EcoPower 55 – 550 t

All-electric, fast and precise

world of innovation

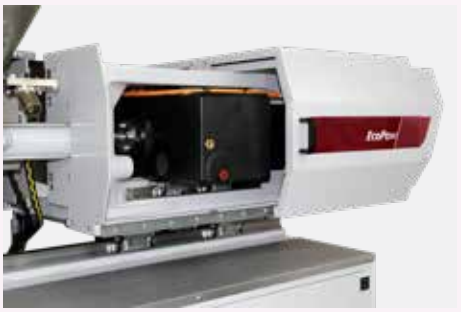
DYNAMIC – PRECISE – HIGHLY EFFICIENT
Optimal sustainability and performance

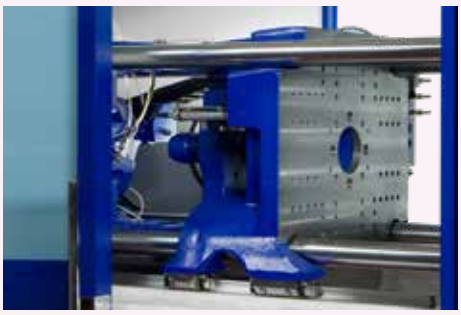
The advantages

» Dynamic toggle clamping unit with sensitive mold protection
» High-precision injection units with extreme shot-by-shot accuracy
» Fast, precise and efficient thanks to servo drive axes with parallel operation
» Additional energy bonus through patented KERS energy recovery system
» User-friendly through the Unilog B8 control system with integrated assistance systems
» "Plug & Produce" extension into a full-fledged production cell possible with WITTMANN auxiliary equipment and the Wittmann 4.0 integration package
» Optimal price/performance ratio

The machine series

EcoPower standard: 11 clamping force sizes from 55 to 550 t
EcoPower Medical: for clean room applications – from 55 to 550 t
EcoPower Combimould: for multi-component injection molding – from 55 to 300 t





EcoPower

The system-highlights

» **Direct servo drives for main movements**
The EcoPower machines come with highly dynamic servo motors to drive the main movements (closing/opening, plasticizing, injection). The mold height adjustment device in the clamping unit is also driven by a servo-electric motor. The ancillary strokes (ejector, nozzle stroke/contact pressure, core pulls) are driven by an integrated servo-hydraulic aggregate powered by a servo-electric motor. Direct servo-mechanic drives are available as an option.

» **High-performance injection unit**
The EcoPower injection units are equipped with a twin drive system for the injection and dosing functions. A torsion-resistant, one-piece cast iron frame with linear guides and a central ball screw drive provides the basis for highly dynamic, precise movements.

» **Fast toggle clamping system**
The EcoPower clamping unit is a 3-platen/4-tie-bar system with a 5-point toggle lever, driven directly by a servo motor via a rack-and-pinion drive. The moving platen of the machine travels on linear guides and rotating roller bearings without coming into contact with the tie-bars. Injection can already start during clamping force build-up.

» **KERS – energy recovery is standard**
The KERS kinetic energy recovery system, patented for injection molding machines, converts the kinetic energy released by braking processes into electrical energy. The resulting current is used within the machine, e. g. for barrel heating. With KERS, the energy consumption can be cut further by up to 5 %.

» **Mould Protect – fast-response mold protection**
The minimal rolling friction of the moving platen guide system combined with measurement of force changes inside the toggle lever drive offers optimal conditions for highly sensitive, self learning, fast-response mold protection.

CLAMPING UNIT
Servo-electric speed and dynamism

» **Ample space for complex molds**
- Generously dimensioned mold platens [1] and a clean toggle lever clamping system offer the optimal environment for all molds including all media connections.
- The ejector area and the environment of the platens offer easy access for machine setup and adjustment work. [2]

» **Sensitive and precise**
In the EcoPower clamping system, the tie-bars are exclusively used for force transmission between the outer platens. The moving platen travels virtually free of friction across the linear bearings without coming into contact with the tie-bars. [3]

» **Servo-electric dynamism**
- The moving platen is moved quickly and with high precision by a self-locking 5-point toggle lever. [4]
- The toggle lever is driven by a highly dynamic servo motor via a rack-and-pinion drive system. [5]
- The synchronized mold height adjustment via 4 bronze bar nuts and a sun gear system is driven by a servo motor. In this way, an extremely accurate clamping force regulation can be achieved. [6]

» **Servo-hydraulic ancillary strokes**
To drive the ancillary strokes (ejector, nozzle strokes and core pulls), a hydraulic aggregate powered by a servo-electric motor is mounted on the inside of the machine frame. Being specially designed for high efficiency, it requires no cooling water connection. The maintenance-friendly access is from the rear, behind the clamping unit. Servo-mechanical drives for the ancillary strokes are available as options.

INJECTION UNIT
Precision from beginning to end

» **Everything to ensure series consistency**
- All screws > 25 mm come with a 22:1 L/D ratio.
- All injection units offer a wide injection pressure range.
- Plasticizing parallel to clamping unit movements and start of the injection process during clamping force build-up are possible as standard.
- EcoPower injection units with a higher injection performance can be supplied as an option.
- Moment-free nozzle contact thanks to axial configuration of traveling cylinders [7]
- Plasticizing units can be mounted to different injection aggregates with identical screw diameters.
- In combination with WITTMANN BATTENFELD HiQ software packages sensitive adjustment facilities are available in the form of (optional) software modules to compensate environmental factors such as temperature and moisture, regrind or masterbatch content.

» **Optimal operational excellence**
- The complete range of all-electric injection units is designed for quick barrel exchange from above.
- Easy access for changeover work thanks to compact design and sliding guard [8]

» **More productivity and efficiency**
- High-resolution absolute value encoder for precise control [9]
- Low-noise injection spindle with modern ball screw drive and "spacer" technology and low grease consumption [10]

Anti-wear options
In addition to the premium-quality standard equipment, an extensive range of options is available to provide extra anti-wear and/or anti-corrosion protection. Predefined option packages and a selection matrix facilitate the selection of the right plasticizing unit.

DRIVE TECHNOLOGY
Energy efficiency with servo motors

Fast-responding, precise, cost-efficient
The use of servo-electric drive technology for all main movements affecting the cycle offers a large number of advantages compared to conventional hydraulic injection molding machines:

» Energy efficiency through direct drive without energy conversion into hydro energy
» Energy efficiency through the servo drives' high efficiency rates
» Digital control for maximum repeatability
» Use of recovered braking energy via KERS system for powering of heater bands
» Cycle flexibility thanks to possibilities with parallel movements
» Low sound emission (< 65 dBA)

The combination of servo motors and drive units (rack-and-pinion drive for the toggle lever and spindle drive for the injection stroke) can be supplied at different performance levels for different speeds.

Basically, the EcoPower drive concept offers the advantage of modularity for demand-oriented adjustment of drive performance to the intended use in each case.

Servo-hydraulic drive for ancillary strokes
» Integrated in the machine frame without additional space requirements
» Drive unit for hydraulic core pulls
» Energy-efficient, maintenance-free nozzle contact with high pressure
» No cooling required for standard applications

INSIDER CONCEPT
"ex works" production cell

The insider concept is an ex-works solution to transform an EcoPower injection molding machine into a fully fledged production cell. In its basic version, the equipment cell integrates a parts handling system, a conveyor belt for parts transport and a protective housing firmly connected with the machine. Additional equipment modules for further processing, quality documentation and packaging are available as options. For the design and configuration of such higher automation levels, WITTMANN BATTENFELD places the combined expert knowledge of the entire group at its customers' disposal.

The advantages of insider automation

» **Material flow systematization**
thanks to a uniform logistics interface for finished parts transfer at the end of the clamping unit, a prerequisite for positioning of several machines in rows

» **Reduction of production space**
by up to 50 % compared to conventional automation solutions

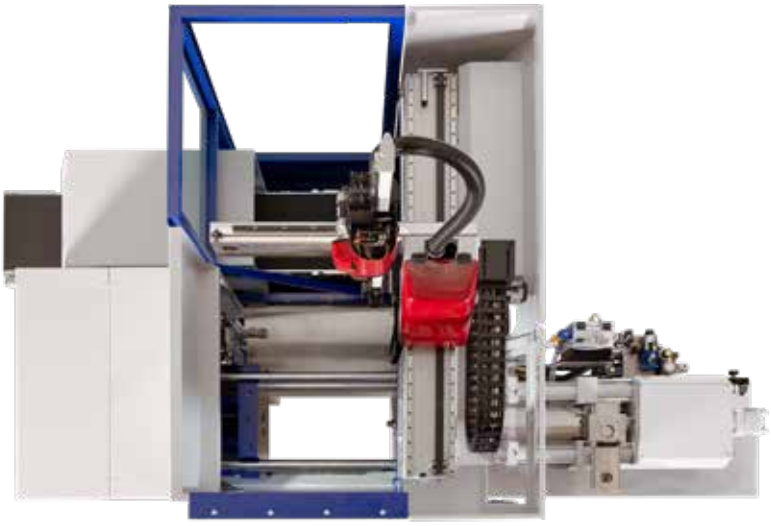
» **Minimization of robot cycle times**
through shorter travel paths and immediate parts depositing on conveyor belt

» **Easy access in spite of integration**
to the mold and the robot thanks to mobility of the conveyor belt integrated in the protective housing

» **Cost benefits,**
since safety features for all danger areas are already in place and certified ex works.

» **CE mark included**
for every machine with an insider solution. No more costs for individual approval.

CE certified by type examination CE



UNILOG B8
Complex matters simplified

The Unilog B8 machine control system is the WITTMANN BATTENFELD solution to facilitate the operation of complex processes for human operators. For this purpose, the integrated industrial PC has been equipped with an enlarged intuitive touch screen operator terminal. The visualization screen is the interface to the new Windows® 10 IoT operating system, which offers extensive process control functions. Next to the pivotable monitor screen, a connected panel/handset is mounted on the machine's central console.

Unilog B8
Highlights

» **Operating logic**
with a high degree of self-explanation, similar to modern communication devices

» **2 major operating principles**
- Operating/movement functions via tactile keys
- Process functions on touch screen (access via RFID, key card or key ring)

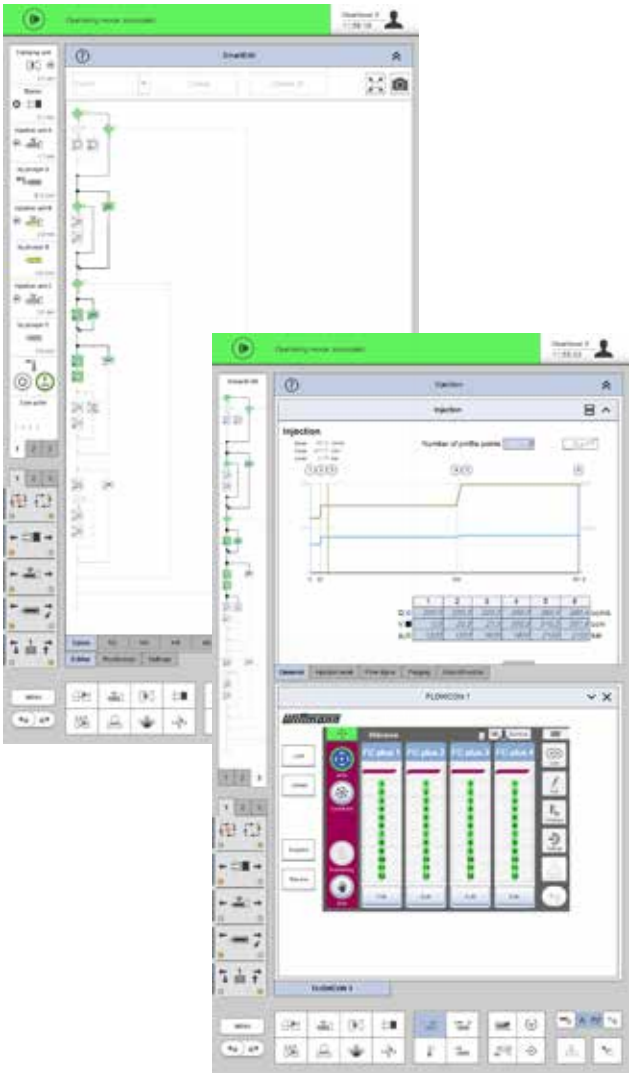
» **Process visualization**
via 21.5" touch screen display (full HD), pivoting laterally

» **New screen functions**
- Uniform layout for all WITTMANN appliances
- Recognition of gestures (wiping and zooming by finger movements)
- Container function – split screen for sub-functions and programs

» **Status visualization**
uniform signaling system across the entire WITTMANN Group
- Headline on the screen with colored status bars and pop-up menus
- AmbiLED-display on machine

» **Operator assistance**
- QuickSetup: process parameter setting assistant using an integrated material database and a simple query system to retrieve molded part data with machine settings pre-selection
- Extensive help library integrated

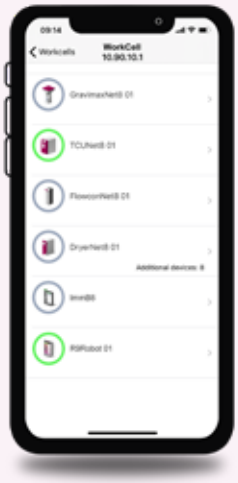
The process in constant view



» **SmartEdit**
SmartEdit is a visual, icon-based cycle sequence programming facility, which enables direct addition of special functions (core pulls, air valves, etc.) based on a standard process via touch operation on the screen. In this way, a total user-defined sequence can be compiled from a sequence menu. This machine cycle, visualized either horizontally or vertically, can be adjusted simply and flexibly to the process requirements by finger touch with "drag & drop" movements.

The advantages
- Icon visualization ensures clarity.
- Clear events sequence through node diagram
- Alterations without consequences through "dry test runs"
- Theoretical process sequence can be quickly implemented in practice.
- Automatic calculation of the automation sequence based on the actual set-up data set without machine movements

» **SmartScreen**
- Partitioning of screen displays to visualize and operate two different functions simultaneously (e.g. machines and auxiliaries)
- Uniform design of the screen pages within the WITTMANN Group
- Max. 3 containers can be addressed simultaneously for the SmartScreen function.
- Adjustments of set values can be effected directly in the set value profile.



Remote communication

» **QuickLook 4.0**
Production status check via smartphone – simple and comfortable:
- Production data and statuses of all essential appliances in a production cell
- Complete overview of the most important production parameters
- Access to production data, error signals and user-defined data
- The production cell overview offers a clear, simple overview of the production cell's general condition and that of its individual Wittmann 4.0 appliances.

» **Global online service network**
- Web-Service 24/7: direct Internet connection to WITTMANN BATTENFELD service
- Web-Training: efficient staff training by means of the virtual training center

WITTMANN 4.0
Communication in and with production cells

With its communication standard Wittmann 4.0, the WITTMANN Group offers a uniform data transfer platform between injection molding machines and auxiliary equipment from WITTMANN. In case of an appliance change, the corresponding visualizations and settings are loaded automatically via an update function, following the principle of "Plug & Produce".

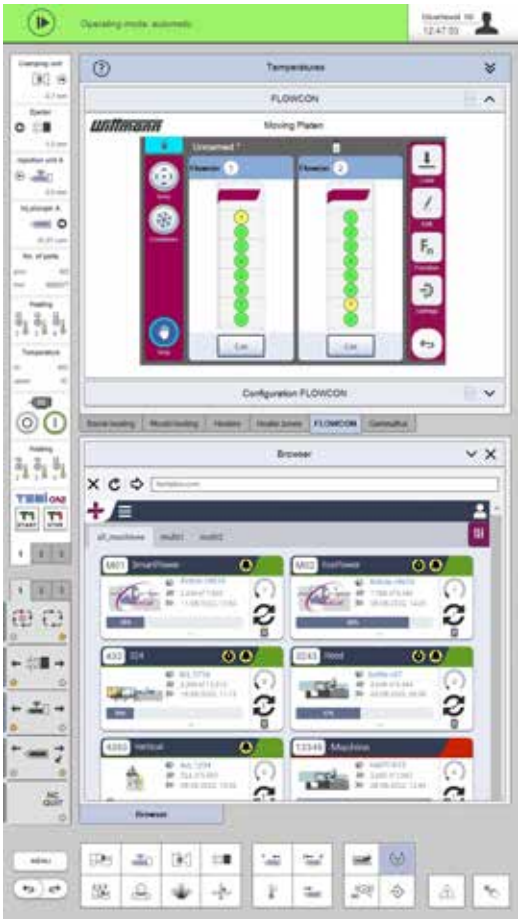
Connection of auxiliaries via Wittmann 4.0

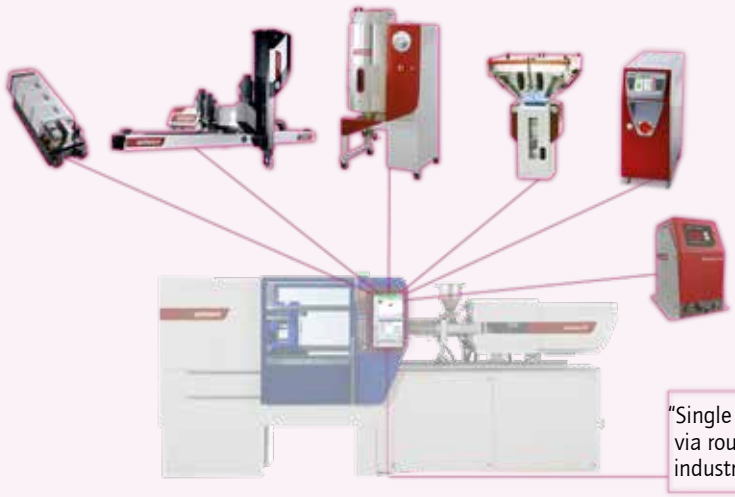
» **WITTMANN Flowcon plus water flow regulator, Gravimax blenders and Aton dryers**
- Units directly addressed and controlled via the machine's control system
- Joint saving of data in the production cell, the machine and in the network via MES

» **WITTMANN robots with R9 control system**
- Operation of robots via the machine's monitor screen
- High-speed communication between machine and robot to synchronize movements
- Important machine movements can be set via the R9 robot control system

» **WITTMANN Tempro plus D temperature controllers**
- Setting and control of temperatures via the machine's control system possible
- All functions can be operated either on the unit or via the machine's control system

Integration in MES system
The integration of machines and complete production cells in an MES system is a prerequisite for an efficient and transparent production facility according to the Industry 4.0 concept.
Depending on customers' requirements, small and medium-sized companies as well as global players are offered a compact MES solution based on TEMI+. With the Windows® 10 IoT operating system it is also possible to have selected status information from all connected machines on the production floor shown under *SmartMonitoring* on the display screen of every machine.





Wittmann 4.0 system
With Wittmann 4.0, a machine and its robots and auxiliaries are transformed into a uniform technical organism, which communicates externally via a specific IP address. Such a "Single Point Entry" with an integrated internal firewall substantially increases cyber security.

OPTIONS
Modular and flexible

EcoPower
The option highlights

» **Performance increase for injection**
As an option, a "high-speed" version of the toggle lever drive is available. The injection dynamism and precision of the servo-electric injection units provide the prerequisites for manufacturing thin-walled molded parts with high standards of dimensional accuracy. This enables the production of thin-walled plastic parts for the packaging and electronics industries.

» **Faster ejection**
As an alternative to the standard servo-hydraulic drive for the ejector, a more powerful version with a servo-mechanical drive is available as an option.

» **Electrical nozzle movement**
Instead of the standard version of the nozzle system with hydraulic cylinders, the nozzle carriage equipped with a servo-electric drive can be supplied as an option (up to injection unit 1330).

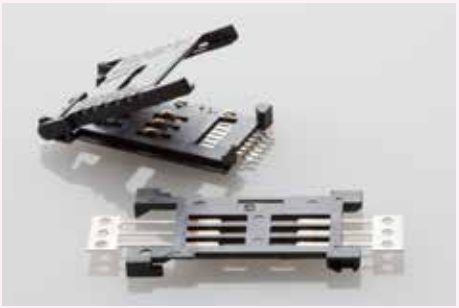
» **Fast media connections**
For the ergonomically positioned standard connection points for cooling water, air and core pull hydraulics, optional fast-coupling plates (individual plates or system plates) can be supplied, as well as electrical plug-in systems for the hot runner heating circuits, temperature and pressure sensors and coding signals.

» **WITTMANN auxiliaries**
The extensive range of the WITTMANN auxiliary equipment offers appropriate solutions for all secondary processes of injection molding, including parts handling, material feeding and drying, sprue recycling and mold cooling. Via the optional Wittmann 4.0 integration package, all additional appliances can be integrated into the production cell according to the "Plug & Produce" principle.

APPLICATION TECHNOLOGY
Outstanding competence

Photo: Greiner Bio-One GmbH

» **Clean room injection molding**
Whenever medical or electronic components need to be manufactured in a particle-free environment, the EcoPower concept with its easy-to-clean mold space offers good basic conditions, which can be further optimized to meet more stringent requirements by adding optional equipment modules (such as water-cooled servo motors and clean room packages).



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

» **IML – In-Mold Labeling**
The fast running EcoPower machines in combination with the proven WITTMANN handling technology are the basic equipment for high-performance in-mold labeling production cells to make directly decorated containers.

» **Combimould**
Where two or more different plastic materials in different colors or with different attributes are to be combined into one part, the EcoPower machines can be fitted with additional injection units in V or L configuration.

» **LIM – Liquid Injection Molding**
LIM designates the injection molding process to make elastic parts from 2-component LSR (liquid silicon rubber). For LSR product manufacturing, WITTMANN BATTENFELD uses proven modular machine and automation concepts with special plasticizing systems adapted to the viscosity of LSR.

» **PIM (CIM/MIM) – Powder Injection Molding**
Powder injection molding (PIM) is a manufacturing process for series production of parts made of metallic or ceramic materials. PIM is the ideal process to produce large quantities of complex, functional components with a high material requirements profile.

» **Injection molding of high-precision components**
The high degree of precision in the movements of servo drives stands for an equally high level of precision and consistency of the injection parameters. This provides ideal conditions for processing engineering plastics into all kinds of high-precision components.

COMBINATIONS OF CLAMPING UNITS/INJECTION UNITS								
Clamping unit	Injection unit							
t	70	130	350	750	1330	2100	3300	5000
55	•	•	•					
90		•	•					
110		•	•	•				
160			•	•				
180			•	•	•			
240				•	•	•		
300				•	•	•		
400					•	•	•	
450					•	•	•	
500					•	•	•	•
550					•	•	•	•

Material	Factor
ABS	0.88
CA	1.02
CAB	0.97
PA	0.91
PC	0.97
PE	0.71
PMMA	0.94
POM	1.15
PP	0.73

The maximum shotweights (g) are calculated by multiplying the theoretical shot volume (cm^3) by the above factor.

Material	Factor
PP + 20 % Talc	0.85
PP + 40 % Talc	0.98
PP + 20 % GF	0.85
PS	0.91
PVC hard	1.12
PVC soft	1.02
SAN	0.88
SB	0.88
PF	1.3
UP	1.6

Dark grey boxes = thermosets

STANDARD

Base machine
Regional packages, Europe
Drop – voltage 230/400V/3p+N-TN/TT, 50 Hz
Painting RAL 7047 tele grey 4 / RAL 5002 ultramarine blue
Air cooling system for drive and amplifier unit, water cooling system open (up to 300 t) or closed (from 400 t) for feed zones
One-piece base frame (up to 300 t) with 3 disposal directions
Two-piece base frame (from 400 t) with 3 disposal directions
Ejection area – coverage of ejection area according to EN201
Machine filled with hydraulic oil HLP32 zinc free according to DIN 51524 T2 / purity level 17/15/12 according to ISO 4406, lubricants according to H2-quality
Operating manual in printed version incl. user manual on USB flash drive in any EU language according to definition of country incl. type examination certificate TÜV Austria in German incl. protocol: electrical safety according to EN 60204-1
Injection molding machine according to machinery directive 2006/42/EG incl. declaration of conformity and CE-marking

Clamping unit
Clamping force and closing and opening forces adjustable
Mold safety program
Moving platen supported by positioned linear guides
Mold platen according to EUROMAP 2, clamping surface metallic bright, rest painted
Fixing holes for robot on fixed platen as per EUROMAP 18
Hydraulic multi stroke ejector
Drive unit S0 with speed controlled servo motor for hydraulic pump to increase the energy efficiency, injection axis, dosing axis and clamping axis with energy-efficient and performance optimized direct servo drive
Servo electric ejector and injection unit movement up to injection unit 1330 (fully electric machine)
Clamping system with 5-point twin toggle, servo electric direct drive via rack-and-pinion drive
Servo electric mold height adjustment

Injection unit
Screw drive by A.C. servo-motor for parallel recovery during cycle
Plasticizing unit with screw in nitrated steel quality and barrel in AK+ for processing thermoplastics, without grooves, standard nozzle head, 3 zone universal screw, quick acting check valve (3 parts), heater bands up to 350 °C without insulation
Thermocouple failure monitor
Maximum temperature supervision
Plug-in ceramic heater bands
Temperature control of feed throat integrated
Injection axis via servo motor and def. hydraulic nozzle contact pressure
Linear guides in standard design, position sensor with non-contact stroke transducer
Selectable barrel stand-by temperature
Decompression before and/or after metering
Physical units – bar, ccm, mm/s etc.
Screw protection
Auxiliary 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
Open nozzle R35
Splash guard and barrel covering in standard execution according to EN 201, L/D 22 protected via limit switch
Material hopper 6 litres (MH206) for automatic material feed, sliding device with shut-off function for material with sliding guide

Safety gate
Covering injection side – maintenance door slightable with sensor
Safety gate in standard execution, acrylic glass light-blue 309 / frame RAL 5002
Safety gate at operator and non-operator side manually operated
Safety gate clamping side front and back with maintenance-free locking manually operated

Electrics
Control zone for nozzle heater band 230 V
AmbiLED status indicator
Fuse protection for sockets
Switch cabinet circulating fan for environment temperature to max. 30 °C
Emergency stop switch button in control panel
Printer socket
USB – 1 x operating unit
1 Ethernet interface (switch cabinet)
Printer via USB connection or network

Control system
Control system Unilog B8 – 21,5'' multi-touch screen (full HD)
Control panel with selectable haptic keys
Software for operating hours counter
Closing/Opening – 5 profile steps
Ejection forward/back – 3 profile steps
Nozzle forward/back – 3 profile steps
Injection/Holding pressure – 10 profile steps
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
Switch over 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, password system and RFID authorization system (1 x check card IT-level-15, 1 x token customer level-30 and 1 x token customer service level-20 are included in delivery)
Freely configurable status bar
Physical, process-related units
Automatic dimming
Logbook with filter function
User programming system (APS)
User page
Note pad function
Cycle time analysis
Hardcopy function
Internal data storage via USB connection or network
Online language selection
Online selection of imperial or metric units
Time monitoring
Basic Quality Monitoring (1 freely config. network connection, quality table 1000 storage depth, events protocol (logbook) for 1000 events, actual value graphics with 5 curves, 1 envelope curves monitoring)
Basic StepForce – Injection parallel to clamping force build-up
Injection and Metering integral supervision
Alarm message via e-mail
SmartEdit – sequence editor
QuickSetup – assistance program for initial parameter setting
Energy consumption monitoring for motors and heating
Clamp force supervision

OPTIONS

Base machine
Regional packages, country-specific
Drop 1, special voltage, drop 2
Handling package with open machine safety gate on non operator side
Parts hopper
Parts chute for separation of good/bad parts or photoelectric ejection check

Hydraulics/Pneumatics
Raw filter in water inlet of cooling incl. adapter with ball valve for oil maintenance on oil tank
Hydraulic core pull for clamping plate, interface according to EUROMAP 13, incl. or without core pull pressure release
Pneum. core pull on clamping plate/nozzle plate, incl. pressure regulator
Hydraulic manifolds for one mold shut-off nozzle or more
Air valves on nozzle plate/clamping plate
Compressed air pressure maintenance unit incl. 1 or more way pressure regulation incl. directional exhaust valve with blocking function

Clamping unit
Mold platen according to SPI, JIS, T-slots
Mold platen incl. cooling channels
Mold platen chemically nickel-plated
Manuel tie-bar retract device
Hydraulic ejector in reinforced execution
Unscrewing device in lieu of ejector
Double check valve to keep ejector in end-position
Ejector cross according to EUROMAP/SPI
Mechanical or pneumatic ejector coupling
Ejector platen safety
Mechanical mold safety mechanism

Injection unit
Plasticizing unit AK+ in wear and corrosion resistant execution
Plasticizing unit AK++ in high wear and corrosion resistant execution
Plasticizing unit AKCN in wear and corrosion resistant execution, for processing PMMA, ABS and PC
Grooves in the feeding zone
Barrier section, screw with mixing section
Ball type screw tip
Melt pressure transducer, melt temperature sensor
Heater bands up to 450 °C
Plasticizing unit in special execution for LIM, MIM, CIM
Barrel insulation
Open nozzles in special execution
Needle type shut-off nozzle operated with spring, pneumatically or hydraulically
Barrel covering and splash guard in special execution
Vacuum package incl. vacuum pump
Material hopper in special execution
Hopper magnet

Safety gate
Safety gate clamping side, rear side and/or operator side elevated, lowered or extended
Insider package WITTMANN rear side incl. conveyor belt
Safety gate clamping side electrically operated
Front side gate safety system for manual part removal incl. clearance of ejector

Cooling and conditioning
Cooling water distributor with/without blow-off valve
Solenoid valve for cooling water distributor
Machine cooling by T-piece in inlet pipe
Filter back flushable/water pressure supervision in inlet pipe
Distributor block on nozzle plate/clamping plate

Electrics
Temperature control zones for hot runner
Acustic element integrated in signal lamp
Socket combination
Additional fan in electric switch cabinet for increased environment temperature
Cabinet air conditioner
Additional emergency stop switch button
Interface for robot, conveyor belt, TCU, dosing unit, Airmould, Bfmold, mold surveillance, production data logging system, RJG eDart, Priamus BlueLine, danger zone boundary, ejection in mold middle plate, brushing device, relay signals

Control system
Cavity pressure switch over
BNC sockets for injection process analysis
Expert Quality Monitoring (4 freely configurable network connections, quality table with 10000 storage depth, events protocol (logbook) for 10000 events, actual value graphic with 16 curves, 4 envelope curves monitoring, SPC charts, trend diagrams)
Mold identification
Special programs on customer request
HiQ Cushion – melt cushion control
HiQ Flow – injection integral control
HiQ Melt – monitoring of material quality
Software Tandemmould, multiple data sets
Energy consumption analysis
Injection compression and venting program
Initiation of next cycle by closing safety gate
Special program ejector intermediate stop/ejection of cold slug
Additional output card/input card, freely programmable
Integration package Wittmann 4.0

Additional equipment
Tool kit
Levelling pads
Lighting in mold space
Mold clamping systems in mechanical, electrical or hydraulic execution
Integration package (robot, feeder, dosing unit, TCU, mold integration)
WITTMANN BATTENFELD web service during warranty period free of charge
Remote control package

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