Electric injection molding machine, achieves high-quality molding and high productivity

FANUC ROBOSHOT S-2000*i*

15B/30B
50B/50BP/100B/100BH
150B/250B/300B

Electric injection molding machine, achieves high quality molding and high productivity

FANUC ROBOSHOT S-2000*i*B series

High-quality and stable molding

Backflow monitor and precise metering
Highly rigid mechanism and latest control technologies
Online pass/fail judgment by robot and vision system

Energy saving and High productivity

Power source regeneration reuses energy
AI mold protection supports clamp close/open

Safety and Superior operability

Ejector with brake
Easy operating condition setting

Ultra thin wall molding and Ultra precision molding

Ultra high speed injection (1,000 mm/s) S-2000*i*100BH
Ultra high precision clamping S-2000*i*50BP

Networking in molding factory

MOLD24*i* of quality management system
Resin characteristic evaluation system


S-2000*i*15B


S-2000*i*30B


S-2000*i*50B


S-2000*i*100B

●High-performance, reliable FANUC CNC and servo control


Newest high-performance CNC
FANUC Series 310*i*s-MODEL A


FANUC AC SERVO MOTOR α*i* series
FANUC SERVO AMPLIFIER α*i* series

●ROBOSHOT

Over 30,000 units shipped (1984～)


S-2000*i*50BP


S-2000*i*100BH


S-2000*i*150B


S-2000*i*250B

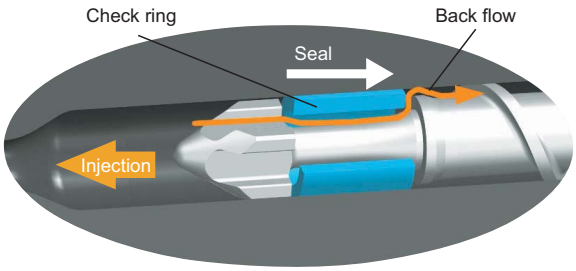

S-2000*i*300B

∗The photos show machine with options.
∗The outer view differs in region.

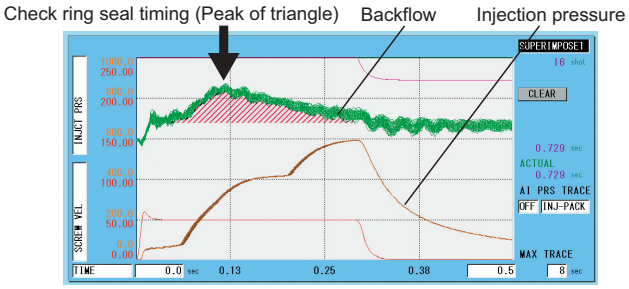
High-quality and stable molding

Backflow monitor displays sealing of check ring and state of wear

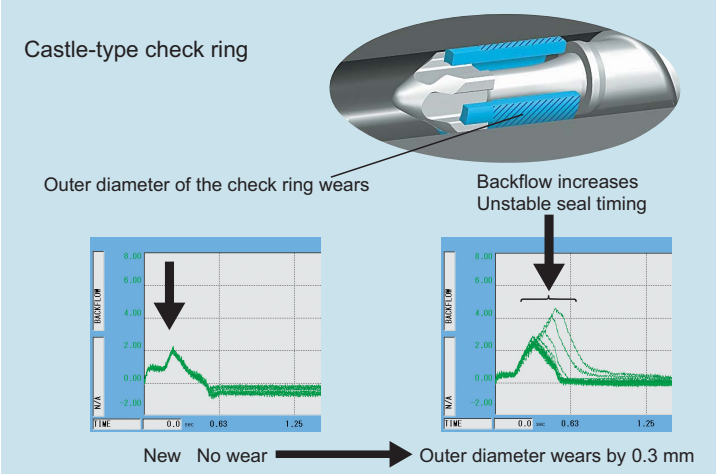
Slight resin backflow occurs until the check ring seals just after the injection start.
The backflow monitor is an epoch-making new function that enables the confirmation of the check ring seal timing or the state of wear, which is not possible with the injection pressure waveform.
The optimum injection parameter adjustment is enabled by checking injection stability by overlapping the waveform.

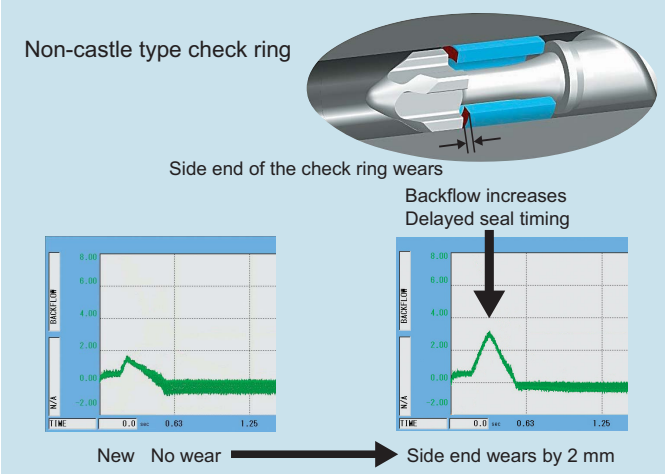


Backflow immediately after injection start



Backflow monitor



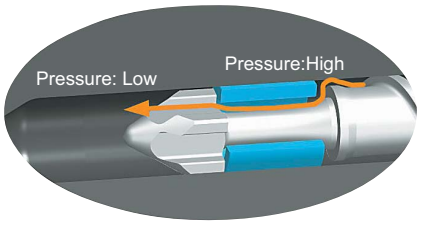


Precise metering prevents stringing and silver streaking and improves injection stability

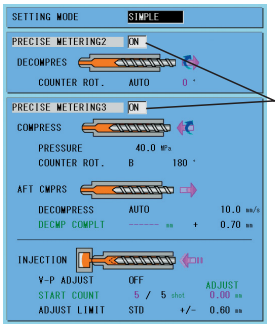
After the metering process, the resin flows to the front of the screw due to the pressure difference between the front and rear of the check ring. (Front flow)

The front flow can lead to stringing or parts weight variance.
Precise metering is a stable molding technology that resolves these problems.

With switching ON/OFF on the special screen, this feature can be enabled easily. (Simple setting mode)



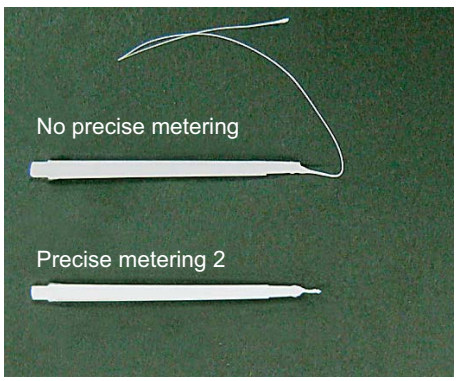
Front flow after metering process



Precise metering screen

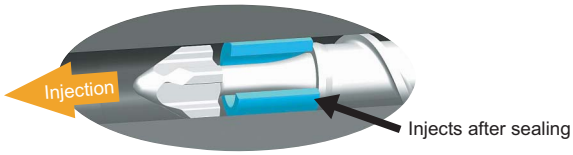
●Precise metering 2

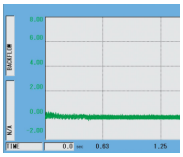
The optimum automatic suck back is performed so that it eliminates pressure error between front and rear of the check ring, therefore it prevents string and silver streaking.

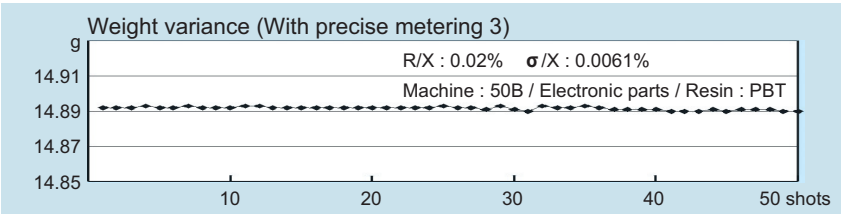


●Precise metering 3

Seals the check ring prior to the start of injection, thus eliminating backflow and making the injection volume stable.



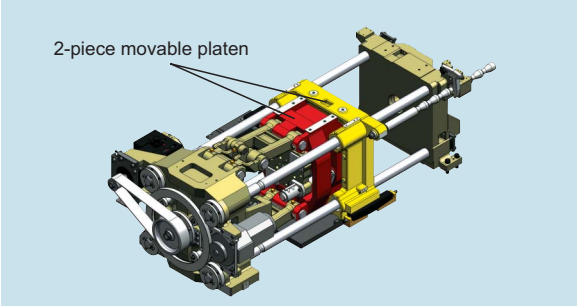

No backflow

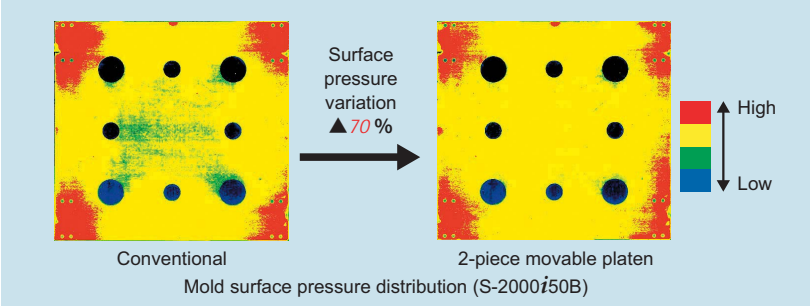


Highly rigid mechanism and latest control technologies support stable molding

● Highly rigid 2-piece wide platen

A 2-piece movable platen concentrates the clamping force into the center of the platen. This reduces the deformation of the platen and makes the mold surface pressure uniform. Furthermore, this prevents flashing or shorting, reduces parts thickness variance and extends the mold life. The horizontal tie-bar spacing can be extended, and a one-size larger mold can be installed.



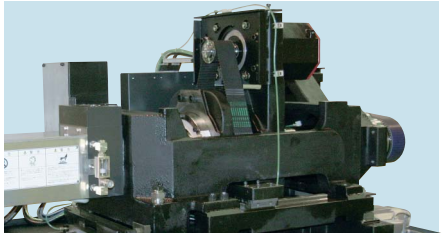


Mold surface pressure distribution (S-2000*i*50B)

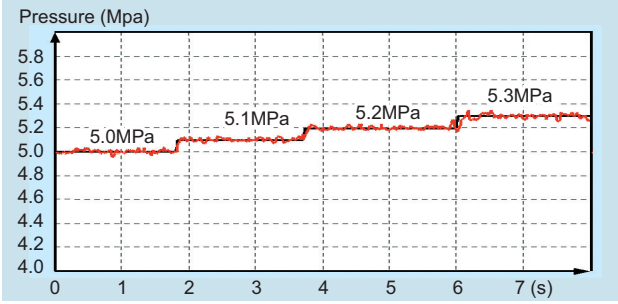
● High-precision pressure control in 0.1-MPa steps

The 15B thru 100B models adopt a highly rigid integrated cast structure and low-friction linear guide. These models offer a smooth injection and metering motion. Furthermore, highly precise pressure control in 0.1-MPa steps is available through the use of a lower noise pressure sensor in the newly developed digital loadcell.

Directly coupled motor
Option for 15B/30B/50B/100B



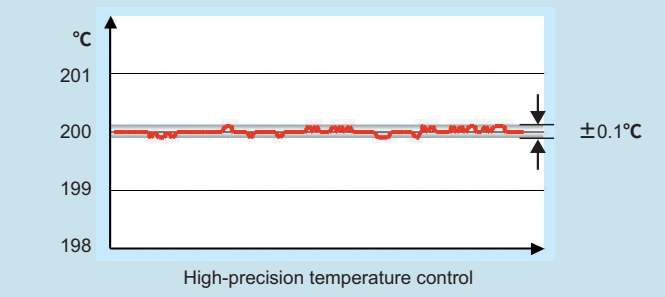
Highly rigid and low-friction mechanical injection unit



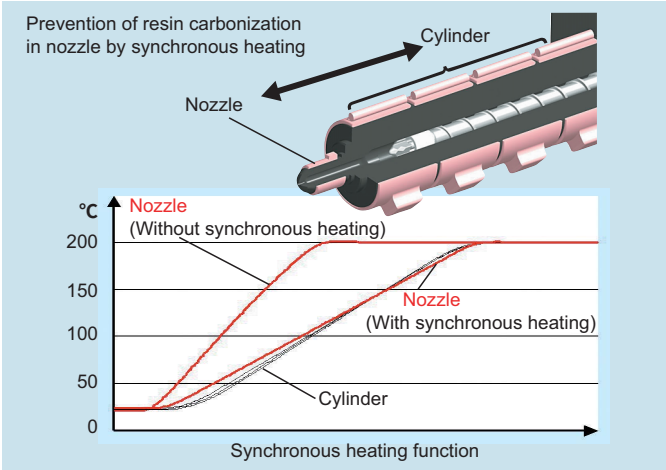
High-precision • High-resolution pressure control (In metering)

● High-precision temperature control in +/-0.1℃ steps and synchronous heating

The heater temperature is precisely controlled in +/- 0.1℃ steps to enable stable plasticizing.
Synchronous heating increases the nozzle and cylinder temperature at the same time to prevent carbonization of the resin in the nozzle during heating.



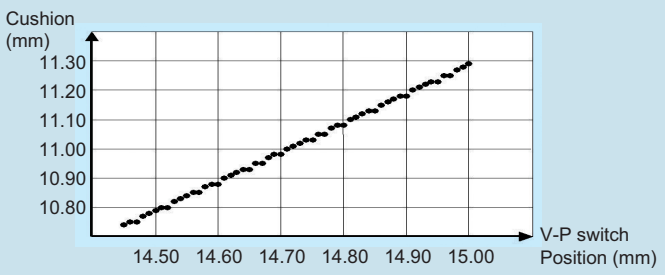
High-precision temperature control



Synchronous heating function

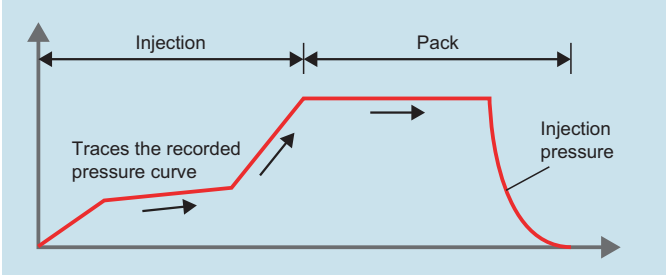
● High-precision V-P switching to stable volume

Injection to the pack switching position is precisely controlled in units of 0.01 mm. The fine injection volume tuning enables stable molding during high-precision parts molding such as that for fine-pitch connectors.



● Enhanced AI pressure profile trace control

Trace accuracy relative to the reference pressure curve for good parts molding is improved. It can be applied to high-speed injection. Cavity pressure trace control (Option) is also available.

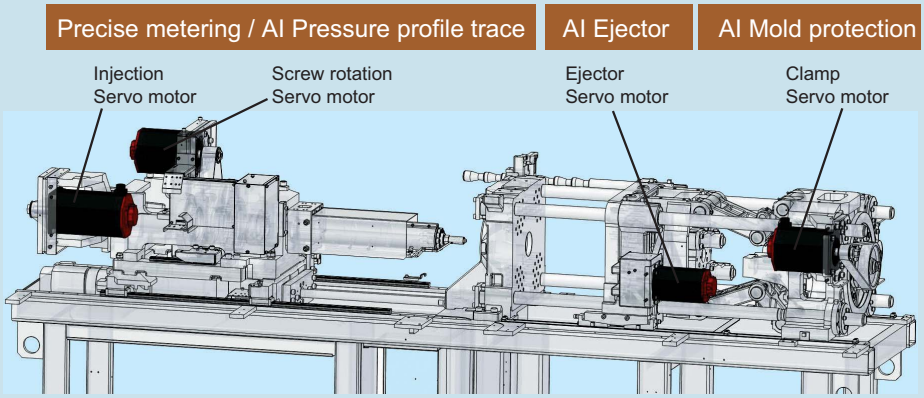


Energy-saving snd High-productivity

Adoption of high-performance servo technology

FANUC servo motors and amplifiers perform as “energy generators for power source regeneration” and “sensitive sensors” as well as the drivers of the ROBOSHOT.

High-performance servo motors and amplifiers αi series

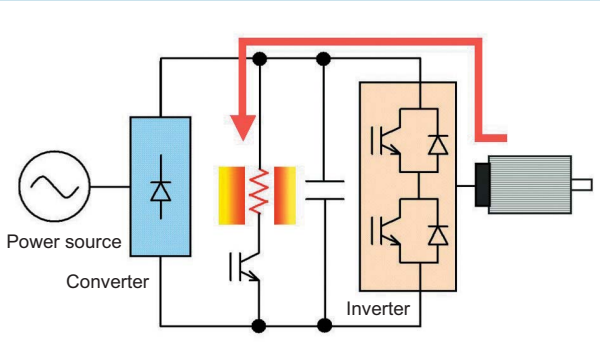


Energy saving by power source regeneration

FANUC’s regeneration servo technology reuses the energy generated during motor deceleration. Furthermore, the elastic strain energy released when tie bars are extended is also reused.
The energy is effectively used for the heater and control unit, such that each ROBOSHOT model offers excellent energy saving.

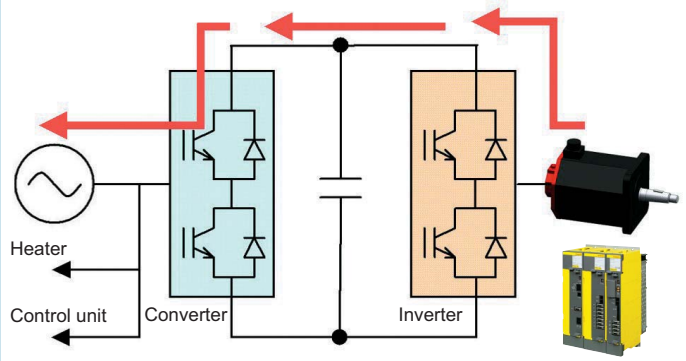
No regeneration

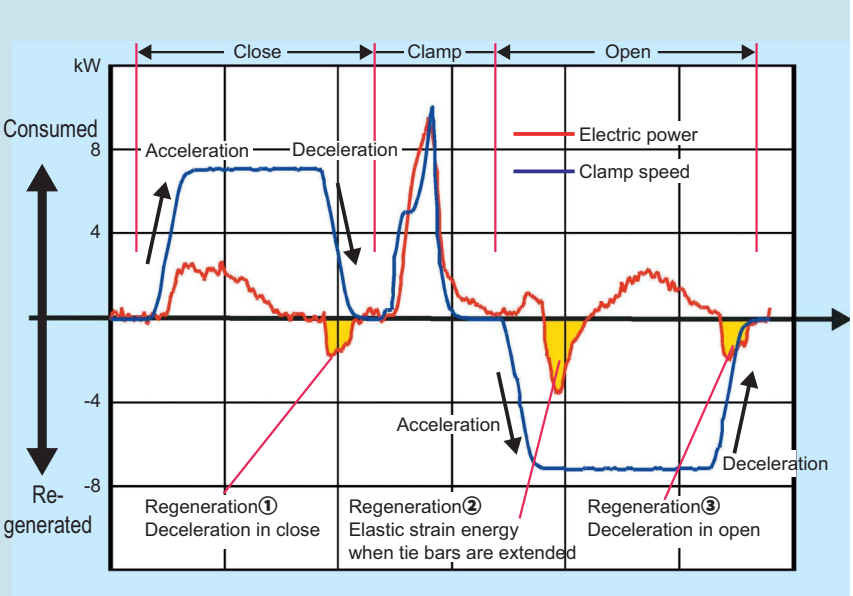
Returned energy is consumed by resistance



Regeneration

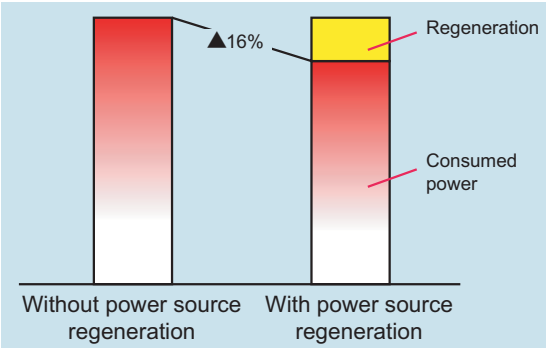
Returned energy is reused for heater or control unit

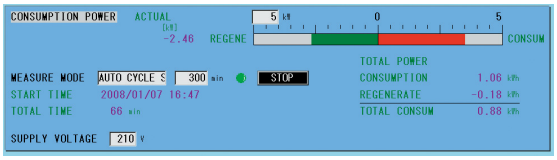




Power consumed during clamp open/close (100-t)

16% energy saving is achieved at clamp open/close on a 100-t machine with regeneration, compared to a machine with no regeneration.





Power consumption monitor

Consumed and regenerated power can be confirmed

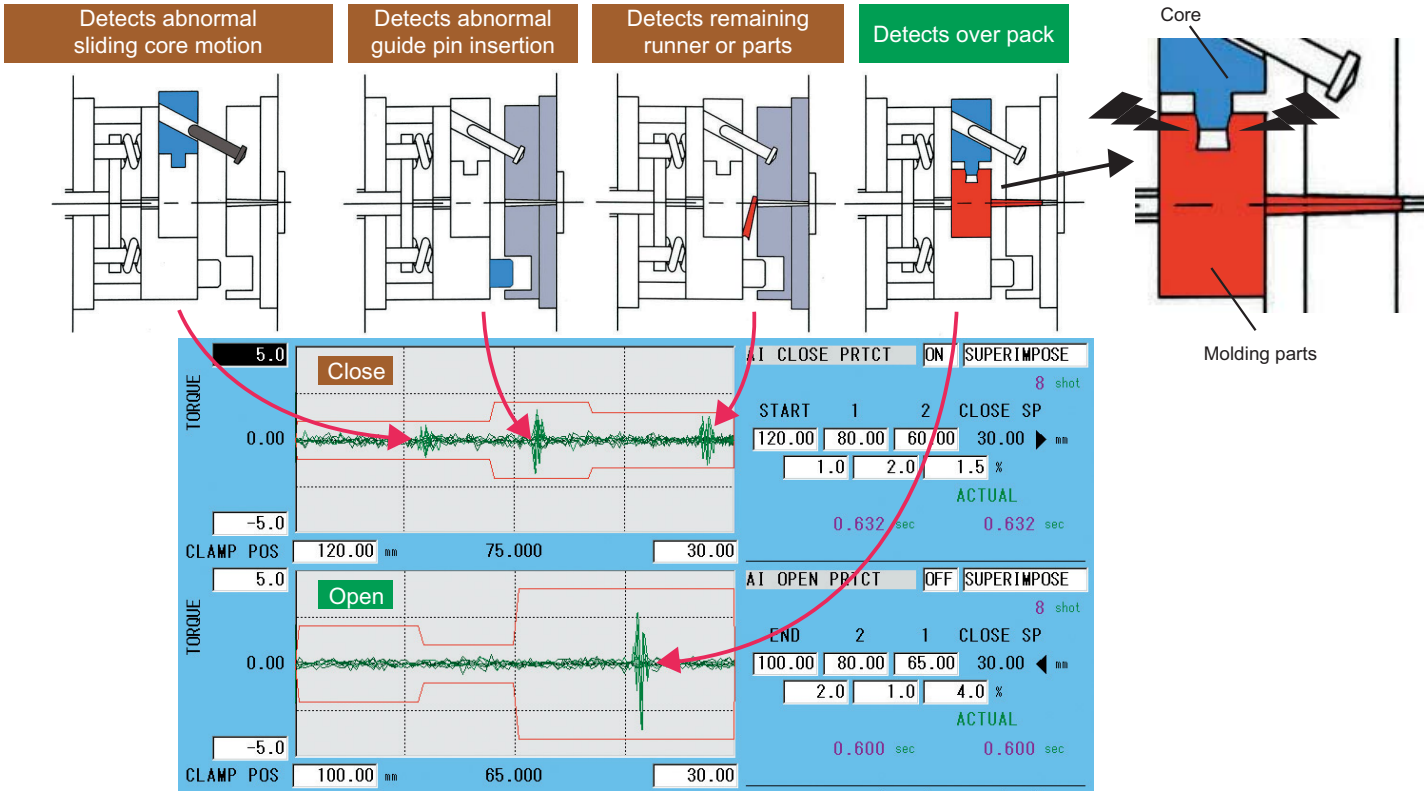
AI mold protection and AI ejector to protect mold and improve productivity

● AI mold protection in clamp close and open

A monitor level setting of the 3 independent close sections and 3 open sections is provided. The clamping motion stops immediately if an abnormal load is detected to protect the mold from damage.
The monitor section and the level can be set easily while observing the mold open distance.

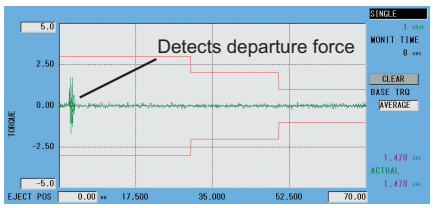

AI mold protection


Normal mold protection



● AI Ejector

Detects the departure force at parts ejection. The ejector motion stops immediately if an abnormal load is detected. This feature can protect the ejector pin from damage and can also be used with the parts quality monitor.



AI ejector screen

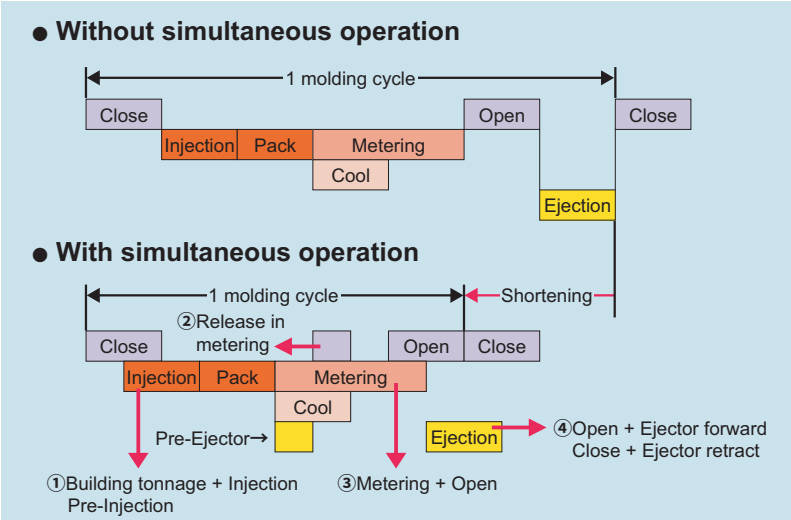
Simultaneous operation for shorter cycle time

● Pre-Injection

Simultaneous clamp closing and injection enables a shorter cycle time. By starting injection before building up tonnage, the pre-injection improves the gas venting .
Furthermore, injection compression is available which enables the setting of a maximum of 6 clamp position and speed steps.

● Pre-Ejector

The pre-ejector performs in-mold de-gating by advancing the ejector while the clamp is closed.
Precise ejector motion and timing eliminates mold damage.
In addition, core compression is available which allows the setting of a maximum of 6 speed steps and 4 ejection force steps. (Option)

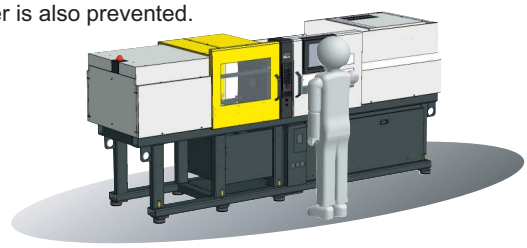


Safety and Superior operability

Safety cover / Ejector with brake

●Safety cover protects operator

Contact with all moving parts is prevented by safety covers, including covers for the clamping and injection units.
Accidental contact with high-temperature parts around the heater is also prevented.

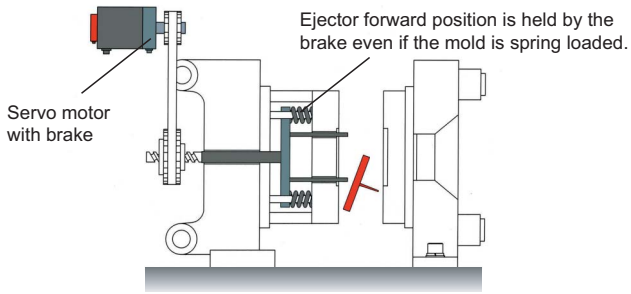


●CE mark for EU countries

The machines for EU countries comply European safety regulation (CE mark).

●Ejector with brake

A servo motor with a brake is installed in the ejector mechanism as a standard feature. The ejector position is held even during the emergency stop state or power cut state. There is no cutting danger while the safety door is open.

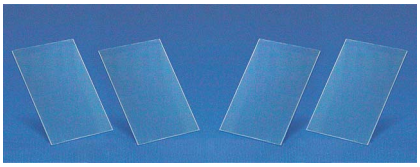


Application to a range of molding fields

Ultra thin wall molding

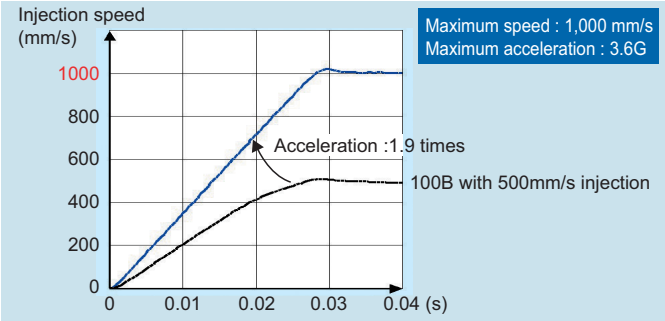
●Ultra high speed injection (1,000 mm/s) S-2000*i*100BH

By incorporating the newly developed high-power servo motor into the injection unit, a 1,000-mm/s injection speed and 3.6-G acceleration can be achieved. An ultra high speed injection molding machine with a clamping force of 100 tons can realize stable high-speed filling.



Cellular phone light guide panel
Thickness : 0.25 mm
Cavities : 4
Resin : Polycarbonate

Ultra high speed injection (1,000 mm/s) S-2000*i*100BH



●Newest control for stable thin wall molding

"FFF control", which increases the injection acceleration ability instantaneously, and "HR control" which enables the selection of the injection to pack pressure response characteristic can be set to one of 8 standard modes. The molding of a thin-wall light guide panel is achieved with no shortages or warpage. In addition, a "high filling mode" enables the temporary increase in the maximum injection pressure when a high-pressure resistance cylinder is installed.

Precise connector molding

●Special nozzle for liquid crystal polymer

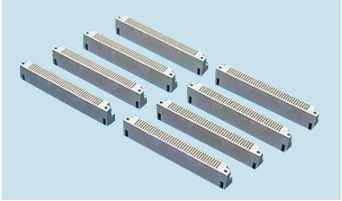
Prevents stringing, stabilizes sprue brakes, and prevents material adhesion.
Improves molding stability and reduces the generation of carbonized objects.

●Constant acceleration eliminates burning or shortage

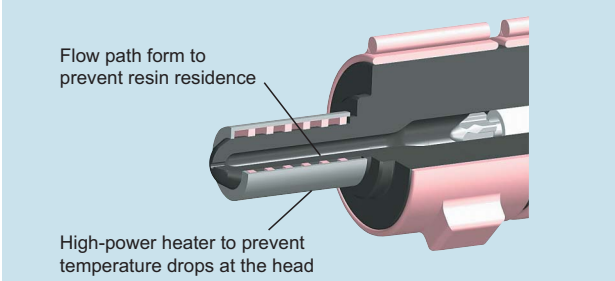
A low- to middle-range injection speed is used for precise connector molding to prevent burning or bubbling.
Constant acceleration prevents short shots by sharp acceleration at low- to middle-range speeds

●Full functions ensure stable molding and prevent carbonization

Precise metering control for stable metering, an AI Ejector for preventing mold pin damage and synchronous heating for preventing resin carbonization or degrading are provided as standard features.



Precise fine-pitch connector
Resin : Liquid Crystal Polymer

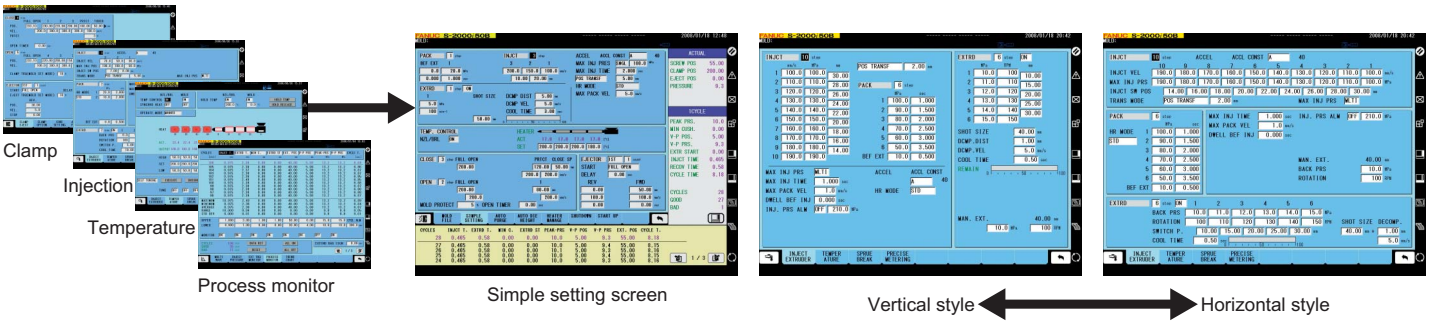


Special nozzle for Liquid Crystal Polymer

Large 15-inch LCD with superior operability

On the simple setting screen, the clamping, injection, temperature and process monitor screens are integrated into a single screen.

Vertical style and horizontal style screen layouts can be switched by a single button.



Supports multiple languages (Switched by a single-button operation)

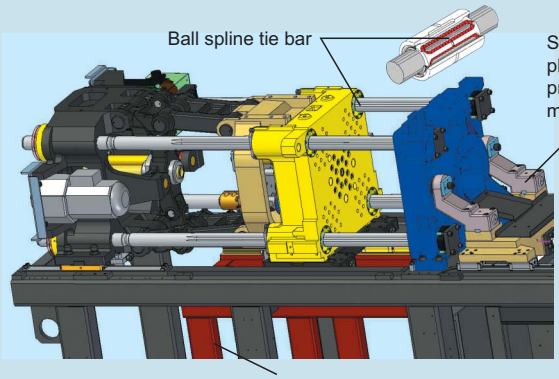
Japanese/ English/ Chinese/ Korean/ German/ French/ Spanish/ Portuguese/ Italian/ Finnish/ Czech

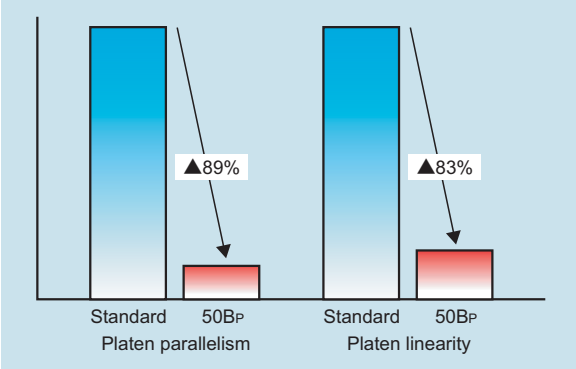
Lens molding

●Ultra high precision clamping S-2000*i*50BP

The ball spline tie bar, auxiliary base with linear guide, and stationary platen bending prevention mechanism achieve high-precision clamp open/close accuracy (parallelism and linearity) as required for lens molding.

DVD pick up lens
Resin : COP





Automotive parts molding

●Shorter setup time

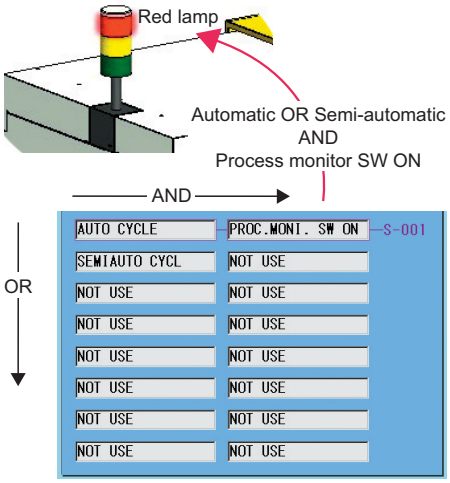
Simultaneous auto die height adjustment and auto purge (Standard)
Automatic start up function (Option) / Automatic clamping system interface (Option)
Magnetic clamping system interface (Option)
Hot runner communication function (Option)

●Preventing operation mistakes

Resin residence prevention (Standard) / Last change log (Standard)
Custom signal (Standard)

●Custom signal, Custom core

Signal combination by OR or AND including 135 input signals from auxiliary or mold, and 356 output signals such as clamp open or injection start enables auxiliary or core motion programming.



Mis-setting prevention on process monitor switch by the custom signal

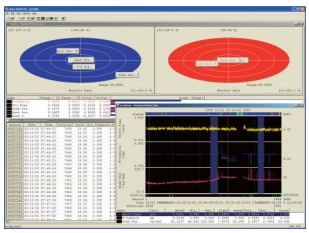
＊The available option differs in region.

Networking in molding factory

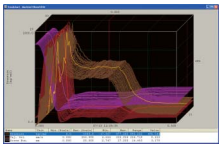
Quality management system MOLD24*i* (Option)

● MOLD MONITOR

Molding monitor data (40 items or more) for up to 1,200,000 shots can be analyzed instantaneously. Molding failure analysis is available quickly by the "Quality radar" which enables the visual monitoring of data variance. Pressure and speed curve display in three dimensions enables the detailed checking of stability.



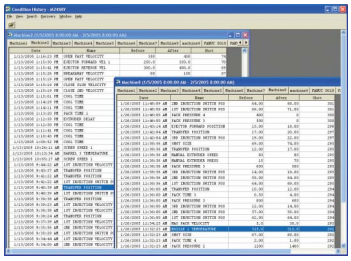
Quality radar



3D waveform display

● Last change log

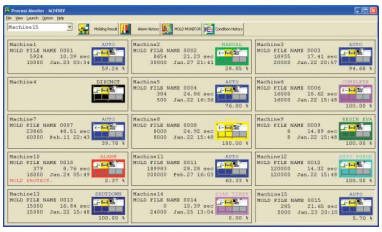
The times at which the molding parameters are changed and the parameters before/after the change can be checked.



Last change log

● Process monitor

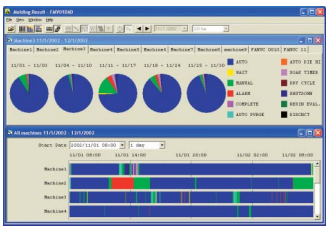
The operation state of the machines can be understood at a glance.



Process monitor

● Operation results tally and Analysis

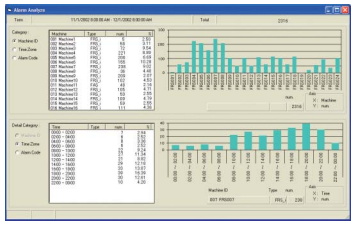
Operation results are tallied per shift or per month. The operating efficiency and operating time can be analyzed in detail.



Operation results

● Alarm analysis

Alarms per machine, time zone or type is analyzed to improve the operating efficiency.

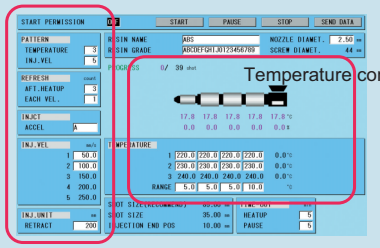


Alarm analysis

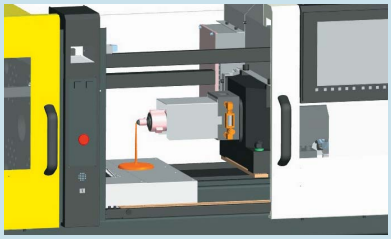
Resin characteristic evaluation system (Option)

By using the ROBOSHOT as a measuring instrument and the MOLD24*i* as a data collection and analysis unit, it is possible to measure the resin characteristic. It is possible to analyze molding problems that can be attributed to the resin, such as variations between resin lots, influence of the color pellets and the difference between recycled and virgin materials. The results can be used as customer's database.

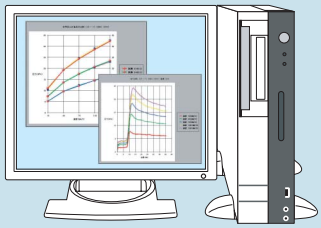
Air shot condition



Measuring parameter setup on ROBOSHOT



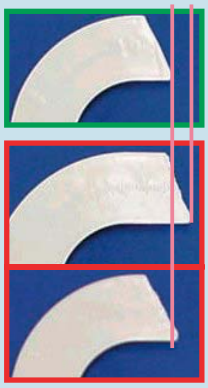
Measures pressure in air shot automatically
(3 temperature parameters, 5 speed parameters)



Automatic data collection and analysis on MOLD24*i*

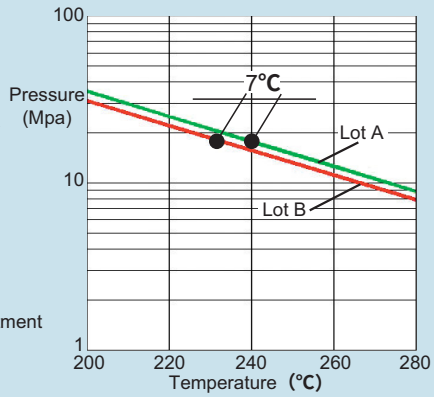
Lot A

Lot B



Temperature 240℃
Extension + 8mm

Temperature adjustment
▲7℃

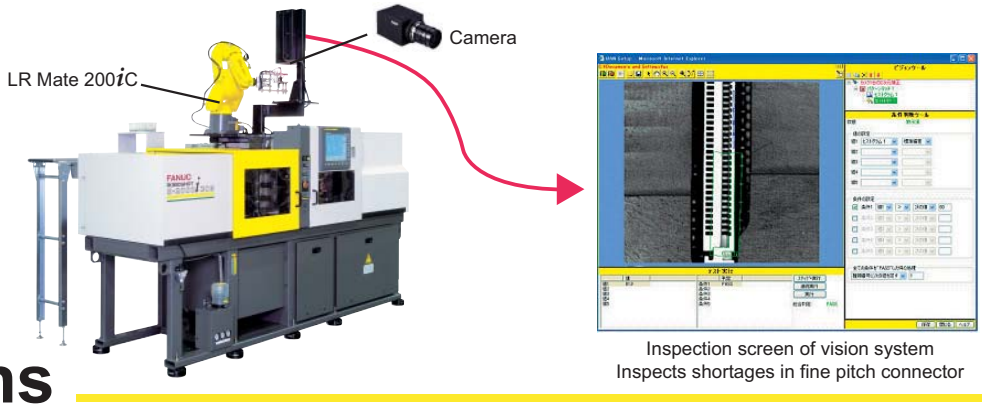


Example of verification that parts length in different lots is equal by adjusting the temperature which was led by the resin characteristic evaluation system

Robot-based automatic molding system

Automatic all molding parts inspection system using robot and vision system

By combining the versatile LR Mate 200*i*C intelligent mini robot and optional vision system, automatic all molding parts inspection can be realized. The vision system detects slightly short shots during the molding cycle and performs pass/fail judgment immediately.



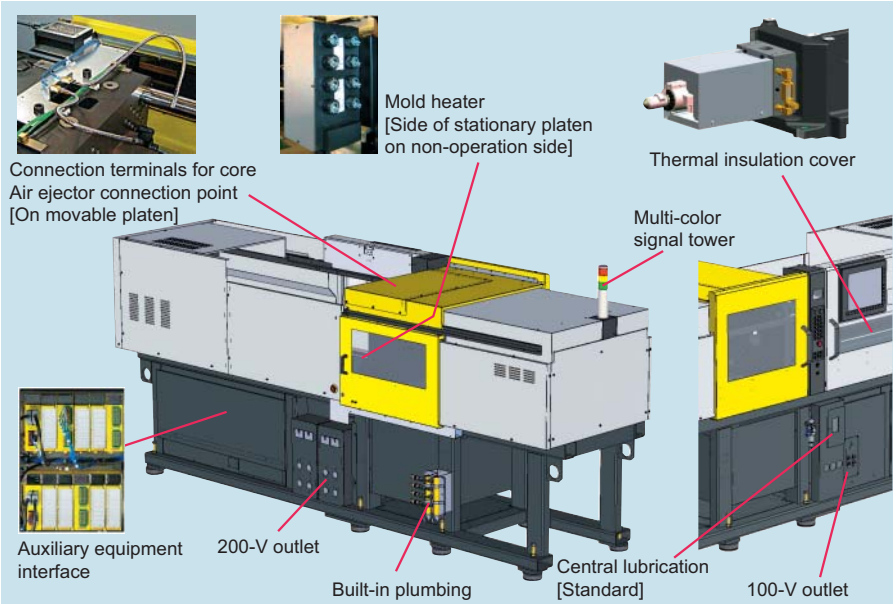
Inspection screen of vision system
Inspects shortages in fine pitch connector

Options

● **Screw, cylinder and nozzle**

It is possible to select the optimum screw, cylinder and nozzle according to the resin or molding.

● **Mechanical options**

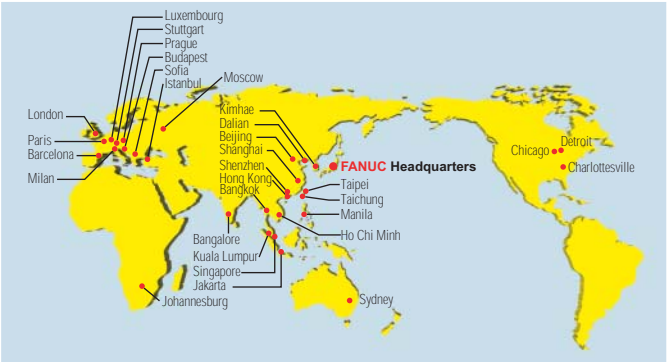


The available option differs in region. Refer to the “specification list” for details on the options.

Maintenance and customer support

Worldwide Customer Service and Support

FANUC provides customer service and support systems around the world through our subsidiaries and affiliates.
FANUC provides the highest quality service with the quickest possible response at a location near you.



Training

The following general, advanced and maintenance courses are offered at the school at FANUC’s headquarters.

- General course : The program gives students an understanding of molding basics, and allows them to acquire the necessary know-how needed to operate and set up the molding conditions.
- Advanced course : The program enables students to understand molding condition setup using ROBOSHOT’s advanced features
- Maintenance course : The program gives students the tools they need to easily perform troubleshooting in the event of a failure.

Specifications

Item		Unit	S-2000*i*15B			S-2000*i*30B				
Clamping unit	Tonnage	kN	150(15tonf)			300(30tonf)				
	Maximum and minimum die height	mm	260/130			330/150				
	Clamping stroke	mm	160			230				
	Tie bar spacing (H×V)	mm	260×235			310×290				
	Platen size (H×V)	mm	355×340			440×420				
	Ejector point / Ejector force / Ejector stroke	point/kN/mm	1/7(0.7tonf)/50			1/8(0.8tonf)/60				
Injection unit	Injection specification	—	Injection speed 525mm/s			Injection speed 525mm/s				
	Screw diameter	mm	14	16	18	14	16	18	20	22
	Maximum injection volume	cm^3	9	11	19	9	11	19	24	29
	Maximum injection pressure (High pressure filling mode)	MPa	—	—	—	—	—	300	270	220
	Maximum injection pressure	MPa	250	250	230	250	250	230	200	180
	Maximum pack pressure	MPa	250	230	190	250	250	210	180	160
	Maximum injection speed	mm/s	525			525				
	Maximum screw rotation speed	min^{-1}	450			450				
	Injection specification	—	Injection speed 700mm/s			Injection speed 700mm/s				
	Screw diameter	mm	14	16	18	14	16	18	20	22
	Maximum injection volume	cm^3	9	11	19	9	11	19	24	29
	Maximum injection pressure (High pressure filling mode)	MPa	—	—	—	—	—	300	270	220
	Maximum injection pressure	MPa	250	250	230	250	250	230	200	180
	Maximum pack pressure	MPa	250	230	190	250	250	210	180	160
	Maximum injection speed	mm/s	700			700				
	Maximum screw rotation speed	min^{-1}	450			450				

Item		Unit	S-2000*i*50B、50BP					S-2000*i*100B						S-2000*i*150B					
Clamping unit	Tonnage	kN	500(50tonf)					1000(100tonf)						1500(150tonf)					
	Maximum and minimum die height	mm	350/150					450/150						490/200					
	Clamping stroke	mm	250					350						440					
	Tie bar spacing (H×V)	mm	360×320					460×410						560×510					
	Platen size (H×V)	mm	500×470					660×610						800×750					
	Ejector point / Ejector force / Ejector stroke	point/kN/mm	5/20(2.0tonf)/70					5/25(2.5tonf)/100						5/35(3.5tonf)/150					
Injection unit	Injection specification	—	Injection speed 200mm/s (Only for 50B)					Injection speed 200mm/s						Injection speed 200mm/s					
	Screw diameter	mm	20	22	26	28	32	22	26	28	32	36	40	32	36	40	44	48	52
	Maximum injection volume	cm^3	24	29	50	58	76	29	50	58	103	147	181	121	153	188	268	318	442
	Maximum injection pressure	MPa	280	260	210	190	150	260	260	240	220	190	160	280	280	260	220	190	160
	Maximum pack pressure	MPa	280	240	190	160	130	260	260	220	200	170	140	280	280	220	190	160	130
	Maximum injection speed	mm/s	200					200						200					
	Maximum screw rotation speed	min^{-1}	300					300						300					
	Injection specification	—	Injection speed 330mm/s					Injection speed 330mm/s						Injection speed 330mm/s					
	Screw diameter	mm	20	22	26	28	32	22	26	28	32	36	40	32	36	40	44	48	52
	Maximum injection volume	cm^3	24	29	50	58	76	29	50	58	103	147	181	121	153	188	268	318	442
	Maximum injection pressure (High pressure filling mode)	MPa	340	320	270	250	—	320	320	300	250	220	—	—	—	—	—	—	—
	Maximum injection pressure	MPa	280	260	210	190	150	260	260	240	220	190	160	280	280	260	220	190	160
	Maximum pack pressure	MPa	280	240	190	160	130	260	260	220	200	170	140	280	280	260	220	190	160
	Maximum injection speed	mm/s	330					330						330					
	Maximum screw rotation speed	min^{-1}	450					450						400					
	Injection specification	—	Injection speed 500mm/s					Injection speed 500mm/s						Small capacity injection					
	Screw diameter	mm	20	22	26	28	—	22	26	28	32	36	—	22	26	28	32	36	40
	Maximum injection volume	cm^3	24	29	50	58	—	29	50	58	103	147	—	29	50	58	103	147	181
	Maximum injection pressure (High pressure filling mode)	MPa	340	320	270	240	—	320	320	280	—	—	—	—	—	—	—	—	—
	Maximum injection pressure	MPa	280	260	210	190	—	260	260	240	220	170	—	260	260	240	220	190	160
	Maximum pack pressure	MPa	280	240	190	160	—	260	260	220	200	170	—	260	260	220	200	170	140
	Maximum injection speed	mm/s	500					500						330					
	Maximum screw rotation speed	min^{-1}	450					450						450					

Item		Unit	S-2000*i*250B						S-2000*i*300B							S-2000*i*100BH		
Clamping unit	Tonnage	kN	2500(250tonf)						3000(300tonf)							1000(100tonf)		
	Maximum and minimum die height	mm	650/300						650/300							450/150		
	Clamping stroke	mm	600						600							350		
	Tie bar spacing (H×V)	mm	710×635						810×710							460×410		
	Platen size (H×V)	mm	1030×960						1130×1030							660×610		
	Ejector point / Ejector force / Ejector stroke	point/kN/mm	13/80(8.0tonf)/200						13/80(8.0tonf)/200							5/25(2.5tonf)/100		
Injection unit	Injection specification	—	Injection speed 330mm/s						Injection speed 240mm/s							Injection speed 1000mm/s		
	Screw diameter	mm	32	36	40	44	48	52	40	44	48	52	56	64	68	22	26	28
	Maximum injection volume	cm^3	121	153	188	268	318	442	188	268	318	442	640	836	944	29	50	58
	Maximum injection pressure	MPa	280	280	260	220	190	160	280	280	270	240	225	175	155	400	380	350
	Maximum pack pressure	MPa	280	280	260	220	190	160	280	260	240	220	195	150	130	380	350	300
	Maximum injection speed	mm/s	330						240							1000		
	Maximum screw rotation speed	min^{-1}	400						400							450		

Note: When high pressure filling mode is used, a special cylinder is needed. Molding conditions may be restricted depending on the screw diameter.
For details, see a separate list of specifications.

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