TH series
Premium hydraulic injection molding machine

Developed at WOOJIN PlaIMM’s R&D center in Austria, TH series is designed to deliver the familiarity in design and performance of its European counterparts. On cycle time, molding precision, and energy-efficiency, TH delivers. The machine’s precision rivals that of a fully electric type IMM, providing more power with the same control offered by all-electric technology, avoiding many of the costs inherent in all-electric machines.

The advantages of TH

■ Wide range of availability
The series is designed for all types of products, offering clamping forces between 50 and 450 tons, and the full range of screw sizes and types to match.

■ Energy saving motor
The hydraulic system is powered by servo-pump, minimizing energy loss. Servo technology reduces energy consumption up to 80% with less ambient noise and vibration than traditional motors.

■ Reduce cycle time
WOOJIN’s Austrian-engineered hydraulic system offers high speed mold movement with independent hydraulic oil circulation to shorten startup time and eliminate idle machine time during production.

■ Perfect degree of platen parallelism
Moving platen equipped with redundant rigid caged roller LM guide, eliminating friction at the base and preserving linearity through even the most abrupt movements. Facilitates precision measurement of clamp position and resists mold deflection.

■ Intuitive controller
15 inch touch screen color monitor with multi-lingual support and intuitive interface makes the machine easy to control while eliminating guesswork.

■ Easy-access screw & barrel
The fast maintenance made possible for screw & barrel service is owed to WOOJIN’s QBC (Quick Barrel Change) structure, enabling the screw and barrel to be host-removed with minimal disassembly and without disturbing the injection unit’s position.

■ Various options available
Optional accumulator system is ideal for thin-wall molding and other high injection speed applications. Optional hybrid injection system permits ultra-short cycle time, uses less energy, and facilitates high-tech injection molding applications.

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### Injection Unit

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The new 5-point toggle design gives complete control over mold open/close positions with a resolution of 0.1mm on the toggle’s position. Measuring toggle position enhances precision as the toggle reaches full extension and clamps the mold, enabling nuanced control of the mold-protect zone and a gentle handling of stack molds.

The hydraulic closed-loop system uses feedback to throttle and boost available hydraulic power in real-time, providing a smooth, responsive transition from standstill to full-speed clamp movement.

Before optimization | Target value | Optimization result
---|---|---
Reaction time of clamping | Before: 200ms | After: 80ms
Precise of clamping position | Before: ±0.7mm | After: ±0.1mm
Variation of mold closing position | Before: ±90mm | After: ±0.2mm

Your advantages

1. Center-press moving platen

- Evenly distributed clamping force
- Lengthens mold life expectancy
- Eliminates cavity distortions and contraction defects due to mold deflection

The 5-point advanced toggle structure with center press platen evenly distributes clamping force across the entire mold face, preventing mold deflection.

2. Proportional valve

- Net energy reduction
  - rapid movement: 13% reduction
  - slow movement: 31% reduction

Low-latency hydraulic valves enable responsive and precise control, minimizing unnecessary oil movement and dynamically adjusting for optimum speed & smoothness.

3. Brake motor

No-slip brake motor prevents the rear platen from drifting out of position even under extreme force. When the user sets the mold height for a job, the clamp position stays put for the entire job.

4. Low-friction linear motion guide

Rigid roller LM Guide resists mold deflection and facilitates rapid speed changes, permitting further reduction in cycle times.

5. T-slot

T-slot shape for mold mounting permits rapid changes to diverse mold sizes.
Hydraulic unit

With energy-efficient servo hydraulics and a dedicated oil conditioning circuit, the process sees minimal time to stability, cuts energy waste, and is gentle on hydraulic oil. The anodized seamless pipe structure is rugged and easy to modify/replace on-site. Compression fitted pipe joints have greater toughness than welded fittings, are easy to fit consistently, and are less likely to form leaks after years of ownership.

1. Servo pump system

- Energy consumption: 60%~80% less
- Cooling water consumption: 25% less
- Hydraulic oil volume required: 33% less

The servo pump uses system feedback to dynamically control motor RPMs in real time. The energy used by the hydraulics is limited to the energy needed by the process. Particularly during the hold and cooling stages, the greatest energy savings can be realized. The mechanical leverage of the toggle preserves clamping force, eliminating the need for hydraulic power. Real time low-latency control of the AC servo motor’s RPMs enables state-of-the-art responsiveness from idle to max speed.

Comparison of energy consumption

General type pump vs Servo pump system

2. Independent cooling and filtering system

- Faster startup to a process with consistent oil conditions
- Prevent hydraulic seal damage from oil overheats
- Faster cooling and filtering than integrated conditioning
- Automatic filter alert (sensor detects high pressure gradient across filter)

A dedicated hydraulic circuit enables the machine to begin conditioning the oil while the user sets up a job. When the first shots are produced, the oil can be at optimum temperature and purged of trapped gases, creating a consistent process from the first shots to the last.

3. Anodized pipe & coated oil tank

Interior-anodized seamless pipe is rust-free with minimal shearing (friction drag) of oil flow. Pipe flange with compression fitting is weld-free and can be easily fitted/modified/replaced on-site. Pipe compression fittings stay tough through repeated temperature cycling when brittle spots in welds form leaks. Polymer-coated tank interior is corrosion-free and anti-abrasive, ensuring that foreign particulates are filtered out before forming deposits in the tank.

- Faster startup to a process with consistent oil conditions
- Prevent hydraulic seal damage from oil overheats
- Faster cooling and filtering than integrated conditioning
- Automatic filter alert (sensor detects high pressure gradient across filter)

* Efficiently engineered, eliminating up to 33% the oil volume of a typical tank (then the old version)
**Injection unit**

Engineered for high speed and precision, the injection unit provides a responsive injection profile, capable of consistently producing products requiring drastic changes in cavity shape and melt flow.

A full line of screw & barrel design ensures that any material, whether corrosive PVC, optical PC, GF nylon, colorant, or any engineered resin, can be processed.

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**Comparison graph of injection function**

The comparison of function between Old version and TH220S

1. **Closed-loop back pressure control**

   High performance back-pressure control valves respond in real time to actual measured pressures and user set pressures for low-latency responsiveness. Electric signals in the valve control feedback loop are directly processed for minimum latency that reaches all components controlling hydraulic flow, establishing a stable & responsive system.

   A specialized nickel alloy in each valve block resists corrosion while increasing density and ductility, reducing block structural fatigue and ensuring long life expectancy.

2. **Dual pull nozzle touch cylinder**

   Bilaterally symmetric design with self-centering rod cushions eliminates mold disturbances from nozzle impact and reduces wear on misaligned nozzle tips.

   Nozzle touch force is evenly dispersed across the nozzle, preventing melt leakage and enhancing process precision.

3. **Quick barrel change**

   Quick-disconnect barrel heater plugs and rigid lift-out design of the screw & barrel permits simple hoist-removal of the S&B for maintenance without disturbing the injection unit’s alignment.

   Industry-standard in-line injection unit with rear-feed hopper throat supports independent actuation of injection and screw rotation, permitting rotating injection and efficient charging.

4. **In-line screw type injection unit**

   4-way caged bearing LM guide provides maximum rigidity with minimal resistance to movement, ensuring smooth guidance and stable nozzle touch force.

5. **Low-friction linear motion guide**
1. Hydraulic accumulator system

- Injection speed: 1,000 mm/sec
- Responsiveness: 60 ms
- Coefficient for weight change level: within ±0.02%
- System representation: within ±0.1%

High-outflow hydraulic accumulators are ideal for thin-wall molding needs, enabling high-speed injection and powerful on-the-fly core actuation. Closed-loop servo valve can be toggled between high-speed injection mode and standard injection mode, ensuring cross-compatibility between all applicable sized molds.

2. PID temperature and synchronized heating control

Industry-standard Proportional/Integral/Derivative (PID) heater control with switched Solid State Relays (SSRs) ensures an evenly heated barrel that resists deviating from set temperatures and is easy to service. Programmable temperature alarms and automatic heater shutoff prevent resin carbonization in-process or in the event of operator inattention. By comparison, simple on/off controlling by set value/perceived exhibits drift over time and leads to uncontrolled variations in temperature.

3. Hybrid system

Reduces injection unit energy consumption up to 30% while permitting simultaneous screw recovery and mold movement, reducing overall cycle time.

High power closed-loop AC electric servo motor allows for precision control over screw RPMs through a dedicated low-latency servo drive.

4. Smart screw

Double-flight design through the charging zone ensures uniform colorant dispersion and randomized polymer chain structure. Promotes a lower melt temperature and can treat production problems associated with excessive charging back pressure and over-shearing of the melt.