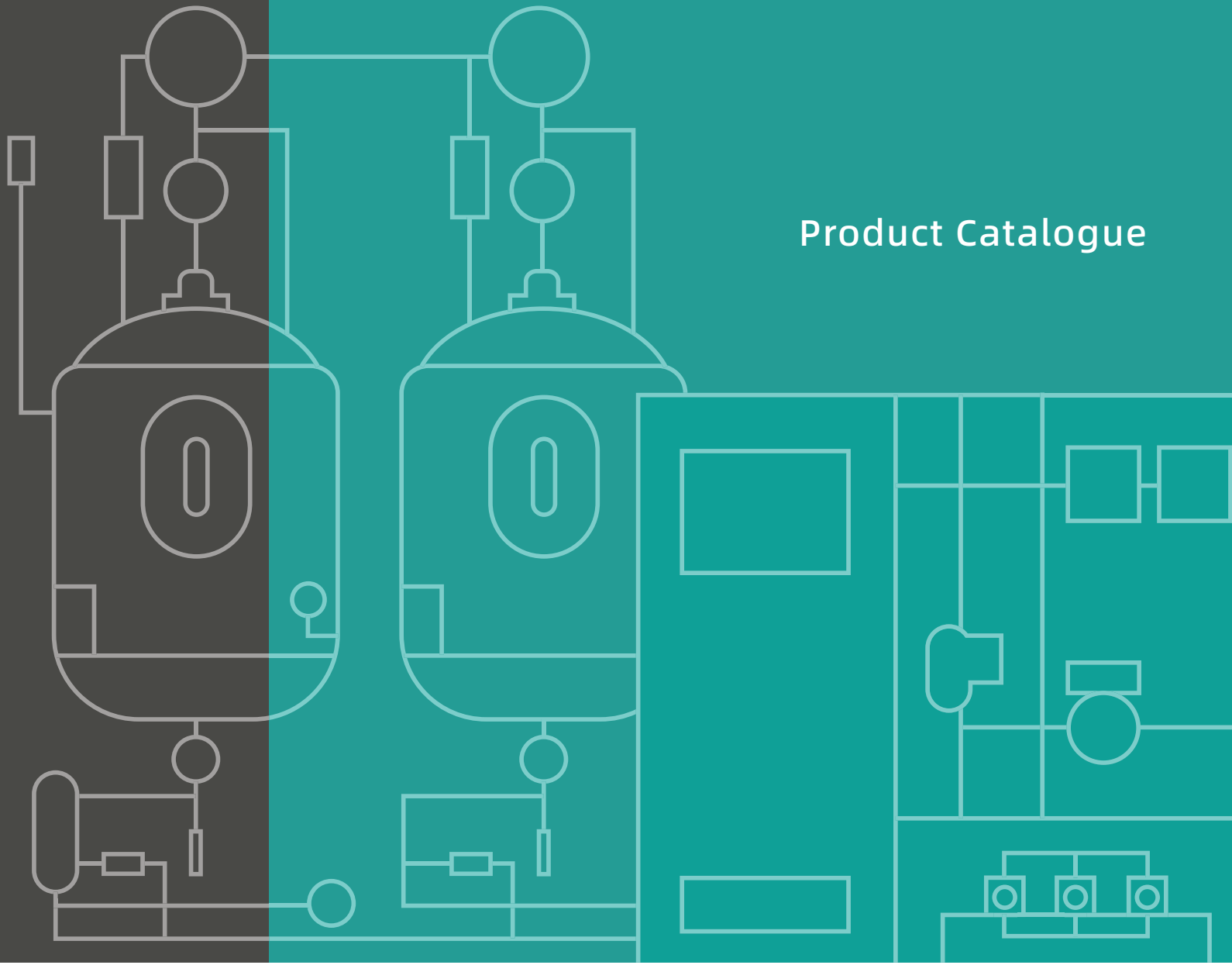
Specifications are subject to change without notice.
Lisure reserves the right of final interpretation and modification.

LISURE
PURIFICATION MADE SIMPLE.

Product Catalogue



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About Lisure

Founded in 2009, Lisure Science (Suzhou) Co., Ltd. is a Chinese national hi-tech enterprise located at Shengpu, Suzhou Industrial Park with production facilities totalling 35,000 m² and a 3,500 m² engineering design and application support center.

Lisure Science is a leading downstream processing equipment manufacturer and engineering solution provider for the biopharmaceutical industry, with a biopharmaceutical customer base of more than 1000. Our primary focus is GMP compliance equipments for biologics production processes such as process chromatography, in-line conditioning/dilution chromatography, ultrafiltration, normal filtration, depth filtration, virus removal and bulk dispensing.

Lisure provides engineering solution for automated continuous buffer preparation and management for the entire downstream processing and developing towards continuous bioprocessing and 'one-click' production. We also design and produce innovative products such as continuous chromatography system, automated ADC system and automated alkaline lysis system. With advance and precision engineering technology, technical expertise and production capacity Lisure is also the preferred OEM partner for some well-known multinational life science companies.

Product line from laboratory, pilot, to process scale

Lab system

Pilot scale system

Process scale system

Downstream Processing System and Solution

Chromatography System and Column

- Inline Conditioning Process Chromatography System/ICPC
- Continuous Buffer Management System/CBMS

UF, MF, NF, DF System

Custom Engineering System

- Continuous chromatography system
- Automated Alkaline lysis system (pDNA extraction)
- BDS Bulk dispensing system
- Antibody conjugate System

Engineering Services

DSP Conceptual and engineering design

Facility layout design

DSP Application support and process validation

DSP Engineering and automation design Pipeline Engineering Design

Other Services and Products

ASME BPE piping, SS piping and frame

Slurry tank, Circulation tank, Prep tank, Concentrate tank, Intermedia tank (WIFI, PW, buffer, pour).

Pharmaceutical pipeline engineering and installation

Welding service

We are

The leading DSP equipment manufacturer in China

Our installed base
Over 2100 process system and columns.

600+ TFF Filtration	900+ Process Columns
600+ Chromatography	140+ Inline Dilution /Conditioning

Our core competencies

- Customer focus
  Customized Solutions Capability
  Have undertaken more than 800 custom design projects.
- Modular, process, systematic
  Manufacturing Capability
  Detailed document communication and tracking system.
- Digital, information, intelligent
  Overall Solution Integration Capability
  DeltaV + WINCC + CBS + CVS + HMI + DCS + PCS7...
- Innovative
  Product Innovation Capability
  Large diameter chromatography column supplier.

Design Traceability

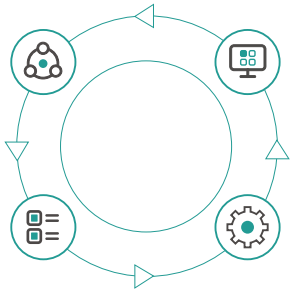
PLM

According to the latest PLM project design management software, Lisure conducts the traceability management of the design process to ensure that the design process can be traced and recorded.

Material Traceability

WMS/ERP

Warehouse system increases the traceability management of materials, ensures the traceability of each material, including materials used in customer equipment.



Customer Traceability

CRM/OA

Connect the market, sales, pre-sales, products, and after-sales business lines, collaborate efficiently across departments, establish a customer-centric business process, and form customer management traceability.

Manufacturing Process Traceability

MES

Online management of the production management process, optimization of processes, abnormal production lines, and manufacturing schedules, to meet different delivery requirements.

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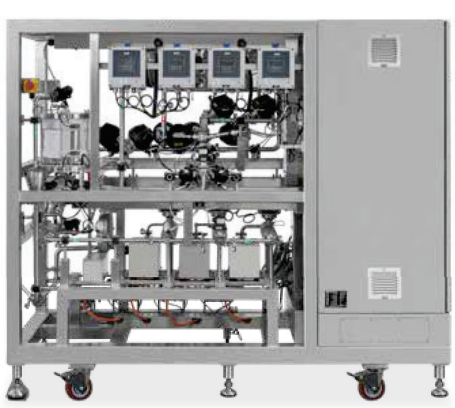
Inline Conditioning Process Chromatography System (ICPC)

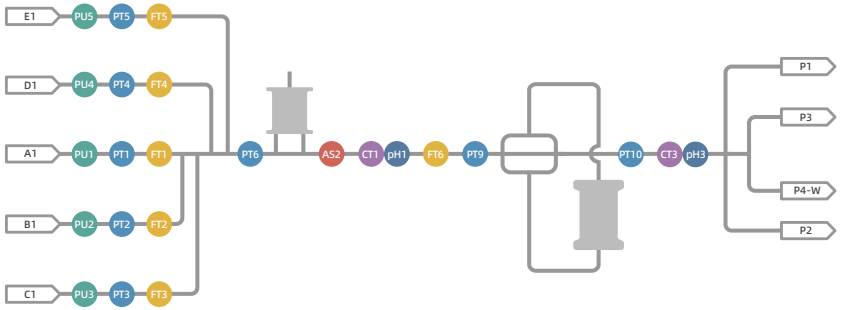
Inline conditioning chromatography systems are highly advanced technologies that has become an integral part of ensuring the safety, purity, and efficacy of biotherapeutics. These systems offer numerous advantages over traditional chromatography methods, including increased productivity, improved efficiency, and reduced operational costs. Lisure's Inline conditioning process chromatography (ICPC) systems are equipped with sophisticated sensors and controls that facilitate real-time monitoring and adjustment of critical parameters for automated preparation of buffer solutions that goes directly into the column for equilibration, loading, elution, wash and regeneration. This level of automation ensures consistent and reproducible results, minimizing batch-to-batch variability and maximizing product quality. Overall, ICPC systems represent a cutting-edge solution for the purification of biomolecules in bioprocessing. Their integration of multiple purification steps, coupled with advanced monitoring and control capabilities, significantly enhance the efficiency, productivity, and outcomes of bioprocessing operations.

Inline Conditioning Process Chromatography System (ICPC)



- Improved productivity:
  faster processing times and higher throughput, ultimately leading to increased production capacity.
- Reduced costs:
  fast buffer stabilization time making it a more economical option for large-scale production.
- Enhanced process control:
  provide real-time monitoring and control of the chromatography process. This ensures consistent product quality and minimizes the risk of product contamination or deviation from desired specifications.
- Flexibility and scalability:
  can be easily integrated into existing bioprocessing facilities, allowing for seamless scalability and flexibility. They can be adapted to various process formats, including batch, fed-batch, and continuous modes.
- Simplified operation:
  user-friendly interfaces and automation capabilities, simplifying operation, minimizes the potential for human errors, improving overall process reliability.
- Reduced footprint:
  compact designs, requiring less physical space compared to traditional chromatography setups.

Inline Conditioning Process Chromatography System (ICPC)



Flow Chart

- Available for system flow rate up to 16000 L/H
- Flow rate accuracy ±1%, conductivity accuracy ±3%, pH accuracy ±0.05 pH units.
- Support different control modes such as fixed ratio dilution and online detection signal feedback adjustment.
- On-line monitoring of multiple instruments ensuring the accuracy of buffer specifications.
- Stabalization time < 3mins as low as 15 secs.
- Dilution ratio: several fold to several tens of fold
- Custom design available
- No holding tank: qualified buffer goes into the chromatography column directly for equilibration, elution and other operations.

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Continuous Buffer Management System (CBMS)

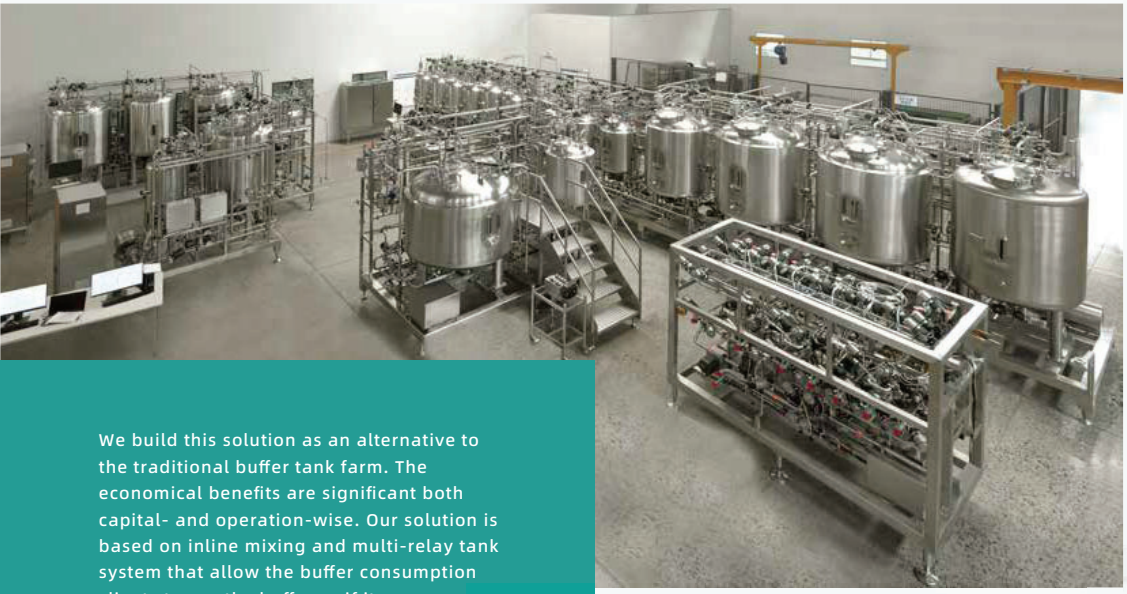
The system includes several specially designed modules that can be aligned to customer plant layout according to users' requirements.
The system is designed in accordance with ASME BPE and cGMP regulations. Besides full documentation support for qualification, the system can be delivered with a full GAMP project execution to support process validation in cGMP environment.

Traditionally, buffer preparation has been a laborious and time-consuming process involving manual mixing, weighing, and monitoring of multiple components. However, with fully automated continuous buffer management systems (CBMS) manufacturers can now achieve significant improvements in efficiency, consistency, and GMP compliance.

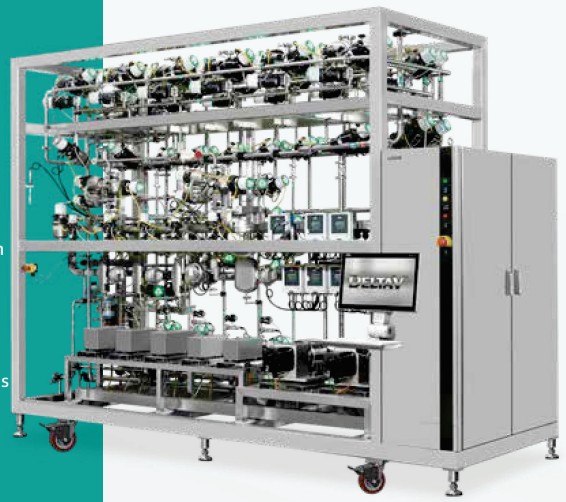
One of the key advantages of CBMS is the reduction of human error. These systems utilize advanced software and hardware technologies to precisely measure and dispense buffer components. By eliminating manual handling, the risk of inaccuracies and variations is significantly reduced, ensuring the exact composition of buffers required for downstream processes. This minimizes the potential for product variability and enhances process robustness in GMP biopharmaceutical production.

With CBMS, buffers can be prepared on-demand, precisely when needed, in the required quantities. This eliminates the need for excessive buffer storage and ensures that fresh buffers are always available. As a result, the manufacturing process can operate at optimal efficiency, reducing downtime and increasing overall productivity. Moreover CBMS offer enhanced traceability and accountability with advanced software for comprehensive documentation of buffer preparation, including precise measurements and time-stamping. This electronic recordkeeping facilitates regulatory compliance by providing a transparent and auditable history of the buffer production process.

Continuous Buffer Management System (CBMS) – Alternative to Tank Farm



We build this solution as an alternative to the traditional buffer tank farm. The economical benefits are significant both capital- and operation-wise. Our solution is based on inline mixing and multi-relay tank system that allow the buffer consumption clients to use the buffer as if it were traditional tank farm. We made it a robust system by standardizing on system design and process control. Our innovative batch approach and continuous buffer filling strategy made the solution a viable alternative to traditional tank farm. Our team have the engineering capability to design and build the system to fit to your new or existing plant. Our experts bring in decades of experience of high end pharmaceutical hardware and flow system design, and process control solution design using DCS platform and S88 batch management standard. Our project execution follows a GAMP framework from Lisure Quality System to meet our pharmaceutical customers' need for process validation.



The system is aligned according to the customer's plant layout, process train, and specific buffer type/amount required.
CBMS has been installed for production scale above 100,000 L

Computer calculates the components such as concentrates and WFI required to prepare the buffer according to pre-set formulas in the batch recipe.

Preparation of concentrate solutions is usually simple as most of them are designed as single-component solution.

Real-time inline monitoring of buffer preparation process ensures only qualified buffer goes into production process, with complete data logging capability.

Buffer preparation is based on patented flow control strategy with accurate massflow/PH/conductivity feedback with no requirement for manual sampling.

Valve proximity feedback, real-time monitoring of equipment status ensures production safety and stability.

Highly reliable industrial control platform (DeltaV), batch recipe complying with ISA88 batch operation standard, ensures the system can be easily integrated into plant DCS or MES.

- Smaller tanks
- Smaller footprint
- Less capital investment
- Lower operating cost
- Scale up to 100,000L

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Custom Engineering

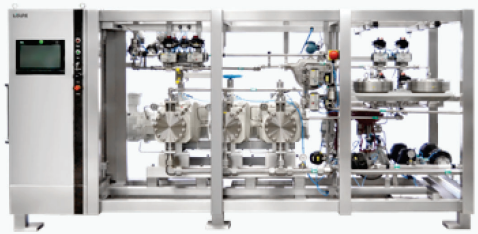
One of Lisure's strength is our technical ability in solving tough custom engineering problems and our willingness to take on such projects. Lisure's engineering team does designs for not only hardware system and equipment but also process conceptual design, facility layout, and utility design. Lisure engineering team can help our customer right from the beginning of their new plant or existing plant expansion project. Lisure engineering team is capable of and has been working in partnership with many clients as their DSP total solution provider.

Our team has the engineering capability to design and build the systems to fit to customers' new or existing plant. Our experts bring in decades of experience of high-end pharmaceutical hardware and flow system design. The systems are designed in accordance with ASME BPE and cGMP regulations with full documentation support for qualification.

Our project execution follows a GAMP framework from Lisure Quality System to meet our pharmaceutical customers' need for process validation. Our systems and control solutions were designed, built, and tested to meet the specific requirements and challenges of each project. Lisure's expertise in custom engineering allows us to provide unique solutions that meet the needs of our customers' biopharmaceutical processes.

Lisure has been always aware of the importance of providing control solutions on OEM skids that can be readily integrated into the DCS/MES system in pharmaceutical plants. As a result we are able to provide not only PLC based local control solution but also DCS based solution such as those on DeltaV and PCS7 for almost all of our systems. Lisure process control solution takes advantage of industrial popular DCS platforms and S88 batch management standard. The systems have the data integration capability generally supported by the DCS platforms. Our engineering team has also been designing S88 complying batch operation solutions for the entire downsteam processing for our customers in many of our DSP total-solution/integration projects.

Integrated Production System
DF, IC & Chromatography



Ex Explosion Proof
APPS Process

Examples of integration projectsand custom designed products.

Stainless Steel
Chromatography Column

For more information regarding custom engineering please contact:
marketing@lisure.com

Downstream Process Conceptual Design

Material balance calculation, water consumption scheduling, process equipment parameter calculation, flow chart, and etc., including the following outputs:

- Mass balance
- PFD
- Batch Schedule
- Water Consumption
- Buffer Calculation
- Control Topology
- CIP SIP Calculation
- Utility Requirement
- Equipment Specification
- Layout-EQ
- Equipment Summary
- Process PID
- EQL & Budget
- Project Scope
- URS
- FS
- Equipment LWH
- 3D Solidworks

Automatic Continuous Conjugation ADC SU system

Modular Design
Industrial -grade PLC
One -Stop Service
UV Detection
Clean & Safe Production
Online Monitoring

Lisure new ADC drug automatic continue conjugation system is used for R&D and production of ADC drugs. The single use pipeline design prevent any cross over contamination during the production process.

The software meets the compliance provisions of FDA 21 CFR Part 11.

- Modular design, which can be flexibly configured according to different process requirements.
- Industrial-grade PLC and software packing station based on PC control are with concise interface, integrated instrument control, method management, data analysis, standard curve, report editing, user authority management, audit trail, digital signature and other functions. They are in line with FDA 21 CFR, Part 11/GLP/GMP related regulations and requirements, and meet the requirements of the pharmaceutical industry for data traceability, security and other related requirements.
- One-stop service, configuration can be upgraded after installation to increase applicability and service life.
- UV detectors adopt diode array spectral detection devices and imported deuterium lamps' light source. Simultaneous display of multiple wavelength absorption values in the wavelength range of 190-700nm can be realized.
- Disposable pipeline design, no cross over contamination in the production process.
- Online automatic sampling monitoring to ensure product quality.

Automated Alkaline Lysis System (pDNA extraction) /Tubular Hold Vessel For Continuous Processing

Precise Control
Multiple Scale
Easy to Clean
Easy to Use
Efficiency Improved

The first domestically developed Automated online alkaline lysis system, which is applied to the large-scale and sanitary preparation of super coiled plasmid DNA. It solved the problem of scale-up production of Escherichia coli alkali lysis, and improved the plasmid recovery rate greatly while maintaining the plasmid configuration.

- Precise control
  Precise control of various indexes such as buffer exchange, PH control, shear force control and lysis time during the lysis process.
- Multiple scale
  One machine for multiple use, suitable for different fermentation scales, to meet the use of pilot and process production.
- Easy to clean
  One-button CIP function, easy to clean.
- Easy to use
  The equipment has strong durability, suitable for long-term stable operation and low maintenance cost.
- Efficiency improved
  Seamlessly connect the front-end HF washing process and the back-end clarification and filtration, without manual intervention.

Bulk Filling System (BFS)

High Dispensing Efficiency | Aseptic Packaging | Automation

- High dispensing efficiency:
  It takes only 2 min to finish dispensing 12L freeze-thaw bag , with dispensing accuracy ±50g. It can finish dispensing more than 1500L within 8 hours.
- Aseptic packaging:
  A customized 3D disposable pipeline is adopted, and with modular design to make it removable; Freeze-thaw bags and pipeline interfaces are equipped with sterile joints; Ultrasonic flowmeter; disposable pressure sensor probe; High precision peristaltic pump; The material/buffer inlet adopts CPC connector; Customized freeze-thaw bag transporter to save labor cost.
- Automation:
  Process-level software with data logging, authority classification, electronic signatures and phase editing function;
  Personnel only need to transport the freeze-thaw bag into the freezer, connect the freeze-thaw bags, and it can be operated by one person only.

Continuous Chromatography System

Process time saving | Suit for high bed packing | Operation model adjustable | Inlet/Outlet valve SIP | One key production

Compact Valve Design

4C Continuous Chromatography System is a brand new type of chromatography system with design and features that offers superior separation performance compared to traditional batch techniques:

- Continuous flow: Continuous flow of sample through the column. Ensures even distribution of sample and a higher utilization of the stationary phase.
- Higher throughput: A larger amount of sample can be processed per unit time, increasing the overall productivity
- Smaller column size: 4C operate at higher flow rates, which leads to faster separations and smaller columns
- Better efficiency: Due to the higher utilization of the stationary phase. as the sample flows through the entire length of the column use up to 4 Lab specification columns, control function through the system, each column can be switched in the steps of loading/elution/washing/regeneration at the same time.
- Superior automation and control features - provide robust process control during critical downstream step
- Automated svstems can precisely control critical parameters, leading to reproducible and optimized separations. Control inreal-time allows for better control over the separation process and improved separation performance.
- Small system footprint : Switch functions are realized by a specially designed compact block valve containing 26 intergated valves
- Custom-designed Process scale 4C Continuous Chromatography available on request

Multi-column Chromatography System

Time saving

High utilization rate

Flexible use

Small dead volume

Powerful modular design

MCPC chromatography system is a specialized chromatography system, used in gel filtration chromatography, when the packing height exceeds 50cm or more of the chromatography column.

- The system is designed to drastically reduce pre-elution and post-elution processing times for gel filtration chromatography media.
- The system uses two combinable systems to select different automatic programs for separate and combined operations during elution/sample loading/processing.
- The system is designed to provide robust process control during this critical downstream step.
- Use up to 3 columns of production specifications, control function through the system, each column can be switched in the steps of loading/elution/washing/regeneration at the same time
- It supports multiple chromatographic columns to load samples in series, which greatly increases the sample load of the chromatographic packing and improves the utilization efficiency of the packing.
- Human-machine interface (HMI) commands to record key process parameters.
- The program of the system software realizes the continuity of the sample loading step through the automatic program control, such as the UV value target.

Chromatography System

Lisure chromatography systems are carefully configured to provide the best operability for the users. Lisure chromatography systems range from low pressure, medium pressure, to high pressure systems and include custom engineering system such as continuous flow system, explosion-proof system, multiple columns serial-parallel system, automated buffer prep system, etc.

Benchtop Pilot Chromatography System
APPS Pilot

Reliable Performance

Valve Group Optional

Automatic Control

Online Monitoring

Signal Optimal

Flexible and Convenient

The APPS Pilot chromatography system is suitable for lab-scale product development, pilot-scale scale-up research, and small-scale GMP-level production and purification. This chromatography system adopts a humanized design concept and provides an integrated, modular, and standardized system. It can run automatically and stably to achieve processes such as equilibrium, sample loading, elution/gradient elution, collection, cleaning and regeneration. Various instruments and valves have excellent performance, follow hygienic design, and have regular and compact structures.

- Strong performance, easy operation and high efficiency.
- High-performance hygienic diaphragm pump, complying with GMP
- requirements.
  High-precision ultrasonic flow meter,
- capable of constant flow control.
  Patented hard tube quick connector for
- easy connection.
  The specially designed solenoid block valve can realize multiple functions and
- comply with GMP requirements.
  The specially designed solenoid block valve can realize multiple functions and comply with GMP requirements.

Specification

Footprint	815 x 700 x 890mm
Weight	90 Kg
Pipe Size	3/16"OD, 1/8"ID
Working Pressure	0~6 bar
Working Temperature	2~40℃
Working Humidity	5%~95%
Power Supply	220V, Single phase three wire electricity
Protection Class	IP33
System Pump	A/B diaphragm pump
	Flow rate range: 10 ~600 mL/min
	Pressure resistance: 0~6 bar

Ultrasonic Flow Meter	Flow rate accuracy: ±1%
UV Detector:	Range: -5AU~5AU, in 0~2AU, linear accuracy is ±2%;
Multi-wavelength detection	Wavelength range: 200~400nm;
	Optical path: 2mm;
	Wavelength accuracy: ±2nm
	Noise: 1.5×10-5AU
	Optional LED light source, service life >8000 hours
pH Detector	0~14, within range 2-12, accuracy ±0.1
Pressure Detector	0-6 bar, accuracy±0.1bar
Column Position Valve	Single/double optional, double columns in series, intelligent column loading function
Inlet	Max. inlet 12 pcs, A1~A6, B1~B6
Outlet	Max. outlet 6 pcs, P1~P6
Software System	CBS 1.2.0
Control System	PLC 1500, benchtop PC

Low Pressure Pilot-Scale Automated Chromatography System

Flexible

Reliable

Configurable

Automated

Real time monitoring

- Movable chassis, frame, skid design.
- High-precision membrane pump, minimized pulsation, reliable performance over long-time operation.
- Options for Pneumatic or electric valves.
- 200-400nm UV Spectral monitor with adjustable optical path length, supporting multi-wavelength simultaneous monitoring.
- Fully automated using industrial control software such as DeltaV and WinCC.
- Sample concentration, so that the UV detection signal can reach the optimal level.

Specification

Recommended flow rate range	0.6-48 L/H	Pipe Material	316L Stainless Steel
Footprint	650*1350mm	Pump Head Material	316L Stainless Steel
Height	1150mm	Pressure Rating	0-6 bar
Weight	300kg	pH Detection Range	0-14
Pipe Size	1/4 inch	Conductivity Detection Range	0.01-300ms/cm
Pneumatic supply	8mm, 5-7bar, No oil or particles	Flow Rate Accuracy	1.00%
Power Supply	220V, single-phase three-wire	Protection Class	IP54

Single-Use Chromatography System

Compatibility

Sanitary piping and probe

High low flow kit

Quick installation

- Wide range of flow rates, the two sequences of systems cover the flow rate range from 4l/h-2000l/h, and the pipeline kit includes 1/4 inch, 1/2 inch, 3/4 inch, 1 inch. Allow customers to choose the best pipeline within the recommended range, the maximum operating pressure can reach 4Bar
- Optional gradient kit, supports gradient elution and online dilution
- Easy to install, the pipe can be snapped into the slot directly
- Inlet pump with slide rail design, convenient and quick installation/removal of pump tube
- Optional valve status detection sensor
- Special finishes available, 304 or 316L stainless steel
- Pinch valves are calibrated for clamping force, clamping clearance and stroke to ensure optimum performance
- Configure APPS CBS software, comply with FDA 21 part11 requirements, and provide complete verification documents. In addition, Emerson Delta V operating software is optional, supporting DCS database merging
- Disposable flow path: Single-Use, ready-to-use and disposable, which can meet the purification of difficult-to-clean products and avoid cleaning validation challenges; Flow path standard design, produced in a C-level workshop, provides a sterile irradiated version, which can guarantee immediate Disassemble and use; Easy to install, support quick installation or disassembly, reduce preparation or cleaning time between batches; supported by complete verification documents, in line with GMP/EP/USP and other regulatory requirements.

Low Pressure Process-Scale Automated Chromatography System

Hygienic Design

cGMP Compliant

Reliable

Multiple Control Platform Available

Highly Configurable

APPS Process chromatography system is designed for large-scale production process of biological products. The system design of APPS Process complies with ASME BPE and cGMP standards. The system is integrated, modular, and standardized with various configurations that meet different requirements from our users.

The system can be run automatically to achieve typical process steps of chromatography such as equilibrium, sample injection, wash, elution, collection, cleaning, regeneration, etc.

System documentation is available to fully support qualification and validation for cGMP regulated customers.

- APPS Process includes a series of models that cover a wide range of flow rates and specifications to meet the process requirements of customers.
- Components are supplied by internationally renowned manufacturers. They are identical or comparable to the best on the market.
- Hygienic design complying with ASME BPE and cGMP requirements.
- Multiple control platform available: Emerson DeltaV, Siemens WinCC, CBS software developed based on Labwindows, fully complying with FDA 21 CFR Part 11 requirements.
- Userfriendly interface: simple, stable, and easy to operate.
- Full documentation support for qualification and validation for cGMP regulated customers.

Specification

Product Number (Item Number)	Recommended Flow Rate Range (L/H)	Max Flow Rate (L/H)	L*W*H (mm)	Piping Size (inch)	Power Supply	Weight (kg)
APPS Process DN8	3-60	72	1250*650*1770	1/4	220V,single-phase	300
APPS Process DN10	6-150	180	1450*650*1770	3/8	220V,single-phase	300
APPS Process DN15	16-600	800	1460*650*1770	1/2	220V,single-phase	350
APPS Process DN20	24-1000	1200	1460*650*1770	3/4	220V,single-phase	400
APPS Process DN25	150-2000	3300	1700*1030*1770	1	380V,three phase five wire.	500
APPS Process DN40	500-5000	10000	3150*1400*2150	1.5	380V,three phase five wire.	600
APPS Process DN50	800-16000	20000	3150*1400*2150	2	380V,three phase five wire.	650

All APPS Process has:

Protection level:	IP55	Pneumatic supply:	8mm, 5-7 bar
Piping /Pump head material:	316L stainless steel	PH Detection range:	0-14
Pressure rating:	6 bar	UV Detection:	200-400nm
Flow rate accuracy:	1.00%	Bubble trap:	Compact Design
Conductivity detection range:	0.01-300ms/cm		

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Chromatography Column

Lisure chromatography columns include following models: GCC, SAC, EAC, DAC and ABH. These models of columns meet the needs from lab scale process development, to pilot scale development, to full scale commercial production. The inner diameters of the columns range from 15mm to 2000mm. Custom made columns are also available.

Electrical Motor Driven Axial Compression Columns (EAC-Bio)

- Designed for cGMP production. Contact Materials comply with FDA/USP Class VI requirements.
- Hygienic design, Clean-in-place.
- Applicable to many different resins.
- Patented distribute plate design ensuring even flow distribution through the column.
- Transparent acrylic column tube, with rotatable design to make column cleaning and maintenance convenient.
- Reproducible packing operated from the packing station.
- IQ/OQ documentation support customization provided.
- Packing station included.

Specification

Product Number (Item Number)	Inner Diameter (mm)	Column Height (mm)	Packing Height (mm)	Bed Volume (L)	Pipe Size	Power Supply	Footprint (mm)	Weight (kg)
EAC-Bio 300-700	300	700	10-570	0.7-40.3	DN10	100-400V	500*1100	230
EAC-Bio 300-900	300	900	10-770	0.7-54.4	DN10	100-400V	500*1100	250
EAC-Bio 400-700	400	700	10-570	1.2-71.6	DN10	100-400V	600*1050	400
EAC-Bio 400-900	400	900	10-770	1.2-96.7	DN10	100-400V	600*1050	425
EAC-Bio 400-1100	400	1100	10-970	1.2-121.8	DN10	100-400V	600*1050	450
EAC-Bio 450-700	450	700	10-570	1.6-90.6	DN10	100-400V	630*1310	450
EAC-Bio 450-900	450	900	10-770	1.6-122.4	DN10	100-400V	630*1310	490
EAC-Bio 450-1100	450	1100	10-970	1.6-154.2	DN10	100-400V	630*1310	530
EAC-Bio 600-700	600	700	10-570	2.8-161.1	DN15	100-400V	840*1460	1000
EAC-Bio 600-900	600	900	10-770	2.8-217.6	DN15	100-400V	840*1460	1200
EAC-Bio 600-1100	600	1100	10-970	2.8-274.1	DN15	100-400V	840*1460	1400
EAC-Bio 800-700	800	700	10-570	5-286.4	DN20	100-400V	1040*1600	1600
EAC-Bio 800-900	800	900	10-770	5-386.8	DN20	100-400V	1040*1600	1800
EAC-Bio 1000-700	1000	700	10-570	7.9-447.5	DN25	100-400V	1240*1800	2800
EAC-Bio 1200-700	1200	700	10-560	11.3-633	DN25	100-400V	1520*2000	4300
EAC-Bio 1400-700	1400	700	10-550	15.4-846.2	DN40	100-400V	1740*2200	7000
EAC-Bio 1600-700	1600	700	10-550	20-1105.3	DN50	100-400V	1990*2400	9350
EAC-Bio 2000-700	2000	700	10-550	31.4-1727	DN50	100-400V	2480*3000	16000

All EAC-Bio columns have the following specifications:

Column Material: Acrylic (316L optional)

Pressure Rating: 4 bar

Power Supply: Instrument compressed air, 5- 7 bar, 50NL/min

Pack-in-Place Chromatography Column (ABH-Bio)

- Designed for cGMP production, Contact materials fully comply with regulatory requirements.
- Hygienic design, no dead space.
- Good compatibility widely applicable for different resins.
- Patented distribute plate design ensuring even flow distribution through the column.
- Pack in place operated from the packing station.
- IQ /OQ documentation support.

Specification

Product Number (Item Number)	Inner Diameter (mm)	Bed Volume (L)	Pipeline Size	Power Supply	Footprint (mm)	Weight (kg)
ABH-Bio-450-500	450	15.9-63.6	DN10	Instrument compressed air, 5-7 bar,1000NL/min	605*650	250
ABH-Bio-600-500	600	28.3-113	DN15	Instrument compressed air, 5-7 bar,1000NL/min	825*900	480
ABH-Bio-800-500	800	50.2-201	DN20	Instrument compressed air, 5-7 bar,1000NL/min	1100*1150	1000
ABH-Bio-1000-500	1000	78.5-314	DN25	Instrument compressed air, 5-7 bar,1000NL/min	1200*1240	1400

The following specifications apply to ABH Bio series:

Column Tube Material:	Acrylic/316L optional	Bed Height:	100-400mm (Optional 250-600mm)
Column Height:	500mm (Optional 350-700mm)	Pressure Rating:	4 bar

Manual Screw Driven Axial Compression Column (SAC-Bio)

- Materials meeting the requirements for biopharmaceutical production processes.
- Movable top adapter.
- Easy to operate, easy to maintain, net pore size: 20μm (10μm optional).
- Hygienic design complying with cGMP requirements.

Specification

Product Number (Item Number)	Column Material	Inner Diameter (mm)	Column Height (mm)	Packing Height (mm)	Bed Volume (L)	Press ure Resistance (bar)	Pipeline Size	Footprint (mm)	Weight (kg)
SAC72-650	Glass	72	650	150-500	0.61-2	7	DN8	620*620	13
SAC100-500	Glass	102	500	0-350	0-2.8	7	DN8	620*620	18
SAC100-750	Glass	102	750	200-600	1.6-4.9	7	DN8	620*620	20
SAC100-950	Glass	102	950	400-800	3.2-6.5	7	DN8	620*620	21
SAC150-500	Glass	152	500	0-350	0-6.3	5	DN10	620*620	30
SAC150-750	Glass	152	750	200-600	3.6-10.8	5	DN10	620*620	33
SAC150-950	Glass	152	950	400-800	7.2-14.4	5	DN10	620*620	35
SAC200-500	Glass	197	500	0-350	0-10.6	5	DN10	700*700	36
SAC200-750	Glass	197	750	200-600	6.1-18.3	5	DN10	700*700	39
SAC200-950	Glass	197	950	400-800	12.2-24.4	5	DN10	700*700	42
SAC300-500	Glass	297	500	0-350	0-24.2	3	DN10	700*700	58
SAC300-750	Glass	297	750	200-600	13.8-41.4	3	DN10	700*700	63
SAC300-950	Glass	297	950	400-800	27.6-55.2	3	DN10	700*700	67
SAC450-500	Acrylic	450	500	0-350	0-55.6	3	DN10	780*780	230
SAC450-750	Acrylic	450	750	200-600	31.8-95.4	3	DN10	780*780	250
SAC450-950	Acrylic	450	950	400-800	63.6-127.2	3	DN10	780*780	270

*Customized packing height & bed volume are available upon request.

Lab-scale chromatography column (GCC)

Glass Column Tube | Easy To Assemble & Disassemble | Rotatable Column head | Multiple Models

- Glass column tube, column position clearly visible Stigma lock design, easy to disassemble and assemble, easy to clean.
- The rotatable column head can move the screw shaft axially for packing compression.
- A variety of models with different diameters and heights are available.

Lock Design,
Easy to disassemble

Specification

Name	Inner Diameter (mm)	Tube Height (mm)	Packing Volume (ml)
GCC 15series	15	200/400/600/800/1000	0-25/32-60/67-95/102-131/138-166
GCC 25series	25	200/400/600/800/1000	0-69/88-167/187-265/285-363/383-461
GCC 40series	40	200/400/600/800/1000	0-214/251-465/503-716/754-968/1005-1219
GCC 50series	50	200/400/600/800/1000	0-334/393-726/785-1119/1178-1512/1571-1904

The following specifications apply to GCC series:

Max. Operation pressure (MPa/bar): 0.7 | 7

Chromatography Accessories

Sample BigLoop

- Designed for large volume of repeated sample injection in lab-scale chromatography systems.
- No contamination of samples through Internal dynamic seal structure.
- Compatible with 1/16 connector and 1/8 connector.
- 10bar Max. operating pressure.

Three specifications are available:

10mL	50mL	150mL
Bigloo10	Bigloop50	Bigloop150

PURIFICATION MADE SIMPLE.

High Pressure Chromatography System & Column

LIPERLA/LIPERCS Preparative HPLC Chromatography System

From development to commercial phase, LIPERLA/LIPERCS Preparative HPLC Chromatography Systems are modular, compact and ergonomic systems designed for the purification of peptides, oligonucleotides, insulin and other small molecules.

- High Gradient Accuracy: The gradient has high precision and strong stability, saving time and solvent.
- Stable & Efficient: Higher separation efficiency and product yield
- Widely Use: With a wide range of system flow rates, pilot and production systems can cover DAC100~DAC1200 columns
- Safe & Reliable: The system is safe and reliable, and the LIPERCS series supports TUV ATEX explosion-proof certification.
- Multi-platform Software: The LIPERCS series software complies with the requirements of ISA88, GAMP, and FDA 21 Part11, and is optionally based on the DCS & Batch automation platform.
- Complete Verification: Complete verification services (FAT/SAT/ IQ/OQ).

Specification

HPLC	Model	Flow Rate	Operating Pressure	Ex-proof Class	Compatible Column
LIPERCS	LIPERCS DN08	6-180L/h	100bar	ATEX II-Class Division2	DAC100/150/200
	LIPERCS DN10	90-200L/h	100bar	ATEX II-Class Division2	DAC150/200/300
	LIPERCS DN15	150-500L/h	100bar	ATEX II-Class Division2	DAC200/300/450
	LIPERCS DN20	300-1000L/h	100bar	ATEX II-Class Division2	DAC300/450/600
	LIPERCS DN25	500-2500L/h	70bar	ATEX II-Class Division2	DAC800/1000/1200
LIPERLA	LIPERLA 100	100ml/min	100bar	0-3AU	DAC50
	LIPERLA 300	300ml/min	100bar	0-3AU	DAC50/80/100
	LIPERLA 600	600ml/min	100bar	0-3AU	DAC80/100/150
	LIPERLA 1000	1000ml/min	100bar	0-3AU	DAC150/200

* All LIPERCS & LIPERLA series systems are gradient system(PCV).

Dynamic Compression Column with precision control

Columns are the core of industrial buffer preparation chromatography separations. During the operation of DAC, the piston can provide continuous pressure to ensure the density and stability of the packed column bed, so as to maintain the best separation effect for a long time. The column efficiency and service life are much higher than that of conventional chromatographic columns.

- Using advanced structure design, simple appearance, flexible and convenient operation.
- Using precision mechanical polishing technology to minimize the tube wall effect during packing and using.
- High column efficiency and good asymmetry: For 10μm C18 packing material, the column efficiency can reach more than 40000N/m, and the asymmetry can be 0.9-1.2.
- Customized design services for products with special requirements is provided.

Specification

Product Number	Inner Diameter (mm)	Length (mm)	Packing Height (mm)	Pressure Resistance (MPA)	Column Tube Wall Roughness	Net Pore Size
DAC50	50	700	≤400	10	≤0.2μm	2μm
DAC80	80	700	≤400	10	≤0.2μm	2μm
DAC100	100	700	≤400	10	≤0.2μm	2μm
DAC150	150	700	≤400	10	≤0.2μm	2μm
DAC200	200	700	≤400	10	≤0.2μm	2μm
DAC300	300	700	≤400	10	≤0.2μm	2μm
DAC450	450	700	≤400	10	≤0.2μm	2μm
DAC600	600	700	≤400	10	≤0.2μm	2μm
DAC800	800	700	≤400	10	≤0.2μm	2μm
DAC1000	1000	700	≤400	10	≤0.2μm	2μm
DAC1200	1200	700	≤400	10	≤0.2μm	2μm

PURIFICATION MADE SIMPLE.

Filtration System and Cassette Holder

Lisure has also been specialized in building filtration systems for both TFF and depth filtration. The systems were used in micro filtration, ultra filtration (TFF), and Nano filtration (Viral Filtration). Lisure built systems for both hollow filber cartridge and cassette membrane. The largest system built has a membrane area of 300m² and flow rate of 60,000L/hr.

Fully Automated Ultrafiltration TFF System

Flexible Configuration

Multiple Control Modes

Multiple Control Platforms

Inline Integrity Test

Water Flux Test

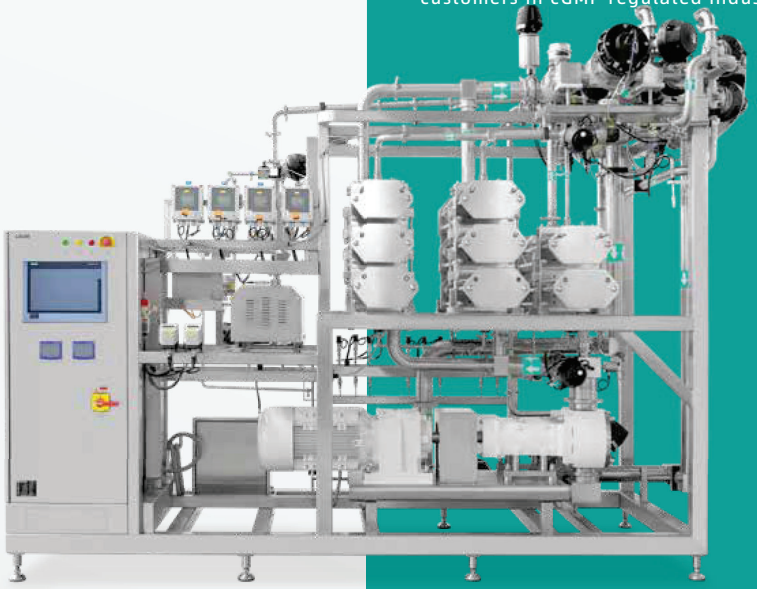
Custom Design Available

Fully automatic ultrafiltration TFF systems are designed for downstream separation and purification processes of biopharmaceuticals.

The systems can be used for concentration of buffer exchange/diafiltration in Ultrafiltration or clarification of unwanted large particles and cells in microfiltration. Our systems can be built for either cassette or hollow fiber membrane.

The systems are suitable for biopharmaceutical production at different scales and development stages, covering lab, pilot, to production scale.

The systems can be customized according to user requirements and GAMP project execution for delivery is available for customers in cGMP regulated industry.



- The filtration type can be selected flexibly according to different processes, which can adapt to the different kind of hollow fiber cartridge and flat membrane cassette, to realize ultrafiltration, concentration, buffer exchange or clarification microfiltration process.
- The control strategy includes various control modes such as constant TMP, constant Fr, constant △P and fixed pump speed, covering the need for most ultrafiltration processes. Other special control strategy can be customized.
- Ultrafiltration software can be based on different platforms, such as DCS (Delta V or PCS 7) or PLC control (WinCC or Lab Windows). All control platforms meet the requirements of FDA 21 CFR Part 11 electronic signature, electronic record and audit trail requirements.
- The system includes an inline integrity test module, which can complete the integrity test without disassembling the membrane cassettes/cartridge, based on brands, models, and membrane areas. Test result can be saved in the batch report.
- The system can perform inline water flux test function, and save the result in the batch report.
- The system can be fully customized according to the plant layout and the process train to meet the customer's need.

Membrane Area:

0.1–0.5m² 0.5–3m² 0.5–5m² 5–20m² 20-40m² 40-60m² up to 300m²

Depth Filtration System

Low Shear Force | Flux Maximum | Reasonable Structure | High Efficiency

DFS depth filtration system is a stainless steel automatic filtration system, used in upstream or downstream production areas, for the removal of particulate matter and impurities in intermediate products.

- The system is designed to provide robust process control during the clarification/harvest step.
- Automate pre-use water rinses, product filtration and buffer rinses
- Using standard Filter or Housing, the maximum operating flow rate of the system can reach 15000L/Hr
- The system is designed to have a fully automated process, and recipe controlled steps. System start-up, product filtration and buffer tracking, all data is stored in a batch reporting system, significantly reducing the risk of disqualification and labor work.
- Human-machine interface (HMI) commands to record key process parameters.
- The system has automatic CIP function, which reduces the manual operation required for cleaning.

Virus Removal Filtration System

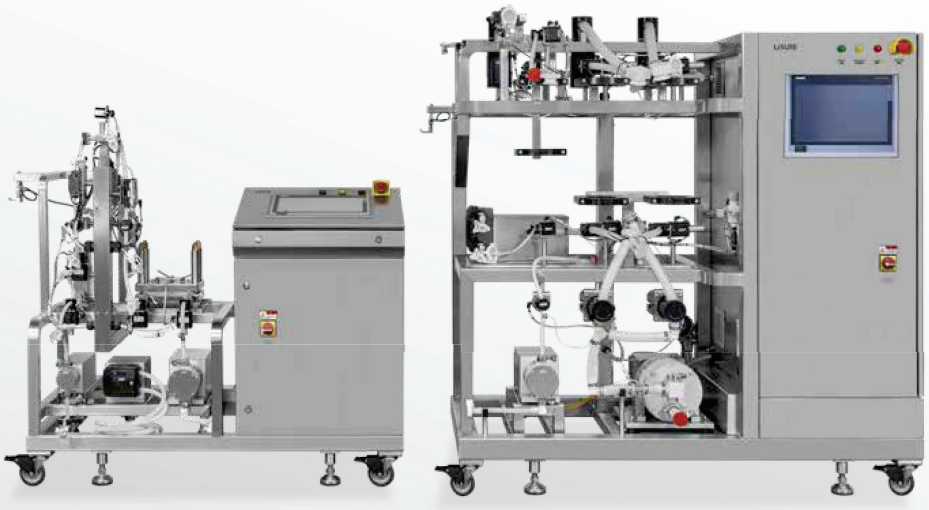
Low Shear Force | Flux Maximum | Reasonable Structure | High Efficiency

The VFS Virus Filtration System is a stainless steel automatic filtration system used in downstream production areas for virus removal from the final product.

- The system is designed to provide robust process control during this critical downstream step.
- Using standard Filter or Housing, the maximum operating flow rate of the system can reach 15000L/Hr
- The system is designed to have a fully automated process through recipe controlled steps including system start-up, ΔP values of product and filter, filtrate buffer tracking.
- All data is stored in a batch reporting system, significantly reducing disqualification and labor work.
- Configurable recipe control stages that automate pre-use system equilibration, product filtration and buffer flushing.
- To keep process parameters within limits, the process selects control functions such as flow rate, differential pressure and inlet pressure.
- Flexible configuration, compatible with all commonly used virus filters.
- Human-machine interface (HMI) commands to record key process parameters.
- The system has automatic CIP function, which reduces the manual operation required for cleaning.

Single-Use Ultrafiltration System

- Four specifications are optional: 0.5m2, 5m2, 10m2, 20m2
- Circulating pump:peristaltic pump and disposable PP diaphragm pump head are optional
- Clamping holder PP material
- Disposable consumables, sterilization by Radiation
- Supporting integration with mixer



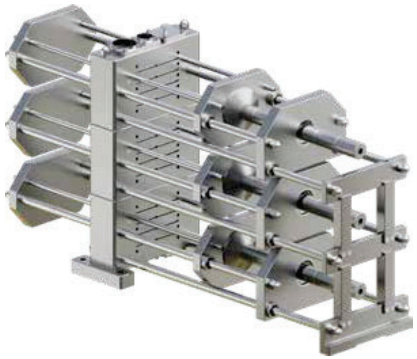
TFF Cassette Holder

- Specifications: 0.1-0.5㎡, 0.5-3㎡, 0.5-㎡-5㎡, 5-20㎡, 20-40㎡, 30-60㎡, 40-80㎡ and other holders covering the needfrom R&D to commercial production. Through combining the holders, 200㎡ of cassette membrane can be achieved.
- Compatible with most membrane cassettes such as those from PALL, Sartorius, Millipore, TangenX, etc.
- Surface roughness, Ra≤0.4μm.
- The holders can be manual or hydraulic driven.

Manual 5㎡

Manual 20㎡

Hydraulic Driven 20㎡



Hydraulic Driven 60㎡

PURIFICATION MADE SIMPLE.

Tanks and vessels

HPHS Hygienic Slurry Tank

Effiient | Gentle Mixing | Low Shear Force | 316L Stainless Steel

- Designed for media slurry storage, buffer exchange of the media, and stirring of the slurry during column packing of large-scale chromatography.
- Movable skid design for easy use and maintenance.
- Low shear gentle stirring to ensure uniform resin slurry.
  Tank material: 316L stainless steel.
- Sizes up to 5,000L.

Hold Tanks / CIP

- Tank bodies are manufactured LIK (Lisure's subsidiary company), which is traceable.
- With pressure vessel manufacture qualification, ASME BPE qualification.
- Buffer holding capability 50-20000L/h.
- Material: 316L/904/titanium are optional.
- Control platform: WinCC/DeltaV/PCS 7 are optional.
- Sizes up to 20,000L.