

SmartPower 25 – 350 t

Servo-hydraulic efficiency

world of innovation



EFFICIENT – PRECISE – VERSATILE

The smart basis for your success

The advantages

- » Highly compact servo-hydraulic injection molding machine with outstanding stability
- » High-precision injection units with extensive equipment options
- » Top efficiency with drive-on-demand drive system as standard
- » Additional energy saving through patented KERS energy recovery system
- » User-friendly thanks to new UNILOG B8 control system with integrated assistance systems
- » Short mold changing time through ergonomically optimized clamping system
- » Conversion into a full production cell possible with WITTMANN peripherals and the WITTMANN 4.0 "plug & produce" integration package
- » Attractive price/performance ratio

The machine series

SmartPower standard: 14 machine sizes with clamping forces ranging from 25 to 350 t

SmartPower Medical: for clean-room applications with clamping forces ranging from 25 to 350 t

SmartPower COMBIMOULD: for multi-component injection molding with clamping forces ranging from 60 to 350 t





SmartPower

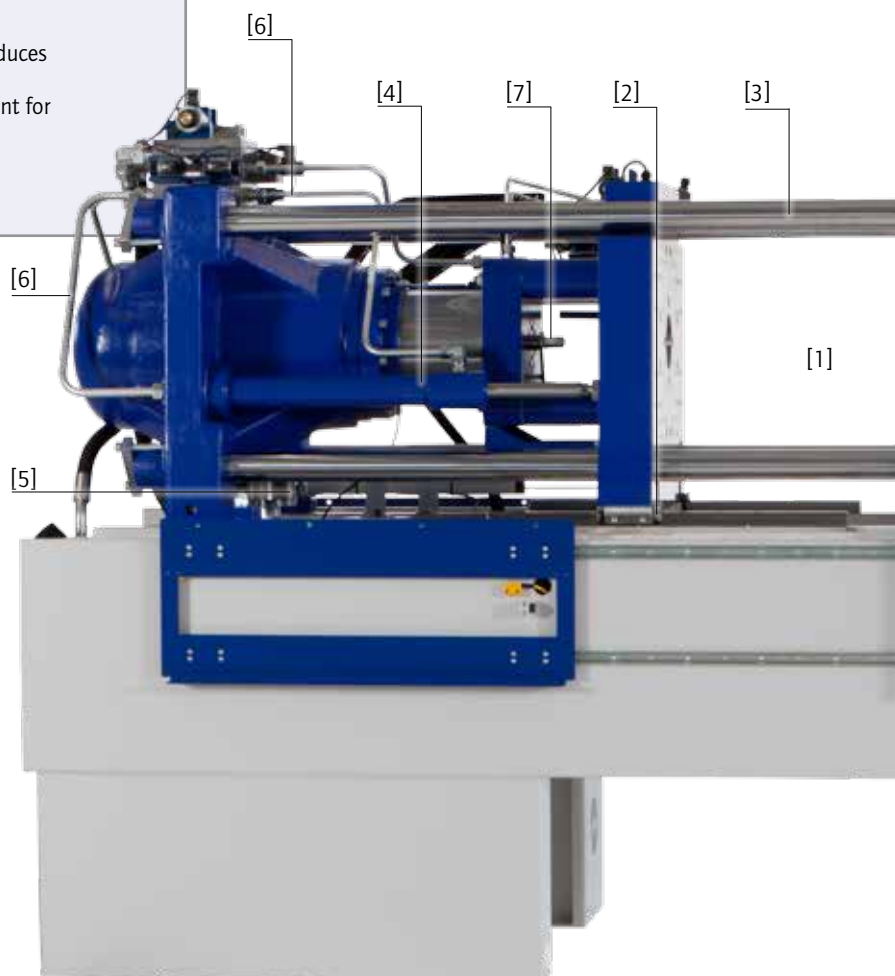
The system highlights

- » **Servo drive is standard for the hydraulic system (Drive-on-Demand)**
All SmartPower machines are equipped with a combination of fast-responding servo motors with high-performance fixed displacement pumps as standard. The system benefits are extreme dynamism, high speed and precision of the machine movements and minimal energy consumption.
- » **Plasticizing unit – compact, maintenance-friendly**
All SmartPower plasticizing/injection units are pivotable and designed for easy access. This offers optimal conditions for quick access to the screw. Optionally a servo electric screwdrive or a fully electric injection unit is available.
- » **KERS – the optimal energy utilization system**
The patented KERS (Kinetic Energy Recovery System) for injection molding machines transforms the kinetic energy released by deceleration processes into electrical energy. The resulting electrical power is utilized within the machine, e. g. for barrel heating. KERS enables an additional energy consumption cut of up to 5 %.
- » **Well-balanced clamping system protects the molds**
The 4-pillar clamping system, with force transmission via a central pressure pad and two diagonally positioned fast-stroke cylinders, ensures optimal force transmission into the mold and simultaneously a high level of mold protection.
- » **Sensitive mold protection**
Without coming into contact with the tie-bars, the moving platen is guided on linear guides and rotating roller bearings via a sturdy moving carriage with a high load capacity for heavy molds. The minimal rolling friction of the moving platen guide system offers ideal conditions for highly sensitive mold protection and cleanness.

CLAMPING UNIT

A perfectly balanced power pack

- » **Ample space for the mold and for symmetrical force distribution**
Generously dimensioned mold platens and a clamping system with perfect symmetrical force distribution provide an optimal environment for all kinds of injection molding tools, including all types of media connections. [1]
- » **Sensitive and precise**
Within the *SmartPower* clamping system, the exclusive task of the tie bars is force transmission between the external platens. Without tie bar contact, the moving platen travels on the linear bearings virtually free of friction [2]. In very few steps, the tie-bars can be optionally retracted and reset. [3]
- » **Fast movements**
 - The moving platen is driven by two diagonally positioned travel cylinders. [4]
 - Combination of the travel cylinders with a hydraulic differential gear system enables quick movements.
 - The travel cylinders are dimensioned for high opening forces. [4]
- » **Compact design for minimal footprint**
The suction valve placed at the bottom of the pressure cylinder reduces the length of the clamping unit to a minimum. [5]
- » **Maintenance-friendly and easy to clean**
 - Ample use of rigid hydraulic tubes in lieu of hoses reduces potential maintenance requirements. [6]
 - Easy access to the ejector area and platen environment for machine setting [7]



INJECTION UNIT

Versatile precision

Wittmann

Battenfeld

- » **Everything designed for series stability**
 - All screws > 25 mm come with a 22:1 L/D ratio.
 - Ultimate repeatability with an optional controlled servo valve
 - Momentum-free nozzle system thanks to axial positioning of the travel cylinders [8]
 - Plasticizing barrels can be fitted to different injection units with identical screw diameter
 - WITTMANN BATTENFELD HiQ software modules (optional) offer sensitive control strategies to compensate external factors such as temperature, moisture, regrind or masterbatch content variations.
- » **Optimal operability and flexibility**
 - Free access to the injection unit for easy material feeding, machine setting and servicing
 - All injection units up to size 3400 are pivotable (for quick screw replacement)



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 Drive-on-Demand



Fast-responding, precise, thrifty

Drive-on-Demand is the innovative combination of a fast-responding, speed-controlled, air-cooled servo motor with a fixed displacement pump. This drive unit is only activated when required by movements and pressure build-up. During cooling times or cycle pauses for parts handling, the servo drive remains switched off and thus consumes no energy. In operation, Drive-on-Demand is the basis for highly dynamic, controlled machine movements and short cycle times.

The Drive-on-Demand system is standard in the *SmartPower* machine series. In this way, the machine series already comply with the EU Energy Directive 2020.

A brake on operating costs

- » The Drive-on-Demand system is standard equipment.
- » Drive-on-Demand lowers energy consumption by up to 35 per cent compared to modern variable displacement pump systems.
- » Additional energy cost cuts through reduction of idle power
- » Lower total expense for cooling, since oil cooling, is normally not required
- » Lower maintenance expense through longer preservation of the oil quality due to less thermal load
- » Lower sound emission levels, consequently less investment in sound protection required
- » Easy retrofit of a second servo drive package for parallel movements [1]



INSIDER CONCEPT

"ex works" production cell

Wittmann

Battenfeld

The insider concept is an ex-works solution to transform a *SmartPower* 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



UNILOG B8

Complex matters simplified

The new 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

Wittmann

Battenfeld

» **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 control system's monitor. 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 peripherals)
- 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**

- 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
- Facilities for grouping of appliances and sorting according to status available

» **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 internal communication standard WITTMANN 4.0, the WITTMANN group offers a uniform data transfer platform between injection molding machines and peripheral equipment from WITTMANN. For an appliance exchange, the correct operating software is loaded automatically via an update function according to the "plug & produce" principle.

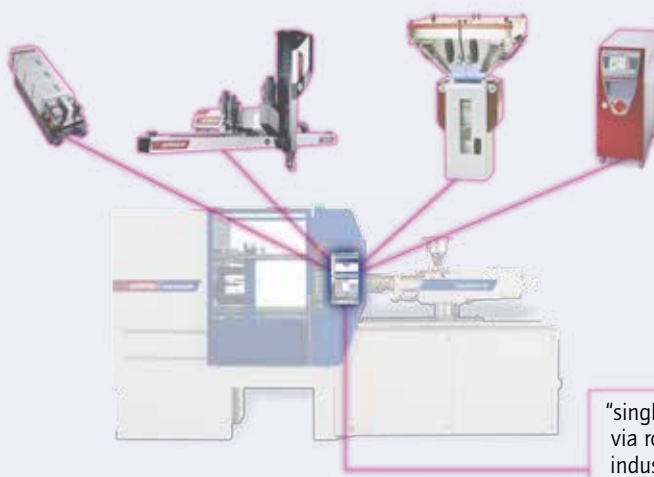
Connection of peripherals via WITTMANN 4.0

- » **WITTMANN FLOWCON plus water flow regulator and GRAVIMAX blenders**
 - Appliances 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 appliance or via the machine's control system

Production monitoring

- » **SmartMonitoring: process data acquisition via authentig**

For monitoring of machines or production cells or entire manufacturing areas, WITTMANN BATTENFELD relies on the "authentig" MES system (Manufacturing Execution System). In combination with the "SmartMonitoring" module, the current status of an injection molding operation can be visualized on the machine's monitor screen B8 in real time.



WITTMANN 4.0 system
With WITTMANN 4.0, a machine and its robots and peripherals are transformed into a uniform technical organism, which communicates externally via a specific IP address. A single point entry increases the cyber security significantly.

"single point entry"
via router into the
industry 4.0 world

OPTIONS

Modular and flexible

Wittmann

Battenfeld



SmartPower

The option highlights

» **Parallel movements**

Additional pump modules for parallel movements

- for ejectors and core pulls
- for higher performance (fast injection)

Building-up the nozzle contact pressure during mold closing

» **Servo-electric plasticizing**

As an alternative to the standard screw rotation drive by a hydro motor, a direct drive with a servo motor is available as an option. It reduces energy consumption and offers additional functions for parallel operation of the clamping and plasticizing units.

» **Fast mechanical mold change**

- Quick mold clamping systems are available as an option, ranging from a manually operated bayonet mechanism up to a magnetic plate system.
- Fast ejector coupling

» **Fast media connection**

For the ergonomically positioned standard connection points for cooling water, air and core-pull hydraulics, fast coupling plates (individual and system plates) are available as options, as well as power plug systems for the hot-runner heating circuits, temperature and pressure sensors, and coding signals.

» **WITTMANN peripherals**

The comprehensive range of WITTMANN peripheral appliances offers the right 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 and produce" principle.

APPLICATION TECHNOLOGY

Competence above standard



Photo: Greiner Bio-One GmbH

» Clean-room injection molding

Whenever medical components or electronic parts must be produced in an environment free of particles, the *SmartPower* concept with its easy-to-clean mold space provides a good starting position, which can be adapted to more stringent requirements by optional equipment modules.



Photo: Kunststoff-Institut Lüdenscheld

» CELLMOULD® structured foam technology

The production of structured foam parts by targeted addition of pressurized nitrogen dioxide to the plastic melt prior to injection into the mold has been a core competence of WITTMANN BATTENFELD based on in-house R&D for more than 30 years.



» AIRMOULD® – gas injection

AIRMOULD® is the process for gas-assisted injection molding developed by WITTMANN BATTENFELD. Its two variants are the AIRMOULD® internal gas pressure process and the external gas pressure process AIRMOULD® CONTOUR.



» COMBIMOULD

When two or more plastic materials in different colors or with different attributes must be combined into one part, the *SmartPower* machines can be equipped with additional injection units in V, L, S or HH configuration and rotary tables with servo drive.



» **LIM – Liquid Injection Molding**

LIM designates the injection molding process to manufacture elastic parts from 2-component LSR (Liquid Silicon Rubber). For processing LSR products, WITTMANN BATTENFELD uses proven modular machines and automation concepts, as well as 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 components made of metallic or ceramic materials. PIM is the ideal production process for making complex, functional components in large batches and with stringent demands placed on the materials.



Photo: Winkelmann Powertrain Components GmbH & Co. KG

» **THERMOSET injection molding**

Thermoset materials, plastics which cross-link into irreversibly rigid networks when exposed to heat, are experiencing a comeback in a growing area of application thanks to latest material developments. WITTMANN BATTENFELD offers the appropriate equipment packages, which can also be combined with *SmartPower* machines.



» **BFMOLD® – Variothermic technology**

BFMOLD® ("Ball Filled Mold") technology enables cyclical heating and cooling of cavity areas adjacent to the contours in combination with specially adapted heating and cooling devices. The effect of this process is the elimination of sink marks and precise formation of high-gloss surfaces.



COMBINATIONS OF CLAMPING UNITS/INJECTION UNITS										
Clamping unit	Injection unit									
t	60	130	210	350	525	750	1000	1330	2250	3400
25	•	•	•							
35	•	•	•							
50	•	•	•	•						
60	•	•	•	•						
80	•	•	•	•	•					
90	•	•	•	•	•					
110		•	•	•	•	•				
120		•	•	•	•	•				
160					•	•	•	•		
180					•	•	•	•		
210						•	•	•		
240						•	•	•		
300						•	•	•	•	•
350						•	•	•	•	•

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 (cm³) 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

Base machine
Regional packages, Europe
Drop – voltage 230/400 V/3p+N-TN/TT, 50 Hz
Painting RAL 7047 tele grey 4/ RAL 5002 ultramarine blue
Cooling system machine – air cooling
One-piece base frame with 3 disposal directions
Ejection area – coverage of ejection area according EN201
Instruction manual and user manual in printed version and on USB flash drive
Operator manual incl. hydraulic, mech. and electr. schedules online
Hydraulics
Drive unit with speed controlled servo motor for hydraulic pump to increase the energy efficiency
Hydraulics with oil cooler controlled in water inlet of cooling, oil level monitoring, oil filtration with electrical clogging indicator
Oil preheating of hydraulic drive
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
Fixing holes for robot on fixed platen as per EUROMAP 18
Hydraulic multi stroke ejector
Injection unit
Hydraulic screw drive
Injection axis/nozzle carriage – injection, holding and back pressure controlled with defined nozzle carriage pressure
Plasticizing unit L/D 22 (from ø 25 mm), with screw in nitrated steel quality and bimetallic barrel in AK+, incl. quick acting check valve
Thermocouple failure monitor
Maximum temperature supervision
Plug-in ceramic heater bands
Temperature control of feed throat integrated
Swivelling injection unit
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
Open nozzle R35
Barrel covering and splash guard according to EN201
Material hopper standard 6 litre, prepared for WITTMANN loader
Safety gate
Covering injection side – maintenance door screw together
Safety gate clamping side front and back monitored according to CE standard
Safety gate clamping side free for easy mold change and handling by robot
Safety gate clamping side front and back with maintenance-free locking manually operated

Electrics
Control zone for nozzle heater band 230 V
<i>ambiLED</i> -status indicator
Fuse protection for sockets
Switch cabinet cooling – circulation fan for environment temperature to 30 °C
Emergency stop switch button
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
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, password system and RFID authorization system
Freely configurable status bar
Physical, process-related units
Automatic dimming
Logbook with filter function
User programming system (APS)
Userpage
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 configurable network connection, quality table with 1000 storage depth, events protocol (logbook) for 1000 events, actual value graphics with 5 curves, 1 envelope curves monitoring)
Injection integral supervision
Metering integral supervision
Alarm message via e-mail
<i>SmartEdit</i> – sequence editor
<i>QuickSetup</i> – assistance program for initial parameter setting

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

Drive unit with speed controlled servo motor for hydraulic pump incl. additional pump for core pull movement, parallel ejection and fast injection
Drive unit with speed controlled servo motor for hydraulic pump incl. additional pump for core pull movement, parallel ejection and fast injection via hydraulic accumulator parallel to clamp force build up
Hydraulic with oil cooler increased
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

High torque hydraulic screw drive/High revolution hydraulic screw drive
Screw drive by servo motor for parallel recovery
Injection, holding and back pressure controlled via servo valve
Injection active closed loop, holding and back pressure controlled via servo valve
Check valve to hold screw in position after end of dosing
Corrosion resistance injection unit
Plasticizing unit AK+ in wear and corrosion resistant execution
Plasticizing unit AK++ in high wear and corrosion resistant execution
Plasticizing unit AKPA, high wear and corrosion resistant, for processing PA
Plasticizing unit AKCN in wear and corrosion resistant execution, for processing PMMA and ABS
Plasticizing unit AKTN in wear and corrosion resistant execution, for processing 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, thermoset, PVC
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
Acoustic 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 switchover
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
Clamp force supervision
Injection compression and venting program
Initiate 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

Plinth for robot
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)
Web-Service
Remote-Control package



WITTMANN BATTENFELD GmbH

Wiener Neustädter Strasse 81

2542 Kottingbrunn | Austria

Tel.: +43 2252 404-0 | Fax: +43 2252 404-1062

info@wittmann-group.com

www.wittmann-group.com