

## high pressure homogenizer for industrial-scale production

Production high-pressure homogenizer is a high-performance liquid treatment equipment for industrial-level application scenarios, widely used in homogenization, emulsification, refinement and other processes that require high stability and high-volume processing.

### Production High Pressure Homogenizer Overview

The production high pressure homogenizer adopts four ceramic plungers alternating drive technology, combined with intelligent touch control system and fully automatic servo pressure regulating mechanism, which can be used to homogenize liquid materials continuously, efficiently and with low pulse under the pressure of up to 1500 bar.

### Main Features

- **Structure and Driving System:** Equipped with four high-precision ceramic plungers, adopting alternating driving method, which greatly reduces the fluctuation of fluid pulses and ensures a more stable pressure output. Equipped with plunger lubrication system to extend the sealing life and reduce the maintenance frequency. Support feed temperature of 90°C, compatible with a variety of heat-sensitive or room temperature materials.



- **Strong homogenization capacity:** Standard rated pressure 1500bar, design pressure up to 1800bar, 180MPa, 26100psi, to meet the needs of complex materials high-energy processing. The feed particle size is less than or equal to 500um, suitable for a variety of coarse particles pretreatment fluid. The viscosity of the product is less than or equal to 6000cps, suitable for most of the medium and high viscosity liquid materials.
- **Industrialized production:** Processing capacity of 10L, designed for large-scale batch production, with online emptying function, reduce residual material. Save material loss, suitable for high value raw materials or large volume batch production.
- **Intelligent control system:** Equipped with high-resolution touch screen control interface, simple operation, visualization of operating status. The core control components are chosen from Siemens brand, with quick response and high stability. Automatic servo pressure regulating handle replaces the traditional manual valve, real-time accurate regulation of working pressure. Three levels of authority management to ensure operational safety, support process data storage and call. Pressure and temperature sensors synchronize the monitoring of operating data, real-time feedback, to ensure that the operation within the set parameters. Multiple safety mechanisms, such as over-pressure, over-temperature, start with pressure, power supply abnormalities, etc. support alarm and self-stop processing, to protect the equipment and operator safety.

- **Advanced sanitation and cooling design:** All parts in contact with materials are made of FDA, GMP certified materials, and can be cleaned online by CIP, which is in line with the sanitation standard of pharmaceutical and food industry. The combination of independent online cooling module and sanitary heat exchanger ensures that the entire homogenization process is carried out in a low-temperature environment, preventing the material from being denatured due to heat rise. Equipped with secondary homogenizing valve structure, effectively improve the emulsification uniformity and particle size distribution stability.
- **Core components and material advantages:** Homogenizing valve components are made of zirconia, tungsten steel, diamond, stellite and other high-hardness materials, wear-resistant, suitable for high-pressure continuous impact. The components support double-sided use, extending the replacement cycle and reducing the cost of spare parts.
- **Energy saving and efficiency:** Adopting frequency conversion control system, automatically adjusting energy consumption according to the working conditions, and improving the system response efficiency. The key components are imported brands to ensure stable operation, low failure rate and convenient maintenance.

## **Working Principle**

The production-type high pressure homogenizer continuously pumps the material to be treated into the homogenizing chamber with high pressure through the four-piston system. When passing through the special homogenizing valve channel, the material is forced to undergo the following kinds of energy effects:

1. High shear: effectively breaks up the aggregates and agglomerated particles.
2. Cavitation: micro-bubbles in the liquid burst instantly, releasing local impact.
3. High-speed collision and turbulence perturbation: enhance the efficiency of multi-phase material mixing and refinement.
4. Secondary dispersion: after the main valve and then through the auxiliary homogenizer, to achieve a more delicate and uniform emulsion structure.

The whole process supports on-line cooling control to ensure that the material in a mild environment to complete the high-energy processing, suitable for heat-sensitive biologics and fine formulations of industrial production.