eV-LINE Electric Injection Molding Machine

MS series

MS50  MS100  MS200
Further realized high cycle molding based on high

V-LINE® injection molding machine which has received high evaluation in the fields of precision and complicated plastic molding. This series consists of superior features, such as high accuracy and stability.

The "MS Series" is Sodick's latest injection molding machine based on this excellent performance which has adopted the "eV-LINE" system integrated with the independently developed servo motor control technology in the drive portion of the plasticization & injection units.

The drive portion of the newly developed mold clamping unit realizes further improvement of high cycle molding and productivity, and energy saving effect. Since advanced high precision and complicated plastic molded products are required, a wide range of application ability has been demanded for injection molding machines.

One solution is the "eV-LINE Electric Injection Molding Machine MS Series."

*"V-LINE® is a registered trademark of Sodick Co., Ltd.

<table>
<thead>
<tr>
<th>Screw diameter</th>
<th>Plunger diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>22mm, 25mm, 28mm</td>
<td>22mm, 28mm</td>
</tr>
</tbody>
</table>
V-LINE® injection molding machine which has received high evaluation in the fields of precision and complicated plastic molding. This series consists of superior features, such as high accuracy and stability. The “MS Series” is Sodick’s latest injection molding machine based on this excellent performance which has adopted the “eV-LINE” system integrated with the independently developed servo motor control technology in the drive portion of the plasticization & injection units.

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One solution is the “eV-LINE Electric Injection Molding Machine MS Series.”

<table>
<thead>
<tr>
<th>Unit</th>
<th>Mechanism &amp; Method</th>
<th>Drive Method</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injection</td>
<td>Plunger</td>
<td>Electric + ball screw</td>
<td>Accurate filling performance</td>
</tr>
<tr>
<td>Plasticization</td>
<td>Screw Pre-plasticizing</td>
<td>Electric</td>
<td>Stable plasticization performance</td>
</tr>
<tr>
<td>Mold clamping</td>
<td>Double toggle</td>
<td>Electric + ball screw</td>
<td>High cycle &amp; energy saving</td>
</tr>
<tr>
<td>Ejection</td>
<td>Ball screw</td>
<td>Electric + ball screw</td>
<td>Accurate position accuracy</td>
</tr>
</tbody>
</table>

V-LINE® is a registered trademark of Sodick Co., Ltd.
V-LINE®

Plasticization & injection units which realize stable and high accuracy molding

Accurate injection performance with high repeatability was realized by the in-house developed servo motor control technology to the V-LINE® method. It consists of a plasticization unit that only performs plasticization, and an injection unit that performs measurement and injection. The improved accuracy of each position by controlling the measurement and injection position information by a closed loop, realizes high precision repeated stability of the plasticization, measurement and injection.

The V-LINE® is filled with Sodick’s unique technology.

- Long-time stable molding
- Stable control of plasticization & melting
- Low shearing plasticization control
- Accurate plunger position control
- Low speed injection speed control
- High speed & high pressure injection control
- Fill volume control
- Holding pressure control

The V-LINE® is filled with Sodick’s unique technology.
■ V-LINE® Injection Method

V-LINE®

- Screw only performs plasticization
- Sequentially controls each process of plasticization and injection
- No portion slides or shears the resin
- Constant heat history of resin during plasticization
- Also controls behavior of the resin
- No excessive shearing heat or over shearing applied to resin

■ V-LINE® Molding Process

The V-LINE® realizes "3 stabilities," (1) melting condition of resin, (2) density of weighed resin, and (3) actual filling volume by independently controlling the entire process of the plasticization and injection.

Three stabilities
- Easy to maintain a stable molding condition, which makes it easier to specify the cause of poor molding
- Improves the process capability of the molding, which makes it easier to identify good conditions and poor conditions

Excellent Repeatability of Injection Process (Waveform)

The figure on the right shows a 30-shot overlapping waveform of the injection speed and injection pressure of the electric MS100. The waveform indicates high repeatability with less variation width.

Abundant plasticization and injection units standardly equipped with wear resistance and anti-corrosion performance

The MS Series allows for the selection of a screw diameter and plunger diameter suitable for the injection volume of molded products, and the plasticization and injection units in consideration of the speed and pressure, so that the machine can respond to a wide range of molded products.

■ Plasticization Unit Specification List

<table>
<thead>
<tr>
<th>Plasticizer Diameter (mm)</th>
<th>22</th>
<th>25</th>
<th>28</th>
<th>32</th>
<th>40</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main feature</td>
<td>Rotation speed</td>
<td>Torque</td>
<td>Rotation speed</td>
<td>Torque</td>
<td>Rotation speed</td>
<td>Torque</td>
</tr>
<tr>
<td>Plasticizing capacity (kg/h)</td>
<td>16</td>
<td>9</td>
<td>23</td>
<td>13</td>
<td>42</td>
<td>24</td>
</tr>
<tr>
<td>Torque (N·m)</td>
<td>100</td>
<td>130</td>
<td>100</td>
<td>130</td>
<td>150</td>
<td>210</td>
</tr>
<tr>
<td>Rotation speed (min⁻¹)</td>
<td>400</td>
<td>200</td>
<td>400</td>
<td>200</td>
<td>400</td>
<td>200</td>
</tr>
</tbody>
</table>

■ Injection Unit Specification List

<table>
<thead>
<tr>
<th>Injector diameter (mm)</th>
<th>22</th>
<th>28 (MS50)</th>
<th>28 (MS100)</th>
<th>40 (MS100)</th>
<th>40 (MS200)</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main feature</td>
<td>Speed</td>
<td>Pressure</td>
<td>Speed</td>
<td>Pressure</td>
<td>Speed</td>
<td>Pressure</td>
</tr>
<tr>
<td>Speed (mm/sec)</td>
<td>450</td>
<td>350</td>
<td>350</td>
<td>250</td>
<td>400</td>
<td>300</td>
</tr>
<tr>
<td>Injection pressure (MPa)</td>
<td>220</td>
<td>285</td>
<td>175</td>
<td>235</td>
<td>215</td>
<td>285</td>
</tr>
</tbody>
</table>
Clamping Unit

Newly developed clamping unit in pursuit of high cycle, high accuracy and uniformity

A new clamping unit which reduces the mold opening/closing cycle was developed to promote electrification of the clamping operation by adopting the unique servo motor drive technology. This also improves energy savings and noise reduction, as well as contributes to high cycling. Also, the movable platen is supported by a linear guide to ensure a molding environment which suppresses variations.
Excellent Uniform Mold Clamping Force

The figure on the right shows the pressure sensitivity results, where pressure sensitive paper was inserted between the platens and test block to confirm the distribution of the mold clamping force when the mold is clamped in the MS100. Excellent uniformity of the mold clamping force equivalent to a conventional machine could also be confirmed in the “MS Series Machine” which adopted the toggle method.

- **Merit**
  - Strong contact in the center of the mold reduces the occurrence of burrs

High Accuracy Mold Open/Close Operation

In opening and closing the mold, it is important to keep the straight advancement accuracy of motion, and parallelism and by keeping the movable platen as a linear motion guide support instead of a turber guide, we maintain their accuracy.

- **Merit**
  - No stress is applied to mold components
  - No position change of movable platen

eV-LINE System

In pursuit of high cycle performance and eco-performance. The "eV-LINE" system integrated with the independently developed servo motor control technology has been adopted for the drive portion of the plasticization and injection units, and the drive portion of the newly developed mold-clamping unit, which realizes high cycle molding and energy savings.
Utility

From manufacturing to maintenance. In pursuit of ease of use for all needs

The newly developed operation panel only for the "MS Series" is equipped with selector type switches. Each unit operates by changing the switch in the direction to be moved, which provides a more intuitive and simple operation. The adoption of the independently developed advanced control and communication system improved the high speed digital processing ability.
Realized Intuitive Operation

The newly developed operation panel only for the “MS Series” is equipped with selector type switches. Each unit operates by changing the switch in the direction to be moved, which provides a more intuitive and simple operation. In order to avoid complicated operation of the switches on the operation panel, a new soft keyboard which displays the input values on a screen was developed.

Improved Productivity by Visualization of Molding Cycle

The adoption of a cycle time chart screen which enables the overall molding cycle to be checked at once, realized visualization of the cycle. Accordingly, a molding operation that can be shortened can now be visualized at once, which reduces time loss. The cycle setting of each process operation can be customized easily, which contributes to time reduction of the molding cycle, and improves productivity.

Substantial Support Functions

The operation method of the molding machine, error contents of the molding machine, and troubleshooting can now be checked in front of the molding machine with the newly added various sensors and maintenance screen, etc. As a Help function, the operation manual can be displayed so that quick action can be taken when molding trouble occurs.

Complies with Safety Standards of each Country which Satisfies Global Production

This series complies with the safety standards of each country, including the Japan Society of Industrial Machinery Manufacturers Standards (JIMS), Korean KC Safety Certification (KC-S), and the Chinese National Standards (GB), and is standardly equipped with double limit switches for the safety doors (enhancement of safety door closed monitoring function), double plasticization cylinder covers (reduces surface temperature of cover), large sized purge cover (prevents contact with high temperature heater), and upper cover on mold open/close portion and undercover on mold open/close portion (prevents contact with the mold). This series can be introduced smoothly as a safe and secure global machine.
Sodick IoT-IMM

Sodick quickly responded to Internet technology. Sodick promptly responded to Internet technology where multiple machines are connected to a network environment, and various information and data collected from machines is utilized to provide IoT (Internet of Things), including (1) monitoring, (2) maintenance, (3) control and (4) analysis.

- **Sodick IoT-IMM System Concept Figure**

**Online Function**

**ETDL4**
The ETDL4 is installed in the client’s PC, and the molding machine is connected online. This function is for displaying the following data of connected molding machines on the client’s PC.

- Operating condition
- Shot data
- Waveform data
- Molding conditions
- Molding conditions change history / error history

**OTM-Mail**
The e-mail server is connected to the molding machine via online. This function is for transmitting Internet e-mail to terminals, such as smart phones and each PC from the molding machines via this e-mail server.

**Sends e-mail from each molding machine**
- Timing of sending e-mail:
  1. When errors occur
  2. When production is completed
  3. Any specified time
SSM Sodick Scientific Molding

Numericalizes the behavior of the resin in the mold, and is used for the following applications.

- Setting of optimal molding conditions
- Automatic sorting of defective products
- Quality control
- Mold evaluation

Molding machine (Mold internal pressure control system)  
Pressure, temperature sensor & amplifier

Centrally manages the information required for the calculations set for the sensor amplifiers of each sensor of the mold included in the molding machine.

Wave Log
This function is for collecting the following various data as CSV data.

- Shot data
- Waveform data
- Molding conditions

Standardly, the USB memory is directly connected to the molding machine to collect the data. The data can be controlled by connecting the USB memory to the client’s PC and downloading the data into common spreadsheet software (Excel, Access, etc.).

Offline Function

Waveform display of 8 ch analog input, process monitoring and alarm setting are possible
## MS Series Specifications

### Model

<table>
<thead>
<tr>
<th>Product</th>
<th>MS50</th>
<th>MS100</th>
<th>MS200</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Image]</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Clamping Unit

<table>
<thead>
<tr>
<th>Specification</th>
<th>MS50</th>
<th>MS100</th>
<th>MS200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mold open / close system</td>
<td>AC servo motor control</td>
<td>AC servo motor control</td>
<td>AC servo motor control</td>
</tr>
<tr>
<td>Clamping system</td>
<td>Double toggle</td>
<td>Double toggle</td>
<td>Double toggle</td>
</tr>
<tr>
<td>Max. clamping force (kN)</td>
<td>490</td>
<td>980</td>
<td>1,960</td>
</tr>
<tr>
<td>Tie bar distance (mm)</td>
<td>360 × 360</td>
<td>460 × 420</td>
<td>560 × 560</td>
</tr>
<tr>
<td>Platen dimension (mm)</td>
<td>500 × 500</td>
<td>640 × 610</td>
<td>720 × 720</td>
</tr>
<tr>
<td>Open daylight (Min. mold thickness + Max. stroke)</td>
<td>600</td>
<td>800</td>
<td>1,000</td>
</tr>
<tr>
<td>Mold opening / closing stroke (mm)</td>
<td>250</td>
<td>350</td>
<td>450</td>
</tr>
<tr>
<td>Min./Max. mold thickness (mm)</td>
<td>150 / 350</td>
<td>200 / 450</td>
<td>250 / 550</td>
</tr>
<tr>
<td>Ejecting system</td>
<td>AC servo motor control</td>
<td>AC servo motor control</td>
<td>AC servo motor control</td>
</tr>
<tr>
<td>Ejecting force / Ejection retention force (kN)</td>
<td>20 / 9.3</td>
<td>20 / 9.3</td>
<td>37.0 / 18.5</td>
</tr>
<tr>
<td>Ejector stroke (mm)</td>
<td>80</td>
<td>80</td>
<td>120</td>
</tr>
</tbody>
</table>

### Plasticization & Injection System

<table>
<thead>
<tr>
<th>Specification</th>
<th>MS50</th>
<th>MS100</th>
<th>MS200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw diameter (mm)</td>
<td>22</td>
<td>25</td>
<td>28</td>
</tr>
<tr>
<td>Plasticizing capacity (GP-PS) (kg/h)</td>
<td>16</td>
<td>23</td>
<td>13</td>
</tr>
<tr>
<td>Rated screw torque (N-m)</td>
<td>100</td>
<td>130</td>
<td>130</td>
</tr>
<tr>
<td>Max. screw revolution (rpm)</td>
<td>400</td>
<td>400</td>
<td>400</td>
</tr>
</tbody>
</table>

### Injection Unit

<table>
<thead>
<tr>
<th>Specification</th>
<th>MS50</th>
<th>MS100</th>
<th>MS200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plunger diameter (mm)</td>
<td>22</td>
<td>28</td>
<td>28</td>
</tr>
<tr>
<td>Max. injection speed (mm/s)</td>
<td>450</td>
<td>350</td>
<td>250</td>
</tr>
<tr>
<td>Max. injection pressure (MPa)</td>
<td>220</td>
<td>285</td>
<td>175</td>
</tr>
<tr>
<td>Max. holding pressure (MPa)</td>
<td>176</td>
<td>228</td>
<td>140</td>
</tr>
<tr>
<td>Injection rate (cm³/s)</td>
<td>171</td>
<td>133</td>
<td>216</td>
</tr>
<tr>
<td>Theoretical injection volume (cm³)</td>
<td>53.2</td>
<td>98.5</td>
<td>98.5</td>
</tr>
<tr>
<td>Plunger stroke (mm)</td>
<td>140</td>
<td>160</td>
<td>160</td>
</tr>
<tr>
<td>Number of temperature control zone</td>
<td>6</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Heater capacity (kW)</td>
<td>6.2</td>
<td>7.1</td>
<td>9.1</td>
</tr>
<tr>
<td>Nozzle pressing force (kN)</td>
<td>6.8</td>
<td>15.7</td>
<td>15.7</td>
</tr>
<tr>
<td>Unit traveling stroke (mm)</td>
<td>280</td>
<td>320</td>
<td>365</td>
</tr>
</tbody>
</table>

### Machine Dimensions / Weight

<table>
<thead>
<tr>
<th>Specification</th>
<th>MS50</th>
<th>MS100</th>
<th>MS200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine dimensions (L x W x H) (mm)</td>
<td>3725 × 1155 × 1647</td>
<td>4240 × 1215 × 1688</td>
<td>4474 × 1215 × 1765</td>
</tr>
<tr>
<td>Machine weight (kg)</td>
<td>2900</td>
<td>3000</td>
<td>4000</td>
</tr>
</tbody>
</table>

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1. The screw torque and maximum screw rotational speed are the output calculated values of the plasticization unit. The actual value may change depending on the resin and temperature.
2. The maximum injection pressure and maximum holding pressure are theoretical values (calculated values) of the unit, and are not the actual pressure of the resin.
3. The maximum injection pressure and maximum holding pressure may not be generated repeatedly depending on the duty of the injection motor.
4. These machine dimensions exclude the projecting portions and the signal light.
5. The above specification may change without prior notice.
**Main Standard Accessories**

**Plasticization & Injection Unit**
- Wear and Corrosion Resistance (type-N)
- High temperature heater (plasticization, injection), nozzle temperature control heater (60 to 420 °C)
- Purge Cover (with Interlock)
- Synchronous Heater TEMP Increase Function & Faulty Heater TEMP Increase (Heater Disconnection) Alarm Package
- Under-hopper Independent Temperature Control Unit
- Injection Setting Unit Selection Package (% or SI)
- Pressure Retention Unit Selection Package (0.1s, 0.01s or 0.001s)
- Injection Ejection Synchronized Multiple Tasks Package (gate cut system)
- Injection Response Change (Injection 5, pressure retention 4)
- PDT Setting (Pressure Drop Time)
- IPPUK Molding
- Measurement and Mold Open Synchronous Multi-function (When valve gate used)
- Plunger Retention Function after Measurement
- Check Valve for Holding Nozzle Touch Pressure
- Load cell for injection pressure detection
- Injection specifications (pressure/speed) selection
- Plasticization specifications (torque/rotation) selection

**Mold Clamping Ejection Unit**
- Vibration-isolating Level Pads
- Ejector Ejecting synchronized Function While the Mold is Open
- CR Setting Function (mold clamping depressurization after pressure retention)
- Automatic Lubrication Unit

**Control Units and Others**
- Ground-fault Interrupter (200mA)
- Carbide Generation Prevention Function (alarm & automatic heat retention switching)
- Traverse Pick-up Unit Connection Circuit
- Wave Log
- Condition Change Disable Password
- Case Counter (Signal Output is Optional)
- Resin Stagnation Alarm (Compulsive Purge Operation Function)

**Options**

**Plasticization & Injection Unit**
- Injection Unit Forward/Backward Speed Variable Specification
- Cylinder Heat Retention Cover
- ZJ Heater and 2Z Heater Temperature Control Unit
- 450 °C heater (injection & plasticization units)

**Mold Clamping Ejection Unit**
- Insulating Plate Thickness Options (5 or 10 mm)
- Heat Resistance Options (200 or 400 °C)
- Mold Ejector Plate Return Confirmation Connection Circuit & Metal Connector
- Mold Slide Return Confirmation Connection Circuit & Metal Connector
- Falling Sensor & Camera Monitoring System Connection Circuit (Terminal Block)
- Platen Adaptor (Movable Platen) / 40mm Extendable Ejector Rod
- Pickup During Mold Opening (During Mold Opening, Mold Opening Limit Signal Output)
- Vacuum Draw Connection Circuit, Vacuum Draw Drive Unit, Vacuum Draw System
- Specification with Motor Brake for Mold Open/Close
- Locating Ring Adapter
- Increased mold open/close motor capacity for high cycle (MS100 / MS200)
- Mold clamping tie-bar sensor

**Auxiliary Units**
- Mold Cooling Water Manifold (Select from 4/8 Channels)
- Reverse Chute Connection Circuit
- Conveyor Start Position Contact Signal Connection Circuit (forward and reverse rotation commands)
- Product Falling Chute
- Core Rotation Signal Terminal Block
- Core Rotation Power Unit
- Pick-up Unit Base
- Mold Heater Temperature Control Connection Circuit (2/4 kW x 2/3/4 circuit)
- Selection with Current Detection and Disconnection Alarm
- Mold (Hot Runner) Temperature Monitoring Thermocouple Connection Circuit
- Hot Runner Temperature Control Connection Circuit (2 kW/2 circuits)
- Mold Thermocouple (non-grounded type)
- Select from φ2.3/4.8 x 2,000/3,000 mm
- Mold Thermocouple Holder (Select from φ2.3/φ4.8)
- Hot Runner Valve Gate Signal (1 Contact Output)
- Air Ejector Connection Circuit (Select from 1/2 Channels) (Terminal Block)
- Hydraulic Core Tractor Connection Circuit & Drive Unit (Solenoid Valve) (Select from 1/2 Channels)
- Pneumatic Core Tractor Connection Circuit & Drive Unit (Solenoid Valve) (Select from 1/2 Channels)
- Machine Body Height Increase (100mm)

**Special Support**
- High Wear and Corrosion Resistance (type-S)
- Optical Lens Specifications (Type S)
- Specification for Safety Standards of All Countries*4
- GB (China / KCS (Korea) / USA)

**Procurement Items from Other Venders**
- Mold Clamp (8 pieces/set)
- Hopper (select from 7/20/40ℓ) (rotary)
- Additional ejector rod
- Cable for data logging
- Grease cartridge LHL-X100-7 (700 cc)

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*1: Terminal block is selectable  *2: Receptacles made by American Denki Co., Ltd. are selectable
*3: (B) interlocking/non-interlocking batch switching type  *4: Standardly equipped for JIMS (Japan) specification
**MS200**

- **Machine Dimensions & Installation Drawing**

**Mold Installation Dimensions**

<table>
<thead>
<tr>
<th>Diameter of nozzle gate (mm)</th>
<th>Extension (mm)</th>
<th>Sphere R (mm)</th>
<th>Outside diameter of cover (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>φ1.5</td>
<td>80</td>
<td>10</td>
<td>φ38.6</td>
</tr>
<tr>
<td>φ2.0</td>
<td>80</td>
<td>10</td>
<td>φ38.6</td>
</tr>
<tr>
<td>φ2.5</td>
<td>80</td>
<td>10</td>
<td>φ38.6</td>
</tr>
<tr>
<td>φ3.0</td>
<td>80</td>
<td>10</td>
<td>φ38.6</td>
</tr>
<tr>
<td>φ3.5</td>
<td>80</td>
<td>10</td>
<td>φ38.6</td>
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<tr>
<td>φ4.0</td>
<td>80</td>
<td>10</td>
<td>φ38.6</td>
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</tbody>
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