cytiva

ÄKTAcrossflow

Operating Instructions

Original instructions
Translation disc included



cytiva.com

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1 Introduction

About this chapter

This chapter contains important user information, descriptions of safety notices, regulatory information, intended use of the ÄKTAcrossflow™ system, and lists of associated documentation.

In this chapter

Section		See page
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1.2	Important user information	6
1.3	Associated documentation	8
1.4	Abbreviations	10

1.1 About this manual

Purpose of this manual

The *Operating Instructions* provide you with the information needed to install, operate, and maintain the product in a safe way.

Scope of this manual

The *Operating Instructions* cover the ÄKTAcrossflow instrument, operated with UNICORN™ software versions 7.2 and above. The illustration below shows the ÄKTAcrossflow system.



Typographical conventions

Software items are identified in the text by ***bold italic*** text.

Hardware items are identified in the text by **bold** text.

In electronic format, references in *italics* are clickable hyperlinks.

1.2 Important user information

Read this before operating the product



All users must read the entire *Operating Instructions* before installing, operating or maintaining the product.

Always keep the *Operating Instructions* at hand when operating the product.

Do not operate the product in any other way than described in the user documentation. If you do, you may be exposed to hazards that can lead to personal injury and you may cause damage to the equipment.

Intended use of the product

The ÄKTAcrossflow is a fully automated system for crossflow filtration (CFF) also known as tangential flow filtration (TFF), and uses flat sheet or hollow fiber membranes to separate components in a liquid solution or suspension based on their difference in size.

The system is designed for process development and optimization of ultrafiltration/diafiltration (UF/DF) and microfiltration (MF) unit operations.

ÄKTAcrossflow is intended for research use only, and must not be used in any clinical procedures, or for diagnostic purposes.

Prerequisites

In order to operate the ÄKTAcrossflow in the way it is intended:

- The user must have a general understanding of how a PC and the Microsoft® Windows® operating system works.
- The user must understand the concepts of crossflow filtration.
- The user must read and understand the *Safety instructions* chapter in the *Operating Instructions*.
- ÄKTAcrossflow and UNICORN software must be installed, configured and calibrated according to the *Operating Instructions*.

Safety notices

This user documentation contains safety notices (WARNING, CAUTION, and NOTICE) concerning the safe use of the product. See definitions below.



WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury. It is important not to proceed until all stated conditions are met and clearly understood.



CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. It is important not to proceed until all stated conditions are met and clearly understood.



NOTICE

NOTICE indicates instructions that must be followed to avoid damage to the product or other equipment.

Notes and tips

Note: *A note is used to indicate information that is important for trouble-free and optimal use of the product.*

Tip: *A tip contains useful information that can improve or optimize your procedures.*

1.3 Associated documentation

Introduction

This section describes the user documentation that is delivered with the product, and how to find related literature that can be downloaded or ordered from Cytiva.

System-specific documentation

The user documentation listed in the table below is available on the web in PDF format.

Documentation	Main contents
ÄKTAcrossflow Operating Instructions (29348113)	Instructions needed to install, operate, and maintain the ÄKTAcrossflow in a safe way.
ÄKTAcrossflow User Manual (29360935)	Overview and detailed descriptions of the system control software designed for the ÄKTAcrossflow. The manual covers the ***System control*** module, the ***Method editor***, and the ***Evaluation*** module.
ÄKTAcrossflow Site Preparation Guide (29139659)	Gives the information needed to fully prepare your site for the installation and testing of the system.
ÄKTAcrossflow Installation Test Guide (11001235)	Gives information on how to install the ÄKTAcrossflow and run the installation test.
ÄKTAcrossflow Method Handbook (11001236)	Provides descriptions of ÄKTAcrossflow processes and UNICORN methods.

Note: *For systems operated with UNICORN 5, refer to the following alternative manuals:*

- *ÄKTAcrossflow Operating Instructions (28959793)*
- *ÄKTAcrossflow User Manual (11001232)*

Software documentation

Together with each system, the following software documentation is supplied providing additional information that applies to the ÄKTAcrossflow, independent of the specific configuration:

Documentation	Main contents
UNICORN manual package	• The manuals contain detailed instructions on how to administer UNICORN, work with methods, perform runs and evaluate results. • The Online help contains dialog descriptions for UNICORN. The Online help is accessed from the ***Help*** menu.

Data files, application notes and user documentation on the web

To order or download data files, application notes or user documentation, see the instruction below.

Step	Action
1	Go to *cytiva.com*.
2	Click ***ÄKTAcrossflow tangential flow filtration system***.
3	Click ***RELATED DOCUMENTS***.
4	Select to download the chosen literature.

1.4 Abbreviations

Abbreviations

Abbreviation	Definition	Translation
CU	control unit	control unit
CFF	crossflow filtration	crossflow filtration
TFF	tangential flow filtration	tangential flow filtration
DF	diafiltration	diafiltration
MF	microfiltration	microfiltration
UF	ultrafiltration	ultrafiltration
UV	ultraviolet	ultraviolet
R-PCV	retentate pressure control valve	retentate pressure control valve
P-PCV	permeate pressure control valve	permeate pressure control valve
PPE	personal protective equipment	personal protective equipment
CIP	cleaning-in-place	cleaning-in-place

2 Safety instructions

About this chapter

This chapter describes safety precautions, labels and symbols that are attached to the ÄKTAcrossflow. In addition, the chapter describes emergency and recovery procedures, and provides recycling information.

Important



WARNING

Before installing, operating or maintaining the product, all users must read and understand the entire contents of this chapter to become aware of the hazards involved.

In this chapter

Section		See page
2.1	Safety precautions	12
2.2	Labels	20
2.3	Emergency procedures	21

2.1 Safety precautions

Introduction

The ÄKTAcrossflow is powered by mains voltage and handles materials that can be hazardous. Before installing, operating or maintaining the system, you must be aware of the hazards described in this manual.

Follow the instructions to avoid injury to the operator or other personnel, damage to samples or other substances handled by the equipment, to the product, or to other equipment in the area.

The safety precautions in this section are grouped into the following categories:

- General precautions
- Personal protection
- Flammable liquids and explosive environment
- Installing and moving the product
- Power supply
- Operation
- Maintenance

General precautions



WARNING

Do not operate the product in any other way than described in the product and UNICORN manuals.



WARNING

Only properly trained personnel may operate and maintain the product.



WARNING

Before connecting to a filter, read the instructions for use of the filter. To avoid exposing the filter to excessive pressure, make sure that the pressure limit is set to the specified maximum pressure for the filter.



WARNING

Accessories. Use only accessories supplied or recommended by Cytiva.



WARNING

Do not use the ÄKTAcrossflow if it is not working properly, or if it has suffered any damage, for example:

- damage to the power cord or its plug
- damage caused by dropping the equipment
- damage caused by splashing liquid onto it

Personal protection



WARNING

Always use appropriate Personal Protective Equipment (PPE) during operation and maintenance of this product.



WARNING

Hazardous substances and biological agents. When using hazardous chemical and biological agents, take all suitable protective measures, such as wearing protective clothing, glasses and gloves resistant to the substances used. Follow local and/or national regulations for safe operation and maintenance of this product.



WARNING

Spread of biological agents. The operator must take all necessary actions to avoid spreading hazardous biological agents. The facility must comply with the national code of practice for biosafety.

Flammable liquids and explosive environment



WARNING

Fire Hazard. Before starting the system, make sure that there is no leakage.



WARNING

A fume hood or similar ventilation system shall be installed when flammable or noxious substances are used.

Installing and moving the product



WARNING

Tipping risk. The instrument has a high center of gravity. Due to the risk of tipping over, do not place the instrument close to the edge of the bench.



WARNING

The instrument has feet with low friction. To prevent the instrument from sliding, the bench surface must be level.



WARNING

Installing the computer. The computer must be installed and used according to the instructions provided by the manufacturer of the computer.



CAUTION

Heavy object. Use suitable lifting equipment when moving the ÄKTAcrossflow. Two people are required to manually lift the system safely.



NOTICE

Any computer used with the equipment must comply with IEC 60950 and be installed and used according to the manufacturer's instructions.



NOTICE

The product must be installed and prepared by Cytiva personnel or a third party authorized by Cytiva.

Power supply



WARNING

Supply voltage. Before connecting the power cord, make sure that the supply voltage at the wall outlet corresponds to the marking on the instrument.



WARNING

Protective ground. The product must always be connected to a grounded power outlet.



WARNING

Power cord. Only use power cords with approved plugs delivered or approved by Cytiva.



WARNING

Access to power switch and power cord with plug. Do not block access to the power switch and power cord. The power switch must always be easy to access. The power cord with plug must always be easy to disconnect.



WARNING

Disconnect power. Always disconnect power from the instrument before replacing fuses.



NOTICE

Disconnect power. To prevent equipment damage, always disconnect the power from the product before an instrument module is removed or installed, or a cable is connected or disconnected.

Operation



WARNING

Hazardous chemicals during run. When using hazardous chemicals, run a system sanitization or filter cleaning to flush the entire system tubing with distilled water before service and maintenance.



WARNING

Overpressure. Never block the outlet ports with, for instance, stop plugs, since this will create overpressure and might result in injury.



WARNING

Hazardous chemicals. Incorrectly fitted tubing might loosen, causing a jet of liquid to spray out. This is especially dangerous if hazardous chemicals are in use. Connect the tubing by first inserting the tubing fully, then tightening the connector finger-tight. Do not tighten ETFE or PVDF tubing further as this will damage the flange on the end of the tubing. If a leakage occurs, immediately switch off the system before rectifying the leakage.



WARNING

Hazardous chemicals. Bottles or other liquid containers must not be placed on the top cover of the instrument. There is risk for personal injury due to exposure to hazardous chemicals by bottles tipping over or tubing coming loose.



CAUTION

Check tubing connections before use. Loose tubing may cause bodily harm. The tubing of the system is rigid. The inlet and outlet tubing of the system requires fixation in bottles and liquid containers, for example by using tubing locks fitted to bottle caps. Note also that additional forces generated by the liquid flow may lead to tubing coming loose.



CAUTION

Hazardous chemicals in UV flow cell. Make sure that the entire flow cell has been flushed thoroughly with bacteriostatic solution, for example NaOH, and distilled water, before service and maintenance.



CAUTION

Waste tubes and containers must be secured and sealed to prevent accidental spillage.



CAUTION

Make sure that the waste container is dimensioned for maximum possible volume when the equipment is left unattended.



NOTICE

Avoid condensation by letting the unit equilibrate to ambient temperature.



NOTICE

Do not place waste containers on a level higher than the pumps. This is to prevent siphoning.

Maintenance



WARNING

Decommissioning. Decontaminate the equipment before decommissioning to make sure that hazardous residues are removed.



WARNING

Disconnect power. Always disconnect power from the instrument before replacing any component on the instrument, unless stated otherwise in the user documentation.



WARNING

Do not perform any type of maintenance work while the system is powered electrically or when the piping system is pressurized. Note that the piping system can be pressurized even when the system is closed down.



WARNING

Hazardous chemicals during maintenance. When using hazardous chemicals for system or filter cleaning, wash the system or filters with a neutral solution in the last phase or step.



WARNING

Use only approved parts. Only spare parts and accessories that are approved or supplied by Cytiva may be used for maintaining or servicing the product.



WARNING

Make sure that the piping system is completely leakage free before performing any CIP on the system.



WARNING

Before disassembly, check that there is no pressure in the piping system.



WARNING

Corrosive substance. NaOH is corrosive and therefore dangerous to health. When using hazardous chemicals, avoid spillage and wear protective glasses and other suitable Personal Protective Equipment (PPE).



WARNING

After assembly, the piping system must be tested for leakage at the maximum system pressure for continued protection against injury risks due to water jets or burst pipes. Refer to leakage test in the user documentation.



WARNING

High intensity UV light. This product uses high intensity ultra-violet light. Do not disconnect the optical unit while the lamp is on.



CAUTION

Fire hazard. Contact your Cytiva service representative to install a new UV lamp. If the lamp is not installed properly it may overheat and cause a fire hazard.



CAUTION

If the mercury lamp is broken, make sure that all mercury is removed and disposed of according to national and local environmental regulations.



NOTICE

Cleaning. Keep the exterior of the instrument dry and clean. Wipe regularly with a soft damp tissue and, if necessary, a mild cleaning agent. Let the instrument dry completely before use.

2.2 Labels

Introduction

This section describes the system label and other safety or regulatory labels that are attached to the product.

System label

The system label is located on the back of the equipment. The system label identifies the equipment and shows electrical data, regulatory compliance, and warning symbols.

Description of symbols on the system label

The following symbols and text may be present on the system label:

Symbol/text	Meaning
	**Warning!** Read the user documentation before using the system. Do not open any covers or replace parts unless specifically stated in the user documentation.
Code no	Instrument assembly number
Serial no	Instrument serial number
Mfg Year	Year (YYYY) and month (MM) of manufacture
Voltage **Frequency** **Max Power**	Electrical requirements: • Voltage (VAC ∼) • Frequency (Hz) • Max. power (VA)

2.3 Emergency procedures

Introduction

This section describes how to shut down the ÄKTAcrossflow system in an emergency situation.

This section also describes the result in the event of power failure.

Safety precautions

WARNING

Access to power switch and power cord with plug. Do not block access to the power switch and power cord. The power switch must always be easy to access. The power cord with plug must always be easy to disconnect.

Emergency shutdown

In an emergency situation, follow the steps below to stop the run:

Step	Action
1	To pause the run from UNICORN, click the ***End*** button in ***System Control***. 
2	If required, switch off power to the instrument by pressing the **Main power** switch to the **0** position.

Power failure

The following table describes the consequences of a power failure.

Component	Result of power failure
ÄKTAcrossflow instrument	• The run is interrupted immediately, in an undefined state. • The data collected up to the time of the power failure is available in UNICORN.

Component	Result of power failure
Computer	• The UNICORN computer shuts down in an undefined state. • The run continues, but data cannot be saved in UNICORN. Data will be saved on a Flash memory card located in the CU-950. When communication with the computer is re-established, the data will be uploaded to UNICORN.

3 System description

About this chapter

This chapter gives an overview of the ÄKTAcrossflow system and a brief description of its function.

In this chapter

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3.1	System overview	24
3.2	Instrument overview	25
3.3	Control software	29

3.1 System overview

Introduction to the ÄKTAcrossflow

The ÄKTAcrossflow is a fully automated system for crossflow filtration that uses flat sheet or hollow fiber membranes to separate components in a liquid solution or suspension based on their difference in size.

The system is designed for process development and optimization of ultrafiltration/diafiltration (UF/DF) and microfiltration (MF) unit operations.

Illustration of the system

The illustration below shows the ÄKTAcrossflow system.



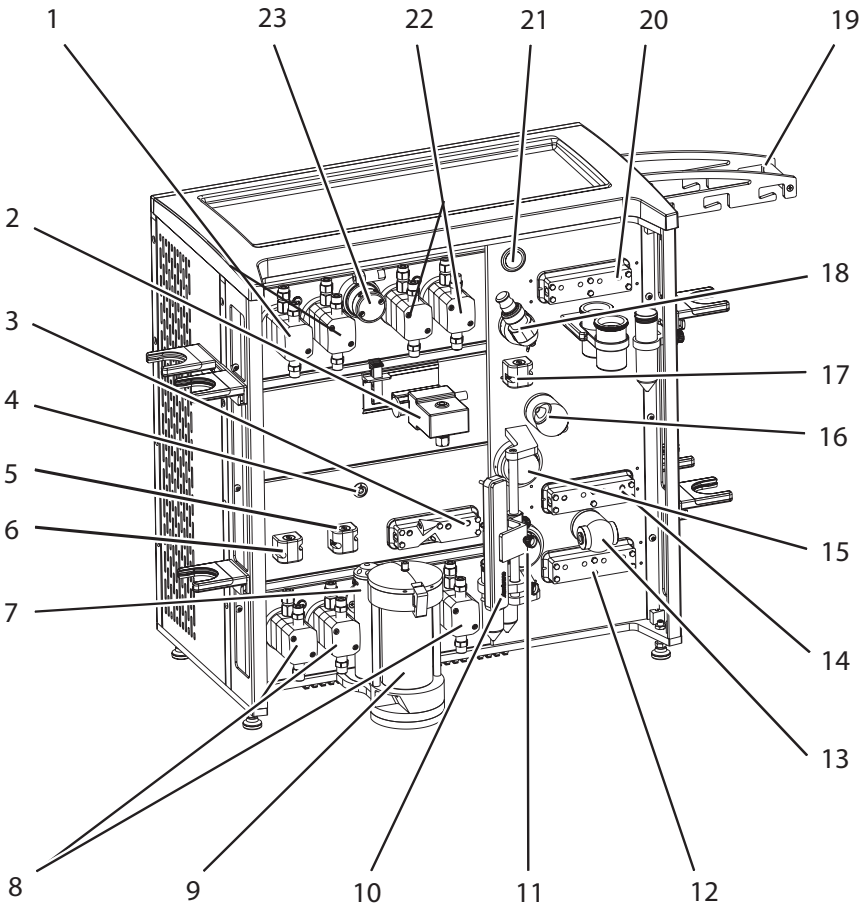
3.2 Instrument overview

Introduction

This section gives an overview of the ÄKTAcrossflow instrument.

Illustration of the instrument

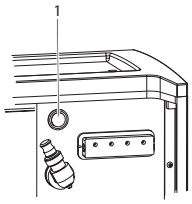
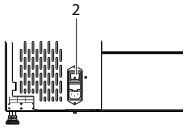
The illustration below shows the main parts of the instrument.



Part	Function	Part	Function
1	Transfer pump P-982 (module A)	13	Air sensor
2	UV cell	14	Transfer block 1
3	Retentate valve block	15	Permeate pressure sensor P_P
4	Connection for reservoir level sensor cable	16	Conductivity cell
5	Valve R-PCV	17	Valve P-PCV
6	Transfer purge valve	18	pH electrode
7	Feed pressure sensor P_F	19	Buffer bag holder
8	Feed pump P-984 (module A and B)	20	Permeate valve block
9	Reservoir	21	Power indicator
10	CFF filter	22	Permeate pump P-982 (module B)
11	Retentate pressure sensor P_R	23	Transer pressure sensor P_T (manifold)
12	Transfer valve block 2		

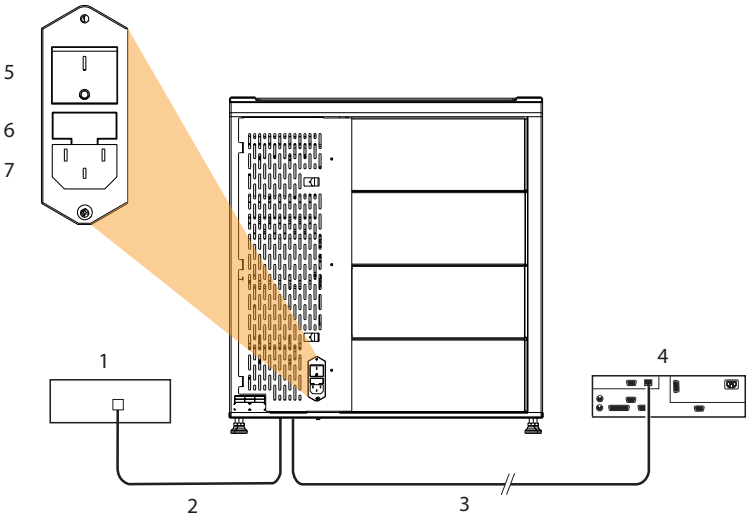
Indicator and switch on the instrument

The illustrations below show the location of the power indicator and the power switch on the instrument.

	Indicator/Switch	Color	Description
	**Power** (indicator) (1)	Green	1. Steady light during the internal communication test. 2. Flashes slowly when the internal communication test is finished. 3. Steady light when UNICORN is connected to the instrument unit.
	**Power** (switch) (2)	-	Switches on/off power to the instrument. Located on the rear panel.

Electrical and communication connections

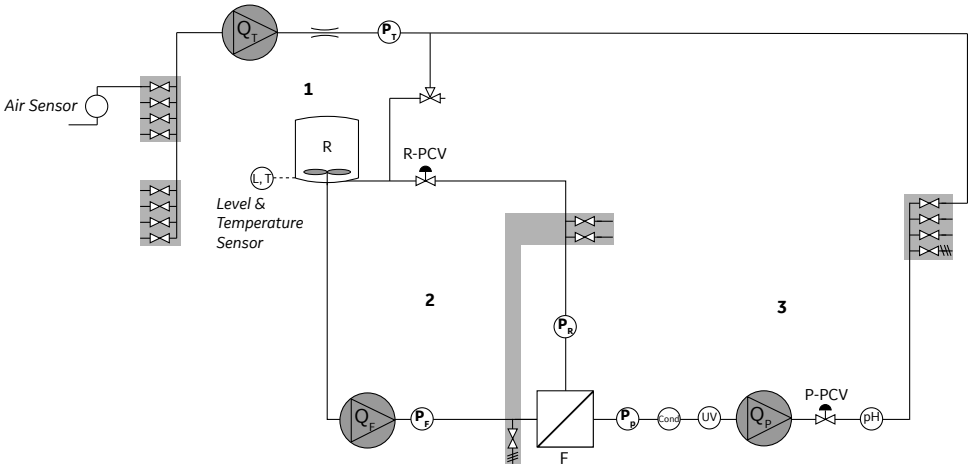
The illustration below shows electrical and communication connections.



No.	Connection	No.	Connection
1	Fraction collector (optional)	5	Power switch
2	UniNet 1 cable	6	Fuse holder
3	Ethernet cable	7	Mains power inlet
4	Computer		

Basic flow path

The illustration below shows the basic flow path.



Step	Part	Description
1	Q_T, R	**Transfer line.** The transfer line feeds sample, buffers, cleaning solutions, and storage solutions via the transfer pump (P_T) to the reservoir (R).
2	Q_F, R, F	**Recirculation line (feed line and retentate line).** The feed line transports the liquid via the feed pump (Q_F) from the reservoir to the CFF filter (F). The liquid and components not passing the CFF filter flow into the retentate line.
3	F, Q_P	**Permeate line.** The permeate line transports the liquid passing the CFF filter via the permeate pump (Q_P).

3.3 Control software

UNICORN control software

UNICORN is a complete software for control and supervision of the ÄKTAcrossflow. The software runs under Microsoft Windows operating system.

The instrument configuration for the ÄKTAcrossflow supplied with the UNICORN software contains a method wizard for easy creation of filtration methods.

For more information about UNICORN control systems, see the UNICORN user manuals supplied.

4 Installation

About this chapter

This chapter describes site requirements and preparations necessary to perform before installation of the ÄKTAcrossflow system.

In addition, instructions are included for moving the ÄKTAcrossflow system within the lab or to another building.

Important

The ÄKTAcrossflow is delivered in protective packing material and must be unpacked with great care.

Any equipment connected to the ÄKTAcrossflow must fulfill applicable standards and local regulations.

Safety precautions



NOTICE

Any computer used with the equipment shall comply with IEC 60950 and be installed and used according to the manufacturer's instructions.

In this chapter

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4.4	Level the ÄKTAcrossflow	39
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4.7	Electrical and communication connections	48
4.8	Connect Frac-920 to the ÄKTAcrossflow (optional)	50

4.1 Site requirements

Space requirements

Parameter	Specification
Minimum bench area for operating the ÄKTAcrossflow	1200 x 600 mm
Free space required around the instrument	At least 200 mm free space in front of the instrument 300 mm free space on all other sides
Space for touchscreen or monitor with keyboard and mouse	600 x 600 mm
Load capacity	980 N (100 kg) or higher
Inclination of bench surface	Horizontal ±2°

Environmental requirements

Parameter	Requirement
Allowed location	Indoor use only
Placement	Stable laboratory bench with 1200 × 600 mm (width × depth) of free space for operation
Space requirements for instrument	650 × 620 × 400 mm (height × width × depth)
Ambient temperature	4°C to 40°C
Humidity	20% to 95%, non-condensing
Altitude	Maximum 2000 m
Pollution degree	2

Electrical power requirements

Parameter	Requirement
Supply voltage	100 to 120/220 to 240 VAC
Frequency	50 to 60 Hz
Maximum current	6A

Parameter	Requirement
Maximum power consumption	900 VAC
Fuse rating	6.3 A
Transient overvoltages	Overvoltage category II

Ambient environment

The following conditions should be avoided:

- Sources of heat, such as direct sunlight
- Strong magnetic or electrical fields
- Vibrations
- Corrosive gas
- Dust
- Temperatures outside of the recommended operating temperature (4°C to 40°C)

For full technical specifications of the ÄKTAcrossflow, refer to *Section 8.1 Specifications, on page 107*.

4.2 Unpacking

Follow the instructions below to unpack the ÄKTAcrossflow. Record on the receiving documents if there is any apparent damage on the delivery.

Note: *Some items are packed in separate boxes that are delivered with the system. Packing lists are included in the boxes.*

Step	Action
1	Remove the cardboard hood and other packing material.



2	Check the contents against the enclosed packing list. Also check all enclosed boxes. Store all the boxes and plastic bags in a convenient nearby place.

Step	Action
3	Open the plastic cover from the top and fold down to uncover the system. Take care not to damage any tubing or components.



4	Remove the plastic cover from the system.
5	Save all the original packing material. If the equipment has to be repackaged for transportation in the future, it can be safely repackaged using the original packing material.

4.3 Transport

Precautions



WARNING

Personal Protective Equipment (PPE). Whenever packing, unpacking, transporting or moving the product, wear:

- Protective footwear, preferably with steel toe-cap.
- Working gloves, protecting against sharp edges.
- Protective glasses.

The equipment weighs 70 kg and requires at least two people to lift and move manually unless a suitable lifting device is used. Transport the equipment on a trolley capable of supporting at least 100 kg.

Lift the ÄKTAcrossflow

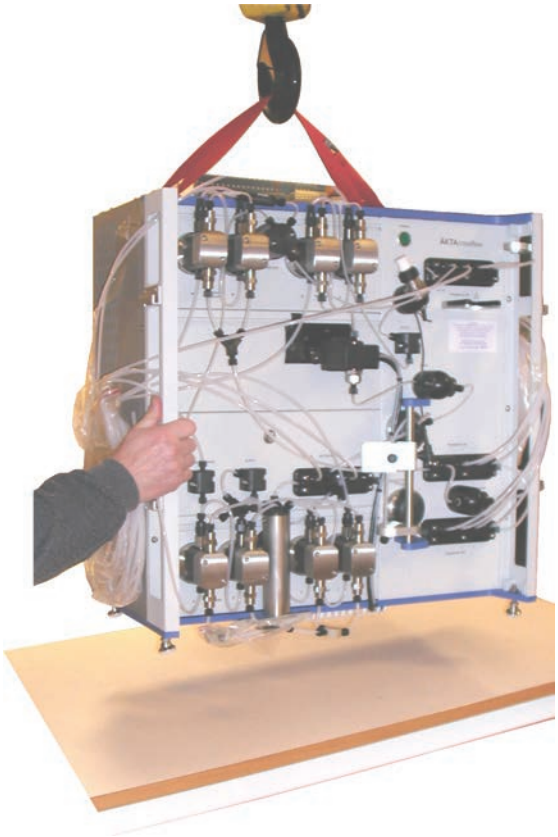
After unpacking the instrument, lifting equipment is needed to lift the instrument. If lifting equipment is not available, see *Move the ÄKTAcrossflow, on page 37*.

Note: *The top cover is not attached at delivery.*

Step	Action
1	A lifting strap is attached to the instrument at delivery.



Step	Action
2	Lift the instrument onto the workbench, or onto a trolley for transportation.



Move the ÄKTAcrossflow

WARNING

The instrument has a high center of gravity. Due to the risk of tipping over, do not place the instrument close to the edge of the bench.

WARNING

The instrument has feet with low friction. To prevent the instrument from sliding, the bench surface must not be inclined.

WARNING

The ÄKTAcrossflow instrument weighs 70 kg. Use suitable lifting equipment to lift the instrument . Wear safety shoes. A minimum of two people are required to lift the instrument .

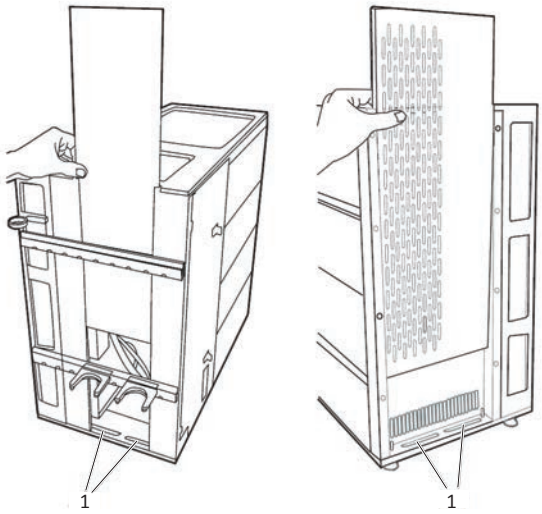
CAUTION

Bottle holders and the bag holder should not be mounted when lifting and moving the instrument .

If a smaller movement of the instrument is necessary on the laboratory bench, the instrument can be moved by carefully pushing it along the bench surface.

For smaller lifts without using lifting equipment, use the manual lifting slits as shown in the following procedure:

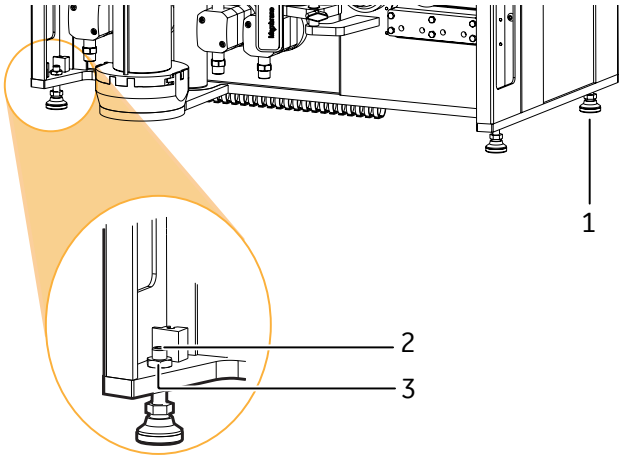
Step	Action
1	Disconnect all cables and tubing connected to peripheral components and liquid containers.
2	Remove bottle holders and bag holder.
3	Use the slits (1) in the bottom frame to manually lift the instrument.



4.4 Level the ÄKTAcrossflow

After placing the ÄKTAcrossflow instrument on the laboratory bench, the instrument must be leveled.

The instrument base frame is equipped with four feet . One foot is fixed (the rear right side) and the other three are adjustable. The two feet in the front have accessible positions for adjustment. To adjust the rear left foot, the side cover must be removed.



Part	Function
1	Fixed foot
2	Locking nut
3	Hex socket cap screw

To level the instrument, use the following procedure:

Step	Action
1	Loosen the locking nuts.
2	Use a 4 mm hex key to adjust the height with the hex socket cap screws.
3	Check the leveling by using a spirit level on the upper plane.
4	Tighten the locking nut.

4.5 Assembly

The following parts must be added to the ÄKTAcrossflow instrument before use:

- Reservoir holder
- Reservoir
- Bottle holders
- Bag holder (optional)

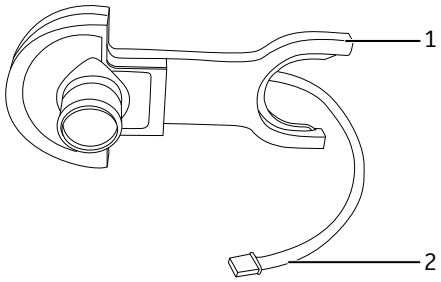


Part	Function
1	Bottle holders
2	Reservoir
3	Reservoir holder
4	Upper rail for bag holder (optional)

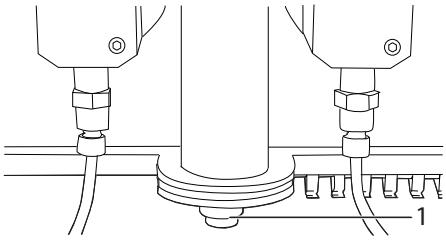
Reservoir holder

To install the reservoir holder:

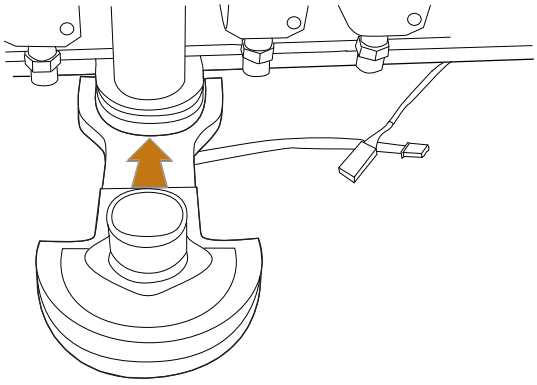
Step	Action
1	Unpack the reservoir holder (1) with the stirrer drive motor cable (2).



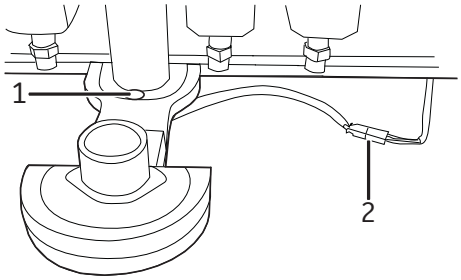
2	Locate the reservoir holder bracket (1) on the instrument unit.



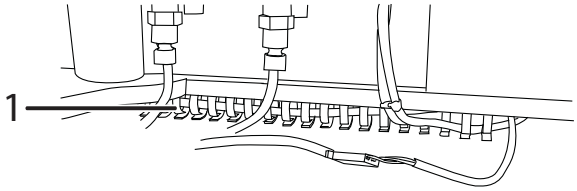
3	Attach the reservoir holder.



Step	Action
4	Tighten the attachment screw (1). Locate the instrument's stirrer drive motor cable (2) and connect the cables.

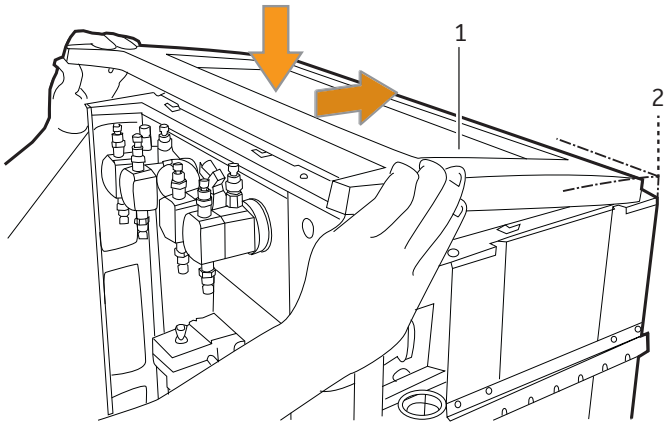


5	Insert the connected stirrer drive motor cable into the cable holder (1) under the instrument.



Top cover

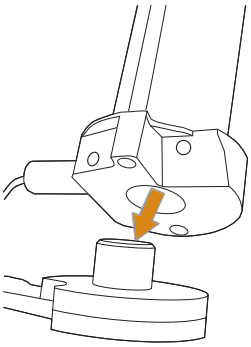
Attach the top cover (1) by first laying it down, and then sliding it backwards to the rear position (2), see figure below.



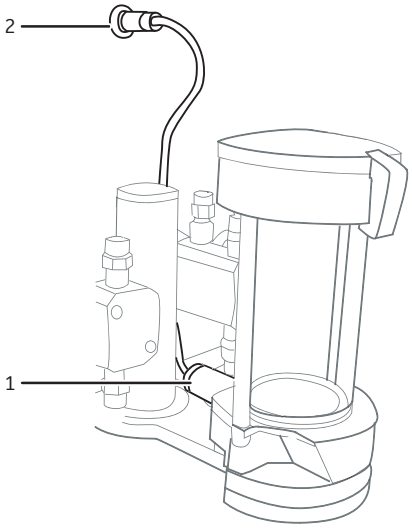
Reservoir

To install the reservoir:

Step	Action
1	Place the reservoir onto the reservoir holder.



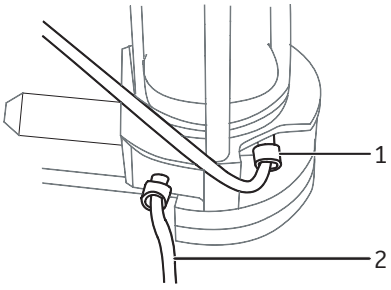
Step	Action
2	Connect the reservoir level sensor cable (1) to the instrument front panel connector (2).



Note:

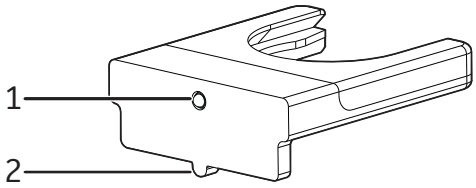
When using the large reservoir (1100 mL) the reservoir level sensor cannot be installed at a right angle towards the front panel as shown in the figure above. The reservoir must be rotated to a suitable position for the level sensor.

3	Connect the inlet (1) and outlet (2) tubing.



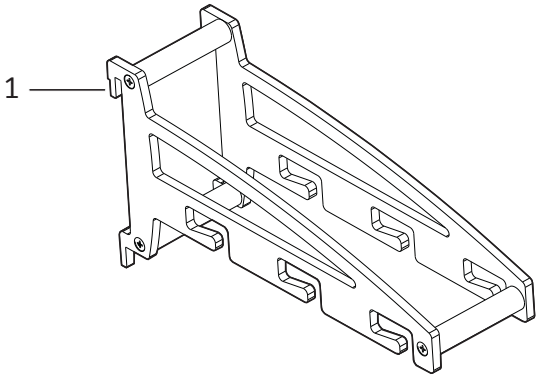
Bottle holders

Attach the bottle holders into the rails on the instrument unit. The knob on the bottle holder (2) should fit into the holes in the rail for correct position, and the locking device (spring-loaded ball) (1) will keep the holder in place.



Bag holder (optional)

Mount the bag holder to the ÄKTAcrossflow instrument by attaching the bag holder hooks (1) to the upper rail on the right side of the instrument.



4.6 Connect the tubing

The tubing connections on the instrument are not complete on delivery. All necessary tubing is however included in the delivery and must be connected before operating the equipment. There are a large number of tubings and connection points. Refer to the *ÄKTAcrossflow User Manual* for detailed information. The factory tubing connections are shown in the figure below.



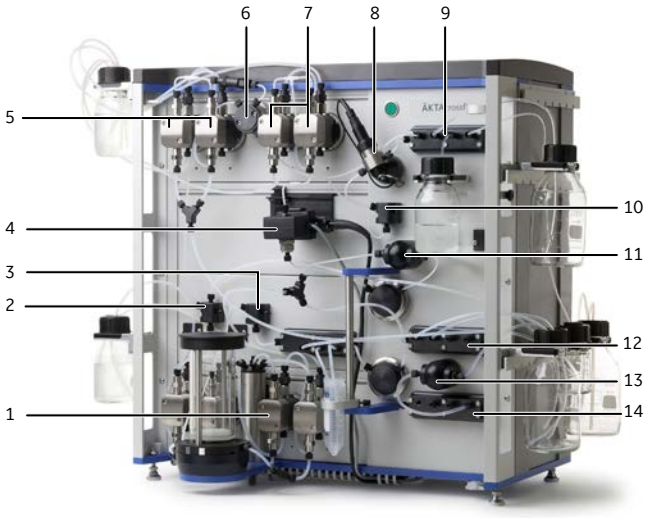
Several of the tubing connections are plugged when the instrument is delivered. Tubings that must be connected are those from the transfer valve blocks, the permeate valve block, the air sensor, the retentate valve block, and the reservoir.

There are two tubing kits available for the recirculation pathway, which runs to and from the feed pumps. Depending on the application, the small i.d. tubing kit that is installed on delivery might need to be changed to the large i.d. tubing kit. Refer to the *ÄKTAcrossflow User Manual* for more information.

All the tubings are tagged to show where they should be connected. The parts to which tubings are connected are shown in the figure below.

CAUTION

Retentate Out 1 and Permeate Out 3 are safety relief valves. Do not plug these outlets with a stop plug.



Part	Function	Part	Function
1	Feed pump P-984	8	pH sensor
2	Transfer purge valve	9	Permeate valve block
3	R-PVC	10	P-PCV
4	UV-cell and optical unit	11	Conductivity cell
5	Transfer pump P-982	12	Transfer valve block 1
6	Transfer pressure sensor	13	Air sensor
7	Pearmeate pump P-982	14	Transfer valve block 1

Tighten the connectors properly to make sure that no air is sucked into the system and that no liquid leaks out.

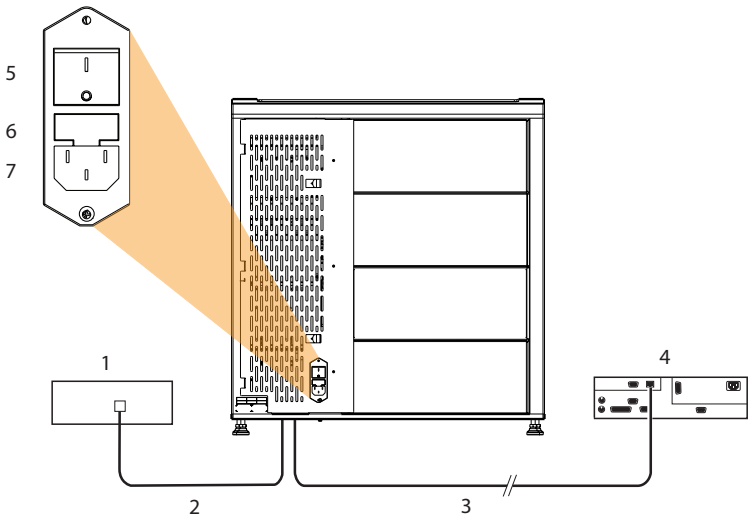
4.7 Electrical and communication connections

CAUTION

The computer should be installed and used according to the instructions provided by the manufacturer of the computer.

Electrical and communication connections

The illustration below shows electrical and communication connections.



No.	Connection	No.	Connection
1	Fraction collector (optional)	5	Power switch
2	UniNet 1 cable	6	Fuse holder
3	Ethernet cable	7	Mains power inlet
4	Computer		

Connect main power supply

Step	Action
1	Unpack and set up the computer according to the manufacturer 's instructions.



CAUTION
Do not switch on the computer at this time.

Step	Action
2	Connect one end of the supplied mains cable to the ÄKTAcrossflow mains inlet and the other end to a mains supply outlet with protective ground. Refer to the figure in *Electrical and communication connections, on page 27*.
3	Connect one end of the supplied mains cable to the PC mains inlet and the other end to a mains supply outlet with protective ground.

Install the ethernet communication cable



CAUTION
The mains power to the ÄKTAcrossflow and the PC must be switched OFF before the ethernet cabling is installed.

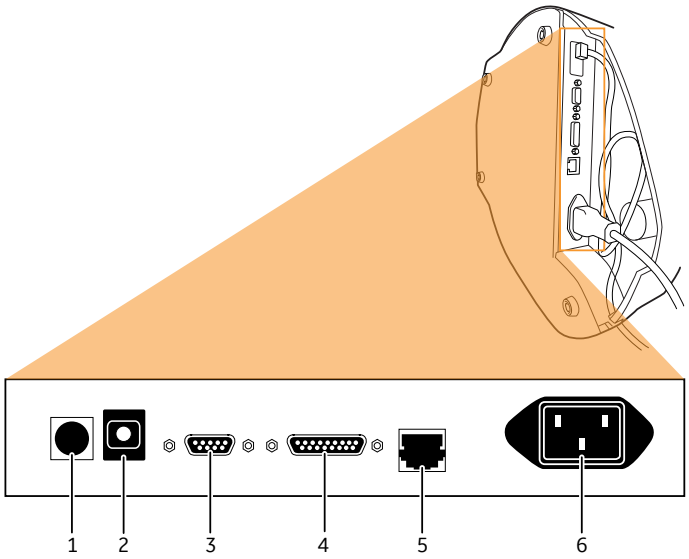
Step	Action
1	One end of the **UniNet 1** data communication cable is connected internally to the CU-950 in the ÄKTAcrossflow at delivery.
2	Connect the other end of the data communication cable to an ethernet communication port.

4.8 Connect Frac-920 to the ÄKTAcrossflow (optional)

The ÄKTAcrossflow can be used with the fraction collector **Frac-920**. **Frac-920** function is controlled via a cable connected to the **UniNet 1** communication chain. The **Frac-920** is self terminating and requires no termination plug. Perform the following steps to connect the **Frac-920**.

Connect the mains supply

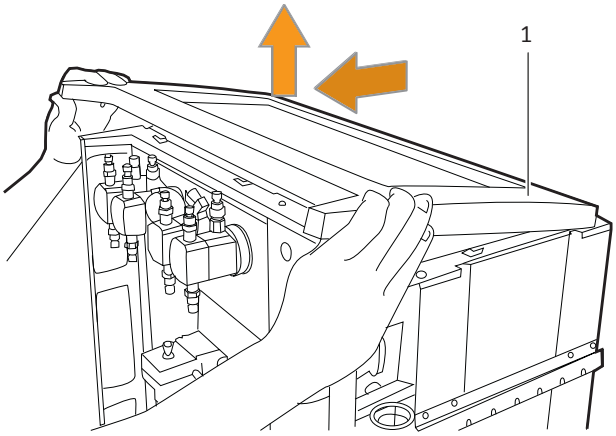
To locate the Mains connector on the **Frac-920**, see the figure below.



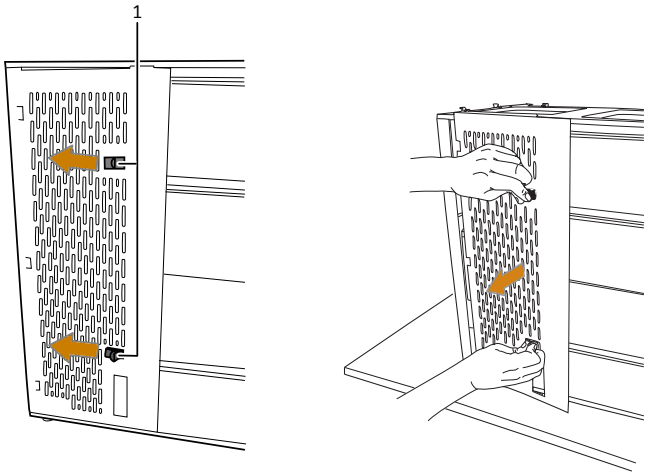
Part	Function	Part	Function
1	Drop counter	4	Remote
2	Valve	5	**UniNet 1**
3	Monitor/Event mark	6	Mains

Use the following procedure to connect the **Frac-920**:

Step	Action
1	Remove the instrument's top cover (1) by first sliding it towards the front panel and then lifting it up.



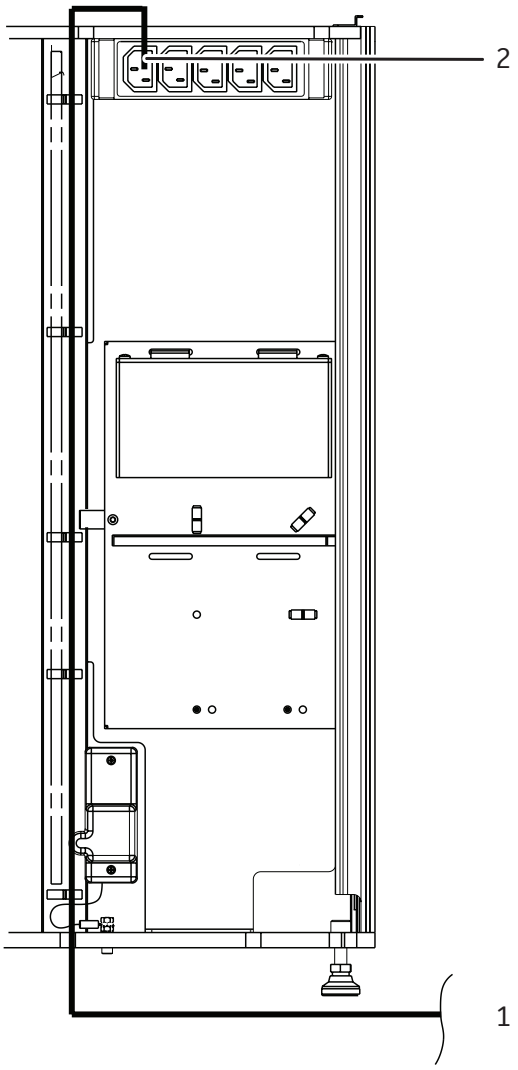
Step	Action
2	Using the two handles (1), remove the rear panel by first moving the handles sidewards to the left and then lifting out the panel.



CAUTION

The free mains outlet inside the ÄKTAcrossflow instrument is intended for connection of the fraction collector Frac-920 only.

Step	Action
3	Connect the supplied mains cable (1) between Frac-920 and the free mains socket (2) inside the ÄKTAcrossflow instrument.



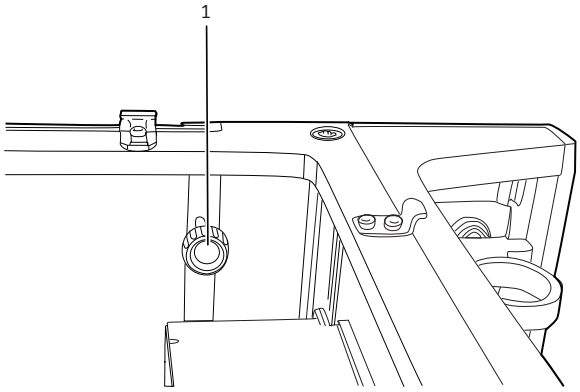
UniNet-1 communication

CAUTION

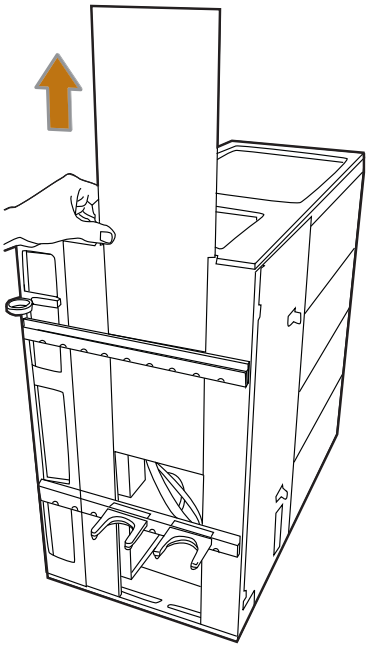
The mains power to the ÄKTAcrossflow system and the PC must be switched off before connecting the instrument to the **UniNet 1** link.

Use the following procedure to include the fraction collector in the **UniNet 1** communication chain:

Step	Action
1	Unplug the instrument.
2	Remove the right side cover by first loosening the locking screw (1) inside the instrument one turn.



Step	Action
3	Lift up and remove the side cover.



4	Locate and remove the termination plug (1) in the **UniNet 1** socket of the **Frac-920**.



Step	Action
5	Connect a **UniNet** cable in place of the termination plug in the **UniNet 1** socket.
6	Restore power to the instrument and reconnect to the UNICORN software.

5 Operation

About this chapter

This chapter gives instructions on how to operate the ÄKTAcrossflow in a safe way.

In this chapter

Section		See page
5.1	Operation overview	58
5.2	Start the instrument	59
5.3	Start the control system	60
5.4	Preparations before start	62
5.5	Set up a run	70
5.6	Perform a run	75
5.7	Procedures after a run	79

5.1 Operation overview

Workflow

The typical workflow in the ÄKTAcrossflow, after turning on the system and connecting it to UNICORN, can be divided into a number of steps.

Step	Action	Section
1	Create a method	*Create a method, on page 70*
2	Prepare the system for a run	*Section 5.5 Set up a run, on page 70* *Section 5.4 Preparations before start, on page 62*
3	Start a run using a method	*Section 5.6 Perform a run, on page 75*
4	During a run - view and change parameters	*View the run, on page 77*
5	Procedures after a run	*Section 5.7 Procedures after a run, on page 79*
6	Evaluate the results	See UNICORN user documentation for information on ***Evaluation Classic***. Information on the Filtration Analysis functionality can be found in the *ÄKTAcrossflow User Manual*.

Liquid flow path

See *Appendix A Connection diagram - Liquid flow path, on page 128* for an illustration of the liquid flow path in the ÄKTAcrossflow.

5.2 Start the instrument

Before starting the instrument

Make sure that the waste container and buffer bottles needed are correctly connected. Check that all tubing connections are properly tightened and that all valves are connected to a tubing or a termination plug.

Note: *Retentate Out 1 and Permeate Out 3 are safety relief valves and should not be plugged with a termination.*

Start the instrument

Turn on the **Power** switch on the instrument.

- The **Power** indicator on the front panel flashes slowly until internal communication with the **CU (Control Unit)** is established.
- The **Power** indicator displays a constant green light when the internal communication with the **CU** is established.

5.3 Start the control system

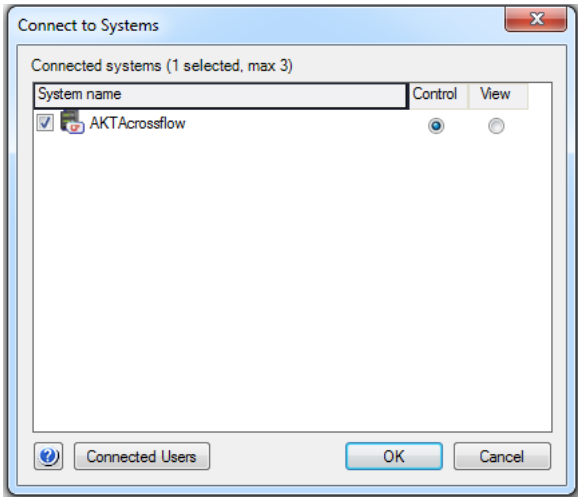
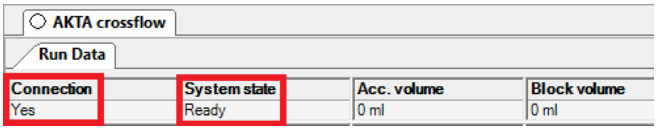
Starting UNICORN

Follow the steps below to start the UNICORN software.

Step	Action
1	Turn on the monitor, computer, and optional printer according to the manufacturer's instructions. Wait for the computer to start up.
2	Log on to Windows operating system.
3	Start UNICORN by double-clicking the UNICORN shortcut icon on the desktop. 
4	In the ***LogOn*** dialog, select a user from the ***User name*** list and enter the password. If you log on for the very first time, select ***User Name →Default*** and enter the password ***default***. Click ***OK***. Choose which of the four modules to start from ***Administration***, ***System Control***, ***Method Editor***, and ***Evaluation***.  *Result:* The selected UNICORN modules open. ***Note:*** *See the UNICORN user documentation for instructions on how to create new users.*

Connecting an instrument to UNICORN

Follow the steps below to connect the instrument to UNICORN.

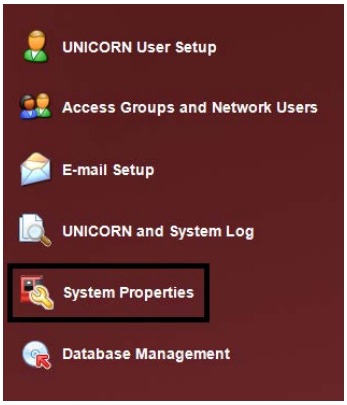
Step	Action
1	In the ***System Control*** module, select the ***Connect to Systems*** icon to connect to the ÄKTAcrossflow system.  *Result:* The ***System Connect*** dialog opens. 
2	Select the system and connect in ***Control*** mode. Click ***OK***. When the communication between UNICORN and the instrument unit is established: • There is a constant light on the power indicator on the instrument unit. • The ***Connection*** box shows ***YES***. • The ***System state*** shows ***Ready***. 

5.4 Preparations before start

Selecting system components

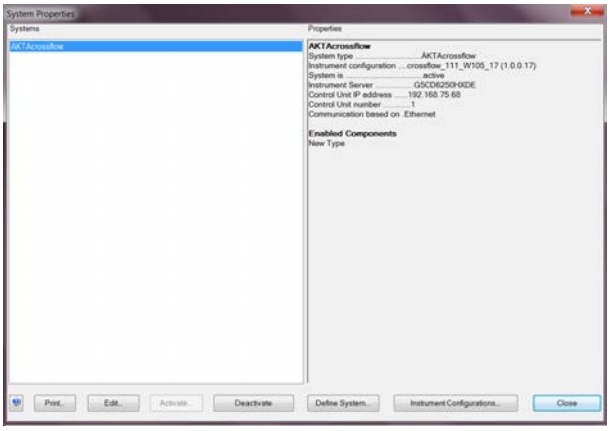
Follow the steps below to select system components.

Step	Action
1	In the ***Administration*** module, select ***System Properties***.

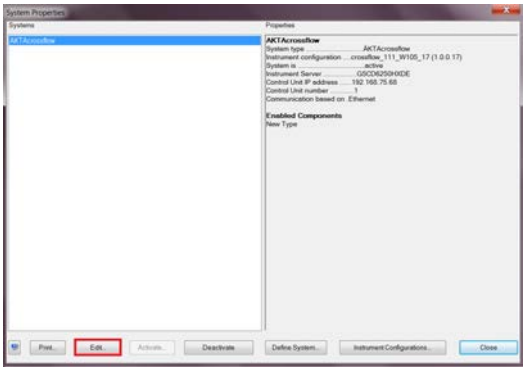


Result:

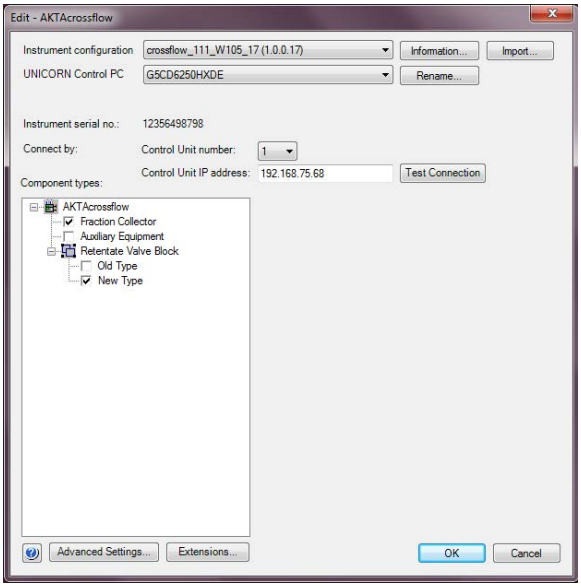
The ***System Properties*** dialog opens.



Step	Action
2	Select a system and click ***Edit***.



3	In the ***Component*** dialog, select the relevant system components: • ***Fraction Collector*** • ***Auxiliary Equipment*** • ***Old Type*** or ***New Type*** retentate valve block



Note:

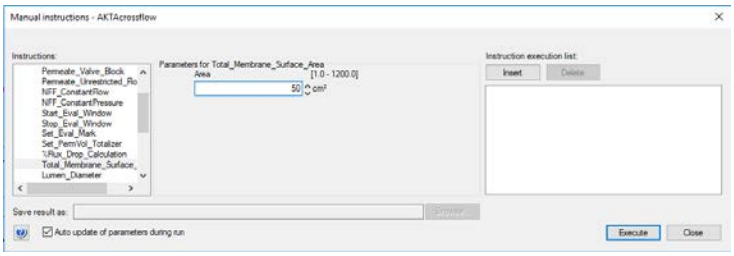
*The **Old Type** retentate valve block is only found on instruments produced prior to 2006. If you are not sure which style retentate valve block you have, contact your Cytiva Service representative*

Step	Action
4	Click ***OK*** to close the ***Component*** dialog.
5	Click ***OK*** to close the ***Edit System*** dialog.
6	Click ***Close*** to close the ***System Setup*** dialog.

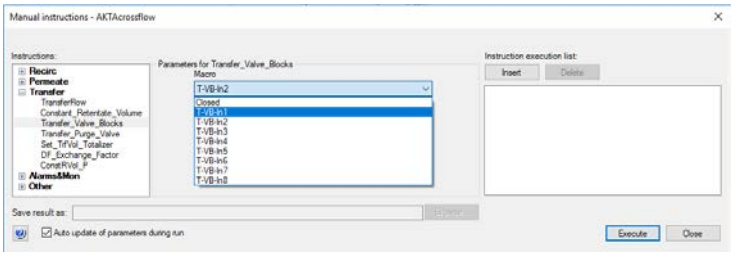
Filling the pump rinse system

When using the ÄKTAcrossflow system for the first time, follow the instructions below to manually fill the pump rinsing system with rinsing solution. This procedure can also be used to exchange the pump rinsing solution.

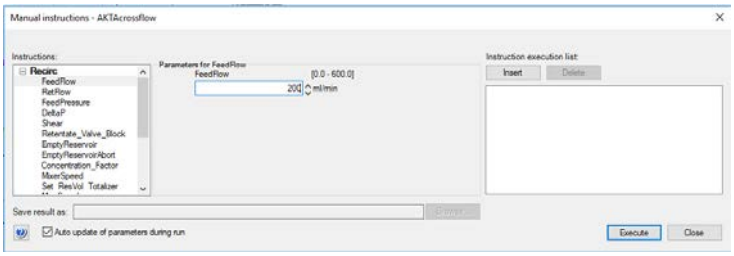
Step	Action
1	Fill the rinsing solution bottles for the feed, transfer, and permeate pumps with freshly prepared rinsing solution (20% ethanol) and insert the rinsing system tubing for each pump into a separate bottle (one bottle per pump). ***Note:*** *It is recommended to use 200 mL or 500 mL bottles with GL-45 thread and GL-45 screw lid kits (product code: 11000410) supplied with the ÄKTAcrossflow delivery kit.*
2	Connect the permeate valve block position **P-VB-Out1** to waste.
3	Connect the 3-way connector to the feed, retentate, and permeate lines in place of a filter.
4	Place transfer valve block **T-VB-In1** tubing into a 500 mL bottle of 20% ethanol.
5	In ***System Control***, select***Manual*** →***Execute Manual Instructions***.
6	Under ***Permeate*** →***Total_Membrane_Surface_Area***, set the membrane area to 50 cm^2 and click ***Execute***.



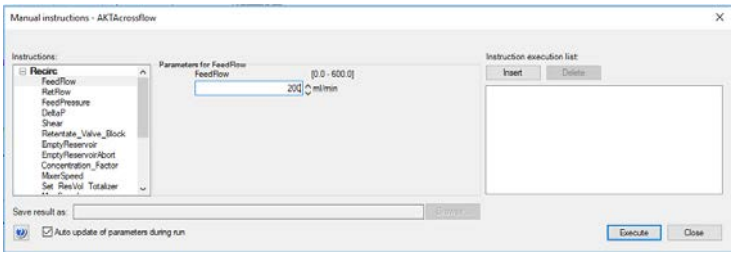
Step	Action
7	Under ***Transfer*** →***Transfer_Valve_Block***, select ***T-VB-In1*** under ***Transfer_Valve_Block***, and click ***Execute***.



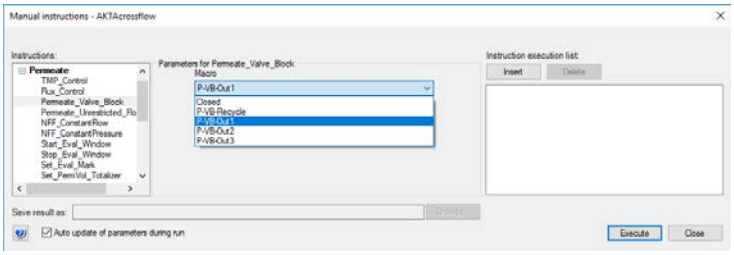
8	Execute the instruction ***Transfer*** →***TransferFlow*** 200 mL/min.



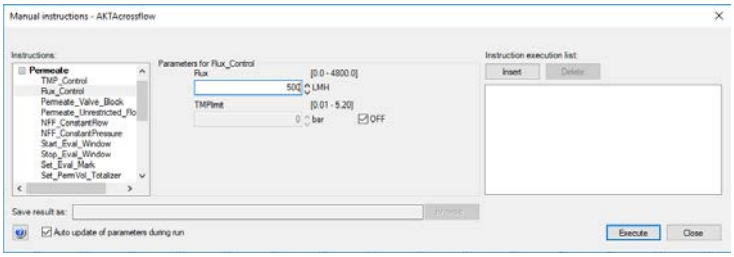
9	Stop the transfer pump after 1 minute when approximately 200 mL is in the reservoir by selecting ***Transfer*** →***TransferFlow*** of 0 mL/min and clicking ***Execute***.
10	Start a feed recirculation by executing the instruction ***Recirc*** →***FeedFlow*** 200 mL/min.



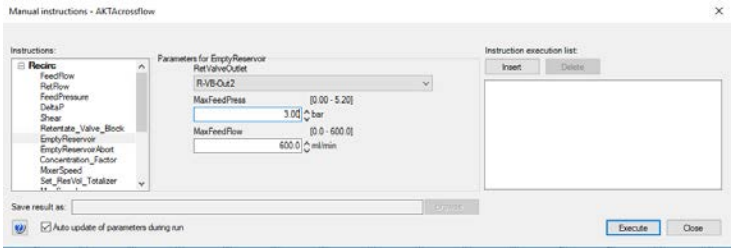
Step	Action
11	Open the **P-VB-Out1** position under ***Permeate*** →***Permeate_Valve_Block*** →***P-VB-Out1***.



12	Under ***Permeate*** →***Flux_ Control***, set a flux rate of 500 LMH and pump for two minutes.



13	Stop the permeate pump by setting the permeate flux rate to 0 LMH under ***Permeate*** →***Flux_Control*** and clicking ***Execute***.
14	Stop the feed pump by setting the feed flow to 0 mL/min under ***Recirc*** →***FeedFlow***and clicking ***Execute***.
15	Under ***Recirc*** →***EmptyReservoir***, set ***RetValveOutlet*** to ***R-VB-Out1***, set ***MaxFeedPressure*** to 3.0 bar, and click ***Execute***.



Note:

The system will stop when the reservoir is empty.

Calibration

With normal use, the conductivity monitor and pressure sensors do not typically require calibration. For more information, see the *ÄKTAcrossflow User Manual*.

The pH electrode and reservoir level sensor must be calibrated before use. For instructions on calibration of the pH electrode, see the *ÄKTAcrossflow User Manual*.

For the calibration of the level sensor, using the automatic level sensor calibration method, the automatic level sensor calibration method created with the ***Method Wizard*** is recommended, instead of the ZeroLS component in the ***Calibration*** menu.

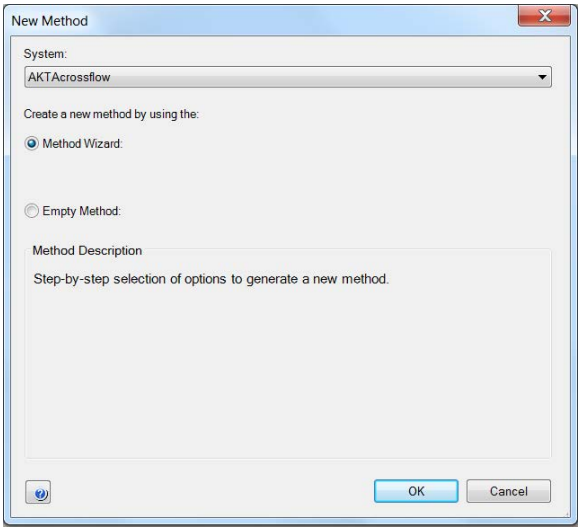
Note: *The level sensor calibration method makes sure that the reservoir is empty before the level sensor sets the volume to 0 mL.*

Follow the steps below for automatic calibration of the level sensor. This method will empty the reservoir out **R-VB-Out1** and make sure that there is air in the retentate tubing prior to calibration. When the calibration is finished, the method will de-air the system with water from **T-VB-In5**.

Note: *The reservoir lid must be open during level sensor to obtain a good result.*

Step	Action
1	In the ***Method Editor***, click on the ***Create New method*** icon.  *Result:* The ***New Method*** dialog appears.

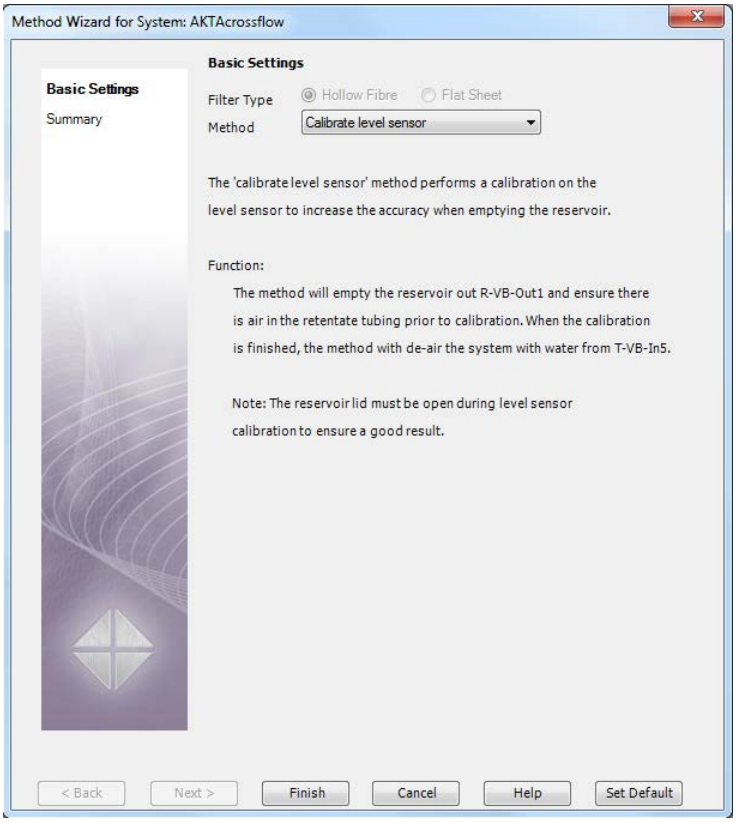
Step	Action
2	If several systems are available, select the ***ÄKTAcrossflow*** in the ***System*** list box. Select ***Method Wizard*** for the new method creation, then click ***OK***.



Result:

The ***Method Wizard*** dialog opens.

Step	Action
3	In the ***Basic Settings*** page in the ***Method Wizard***, select ***Calibrate level sensor*** in the ***Method*** list box.



4	Click ***Finish***.
5	Save the method and run it. For instructions on starting a run, see *Start the run, on page 76*.

Note: *If the level sensor value deviates too far from the correct value, e.g., the system has not been used for some days, this method might not run properly. In this case, make sure that the reservoir is empty and perform a manual level sensor calibration on* ***System Control →System →Calibrate****. See the ÄKTAcrossflow User Manual and* *Section 7.5 Reservoir and level sensor problems, on page 105* *for more information on manual calibration.*

Connecting filters

For preparing and connecting flat sheet cassettes or hollow fiber membrane cartridges, refer to the *ÄKTAcrossflow User Manual*.

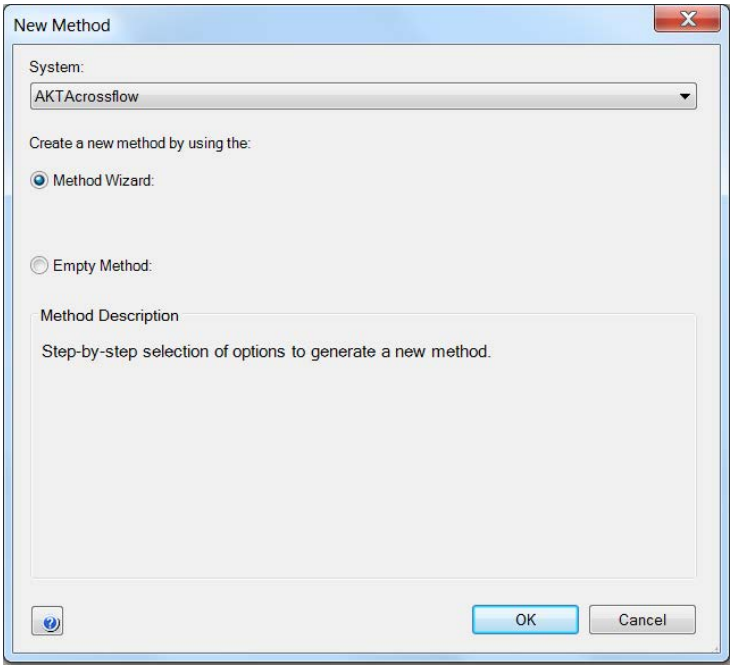
5.5 Set up a run

Create a method

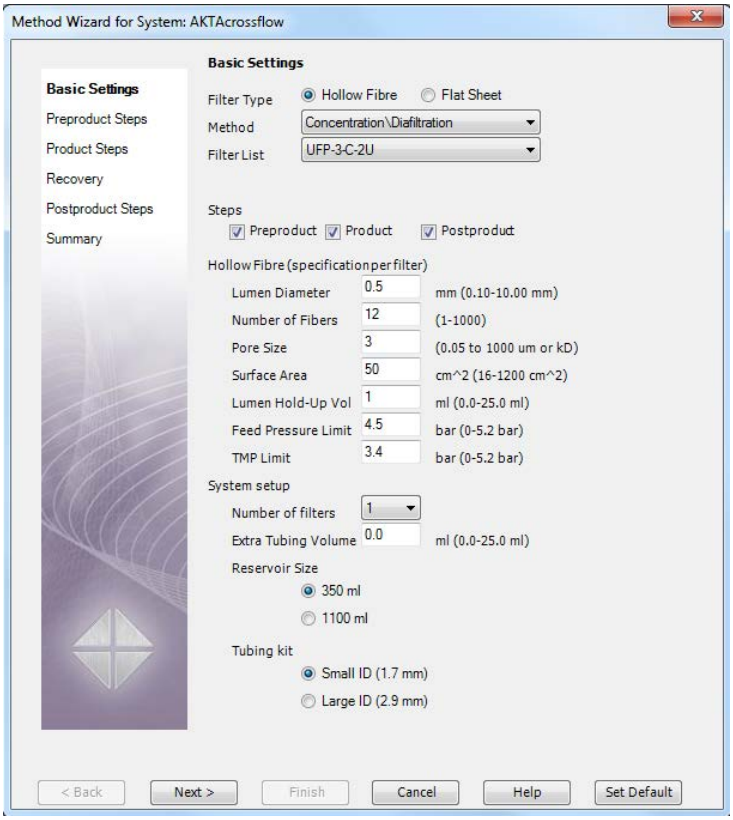
There are two alternatives to create a new method:

- In the ***Method Wizard***, customized methods for most purposes are made by setting appropriate values for the method variables.
- In the ***Text Instructions*** editor in the ***Method Editor*** module, more advanced editing facilities are available. For more information, see UNICORN user documentation.

Follow the steps below to create a new method with the ***Method Wizard***.

Step	Action
1	Click the ***Create a new method*** icon in the ***Method Editor*** window.  *Result:* The ***New Method*** dialog appears. 
2	If several systems are available, select which system to use in the ***System*** list box.

Step	Action
3	Select ***Method Wizard*** to create a method using the wizard. Click ***OK***. *Result:* The ***Method Wizard*** dialog opens.

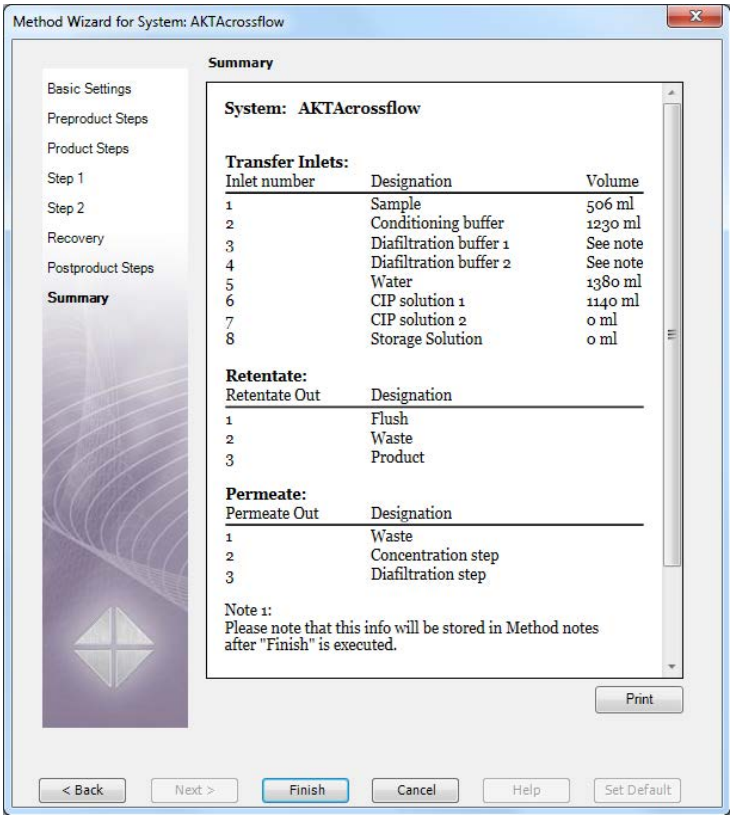


Note:

This example uses ***Hollow Fibre*** *as membrane type.*

Step	Action
4	In the ***Method Wizard*** dialog: • Click ***Set Default*** to obtain default values in the ***Method Wizard***. This is only possible in the first page of the ***Method Wizard*** dialog. • Select type of process in the ***Method*** list box. • Select the filter type to be used in the ***Filter List*** list box. ***Note:*** *The **Hollow Fibre (specification per filter)** area displays the recommended default values for the selected filter type. These can be edited by the user.* ***Note:*** *If **Flat Sheet** is selected, the only filter available in the **Filter List** is **User-defined filter**.* • In the ***System setup*** area, select number of filters and extra tubing volume. This is necessary when using several filters assembled together in parallel. The ***Extra tubing volume*** must be calculated manually if non-standard or extra pieces of tubing are used, for example, to connect a filter holder. • In the ***Reservoir Size*** and ***Tubing kit*** areas, select values for reservoir size and tubing kit to be used in the recirculation. • To get help instructions for each page in the ***Method Wizard***, click ***Help***, or press the **F1** key.
5	Click ***Next***.

Step	Action
6	On each new page in the ***Method Wizard***, select the appropriate parameters and click ***Next*** to continue. After a number of dialogs, a ***Summary*** page that reflects the selections made in the dialogs is shown.



A list of calculated volumes of required solutions is displayed.

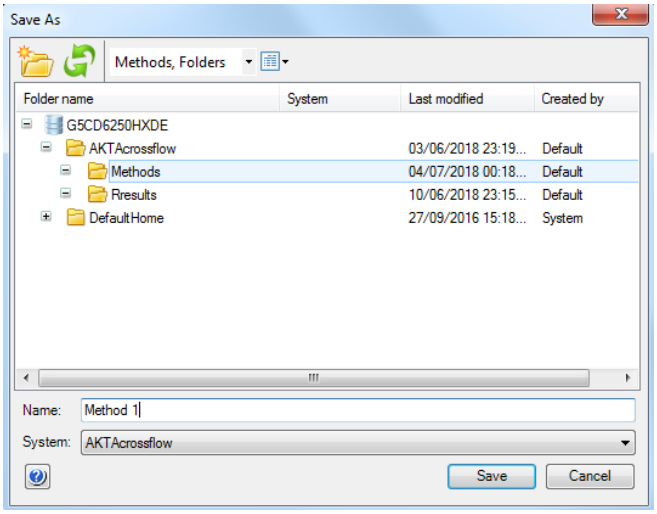
Note:

To prepare a run with solutions, it is recommended to print this list using the ***Print*** *button.*



This list will also be displayed in ***Method Notes*** *in* ***Method Editor****.*

7	Click ***Finish***.

Step	Action
8	In the ***Method Editor***, select ***File*** →***Save As*** to save the method. *Result:* The ***Save As*** dialog opens. 
9	In the ***Save As*** dialog, enter method name in the ***Name*** field and select a folder to save the method in. ***Note:*** *If you have more than one system connected to the computer, select system in the* ***System*** *field for which the method is intended.*
10	Click ***OK***. *Result:* The method is saved. It can now be started from the ***System Control*** module.

Note: *For more detailed instructions on creating a method with the* ***Method Wizard****, refer to the ÄKTAcrossflow User Manual.*

5.6 Perform a run

Final preparation

Check the set parameters before starting a run. Refer to the ***Summary*** page created by the ***Method Wizard*** for required volumes and corresponding inlet positions.

Check solution volumes

Check the **Solution** volumes with the following steps:

Step	Action
1	Immerse the ends of the solution inlet tubing in the appropriate solution containers.
2	Check that there are sufficient solution volumes available.

Note: *Use distilled water when preparing solutions and buffers.*

Check sample volumes

Check the **Sample** volumes with the following steps:

Step	Action
1	Put the end of the sample inlet tubing in the appropriate sample container.
2	Check that there is sufficient sample available.

Note: *If using the air sensor to terminate sample load, make sure that the tubing is completely immersed down to the bottom of the sample bottle.*

Check waste containers

Prepare the **Waste** containers with the following steps:

Step	Action
1	Check that the following outlet tubings are placed in waste containers: • **Transfer Purge *Valve→Waste*** • **R-VB-Out2**: Retentate waste from **Retentate Valve Block**. • **P-VB-Out1**: Permeate waste from **Permeate Valve Block**.
2	Check that the waste containers are not full and will accept the volume diverted to it during the run.

Check Filter settings

Check the **Filter** with the following steps:

Step	Action
1	Check that the correct filter is correctly installed on the system.
2	Make sure the filter is clean and of acceptable quality. To check suitability for use, perform a clean water flux test. For more information, refer to the *ÄKTA-crossflow User Manual*.

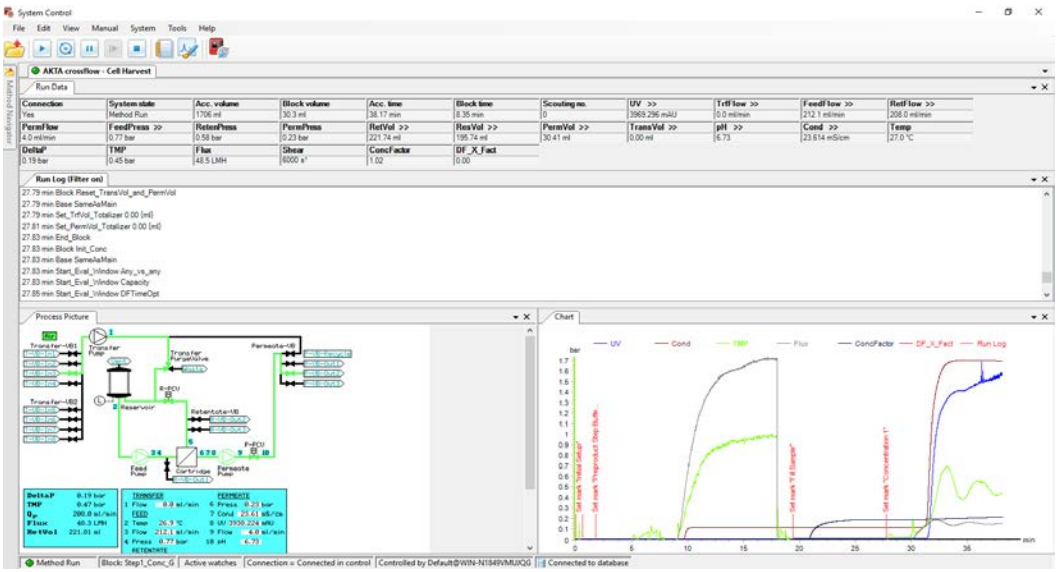
Start the run

Follow the steps below to start the run.

Step	Action
1	In ***System Control***, select ***File*** →***Run***.
2	Select the required method from the list. Click ***OK***. A ***Start Protocol*** appears consisting of a number of dialog boxes. ***Note:*** *If the **Variables** dialog was selected as part of the **Start Protocol**, it is possible to fine tune the method before proceeding.*
3	Click ***Next*** to go through the dialog boxes and add the information that is required.
4	Click ***START*** in the ***Result Name*** dialog box. This will initiate the method run.

View the run

The progress of the run can be viewed in detail in the ***System Control*** module.



Up to four view panes, ***Run Data***, ***Chart***, ***Process Picture***, and ***Run Log*** can be displayed showing different aspects of the run in real-time.

- The ***Run Data*** view pane displays the current values for selected run parameters.
- The ***Chart*** view pane displays the monitor signal values graphically.
- The ***Process Picture*** view pane displays a graphical representation of the filtration system that shows the current status of the run. During a run, the process picture shows the open flow path in green and monitor signals with numerical display.
- The ***Run Log*** view pane shows the actions as the run proceeds. All actions and unexpected conditions are logged, with date, time, and current user name. The run log provides a complete history of the run and is saved in the result file.

Customize the view panes

To customize the view panes, right-click in the respective view pane and select ***Customize***. For more information about customizing the view panes, see the UNICORN user documentation.

End the run

To stop the run on a system before it is finished, click the ***End*** icon.



Error indication

When a warning or an alarm is issued from the system, an error code is displayed. See the *ÄKTAcrossflow User Manual* for guidance.

Evaluate the results

See the *ÄKTAcrossflow User Manual* and UNICORN user documentation for how to evaluate the results.

5.7 Procedures after a run

System sanitization

To make sure that the system is clean, for example when a new filter is used or a process is changed, it is recommended to perform a sanitization of the system.

NOTICE

Instead of a filter, use a three way connector (18117059). Filters are not compatible with the flows rates used and pressures generated in the ***System Sanitization*** method. Replace the pH electrode with a dummy electrode. Remove the reservoir float.

If an air filter is connected to the reservoir, remove the filter. Connect the tubing **Reservoir cleaning kit** (11003386) at the reservoir top. Place the tubing in waste.

NOTICE

The reservoir is over-filled during the sanitization. It is important to connect tubing (11003386) to waste.

WARNING

Corrosive substance. NaOH is corrosive and therefore dangerous to health. When using hazardous chemicals, avoid spillage and wear protective glasses and other suitable Personal Protective Equipment (PPE).

Note: *The stirrer should be present in the reservoir during sanitization. However, it should be replaced with a new aseptic one after the sanitization.*

Note: *The **System Sanitization** method can also be used to pH neutralize the system after sanitization and to exchange the solution in the system to an appropriate storage solution, for example 20% ethanol.*

Sanitize the pump rinsing system

When performing a sanitization of the system, the pump rinsing system should be sanitized by using 1 M NaOH as liquid in the rinsing system bottles.

Sanitize the reservoir float

The reservoir float has to be sanitized separately. Remove it from the reservoir before sanitizing the system. The float can be autoclaved, or equivalent.

Create a *System Sanitization* method

Follow the steps below to create a ***System Sanitization*** method.

Step	Action
1	In the ***Method Editor***, click on the ***Create a new method*** icon. Create the new method using the ***Method Wizard***.
2	Select a system. Click ***OK***.
3	In the ***Basic Settings*** page, select ***System Sanitization*** in the ***Method*** list box.
4	Enter recirculation time in the ***Recirculation Time*** field. A minimum recirculation time of 30 min is recommended.
5	Select reservoir size using the ***Reservoir Size*** radio buttons. ***Note:*** *Information on important preparations before the method is run is displayed in the **Basic Settings** page. All inlet and outlet connections will be used.*
6	Click ***Finish***.
7	In the ***Summary*** page, click ***Print*** to print the summary. Click ***Finish*** to create the method. ***Note:*** *Do not edit any variables or method instructions.*
8	Save the method.

Run the *System Sanitization* method

When running a method using a sanitization solution containing sodium hydroxide (NaOH):



CAUTION

NaOH is corrosive and therefore dangerous to health. When using hazardous chemicals, avoid spillage and wear protective glasses and other suitable personal protective equipment.



NOTICE

When using a solution other than the recommended 1 M NaOH for sanitization, make sure that the system components are compatible with the chosen solution at the concentration, time, and temperatures used.

Step	Action
1	Prepare a sanitization solution that is compatible with the ÄKTAcrossflow system, for example 1 M NaOH. The size of the reservoir will affect the volume needed: • Reservoir 350 mL: 5000 mL • Reservoir 1100 mL: 7000 mL
2	Fill the pump rinsing system with 1 M NaOH (200 mL for each rinsing solution bottle).
3	Replace the filter device with a three-way connector.
4	Replace the pH electrode with a dummy electrode.
5	Remove the float from the reservoir.
6	If an air filter is connected to the reservoir, remove the filter. Connect the reservoir waste tubing to a waste container. The tubing is included in the **Reservoir cleaning kit** (product code 11003386). **NOTICE** The reservoir is over-filled during the sanitization. It is important to connect tubing (11003386) to waste. ***Note:*** *To avoid siphoning back into the reservoir, keep the tubing above the liquid surface in the waste bottle.*
7	Place all inlet tubing in the prepared sanitization solution.
8	Place all outlet tubing in a waste container.
9	Run the method (see *Start the run, on page 76*).
10	Empty the rinsing system bottles and fill them with ordinary rinsing solution, 20% ethanol.
11	If desired, repeat steps 1 to 9 using deionized water or buffer instead of sanitization solution.
12	Drain the rinsing tubing, empty the rinsing system bottles, and refill them with ordinary rinsing solution, 20% ethanol.
13	Replace the stirrer with a new one.

6 Maintenance

About this chapter

This chapter provides information to enable users and service personnel to clean, maintain, calibrate, and store the product.

Important

Regular maintenance is important for safe and trouble-free operation of your instrument. The user should perform daily and monthly maintenance. Preventative maintenance should be performed on a yearly basis by qualified service personnel.

Safety precautions



WARNING

Before attempting to perform any of the procedures described in this chapter, you must read and understand all contents of the corresponding sections in the Safety instructions chapter as listed below:

- *General precautions, on page 12*
- *Personal protection, on page 13*
- *Maintenance, on page 18*

In this chapter

Section		See page
6.1	User maintenance schedule	84
6.2	Cleaning	86
6.3	Component maintenance	88
6.4	Disassembly and assembly of components and consumables	90
6.5	Replacement of fuses	95
6.6	Calibration	97
6.7	Storage	98

6.1 User maintenance schedule

Introduction

The user maintenance schedule provides a guide to maintenance operations and intervals at which these operations should be performed by the user. The user is however responsible for deciding the type of operations and length of intervals necessary to maintain system function and safety.

User maintenance schedule

Interval	Action	Instructions/reference
Daily	Leak inspection	Visually inspect the system for leaks.
	Wash the system flow path	1. For cleaning the flow path, see *Cleaning-In-Place and sanitizing, on page 86*. 2. For storing the system, see *Section 6.7 Storage, on page 98*.
	Calibrate pH electrode	Calibrate the pH electrode according to the *ÄKTAcrossflow User Manual*.
	Check fan operation	Check that cooling air flows through the system, exiting at the right side of the instrument.
Weekly	Change pump rinsing solution	Change rinsing solution. Always use 20% ethanol as a rinsing solution. If the volume of rinsing solution in the storage bottle has increased, it can be an indication of internal pump leakage. Contact your Cytiva representative or service personnel for more details. If the volume of rinsing solution in the storage bottle has decreased significantly, check if the rinsing system connectors are mounted properly. If the rinsing system connectors are not leaking, the rinsing membranes or piston seals may be leaking. Contact your Cytiva representative or service personnel for more details.

Interval	Action	Instructions/reference
Yearly	Valve inspection	Check for external leakage or sticking valves. Valve membranes and rockers are changed as part of a yearly Preventative Maintenance (PM). Contact your Cytiva representative or service personnel for more details.

6.2 Cleaning

Cleaning before planned maintenance/service

To ensure the protection and safety of service personnel, all equipment and work areas must be clean and free of any hazardous contaminants before a Service Engineer starts maintenance work.

Please complete the checklist in the *On Site Service Health and Safety Declaration Form* or the *Health and Safety Declaration Form for Product Return or Servicing*, depending on whether the instrument is going to be serviced on site or returned for service, respectively.

Health and safety declaration forms

Health and safety declaration forms are available for copying or printing in the *Reference information* chapter of this manual, or on digital media supplied with the user documentation.

Cleaning-In-Place and sanitizing

All components in the system are designed for ease of cleaning-in-place (CIP) and sanitizing.

After repeated filtration cycles, contaminating material might progressively build up in the system and on the membranes. The nature and degree of contamination depends on the sample and the filtration conditions employed. These should be considered when designing a cleaning protocol.

A CIP method is available in the ***Method Wizard***. The CIP options give many possibilities to design an appropriate cleaning protocol combining multiple steps, depending on the degree of contamination.

Note: *Make sure that the piping system is completely leakage free before performing any CIP on the system.*



WARNING

Hazardous chemicals during maintenance. When using hazardous chemicals for system or filter cleaning, wash the system or filters with a neutral solution in the last phase or step.



WARNING

Corrosive substance. NaOH is corrosive and therefore dangerous to health. When using hazardous chemicals, avoid spillage and wear protective glasses and other suitable Personal Protective Equipment (PPE).

See also *Section 6.7 Storage, on page 98* and *System sanitization, on page 79*.

Cleaning the pH electrode

The pH electrode has a limited lifespan and should be replaced either every six months or when the response time is slow. Visually inspect the electrode and choose the cleaning method from the table below based on the type of contaminant on the electrode tip.

Contaminant	Procedure
Salt deposits	1. Immerse the electrode in 0.1 M HCl for 5 minutes. Rinse tip in distilled water. 2. Immerse the electrode in 0.1 M NaOH for 5 minutes. Rinse tip in distilled water. 3. Immerse the electrode again in 0.1 M HCl for 5 minutes. Rinse tip in distilled water.
Oil or grease films	1. Wash the electrode tip in liquid detergent and water. 2. If the film is known to be soluble to a particular solvent, wash with this solvent. 3. Rinse the electrode tip in distilled water.
Protein deposits	1. Immerse the tip in a 1% pepsin, 0.1 M HCl solution for 5 minutes. 2. Rinse with distilled water.

If these procedures fail to improve the response, use the following procedure:

Step	Action
1	Heat a 1 M KNO_3 solution to 60°C to 80°C.
2	Place the electrode tip in the heated KNO_3 solution.
3	Leave the electrode to cool while immersed in the KNO_3 solution before retesting.

If these steps fail to improve the electrode response, replace the electrode.

6.3 Component maintenance

Maintenance and preventative replacement of parts of the major components are described in the *ÄKTAcrossflow User Manual*.

The system documentation also includes a spare part list to be used to find common spare parts and their code numbers for ordering. This list can also be found online at *cytiva.com*.

Unions and stop plug	
Y-Connector, 3 × UNF 5/16" Female	18117059
Luer Male - 5/16" Female	11002707
Union Luerlock Female/M6 Female	18102712
Connector 5/16" Female - M6 Male	18112776
Stop Plug 5/16" Male	18111250
Connector, 5/16" Female - 5/16" Female	18117351
Connector, 25 mm TC - UNF 5/16" Female	18116922
TC Gasket, 25 mm, i.d. 6.5 mm	18116925
Connector, 3 × UNF 5/16" Female	28404769
T-Connector 3 × 5/16" Female	11003264
Front spare parts	
pH Calibration Bracket for ÄKTAcrossflow	11002713
pH Calibration Kit for ÄKTAcrossflow	11002716
O-ring 5.3 x 2.4 mm	18111860
ÄKTApilot pH Electrode	18116877
ÄKTApilot Dummy pH Electrode	18116911
Conductivity cell i.d. 2	18116900
UV Flow Cell 2 mm for ÄKTAcrossflow	11003148
Filter 254 nm	18062001
Filter 280 nm	18062101
Filter 214 nm	18062201
Filter 365 nm	18062401
Filter 405 nm	18062501

Filter 436 nm	18062601
Filter 546 nm	18062701
Hg optics with 254 and 280 nm filters	28404223
Zn optics with 214 nm filter	28404224
Hg lamp and housing complete	28404225
Zn lamp and housing complete	28404226
Air filter	11002718
Stirrer 30 × 6 for ÄKTAcrossflow	11002721
Stirrer 35 × 7 for ÄKTAcrossflow	11002722
Reservoir 1200 Complete for ÄKTAcrossflow	11003116
Reservoir 300 Complete for ÄKTAcrossflow	11003146
Reservoir Cleaning Kit for ÄKTAcrossflow	11003386
ÄKTApilot Air Sensor Cell 925	18116770
Level sensor	28945699
Flow Restrictor	11002672
Float, 300 mL	11002677
Float, 1200 mL	11003288

6.4 Disassembly and assembly of components and consumables

Important

The operator must carefully read and understand the instructions supplied for each component before disassembly and assembly of the component. When replacing consumables, such as tubing and tubing connectors, all neccessary safety precautions must be taken. Contact your local Cytiva representative if further information or help is needed.

Safety precautions



WARNING

Disconnect power. Always disconnect power from the instrument before replacing any component on the instrument, unless stated otherwise in the user documentation.



WARNING

Before disassembly, check that there is no pressure in the piping system.



WARNING

After assembly, the piping system must be tested for leakage at the maximum system pressure for continued protection against injury risks due to water jets or burst pipes. Refer to leakage test in the user documentation.

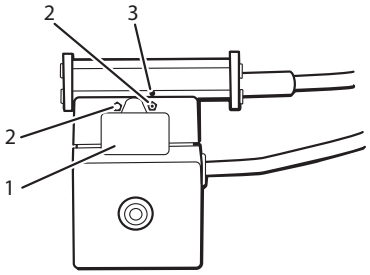
Change lamp assembly

To change the lamp assembly or filters, contact your Cytiva representative or service personnel for more information.

Change the wavelength on the UV monitor

Follow the steps below to change the wavelength on the UV monitor.

Step	Action
1	Set the wavelength to be used by selecting lamp position (indicated by a notch (3) on the lamp housing) in combination with the appropriate filter, i.e., the notch on the lamp housing should be adjacent to the symbol on the filter housing (2) corresponding to the symbol on the filter wheel (1) for the filter to be used. A click will indicate that the filter is in position.
2	To set the wavelength for 280 nm, align the notch on the lamp housing to 
3	To set the monitor for all other wavelengths, align the notch on lamp housing to 
4	***Note:*** *The wavelength is not registered in UNICORN but can be entered into either* ***Notes*** *or* ***Questions*** *in* ***Method Editor****.*



Replace level sensor

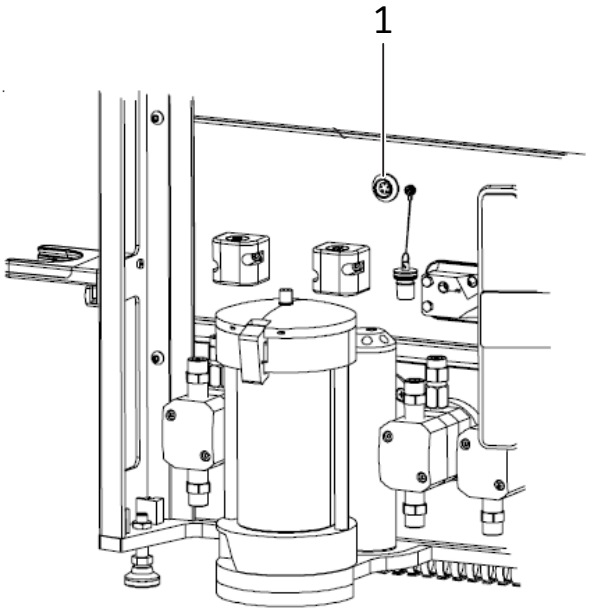
NOTICE

The metal membrane of the level sensor is very sensitive. To avoid damaging the level sensor, do not touch the surface of the membrane.

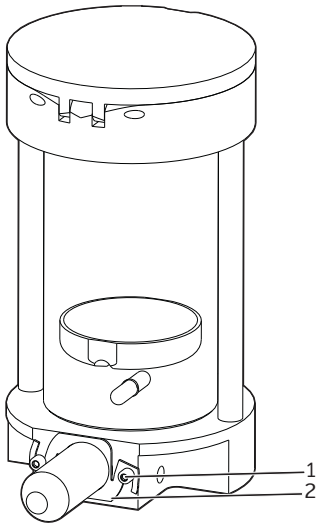
Follow the steps below to exchange the level sensor.

Step	Action
1	Disconnect the ÄKTAcrossflow system in ***System Control*** and power down the instrument.

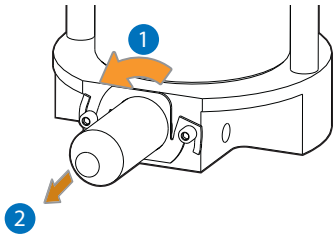
Step	Action
2	Disconnect the level sensor cable from the connection point (1) on the front cabinet of the system.



Step	Action
3	Using the 2 mm hex key supplied with the delivery kit, loosen (but do not remove) the screws (1) holding the level sensor bracket (2) in place.



4	Rotate the bracket counter-clockwise (1) and firmly pull the level sensor out of the reservoir (2).



5	Place the bracket onto a new level sensor.
6	Insert the new level sensor into the reservoir.

Note:

Do not to touch the membrane surface.

Step	Action
7	Rotate the bracket clockwise underneath the screws and tighten with a 2 mm hex key.
8	Reconnect the level sensor cable to the connection point on front of the cabinet.
9	Power on the system and connect in ***System Control***.
10	Using the method wizard in ***Method Editor***, create and run a level sensor calibration method.

6.5 Replacement of fuses

Safety precautions

WARNING

Disconnect power. Always disconnect power from the instrument before replacing fuses.

WARNING

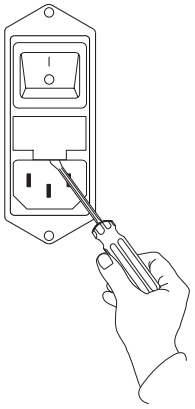
For continued protection from fire hazard, replace only with same type and rating of fuse.

Note: *Refer to Section 8.1 Specifications, on page 107 for information about the fuse type and rating. If a fuse repeatedly blows, switch off the system mains switch and contact your local Cytiva representative.*

Replace the mains fuse

Follow the steps below to replace the mains fuse.

Step	Action
1	Disconnect the mains power cord from the power outlet and from the rear panel socket.
2	Locate the fuse drawer on the rear panel.
3	Insert a small screwdriver into the notch next to the fuse drawer.



Step	Action
4	Twist the screwdriver to open and remove the fuse drawer.
5	Replace the fuse.
6	Insert the fuse drawer into its receptacle on the connector panel.

Note: *In the case of electrical failure, contact your Cytiva Service representative.*

6.6 Calibration

The table below lists the type and frequency of calibrations that can be done on the instrument. Refer to UNICORN user documentation and to the *ÄKTAcrossflow User Manual* for descriptions of how to perform these calibrations. The calibrations are performed from UNICORN by selecting ***System*** →***Calibrate*** in ***System Control***.

Component		How often
pH monitor		Every day.
Level sensor		Before every run.
Conductivity flow cell	Cell constant	Only necessary if specific conductivity with high accuracy is measured (***Cond_Calib***).
	Temperature	Must be done when changing the conductivity flow cell (***Temp***).
	Entering a new cell constant	Must be done when changing the conductivity flow cell (***Cond_Cell***).

6.7 Storage

General recommendation

For storage, the system must first be cleaned and sanitized as described in *Cleaning-In-Place and sanitizing, on page 86*. After cleaning, the system must be filled with a 20% ethanol solution.

Filters must be stored according to their respective instructions.

Storage conditions

The following conditions must be maintained while the system is in storage:

- Temperature: 2°C to 30°C (preferably room temperature)
- Relative humidity: 0% to 95%, non-condensing (preferably low humidity)

After storage, clean and sanitize the system, calibrate the pH monitor and level sensor, and perform a leakage test before using the system.

Start-up after storage

After long-term storage, it is recommended that trained and certified personnel perform a preventative maintenance test procedure on all sensors, pumps, and valves. Contact your local Cytiva representative.

The valves can be slow or get stuck when they have been closed for a longer period of time. Open and close the valves several times to get them started. Replacement of valve membranes may be necessary. See your Cytiva representative or service personnel for more information.

7 Troubleshooting

About this chapter

This chapter provides information to assist users and service personnel to identify and correct problems that may occur when operating the product.

If the suggested actions in this guide do not solve the problem, or if the problem is not covered by this guide, contact your Cytiva representative for advice.

In this chapter

Section		See page
7.1	UV curve problems	100
7.2	Conductivity curve problems	101
7.3	pH curve problems	102
7.4	Pressure curve problems	104
7.5	Reservoir and level sensor problems	105

7.1 UV curve problems

Error symptom	Possible cause	Corrective action
Noisy UV-signal, signal drift, or instability.	Dirty UV cell.	Clean the UV cell by flushing with Decon™ 90, Deconex™ 11 or equivalent.
Low sensitivity.	Aging UV lamp.	Check the lamp run time. For replacement, contact your Cytiva Service representative.
	UV lamp in wrong position.	Check that the lamp position and the filter position are both set to the wavelength to be used, 280 nm or 254 nm. See *Change the wavelength on the UV monitor, on page 90*.
	The theoretical extinction coefficient is too low.	Calculate the theoretical extinction coefficient of the protein. If it is zero or very low at 280 nm, the protein cannot be detected.

7.2 Conductivity curve problems

Error symptom	Possible cause	Corrective action
Baseline drift or noisy signal.	Leaking tubing connections.	Tighten the connections. If necessary, replace the clamps.
	Dirty conductivity cell.	Clean the conductivity cell by flushing with 1 M NaOH or 20% ethanol.
Conductivity measurement with the same buffer appears to decrease over time.	Dirty flow cell.	Clean the flow cell according to procedure in the *ÄKTAcrossflow User Manual*.
	Decrease in ambient temperature.	Use a temperature compensation factor. Refer to the *ÄKTAcrossflow User Manual*.
Incorrect or unstable reading.	Loose connection of conductivity flow cell cable.	Contact your Cytiva representative for more information.
	Incorrect temperature compensation factor.	Check that the correct temperature compensation factor is in use in ***System Control*** →***System*** →***Settings*** →***Monitors*** →***CondTempComp***

7.3 pH curve problems

Error symptom	Possible cause	Corrective action
No response to pH changes.	Faulty electrode connection.	Check that the electrode cable is connected properly.
	Damaged electrode.	The electrode glass membrane may be cracked. Replace the electrode.
	Incorrectly connected pH monitor.	Contact your Cytiva representative for more information.
Small response to pH changes.	Dirty pH electrode.	Clean the pH electrode as detailed in *Cleaning the pH electrode, on page 87*. If the problem remains, replace the pH electrode.
Slow pH response or calibration impossible.	Contaminated electrode glass membrane.	Check the electrode glass membrane. If it is contaminated, clean the electrode following the instructions in *Cleaning the pH electrode, on page 87*.
	Membrane has dried out.	If the membrane has dried out, the electrode can be restored by soaking it in a 3 M KCl solution overnight.

Error symptom	Possible cause	Corrective action
Incorrect or unstable pH reading.	Problem with electrode.	Check that the electrode cable is connected properly. Check that the electrode is correctly inserted in the flow cell and, if necessary, hand-tighten the nut. Check that the pH electrode is not broken. Calibrate the pH electrode. Clean the pH electrode if required, see *Cleaning the pH electrode, on page 87*. Compare the response of the pH electrode with that of another pH electrode. If the response differs greatly, the electrode may require cleaning or replacement. In organic solvents such as ethanol, methanol and acetonitrile, stable pH measurements are not possible since dehydration of the membrane will occur. It is recommended that the pH electrode is not used in applications using organic solvents. Mount the dummy electrode instead.
pH values vary with varied back pressure.	Problem with the electrode.	Replace the pH electrode.

7.4 Pressure curve problems

Error symptom	Possible cause	Corrective action
Erratic flow, noisy baseline signal, or irregular pressure trace.	Air bubbles passing through or trapped in the pump.	Check all connections for leaks. Check that there is sufficient liquid present in the reservoir or transfer line bottles.
	Piston seal leaking.	Contact your Cytiva service representative for more information.
	Sticking or malfunctioning **R-PCV** or **PPCV** valve.	Contact your Cytiva Service representative for more information.

7.5 Reservoir and level sensor problems

Error symptom	Possible cause	Corrective action
On ***EmptyReservoir*** instruction, level sensor does not recognize that reservoir is empty and continues pumping.	Level sensor is out of calibration.	Calibrate level sensor using ***Calibrate level sensor*** method created with the ***Method Wizard***.
	Damaged or malfunctioning level sensor.	Replace level sensor according to the instructions in *Replace level sensor, on page 91*.
On ***EmptyReservoir*** instruction, the level sensor stops emptying before reservoir is empty.	Incorrect plumbing of **In** and **Out** tubing to reservoir.	Double-check that the **In** port on the reservoir is connected to the 3-way connector from the **Transfer Purge Valve** and reservoir return and that the **Out** port is connected to the feed pump.
	Level sensor is out of calibration.	Calibrate level sensor using ***Calibrate level sensor*** method created with the ***Method Wizard***.
On ***EmptyReservoir*** instruction, feed pump brakes continually before reservoir is empty.	Damaged or malfunctioning level sensor.	Replace level sensor according to the instructions in *Replace level sensor, on page 91*.
Constant retentate volume is not maintained during fed batch concentration or diafiltration.	Temperature fluctuation in reservoir is greater than ± 1°C.	Make sure that stable temperature is maintained during constant volume operations.
	Damaged or malfunctioning level sensor.	Replace level sensor according to the instructions in *Replace level sensor, on page 91*.

8 Reference information

About this chapter

This chapter lists the technical specifications of the ÄKTAcrossflow. The chapter also includes a chemical resistance guide, ordering information, and Health and Safety Declaration forms for service.

In this chapter

Section		See page
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8.2	Chemical resistance	108
8.3	System recommendations	112
8.4	Recycling information	113
8.5	Regulatory information	114
8.6	Ordering information	125
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8.1 Specifications

Technical specifications

Parameter	Specification
Supply voltage	100 to 240 V~
Maximum voltage fluctuation	± 10% from the nominal voltage
Frequency	50-60 Hz
Maximum power	900 VA
Fuse rating	T 8.0 AH 250 V
Dimensions (W × H × D)	620 × 650 × 400 mm
Weight	70 kg
Acoustic noise level	< 70 dB A
Enclosure protective class	IP 20

Environmental requirements

Parameter	Specification
Ambient temperature	4°C to 40°C
Relative humidity tolerance (non-condensing)	20% to 95%
Atmospheric pressure	84 to 106 kPa (840 to 1060 mbar)

8.2 Chemical resistance

Chemical	Exposure < 1 day	Exposure up to 2 months	CAS no.	EEC no.	Comments
Acetaldehyde	OK	OK			
Acetic acid, < 5%	OK	OK			
Acetic acid, 70%	OK	OK	64-19-7	200-580-7	
Acetonitrile	OK	OK	75-05-8	200-835-2	PP and PE swell.
Acetone, 10%	OK	Avoid			PVDF is affected by long term use.
Ammonia, 30%	OK	OK	7664-41-7	231-635-3	Silicone is affected by long-term use.
Ammonium chloride	OK	OK	12125-02-9	235-186-4	
Ammonium bicarbonate	OK	OK			
Ammonium nitrate	OK	OK			
Ammonium sulphate	OK	OK	7783-20-2	231-984-1	
1-Butanol	OK	OK			
2-Butanol	OK	OK			
Citric acid	OK	OK	29340-81-6	249-576-7	
Chloroform	OK	Avoid			Kalrez™, CTFE, PP, and PE are affected by long term use.
Cyclohexane	OK	OK			
Detergents	OK	OK			
Dimethyl sulphoxide	Avoid	Avoid	67-68-5	200-664-3	PVDF is affected by long term use.

Chemical	Exposure < 1 day	Exposure up to 2 months	CAS no.	EEC no.	Comments
1, 4-Dioxane	Avoid	Avoid			ETFE, PP, PE, and PVDF are affected by long term use.
Ethanol, 100%	OK	OK	75-08-1	200-837-3	
Ethyl acetate	OK	Avoid			Silicone not resistant. Pressure limit for PEEK decreases.
Ethylene glycol, 100%	OK	OK	107-21-1	203-473-3	
Formic acid, 100%	OK	OK	64-18-6	200-579-1	Silicone not resistant.
Glycerol, 100%	OK	OK	56-81-5	200-289-5	
Guanidinium hydrochloride	OK	OK			
Hexane	OK	Avoid			Silicone not resistant. Pressure limit for PEEK decreases.
Hydrochloric acid, 0.1 M	OK	OK	7647-01-0	231-595-7	Silicone not resistant.
Hydrochloric acid, > 0.1 M	OK	Avoid			Silicone not resistant. Titanium is affected by long term use.
Isopropanol, 100%	OK	OK	67-63-0	200-661-7	
Methanol, 100%	OK	OK	74-93-1	200-659-6	
Nitric acid, diluted	OK	Avoid			Silicone not resistant.
Nitric acid, 30%	Avoid	Avoid			Elgiloy is affected by long term use.
Phosphoric acid, 10%	OK	Avoid	7664-38-2	231-633-2	Titanium, aluminium oxide, and glass are affected by long term use.

Chemical	Exposure < 1 day	Exposure up to 2 months	CAS no.	EEC no.	Comments
Potassium carbonate	OK	OK	584-08-7	209-529-3	
Potassium chloride	OK	OK	7447-40-7	231-211-8	
Pyridine	Avoid	Avoid			ETFE, PP, and PE not resistant.
Sodium acetate	OK	OK			
Sodium bicarbonate	OK	OK			
Sodium bisulphate	OK	OK			
Sodium borate	OK	OK			
Sodium carbonate	OK	OK			
Sodium chloride	OK	OK	7647-14-5	231-598-3	
Sodium hydroxide, 2 M	OK	Avoid	1310-73-2	215-185-5	PVDF and borosilicate glass are affected by long term use.
Sodium sulphate	OK	OK	7757-82-6	231-820-9	
Sulphuric acid, diluted	OK	Avoid			PEEK and titanium are affected by long term use.
Sulphuric acid, medium concentration	Avoid	Avoid			
Tetrachloroethylene	Avoid	Avoid			Silicone, PP, and PE are not resistant.
Tetrahydrofuran	Avoid	Avoid			ETFE, CTFE, PP, and PE are not resistant.
Toluene	OK	Avoid			Pressure limit for PEEK decreases.
Trichloroacetic acid, 1%	OK	OK	76-03-9	200-927-2	

Chemical	Exposure < 1 day	Exposure up to 2 months	CAS no.	EEC no.	Comments
Trifluoroacetic acid, 1%	OK	OK	176-05-1	200-929-3	
Urea, 8M	OK	OK	57-13-6	200-315-5	
o-Xylene and p-Xylene	OK	Avoid			PP and PE are affected by long term use.

8.3 System recommendations

Information

Refer to the *ÄKTAcrossflow User Manual*, or contact your local Cytiva representative for the most current information.

8.4 Recycling information

Introduction

This section contains information about the decommisioning of the ÄKTAcrossflow.

Decontamination

The product must be decontaminated before decommissioning. All local regulations must be followed with regard to scrapping of the equipment.

Disposal of the product

When taking the product out of service, the different materials must be separated and recycled according to national and local environmental regulations.

Recycling of hazardous substances

The product contains hazardous substances. Detailed information is available from your Cytiva representative.

The **UPC-980** lamp in the ÄKTAcrossflow contains mercury vapor. This must be recycled or disposed of in a manner compliant with national and local environmental regulations.

Disposal of electrical components



Waste electrical and electronic equipment must not be disposed of as unsorted municipal waste and must be collected separately. Contact an authorized representative of the manufacturer for information concerning the decommissioning of the equipment.

8.5 Regulatory information

Introduction

This section lists the regulations and standards that apply to the ÄKTAcrossflow instrument.

In this section

Section		See page
8.5.1	Contact information	115
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8.5.1 Contact information

Contact information for support

To find local contact information for support and sending troubleshooting reports, visit *cytiva.com/contact*.

Manufacturing information

The table below summarizes the required manufacturing information.

Requirement	Information
Name and address of manufacturer	Cytiva Sweden AB Björkgatan 30 SE 751 84 Uppsala Sweden
Telephone number of manufacturer	+ 46 771 400 600

8.5.2 European Union and European Economic Area

Introduction

This section describes regulatory information for the European Union and European Economic Area that applies to the equipment.

Conformity with EU Directives

See the EU Declaration of Conformity for the directives and regulations that apply for the CE marking.

If not included with the product, a copy of the EU Declaration of Conformity is available on request.

CE marking



The CE marking and the corresponding EU Declaration of Conformity is valid for the instrument when it is:

- used according to the *Operating Instructions* or user manuals, and
- used in the same state as it was delivered, except for alterations described in the *Operating Instructions* or user manuals.

8.5.3 Eurasian Economic Union Евразийский экономический союз

This section describes the information that applies to the product in the Eurasian Economic Union (the Russian Federation, the Republic of Armenia, the Republic of Belarus, the Republic of Kazakhstan, and the Kyrgyz Republic).

Introduction

This section provides information in accordance with the requirements of the Technical Regulations of the Customs Union and (or) the Eurasian Economic Union.

Введение

В данном разделе приведена информация согласно требованиям Технических регламентов Таможенного союза и (или) Евразийского экономического союза.

Manufacturer and importer information

The following table provides summary information about the manufacturer and importer, in accordance with the requirements of the Technical Regulations of the Customs Union and (or) the Eurasian Economic Union.

Requirement	Information
Name, address and telephone number of manufacturer	See *Manufacturing information*
Importer and/or company for obtaining information about importer	LLC Global Life Sciences Solutions Rus Russian Federation, 123112 Presnenskaya nab., 10, fl. 12, pr. III, room 6 Telephone: + 7 495 739 6931 Fax nr: + 7 495 739 6932 E-mail: *rucis@cytiva.com*

Информация о производителе и импортере

В следующей таблице приводится сводная информация о производителе и импортере, согласно требованиям Технических регламентов Таможенного союза и (или) Евразийского экономического союза.

Требование	Информация
Наименование, адрес и номер телефона производителя	См. *Информацию об изготовлении*

Требование	Информация
Импортер и/или лицо для получения информации об импортере	ООО "Глобал Лайф Сайэнсиз Солюшнз Рус" Российская Федерация, 123112 Пресненская наб., д. 10, эт. 12, пом. III, ком. 6 Телефон: + 7 495 739 6931 Факс: + 7 495 739 6932 Адрес электронной почты: *rucis@cytiva.com*

Description of symbol on the system label
Описание обозначения на этикетке системы

This Eurasian compliance mark indicates that the product is approved for use on the markets of the Member States of the Customs Union of the Eurasian Economic Union

Данный знак о Евразийском соответствии указывает, что изделие одобрено для использования на рынках государств-членов Таможенного союза Евразийского экономического союза

8.5.4 Regulations for North America

Introduction

This section describes the information that applies to the product in the USA and Canada.

FCC compliance

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: *The user is cautioned that any changes or modifications not expressly approved by Cytiva could void the user's authority to operate the equipment.*

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

8.5.5 Regulatory statements

Introduction

This section shows regulatory statements that apply to regional requirements.

EMC emission, CISPR 11: Group 1, Class A statement



NOTICE

This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

South Korea

Regulatory information to comply with the Korean technical regulations.



NOTICE

Class A equipment (equipment for business use).

This equipment has been evaluated for its suitability for use in a business environment.

When used in a residential environment, there is a concern of radio interference.



주의사항

A급 기기 (업무용 방송통신 기자재)

이 기기는 업무용환경에서 사용할 목적으로 적합성평가를 받은 기기

로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

8.5.6 Declaration of Hazardous Substances (DoHS)

根据 SJ/T11364-2014《电子电气产品有害物质限制使用标识要求》特提供如下有关污染控制方面的信息。

The following product pollution control information is provided according to SJ/T11364-2014 Marking for Restriction of Hazardous Substances caused by electrical and electronic products.

电子信息产品污染控制标志说明
Explanation of Pollution Control Label



该标志表明本产品含有超过中国标准 GB/T 26572《电子电气产品中限用物质的限量要求》中限量的有害物质。标志中的数字为本产品的环保使用期，表明本产品在正常使用的条件下，有毒有害物质不会发生外泄或突变，用户使用本产品不会对环境造成严重污染或对其人身、财产造成严重损害的期限。单位为年。

为保证所申明的环保使用期限，应按产品手册中所规定的环境条件和方法进行正常使用，并严格遵守产品维修手册中规定的定期维修和保养要求。

产品中的消耗件和某些零部件可能有其单独的环保使用期限标志，并且其环保使用期限有可能比整个产品本身的环保使用期限短。应到期按产品维修程序更换那些消耗件和零部件，以保证所申明的整个产品的环保使用期限。

本产品在使用寿命结束时不可作为普通生活垃圾处理，应被单独收集妥善处理。

This symbol indicates the product contains hazardous materials in excess of the limits established by the Chinese standard GB/T 26572 Requirements of concentration limits for certain restricted substances in electrical and electronic products. The number in the symbol is the Environment-friendly Use Period (EFUP), which indicates the period during which the hazardous substances contained in electrical and electronic products will not leak or mutate under normal operating conditions so that the use of such electrical and electronic products will not result in any severe environmental pollution, any bodily injury or damage to any assets. The unit of the period is “Year”.

In order to maintain the declared EFUP, the product shall be operated normally according to the instructions and environmental conditions as defined in the product manual, and periodic maintenance schedules specified in Product Maintenance Procedures shall be followed strictly.

Consumables or certain parts may have their own label with an EFUP value less than the product. Periodic replacement of those consumables or parts to maintain the declared EFUP shall be done in accordance with the Product Maintenance Procedures.

This product must not be disposed of as unsorted municipal waste, and must be collected separately and handled properly after decommissioning.

有害物质的名称及含量
Name and Concentration of Hazardous Substances

产品中有害物质的名称及含量
Table of Hazardous Substances' Name and Concentration

部件名称 Compo-nent name	有害物质 Hazardous substance					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
18118000	X	X	0	0	0	0

0: 表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。

X: 表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。

- 此表所列数据为发布时所能获得的最佳信息.

0: Indicates that this hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in GB/T 26572.

X: Indicates that this hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in GB/T 26572

- Data listed in the table represents best information available at the time of publication.

8.5.7 Notification - products containing mercury

This section describes the information that applies to the product in Canada.

Introduction

This notice is provided in accordance with the Products Containing Mercury Regulation SOR/2014-254 November 7, 2014 as annexed in the Canadian Environmental Protection Act, 1999.

Cette mise en garde est fournie conformément au règlement DORS/2014-254 du 7 novembre 2014 sur les produits contenant du mercure, tel qu'annexé à la loi canadienne sur la protection de l'environnement (1999).

Notification (English)

Notification about this product.



- Contains mercury.
- For safe handling procedures and the measures to be taken in case of accidental breakage, and for options available for disposal and recycling, please refer to https://www.ec.gc.ca/mercuremercury/Default.asp?lang=En&n=DB6D2996-1. If additional support is needed, please contact your Cytiva representative.
- This product should be disposed of or recycled in accordance with the applicable laws.

Notification (français)

Notification sur ce produit.



- Contient du mercure.
- Pour les procédures de manipulation sécuritaires et les mesures à prendre en cas de rupture accidentelle, et pour les options disponibles pour l'élimination et le recyclage, veuillez consulter le site https://www.ec.gc.ca/mercure-mercury/Default.asp?lang=Fr&n=DB6D2996-1.
  Pour obtenir une aide supplémentaire, veuillez communiquer avec votre représentant Cytiva.
- Ce produit doit être éliminé ou recyclé en conformité avec les lois applicables.

8.5.8 Other regulations and standards

Introduction

This section describes the standards that apply to the product.

Light sources

The safety of the LED light sources in this instrument has been assessed by risk analysis in accordance with EN 61010-1

The UPC-980 UV monitor is equipped with light sources described in the table below:

Light sources	Wavelength
UPC-980 Zn lamp (optional)	214 nm
UPC-980 Hg Lamp	254 nm
	280 nm

8.6 Ordering information

Contact details

For ordering information, visit *cytiva.com*.

8.7 Health and Safety Declaration Form

On site service

cytiva

On Site Service Health & Safety Declaration Form

Service Ticket #:	

To make the mutual protection and safety of Cytiva service personnel and our customers, all equipment and work areas must be clean and free of any hazardous contaminants before a Service Engineer starts a repair. To avoid delays in the servicing of your equipment, complete this checklist and present it to the Service Engineer upon arrival. Equipment and/or work areas not sufficiently cleaned, accessible and safe for an engineer may lead to delays in servicing the equipment and could be subject to additional charges.

Yes	No	Review the actions below and answer "Yes" or "No". Provide explanation for any "No" answers in box below.
○	○	**Instrument has been cleaned of hazardous substances**. Rinse tubing or piping, wipe down scanner surfaces, or otherwise make sure removal of any dangerous residue. Make sure the area around the instrument is clean. If radioactivity has been used, perform a wipe test or other suitable survey.
○	○	**Adequate space and clearance is provided to allow safe access** for instrument service, repair or installation. In some cases this may require customer to move equipment from normal operating location prior to Cytiva arrival.
○	○	**Consumables, such as columns or gels, have been removed or isolated from the instrument and from any area that may impede access to the instrument.**
○	○	**All buffer / waste vessels are labeled. Excess containers have been removed from the area to provide access.**
Provide explanation for any "No" answers here:		

Equipment type / Product No:		**Serial No:**	
I hereby confirm that the equipment specified above has been cleaned to remove any hazardous substances and that the area has been made safe and accessible.			
Name:		**Company or institution:**	
Position or job title:		**Date (YYYY/MM/DD):**	
Signed:			

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For local office contact information, visit cytiva.com/contact.
28980026 AD 04/2020

Product return or servicing

cytiva

Health & Safety Declaration Form for Product Return or Servicing

Return authorization number:		*and/or* **Service Ticket/Request:**	

To make sure the mutual protection and safety of Cytiva personnel, our customers, transportation personnel and our environment, all equipment must be clean and free of any hazardous contaminants before shipping to Cytiva. To avoid delays in the processing of your equipment, complete this checklist and include it with your return.

1. Note that items will NOT be accepted for servicing or return without this form
2. Equipment which is not sufficiently cleaned prior to return to Cytiva may lead to delays in servicing the equipment and could be subject to additional charges
3. Visible contamination will be assumed hazardous and additional cleaning and decontamination charges will be applied

Yes	**No**	**Specify if the equipment has been in contact with any of the following:**	
◯	◯	Radioactivity (specify)	
◯	◯	Infectious or hazardous biological substances (specify)	
◯	◯	Other Hazardous Chemicals (specify)	

Equipment must be decontaminated prior to service / return. Provide a telephone number where Cytiva can contact you for additional information concerning the system / equipment.

Telephone No:		
Liquid and/or gas in equipment is:	☐	**Water**
	☐	**Ethanol**
	☐	**None, empty**
	☐	**Argon, Helium, Nitrogen**
	☐	**Liquid Nitrogen**
	Other, specify	

Equipment type / Product No:		**Serial No:**	

I hereby confirm that the equipment specified above has been cleaned to remove any hazardous substances and that the area has been made safe and accessible.

Name:		**Company or institution:**	
Position or job title:		**Date (YYYY/MM/DD)**	
Signed:			

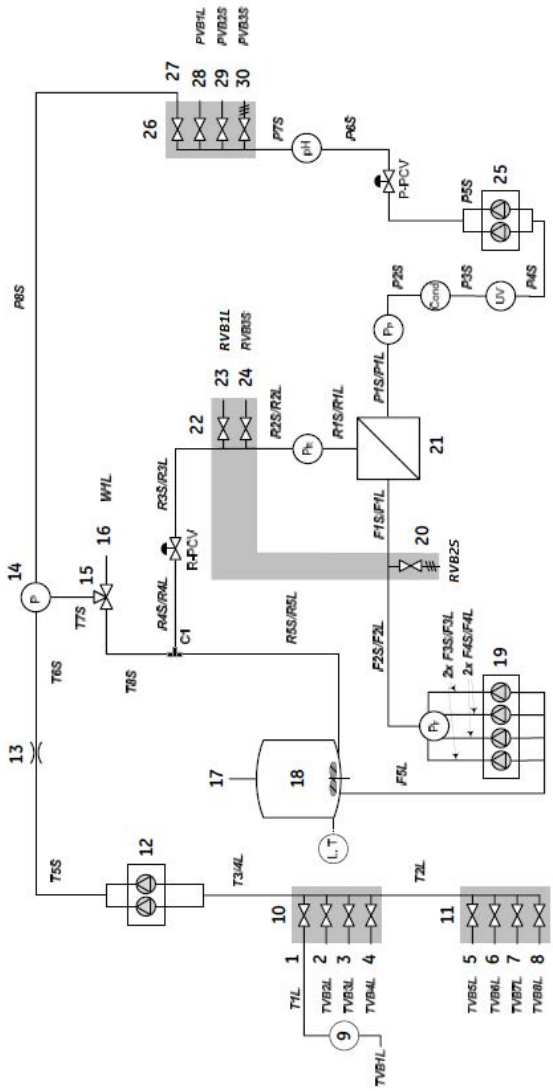
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For local office contact information, visit cytiva.com/contact.
28980027 AD 04/2020

To receive a return authorization number or service number, call local technical support or customer service.

Appendix A
Connection diagram - Liquid flow path



No.	Description	No.	Description
1	Transfer In 1	16	Waste 1
2	Transfer In 2	17	Vent
3	Transfer In 3	18	Reservoir
4	Transfer In 4	19	Feed pump
5	Transfer In 5	20	Retentate Out 1[1]
6	Transfer In 6	21	Filter
7	Transfer In 7	22	Retentate Valve Block
8	Transfer In 8	23	Retentate Out 2
9	Air Sensor	24	Retentate Out 3
10	Transfer Valve Block 1	25	Permeate pump (Module B)
11	Transfer Valve Block 2	26	Permeate Valve Block
12	Transfer pump (Module A)	27	Permeate Recycle
13	Flow restrictor	28	Permeate Out 1
14	Manifold	29	Permeate Out 2
15	Transfer Purge Valve	30	Permeate Out 3[1]

[1] Safety relief valve, do not plug with a stop plug.

Appendix B
Tubing

About this chapter

Names in the Tubing column in the Table below refer to tubing labels in the liquid flow path connection diagram, see *Appendix A Connection diagram - Liquid flow path, on page 128*.

Tubing specifications for ÄKTAcrossflow

Tubing	Length (mm)	I.D. (mm)	Material	Location (From)	Location (To)
F5L	660 M	2.9	PVDF	Reservoir (outlet port)	Feed pump inlets
F3S	155	1.7	PVDF	Feed pump A (left, upper)	Sensor P_F inlet
				Feed pump B (right, upper)	Sensor P_F inlet
F3L	150	2.9	ETFE	Feed pump A (left, upper)	Sensor P_F inlet
				Feed pump B (right, upper)	Sensor P_F inlet
F4S	110	1.7	PVDF	Feed pump A (right, upper)	Sensor P_F inlet
				Feed pump B (left, upper)	Sensor P_F inlet
F4L	110	2.9	ETFE	Feed pump A (right, upper)	Sensor P_F inlet
				Feed pump B (left, upper)	Sensor P_F inlet
F2S	110	1.7	PVDF	Valve block R-VB	Sensor P_F outlet
F2L	95	2.9	ETFE		
F1S/F1L	See *Recommended tubing for flat sheet membrane cassettes, on page 133* and *Recommended tubing for Start AXM and AXH hollow fiber membrane cartridges, on page 133*.				
R1S/R1L	See *Recommended tubing for flat sheet membrane cassettes, on page 133* and *Recommended tubing for Start AXM and AXH hollow fiber membrane cartridges, on page 133*.				
R2S	110	1.7	PVDF	Sensor P_R outlet	Valve block R-VB (left port)
R2L	95	2.9	ETFE		
R3S	200	1.7	PVDF	Valve block R-VB (right port)	Valve R-PVC (inlet port)

Tubing	Length (mm)	I.D. (mm)	Material	Location (From)	Location (To)
R3L		2.9	ETFE		
R4S	120	1.7	PVDF	Valve R-PCV (outlet port)	Connector C1
R4L		2.9	ETFE		
R5S	200	1.7	PVDF	Connector C1	Reservoir, inlet port
R5L		2.9	ETFE		
P1S/P1L	See *Recommended tubing for flat sheet membrane cassettes, on page 133* and *Recommended tubing for Start AXM and AXH hollow fiber membrane cartridges, on page 133*.				
P2S	170 pf	1.7	PVDF	Sensor P_P outlet	Conductivity cell, inlet
P3S	200 pf	1.7	PVDF	Conductivity cell, outlet	UV cell, inlet
P4S	200 M	1.7	PVDF	UV cell, outlet	Permeate pump inlets
P5S	477 M	1.7	PVDF	Permeate pump outlets	Valve P-PCV (inlet port)
P6S	120	1.7	PVDF	Valve P-PCV (outlet port)	pH cell, inlet
P7S	100 pf	1.7	PVDF	pH cell, outlet	Permeate valve block P-VB (left port)
P8S	380 pf	1.7	PVDF	Permeate valve block P-VB-Out (recycle port)	Sensor P_T
T1L	95	2.9	ETFE	Air sensor	Transfer valve block 1 T-VB-In (port 1)
T2L	200	2.9	ETFE	Valve block 2, outlet	Valve block 1, inlet
T3/T4L	610 M	2.9	ETFE	Valve block 1, outlet	Transfer pump A, inlets
T5S	200 M	1.7	PVDF	Transfer pump outlets	Flow restrictor, inlet
T6S	150 pf	1.7	PVDF	Flow restrictor, outlet	Sensor P_T
T7S	510 pf	1.7	PVDF	Sensor P_T	Transfer purge valve
T8S	120	1.7	PVDF	Transfer purge valve	Connector C1
W1L	2000	2.9	ETFE	Transfer purge valve	Waste
TVB1L[1]	600	2.9	ETFE		Air sensor
TVB2L[1]	1200	2.9	ETFE		Transfer valve block 1 T-VB-In (port 2)

Tubing	Length (mm)	I.D. (mm)	Material	Location (From)	Location (To)
TVB3L[1]	1200	2.9	ETFE		Transfer valve block 1 T-VB-In (port 3)
TVB4L[1]	1200	2.9	ETFE		Transfer valve block 1 T-VB-In (port 4)
TVB5L[1]	1200	2.9	ETFE		Transfer valve block 1 T-VB-In (port 5)
TVB6L[1]	1200	2.9	ETFE		Transfer valve block 1 T-VB-In (port 6)
TVB7L[1]	1200	2.9	ETFE		Transfer valve block 1 T-VB-In (port 7)
TVB8L[1]	1200	2.9	ETFE		Transfer valve block 1 T-VB-In (port 8)
RVB1L[1]	600	2.9	ETFE	Retentate valve block R-VB-Out (port 2)	
RVB2S[1]	600	1.7	PVDF	Retentate valve block R-VB-Out (port 1 = pressure relief valve)	
RVB3S[1]	600	1.7	PVDF	Retentate valve block R-VB-Out (port 3)	
PVB1L[1]	2000	2.9	ETFE	Permeate valve block P-VB-Out (port 1)	Waste
PVB2S[1]	600	1.7	PVDF	Permeate valve block P-VB-Out (port 2)	
PVB3S[1]	600	1.7	PVDF	Permeate valve block R-VB-Out (port 3 = pressure relief valve)	
AL600[1]	600	2.9	ETFE	Accessory outlet tubing	
AL2000[1]	2000	2.9	ETFE	Accessory outlet tubing	
AS600[1]	600	1.7	PVDF	Accessory outlet tubing	
M = Manifold (equivalent tubing length)					

Tubing	Length (mm)	I.D. (mm)	Material	Location (From)	Location (To)
pf = pre-formed tubing					

[1] Single nut

Recommended tubing for flat sheet membrane cassettes

Tubing	Length(mm)	O.D. (mm)	I.D. (mm)	Volume (mL)	Material	Location (From)	Location (To)
F1S	200	3	1.7	0.45	PVDF	Valve block R-VB	Cassette, feed inlet
F1L	200	4.76 (3/16")	2.9	1.32	ETFE		
R1S	300	3	1.7	0.68	PVDF	Cassette (RET), retentate outlet	Sensor P_R, inlet
R1L	300	4.76 (3/16")	2.9	1.98	ETFE		
P1S	155	3	1.7	0.35	PVDF	Cassette (PERM1), permeate outlet	Sensor P_p, inlet
P1L	150	4.76 (3/16")	2.9	0.99	ETFE		

Recommended tubing for Start AXM and AXH hollow fiber membrane cartridges

Tubing	Length (mm)	O.D. (mm)	I.D. (mm)	Volume (mL)	Material	Location (From)	Location (To)
F1S	300	3	1.7	0.68	PVDF	Valve block R-VB	Cartridge, feed inlet
F1L	300	4.76 (3/16")	2.9	1.98	ETFE		
R1S	200	3	1.7	0.45	PVDF	Cartridge, retentate outlet	Sensor P_R, inlet
R1L	200	4.76 (3/16")	2.9	1.32	ETFE		
P1S	155	3	1.7	0.35	PVDF	Cartridge, permeate outlet	Sensor P_P, inlet
P1L	150	4.76 (3/16")	2.9	0.99	ETFE		

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