

AI Electric Injection Molding Machine

# FANUC ROBOSHOT S-2000*i*

50B/100B/150B/300B

Incorporating the molding part unloader SR Mate

50BR/100BR/150BR/300BR



Next Generation AI Electric Injection Molding Machine That Has Further Extended Performance in Precision Molding

# FANUC ROBOSHOT S-2000*i*B series

## Newly Developed Clamping Unit and Injection Unit

### High rigid 2-piece wide platen

that can accommodate molds one size bigger and suppresses its slightest deformation

### High rigid and low friction injection unit

that achieves quick and smooth injection and metering operations

### High precision and high resolution digital load cell

that achieves stable pressure control

### Motor directly coupled high-speed injection (option)

that exhibits its power in thin wall molding

## Superior Safety

Conformance on the most safety standards for Japan, North America and Europe

ISO9001 and ISO14001 are certified

## Advanced Control

### High-speed and high precision CNC and servo technology

that supports stable precision molding

### Large size operation screen

that adopts a large screen LCD in pursuit of ease of use

## Precision Molding Capability

### FFF control and HR control

that achieves high response injection

### Constant-acceleration control

### High precision V-P switching control

that achieves stable molding

### Precision metering control

### High precision temperature control



FANUC ROBOSHOT S-2000*i*100BR  
with the molding part unloader SR Mate 100iB



FANUC ROBOSHOT S-2000*i*50BR  
with the molding part unloader SR Mate 100iB



FANUC ROBOSHOT S-2000*i*150BR  
with the molding part unloader SR Mate 200iB



FANUC ROBOSHOT S-2000*i*300BR  
with the molding part unloader SR Mate 200iB

## Intelligence

Highly secured mold protection  
**AI mold protection**

Quality judgment and breakage prevention of ejector pin

**AI ejector**

Stable molding with quality  
**AI pressure profile trace control**

Metering stability  
**AI metering control**

## Robotization

Molding part unloaders integrated with the ROBOSHOT

**SR Mate 100iB**  
(for 50B and 100B)

**SR Mate 200iB**  
(for 150B and 300B)

## Networking

Total data management system for molding factories

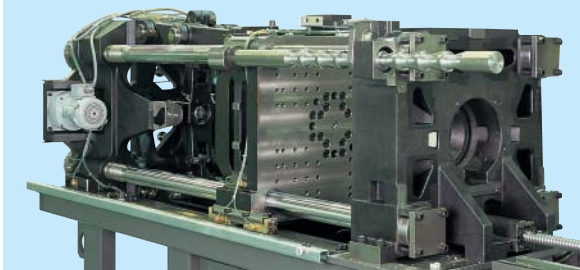
**MOLD24i**

**Resin characteristic evaluation system (option)**  
that measures resin viscosity by using the ROBOSHOT and the MOLD 24i

# Newly Developed Clamping Unit and Injection Unit

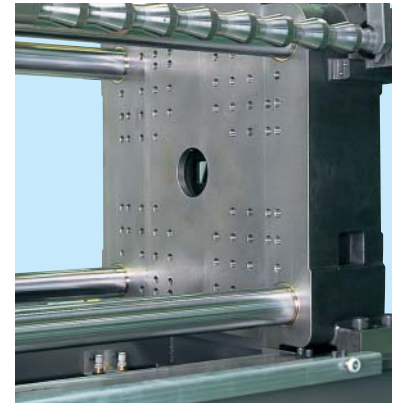
## High rigid 2-piece wide platen

- The tie-bar distance has been extended in the horizontal direction to meet the need for multiple-workpiece loading and to accommodate molds that are becoming larger due to the complexity of their structures.

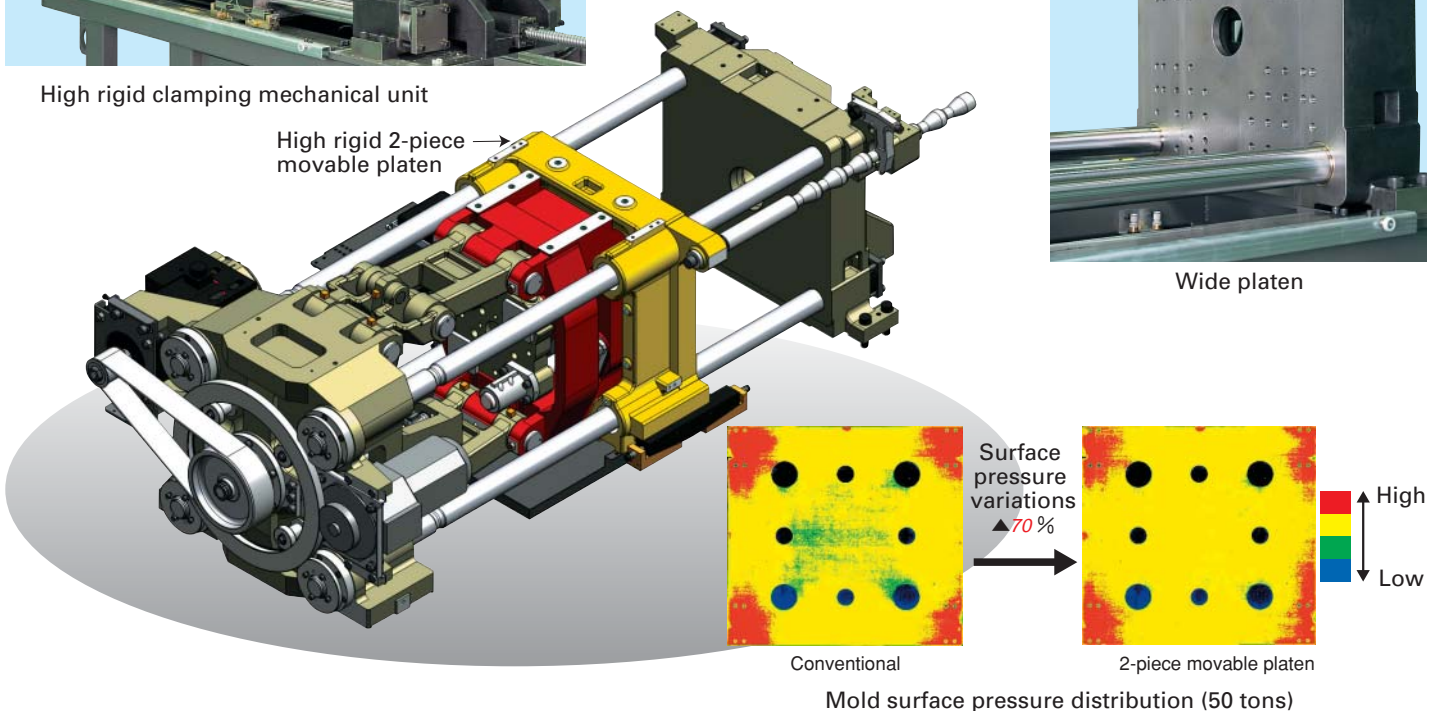


High rigid clamping mechanical unit

- For the movable platen, a newly developed 2-piece structure has been adopted. The slightest deformation of the platen is suppressed by concentrating the clamping force generated by the toggle mechanism into the center of the platen and pressing on the center of the mold. By applying uniform clamping force to the mold, stable molding of precision molding parts is made possible.



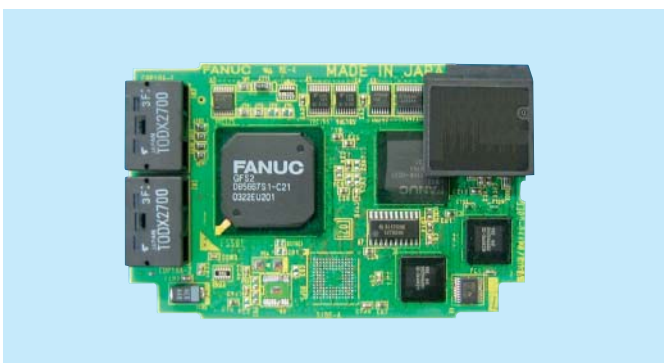
Wide platen



## Advanced Control

### Most advanced high-speed and high reliability CNC

- FANUC's next generation CNC series 310is-MODEL A is incorporated, which adopts the latest high-speed microprocessor.
- Using high-speed control with a sampling period of  $62.5\mu\text{s}$  (1/16,000 second) and the latest servo technology, high precision position, speed, and pressure control required of precision molding, is achieved.



High-speed servo control board

### High reliability control

- The control unit has been designed on the basis of safety standards in Europe. The control unit, housed in a highly airtight cabinet, offers high reliability in a harsh factory environment.
- Electric parts have been assembled on a printed circuit board for wiring saving and improvement of maintainability.



High reliability electric parts

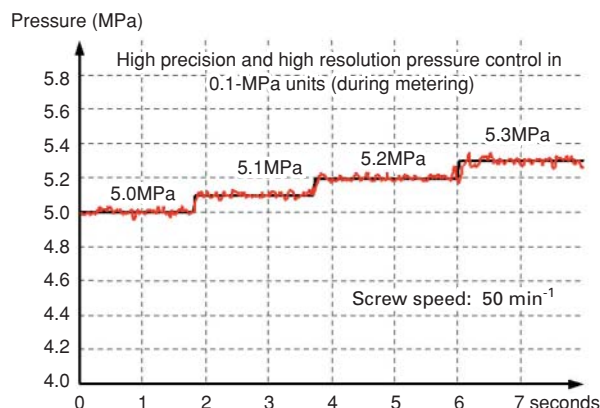
## High Rigid and Low Friction Injection Unit

- For the S-2000/50B/100B, the injection mechanical unit is of a high rigid, integral cast structure to meet the need for the molding of ultraprecision parts.
- A low friction linear guide has been adopted for the backward and forward movement of the screw, achieving smooth operation.
- The newly developed digital load cell have achieved high precision pressure detection because of its high resolution and thorough noise reduction by the use of an optical cable, etc.



High rigid and low friction injection mechanical unit

- The high rigid and low friction injection mechanical unit, combined with the high precision and high resolution digital load cell, has achieved high response injection and high precision pressure control, essential to precision molding.

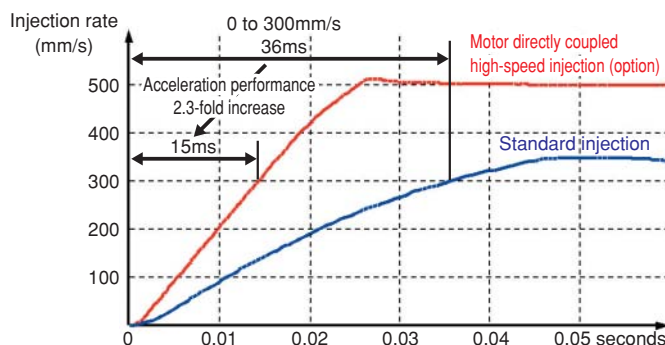


## Motor directly Coupled High-Speed Injection (Option)

- The motor directly coupled injection (high-speed option), developed to meet the need for further high precision molding and thin wall molding, incorporates a newly developed high output and low inertia servo motor, exhibiting quick injection and acceleration.



Motor directly coupled injection mechanical unit (option)



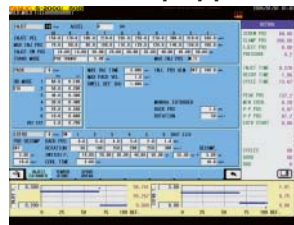
## Large-Size Operation Screen in Pursuit of Ease of Use

- As the operation screen, a large-size 15-inch color LCD has been adopted. By taking advantage of the large screen, information necessary for operation is displayed at an optimum layout.
- A touch panel keyboard has been adopted to improve operability.
- It is possible to select one of the three display patterns and switch to it at one touch of a button, in accordance with the work and purpose.



New operation window (15-inch color LCD)

### Standard display pattern



Pursuit of ease of use  
Simultaneous display of settings and monitors

### Display pattern with one segment maximized



Pursuit of readability  
Large, easily readable characters

### Pattern in which four sections are displayed simultaneously

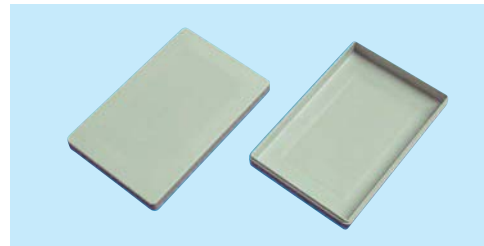


Grasping of main conditions  
Simultaneous display of 4 sections for operation

# Further Improved Precision Molding Capability

## FFF Control

- FFF control, which increases the acceleration capability of a servo motor instantaneously by making full use of the latest servo technology, exhibits its power in high-speed filling of thin wall parts.



Cellphone battery case  
Resin: Polycarbonate

## High Precision V-P Switching Control

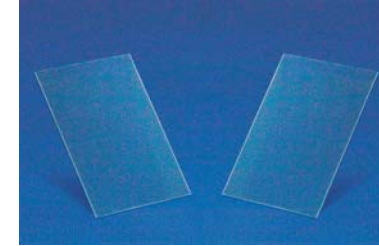
- V-P (injection-packing) switching control, which has a direct effect on transferability and weight variations, has been improved in precision.
- V-P switching is controlled at high precision with high-speed control with a sampling period of  $62.5 \mu s$  (1/16,000 second) and a new control algorithm for detecting the screw position and pressure in sampling periods in more detail.



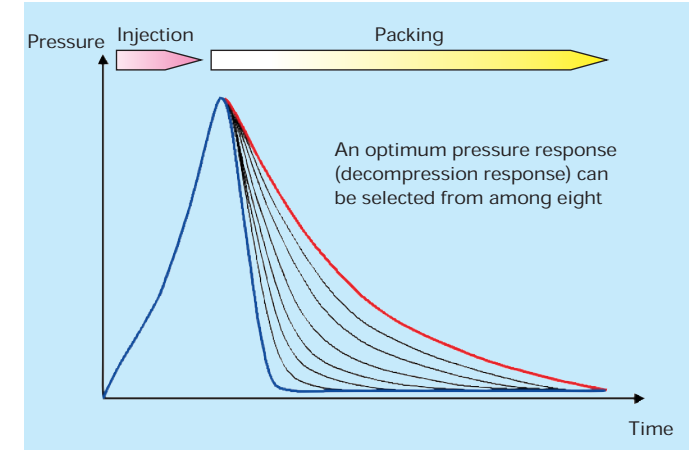
DVD pickup lenses  
Resin: COP

## HR Control

- By using HR control, it is possible to select from eight modes for the pressure response from injection to packing processes, in accordance with the molding part.
- For thick wall molding parts, it exhibits its power in the prevention of sink marks; for thin wall molding parts, in the prevention of warps and the uniformity of wall thicknesses.

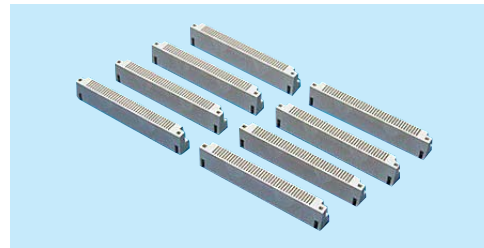


Cellphone optical light guide panel  
Resin: Polycarbonate

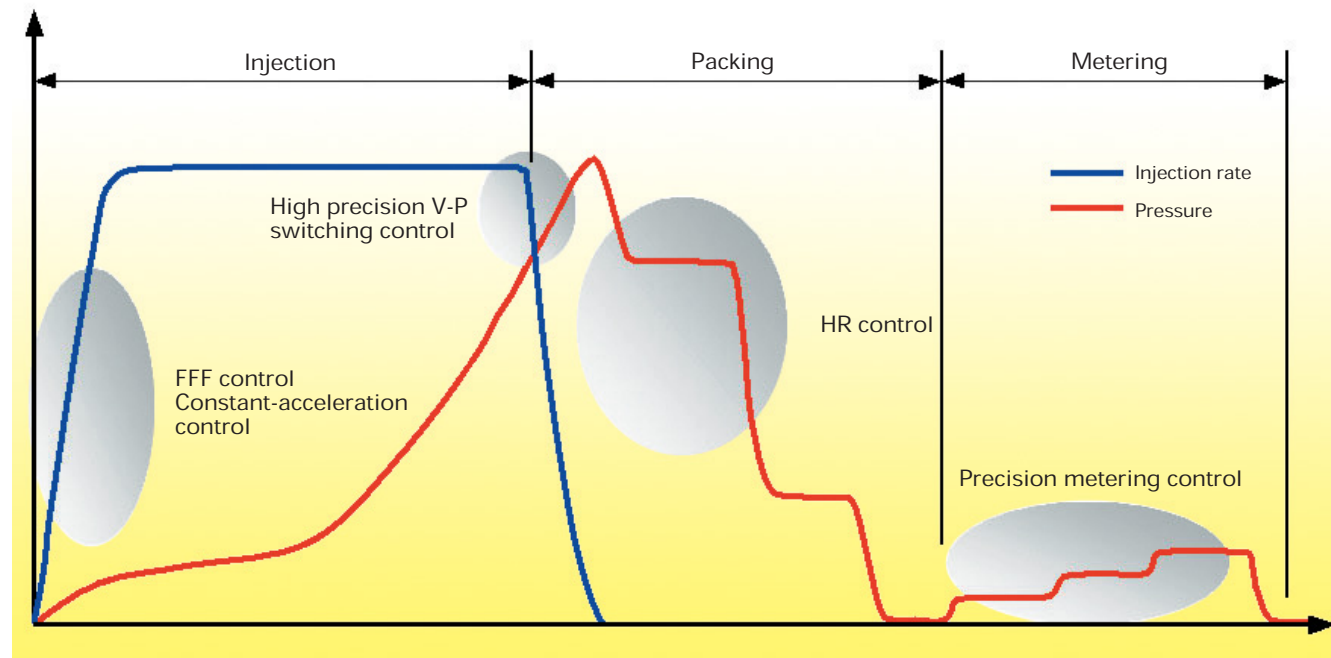


## Constant-Acceleration Control

- Even at medium to low injection rates, the slope is the same as that for the maximum rate.
- It exhibits its power in the stable molding of parts such as precision and narrow-pitch connectors, for which it is difficult to set high injection rates to prevent burned resin and air entrapment.

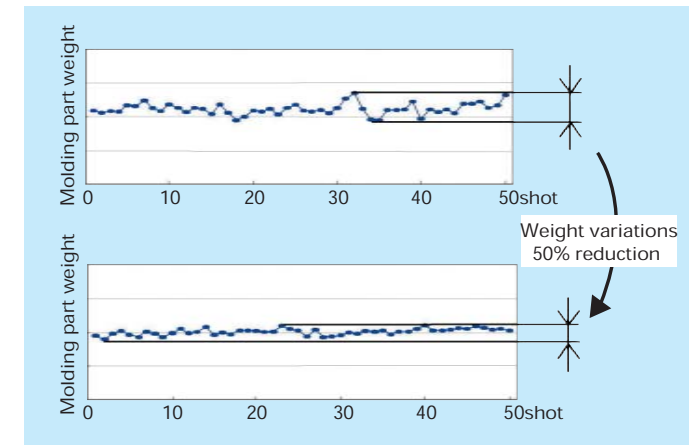


Precision and narrow-pitch connectors  
Resin: Liquid crystal polymer



## Precision Metering Control

- Variations in resin pressure are suppressed at the end of metering, thereby stabilizing metering density.
- The combination of high precision and high resolution digital load cell and low friction injection mechanism has achieved further stability improvement.



# Intelligence Molding Technology

## AI mold protection

- Upon detecting an abnormal load during clamping, this function brings clamping to an abrupt stop, thereby protecting the mold from breakage.
- With its three mold protection detection levels, this function can be applied to the detection of mold guide pins and slide core failures, in addition to the detection of remaining moldings.

## AI mold protection

Instant stop of clamp closing at molding piece jammed



## Conventional

Conventional stop of clamp closing at molding piece jammed

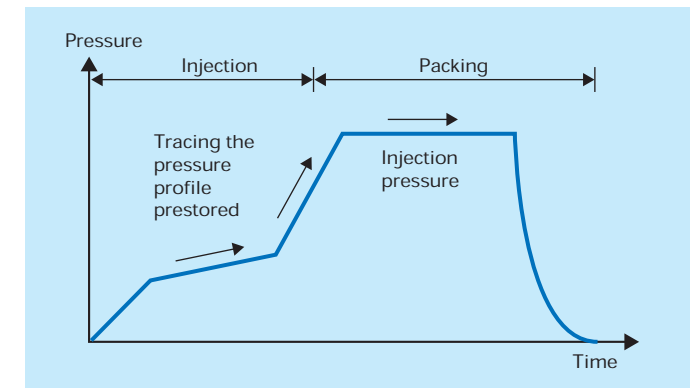


## AI pressure profile trace control

- AI pressure profile trace control features to control injection packing process by tracing the recorded pressure profile on optimal molded piece.
- The exact profile tracing closer to the best profile realizes stable production of piece under the same technical conditions.

## AI metering control

- The AI metering control stabilizes transferring resin with optimal metering through control of screw speed to enable smooth resin flow and to avoid excess pressure.
- The AI metering control together with the AI pressure profile trace control gives further stabilization on mold pieces.

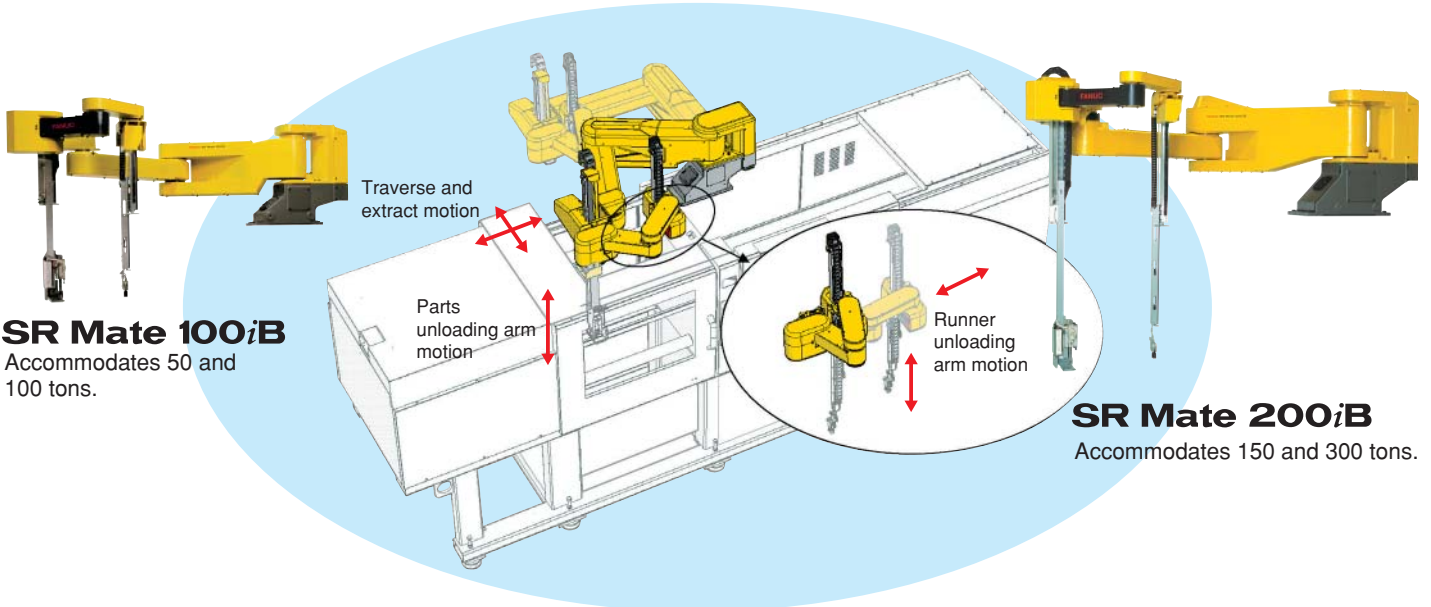


# Robotization

## Molding Parts Unloader SR Mate series

- SR Mate is exclusive servo driven unloader for ROBOSHOT that can move flexibly like an arm grow up from ROBOSHOT.

- SR Mate can be used at once without troublesome mounting on the machine, wiring and adjustment, because SR Mate can be shipped integrated in the ROBOSHOT.

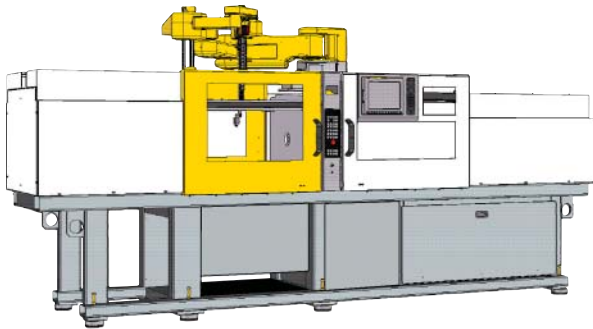


**SR Mate 100iB**  
Accommodates 50 and 100 tons.

**SR Mate 200iB**  
Accommodates 150 and 300 tons.

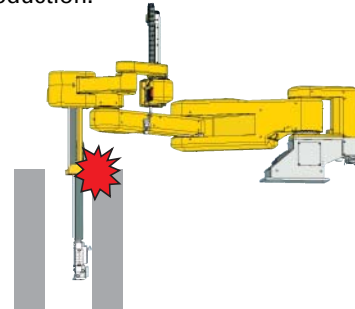
## Compact mechanical unit

- Height of the mechanical unit is minimized. SR Mate can be used at low ceiling place.
- During a mold change, the arm retracts to the non-operation side so as not to interfere with the change.



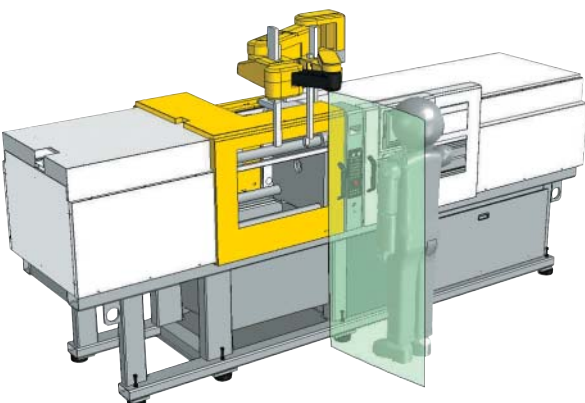
## High sensitive collision detection

- Collision can be detected and stop the arm instantly without special protection device required. This can minimize a damage of the die, hand and peripheral devices caused by miss-operation at teaching and interference during production.



## Operation side traverse

- Parts can be transferred to ROBOSHOT operation side.
- Convenient for molding condition tuning with confirming the parts and periodical parts sampling.



## Touch panel teach pendant

- Communicative interface with graphical drawings enables easy setup.
- Operation keys are placed in accordance with the illustration of the SR Mate, so that even beginners not familiar with operation can use it easily.

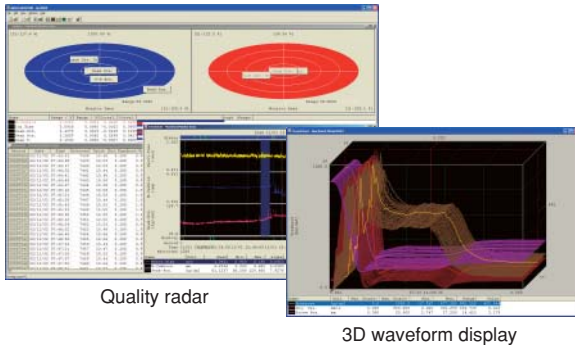


# Networking

## Total data management system for molding factories MOLD24i

### Quality radar

- Molding monitor data (40 items or more) for up to 1,200,000 shots can be analyzed instantaneously, which assists in analyzing variations in data between molding lots and the factors of the occurrence of molding failures.
- It is possible to display pressure and speed waveforms of the ROBOSHOT in three dimensions to check stability in detail.



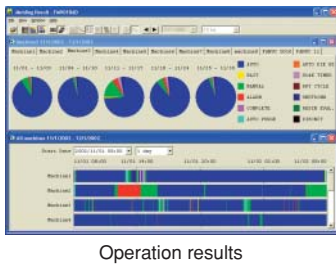
### Molding condition history

- History is displayed of the times at which molding conditions are changed, the names of the conditions, and numbers of shots.
- It is possible to go back in time to reproduce and display the molding conditions at a specified time. This can be used to accumulate know-how for condition adjustment and reduce molding startup time.



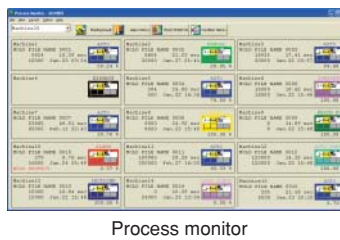
### Operation Results Tally and Analysis Function

- Operation results can be tallied in units ranging from shift units to monthly units.
- The operation status can be analyzed in detail from operating efficiency and cumulative time.



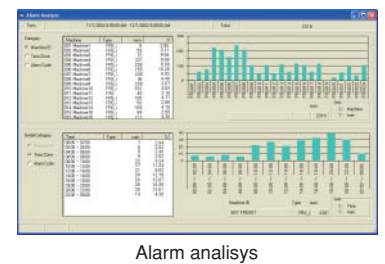
### Process Monitor Function

- The operation state of the ROBOSHOT can be grasped at a glance.
- It is possible to display the state in a layout in accordance with the actual machine arrangement at the factory.



### Alarm Analysis Function

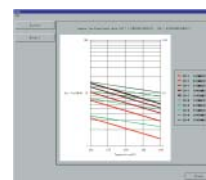
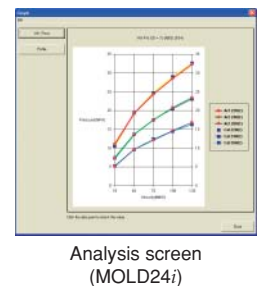
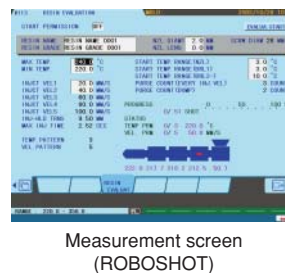
- For the alarms generated in the ROBOSHOT, frequencies of occurrence are displayed according to machine, production time zone, and alarm code.
- This can be used in a study of operating efficiency improvement.



## Resin Characteristics 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 viscosity of resin.

- Measurement is automatically conducted merely by setting measurement conditions in the ROBOSHOT. Measurement results are automatically transferred to the MOLD24i for analysis.
- It is possible to accurately analyze molding problems attributable to resin, such as variations between resin lots and the difference between recycled and virgin materials in viscosity and use the results as indexes for problem solving.
- Analysis results can be stored in the resin database of the MOLD24i. They will assist in the establishment of know-how related to resin.



Resin characteristics evaluation graph screen (MOLD24i)

Resin database screen (MOLD24i)

# Full Equipment

## Screws and Cylinders

### Screws and cylinders

An optimum screw and cylinder combination can be selected in accordance with the characteristics of the resin and the molding application.

- Lens specification (available in various materials such as PMMA, PC, and COP)
- Connector specification (those for heat-resistant LCP are now selectable in addition to existing ones for PA, PBT, and LCP)
- Corrosion and abrasion resistance specification (high corrosion and abrasion resistance ones and ultra high corrosion and abrasion resistance ones are also selectable.)
- High pressure resistance specification (molding of thin wall parts such as memory cards and light guide panel is accommodated.)
- High plasticization specification (plasticization capability and distributive mixing ability are improved to accommodate high cycle molding.)

In addition, various screws and cylinders are available.



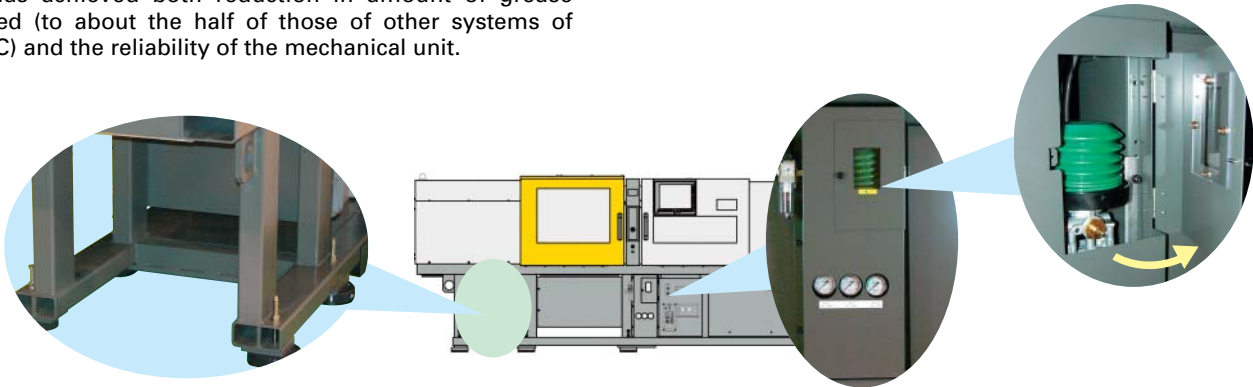
### Nozzles

A nozzle can be selected in accordance with the characteristics of the mold and the molding materials. A nozzle that has a high stringy and drooling reduction effect and is excellent in injection performance supports precision molding.

## 3-Path Centralized Greasing System (Standard)

- An independent 3-path centralized greasing system has been adopted to manage the amount of grease supplied to the mechanical unit and the greasing intervals in detail.
- This has achieved both reduction in amount of grease supplied (to about the half of those of other systems of FANUC) and the reliability of the mechanical unit.

- A grease pump is mounted inside the cover under the operator's panel, making it easy to check the greasing state and the amount of remaining grease.



## Miscellaneous

### Main Standard Equipment

- **Pre-injection function (software)**  
Performs injection and clamping simultaneously. It is effective to cycle reduction and degassing.
- **Pre-ejector function (software)**  
Can perform in-mold gate cutting operations.
- **Low-temperature retention function (software)**  
Can reduce the heater temperature to a preset one temporarily if it is desired to prevent carbonation due to the residence of the resin.
- **Resin residence monitoring function (software)**  
Monitors the accumulation state of the resin, and issues an alarm in the event of an error.

### Main Options

- **Mechanical unit options**
  - Air ejector
  - Flashing light (3/4 colors)
  - 100V receptacle
  - 200V receptacle
  - Mold heater
  - Core pull and core set interface
  - Collective piping (with/without flow meters)
- **Control unit options**
  - Shutdown sequence
  - Heater disconnection detection function
  - Excessive temperature rise prevention function
  - Simultaneous metering/mold opening operation function
  - Pre-suck back function
  - Ejector signal function
  - Monitor camera interface

# Specifications

Item		Unit	S-2000 <i>i</i> 50B/50BR				S-2000 <i>i</i> 100B/100BR					
Clamping unit	Clamping mechanism	—	Double toggle				Double toggle					
	Tonnage	kN	500 (50tonf)				1000 (100tonf)					
	Maximum and minimum die height	mm	350/150				450/150					
	Clamping stroke	mm	250				350					
	Tie bar spacing (H×V)	mm	360×320				460×410					
	Platen size (H×V)	mm	500×460				660×610					
	Ejector point	—	5				5					
	Ejector force	kN	20 (2.0tonf)				25 (2.5tonf)					
Ejector stroke	mm	70				100						
Injection unit	Screw diameter	mm	20	22	26	28	22	26	28	32	36	
	Maximum injection volume	cm <sup>3</sup>	24	29	50	58	29	50	58	103	147	
	Std.	Maximum injection pressure	MPa	280	260	210	190	260	260	240	220	190
		Maximum pack pressure	MPa	280	240	190	160	260	260	220	200	170
		Maximum injection speed	mm/s	330				330				
		Maximum screw rotation speed	min <sup>-1</sup>	450				450				
	High speed	Maximum injection pressure	MPa	280	260	210	190	260	260	240	220	170
		Maximum pack pressure	MPa	280	240	190	160	260	260	220	200	170
		Maximum injection speed	mm/s	500				500				
		Maximum screw rotation speed	min <sup>-1</sup>	450				450				

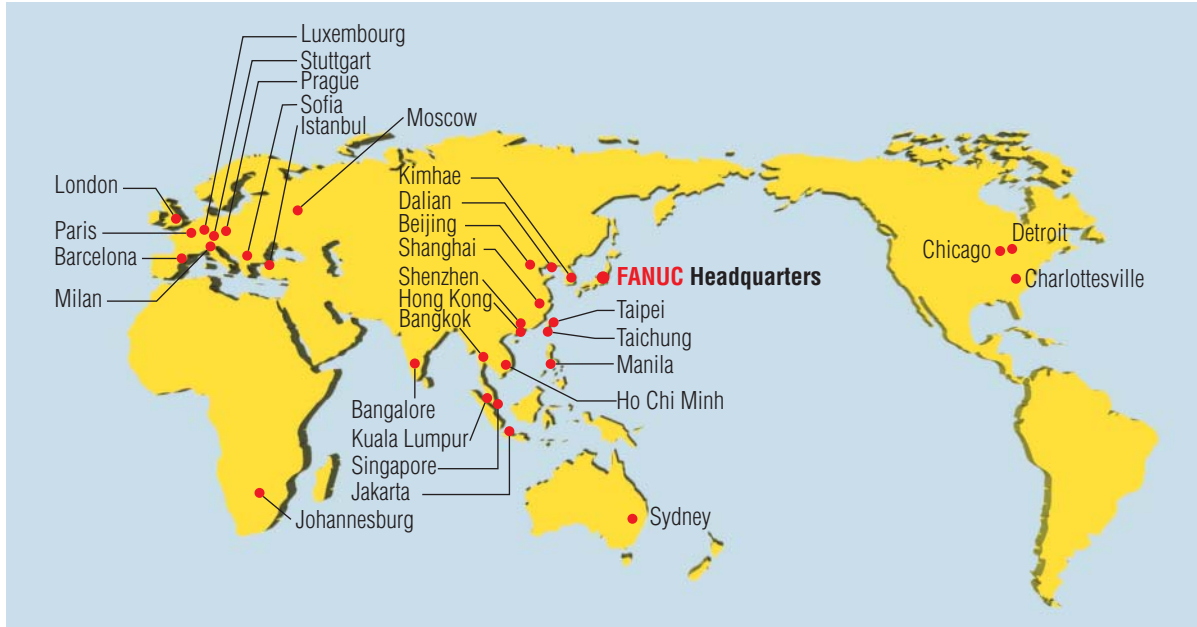
Item		Unit	S-2000 <i>i</i> 150B/150BR						S-2000 <i>i</i> 300B/300BR							
Clamping unit	Clamping mechanism	—	Double toggle						Double toggle							
	Tonnage	kN	1500 (150tonf)						3000 (300tonf)							
	Maximum and minimum die height	mm	490/200						650/300							
	Clamping stroke	mm	440						600							
	Tie bar spacing (H×V)	mm	560×510						810×710							
	Platen size (H×V)	mm	800×750						1130×1030							
	Ejector point	—	5						13							
	Ejector force	kN	35 (3.5tonf)						80 (8.0tonf)							
Ejector stroke	mm	150						200								
Injection unit	Screw diameter	mm	32	36	40	44	48	52	40	44	48	52	56	64	68	
	Maximum injection volume	cm <sup>3</sup>	121	153	188	268	318	442	188	268	318	442	640	836	944	
	Std.	Maximum injection pressure	MPa	280	280	260	220	190	160	280	280	270	240	225	175	155
		Maximum pack pressure	MPa	280	280	260	220	190	160	280	260	240	220	195	150	130
		Maximum injection speed	mm/s	330						240						
		Maximum screw rotation speed	min <sup>-1</sup>	400						400						

# Maintenance and Customer Support

## Worldwide Customer Service and Support

FANUC operates customer service and support system anywhere in the world through subsidiaries and affiliates.

FANUC provides the highest quality service with the quickest response at the location nearest you.



## FANUC Training Center

FANUC training center operates training programs on FANUC ROBOSHOT through the year, which focus on practical operations using various molding dies and setting method of molding conditions.

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