

## *Automatic 4 Piston Paste Liquid Filling Machine*



The automatic servo piston filling machine is a highly efficient and precise filling device widely used in industries such as food, pharmaceuticals, daily chemicals, and chemicals. It is capable of handling liquids, pastes, and high-viscosity materials. Its core advantage lies in its servo motor drive, which ensures high precision and flexibility during the filling process.

### **### 1. Working Principle**

This equipment operates based on the volumetric filling principle, with the servo motor driving the piston to complete the suction and discharge processes:

- **\*\*Suction Process\*\***: The servo motor retracts the piston, creating negative pressure that draws the material into the piston chamber.
- **\*\*Discharge Process\*\***: The servo motor advances the piston, pushing the material through the discharge valve into the container.

The servo system precisely controls the stroke and speed of the piston, ensuring consistency and accuracy in each filling cycle.

### **### 2. Servo Control System**

The servo control system is the core of the filling machine, featuring:

- **\*\*High Precision Control\*\***: Filling volume accuracy is maintained within  $\pm 0.3\%$  to  $\pm 0.5\%$ .
- **\*\*Programmable Control\*\***: Users can set filling parameters such as speed and volume through a PLC (Programmable Logic Controller) and HMI (Human-Machine Interface), allowing for personalized adjustments.
- **\*\*Multiple Filling Modes\*\***: Supports various filling methods, including volumetric, constant speed, and pulse filling, to meet different production needs.

### ### 3. Structural Features

- **\*\*Filling Head and Flow Path System\*\***: Made from hygienic stainless steel, the filling head is designed with anti-drip features to ensure a clean and contamination-free filling process. The internal structure minimizes foaming, particularly useful for foamy liquids.
- **\*\*Piston System\*\***: Utilizes a high-precision piston that works in conjunction with the cylinder, allowing for accurate volume control. The piston diameter and stroke can be customized based on specific filling requirements.
- **\*\*Sterile Design with CIP/SIP Cleaning Functions\*\***: The material contact parts are designed for easy disassembly and cleaning, and can be equipped with automatic cleaning (CIP) and sterilization (SIP) systems to ensure a sterile production environment, compliant with GMP (Good Manufacturing Practice) and HACCP (Hazard Analysis Critical Control Point) standards.

### ### 4. Applicable Material Range

- **\*\*Liquid Materials\*\***: Such as water, juice, milk, sauces, and oils.
- **\*\*Semi-fluid and High-viscosity Materials\*\***: Including creams, toothpaste, sauces, honey, jams, shampoos, and lubricants.
- **\*\*Materials with Particles\*\***: Specially designed filling valves and wide flow paths allow for the filling of materials containing solid particles or suspensions, such as fruit pulp beverages, ketchup, and sesame paste.

### ### 5. Automation and Intelligent Features

- **\*\*Automatic Detection System\*\***: Equipped with photoelectric sensors or machine vision systems to automatically detect bottle presence, positioning, and defects, ensuring filling only occurs when the bottle is properly positioned, thereby preventing waste.
- **\*\*Multi-head Filling with Synchronous Control\*\***: Typically configured with 2 to 12 filling heads, the number of heads can be selected based on production line speed and output requirements. Each head can be controlled independently to ensure precise filling amounts for each bottle, accommodating batch production needs.
- **\*\*Production Data Recording and Traceability\*\***: The equipment can monitor and record key data such as filling volume, production speed, and errors in real time, providing data export and remote monitoring functions for quality control and traceability during production.

### ### 6. Safety and Maintenance

- **\*\*Safety Protection Features\*\***: The servo piston filling machine is equipped with multiple safety measures, such as overload protection, emergency stop buttons, and safety covers to ensure the safety of operators and the equipment.
- **\*\*Fault Diagnosis and Alarm Functionality\*\***: The system conducts real-time monitoring, and when abnormalities occur, it automatically alarms and displays fault codes to help operators quickly locate and resolve issues.
- **\*\*Ease of Maintenance\*\***: Due to the high-precision design of the servo system and mechanical structure, the equipment operates more reliably, reducing downtime caused by mechanical wear. Most components are modular, making them easy to disassemble and replace, lowering maintenance costs.

### ### 7. Adjustability of Filling Precision and Speed

The advantages of the servo motor not only include high precision control but also allow for highly adjustable filling speeds. Users can flexibly adjust the filling speed and acceleration/deceleration curves according to the characteristics of the materials and production needs, ensuring an efficient and stable filling process. For example:

- For liquid materials with good flow properties, the filling speed can be increased to enhance production efficiency.
- For higher viscosity materials or liquids prone to foaming, the filling speed can be decreased to ensure filling quality.

## Parameter

|                          |                        |
|--------------------------|------------------------|
| Number of filling heads: | 2                      |
| Filling range:           | 500-5000ml             |
| Filling speed:           | 1800-2400 bottles/hour |
| Measuring accuracy:      | ±0.5%                  |
| Power:                   | 6.5KW                  |
| Voltage:                 | 380V                   |
| Working air pressure:    | 0.6-0.7Mpa             |
| Air consumption:         | 6-7m³/min              |
| Machine size:            | 4000*1500*2100mm       |
| Machine weight:          | 800kgs                 |