EcoPower 55 – 300 t

The new benchmark for electrical machines

Battenfeld
world of innovation
Special features of the EcoPower series 55 – 300 t

The promise: energy-saving, clean and compact

The all-electric EcoPower, with clamping forces ranging from 55 to 300 t, combines efficiency with precision. The beltless EcoPower scores with a compact injection unit and the clean design of its clamping unit, together with a highly efficient direct drive. The machine also offers a small footprint and is open at the top and on the injection side.

Fast, precise injection

The injection unit is laid out for high-speed and high-precision injection processes even under maximum injection pressure. The encapsulated drive is clean and compact. Injection and metering are effected via a dual drive with a circulating ball spindle at its center.

The EcoPower comes with air cooling as standard and two extension options: water cooling with either an open or a closed cooling circuit.

Integrated peripheral equipment from WITTMANN

Peripheral equipment from WITTMANN built into the machine frame helps to substantially reduce the machine’s space requirements. The entire peripheral equipment can also be operated via the machine’s UNILOG B6® control system, where its data are directly stored.
Barrel change from above
The barrel can be completely removed from above. It can also be held in an intermediate position, from which the screw can be quickly removed to the rear for easy maintenance. The use of existing barrels from the HM and TM series is also possible.

Efficient direct drive
The precise, efficient direct toggle drive stands out by its high dynamics and positioning accuracy. It is also extremely energy-efficient.

Flexible safety gate and operating panel
The safety gate, open at the top, is flexible enough to accommodate automation equipment, and easy to clean. The swivel-mounted touch screen of the machine’s control system is positioned ergonomically and can be moved to the most convenient working position, which also allows easy access to the nozzle area.

Toggle system
The toggle encasements are sealed on the outside to ensure a clean clamping unit suitable for clean room applications as standard. Starting the injection process parallel to clamping force build-up is also possible in the standard version, leading to a gain in cycle time.

Drive for peripheral movements
A speed-controlled servo-hydraulic drive is used in the standard version, which features a hydraulic ejector, a hydraulic nozzle stroke and an optional core pull. All-electric drives for these functions are available as an option.
In addition to highest precision and speed, the EcoPower stands for energy-efficiency and modularity. The following advantages demonstrate the new, unprecedented benchmarks set by the EcoPower:

**Modularity / flexibility**
- Many configuration options and optional extras.
- All customary process technology modules are available.
- Customized equipment for standard high-precision injection molding, clean room technology, medical applications, including packaging and special thin-wall technology.
- Air cooling or optional water cooling with open or closed-loop cooling circuit.
- Ideally suited for automation, from space-saving insider solutions to complex automation systems.

The EcoPower offers ultimate modularity and can be laid out perfectly to suit each application. This helps to avoid extra costs for redundant equipment on the one hand, on the other hand there are no more restrictions, which enables optimal utilization of the machine. All-electric systems provide maximum scope for diversity.

**Customizing system**

The EcoPower “Customizing system” helps to select the right machine. From the standard high-precision equipment up to clean room and high-speed applications, everything can be simply assembled according to the customer’s needs. Customary equipment options for the injection side, clamping side, electrical equipment, control system, media and automation can be selected from a catalog.

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Cooling</th>
<th>Hydraulic system</th>
<th>Electrical equipment</th>
<th>Injection speed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Air</td>
<td>Water</td>
<td>Ejector</td>
<td>Nozzle stroke</td>
</tr>
<tr>
<td>Basic standard</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Basic all-electric</td>
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<tr>
<td>Packages</td>
<td>Basis</td>
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<td></td>
</tr>
<tr>
<td>- Clean room package</td>
<td>all-electric</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- LIM</td>
<td>standard</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- freely configurable</td>
<td>standard</td>
<td></td>
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</table>

**Energy-efficiency**
- Minimal energy consumption with internal utilization of braking energy for power supply to the control system and barrel heating. [pat. pend.]
- Modest space requirements and extremely low noise emission. (< 68 dB(A))
- Extremely high degree of efficiency with ultra-modern servo drive technology.
Clamping unit EcoPower 55 – 300 t

Integration of the servo-hydraulic aggregate for ancillary strokes in the machine frame.
Patented beltless direct drive for the spindle nut.
Clean mold space free of lubricating grease through linear guides and sealed toggle encasements.
Sensitive mold protection.
Precise platen parallelism across the entire stroke.

The benefits of the EcoPower’s compact clamping system

- Integration of the servo-hydraulic aggregate for ancillary strokes in the machine frame.
- Patented beltless direct drive for the spindle nut.
- Clean mold space free of lubricating grease through linear guides and sealed toggle encasements.
- Sensitive mold protection.
- Precise platen parallelism across the entire stroke.
- Short dwell times.
- Self-locking 5-point toggle system.
- Precise clamping force control.
- Servo-driven mold height adjustment.
- Clamping force build-up parallel to injection.
- Compact design with generous ejection area open at the bottom.
Injection unit EcoPower 55 – 300 t

A concept for improved parts quality
- Optimized melt homogeneity thanks to a uniform L/D ratio of 22:1 and an injection pressure of 2,000 bar with medium-diameter screws.
- Linear guide systems ensure precise axial movements of the injection unit.
- Carriage cylinders positioned opposite each other provide momentum-free nozzle carriage.

Highly dynamic and robust
- Twin drive for injection and dosing.
- Highly dynamic servo motor for injection.
- Central ball screw drive with automatic central grease lubrication.
- One-piece, robust cast iron body with linear guides.

Flexible, ready for fast change
- Can also be mounted as a vertical unit.
- Increased injection speed and dosing performance as an option.
- Injection force measurement or melt pressure sensor for ultimate precision.
- Barrel can be removed from the top.
- Interim position for easy screw change while heated.

High-performance plasticizing systems
Plasticizing systems for injection molding machines must fulfill many different requirements. By applying a universal L/D ratio of 22:1 to the three screw sizes available for each injection unit, the processing window has been optimized to meet rising quality standards.
UNILOG B6p is the name of the new control system generation that is setting benchmarks in user-friendliness, speed and precision. It is used across the entire product portfolio. A powerful system concept optimally geared to the requirements of hydraulics / sensor technology ensures fast, accurate movements along all axes of the machine. Precise analysis of all important process parameters provides the user with the control required for demanding applications.

- Operating system Windows.
- 15" TFT color screen with unlimited touch screen functionality for operation and display.
- 2 rows of soft keys to select machine functions.
- Freely configurable status bar for all machine operating functions.
- Access authorization via password system and USB flash drive, complete events protocol, quality table, online support system, envelope curves monitoring, cycle time analysis, alarm message via Email and other functions.
- The complete machine documentation including all operation manuals, spare parts drawings and parts lists can also be retrieved. In addition, users can integrate their own PDF files and make them available to machine operators.
- USB interfaces are available on the operating unit to connect peripheral equipment such as a printer, keyboard or USB flash drive, or they may be used as an access control system in combination with the integrated password system. Two Ethernet interfaces are installed in the control cabinet at the rear.
- Optional: Manual operating panel with 48 membrane keys to operate the machine’s axes and optional equipment and 10 membrane keys with luminous rings are available for the basic machine functions (drive, operation modes, heaters). Space for 7 additional optional mechanical switches/keys.
- Optional: Hi-Q package with SPC chart, trend diagram and further recording possibilities.
Cycle time analysis

The purpose of cycle time analysis is to record and optimize all movements. It is a fast and simple method of defining the optimal cycle. The ideal cycle is stored as part of the mold data set and can be retrieved for the next production run of the mold. This enables quick recognition and correction of any process deviations.

Energy measurement

Clear visualization of energy consumption is possible with UNILOG B6. Various modes of operation can be displayed as required in terms of cycle time or material consumption. Consequently, the machine's energy- and cost-efficiency with regard to energy consumption can also be evaluated and calculated by means of accurate process analyses. Included as standard with EcoPower and MicroPower machines, available as an option for other models.

Quality monitoring

With up to four (HiQ package up to 16) envelope curves, the monitoring parameters are optimally adapted to the individual process. An ideal curve serves as monitoring reference within the tolerance margin. Whenever the tolerance margin is exceeded, an alarm is triggered and the faulty part automatically sorted out. Every parameter can be visualized via the quality table and evaluated by means of an SPC chart.

Trend diagrams

Important process factors can be clearly and concisely visualized. All data processing and monitoring functions are covered by a single control system. Open interfaces facilitate access, simplify operation and integration in customers' networks.
Integration and communication

Robot control

WITTMANN robots are operated simply and flexibly via the machine's monitor screen, no switch-over is necessary between machine and robot control.

The total overview is given on one screen. The control system of the robot itself is still placed directly on the robot.

Communication takes place via a CAN bus system, the EUROMAP interface remains free.

Webcam

A webcam is integrated in the injection molding machine to visualize production monitoring. This makes it possible to display areas on the B6' control system that are normally not open to view, such as robot-assisted part deposition or the mold area.

The integrated webcam is used in particular also for Web-Service 24/7. Intelligible pictures of the problem situation on site can be transmitted to our global support center to enable effective analysis.

Process data acquisition via K4

We offer BATTENFELD K4, a process data acquisition software that provides access to a central database. Centralized data administration runs on a server and is also directly integrated in the UNILOG B6'. Thus the plant's entire machinery can be monitored and all machine data accessed via every machine control system.

K4 is an innovative MES (Manufacturing Execution System) and provides a unique scope of functions. It not only offers machine parameter settings and quality assurance, but also maintenance records, preliminary and final costing, order-related staff work time logging and hall layout, as well as innumerable evaluation options including open item management, everything covered by and available from a single system.

Web-Service 24/7

WITTMANN BATTENFELD meets the plastics industry's demand for 24/7 availability with a global network of experts.

With the help of the web service center, experienced service engineers establish a direct link to the customer's injection molding machine via the Internet.

In this way, actual service tasks on the machines are performed quickly and flexibly, which ensures optimal productivity and conservation of value.
Application technology EcoPower 55 – 300 t

The demands placed on products and components in plastics technology are becoming more and more stringent. The machines of the EcoPower series are characterized by ultimate energy-efficiency, cleanliness and precision. Other advantages are their low noise level and high reproducibility of parts; their high degree of efficiency ensures low-cost production. This enables the EcoPower to meet the most stringent demands for a wide range of applications. It covers virtually all areas of application including medical technology, industrial and high-precision parts, from automotive components to baby care.

Medical and clean-room technology

Thanks to their minimal emissions, low heat radiation and smooth surfaces, the all-electric machines of the EcoPower series are predestined for clean room applications. With the additional benefit of high process reliability, the EcoPower is ideally suited to a great variety of applications in medical technology. For example, the production of parts for the Respimat® inhaler, disposable syringes and blood sampling devices yields end products of the highest quality that fully meet the requirements of modern medical technology.

Industrial parts, high-precision parts

The EcoPower ensures highest standards of precision and reproducibility, with free-of-play force transmission and servo-electric drives. Parts such as SIM card holders, mini coils, etc. can be produced with high accuracy and at high speeds. Minimal cycle times and reliable production processes ensure profitability and top-quality products.

Automotive, baby care

The EcoPower can be used for all types of plastics and elastomers, including LIM (= liquid injection molding). Possible applications range from automotive parts (single-wire seals) or baby care products (pacifiers) to gaskets and gasket elements.
The Insider solution combines the injection molding machine with an automatic parts removal system and a conveyor belt to form a compact, space-saving unit. Custom-built peripheral equipment for preparation and downstream finishing, as well as special equipment such as an integrated light barrier or installation of a second conveyor belt are included in the production program as options. The Insider is available with up to 300 t clamping force as standard and offers processors a number of advantages.

The robust, compact design of the Insider stands the test in a long-term operation through stability and accessibility.

**Space-saving design**

Space requirements are up to 50 per cent below those of conventional automation solutions.

**Improved material flow**

All parts can be removed from the end of the clamping unit. This facilitates the arrangement of several machines in rows.

**Reduced robot cycle times**

Cycle times are reduced by shorter traverse paths and direct depositing of parts on the conveyor belt.

**Easy access in spite of integration**

Thanks to easy removal of the conveyor belt and feeding area, access to the injection molding machine is as comfortable as in machines without automation systems.

**No separate safety barriers**

Since there is no need for separate safety barriers, costs have been reduced, yet all occupational health and safety regulations are complied with.

**CE mark**

The CE mark for certified safety is granted for every machine with an Insider solution, which saves costs for individual inspections.

**Cost-efficient production**

Thanks to the space-saving design of the Insider, not only the material flow on the injection molding machine is improved, but the convenient movement of molded parts to the end of the clamping unit also allows for more favorable positioning of the machines.
### Possible combinations of clamping units/injection units

<table>
<thead>
<tr>
<th>Clamping Unit</th>
<th>Injection Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>t</td>
<td>70</td>
</tr>
<tr>
<td>55</td>
<td>•</td>
</tr>
<tr>
<td>110</td>
<td>•</td>
</tr>
<tr>
<td>180</td>
<td>•</td>
</tr>
<tr>
<td>240</td>
<td>•</td>
</tr>
<tr>
<td>300</td>
<td>•</td>
</tr>
</tbody>
</table>

### Shot weight conversion table

<table>
<thead>
<tr>
<th>Material</th>
<th>Factor</th>
<th>Material</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABS</td>
<td>0.88</td>
<td>PP + 20% Talc</td>
<td>0.85</td>
</tr>
<tr>
<td>CA</td>
<td>1.02</td>
<td>PP + 40% Talc</td>
<td>0.98</td>
</tr>
<tr>
<td>CAB</td>
<td>0.97</td>
<td>PP + 20% GF</td>
<td>0.85</td>
</tr>
<tr>
<td>PA</td>
<td>0.91</td>
<td>PS</td>
<td>0.91</td>
</tr>
<tr>
<td>PC</td>
<td>0.97</td>
<td>PVC hard</td>
<td>1.12</td>
</tr>
<tr>
<td>PE</td>
<td>0.71</td>
<td>PVC soft</td>
<td>1.02</td>
</tr>
<tr>
<td>PMMA</td>
<td>0.94</td>
<td>SAN</td>
<td>0.88</td>
</tr>
<tr>
<td>POM</td>
<td>1.15</td>
<td>SB</td>
<td>0.88</td>
</tr>
<tr>
<td>PP</td>
<td>0.73</td>
<td>PF</td>
<td>1.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UP</td>
<td>1.6</td>
</tr>
</tbody>
</table>

The maximum shotweights (g) are calculated by multiplying the theoretical shot volume (cm³) by the above factor.

Dark grey boxes = thermosets
Standard features EcoPower UNILOG B6°

**Base machine**
- Integrated servohydraulic power unit containing speed controlled servomotor and internal gear pump for ejector and nozzle movement including adjustable nozzle contact force

**Base machine fully electric**
- Servoelectric ejector and injection unit movement

**Machine in general**
- Paint RAL 7047 tele grey 4/RAL 5002 ultramarine blue
- One-piece machine frame
- Built-in control cabinet
- Parts transport on operator side, rear side or axial
- Automatic central lubrication system

**Clamping unit**
- Clamping system with 5-point twin toggle, servo electrical direct drive via ball screw
- Adjustable clamping and opening stroke, adjustable mold locking system
- Mold safety program with envelope curves monitoring for optimal mold cover
- Precise platen parallelism with low-maintenance moving platen support
- Platen drillings and register rings as per EUROMAP
- Fixing holes for robot on top of the fixed platen as per EUROMAP 18
- Clamping force display on screen
- Clamping force monitoring incl. display via screen

**Injection unit**
- Screw drive by 3-phase servo motor, screw speed continuously adjustable via screen
- Screw with check valve, screw and barrel nitrated
- Thermocouple failure monitor
- Maximum temperature supervision
- Plug-in ceramic heater bands
- Temperature control of feed throat integrated
- Open nozzle
- Quick cylinder removal to the top
- Barrel guarding
- Hopper WITTMANN MH-206
- Linear bearings for the injection unit
- Selectable barrel stand-by temperature
- Decompression before and/or after metering
- Physical units – bar, ccm, mm/s etc.
- Screw protection
- Peripheral screw speed indication
- Linear interpolation of holding pressure set values
- Bar chart for barrel temperature with set value and actual value display
- Selectable injection pressure limitation
- Changeover from injection to holding pressure depending on stroke, time and pressure

**Safety gate**
- Monitored safety gate electric controlled according to CE on front and rear side
- Maintenance-free safety gate locked by electromagnet
- Safety gate free for mold change and handling by robot

**Electrical components**
- Operating voltage 230/400 V-3PH, 50 Hz
- Fuse protection for sockets
- Common voltage supply for drive and heat
- Separate voltage supply for drive and heat USA/CDN
- Control unit UNILOG B6° with touchscreen, operating system Windows XP
- Software for operating hours counter
- Closings/Opening – 5 profile steps
- Ejection forward/back – 3 profile steps
- Injection/holding pressure – 10 profile steps
- Injection parallel to clamp force build-up
- Screw speed/Back pressure – 6 profile steps
- Parts counter with good/bad part evaluation
- Purging program through open mold
- Stroke zero offset settings
- Start-up program
- Adjustable injection pressure limitation
- Switchover to holding pressure MASTER/SLAVE by injection time, screw stroke/injection volume and injection pressure
- Self-teaching temperature controller
- Display of temperature inside electrical cabinet
- Seven-day timer
- Access authorization via USB interface
- Access protection via password system
- Freely configurable status bar
- Physical, process-related units
- 15” TFT color screen – touch screen
- Energy consumption monitoring for motors and heating
- Automatic dimming
- Logbook with filter function
- User programming system "APS"
- Userpage
- Note pad function
- Cycle time analysis
- Energy measurement displayed
- 1 freely configurable network connection
- Hardcopy function
- Internal data storage via USB connection or network
- Online language selection
- Online selection of imperial or metric units
- Operator manual incl. hydr., mech. and el. schedules online
- Time monitoring
- Quality table, 1,000 storage depth
- Events protocol (logbook) for 1,000 events
- Actual value graphics with 5 curves
- 1 envelope curves monitorings
- Injection integral supervision
- Metering integral supervision
- Alarm message via Email
- USB – 2x operating unit
- 2 Ethernet interfaces
- Printer via USB connection or network
## Optional features EcoPower UNILOG B6°

### Base machine option
- Water cooling system of the machine with closed cooling circuit via water/water heat exchanger
- Mold height increased

### Pneumatic/Hydraulic
- Oil heating for hydraulic aggregate
- Oil cooler with cooling water regulation for hydraulic aggregate
- Hydr. core pulls incl. add. drive system. Limit switch function according to EUROMAP 13. Pressure and speeds adjustable
- Core pull pressure release
- Pneumatic core pull
- Pneumatic manifold for Mouldmaster nozzle (controlled 1 nozzle or more parallel in the mold)

### Clamping unit
- T-slots in mold platens
- Cooling channels in mold platens
- Nicel plated mold platen
- SPI bolt pattern
- Servo electric ejector only for standard base machine
- Ejector cross in clamping platen as per EUROMAP/SPI
- Mechanical ejector couple
- Ejector platen safety device as per EUROMAP 13
- Mechanical mold safety mechanism
- Parts chute
- Parts chute for separation of good/bad parts
- Photoelectric ejection check
- Air valve, action initiated (ON) and timer (OFF)
- Quick mold clamping system magnet

### Injection unit
- Grooves in the feeding zone of barrel for improved feeding
- Increased injection and plasticizing performance
- High temperature heater bands up to 450°C
- Barrel insulation
- Ball type screw tip
- Check valve with carbide insert
- Non-standard open nozzle
- Needle type shutoff nozzle with spring, pneumatic operated
- Melt temperature or pressure sensor in cylinder head
- Wear resistant screw and barrel AK+
- High wear and corrosion resistant screw and barrel AK++
- Corrosion resistant screw and barrel AKCN in chrome nitride
- Screw with mixing section or barrier section
- Liquid Silicon unit LIM and 3-component meter mix pump
- PIM/MIM/CIM package
- Vacuum pump
- Material hooper volume 29 litres
- Hopper magnet
- Hopper loader UNIFEED A1

### Safety gate
- Front side safety system for manual part removal
- Pneumatic safety gate at the operator side
- Initiate next cycle by closing safety gate in semi-auto operation
- Safety gate clearance operator side/rear side extended
- Safety gate rear side lowered at the top of the upper tie bar

### Cooling and Conditioning
- Flow controller with temperature gauges
- Shut-off valve for cooling water battery
- Blow out valve for cooling water battery
- Distributor of cooling circuits on the fixed platen of the moving platen
- Machine cooling via cooling water distributor with T-pieces

### Electrical components
- Pressure transducer for melt pressure switch over
- Temperature control zone for hot runner
- Special voltage
- Control cabinet cooler
- Membrane keyboard for manual movements of UNILOG B6°
- Additional socket
- Manual board
- Closed loop temperature control of mold
- Additional socket
- Emergency stop button on rear side
- Energy consumption analysis
- Switch over to holding pressure by cavity or melt pressure
- Switch over to holding pressure by external signal
- Injection compression and venting sequences
- Melt cushion control
- Signal tower with acoustic elements
- Analog temperature control interface
- Temperature control interface digital, serial 20mA TTY protocol
- CAN-Bus-interface for mold conditioner as per EUROMAP 66-2
- Interface BFMOULD® via CAN BUS for WITTMANN D-serie
- Interface for AIRMOULD® mobile
- Interface for robots as per EUROMAP 67
- Interface for conveyor belt
- Interface for dosing pump
- RIG eDart interface
- Master interface for danger zone boundary (DZB)
- Interface for fully integration of robot incl. Ethernet switch
- Host computer interface/PDA (EUROMAP 63)
- Relays contact parallel to plasticizing
- Machine fault (potential-free contact)
- BNC connectors for injection process analysis
- Interface for vacuum pump
- Second injection data setting for automatic start up
- User specific programable set value limits
- Web- and remote service
- Control button IOS system incl. Interface EUROMAP 63-K4

### Additional Equipment
- Hi-Q package, Euro package, Insider package
- Inline thermography
- Webcam
- Special paint and/or touch-up paint
- Tool kit
- Levelling pads
- Additional manual on USB flash drive
- Lighting in mold space