



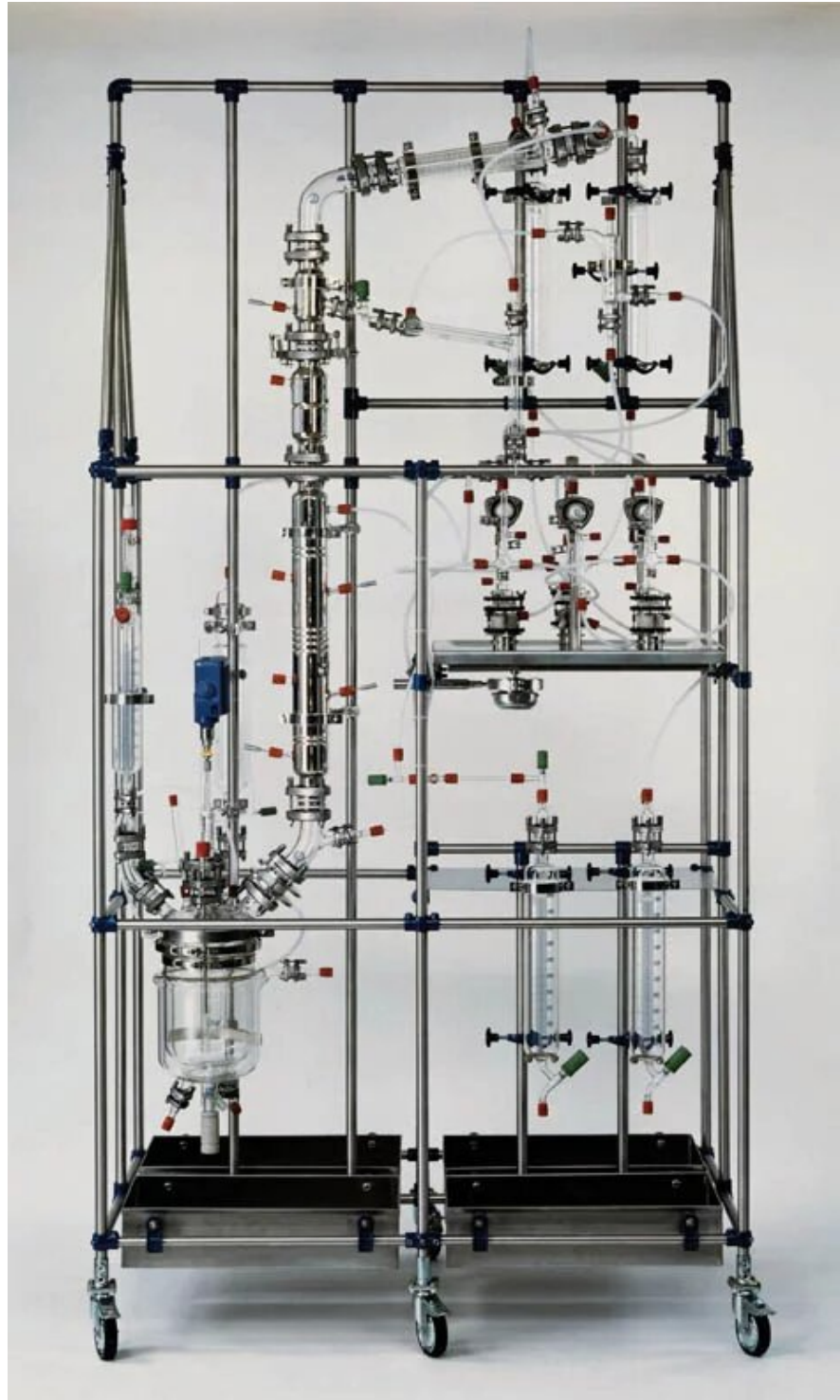
Global Antico Process Systems

Product Overview

Reaction Unit
Filtration Unit
Evaporators
Heat Transfer
Absorption Unit
Extraction
Mixing Vessels

Solutions for:

- Active pharmaceutical ingredients APIs
- Fine chemicals / Speciality chemicals
- Basic chemicals (organic, inorganic)
- Agrochemicals
- Flavours & Fragrances
- Pigments & Dyes
- Detergents & Tensides
- Coatings, Paints, Adhesives
- Polymers
- Petrochemicals
- Catalysts
- Oil & Gas, Mining
- Material science
- Chemical research



Customized solutions for your specific process requirements

**Start your chemical processing journey
with GLOBAL engineered glass systems**

Ingeniously designed glassware
for Science and Industry

www.globalindus.in



Global Antico Process Systems

Global Antico Process Systems is a leading manufacturer of reactor systems, pilot plants and related services in the field of demanding process requirements in terms of:

- Corrosion resistance
- Pressure resistance
- Regulatory, operational and other process related requirements

We are a global partner for companies operating in the chemical and pharmaceutical industries as well as for research organizations.

Our solutions cover the range from lab, through pilot up to production volumes.

We support our customers throughout the entire life-cycle of their project, from basic design and engineering through manufacturing and installation to after-sales services and plant-optimization.

Our mission is to accelerate scientific progress and to increase productivity and sustainability of chemical and pharmaceutical manufacturing. Thereby, we advance health and well-being of a growing global population and enable a sustainable future.

Our ambition is to position the Group's future on a sustainable growth and profitable path. Based on the innovation and development of our technological capabilities we aim to provide our customers with a wider range of products, solutions and service offers while carrying on the century-long history of innovation, passion and solutions that defines Global Antico Process Systems.

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Continuous Stirred Tank Reactors (CSTR)

Bench-top Reactor

Benchtop Reactor is built for top performance at lab-scale and has been engineered to provide a great user experience. Our Benchtop Reactor is a compact system with interchangeable vessels (300 ml to 5 L) and is suitable for placing in a fume hood. Various vessel options and accessories allow you to choose exactly what you need for your process.

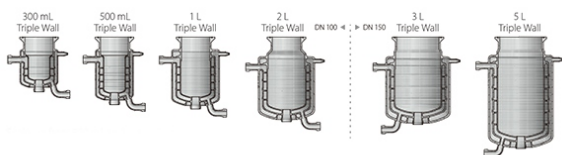
General specifications

Vessel capacity	:	300 mL, 500 mL, 1 L, 2 L, 3 L and 5 L
Vessel type	:	Double wall or triple wall
Operating pressure	:	Full vacuum to atmospheric pressure
Operating jacket pressure	:	Up to +0.5 barG (0.05 MPa)
Operating temperature	:	-90 °C to +230 °C
ΔT - Thermal shock resistance	:	110 °C (double wall), 60 °C (triple wall)

1 Variety of Vessel Options



2 Interchangeable Scale-up



3 Impeller Options



4 Leak-proof Flush Valve



Bench-top Reactor

5 Insulated Flexible Hose



6 Hose Support Clamp



7 Compatible with all brands

Overhead Stirrer



Thermal Control Units



8 Bench-top Filter Reactor



Reaction + Filtration = Filter Reactor

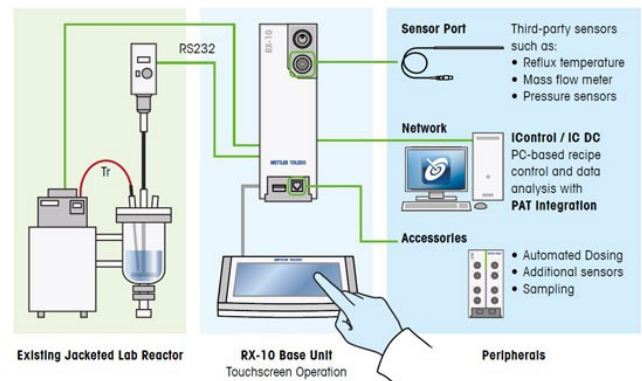
Benchtop Filter Reactor is a compact system that integrates the functionality of a reactor and a filter in one system at a benchtop scale. The result is a seamless workflow for crystallisation processes. Our Benchtop Filter Reactor performs synthesis of crystalline products and subsequent filtration/washing cycles and its full jacket design allows reactions to happen efficiently due to excellent thermal transfer.

Filtration is assisted by either vacuum or gravity, and the resulting product cake can be dried under vacuum. A quickly removable filtration part makes it easy to collect wet product cake or dried powder, change the filter cloth, and clean the filter. The filter membrane/cloth can be chosen based on your process need.

Improve Control, Capture, Reporting

RX-10™ – Reactor Control and Capture

RX-10 combines the familiar METTLER TOLEDO reactor control touchscreen with various plug-and-play interfaces to control and monitor results from a broad range of jacketed lab reactors.



Mini and Pilot Plant Reactor

Global Pilot Plant Reactor is designed for demanding applications, such as process development, kilo and pilot scale production. Performance, functionality, and ease of use are of the highest standard in this reactor.

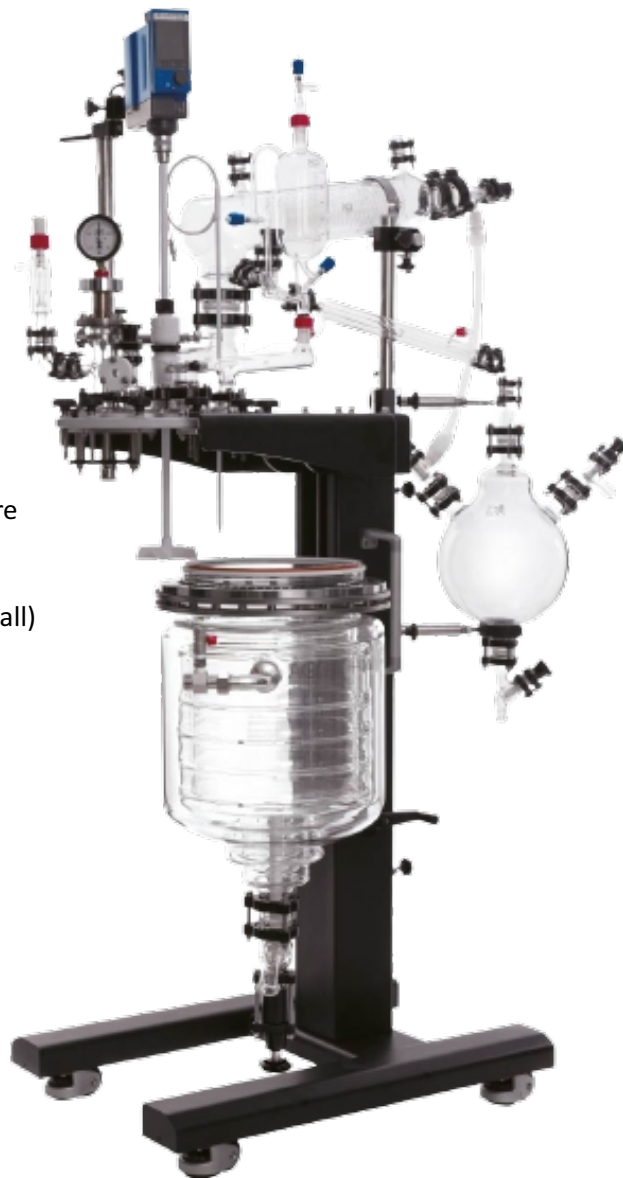
Exceptional usability of Global Pilot Plant Reactor is provided via the flexible stand. By enabling quick and easy displacement of the vessel, it allows you to spend more time focusing on your process and less time setting it up. The system offers outstanding value and is available in 10, 20 and 30 L vessel capacities.

General specifications

Vessel capacity	:	10 L, 20 L and 30 L
Vessel type	:	Double wall or triple wall
Operating pressure	:	Full vacuum to atmospheric pressure
Operating jacket pressure	:	Up to +0.5 barG (0.05 MPa)
Operating temperature	:	-90 °C to +230 °C
ΔT - Thermal shock resistance	:	110 °C (double wall), 60 °C (triple wall)

Examples of application areas for MiniPilots

- Vacuum distillation
- Azeotropic distillation (phase separation)
- Evaporation to any desired consistency
- Multi-component reactions
- Gas introduction into liquid phase
- Extraction of multi-phase mixture
- Crystallization
- Refluxing
- Multiple chemical reactions liquid/liquid, liquid/solid
- Low temperature chemistry



Advantages of our glass MiniPilots

- FDA confirm made of borosilicate glass 3.3/ PTFE/ PFA
- Interchangeable reactors of 10, 20, 30 L
- Reactor lift - Manual and motorized both options available
- Corrosion resistant
- Bench and floor model (mobile)
- Fits in standard fume-hood
- Complies with ATEX zone I / CE / cGMP / CIP

Our specialists are here to advise on the optimal solution for your process. Our engineers will design a reactor system for you according your specifications.

Reflux Reaction Unit

This is a versatile unit and can be used as Reaction Distillation Unit, Fractional Distillation Unit or a combination of both. All features of Reaction Distillation Unit and Fractional Distillation Unit are incorporated. This has a flexibility of working at atmospheric pressure as well as under vacuum.

The typical unit has a reaction vessel fitted with a metal heating/cooling bath having a facility for heating and cooling bath by means of heating/cooling fluids as a media. The Standard system is equipped with stirrer heating mechanical seal, a packed column, reflux divider, coil type condenser and receiver system having a product cooler, vent, drain and vacuum valves. Option of speed variable can be provided.

Reaction Distillation unit features

- Zero Hold Up flush bottom valve
- Reactor capacity up to 500 lts.
- All contact parts – Borosilicate glass and PTFE
- Process visibility due to all glass design
- Digital display of process parameters
- Control of parameters through control panel
- Ex / Flameproof Stirring assembly with variable drive

General specifications

Vessel capacity	:	1 ltr to 500 ltr
Vessel type	:	Single wall (upto 500 L), Double wall or triple wall (upto 100 L)
Operating pressure	:	Full vacuum to atmospheric pressure
Operating jacket pressure	:	Up to +0.5 barG (0.05 MPa)
Operating temperature	:	-90 °C to +230 °C
ΔT - Thermal shock resistance	:	110 °C (double wall), 60 °C (triple wall)

Examples of application areas for MiniPilots

- Vacuum distillation
- Evaporation to any desired consistency
- Multi-component reactions
- Gas introduction into liquid phase
- Extraction of multi-phase mixture
- Refluxing
- Low temperature chemistry

Safety accessories :

1. Rupture Disc
2. Spring loaded Pressure Safety valve
3. Pressure Control valve



Pressure Reactor

Laboratory pressure reactor system - Pressure, performance, and safety

Global Pressure Reactor can withstand up to 10 barG pressure in an all-glass vessel design. Every glass reactor is pressure tested and has a protective covering for maximal safety. There is a unique removable glass shaft in the flush valve for easy cleaning, and the reactor lid has 8 ports to accommodate various accessories. The magnetic stirrer seal provides protection against pressure leakage and is made of SS316 (Option: Hastelloy®) for excellent corrosion resistance.

General specifications

Reactor volume	: 0.25 to 5.0 liter
Pressure	: -1 (FV) to +60 / 200 bar
Temperature	: -20 °C to +250 °C
Material	: Borosilicate glass 3.3, stainless steel, Hastelloy®

This multipurpose pressure reactor system is designed for the use of interchangeable glass and steel pressure vessels. Safety features guarantee safe reactions under pressure. The glass reactors ensure high resistance against acids, while allowing visual process control and monitoring. This is also possible under high pressure by using steel pressure vessels with sight glasses. Various low to high torque magnetic drives ensure efficient mixing and stirring low to high viscosity process media as well as excellent heat transfer.

Typical applications

- Hydrogenation reactor
- Polymerization reactor
- Synthesis reactor
- Catalyst testing / evaluation
- Catalytic reactor
- Crystallization
- Chemical research, synthesis
- Petrochemical research
- Corrosion Measurement
- Upstream research
- Biomass research
- Biopolymer research
- Biorefinery research
- Biofuels research
- Zeolite synthesis
- Nanoparticle synthesis
- Corrosion testing autoclave



Jacketed Reactor

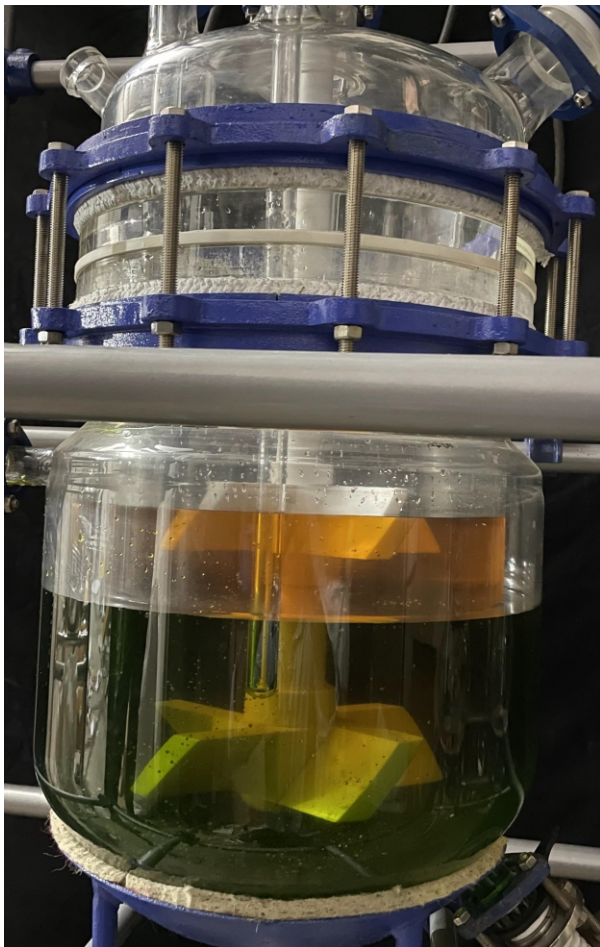
- Perfect Observation Of The Process
- High Corrosion Resistance
- Wide Temperature Range
- Vacuum Resistance
- Easy Cleaning
- Transparency
- Smooth Surface

A jacketed glass reactor is a type of lab equipment used for industrial processes such as the production of chemicals, pharmaceuticals, and environmental tests. This type of reactor is different from a traditional glass reactor as it has an additional layer of insulation, typically made of borosilicate or stainless steel, that helps to maintain a constant temperature and pressure.

This insulation also helps to protect the contents of the reaction vessel from outside influences and contamination. Agitation can also be used to increase the homogeneity of the fluid properties such as concentration or temperature in jacketed glass vessels.



Triple Walled Jacketed Glass Vessel



Double Walled Jacketed Glass Vessel

Global Antico Process Systems plans and constructs equipment and plants for the entire field of reaction and thermal separation process engineering. With this experience gained over the years, Global Antico Process Systems has a comprehensive know-how available in the sector of processing highly aggressive and pure media. The glass reactors convey this knowledge to the user. The solutions shown are fully developed and standardized types of equipment or equipment specifically adapted to a certain process.

Furthermore the material glass offers a unique combination of advantages:

- Universal corrosion resistance
- Smooth, nonporous surface reduces deposits and incrustations
- Catalytic inertness: Reactions remain uninfluenced by the material
- Physiologically and ecologically safe (100% recycling is possible)
- Vacuum stability
- Transparency, enables visual process control
- Complete emptying
- Modular design, easily modifiable

Universal Reactor

Multipurpose reflux reaction, distillation and Azeotropic distillation plant

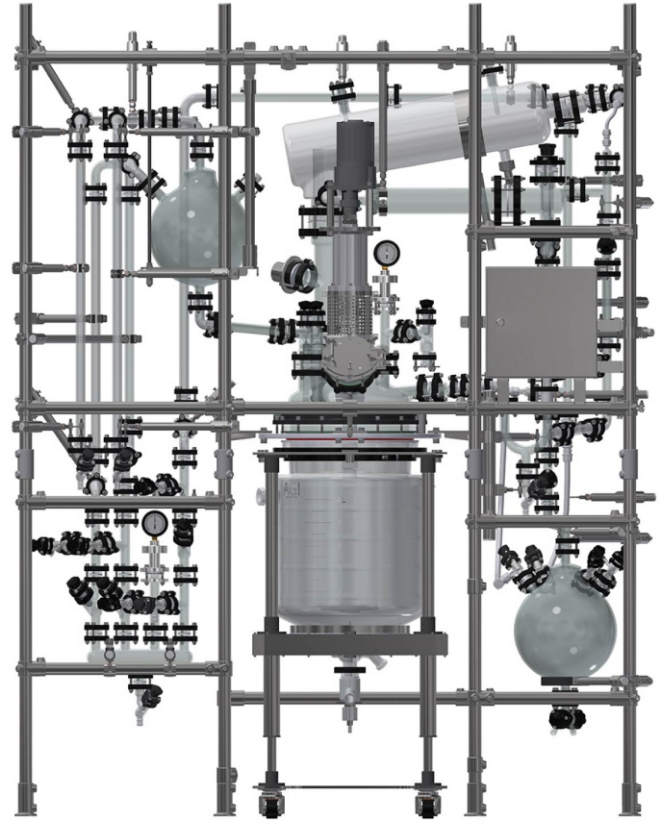
Global Universal Reactor is a very versatile system with a variety of features that meets the needs of most reaction processes including distillation, phase separation and dosing. We pour our knowledge and experience into its construction, resulting in a multifunctional chemical processing system that offers excellent value. Each system is built to order and so can be totally configured to meet your specific process needs.

General specifications

Glass reactor	:	5,10,20, 30, 50,100,200 liter
Pressure	:	-1.0 (FV) to +0.8bar (0.5bar)
Temperature	:	-60 °C (-90 °C) to +200 °C
Material	:	Borosilicate glass 3.3, PTFE

Highlights

- Reaction unit including instrumentation
- Robust stirrer drive
- Baffles
- Triple walled reactor
- Inert gas connection
- Vacuum connection including PSV and bursting disc
- CIP-Nozzle made of PTFE
- RPM-Measurement
- pH-Measurement
- Can be fabricated for operation in EX-rated areas
- Certificates for material in contact with product



We produce complete solutions for chemical processing: Reactor systems including accessories like sampling devices, pH probes, rectification columns with structured packing, process monitoring and control as well as integration of auxiliary equipment such as temperature control units, nutsche filters / dryers, gas scrubbers or mixing vessels.

Typical applications

- Chemical synthesis
- Extraction / evaporation
- Purification / crystallization
- Separation
- API manufacturing
- Peptide production
- Process development
- Scale-up
- Cryogenic reactions
- Small scale production
- Pilot plant / kilo lab

Agitated Nutsche Filter

The Agitated Glass Nutsche filters are commonly used in the following industries for the production purposes, chemical industry, pharmaceutical industry, and laboratory industries, and many others. (ANFD) Agitated Nutsche Filter Dryer Manufacturer produces the ANFD'S for the purpose of filtration as well as drying the material in the same unit.

The Glass Nutsche Agitated Filters are designed specifically for efficient filtration to allow for liquid to Solid- Separation, it can be comfortably combined with our regular reaction unit. Both contact parts are inert and thus permit a range of pharmaceutical, chemical, and solvent equipment to be used. An appropriate filter is used to separate the solid particles of the slurry, forming a filtered cake. The Filtrate Flows downwards and can be obtained from the valve at the bottom outlet, Also easily remove the filter Cake.

General specifications

Glass vessel	:	10,20,50,100, 200, 300 liter
Pressure	:	-1.0 (FV) to +0.4/ 1.0 bar
Temperature	:	-60 °C to +150 °C (200 °C)
Filter cloth	:	Mesh size 8 to 115 micron
Material	:	Borosilicate glass 3.3, PTFE, PFA

Non-Jacketed Glass Nutsche Filters sized up to 300 Liters
Glass Jacketed Nutsche Filters size 1 Liter up to 100 Liters.

General specifications (Benchtop Filter Reactor)

Vessel capacity	:	1 L, 2 L, 3 L and 5 L
Vessel type	:	Double wall, full jacket
Filtration area	:	78.5 cm ² (1 L & 2 L) 176.7 cm ² (3 L & 5 L)
Operating pressure	:	FV to atmospheric pressure
Operating jacket pressure	:	Up to +0.5 barG (0.05 MPa)
Operating temperature	:	-40 °C to +200 °C
ΔT - Thermal shock resistance	:	110 °C (double wall)

Typical application

- Filtration / Separation
- Drying
- Purification
- Crystallization
- Ion exchange
- Peptide synthesis
- Solid phase peptide synthesis (SPPS)
- Chromatography
- Cannabis extraction (solvent extraction)
- Cannabinoid extraction
- Cannabis extract purification
- Cannabis winterization (cannabis extract winterization)



200 Ltr. Agitated Nutsche Filter



20 Ltr. Agitated Nutsche Filter

1 to 5 Ltr. Benchtop Filter Reactor

High Containment Filter

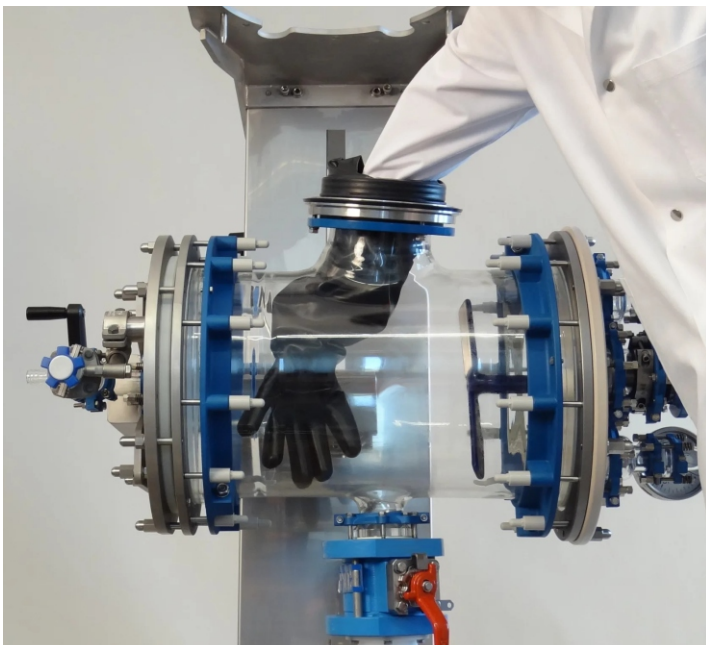
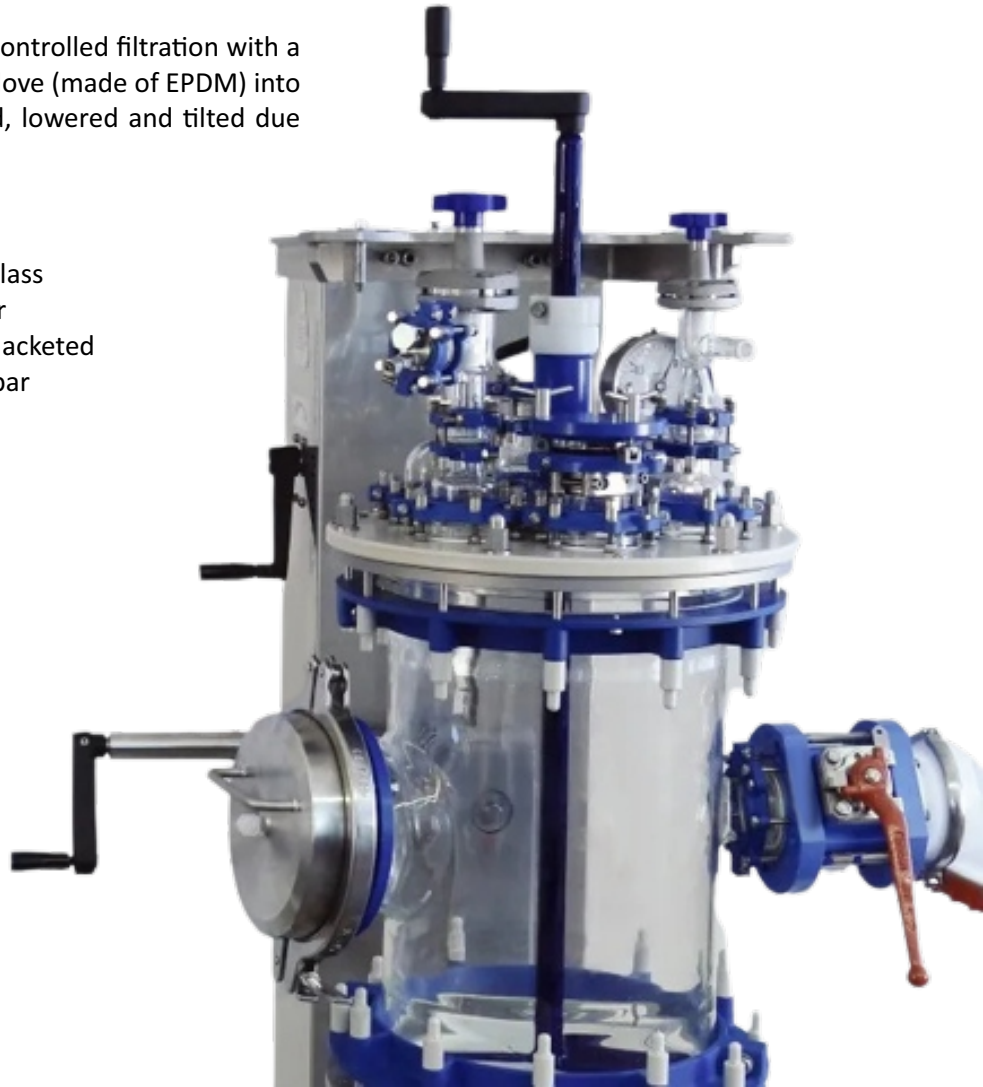
Global high containment nutsche filters allow for controlled filtration with a contained discharge by wiping out with the fixed glove (made of EPDM) into a bag system. The filter vessel can easily be lifted, lowered and tilted due to its versatile and solid stand.

General specifications

Vessel MOC	:	Borosilicate 3.3 Glass
Vessel Capacity	:	10 liter to 30 Liter
Vessel Type	:	Jacketed or Non Jacketed
Operating Pressure	:	-1.0 (FV) to +0.5 bar
Operating Temperature	:	-60°C to +180°C
Filter & Filter Cloth	:	PTFE/ECTC/PP
MOC of Glove	:	EPDM

Typical application

- Contained filtration of APIs / HPAPIs
- Washing of filter cake
- Filtration under protective (inert) atmosphere
- Contained discharge of filter cake
- Filtration of HPAPI
- Filtration / Separation
- Purification
- Crystallization
- Ion exchange
- Peptide synthesis
- Solid phase peptide synthesis (SPPS)
- Filtration under protective atmosphere



Global Antico Process Systems – leading Indian manufacturer of reactor systems, pilot plants and process solutions for cGMP API synthesis – from lab through pilot plant/kilo lab to production scale.

With over years of experience Global stands for the highest level of quality and reliability. Our offering covers the whole life cycle of the equipment from pre-sales consulting and engineering through manufacturing, installation and IQ/OQ to after-sales services and plant optimization. Our engineered solutions lead to the highest output of your R&D, scale-up/pilot activities and production processes.

Glass Mixer - Settler

Mixer-settlers are commonly used for liquid/liquid solvent extraction applications that typically operate in continuous mode. Their name is derived from the two stages that make up the process – the first stage that mixes the two liquid phases together to accomplish mass transfer, and the second stage that uses gravity to naturally separate and settle the phases.

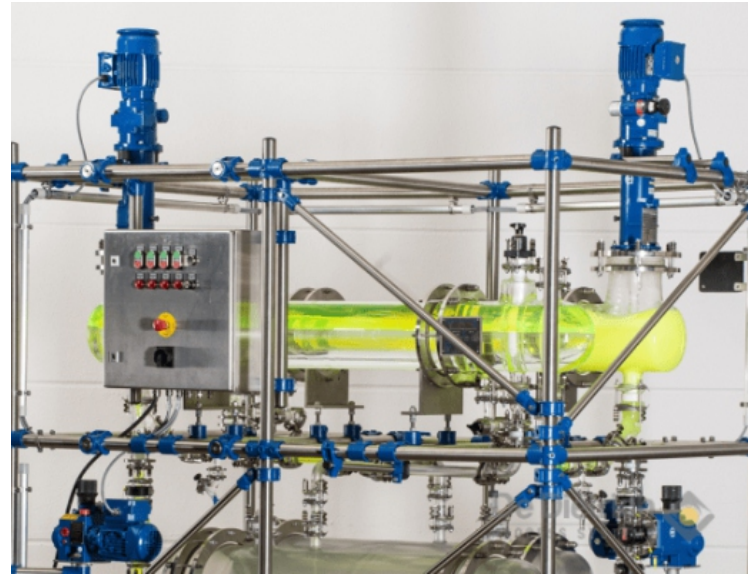
The mixer and settler are essentially two separate components that are integrated to act as one system. In the simplest of arrangements, the mixer vessel contains an agitator that is in contact with the feed solution (heavy phase) and solvent (light phase) to thoroughly mix the phases. If more contact time is required, then the feed rate is decreased, or multiple mixer-settlers / stages are employed.

From there, a pumping turbine transfers the emulsion to the settler. The settler, which is located downstream from the mixer to allow the heavy phase and light phase liquids to separate by gravity. The settler may incorporate coalescer plates to aid in the separation of phases and break down of foam.

Additionally, the mixing and settling zones are separated by a weir, or barrier, to avoid back-mixing. Once the process is complete, the liquids can be removed separately.

Typical applications

- Extraction (moving an ion of interest from an aqueous phase to an organic phase),
- Washing (rinsing entrained aqueous contaminant out of an organic phase containing the ion of interest), and
- Stripping (moving an ion of interest from an organic phase into an aqueous phase).



Glass Mixer Settler consists of :

- Mixer – Settler battery
- Metering pumps for light and heavy phase for volume and ratio setting/ flow adjustment
- Feed & collector vessels for light and heavy phase
- Agitator for mixer vessel
- Stainless steel structure
- Temperature and feed indicator panel

Glass Mixer Settler features

- Exceptional settler design for minimized hold-up combined with maximal flexibility of phase ratio
- Any adaptation possibilities (temperature, pH, ...) in drain line and settler of light and heavy phase
- Mixer pump for optimized drop generation combined with full feed suction capacity
- Tempered jacket and feed pre-heating for scale-up for tempered and non-tempered systems
- Product phase collection via gravity flow in receiver vessels

Liquid - Liquid Extraction Column

The cost efficient solution for multi-stage extraction processes

- Continuous product separation
- Cost efficient realisation of multi-stage processes
- Various design types to suit different applications

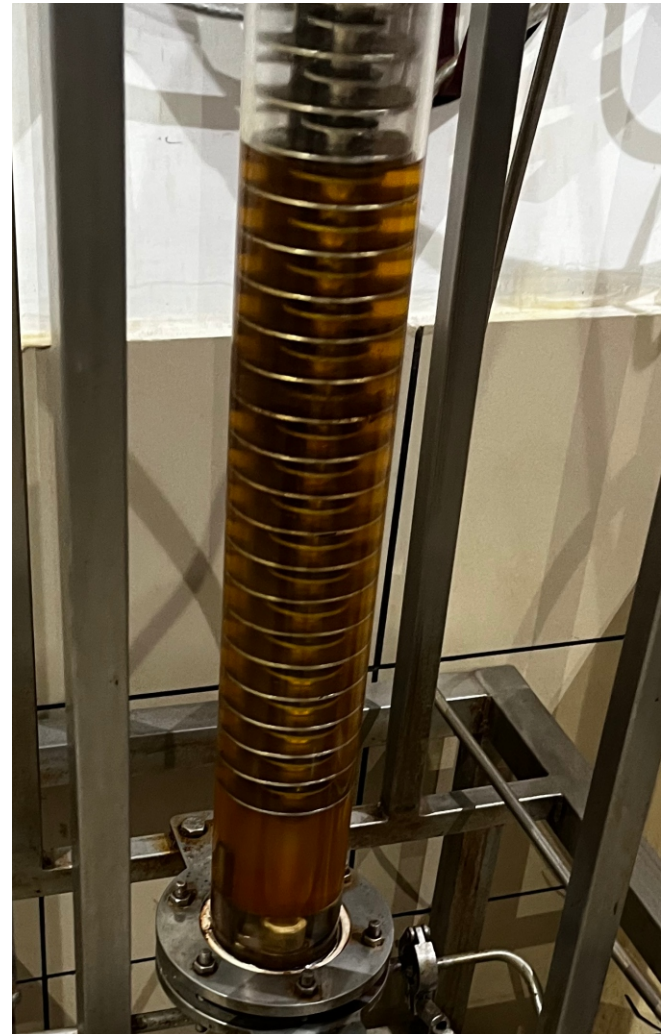
The more theoretical separation stages have to be realized the more an extraction column becomes economically interesting compared to mixer-settlers since increasing the number of theoretical separation stages just increases the height of the column. The 2 liquid phases pass the column by gravity in a counter current manner. In extraction columns the same 2 process steps as mixing and settling have to be realized per separation stage.

The mixing process in a column can be carried out in different ways differentiating the types of extraction columns.

The settling processes in columns is mostly less efficient as in mixer-settlers since back mixing and dispersion entrainment are less avoidable and more or less fixed by the selection of the mixing process and hence the type of extraction column.

Global Antico Process Systems offers different column types as:

- Pulsed Packed Extraction Columns
- Pulsed Sieve-Tray Extraction Columns
- Oscillating Disc Contactors
- Rotating Disc Contactors
- Stirred Cell Extraction Columns



When to use the extraction process

The liquid/liquid extraction process is favorable for separations as for:

- products having similar volatilities
- products forming azeotropes
- products which would require high energy input in distillation
- products being temperature sensitive
- non-volatile products as e.g. metal salts



Mixing Vessel, Storage tanks

Mixing vessels are frequently used for stirring, dissolving, mixing, extraction and other processes in kilo labs and pilot plants. Jacketed glass reactors permit heat exchange for better dissolving and crystallization.

Mobile mixing vessels can be transported with their content for further processing. They can also be equipped with condensers for vacuum distillation and operated as a reactor.

Glass tanks are used in distillation glass overheads as feeders and receivers. Such vessel are normally graduated, sometimes coated with glass protect coating to protect the glass surface against scratches.

General specifications

Mobile and stationary units

Mixing vessels	:	Upto 100 liter (jacketed glass vessel)
Mixing vessels	:	Upto 500 liter (non-jacketed glass vessel)
Storage tanks	:	10 to 400 liter (non-jacketed glass vessel)
Pressure	:	-1.0 (FV) to +0.5 bar
Temperature	:	-60 °C (-90 °C) to +150 °C (200 °C)
Material	:	Borosilicate glass 3.3, PTFE, PFA, ETFE



Examples of application areas for mixing vessels

- Work-up
- Conditioning
- Dissolving
- Extraction
- Mixing & stirring
- Phase separation

Glass Scrubber

Gas scrubbers are used to neutralize corrosive exhaust gas from reactors. Depending on the scrubbing liquid, they can be used for caustic or acidic vapors. Gas scrubbers are equipped with a fluoropolymer lined, corrosion resistant magnetic coupled pump.

Global borosilicate glass scrubbers have been used in the chemical, pharmaceutical, and allied industries for many years. Glass scrubbers provide unrivalled service where corrosion resistance or process visibility are of importance. They are particularly suited to multipurpose and pilot plant applications, where they may be used as water, acid or alkali scrubbers. Global provides a range of mobile glass scrubbers, which standard and custom designs to provide the user even greater flexibility.

They reduce the need for expensive permanent installations and also reduce the pressure losses resulting from pipeline installations. The mobile scrubbers can be wheeled into place alongside the process plant and simply connected to the process. The standard mobile scrubbers are available with scrubber columns of DN100 and Dn150 diameter. Each scrubber is supplied complete with a sump tank, recirculation pump and recirculation cooler. The mobile trolley on which the scrubbers are mounted is supplied with two lockable steering castors and two fixed castors to enable maximum maneuverability. The mobile scrubbers are simply connected to other equipment using quick release couplings and flexible hoses.

The flow rate of the scrubbing liquid can be controlled with the built-in reducing valve. The scrubbing liquid temperature is maintained by a spiral cooler in the liquid circuit.

General specifications

Pressure	:	-1.0 (FV) to +0.5 bar
Temperature exhaust gas	:	-60 °C to +200 °C
Temperature scrubbing liquid	:	0 °C to +80 °C
Material	:	Borosilicate glass 3.3, PTFE

Mobile gas scrubber (volume scrubbing liquid)	:	6, 10, 20, 50, 100 liter
Mobile gas scrubber (column diameter)	:	DN 50, 100, 150, 225
Stationary gas scrubber (volume scrubbing liquid)	:	Customized according to process requirements
Stationary gas scrubber (column diameter)	:	DN50 up to Dn600

Typical application

- Off-gas treatment
- Neutralizing of exhaust gas
- Stripping
- Scale-up
- Process development



Thin Film Evaporator

High efficiency evaporation at lab-scale

Global Thin Film Evaporator (also known as Wiped Film Evaporator) is ideal for separating volatile components from heat sensitive, viscous and fouling chemical mixtures. Thin film, under low pressure, reduces the boiling point of chemical components, as well as the hydrostatic pressure, resulting in the evaporation of volatile fraction at low temperatures. The PTFE wipers form a thin film on the evaporation column and push the film downwards with every rotation. This causes the heat-sensitive components to experience short residence time on the evaporation area and minimal thermal degradation.

The all-glass design of our Thin Film Evaporator allows for continuous visual monitoring, and the adjustable feed rate provides control over film formation.

General specifications

Evaporation surface area	:	0.05 m ² (DN 60), 0.1 m ² (DN 100)
Maximum temperature	:	+200 °C in jacket with PTFE wiper
OPTION	:	+300 °C in jacket with PBI* wiper
Operating pressure	:	0.1 mbar (abs.) to atm
Operating jacket pressure	:	Up to +0.5 barG (+0.05 MPa)
Feed rate	:	0.1 to 1.5 kg/h (DN 60) 0.3 to 3.0 kg/h (DN 100)
Maximum viscosity	:	Up to 1,000 mPa.s
Maximum wiper rotation speed	:	DN60 300rpm DN100 200 rpm
Stirrer seal	:	Magnetic



Thin Film Evaporator can be customized and we are happy to discuss the design of custom features with you in order to meet your specific process requirements.

- Fully corrosion resistance models for aggressive chemical mixture separations
E.g., using Hastelloy
- Modifications to evaporation surface area, 0.012 m² (DN 45) or 1.5 m² (DN 450)
- Addition of thermal jacket to feed and receiving vessels

Difference between Thin Film and Short Path Evaporator

The differences between Thin Film and Short Path Evaporator are the operating pressure and the position of the condenser.

Thin Film Evaporator has an external condenser and can operate from 0.1 mbar (abs.) to atmospheric pressure.

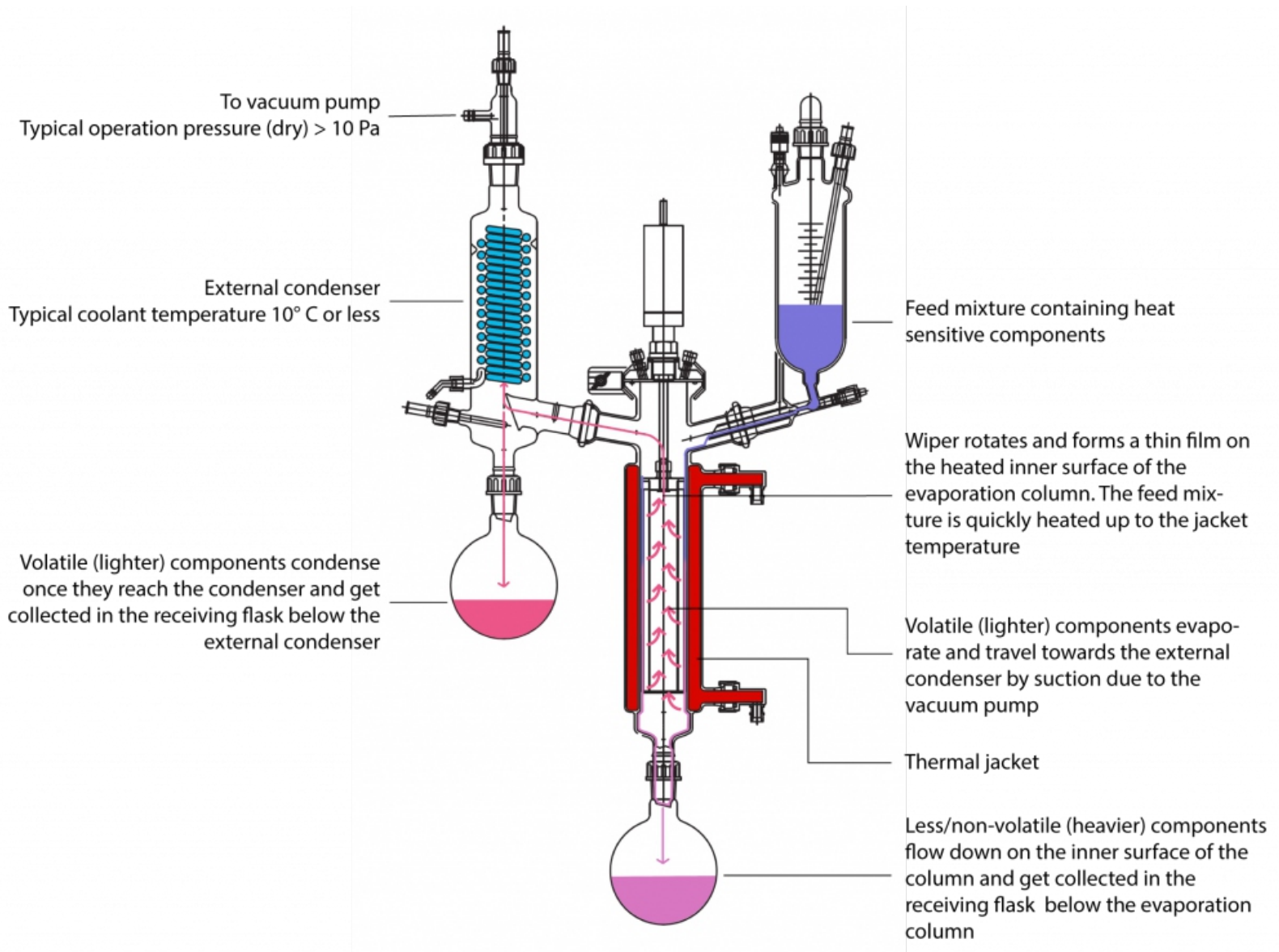
Short Path Evaporator has an internal condenser co-axially positioned alongside the wiper and evaporation surface area. It can operate from 0.001 mbar (abs.) to atmospheric pressure.

The difference in pressure is due to the pressure drop that occurs when the vapour travels from the evaporating area to the condensing area. For our Short Path Evaporator, this distance is shorter compared to our Thin Film Evaporator. This means that Short Path Evaporator can operate at very low pressure compared to Thin Film Evaporator.

Thin Film Evaporator

Why should you choose a glass thin film evaporator?

A glass evaporator is ideal for process development and troubleshooting applications. An all-glass design ensures high visibility of the process, as opposed to steel evaporators. This means that any undesired events that might occur during process development can be easily observed and rectified.



Working Principle of Thin Film Evaporator

Short Path Evaporator

Ideal system for fine chemical separation

Global Short Path Evaporator is perfect for separating volatile components from chemical mixtures with properties that are hard to separate, heat-sensitive and high-boiling. The combination of very low pressure (up to 0.001 mbar, abs.), thin film formation and short residence time on the heated surface makes our Short Path Evaporator ideal for the gentle separation of high-boiling heat sensitive chemical mixtures.

The all-glass design allows for continuous visual monitoring and the adjustable feed rate provides control over film formation.

General specifications

Evaporation surface area	:	0.05 m ² (DN 60), 0.1 m ² (DN 100)
Maximum temperature	:	+200 °C in jacket with PTFE wiper
OPTION	:	+300 °C in jacket with PBI* wiper
Operating pressure	:	0.1 mbar (abs.) to atm
Operating jacket pressure	:	Up to +0.5 barG (+0.05 MPa)
Feed rate	:	0.1 to 1.5 kg/h (DN 60) 0.3 to 3.0 kg/h (DN 100)
Maximum viscosity	:	Up to 1,000 mPa.s
Maximum wiper rotation speed	:	DN60 300rpm DN100 200 rpm
Stirrer seal	:	Magnetic



Short Path Evaporator can be customized and we are happy to discuss the design of custom features with you in order to meet your specific process need. Many applications benefit from adjusting the material properties and/or physical size of the evaporator.

- Fully corrosion resistance models for aggressive chemical mixture separations
- Modifications to evaporation surface area e.g., 0.012 m² (DN 45) or 1.5 m² (DN 450)
- Addition of thermal jacket to feed and receiving vessels
- Continuous feeding design
- Dual condensers

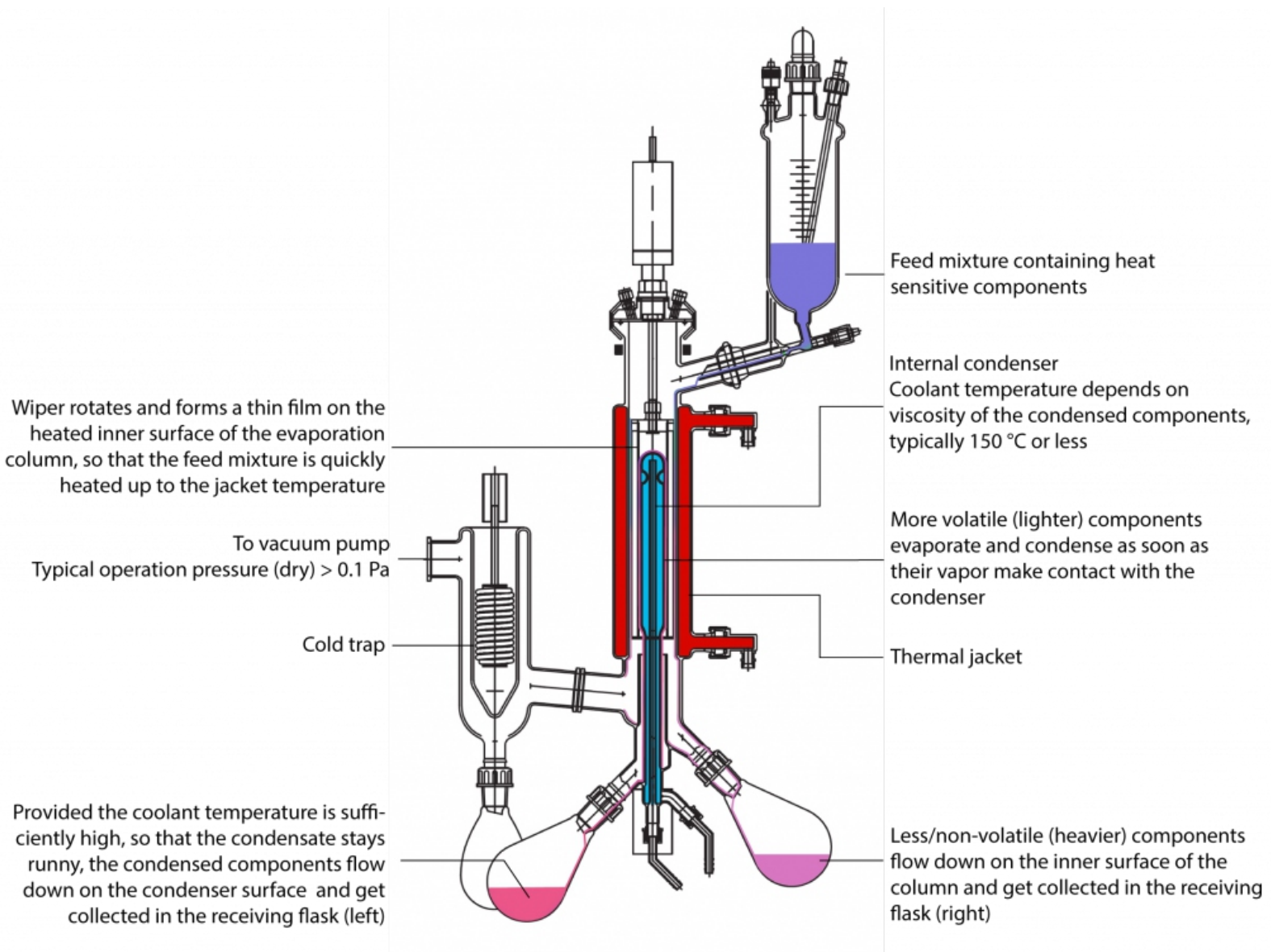
Short Path Evaporator features

- Removal of trace volatiles from heat sensitive mixtures
- Suitable for heat sensitive mixtures with high boiling point
- Minimal pressure drop due to internal condenser
- Uniform thin film formation by PTFE wipers
- Shorter residence time compared to other evaporation systems
- Process visibility due to all glass design
- Operating range up to 200 °C
- Stand with castors for mobility

Short Path Evaporator

Why should you choose a glass Short Path evaporator?

Global Short Path Evaporator offers excellent performance at lab scale. A variety of volatile mixtures with high boiling points can be separated gently and efficiently with minimal thermal degradation. Our Short Path Evaporator is highly suitable for small-scale production, process development, pilot, and troubleshooting studies.



Working Principle of Short Path Evaporator

Rotary Evaporator

The most universal solution for gentle and efficient evaporation

Rotary evaporators are mainly used to evaporate light boiling components under normal pressure or vacuum. When used in pilot plant and small scale production they are also suitable for semi-continuous evaporation. They are characterized by providing a gentle thermal treatment for temperature-sensitive mediums and provide a higher evaporation rate as non-stirred glass distillation flasks. Compared to other evaporation processes the unique process feature of rotary evaporators is their ability to evaporate all volatile media providing at the end a dry product in the flask.

The liquid to be processed in the rotary evaporator is either charged batch wise by gravity, by a pump or sucked-in by vacuum into the evaporation flask. During the evaporation process further feed can be added by means of a pump, gravity or by the operating vacuum through the PTFE-hose passing the rotating shaft and ending in the spherical vessel. The rotating sphere is half way rotating through the liquid in a heating bath filled with water or another suitable liquid heating fluid. The bath is heated by means of electrical heating elements and can be lowered to immediately stop the evaporation process.

The rotation of the sphere which is flanged to the geared motor ensures an effective mixing of the product inside the vessel and wets the complete inner surface of the sphere, increasing the evaporation surface, therefore increasing the evaporation rate and hence shortening the evaporation time.

The components with the lower boiling point are evaporated in the rotating sphere first. Their vapours flow through a sleeve shaft integrated in the drive and enter the condenser assembly. The vapours are condensed and optionally cooled in an distillate cooler before being captured in a final distillate receiver.

General specifications

Flask Capacity	:	1 Ltr, 2 Ltr, 5 Ltr (Lab Scale - Benchtop Model) 10 Ltr, 20 Ltr, 50 Ltr, 100 Ltr.
Bath Temperature	:	+20 °C to +90 °C (Water), +20 °C to +200 °C (Oil)
Models	:	GMP / non-GMP
Electricals	:	ATEX / Flame-proof / Weather-proof
Condenser variations	:	Ascending and descending version

Rotary Evaporator features

- Universal heating bath up to 200°C
- Seal ensures perfect vacuum & maintenance free operation
- Control of critical process parameters on a control panel
- Uniform heating and reduced residence time
- Mounted on caster wheels for easy movement
- Visibility of the entire process



Shell and Tube Heat Exchanger

Heat transfer is essential to the reaction process, whether it is used to heat up batch reactors, control exothermic reactions, condense vapors and gases or cool down final products.

Combining our process engineering knowledge with highly corrosion-resistant materials allows us to provide many high-performance heat exchangers and condensers for difficult applications. By selecting the appropriate materials for your chemical application and sizing the heat exchanger using computer simulations for your specific process flows and requirements, we can provide many different heat exchanger designs.



Advantages of Shell and Tube Heat Exchanger Over Conventional Coil Type Heat Exchangers:

- The overall heat transfer coefficient in shell and tube heat exchanger is about 3 times higher than in coil type heat exchanger.
- The pressure drop in shell and tube heat exchanger is minimal compared to 2-3 kg/cm² in coil side of coil type heat exchanger.
- For requirement of higher heat transfer areas shell and tube heat exchanger is the only alternative.

Shell & Tube Heat Exchangers features

- Universal Corrosion Resistance
- Outstanding heat transfer
- Space-saving arrangement by installing in Horizontal or Vertical position
- Simple replacement of inner tubes for repair and cleaning
- Low Maintenance cost
- Standard Shell & Tube Heat Exchangers are available in range of 2.5 m² to 40 m²

Glass Coil Heat Exchangers

Coil type heat exchangers are mainly used as condensers, coolers, or boilers. They can, however, be used for heat transfer between liquids and gases in general.

Glass Coil Heat Exchanger Advantages

Turbulent flow is ensured even in the larger nominal bores since the coil layers are offset and fill the flow cross-section to a great extent. This creates the following advantages:

- No possible leak between the shell and the coil, making the design ideal for GMP applications.
- Outstanding corrosion resistance
- No possible metal contamination, yielding the highest product purity.
- Suitable for direct installation into columns
- Glass Coil Heat Exchanger Specifications
- Heat exchange area from 0.2 to 15.0 m²



Engineered Process Plants

The intricacy and scope of many engineering projects are complex enough—don't work with an engineering partner that further complicates the process. Global Antico Process Systems offers the full range of engineering services in-house, which means you always communicate directly with the source so nothing gets lost in translation.

Global Antico Process Systems has an experienced team of chemical engineers and consultants specializing in the design, engineering and commissioning of complete turnkey process plants. The complete range of services is offered right from feasibility studies, basic and detailed engineering to commissioning.

Our experience of working with various materials of construction such as Borosilicate Glass, Stainless Steel, PTFE, fluoropolymer lined components, Hastelloy, Graphite, etc ensures that we design the most optimum and efficient plant.



Some of the process plants offered by Global Antico Process Systems are :

- Sulfuric acid Purification
- Bromine Production / Recovery Plant
- Nitric acid Purification
- Nitric acid Concentration
- Solvent Recovery plants
- Purification of Spent acids
- Purification of natural extracts such as essential oils
- Waste water treatment plants
- De - Nitration plants
- NOx absorption
- Precious metal recovery and refining
- Integrated NAC / SAC
- Exhaust Gas Purification
- HNO₃ Purification

Laboratory - scale plants, demonstration-scale plants, and everything in between—Global Antico Process Systems provides turn-key solutions to help you take new processes and products from concept to commercialization.

Advanced Flow Reactors (AFR)

Our reactors enable the continuous processing of chemicals with a smaller footprint than conventional batch reactors and are specially designed for the seamless transition from lab feasibility to process development to industrial-scale production of chemicals for the pharmaceutical, fine and specialty chemical industries.

Our Lab Reactor is a metal-free plug and play open system that can seamlessly scale-up with other AFR products, and has a photo reactor option.

Advanced Flow Reactors (AFR) features

- Plug and play open system including data monitoring
- Ready to start, with thermostat integrated
- Up to 3 liquid lines, 1 gas line and a back pressure regulator for pressure control
- High chemical durability due to a full metal free system
- Outstanding mixing and heat exchange
- Low internal volume
- Seamless scale-up

Lab Dosing Unit

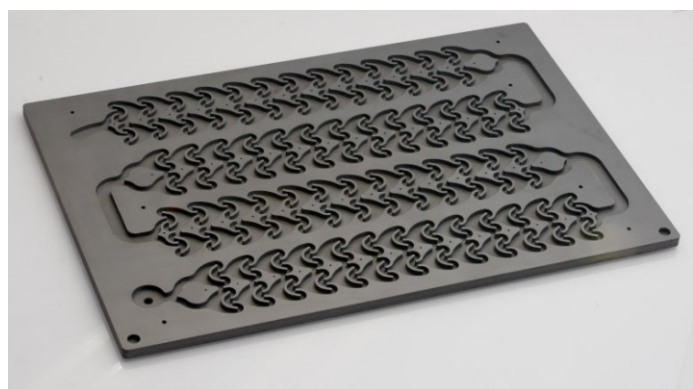
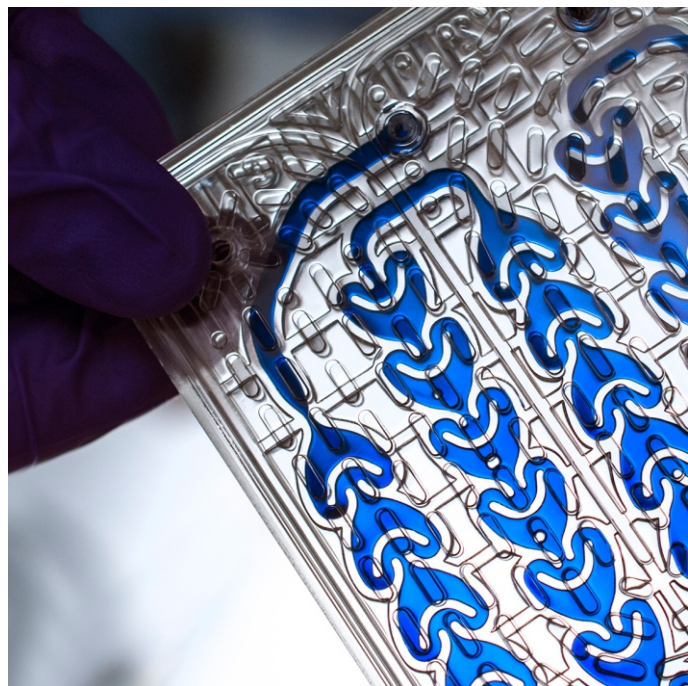
- Plug and play system
- High chemical durability due to full metal free system
- Up to 4 liquid lines including one high precision syringe pump
- 1 gas line with pressure sensor
- Thermostat for reaction temperature control included

General specifications

Dimensions	:	(L x W x H) 40 x 38 x 45 cm
Pressure	:	Up to 18 barg
Materials	:	Glass, PFA/PTFE, Perfluoroelastomer
Fluidic module size	:	6.1" x 4.9" (155 x 125 mm)
Fluidic module	:	2.7 ml internal volume
Temperature	:	- 40°C to 200°C
Flow rate	:	2 to 10 ml/min

Lab Photo Reactor Option

- Compatible with the Lab Reactor system
- Tunable LED irradiation source, with 6 different wavelengths
- LED lighting intensity higher than 100 mW/cm²
- Efficient light penetration with both sides of glass fluidic module illuminated
- Extended LED lifetime due to efficient liquid cooling
- Wireless control of wavelength selection and intensity



Continuous Stirred Tank Reactors (CSTR)

A continuous stirred tank reactor (CSTR) is a type of chemical reactor that is widely used in industrial processes to produce chemicals, pharmaceuticals, and other products. In a CSTR, reactants are continuously fed into the reactor vessel, where they are mixed and allowed to react, producing the desired products. The CSTR consists of a large tank or vessel, typically made of borosilicate glass or stainless steel, which is equipped with a stirring mechanism, such as a mechanical stirrer or an agitator, that keeps the reactants in motion and ensures that they are well-mixed. The reactants are introduced into the tank through inlet ports, and the products are continuously removed through outlet ports.

The key feature of a CSTR is its constant stirring, which ensures that the reactants are evenly distributed throughout the vessel and that the reaction proceeds at a uniform rate. This allows for precise control over the reaction conditions, such as temperature, pressure, and concentration, which can be adjusted by controlling the flow rates of the reactants and products.

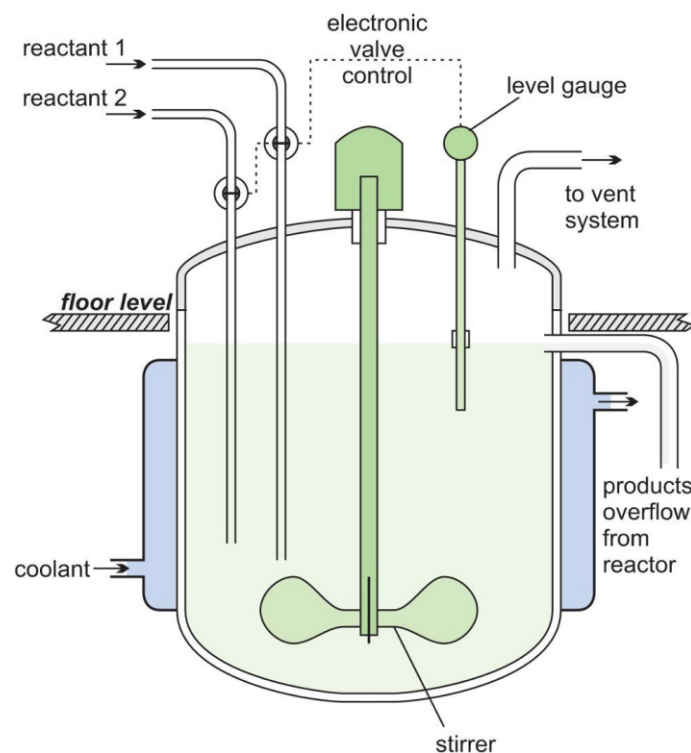
CSTRs are particularly well-suited for reactions that require high conversion rates or produce intermediate products, as the continuous mixing ensures that the reaction proceeds to completion. They are also commonly used in bioreactors for the cultivation of microorganisms, such as bacteria or yeast, which require constant stirring to ensure optimal growth and metabolic activity.

Overall, CSTRs are a versatile and reliable tool for industrial processes that require continuous, high-volume production of chemicals or other products.

In flow chemistry, a continuous stirred tank reactor (CSTR) equipped with features to continuously feed and exhaust reactants is an example of a mechanically mixed flow reactor.

General specifications

Reaction Volume	:	50 ml to 100 liters (jacketed glass vessel)
Temperature	:	-60 °C (-90 °C) to +150 °C (200 °C)
Material	:	Borosilicate glass 3.3, Stainless Steel, PTFE



Our Successful Installations...



Phosphoric Acid Extraction Pilot Plant



Borosilicate glass 3.3 Shell and Tube Heat Exchanger



Borosilicate Glass 3.3 Pipeline Components



Continuous Photo-Chlorination Unit



GLR Overhead Borosilicate Glass 3.3 Assembly



Custom Borosilicate glass 3.3 plant

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Global Antico Process Systems

Global Antico Process Systems Pvt. Ltd.

Reg. Office : A-7, Ashokvatika Society, VIP Road, Karelibaug, Vadodara - 390018, Gujarat, India.

Head Office : C-50/A, Sardar Estate, Ajwa Road, Vadodara - 390019, Gujarat, India.

Factory / Works : 277, Shah Industrial Park - 3, Kotambi, Halol Road, Gujarat, India.

E - mail : sales@globalindus.in

Contact : +91 9978239316, +91 9909662423