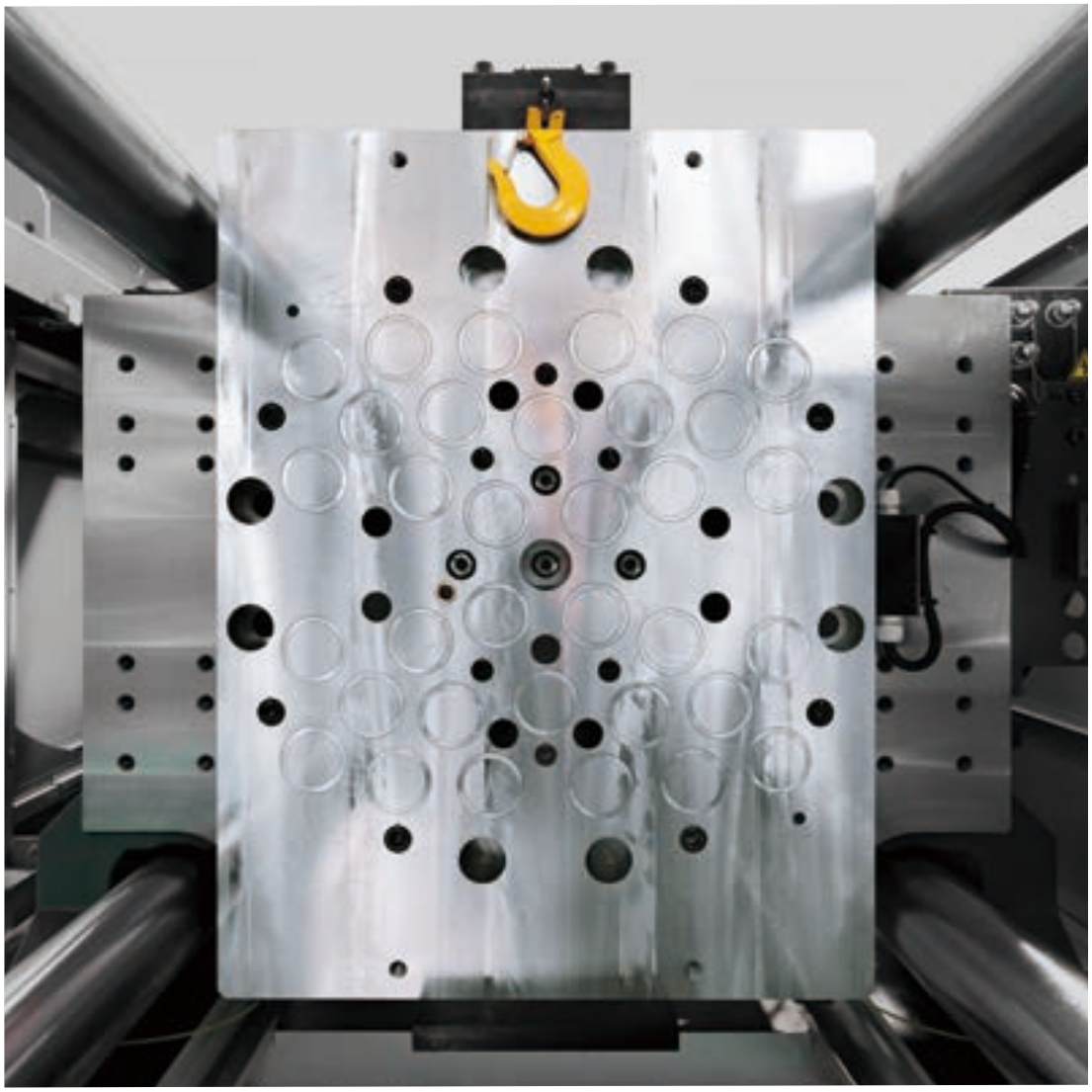
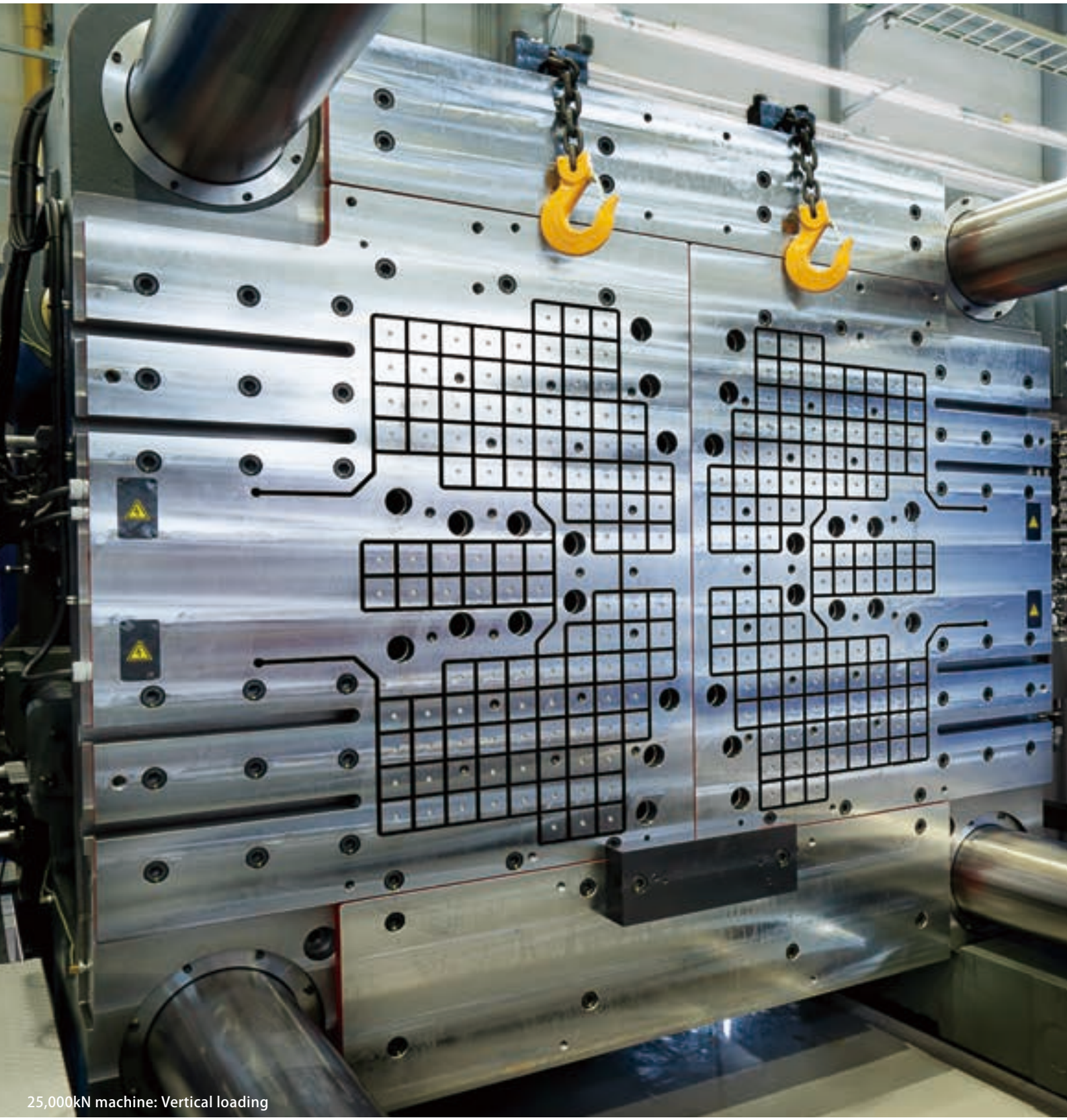
Pascal

Circle core mag clamp



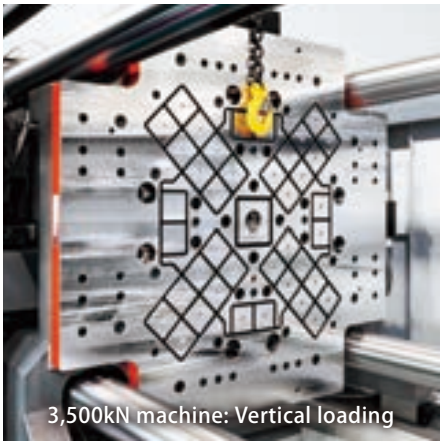
3,500kN IMM injection Circle Core magnetic clamp (Slim model)

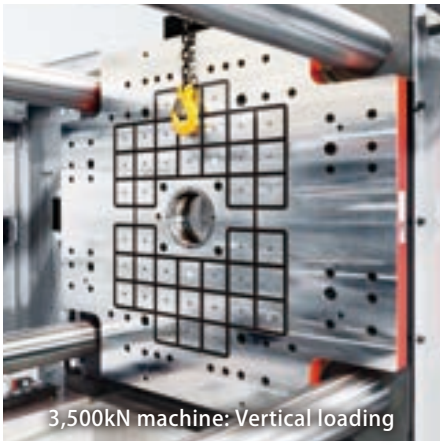


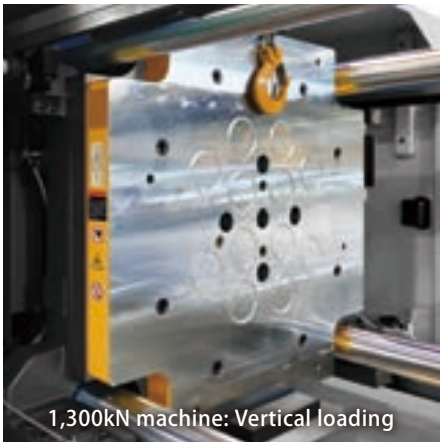
25,000kN machine: Vertical loading

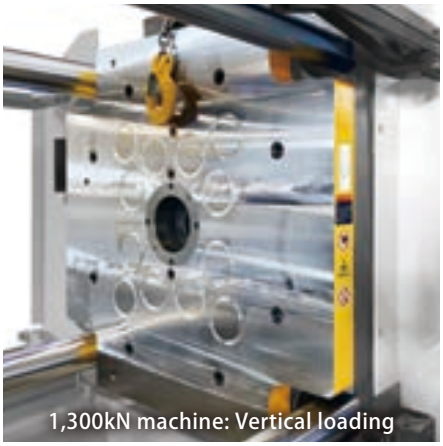
6,000 units sold

More than 6,000 units of Pascal's mag clamp has been supplied to manufacturers since 2002, which demonstrates its excellent product reliability.


3,500kN machine: Vertical loading


3,500kN machine: Vertical loading


1,300kN machine: Vertical loading

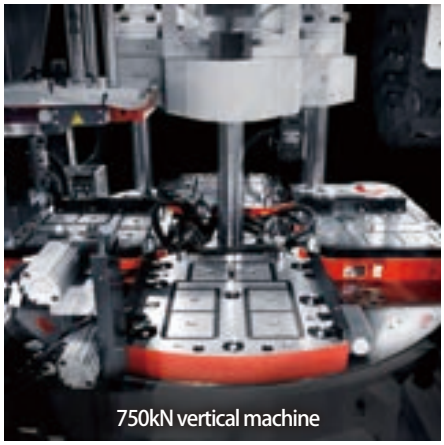

1,300kN machine: Vertical loading

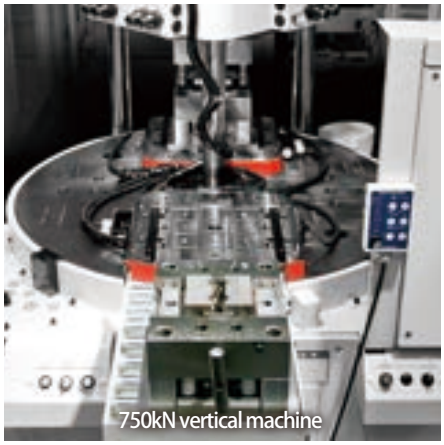

18,000kN machine: Vertical loading


4,500kN machine: Horizontal loading

Supplied for small and large sized machines, vertical machines, and multi-color machines.

Pascal mag clamp has been installed on wide range of machines such as injection molding machine ranging from 200kN to 30,000kN size as well as vertical and and multi-color plastic machine.

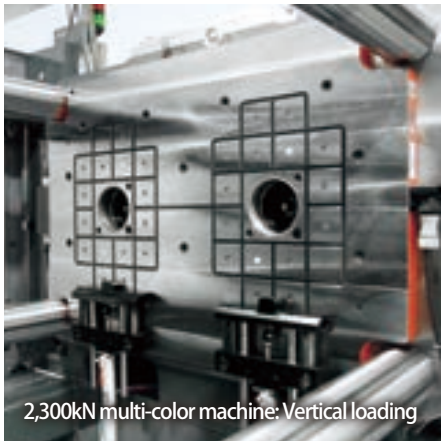

750kN vertical machine

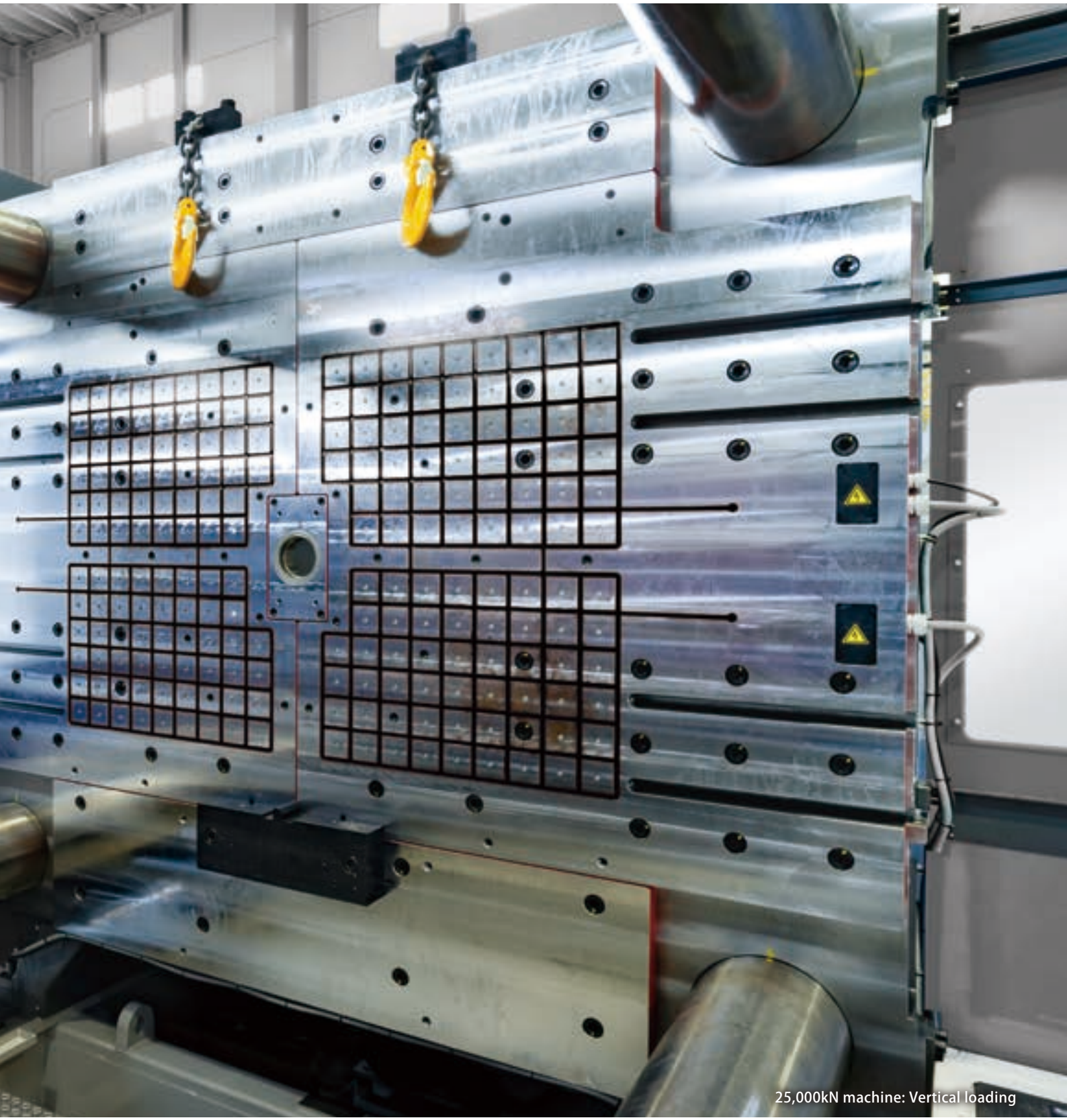

750kN vertical machine


2,500kN multi-color machine: Horizontal loading

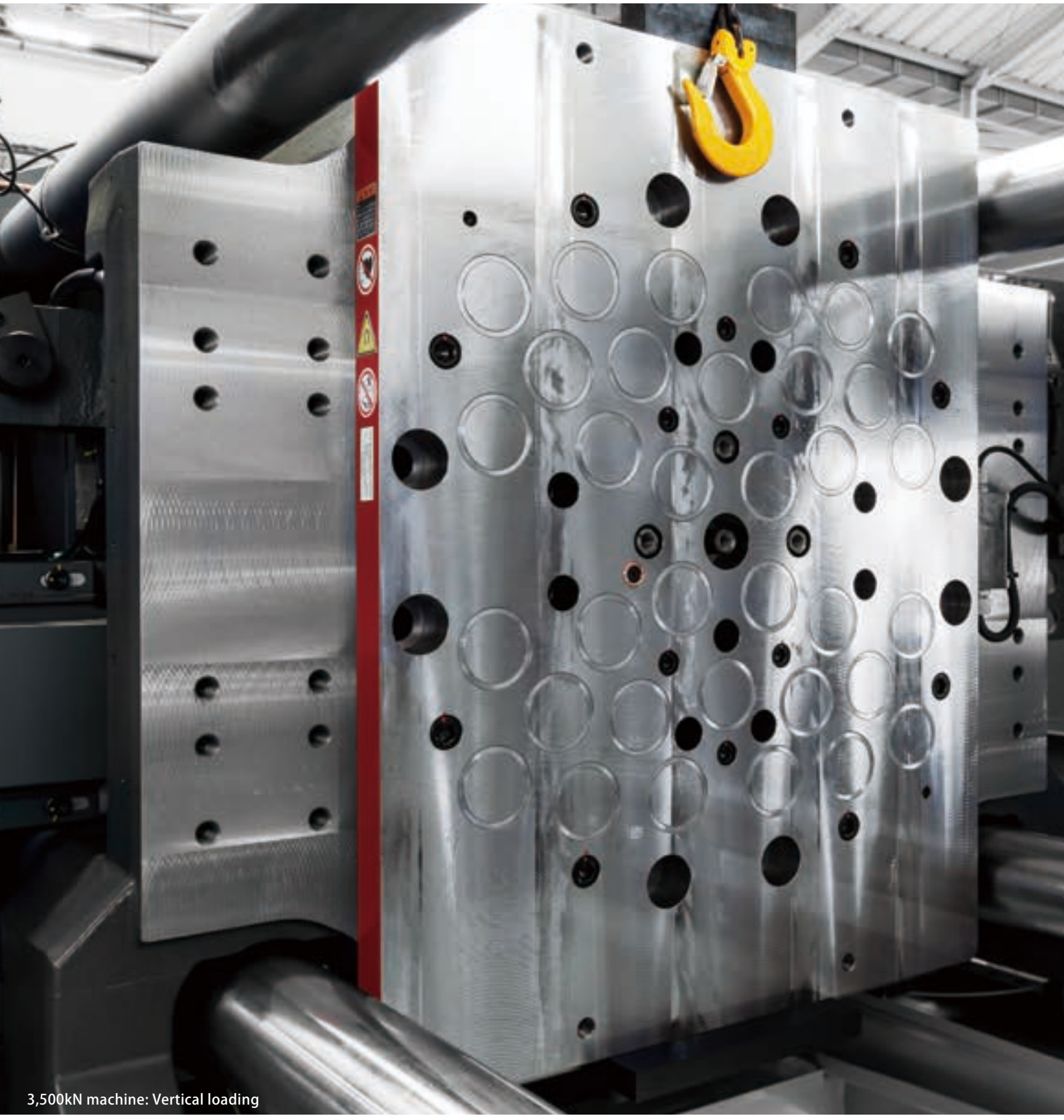

2,500kN multi-color machine: Horizontal loading


2,500kN machine: Horizontal loading


2,300kN multi-color machine: Vertical loading



25,000kN machine: Vertical loading



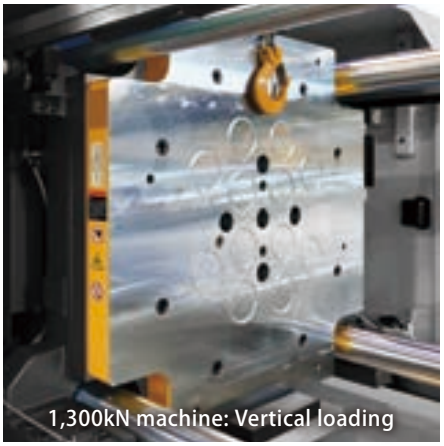
3,500kN machine: Vertical loading

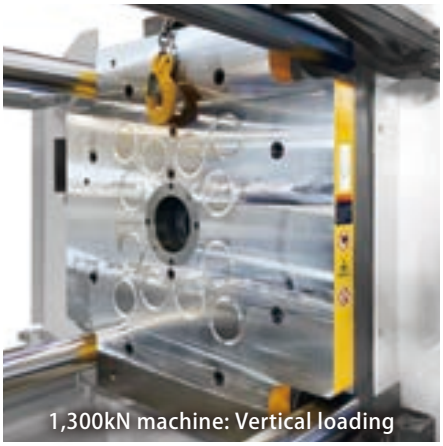
In pursuit of high reliability, Pascal now offers a circle core magnetic clamp.

The shape of the magnetic core has been changed to improve reliability, and this has also reduced the cost to lower than that of the previous model.


2,200kN machine: Vertical loading


2,200kN machine: Vertical loading


1,300kN machine: Vertical loading

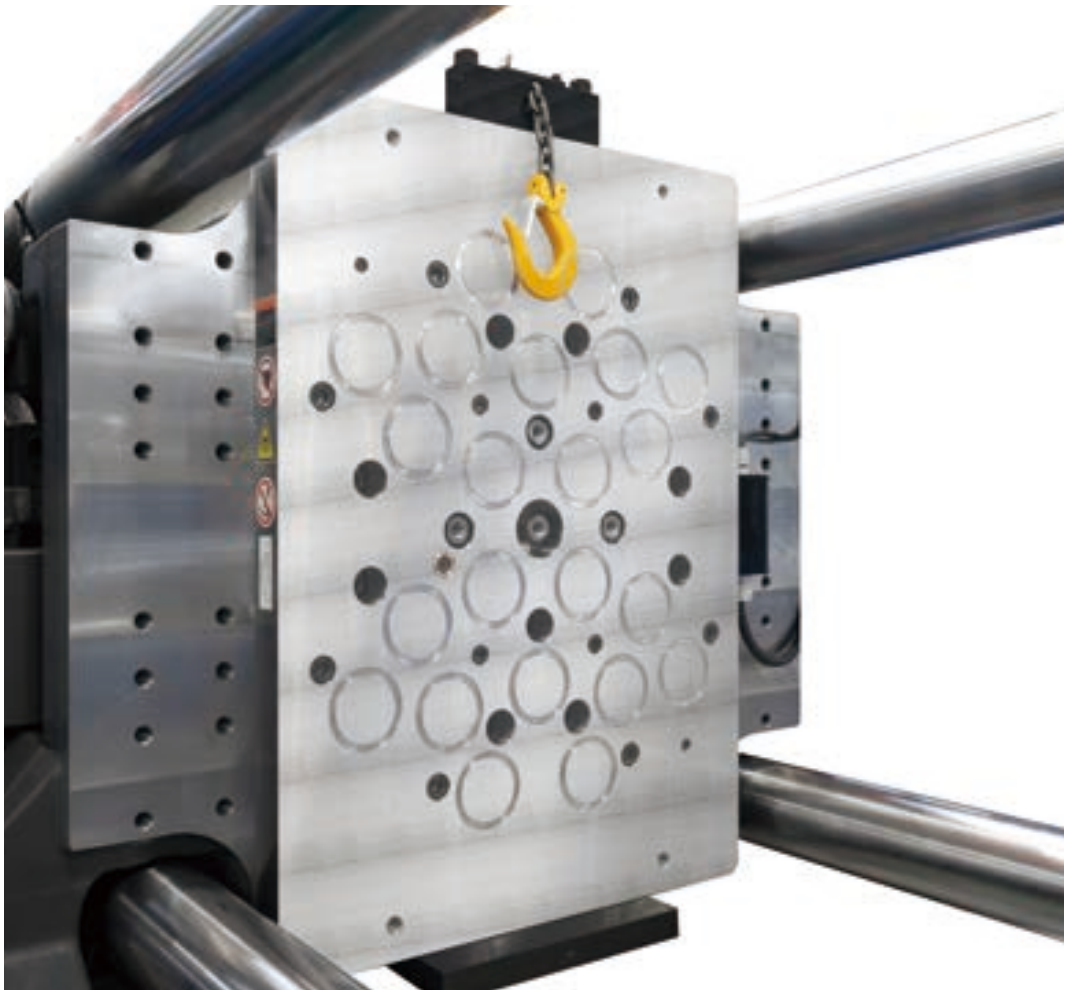

1,300kN machine: Vertical loading

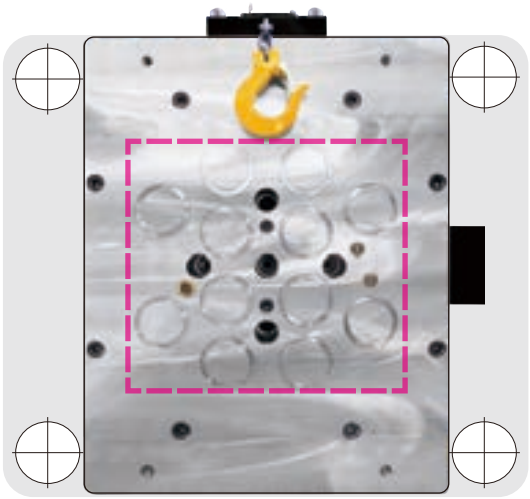

5,500kN machine: Vertical loading


5,500kN machine: Vertical loading

Pascal offers 2 models in accordance

Slim model



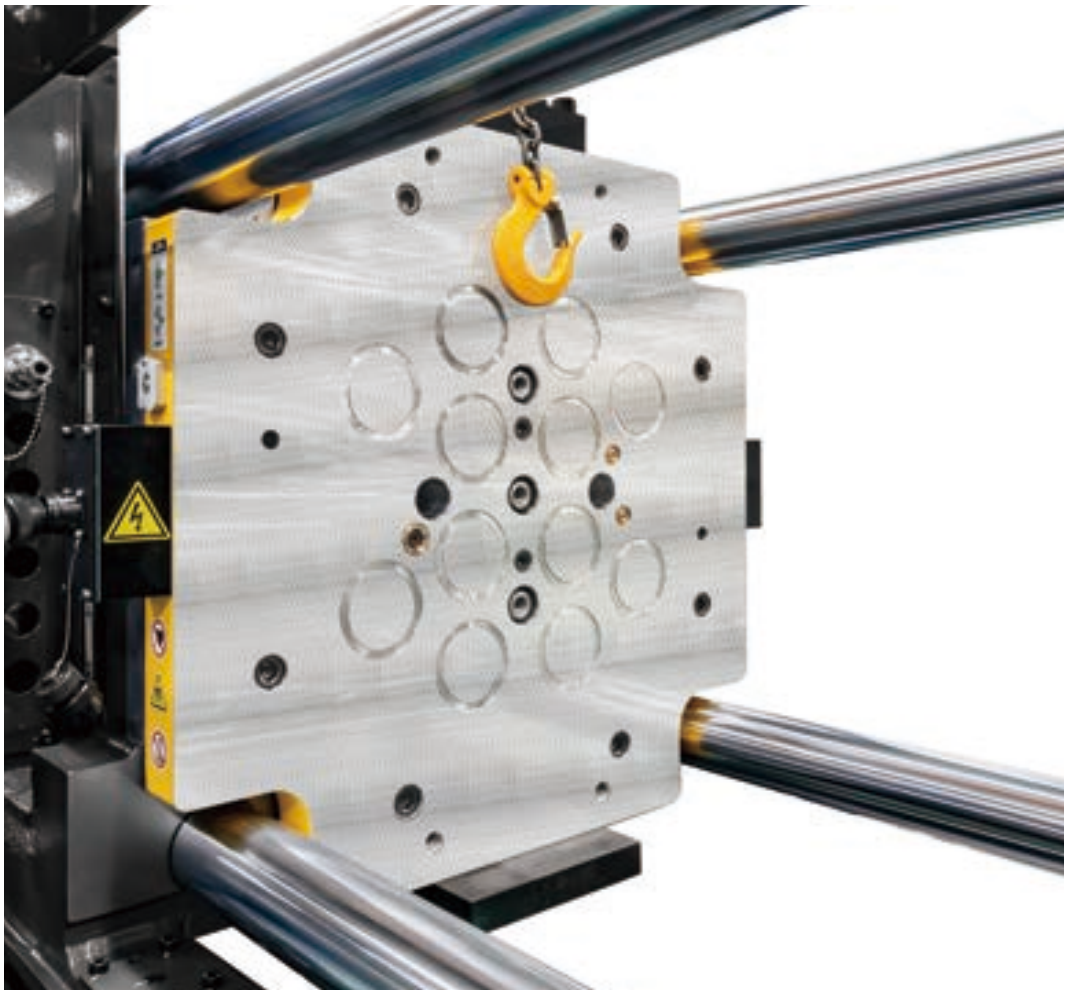


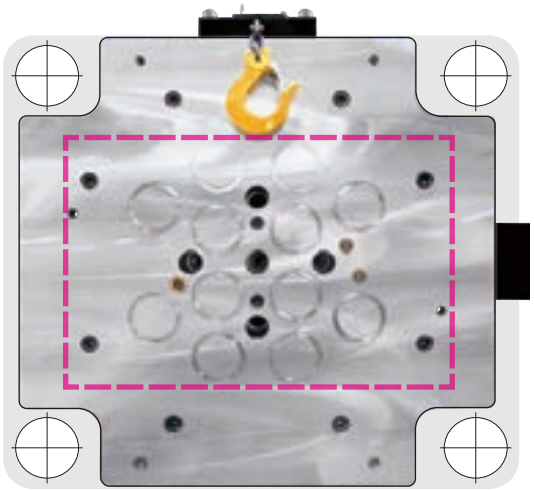
Suitable for long vertical molds

This new model features a slimmer plate to reduce the cost. It is best suited for when the mold width fits inside the tie bar.

with the size and shape of the user's mold.

Standard model





Suitable for wide molds

The plate shape is the same as the previous model which can accommodate laterally wide mold.

Time to change from a manual clamp to circle core magnetic clamp

It is difficult and dangerous work for an operator to fix the mold by hand tools and reaching underneath heavy molds.

Safe, easy, and quick mold changes with a circle core magnetic clamp will eventually reduce machine downtime and make the operators job much easiler. The work environment will be much more comfortable, and productivity will be improved.

It takes time to fasten/unfasten screws

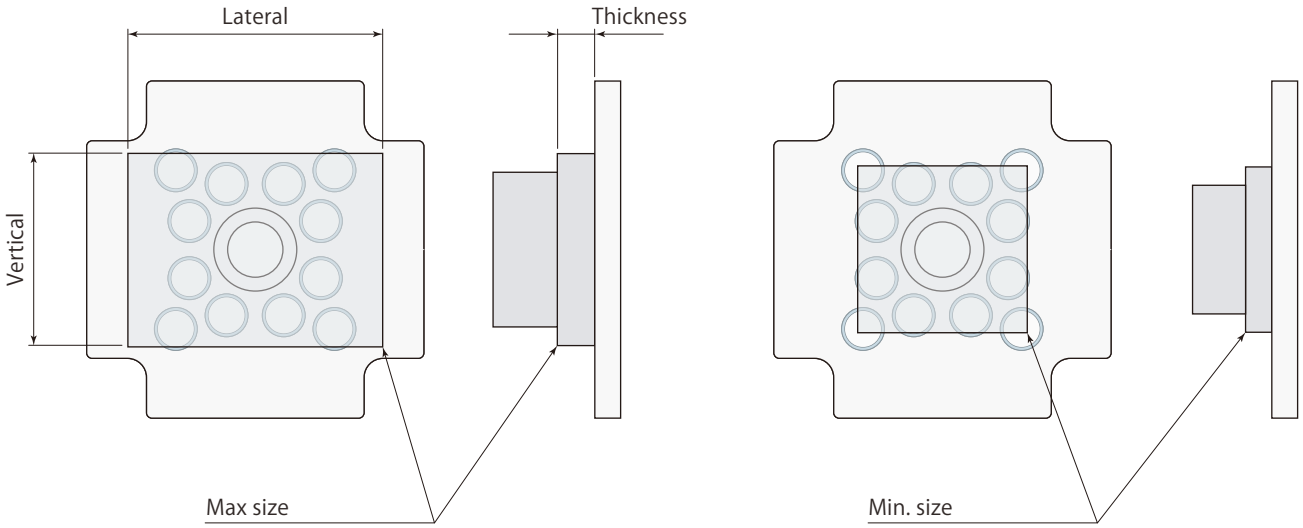
Uncomfortable working posture

Molds can be clamped in 0.5 to 4.5 sec.

Simply push the button

Automated clamping regardless of size of mold

It is not necessary to standardize the size (vertical/horizontal/thickness)



Utilize the machine platen area to the maxium

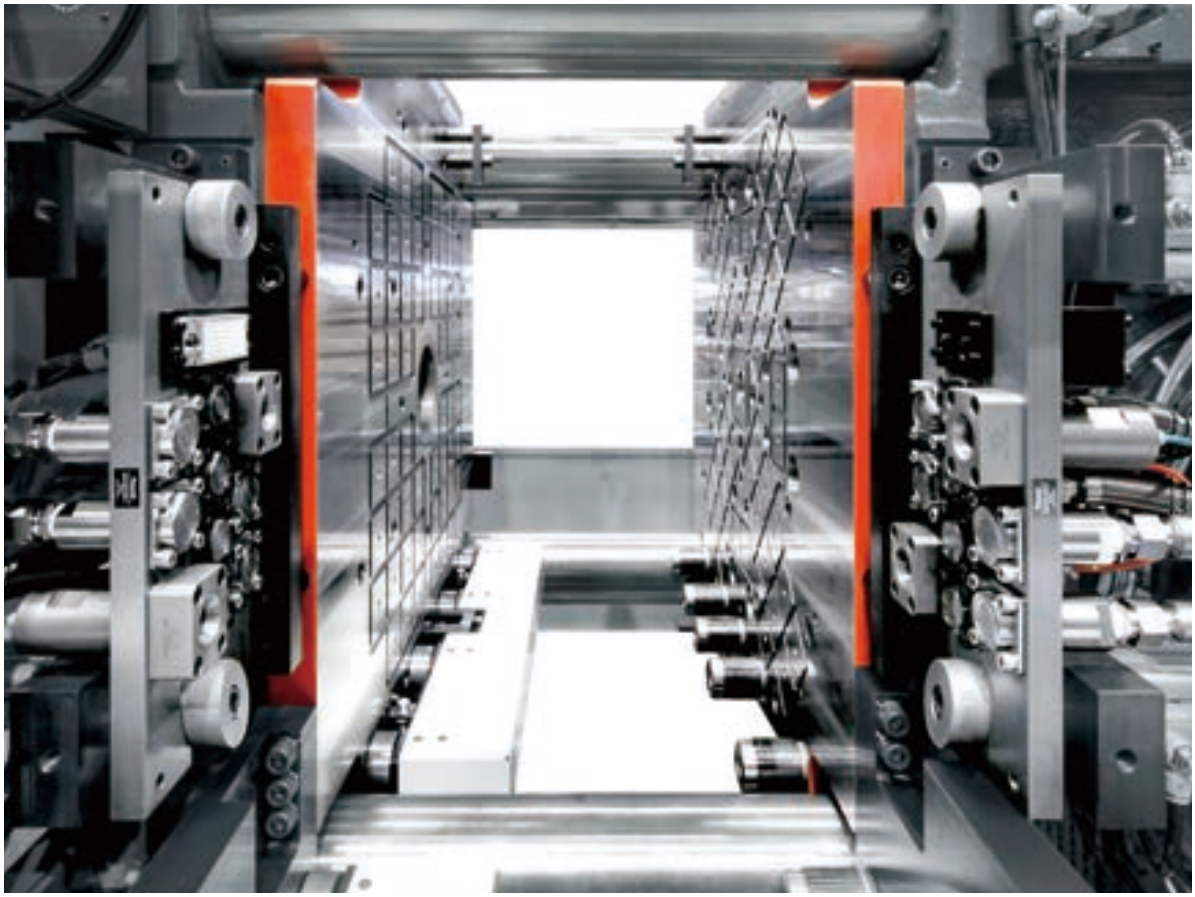
Extra space is not necessary to mount a conventional clamp on the machine platen and a designer can design the mold without any dimensional constraints.

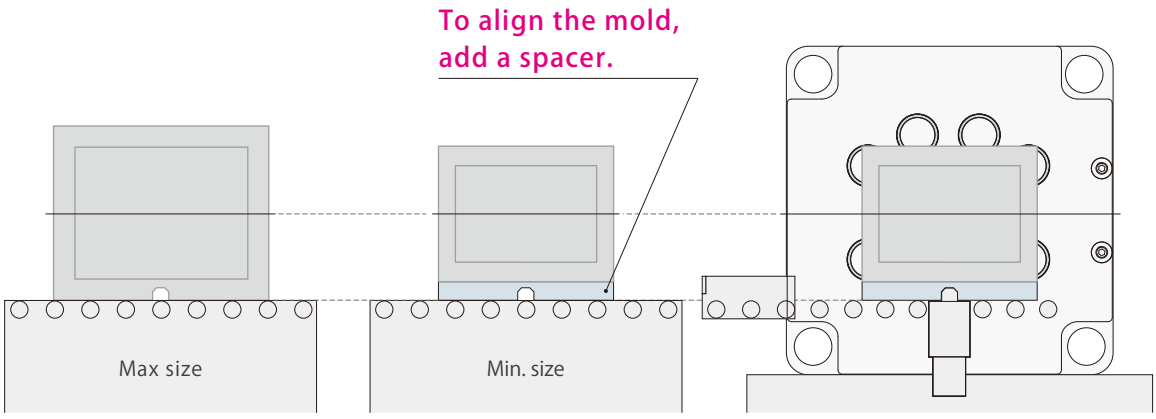
No interferences such as wires or hoses

Extra space is reuquired to mount manual or hydraulic clamps on the platen and core cylinders, electrical connectors, couplers, and hoses can be interferences.

Perform horizontal mold-changes without an overhead crane

The standard model can accommodate horizontal mold changes with a spacer. Even if the mold height is not standardized, horizontal mold changes can be achieved by using a spacer.

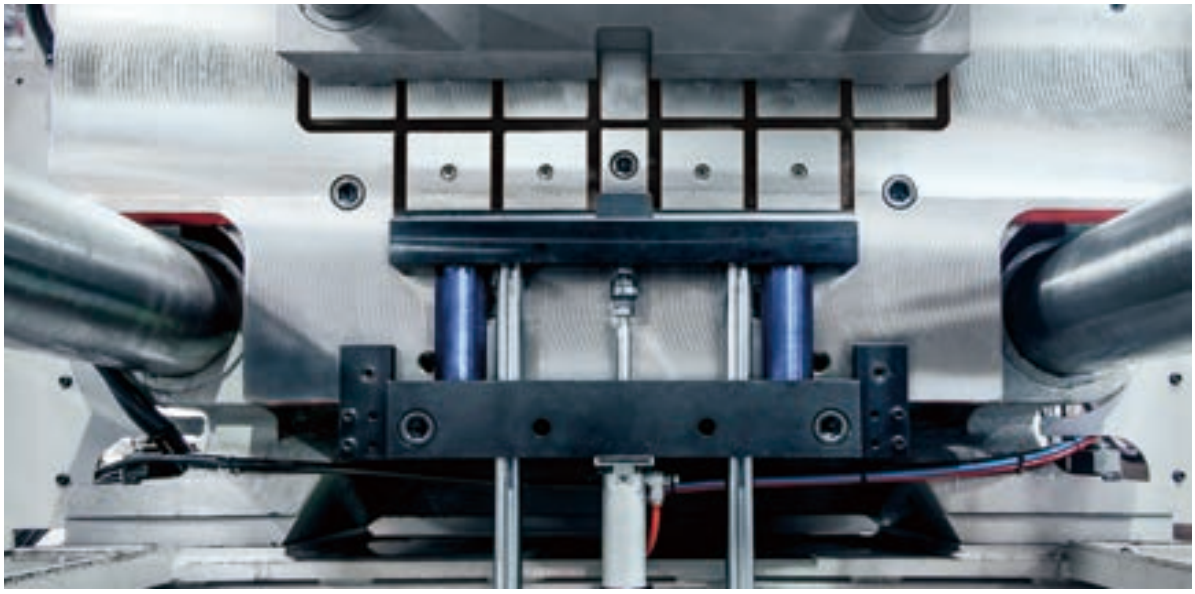




New mold positioning devices to help improving the mold set-up

die setter

By simply placing a mold on the die setter, positioning for vertical and horizontal directions can be done securely and easily, improving mold set up time (Optional)



die leveler

Using the die leveler with a locator ring can reduce the mold installation time. (Optional)

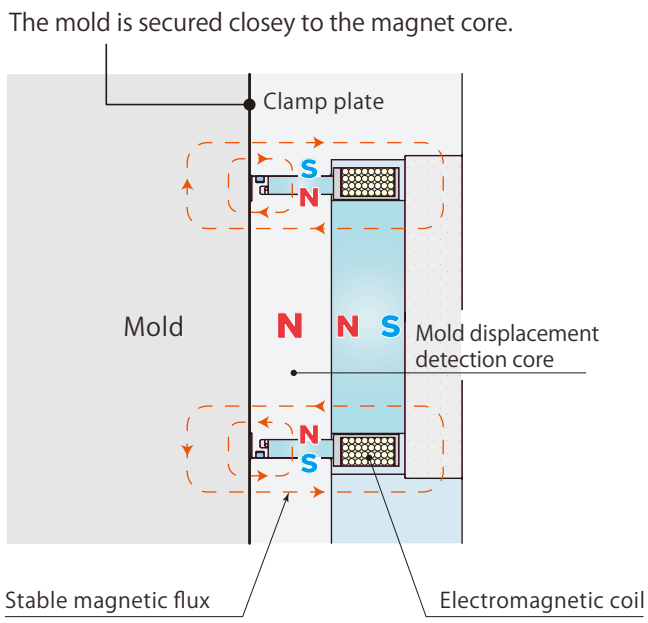
Safety measures

Mold displacement detection system

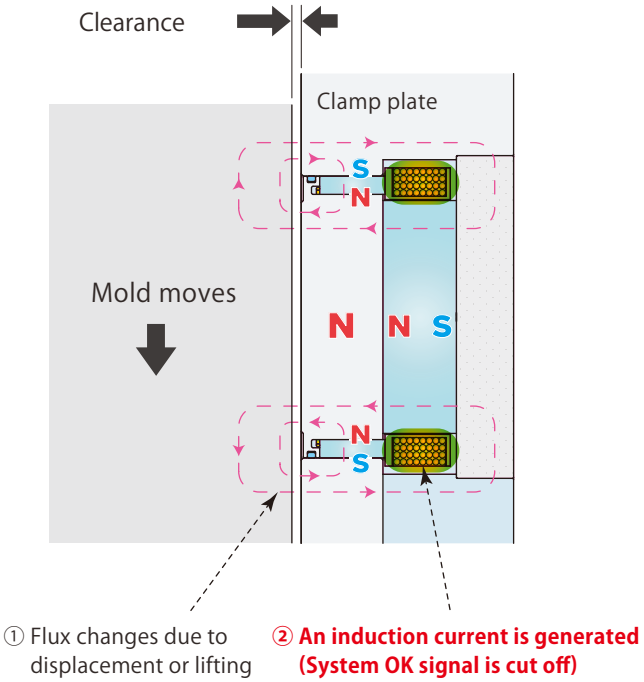
Displacement or lifting of the mold can be detected by the electromagnetic coils that are built into magnet core located near the center of the clamp plate.

When the mold moves, these electromagnetic coils detect an induction current signal.

Normal clamping status



when the mold moves or lifts



If there are moving parts on the mold displacement detection core, they may create false detection signals. Moving parts should be changed to non-magnetic materials. Ask Pascal for the details.

Mold fall protection hook(optional)

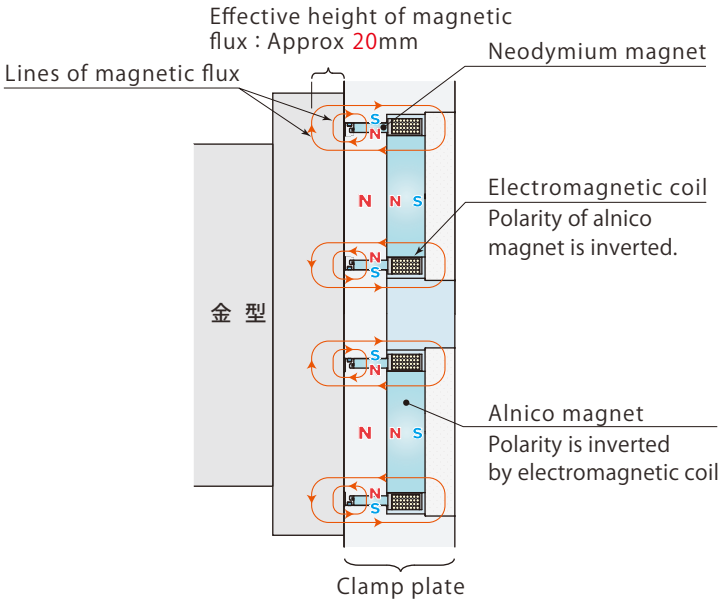
Another available option is a protection hook with an easily adjustable chain length.

Feasures

- Energization is only required when switching on and off. No energization is required during clamping. No electricity is consumed, and so there is no heat generation.
- The clamp plate has no moving parts, thus assuring high durability . The interior is maintenance-free.
- Clamp force is evenly applied on all faces of the magnet core. No gaps are created between the machine's platen surface and center part of the mold which helps improve molding accuracy.
- Once the mold is clamped, unclamping（demagnetization） will not occur even when there is a power failure or cable breakage occurs.
- The magnetic force of permanent magnet will not decrease over time. Clamping force is maintained for long-term use.
- The effective height of the magnetic flux is about 20 mm above clamp plate surface.
- No magnetic field is generated from the sides of the clamp plate. So the injection nozzle and controller are not affected.

Structure and function

Clamp



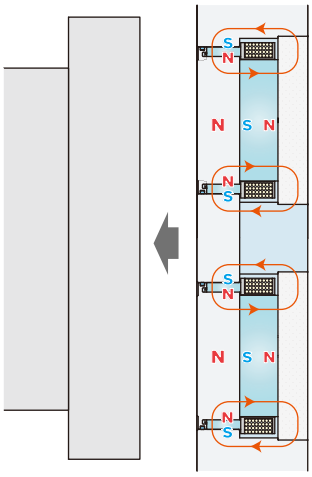
① Electromagnetic coil is energized for 0.5 sec.

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 mold.

Unclamp



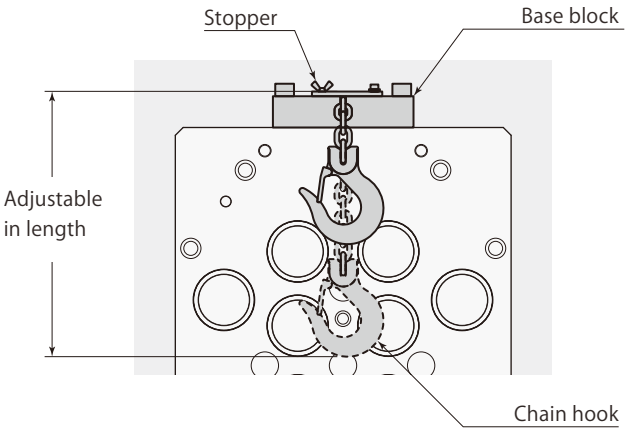
① Electromagnetic coil is energized for 0.5 sec.

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 mold can be unclamped.

Mold fall protection hook（length adjustable） model MGR PAT.

Mold fall protection hook with easily adjustable chain length

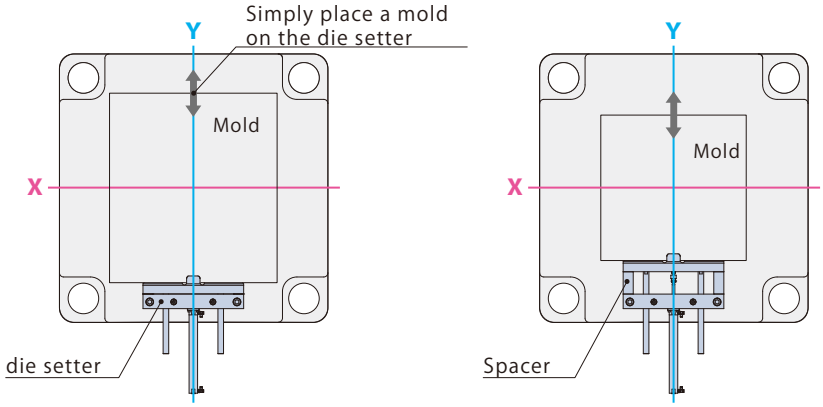


Stopper

Mold positioning tool

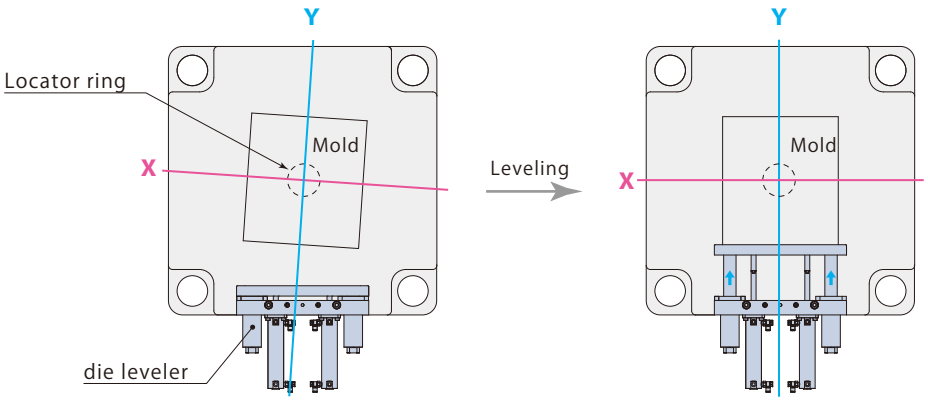
die setter PAT.

By simply placing a mold on the die setter, positioning for vertical and horizontal directions can be done securely and easily, improving mold set up time.



die leveler PAT.P.

Using the die leveler with a locator ring can reduce the mold installation time.

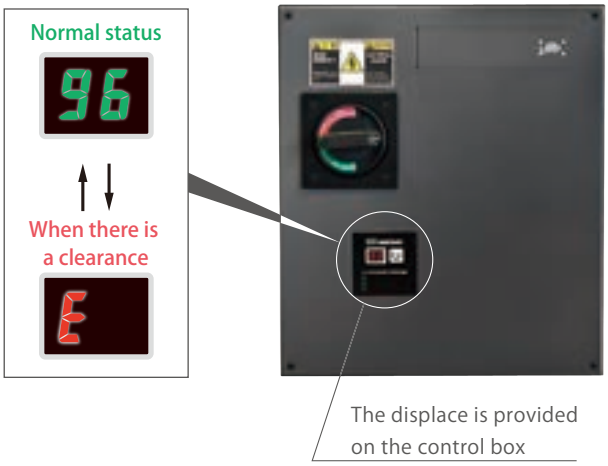


DD Mag clamp (safety measure)

It is a magnetic clamp with a built-in DD sensor that checks the molds condition numerically. It can detect drops in clamping force due to gaps or clearances between the mold and the plate that are caused by mold material that is difficult for the magnetic force to pass through.

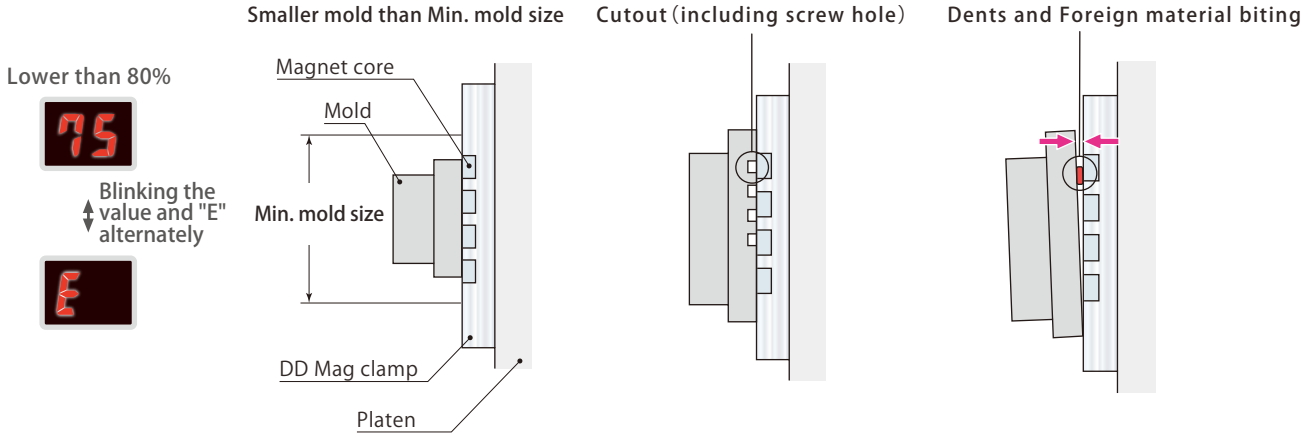
Normal status

The display indicates  when the mold size is proper for the system and also ensures that there are no clearance and that the mold material and the temperature is appropriate.

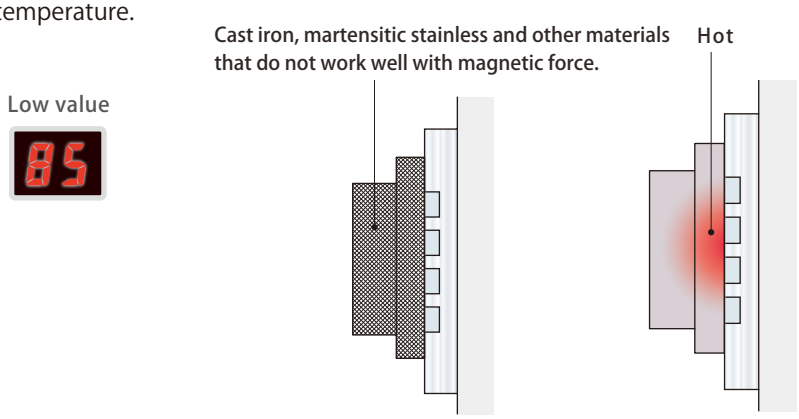


Abnormal signal output (Indicated on the display)

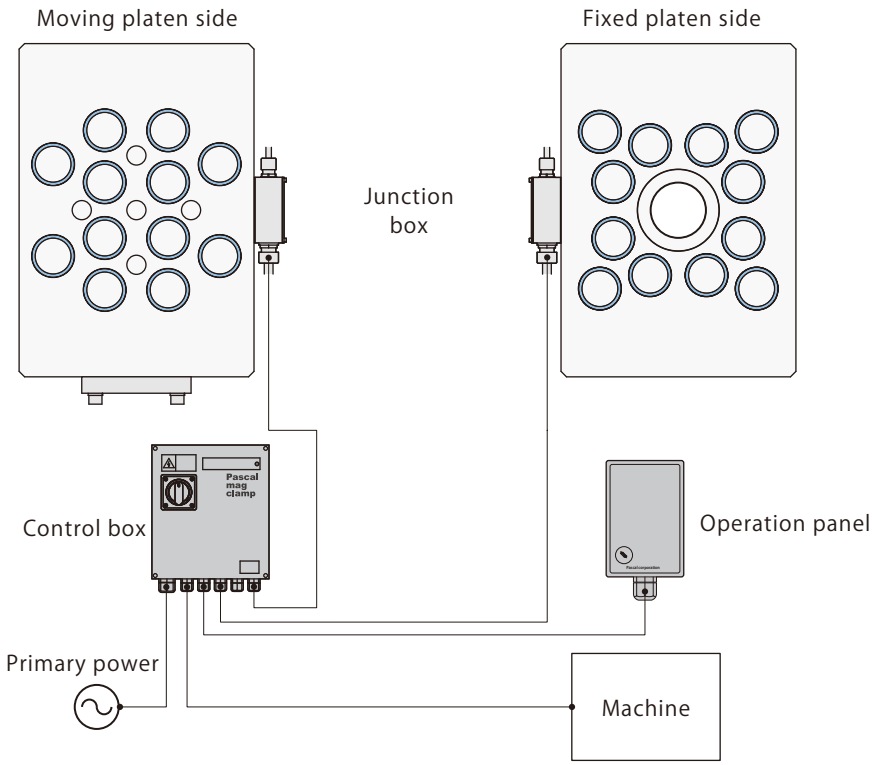
An abnormal signal is detected when the clamping force weakens to less than 80% due to clearance.



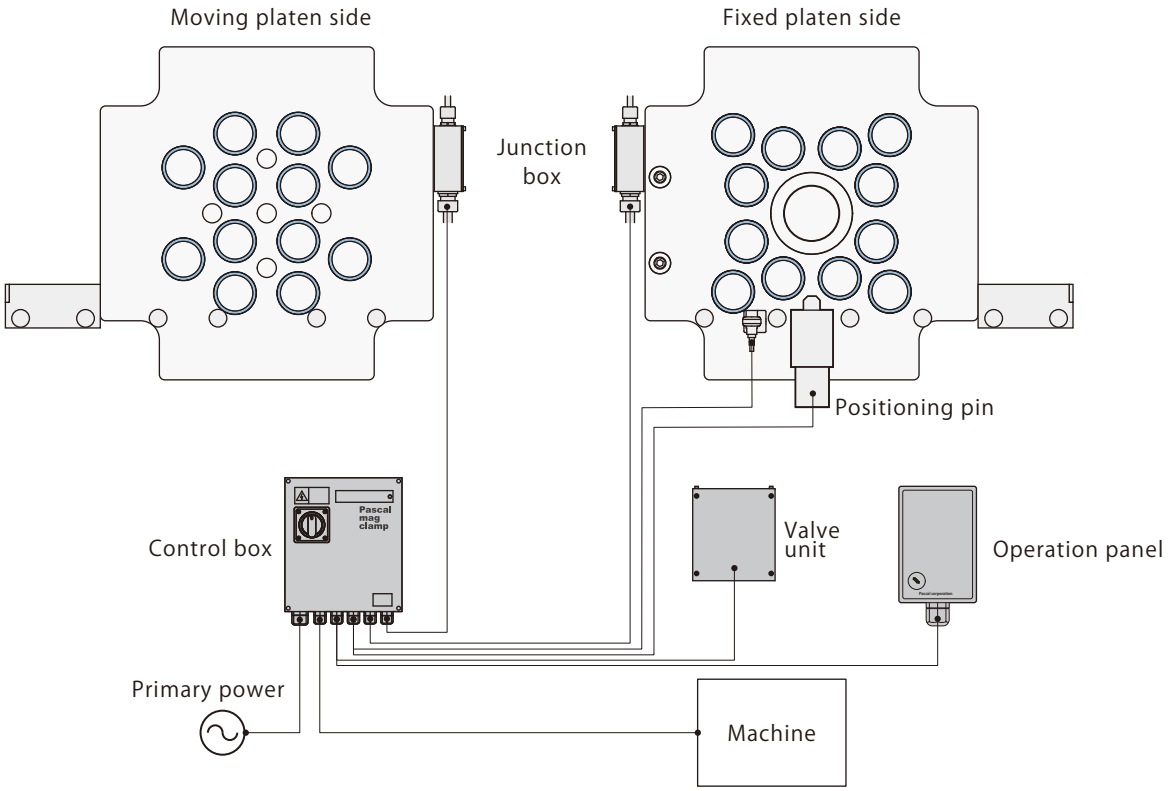
The displace indicates a lower value than usual if the clamp force decreases due to the mold material or temperature.



[Vertical loading]

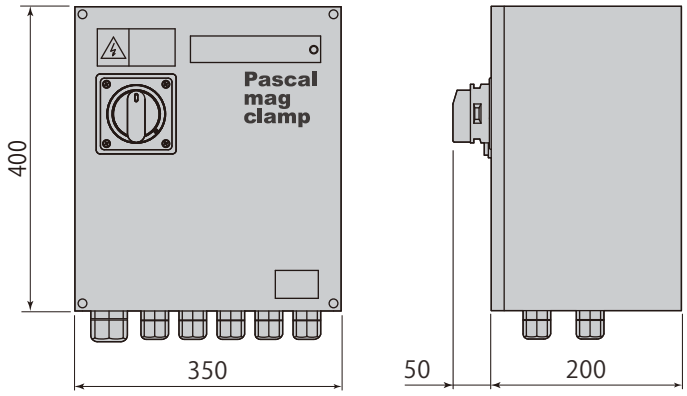


[Horizontal loading]



[For vertical and horizontal loading] Control box

model **EMGD**

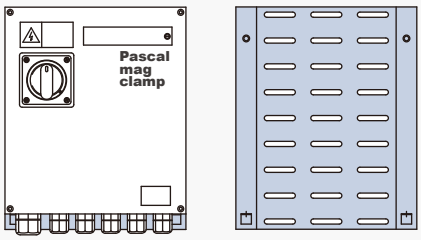


Weight: 25 ~ 80 kg

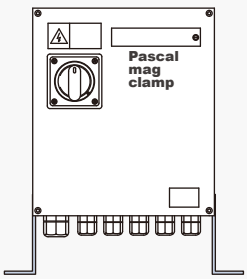
The diagram above denotes the dimensions of EMGD-A2J2.

Mounting bracket

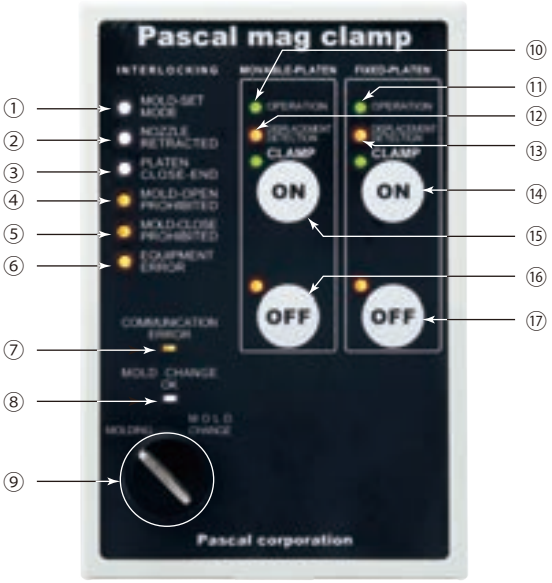
Wall mount type



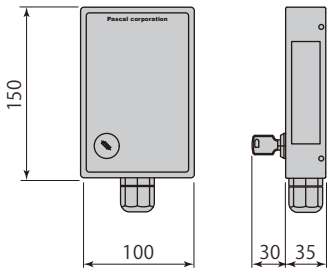
Self-standing type



[Vertical loading] Operation panel



model **ESMD-AE**



Weight：0.6 kg

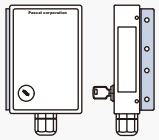
It can be mounted to the machine or the wall with the tap holes on the back of the panel.

①	Lit	IMM at manual or mold-set mode
②	Lit	IMM injection nozzle retracts
③	Lit	IMM clamps the mold with the platens
④	Lit	IMM Opening the mold disabled
⑤	Lit	IMM Closing the mold disabled
⑥	Lit	When mold displacement detection errors occur, the SCR unit is out of order.
	Blinking	When the cables are disconnected, clamp ON/OFF conduction errors occurs（Current value decreases）
	Blinking	When the DD sensor detects abnormal clamping status.（Magnetic flux decreases）
⑦	Lit	Communication error between operation panel and control box
⑧	Lit	Mold change operation possible
	Lit off	Mold change operation is disabled (due to lack of interlocking signals)
⑨	Mold	Mold change operation done
	Change	During mold change operation
⑩ ⑪	Lit	Clamp ON/OFF operation possible
	Blinking	Operation suspended
	Blinking	When the DD sensor detects abnormal clamping status. (Magnetic flux decrease)

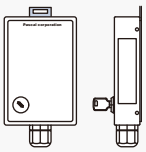
⑫	Lit	Mold moves on the clamp plate
⑬	Blinking	Requires clamp operation again
⑭ ⑮	Clamp ON push botton	
	Lit	Clamp ON complete
	Blinking	Clamp magnetizing
⑯ ⑰	Clamp OFF push button	
	Lit	Clamp OFF complete
	Blinking	Clamp magnetizing

Mounting bracket

L type

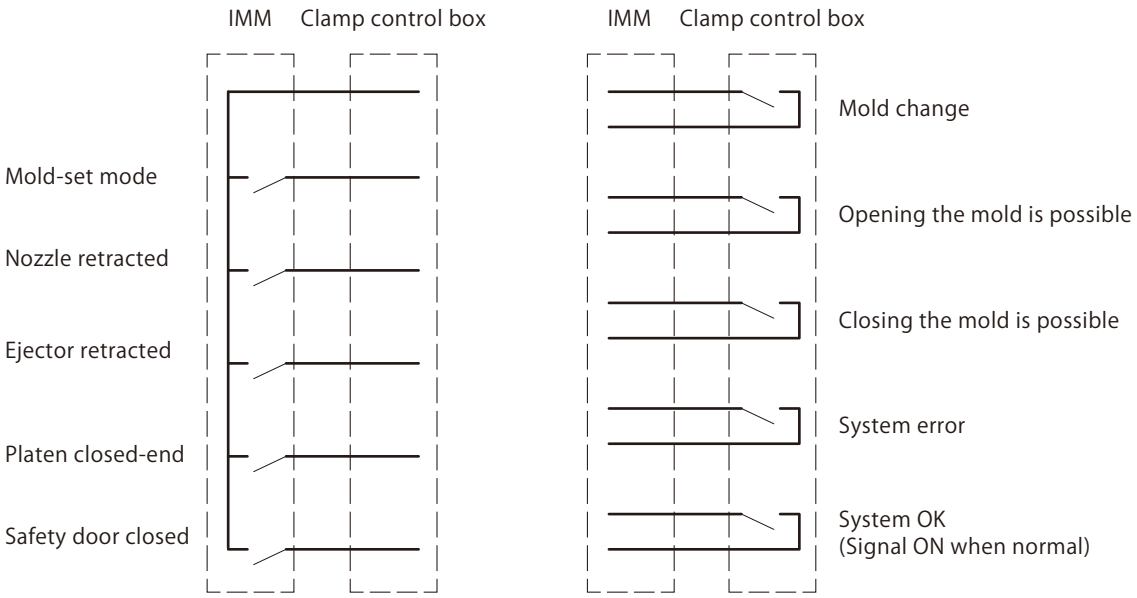


Wall mount type



[Vertical loading] Interface

The interlock signals shall be transmitted in zero potential voltage.



IMM → Clamp control box

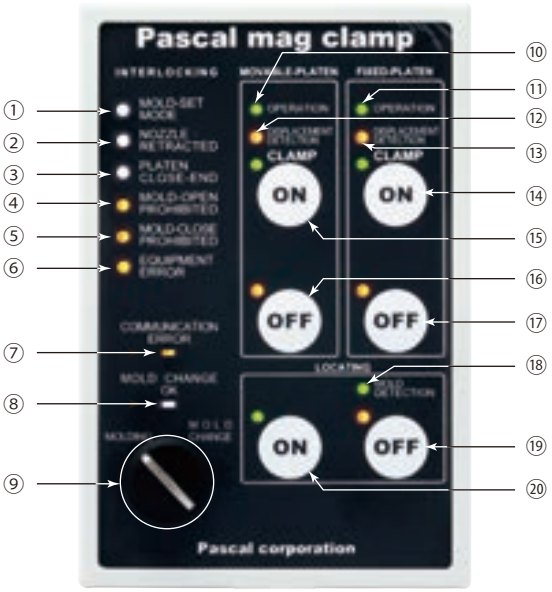
Name of signals	Description
Mold-set mode	ON when machine operation mode at mold set
Nozzle retracted ※1	ON when injection nozzle retracted
Ejector retracted ※1	ON when ejector retracted
Platen closed-end	ON when mold is clamped by machine platens at mold set mode, OFF when mold opens.
Safety door closed ※1	ON when machine safety door closed

※1 The signal can be omitted by changing the setting in the control box.

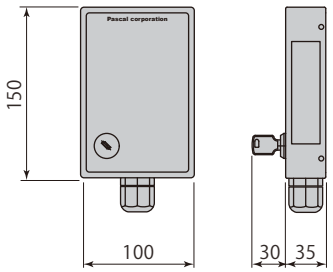
Clamp control box → IMM

Name of signals	Description
Mold change	Mold changing (Operation panel selected mold change)
Closing the mold is possible	Condition needed for the IMM mold to close
Opening the mold is possible	Condition needed for the IMM mold to open
System error	This signal is used to indicate abnormal IMM clamping
System OK (Signal ON when normal)	IMM stops immediately when clamping is abnormal (E-stop)

[Horizontal loading] Operation panel



model **ESMD-BE**



Weight: 0.6 kg

It can be mounted to the machine or the wall with the tap holes on the back of the panel.

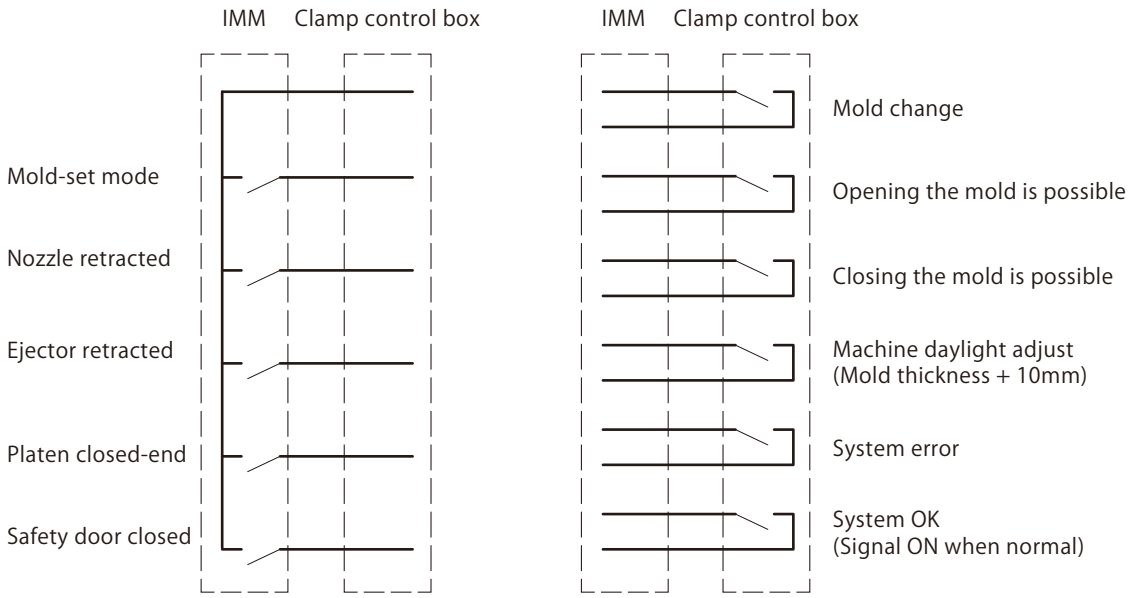
①	Lit	IMM at manual or mold-set mode
②	Lit	IMM injection nozzle retracts
③	Lit	IMM clamps the mold with the platens
④	Lit	IMM Opening the mold disabled
⑤	Lit	IMM Closing the mold disabled
⑥	Lit	When mold displacement detection errors occur, the SCR unit is out of order.
	Blinking	When the cables are disconnected, clamp ON/OFF conduction errors occurs (Current value decreases)
	Blinking	When the DD sensor detects abnormal clamping status. (Magnetic flux decreases)
⑦	Lit	Communication error between operation panel and control box
⑧	Lit	Mold change operation possible
	Lit off	Mold change operation is disabled (due to lack of interlocking signals)
⑨	Mold	Mold change operation done
	Change	During mold change operation
⑩ ⑪	Lit	Clamp ON/OFF operation possible
	Blinking	Operation suspended
	Blinking	When the DD sensor detects abnormal clamping status. (Magnetic flux decrease)

⑫ ⑬	Lit	Mold moves on the clamp plate
	Blinking	Requires clamp operation again
⑭ ⑮	Clamp ON push botton	
	Lit	Clamp ON complete
	Blinking	Clamp magnetizing
⑯ ⑰	Clamp OFF push button	
	Lit	Clamp OFF complete
	Blinking	Clamp magnetizing
⑱	Lit	Mold in the machine
	Lit off	Mold not in the machine
⑲	Mold positioning ON push button	
	Lit	Mold positioning pin dowelled
	Blinking	Mold positioning pin dowelling
⑳	Mold positioning OFF push button	
	Lit	Mold positioning pin released
	Blinking	Mold positioning pin releasing

See →page 24 for the details of bracket

[Horizonta loading] Interface

The interlock signals shall be transmitted in zero potential voltage.



IMM → Clamp control box

Name of signals	Description
Mold-set mode	ON when machine operation mode at mold set
Nozzle retracted ※1	ON when injection nozzle retracted
Ejector retracted ※1	ON when ejector retracted
Platen closed-end	ON when mold is clamped by machine platens at mold set mode, OFF when mold opens.
Safety door closed ※1	ON when machine safety door closed

※1 The signal can be omitted by changing the setting in the control box.

Clamp control box → IMM

Name of signals	Description
Mold change	Mold changing (Operation panel selected mold change)
Closing the mold is possible	Condition needed for the IMM mold to close
Opening the mold is possible	Condition needed for the IMM mold to open
Machine daylight adjust(Mold thickness + 10mm)	The signal controls machine mold open operation (Mold thickness + 10mm)
System error	This signal is used to indicate abnormal IMM clamping
System OK (Signal ON when normal)	IMM stops immediately when clamping is abnormal (E-stop)

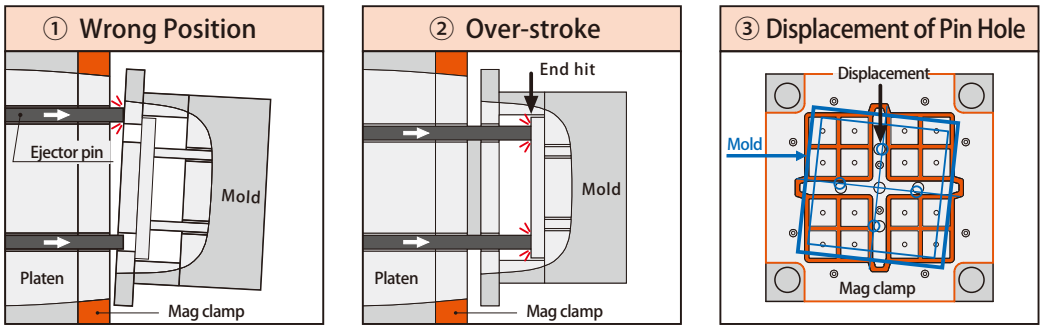
Check point before molding operation

- Ejector setting errors are the main reason a mold may fall. A caution plate is provided for the machine operators so that they can check the mounted position of the ejector pins, stroke, and displacement of the pin hole.

Pascal mag clamp

Check the following points to avoid the mold to fall.

- **If ejector pin is incorrectly positioned, the mold may be pushed to fall.**
- **When confirming, lift the mold and move the ejector pin manually.**



Is the position of ejector pin CORRECT? | Isn't the length of ejector pin TOO LONG? | Does the mold mount PROPERLY?

Recommended Ejector Setting Value	Ejector force should be less than 1/3 against magnetic clamping force on movable platen side.	Ejector speed should be less than 50 mm/sec.

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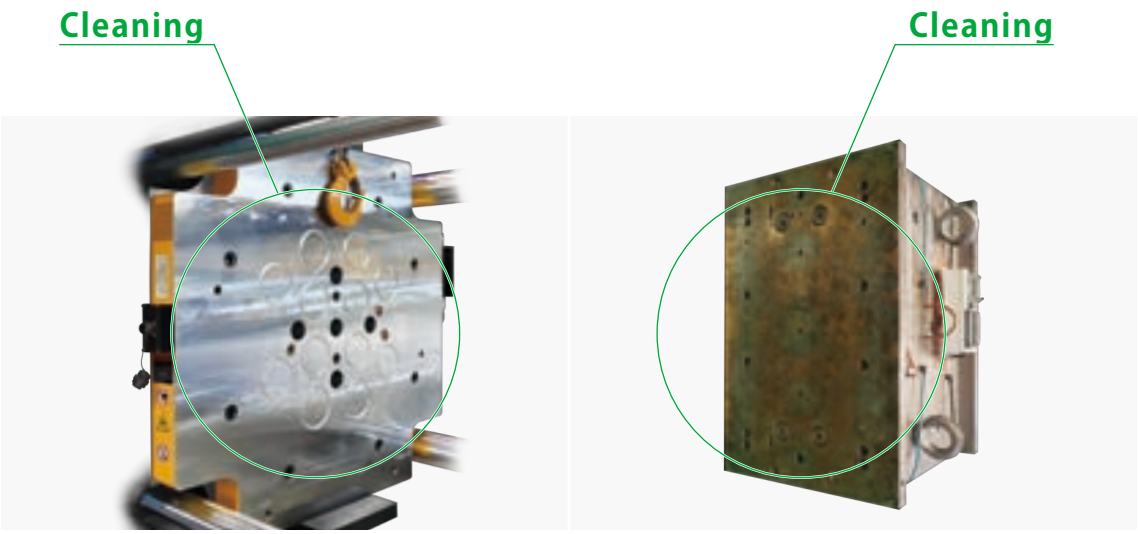
The surface of the mold base and the magnetic plate must always be clean. Perform daily visual check and wipe them off when they are dirty.

- Water, oil, etc. adhering to the surface does not directly cause a clamping force decrease, but it does make it easier for dust and foreign substances to adhere to the surface. If there are any dents on the surface, remove them using an oil stone or a similar tool. Foreign substances and dents can cause damage to the magnetic plate.



Surface, Mangetic plate

Surface, Mold plate

Keep metal substances and electronic devices away from the magnetic plate when it is magnetized.

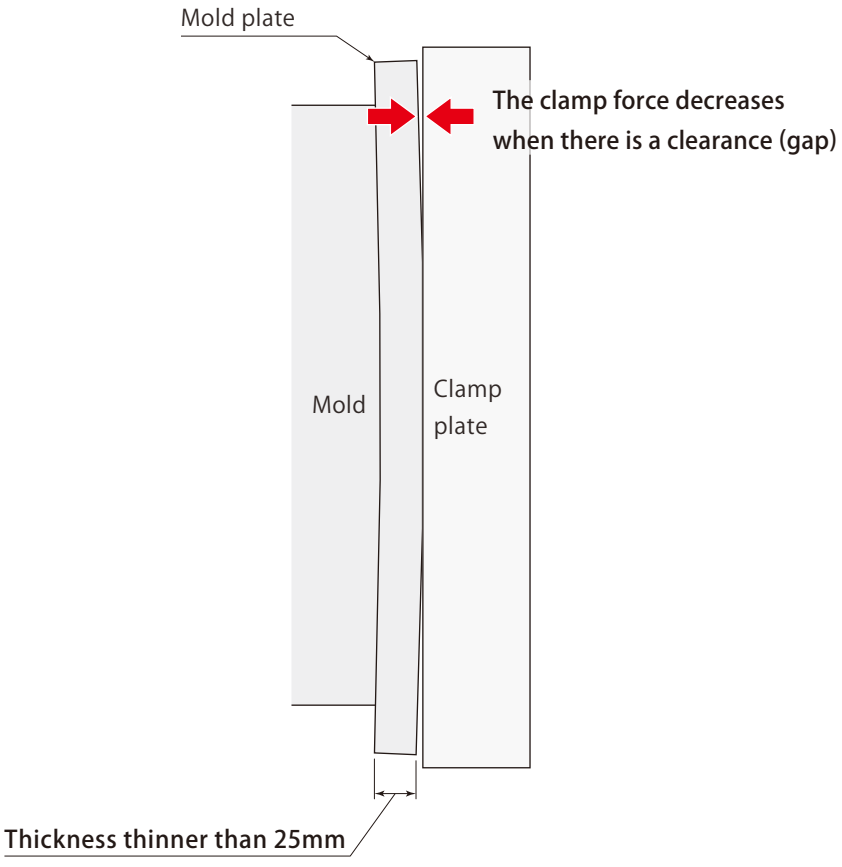
- The magnet clamp generates a strong magnetic force. People with cardiac pacemakers are strictly prohibited from approaching the mag clamp. The projected height of the magnetic flux above the clamp plate towards the front (mold side) is just around 20mm. To avoid the damage, be sure to bring mobile phones, magnetic cards, compact discs, or any other devices that are susceptible to magnetism close to the clamp plate.
- Do not bring any magnetic substance such as ferrous metal close to the adhering surface when the mag clamp is clamped（magnetized）. These materials may be attracted to the clamp surface, and anyone carrying them near the strong magnet risks injury to their fingers or hands.

Be careful of mold plate deformation and thickness.

- Do not use a mold with a plate that is deformed or warped. The clamp force will decrease due to gaps between the mold plate and the clamp plate.

- Use a mold plate with a thickness of 25 mm or more. The height of the magnetic force lines protruding toward the mold mounting plate is approximately 20 mm. If the mold plate is thinner than 25 mm, there is a risk of the clamp force decreasing as well as sensor malfunctions. If there is no restriction on mold thickness, a mounting plate thickness of 40 mm or more is recommended.

- In rare cases the magnetic flux may affect the stripping operations of 3-plate molds.

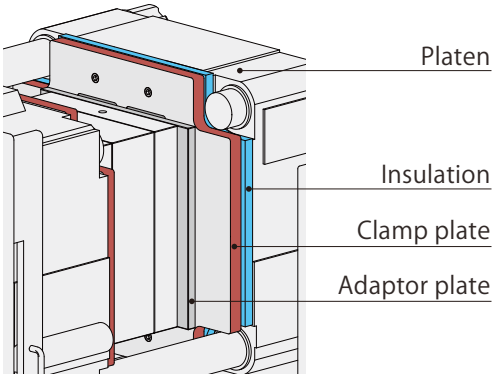


When using a heat insulating plate

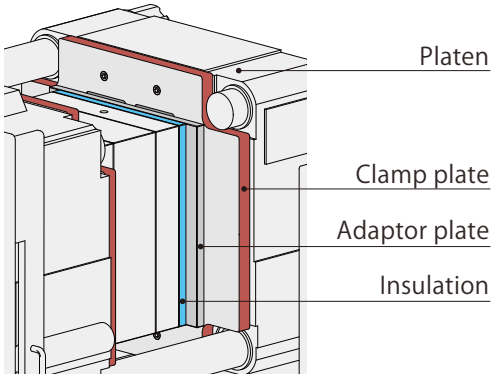
- Ensure that the plate is in the proper position. The mag clamp cannot be operated if it the plate is not installed correctly.

System operable

Between the platen and clamp plate

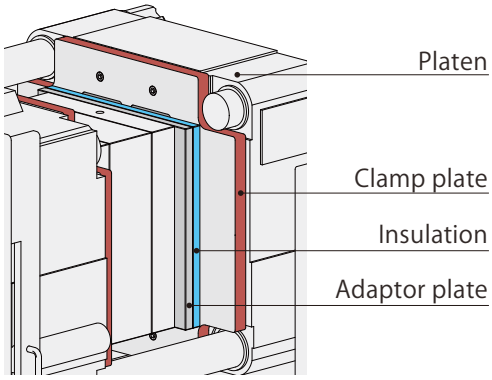


Between the mold and adaptor plate



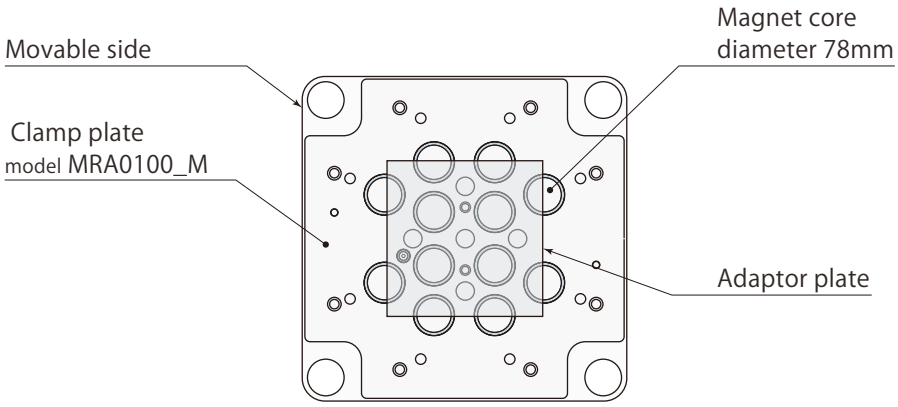
System not operable

Between the adaptor plate and clamp plate



Calculation of rated clamping force

- The clamping force of the Mag clamp (the adhering force of the magnetic clamp) varies according to the area size (number of magnet cores) where the mold plate and the clamp plate are in close contact. When loading a small mold, and the mold plate is not in contact with all the magnet cores, the rated clamping force can be obtained using the calculation formula shown below. Refer to the following calculation example.



Example : Clamp plate model MGA0100（movable side）

1. Magnet cores in full contact with the mold plate
   ＝ 4 pcs
2. Magnet cores in contact with 1/2 of the mold plate
   ＝ 8 pcs
3. Total of the magnet cores in contact with the mold plate
   ＝ 4 pcs + 8 pcs × 1/2 ＝ 8 pcs
4. Clamping force per magnet core ＝ 7.0 kN/pcs
5. Rated clamping force ＝ 7.0 kN/pcs × 8 pcs ＝ 56 kN

- If there is a hole or notch at the bottom of the mold plate, deduct the respective area from the total contact area（number of magnet cores）
- The actual clamping force may be less than the rated force according to the conditions of mold plate.
（Regarding to the decline of the clamping force refer to page →33）

Decline of clamping force

- The actual clamping force may become less than the rating, depending on the condition of the mold plate. Before using the mag clamp, be certain to calculate and acknowledge the decline of clamping force referring to the tables and charts below. Be aware that the actual clamping force is greater than the mold opening force of the injection molding machine.

  (Actual clamping force) = (Rated clamping force - Reduced force) ≧ (Mold opening force of injection molding machine)

  If the actual clamping force is not sufficient , replace the mold plate with a larger one to increase the contact area on the clamp plate.

- Clamping force decreases according to the material of the mold plate. Also the mold plate that is made of S45C-H, SUJ and FCD600 material tend to be difficult to detach when demagnetized. This is due to the residual magnetic flux in the mold. A small clearance between the magnetic plate and mold plate will make it easier to detach it.

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

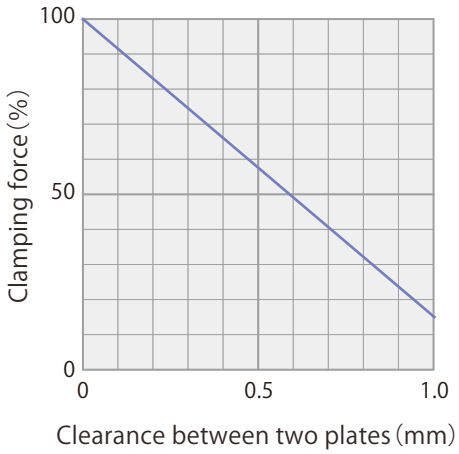
- The clamping force declines according to the grade of surface roughness in contact with the mold plate and clamp plate.

Clamping force	100% (Rated value)	approx.100%	approx.90%
Surface roughness (Max. height and surface roughness Rz)	Rz 1.6 ～ 3.8	Rz 7.5 ～ 15.5	Rz 85 ～ 150

Decline of clamping force

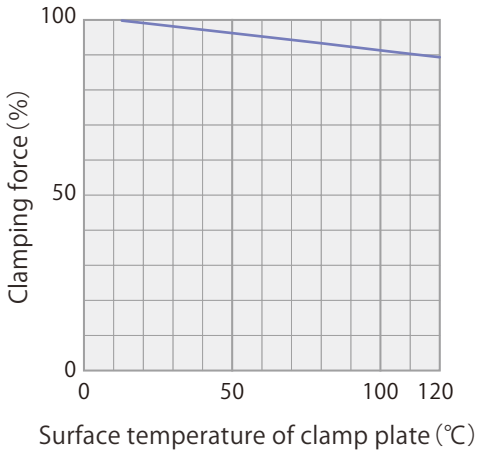
- A dent or deformation on the mold plate that creates distance between the plates will decrease the clamping capacity significantly.

■ Clearance between two plates



- If the temperature of the mold plate rises, the clamping force will significantly decrease. Keep the mold plate temperature below 120° C while it is clamped.

■ Temperature of mold plate



Temperature transmitted to the mold plate

Machine platen

- Make sure the surface of the platens will not interfere with the Mag clamp when installing it on an existing machine. If wide grooves, dents, or scratches are found on the platens, the Mag clamp may become deformed and malfunction. Ask Pascal for details.

■ Wide groove

■ Dents or scratches

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