Multi-Stage Vacuum Concentration Equipment Instruction

(Model: JMF-350)

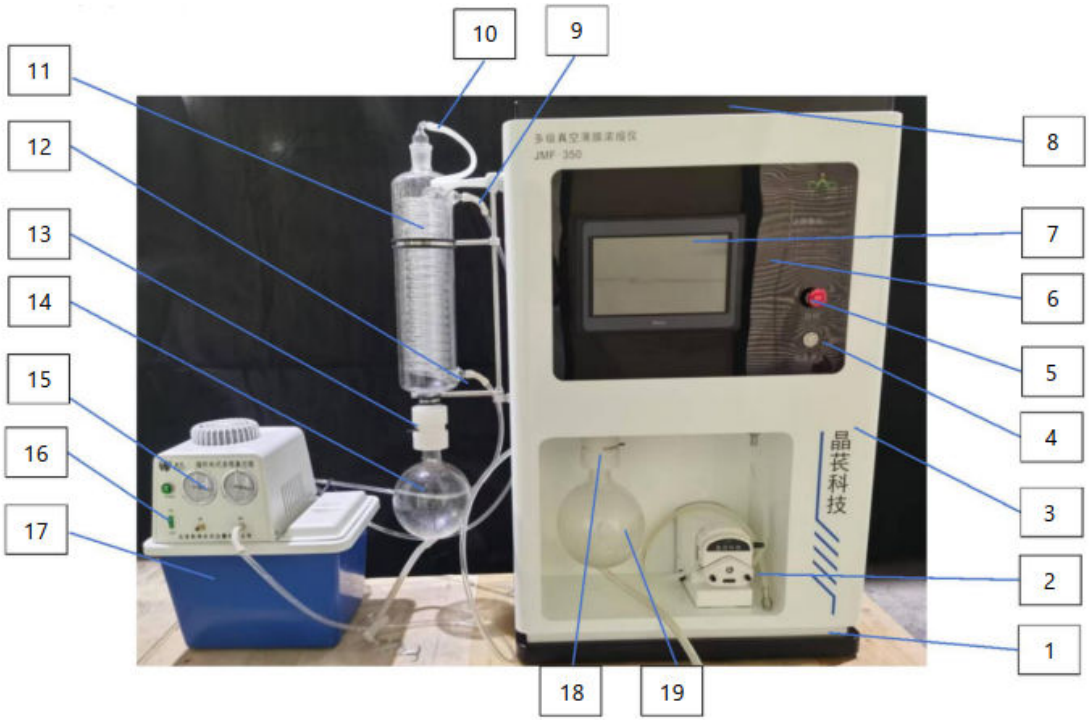
I. Product Introduction

The multi-stage vacuum concentrator (Model: JMF-350) is an innovative liquid concentration instrument designed based on the "flash evaporation" principle. Driven by dual power—precision liquid supply via a peristaltic pump and vacuum negative pressure—the liquid flows through the system pipeline while being heated. Once reaching the set temperature, it enters the gas-liquid separation system, where the concentrated liquid and volatile solvents are directed to their respective recovery systems, completing a concentration cycle.

Compared with traditional concentrators, it offers higher efficiency, shorter liquid heating time (better for protecting heat-sensitive components), lower energy consumption, and easier operation, making it ideal for rapid concentration of large-volume liquids.

The JMF-350 is suitable for concentrating almost all solvents except highly volatile, highly toxic, or highly corrosive ones (e.g., ether, chloroform). Tests show its concentration efficiency is over 30% higher than traditional methods, with superior performance in protecting heat-sensitive components, making it a replacement for traditional rotary evaporators.

II. Equipment Components and Functions



1. **Equipment status indicator (base)**: Shows operating status—blue for standby, green for running, red for fault alarm.
2. **Peristaltic pump and bracket**: Supports the peristaltic pump (movable forward/backward) to pump concentrated liquid into the equipment.
3. **Equipment shell**: Protects and supports internal components.
4. **Power switch**: Controls main power.
5. **Emergency stop button**: Stops heating when pressed.
6. **Equipment status indicator (panel)**: Shows operating status.
7. **10-inch touchscreen**: Human-machine interface for equipment control.
8. **Cooling fan**: Dissipates heat.
9. **Circulating water outlet**: Discharges circulating cooling water.
10. **Condenser vacuum port**: For vacuum extraction.
11. **Condenser**: Cools solvent vapor.
12. **Circulating water inlet**: Supplies circulating cooling water.
13. **PTFE vacuum valve for solvent**: Switches vacuum paths.
14. **Solvent recovery bottle**: Stores recovered solvents.
15. **Vacuum gauge**: Displays system vacuum pressure.
16. **Water-circulating vacuum pump switch**: Turns the pump on/off.
17. **Water-circulating vacuum pump**: Provides vacuum and circulating cooling water.
18. **PTFE vacuum valve for concentrate**: Switches vacuum paths.
19. **Concentrate recovery bottle**: Stores concentrated liquid.

III. Operating Procedures

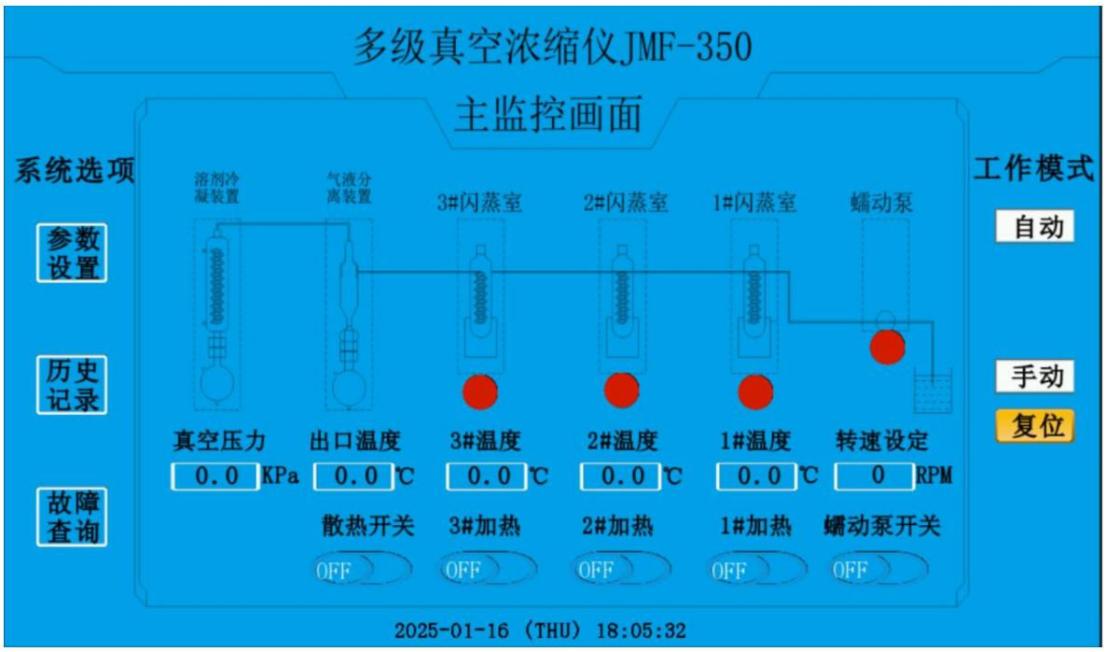
3.1 Pre-Operation Preparation

3.1.1 Check that pipes for the peristaltic pump, vacuum pump, circulating water, and condenser are properly connected and not loose.
3.1.2 Check the water level in the vacuum pump tank: it must not be lower than the minimum line, ideally at ~2/3 of the tank height.

3.2 Startup

3.2.1 Turn on the main power switch (at the bottom right of the rear panel), press the front panel power switch, and activate the water-circulating vacuum pump switch.
Note: Keep the peristaltic pump inlet tube clamped. Starting the vacuum pump first helps check system tightness later.

3.2.2 **Introduction to the touchscreen interface**:



- **Auto mode**: Pre-set parameters are factory-tested. Selecting this mode displays "One-key Start" and "One-key Stop" buttons. "Start" activates heating tubes (automatically turning on/off based on set temperatures); "Stop" shuts down all heating.
- **Manual mode**: For factory testing or re-testing components after system reset.
- **Reset**: Clears fault alarms after troubleshooting.
- **Parameter setting**: Adjust heating medium temperatures (upper/lower limits, alarm thresholds) based on liquid properties.
- **History records**: Automatically logs data (temperatures, vacuum pressure, pump speed) every minute for review.
- **Vacuum pressure**: Real-time system vacuum (unit: KPa).
- **Outlet temperature**: Real-time temperature of concentrated liquid in the gas-liquid separator (unit: ℃).
- **1#/2#/3# temperature**: Real-time temperatures of heating media in the 1#/2#/3# heating tubes (not the concentrated liquid).
- **Peristaltic pump speed setting**: Adjusts liquid supply rate (0~300r/min, recommended 50~200r/min). The relationship between speed and flow depends on the inlet tube diameter (default: 17# tube, user to confirm).
- **Peristaltic pump switch**: Starts/stops the pump (toggle "ON"/"OFF").
- **Cooling fan switch**: Turns on the fan (located on the top cover) when heating starts to protect internal electrical components from overheating.
- **1#/2#/3# heating switches**: Control heating tubes in manual mode (inactive in auto mode).

3.3 Parameter Setting

Click "Parameter Setting" to adjust parameters as needed (tap the white box to activate input).

Recommendations:

- For water-based liquids (water content >60%): Set 1#/2#/3# heating start temperature to 90~100°C, stop temperature to 105~120°C. Set alarm thresholds with ≥8°C difference (lower limit) and ≥10°C difference (upper limit) to avoid frequent alarms from temperature fluctuations.
- For ethanol/methanol/acetone-based liquids (concentration >60%): Set start temperature to 70~90°C, stop temperature to 100~105°C. Alarm thresholds same as above.
- Do not use for ether, chloroform, or other highly volatile, toxic, or corrosive solvents to prevent accidents.
- Heating tubes start at lower temperatures and stop at higher ones. Alarms activate if temperatures deviate from set ranges, alerting operators via lights.
- For further guidance, contact the manufacturer’s after-sales service.

Click "Return" to exit to the main interface.

3.4 Tightness Check

3.4.1 Observe the vacuum gauge: A stable reading of ≤-0.08MPA within 5 minutes indicates good tightness. Proceed if stable; otherwise, check and fix leaks first.

Key leak points to check:

- Peristaltic pump inlet tube connection
- Concentrate vacuum valve
- Solvent recovery bottle vacuum valve

3.5 Concentration Process

3.5.1 Set the peristaltic pump speed directly on the bottom right of the main interface.
3.5.2 Open the cooling water valve to cool the solvent recovery condenser.
3.5.3 Turn on the cooling fan (toggle from "Off" to "On").

Notes during concentration:

1. Start the peristaltic pump (toggle to "On") only after the 1# heating tube reaches the set temperature.
2. **Draining concentrated liquid**: When the recovery bottle is nearly full, close its vacuum valve, drain from the bottom outlet, reseal the outlet, then reopen the vacuum valve.
3. **Draining recovered solvent**: When the solvent bottle is nearly full, repeat step 2 for the solvent bottle.
4. **To concentrate the finish or need to stop enrichment work**:
   a. Stop heating: Use "One-key Stop" (auto mode) or turn off individual heating switches (manual mode).
   b. Suspend liquid supply, then stop the peristaltic pump.
   c. Lift the pump’s pressure lever to drain residual liquid in the pipeline into the gas-liquid separator.
   d. Drain concentrated liquid (Follow Item 3), then immerse the inlet tube in cleaning solution to rinse the pipeline.

3.6 Pipeline Cleaning

1. Clean immediately after concentration to prevent residue buildup (which may block pipes or reduce performance).
2. Use recovered solvent, dilute acid/alkali solution, or pure water as cleaning agents.
3. After draining all liquid from the separator and recovery bottles, immerse the inlet tube in cleaning solution. Use system vacuum to pull the solution through the pipeline, draining from the concentrate bottle. Repeat until no impurities remain.

3.7 Shutdown

1. After cleaning, keep the inlet tube suspended and maintain vacuum (do not turn off the pump yet).
2. Turn off the vacuum pump and cooling water only when heating tube temperatures drop below 45°C.
3. Drain cleaning solution from the concentrate bottle and recovered solvent from the solvent bottle to complete shutdown.

IV. Precautions

4.1 Maintain system vacuum by avoiding unnecessary shutdowns of the vacuum pump during operation.
4.2 For heat-sensitive liquids, set a 3~5°C lower stop temperature (residual heat remains after heating stops).
4.3 Regularly check thermal oil levels: Add oil if the level is >5cm below the maximum line. Replace oil annually.
4.4 Inspect and replace the peristaltic pump tube regularly.
4.5 Do not tilt the equipment (maximum tilt ≤20°) to prevent thermal oil spillage.

V. Technical Parameters

5.1 Evaporation stages and power: 3 stages, 1200W×3, 220V
5.2 Heating system: 3-stage series flash evaporation tubes
5.3 Evaporation area: 0.7 ㎡
5.4 Liquid heating time: <120s
5.5 Temperature range and fluctuation: Room temperature~140°C, ±5°C
5.6 Heat transfer medium: High-chain thermal oil (electric heating)
5.7 Liquid supply: Peristaltic pump (continuous, speed-controllable)
5.8 Control and display: 10-inch touchscreen
5.9 Inlet flow rate: 0~400ml/min
5.10 Cooling system: Double-layer cross-flow high-density glass coil (uses circulating/cooling water)
5.11 Solvent distillation rate: 5000ml/h (for water)
5.12 Main body dimensions: 650mm×400mm×1000mm

VI. Warranty and After-Sales Service

- The whole machine is warranted for 1 year (excluding consumables).
- Consumables (e.g., vacuum valve seals) are warranted for 3 months.
- During the warranty period, repair/replacement costs for damage caused by improper operation will be charged.

For issues during use, contact the manufacturer immediately—do not disassemble the instrument without authorization.

After-sales service hotline: 15837137855

VII. Packing List

- 1 set complete equipment
- 1 instruction manual
- 6 sealing rings
- 2 hose clamps