



**INNOVA**

*The passion for science*

## Evaporation System

- Wipe film molecular distillation system(borosilicate glass)
- Wipe film molecular distillation system(stainless steel)
- Thin film evaporation system(borosilicate glass)
- Thin film evaporation system(stainless steel)

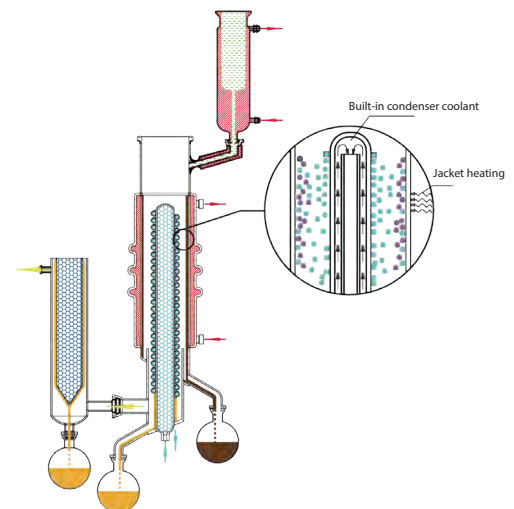
# Wiped Film Molecular Distillation System

Short path(molecular)distillation is a special liquid-liquid separation technology,which is different from the traditional distillation by boiling point difference separation principle,but by different substances molecular movement of the average free path difference to achieve separation.Molecular distillation is applied for separation of high boiling point,heat-sensitive and readily oxidizable materials.

Feed material is delivered from a feed flask into the main jacketed evaporator, having heating from the jacket, and a diagonally slotted wiper mechanism forcing liquid around and downward in a thin film on the inside. In the center of the body is a closely positioned internal condenser, providing a short path for vapor molecules traveling from the heated surface to the condenser surface. During the journey downward, lighter (lower boiling point) fractions of the liquid begin to vaporize, move to the internal condenser and condense, falling down as a liquid into a well that captures and separates the distilled liquid which flows into the Distillate receiving flask. Heavier residue material (like chlorophyll, salts, sugars, heavy wax) does not evaporate and instead travels the length of the main evaporator body and flows into the Residue receiving flask.

## User interests:

- Low operating temperature, high vacuum degree( $\leq 1\text{Pa}$ ), short heating time (15-20s), good separation effect, etc., especially suitable for the separation of high boiling point, heat sensitive, and easily oxidizable material;
- It can effectively remove light molecular material (deodorization), heavy molecular material(decolorization) and remove impurities in the mixture;
- The separation process is a physical separation process, which can well protect the separated component from contamination, especially maintaining the original quality of natural extracts;
- The degree of separation is higher than that of traditional distillation and ordinary thin film evaporators;



## Applications:

Molecular distillation is applied for separation of high boiling point, heat-sensitive and readily oxidizable materials.





- 1
  - Pharmaceutical
  - Biomaterial concentration
  - Vitamin, Nutraceutical, Essential oil isolation
- 2
  - Purification after extraction, (supercritical CO<sub>2</sub>, butane, hydrocarbon, ethanol, etc.)
  - Vacuum distillation of terpenes, Terpenoids
  - Chlorophyll, Phytosterols, Insecticide, Fat & Wax Removal
  - Concentration of botanicals & Essential oils
  - Oil deodorization
- 3
  - PCB
  - Residue removal / Decolorization
  - Molecular distillations of esters, Fatty acids & Triglycerides
  - Flavor purification, Solvent recovery
  - Improved evaporation over rotary evaporators, Kugelrohr & Rotovap apparatus

# Wiped Film Molecular Distillation System(Borosilicate Glass)

The main components of the glass short path molecular distillation are made of high borosilicate 3.3 material, and the evaporator is made of glass sintering, which is easy to clean without dead corners. At the same time, it reduces the number of interfaces and ensures high vacuum; the experimental materials are distilled from feeding to collecting materials. The process is intuitive and visual, and the parameter settings can be adjusted at any time according to the experimental phenomenon, which is convenient to quickly find the best process conditions. The high borosilicate glass also has good corrosion resistance, which is an ideal choice for experimental research and development or small-scale production.



## User interests:

- The glass parts are made of high borosilicate 3.3 material, with excellent visibility;
- The magnetic coupling seal can maintain a higher vacuum degree to ensure the evaporation effect;
- Scraper film forming design, contacting material part take stainless steel 316L+PTFE;
- The sealing ring is made of fluorine rubber or tetrafluoroethylene, suitable for different material applications;
- The main evaporator have been designed with full jacket and full insulation to ensure material fluidity;
- Digital display pirani vacuum gauge, display high vacuum number;
- Multi-plan structure configuration to guarantee different material and different process requirements;
- Certification:  

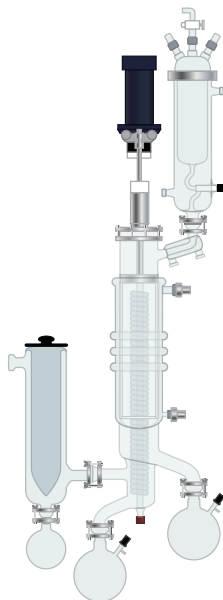
Model	DMG-60	DMG-80	DMG-100	DMG-150	DMG-200
Feeding rate(L/h)	0.05-2	0.1-4	0.2-6	0.5-10	0.5-15
Effective evaporation area(㎡)	0.06	0.1	0.15	0.25	0.35
Feeding flask volume(L)	0.5	1	2	2	5
Cooling area of internal condenser(㎡)	0.15	0.2	0.3	0.4	0.5
Distillate receiving flask(L)	0.5	1	2	5	5
Residue receiving flask(L)	0.5	1	2	5	5
Rotation speed(rpm)	50-300	50-500	50-500	50-500	50-500
Vacuum level(mbar)	≤0.001				
Operation temperature(°C)	≤300				
Electrical requirement	220V, 50/60Hz; 380V, 50/60Hz (Other options can be provided)				
Equipment size (cm)	170×61×170	190×61×180	190×61×190	210×61×230	225×60×240

## Flexible glass structure

# A

### Efficient

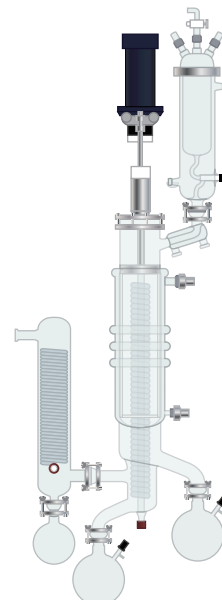
External single cold trap structure, liquid nitrogen or dry ice can be selected, high cost performance, and good cooling effect



# B

### Simple

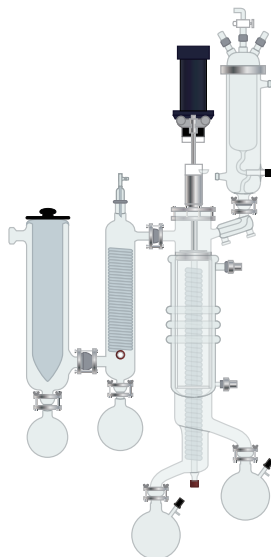
External single-coil condenser structure, supporting low-temperature circulator, can meet the needs of different temperatures



# C

### Practical

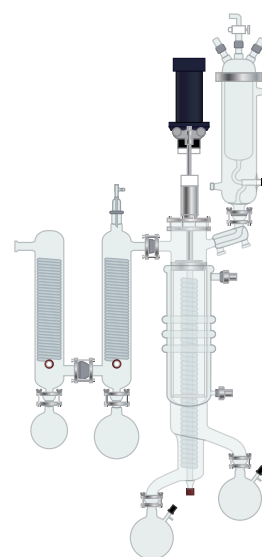
External cooling coil condenser + cold trap can meet more material needs



# D

### Convenient

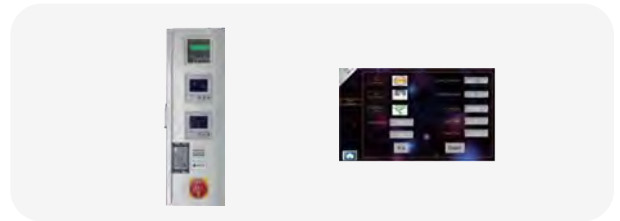
The structure of the external double-coil condenser is convenient and flexible for temperature control to meet more temperature needs



# Optional package

## 1 Control system

- Frequency
- Optional automatic control system (PLC unit)



## 2 Distiller

- INNOVA's latest design brings better evaporation efficiency
- Optional jacket discharge module, suitable for high boiling point viscosity materials



## 3 Vacuum series



- Bipolar rotary vane vacuum oil pump  
Flow 8-60m<sup>3</sup>/s  
Minimum vacuum ≤ 10pa



- Optional Roots pump  
Flow 30-150m<sup>3</sup>/h  
Minimum vacuum ≤ 1pa



- Optional diffusion pump  
Flow 50-1200L/s  
Minimum vacuum ≤ 0.1pa



- Optional molecular pump  
Flow 300-2400L/s  
Minimum vacuum ≤ 0.1pa

## 4 Constant temperature system

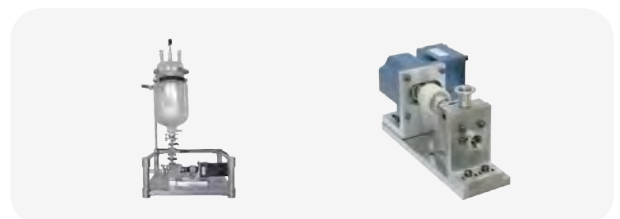
Match suitable equipment according to customer material requirements

- Heating circulator
- Heating/cooling circulator
- Cooling circulator



## 5 Feeding & Discharging

- Optional jacketed glass feeding tank and receiving tank (Customizable volume)
- Automatic gear pump feeding and discharging system



# Wiped Film Molecular Distillation System (Stainless Steel)

The stainless steel short-path molecular distillation system is more integrated and has better heat transfer efficiency. The high-precision automatic feeding and discharging pump can greatly increase the production capacity. It is an ideal choice for pilot and industrial production equipment.



## User interests:

### ■ Unique full jacket and full insulation design

1. Jacket design of feed tank, heat-conducting oil preheating and heat preservation function;
2. The outlet jacket design for light and heavy components makes the material flow smoothly;
3. Jacket design of automatic feeding and discharging pump head to prevent material blocking from happening;
4. The thermal insulation design of the full jacket pipe meets the use conditions of different materials and accelerates the material processing rate;

### ■ Modular design, flexible selection

1. High-precision automatic feeding and discharging pump, with high degree of automation, saving labor costs and working time;
2. The independent magnetic coupling sealing structure does not affect the vacuum system of the module, ensuring an excellent vacuum effect;
3. Standard interface connection can be matched with different external condenser requirements according to process requirements;
4. Standard port connection for supporting heating and refrigeration equipment, easy to match;
5. According to the requirements of vacuum degree, it can be matched with different vacuum units to realize two-stage or multi-stage pump connection;

### ■ Strict processing and process design to meet the use of different fields

1. High-precision polishing treatment of the inner wall of the barrel, smooth and clean, not easy to stick and scale;
2. The material in contact with the material is made of stainless steel 316L+PTFE, with high heat transfer efficiency and excellent corrosion resistance;
3. The connecting pipe is sealed with fluororubber or tetrafluororubber material to meet the use of materials of different properties;
4. The design of sight glass such as the feeding tank and the discharging port is convenient to observe the state of the material;
5. Brand frequency conversion gear motor, safe and reliable operation, can work continuously for a long time;
6. The explosion-proof configuration of the whole system is optional;

### ■ Authoritative release of equipment, the whole system meets UL/CE certification

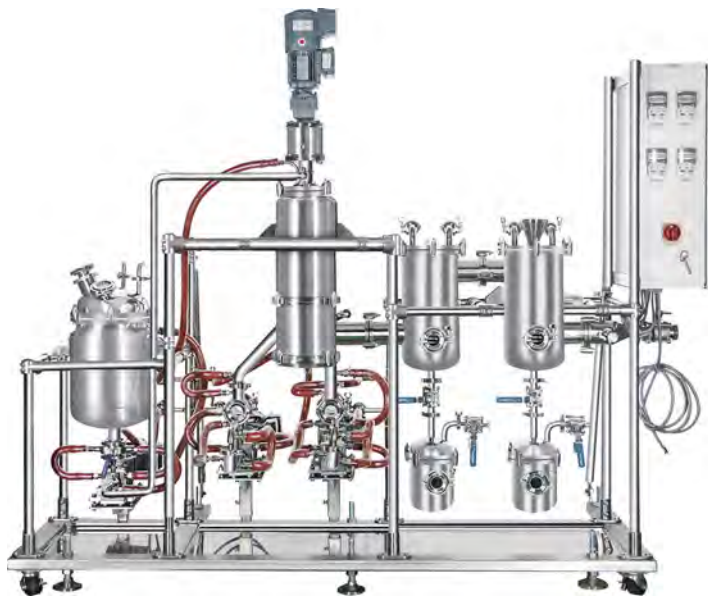


Model	DMS-06S	DMS-1S	DMS-2S	DMS-3S	DMS-5S	DMS-10S	DMS-20S	DMS-50S
Feeding rate(L/h)	1-5	2-10	2-20	2-30	10-50	20-100	40-200	100-500
Effective evaporation area( m <sup>2</sup> )	0.06	0.1	0.2	0.3	0.5	1	2	5
Cooling area of internal condenser( m <sup>2</sup> )	0.1	0.17	0.4	0.6	1.7	3	5	8
Feeding flask volume(L)	10	10	15	20	50	100	200	200
Vacuum level(mbar)	≤0.001	≤0.001	≤0.001	≤0.001	≤0.001	≤0.001	≤0.001	≤0.001
Operation temperature(°C)	≤350	≤350	≤350	≤350	≤350	≤350	≤350	≤350
Electrical requirement	220V,50/60Hz ; 380V,50/60Hz (Other options can be provided)							
Equipment height (cm)	180	200	235	265	330	445	500	750



## Featured components

We offer a wide range of high performance components, stable inlet and outlet modules and magnetic seals to eliminate secondary contamination during distillation. Sight glass and molecular pumps provide consistently low vacuum conditions with high visibility.



Inlet and outlet pump



Molecular pump



Magnetic film scraper



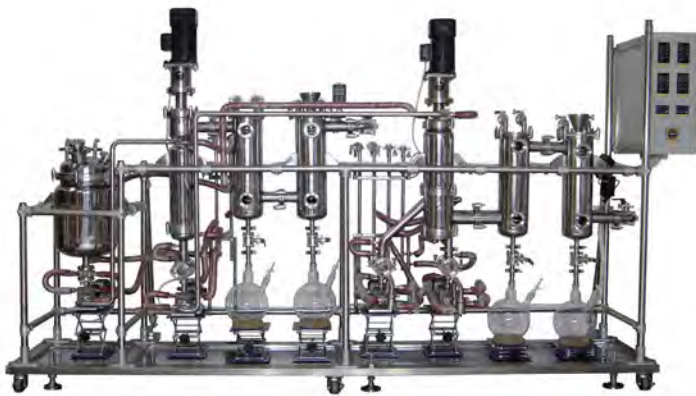
Sight glass

## Cases



# Customization

Multi-stage design to meet the requirements of different material extraction processes and purity. Two-stage, three-stage and more stages designs can be customized



1st stage: Thin film evaporator  
2nd stage: Wiped film molecular distillation



1st stage: Wiped film molecular distillation  
2nd stage: Wiped film molecular distillation

- Integrated vacuum and cooling and heating systems to reduce floor space
- PLC control system (optional), real-time monitoring of equipment operating status, dynamic adjustment of equipment parameters, storage of operating data, and analysis of application results



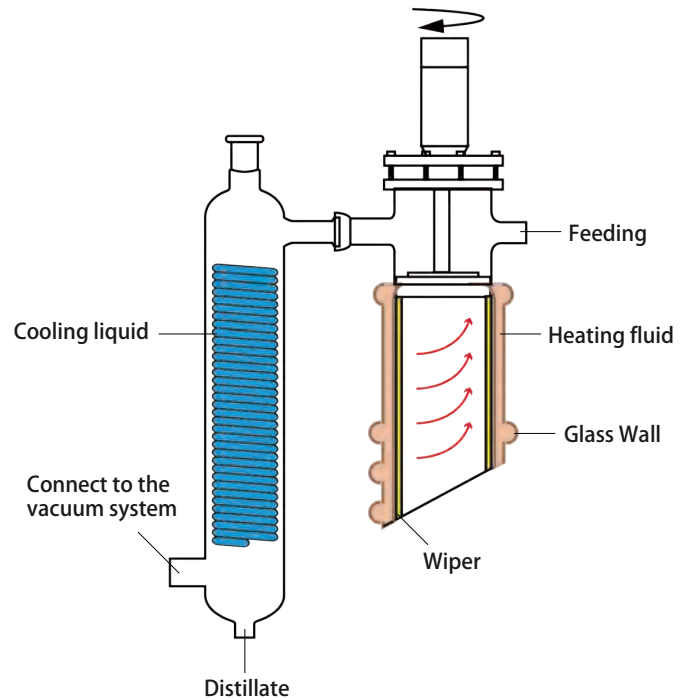
## Work process for designing solution for clients

1. Conduct feasibility and equipment layout analysis
2. Process simulation with accurate analysis of data
3. Complete the basic design and preliminary overall layout
4. Complete detailed design by communication
5. Manufacturing and transportation
6. Installation and testing
7. Training and after sales service



# Thin Film Evaporation System

The thin film evaporator consists primarily of a heating jacket, an internally rotatable wiper, and a condenser and vacuum system. In the high vacuum system, the feeding liquid is fed from the upper part of the evaporator. After that, under the driving of the gravity and the rotating wiper, a downwardly swirling film is formed along the inner wall surface of the jacket. The finishing fluid is discharged from the bottom discharger, while the steam is discharged from the upper part. The system is very suitable for liquid materials with high viscosity, easy crystallization, easy scaling, suspended solids or heat sensitive properties, and is widely used for pretreatment and finishing of products in the chemical, pharmaceutical, health care and other industries.



## Workflow:

The material is transported from the feeding bottle to the main jacketed evaporator, and the film scraper scrapes the material liquid into an extremely thin, turbulent liquid film, and pushes it downward in a spiral shape. The material is continuously heated during the traveling process, the light component is pumped into the external condenser in the form of steam and collected in the form of liquid, and the heavy component flows into the collection bottle along the evaporator.

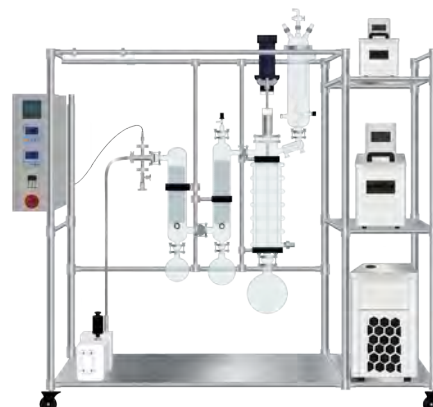
## Applications:

The thin film evaporation system is mainly used in the pretreatment process of food and health products, also widely used in solvent removal and distillation separation in pharmaceutical, chemical industry and other industries.





# Thin Film Evaporation System (Borosilicate Glass)

The main components of the glass thin film distillation system are made of high borosilicate 3.3 material, and the evaporator is made of glass sintering. It is easy to clean without dead corners. At the same time, it reduces the number of interfaces and ensures high vacuum. The experimental materials are completely distilled from feeding to collecting materials. The process is intuitive and visible, and the parameter settings can be adjusted at any time according to the experimental phenomenon, which is convenient to quickly find the best process conditions. High borosilicate glass also has good corrosion resistance, which is an ideal choice for experimental research and development or small-scale production



## User interests:

- The glass parts are made of high borosilicate 3.3 material, with excellent visibility;
- The magnetic coupling seal can maintain a higher vacuum degree to ensure the evaporation effect;
- Scraper film forming design, contact material material stainless steel 316L+PTFE;
- The sealing ring is made of fluorine rubber or tetrafluoroethylene, suitable for different material applications;
- The main evaporator can be designed with full jacket and full insulation to ensure material fluidity;
- Digital display Pirani vacuum gauge, accurate feedback of vacuum degree;
- Multi-plan structure configuration to guarantee different material and different process requirements;
- Certification:  



Model	DTG-60	DTG-80	DTG-100	DTG-150	DTG-200
Feeding rate(L/h)	0.05-3	0.1-6	0.2-10	0.5-15	0.5-20
Effective evaporation area(m <sup>2</sup> )	0.06	0.1	0.15	0.25	0.35
Cooling area of internal condenser(m <sup>2</sup> )	0.05	0.25	0.3	0.34	0.6
Feeding flask volume(L)	0.5	1	2	2	5
Rotation speed(rpm)	50-300	50-500	50-500	50-500	50-500
Vacuum level(mbar)	≤0.001				
Operation temperature(°C)	≤300				
Electrical requirement	220V, 50/60Hz; 380V, 50/60Hz (Other options can be provided)				
Equipment size (cm)	170*61*170	190*61*180	190*61*190	210*61*230	225*60*240

# Thin Film Evaporation System(Stainless Steel)

Stainless steel thin film distillation system is widely used in solvent removal, deodorization and distillation separation in industrial production. The equipment is more integrated, better heat transfer efficiency, and equipped with high-precision automatic feeding and discharging pumps can greatly increase production capacity. It is an ideal choice for pilot and industrial production equipment.



## User interests:

- Modularized design for flexible options;
- Continuous feeding & discharging modules design, saving labor cost and working time;
- Fully jacketed design, better material adaptability;
- The magnetic coupling seal can maintain a higher vacuum degree to ensure the evaporation effect;
- 316L stainless steel material, high heat transfer efficiency, safe and reliable;
- Sight glass and quick-connect design, easy to disassemble and clean;
- Optional gas-liquid separator to reduce material loss;
- It is often matched with short-path molecular distillation system or rectification tower to achieve more functions;
- Certification:  

Model	DTS-06	DTS-1	DTS-2	DTS-3	DTS-5	DTS-10	DTS-20	DTS-50
Feeding rate(L/h)	1-8	2-15	4-30	6-45	10-80	20-150	40-300	100-500
Effective evaporation area(m <sup>2</sup> )	0.06	0.1	0.2	0.3	0.5	1	2	5
Cooling area of internal condenser(m <sup>2</sup> )	0.18	0.3	0.6	0.9	1.5	3	6	15
Feeding flask volume(L)	10	10	15	20	50	100	200	200
Vacuum Level(mbar)	≤0.001							
Operation temperature(°C)	≤300							
Electrical requirement	220V, 50/60Hz; 380V, 50/60Hz (Other options can be provided)							
Equipment height (cm)	180	200	235	265	350	450	500	750



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