

HAITIAN INTERNATIONAL HOLDINGS LIMITED

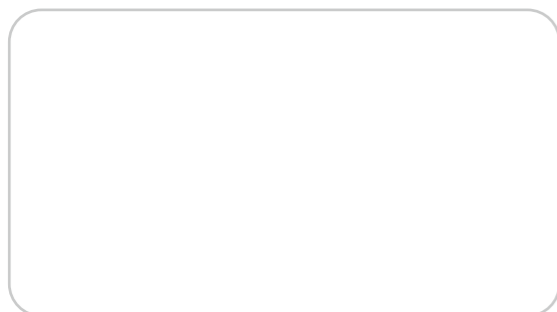
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NINGBO HAITIAN HUAYUAN MACHINERY CO., LTD.

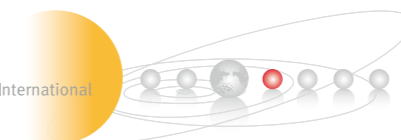
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MA/F Injection Molding Machinery
for Fast Cycle Applications
2100-6500kN / Europe

Haitian Partner:



HT 20230227-EU



We Create Advantage

More Than 50 Years of Manufacturing Experience



Applications of MA/F Series

Food Packaging

The MA/F provides a highly efficient and high-quality solution for the plastics packaging products in the fast-moving consumer goods industry. With the maximum injection speed up to 500mm/s, our machinery can produce thinner, lighter products on a more consistent process. Such as fast food containers, beverage cups, ice cream boxes and disposable tableware, etc. Automated accessories such as product stacking, film packaging, printing and carton packaging are optional.

Pharmaceutical Packaging

For cylindrical products such as cups and medicine bottles, etc., accurate flow control is applied to ensure high quality standards.

Civil Product Packaging

In terms of thin-wall products with long flow length and even mixture, the MA/F can meet the requirements for shorter cycle and long-term continuous production, while ensuring the high degree of process stability. Application cases include buckets, flower pots, storage boxes, etc.

Logistics Packaging

We provide more efficient application solutions for price-sensitive market segments, such as cable ties.

Haitian MA/F Series

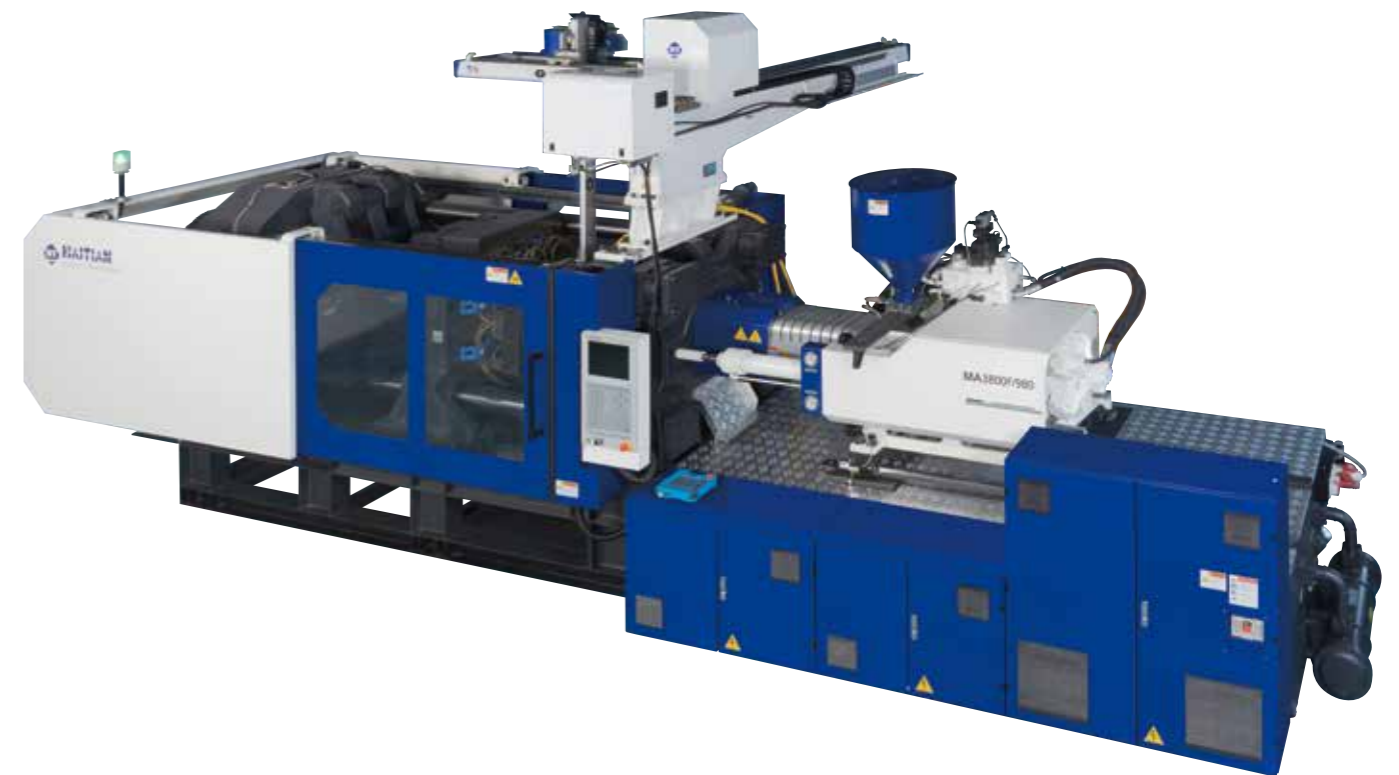
Injection Molding Machinery for Fast Cycle Applications

Industry Trends

For plastic products, customers expect a variety of choices, excellent quality and reasonable prices. In order to be competitive in the packaging industry, plastics manufacturers must achieve low costs and short cycle times while ensuring strict product quality standards.

Plastics packaging containers tend to be thin-walled to reduce cost and to meet environmental requirements. Therefore, faster injection speeds and mass production are the main characteristics of thin-wall plastic packaging. Haitian's persistent drive to optimize solutions in both mechanical engineering and forming technology enabled us to develop injection molding machinery with a higher cost to performance ratio in the packaging industry.

The Haitian MA/F Series is designed for fast cycle applications in the production of thin-walled containers. Engineered to achieve the dual benefits of high efficiency and low cost to bring customers more profits in their pursuit of precision, high-speed and repeatability. The high-speed MA/F series is widely used in various fields of packaging products, such as beverage cups, yogurt cups, ice cream boxes, lunch boxes, bowls, crisper, cutlery, bottle caps, mobile phone battery covers, medical packaging, etc. The excellent performance and versatility of the MA/F has proven itself across a wide range of packaging products and applications.



Advantages of MA/F Series

- Strong power
- Quick responsiveness
- Stable and controllable injection
- High rigidity clamping mechanism
- Special high efficiency screw
- Automation integration solution

Overview of the Whole Machine

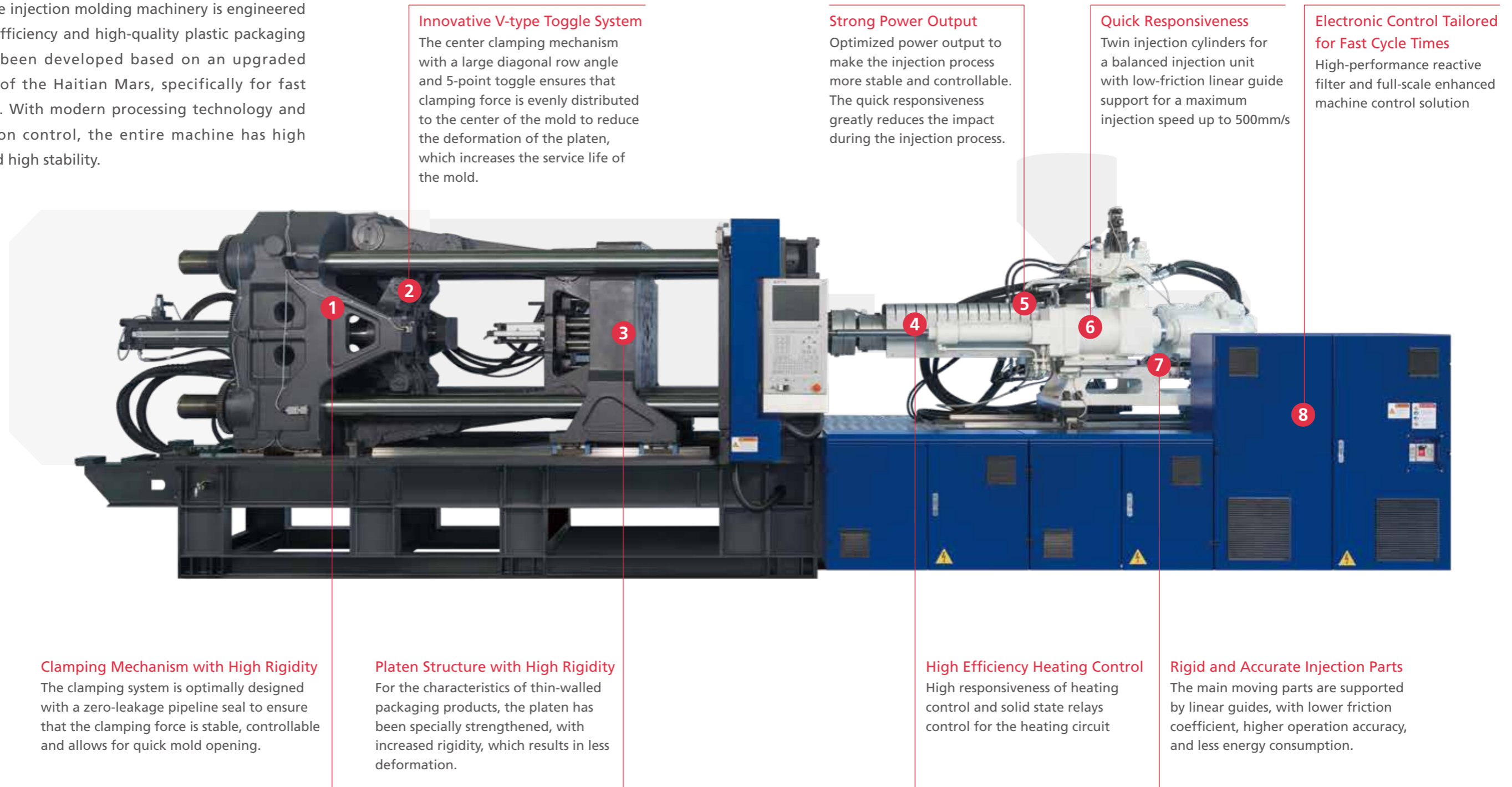
Excellent Performance

Haitian MA/F Series

Injection Molding Machinery for Fast Cycle Applications

Solutions for High-Speed Packaging Industry

The MA/F fast cycle injection molding machinery is engineered to produce high efficiency and high-quality plastic packaging products. It has been developed based on an upgraded design platform of the Haitian Mars, specifically for fast cycle applications. With modern processing technology and advanced injection control, the entire machine has high responsiveness and high stability.



Innovative V-type Toggle System

The center clamping mechanism with a large diagonal row angle and 5-point toggle ensures that clamping force is evenly distributed to the center of the mold to reduce the deformation of the platen, which increases the service life of the mold.

Strong Power Output

Optimized power output to make the injection process more stable and controllable. The quick responsiveness greatly reduces the impact during the injection process.

Quick Responsiveness

Twin injection cylinders for a balanced injection unit with low-friction linear guide support for a maximum injection speed up to 500mm/s

Electronic Control Tailored for Fast Cycle Times

High-performance reactive filter and full-scale enhanced machine control solution

Clamping Mechanism with High Rigidity

The clamping system is optimally designed with a zero-leakage pipeline seal to ensure that the clamping force is stable, controllable and allows for quick mold opening.

Platen Structure with High Rigidity

For the characteristics of thin-walled packaging products, the platen has been specially strengthened, with increased rigidity, which results in less deformation.

High Efficiency Heating Control

High responsiveness of heating control and solid state relays control for the heating circuit

Rigid and Accurate Injection Parts

The main moving parts are supported by linear guides, with lower friction coefficient, higher operation accuracy, and less energy consumption.

Clamping Unit

Reliable Toggle and High Efficiency

Haitian MA/F Series

Injection Molding Machinery for Fast Cycle Applications



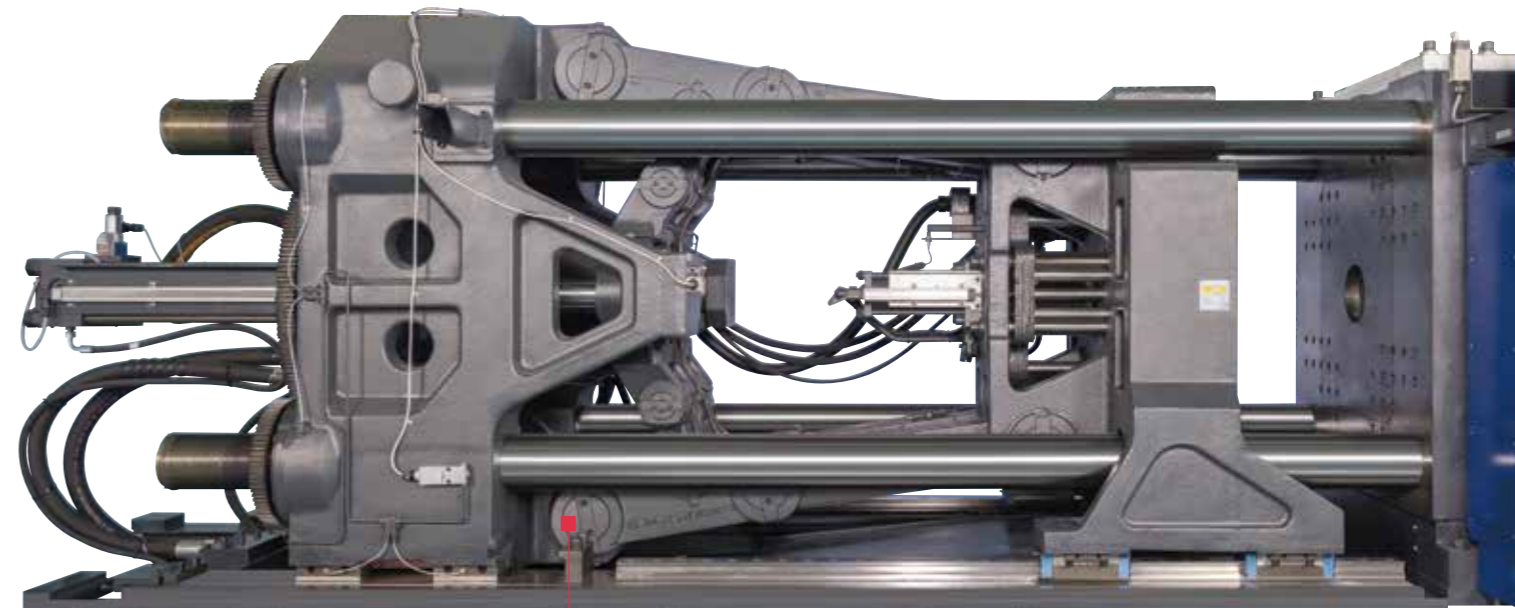
Figure ①
The customized special steel tie bar and reinforced safety design meet the requirements for fast cycle times and long life.

Figure ②
The high-precision proportional directional valve ensures stable and precise positioning of the platen.

Figure ③
The zero-leakage mold closing shut-off valve is used to maintain stable clamping force and establish sufficient hydraulic pressure which improves the capability of mold clamping.

Figure ④
The redesigned moving platen reduces clamping force deformation.

Figure ⑤
Low-friction linear guides ensure parallelism of the platen while reducing operating energy; The movable platen maintains its structure which enhances the rigidity and platen parallelism.



High Rigidity V-type Toggle Mechanism

The optimized clamping mechanism with diagonal row angles and 5-point toggle adopts the V-type toggle design which ensures the optimal force transmission at the center of the mold mounting area and improves the quick response of the mold opening and closing.



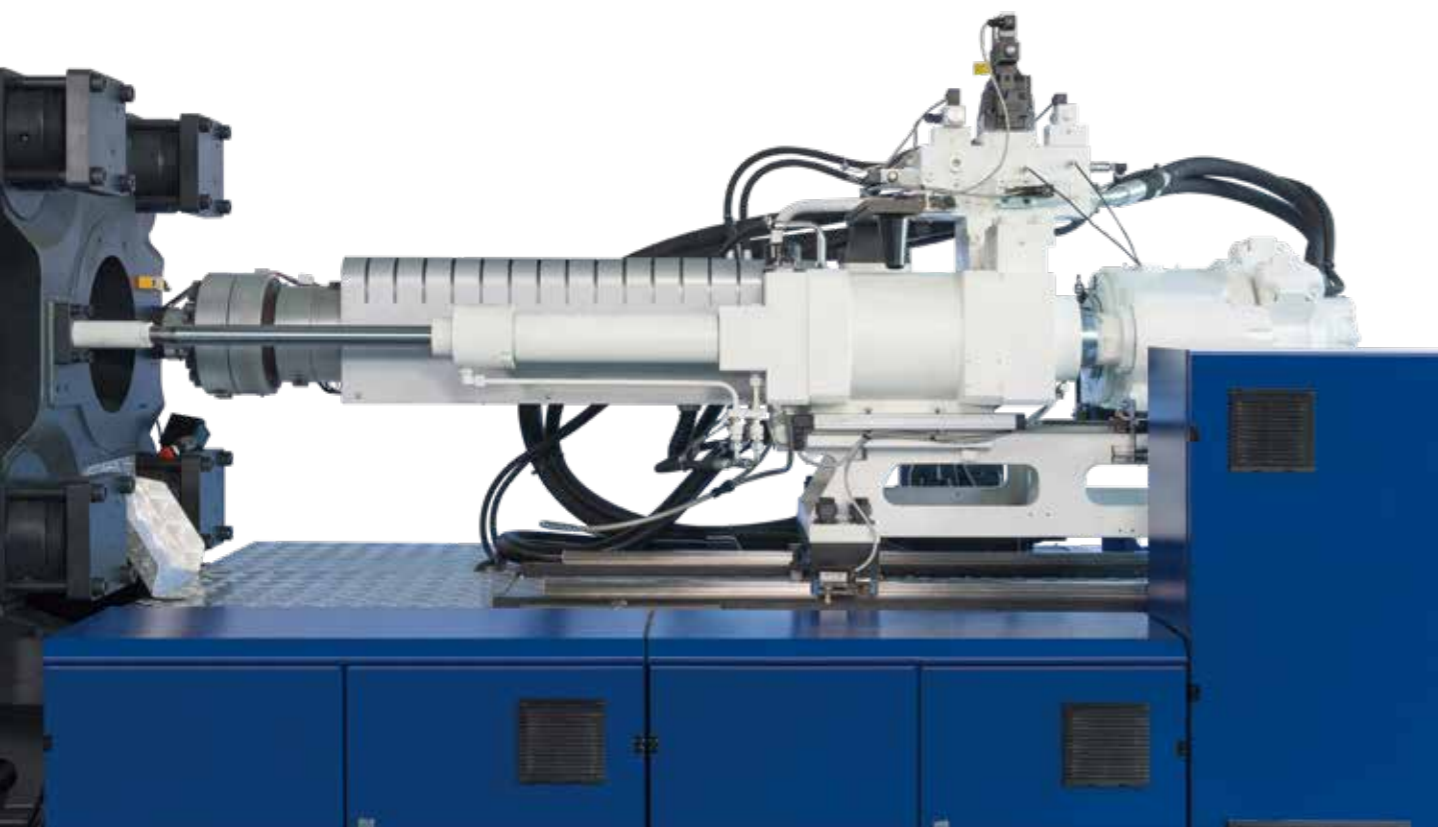
The use of the brass bushings greatly improves the lubrication between the toggle and the tie bars, which extends the service life of the parts and decreases the overall cost of ownership.

Injection Unit

High-Speed and High Response

Haitian MA/F Series

Injection Molding Machinery for Fast Cycle Applications



8 Optimum Design of Injection Unit

The twin-cylinder balanced injection unit is equipped with a low-resistance injection cylinder, excellent control system, reliable positioning accuracy, as well as high-speed and high response capabilities. In order to optimize the plasticizing system, a special screw with high plasticizing ability is used to ensure that the melt maintains high quality standards.

Figure①
Strengthened injection platform, reduces deformation during injection and improves the injection precision.

Figure②
Equipped with a precision by-pass filter, it can improve oil cleanliness, reduce the wear of hydraulic components and prolong the service life of hydraulic components.

Figure③
Ultra-high-speed, low-noise and high efficiency new internal gear pump demonstrates a strong output capability.

Figure④
Stable high-speed injection through dynamic balanced twin-cylinder, and linear guide rail support improves accuracy.

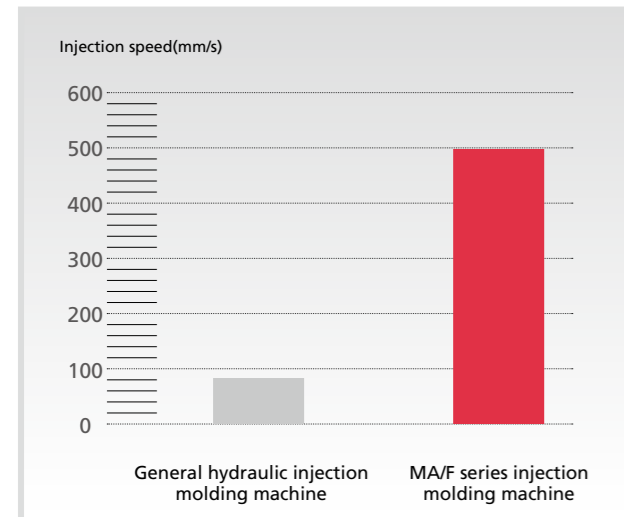
Data Analysis

Low Energy Consumption and High Performance

Haitian MA/F Series

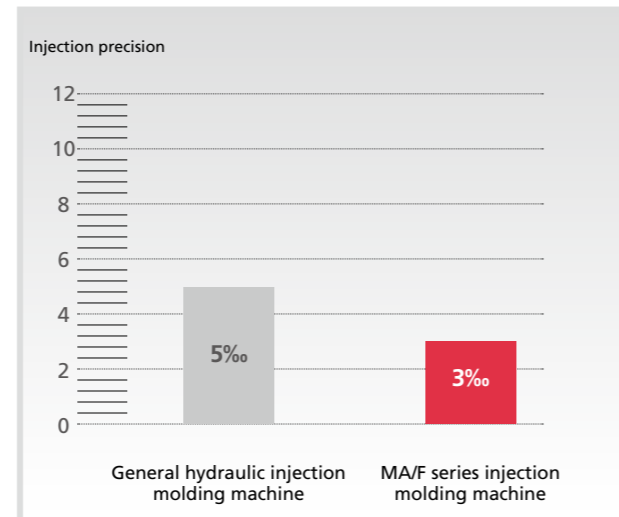
Injection Molding Machinery for Fast Cycle Applications

Comparison of Injection Speed



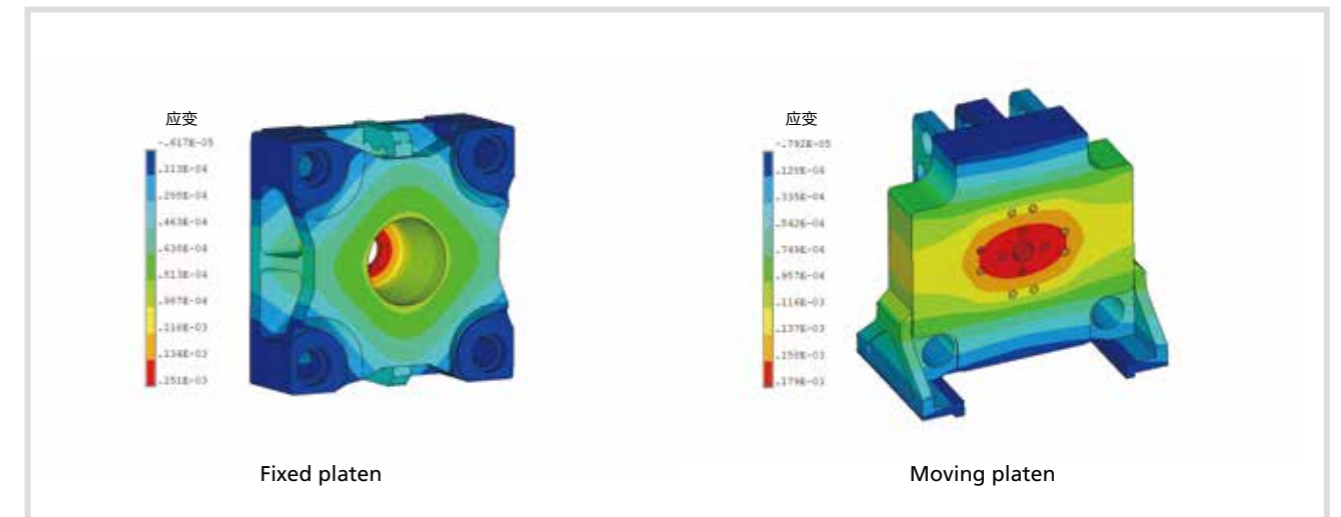
Supported by new servo motors and redesigned gear pumps, the maximum injection speed of the MA/F is more than 500 mm/s. Through optimized hydraulic output, the injection process is stable and controllable.

Comparison of Injection Repeatability



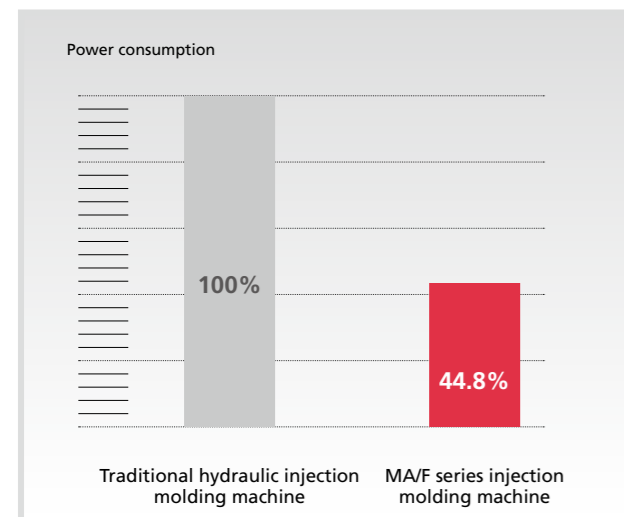
The precision characteristics of the servo motor is paired with that of the internal gear pump, and the closed loop is formed by a high sensitivity pressure feedback sensor. This allows injection repeatability to reach 3%. Compared to a traditional hydraulic circuit the injection stability with the servo motor and gear pump is greatly improved, and the yield rate is greatly enhanced.

Stress Analysis of Platen



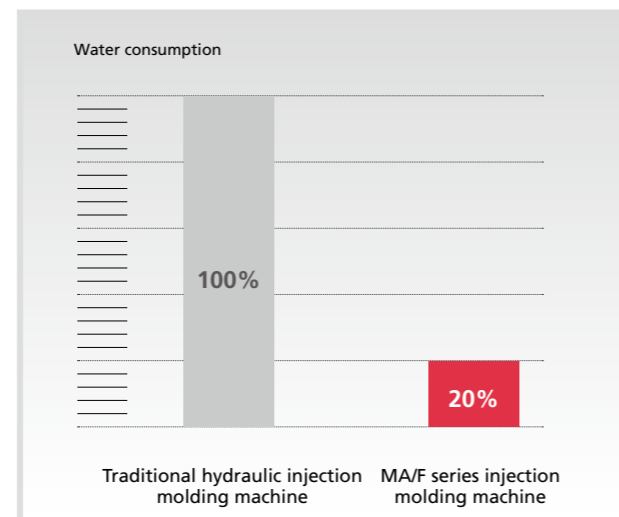
The newly designed platen is specially engineered for packaging products. The finite element software analysis shows that the average deformation is reduced by more than 30% compared to a normal hydraulic injection molding machine, effectively improving the precision of the products.

Comparison of Power Consumption



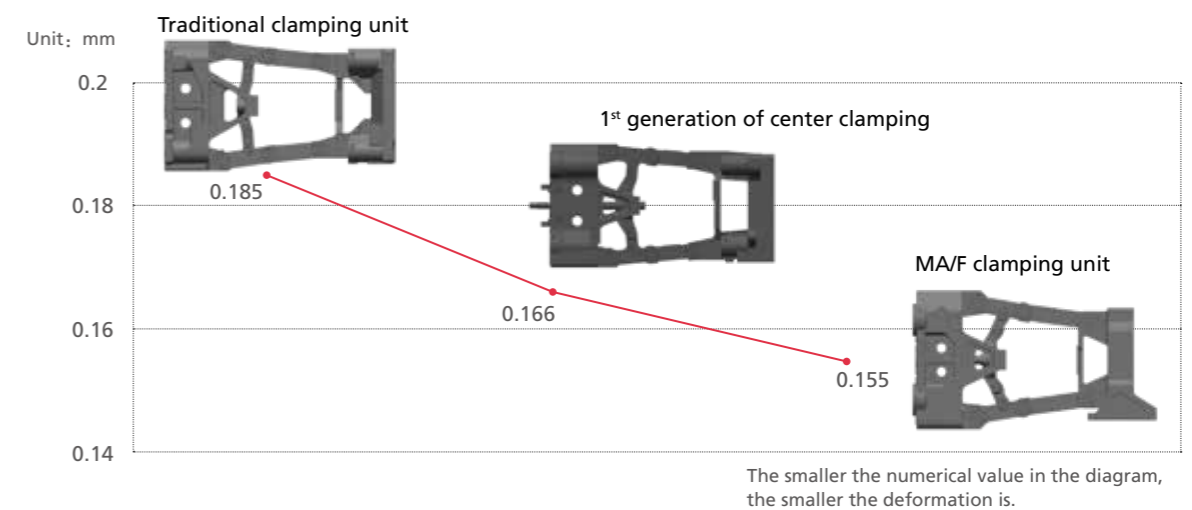
The MA/F adopts the 6th generation of servo control systems, which brings more energy-saving benefits, and compared to the traditional constant (standard) rate pump the energy-saving efficiency can be more than 50%.

Comparison of Water Consumption



The 6th generation of servo control system allows the servo motor to proportionally output hydraulic oil to avoid excess heat generation and ensures low temperature rise, therefore saving 20% - 80% of electricity compared to traditional injection molding machines.

Force Analysis of the Clamping Unit

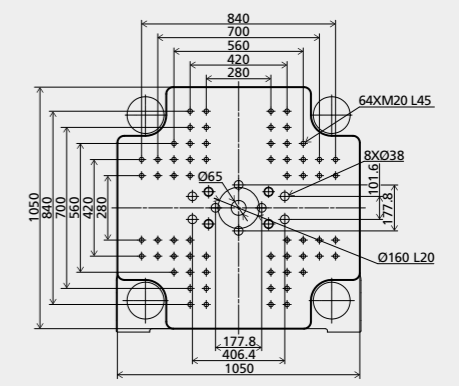
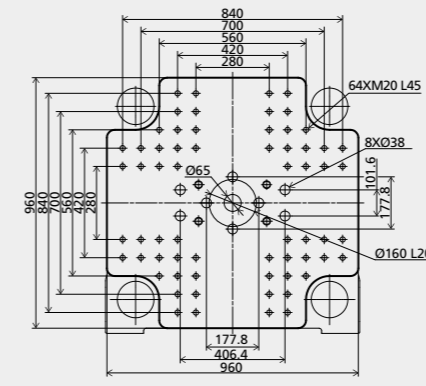
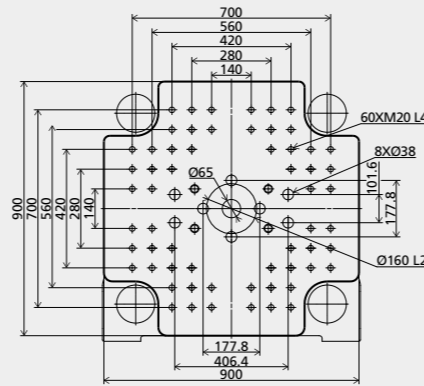
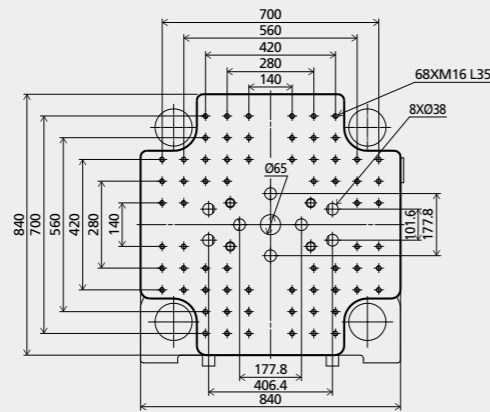


The design of the center clamping mechanism, large diagonal row angle and the high rigidity platen are adopted to control the deformation. The MA/F series has very small mechanical deformation and is suitable for thin-walled high-precision product molding.

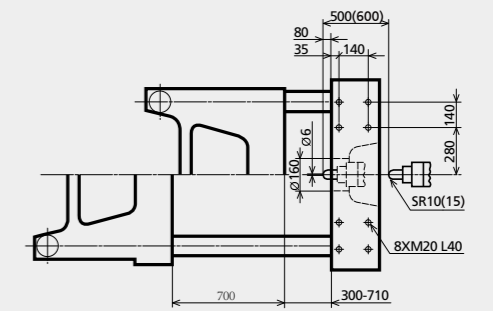
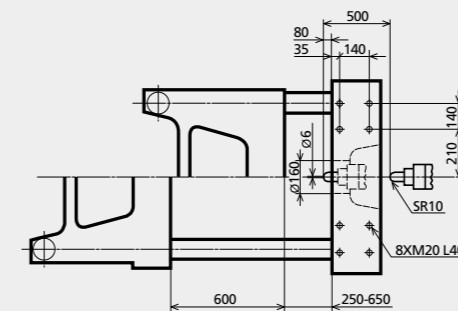
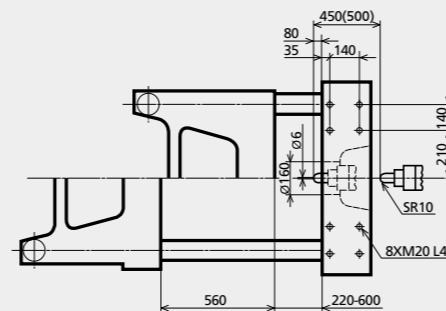
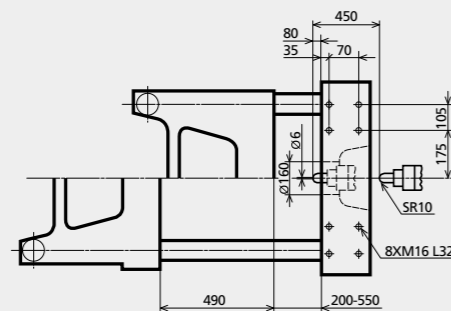
Technical Parameters 2100-3800kN

		MA2100F	MA2700F	MA3000F	MA3800F	
INJECTION UNIT		580	780	980	980	1280
Screw diameter	mm	45	50	55	55	60
Screw L/D ratio	L/D	25	25	25	25	25
Injection volume (theoretical)	cm ³	334	471	617	471	617
Injection weight (PS)	g	304	429	562	429	562
Injection pressure	MPa	168	162	161	162	161
Plasticizing rate (HDPE) ①	g/s	51.5	63.7	80.6	63.7	80.6
Injection rate (PS)	g/s	723	916	1092	916	1092
Injection speed	mm/s	500	500	500	500	500
Screw speed	rpm	0-300	0-300	0-300	0-300	0-280
CLAMPING UNIT						
Clamping force	kN	2100	2700	3000	3800	
Mold movement stroke	mm	490	560	600	700	
Dist. between tie bars (HxV)	mm	520x520	560x560	620x620	670x670	
Mold height min	mm	200	220	250	300	
Mold height max	mm	550	600	650	710	
Ejection stroke	mm	120	150	150	160	
Ejector tonnage	kN	62	62	62	110	
OTHERS						
System pressure	MPa	21	21	21	21	
Pump motor power	kW	77	48+48	57.7+57.7	48+48	57.7+57.7
Heater power	kW	25	29	40	29	40
Oil tank	l	660	675	675	675	675
Machine dimension (LxWxH)	m	7.3x1.92x2.4	7.65x1.92x2.46	7.93x1.92x2.47	8.23x1.92x2.50	
Machine weight	t	10	12	15	18	

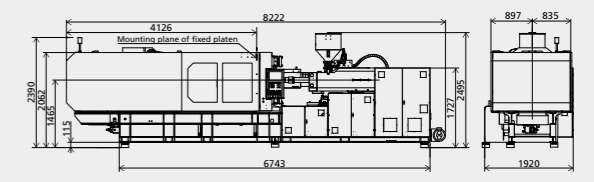
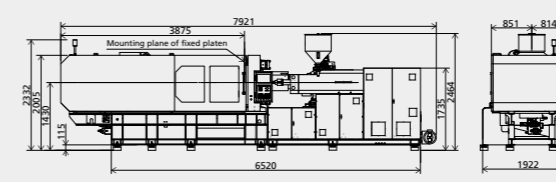
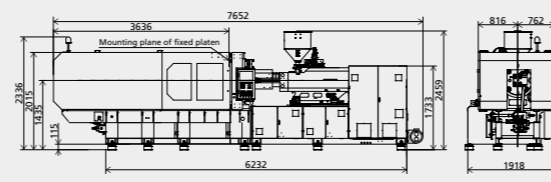
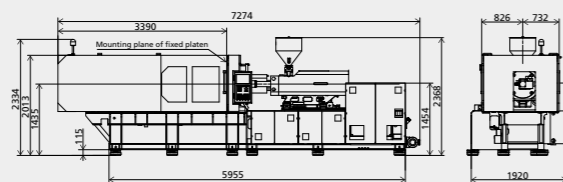
Platen dimensions



Platen dimensions ②



Machine dimensions ②



Note:

① Plasticizing capacity (HDPE): Equipped with plasticizing components of standard packaging machine, tested according to Euromap 19.

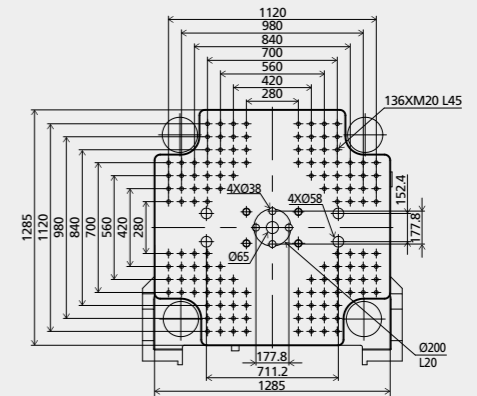
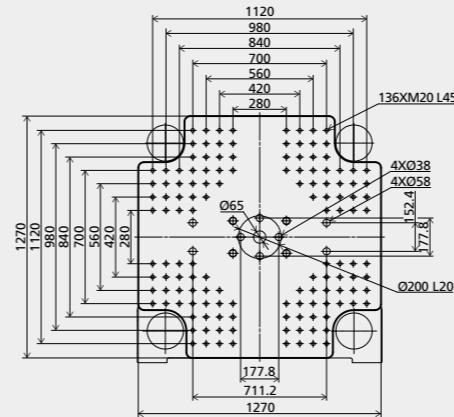
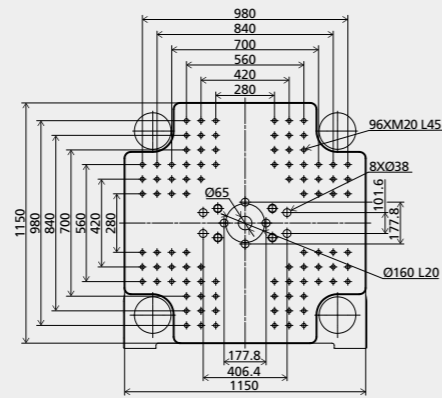
② Value in "()" is the size of bigger injection unit.

The Company reserves the right to modify technical parameters without prior notice.

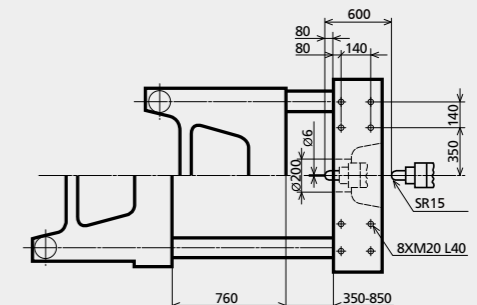
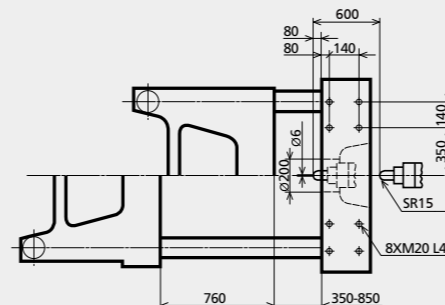
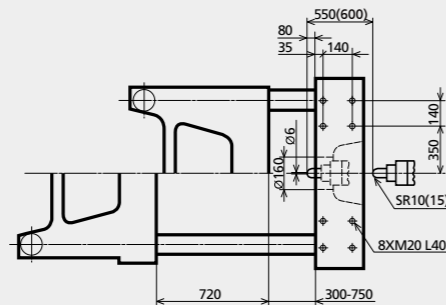
Technical Parameters 4500-6500kN

		MA4500F		MA5500F		MA6500F
INJECTION UNIT						
INJECTION UNIT		980	1280	1280	1680	2500
Screw diameter	mm	55	60	60	65	70
Screw L/D ratio	L/D	25	25	25	25	25
Injection volume (theoretical)	cm ³	617	791	791	1068	1239
Injection weight (PS)	g	562	720	720	972	1127
Injection pressure	MPa	161	160	160	159	204
Plasticizing rate (HDPE) ①	g/s	80.6	102.7	102.7	120	151.9
Injection rate (PS)	g/s	1092	1241	1241	1538	1751
Injection speed	mm/s	500	500	500	500	500
Screw speed	rpm	0-300	0-280	0-280	0-250	0-245
CLAMPING UNIT						
Clamping force	kN	4500		5500		6500
Mold movement stroke	mm	720		760		760
Dist. between tie bars (HxV)	mm	730x730		820x820		820x820
Mold height min	mm	300		350		350
Mold height max	mm	750		850		850
Ejection stroke	mm	160		180		180
Ejector tonnage	kN	110		158		158
OTHERS						
System pressure	MPa	21		21		21
Pump motor power	kW	57.7+57.7	57.7+57.7	57.7+57.7	77+77	77+77+77
Heater power	kW	40		40		51
Oil tank	l	825		960		1025
Machine dimension (LxWxH)	m	8.66x2.01x2.54		9.37x2.05x2.65		10.0x2.3x2.6
Machine weight	t	22		27		31

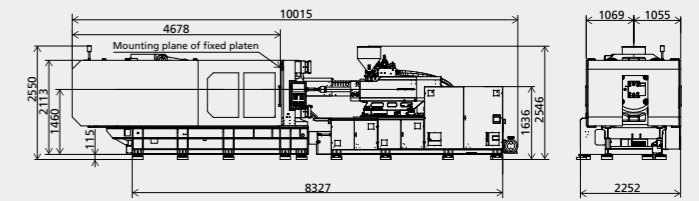
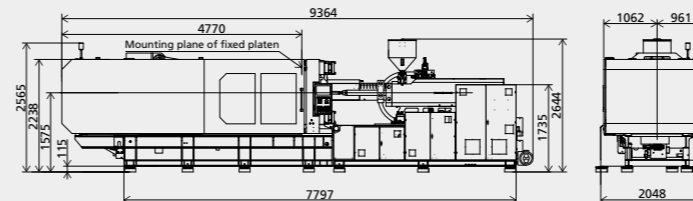
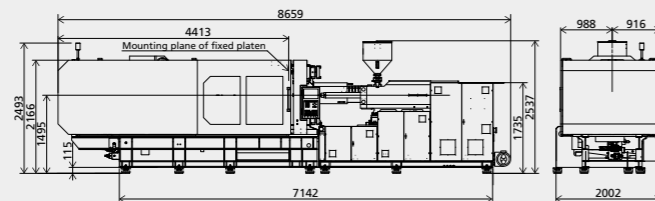
Platen dimensions



Platen dimensions ②



Machine dimensions ②



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