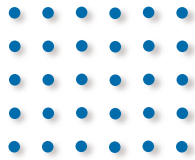


SED Series





SUMITOMO'S SED Series

Sumitomo's new SED Series makes debating the pros and cons of hybrids and hydraulics versus all-electric machines irrelevant. With its next-generation direct-drive technology, the all-electric SED provides:

- The high speeds and pressures of high-performance hybrid and hydraulic machines
- The exceptional energy efficiency and cleaner molding environment of other all-electric machines
- Ultra-high precision and repeatability that exceed belt-and-pulley driven all-electric machines

Available in various model sizes up to 200 tons, the SED Series features four direct-drive, Sumitomo-built, AC servo motors with full closed-loop control and digital sensors. All four motions—plasticizing, injection, clamping and ejection—are controlled by these motors. Each motion except plasticizing uses a ball screw, and all four motors are beltless, providing superior mechanical efficiency, repeatability and durability, and avoiding the problems associated with belt wear/adjustment and belt dust.

Extensive R&D has gone into the design of the SED motors to achieve a lighter, more compact, low inertia design with the best mechanical configuration for each motion. The result is a low inertia system that draws power only as it is needed, is easier and faster to stop and start, and is exceptionally precise. And the use of permanent magnet stators has made these synchronous motors even more energy efficient.

Faster, higher precision injection

The low inertia design of the SED's injection and screw drive motors yields several advantages: higher injection power (torque), higher velocities, faster velocity response, and unerring velocity control from 0 to the maximum velocity. From thick-wall lenses to micro-sized thin-wall parts, the SED provides the performance for the most demanding applications.

For applications requiring the most advanced injection control, the SED is available with the SK-II Control



option. Unique to Sumitomo, this option completely eliminates back flow during screw pull back and controls shot density by automatically compensating for any changes in resin properties.

Faster, smoother clamping

Sumitomo's next-generation direct-drive technology also contributes to the SED's clamping and ejection performance. Clamp open/close speed has been increased to 1200mm/sec, and the ejector response and speed have been improved, helping achieve faster overall cycle times. Vibration has also been decreased, resulting in exceptionally fast, smooth and quiet clamping.

New clamp features include increased platen rigidity and a CPP (Center Press Platen) clamp design that provides improved force distribution, elimination of short-short and flash problems, and improved mold protection. And, key for custom molders, Sumitomo increased the width between tie bars across all model sizes to allow for larger mold bases and easier mold changeover.

What advanced technology should be.



Operator and CFO friendly operation

Sumitomo's control systems continue to be an industry favorite due to their many ease-of-use features. And the SED's standard N-VIII control sets a new higher standard with a 12", full-color touch screen, enhanced SPC/QC capabilities and internal memory for 200 mold setups.

Your CFO is going to find the SED extremely friendly to the bottom line, too. There are eye-opening savings on electric bills—and in some areas, substantial utility rebates. Very little water and no need for machine water chillers. No hydraulic oil to buy, clean up or dispose. Reduced scrap and fast cycles for ultra-high productivity. Plus, new electric machine customers get three days free in-plant training, not flyers for expensive training somewhere else. All this, with the added assurance of Sumitomo's 24/48 Month Warranty that covers everything except brake pads, fuses and bulbs.

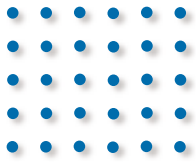
The SED Difference

When you make the comparison with other manufacturers' all-electrics and hybrids, the SED difference is clear.

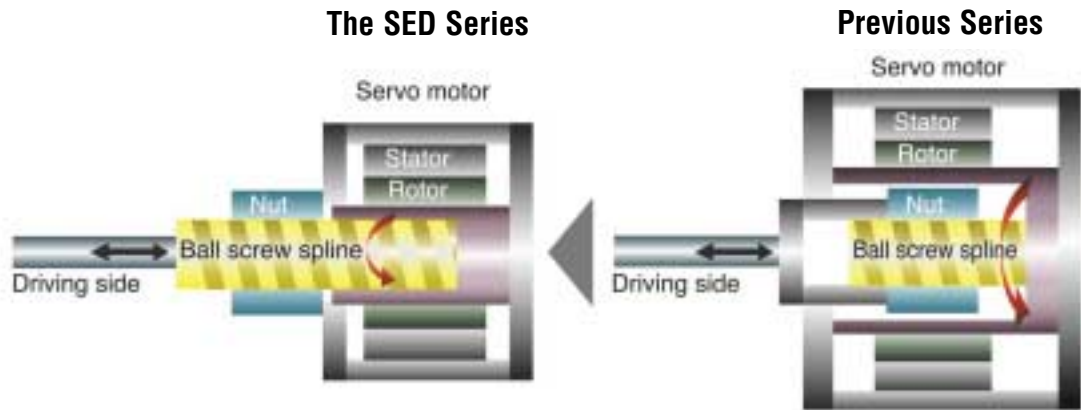
- The low-inertia design of Sumitomo's direct-drive technology provides the energy efficiency of an all-electric and the high injection power (torque) and velocity of a hybrid
- Unlike belt-and-pulley motors, the SED's direct-drive motors avoid problems associated with elasticity, slippage, belt wear and dust, ensuring higher precision and cleaner molding
- Unlike hybrid machines, there's substantial savings on electricity, minimum water use, and no hydraulic oil, for lower cost, cleaner, environmentally friendly molding

The SED also provides:

- Up to 50-millisecond velocity response for narrow pitch connectors and micromolding
- Unerring velocity control, from .01mm/sec to maximum for improved precision on a wide range of parts
- SK-II Control option for the industry's highest level of fill precision and density control
- New CPP clamp design with increased platen rigidity and improved force distribution
- Faster, quieter clamp open/close speed (1200mm/sec)
- Added width between tie bars and a larger overall platen area
- Unique auto lube system that protects the ball screws and allows a clean molding environment
- Easy-to-use N-VIII control with 12" touch screen, internal memory for 200 mold setups and full SPC/QC capabilities
- 3 days free in-plant training
- 24/48 Month Warranty



The Injection Unit



This diagram compares the compact, low-inertia, direct-drive configuration of the SED with the previous model. The SED's motor for injection uses a load cell to provide feedback that dictates the speed and torque required for precision injection pressure. The screw drive motor works together with a position transducer.

Exceptional speed and precision

Sumitomo's commitment to continuous improvement is evident throughout the SED Series. You'll find a wider range of available injection units. Improved performance and energy efficiency. Plus innovative new features that "push the envelope" of precision and molding stability for exceptional repeatability.

The SED's direct-drive motors feature a lighter, more compact, low inertia design—and the advantages of this design are substantial.

First, there's the higher injection power (torque) and velocity. With injection speeds up to 500mm/sec, and injection pressures up to 2900 kgf/cm², the SED provides the performance capabilities for the most demanding applications.

Second, there's faster velocity response, unaffected by belt elasticity. Well-suited for narrow pitch connectors and micro-sized parts, the SE30D, for example, has a 50-millisecond velocity response with a maximum injection velocity of 500mm/sec.

Third, the SED delivers unerring velocity control from .01mm/sec to the maximum velocity, providing improved precision on a wide range of parts including thick-wall lenses, visually critical and thin-wall parts.

Simultaneous with these performance improvements, the energy efficiency of the motors has been further improved through the use of permanent magnet stators. Being synchronous rather than induction type motors, power is not drawn to maintain position, thus lowering energy use. The new motors also have been designed to accept a broader range of incoming power without requiring a transformer.



The high torque of the screw drive motor, as compared with a belted motor, is a particular advantage for high-viscosity resins. And compared with a hydraulic machine, the SED requires fewer control devices because there are no proportional and directional valves needed to control hydraulic pressures.

What advanced technology should be.

Other injection performance features

For accurate, stable control of shot size, three plasticizing programs allow the operator to set the plasticizing end position and select sharp, standard or soft ramping of screw speed. There are also now 10 modes available for ramping control of injection fill and hold, and screw pullback delay has been added as standard.

Programmable switchover from velocity to hold—selectable by position, external signal, or pressure—delivers precision filling. Hold pressure is settable and accurate to 1kgf/cm^2 from 0 to 2400 depending on machine size.



The SED's PID temperature control system optimizes melt conditions with 2-second sampling and 0.1°C settable barrel zones. A Fine Flow Control screw assembly, for easier color change and superior pressure transmission, is standard.

Flash Speed Mode (Standard)—At injection speeds of 300mm/sec and higher, the SED automatically goes into Flash Speed mode. In this mode, fast response control of velocity and pressure, before and after V/P switchover, prevents short shots and warp from overpacking.

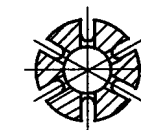
Synchro-Plast Control (Option)—For resins with low viscosity or uneven pellet size, this option optimizes the control of screw position and back pressure, ensuring plasticizing stability.

The Industry's Most Advanced Injection Control

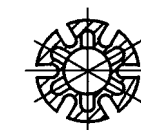
The SK-II Control option uses a specially designed screw tip assembly and control software to:

- Eliminate back flow during screw pull back
- Improve shot density control by pre-set pressure and forward screw speed, automatically compensating for any changes in resin properties
- Achieve new levels of fill precision (weight and density) and peak pressure stability

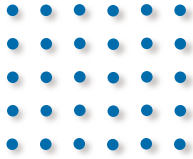
On completion of recovery, the check ring is mechanically sealed, completely shutting off material flow (or back flow). Pressure is then put on the screw prior to injection. When the pre-set pressure is reached, the machine control calculates the required density correction for the next shot to achieve the correct shot weight. The pressure and speed at which the forward motion occurs are set on the Injection Option control screen for the SK-II.



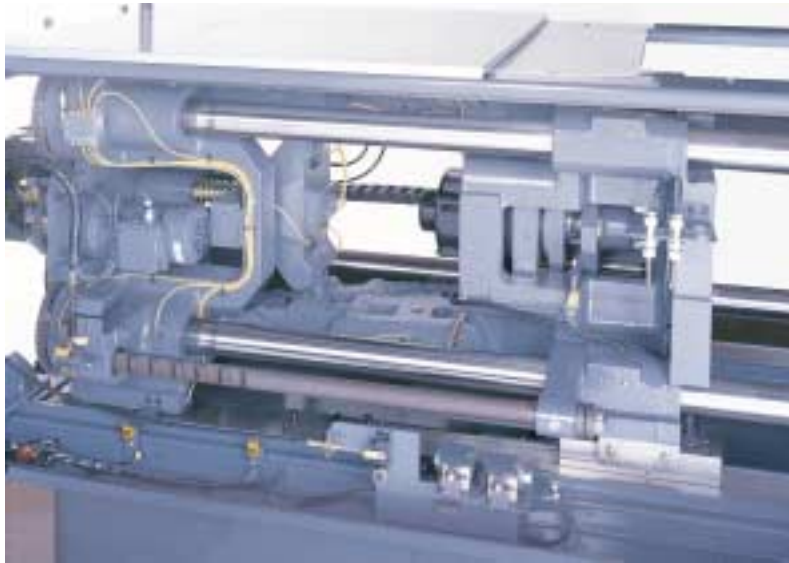
During plasticizing, screw rotation allows the check ring and seal to align so the channel is open for melt flow.



On completion of recovery, the screw counter-rotates to block the flow channel, and the channel remains blocked during screw pull back and fill.



The Clamp

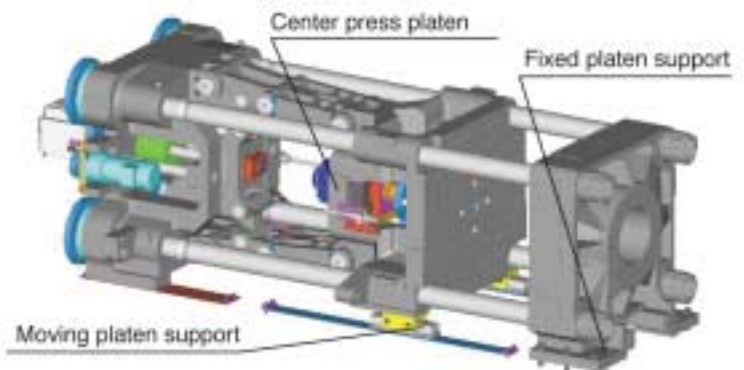


For clamping and ejection, the SED features two, direct-drive, digitally controlled AC servo motors. Full closed-loop control of mold open/close position and speed, plus monitoring by precise optical encoders, ensure maximum mold protection and consistent molding cycles.

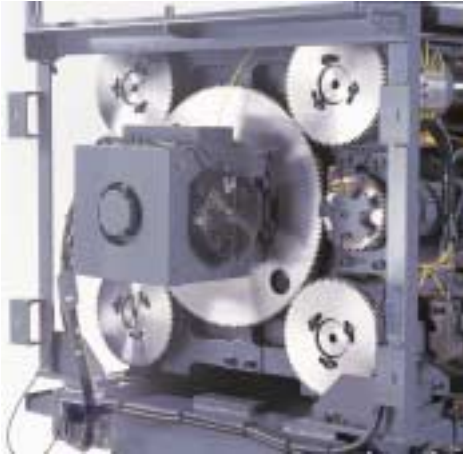
Improved clamping

The SED has “raised the bar” for clamping performance with several significant improvements and added features:

- New direct-drive technology has allowed the clamp open/close speed to be increased 50%—to 1200mm/sec—and vibration has been lowered, for improved cycle times and smooth, quiet operation
- Faster response time and a higher ejector speed of 333mm/sec are also made possible by the SED’s direct-drive technology
- The new CPP (Center Press Platen) clamp design plus the SED’s increased platen rigidity provide improved force distribution, elimination of short-short and flash problems, and improved mold protection
- The horizontal clearance between tie bars has been extended, allowing for the installation of larger mold bases and ease of mold changeover
- Connecting ejector rods from the mold to the knockout plate is easier now, too, due to added access space
- A new ejector impact absorber feature helps prevent parts from sticking to the ejector pins
- Moving platen supports have been redesigned with a larger shoe for added support area—and they’ve been made a standard feature
- Other features added as standard include an emergency stop button on the non-operation side and a clear, PMMA window on the clamp guard



What advanced technology should be.



Applications flexibility and superior mold protection

SED clamp operation also provides the capabilities needed for a wide range of applications. Three-stage mold open/close speed control can be used to tailor machine operation to specific mold requirements. Excellent clamp force linearity, from low to high tonnage, enables optimum setting of clamp force to suit parts with different projected areas. And selectable auto-ramping modes can be used to optimize clamp open and close profiles for fast cycling with shock-free movement.

Optional multi-toggle clamp force control offers two modes: a high-cycle mode in which filling can begin during clamping for improved cycle time; and a gas-release mode in which filling can begin during low-pressure clamping for improved part quality.

Plus, mold protection is never an issue with the SED. With low pressure mold protection settable to 0.3mm, and mold open/close positions settable to 0.1mm, precision mold protection is ensured and there's no banging—even at high speeds. Mold open stop position accuracy of 20 microns, an important factor for take-out robots and 3-plate molds, is ensured with monitoring by precise optical encoders and full closed-loop control.

Ease of maintenance

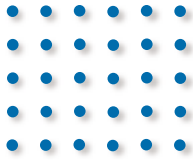
For optimum life of the ball screw and toggle pins, the SED is equipped with a highly reliable, automatic grease supply through a valve-type progressive distribution system. This system uses an externally mounted pump unit and easy-to-load grease cartridges that can be changed without shutting down machine operation.



Externally mounted pump for the automatic grease supply system

Graphite-impregnated bushings, field-proven on SES and SG/SGM machines, significantly reduce toggle lubrication requirements. Other ease of maintenance features include: location of the pull-in cylinder under the injection unit, a swing-away control panel, selectable Auto Purge, and on-screen displays of the inspection guide, I/O check and maintenance log.





The N-VIII Control



Selectable profiling

The Injection Screen allows a 2 velocity/2 hold pressure basic profile or a 5 velocity/4 hold pressure profile for applications where multi-step injection is preferred or required. Sharp, standard or soft screw speed acceleration can also be selected on this screen. And digital readout of screw position is provided to 25 microns (.001 inch).

Sumitomo's control systems are recognized for building operator confidence and being processing oriented. This means that they are not only easy to use, but they also help molders optimize machine performance and produce better parts.

The SED's N-VIII control sets a new, even higher standard with added features and capabilities.

There's the larger, 12.1-inch, full-color, TFT flat display with touch-screen capability. SPC/QC capabilities have been expanded to include: storage of data on 100,000 shots for downloading; display of the last 500 shots; and the addition of various charting capabilities including histograms and dispersion diagrams.

For visual trending over time, the capability to store and view molding profiles for the last 1000 shots is provided. Plus, with 4 added data channels, 8 selectable parameters can be graphically displayed for analysis on a single screen.

Additionally, the N-VIII control promotes ease of use in various ways:

- Eye-level, platen-mounted control panel positioned for easy reading and operation
- Fast, one-touch access to the most commonly used screens from either the touch-screen or the function keys located directly below the screen
- Screen-prompted setup assistance and auto-programming of initial molding conditions
- Convenient data storage capability in the control unit—increased to 200 mold setups—plus, if required, an optional external storage system that uses memory cards
- Highly reliable keys that ensure fast, accurate data entry
- Metric or English units available by selection

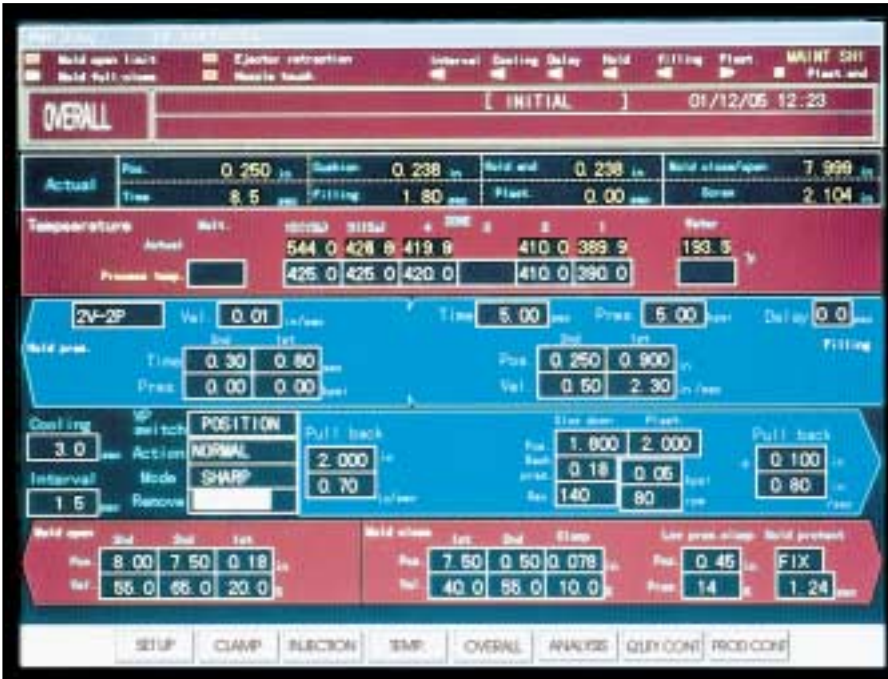
What advanced technology should be.

Convenient, single-screen overview

The Overall Screen is a standard feature of the SED's control system. All the main settings are combined and clearly displayed on this single screen.

Data from the temperature, injection and clamp screens are available at a glance, allowing the operator to set and change conditions without switching to other screens. Because of its convenience, many operators choose to run the machine from this single screen.

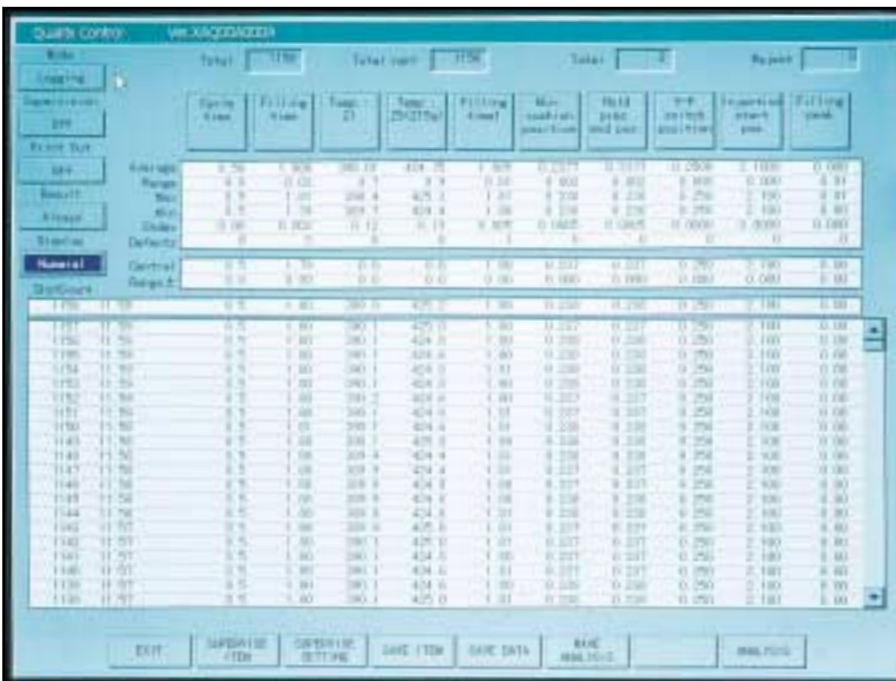
The Overall Screen also permits quick setup of similar applications.



Quality control capabilities

The Quality Control Screen displays 10 parameters, selectable from a list of 20. The average values for the last 500 shots are displayed across the top, and the actual values for the last 500 shots can be viewed using the scroll bar. By touching the Display button, the actual values can be viewed in a graph format.

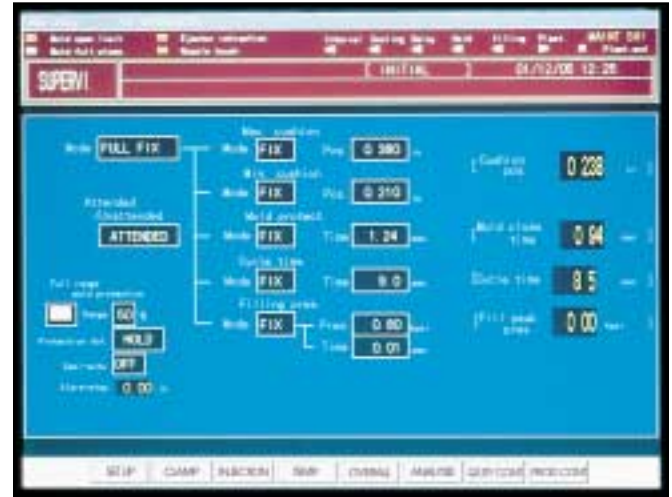
QC data logging can be performed for 20 parameters selectable from a list of 50. Logged information can also be selected for display in a dispersion diagram, histogram, or correlation data format for analysis. And, of course, all QC screens can be downloaded or printed for follow-up documentation.





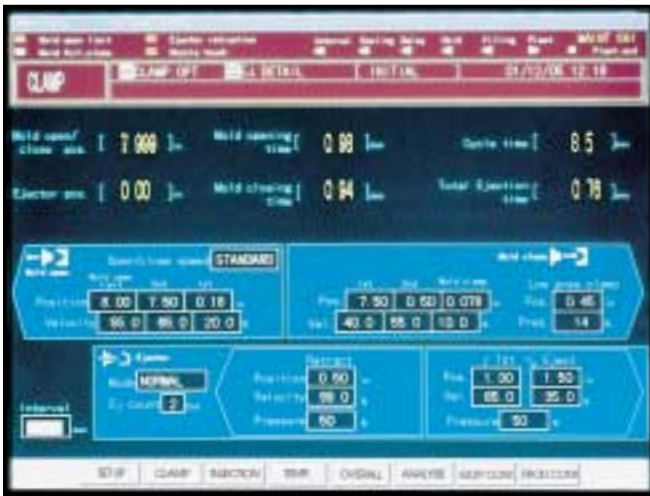
Easy setup

The straightforward design of the Setup Screen assists in the setup of new resins and molds as well as defining the parameters for the purging process. Auto-programming of initial molding conditions is available on a separate screen.



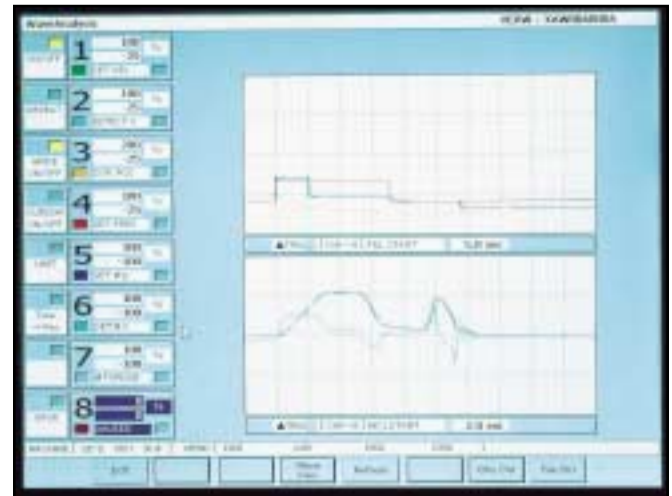
Supervision control

The Supervision Screen tracks the min/max cushion position, fill pressure and time, mold protection and cycle time to provide for machine shutdown in either attended or unattended operation.



Selectable auto-ramping modes

The Clamp Screen allows three-stage mold open/close speed control settable on a percentage basis and selection of three auto-ramping modes—sharp, standard and soft—depending on the complexity of the tool. Low pressure mold protection is settable to 0.3mm; mold open/close positions to 0.1mm.



Graphing for 8 parameters

In addition to assisting with Quality Control, the Analysis Screen helps analyze initial molding conditions and the results from changes in process parameters. With the increased number of data channels and selectable parameters, molders now can select from 34 parameters, displaying 1 or 2 charts showing up to 8 parameter graphs.

STANDARD EQUIPMENT

Injection Unit

- 1 General purpose screw assembly for unfilled resin
- 2 Fine Flow Control screw assembly
- 3 Profile program for injection
 - 2 or 5 injection velocity set points
 - 2 or 4 hold pressure set points
- 4 Ramping control of injection fill and hold (10 modes)
- 5 Flash Speed Mode for high injection rates
- 6 Three selectable programs for plasticizing
- 7 Injection unit programming in engineering units
- 8 Digital readout of screw position to 0.01mm
- 9 Injection start and plasticizing delay timers
- 10 Peak pressure control during injection
- 11 V/P switchover control (pressure/external signal/position)
- 12 Timers for hold pressure profile to 0.01 sec.
- 13 Screw pull back before and/or after plasticizing
- 14 Screw pull back delay
- 15 Auto slowdown function for screw rotation
- 16 Automatic purging program
- 17 Screw cold start-up protection (+/- 5°C from set point)
- 18 Adjustable screw interlock timer with auto-reset
- 19 Nozzle PID temperature control zone
- 20 PID temperature control of barrel zones
- 21 Selectable sprue break with delay timer
- 22 Nozzle contact sensor
- 23 Digital readout of screw RPM
- 24 Water-cooling jacket temperature indicator
- 25 Sliding protective purge shield with interlock
- 26 Injection unit swivel and control panel pivot
- 27 Closed-loop velocity and pressure control system

Clamp Unit

- 1 Three-stage mold open/close speed control (%)
- 2 Closed-loop control of mold open/close position and speed
- 3 Selectable auto-ramping modes for clamp open/close
- 4 Low pressure mold protection setting to 0.3mm
- 5 Digital setting of mold open/close positions to 0.1mm
- 6 Digital setting of mold clamping force
- 7 Ejector with selectable multiple functions and speed
- 8 Ejector forward delay and hold timers
- 9 Digital setting of ejector stroke and speed (%)
- 10 Ejector return confirmation signal
- 11 Manual mode interlock for ejector
- 12 Moving platen supports
- 13 Ejection during mold opening
- 14 Motorized mold height adjustment
- 15 Robot interface circuit (5 in/out relay contacts)
- 16 Standby mode for mold mounting with low clamp speed
- 17 Operator's door interlocked electrically and mechanically
- 18 Operator's door and rear guard with clear PMMA window
- 19 Clamp guard with clear PMMA window
- 20 Emergency stop button on operator and non-operator sides
- 21 Mounting holes on top of fixed platen for robot
- 22 Adjustment-free mechanical safety stop bar
- 23 Grease-lubricated tie bar bushings
- 24 Central automatic grease lubrication system
- 25 Fully implemented ANSI B151.1-1997 guarding

Electronic & Mechanical Systems

- 1 Full-color, 12.1-inch TFT liquid crystal touch-screen display
- 2 Auto-programming of initial molding conditions
- 3 Automatic calendar start-up system
- 4 Multi-language selection
- 5 On-screen operation guide for easy use
- 6 All-in-one setup screen
- 7 Internal memory of 200 mold setup conditions
- 8 Metric or English units selection
- 9 Indicator of current molding cycle phase
- 10 Logging of last 50 setup changes
- 11 Real-time readout of actual operating values
- 12 Graphic display of injection and clamp set values vs. actual
- 13 Running hour meter and shot counter
- 14 Supervision function monitor for unattended operation
- 15 PID barrel temperature control setting to 0.1°C
- 16 Temperature control for production and standby modes
- 17 Fast-rise PID response curve for barrel heat up
- 18 Two-second PID cycle for temperature control
- 19 SSR control circuit for heater bands
- 20 Hi/Lo alarm monitor of barrel temperatures
- 21 Logging and display of abnormal functions
- 22 Product quality control by injection value monitor
- 23 Production control monitor and completion warning
- 24 On-screen operation guide for maintenance
- 25 On-screen diagnostics and troubleshooting
- 26 Printer port with print screen function
- 27 Audible warning alarm
- 28 Open machine base with three-way part removal
- 29 Two closed-circuit water connection lines
- 30 Spare power supply receptacle

NOTE: Specifications subject to change without notice.

OPTIONAL EQUIPMENT

Injection Unit

- 1 Wear/corrosion-resistant screw/barrel assembly
- 2 SF sub-flight barrier screw
- 3 Screw assembly for high-temperature resins
- 4 High watt capacity heater bands
- 5 Needle valve nozzle and circuit (pneumatic)
- 6 Resin temperature monitor with needle valve option
- 7 FTC II nozzle and control circuit ($\leq 36\text{mm}$)
- 8 Insulated plasticizing cylinder cover
- 9 Cylinder nozzle (flat face)
- 10 Water jacket temperature control zone
- 11 Dual connection for high nozzle contact force
- 12 Standard-type hopper with sight glass
- 13 Hopper swivel mounting plate
- 14 V/P switchover by mold cavity pressure
- 15 SK-II screw tip assembly and control software
- 16 Synchronized plasticizing

Clamp Unit

- 1 Pneumatic ejection (air blow off)
- 2 Cavity ventilator (air poppet)
- 3 Hydraulic core pull control circuit
- 4 Pneumatic core pull circuit
- 5 Rotating core control circuit
- 6 Interface for ejected product sensor
- 7 Mold ejector plate return signal
- 8 Temporary stop of mold closing
- 9 Temporary stop of mold opening
- 10 Multi-toggle clamp force control
- 11 Hot runner mold open/close signal
- 12 Ejector protrusion during cooling
- 13 Platen-mounted mold insulating plates
- 14 Hydraulic mold mounting clamps
- 15 Guide rollers for loading mold
- 16 Product drop chute under mold space
- 17 Mold valve gate control circuit

Electronic & Mechanical Systems

- 1 Two temperature control zones for electric mold heat
- 2 Electric power supply receptacles
- 3 Heater band burnout monitor and alarm
- 4 Electrical circuit breaker leak monitor
- 5 Fire detection monitors
- 6 Mold temperature monitor
- 7 Color feeder signal during plasticizing
- 8 Production stocker-feed signal
- 9 Oscillograph connection circuit
- 10 Key-lock switch for molding setup
- 11 External memory of 20 setups on memory card
- 12 Ejector pressure remote setting
- 13 Two-direction product reject chute
- 14 Revolving alarm lamp (red)
- 15 Tower alarm lamp (3 colors)
- 16 Personal computer connection port (DOS/V or NEC)
- 17 Mold cooling water flow regulators (4, 8 or 12)
- 18 Four closed-circuit water connection lines
- 19 Cooling water shut-off valve and indicator
- 20 Machine leveling pads

NOTE: Specifications subject to change without notice.



www.sumitomoPM.com

1266 Oakbrook Drive, Norcross, GA 30093 • Tel: (770) 447-5430 FAX: (770) 441-9168

SHI Plastics Machinery Division worldwide offices located in: Japan (Tokyo and Chiba), China (Shanghai and Hong Kong), Indonesia, Malaysia, Mexico, The Netherlands, The Philippines, Singapore, Taiwan and Thailand.