**MicroPower** 5 and 15 t
The best for micro injection molding
The advantages

» Reliable injection molding technology for shot weights from 0.05 to 4 g
» 2-step injection unit with screw plasticizing and plunger injection
» Energy-efficient, all-electric “Drive-on-Demand” motor system
» Innovative 5-point toggle lever clamping unit
» User-friendly through new UNILOG B8 control system with integrated assistance systems
» Compact machine cell to accommodate a rotary table, robot, quality assurance system and conveyor belt inside the machine
» Matching integrated peripherals available (material loader and temperature controller)
» Easy conversion into a clean room cell by adding a laminar flow unit
» Also as 2-component machine with second injection module and an adjusted rotary table available

The machine series

MicroPower standard: 2 clamping force sizes – 5 and 15 t
MicroPower MEDICAL: for clean room applications – 5 and 15 t
MicroPower COMBIMOULD: for multi-component injection molding – 15 t
MicroPower
The system highlights

» Clamping unit – all-electric – with optimal access
The MicroPower clamping unit is a 2-platen system, in which the clamping force between the nozzle and the toggle lever side is transmitted by a U frame element. The moving platen is driven by an integrated, high-precision 5-point toggle lever. It moves the mold platen guided with high precision on linear bearings smoothly and with high dynamism.

» Plasticizing unit: best control of micro quantities
Three injection unit sizes are available for MicroPower machines, with shot volumes ranging from 1.2 to 4 cm³. In all three of these aggregates, plasticizing is effected by a 14 mm 3-zone screw with a 20:1 L/D ratio. Injection takes place via a plunger either 5 or 8 mm in diameter, with injection pressure of up to 3000 bar and with an injection speed of up to 750 mm/s.

» Small platen drillings – optimal force transmission
The small through holes of only 26 mm in both mold platens enable optimal clamping force transmission into the mold, thus providing ideal conditions for high precision and long service life of the molds.

» All-in-one production cell available on request
The MicroPower system is totally modular. Therefore it can be extended into a complete production cell inside the standard machine frame by adding a WITTMANN SCARA robot, a rotary table, an optical parts inspection system and a conveyor belt or glass container for finished parts.

» Clean room-compatible standard concept
The standard machine frame is designed for easy cleaning. Without any structural alterations, it can be combined with a laminar flow unit, which supplies class 6 clean air according to ISO 14644-1 standard. Hygienic depositing of the finished parts is possible within the clean room cell strictly according to cavities in an 8-compartment depositing unit with glass containers.
CLAMPING UNIT
Free mold space

» High precision
The MicroPower clamping unit meets the most stringent requirements for precision in movements and automation options. Its high standard of precision is achieved by guidance of the system platen on the clamping side and the mold carrier plate on the same linear bearings. The central positioning of the toggle lever inside the U frame clamping unit ensures symmetrical clamping force transmission into the mold.

» One machine size with two force levels
– The clamping unit is available with 5 or 15 t clamping force.
– The mold platens on the ejector side come in one uniform size of 240 x 248 mm as standard.
– The width of the fixed platen is either 170 or 240 mm.
– The maximum daylight between platens is 400 mm.

» Free access and flexible automation
– Thanks to the U frame, the mold space remains free of tie-bars.
– Ample space is provided on both sides of the U frame for the installation of a rotary table (rotation diameter 443 or 466 mm), a parts handling robot and other peripherals for quality inspection and parts depositing.
INJECTION UNIT
Specially designed for micro parts

» Injection unit for extremely small quantities
The MicroPower injection unit is equipped with a two-step plasticizing and injection unit. It is available in three sizes. What all three sizes have in common is their 14 mm plasticizing screw for processing standard-size granulates. The injection plunger comes in different sizes. They are available for shot volumes ranging from 1.2 to 4 cm³.

» One system for 3 shot volume levels
The MicroPower plasticizing and injection aggregate is a 2-step unit. Step one is plasticizing with controlled back pressure. Step two is a separate plunger injection unit. The plunger of this aggregate functions simultaneously as a shut-off device to separate the melt channel of the plasticizing unit from the injection unit. Behind the injection plunger, an injection pressure sensor is located, which actively regulates the injection process and thus controls the precision and consistency of the molded parts.

The advantages of the MicroPower injection unit
» Low-stress metering at low pressure
» System without check valve, therefore no damage to materials through shear stress
» Fi-FO injection process (first in – first out)
» Minimal pressure loss during injection
» Extremely small melt cushion, consequently high temperature stability of the shot volume
» Shot weights below 50 mg possible
» All standard granulates can be processed.

Anti-wear options
In addition to the high-quality standard finish, an extensive range of optional versions with extra anti-wear and/or anti-corrosion protection is available. Pre-defined option packages and a selection matrix facilitate the choice of the right version.
The all-electric rotary unit is laid out for running in the +/- 180° mode. The rotary table features high dynamism, flexibility, operational safety and mold protection packed into a minimum of space. The robust basic structure provides optimal clamping force transmission. In combination with the backlash-free toggle lever, it thus enables extremely energy-efficient operation of the machine. The direct drive situated behind the rotary table combines ultimate precision with high rotary speed.
INJECTION UNIT – COMBIMOULD SOLUTION
Designed for molding micro parts

2-component injection molding
A 2-component machine also is available by combining two injection aggregates placed next to each other and using a rotary table inside the clamping unit.

» Parallel operation of the injection units possible
  In the MicroPower COMBIMOULD machine, both plasticizing and injection units can be operated parallel to each other. This equally applies to the ejectors, core pulls and air valves, which can be operated parallel to the clamping movement.

» H-H configuration
  Two parallel horizontal aggregates
  – Both aggregates moveable individually
  – Effective thermal separation of the aggregates

» Flexible, modular, compact
  – Fast changeover between the injection units (PIM, LIM, thermoplastics)
  – All standard granulates can be processed.
  – Part weights below 50 mg possible
  – Easy barrel change

» Ultimate precision
  – 2-step screw-and-plunger system
  – Minimal injection times
  – Optimal injection pressure control combined with highly dynamic changeover to holding pressure.
The production cell concept is an "ex works" solution for MicroPower injection molding machines.

**The advantages of the MicroPower production cell**

» Machine frame closed on all sides as standard. Thus molding of the micro parts takes place in an isolated environment.

» The enclosed machine cell is designed to provide space for additional equipment modules inside the standard cell.

» The enclosed cell can be fitted with a clean room module. It consists of a suction filter and a ventilation unit for laminar air flow through the machine.

» Cost benefits, since all danger areas are covered and certified ex works.

» MicroPower clean room production cells are suitable for producing micro parts for medical technology, as well as the electronics, watch making and optical industries.

» CE mark included for every machine with an insider solution. No separate costs for individual examinations.

CE-certified by type examination
**MicroPower**

The option highlights

» **Rotary table**
   The rotary table enables use of 2 bottom mold halves to achieve shorter cycle times on the one hand, and on the other hand to implement insertion and removal processes. In the multi-component version, the rotary table serves to accommodate the two different mold halves.

» **Silicone processing in micro dimensions**
   For liquid silicone processing, for example in the production of medical components, a micro two-component material loader is available, including a blending and metering system. With this equipment, the machine can be quickly converted from thermoplastics to LIM injection molding.

» **High-precision coining (EXPERT-pvT-Coining)**
   For the production of optical or micro-structured parts, a high-precision coining system is available as an optional equipment package. In this process, the coining pressure is controlled with high dynamism via the clamping stroke, depending on mold temperature or cavity pressure.

» **HiQ control for hot runners**
   With decreasing part size, the proportion of sprue in the shot volume increases, due to the nature of the system. Minimizing the proportion of sprue is given a high priority in WITTMANN BATTENFELD product development.

» **WITTMANN peripherals in micro dimensions**
   The optional WITTMANN 4.0 peripherals integration package is the basis for "Plug & Produce" technology of WITTMANN BATTENFELD injection molding machines with peripheral units from WITTMANN.

WITTMANN peripherals specially developed for the MicroPower:
- TEMPRO plus D Micro 100/140/160
- DRYMAX Micro F2-15 compact + material loader
- WBVS2 Vertical SCARA
- WBVS4 Vertical SCARA
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

> **Operator assistance**  
Extensive help library integrated
With its 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 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 the customer's requirements, small and medium-sized companies are offered a compact MES solution based on TEMI+. For large-scale and globally active companies, our cooperation partner is MPDV Microlab GmbH, a leading MES service provider. Due to 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.
» **COMBIMOULD**
Two or more plastic materials in different colors or with different attributes can be combined into one part by upgrading the standard MicroPower with a second micro aggregate or by combining several machines into one production unit.

» **Clean room injection molding**
When medical components or electronic parts need to be manufactured in a particle-free environment, the MicroPower concept offers excellent conditions with its easy-to-clean mold environment and an optional clean air supply system.

» **Insert molding**
When individual parts such as plug contacts need to be insert-molded, an insert station on a rotary table outside the mold is available for this purpose. A high-precision Scara handling robot and a metal parts feeding station can be integrated into the machine as additional modules.

» **Reel-to-reel molding**
To produce electronic parts, punched structures are fed through the clamping unit and insert-molded. The ample mold mounting space of the MicroPower offers optimal conditions for this process.

» **Photo:** mikrotechnik Freudenreich GmbH & Co. KG
» **Photo:** Micro Systems (UK) Ltd.
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 make complex, functional components with stringent material requirements in large quantities.

Microstructures
The quality of the plastic melt generated gently and at a constant temperature inside the MicroPower injection unit is particularly suited for high-precision reproduction of microstructures inside the mold, from sensor structures to Fresnel lenses or copy protection holograms.

High-precision micro parts
In addition to standard plastics processing, the MicroPower injection unit is an ideal choice for manufacturing high-precision parts from engineering plastics such as POM, PEEK or PSU.

LIM – Liquid Injection Molding
LIM designates the injection molding process for making elastic parts from 2-component liquid silicone rubber (LSR). LIM micro parts are used for optical and medical applications.

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 make complex, functional components with stringent material requirements in large quantities.
### Base machine
- Paint RAL 7047 tele grey 4/RAL 5002 ultramarine blue
- Rectangular main beam on one-piece base frame
- Built-in control cabinet
- Part transp. on operator side, or parallel to machine axis
- Drillings for peripheral equipment – like robot, camera, etc. – operator sided on rectangular main beam

### Clamping unit
- Clamping system: 5-point toggle with servo-electric direct drive
- Servo-electric mold height adjustment
- Clamping and opening forces for mold safety system adjustable
- Mold safety program with envelope curves monitoring for optimal mold cover
- Precise platen parallelism with low-maintenance moving platen support
- Platen drillings metrical as per EUROMAP
- Clamping force displayed on screen
- Clamping force monitoring incl. display via screen
- Servo-electric ejector
- Mechanical ejector couple
- Cooling hole in the mold mounting platen

### Injection unit
- Servo-closed loop control
- Increased injection performance
- Screw drive by 3-phase servo motor, screw speed continuously adjustable via screen
- Barrel, screw, distributor block and injection nozzle in hot-work tool steel, injection piston TIN coated
- Thermocouple failure monitor
- Plug-in ceramic heater bands
- Open nozzle
- Quick removal for injection nozzle and cylinder
- Hopper of V2A stainless steel can be shut and emptied
- 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
- Maintenance-free safety gate locked by electromagnet
- Safety gate with electric monitoring according to CE standard
- Safety gate on the rear side

### Cooling and conditioning
- Watercooling with open cooling system
- Feeding zone with controlled cooling system

### Additional equipment
- Operating instructions
- User manual

### Electrics
- Operating voltage 230/400 V-3PH, 50 Hz
- Common voltage supply for drive and heat
- Separate voltage supply for drive and heat USA/CDN
- USB – 1 x operating unit
- 1 Ethernet interface (switch cabinet)
- Printer via USB connection or network
- Signal lamp at the machine

### Control system
- Control system UNILOG B8 – 21,5" multi-touch screen (full HD)
- Software for operating hours counter
- Closing/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
- Stroke zero offset settings
- Start-up program
- Adjustable injection pressure limitation
- Switchover to holding press. MASTER/SLAVE by injection time, screw stroke/injection vol. 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
- Energy consumption monitoring for motors and heating
- Automatic dimming
- Logbook with filter function
- User programming system (APS)
- Cycle time analysis
- Energy measurement displayed
- Freely configurable screen pages „user page”
- Notepad function
- 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
- 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 Email
- SmartEdit – sequence editor
OPTIONS

Clamping unit
- Servo electric rotary table
- Mechanical mold safety mechanism
- SPI bolt pattern
- Ejector platen safety device as per EUROMAP 13
- Parts chute for separation of good/bad parts
- Nickel plated platen in lieu of standard
- Air valve, action initiated (ON) and timer (OFF)
- Non-standard layout of fastening bores in clamping/nozzle platen
- Turning-out device with servo motor, installed on ejector plate

Injection unit
- Grooves in the feeding zone of barrel for improved feeding
- High temperature heaterbands up to 450 °C
- Barrel insulation
- Enter block with additional connection for nitrogen supply in lieu of standard
- Wear and corrosion resistant injection unit AK+
- Equipment package for liquid silicone
- Equipment package for PIM (MIM/CIM)
- Equipment package for technical plastics (PC, PMMA, ABS)
- Equipment package for bioresorbable materials
- Screw in special geometry
- Conversion kit injection unit reduction to size 3 in AK+
- Vacuum package: vacuum pump incl. interface, vacuum valve, vacuum sensor
- Material hopper in DURAN glas design, 0.6 litres in volume
- Connecting flange for customer-supplied hopper drier or drying unit
- Equipment packages available in lieu of standard and/or in addition

Safety gate
- Pneumatic safety gate at the operator side
- Initiation of the next cycle by closing safety gate in semi-auto operation
- Front side safety system for manual part removal

Pneumatic
- Pneumatic maintenance unit incl. pressure regulation
- Pneumatic core pullers incl. pressure regulator
- Additional compressed-air controller

Cooling and conditioning
- Watercooling with closed cooling system
- Hosting of cooling circuits on the fixed platen of the moving platen
- Integrated WITTMANN temperating units and dryer
- Cooling circuits 2x additionally without shut-off valve

Granulat/dryer/feeder
- Integrated WITTMANN dryer/dew point sensor
- Integrated WITTMANN feeder

Robot/handling unit
- W8VS2 WITTMANN Vertical Scara Robot with 3 servo axis
- W8VS4 WITTMANN Vertical Scara Robot with 4 servo axis
- Teachbox R8.2 / R9
- Additional valve
- Additional vacuum circuit (Venturi)
- Additional vacuum circuit (Venturi with blow-off function)
- I/O expansion control cabinet (8I/8O)
- Interface for COGNEX camera
- Adapter for gripper plate (EOAT) with crash sensor
- Conveyor belt

Electrics
- Temperature control zone for hot runner
- Special voltage
- Control cabinet cooler
- Interface for handling equipment
- Temperature control interface digital, serial 20 mA TTY protocol
- CAN-Bus interface for mold conditioner as per EUROMAP 66-2
- Interface for WITTMANN dryer integrated
- Interface for WITTMANN temperating units integrated
- Interface for robots as per EUROMAP 67
- Interface for robots as per EUROMAP 67 with add. signals for rotary table
- Interface for conveyor belt and dosing unit
- Interface for full integration of robot incl. Ethernet switch
- Host computer interface / POA (EUROMAP 63)
- Relays contact parallel to plasticizing
- Kistler module for cavity pressure dependent switchover
- BNC connectors for injection process analysis
- Machine fault (potential-free contact)
- Part inlay monitoring via vacuum
- Signal tower with acustic element
- CEE socket 16 A
- Protection of the socket circuits via residual-current-operating circuit breaker with 30 mA conventional tripping current
- Additional emergency-stop button, mounted on the rear of the machine
- Interface evacuation with software (incl. vacuum valves for rotary table)
- Interface for freely configurable mold monitoring

Control system
- 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
- Second injection data setting for automatic start up
- HiQ-Cushion – melt cushion control
- HiQ-Flow – injection integral control
- HiQ-Melt – monitoring of material quality
- Injection compression program/Extended injection compression program
- Gate start special program
- Special program according to customer specification
- User specific limiting input value system
- Program in US dimensions
- RJG eDart interface
- 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)
- Add. screen text not according to EU (max. 2 languages in add. to German)
- Second injection parameter record for lower mold allocation or injection parameter change-over during start-up phase
- Variotherm processing package

Additional equipment
- Special paint and/or touch-up paint
- Tool kit
- Levelling pads
- Lighting in mold space
- Distance blocks 100 mm for leveling mounts
- Spare parts package
- Sprue-cut-off-appliance with air nozzle
- Clean room box
- Visual quality inspection
- Ionization
- 8-fold parts depositing