Sodick

Injection Molding Machine for High Value-Added Products

GL series

GL30 GL60 GL100 GL150 GL200

V-LINE

V LINE creates the value of the

V-LINE®'s Global Standard Model

The "GL Series" is the Global Standard Model of Sodick which has been concentrating on the development of precision injection molding machines, based on the features of the "V-LINE® + Electric Hybrid Direct Pressure Mold Clamping."
This model will contribute to the manufacturing of customers who continue to challenge the development and manufacturing of state of the art high-value added products, including precision, electronics, optical, and medical instruments, in addition to the unique technology of the linear servo drive injection and total servo drive.

Medical
Medical Equipments

Automotive
Next Generation Automobiles

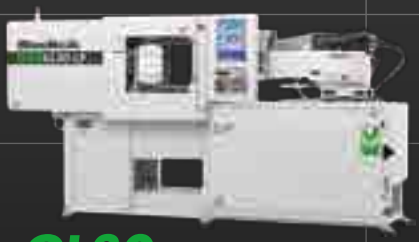
Automation
Automation Solutions

Optical
Optical Instruments

Precision
Precision Instruments

GL Series Lineup

30 tf	60 tf



GL30
Mold Clamping Force 294 (392) kN*
- Plunger diameter : 12, 16, 22 mm
- Screw diameter : 14, 18, 22 mm

GL60
Mold Clamping Force 588 k
- Plunger diameter : 22, 25, 28 mm
- Screw diameter : 22, 25, 28 mm

Total Servo Drive

next generation

GL series

Evolved Categories

Traceability

Usability

Mold Clamping Force

100 tf | 150 tf | 200 tf

GL100

Mold Clamping Force 980 kN

- Plunger diameter : 28, 32, 40 mm
- Screw diameter : 28, 32, 40 mm

GL200

Mold Clamping Force 1960 kN

- Plunger diameter : 28, 32, 40 mm
- Screw diameter : 28, 32, 40 mm

GL150

Mold Clamping Force 1472 kN

- Plunger diameter : 28, 32, 40 mm
- Screw diameter : 28, 32, 40 mm

* Mold clamping force 392kN is an optional specification.

V-LINE®

Technology

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

1. Long-time stable molding
2. Stable control of plasticization & melting
3. Low shearing plasticization control
4. Accurate plunger position control
5. Low speed injection speed control
6. High speed & high pressure injection control
7. Fill volume control
8. Holding pressure control

Solutions to issues while molding

- Easy achievement of molding conditions
- High repeatability of molding conditions
- Mutual compatibility of molding conditions in same machine

Pursuit of further economical efficiency

- Quick start until good product is produced
- Higher ratio of crushed material and recycled material
- Prevents damage of molds resulting from molding
- Easy clarification of defect factors of molds and materials
- Durability of the plunger is 4 to 5 times better than the backflow check ring mechanism

Aiming for defect-free products

- No occurrence of sporadic defects and unanalyzable defects in continuous molding
- Free of contamination (foreign matter)
- Prevents jamming trouble of material
- Extremely stable feeding of material

Sodick's GL Series leads to potential next generation products

Suppression of outgassing	Less fracturing of fiber by preventing over shearing of long-fiber material	Realizes extremely difficult molding

V-LINE® Solution

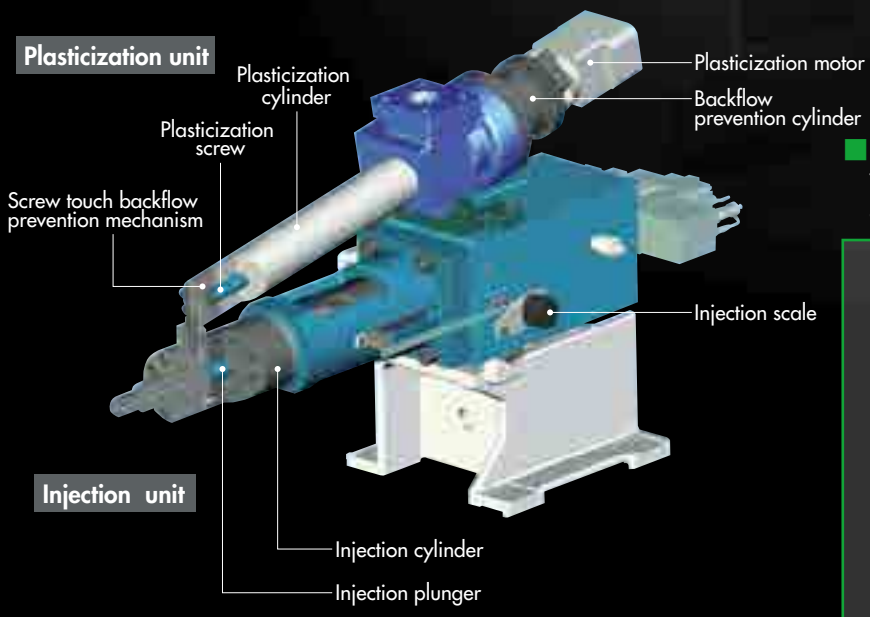
Mastering the core of injection molding machines the "injection and plasticization units", infinitely reduces the destabilizing factors-

The features of the screw in-line method (hereinafter "in-line") adopted in most injection molding machines, is to perform the plasticization and injection by one screw equipped with a check ring mechanism. However, the destabilizing factors in plasticization, measurement, and injection have been pointed out for many years. Sodick's GL Series eliminates the destabilizing factors in injection molding to date with Sodick's original injection plasticization method "V-LINE®," which improves efficiency in product manufacturing including molds, and provides the ability to solve issues of next generation products.

V-LINE®

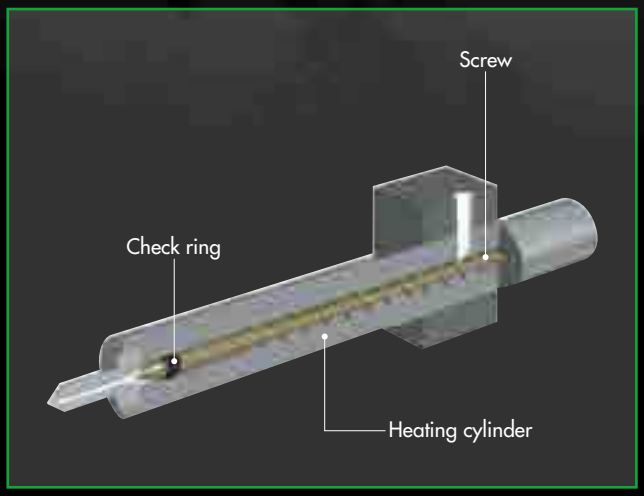
Features

V-LINE® separates the injection and plasticization processes



■ In-line: Coaxial structure of injection and plasticization unit

The plasticization process and injection process switch with the forward and backward movement of the check ring of the screw head.



V-LINE® realizes accurate filling and stable plasticization performance

■V-LINE® Injection Method

V-LINE®

- ●Screw only performs plasticization → **Constant heat history of resin during plasticization**
- ●Controls each process of injection and plasticization in order → **Controls behavior of resin as well**
- ●No portion slides or shears the resin → **No excessive shearing heat or over shearing applied to resin**

■V-LINE® Molding Process

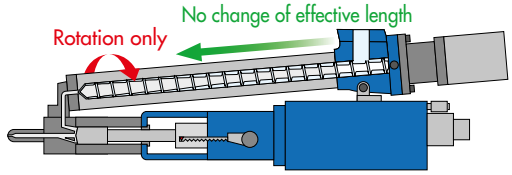
Measurement → **Backflow prevention** → **Suck back** → **Injection** → **Hold pressure**

3 Stabilities

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 injection and plasticization.

Measurement

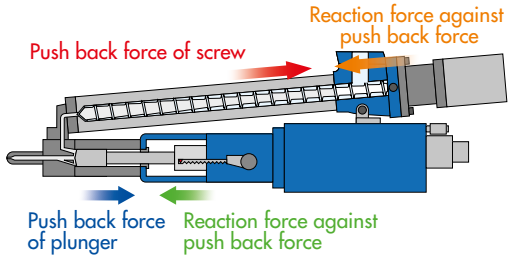
Start of plasticization



Effective length of plasticization screw required for plasticization does not change

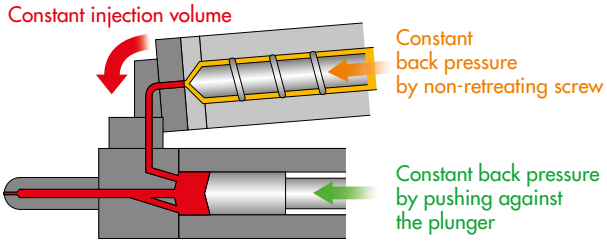
(1) Stable melting condition

Start of measurement



Push back force of each component and reaction forces are balanced

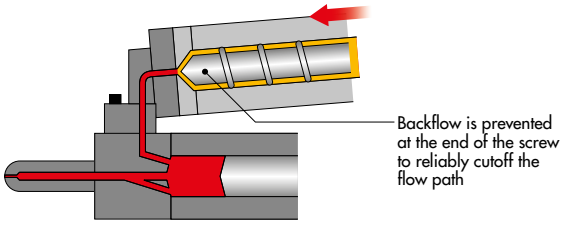
During measurement



(2) Stable density of weighed resin

Backflow prevention

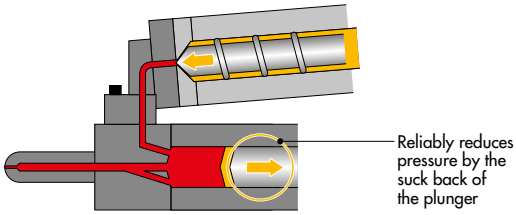
Backflow prevention



Suck back

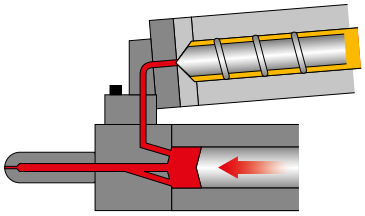
Suck back

The suck back in the V-LINE® uses the same principle as a syringe. Since the flow path is cutoff at the end of the screw and the injection plunger moves backwards, the pressure in the injection cylinder can be reduced without transferring the material supply pressure to the injection cylinder side.



Injection

Hold pressure



Injection after the active closure of the flow path → No backflow during injection → **All the resin is filled into the mold**

(3) Stable actual filling volume

■Injection methods other than V-LINE®

In-line

- ●Screw performs plasticization and injection → **Heat history of resin becomes unstable**
- ●Backflow prevention and injection processes operate simultaneously → **Behavior of resin cannot be controlled completely**
- ●There are portions which slide or shear the resin → **No excessive shearing heat or over shearing is applied to resin**

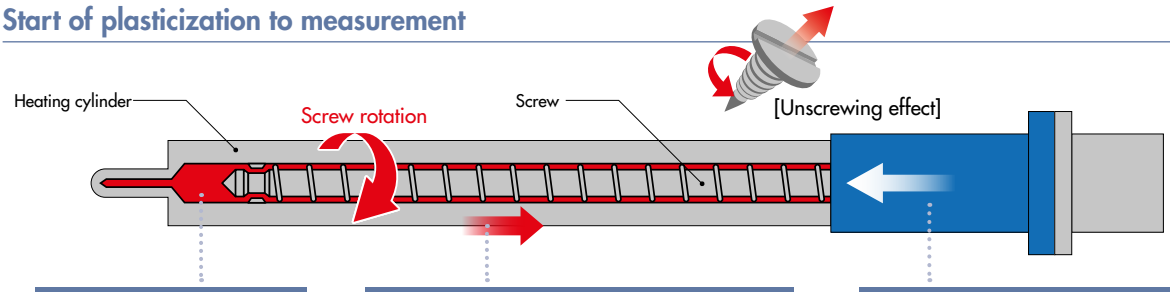
3 Unstables

Three instabilities, such as **(1) the melted state of the resin, (2) the density of the weighed resign,** and **(3) the actual filling volume** that occur in-line, because one screw is used for both injection and plasticization.

One screw is used for injection and plasticization
+
backflow prevention and injection operate simultaneously
→ **instability of resin melted state**

Measurement

Start of plasticization to measurement



Density of resin measured = **Force of the resin tries to push back the screw (uncontrollable)** + **Constant back pressure being controlled (controllable)**

This method relies on balance and is not controllable.

Unstable density of weighed resin

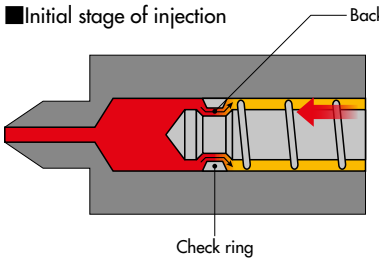
In the in-line, the density of the resin is determined by the difference which occurs between the force of the resin trying to push back the resin when the screw rotates, and the back pressure that is activated in the reverse direction. Since the push back force of the screw changes by the condition of the resin to be supplied and the screw position, it is extremely difficult to control the density of the resin uniformly.

Backflow prevention & injection

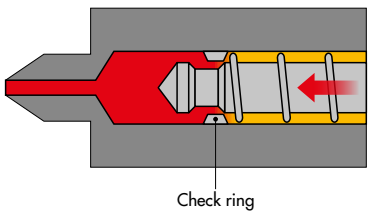
Hold pressure

Backflow prevention & injection

■Initial stage of injection



■Injecting

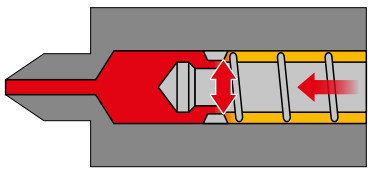


Unstable actual filling volume

In the in-line, the backflow of resin occurs from between the screw and backflow prevention ring (check ring) in the initial stage of injection. The backflow volume of resin cannot be controlled, and is not uniform. The variation in this backflow of resin causes variations in the actual filling volume during injection.

Injecting

■Braking phenomenon:
Rubbing against the inner wall of the plasticizing cylinder, burns the resin



The braking phenomenon occurs where the backflow prevention ring is expanded by the injection pressure.

LSVD
Linear Servo Valve Drive

Linear servo drive that further produces the breakthrough force of the V-LINE®

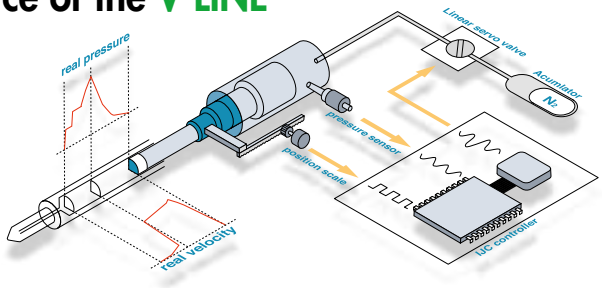
The GL Series machine controls the low inertia plunger by linear servo drive.

V-LINE® Technologies

Drive of the low inertia injection plunger is controlled by a linear servo valve (LSV) and an optimal injection controller

+

plasticization screw is controlled by the servo drive of the TSD system



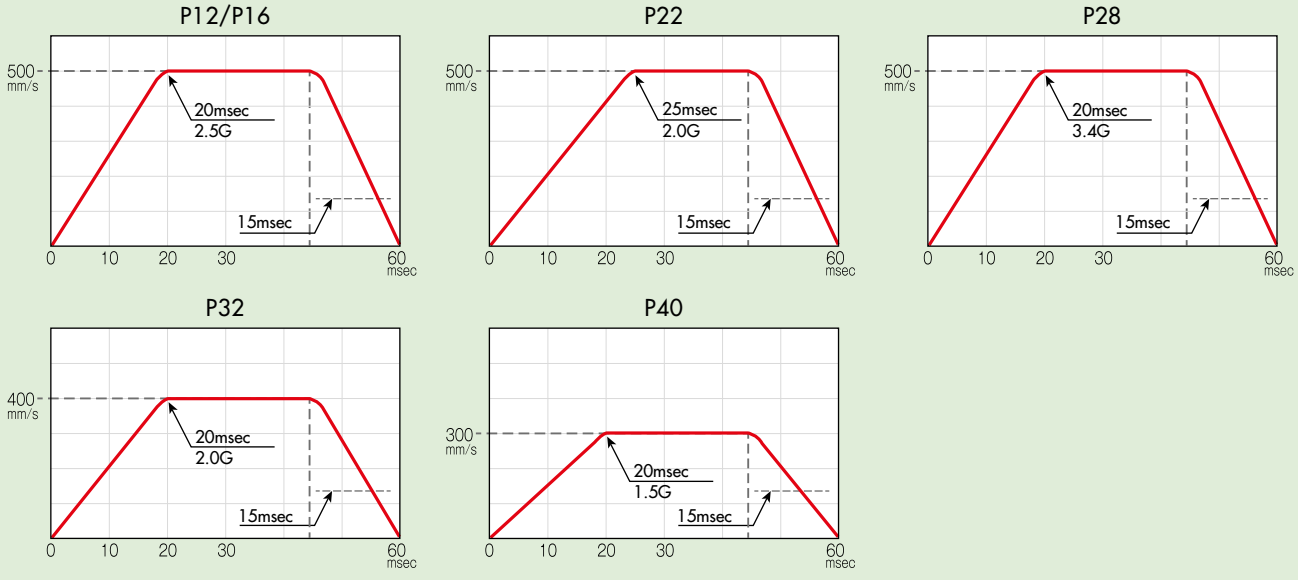
The LSVD adds excellent injection performance to the V-LINE®.

Quick acceleration | Sharp stopping | Accurate acceleration/ deceleration tracking

The high injection acceleration and high rate of injection efficiency by the produced performance, brings further possibilities to injection molding.

■Ability of Injection Acceleration (Responsiveness of Rise and Fall of Injection Speed)

Plunger diameter		P12	P16	P22	P28	P32	P40
Max. injection speed	mm/sec.	500	500	500	500	400	300
Max. injection pressure	MPa	288	262	260	240	220	210
Injection rate	cm^3/sec.	57	101	190	308	322	377
Injection acceleration	G	2.5	2.5	2.0	3.4	2.0	1.5
Speed rising time	msec.	20	20	25	20	20	20
Speed falling time	msec.	15	15	15	15	15	15



Low inertia plunger + linear servo valve drive (LSVD)

→ (1) Quick accelleration
(2) Sharp stopping
(3) Accurate acceleration/ deceleration

→ **Overwhelming Injection acceleration**
High injection rate
Effective efficiency rate

Further improvement in stable molding repeatability

Prevention of contamination and discoloration of resin
Allows for injection at the low speeds required for actual molding, and suppresses the generation of shearing heat.

Improves the fillability for product shapes with a high degree of difficulty, such as small precision items, complicated and thin-wall thicknesses
The filling can be performed in an extremely short time, as the filling can be completed before the solidification of the resin.

Plasticization
Enhanced Stability

Possibilities expanded by "stability of plasticization" enhanced with TSD (Total Servo Drive)

Suppresses outgassing and fracturing of long-fiber material

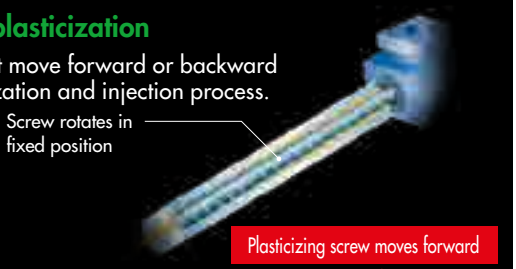
Improvements in the function and quality will continue to be pursued for plastic molded products, and an increasing number of various additives will be included in the plastic materials.
These additives have been the cause of poor molding, and outgassing during molding will continue to be regarded as an issue.
Molding containing glass and carbon fiber materials which are an effective method of realizing highly strengthened plastic will continue to be used actively in a wide range of fields.
The V-LINE® has received high evaluations on the "stability of plasticization" to date, and the control performance of the rotation speed and torque has been improved further by the servo motor pump drive on the plasticization unit by the TSD system.

The "stability of plasticization" enhanced by the TSD contributes to the solving of high-dimensional issues, such as suppression of the outgassing and fracturing of long-fiber materials.

Features of V-LINE® Mechanism

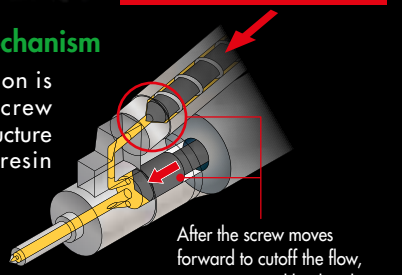
Extruder type plasticization

The screw does not move forward or backward during the plasticization and injection process.



Backflow prevention mechanism

Since the backflow prevention is completed by moving the screw body forward, there is no structure like a check ring where the resin flows through a narrow path.



Outstanding stability of plasticization of V-LINE®

Improved controllability of screw rotation speed and torque by TSD system
Further improves plasticization stability

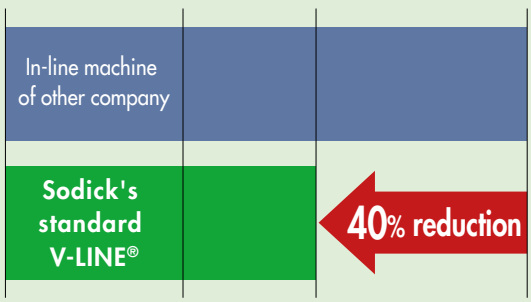
■No portions which generate shearing

Excessive shearing heat is not applied to resin	Suppresses occurrence of outgassing	Reduces mold maintenance
Excessive shearing stress is not applied to resin	Suppresses fracturing of long-fiber material	Improves actual strength of molded products by fiber material

Comparison of outgassing suppression effectiveness

Suppressing the outgassing which occurs from the melted condition greatly reduces the adhesion of gas to the molded product and mold.

■Amount adhered to molds by outgassing



Example of fracture suppression of long-fiber material

Result of molding a resin dumbbell sample containing long-fiber (11 mm)

Strengthening a resin by a fiber material to a higher level is achieved by entangling a fiber which maintains a predetermined length in the resin. Glass powder or carbon powder without a fiber length where the fiber was fractured into pieces does not function effectively in strengthening a resin. The measurement results of products molded in a V-LINE® machine show that the fiber material maintains a fiber length in units of mm without fracturing into a powder.

·Screw diameter: ϕ32mm
·Cylinder temperature: 280℃

	Unit	Initial Length	Purge Item	Dumbbell	Stripped Piece
PP-CF20	mm	11	5.04	2.09	2.14

* The table shows the measurement results of the weight-average fiber length of a purged resin item containing long-fiber material, and the molded dumbbell sample as shown in the photo.

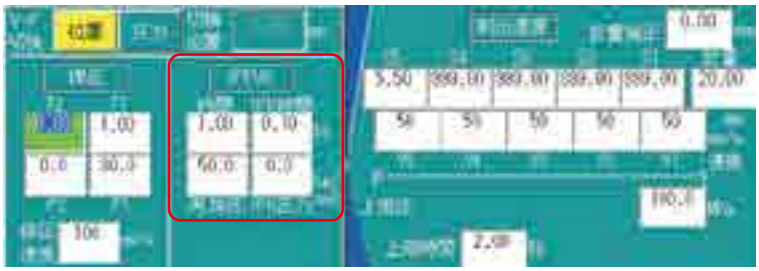
New Injection Functions

Added an injection function that demonstrates effectiveness against poor molding

IPPUK Control (Dose Molding)

IPPUK is a control method which repressurizes during the holding pressure process, and effectiveness in improving the filling balance in uneven runners can be expected.
When there is a variation in the injection filling volume of each shot, the effective repeatability is not guaranteed however, the IPPUK control functions effectively in the V-LINE® with high accuracy in the injection filling volume.

■Injection Setting Screen (IPPUK Settings)



In an injection molding process, when the pressure is temporarily reduced to stop the filling after an injection fill, the surface of the molded product will solidify and forms a thin film. When the resin inside the film is repressurized, the necessary pressure is applied on the mating surface of the mold without the occurrence of burrs, which improves the quality.
The same effect can be acquired by repressurizing the unsolidified thick wall portion, to reduce warping and etc.

■Example of molding with reduced sled

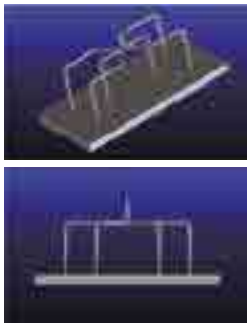


Fig-1 Normal Shape

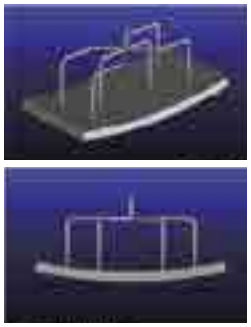


Fig-2 State of the internal sled

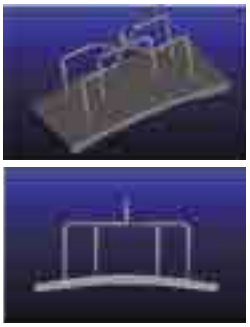


Fig-3 State of reverse sled (sledge outside)

The molded product is a plate shaped product with uneven runners with the shape in [Fig-1]. When the holding pressure is increased in a standard molding pattern, this product will be deformed in the gate direction as shown in [Fig-2]. In order to change the pressure propagating state of the cavity, when the holding pressure is set to repressurize in the timing where the inside gate seals, the product warped outwards as shown in [Fig-3]. Good products can be produced by adjusting the timing of the repressurization.

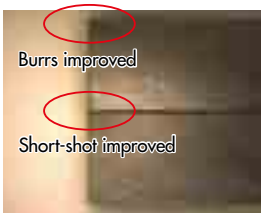
PDT Control (Pressure Drop Time)

This function demonstrates effectiveness when poor molding, such as sink marks, warping, short-shot, and flashing occur in combination. Complex poor molding can be improved by adjusting and controlling the decrease in the holding pressure, after changing the V (Velocity) and P (Pressure).

■Example of improvement by PDT control

This is an example where the flash and short-shot was improved by setting the V and P switch position (S5) to a position where the flash does not occur, and setting the holding pressure to a lower value where the pressure is decreased gradually in small component molding (resin used: LCP) in which flash and short-shot occur in combination.

Molded product without PDT control



Molded product with PDT control

■Injection setting screen (PDT control) and velocity pressure waveform

PDT setting: 0.1 sec

PDT setting: 0.5 sec

Injection setting screen and velocity pressure waveform without PDT control

Injection setting screen and velocity pressure waveform with PDT control

Direct Pressure Mold Clamping

SHDC Sodick Electric Hybrid Direct Mold Clamp

Strong points

1. Parallelness
2. Straightness
3. Mold open/ close position accuracy
4. Mold open/close velocity accuracy
5. Direction deviation accuracy
6. Mold clamping force distribution uniformity
7. Mold clamping force accuracy
8. Mold clamping rigidity

Electric hybrid direct pressure mold clamping

Sodick Electric Hybrid

Mold open/close process: Electric servo motor mechanism → **Accurate position control**

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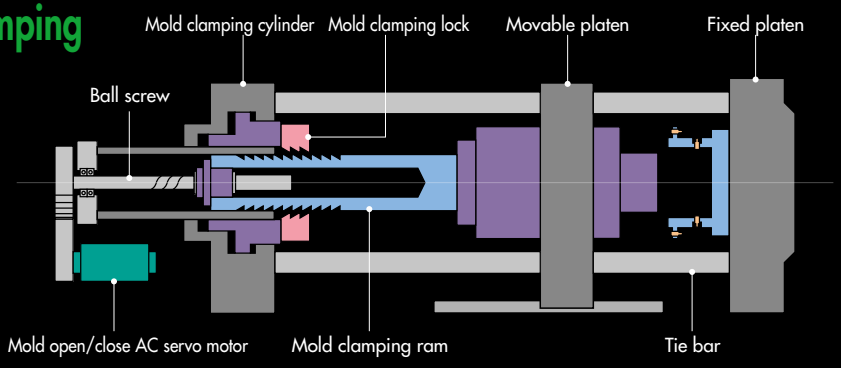
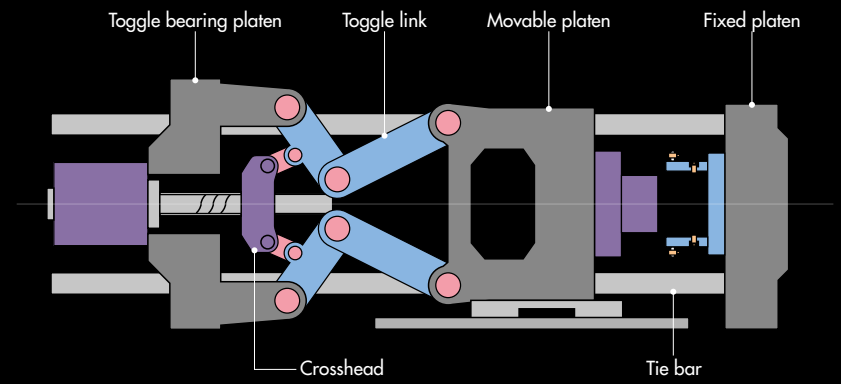
Mold clamping process: Hydraulic cylinder mechanism → **Uniform mold clamping force**



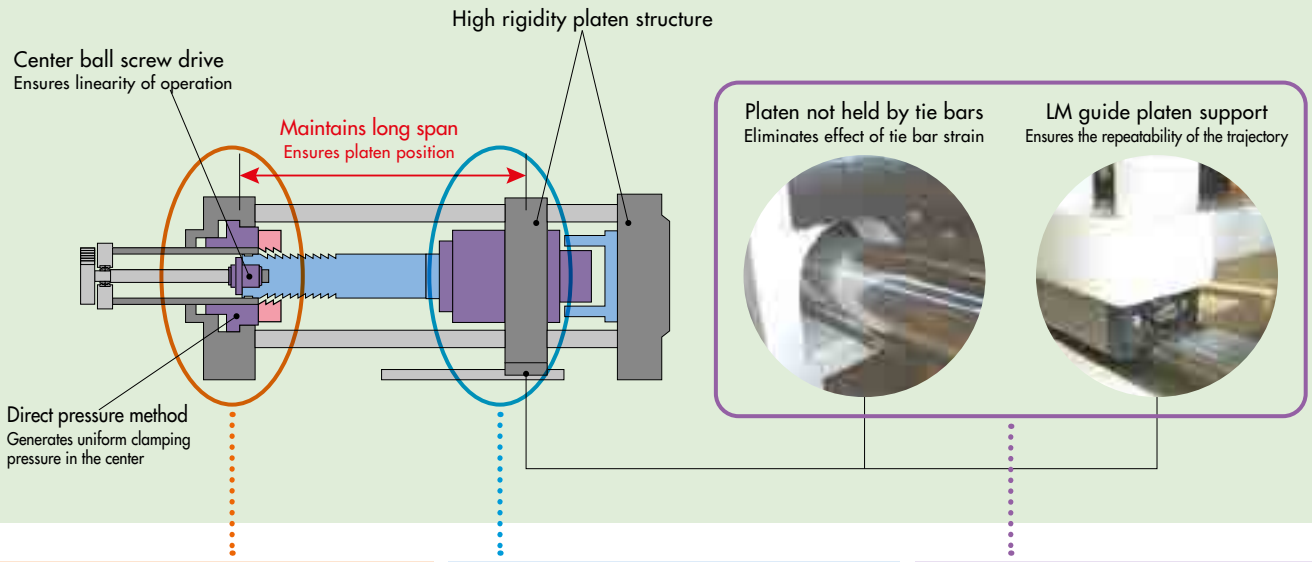
■Toggle Method

Adopted by most injection molding machines
(This method is adopted by most electromotive types)

This is a method to acquire a large mold clamping force by using a toggle mechanism to increase the force which occurs in a hydraulic cylinder, and other sources of motive power.
The mold opens/closes by the expansion and contraction of the toggle link consisting of a toggle (called the arm) and a link, and the mold clamping force is generated when the toggle link is fully extended.
The feature of this mechanism is to open/close the mold in a single operation by linkage.



SHDC Mechanism and Superiority Supporting V-LINE®



Mold clamping force changed easily

The clamping force can be changed even during operation, because it only requires a change of the hydraulic pressure setting value.

Accurate mold clamping force can be understood

The pressure value of the mold clamping cylinder measured in real time enables understanding of the accurate mold clamping force.

Realizes no burr molding

The strong contact in the center of the mold prevents the occurrence of burrs.

Maintains position easily

There is no secular change in the position, because the direct pressure mechanism unit has no structure which could wear.

No stress is applied to mold components

The secured repeatability of the trajectory prevents moving of the mold in the up and down directions, and does not generate excessive stress.

■Comparison of mold clamping mechanisms

SHDC	vs	Toggle type mold clamping of other company
The repeatability of the trajectory is high with the support of the LM guide and mold clamping ram, which makes it easy to maintain the position of the movable platen.	Operation accuracy	A straight trajectory cannot be acquired due to the difference in the size of the toggle arms, and the position of the movable platen cannot be maintained.
An unbalanced load does not occur with the center (ball screw) drive.	Load distribution	A maximum load is applied at the moment the arm is fully extended, and the mold clamping force is distributed centering on the arm mounting position.
The mold clamping force by hydraulic pressure is not affected by disturbances, such as the temperature.	Effect from disturbances	The mold clamping force changes when the extension of the tie bars changes along with the change in the metal temperature.

SHDC
Sodick Electric Hybrid Direct Mold Clamp

Direct Pressure Mold Clamping System

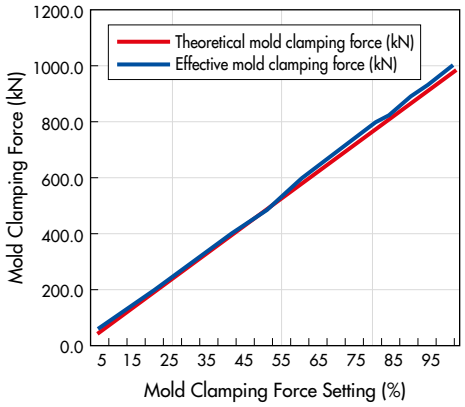
Enhancement of mold opening/closing and mold clamping function by TSD (Total Servo Drive) system

Linear clamp control (Very low pressure mold clamping)

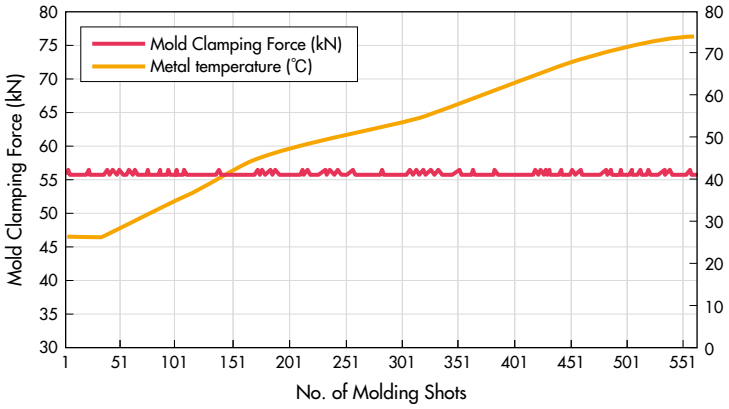
Contributes to reduction of mold deposits

The main feature of the direct pressure mold clamping is that an accurate mold clamping force can be acquired from the next shot after the molding conditions change even during molding.
In a common direct pressure machine, a difference may occur between the mold clamp setting value and the actual mold clamping force in the setting range of a low mold clamping force.
The GL Series provides an accurate mold clamping force in wide range from a 5% to 100% setting value, by adopting linear clamp control.
The degassing effect of the mold vent can be improved in low pressure mold clamping.
In the GL Series, the mold clamping force required for molding can easily be set to a lower value,
and demonstrates effectiveness in reducing mold deposits.

■GL100 Mold Clamping Force Accuracy



■GL100 Stable Mold Clamping Force Data for Mold Temperature Changes



This graph shows the results of a continuous operation, where the mold clamping force was set to 5% (constant). The results show the features of the direct pressure mold clamping where the mold clamping force shifts uniformly, even though the mold temperature was changed from a low to high temperature.

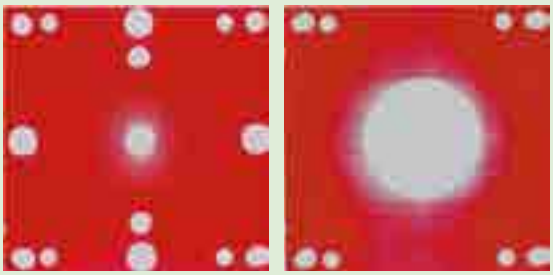
Easy mold protection (Mold protection setting automatic calculation function)

When the mold protection setting is set to an inappropriate value, it will lead to damage of a mold.
Conventionally, the monitoring setting values, such as the upper torque limit, monitoring torque, and monitoring start position were determined while performing the mold open/close operation by an operator however, it took time because the settings had to be performed for each mold, and the work was complicated.
The GL Series is equipped with a function to automatically calculate the appropriate setting values by using the mold protection automatic calculation, after the sensitivity of the mold protection for the change in the mold temperature is selected from 3 steps.

Mold clamping surface contact test

The highly rigid platen structure and uniform mold clamping force at the center generated by the diret pressure method, realizes uniform distribution of the mold clamping force to the entire mold.

■Evaluation by impact paper



Movable platen　　Fixed platen

Evaluated mold
(230 x 230 mm)

Dynamic straightness accuracy at mold clamping → start of mold opening → mold open

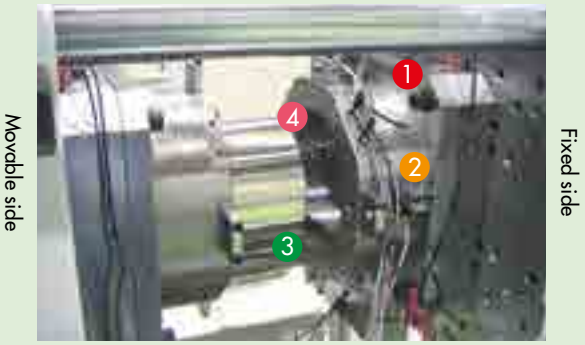
Difficult for flaws to occur

With deep molded products, problems such as flaws in the surfaces of products do not occur easily.

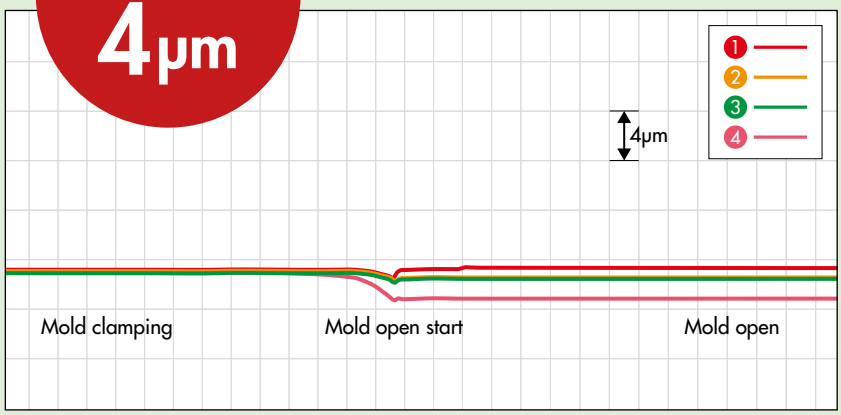
Hard to damage

In molds that have fine core pins, fracturing of these pins and other damage does not occur easily.

■Mold for measurement



SHDC
Horizontal/
vertical misalignment
4μm



SHDC
Sodick Electric Hybrid Direct Mold Clamp

TSD Total Servo Drive

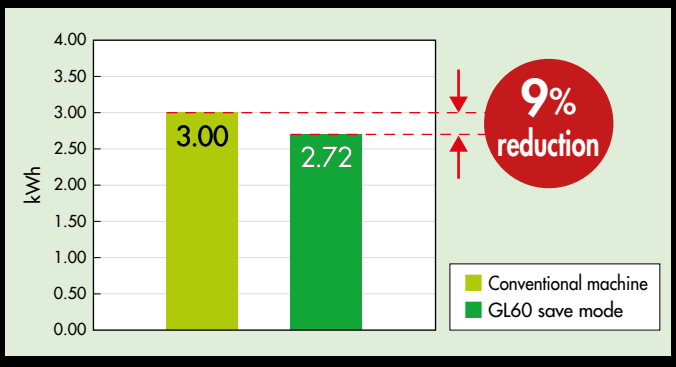
In the newly developed total servo drive system, in addition to the linear servo drive in the injection process and the electric servo motor direct drive in the mold open/close process and the extrusion process, the use of a pump drive by an electric servo motor in the mold clamping process and plasticization process were promoted to further improve the operation accuracy and energy savings.

Save mode (Energy saving mode operation)

This mode is a control method which repressurizes during the holding pressure process, and effectiveness in improving the filling balance in uneven runners can be expected.
When there is a variation in the injection filling volume of each shot, the effective repeatability is not guaranteed however, the IPPUK control functions effectively in the V-LINE® with high accuracy in the injection filling volume.

Reduces unnecessary power by adjusting the operation settings of the molding machine to the actual molding conditions.

When the mold clamping force, injection pressure, maximum injection speed, and shot capacity (injection stroke) are set to low molding conditions for a molding machine with full specifications, the power consumption of the molding machine can be reduced by selecting the save mode. The power can be reduced by 9% compared with a conventional machine (LA Series).



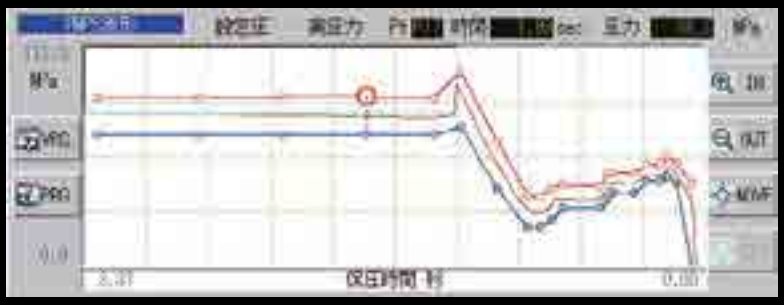
Traceability

Idea for visualization of molding.
Enhanced traceability function

The process monitoring data of the high precision V-LINE® molding machine allows for quality determination of actual molding only, which contributes to a reduction of the visual inspection process. The monitoring of waveform data was added to the "GL Series" as an additional acceptance criterion. In addition, a function to save each shot in a waveform data image was added to the data logging function, so that it can be used to trace molded products.

Waveform monitoring

The speed waveform and pressure waveform can be monitored in all speed and holding pressure ranges, by the function in which the measurement points are provided on the injection waveform to detect defects from the waveform of each shot.
The shots that deviated from the monitoring range are recognized as defective shots.
In the process monitoring setting, the defective shots which could not be distinguished can now be recognized.



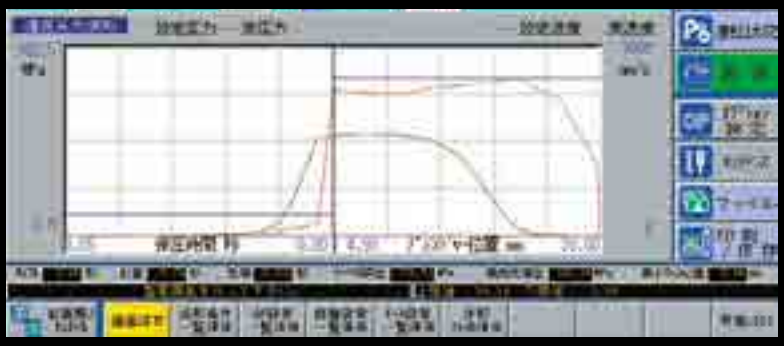
Waveform log (Shot & waveform logging function)

This function is for logging the velocity pressure waveform of each shot along with the process monitoring data.
The velocity pressure waveform generated may differ depending on the resin Lot No. or the difference in the dryness conditions.
This data can be used to trace the data of molded products by collectively managing it with the molding information shown on the upper right.

Molding conditions Resin information (Resin name, Lot No., dryness, etc.)

+

Process monitoring data Velocity pressure waveform



Cycle chart display

The visualization of the molding cycle was realized by adopting a new cycle time chart screen, which allows the entire molding cycle to be checked at a glance. The customization of the operation settings of each process can be performed easily. In addition, the molding operations which can be reduced are now obvious, which contributes to a reduction of time loss.

Usability

Operability which improves productivity.

Mold open/close unit top cover
Mold contact prevention

GL30/GL60/GL100
Full cover on top of mold open/close unit

GL150/GL200
Return unit cover

Double limit switches for safety door
Enhanced safety door closed monitoring function

Product extraction unit cover
Mold contact prevention

Ease of Use & Operability

Operation panel
Improved operability when setting and changing molding conditions, by mounting the panel in a high position that swivels a maximum of 90 degrees.

Large window in safety door
Improved the visibility of the mold and the molding item during molding.

Password lock function
The changing of the molding conditions can only be performed by authorized personnel to prevent changes of the molding conditions due to operation errors, etc.


Locked condition


Unlocked condition

Semiautomatic operation motion switch
Restriction of operation accompanied by danger

Large sized purge cover
Prevention of contact with high temperature heater

Double plasticization cylinder cover
Low temperature of cover surface

Wire clamps on hydraulic hoses
Whip prevention of hydraulic hoses

Compliance with International Standards of electrical power supply units

1. Adoption of components which conform to International Standards
   - Dual monitoring of pump power supply and motor power supply circuit
   - Installed breakers for pump power supply and motor power supply circuit
   - Attached external handle for main breaker
2. Electric shock preventive measures considering maintenance and inspections
   - Attached protective covers to live components to prevent electric shock

Complies with safety standards

In order to comply with the safety standards of each country, such as the JIMS Safety Standards for domestic injection molding machines, Korea Safety Standards KC-S, and China Safety Standards GB, this machine is standardly equipped with double limit switches for the safety door (enhanced safety door closed monitoring function), double plasticization cylinder covers (low temperature of cover surface), wire clamps on hydraulic hoses (whip prevention of hydraulic hoses), large sized purge cover (prevention of contact with high temperature heater), top cover on mold open/close unit, and cover on the product extraction unit (prevention of contact with mold). This is a safe and secure global molding machine.

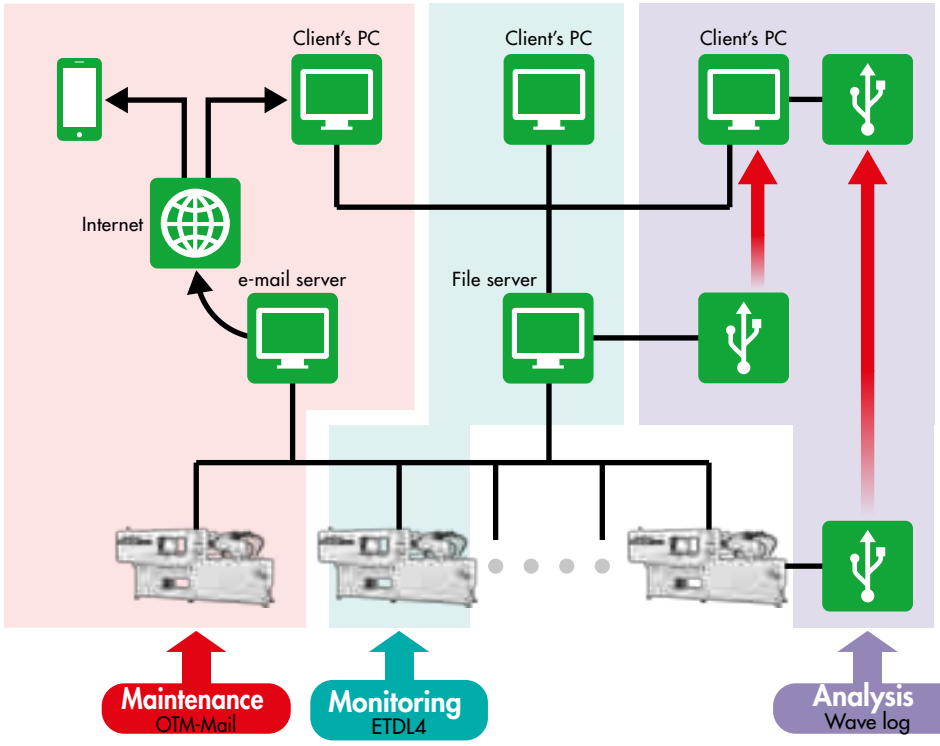
Maintenance

This machine has adopted a highly efficient filter that removes moisture in the oil, and controls the acid value, viscosity, and the NAS class to an optimal value. The replacement frequency of the hydraulic fluid can be reduced, and also the replacement period of the hydraulic fluid has been extended to 5 years from the conventional 1 year. (Replacement of the filter element is required when the filter differential pressure is 0.45MPa, or once every 6 months.)

Sodick IoT-IMM

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



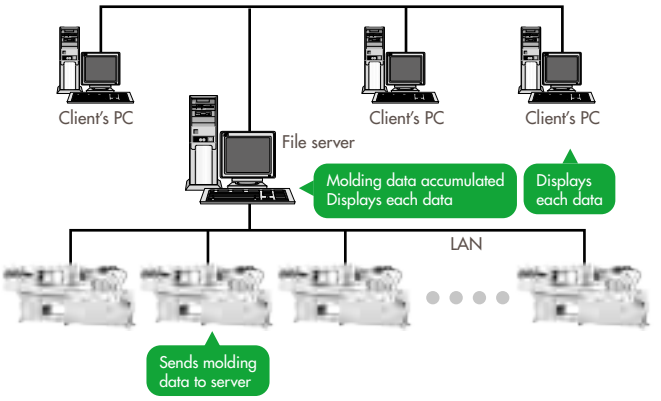
Online Function

ETDL4

Option

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



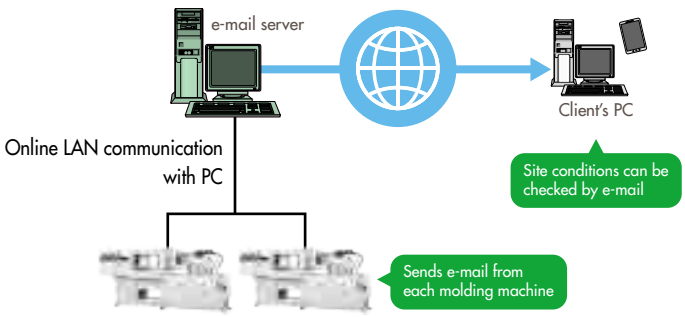
OTM-Mail

Option

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.

- Error information
- Molding data
- Production status

Timing of sending e-mail
(1) When errors occur
(2) When production is completed
(3) Any specified time



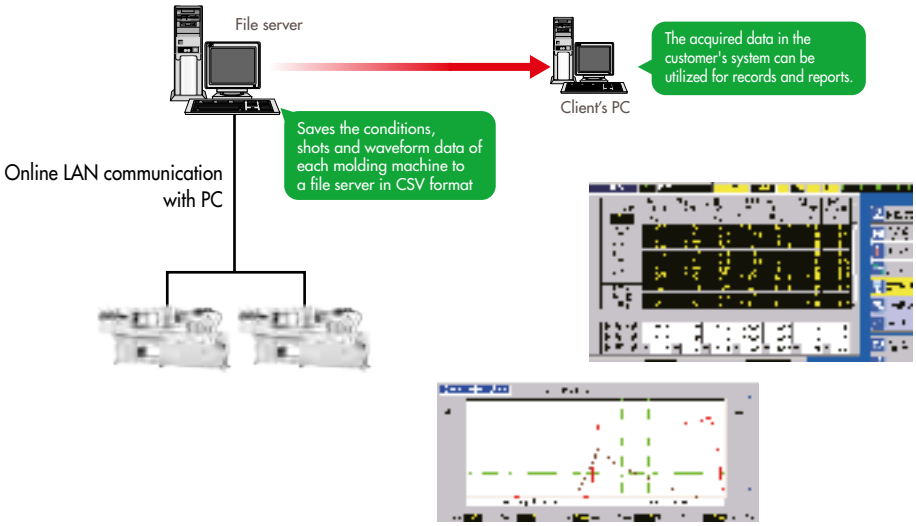
Offline Function

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.).

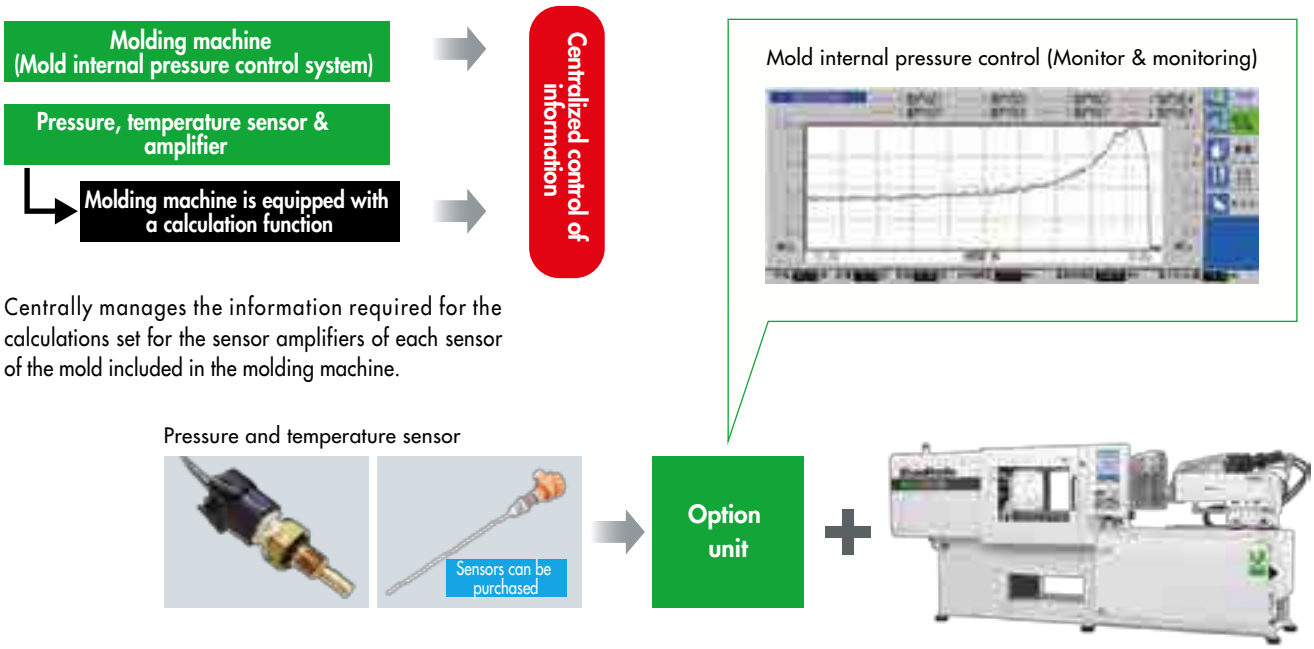


SSM Sodick Scientific Molding

Option

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



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

■Waveform display of 8 ch analog input, process monitoring and alarm setting are possible

V-LINE® GL Series Specifications

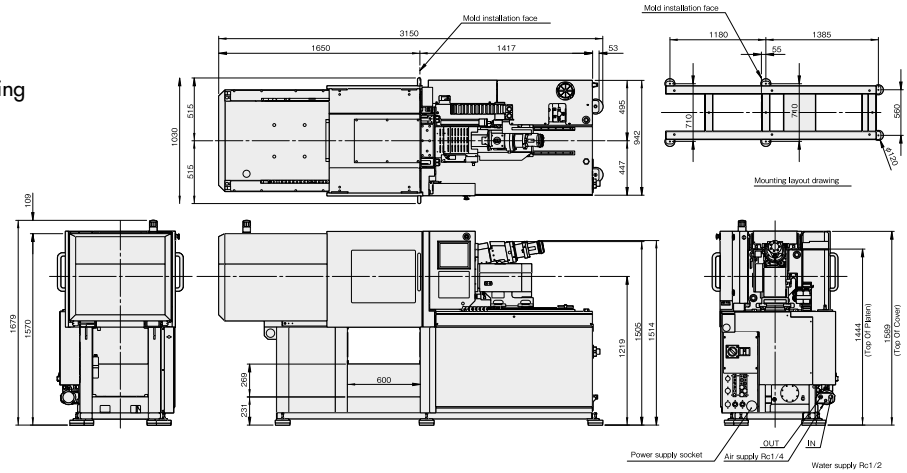
Model		GL30			GL60		
Product							
Clamping Unit							
Mold open / close system		AC servo motor control			AC servo motor control		
Clamping system		Direct pressure locking type			Direct pressure locking type		
Max. clamping force	kN	294 [392]*1			588		
Tie bar distance	mm	310 × 310			360 × 320		
Platen dimension	mm	440 × 440			520 × 460		
Open daylight (Min. mold thickness + Max. stroke)	mm	550			650		
Min./Max. mold thickness	mm	150 / 360			200 / 390		
Mold open/close force Rated/Instantaneous	kN	6.8 / 13.6			9.9 / 19.8		
Ejecting system		AC servo motor control			AC servo motor control		
Ejecting force / Ejection retention force	kN	9.8 / 5.8			13.7 / 7.8		
Ejector stroke	mm	50			80		
Plasticization & injection Unit							
Plasticization & injection system		Screw Pre-plasticizing			Screw Pre-plasticizing		
Screw diameter	mm	14	18	22	22	25	28
Plunger diameter	mm	12	16	22	22	25	28
Max. injection pressure	MPa	288	262	260	260	240	
Max. injection pressure	cm^3	4.5	14	27	27	49	83
Injection rate	cm^3/s	57	101	190	190	245	308
Plunger stroke	mm	40	70		70	100	135
Max. injection speed	mm/s	500			500		
Plasticizing capacity	kg/h	4	7	10.5	14	20	30
Max. screw revolution	rpm	400			400		300
Rated screw torque	N·m	59	98	147	147	202	235
Number of tempera- ture control zone		5			5	6	7
Heater capacity	kW	4.9	5.0	6.1	6.2	6.7	10.3
Nozzle pressing force	kN	4.9			6.8		15.7
Unit traveling stroke	mm	280			320		
Hydraulic Pressure / Air Pressure							
AC servo motor capacity for hydraulic pump	kW	3.0			3.0	4.4	
Hydraulic circuit pressure	MPa	15			15		
Tank capacity	ℓ	68			68	90	
Motor capacity for AC servo	kW	4.3			4.2		
Machine Dimension / Weight							
Machine dimension (L x W x H)	mm	3150×1030×1679			3685 × 1094 × 1679		
Machine weight	kg	2000			2700	2800	

*1 Mold clamping force [392kN] is an optional specification.

GL100	GL150	GL200
		
AC servo motor control	AC servo motor control	AC servo motor control
Direct pressure locking type	Direct pressure locking type	Direct pressure locking type
980	1472	1960 (200tonf)
460 × 420	560 × 520	560 × 560
640 × 610	720 × 680	680 × 680
800	900	950
250 / 550	250 / 600	300 / 650
9.9 / 19.8	14.2 / 28.5	14.2 / 28.5
AC servo motor control	AC servo motor control	AC servo motor control
21.5 / 12.7	28.8 / 17.6	28.8 / 17.6
100	120	120
Screw Pre-plasticizing	Screw Pre-plasticizing	Screw Pre-plasticizing
28 / 32 / 40	28 / 32 / 40	28 / 32 / 40
28 / 32 / 40	28 / 32 / 40	28 / 32 / 40
240 / 220 / 210	240 / 220 / 210	240 / 220 / 210
83 / 108 / 251	83 / 108 / 251	83 / 108 / 251
308 / 322 / 377	308 / 322 / 377	308 / 322 / 377
135 / 200	135 / 200	135 / 200
500 / 400 / 300	500 / 400 / 300	500 / 400 / 300
30 / 40 / 44	30 / 40 / 44	30 / 40 / 44
300 / 240	300 / 240	300 / 240
235 / 331 / 411	235 / 310 / 411	235 / 310 / 411
7	7	7
9.9 / 10.7 / 17.1	9.9 / 10.7 / 17.1	10.3 / 11.0 / 17.3
15.7 / 19.6	15.7 / 19.6	15.7 / 19.6
400	365	365
4.4 / 6.0	4.4 / 6.0	4.4 / 6.0
15	15	15
90	90	90
4.2	6.4	6.4
4030×1196×1792	4400×1378×1878	4505×1360×1990
3100 / 3300	5000 / 5100	5800 / 5900

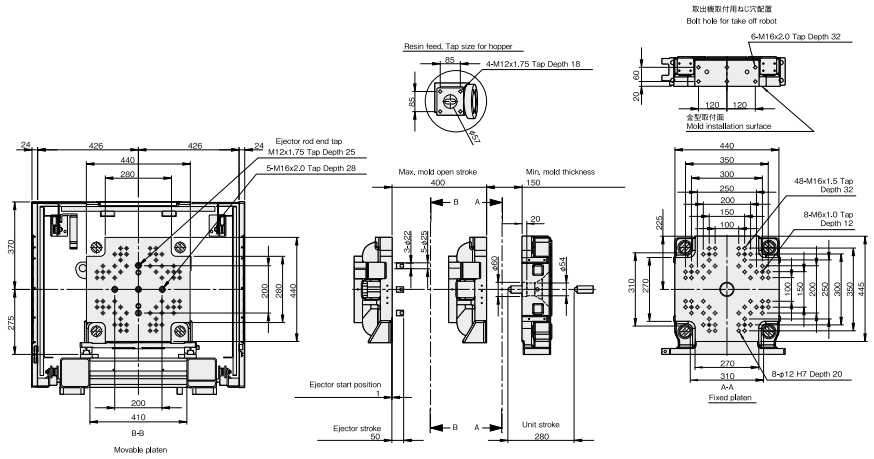
GL30

Machine Dimensions & Installation Drawing



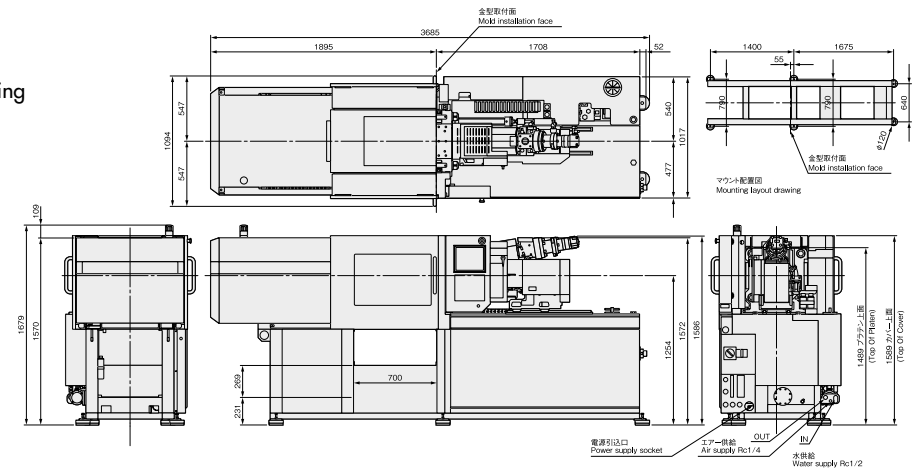
Mold Installation Dimensions

Main spec of nozzle (P12/P16/P22)			
Diameter of nozzle gate	Extension	Sphier R	Outside diameter of cover
ϕ1.5	60	10	ϕ30.4
ϕ2.0	60	10	ϕ30.4
ϕ2.5	60	10	ϕ30.4
ϕ3.0	60	10	ϕ30.4



GL60

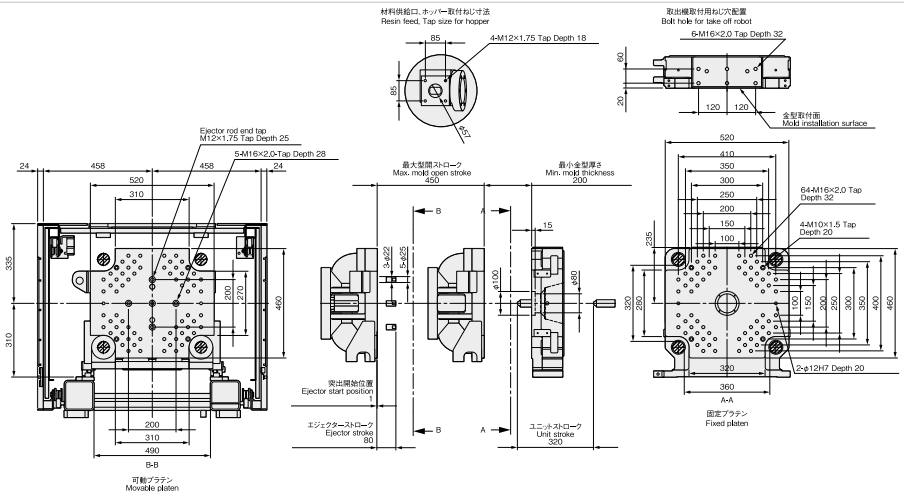
Machine Dimensions & Installation Drawing



Mold Installation Dimensions

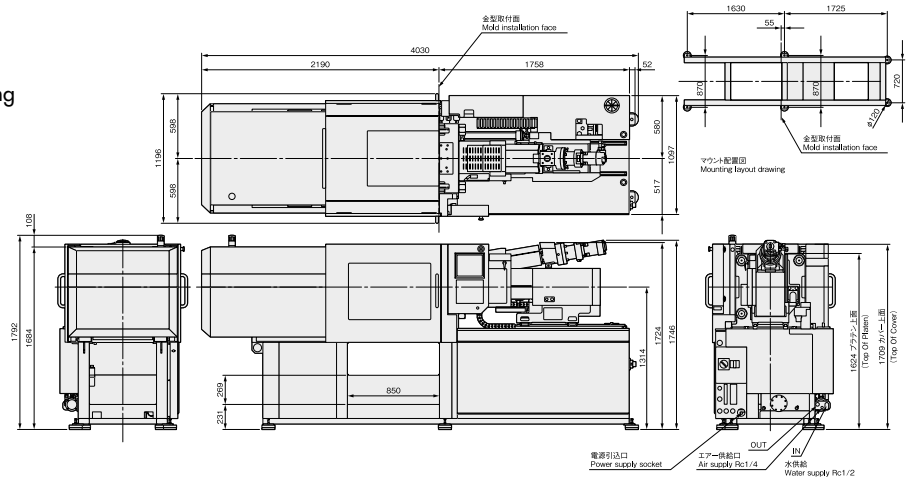
Main spec of nozzle (P22)			
Diameter of nozzle gate	Extension	Sphier R	Outside diameter of cover
ϕ1.5	60	10	ϕ30.4
ϕ2.0	60	10	ϕ30.4
ϕ2.5	60	10	ϕ30.4
ϕ3.0	60	10	ϕ30.4

Main spec of nozzle (P22)			
Diameter of nozzle gate	Extension	Sphier R	Outside diameter of cover
ϕ1.5	60	10	ϕ34.4
ϕ2.0	60	10	ϕ34.4
ϕ2.5	60	10	ϕ34.4
ϕ3.0	60	10	ϕ34.4



GL100

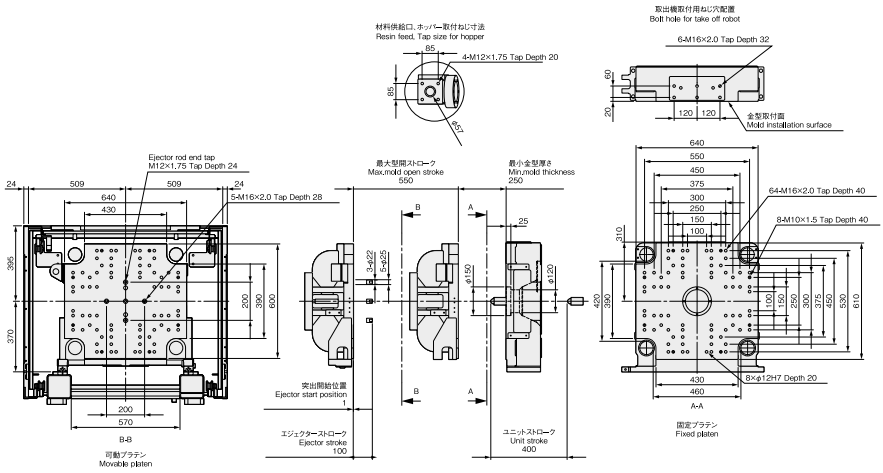
Machine Dimensions & Installation Drawing



Mold Installation Dimensions

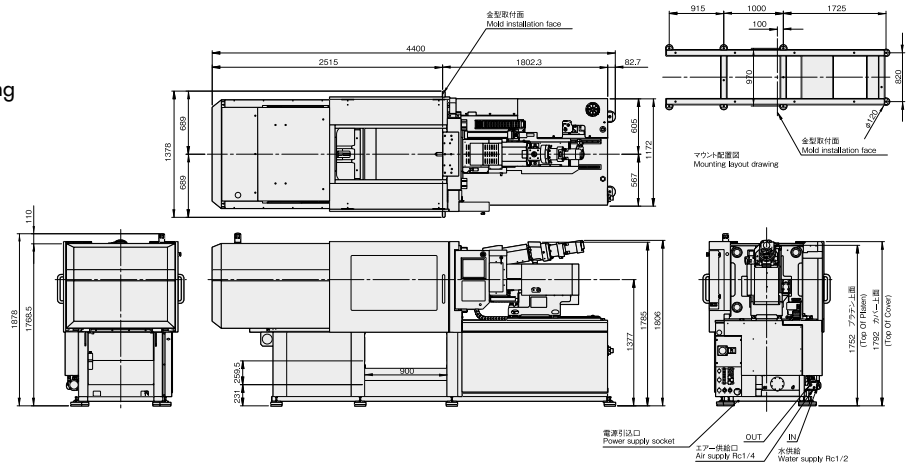
Main spec of nozzle (P28/P32)			
Diameter of nozzle gate	Extension	Sphier R	Outside diameter of cover
ϕ1.5	60	10	ϕ34.4
ϕ2.0	60	10	ϕ34.4
ϕ2.5	60	10	ϕ34.4
ϕ3.0	60	10	ϕ34.4

Main spec of nozzle (P40)			
Diameter of nozzle gate	Extension	Sphier R	Outside diameter of cover
ϕ2.5	80	10	ϕ38.6
ϕ3.0	80	10	ϕ38.6
ϕ3.5	80	10	ϕ38.6
ϕ4.0	80	10	ϕ38.6



GL150

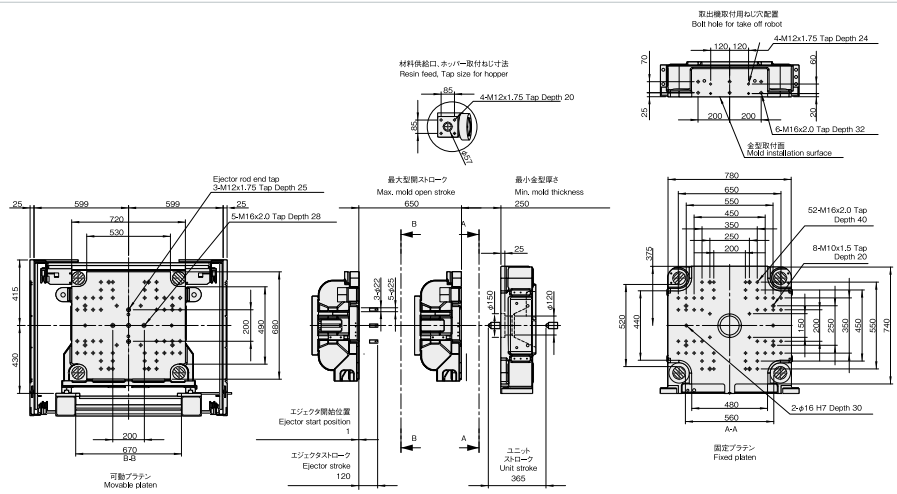
Machine Dimensions & Installation Drawing



Mold Installation Dimensions

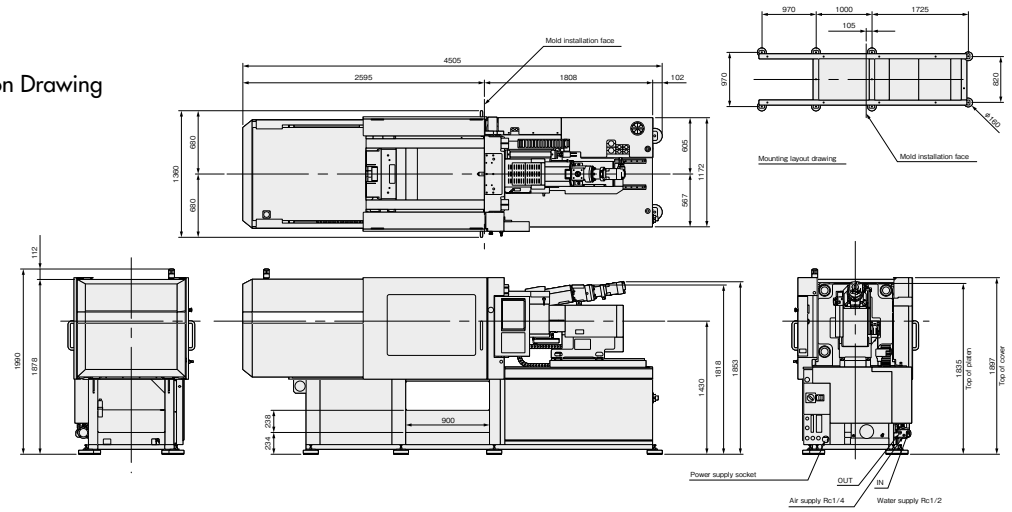
Main spec of nozzle (P28/P32)			
Diameter of nozzle gate	Extension	Sphier R	Outside diameter of cover
ϕ1.5	60	10	ϕ34.4
ϕ2.0	60	10	ϕ34.4
ϕ2.5	60	10	ϕ34.4
ϕ3.0	60	10	ϕ34.4

Main spec of nozzle (P40)			
Diameter of nozzle gate	Extension	Sphier R	Outside diameter of cover
ϕ2.5	80	10	ϕ38.6
ϕ3.0	80	10	ϕ38.6
ϕ3.5	80	10	ϕ38.6
ϕ4.0	80	10	ϕ38.6



GL200

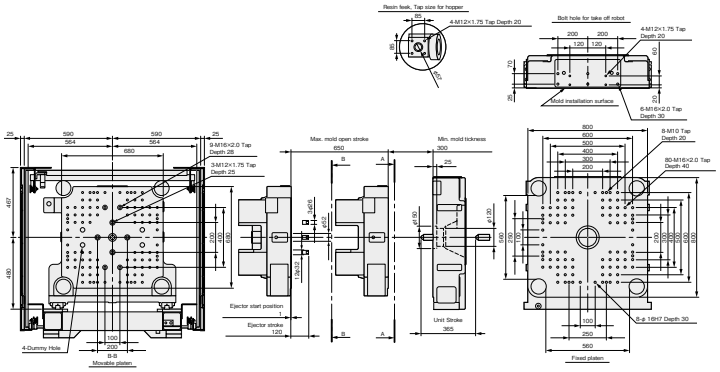
Machine Dimensions & Installation Drawing



Mold Installation Dimensions

Main spec of nozzle (P28/P32)			
Diameter of nozzle gate	Extension	Sphere R	Outside diameter of cover
ϕ1.5	60	10	ϕ34.4
ϕ2.0	60	10	ϕ34.4
ϕ2.5	60	10	ϕ34.4
ϕ3.0	60	10	ϕ34.4

Main spec of nozzle (P40)			
Diameter of nozzle gate	Extension	Sphere R	Outside diameter of cover
ϕ2.5	80	10	ϕ38.6
ϕ3.0	80	10	ϕ38.6
ϕ3.5	80	10	ϕ38.6
ϕ4.0	80	10	ϕ38.6



V-LINE® GL Series Accessory List

Main Standard Accessories

Plasticization & Injection Unit
Wear and Corrosion Resistance (type-N)
High temperature heater (plasticization, injection), nozzle temperature control heater (60 to 420 ℃)
Accumulator
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
Plunger Retention Function after Measurement

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)

Control Units and Others
Ground-fault Interrupter (200mA)
External Receptacles 200V20A×②
Data Logging Inter face Unit
Carbide Generation Prevention Function (alarm & automatic heat retention switching)
Traverse Pick-up Unit Connection Circuit
Icon Display
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
Injection and Mold Clamping Synchronizing Multi-function (injection inter- locked with mold clamping)
Measurement and Mold Open Synchronous Multi-function (When valve gate used)
Cylinder Heat Retention Cover
ZJ Heater and ZH Heater Temperature Control Unit
LCP Nozzle *1
Backflow Prevention Compulsive Back

Mold Clamping Ejection Unit
Automatic Lubrication 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 *2
Mold Slide Return Confirmation Connection Circuit & Metal Connector *2
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
Hydraulic Core Tractor Drive Unit for Mold Open Drive (Select from 2/4 Channels)
Locating Ring Adapter

Control Units and Others
Tricolor Signal Light
External Receptacles*3A 200V30A①/200V20A③/100V10A②
External Receptacles*3ES (-B*4) 200V30A①/200V20A④
External Receptacles*3EL (-B*4) 200V30A①/200V20A④
External Receptacles N 100V10A①
Power Strip Type Receptacle (3m) 200V 30A (2) /200V 20A (2) Note: Connect to 30A receptacle
Ground-fault Interrupter for External Receptacles (30mA)
Case Counter Package (case changing signal & production complete signal terminals)
Automatic Alarm & Counter ON Package
Stop Timer Unit dedicated for Hydraulic Motor after Error Stop
Color (overall/for safety door only) Selection
Auxiliary Units 1.2.3 Abnormal tri-input stop signal
Water Unavailable, Air Unavailable Alarms
ETDL4-SMDL (USB Flight Recorder)
Logic I/O
Mold Internal Pressure Control Function (8 Channels)

Auxiliary Units
Mold Cooling Water Manifold (Select from 4/8 Channels)
Reverse Chute Connection Circuit
Reverse Chute Unit (Connection circuit, with main body)
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)
RJG Interface

Special Support
High Wear and Corrosion Resistance (type-S)
Optical Lens Specifications (Type 5)
Check Valve for Holding Nozzle Touch Pressure
Specification for Safety Standards of All Countries*5 (GB (China / KCS (Korea) / USA)

Procurement Items from Other Venders
Mold Clamp (8 pieces/set)
Hydraulic Fluid (S3VE46 and S4ME46)
Hopper (select from 7/20/40ℓ) (rotary)
Extendible ejector rod (1)
ETDL2006 (Without Cable)
Cable for data logging

*1: GL30/GL60 *2: Terminal block is selectable *3: Receptacles made by American Denki Co., Ltd. are selectable
*4: (-B) (interlocking/non-interlocking batch switching type) *5: Standardly equipped for JIMS (Japan) specification

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GL series

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