

LMI series

Light Metal Injection

V-LINE® Direct Casting Injection Moulding Machine for Light Metal Alloys



Injection Moulding Machine Compatible with Magnesium Alloys Featuring a Two-cylinder Design

LMI series

Injection Moulding Machine Capable of Moulding Magnesium Alloy !

The LMI series of injection moulding machines is the cutting edge of light metal alloy moulding. Featuring an innovative two-cylinder structure applying ultra precise control over velocity and holding pressure. Utilizing and transferring key concepts from plastic injection moulding to light metal alloy moulding.

Improved viscosity of molten metal, which enables molding thin walled parts with complicated structures. Applying direct pressure in the holding phase helps to eliminate the defective part rate.

The space-saving design without a need for a separate melting furnace improves safety and create more friendly work environment.

Core technologies that underpin LMI series

V-LINE® Direct Casting

Due to the complete separation of melting and injection process more accurate and precise injection is achieved.

Electrical Hybrid Machine that Utilizes Direct Pressure Mould Clamping

Even distribution of clamping force reduces the occurrence of burrs. Constant straight movement reduces moulded part stress.



Electronic equipment



Next-generation vehicles



Aircraft



Wearable devices



Video equipment



Advantages of LMI series Machine

Advantages 1 Application of Plastic Injection Moulding Techniques are Incorporated

Versatility that Can Meet or Exceed Moulding Requirements

The LMI series can fill out thin walled parts due to the molten metal being kept at constant temperature throughout the process. This machine features direct injection pressure and precise low speed injection. This helps prevent internal part defects such as voids and porosity that often occur during the moulding phase of injection.

Downsizing

Due to the capability of low speed and low pressure injection, less clamping force is required, therefore a larger mould can be utilized.

Long Direct Nozzle

The molten metal is kept above the melt temperature until the metal passes through the nozzle tip which reduces material consumption.

A high Efficiency Heater is Used, Reducing Power Consumption

The heater element is in close contact with the cylinder and uses a unique heat insulating material to prevent heat loss to the ambient air. The heat source is electrical. There is no need to supply auxiliary equipment to melt the billets.

Advantages 2 A separate Melting Furnace is Not Needed

Peripheral Equipment is Not Needed

There is no need for peripheral equipment such as melting furnace, a ladle for pouring or robotics for feeding.

User Friendly

A precise amount of material is used for every shot. This contributes to machines' overall efficiency. Our machine is environmentally friendly and all components are laid out in a way that is easy to use, easy to understand. The LMI series have a small foot print contributing to a space savings within your facility. If metal is left in the barrel, that is no problem. Our machine can be shut down without the need to pump out the material and restarted easily.

Advantages 3 The Billets are Easy to Handle.

Compatible with All Magnesium Alloys.

- AZ91D
- AM60
- Non combustible magnesium alloys
- Heat-resistant magnesium alloys
- Magnesium-lithium alloys

Oxidation Resistant

The use of machined billets reduces oxide contamination.



φ90 × 300L (mm)



Cut round bar

V-LINE® Direct Casting

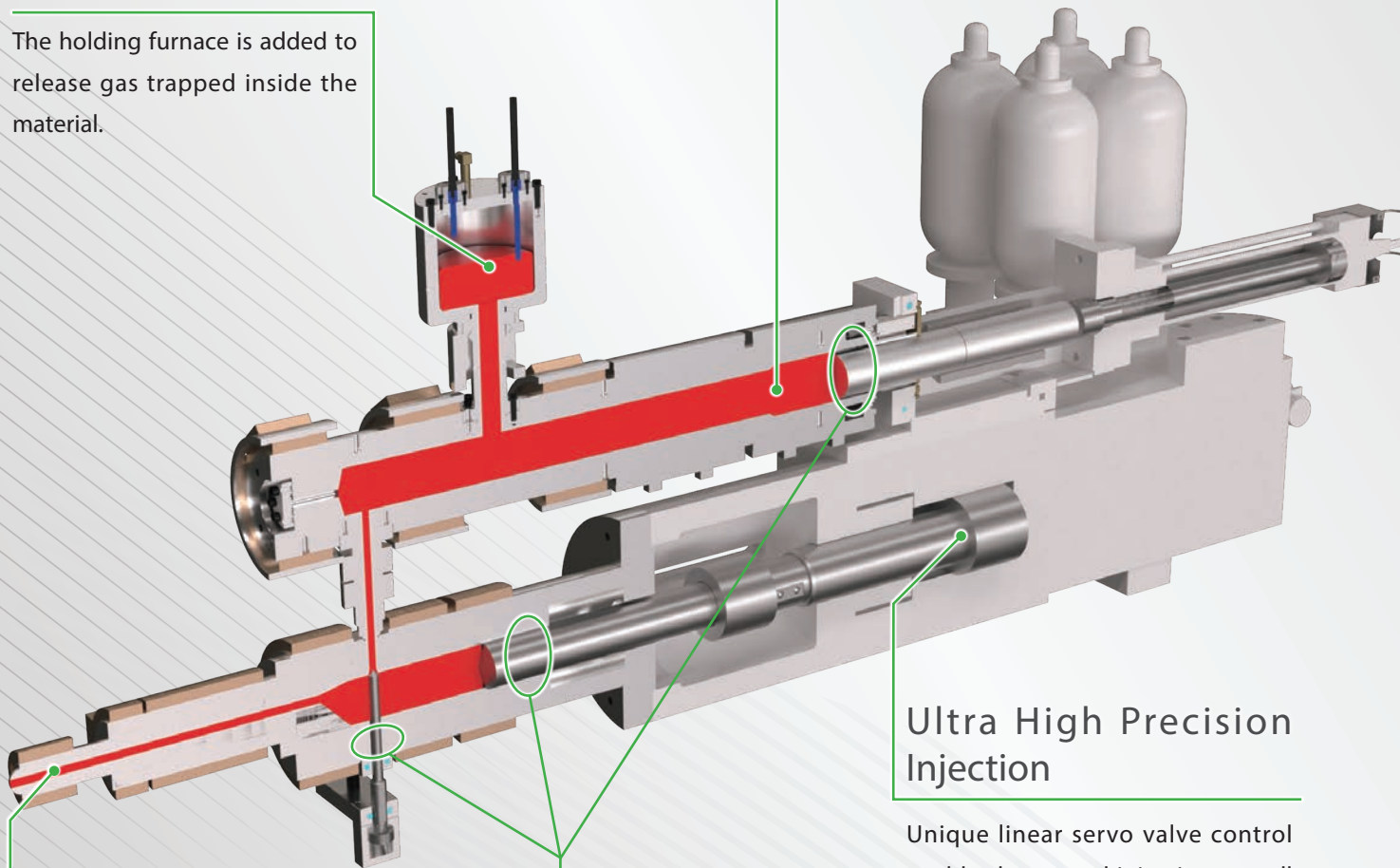
Our V-LINE® Direct Casting system, consisting of two cylinders, a melting section and an injection section. When injection starts, the back-flow-proof design eliminates internal pressure leakage and maintains the same constant pressure in the barrel and the mould.

Holding Furnace (Pot)

The holding furnace is added to release gas trapped inside the material.

The Heating Element are Highly Energy Efficient

The rapid melting of material contributes to a high energy efficiency.



Ultra High Precision Injection

Unique linear servo valve control enables low-speed injection as well as high-speed injection control.

Nozzle

The molten metal is kept at a low viscosity until it reaches the nozzle tip, therefore it will maintain that low viscosity throughout the injection process. This will allow the holding pressure to work at peak efficiency.

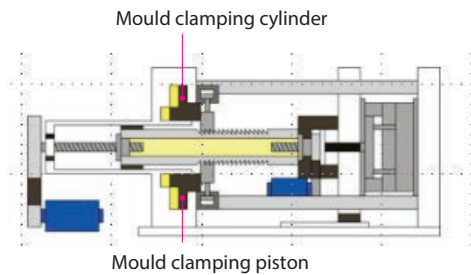
Mag Seal

The temperature of the moving parts that need to be sealed is controlled in the transition zone so the magnesium can serve as a self sealing material to prevent leakage at the machine seals.

Electric Hybrid Direct Pressure Mould Clamping

Synergy with V-LINE® Direct Casting achieves precise and stable moulding.

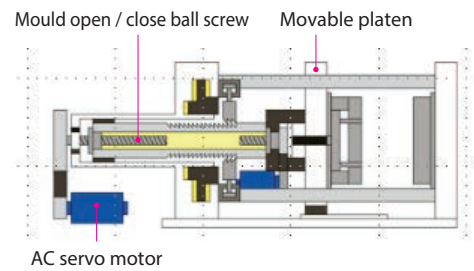
I. Mould clamping: Direct pressure mould clamping mechanism



Hydraulic cylinder drive

⇒ Uniform mould clamping force

II. Mould opening/closing: Electric direct pressure type opening and closing mechanism



AC servo motor

Movable platen driven via AC servomotor

⇒ Accurate position control

I. Features and Advantages of the Direct Pressure Mould Clamping Mechanism

Uniform clamping force is distributed throughout the mould



Maximal burr suppression effect

Optimal mould clamping force can be set, in particular allowing low-pressure mould clamping control



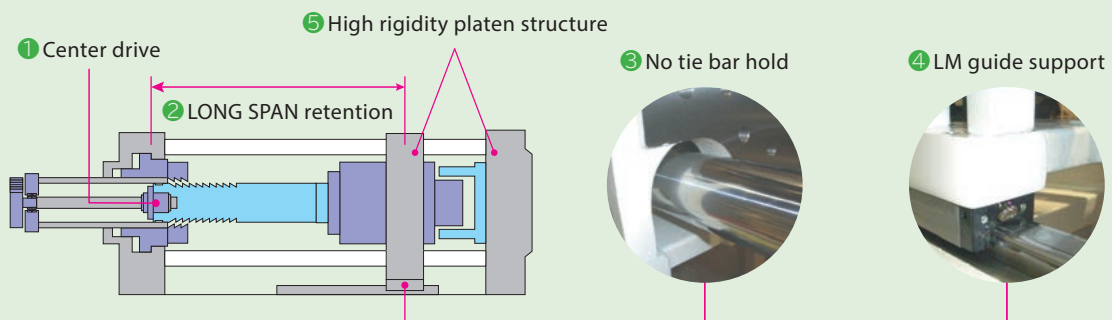
Extended mould life and maintenance period

Stable mould clamping force even when external disturbances changes



No effect of thermal expansion of moulds

II. Features and Advantages of the Electric Direct-pressure-type Opening / Closing Mechanism



① Movable platen center ball screw drive

② Retention point LONG SPAN structure

③ Structure has no tie bar hold

④ LM guide movable platen support



Superior straight trajectory reproducibility
Suppression of biased mould load

⑤ Highly rigid structure for fixed and movable platen

⑥ Center press structure with hydraulic cylinder

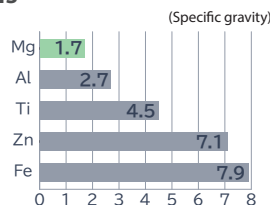


Burr prevention by strengthening around mould centers

Properties of Magnesium

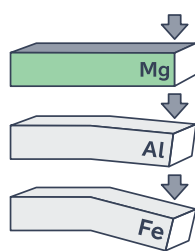
One of Lightest Mouldable Metals

Magnesium has a specific gravity of 1.7. That makes it the lightest cost effective metals. (Comparable metals such as: aluminum [2.7], titanium [4.5], zinc [7.1], and iron [7.9].)



Superior to Steel and Aluminum in Strength to Weight Ratio and Tensile strength.

The specific strength (strength to weight ratio) and specific rigidity (tensile strength) of magnesium are higher than those of aluminum, iron, and resin materials.



Highest Vibration Absorption Performance Among Cost Effective Metals

Magnesium has excellent vibration absorption performance. Depending upon the alloy composition, higher purity of magnesium will result in higher absorption performance.



Excellent Machinability

Magnesium can be machined at high speed due to its low cutting resistance. If the required cutting power index of magnesium is 1, that of magnesium and iron is 1.8 and 6.3 respectively.



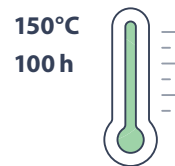
Excellent Dent Resistance

Magnesium dents less than aluminum and iron when an object collides with it.



Magnesium has Better Dimensional Stability with Temperature Change.

Even when heated at 150°C for 100 hours, magnesium dimensional change is as small as 6×10^{-6} , and there is almost no dimensional change at temperatures below 100°C.



Can be Recycled

Magnesium is recycled. The energy required to recycle magnesium is 4% of what new ingots require.



Magnesium has Excellent Chemical Properties.

With proper handling, understanding its basic characteristics, and proper equipment, magnesium can be handled safely.

Professional advice is recommended before actual use.

General Characteristics



Molten magnesium will react with carbon dioxide gas, sulfuric acid gas and moisture in the atmosphere to form oxide, sulfide and hydroxide films.



Molten magnesium will react with oxygen producing sparking and forming a white magnesium oxide (MgO).



Molten magnesium will also react with atmospheric nitrogen to form brown magnesium nitride (Mg₃N₂). Magnesium nitride reacts violently with water and generates high heat.



When a minimal amount of water comes into contact with burning magnesium, the water is decomposed into hydrogen and oxygen, which could cause an explosion and accelerate the combustion of magnesium.



Chips and fine powder of magnesium combined with water are easily ignited by an open flame, decomposing water into hydrogen and oxygen and burning violently.



If molten magnesium comes into contact with heated iron oxide (e.g. oxide scale generated from an iron pot), both will react violently. (thermit reaction)



In high-temperature water or aqueous solutions containing chlorides, magnesium reacts with water to form magnesium hydroxide (Mg(OH)₂) while generating hydrogen gas.

↳ These precautions are given every time magnesium is processed.

Specifications LMI450M

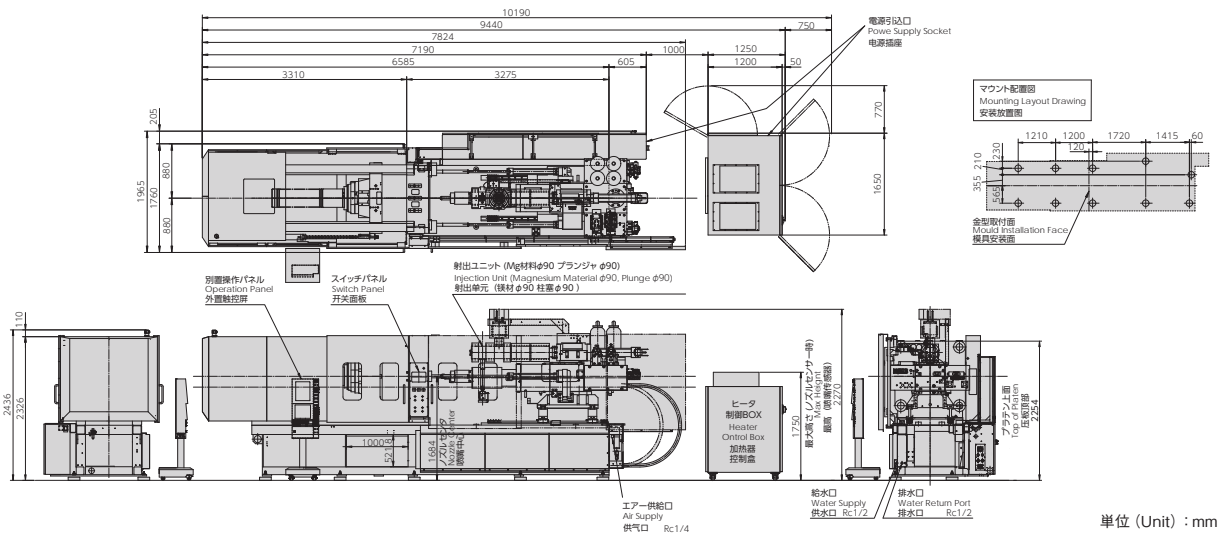
Clamping Unit	
Mould Open / Close System	AC Servo Motor Control
Clamping System	Direct Pressure Locking Type
Max. Clamping Force	kN 4410
Tie Bar Distance (W x L)	mm 820 x 820
Platen Dimension (W x L)	mm 1140 x 1140
Open Daylight (Min. Mould Thickness + Max. Stroke)	mm 1240
Min. / Max. Mould Thickness	mm 340 / 900
Mould Open / Close Force Rated / Instantaneous	kN 24.7 / 49.4
Ejecting System	Hydraulic (13 ejection points, including 5 tight-in ejection points)
Ejecting Force	kN 252
Ejector Stroke	mm 100
Injection Unit	
Injection System	V-LINE® Direct Casting method
Plunger Diameter	mm 90 (120)
Diameter of Billet (Mg)	mm 90 (120)
Max. Injection Pressure	MPa 50 (40)

Theoretical Injection Volume	cm ³	826 (1810)
Injection Rate	cm ³ /s	31808 (33929)
Plunger Stroke	mm	130 (160)
Max. Injection Speed	mm/s	5000 (3000)
Number of Heater Control Zones		15
Heater Capacity	kW	74.2 (100)
Number of Billets in Stock	billets	10
Melting capacity	cc/min	300 (600)
Hydraulic & System		
Motor Capacity for Hydraulic Pump	kW	20
Hydraulic Circuit Pressure	MPa	MAX 18.5
Tank Capacity	Liter	191
Motor Capacity for AC Servo	kW	11.0
Machine Dimension · Weight		
Machine Dimension (L x W x H)	mm	9440 x 1965 x 2770
Machine Weight	kg	21000 (22000)

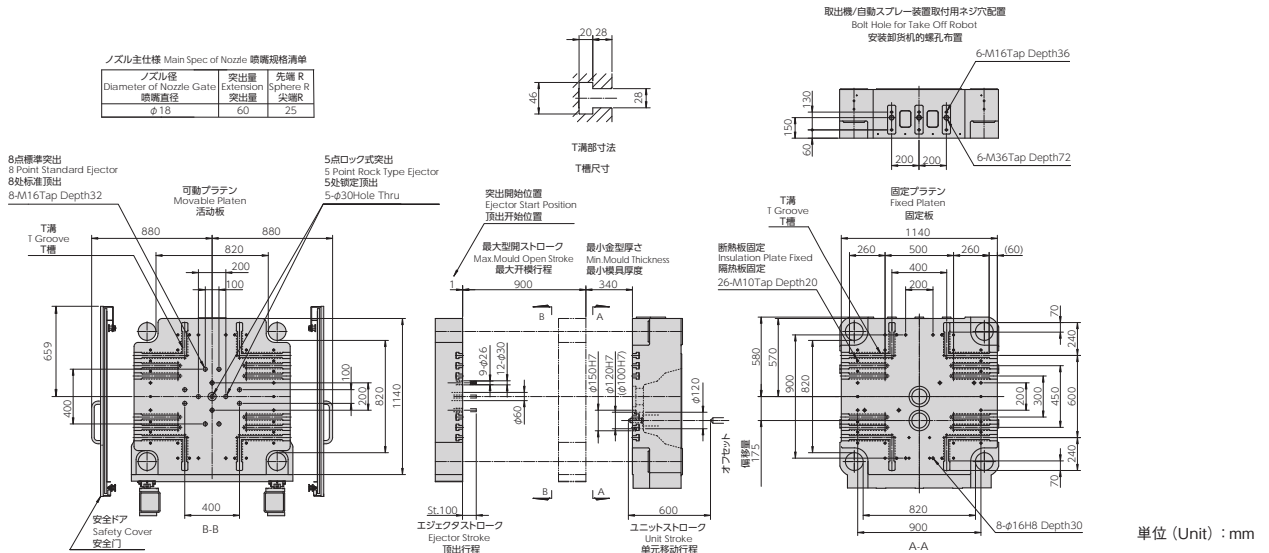
Figures in () are for ϕ 120.

Due to ongoing research, specifications are subject to change without prior notice.

Machine Dimensions & Installation Drawings



Mould Installation Dimensions



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Sodick Co., Ltd.

Sodick Head Office / Research and Technology Center
3-12-1, Nakamachidai, Tsuzuki-ku, Yokohama, Kanagawa
224-8522 Japan
TEL: 81-45-942-3111

<https://www.sodick.co.jp/en/>

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- This catalogue contains illustrations and drawings, and some may include certain options.
- The information in this catalogue is current as of September 2022.