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

**FANUC ROBOSHHOT S-2000i**

15B/30B
50B/50BP/100B/100BH
150B/250B/300B
Electric injection molding machine, achieves high quality molding and high productivity

**FANUC ROBOSHOT S-2000iB 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) \( S-2000i100E \)
- Ultra high precision clamping \( S-2000i50P \)

**Networking in molding factory**
- MOLD24i of quality management system
- Resin characteristic evaluation system

*ROBOSHOT
Over 30,000 units shipped (1984—)
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

- Castle-type check ring
  - Outer diameter of the check ring wears
  - Backflow increases
  - Unstable seal timing

- Non-castle type check ring
  - Side end of the check ring wears
  - Backflow increases
  - Delayed seal timing

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)

- **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.

Precise metering screen

Weight variance (With precise metering 3)

- Machine: 50B / Electronic parts / Resin: PBT
- RX: 0.02%  □ / X: 0.0061%
- 10 20 30 40 50 shots
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.

- **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.

- **High-precision temperature control in \( \pm 0.1^\circ \) steps and synchronous heating**
  The heater temperature is precisely controlled in \( \pm 0.1^\circ \) 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 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 and 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.

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

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

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

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 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.

**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.

- **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.

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

Application to a range of molding fields

Ultra high speed injection (1,000 mm/s) S-2000i100Bh
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.

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.

Ultra thin wall molding

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

Injection speed (mm/s)
- Maximum speed: 1,000 mm/s
- Maximum acceleration: 3.6G

Accommodation time (s)
- Acceleration: 1.9 times
- 100B with 500mm/s injection

Precise fine-pitch connector
- Resin: Liquid Crystal Polymer

Flow path form to prevent resin residence
High-powered heater to prevent temperature drops at the head

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-2000/50B**
  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.

- **Lens molding**
  - DVD pick up lens
  - Resin : COP

  
<table>
<thead>
<tr>
<th>Standard</th>
<th>50BP</th>
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<th>50BP</th>
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<tbody>
<tr>
<td>Platen parallelism</td>
<td>89%</td>
<td>Platen linearity</td>
<td>83%</td>
</tr>
</tbody>
</table>

  ![Ball spline tie bar
  Stationary platen bending prevention mechanism](image)

  - Auxiliary base with linear guide

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.

* The available option differs in region.
Networking in molding factory

Quality management system MOLD24i (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.

- **Process monitor**
  The operation state of the machines can be understood at a glance.

- **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.

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

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

Resin characteristic evaluation system (Option)

By using the ROBOSHOT as a measuring instrument and the MOLD24i 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.

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 200iC 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.

Options

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

- **Mechanical options**
  - Screw, cylinder and nozzle
  - Connection terminals for core
  - Air ejector connection point
  - Multi-color signal tower
  - Mold heater
  - [Side of stationary platen on non-operation side]
  - Thermal insulation cover
  - 100-V outlet
  - 200-V outlet

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**

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>(\text{RSHOT S-2000} )</th>
<th>(\text{RSHOT S-1000} )</th>
<th>(\text{RSHOT S-600} )</th>
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<tr>
<td><strong>Clamping unit</strong></td>
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<tr>
<td>Tonnage</td>
<td>kN</td>
<td>500 (50tonf)</td>
<td>500 (50tonf)</td>
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<tr>
<td>Maximum and minimum die height</td>
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<td>250/300</td>
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<tr>
<td>Clamping stroke</td>
<td>mm</td>
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<td>200</td>
<td>200</td>
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<tr>
<td>Tie bar spacing (H1/H2)</td>
<td>mm</td>
<td>710/635</td>
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<td>610/710</td>
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<tr>
<td>Platen size (H1/H2)</td>
<td>mm</td>
<td>1030/1060</td>
<td>1130/1130</td>
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<tr>
<td>Ejector point / Ejector force / Ejector stroke</td>
<td>mm/tonf/mm</td>
<td>17 &amp; 0.7/tonf/250</td>
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<tr>
<td><strong>Injection unit</strong></td>
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<tr>
<td>Screw diameter</td>
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<tr>
<td>Maximum injection pressure</td>
<td>MPa</td>
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<tr>
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<td>Maximum screw rotation speed</td>
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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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RSHOT S-2000(8(E))-06, 2008.7, Printed in Japan